MICROSCAN.

VS-310 Scanner
User's Manual

Disclaimer

The information and specifications described in this manual are subject to change without notice.

Latest Manual Version

For the latest version of this manual, see the Download page on our web site at *www.microscan.com*. For technical support email *helpdesk@microscan.com*.

Microscan Limited Warranty Statement and Exclusions

What is Covered?

Microscan Systems Inc. warrants to the original purchaser that products manufactured by it will be free from defects in material and workmanship under normal use and service for a period of one year from the date of shipment. This warranty is specifically limited to, at Microscan's sole option, repair or replacement with a functionally equivalent unit and return without charge for service or return freight.

What is Excluded?

This limited warranty specifically excludes the following: (1) Any products or parts that have been subject to misuse, neglect, accident, unauthorized repair, improper installation, or abnormal conditions or operations; (2) Any products or parts that have been transferred by the original purchaser; (3) Customer mis-adjustment of settings contrary to the procedure described in the Microscan Systems Inc. owners manual; (4) Upgrading software versions at customer request unless required to meet specifications in effect at the time of purchase; (5) Units returned and found to have no failure will be excluded; (6) Claims for damage in transit are to be directed to the freight carrier upon receipt. Any use of the product is at purchaser's own risk. This limited warranty is the only warranty provided by Microscan Systems Inc. regarding the product. Except for the limited warranty above, the product is provided "as is." To the maximum extent permitted by law, this express warranty excludes all other warranties, express or implied, including but not limited to, implied warranties of merchantability and fitness for a particular purpose. Microscan Systems Inc. Does not warrant that the functions contained in the product will meet any requirements or needs purchaser may have, or that the product will operate error free, or in an uninterrupted fashion, or that any defects or errors in the product will be corrected, or that the product is compatible with any particular machinery.

Limitation of Liability.

In no event shall Microscan Systems Inc. be liable to you or any third party for any special, incidental, or consequential damages (including, without limitation, indirect, special, punitive, or exemplary damages for loss of business, loss of profits, business interruption, or loss of business information), whether in contract, tort, or otherwise, even if Microscan Systems Inc. has been advised of the possibility of such damages. Microscan Systems Inc.'s aggregate liability with respect to its obligations under this warranty or otherwise with respect to the product and documentation or otherwise shall not exceed the amount paid by you for the product and documentation.

Some jurisdictions do not allow the exclusion or limitation of incidental or consequential damages or limitations on an implied warranty, so the above limitation or exclusion may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which may vary from state to state.

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About the VS-310 Scanner

A user interface program, the ESP-MP (Easy Setup Program–Multi-platform), can be downloaded from our web site (*www.microscan.com*) and runs on Microsoft Windows 95™, Windows 98™, Windows NT™, Windows 2000™ operating systems. Alternately, configuration commands can be sent directly by host serial command strings.

About This Manual

This manual provides complete information on setting up, installing, and configuring the VS-310 scanner. The chapters are presented in the order in which a scanner might be setup and made ready for industrial operation.

Chapter 1, "Quick Start" provides overall step-by-step instructions for getting your scanner operational with specific "go to" references to other chapters and appendices.

The appendices include specifications, reference tables of serial commands, ASCII characters, multidrop setup and addresses, as well as other useful information relating to bar coding and electrical and mechanical setups for the scanner.

Host Communications

There are two ways the scanner communicates with a host:

1. Microscan's Windows™ based **ESP-MP™** (Easy Setup Program—Multi-Platform), the preferred method which offers point-and-click ease of use and visual responses to user adjustments.

2. Serial commands such as **<Kr1>** can be sent from a terminal program. They can also be sent from the **Terminal** or **Utility** window within ESP-MP.

Keystrokes

Serial commands, selections inside instructions, and menu defaults are highlighted in **red bold**. Cross-references are highlighted in blue. Web links and outside references are highlighted in *blue bold italics*. References to menu topics are highlighted in **Bold Initial Caps**. References to topic headings within this manual or other documents are enclosed in quotation marks.

Approvals

This equipment is in compliance or approved by the following organizations:

- CDRH (Center for Devices & Radiological Health)
- UL (Underwriters Laboratories, Inc.)
- cUL (UL mark of Canada)
- TüV (Technischer überwachungs-Verein)
- FCC (Federal Communication Commission)
- CE Compliant
- BSMI (Bureau of Standards, Metrology and Inspection)

Safety Labels

These certification labels are located on the VS-310 scanner.

AVOID EXPOSURE	LASER LIGHT IS EMITTED FROM THIS APERTURE

CAUTION / VORSICHT

LASER LIGHT DO NOT STARE INTO BEAM.

670 nm LASER DIODE
1.0 MILLIWATT MAX
CLASS II LASER PRODUCT

LASERSTRAHLUNG, NICHT IN DEN LICHTSTRAHL BLICKEN. SICHTBARE LASERSTRAHLUNG.

LASERKLASSE 2

CAUTION-LASER LIGHT WHEN OPEN-DO NOT STARE INTO BEAM.
PRODUCT CONFORMS TO USA DHHS 21 CFR SUBCHAPTER "J"

11-110006-01

Side of
VS-310

MICROSCAN. 1201 SW 7th St. - RENTON, WA 98055

THIS DEVICE COMPLIES WITH PART 15 OF THE FCC RULES. OPERATION IS SUBJECT TO THE FOLLOWING TWO CONDITIONS. (1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE, AND (2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED, INCLUDING INTERFERENCE THAT MAY CAUSE UNDERSIRED OPERATION.
CLASS B DEVICE.

LISTED
UL 1950
4K68

2.29" (58.06 mm)

FIS

CLASS 2

5V ⎓ 200mA

MANUFACTURED

SERIAL NUMBER   11-120028-01

Bottom of VS-310

Warning and Caution Summary

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 in a residential installation. This equipment generates, uses, and can radiate radio frequency energy, and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

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

For connection to a UL Listed direct plug-in power unit marked Class II and rated at 5 VDC at 200 mA.

European models must use a similarly rated Class I or Class II power supply that is certified to comply with standard for safety EN 60950.

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

	WARNING
There are no user serviceable parts in the scanner. Opening the scanner voids the Microscan Systems warranty and could expose the user to laser diode power of up to 5 mW.	

	WARNING
The laser beam can be harmful to eyesight. Avoid eye contact with the laser beam. Never point the beam at other people, or in a direction where people may be passing.	

Chapter

1

Quick Start

Chapter Contents

This chapter is designed to get your scanner up and running quickly using Microscan's **ESP-MP™** so the user can get a sense of its capabilities and test bar code samples. Detailed setup information for installing the scanner into the actual application can be obtained in the subsequent chapters.

In addition to **ESP**, you can send commands to your scanner by serial commands.

Step 1 — Hardware Required

To get started you will need:

- A VS-310 scanner (**1**).

- A host computer (**2**) with either a terminal communications program or Microscan's ESP™ which runs under Windows™ operating system, Windows-95 or higher, including Windows NT™.

- A null modem configuration cable (**3**) P/N 61-300026-01.

- An IB-105 interface box P/N 99-420001-01 (**4**).

- A scanner to interface cable such as Microscan's P/N 61-130019-03 (**5**).

- A power supply (**6**) P/N 97-100002-01 (120V) or P/N 97-100002-02 (240V).

Caution: If using your own power supply, be certain that it is wired correctly and supplies voltage is 5VDC. Incorrect wiring or voltage can cause software or equipment failures.

Note: An optional object detector P/N 99-4400021-03 (**7**) is shown here.
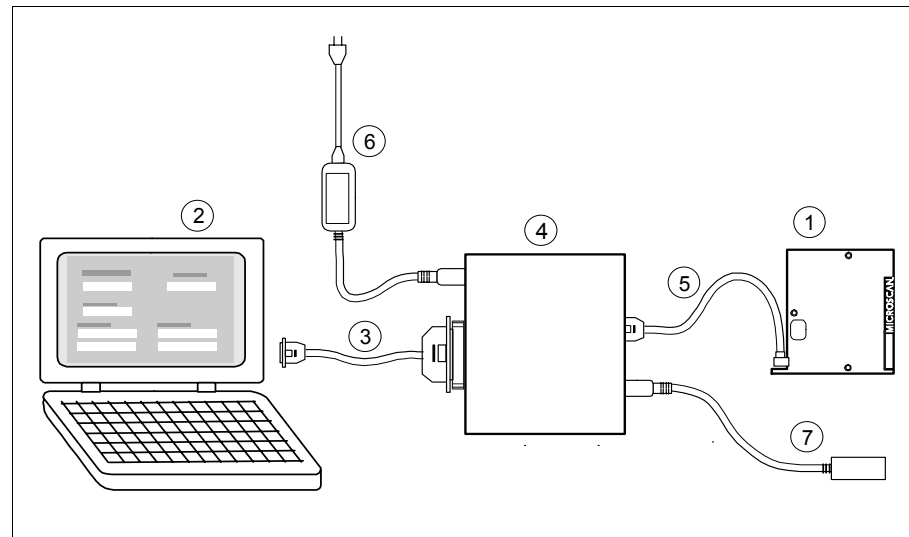
Figure 1-1 Hardware Configuration

Step 2 — Connect the System

1. Connect the scanner to the 15-pin connector of the IB-105 interface box, using custom cable or Microscan's P/N 61-130019-03.[1]

1

25
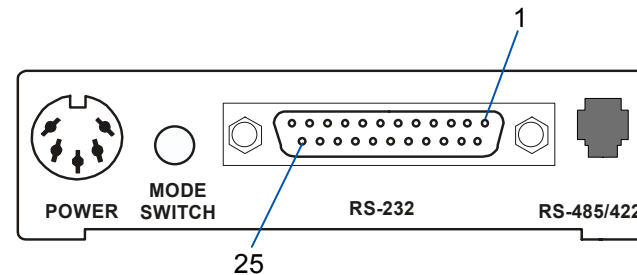
Figure 1-2 IB-105 showing Host 25-pin Connector

2. Connect the IB-105's "RS232" 25-pin connector to the host computer.[2]

   (Refer to tables in "IB-105 Connectors and Pinouts" on page A-11 for pin connections.)

3. Connect the power supply to the IB-105's POWER connector.

4. Power up the system.

> **Caution:**
>
> 1. Be sure all cables are connected **BEFORE** applying power.
>
> 2. Always power down **BEFORE** disconnecting any cables.

---

1. Since +5 VDC power supply is included in the single cabling assembly, the scanner cable should not exceed 3 feet. RS232 cabling from the 15-pin connector to the host can be up to 47 feet provided it does not include 5 VDC input

2. If using your own null modem RS232 host cable, be certain that the host's TxD connects to the scanner's RxD and the scanner's TxD connects to the host's RxD.

Step 3 — Install ESP-MP

(**ESP-MP** is short for *Easy Setup Program–Multi-Platform*.)

1. Insert your Microscan CD into your computer's CD drive.
2. Launch **Setup.exe** under **ESP_Software\Multi_Platform** and follow the prompts.[1]

   If downloading from the web:

   a. Go to ***http://www.microscan.com/esp***

   b. Enter company information.

   c. Select **ESP-MP** and download to your computer hard drive.

   d. Extract **ESP-MP WinZip** files to a directory of your choice.
3. Note where your ESP.exe file is stored on your hard drive.

   At the end of the install process, you should see the following icon on your desktop:

4. Click the **ESP-MP** icon to start the program.

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1. Contact your sales representative

Step 4 — Select Scanner Model

When you start the program, the following dialog box will appear:
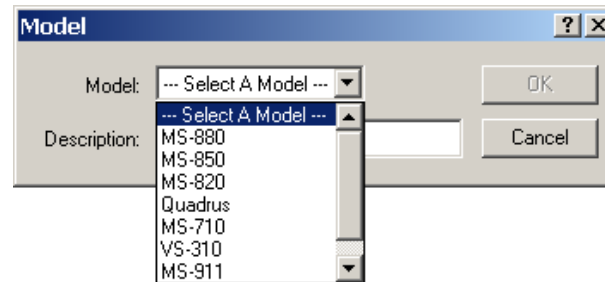
Note: If you need to select another model later, you can find it under **Model Select** in the menu bar.

1. In the model dialog box, select your model.
2. Select the default name, or type in a new name of your choice.
3. Click **Yes** when the following dialog on the right appears.
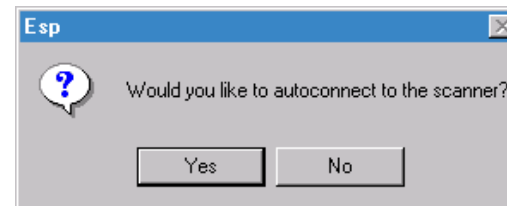
Step 5 — Select the Communications Ports

1. Select your communications port under **COM Port**.
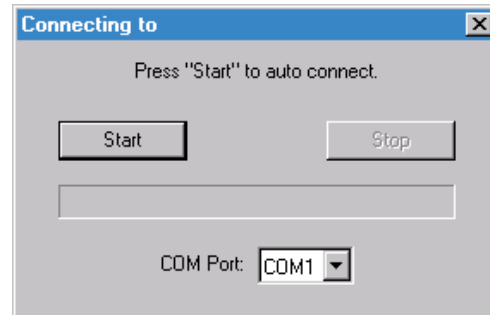
     COM1 is typically used for laptops.
     COM1 and **COM2** are typically for desktop computers.

2. Click the **Start** button.

Step 6 — Connect with Auto Connect

After clicking the **Start** button in the **Connecting to...** dialog, allow time for the auto connect routine to test all of the combinations. You will see a blue progress bar fill across the **Connecting to...** dialog.

When connected, the **CONNECTED** message will appear in a green box in the status bar on the bottom right of the dialog.

Tip: If you do not see either the CONNECTED or DISCONNECTED message at the bottom of your dialog, try expanding the ESP window horizontally.

Tip: If connection fails, enable a different Com port and try again.

Also, make certain that the MODE switch on the IB-105 is set to the out position.

Step 7 — Retrieve Scanner Settings

Unless you have unchecked the default **Upload After Autoconnect** under **Options**, all values of the scanner will be loaded automatically and displayed under **ESP Values**.

If **Upload After Autoconnect** is not checked, the scanner values will not be loaded and ESP communications values will remain displayed under the heading, **ESP Values**.

> **Tip**: Before doing **Retrieve Scanner Settings**, you may want to preserve your current ESP settings to your computer as an ESP file by selecting **Save** or **Save As** in the **File** menu.

At any time you can retrieve **ALL** scanner values by:

1. **Right-clicking** anywhere in the configuration window, and
2. Selecting **Retrieve Scanner Settings**.

You can also retrieve settings by clicking on the **Send/Receive** button.
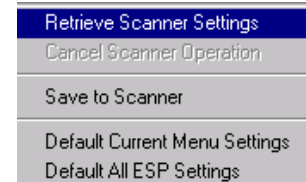
This is useful if you want to:

• Copy (upload) the scanner's settings and save them as a computer file for later retrieval.

• Ensure that whenever you save ESP settings to the scanner you are not saving any unwanted changes that you or someone else had made previously in ESP. By first doing **Retrieve Scanner Settings**, you eliminate that possibility.

Step 8 — Compare Scanner Settings

If you want to compare settings in the current scanner side-by-side with those in ESP without changing the ESP values:

1. Under the pull down Options menu check **Show Comparison Column**.

2. **Right-click** anywhere in the configuration window.

3. Select **Retrieve as Comparison**.

After a short pause the scanner's current settings will be displayed under the **Comparison** column. Compare those settings with the ESP values which are displayed under the **ESP Values** column.

For example, if you change **Background Color** to **Black**, but haven't yet saved this to the scanner, you will see the dissimilar program and scanner values highlighted in blue.
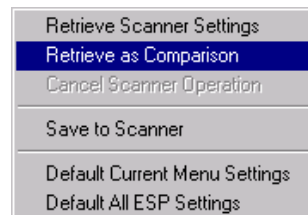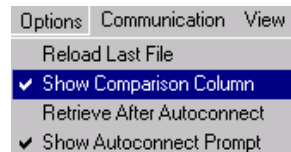
Parameters	ESP Values	Comparison
Code Type / Symbologies		
Narrow Margins/Symbology ID		
Narrow Margins	Disabled	Disabled
Symbology ID	Disabled	Disabled
Background Color	Black	White

Step 9 — Position Scanner and Symbol

Set up a symbol at the scanning distance you will be using in your application.In positioning the scanner and symbols being scanned, consider the following:

- Avoid bright light or IR light from other sources, including other scanners.

- Pitch or skew label or scanner a minimum of ±15° to avoid specular reflection, the return of direct, non-diffused light.
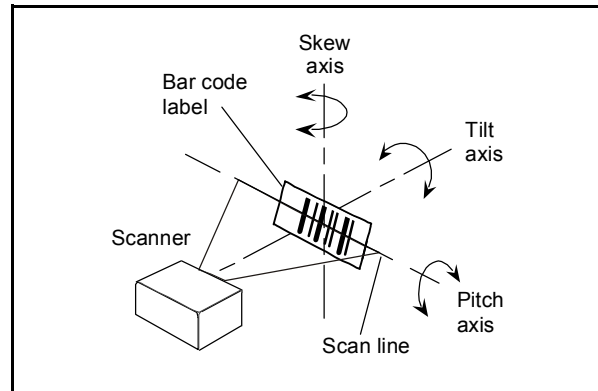
Table 1-1 Label/scanner Position

Note: For additional tips on positioning the scanner and bar code labels, see "Position Scanner and Bar Code" on page A-22.

Code 39 is the default code type enabled. If you are uncertain as to the symbology type, enable all codes, by clicking the **Utilities** menu and enabling **Autodiscriminate** under **Code Types**. If using I 2/5 symbol, you must set the code length. (See Table , "Interleaved 2 of 5," on page 5-9.)

Step 10 — Test Range for Bar Code Label

1. Position a label in front of an operational scanner.[1]

20 mil Code 39 Test Symbol
You can also find test symbols on the back of the Microscan Marketing CD jacket. The 20 mil refers to the width of the narrowest bar (e.g., 7.5 mil = .0075" or .1905 mm).

2. Click the **Utilities** button.

3. Right-click **Read Rate** and select **Start.**

4. Observe rate in terminal window on the right of the **Utilities** screen.
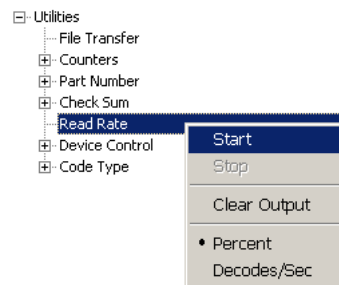
5. Move your bar code label towards the scanner and away from the scanner until the decode rates drop off in each direction as shown in figure 1-3.

   This will give you a sense of the depth of field (inner and outer ranges) for your symbol's density and range.

6. To end test, right-click **Read Rate** and select the **Stop** button.

   Note: If the scanner is in the default **Continuous Read** mode, it will read and beep repeatedly as long as a readable label remains in the read range and the read cycle configuration has not changed.

   Note: See "Formulas for Number of Decodes" on page A-24 for additional information on scan width and depth of field.
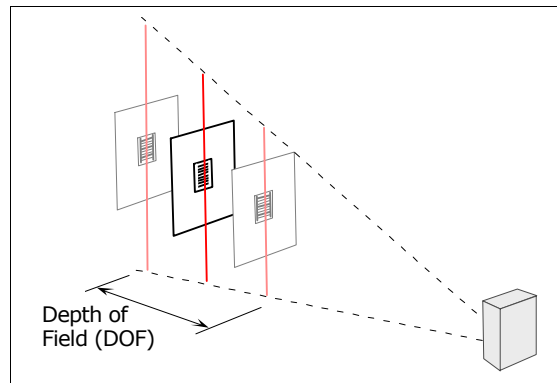
Depth of Field (DOF)

Figure 1-3 Depth of Field

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1. If using an I 2/5 label, verify that the number of characters in the label being scanned matches the code length enabled for the I 2/5 code type (default is 10 and 6). See "Interleaved 2 of 5" on page 5-9.

Step 11 — Make Changes to Configuration and Save

To make changes to a configuration setting:

1. **Double-click** the setting (for example, **End of Read Cycle**).
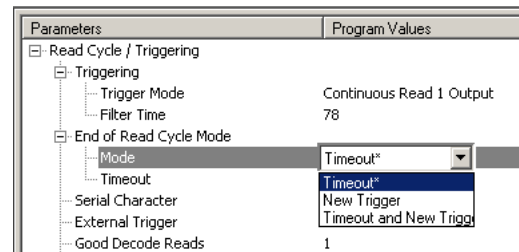
2. Place your pointer in the selection box, scroll down to the setting of your choice and **left-click** on the setting.

3. **Left-click** again anywhere in the configuration window to complete the selection.

4. **Right-click** in the configuration window and select **Save to Scanner** to implement the command in the scanner. You have 3 choices:

   a. **Send, No Save.** This initializes all changes in active memory. These changes will be lost if power to the scanner is cycled.

   b. **Send and Save.** This will cause the scanner to beep, indicating that the change has been implemented and that all changes have been saved to the scanner's NOVRAM for power-on, except factory settings.[1]

   c. **Advanced/Send and Save, Including Factory.** Same as above, except that changes to factory settings will also be saved for power-on.

For **Multidrop** setup, see "Multidrop Communications" on page A-29.

For **Matchcode** setup, see Chapter 6, "Matchcode."

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1. Consult your model specific user's manual for a list of factory settings.

Chapter

2

Communications

Chapter Contents

With Microscan's ESP-MP™ (Easy Setup Program) configuration changes can be made in the ESP-MP menus, then sent and saved to your scanner. The user can also send serial commands to the scanner via the ESP's Terminal window.

