MICROSCAN®

VS-310 Scanner User's Manual

P/N 83-000310 Rev F

Information and specifications in this manual are subject to change without notice.

by Microscan Systems, Inc.,
1201 S.W. 7th Street, Renton, Washington, U.S.A. 98055
(425) 226-5700 FAX: (425) 226-8682

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?

Any products or parts that have been subject to misuse, neglect, accident, unauthorized repair, improper installation, or abnormal conditions or operations. Any products or parts that have been transferred by the original purchaser. Customer mis-adjustment of settings contrary to the procedure described in the Microscan owners manual. Upgrading software versions at customer request unless required to meet specifications in effect at the time of purchase. Units returned and found to have no failure will be excluded. Claims for damage in transit are to be directed to the freight carrier upon receipt.

THIS EXPRESS WARRANTY EXCLUDES ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO, IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PURPOSE. MICROSCAN SYSTEMS INC. SHALL NOT BE LIABLE FOR ANY SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, WHETHER IN CONTRACT, TORT, OR OTHERWISE.

Some states 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.

The buyer acknowledges that he/she is not relying on the seller's skill or judgment to select or furnish goods suitable for any particular purpose and that there are no warranties that extend beyond the description on the face hereof.

Before Requesting Service…

Please check the owners manual for proper setup and cabling procedures and any customer settings for mis-adjustment for your particular application. Correcting these may save you a service call.

To receive Warranty Service…

Contact your nearest Microscan Service Center at the address shown below for a Return Material Authorization (RMA) number before returning product. Receipt of an RMA number is not an admission of warranty status. All product must be returned freight prepaid to the location issuing the RMA number before the expiration of the warranty period.

Table of Contents

Table of Contents iii
List of Figures v
List of Tables vi
About the VS-310 Scanner vii
About This Manual vii
Keystroke Entries vii
Warning and Caution Summary viii
Safety Labels ix

Chapter 1 Setup and Installation

Step 1 - Plan Scanning System 1-2
Step 2 - Verify Read Range and Scan Width 1-3
Step 3 - Calculate Number of Scans 1-4
Step 4 - Attach Cabling 1-6
Step 5 - Install ESP™ 1-7
Step 6 - Establish Communications 1-8
Step 7 - Configure Scanner 1-9
Step 8 - Position Scanner and Label 1-10
Step 9 - Do Decode Rate Test 1-11
Step 10 - Adjust Other Scanning Parameters 1-12
Step 11 - Install Scanner 1-13
Step 12 - Position Object Detector 1-14
Operational Tips 1-15

Chapter 2 Menu Configuration

Using ESP™ to Configure the Scanner 2-2
Communications Menu 2-4
Protocol 2-6
Operations Menu 2-10
Code Types Menu 2-16
Scanner Outputs Menu 2-21

Chapter 3 Serial Configuration

Summary of Serial Configuration Commands 3-2
Serial Configuration Command Format 3-3
Concatenating Serial Commands 3-4
Establishing Communications 3-4
Communications 3-5
Protocol 3-5
Operations Commands 3-8
Code Types Commands 3-10
Scanner Output Commands 3-12
Scanner Setup Commands 3-13

Chapter 4 Utilities

Summary of Operational Serial Commands 4-2
Using ESP™ for Operations 4-3
Read Rate 4-4
Trigger 4-5
Scanner 4-6
Counters 4-7
Master Label 4-9
Reset 4-11
Checksum/Part Number Commands 4-13
Other Operational Commands 4-13
Terminal Mode 4-14

Appendices

Appendix A — Scanner Specifications A-2
Appendix B — Mating Connector A-4
Appendix C — Accessory Cables A-5
Appendix D — Connectivity with the IB-105 ..... A-6
Appendix E — ASCII Table A-12
Appendix F — Multidrop Communications A-13
Appendix G — Orientation A-17
Appendix H — Grounding and Shielding A-19
Appendix I — Bar Code Symbology A-20
Appendix J — Glossary of Terms A-21

List of Figures

Figure 1-1 System Diagram (without interface box) 1-2
Figure 1-2 System Diagram (with interface box) 1-2
Figure 1-3 Ladder Orientation 1-4
Figure 1-4 Picket Fence Orientation 1-4
Figure 1-6 Label Dimensions 1-5
Figure 1-5 Angled Picket Fence Orientation 1-5
Figure 1-7 9-pin mini-Din Connector 1-6
Figure 1-8 Basic ESP™ Menu 1-7
Figure 1-9 Host Serial Port Configuration 1-8
Figure 1-10 Error Messages 1-8
Figure 1-11 Upload Status 1-8
Figure 1-12 ESP™ Configuration Menus 1-9
Figure 1-13 Tilt, Skew, and Pitch Axes 1-10
Figure 1-14 Specular Reflection Zone 1-10
Figure 1-15 Mounting Holes and Dimensions (not to scale) 1-13
Figure 1-16 Detector Orientation 1-14
Figure 2-1 Configuration Setup File 2-2
Figure 2-2 Upload Error 2-3
Figure 2-3 Communications Menu Structure 2-4
Figure 2-4 Protocol 2-6
Figure 2-5 Operations Menu 2-10
Figure 2-6 External Level Trigger Events 2-13
Figure 2-7 External Edge Trigger Events 2-13
Figure 2-8 Code Types Menu 2-16
Figure 2-9 Scanner Outputs Menu 2-21
Figure 4-1 Partial Menu Selection 4-3
Figure 4-2 Utilities Menu 4-3
Figure 4-3 Full Menu Selection 4-3
Figure 4-4 Read Rate 4-4
Figure 4-5 Serial Trigger Commands 4-5
Figure 4-6 Scanner Controls 4-6
Figure 4-7 Counter Controls 4-7
Figure 4-8 Master Label Commands 4-9
Figure 4-9 Reset/Default Menu Commands 4-11
Figure 4-10 Reset 4-11
Figure 4-11 Default 4-11
Figure 4-12 Reset/Save 4-12
Figure 4-13 Reset/Restore 4-12
Figure 4-14 Save Scanner Type 4-12
Figure 4-15 Checksum/Part Number 4-13
Figure 4-16 Terminal Mode 4-14
Figure A-1 VS-310 Dimensions A-2
Figure A-2 Low Density and High Density Scan Range/Width Profile A-3

Figure A-3 Backshell A-4
Figure A-4 Solder A-4
Figure A-5 Clamp and Lock A-4
Figure A-6 Insert Cover A-4
Figure A-7 VS-310 Accessory Cable, 9-pin Connector A-5
Figure A-8 VS-310 Accessory Cable, 15-pin Connector A-5
Figure A-9 Front of IB-105 ..... A-6
Figure A-10 Back of IB-105 ..... A-6
Figure A-11 IB-105, Configuration 1 ..... A-8
Figure A-12 IB-105 Configuration 2 ..... A-8
Figure A-13 IB-105 Configuration 3 ..... A-9
Figure A-14 IB-105 Configuration 4 ..... A-9
Figure A-15 LAN RJ-11 Cable A-10
Figure A-17 IB-105 to Host Null Modem Cable A-11
Figure A-16 Typical Multidrop Network A-13
Figure A-17 Polling Sequence A-14
Figure A-18 Select Sequence A-15
Figure A-19 Ladder Orientation A-17
Figure A-20 Picket Fence Orientation A-17
Figure A-21 Angled Picket Fence Orientation A-18
Figure A-22 Grounding Diagram A-19

List of Tables

Table 1-1 Read Ranges and Scan Widths..... 1-3
Table 1-2 9-pin, mini-Din Connector 1-6
Table 3-1 Summary of Serial Configuration Commands 3-2
Table 3-2 Protocol Commands 3-7
Table 4-1 Summary of Operational commands 4-2
Table A-2 9-pin mini-Din Pin Assignments A-3
Table A-3 Read Range and Scan Width Data A-3
Table A-4 FIS Options A-3
Table A-5 IB-105 Configurations A-7
Table A-6 IB-105 15-pin Scanner Connector A-10
Table A-7 IB-105 Power Connector A-10
Table A-8 IB-105 Trigger Connector A-10
Table A-9 IB-105 6-pin LAN Connector A-10
Table A-10 IB-105 25-pin Host Connector A-11
Table A-11 ASCII Table with Control Characters A-12
Table A-12 Multidrop Address Characters A-16

About the VS-310 Scanner

The VS-310 is an economical, miniaturized, fixed-mount scanner that reads and decodes a wide variety of bar code labels using a 10-sided spinning mirror to project laser beams over a wide scan angle. It is the first Microscan scanner to use the ESP™ program which allows the user to quickly configure and test the scanner from a Windows 3.1 or Windows 95 operating system. It is assumed that the you are familiar with your operating system and the procedure for installing Windows-based programs.

The VS-310 is available in low density (100 scans per second) or high density (60 scans per second), in RS-232 or RS-422/485, and in single line or raster options (see FIS Options on page A-3).

About This Manual

This manual provides complete information on setting up and installing the VS-310 scanner.

Chapter 1 provides overall step-by-step instructions and installing the VS-310 scanner with specific “go to” references to other chapters and appendices.

Chapter 2 provides instructions for configuring the VS-310 scanner by menu, using the Easy Setup Program.

Chapter 3 provides instructions for configuring the VS-310 scanner by serial command.

Chapter 4 describes serial operational commands and ESP™ menu commands that can be used by the host.

For specifications, see appendix A. The appendices also include an ASCII table as well as other useful information relating to bar coding and the VS-310 scanner.

Keystroke Entries

Keystrokes to be entered from your terminal are highlighted in bold, as in **<A>**, including a < left angle bracket symbol and followed by a > right angle bracket symbol.

Warning and Caution Summary

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

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

For connection to a Listed direct plug-in power unit marked Class 2 and rated at 5 VDC @ 200 mA.

WARNING

Use of controls, adjustments, or performance of procedures other than those specified herein may result in hazardous laser light radiation exposure. For connection to a listed direct plug-in power unit market Class 2 and rated 5 VDC/200mA.