Note: The characters **NULL <>** and **,** can only be entered through embedded menus, not through ESP or serial commands.

Communications by ESP

Click this button to bring up the **Communications** menu.

To change a setting, **double-click** the setting and use your curser to scroll through the options.

Parameters	ESP Values
⊟ Communication Settings	
⊟ Host Port	
Baud Rate	9600
Parity	Even
Stop Bits	One
Data Bits	Seven
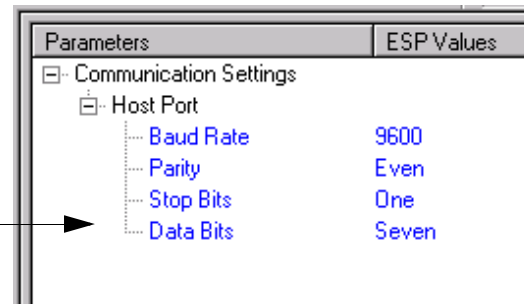
Communications by Serial Command

Command Title	cmds	Format
Host Port Parameters	**Ka**	<**Ka**baud,parity,stop bits,data bits>

Send a **<D>** command from your terminal to bring up the main menu:

Host Port Parameters

Baud Rate, Host Port

Definition:	The rate at which the scanner and host transfer data back and forth.
Usage:	Can be used to transfer data faster or to match host port settings.
Serial Cmd:	<**Ka** *baud rate*,*parity,stop bits,data bits*>
Default:	**9600**

Options:	0 = 600	3 = 4800	6 = 300
	1 = 1200	4 = 9600	
	2 = 2400	5 = 19.2K	

Parity, Host Port

Definition:	An error detection routine in which one data bit in each character is set to 1 or 0 so that the total number of 1 bits in the data field is even or odd.
Usage:	Only changed if necessary to match host setting.
Serial Cmd:	<**Ka** *baud rate*,***parity***,*stop bits,data bits*>
Default:	**Even**
Options:	0 = None 1 = Even 2 = Odd

Stop Bits, Host Port

Definition:	One or two bits added to the end of each character to indicate the end of the character.
Usage:	Only changed if necessary to match host setting.
Serial Cmd:	<**Ka** *baud rate,parity*,***stop bits***,*data bits*>
Default:	**One**
Options:	0 = One 1 = Two

Data Bits, Host Port

Definition:	Number of bits in each character.
Usage:	Only changed if necessary to match host setting.
Serial Cmd:	<**Ka** *baud rate,parity,stop bits*,***data bits***>
Default:	**Seven**
Options:	0 = Seven 1 = Eight

Host Port Parameters

Chapter

3

Protocol

Chapter Contents

3–Protocol

Protocols are the rules by which devices pass data back and forth. This section includes the basic options available for data communication, including multidrop and user-defined options and output data formats.

Note: The characters **NULL <>** and **,** can only be entered through embedded menus, not through ESP or serial commands.

Protocol by ESP

Click this button to bring up the **Protocol** menu

To change a setting, **double-click** the setting and use your curser to scroll through the options.

Parameters	ESP Values
Protocol Settings	
Protocol	Point-to-Point
LRC	Disabled
Response Timeout	12
Intercharacter Delay	0
Output Data Format	
Preamble Characters	
Status	Disabled
Preamble Characters	CR
Postamble Characters	
Status	Enabled
Postamble Characters	CR LF

Protocol by Serial Command

Command Title	cmds	Format
Host Protocol	**Kf**	<**Kf***protocol*>
LRC	**Kc**	<**Kc***status*>
Response Timeout	**KA**	<**KA***response timeout*>
Intercharacter Delay	**KB**	<**KB***intercharacter delay*>
Preamble	**Kd**	<**Kd***status,preamble*>
Postamble	**Ke**	<**Ke***status,postamble*>

3–Protocol

Protocol

Definition:	Protocols define the sequence and format in which information is transferred between the scanner and the host, or in the case of **Multidrop**, between scanners and a concentrator.
Usage:	In general, the point-to-point protocols will work well in most applications. They require no address and must use RS232 or RS422 communications standards.
Default:	**Point-to-Point**
Options:	0 = Point-to-Point 1 = Point-to-Point with RTS/CTS 2 = Point-to-Point with XON/XOFF 3 = Point-to-Point with RTS/CTS & XON/XOFF 4 = Polling Mode D 5 = Multidrop 6 = User Defined 7 = User Defined Multidrop

If selecting one of the options from 0 to 4 (**Point-to-Point**, **Point-to-Point with RTS/CTS**, **Point-to-Point with XON/XOFF**, **Point-to-Point with RTS/CTS and XON/XOFF**, or **Polling Mode D**), use the <**Kf***protocol*> format.

Option 5 through 7 are special cases and discussed later in this section.

Point-to-Point (standard)

Definition:	Standard **Point-to-Point** requires no address and sends data to the host whenever it is available, without any request or handshake from the host.
Usage:	Used only with RS232 or RS422.
Serial Cmd:	<**Kf0**>

3–Protocol

Point-to-Point with XON/XOFF (Transmitter On/Off)

Definition:	This option enables the host to send the XON and XOFF command as a single byte transmission command of start (^Q) or stop (^S).
Usage:	If an XOFF has been received from the host, data will not be sent to the host until the host sends an XON. During the XOFF phase, the host is free to carry on other chores and accept data from other devices.
	Used only with RS232.
Serial Cmd:	<**Kf1**>

Point-to-Point with RTS/CTS

Definition:	**Point-to-Point with RTS/CTS** (request-to-send/clear-to-send) is a simple hardware handshaking protocol that allows a scanner to initiate data transfers to the host.
Usage:	A scanner initiates a data transfer with an RTS (request-to-send) transmission. The host, when ready, responds with a CTS (clear-to-send) and the data is transmitted. CTS and RTS signals are transmitted over two dedicated wires as defined in the RS-232 standard.
	Used only with RS232.
Serial Cmd:	<**Kf2**>

Point-to-Point with RTS/CTS & XON/XOFF

Definition:	This option is a combination of **Point-to-Point with RTS/CTS** and **Point-to-Point with XON/XOFF.**
Usage:	Used only with RS232.
Serial Cmd:	<**Kf3**>

Polling Mode D

Definition:	Like **Point-to-Point**, **Polling Mode D** requires a dedicated connection to the host; but unlike **Point-to-Point**, it requires an address and must wait for a poll from the host before sending data.
Usage:	When in **Polling Mode D,** an address of 1 is automatically displayed on the configuration screen. However, during transmission, a 1C hex poll address (FS) and a 1D hex select address (GS) are substituted for the 1.
Serial Cmd:	<**Kf4**>

3–Protocol

Multidrop

Note: See also "Multidrop Communications" on page A-29.

Definition:	**Multidrop** allows up to 50 devices to be connected to a single RS485 host, with the scanner assigned an unique address (from 01 to 50).
Usage:	The MS-5000 can be used as a concentrator to a single host port connection.
	When **Multidrop** is selected, the protocol characters for RES, REQ, etc. are assigned automatically.
Multidrop Addresses:	Each address has its own separate poll and select address (from 1C to 7F hex).
Options:	01 through 50
Serial Cmd:	If selecting **Multidrop** an address must be defined and appended to the command string.
	Format: <**Kf5**,*address[01 to 50]*>

Note: Scanners linking up to a Microscan MS-5000 multidrop concentrator must be configured in standard multidrop protocol.

User Defined Point-to-Point

Definition:	**User Defined Point-to-Point** allows the user to customize the point-to-point protocol.
Usage:	Useful for developing custom protocols in polled or unpolled mode.
Serial Cmd:	<**Kf6**,*RES,address,REQ,EOT,STX,ETX,ACK,NAK,from host*>

User Defined Address

Definition:	**User Defined** is considered to be in a polled mode only if an address has been assigned.
Serial Cmd:	<**Kf6**,*RES,**address**,REQ,EOT,STX,ETX,ACK,NAK,from host*>
Default:	No address
Options:	Any ASCII character except a null.

3–Protocol

User Defined Example

Definition:	Example: ACK/NAK protocol can be configured using **User Defined**. The scanner will transmit data to the host, when an **ACK** is received, it will carry on with its business. If a **NAK** or response timeout occurs, the scanner will re-send the data to the host up to 3 more times before aborting.
	Tip: To use **User Defined Point-to-Point**, first select **Point-to-Point <K0>** and then **User Defined <K6>**.
	Example: To select an unpolled ACK/NAK **User Defined** protocol with LRC disabled, send **<K0><K6,,,,,,,,^F,^U><K0>**. ACK and NAK will be displayed in the menu.
Serial Cmd:	<**Kf6**,*RES,address,***REQ,EOT,STX,ETX,ACK,NAK***,from host*>
Default:	**No assignment**
Options:	Any ASCII character except a null. Control characters can be used to define RES through NAK in serial commands.

From Host

Definition:	This option allows the handshaking protocol to be initiated from the host, if not configured in an unpolled mode. Messages sent to the host will include the scanner's defined protocol. The status of **From Host** determines if messages sent from the host to the scanner must include the defined protocol. If **From Host** is disabled, the defined protocol is not included. If **From Host** is enabled, the defined protocol must be included.
Serial Cmd:	<**Kf6**,*RES,address,REQ,EOT,STX,ETX,ACK,NAK,***from host***>
Default:	**Disabled**
Options:	0 = Disabled 1 = Enabled

3–Protocol

User Defined Multidrop

Definition:	**User Defined Multidrop** allows the user to customize the polling protocol.
Usage:	This option is used when connecting to a concentrator or other device that does not match standard multidrop protocol.
	If selecting **User Defined Multidrop** (7), complete the format by either choosing new parameters or place commas where unchanged data fields occur.
Serial Cmd:	<**Kf 7**,RES,address,REQ,EOT,STX,ETX,ACK,NAK>
	For **User Defined Multidrop**, first select **Multidrop <K5>**, then **User Defined Multidrop <K7...>**.
Address:	Any single character (02 hex to 7E hex) in the ASCII table can be assigned as the address character. The character chosen is used as the poll character and the subsequent ASCII character becomes the select character. For example, if a **^B** (02 hex) is selected as the address, **^C** (03 hex) becomes the select address that the host will use in sending host select commands.

Note: Any ASCII character except a null (00) and a ^A (01) can be assigned as an address. Control characters can be used to define RES through NAK in serial commands. (See "Communication Protocol Commands" on page A-17.)

Note: Definitions of commands in **User Defined** and **User Defined Multidrop** must be duplicated in host applications to enable poll and select sequences to execute correctly during transmission.

Note: Typically, parameters in **User Defined Multidrop** are defined by first enabling **Multidrop**, then enabling **User Defined Multidrop**. This pre-loads multidrop characters into the parameters. Then changes are made to individual characters to match the host or other requirements.

3–Protocol

LRC

(Longitudinal Redundancy Check)

Definition:	An error-checking routine that verifies the accuracy of transmissions. It is the exclusive OR of all characters following the **STX** (start of text) up to and including the **ETX** (end of text). What this means is that the binary representation of all the characters in a transmissions are cumulatively added in a column and each resulting odd integer is assigned a 1 and each even integer a 0 (two 1s = 0, two 0s = 0, a 1 and a 0 = 1). The extra **LRC** character is then appended to the transmission and the receiver (usually the host) performs the same addition and compares the results.
Usage:	Used when extra data integrity is required.
Serial Cmd:	<**Kc**status>
Default:	**Disabled**
Options:	0 = Disabled 1 = Enabled

3–Protocol

Response Timeout

Definition:	Time the scanner will wait before timing out if **ACK**, **NAK**, and **ETX** are enabled, and a host response is expected.
Usage:	Only used when a response is required from the host. While in **Multi-drop**, if the scanner does not receive an **ACK** or **NAK** from the host after sending polled data, it will act on a fault. The scanner can be set to wait indefinitely by setting **Response Timeout** to zero.
Serial Cmd:	<**KA**response timeout>
Default:	**4** (x 10 = 40 mS)
Options:	0 to 255 (A zero (0) setting causes an indefinite wait.)

3–Protocol

Intercharacter Delay

Definition:	The time interval in milliseconds between individual characters transmitted from the scanner to the host.
Usage:	**Intercharacter Delay** is only used where a host cannot receive data quickly enough and there is enough time between labels to allow data to be completely transferred. It is rarely used since any setting other than zero will slow down communications. For example, a 200 setting will result in a 1/5 second delay between each character that is transmitted.
Serial Cmd:	<**KB** *intercharacter delay*>
	Example: To change **Intercharacter Delay** to 30 mS, send **<K30>**.
Default:	**0**
Options:	0 to 255 (in milliseconds). Zero (0) causes no delay between characters.

3–Protocol

Output Data Format

Up to two user defined ASCII characters, including control characters can be defined and added to the front or end of the data string that is sent from the scanner to the host.

Preamble Characters

Preamble Status

Definition:	Defines a one or two character data string that can be added to the front of the decoded data.
Usage:	Useful for identifying and controlling incoming data. For example, defining the **preamble** as a carriage return and a line feed causes each decoded message to be displayed of on its own line.
Serial Cmd:	<**Kdstatus**,*preamble character(s)*>
Default:	**Disabled**
Options:	0 = Disabled 1 = Enabled (within any protocol)

Preamble Character(s)

Serial Cmd:	<**Kd**status,***preamble character(s)***>
Default:	**^M** corresponds to: **carriage return/null/null/null**.
Options:	Up to two user-defined ASCII character, including control characters.

Within a Serial Command
To enter control characters within a serial command, hold down the control key while typing the desired character.

Example: **<K1,CNTL-m>** to enter **^M**

Within an Embedded Menu
Control characters entered on the command line are displayed in the menu as mnemonic characters, such as: <CR><NUL><NUL><NUL>.

To enter a control character from within an embedded menu, first type in a space (with the space key). This has the effect of allowing the control key to be recognized as a part of the control character. Next hold down the control key while typing the desired character.

Example: **Space CNTL-m** to enter **^M.**

3—Protocol

Postamble Characters

Postamble Status

Definition:	Defines a one or two character data string that can be added to the end of the decoded data.
Usage:	Useful for identifying and controlling incoming data. For example, defining the postamble as a carriage return and a line feed causes each decoded message to be displayed of on its own line.
Serial Cmd:	<**Ke***status,postamble character(s)*>
Default:	**Enabled**
Options:	0 = Disabled 1 = Enabled (within any protocol)

Postamble Character(s)

Serial Cmd:	<**Ke***status,**postamble character(s)***>
Default:	**^M^J**. Corresponds to carriage return/line feed/null/null, as displayed in the menu.
Options:	Up to two user-defined ASCII character, including control characters.

Within a Serial Command

To enter control characters within a serial command, hold down the control key while typing the desired character.

Example: **<K1,CNTL-m CNTL-j>** to enter ^M^J.

Within an Embedded Menu

Control characters entered on the command line are displayed in the menu as mnemonic characters, such as: <CR><LF><NUL><NUL>

To enter a control character from within an embedded menu, first type in a space (with the space key). This has the effect of allowing the control key to be recognized as a part of the control character. Next hold down the control key while typing the desired character.

Example: **Space CNTL-m Space CNTL-j** to enter ^M^J.

3–Protocol

Chapter

4

Read Cycle/Trigger

Chapter Contents

Read cycles and triggering modes are at the heart of bar code scanning. After you've established communications and completed basic read rate testing, you will need to address the spatial and timing parameters associated with your application. In a typical operation a bar-coded item moves along a line past a scanner. A sensor or timer activates a read cycle during which the scanner actively searches for bar code symbols. You will need to decide how to initiate the read cycle and how and when to end it. This section addresses these issues.

Note: The characters **NULL <>** and **,** can only be entered through embedded menus, not through ESP or serial commands.

4—Read Cycle/Trig-

Read Cycle/Triggering by ESP
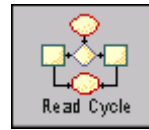
Click this Button to bring up the **Read Cycle/Triggering** menu.

To change a setting, **double-click** the setting and use your curser to scroll through the options.

Parameters	Program Values
Read Cycle / Triggering	
Trigger	
Trigger Mode	
Trigger Mode	Continuous Re...
External Trigger	Active Closed
Trigger Filter Time	320
Good Decode Reads	1
Serial Trigger	
Serial Character	GS
User Defined Characters	
End Trigger Character	0 0
Start Trigger Character	0 0
Multilabel	
Number of Labels	1
Separator	,
End of Read Cycle Mode	
End of Read Cycle Mode	Timeout
Timeout	100
Opto-Electrical Control	
Scanner Setup	
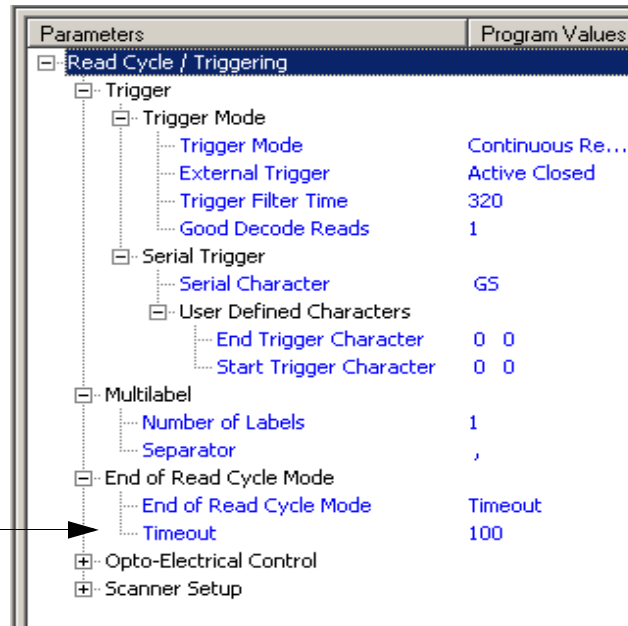
Read Cycle/Triggering by Serial Command

Command Title	Cmd	Format
Trigger Mode	**Kg**	<**Kg***trigger mode,filter time*>
Serial Trigger Character	**Ki**	<**Ki***serial trigger character*>
Good Decode Reads	**Km**	<**Km***decodes before output*>
External Trigger State	**Kj**	<**Kj***external trigger state*>
End of Read Cycle	**Kh**	<**Kh***end of read cycle,timeout*>
Multilabel	**KL**	<**KL***number of labels,multilabel separator*>

4–Read Cycle/Trig-

Trigger Mode

Definition:	The type of trigger event that will initiate the read cycle.
Serial Cmd:	<**Kg** *trigger mode,* *trigger filter duration*>
Default:	**Continuous Read**
Options:	0 = Continuous Read 4 = Serial Data 1 = Continuous Read 1 Output 5 = Serial Data & External Edge 2 = External Level 3 = External Edge

Continuous Read

Definition:	In **Continuous Read**, trigger input options are disabled, the scanner is always in the read cycle, and it will attempt to decode and transmit every scan crossing a label. **When To Output** and **Noread** options have no affect on **Continuous Read**.
Usage:	**Continuous Read** is useful in testing bar code label readability or scanner functions. It is not recommended for normal operations.
Serial Cmd:	<**Kg** *0*>

Continuous Read 1 Output

Definition:	In **Continuous Read 1 Output** the scanner self-triggers whenever it decodes a new bar code label or a timeout occurs.
	If **End Of Read Cycle** is set to **Timeout** and the label doesn't change, the scanner will repeat the output at the end of each timeout period. For example, if **Timeout** is set to one second, the scanner sends the label data immediately and repeats the output at intervals of one second for as long as the label continues to be scanned.
	If **End Of Read Cycle** is set to **New Trigger**, the scanner will send the current label data immediately, but send it only once. A new label appearing in the scanner's range will be read and sent immediately provided it is not identical to the previous label read.
Usage:	**Continuous Read 1 Output** can be useful in applications where it is not feasible to use a trigger and all succeeding labels contain different information. It is also effective in applications where the objects are hand presented.
Serial Cmd:	<**Kg1**>

Caution: In automated environments, **Continuous Read 1 Output** is not recommended because there is no one to verify that a label was missed.

Note: If **Trigger** is set to **Continuous Read 1 Output**, **Number of Labels** will default back to **1** (if set to any number greater than 1).

4–Read Cycle/Trig-

External Trigger Level

Definition:	**External Trigger Level** allows the read cycle (active state) to begin when a trigger (change of state) from an external sensing device is received. The read cycle endures until the object moves out of the sensor range and the active trigger state changes again.
Usage:	This mode is effective in an application where the speeds of the conveying apparatus are variable and the time the scanner spends scanning each object is not predictable. It also allows the user to determine if a noread has occurred.

Figure 4-1 Trigger Level

Serial Cmd: <**Kg2**>

Important: Level and **Edge** apply to the active logic state (Active Off (I_{OFF})or Active On (I_{ON})) that exists while the object is in a read cycle, between the rising edge and falling edge. *Rising edge* is the trigger signal associated with the appearance of an object. *Falling edge* is the trigger signal associated with the subsequent disappearance of the object.

4–Read Cycle/Trig-

External Trigger Edge

Definition:	**External Trigger Edge**, as with Level, allows the read cycle (active state) to begin when a trigger (change of state) from an external sensing device is received. However, the passing of an object out of sensor range does not end the read cycle. The read cycle ends with a good read output or, depending on **End of Read Cycle** setting, a timeout or new trigger occurs.
Usage:	This mode is highly recommended in any application where conveying speed is constant or if spacing, object size, or timeouts are consistent.

Initiate Read Cycle:
Object # 1, moving in front of the detector beam, causes a change in the trigger state, initiating the read cycle.

Active
- - 0

Associated waveforms assume **External Trigger State** is set to **Active On.**

Initiate Second Read Cycle:
Object # 2, moving in front of the detector beam, causes another change in the trigger state. This signal initiates a new read cycle and ends the previous read cycle unless **Timeout** is enabled and a good read or timeout has not occurred.
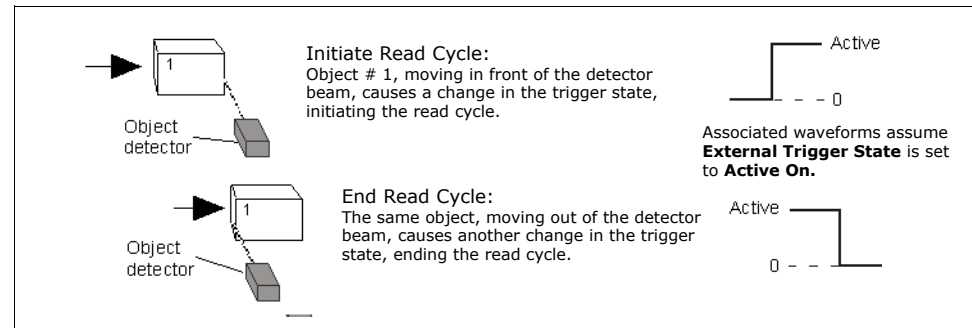
Active
- - 0

Figure 4-2 Trigger Edge

Serial Cmd: <**Kg3**>

Important: Level and **Edge** apply to the active logic state (**Active Off** (I_{OFF}) or **Active On** (I_{ON})) that exists while the object is in a read cycle, between the rising edge and falling edge. *Rising edge* is the trigger signal associated with the appearance of an object. *Falling edge* is the trigger signal associated with the subsequent disappearance of the object.

4–Read Cycle/Trig-

Serial Data

Definition:	In **Serial Data**, the scanner accepts an ASCII character from the host or controlling device as a trigger to start a read cycle. A **Serial Data** trigger behaves the same as an **External Edge** trigger. Serial commands are entered inside corner brackets, such as **<t>**.
Usage:	**Serial Data** is effective in a highly controlled environment where the host knows precisely when the object is in the scan zone. It is also useful in determining if a noread has occurred.
Serial Cmd:	<**Kg4**>

Serial Data or External Edge

Definition:	In this mode the scanner accepts either a serial ASCII character or an external trigger pulse to start the read cycle.
Usage:	**Serial Data or External Edge** is seldom used but can be useful in an application that primarily uses an external sensing device but occasionally needs to be manually triggered. An auxiliary terminal can be connected to the aux port so the user can send the serial trigger character through the scanner to the host.
Serial Cmd:	<**Kg5**>

4—Read Cycle/Trig-

Triggering

Serial Trigger Character

Definition:	**Serial Trigger Character** is the definable ASCII character that a host sends to the scanner to begin a read cycle.
Usage:	**Serial Trigger Character** is useful in any application in which a read cycle needs to be initiated by a serial character from a host.
Serial Cmd:	<**Ki***serial trigger character*>

Trigger Filter Duration

Definition:	**Trigger Filter Duration** can prevent trigger bounce from falsely triggering the scanner by limiting the time in which trigger pulses can be received.
Usage:	**Trigger Filter Duration** is useful where trigger bounce could cause false triggers.
Serial Cmd:	<**Kg** *trigger mode*,***trigger filter duration***>
Options:	**0 to 255** (corresponding to 0 to 1.275 in 5ms steps)

External Trigger State

Definition:	When enabled for **Positive** the triggering device imposes a current to activate the read cycle. When enabled for **Negative** the triggering device interrupts the current to activate the read cycle.
Usage:	Users can select the trigger state that will operate with their systems. (If using the Microscan object detector, use **Positive**.)
Serial Cmd:	<**Kj***external trigger state*>
Default:	**Positive**
Options:	0 = Negative 1 = Positive

Note: External Level, **External Edge**, or **Serial Data or Edge** trigger mode must be enabled for **External Trigger** to take effect.

4–Read Cycle/Trig-

Good Decode Reads

Definition:	The number of decodes (from 1 to 31) required per label before a label's decoded data is sent. It requires the scanner to successfully decode a label a designated number of times (not necessarily consecutively) before it is sent. If it doesn't achieve the number of good reads during the read cycle, then a noread will be sent.
	Note: Higher settings will decrease throughput speed.
Usage:	This is a very useful feature to increase reliability of reads for symbologies that do not have internal error checking such as Pharmacode.
Serial Cmd:	<**Km** *decodes before output*>
Default:	**1**
Options:	1 to 31

Note: When setting up, be sure to determine if the scanner's scan rate is capable of scanning your longest label the required number of times.
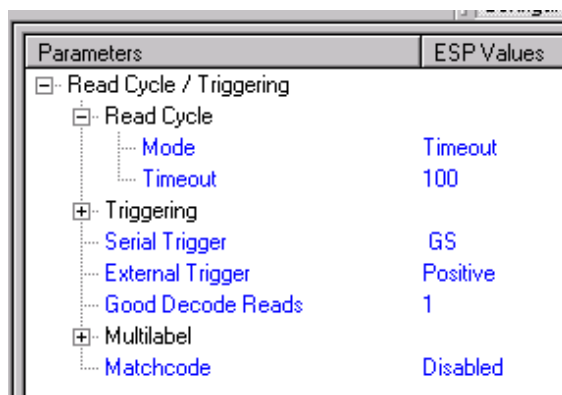
4—Read Cycle/Trig-

Read Cycle

Note: **When to Output** must be set to **End of Read Cycle** before this command can be active. (See "Beeper Status" on page 7-8.)

Definition:	The read cycle is the time during which the scanner will attempt to read and decode a bar code symbol. At the end of a read cycle the scanner stops reading labels and sends the label data or noread message to the host.

End of Read Cycle Mode

Definition:	A read cycle can be terminated by a new trigger, a timeout, or a combination of both.
ESP:	Double-click on **End of Read Cycle Mode** and make a selection.

Serial Cmd:	<**Kh** *end of read cycle*,*timeout duration*>
Default:	**Timeout**
Options:	0 = Timeout
	1 = New Trigger
	2 = Timeout & New Trigger

Note: When operating in **Continuous Read** or **Continuous Read 1 Output**, the scanner is always in the read cycle.

4–Read Cycle/Trig-

Timeout

Definition:	**Timeout** ends the read cycle when the time set in **Timeout** elapses or "times out."
	If in **Continuous Read 1 Output**, a timeout initiates a new read cycle and allows the same label to be read again.
	With either **External Edge**, **Serial Data**, or **Serial Data & Edge** enabled, a timeout ends the read cycle and label data or a noread message is sent to the host.
	With **External Level** enabled, the read cycle does not end until the falling edge trigger or a timeout occurs. The next read cycle does not begin until the next rising edge trigger.
Usage:	Typically used with Serial or **Edge** and **Continuous One**.
	It is effective in highly controlled applications when the maximum length of time between objects can be predicted. It assures that a read cycle ends before the next bar-coded object appears, giving the system extra time to decode and transmit the data to the host.

New Trigger

Definition:	**New Trigger** ends the current read cycle and initiates a new one when a new trigger occurs. **New Trigger** refers only to a "rising edge" trigger.
	With either **External Edge**, Serial, or **Serial** or **Edge** enabled, an edge or serial trigger ends a read cycle and initiates the next read cycle.
	In the case of **External Level**, a falling edge trigger ends the read cycle but the next read cycle does not begin until the occurrence of the next rising edge trigger.
	(See and .)
Usage:	**New Trigger** is an effective way to end a read cycle when objects move past the scanner at irregular intervals (not timing dependent).

Note: When **New Trigger** is enabled, **Laser On/Off** will have no effect. When noreads occur, the laser will remain on.

Timeout or New Trigger

Definition:	**Timeout or New Trigger** is identical to **Timeout**, except that a timeout *or* a new trigger (whichever occurs first) ends the read cycle.
Usage:	Useful in applications that require an alternative way to end the read cycle. For example, if an assembly line should stop completely or the intervals between objects are highly irregular.

4—Read Cycle/Trig-

Timeout Duration

Definition:	**Timeout Duration** is the time span of the read cycle and is represented in 10 mS increments. It is used in conjunction with **External Edge** or **Serial Trigger.**
Usage:	It is useful in many tightly controlled applications which require a read cycle to end before the next object appears and therefore need the flexibility of a timeout adjustment.
Serial Cmd:	<**Kh***end of read cycle,**timeout duration**>
Default:	**100** (Corresponds to one second or 1000 mS.)
Options:	0 to 65535. (Divide any positive number entered by 100 to determine the time in seconds.)

Note: A minimum setting of **2** is recommended.

Note: **Timeout** or **Timeout or New Trigger** under **End of Read Cycle** must be enabled for **Timeout Duration** to take effect.

4–Read Cycle/Trig-

Multilabel

|	
Definition:	**Multilabel** allows the user to define up to 12 bar code labels that can be read in a single read cycle.
Usage:	**Multilabel** is commonly used in shipping applications where a shipping label contains individual bar codes for part number, quantity, etc. This feature allows one trigger to pick up all the labels. AIAG and UCC/EAN-128 are two application standards that address this need.

Number of Labels

Definition:	**Number of Labels** is the number of different labels that can be read in a single read cycle.
Serial Cmd:	<**KL number of labels**,*multilabel separator*>
Default:	**1**
Options:	1 to 12

4—Read Cycle/Trig-

Multilabel Separator

Definition: The character that's inserted between each label scanned when **Multi-label** is set to any number greater than **1**.

Usage: Used to delimit or separate data fields with a user defined character.

ESP: To select a new multilabel separator, double-click on **Separator** and select a character in the popup window.
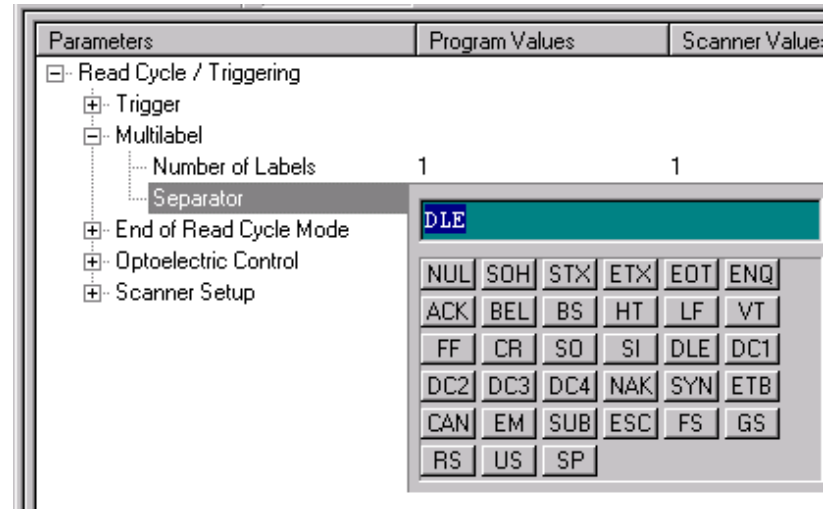
Serial Cmd: <**KL** *number of labels,***multilabel separator**>

Note: If **Multilabel Separator** has been changed to any character other than the default comma and you wish to re-define the separator as a comma, use ESP (as shown below) or the embedded menu.

Default: **,** (comma)

Options: Any available ASCII character, except **< > NUL**.

Chapter

5

Codes

Chapter Contents

This section describes the various bar code symbol types that can be read and decoded by the scanner.

Code 39 is enabled by default. To enable all codes, right-click **Autodiscrimination** under Code Type in the Utilities menu and select **Enable**, or send a **<P>** serial command to the scanner from the Terminal window.[1]

See **www.aimusa.org/standards** for additional information about codes.

---

1. If using an I 2/5 label, verify that the number of characters in the label being scanned matches the code length enabled for the I 2/5 code type (default is 10 and 6).

Code Types by ESP

Click this button to bring up the **Code Types** menu.

To change a setting, double-click the setting and use your curser to scroll through the options.
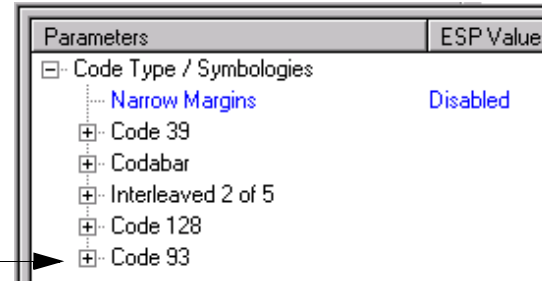
Code Types by Serial Command

Command Title	cmds	Format
Narrow Margins	**Ko**	<**Ko**narrow margins status>
Code 39	**Kp**	<**Kp**status,check digit status,check digit output status,large intercharacter gap,fixed code length status,fixed code length>
Codabar	**Kq**	<**Kq**status,start & stop match status,start & stop output status,large intercharacter gap,fixed code length status,fixed code length,check digit type,check digit output>
Interleaved 2 of 5	**Kr**	<**Kr**status,check digit,check digit output,length 1,length 2>
Code 128	**Kt**	<**Kt**status,fixed length status,fixed code length>
Code 93	**K!**	<**K!**status,fixed code length status,fixed code length>

Narrow Margins

Definition:	Allows the scanner to read symbols with quiet zones less than 8 times the width of the narrow bar element. "Quiet zone" is the space at the leading and trailing ends of a symbol. Each quiet zone can be as narrow as only five times the width of the narrow bar element when **Narrow Margins** is enabled.
Usage:	Used when the leading and trailing edges of the symbols are smaller than the standard margin or other objects encroach into the margins.
Serial Cmd:	<**Ko***narrow margins status*,*symbology identifier*>
Default:	**Disabled**
Options:	0 = Disabled 1 = Enabled

Note: Do not use **Narrow Margins** with **Large Intercharacter Gap** enabled in Code 39 or Codabar.

5—Codes

Code 39

Definition:	An alphanumeric code with unique start/stop code patterns, composed of 9 black and white elements per character, of which 3 are wide.
Usage:	**Code 39** is considered the standard for non-retail symbology.

Code 39 Status

Serial Cmd:	<**Kp***status*,*check digit status,check digit output status,large interchar-acter gap,fixed code length status,fixed code length>*
Default:	**Enabled**
	Note: This is the only code type enabled by default.
Options:	0 = Disabled 1 = Enabled

Check Digit Status (Code 39)

Serial Cmd:	<**Kp***status*,***check digit status***,*check digit output,large intercharacter gap,fixed code length status,fixed code length>*
Default:	**Disabled**
Options:	0 = Disabled 1 = Enabled

Check Digit Output (Code 39)

Definition:	When enabled, the check digit character is read and compared along with the label data. When disabled, label data is sent without the check digit.
	Note: With **Check Digit Output** and an **External** or **Serial** trigger option enabled, an invalid check digit calculation will cause a noread message to be transmitted at the end of the read cycle.
Usage:	**Check digit Output**, added to the bar code symbol, provides additional security.
Serial Cmd:	<**Kp***status*,*check digit status*,***check digit output***,*large intercharacter gap,fixed code length status,fixed code length>*
Default:	**Disabled**
Options:	0 = Disabled 1 = Enabled

Large Intercharacter Gap (Code 39)

Definition:	When enabled, the scanner can read symbols with gaps between bar code characters that exceed three times (3x) the narrow element width.
Usage:	**Large Intercharacter Gap** is helpful for reading symbols that are printed out of specification.
	Caution: Do not use **Large Intercharacter Gap** with **Narrow Margins** enabled since a large intercharacter gap (over 3x) could cause a narrow margins (5x) to be interpreted as an intercharacter gap.
Serial Cmd:	<**Kp** *status,check digit status,check digit output,large intercharacter gap,fixed code length status,fixed code length*>
Default:	**Disabled**
Options:	0 = Disabled 1 = Enabled

Fixed Code Length Status (Code 39)

Definition:	When enabled the scanner will check the label length against the code length field. If disabled any length would be considered a valid label.
Serial Cmd:	<**Kp** *status,check digit status,check digit output,large intercharacter gap,fixed code length status,fixed code length*>
Default:	**Disabled**
Options:	0 = Disabled 1 = Enabled

Fixed Code Length (Code 39)

Definition:	Specifies the exact number of characters that the scanner will recognize (this does not include start and stop and check digit characters). The scanner ignores any code not having the specified length.
Usage:	**Fixed Code Length** helps prevent truncations and increases data integrity by ensuring that only one label length will be accepted.
Serial Cmd:	<**Kp** *status,check digit status,check digit output,large intercharacter gap,fixed code length status,fixed code length*>
Default:	**10**
Options:	1 to 64

5—Codes

Codabar

Definition:	Codabar is a 16-character set (0 through 9, and the characters $, :, /, ., +, and –) with start/stop codes and at least two distinctly different bar widths.
Usage:	Used in photo-finishing and library applications. Formerly used in some medical applications but not typically used in newer applications.

Codabar Status

Serial Cmd:	<**Kq***status*,*start & stop match,start & stop match output,large inter-character gap,fixed code length status,fixed code length,check digit type,check digit output*>
Default:	**Disabled**
Options:	0 = Disable 1 = Enabled

Start & Stop Match (Codabar)

Definition:	Requires the Codabar start and stop characters (a, b, c, or d) to match before a valid read can occur.
Usage:	Used to increase security of symbology.
Serial Cmd:	<**Kq***status,***start & stop match***,start & stop match output,large inter-character gap,fixed code length status,fixed code length,check digit type,check digit output*>
Default:	**Enabled**
Options:	0 = Disabled 1 = Enabled

Start & Stop Output (Codabar)

Definition:	Causes the start and stop characters to be transmitted with bar code data.
Usage:	Used to verify matching.
Serial Cmd:	<**Kq***status,start & stop match,***start & stop match output***,large inter-character gap,fixed code length status,fixed code length,check digit type,check digit output*>
Default:	**Enabled**
Options:	0 = Disabled 1 = Enabled

Large Intercharacter Gap (Codabar)

Definition:	Instructs the scanner to read symbols with gaps between characters exceeding three times the narrow element width.
Usage:	It is helpful for reading symbols that are printed out of specification.
	Caution: Do not use **Large Intercharacter Gap** with **Narrow Margins** enabled since enabling **Large Intercharacter Gap** (over 3x) could cause a narrow margins (5x) to be interpreted as an intercharacter gap.
Serial Cmd:	<**Kq** *status,start & stop match,start & stop output match,**large intercharacter gap**,fixed code length status,fixed fixed code length,check digit type,check digit output>*
Default:	**Disabled**
Options:	0 = Disabled 1 = Enabled

Fixed Code Length Status (Codabar)

Definition:	When enabled, the scanner will check the label length against the fixed code length field. If disabled any length would be considered a valid label.
Serial Cmd:	<**Kq** *status,start & stop match,start & stop match output,large intercharacter gap,**fixed code length status**,fixed code length,check digit type,check digit output>*
Default:	**Disabled**
Options:	0 = Disabled 1 = Enabled

Fixed Code Length (Codabar)

Definition:	Specifies the exact number of characters that the scanner will recognize (this does not include start and stop and check digit characters). The scanner ignores any code not having the specified length.
Usage:	**Fixed Code Length** helps prevent truncations and increases data integrity by ensuring that only one symbol length will be accepted.
Serial Cmd:	<**Kq** *status,start & stop match,start & stop match output,large intercharacter gap,fixed code length status,**fixed code length**,check digit type,check digit output>*
Default:	**10**
Options:	1 to 64

Note: **Fixed Code Length Status** must be enabled for **Fixed Code Length** to take effect.

Note: Because of symbology limitations, setting **Code Length** to any number less than four will produce undetermined results.

5—Codes

Check Digit Type (Codabar)

Definition:	Allows the user to select the check digit type Codabar will use.
Serial Cmd:	<**Kq** *status,start & stop match,start & stop match output,large inter-character gap,fixed code length status,fixed code length,***check digit type**,*check digit output*>
Default:	**Disabled**
Options:	0 = Disabled 1 = Modulus 16 2 = NW 7 3 = Both
Modulus 16:	Used in the photo-finishing market.
NW 7:	Used in Japanese markets.

Check Digit Output (Codabar)

Definition:	When enabled, the check digit character is sent along with the bar code data. When disabled, bar code data is sent without the check digit.
Usage:	For additional security a check digit can be added to the bar code symbol.
Serial Cmd:	<**Kq** *status,start & stop match,start & stop match output,large inter-character gap,fixed code length status,fixed code length,check digit type,***check digit output**>
Default:	**Disabled**
Options:	0 = Disabled 1 = Enabled

Interleaved 2 of 5

Definition:	A dense, continuous, self-checking, numeric symbology. Characters are paired together so that each character has five elements, two wide and three narrow, representing numbers 0 through 9, with the bars representing the first character and the interleaved spaces representing the second character. (A check digit is highly recommended.)
	Important: You must set **Code Length** in order to decode I 2/5 symbols.
Usage:	It is has been has been popular because it is the most dense code for printing numeric characters less than 10 characters in length; however Microscan does not recommend this symbology for any new applications because of inherent problems such as truncation.