WARNING

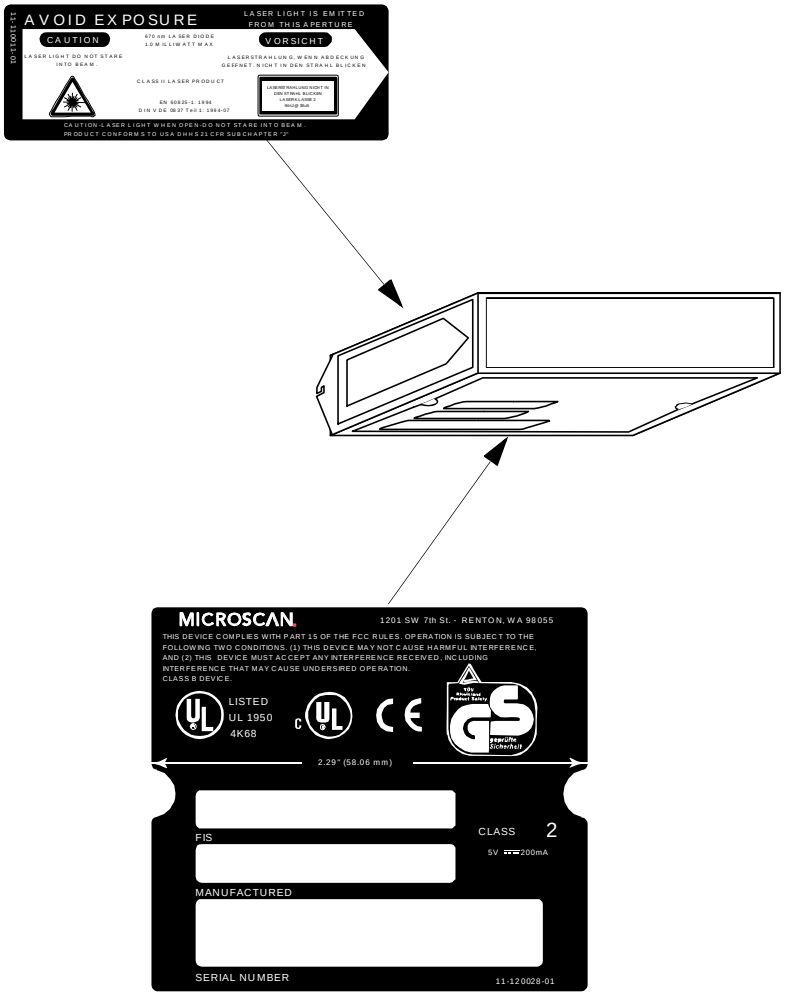
There are no user serviceable parts in the VS-310 scanner. Opening the scan head voids the Microscan Systems warranty and could expose the user to laser diode power of up to 5 mW.

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.

Safety Labels

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



Chapter 1

Setup and Installation

Chapter Contents

Step 1 - Plan Scanning System 1-2
Step 2 - Verify Read Range and Scan Width 1-3
Step 3 - Calculate Number of Scans 1-4
Step 4 - Attach Cabling 1-6
Step 5 - Install ESP™ 1-7
Step 6 - Establish Communications 1-8
Step 7 - Configure Scanner 1-9
Step 8 - Position Scanner and Label 1-10
Step 9 - Do Decode Rate Test 1-11
Step 10 - Adjust Other Scanning Parameters 1-12
Step 11 - Install Scanner 1-13
Step 12 - Position Object Detector 1-14
Operational Tips..... 1-15

This chapter provides step-by-step instructions for setting up and installing the VS-310 scanner.

Note: Bar code labels should meet minimum ANSI (American National Standards Institute) standards as specified in ANSI Bar Code Print Quality Guideline, X3.182-1990.

1 Plan Scanning System

Before installing the VS-310 scanner sketch out a diagram of your scanning system (RS-232 or RS-422/485?), showing equipment, connector and cable types (custom or Microscan cables), and cable lengths (see “Attach Cabling” on page 1-6).

Figure 1-1 shows an RS-232 scanning system setup without an interface box. Figure 1-2 shows a system with an IB-105 interface box (see “Connectivity with the IB-105” on page A-6).

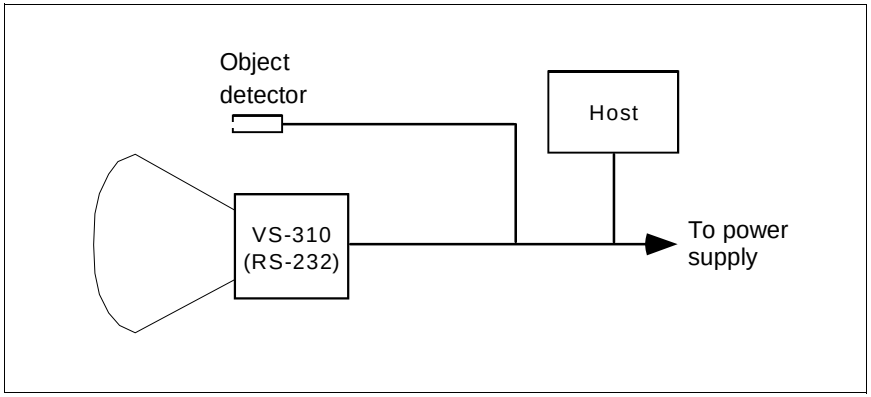


Figure 1-1 System Diagram (without interface box)

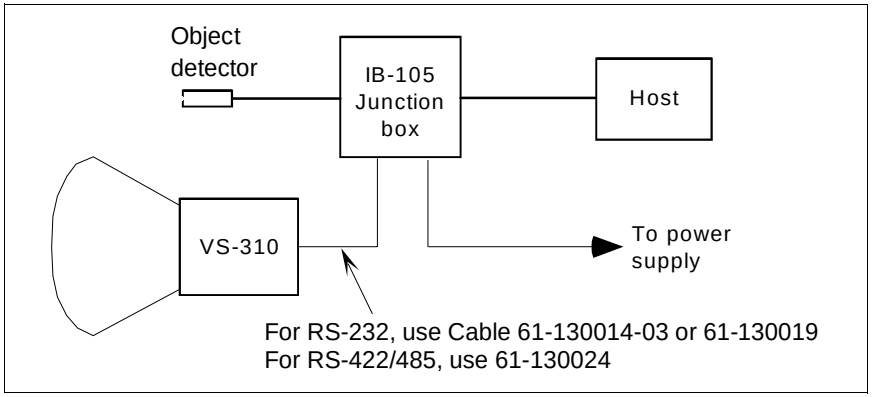


Figure 1-2 System Diagram (with interface box)

2 Verify Read Range and Scan Width

Table 1-1 shows readable ranges and scan widths for specific bar code density (narrow-bar-width) types. Use this table as a reference to verify that the planned range for the label falls within one of the listed ranges.

Scan width is that portion of the scan line in which a label can be read. For ladder oriented labels, scan width must only be wide enough to fully cover the label length, including quiet zones. With picket fence oriented labels, scan width is a factor in determining the time in which the label can be read (see “Calculate Number of Scans” on page 1-4).

Table 1-1 Read Ranges and Scan Widths

Narrow-Bar-Width	Read Range[a]	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 SPS)		
.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)

a. *Read range* is the distance from the front of the scanner to the label in which the label can be reliably read. The distance between the minimum and maximum ranges is the *depth of field*.

Note: Optimum decode rates can be expected at the center of the depth of field (halfway between minimum and maximum read range) for a given bar code density.

For information on label orientation, see Appendix G, “Orientation.”

3 Calculate Number of Scans

To ensure reliable scanning, we recommend a minimum of ***five*** scans per label. Use the formulas below to calculate the number of scans that the label will receive. For definitions of terms, see inset on page 1-5.[1]

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

Note: Scans per second is 100 for low density option and 60 for high density option.

Ladder Calculation

$$\left(\frac{LH}{LS} \times SR\right) - 2 \; = \; \text{number of complete scans}$$

Where LH = Label Height, LS = Label Speed, and SR = Scan Rate.

LH = 1 inch

LS = 5 inches per second

SR = 100 scans per second

$$\left(\frac{1}{5} \times (100)\right) - 2 \; = \; 18 \text{ complete scans}$$

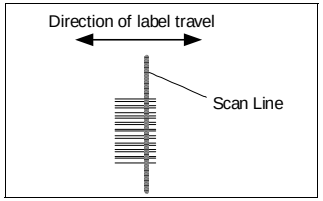


Figure 1-3 Ladder Orientation

Picket Fence Calculation

$$\left(\frac{(SW - LL)}{LS} \times SR\right) - 2 \; = \; \text{number of complete scans}$$

Where SW = Scan Width, LL = Label Length, LS = Label Speed and SR = Scan Rate

SR = 100 scans per second

$$\left(\frac{(4-2)}{2} \times 100\right) - 2 \; = \; 98 \text{ complete scans}$$

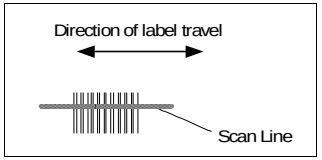


Figure 1-4 Picket Fence Orientation

1. The -2 component is added to allow for AGC acquisition and for incomplete first or last scans.

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.

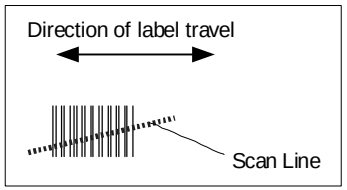


Figure 1-5 Angled Picket Fence Orientation

- **Scan Rate** (SR) is the number of scans per second that a given scanner is capable of emitting.
- **Scan Width** (SW) (picket fence formula only) is the width across the scan beam, at a given distance from the scanner, in which a label can be read.
- **Label Speed** (LS) is the distance per second that a label moves as it travels through the scan lines.
- **Label Length** (LL) (picket fence formula only) is the length of the longest printed label to be read plus the length of the quiet zones (figure 1-6).

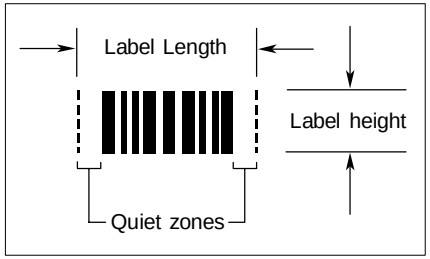


Figure 1-6 Label Dimensions

- **Label Height** (LH) (ladder formula only) is a measurement of the height of individual bars (figure 1-6).

Note: The formulas given here solve for the predicted number of scans; you may also assign a value for number of scans (3 or more) and to solve for other parameters that might be changed, such as label speed, etc.

4 Attach Cabling

If your VS-310 is an RS-232 option (see table A-4 on page A-3) refer to the “RS-232 Options” column in table 1-2. If it’s an RS-422/485 option, refer to the “RS-422/485 Options” column.

If you are making up a custom cable, see “Mating Connector” on page A-4 for instructions on assembling the mating connector kit (Microscan P/N 98-200021-01) included with the VS-310 scanner.

You can also order a Microscan 9-pin to 15-pin cable as described in Appendix C, “Accessory Cables,” on page A-5 for connection to the IB-105 interface box or other device. See also “IB-105 Connectors and Pinouts” on page A-10.

Table 1-2 9-pin, mini-Din Connector

Pin No.	RS-232 Options	RS-422/485 Options
1	+5 VCC	+5 VCC
2	Output-1[a]	Output-1[a]
3	RS-232 RXD	TX +
4	Signal Ground	Signal Ground
5	RS-232 TXD	TX –
6	Trigger input	Trigger input
7	Default pin	Default pin
8	Output-2[a]	RX +
9	RS-485 Driver Enable	RX –
Shield	Chassis Ground[b]	Chassis Ground

a. can sink 3.5 mA or source 60 µA

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

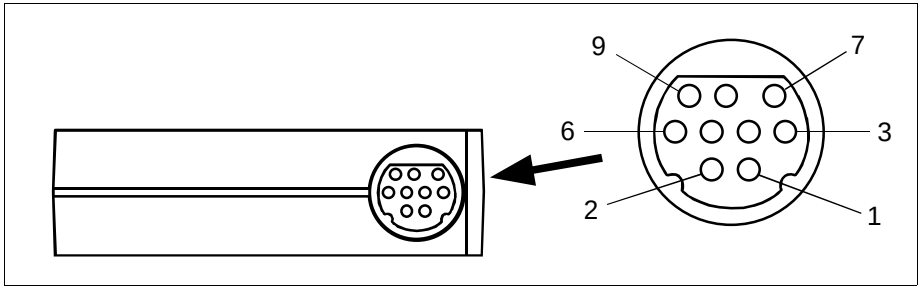


Figure 1-7 9-pin mini-Din Connector

5 Install ESP™

To install the ESP™,

a. Make a backup copy of the ESP™ disk(s).

b. Start the setup.exe program and follow the on-screen directions to install ESP™. You will see a screen similar to figure 1-8.