Interleaved 2 of 5 Status

Serial Cmd:	<**Kr***status*,*check digit status,check digit output,code length #1,code length #2*>
Default:	**Disabled**
Options:	0 = Disabled 1 = Enabled

Check Digit Status (Interleaved 2 of 5)

Definition:	An error correcting routine in which the check digit character is added.
Usage:	It is typically not used but can be enabled for additional security in applications where the host requires redundant check digit verification.
Serial Cmd:	<**Kr***status*,***check digit status***,*check digit output,code length #1,code length #2*>
Default:	**Disabled**
Options:	0 = Disabled 1 = Enabled

Check Digit Output (Interleaved 2 of 5)

Definition:	When enabled, a check digit character is sent along with the bar code data for added data security.
Serial Cmd:	<**Kr***status,check digit status*,***check digit output***,*code length #1,code length #2*>
Default:	**Disabled**
Options:	0 = Disabled 1 = Enabled

5—Codes

Code Length #1 (Interleaved 2 of 5)

Definition:	Allows user to define the symbol length. Because I 2/5 is a continuous code, it is prone to substitution errors. Hence, a code length must be defined and a bar code symbol must contain an even number of digits.
	Note: If a start, stop or check digits are used, they are not included in the code length count.
Usage:	With I 2/5, two code lengths can be defined. When using only one symbol length in an application, setting **Code Length #2** to 0 (zero) to ensure data integrity is recommended.
Serial Cmd:	<**Kr** *status,check digit status,check digit output,**code length #1**,code length #2>*
Default:	**10**
Options:	2 to 64, even.
	Since I 2/5 characters are paired, code length must be set to an even number. If **Check Digit** is enabled, add 2 to your code length. For example, if your symbol is 10 characters plus a check digit, then enable **Code Length** for 12.
	Note: Typically, when printing an I 2/5 label with an odd number of digits, a 0 will be added as the first character.

Code Length #2 (Interleaved 2 of 5)

Definition:	Allows user to define a second code length for I–2 of 5.
Usage:	If using a second symbol, a zero or any even code length from 2 to 64 may be specified. If not using a second symbol, set Code Length #2 to 0 to ensure data integrity.
Serial Cmd:	<**Kr** *status,check digit status,check digit output,code length #1,**code length #2**>*
Default:	**6**
Options:	2 to 64, even.
	Since I 2/5 characters are paired, code length must be set to an even number. If **Check Digit** is enabled, add 2 to your code length. For example, if your symbol is 10 characters plus a check digit, then enable **Code Length** for 12.
	Note: Typically, when printing an I 2/5 label with an odd number of digits, a 0 will be added as the first character.

Code 128

Definition: A very dense alphanumeric symbology. It encodes all 128 ASCII characters; it is continuous, has variable length, and uses multiple element widths measured edge to edge.

Usage: **Code 128** is a smaller code useful in applications with tight spots and high security needs.

Code 128 Status

Serial Cmd: <**Kt** *status*,fixed code length status,fixed code length>
Default: **Disabled**
Options: 0 = Disabled   1 = Enabled

Fixed Code Length Status (Code 128)

Definition: When enabled the scanner will check the label length against the code length field. If disabled any length would be considered a valid label.

Serial Cmd: <**Kt** *status*,***fixed code length status***,fixed code length>
Default: **Disabled**
Options: 0 = Disabled   1 = Enabled

Fixed Code Length (Code 128)

Definition: It specifies the exact number of characters that the scanner will recognize (this does not include start and stop and check digit characters). The scanner ignores any code not having the specified length.

Usage: **Fixed Code Length** helps prevent truncations and increases data integrity by ensuring that only one symbol length will be accepted.

Serial Cmd: <**Kt** *status,fixed code length status,***fixed code length***>
Default: **10**
Options: 1 to 64

Note: Fixed Code Length Status must be enabled for **Fixed Code Length** to take effect.

Code 93

Definition: Code 93 is a variable length, continuous symbology employing four ele-
ment widths. Each Code 93 character has nine modules that may be
either black or white. Each character contains three bars and three
spaces.

Usage: Used occasionally in clinical industry.

Code 93 Status

Serial Cmd: <**K!***status*,*fixed code length status*,*fixed code length*>

Default: **Disabled**

Options: 0 = Disabled   1 = Enabled

Fixed Code Length Status (Code 93)

Definition: When enabled the scanner will check the label length against the code
length field. If disabled any length would be considered a valid label.

Serial Cmd: <**K!***status*,***fixed code length status***,*fixed code length*>

Default: **Disabled**

Options: 0 = Disabled   1 = Enabled

Fixed Code Length (Code 93)

Definition: Specifies the exact number of characters that the scanner will recognize
(this does not include start and stop and check digit characters). The
scanner ignores any code not having the specified length.

Usage: **Fixed Code Length** helps prevent truncations and increases data
integrity by ensuring that only one symbol length will be accepted.

Serial Cmd: <**K!***status*,*fixed code length status*,***fixed code length***>

Default: **10**

Options: 1 to 64

Autodiscriminate

Although **Autodiscriminate** is not a configuration command, but it is included here as a convenient tool for enabling most code types.

Definition: Enables all available symbology types except PDF417, UCC/EAN 128. The user may also individually disable/enable each symbology type.

Usage: Commonly used for quick setup mode to detect bar code type. This is particularly useful for users who might be unfamiliar with their application's symbology.

Note: It does not alter individual fields such as **Start/Stop**, **Fixed Length**, etc. These need to be setup individually.

ESP: In the **Utilities** menu, right-click on **Autodiscriminate** and select **Enable**.

Note: There will be a few seconds delay while the scanner values are retrieved.
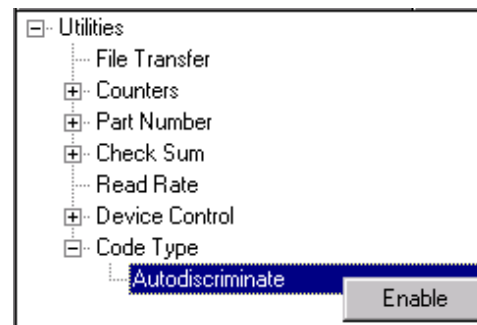
Serial Cmd: **<P>**
Default: **Code 39** (only)
Options: <P> Enables all codes except noted above.

<Q> Enable Code 39 only

<R> Enable Codabar only

<S> Enable I 2/5 only

Note: If using an I 2/5 label, verify that the number of characters in the label being scanned matches the code length enabled for the I 2/5 code type (default is 10 and 6).

5—Codes

Autodiscriminate

Chapter

6

Matchcode

Chapter Contents

This section explains the matchcode output functions and the master label database setup.

Matchcode by ESP
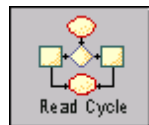
Click this button to bring up the **Read Cycle** menu.

To change a setting, **double-click** the setting and use your curser to scroll through the options.
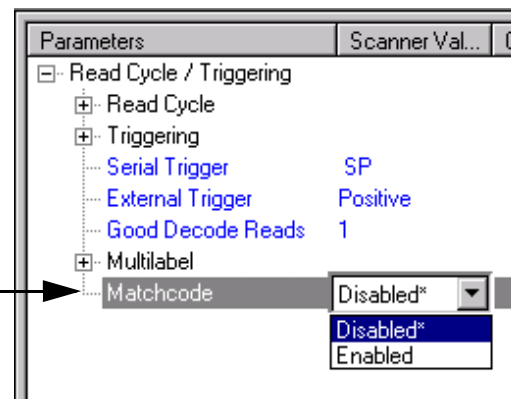
Matchcode by Serial Command

Command Title	cmds	Format
Matchcode Enable	**Kn**	<**Kn** *status*>

Utility Commands	Format
Set Matchcode Type to Enabled	<**E**>
Set Matchcode Type to Disabled	<**F**>
Enter data as master label #1	<**)** *data***)** >
Scan in next label as Master Label	<**G**>
Request master label #1	<**)**>
Delete master label #1	<**))**>

Overview of Matchcode

Definition: With **Matchcode** you can store master label data in the scanner's memory, compare this data against the scanned bar codes, and define how label data and/or discrete signal output will be directed.

Usage: **Matchcode** is used in applications to sort, route, or verify data based on matching the specific bar code label in a variety of ways as defined in this section. For example, a manufacturer might sort a product based on dates that are embedded in the bar code.

Using Master Labels

1. Set **Triggering Mode** to **External** or **Serial** (see "Trigger Mode" on page 4-3).
2. Enable Matchcode (see "Matchcode" on page 6-4).
3. Define the output you want with your matchcode setup:
   a. Barcode output ("Bar Code Output" on page 7-4).
   b. Discrete output (see Chapter 8, "Discrete I/0").
4. Enter master label data in one of the following ways:
   a. Use **ESP** to type in master label data directly into the Utilities menu (see "Master Label Database" on page 9-10).
   b. Send a `<G>` command to scan next label in as the master label.
   c. Enter data directly by serial command: `<)data)>`.

Other Master Label Serial Commands

Sending `<)>` will return the current master.

Sending `<))>` will delete the current master label.

See also for more information details on entering, requesting, and deleting master labels.

6—Matchcode

Matchcode

Definition:	Allows the user to enable **Matchcode**.
	Note: First set **Triggering Mode** to **External** or **Serial**.
ESP:	
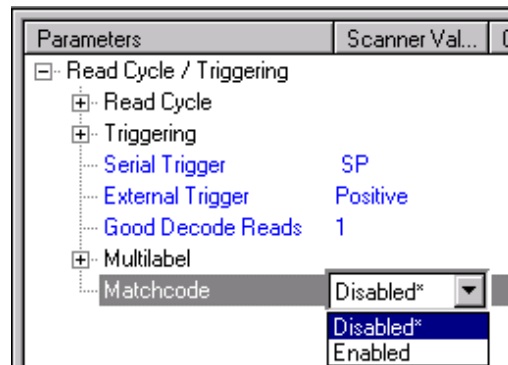
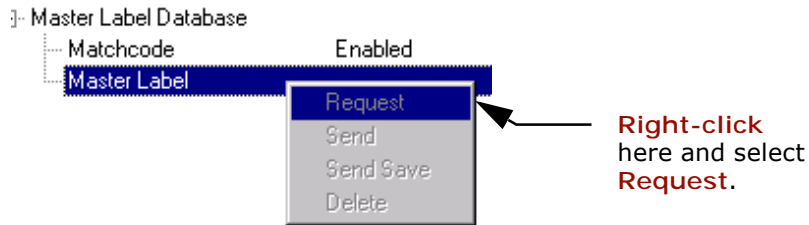|	
Serial Cmd:	<**Kn** *matchcode status*>
Default:	**Disabled**
Options:	0 = Disabled
	1 = Enabled
Disabled:	Has no effect on operations.
Enabled:	Instructs the scanner to compare labels or portions of labels with the master label.

You can access **Master Label** operations from the **Utilities** menu.

Enter Master Label Data

Definition:	This command allows the user to enter text as the master label.
ESP:	1. Open the **Utilities** menu and double-click on **Master Label**.
	2. Enter text in the text block, right-click and select **Send** or **Send Save**.
Serial Cmd:	<)*data*)>
Serial Cmd:	Send <**G**> to store the next label decoded as the master label.

Request Master Label Data

Definition:	Returns the current master label data.
ESP:	Click the **Utilities** button to access the master label:

Utilities

]- Master Label Database
--- Matchcode   Enabled
---Master Label

Request
Send
Send Save
Delete

Right-click here and select **Request**.

ESP:	1. Open the **Utilities** menu and right-click on **Master Label**.
	2. Select **Request** to display the current master label.
Serial Cmd:	Send <)> to request the current master label.

Delete Master Label Data

Definition:	This command will delete the current master label data.
ESP:	1. Open the **Utilities** menu and double-click on **Master Label**.
	2. Delete text in the text block, right-click and select **Send** of **Send Save**.
Serial Cmd:	Send <))> to delete the master label.

New Master Pin

Chapter

7

Outputs

Chapter Contents

7–Outputs

This section explains the commands for controlling data and beeper outputs.
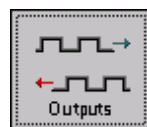
Note: The characters **NULL <>** and **,** can only be entered through embedded menus, not through ESP or serial commands.

Outputs by Serial Command

Command Title	cmds	Format
Bar Code Output	**Kl**[a]	<**Kl***status,when to output*>
Noread Message	**Kk**	<**Kk***status,message*>
Laser On/Off	**KC**	<**KC***laser on/off status*>
Beeper	**Ku**	<**Ku***status,volume*>

a. Lower case L

Output Data by ESP Menu

Click this button to bring up the **Outputs** menu.

To change a setting, **double-click** the setting and use your curser to scroll through the options.

Parameters	ESP Values
Outputs	
Output 1 Parameters	
Output On	Mismatch or Noread
Polarity	Negative
Pulse Width	5
Output 2 Parameters	
Output On	Mismatch or Noread
Polarity	Negative
Pulse Width	5
Beeper	
Status	On Good
Beeper Speed	Fast
Bar Code Output	
Status	Good Read
When to Output	As Soon As Possible
Laser ON/OFF	Disabled
Noread Message	
Status	Enabled
Message Output	NOREAD

7–Outputs

Bar Code Output

Note: **Bar Code Output** relates to data and should not to be confused with **Discrete Outputs** listed in the Chapter 8, "Discrete I/0" which describe output states and functions.

Bar Code Output Status

Definition: Defines the conditions under which decoded bar code labels are trans-mitted to the host.

Usage: Useful when the host needs bar code data only under certain conditions.

Serial Cmd: <**Kloutput status**,*when to output*>

Default: **Good Read**

Options: 0 = Disabled
1 = Match
2 = Mismatch
3 = Good Read

Note: Bar Code Output Status if set to **Match** or **Mismatch** will not take effect unless **Matchcode Type** is enabled and a master label is loaded into memory.

Disabled

Definition: When set to **Disabled**, the scanner will not transmit any data that is generated during a read cycle (bar codes, noreads, etc.).

Usage: It is useful when an application only needs to use the discrete outputs and can allow the scanner to do the decision-making. When **Disabled**, the host does not need the bar code data and the communication lines are used only for setup and status checks.

Match

Definition: When set to **Match**, the scanner transmits bar code data whenever a bar code matches a master label. However, if **Matchcode Type** is **Disabled**, it transmits on any good read.

Note: A noread can still be transmitted if **Enabled**.

Usage: **Match** is used in an application that requires specific bar code informa-tion and needs to sort, route or verify based on matching the specific bar code data.

7–Outputs

Mismatch

Definition: With **Mismatch** enabled, the scanner transmits bar code data when-ever the bar code data information does NOT match the master label.

> **Note**: A noread can still be transmitted if enabled.

Usage: **Mismatch** is typically used as a flag within the host system to prevent an item from being routed in the wrong container.

Good Read

Definition: With **Good Read** enabled, the scanner transmits bar code data on any good read regardless of **Matchcode Type** setting.

> **Note**: A noread can still be transmitted if enabled.

Usage: **Good Read** is used when an application requires all bar code data to be transmitted. It's typically used in tracking applications in which each object is uniquely identified.

When to Output Bar Code Data

Definition: This command allows the user to choose when bar code data can be sent to the host.

Serial Cmd: <**KI**output status,***when to output***>

Default: **As Soon As Possible**

Options: 0 = As Soon As Possible
1 = End of Read Cycle

As Soon As Possible

Definition: Enabling **As Soon As Possible** causes bar code data to be sent to the host immediately after a bar code has been successfully decoded.

> **Note**: More than one decode might in fact be required to qualify as a good decode, depending on how **Decodes Before Output** is set.

Usage: **As Soon As Possible** is useful in applications in which bar code data needs to be moved quickly to the host, typically when the host is mak-ing decisions based on bar code data.

7–Outputs

End of Read Cycle

Note: See "Read Cycle" on page 4-10 for options to end the read cycle.

Definition: Enabling **End of Read Cycle** means that bar code data does not get sent to the host until the read cycle ends with a timeout or new trigger.
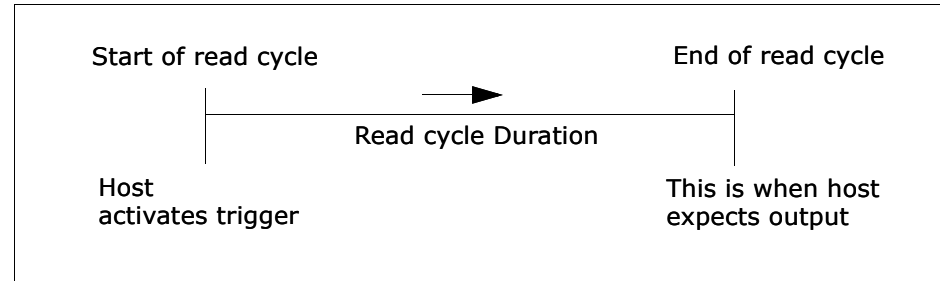

Figure 7-1 Read Cycle

Usage: **End of Read Cycle** is useful in timing-based systems in which the host is not ready to accept data at the time it is decoded.

7–Outputs

Noread Message

Definition: When enabled, and if no bar code label has been decoded before time-out or the end of the read cycle, the noread message will be transmitted to the host.

Usage: Used in applications where the host needs serial verification that a label has not been read and especially useful in new print verification.

Noread Status

Serial Cmd: <**Kkstatus**,message>
Default: **Enabled**
Options: 0 = Disabled   1 = Enabled

Noread Message

Definition: Any combination of ASCII characters can be defined as the noread message.
Serial Cmd: <**Kk**status,**message**>
Default: **NOREAD**

Note: Noread Message will only be transmitted if **Bar Code Output** (page 7-3) is set to **Match**, **Mismatch** or **Good Read**.

Noread Message can be set to any ASCII characters except **NULL <>** and **,** (comma).

7–Outputs

Laser On/Off Status

Definition: When enabled, the laser is ON only during the read cycle. When dis-
abled, the laser operates continuously.

Usage: **Laser On/Off** extends the life of the laser. It is useful where there are
significant time gaps between symbols. It also provides visual confir-
mation of a read cycle duration and minimizes laser exposure to people.

Serial Cmd: <**KC** *laser on/off status*>

Default: **Disabled**

Options: 0 = Disabled

1 = Enabled

7–Outputs

Beeper Status

Definition: A beep is emitted either after each good read of a bar code label or after each noread.

        Note: Beeper will also sound if any of the following occur:

- the scanner is defaulted
- a send/save command from **ESP** or an **Exit** command from any embedded menu
- a **<Z>**, **<Zp>**, **<Zd>**, or **<K,1>** command is sent

Usage: Can be used as an audible verification that either a good read or a noread has occurred.

Status

Serial Cmd: <**Ku*status***>
Default: **On Good**
Options: 0 = Disabled
              1 = On Good
              2 = On Noread

Definition:

Usage: These commands are useful in removing any doubt about the scanner's acceptance and response to host configuration commands.

        For example, if the current **preamble** is "SOM" and <Kd1, START> is entered, the scanner will echo back <Kd1, SOM> since the attempted entry "START" exceeds the four character limit for that command. Therefore it is rejected and the existing "SOM" message is echoed back and remains the preamble message.

Chapter

8

Discrete I/0

Chapter Contents

This section includes instructions for setting up conditions for changing input/output electrical transitions for control of internal and external devices. A discrete I/O (in/out) signal is an electrical transition from one voltage level to another so that digital switching can occur.

Note: The characters **NULL <>** and **,** can only be entered through embedded menus, not through ESP or serial commands.

8—Discrete I/0

Discrete I/O by ESP Menu

Click this button to bring up the **Outputs** menu.

To change a setting, **double-click** the setting and use your curser to scroll through the options.

Discrete I/O by Serial Command

Command Title	cmds	Format
Output 1	**Kv**	<**Kv**output on,polarity,pulse width>
Output 2	**Kw**	<**Kw**output on,polarity,pulse width>

Output 1

Definition:	Sets the discrete output functions for specific user-selected conditions.
Usage:	This option provides switching to host software to control external devices such as PLCs and relays. It is useful for routing and sorting and to prevent mis-packaging and mis-routing.

Output On

Definition:	Allows the user to set the conditions under which an output (or outputs) will be activated.
Serial Cmd:	<**Kv***output on*,*polarity,pulse width*>
Default:	**Noread**
Options:	0 = Mismatch Or Noread
	1 = Match (or good read)
	2 = Mismatch
	3 = Noread

Note: If **Output On** is set to **Mismatch Or Noread**, **Match**, or **Mismatch**, a transition (switching) will not occur unless **Matchcode Type** is enabled and a master label is loaded into memory.

Mismatch or Noread

Definition:	Activates discrete output when the bar code data does not match that of the master label or the bar code has not been decoded before the end of the read cycle.

Match

Definition:	Activates a discrete output when the bar code data matches the master label.
	Note: If you want to output for a good read and **Matchcode** is not enabled, you can enable any output for **Match**.

Mismatch

Definition:	Activates a discrete output whenever the bar code data does not match that of the master label.

Noread

Definition:	Activates a discrete output whenever the bar code data is not decoded before the end of the read cycle.

8—Discrete I/0

Output 1

Polarity

Definition:	Sets the polarity of the discrete output.
Serial Cmd:	<**Kv**output on,***polarity***,pulse width>
Default:	**Negative**
Options:	0 = Negative
	1 = Positive

Pulse Width

Definition:	Sets the time in 10 mS increments that the discrete output remains active.
Serial Cmd:	<**Kv**output on,polarity,***pulse width***>
Default:	**5** (.05 seconds). Corresponds to 50 mS displayed in the menu.
Options:	1 to 255 (0.01 to 2.55 seconds). Divide the number entered on the command line by 100 for time in seconds.

8—Discrete I/0

Output 2

Serial Cmd: <*Kwoutput on,polarity,pulse width*>

Output 2 has the same parameters and default settings as **Output 1**.

8–Discrete I/0

Output 2

8–Discrete I/0

Chapter

9

Utilities

Chapter Contents

Utility commands are generally commands that are performed during scanner opera-
tions to check read rates, determine read rates or perform miscellaneous operations
on scanner hardware. Serial utility commands are not prefaced with a "K". Nor do
they require an initialization command (<A> and <Z>). They can be entered from
within any terminal program or from within ESP-MP in the **Terminal** window.

Note: The characters **NULL <>** and **,** can only be entered through embedded menus,
not through ESP or serial commands.

Utilities by ESP Menu

Click this button to bring up the **Utilities** menu

To change a setting, **right-click** the set- ting and use your curser to scroll through the options.
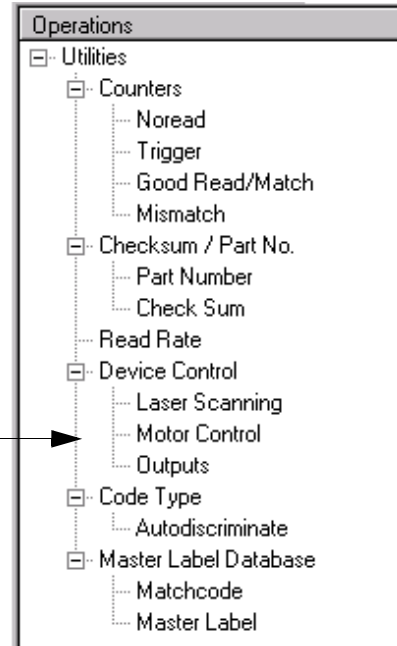
Utilities by Serial Command

Table 9-1 Summary of Utility Serial Commands

Command Type	Command	Name
Counters	**\<N>**	Noread Counter
	\<O>	Noread Counter Reset
	\<T>	Trigger Counter
	\<U>	Trigger Counter Reset
	\<V>	Good Read/Match Counter
	\<W>	Good Read/Match Counter Reset
	\<X>	Mismatch Counter
	\<Y>	Mismatch Counter Reset
Part #/Checksum	**\<!>**	Display Checksums of EPROM
	\<#>	Display Part Number
Read Rate	**\<Cp>**	Enter Single Label Percent Rate Test
	\<C>	Enter Single Label Decode Rate Test
	\<J>	Exit Decode Rate and Percent Rate Test
Device Control	**\<H>**	Enable Laser Scanning
	\<I>	Disable Laser Scanning
	\<KE>	Motor On
	\<KF>	Motor Off
	\<L1>	Programmable Output 1
	\<L2>	Programmable Output 2
Code Types	**\<P>**	Autodiscriminate All Codes
	\<Q>	Enable Code 39 Only
	\<R>	Enable Codabar Only
	\<S>	Enable I 2/5 Only
Trigger	**\<char>**	Serial Trigger Character
Restore/Save	**\<A>**	Reset (does not save for power-on)
	\<Ad>	Default
	\<An>	Restore Saved Settings
	\<Z>	Reset/Save (for power-on)
	\<Zp>	Save Factory Settings
	\<Zd>	Save/Restore Factory Defaults
Master Label	**\<E>**	Enable Master Label
	\<F>	Disable Master Label
	\<G>	Store next label scanned as the master label
	\<)data)>	Enter label data as master label.
	\<)>	Request master label information
	\<))>	Delete Master Label

9–Utilities

Counters

Counter commands can be a numeric value from 00000 to 65,535. After reaching the maximum numeric limit of 65,535, the counter will automatically roll-over and start counting again at 00000. To obtain the cumulative total of counts after the roll-over has occurred, add 65,536 per each roll-over (the scanner does not keep track of the number of roll-overs) to the current count.

Note: All counter values will be lost if power is recycled to the scanner or the scanner receives a reset or save command.

By ESP

You can access **Counters** from the **Utilities** menu.

Right-click the appropriate counter option and select **Request** to display count or **Clear** to set counter to zero. Or, right-click on **Counters** and select **Request All**.
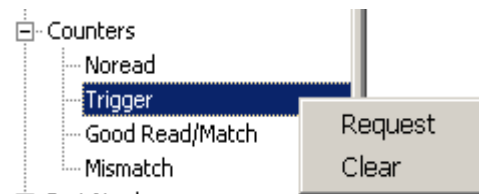
By Serial Command

Noread Counter
Sending **<N>** displays the total number of noreads that have occurred since the last reset.

Noread Counter Reset
Sending **<O>** sets Noread Counter to 00000.

Trigger Counter
Sending **<T>** displays the total number of triggers since the last reset.

Trigger Counter Reset
Sending **<U>** sets the trigger counter to 00000.

Good Read/Match Counter

Sending **\<V\>** displays the total number of good reads matching the master label or, if Master Label is not enabled, the number of good reads since the last reset. This counter is always enabled, but will only work as a match count when Master Label is enabled. If Master Label is not enabled, this counter records the number of good reads. This count can be requested at any time.

Good Read/Match Counter Reset

Sending **\<W\>** sets the Match Counter to 00000.

Mismatch Counter

With Matchcode enabled sending **\<X\>** displays the number of decoded labels since the last reset that do not match the master label.

Mismatch Counter Reset

Sending **\<Y\>** sets the Mismatch Counter to zero.

9—Utilities

Part Number

You can send a request to the scanner for associated part numbers.

By ESP

You can access **Part Numbers** from the **Utilities** menu.

Right-click **Part Number** and select **Request** to see the associated part number.

By Serial Command

Upon sending **<#>** the scanner returns software part numbers for application code.

9–Utilities

Checksum

A Checksum verifies a scanner's firmware.

By ESP

You can access **Checksum** from the **Utilities** menu.

Right-click **Checksum** and select **Request** to see the associated check sum number.

By Serial Command

Upon sending **<!>** the scanner returns two 4-digit hex numbers that are the check sums for the application code.

9–Utilities

Read Rate

By ESP

You can access **Read Rate** from the **Utilities** menu.

To start or end a read rate test, right-click **Read Rate** and select **Start** or **Stop**.

To change from percent read rate to decodes per second, first end the read rate by selecting **Stop**, then right-click select **Decodes/Sec**.
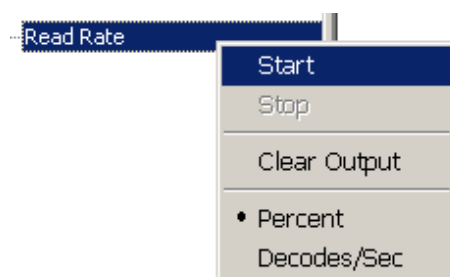
By Serial Command

Enter Single Label Decodes/Second Test

Sending **<C>** instructs the scanner to transmit the decodes per second and label data (if any). The decode rate can vary dramatically due to the angle and location of the label in relation to the scan line. This test is very useful in aligning and positioning the scanning device during installation.

Enter Single Label Percent Test

Sending **<Cp>** instructs the scanner to transmit the percentage of decodes and any scanned label data.

End Read Rate Test

Sending **<J>** ends both the **Percent** test and the **Decodes/Second** test for both single and multi-label.

Device Control

By ESP

You can access **Device Control** from the **Utilities** menu.

For any of the **Device Control** commands, **right-click** on the command and make your selection.
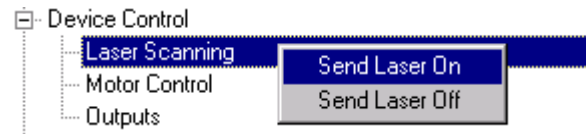
By Serial Command

Enable Laser Scanning

Sending **<H>** will turn the laser on continuously.

Note: Enable Laser Scanning does not relate to **Laser On/Off** command.

Disable Laser Scanning

Sending **<I>** will turn the laser off and end the current read cycle. This feature is useful during extended periods of time when no bar code labels are being scanned or the scanner is being configured. Disabling laser scanning will not affect any downloaded commands to the scanner.

Note: Disable Laser Scanning does not relate to **Laser On/Off**, which when enabled also turns off the laser but only between read cycles.

Motor On

Sending **<KE>** turns the spinning mirror on (if not already running).

Note: the spinning mirror reaches full speed after a short time delay.

Motor Off

Sending **<KF>** turns the spinning mirror motor off. This command is useful for long idle periods.

Note: Laser turns off whenever motor is off.

Output 1

Sending **<L1>** pulses Output 1 (regardless of Master Label or Output 1 status).

Output 2

Sending **<L2>** pulses Output 2 (regardless of Master Label or Output 2 status).

Code Type

See also "Autodiscriminate" on page 5-13 for a discussion of **Utility** commands for **Code Types** and **Autodiscrimination**.

Default: **Code 39 (only)**

Options: **<P>** Enables most code types.

          <Q> Enable Code 39 only

          <R> Enable Codabar only

          <S> Enable I 2/5 only

9–Utilities

Master Label Database

Note: You must set **Matchcode Type** first before master labels can take effect. See "Matchcode" on page 6-4.

You can access **Master Label** operations from the **Utilities** menu.

Enter Master Label Data

Definition:	This command allows the user to enter text as the master label.
ESP:	1. Open the **Utilities** menu and double-click on **Master Label**.
	2. Enter text in the text block, right-click and select **Send** or **Send Save**.
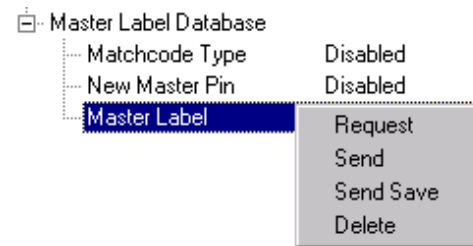
Serial Cmd:	<**)data)**>
	Enter the data in place of the x's.

Request Master Label Data

Definition:	This command will display the current master label data.
ESP:	1. Open the **Utilities** menu and right-click on **Master Label**.
	2. Select **Request** to display the current master label.
Serial Cmd:	Sending <**)**> will display the current master label.

Delete Master Label Data

Definition:	This command will delete the current master label data.
ESP:	1. Open the **Utilities** menu and double-click on **Master Label**.
	2. Delete text in the text block, right-click and select **Send** of **Send Save**.
Serial Cmd:	Sending <**))**> will delete the master label.

Master Label Database

Chapter

10

Terminal Mode

Contents

This section describes the terminal window and macro functions.

Terminal Window

To use the terminal mode, click on the **Terminal** button.

You will see the following window:
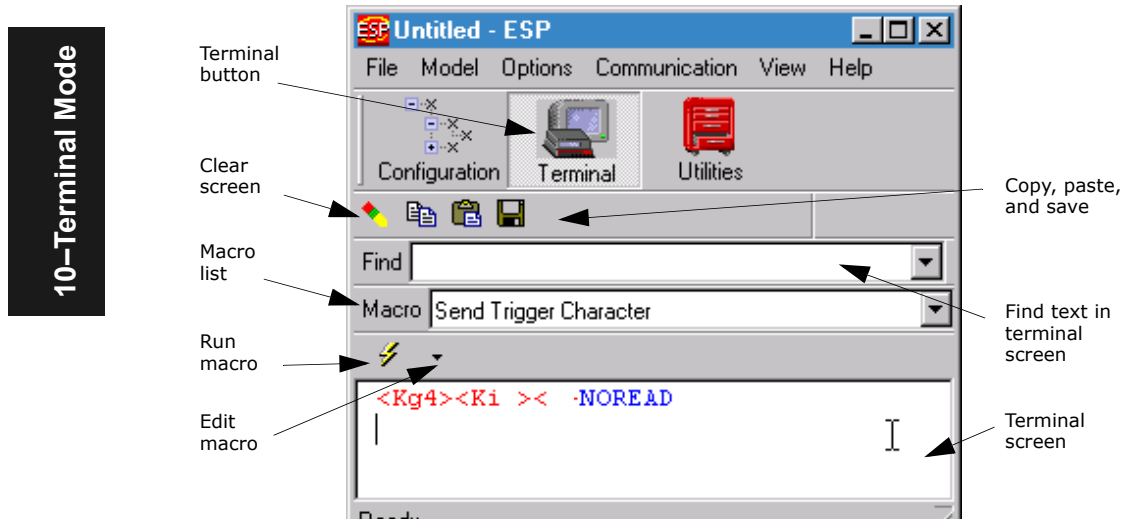
Figure 10-1 Terminal Window

The terminal screen allows you to enter serial commands (in **red**) from the macro box, by copying, or directly from your keyboard.

The terminal screen also displays bar code data or information from the scanner (in **blue**).

You can also right click in the terminal screen to bring up a handy option box.

Find Function

The Find box allows you to enter text strings to be searched for in the terminal window. For example a series of bar codes have been scanned into the terminal view and you want to determine if a particular bar code starting with ABC has been read.

1. Type **ABC** into the Find box and

2. Press the **return key**.

The first instance of **ABC** will be high-lighted in the terminal window.

3. Press the **return key** again for the next instance of **ABC**.

Macros

Macros can be stored in a pull down macro selection box, edited in a separate window, and executed by clicking the macro icon.

When you click on the macro icon, the current macro title displayed in the **Macro** box is copied into the terminal window. If this is a command as in the example below, the command is also sent to the scanner at the same time it is displayed.

Macro Software Part Number

<#>35-403010-10

Running a Macro

To enable a serial trigger by using a macro,

1. Click in the **Macro** pull-down box and select **Enable Serial Trigger**.
2. Click on the macro icon.

Macro Enable Serial Trigger

<Kg4><Ki >

This displays the macro command in the terminal screen and sends the command to the scanner.

To send the trigger character by using a macro,

1. Click in the **Macro** pull-down box and select the **Send Trigger Character**.
2. Click on the macro icon.

Macro Send Trigger Character

< >NOREAD

Notice the NOREAD response from the scanner.

Note: You can also send this serial command by typing **<?>** in the terminal window.
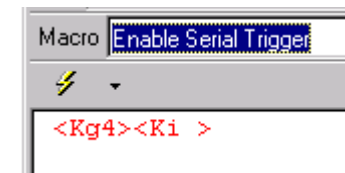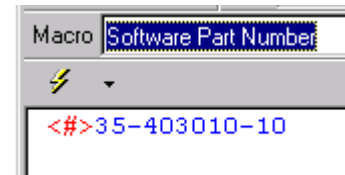
Editing a Macro

To change the **Enable Serial Trigger** macro to make **%** the new serial trigger character, do the following:

1. Click on the little **down arrow** to the right of the macro icon or **right-click** in the terminal window to bring up the following blue **Edit Macros...** box:
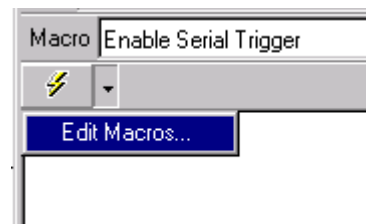
2. Click on the **Edit Macros...** box. This will bring up the macro editor list:

3. **Select** the macro you want to edit, in this case **Enable Serial Trigger**, and **right-click**.

    This will bring up a smaller option dialog that allows you to insert a new macro, or to delete or edit the current macro.

4. Select **Edit Macro**.

    This will display the **Macro Entry** dialog as shown below:
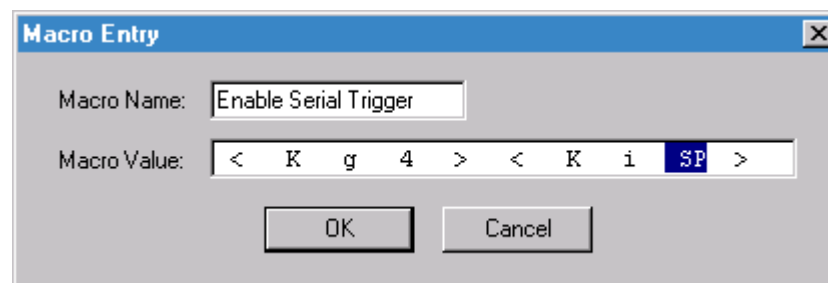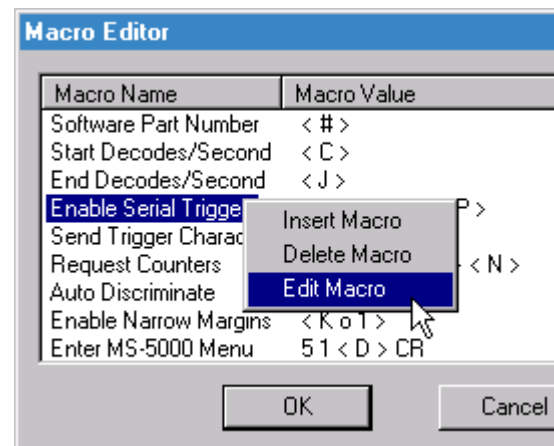
5. Next, select the **SP** character in the **Macro Value** line, type in a **$** character and click **OK** to update the macro.

Appendices

Chapter Contents

Appendices

Appendix A — General Specifications

Key Features

- Multiple label and symbology reading
- ESP software
- Ultra compact size

Mechanical

Depth: 2.15" (54.6mm)
Width: 2.61" (66.3mm)
Height: .70" (17.8mm)
Weight: 3 oz. (.85g)

Environmental

Enclosure rating: IP54
Humidity: Up to 90% (non-condensing)

Emissions and Immunity

Radiated and conducted emissions of ITE equipment: EN 55022:98, Class B

Laser Light

Semiconductor visible laser diode:
Safety class: CDRH Class II

Scanning Parameters

Scanning mirror type: Rotating,10 faceted
Scan rate: 60 scans per second (low density) 100 scans per second (high density)
Scan width angle: Typically 60°; Pitch: ±50° max.; Skew: ±40° max.
Label contrast: 25% min. absolute dark to light differential at 670nm wavelength.

Communication

RS232, RS422/485

Code Types

Standard offering: Code 128, Code 39, Code 93, Codabar, Interleaved 2 of 5
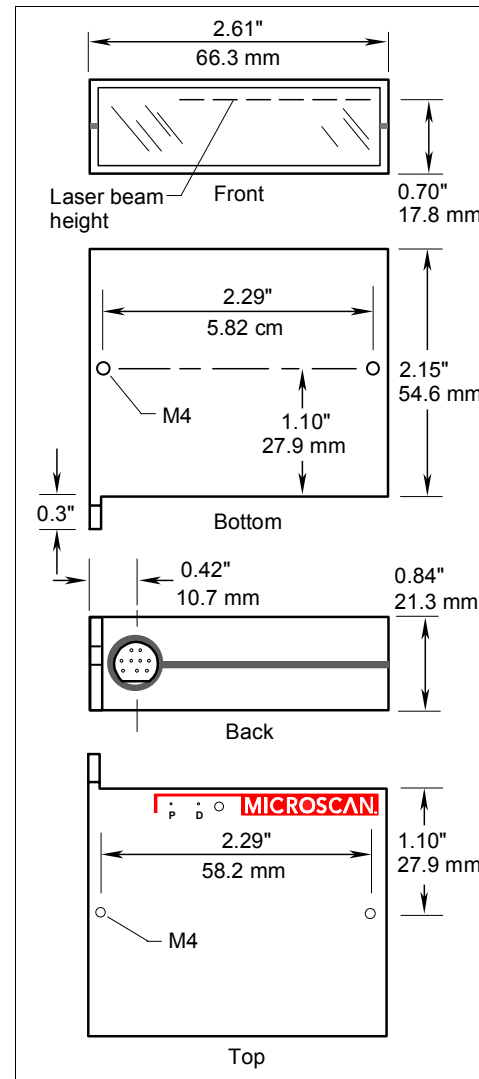
Figure A-1 VS-310 Dimensions

FIS Options

FIS #	Communications	Density	Spinning Mirror Type
-009	RS232	Low	Single Line
-010	RS232	Low	Raster
-011	RS232	High	Single Line
-012	RS232	High	Raster
-013	RS422/485	Low	Single Line
-014	RS422/485	Low	Raster
-015	RS422/485	High	Single Line
-016	RS422/485	High	Raster

Read Ranges

Table A-1 Read Range and Scan Width Data

Narrow-Bar-Width	Read Range	Scan Width Data
HIGH DENSITY (60 SPS)		
.005" (0.15 mm)	2.25" to 3.0" (5.72 to 7.62 cm)	3.15" @ 2.75" (8.0 @ 6.99 cm)
.0075" (0.191 mm)	2.0" to 3.5" (5.08 to 11.43 cm)	4.0" @ 2.75" (10.16 @ 6.99 cm)
LOW DENSITY (100 CPS)		
.0075" (0.191 mm)	2.5" to 4.5" (6.35 to 11.43 cm)	4.0" @ 2.75" (10.16 @ 6.99 cm)
.010" (0.254 mm)	2.0" to 5.5" (5.08 to 13.97 cm)	4.0" @ 2.75" (10.16 @ 6.99 cm)
.015" (0.381 mm)	2.0" to 6.5" (5.08 to 16.51 cm)	4.0" @ 2.75" (10.16 @ 6.99 cm)
.020" (0.508 mm)	2.0" to 7.25" (5.08 to 18.42 cm)	4.0" @ 2.75" (10.16 @ 6.99 cm)
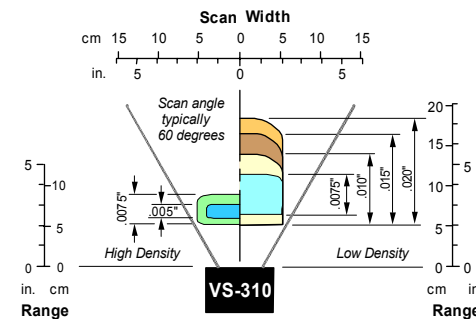
Figure A-2 Low Density and High Density Scan Range/Width Profile

Appendices

Beeper

Beeps on output (good read, noread, on/off).