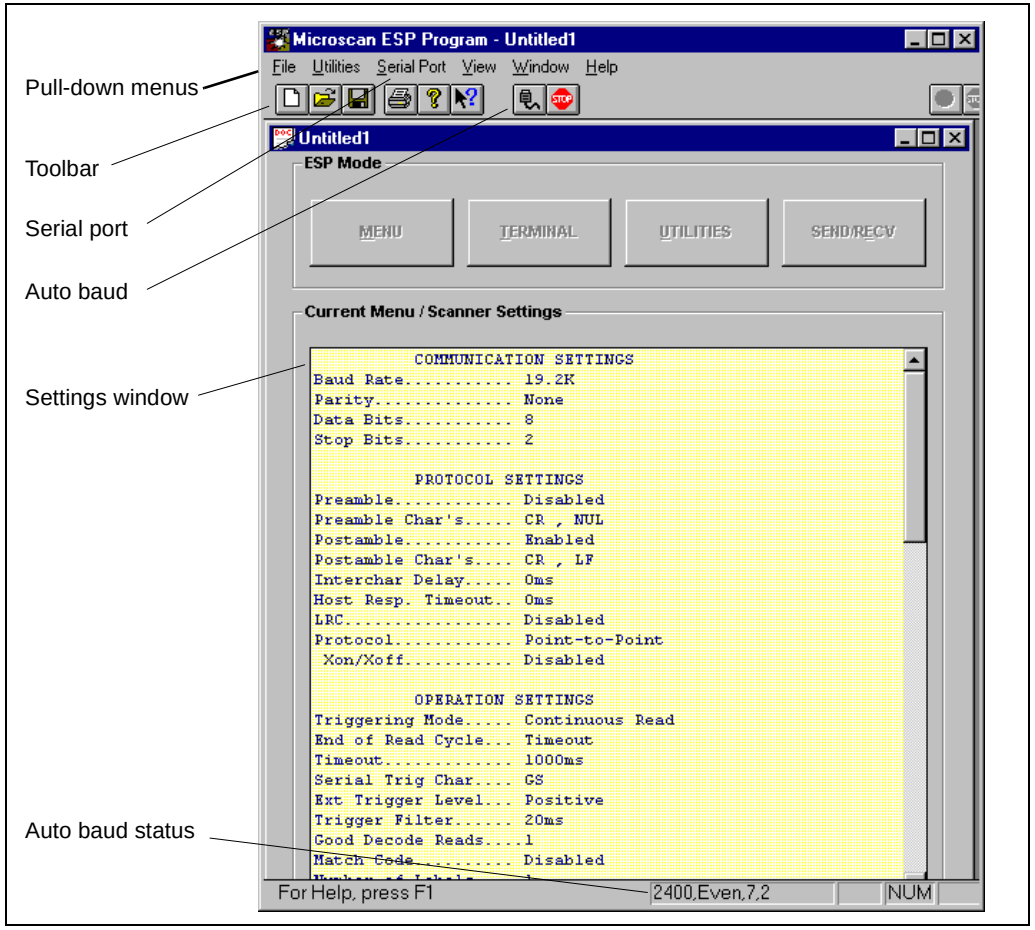


Figure 1-8 Basic ESP™ Menu

c. Proceed to Step 6.

Note: ESP™ menu commands can be carried out by mouse or by key-stroke by pressing the Alt key and typing in the appropriate underlined letter(s) of the menu or command.

6 Establish Communications

To establish communications,

a. Select **Serial Port** and **Configure** from the pull-down menus.

b. Make your port selection from Serial Port options **COM 1** through **COM 4** (usually COM 2 for desktops and COM 1 for laptops).

c. Click **SEND / RECV** button on the main menu to see the transfer dialog (figure 1-9).

d. If you want to copy the settings from your scanner to the host computer, click **SEND TO SCANNER.**

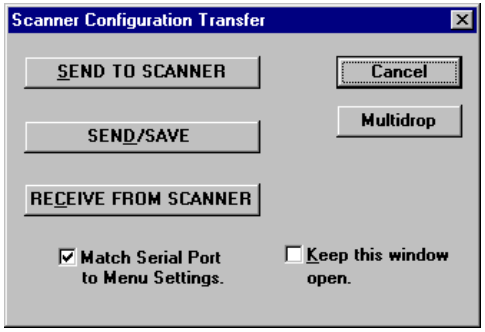


Figure 1-9 Scanner Configuration Transfer

e. To transfer your current host file settings to the scanner, click **RECEIVE FROM SCANNER**. If **Match Serial Port to Menu Settings** is checked, the current menu settings as listed in the settings window will be copied to the host's serial port as well as sent to the scanner. The default settings for the scanner are **9600** baud, **Even** Parity, **7** Data Bits, and **1** Stop Bits.

f. If after some delay you get an "Upload from scanner has timed out!" message, click the **Auto Baud** button (figure 1-8) or select **Auto Baud** from **Serial Port** pull down menu.

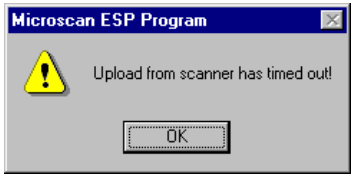


Figure 1-10 Error Messages

Allow some time for the auto baud routine to test most of the combinations. You can watch this at the bottom of the dialog box. Once it has found it, it will change the host's settings to match the scanner's.

If **Upload Status** shows Passed in all categories (as shown in figure1-11), then go to Step 7, "Configure Scanner," on page 1-9.

Note: Auto Baud does not test for Com ports. This requires manual entry.

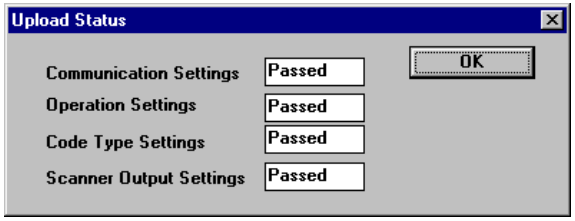


Figure 1-11 Upload Status

7 Configure Scanner

Settings for Communications, Operations, Code Types, and Scanner Output are loaded into the scanner's RAM from a Windows-based configuration program by menu (see Chapter 2, "Configuration Setup File") or by serial command (Chapter 3, "Serial Configuration") from an ASCII terminal.

For explanations of configuration settings, see Chapter 2, "Menu Configuration."

For a list of serial configuration commands, see Chapter 3, "Serial Configuration."

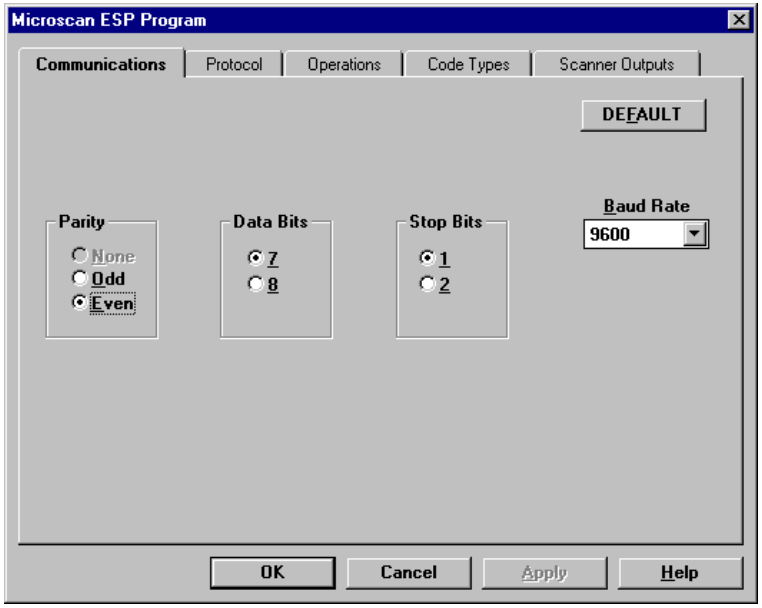


Figure 1-12 ESP™ Configuration Menus

Note: When you save communications changes to the scanner, serial port settings are automatically matched.

Note: You can check your scanner's settings at any time by clicking SEND/RECV and RECEIVE FROM SCANNER to upload the scanners current settings.

8 Position Scanner and Label

Before testing the decode rate, you will need to position the scanner and label in a manner that matches as nearly as possible the actual conditions of your application.

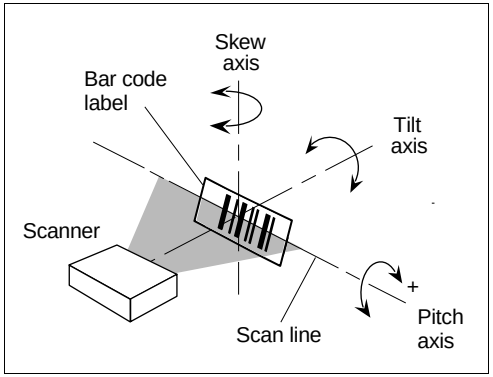


Figure 1-13 Tilt, Skew, and Pitch Axes

a. Position the scanner and label, taking care to avoid excessive tilt, skew, or pitch.[1]

b. Pitch label (or scanner) slightly up (at least 2°) or down (at least 7°) as shown in figure 1-14 to avoid *specular reflection*, the return of direct, non-diffused light.[2]

Note: If this label were moving from left to right (or vice versa), the orientation of the label, relative to the scan beam, would be "picket fence;" if the label were moving from top to bottom (or vice versa), the orientation of the label, relative to the scan beam, would be "ladder."

For more information, see Appendix G, "Orientation," on page A-17.

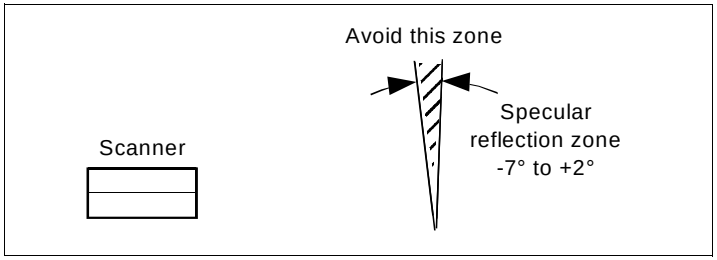


Figure 1-14 Specular Reflection Zone

1. Maximum tilt is determined by label characteristics and number of scans required. Maximum skew is ±40°; maximum pitch is ±50°.
2. The specular reflection zone is a narrow arc on the label's pitch axis -7° to +2° relative to the scanner in which direct reflected light from the label can distort the scanner's ability to distinguish bars from spaces.

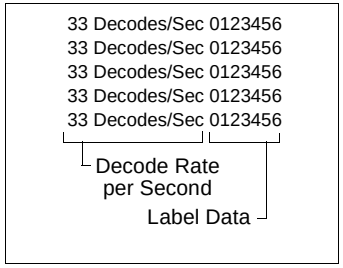
9 Do Decode Rate Test

To begin the decode rate test:

a. Position the label in front of a functioning scanner; enter the read rate test from the ESP™ terminal mode as described in “Enter Percent Test” on page 4-4.

b. Observe decode rate.

c. Check depth-of-field (minimum/maximum range) by moving the label closer and further relative to the scanner and noting the points where the decode rates fall below a level acceptable to your application.



d. Ideally, the label used in your application should pass through or near the center of the depth-of-field.

e. Repeat steps a through c for other labels used in your application.