LED Indicators

Table A-1 VS-310 Status Lights

LED	State	Status
PWR	Yellow On	Scanner has power
RDY	Green On	Scanner is ready to read
GD/RD	Green On	Label is qualified as good

Safety Certifications

FCC, CDRH, CE, UL/cUL, TüV, BSMI

Product specifications are given for typical performance at 25°C (77°F) using grade A labels. Some performance characteristics may vary at high temperatures or other environmental extremes.

© Microscan Systems, Inc. Specifications subject to change.

Appendices

Appendix B — Electrical Specifications

Power Input: +5VDC ±4% regulated @ 200 mA with 200 mV p-p max. ripple.

Cabling: A mating connector kit, part no. 98-200021-01, is included with each VS-310.

Pin Assignments

Table A-2 VS-310 Host Connector, 9-pin

Pin	Host RS232	RS422/485
1	Power +5 VDC (In)	
2	Output 1 TTL[a]	
3	RxD	TxD (+)
4	Signal ground	
5	TxD	TxD (−)
6	Trigger input	
7	Default pin	
8	Output 2 TTL (+)[a]	RxD (+)
9	RS485 Driver enable	RxD (−)
Shield	Chassis ground[b]	

a. Can sink 3.5mA and source 60µA.

b. Chassis ground and signal ground are internally connected through a zero ohm resistor.

Caution:

1. Be sure all cables are connected **BEFORE** applying power.
2. Always power down **BEFORE** disconnecting any cables.

Accessory Cable

An accessory cable that can be purchased separately, part number 61-130019-03, has a 9-pin right-angle connector that attaches to the VS-310 scanner and a 15-pin connector that can attach to the IB-105 interface box.

9-pin Scanner Connector   15-pin IB-105 Connector
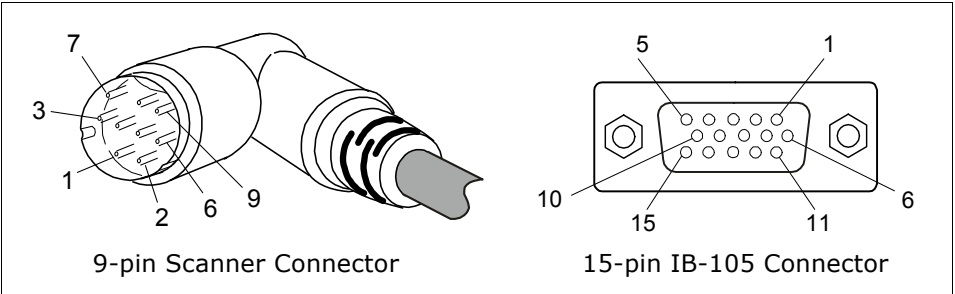
Figure A-1 VS-310 Scanner to IB-105 Cable Connector 61-130019-03

Appendices

Appendix C — Mating Connector

A mating connector kit, part no. 98-200021-01, is included with each VS-310 which can be attached to a cable as shown in the following steps:
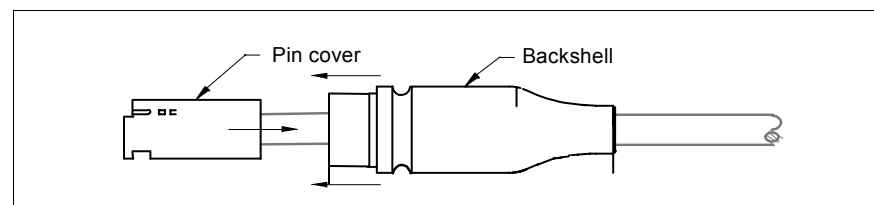
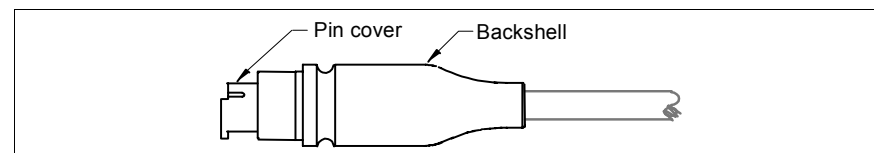1. Slide cable through backshell and expose wires for soldering.
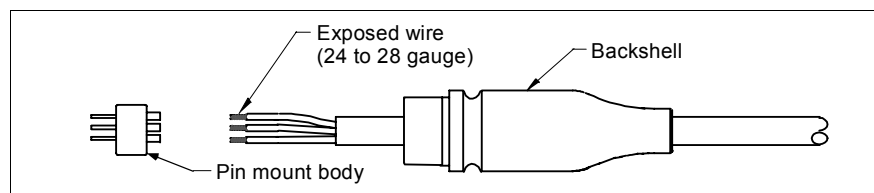
2. Solder wires to appropriate pins in pin mount body.
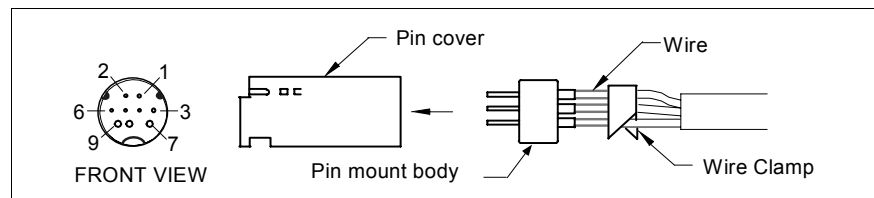
3. Apply wire clamp around wires and push the pin mount body into the pin cover until it snaps into place.

4. Slide the pin cover into the backshell until its snaps into place.

Note: To help achieve Class B conformance, both ends of the cable shield should be connected to ground.

Appendices

Appendix D — Connectivity with the IB-105

The IB-105, Microscan P/N 99-420001, is a separately sold item that can be used to enhance the operation of the VS-310. See also "Hardware Required" on page 1-2.

Specifications of IB-105

Mechanical

Length: 4.5 in. (114.3 mm)
Width: 3 in. (76.2 mm)
Height: 1.5 in. (38.1 mm)

Internal Relay

Uses the scanner's output 1 signal to drive a one watt internal relay that internally connects pins 15 and 17 of the host connector and pins 2 and 6 on the trigger connector. The normally open relay contacts are closed when output 1 is high.

Environmental

Operating Temperature: 0 to 50°C
Humidity: 90% @ 40°C maximum

Electrical

Supply Voltage Input: Regulated +5VDC @ 20 mA

Maximum ripple: 200 mV p–p with VS-310 +5VDC @ 500 mA

Maximum ripple: 200 mV p-p with VS-310 +5VDC @ 200 mA

Communications

RS232, RS422, RS485
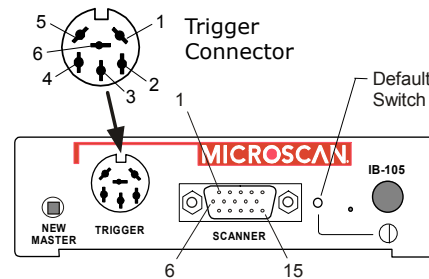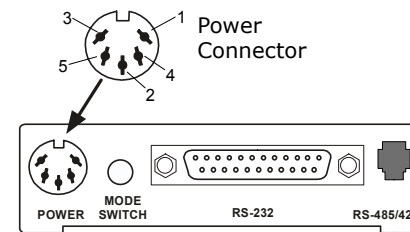
Figure A-2 Front of IB-105

Figure A-3 Back of IB-105

IB-105 Connectors

Scanner Connector. A 15-pin connector provides connectivity to the scanner.

25-pin (host) "RS232" Connector. The 25-pin host connector, labeled "RS232" on the box, can also be used in certain configurations to route RS422/485.

RS485/422 (LAN) Connector. See Table A-7 on page A-11 for pinouts.

Power Connector. Designed to accept the standard +5V Microscan power supply. Chassis ground must be properly connected for the IB-105 and scanner to pass all regulatory requirements (FCC, CE, CISPER-22).

Trigger Connector. Connects to an object detector.

IB-105 Switches

Default Switch. Provides a convenient way to restore factory configuration settings to the scanner. This switch is recessed to prevent accidentally defaults. See "Defaulting/Saving/Initializing" on page A-18.

Power Switch. Accesses +5V power supply (pin 3 of power connector).

Mode Switch. **IN** or **OUT** according to configuration

IB-105 Configuration Options

Note: See tables starting on page A-11 for IB-105 pinouts and mode switch settings.

Because the IB-105 is a very flexible device used with more than one scanner model, you need to verify cable type, IB-105 model, and mode switch setting for your option.The IB-105, Microscan P/N: 99-420001, is a separately sold item that can be used to enhance the operation.

For the VS-310, the IB-105 is available in four basic configurations as shown in table A-4 on page A-13.

Table A-3 IB-105 Configurations IB-105 Configurations

Configura-tion	P/N 99-420001	Mode Switch	Function
1	-01	OUT	RS232 breakout device to provide connectivity between the scanner, host, power, and trigger sources.
2	-01	IN	RS232 to RS422/485 converter
3	-04	OUT	Multidrop setup device
4	-01	IN	Long distance communications converter from RS232 to RS422
	-05	OUT	Long distance communications converter from RS422 to RS-232

Configuration 1 — RS232 Breakout Device

Provides RS232 connectivity for the VS-310 to the host via a 25-pin connector, a triggering device via a 6-pin connector, and to a power supply via a 5-pin connector.
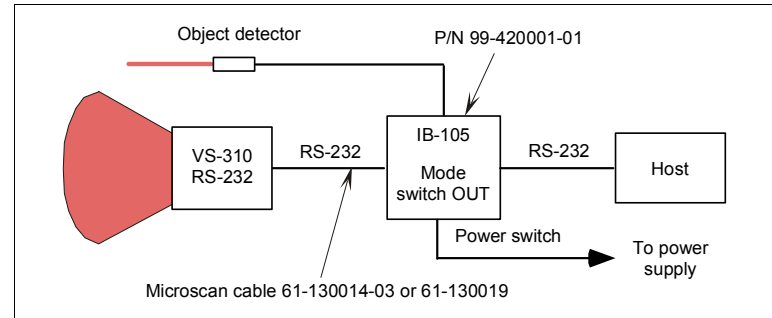

Figure A-4 IB-105, Configuration 1

Configuration 2 — RS232 to 422/485 Converter

The IB-105 converts RS232 signals (TXD, pin 2, RXD, pin 3 of the 15-pin scanner connector) to RS485 levels which are available at both the RS-485/422 (LAN) connector and the 25-pin RS232 (host) connector. (See tables A-A-26, A-A-27, A-A-28, and A-A-30 for pinouts.)

In this mode the scanner must be set up for Multidrop communications.
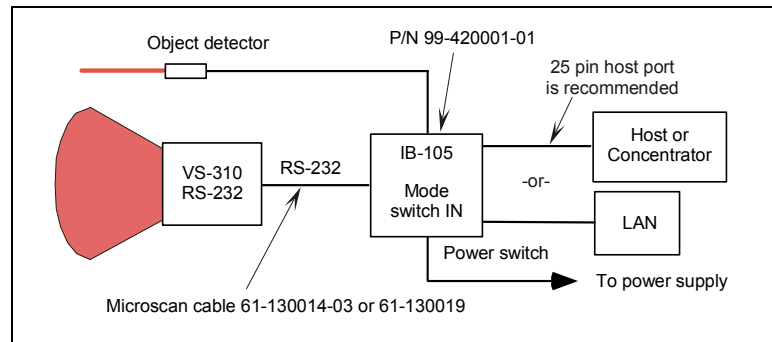
Figure A-5 IB-105 Configuration 2

Appendices

Configuration 3 — Multidrop Setup Device using RS232

The IB-105 can be used to setup a VS-310 that has an on board RS422/485 option. To communicate between an RS-232 host and the VS-310, the IB-105 converts the host's RS232 levels to RS422/485 levels.
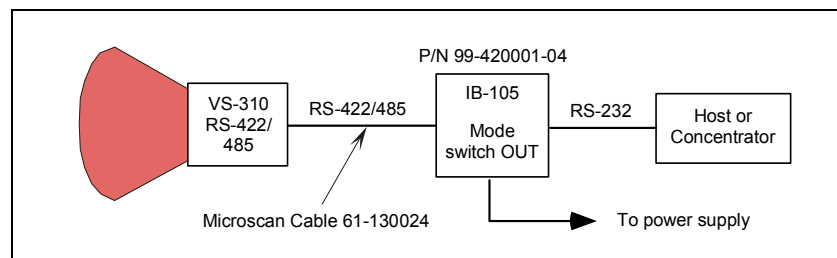

Figure A-6 IB-105 Configuration 3

Configuration 4 — Extended Range RS232 using RS422

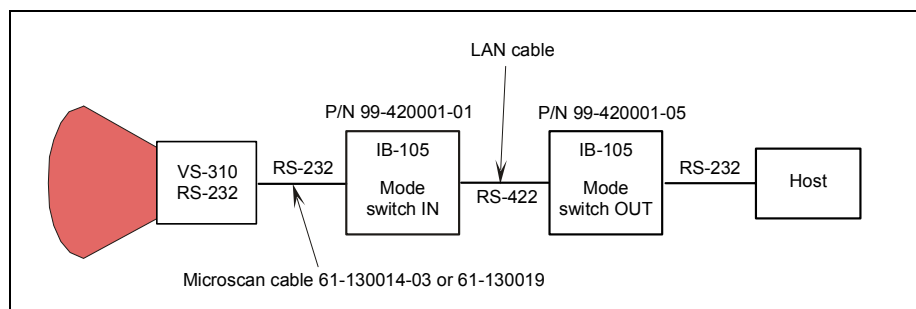This configuration allows you to use two IB-105s to extend communications distance between a VS-310 and a host configured for RS232.

Figure A-7 IB-105 Configuration 4

IB-105 Connectors and Pinouts

Table A-4 IB-105 15-pin Scanner Connector

Pin	Using RS232 Cable (P/N 61-130014 or 61-130019)	Using RS422/485 Setup Cable (P/N 61-130024)[a]
1	+5 VDC (out)	+5 VDC (out)
2	RS232 TXD (in)	RS422/485 TX – (in)
3	RS-232 RXD (out)	RS422/485 RX – (out)
4	Signal ground	Signal ground
5	NC	NC
6	NC	RS422/485 TX + (in)
7	Output-1 (in) (to pin 8, host conn.) (sink 3.5 mA and source 60 μA[b])	Output-1 (in) (to pin 8, host conn.) (sink 3.5 mA and source 60 μA[a])
8	Default (out)	Default (out)
9	Trigger (out) (3V to 24V)	Trigger (out) (3V to 24V)
10	NC	RS422/485 RXD + (out)
11	NC	NC
12	RS422 DE (out)	NC
13	Chassis ground	Chassis ground
14	Output-2 (in) (to pin 6, host conn.) (sink 3.5 mA and source 60 μA)	NC
15	NC	NC

a. In certain configurations the "RS232" connector can be used to route RS422/485 signals.

b. Output-1 also causes closure of an isolated relay between pin 15 and pin 17 of the IB-105 host connector.

Table A-5 IB-105 Power Connector

Pin	Function
1	Signal ground
2	Chassis ground
3	+5 VDC
4	NC
5	NC

Table A-6 IB-105 Trigger Connector

Pin	Function
1	Trigger (in) (to pin 9 of scanner conn.)
2	Relay contact normally open (up to 1watt)
3	VCC (+5V)
4	VBB (+12V, if using Microscan's standard object detector[a])
5	Ground
6	Relay common

a. P/N 99-440001-03

Table A-7 IB-105 6-pin LAN Connector6-pin LAN (RJ11) Connector

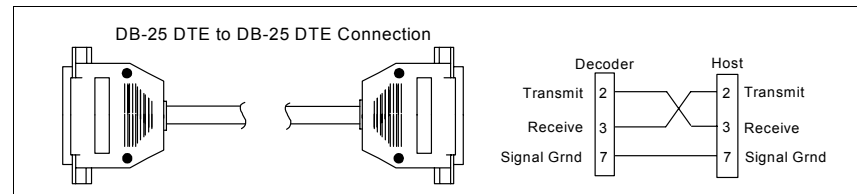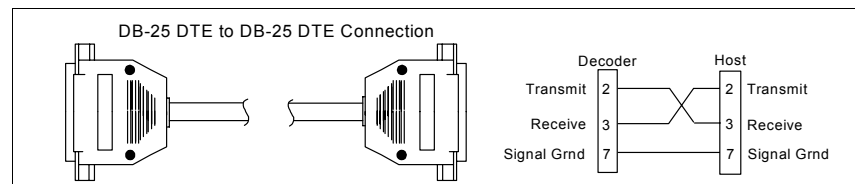| Pin	Function
1	Chassis ground
2	RS422/485 RX + (in)
3	RS422/485 RX – (in)
4	RS422/485 TX + (out)
5	RS422/485 TX – (out)
6	Chassis ground

Figure A-8 IB-105 to Host Null Modem Cable

Table A-8 IB-105 25-pin Host Connector

Pin #	Configuration 1, P/N 99-420001-01 Configuration 4, P/N 99-420001-05[a] Mode Switch **OUT**	Configuration 2, P/N 99-420001-01 Configuration 4, P/N 99-420001-01 Mode Switch IN	Configuration 3 P/N 99-420001-04 Mode Switch **OUT**
1	Chassis ground	Chassis ground	Chassis ground
2	RS232 TXD (out)[b]	NC	RS422/485 TX (out)
3	RS232 RXD (in)	NC	RS422/485 RX (in)
4	NC	NC	RS422/485 TX (out)
5	NC	NC	RS422/485 RX (in)
6	Output-2 (out) (from pin 14 of scanner conn.)	Output-2 (out) (from pin 14 of scanner conn.)	NC
7	Ground	Ground	Ground
8	Output-1 (out) (from pin 7of scanner conn.)	Output-1 (out) (from pin 7of scanner conn.)	Output-1 (out) (from pin 7, scanner conn.)
9	+5VDC (out)	+5VDC (out)	+5VDC (out)
10	Trigger (in) (same as pin 1 of trigger conn.) to pin 9 of scanner connector	Trigger (in) (same as pin 1 of trigger conn.) to pin 9 of scanner connector	Trigger (in) (same as pin 1 of trigger conn.) to pin 9 of scanner connector
11	Default (in) to pin 8 of the scanner connector and the default switch	Default (in) to pin 8 of the scanner connector and the default switch	Default (in) to the default switch and pin 8 of the scanner connector
12	NC	NC	NC
13	NC	RS422/RS485 RX + (in)	NC
14	NC	RS422/RS485 TX − (out)	NC
15	Output switch normally open (up to 1watt) (common with pin 17)	Output switch normally open (up to 1watt) (common with pin 17)	Output switch normally open (up to 1watt) (common with pin 17)
16	NC	RS422/RS485 RX − (in)	NC
17	Output switch normally open (up to 1watt) (common with pin 15)	Output switch normally open (up to 1watt) (common with pin 15)	Output switch normally open (up to 1watt) (common with pin 15)
18	NC	NC	NC
19	NC	RS422/RS485 TX+ (out)	NC
20	NC	NC	NC
21	NC	NC	NC
22	Ground	Ground	Ground
23	NC	NC	NC
24	NC	NC	NC
25	RS422 DE (out)	RS422 DE (out)	NC

a. Configuration 4 (to host), 99-420001-05, is similar to Configuration 1 except that only pins 2 and 3 apply in the conversion of RS422 to RS232.
b. See figure A-A-8 for null modem cable diagram.

DB-25 DTE to DB-25 DTE Connection

Decoder   Host
Transmit   2 ——×—— 2   Transmit
Receive   3 ——×—— 3   Receive
Signal Grnd 7 —————— 7   Signal Grnd

Appendix E — Serial Configuration Commands

The following table is a list of all the available serial configuration commands (also called *K commands*). These commands are also listed at the beginning of each appli-cable chapter. For utility (operational) commands see

Table A-9 Complete List of Serial Configuration Commands in Alphabetical Order

Command Title	Cmd	Format
Response Timeout	**KA**	<**KA***response timeout*>
Host Port Parameters	**Ka**	<**Ka***baud rate,parity,stop bits,data bits*>
Intercharacter Delay	**KB**	<**KB***intercharacter delay*>
Laser On/Off	**KC**	<**KC***laser on/off status*>
LRC	**Kc**	<**Kc***status*>
Preamble	**Kd**	<**Kd***status,preamble*>
Postamble	**Ke**	<**Ke***status,postamble*>
Host Protocol	**Kf**	<**Kf***protocol*>
Trigger Mode	**Kg**	<**Kg***trigger mode,trigger filter duration*>
End of Read Cycle	**Kh**	<**Kh***end of read cycle,timeout duration*>
Serial Trigger Character	**Ki**	<**Ki***serial trigger character*>
External Trigger State	**Kj**	<**Kj***external trigger state*>
Noread Message	**Kk**	<**Kk***status,output*>
Multilabel	**KL**	<**KL***number of labels,multilabel separator*>
Bar Code Output	**Kl**	<**Kl***status,when to output*>
Good Decode Reads	**Km**	<**Km***decodes before output*>
Matchcode Type	**Kn**	<**Kn***status*>
Narrow Margins	**Ko**	<**Ko***narrow margins status*>
Scanner Type (factory)	**KP**	<**KP***density*>
Code 39	**Kp**	<**Kp***status,check digit status,check digit output,large inter-character gap,fixed code length status,fixed code length,full ASCII*>
Codabar	**Kq**	<**Kq***status,start & stop match,start & stop output,large intercharacter gap,fixed code length status,fixed code length,check digit type,check digit output*>
Interleaved 2 of 5	**Kr**	<**Kr***status,check digit,check digit output,length 1,length 2*>
Code 128	**Kt**	<**Kt***status,fixed length status,fixed code length*>
Beeper	**Ku**	<**Ku***status,speed*>
Output 1	**Kv**	<**Kv***output on,polarity,pulse width*>
Output 2 (RS-232 only)	**Kw**	<**Kw***output on,polarity,pulse width*>
Background Color	**Kx**	<**Kx***background color*
Code 93	**K!**	<**K!***status,fixed code length status,fixed code length*>

Appendices

Appendix F — Serial Command Format

Serial commands are of two types: utility and configuration.

Rules that apply to both utility and configuration commands

• A less than **<** and greater than **>** characters enclose the commands.
• Commands and data are "case sensitive." That is, characters must be entered as upper or lower case, as specified.

Serial Utility Commands

These are sent during operations and are not followed by a **<A>** or **<Z>.** See Table 9-1, "Summary of Utility Serial Commands," on page 9-3.

Serial Configuration "K" Commands

These begin with a single **K** character followed by a single character, data fields, and an initializing command, as follows:

<**K***parameterdata,data,...etc.*><*initializing command*>

An initializing command **<A>** or **<Z>** always follows the command. A **<Z>** initializes the scanner's memory and saves for power-on; an **<A>** initializes the scanner's memory but does not save for power-on.

For example, to enable **UPC** and save the change for power-on, send **<K1><Z>**.

To change **Baud Rate** and reset without saving changes for power-on, send **<Ka3><A>**.

Serial Configuration Command Conventions:

• All data fields (except the last) must be followed by a comma (without a space).
• The following characters cannot be used: , < > NUL.
• All fields preceding a modified field must be included.
• If there is no change in preceding fields, then commas alone can be entered in these fields. For example, if only the last field in the following command is changing, **<Ka4,1,0,0>** can be entered as **<Ka,,,0>**.
• All fields *following* a modified field can be omitted. For example, to change **Baud Rate**, send **<Ka3>**.

Concatenating Configuration Commands

Commands can be concatenated (added together) in a single string or data block.

Serial Command Status Request

To ensure that any command was received and accepted, you can send the **Show Scanner Status** command: **<?>**.

The status of a specific serial command can be requested by entering the command followed by a question mark.

Entering Special Characters in Serial Commands

To enter control characters within a serial command, hold down the control key while typing the desired character.

Entering Special Characters in Embedded Menus

Control Characters

Control characters entered on the command line are displayed in the menu as mnemonic characters, such as: <CR><LF><NUL><NUL>.

Press **SP** (the space bar) once, then enter the control character by holding down the control key and simultaneously pressing the desired character. For example to define a line feed, press **SP**, then **Control** and **J** simultaneously. It is displayed as ^J on the command line and as <LF> in the menu when the screen is refreshed.

To Define a Carriage Return as a Character

Press **SP**, then **CR**. It is displayed as ^M on the command line and as <CR> in the menu when the screen is refreshed.

To Define a Space as a Character

Press **SP** twice. It is displayed as a blank space in the menu when the screen is refreshed. While it appears that nothing has been assigned, the hex value 20 will be sent during data transmission.

To Select NUL as the Character

Press **SP**, then a **0** (zero). It is displayed as <NUL> in the menu when the screen is refreshed.

Appendices

Appendix G — ASCII Table

Table A-10 ASCII Table with Control Characters

Dec	Hex	Mne	Ctrl	Dec	Hex	Ch	Dec	Hex	Ch	Dec	Hex	Ch
00	00	NUL	^@	32	20	SP	64	40	@	96	60	`
01	01	SOH	^A	33	21	!	65	41	A	97	61	a
02	02	STX	^B	34	22	"	66	42	B	98	62	b
03	03	ETX	^C	35	23	#	67	43	C	99	63	c
04	04	EOT	^D	36	24	$	68	44	D	100	64	d
05	05	ENQ	^E	37	25	%	69	45	E	101	65	e
06	06	ACK	^F	38	26	&	70	46	F	102	66	f
07	07	BEL	^G	39	27	'	71	47	G	103	67	g
08	08	BS	^H	40	28	(	72	48	H	104	68	h
09	09	HT	^I	41	29	)	73	49	I	105	69	i
10	0A	LF	^J	42	2A	*	74	4A	J	106	6A	j
11	0B	VT	^K	43	2B	+	75	4B	K	107	6B	k
12	0C	FF	^L	44	2C	,	76	4C	L	108	6C	l
13	0D	CR	^M	45	2D	-	77	4D	M	109	6D	m
14	0E	SO	^N	46	2E	.	78	4E	N	110	6E	n
15	0F	SI	^O	47	2F	/	79	4F	O	111	6F	o
16	10	DLE	^P	48	30	0	80	50	P	112	70	p
17	11	DC1	^Q	49	31	1	81	51	Q	113	71	q
18	12	DC2	^R	50	32	2	82	52	R	114	72	r
19	13	DC3	^S	51	33	3	83	53	S	115	73	s
20	14	DC4	^T	52	34	4	84	54	T	116	74	t
21	15	NAK	^U	53	35	5	85	55	U	117	75	u
22	16	SYN	^V	54	36	6	86	56	V	118	76	v
23	17	ETB	^W	55	37	7	87	57	W	119	77	w
24	18	CAN	^X	56	38	8	88	58	X	120	78	x
25	19	EM	^Y	57	39	9	89	59	Y	121	79	y
26	1A	SUB	^Z	58	3A	:	90	5A	Z	122	7A	z
27	1B	ESC	^[	59	3B	;	91	5B	[	123	7B	{
28	1C	FS	^\	60	3C	<	92	5C	\	124	7C	|
29	1D	GS	^]	61	3D	=	93	5D	]	125	7D	}
30	1E	RS	^^	62	3E	>	94	5E	^	126	7E	~
31	1F	US	^_	63	3F	?	95	5F	_	127	7F	D

Appendices

Table A-11 Communication Protocol Commands

Protocol Command (Mnemonic displayed on Microscan menu)	Control Characters (Entered in menu or serial command)	Hex Code	Effect of Command
RES	^D	04	Reset
REQ	^E	05	Request
EOT	^D	04	Reset
STX	^B	02	Start of Text
ETX	^C	03	End of Text
ACK	^F	06	Acknowledge
NAK	^U	15	Negative Acknowledge
XON	^Q	11	Begin Transmission
XOFF	^S	13	Stop Transmission

Appendices

Appendix H — Defaulting/Saving/Initializing

Defaults are original or saved settings. Defaulting occurs when default settings (from ROM or user-saved NOVRAM) are restored. Defaulting might be necessary if you have make temporary changes, communications between the scanner and another device are lost or interrupted, or you are using incompatible equipment (for example, a terminal that is set at 9600 baud communicating with a scanner that is set at 38.4K baud).

Initializing occurs whenever any command or set of commands is implemented.

Active Memory (SRAM) is where the scanner's active settings are stored during use. These are not available on power-up.

User-saved NOVRAM *(non-volatile random access memory)* is where the scanner's operating parameters are stored for power-on. It can be changed by user command.

ROM Defaults are where the scanner's default application/boot programs are stored. It can only be changed by changing the application/boot codes.[1]

Defaulting

Restore User-saved NOVRAM Defaults to Active Memory

- Restores user-defined NOVRAM settings to active memory.

- Initializes serial configuration commands in active memory and resets counters to zero.

By Serial Command

Send **<An>** command to the scanner.

By ESP (There is no equivalent ESP command.)

Restore ROM Defaults to Active Memory

- Restores ROM defaults to memory.

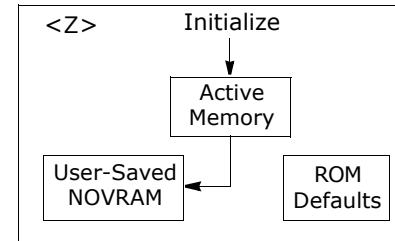- Initializes serial configuration commands in active memory and resets counters to zero.

- Does not save settings to NOVRAM for power-on.

By Serial Command

Send **<Ad>** command to the scanner.

By ESP

1. **Right-click** in the configuration window and select **Default All ESP Settings.**

2. **Right-click** and select **Save to Scanner, Send No Save**.

1. See your Microscan sales representative to access the latest application codes.
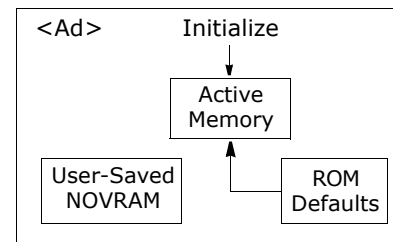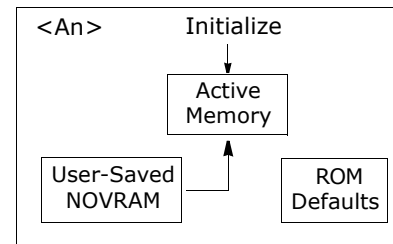
Restore ROM Defaults to Active Memory and for Power-on

Caution: Defaulting the scanner to ROM default settings will overwrite user-saved NOVRAM settings.

- Restores ROM defaults to memory.

- Restores ROM defaults to user-saved NOVRAM for power-on.

- Initializes serial configuration commands in active memory and resets counters to zero.
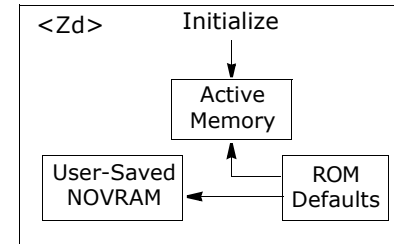
By Serial Command

Send **<Zd>** command to the scanner.

By ESP

1. **Right-click** in the configuration window and select **Default All ESP Settings**.

2. **Right-click** and select **Save to Scanner, Send and Save**.

By Hardware Default

If a software default reset is not possible, it may be necessary to reset the scanner by shorting (connecting) specific pins. This procedure has the same effect as the <Zd> software command.

1. Apply power to the scanner.

2. If using an IB-105, insert a pin or straightened paper clip into the default switch (see).

   Caution: Be certain that the correct pins are located. Connecting the wrong pins could cause serious damage to the unit.

3. Momentarily connect these wires (or pins) and listen for a series of short beeps.

4. Within 3 seconds, connect them again. A longer beep should be heard. If not, repeat the process.

Appendices

Saving

Save Active Settings except Factory for Power-on

- Initializes serial configuration commands in active memory and resets counters to zero.

- Saves all active settings except factory settings to NOVRAM for power-on.

By Software Command

Send **<Z>** command to the scanner.

By ESP

Right-click in the configuration window and select **Save to Scanner, Send and Save**.

Save Active Settings including Factory for Power-on

- Initializes serial configuration commands in active memory and resets counters to zero.

- Saves all active settings including factory settings to NOVRAM for power-on (factory settings include but are not limited to Focus, Gain, Tracking, and Scan Speed).

By Serial Command

Send **<Zp>** command to the scanner.

By ESP

Right-click in the configuration window and select **Advanced, Send and Save, Including Factory**.
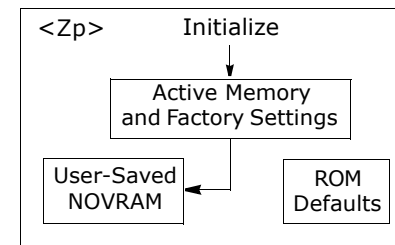
Initializing

Initializing is a part of all save and default functions. It is also used as a follow-on to implement serial configuration commands into active memory.

- Initializes serial configuration commands in active memory and resets counters to zero.

- Does not save settings to NOVRAM.

By Serial Command

Send **<A>** after a serial configuration command or a string of serial configuration commands, for example, **<Kd1><A>**.

By ESP

Right-click in the configuration window and select **Save to Scanner, Send No Save.**

This will initialize all serial configuration changes that have been made in the current ESP session.

```
<A>          Initialize
                 |
                 v
            ┌──────────┐
            │  Active  │
            │  Memory  │
            └──────────┘
┌──────────┐          ┌──────────┐
│User-Saved│          │   ROM    │
│  NOVRAM  │          │ Defaults │
└──────────┘          └──────────┘
```
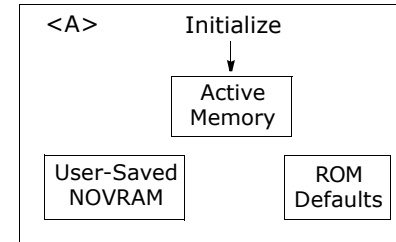
Loss of Communications

Making changes to communications with the host such as **Baud Rate, Parity, Stop Bits, LRC**, etc. without corresponding changes in linked device(s) can result in the loss of menu access through If this should occur, you should restore the scanner's defaults.

Appendices

Appendix I — Position Scanner and Bar Code

In positioning the scanner in relation to the bar codes being scanner, consider the following:

- Position the scanner in a place devoid of sunlight, bright lights, or laser light from other sources.
- Avoid excessive tilt, skew, or pitch. Maximum tilt is determined by label characteristics and the number of decodes required. Maximum skew is **±40°**; maximum pitch is **±50°**.[1]
- Pitch or skew label or scanner a minimum of ±5° to avoid specular reflection, the return of direct, non-diffused light.[2]
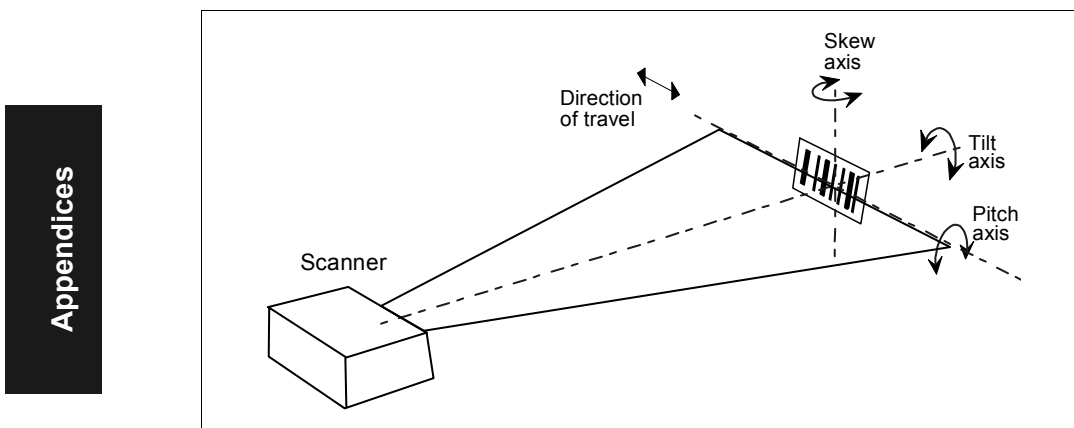
Figure A-9 Scanner/Symbol Position

---

1. Maximum tilt is determined by label characteristics and number of decodes required.
2. The specular reflection zone is a narrow zone straight out from the scanner in which direct reflected light from a label can distort the scanner's ability to distinguish bars from spaces.

Appendix J — Test Decode Rate

With a Static Label

1. Position a stationary bar code in front of a functioning scanner at the scan distance used in your application.

2. Enter a **\<C>** command to see the decodes per second.

   The decode rate is the number of decoded scans per total number of scan. It will appear at the beginning of the data strings.

   Note: You can also enter a **\<Cp>** command to see the percentage of decodes per scans.

3. Make a note of the decode rate. You will need this when calculating the number of decodes (see "Formulas for Number of Decodes" on page A-24).

4. End the test by sending the **\<J>** command.

Number of Decodes

To ensure reliable scanning, you need to apply a minimum of five decodes to each bar code. This means that all variables, label speed, read range, etc. are significant.

Note: Variations between labels are common. For this reason, the greater number of sample bar codes tested, the more likely you are to achieve optimum decode rates.

In general, the number of decodes of a given bar code can be increased by:

• Increasing label height

• Decreasing label length

• Increasing scan rate (spinning mirror speed)

• Slowing label speed

With a Moving Label

Before testing with a moving label, it is highly recommended that you calculate the expected number of decodes by using the formulas in "Formulas for Number of Decodes" on page A-24.

Once you've mounted the scanner, established a good read rate with a stationary label, and calculated the number of decodes for your label speed, you can begin decoding with moving labels.

Appendices

Appendix K — Formulas for Number of Decodes

To ensure reliable scanning, apply a minimum of *five* decodes to each bar code. Use the formulas below to calculate the number of decodes that your label will receive.

If the number of decodes you derive from one of these calculations is less than the minimum for your application, plug in the minimum number of decodes (5) and solve for another parameter that might be changed, such as label speed or scans per second.

Note: While the formulas given here solve for the predicted number of decodes, you may also use the formulas to solve for other parameters that might be changed, such as label speed, label length, etc.

Single Line Ladder Calculation

For single scan line ladder scanning, use the following formula:

$$\left(\frac{LH}{LS} \times DR\right) - 3 \ = \ NS \text{ (number of decodes)} \quad [1]$$

LH (Label Height) (ladder formula only) is a measurement of the height of individual bars.

LS (Label Speed) is the distance per second that a bar code moves through the scan.

DR (Decode Rate) is the number of decodes per second that a given bar code receives (as derived from a stationary scan test in "Test Decode Rate" on page A-23).

Example:

$$LH \ = \ 1 \text{ inch}$$
$$LS \ = \ 10 \text{ inches per second}$$
$$SR \ = \ 100 \text{ scans per second}$$
$$\left(\frac{1}{10} \times 100\right) - 3 \ = \ 7 \text{ complete scans}$$

Direction of label travel

Scan Line
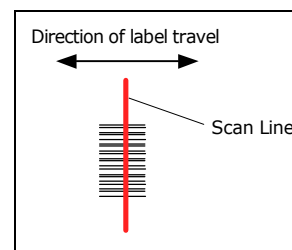
Figure A-10 Ladder

---

1. The -3 component in the formula is included to allow for AGC acquisition, an incomplete first scan, and an incomplete last scan. This applies only if the number inside the parentheses equals 4 or more. If the number equals 3, then only subtract 2 to derive 1 good scan.

Single Scan Line Picket Fence Calculation

For single scan line picket fence scanning use the following formula:

$$\left(\frac{(SW - LL)}{LS} \times DR\right) - 3 \ = \ \text{number of complete decodes} \quad [1]$$

Example:

LL = 2 inch (including quiet zones)

LS = 10 inches per second

SW = 8 inches

SR = 100 scans per second

$$\left(\frac{(8 - 2)}{10} \times 100\right) - 3 \ = \ 57 \text{ complete scans}$$
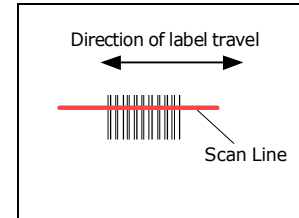
Figure A-11 Picket Fence

Angled Picket Fence Calculation

The number of complete scans for angled picket fence is calculated the same as that for picket fence, with the exception that the scan width is shortened in proportion to scan tilt.
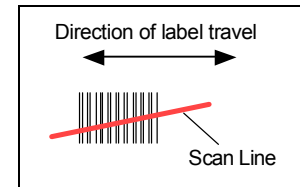
Figure A-12 Angled Picket Fence

Appendices

Improving the Number of Decodes

After changing any of the parameters described in this section, recalculate the number of decodes.

Scan Rate

Scan rate is a function of motor speed and is adjustable. A slower scan rate may allow greater label range and/or higher decode rates, but at the cost of fewer scans per label.

Range

Adjusting the label's range, if possible, is one of the quickest and most effective ways to improve decode rates. However, in some applications you may need to select a less than optimum range, or one that is beyond the fringes of the ranges.

Scan Width

Increasing scan width will increase the number of scans in a picket fence oriented application. Scan width is linked with scan range and changing one will usually require a change in the other.

Label Speed

Applies to both picket fence and ladder oriented labels. If your application allows it, slowing label speed (the time in seconds that a label is fully within the scan width of the scanner) is an effective way to increase the number of decodes.

Label Dimensions, Label Density, and Label Ratio

Not usually an option in most applications, but changes to label parameters can affect number of decodes calculations and possibly decode rates.

If your application allows it, shortening the length of a picket fence label means the label will be in the scan range longer and hence receive a greater number of scans. Increasing the height of a ladder label means it will receive more scans. Changing label density and/or bar code ratio is another way ranges, decode rates, etc. can be altered.

Gain and Tracking

These adjustments, typically made by qualified technicians, are referenced in the Scanner Setup menu (see "Defaulting/Saving/Initializing" on page A-18). Changes to tracking will generally have a limited affect on decode rates.

Appendices

Appendix L — Operational Tips

Do:

- Check inputs (label speed, length, height, etc.) to ensure the desired number of decodes per label.
- For optimum decodes, mount scanner so that your labels pass through the center of the depth-of-field (minimum/maximum range). You find the center by moving your label in and out during a read rate test.
- Avoid excessive tilt, pitch, and skew of the bar code label.
- Check the bar code label for readability by doing a decode rate test. If there is any question about the label's readability, contact your Microscan representative at ***helpdesk@microscan.com***.
- After changing any parameter that might affect decode rate, repeat decode rate test.
- Clean the scanner window with a clean, dry Q-tip or cotton cloth on a regular basis.

Do Not:

- Aim the scanner into direct light or sunlight.
- Aim the scanner into an external object detector or other light-emitting device.
- Obstruct the scanner window with mounting hardware or other objects.
- Connect chassis of scanner and host to different ground potentials.
- Operate the scanner in excessive temperature environments.

Appendices

Appendix M — Interface Standards

Interface Standards, established by the Electronic Industries Association (EIA), specify such things as the signaling voltage levels, maximum cable lengths, and number of drivers. With Microscan devices, selection of interface is made by pin assignment and, in the case of the host communications, by software switching between RS232 and RS422. Microscan devices use RS232, RS422, and RS485 multidrop.