If the decode rate is acceptable, go to Step 11, “Install Scanner,” on page 1-13. If the decode rate is unacceptable, go to Step 10, “Adjust Other Scanning Parameters,” on page 1-12.

Note: If, after making adjustments, the read range or another parameter used in the number of scans formula has changed, recalculate the number of scans (Step 3, “Calculate Number of Scans,” on page 1-4).

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

10 Adjust Other Scanning Parameters

This section lists various adjustments that may improve decode rates.

After changing any of the parameters described in this section,

a. If applicable, recalculate the number of scans (Step 3, “Calculate Number of Scans,” on page 1-4).

b. Repeat Step 9, “Do Decode Rate Test,” on page 1-11.

c. Compare the new decode rate results with those obtained before changes were made.

Range

Adjusting the label’s range, if possible, is one of the quickest and most effective ways to improve decode rates.

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, label speed (the time in seconds that a label is fully within the scan width of the scanner) is an effective way to alter the number of scans.

Label Dimensions, Label Density, and Label Ratio

Not usually an option in most applications, but changes to label parameters can affect number-of-scan 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 bar height of a label in ladder orientation means the label will receive more scans. Changing label density and/or bar code ratio is another way ranges, decode rates, etc. can be altered.

11 Install Scanner

The VS-310 scanner can be top or bottom mounted as per dimensions shown in figure 1-15.

To permanently mount the scanner:

a. Position the scanner in a place devoid of sunlight, bright lights, or laser light from other sources.

b. Drill two 0.128 inch (3.25 mm) diameter holes 2.29” (5.82 cm) apart as per figure 1-15.

Caution: Maximum penetration depth of screws is 0.200 inch (5.08 mm).

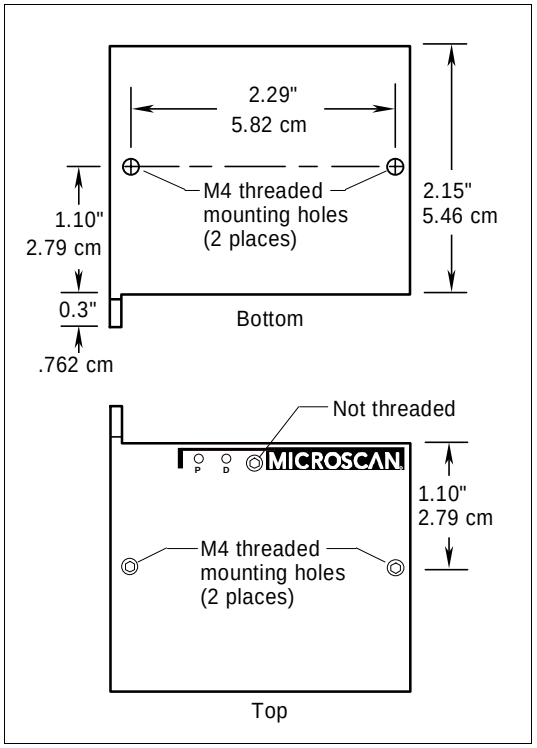


Figure 1-15 Mounting Holes and Dimensions (not to scale)

12 Position Object Detector

If you are not using an object detector, ignore this step.

In a typical operation, a scanner will wait for bar code data only during a triggered read cycle. A read cycle is initiated by a “trigger” that can be in the form of a serial command from the host (internal trigger) or a signal from an object detector (external trigger).

When an object detector is used, it is set up so that its beam will bounce off the approaching object and the resulting pulse will be sent to the scanner to begin the read cycle. Typically, a detector is positioned so that it will detect the presence of an object before the object’s label can be scanned by the scanner.

An object detector is mounted in almost any position relative to the object as long as (1) the object passes within range of the detector and (2) direct or reflected light from the detector does not interfere with the scanner’s reception.

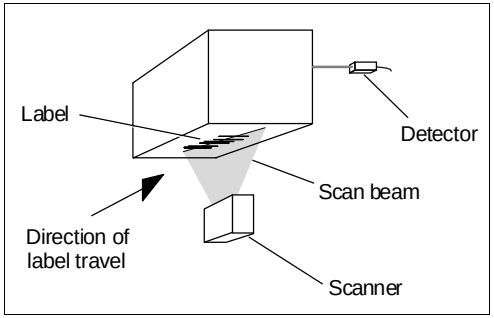


Figure 1-16 Detector Orientation

As the item continues to move down the line, its label moves into the scanner beam and is read by the scanner.

Figure 1-16 shows a picket fence label being scanned with the detector and scanner at right angles to each other.

Operational Tips

Do:

- Check inputs (label speed, length, height, etc.) to ensure the desired number of scans per label.
- Avoid excessive tilt, pitch, and skew of the bar code label.
- Check the label for readability by doing a decode rate test. If there is any question about the label's readability, contact your Microscan representative.
- 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 (see appendix H on page A-19).
- Operate the scanner in excessive temperature environments (see “ENVIRONMENT” on page A-2).

Chapter 2 Menu Configuration

Chapter Contents

Using ESP™ to Configure the Scanner 2-2
Communications Menu 2-4
Protocol 2-6
Operations Menu 2-10
Code Types Menu 2-16
Scanner Outputs Menu 2-21

This chapter tells how to configure the VS-310 scanner using the ESP™ program on a Windows based (Windows 3.1™ or Windows 95™) computer.[1]

The ESP™ program can be thought of as two programs: one for use in configuration, the other for use in testing and operations. Configuration is covered in this chapter; testing and operations are covered in Chapter 4.

Microscan's ESP™ will allow the user to quickly configure the VS-310 scanner and save multiple configuration files to the host or setup computer which in turn can be used to archive or download settings to other scanners.

After changes are made in the configuration menus, they can be downloaded in total to the scanner and the current settings will be posted in a status window. It is important to note that configuration settings can be saved in two distinct ways: to the *scanner* or to the host *computer*.

Note: See Step 5, "Install ESP™," on page 1-7 and Chapter 4, "Utilities," for testing and operational uses of the ESP™ program.

1. Before installing the program you should have a working acquaintance with the Windows® platform. See Microsoft Windows® literature and Help files for additional information.

Using ESP™ to Configure the Scanner

Figure 2-1, “Configuration Setup File,” shows the window you will see when you launch the Easy Setup Program.

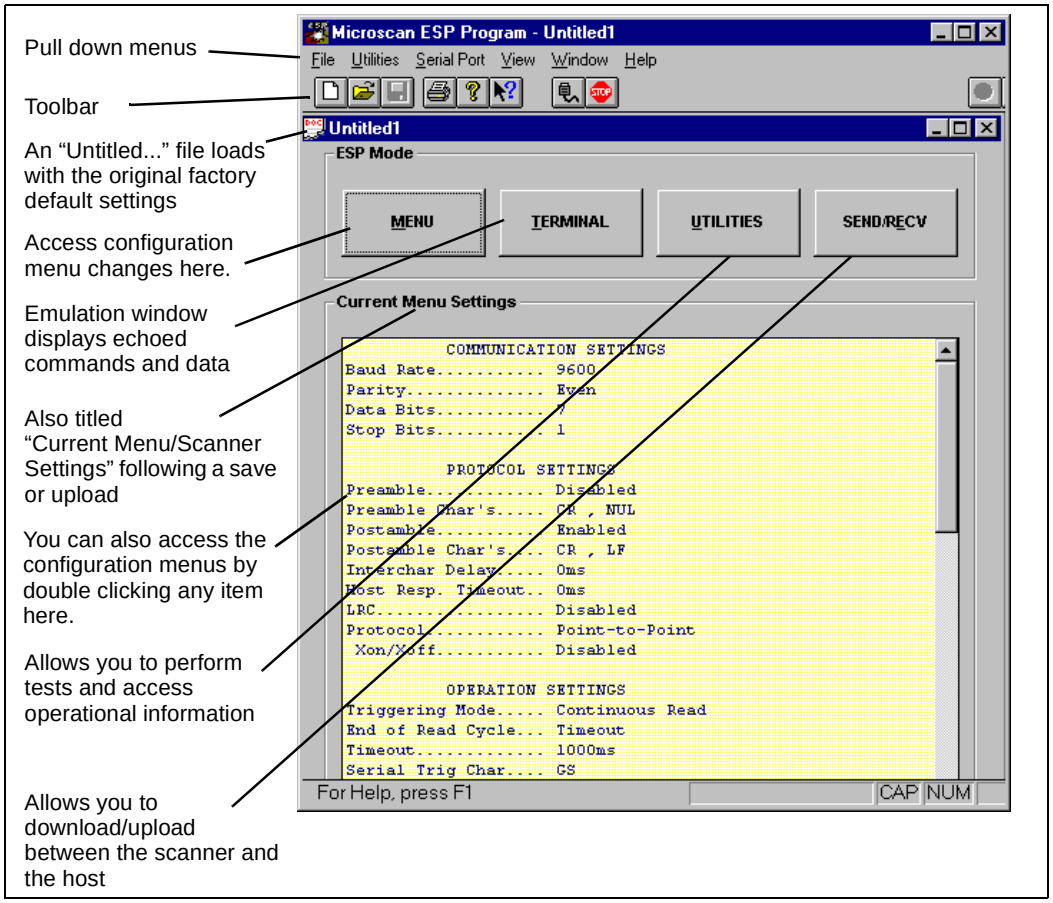


Figure 2-1 Configuration Setup File

To access the configuration menus, press the **MENU** button.

If using a mouse, single click on menu items and enter text as appropriate. If using the keyboard, use the Alt key plus underlined letters and the tab key to move to the desired field, use arrow keys or the space bar to scroll through selections, and the Enter key to accept changes.

Saving Settings to the Scanner

You can access the **SEND / RECV** box by clicking it directly from the Current Main menu, or after making changes from within any of the configuration menus, clicking **Apply**. (Clicking **OK** on these menu pages will only update the items in the Current Settings window.) From within the **SEND / RECV** box, click **SEND TO SCANNER** to initialize and reset counters only, or **SEND / SAVE** to initialize, reset counters, and save these settings to the scanner's nonvolatile memory. (See figure 2-1 on page 2-2.)

Uploading Settings

To update current settings from the scanner (from RAM), click **SEND / RECV** and then **RECEIVE FROM SCANNER**.

Note: If receiving scan data and you are in Continuous Read, labels being scanned may interfere with your data request (figure 2-2).

Figure 2-2 Upload Error

Saving Settings to the Host Computer

When saving a file by clicking **SAVE AS** (or **SAVE**) from the File pull-down menu, the settings are saved only on the computer's hard drive or other storage medium. This is particularly useful for saving special sets of settings that you may want to recall later and use for a different application.

Creating a New Configuration File

To create a new file of configuration settings, first be sure you've saved the current configuration file to the computer's hard drive or other storage device. Next pull down the File menu in the ESP™ and click **New**. A new Untitled window will open with a listing of the factory default settings. Change these settings to suit your requirements and save this file to the computer's hard drive under a new name. These settings can also be downloaded to the scanner at any time under a name of your choice.

Restoring Factory Default Settings

Note: Be certain that you've saved any other configuration files to the host computer that you may want to reload later.

Default settings can be reset for individual menus pages or for all menus at once. To restore factory defaults for individual menus (Communications, Operations, Code Types, or Scanner Settings), click the **DEFAULT** button on the specific menu.

To restore factory defaults for ALL settings in the scanner, click the **DEFAULT** button on the **Reset** page of the **Utilities** menu, or click **New** in the File pull-down menu.

Communications Menu

The Communications menu allows you to set the communication protocols of the scanner. (See figure 2-3.).

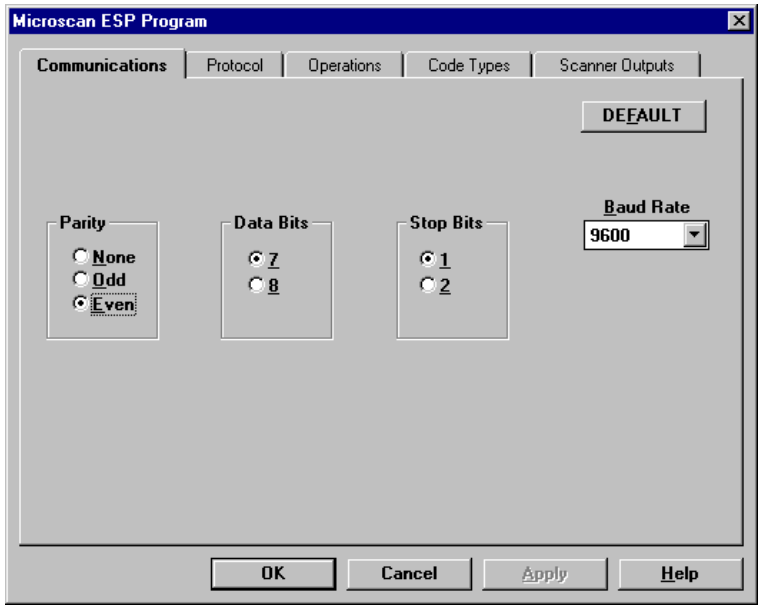


Figure 2-3 Communications Menu Structure

Note: When you make and save menu communications changes to the scanner, those changes will automatically be matched in the Serial Port configuration.

Default

Clicking the **DEFAULT** button will reset all options on the Communications menu to factory defaults. This does not affect any other menus and it does not take effect until it is saved to the scanner with the **SEND TO SCANNER** or the **SEND / SAVE** buttons under **SEND / RECV**.

Parity

Default: Even

Options: Even, Odd, None

Allows you to choose 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.

Data Bits

Default: Seven

Options: Seven, Eight

Allows you to establish the total number of bits in each character.

Stop Bits

Default: One

Options: One, Two

Allows you to choose the last one or two bits in each character to indicate the end of the character.

Baud Rate

Default: 9600

Options: 300, 600, 1200, 2400, 4800, 9600, 19.2K

Allows you to set the number of bits transmitted per second.

Protocol

The Protocol menu allows you to choose your communications protocol and associated output data format.

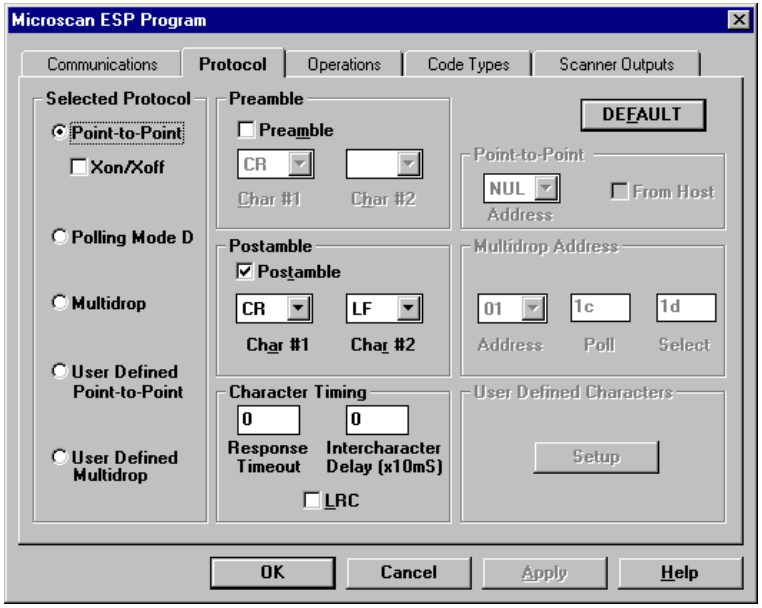


Figure 2-4 Protocol

Default

Clicking the **DEFAULT** button will reset all options on the Protocol menu to factory defaults. You can then click **Apply** followed (in the pop-up dialog box) by **SEND TO READER** or **SAVE TO READER**.

Selected Protocol

Default: Point-to-Point

Options: Point-to-Point, Point-to-Point with XON/XOFF, Polling Mode D, Multidrop, User Defined, User Defined Multidrop

Protocols define the sequence and format in which information is transferred between devices.

Point-to-Point

Has no address and sends data to the host (RS-232) whenever it is available and without any request or handshake from the host.

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

Used only with RS-232. This selection enables the host to send a single byte transmission command of start (XON) or stop (XOFF). 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.

Polling Mode D

Like Point-to-Point, Polling Mode D requires a separate 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. 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.

Multidrop

Note: Readers intended to link up to a Microscan MS-5000 multidrop concentrator must be configured in standard Multidrop protocol.

Note: To avoid slow or degraded performance when the VS-310 is networked with Microscan's MS-5000 multidrop concentrator, the MS-5000 must have Turnaround Timeout set to 35 ms and should have Baud Rate set to 19.2 and Number of Devices set to no more than the actual number of connected devices. See MS-5000 Multidrop concentrator User's Manual.

Similar to Polling Mode D except that a unique poll address and select address are required for each multidrop device, and only one host port connection is needed for up to 50 devices. (For Multidrop poll and select characters, see Table A-E, "ASCII Table," on page A-12.)

Requires a concentrator or controller using RS-485 communications. When Multidrop is selected, the protocol characters for RES, REQ, etc. are assigned automatically. (See Table A-11, "ASCII Table with Control Characters," on page A-12 for poll and select sequences.)

User Defined

Note: A specific ASCII character must not be assigned more than once.

Used only with RS-232. User Defined is necessary when a new protocol must be defined to match a specific host protocol. ASCII characters can be assigned as an address and as protocol commands (RES, REQ, EOT, STX, ETX, ACK, NAK, From Host). In order to enable a handshaking protocol, you must manually assign values where necessary. When User Defined is selected, the displayed protocol commands match those of the previously selected protocol. User Defined is considered to be in a polled mode only if an address has been assigned. The address can be any ASCII character from Table A-11, "ASCII Table with Control Characters," on page A-12. If null is selected as the address, the reader will not function in a polling sequence.

From Host, if enabled, allows the handshaking protocol to be initiated from the host, if unpolled.

Default: Disabled

Options: Disabled, Enabled

From Host

When enabled, messages sent to the host from the VS-310 will always include the reader's defined protocol. The status of From Host determines if messages sent to the VS-310 from the host must also 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. (See "From Host," on page 2-8 for further information.)

Default: Disabled

Options: Disabled, Enabled

User Defined Multidrop

Used when connecting to a concentrator or other device that does not match standard Multidrop protocol.

Any single character (01 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 ^A (01 hex) is selected as the address, ^B (02 hex) becomes the select address that the host will use in sending host select commands. (See table A-16 on page A-16.)

Note: Definitions of commands in User Defined and User Defined Multi-drop 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. You then change individual characters to match the host or other requirements.

Preamble

Preamble (enable/disable)

Default: Disabled

Options: Disabled**,** Enabled (within any protocol)

Allows you to enable or disable the preamble character(s).

Preamble (definition)

Default: CR (carriage return).

Options: Up to two ASCII characters except NUL, <, or >.[1]

If enabled, allows you to define up to two characters that can be added in front of the symbol data. For example, a carriage return.

Postamble

Postamble (enable/disable)

Default: Enabled

Options: Enabled, Disabled (within any protocol)

Allows you to enable or disable the Postamble character(s).

Postamble (definition)

Default: CR LF (carriage return/line feed).

Options: Up to two ASCII characters except NUL, <, or >.[1]

Allows you to define up to two characters that can be added after the symbol data. When enabled, the default CR LF causes each symbol to be displayed on its own line.

Response Timeout (character)

Default: 4 (40 ms)

Options: 0 to 255 (in 10 ms increments)

Allows you to set the time the reader will wait between characters before timing out if ACK, NAK, and ETX are enabled, and a host response is expected.

Intercharacter Delay

Default: 0

Options: 0 to 255 in 60 ms increments. Zero (0) causes no delay between characters.

Allows you to set the time interval in milliseconds between individual characters transmitted from the VS-310 to the host computer. A high setting will significantly slow down communications. For example, a 200 setting will result in a 2 second delay between each character that is transmitted.

Longitudinal Redundancy Check (LRC)

Default: Disabled

Options: Disabled, Enabled

An error-checking routine that verifies the accuracy of transmissions. It is the exclusive OR of all characters in the transmitted message. The result is appended to the end of the transmitted message.

1. In the case where only one character is entered, a NUL character is selected to serve as a place holder; however, no output will result.

Operations Menu

The Operations menu allows you to set the operations parameters for the scanner. (See figure 2-5.)

Note: Clicking the **DEFAULT** button will only restore those settings of the specific menu on which the button appears.

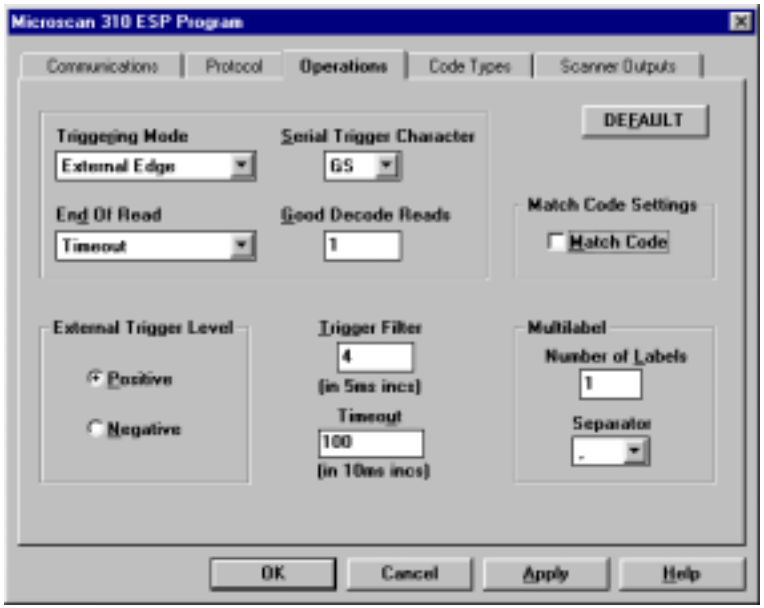


Figure 2-5 Operations Menu

Default

Clicking the **DEFAULT** button will reset all options on the Operations menu to factory defaults. This does not affect any other menus and it does not take effect until it is saved to the scanner with the **SEND TO SCANNER** or the **SEND / SAVE** under **SEND / RECV**.