RS232

RS232 defines an interface between two devices such as, for example, the scanner and host. It differs from the other interfaces by dedicating individual pins to specific functions and by requiring both devices to share a common ground line. Since both device chassis are connected to a common ground, a ground loop potential and the possibility of noise interference exists. Therefore cable lengths are limited to a maximum of 50 feet (19.7m). Despite being the most limited, this interface is used frequently because of the large installed base of RS232 equipment.

RS422

RS422, unlike RS232, measures signals deferentially; that is, the receiver looks at the potentials between the two receive (or transmit) wires rather than the potential between signal and ground. As a result, cables, if shielded, can be up to 4000 feet (1219m) in length. Like RS232, RS422 communication is designed for only two devices on a single line and must have a common ground. It can be used wherever RS232 is used.

RS485

RS485, like RS422, can transmit up to 4000 feet (1219 m) using differential voltages but unlike RS422, its transmitters are turned off until a request for data is received from the host. RS485 is used exclusively in multidrop protocol.

Appendices

Appendix N — Multidrop Communications

This appendix describes the rules for setting up a concentrator or controller to communicate with a scanner in standard Multidrop protocol.

The diagram to the right shows a typical Multidrop network in which 1 to 50 scanners can communicate with a host via an intermediary device, a concentrator or a controller.
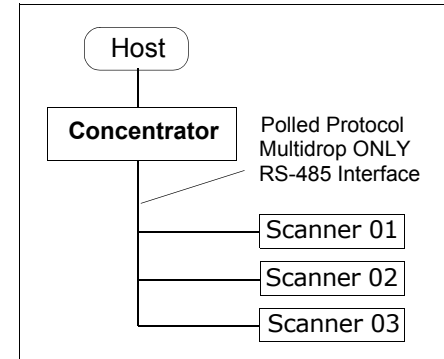
Configure Your Scanner for Multidrop

1. With the scanner connected to the host, do **Retrieve Scanner Settings** as in Step 5 —"Retrieve Scanner Settings" on page 2-6.

2. Select **Multidrop** in the **Protocol** configuration menu.

   You will see the following message:

   Important. You must change your preamble and postamble characters so that they are not CR or NULL.

   This allows data to move through the concentrator without interference.
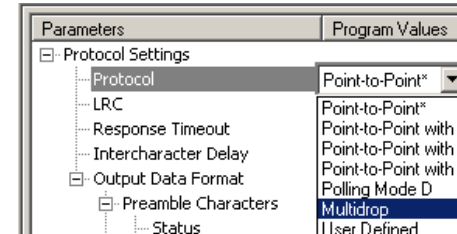
3. Click **OK**.

4. Next, go to **Preamble Characters** (still in the **Protocol** menu) and double-click on **Characters**.

5. This will open up an ASCII character table. Select any character other than **CR**. For example, select **LF**.

6. Repeat the above for **Postamble**.

7. Check the multidrop address. Enter a number from **01** to **50**.

8. Right-click in the window and select **Save to Scanner** and **Send and Save**.

9. Your scanner is now in multidrop. From here on, you will need to use the concentrator to relay commands and data between the scanner or scanners and the host.

10. Next, go to "Connect to Scanner via the Concentrator" on page A-30.

Connect to Scanner via the Concentrator

You will need a multidrop concentrator and the required power supplies and cabling to communicate with your scanner(s).

1. From the **Communications** drop down menu, select **Configure Multidrop** to bring up the **Multi-drop Settings** dialog.

2. If necessary, change the default address to match the address of your multidropped scanner and click **OK**.

   If the host serial port is not connected in ESP, you will see the following popup message:

   ESP is not currently connected to the multidrop concentra-tor. Do you wish to establish a connection now?

3. Click **Yes**.

   You will see a **Serial Communication Parameters** dialog as shown on the next page.

   Notice that the **Force Connection** option is checked. Do not change this.

4. Select the concentrator's host port communications settings.

   When you click **Connect**, you will be connecting to your concentrator, which can then relay commands to the scanner whose address was set in the **Multidrop Settings** dialog.

5. Click **Connect**.

6. You should see the **CONNECTED** message in green at the bottom of the window along with the scanner's **Multidrop** address.
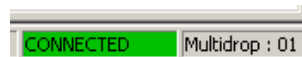
7. Do **Retrieve Scanner Settings** to upload scanner's configuration. If upload fails, return to the **Serial Communication Parameters** dialog and make the corrections.

8. Follow the same procedure for connecting other scanners to your multidrop network.

Note: For more information, see your scanner user's manual or Microscan's ***MS-5000 Multidrop Concentrator User's Manual, 83-005000.***
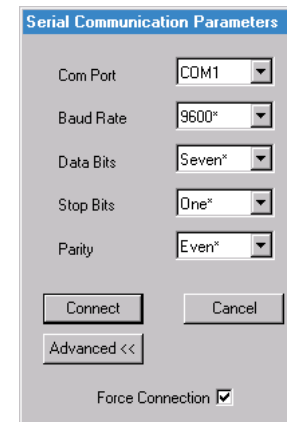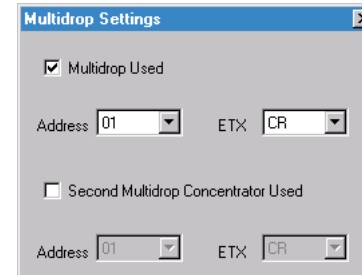
Polling Sequence

Data that is transmitted to the host (bar code data, noread messages, counters, etc.) via concentrators is solicited by poll requests from the host.

The polling sequence example by poll address 1E (ASCII hex value for Scanner 02) and a REQ (request). The scanner responds by first transmitting its own address, 1E, followed by a STX (start of text) character, and then the data. Next it transmits an ETX (end of text) character and an LRC (longitudinal redundancy check) character.

If the concentrator (or controller) receives the data from the scanner and is able to validate it with an LRC calculation, it responds with an ACK (acknowledgment). If the scanner in turn receives the ACK, the scanner ends this exchange with a RES (reset).
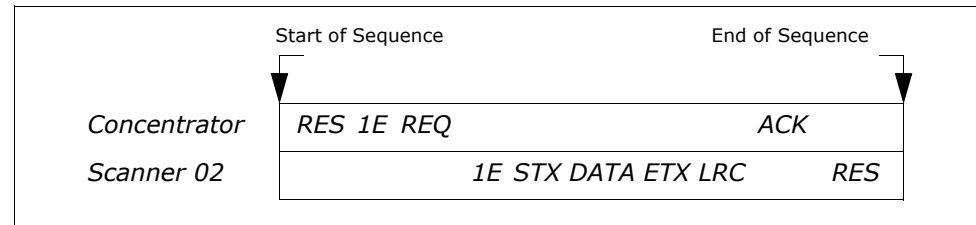
Figure A-13 Polling Sequence

Polling Reset

• If the scanner has no information, it responds to a poll request by transmitting a RES (reset).

• If the scanner receives a NAK instead of the ACK after transmitting its data string, it will re-attempt to send the data string up to three times. If the scanner still does not receive an ACK, it will send a RES (reset) and discard the data in its buffers.

• If the scanner transmits data to the concentrator and the concentrator responds with an ACK or NAK, but the scanner doesn't receive the concentrator's response, the scanner will timeout and send a REQ to the concentrator and request another response. If after three retries (the number of times it transmits a REQ to the concentrator) the scanner receives no response, it ends the transmission with a RES (reset).

Appendices

Select Sequence

Unlike poll requests, select commands always originate from the host and consist of serial configuration or operation commands to devices that are configured in Multi-drop. The scanner complies with the command when it is polled during the cycle.
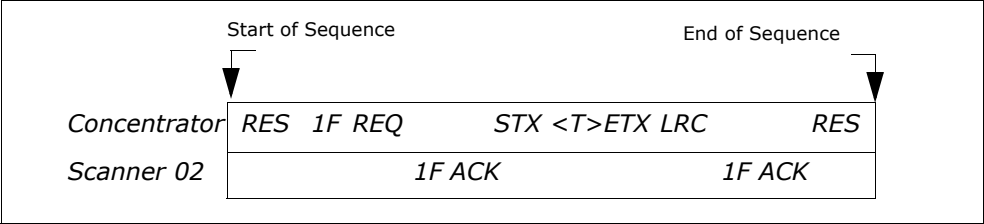
Figure A-14 Polling Sequence

A RES (reset) is the first command in the select sequence. The 1F hex is the select address associated with Scanner 02 address. It is followed by a REQ (request). The scanner responds with its own select address, 1F hex, and an ACK (acknowledge). The concentrator then transmits an STX (start of text), the data (in this case a <T>), an ETX (end of text), and an LRC character.

The scanner replies by transmitting its own address, followed by an ACK, acknowledging receipt of the command. Upon receipt of an ACK, the concentrator concludes the successful exchange with a RES.

In the example above, the scanner only acknowledges a trigger counter request from the concentrator. It does not respond to the trigger counter request until a subsequent poll. For example, if the scanner's trigger count was 12 at the time the trigger counter request was received, on a subsequent poll it would send 02T/00012. (The 02 at the beginning of the string is the scanner's address.)

Select Reset

If the scanner receives bad data from the concentrator, it transmits a SEL (its select address) and a NAK to the concentrator. The concentrator re-transmits the data up to three times. The concentrator will end the sequence with a RES (reset) if no ACK is received.

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Table A-12 Multidrop Addresses

Multidrop Address	Poll Character		Select Character		Multidrop Address	Poll Character		Select Character	
	ASCII	HEX	ASCII	HEX		ASCII	HEX	ASCII	HEX
01	^\	1C	^]	1D	26	N	4E	O	4F
02	^^	1E	^-	1F	27	P	50	Q	51
03	SP	20	!	21	28	R	52	S	53
04	"	22	#	23	29	T	54	U	55
05	$	24	%	25	30	V	56	W	57
06	&	26	'	27	31	X	58	Y	59
07	(	28	)	29	32	Z	5A	[	5B
08	*	2A	+	2B	33	\	5C	]	5D
09	,	2C	-	2D	34	^	5E	_	5F
10	.	2E	/	2F	35	`	60	a	61
11	0	30	1	31	36	b	62	c	63
12	2	32	3	33	37	d	64	e	65
13	4	34	5	35	38	f	66	g	67
14	6	36	7	37	39	h	68	i	69
15	8	38	9	39	40	j	6A	k	6B
16	:	3A	;	3B	41	l	6C	m	6D
17	<	3C	=	3D	42	n	6E	o	6F
18	>	3E	?	3F	43	p	70	q	71
19	@	40	A	41	44	r	72	s	73
20	B	42	C	43	45	t	74	u	75
21	D	44	E	45	46	v	76	w	77
22	F	46	G	47	47	x	78	y	79
23	H	48	I	49	48	z	7A	{	7B
24	J	4A	K	4B	49			7C	}	7D
25	L	4C	M	4D	50	~	7E	D	7F

Appendices

Appendix O — Glossary of Terms

Active On (I_{ON}). An optoisolated input that's logically "on" when current flows through the connection points.

Active Off (I_{OFF}). An optoisolated input that's logically "on" when *no* current flows through the connection points.

Analog Gain Adjustment (AGC). Adjustment to signal strength that seeks to maintain a constant level regardless of the range of the bar code label.

Application Record. A variation of UCC/EAN-128 which adds an application identifier to label data, including user-definable separators, brackets, and padding.

Autocalibration. A routine that cycles through various optical settings and selects the combination that produce the best read rate.

Autodiscriminate. The ability to decode several different bar code symbologies without changing configuration.

Auto Range. Outward focus of the scanner until an object is sensed by signal strength. The scanner then begins searching for a decodable label.

Auxiliary Port. RS232 connections to an auxiliary terminal or device for remote viewing. the transfer of data to and from the host, and under certain conditions a configuration port.

Bar Code. The symbol used for recognition by a bar code scanner. An array of parallel bars and spaces of varying widths that conform to recognized standards and can be decoded and displayed as serial data.

Bar Code Data. The information that is transmitted from a decoded bar code symbol.

Bar Code Label. The physical media on which a bar code symbol is presented.

Bar Code Density. Number of characters per inch or other unit of measure.

Baud Rate. The number of discrete signal events per second. Bits per second.

Capture. The act of grabbing or recording a frame by an sensor. A frame or succession of frames that are captured.

Channel. A high-speed pathway between the computer and the control units of the peripheral devices.

Check Digit. A Modulus 43 or Modulus 10 digit that is added to the bar code message for additional data integrity.

Configuration. A setup or process of changing a scanner's settings to conform to a specific application.

Concentrator. Intermediary device that relays data from scanners to a host and commands from the host to the scanner or other devices.

Connector. Physical device (plug or socket) on a device or cable to provide in/out connectivity for various circuits and pins.

Counter. Memory space provided to keep track of scanner events.

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Daisy Chain. Linkage of master and slave scanners to allow data to be relayed up to the host via auxiliary port connections.

Decode. A good read. The successful scanning and decoding of the information encoded in a bar code label.

Default. Restores ROM or Flash settings, initializes serial commands and resets all counters.

Delimited. A command or field that is bracketed by pre-defined characters.

Decode Rate. The number of good reads per second decoded by the scanner.

Depth of Field. The distance between the minimum and maximum range in which a scanner can read bar code labels.

Discrete I/O. Inputs and outputs characterized by discrete signal transitions from one voltage level to another so that digital switching can occur.

EPROM. Erasable, programmable, read only memory.

Embedded Memory. Onboard memory device such as EPROM or flash.

End of Read Cycle. The time or condition at which the scanner stops expecting label information to decode.

External Edge. Allows a read cycle to be initiated by a trigger signal from an object detector when it detects the appearance of an object (rising edge). The read cycle ends with a good read, a timeout, or a new trigger.

External Level. Allows a read cycle to be initiated by a trigger signal from an object detector. The read cycle ends when the object moves out of the detector's range.

Falling Edge. A change of state (to inactive) associated with a level trigger in which the scanner stops searching for bar code symbols. (See **Rising Edge**.)

Fixed Code Length. Increases data integrity by ensuring that only one label length will be accepted.

Flash Memory. Memory that can be changed by downloading new code.

Focal Length. The distance measured from the scanner to the center of the depth of field, or *focal* point.

Focus. The point at which the tip of the scan beam is at its narrowest.

Frame. The total area scanned in an image sensor.

Full Duplex. Auxiliary port data is sent directly to the host but not displayed on the auxiliary port screen.

Gain. Optimal signal strength.

Good Read. A decode. The successful scanning and decoding of the information encoded in a bar code label.

Half Duplex. Auxiliary port data is sent directly to the host and displayed on the auxiliary port screen.

Host. A computer, PLC, or other device that is used to execute commands and process data and discrete signals.

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Host Port. The pins or connections on a scanner or other device that physically connect with a host and—using the RS232, RS422, or RS485 standards—pass data and serial commands from one device to another.

Initialize. Implement serial configuration commands into the scanner's active memory.

Input. A channel or communications line. Decoded data or a discrete signal that is received by a device. See **Output.**

Intercharacter Delay. The time interval in milliseconds between individual characters transmitted from the scanner to the host.

Intercharacter Gap. The extra space between the last element of one character and the first element of the adjacent character of a specific bar code symbol.

IrDA. Infrared Data Association which promotes interoperable, infrared data interconnection standards.

Label Height. Regardless of orientation, the measurement taken along the length of a label's individual bars.

Label Length. Regardless of orientation, the measurement taken across the label's bars from one end to the other, including the quiet zone.

Label Speed (LS) is the distance per second that a label moves as it travels through the scan lines.

Label Transitions. The transition of bars and spaces on a label, used to detect the presence of a label on an object.

Ladder Label Orientation. A bar code label in which the bars are parallel to the label's direction of travel.

Large Intercharacter Gap. Allows the scanner to read symbols with gaps between bar code characters that exceed three times (3x) the narrow element width.

Laser Framing. Setting scan width size by adjusting the on/off duration of the laser beam.

Laser On/Off. When enabled, the laser is ON only during the read cycle, provided the scanner is enabled for a Serial or External trigger.

LED. Light emitting diode.

Longitudinal Redundancy Check (LRC). An error-checking routine that verifies the accuracy of transmissions.

Master Scanner. First scanner in a daisy chain mode and linked directly to the host and in tandem to slave scanners.

Matchcode. The ability to compare bar code labels being scanned against a master label that is stored in the memory of the scanner.

Embedded Menu. Configuration options embedded in the scanner's erasable memory.

ESP-MP Menu. Easy Setup Program—Multiple Platform. Configuration program that runs in Windows-based operating systems 95 and above.

Mil. One thousandths of an inch or 0.0254 mm. In bar-coding, a measurement standard that identifies a bar code label by the width of its narrowest element.

Mismatch. An event that occurs when the scanned bar code label does not match the master label that is stored in the memory of the scanner.

Multilabel. A scanner mode which allows a scanner to read more than one bar code label in a single read cycle.

Multidrop. A communications protocol for networking two or more scanners or other devices with a concentrator (or controller) and characterized by the use of individual device addresses and the RS485 standard.

Narrow-bar-width. The width of the narrowest bar of a given label, expressed in thousands of an inch (or mils).

Narrow Margins. Allows the scanner to read symbols with quiet zones less than 8 times the width of the narrow bar element.

Non-delimited. A command that is not bracketed by pre-defined characters.

Non-volatile RAM (NOVRAM). Random Access Memory that is available on power-on; that is, after power to the unit has been recycled.

Noread. A non-read. A condition that occurs when the scanner is set up to decode labels but no label is scanned during the read cycle.

Normally Closed. A discrete output state that is only active when open.

Normally Open. A discrete output state that is only active when closed.

NOVRAM. Non-volatile random access memory. Data that is saved for "power-on" is saved to NOVRAM.

Number of Decodes. The number of times a bar code label is scanned by the scanner during one pass through the laser beam.

Object Detector. A photo electric device used to sense the presence or absence of an object (also referred to as a package detector).

Output. A channel or communications line. Data or discrete signals that are transmitted or displayed by a device.

Output Format. The modification of data output according to a user-defined index of **Extraction** and **Insertion** commands.

Parity. An error detection routine in which one data bit in each character is set to 1 or 0 (zero) so that the total number of 1 bits in the data field is even or odd.

Picket Fence Label Orientation. A bar code label in which the bars are perpendicular to the label's direction of travel.

Pitch. Label (or scanner) rotation around the center of a line perpendicular to the label's bars.

Point-to-Point. A protocol consisting of a single communications event, typically used to connect a bar code scanner to a terminal or host computer.

Port. Logical circuit for data entry and exit. (One or more ports may be included within a single connector.)

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Protocol. The rules for communication between devices, providing a means to control the orderly flow of information between linked devices.

Quiet Zones. Specified "clear" (non printed) areas immediately before and after the bar code symbol. The area is usually white (for black and white bar code) and at least 10 times the width of the narrowest bar, as measured in thousands of an inch. The zones can be other than white as long as their densities remain consistent and they have the required contrast relative to the bars.

RAM. (Random Access Memory) Memory that is lost after power is recycled to the unit.

Raster. Multiple, stacked scans produced by a separate oscillating mirror or by a spinning mirror with varying facet angles.

Read Cycle. A programmed period of time or condition during which the scanner will accept bar code label input.

Read Range. The distances in which a label can be reliably read, as measured from the front of the scanner. See "Depth of Field."

Relay. An electrical switch that allows a low power to control a higher one.

Reset. Sets all counters to zero.

Rising Edge. A change of state (to active) that initiates (and in some cases ends) a read cycle with a new trigger, an edge trigger, or the leading edge of a level trigger. (See **Falling Edge**.)

ROM. (Read Only Memory) Memory that cannot be changed.

Scanner. A scanning device that is comprised of a scan head and a decoder integrated in one package.

Scan Rate (SR) The number of decodes per second that a given scanner is capable of casting.

Scan Width (SW) is the width across the scan beam at a given distance from the scanner in which a label can be read.

Send. Transmit data from one device to another.

Separator. A character that separates data fields.

Serial Commands. Online data strings such as <D> or <P> sent from a host or auxiliary terminal to a scanner or other device.

Serial Configuration (Host Configuration). Serial command specifically for changing configuration and distinguished from operational command by the fact that they modify the non-volatile for power up configuration.

Skew. Label (or scanner) rotation around the center of the skew axis.

Slave Scanner. Linked to the master or preceding scanner in a daisy chain and relays bar code data to the host. See "Daisy Chain."

Specular Reflection Zone. The narrow zone straight out from the scanner in which direct reflected light from a label can distort the scanner's ability to distinguish bars from spaces.

Supplemental. A character or data string that is appended to the main bar code symbol.

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Symbol. A bar code. A decodable unit of information that is recognized by a bar code scanner.

Symbology. A code type, such as Code 39 or Code 128, with special rules to define the widths and positions of bars and spaces to represent specific numeric or alphanumeric information.

Symbology ID. An AIM standard prefix character that identifies the bar code type.

Tilt. Label (or scanner) rotation around the centerline of the scan beam.

Timeout. A user-selected period of time that ends a scanner's read cycle.

Tracking. Adjustment of the precision of analog-to-digital conversion.

Transmission. The transfer of data over a communications channel.

Transmit. Send or convey signals or information from one device to another.

Transparent. Data is passed between the auxiliary port and the host with keyed data echoed to the auxiliary port

Trigger. A signal, transition, or character string that initiates a read cycle.

Watchdog Timer. A security device that detects system crashes and attempts to reset the scanner.

Watchdog Reset. A reset that is forced whenever the software locks up.

Wild Card. User-defined character entered into a master label to permit matches with variable characters.

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