Triggering Mode

Default: Continuous Read

Options: Continuous Read, continuous read 1, External Level, External Edge, Serial Data, Serial Data & External Edge

Allows you to establish the type of trigger event that will initiate or end the read cycle. (See “End of Read Cycle” on page 2-12.)

Continuous Read

Trigger input options are disabled and the scanner is always in the read cycle. Bar code data is decoded, and label information is transmitted repeatedly, as long as the label is in the read range of the scanner. When To Output options have no affect on Continuous Read. Continuous Read is useful in testing label or scanner functions.

Note: If Match Code is enabled, the scanner defaults to Continuous Read 1.

Continuous Read 1

Label data is immediately transmitted once every time new label data is placed in front of the scanner. With End Of Read Cycle set to Timeout and the label not changed, the scanner repeats the output at the end of each timeout period. For example, if Timeout is set to one second, the scanner outputs the label data immediately, and then repeats the output at intervals of one second, for as long as the label continues to be scanned.

With End Of Read Cycle set to New Trigger, the scanner outputs the current label data immediately, but outputs it only once. A new label appearing at any time in the scan range will produce a new read output as long as the new label is not identical to the previous label.

Note: Continuous Read 1 will default to Continuous Read when I 2 of 5 code length is enabled for greater than 30.

Note: If Continuous Read 1 is enabled, Number of Labels (page 2-15) will default to one (if set for 2) and UPC Supplementals Enabled will not be available.

External Level

Allows a read cycle to be initiated by a trigger signal from an object detector when an object appears within the detector's range. The read cycle continues as long as the detector "sees" the object and ends when the object moves out of the detector's range.

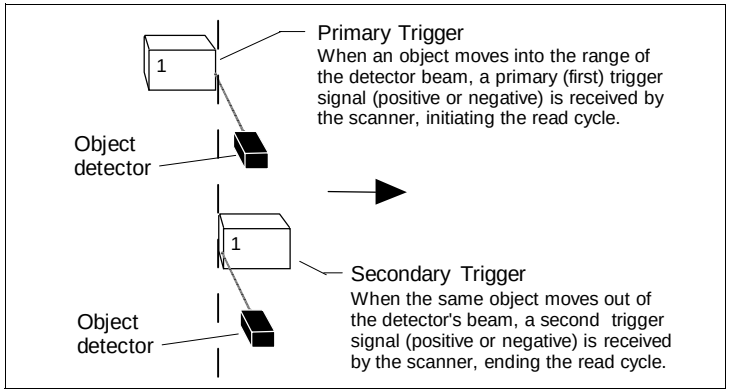


Figure 2-6 External Level Trigger Events

External Edge

As with Level, a read cycle is initiated by a trigger signal from an object detector when it detects the arrival of an object (first edge). But unlike Level, the departure of an object does not end the read cycle. With Edge enabled, the read cycle ends with a new trigger caused by the arrival of a subsequent object, unless a good read or timeout occurs first.

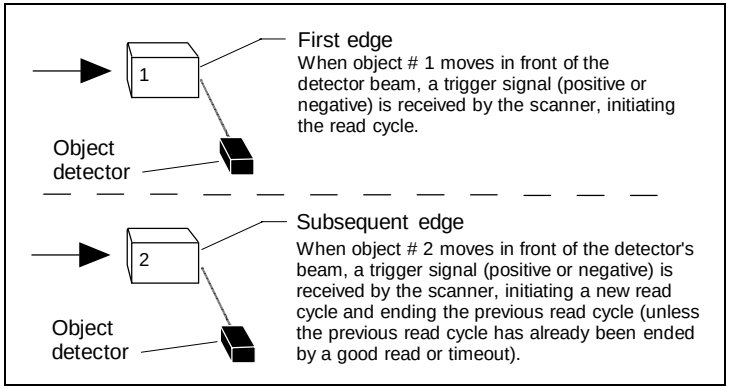


Figure 2-7 External Edge Trigger Events

Serial Data

The scanner accepts an ASCII character from the host or controlling device as a trigger to start a read cycle. Serial data trigger behaves the same as External Edge.

Serial Data & External Edge

The scanner accepts either an external trigger or a serial ASCII command to start a read cycle.

End of Read Cycle

Default: Timeout

Options: Timeout, New Trigger, Timeout & New Trigger

Allows you to choose the circumstances that will end the read cycle. The read cycle is the time during which the scanner will receive and process label data. When Triggering Mode is set to External or Serial, the trigger event initiates the read cycle.

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

Timeout

Can end the read cycle after a specified period of time, and if no label has been read, causes a noread message, if enabled, to be transmitted.

With either External Edge, Serial Data, or Serial Data & Edge enabled, a timeout ends the read cycle.

With External Level enabled, the read cycle does not end until the secondary trigger occurs, and the next read cycle does not begin until the next rising edge trigger.

With Continuous Read 1 enabled, a timeout initiates a new read cycle and allows the same label to be read again.

New Trigger

Ends the read cycle at the occurrence of a new trigger event, and if no label has been read, causes a noread message, if enabled, to be transmitted at the occurrence of the new trigger event.

With either External Edge, Serial Data, or Serial Data & Edge enabled, an edge or serial trigger ends a read cycle and initiates the next read cycle.

With External Level enabled, a secondary trigger, which occurs when the object moves out of the detector's range, ends a read cycle. However, the next read cycle does not begin until the occurrence of the next primary trigger.

Timeout & New Trigger

Ends the read cycle after a specified period of time or at the occurrence of new trigger event, and if no label has been read, causes a noread message, if enabled, to be transmitted.

With either External Edge, Serial Data, or Serial Data & Edge enabled, a timeout, or an edge or serial trigger, whichever comes first, ends the read cycle.

With External Level enabled, the read cycle does not end until the occurrence of a falling edge, and the next read cycle does not begin until the next rising edge trigger.

Serial Trigger Character

Default: GS

Options: Any single ASCII character except NUL, an existing host command character,[1] or an on-line protocol character.

Note: Serial Data (page 2-12) or Serial Data & Edge (page 2-12) must be enabled for Serial Trigger Character to take effect. "N/A" is displayed in the menu when all other triggering modes are enabled.

Allows you to define a single ASCII character as the host serial trigger character that initiates the read cycle. The serial trigger is considered an on-line host command and requires the same command format as all host serial commands (that is, to be entered within the < > brackets).

1. For example, assigning an upper case C would nullify the <C> (Enter Decode Rate Test) command. For a list of operational commands used by the scanner, see Chapter 4, "Utilities."

Good Decode Reads

Default: 1

Options: 1 to 31

Allows you to choose the number of good reads (from 1 to 31) required per label before a good decode output.

Note: Be sure to set the value within the determined scan rate for the scanning setup so that the scanner is capable of scanning a label the required number of times

External Trigger Level

Default: Positive

Options: Positive, Negative

Note: External Level (page 2-11), External Edge (page 2-12), or Serial Data & Edge (page 2-12) must be enabled for External Trigger Level to take effect. “N/A” is displayed in the menu when all other triggering modes are enabled.

Allows you to determine whether a positive or negative transition will initiate the read cycle.

Note: If using the Microscan object detector (P/N 99-440001-03), use positive trigger polarity.

Trigger Filter

Default: 4

Options: 0 to 255. (Approximately 0 ms to 1.275 sec in 5 ms incs.) Multiply the number entered on the command line by 5 for time in milliseconds.

Allows you to set a trigger bounce filter duration.

Timeout (in 10 ms incs)

Default: 100 (one second). Corresponds to 1000 ms displayed in the menu.

Options: 0 to 65535. Divide the number entered on the command line by 100 for time in seconds.

Note: Timeout or Timeout & New Trigger under End of Read Cycle (page 2-13) must be enabled for Timeout (in 10 ms incs) to take effect.

Allows you to define the duration of the timeout period.

Match Code

Default: Disabled

Options: Disabled, Enabled

Note: Match Code will not function when I 2 of 5 code length is enabled for greater than 30.

Note: A triggered mode (page 2-14 to page 2-12) must be enabled for Match Code to take effect.

Note: If Match Code is enabled, Number of Labels will default to 1 (if set for 2) and UPC Supplementals Enabled will not be available.

Allows you to enter a master label into the scanner's memory to be compared with subsequently scanned labels. (See “Master Label” on page 4-9.)

Number of Labels

Default: 1

Options: 1 to 2

Note: If Number of Labels is set to 2 while Match Code or Continuous Read 1 is enabled, Number of Labels will default back to one.

Allows you to choose the number of different labels that will be read in a single trigger event. The following conditions apply:

1. Each label must have different label data to be read.
2. The maximum number of characters that can be transmitted in any one label, or in both labels if 2 is enabled, is 64, excluding preamble, postamble, and all spaces and commas.
3. When 2 is enabled, a noread message for either label will be posted at the end of the full data string.
4. If more than one label is within the scan beam at the same time, label data may not be displayed in the order of appearance.

Multilabel Separator

Default: , (comma)

Options: Any ASCII character except NUL, <, or >.

Allows you to choose the separator character to be inserted between each label.

Code Types Menu

The Code Types menu allows you to choose among five bar code types and define their parameters. (See figure 2-8.)

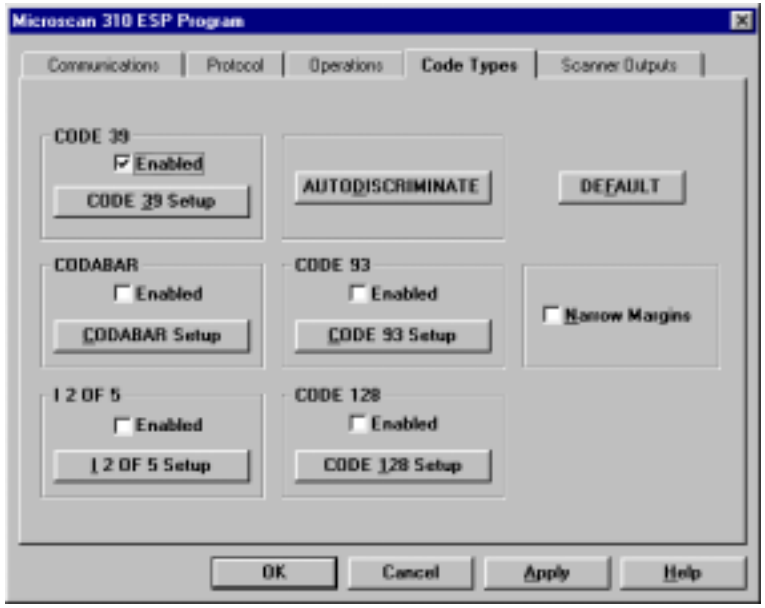


Figure 2-8 Code Types Menu

Default

Clicking the **DEFAULT** button will reset all options on the Code Types menu to factory defaults. This does not affect any other menus and it does not take effect until it is saved to the scanner with the **SEND TO SCANNER** or the **SEND / SAVE** under **SEND / RECV**.

Code 39

Default: Enabled

Options: Enabled, Disabled

Check Digit

Default: Disabled

Options: Disabled, Enabled

Code 39 is self-checking and does not normally require a check digit. However, for additional data integrity, a Modulus 43 check digit can be added to the bar code message. With Check Digit and an External or Serial trigger option enabled (see “External Trigger Level” on page 2-14), an invalid

check digit calculation will cause a noread message to be transmitted at the end of the read cycle.

Check Digit Output

Default: Disabled

Options: Disabled, Enabled

When enabled, the check digit character is sent along with the label data. When disabled, label data is sent without the check digit.

Large Intercharacter Gap

Default: Disabled

Options: Disabled, Enabled

Allows the scanner to read labels with gaps between bar code characters exceeding three times the narrow element width.

Fixed Code Length

Default: Disabled

Options: Disabled, Enabled

Used to increase data integrity by ensuring that only one label length will be accepted.

Code Length

Default: 10

Options: 1 to 31

Allows you to specify the exact number of characters that the scanner will recognize (this does not include start and stop). The scanner will ignore any code not having the specified length.

Codabar

Default: Disabled

Options: Disabled, Enabled

Large Intercharacter Gap

Default: Disabled

Options: Disabled, Enabled

Allows the scanner to read labels with gaps between bar code characters exceeding three times the narrow element width.

Check Digit

Default: Disabled

Options: Disabled, Modulus 16, NW 7, Both

Allows you to choose the type of checksum system Codabar will use.

Check Digit Output

Default: Disabled

Options: Disabled, Enabled

When enabled, the check digit character is sent along with the label data. When disabled, label data is sent without the check digit.

Start & Stop Match

Default: Enabled

Options: Enabled, Disabled

Requires the Codabar start and stop characters (a, b, c, or d) to match before a valid read can occur.

Start & Stop Output

Default: Enabled

Options: Enabled, Disabled

Allows the start and stop characters to be transmitted with bar code data.

Fixed Code Length

Default: Disabled

Options: Disabled, Enabled

Increases data integrity by ensuring that only label length will be accepted.

Code Length

Default: 10

Options: 1 to 31 (Includes check digit but not start and stop characters)

Allows you to specify the exact number of characters that the scanner will recognize. The scanner will ignore any code not having the specified length.

Interleaved 2 of 5

Default: Disabled

Options: Disabled, Enabled

Because I 2 of 5 is a continuous code, it is prone to substitution errors. Hence, a code length must be defined and a bar code label containing an even number of digits must be used. It is also recommended that a Modulus 10 check digit be used to ensure the best possible data integrity.

Check Digit

Default: Disabled

Options: Disabled, Enabled

I 2 of 5 uses a Modulus 10 check digit.

Check Digit Output

Default: Disabled

Options: Disabled, Enabled

When enabled, the check digit character is sent along with the label data. When disabled, label data is sent without the check digit.

Code Length #1

Default: 10

Options: 2 to 64, even. If you enter an odd number the scanner will use the next lower number.

With I 2 of 5, two code lengths can be defined. When using only one label length in an application, we recommend setting Code Length #2 to 0 to ensure data integrity. If a check digit is used, it must be included in the code length count.

Note: If Code Length of #1 is greater than 30, then Continuous Read 1 defaults to Continuous Read, Match Code is disabled, and Number of Labels defaults to 1.

Code Length #2

Default: 6

Options: 0 to 30, even. If you enter an odd number the scanner will use the next lower number.

If using a second label, you may also specify a zero or any even code length from 2 to 30. If not using a second label, set Code Length #2 to 0 to ensure data integrity.

Code 93

Default: Disabled

Options: Disabled, Enabled

Fixed Code Length

Default: Disabled

Options: Disabled, Enabled

Allows you to increase data integrity by ensuring that only one label length will be accepted.

Code Length

Default: 10

Options: 1 to 31

Allows you to specify the exact number of characters that the scanner will recognize (this does not include start and stop). The scanner will ignore any code not having the specified length.

Code 128

Default: Disabled

Options: Disabled, Enabled

Fixed Code Length

Default: Disabled

Options: Disabled, Enabled

Allows you to increase data integrity by ensuring that only one label length will be accepted.

Code Length

Default: 10

Options: 1 to 31

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

Allows you to specify the exact number of characters that the scanner will recognize. The scanner will ignore any code not having the specified length.

Autodiscriminate

Default: Disabled

Options: Disabled, Enabled

Enables all code types simultaneously.

Narrow Margins

Default: Disabled

Options: Disabled, Enabled

Allows the scanner to read bar codes with quiet zones less than 10 times the narrow-bar-width. Quiet zone is a term used to describe the minimum space at the leading and trailing ends of a label. Each quiet zone can be as small as five times the narrow bar element when Narrow Margins is enabled.

Scanner Outputs Menu

The Scanner Outputs menu allows you to configure the scanner's output.

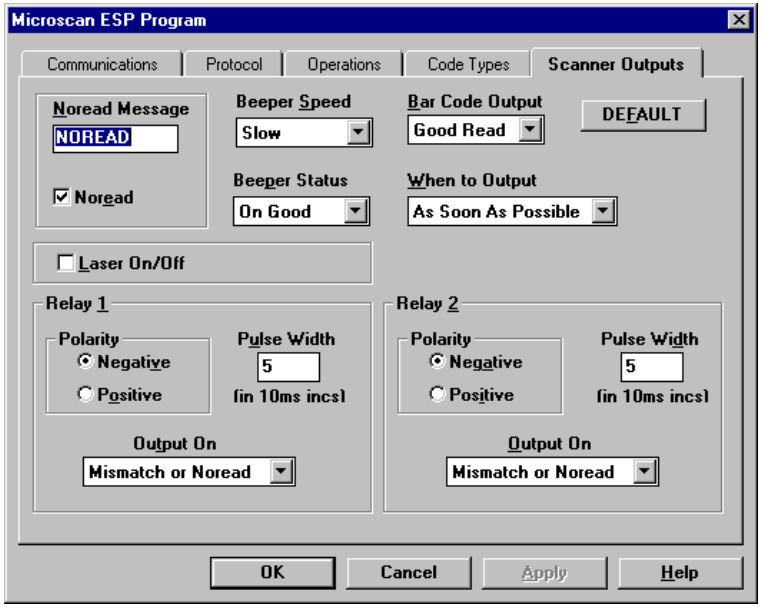


Figure 2-9 Scanner Outputs Menu

Note: Bar code output data and noread messages are transmitted on pin 5 under conditions set principally in Bar Code Output. Relay pulses are transmitted via pins 2 and 8 (Relay-1 and Relay-2 respectively) and individually configured under conditions set in Relay-1 and Relay-2.

Default

Clicking the **DEFAULT** button will reset all options on the Scanner Outputs menu to factory defaults. This does not affect any other menus and it does not take effect until it is saved to the scanner with the **SEND TO SCANNER** or the **SEND / SAVE** under **SEND / RECV**.

Bar Code Output

Default: On Good

Options: On Good, Disabled, Match, Mismatch

If Bar Code Output is set to Match or Mismatch, label data will not output unless Match Code (page 2-16) is enabled and a master label is downloaded into memory. Allows you to choose the conditions that will send label data (or noread messages) to the host computer.

Disabled

The scanner will not output either label data or noread messages to the serial port.

Match (with Match Code enabled)

The scanner will output when the label data information matches the master label. However, if Match Code is disabled it will output on any good read.

Mismatch (with Match Code enabled)

The scanner will output when the label data information does not match the master label. However, if Match Code is disabled it will output on any good read.

When to Output (bar code data)

Default: As Soon As Possible

Options: As Soon As Possible, End of Read Cycle

Allows you to choose when bar code data is sent to the host computer.

As Soon As Possible

Causes bar code data (good reads) to be transmitted immediately upon a good decode.

End of Read Cycle

Causes bar code data output to be delayed until the end of the read cycle.

Beeper Status

Default: On Good

Options: On Good, On Noread, Disabled

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

Beeper Speed

Default: Fast

Options: Fast, Slow

Allows you to control the duration of the sound emitted by the beeper.

Noread Message

Default: NOREAD

Options: Up to seven ASCII characters (except NUL).

Allows you to define any combination of ASCII characters (except NUL) up to seven characters as the noread message. When enabled, the noread message will be transmitted to the host at a timeout or the end of a read cycle if the bar code label has not been decoded.

Enable Laser On/Off

Default: Disabled

Options: Disabled, Enabled

Note: A serial or external trigger (see "External Trigger Level," on page 2-14) must be enabled for Laser On/Off to take effect.

When enabled, the laser is ON only during the read cycle. When disabled, the laser operates continuously.

Note: Laser On/Off does not relate to the <H> (Enable Laser Scanning) or <I> (Disable Laser Scanning) operational commands on page 4-6.

Enable Noread

Default: Enabled

Options: Enabled, Disabled

Note: If Noread Output is enabled, the noread message will only output if Bar Code Output (page 2-21) is also enabled.

Allows you to enable or disable the noread message.

Relay 1 and Relay 2

Relay 1 and Relay 2 can allow simultaneous output on pins 2 and 8 respectively under individually programmed conditions. The following parameters (Output On, Polarity, and Pulse Width) are individually configured in ESP™, but described only once here.

Note: Relay 2 is not available if using an RS-422/485 version.

Polarity

Default: Negative

Options: Negative, Positive

Allows you to choose between positive and negative output signals for the relay output pin that is enabled.

Pulse Width (in 10 ms incs)

Default: 5 (.05 seconds). Corresponds to 50 ms displayed in the menu.

Options: 0 to 255 (0 to 2.55 seconds). Divide the number entered on the command line by 100 for time in seconds.

Allows you to set the duration of the good match/noread output signals at the relay output pin that is enabled.

Output On

Default: Mismatch or Noread

Options: Mismatch or Noread, Match, Mismatch, Noread

Allows you to set the conditions that will output a relay pulse. To see the options for enabling Match Code and downloading a master label into memory. (See *"Master Label," on page 4-9*.)

Mismatch or Noread

Sends a pulse to the relay output pin(s) when the following conditions are met:

1. Match Code is disabled and a noread occurs; or
2. Match Code is enabled (page 2-15), and ANY of the following is true:
   a. a label is decoded and does not match the master label,
   b. there is no master label in memory (page 4-9), or
   c. a noread occurs.

Noread

Sends a pulse to the relay output pin(s) when the label's data is not decoded before the end of the read cycle regardless of the status of Match Code.

Match

Sends a pulse to the relay output pin(s) if the following conditions are met:

1. Match Code is disabled and a label is decoded; or
2. Match Code is enabled (page 2-15) and ALL of the following are true:
   a. A master label is downloaded into memory (page 4-9),
   b. A label is decoded, and
   c. The decoded label matches the master label

Mismatch

Sends a pulse to the relay output pin(s) that is enabled if ALL of the following conditions are met:

1. Match Code is enabled (page 2-15).
2. A label is decoded.
3. The decoded label does not match the master label or there is no master label in memory (page 4-9).

Chapter

3

Serial Configuration

Chapter Contents

Summary of Serial Configuration Commands 3-2
Serial Configuration Command Format 3-3
Concatenating Serial Commands 3-4
Establishing Communications 3-4
Communications 3-5
Protocol 3-5
Operations Commands 3-8
Code Types Commands 3-10
Scanner Output Commands 3-12
Scanner Setup Commands 3-13

All of the configuration changes to the scanner that can be made in the menu program can also be accomplished by command strings from the host.

Serial command strings are entered from an ASCII terminal or from within the Terminal window of the Easy Setup Program for Windows. As with menu configuration commands, serial configuration commands relate to the initial scanner setup.

To quickly reference the serial configuration commands, see table 3-1 on page 3-2.

See Menu commands in Chapter 2 for detailed explanations of configuration commands.

Table 3-1 Summary of Serial Configuration Commands

Type	ESP Cmd ?	Cmd	Name	Format
Communications	Yes	Ka	Communications	<**Ka***baud,parity,stop bits,data bits*>
Protocol	Yes	Kf	Protocol	<**Kf***protocol*>
	Yes	Kd	Preamble	<**Kd***status,ASCII characters*>
	Yes	Ke	Postamble	<**Ke***status,ASCII characters*>
	Yes	Kc	LRC	<**Kc***status*>
	Yes	KA	Response Timeout	<**KA***timeout setting*>
	Yes	KB	Intercharacter Delay	<**KB***number*>
Operations	Yes	Km	Good Decode Reads	<**Km***number*>
	Yes	KL	Number of Labels	<**KL***number of labels,field separator*>
	Yes	Ki	Serial Trigger Character	<**Ki***character*>
	Yes	Kg	Triggering Mode	<**Kg***mode,filter time*>
	Yes	Kh	End of Read Cycle	<**Kh***mode,time*>
	Yes	Kj	External Trigger Level	<**Kj***mode*>
	Yes	Kn	Match Code	<**Kn***status*>
Code Types	Yes	Ko	Narrow Margins	<**Ko***status*>
	Yes	Kp	Code 39	<**Kp***status,check digit status, check digit output status,large interchar-acter gap,fixed code length status,code length,full ASCII status*>
	Yes	Kq	Codabar	<**Kq***status,start & stop match status,start & stop output status,*large intercharacter gap,*fixed code length status,code length,check digit type,check digit output*>
	Yes	Kr	Interleaved 2 of 5	<**Kr***status,check digit,check digit output,lengthþ1,length 2*>
	Yes	Kz	Code 93	<**Kz***status,fixed code length status,code length*>
	Yes	Kt	Code 128	<**Kt***status,fixed length,length*>
Scanner Outputs	Yes	Kv	Relay-1	<**Kv***output on,polarity, pulse width*>
	Yes	Kw	Relay-2 (with RS-232 only)	<**Kw***output on,polarity, pulse width*>
	Yes	Kl	When to Output	<**Kl***status,when to output*>
	Yes	Kk	Noread Message	<**Kk***status,output*>
	Yes	Ku	Beeper	<**Ku***status,speed*>
	Yes	KC	Laser On/Off Status	<**KC***status*>
Scanner Setup	No	KP	Scanner Type	<**KP***density*>

Serial Configuration Command Format

The format for a serial configuration command is,

<Kparameterdata,data,...etc.><initializing command>

Where:

- Less than **<** and greater than **>** symbols are included as part of the commands.
- "parameter," as used here, are those character(s) that precede the data.
- The "initializing command" <A> or <Z> is sent after configuration is complete. <Z> resets and saves the configuration changes for power up. <A> resets and uses the changes in RAM.[1] (For more information, see page 4-12.)

For example, the following command enables Code 93 and saves the change for power-on: **<Kz1><Z>**.

When using serial configuration commands, note also the following conventions:

- Parameters and data are "case sensitive." That is, characters must be entered as upper or lower case, as specified.
- All data fields (except the last) must be followed by a comma (without a space).
- If there is no change in a given field, then commas can be entered alone, or with the existing data (for example, **<Ka,,,0>** or **<Ka4,1,0,0>**).
- All fields preceding the modified field must be included. For example, in Host Port, to change Data Bits to Eight without changing any other field, enter either: **<Ka,,,1>** or **<Ka4,1,0,1>**.
- All fields following the modified field can be left out. For example, in the RS-232 port, to change Baud Rate to 4800, enter **<Ka3>**.

(See examples on following pages.)

1. See "Initializing serial configuration commands" on page 3-4 for definitions and examples.

Initializing serial configuration commands

To ensure that a serial configuration command will take effect, you need to follow it with one of the operational commands below:

<A> To reset but not save changes for power-on.

<Z> To reset and save changes for power-on.

For example, to change Baud Rate and reset without saving changes for power-up, enter **<Ka3><A>**.

To change Baud Rate and reset, saving the changes to NOVRAM for power-on, enter **<Ka3><Z>**.

Concatenating Serial Commands

Commands can be concatenated (added together) to a maximum of 64 characters in a single string or data block. Additional data blocks of 64 or less characters can be sent provided there is at least a 20 ms pause between blocks. If a block is ended with a <Z> or an <A> command, 1 second should be allowed.

For example, <Kc1><Kh1><Ko1><A> enables LRC, sets End of Read Cycle mode to New Trigger, enables Narrow Margins and resets the data buffers (without saving the changes for power-on).

Establishing Communications

Communications settings of the scanner must match those of the host (or other terminal that is being used to setup the scanner.

You can change the scanner's settings by serial commands or in Menu on the Communications page.

Note: Once an address is assigned to the scanner, you must use a multi-drop device and protocol to continue to communicate with the scanner.

If communications should be broken, you can re-establish by changing or defaulting the scanner's settings to match the linked device's and saving these settings to RAM. When you save communications settings to the scanner, those changes are automatically updated and matched in the host (see Step 6, "Establish Communications," on page 1-8).

Caution: Defaulting the scanner will reset all scanner configuration parameters to their original default values.

Communications

Format: <**Ka***baud rate,parity,stop bits,data bits*>

baud rate:		*stop bits:*	*data bits:*	*parity:*
0 = 600	**4 = 9600**	**0 = One**	**0 = Seven**	0 = None
1 = 1200	5 = 19.2K	1 = Two	1 = Eight	**1 = Even**
2 = 2400	6 = 300			2 = Odd
3 = 4800				

Example: To change Host Port Baud Rate to 19.2K, enter **<Ka5>**.

Protocol

If selecting one of the options from 0 to 4 (Point-to-Point, Point-to-Point with XON/XOFF, or Polling Mode D), use this format:

Format: <**Kf***protocol*>[1]

protocol:

0 = Point-to-Point	5 = Multidrop (requires address)
2 = Point-to-Point with XON/XOFF[a]	6 = User Defined
4 = Polling Mode D	7 = User Defined Multidrop

a. RTS/CTS is not available with the VS-310 at this time. Options1 and 3 are reserved for possible future inclusion.

Example: To change the Protocol to Polling Mode D, enter <**Kf4**>

If selecting Multidrop (5), you must define an address and append it to the command string.

Format: <**Kf5***protocol,address*>

protocol:	address:
5 = Multidrop	Any number from 1 to 50

Example: To change the Protocol to Multidrop with an address of 33, enter <**Kf5,33**>.

If selecting User Defined (6) or User Defined Multidrop (7), complete the format by either choosing new parameters or concatenating unchanged data fields (separate by commas).

Tip: For User Defined, first select Point-to-Point <**Kf0**> and then User Defined <**Kf6...**>. For user Defined Multidrop, first select Multidrop <**Kf5**>, then User Defined Multidrop <**Kf7...**>.

Format: <**Kf***protocol,RES,address,REQ,EOT,STX,ETX,ACK,NAK,from host*>

protocol:

6 = User Defined;
From Host: **0 = disabled** 1 = enabled

1. The VS-310 does not support RTS/CTS.

Example: To select an unpolled ACK/NAK User Defined protocol with LRC disabled, enter **<Kf0><Kf6,,,,,,,^F,^U><Kc0>**.[1] ACK and NAK will be displayed in the menu.[2]

Note: Address, can be assigned any ASCII character except a null. Control characters are used to define RES through NAK (except Address). Table 3-2 lists the control characters used for these data fields. (Refer to Table A-E, "ASCII Table," on page A-12 for more information.)

Explanation of the From Host option

Suppose STX, ETX and EOT are defined in the VS-310, the trigger counter is currently T/00000, and you want to send the Trigger Counter Request command to the scanner.

Defined Protocol: STX, ETX, EOT Trigger Counter Status: T/00000

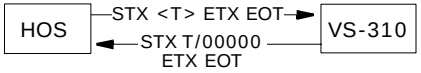
Host Command Request: <T> (Trigger Counter Request Command)

The command string format from the host would depend on the From Host setting.

If From Host is disabled, <T> (Trigger Counter Request command) would be the required format from the host to cause the scanner to return STX T/00000 ETX EOT. However, if From Host is enabled, the required host command string would be STX <T> ETX EOT to receive the same response from the scanner. In either case the data string returned by the scanner always includes the defined protocol. In this example the returned data would be STX T/00000 ETX EOT.

From Host Disabled

From Host Enabled



Format: <**Kf***protocol,RES,address,REQ,EOT,STX,ETX,ACK,NAK*>

protocol:

Format: *7 = User Defined Multidrop*

Example: To select an unpolled ACK/NAK User Defined protocol with LRC disabled, enter **<Kf0><Kf6,,,,,,,^F,^U><Kc0>**.[3] ACK and NAK will be displayed in the menu.[4]

1. <Kf0> nulls the address and <Kc0> disables LRC.
2. A control character, although conventionally represented here and in the ASCII table on page A-12 as two characters (^F or ^U, etc.), is actually a single ASCII character that is entered on the keyboard by holding down the control key while pressing the desired letter.
3. <Kf0> nulls the address and <Kc0> disables LRC.
4. A control character, although conventionally represented here and in the ASCII table on page A-12 as two characters (^F or ^U, etc.), is actually a single ASCII character that is entered on the keyboard by holding down the control key while pressing the desired letter.

Note: Address, can be assigned any ASCII character except a null. Control characters are used to define RES through NAK (except Address). Table 3-2 lists the control characters used for these data fields. (Refer to Table A-11, "ASCII Table with Control Characters," on page A-12 for more information.)

Table 3-2 Protocol Commands

Protocol Command (Mnemonic displayed on Microscan menu)	Control Characters (Entered in menu or serial command)	Effect of Command
RES	^D	Reset
REQ	^E	Request
EOT	^D	Reset
STX	^B	Start of Text
ETX	^C	End of Text
ACK	^F	Acknowledge
NAK	^U	Negative Acknowledge

Preamble

Format: <**Kd***status,preamble character(s)*>

status:	*preamble character(s):*
0 = Disabled	Enter one or two preamble characters except a null (00H). Default is **^M**.
1 = Enabled	

Example: To enable Preamble with just one character, an FF (form feed), enter **<Kd1,^L>**.

Postamble

Format: <**Ke***status,postamble character(s)*>

status:	*postamble character(s):*
0 = Disabled	Enter one or two postamble characters except a null (00H). Default characters are **^M^J**.
1 = Enabled	

Example: To disable Postamble, enter **<Ke0>**.

Response Timeout

Format: <**KA***timeout setting*>

Any number from 0 to 255 in 10 ms increments

Default is **0**.

Note: A zero creates an indefinite wait.

Allows you to set the time the reader will wait before timing out if ACK, NAK, and ETX are enabled, and a host response is expected.

Intercharacter Delay

Format: <**KB***time interval*>

time interval (between characters in milliseconds):

Any number from 0 to 255. Default is **0.**

Example: To change Inter-character Delay to 30 ms, enter **<KB30>**.

LRC

Format: <**Kc***status*>

status:

0 = Disabled
1 = Enabled

Example: To enable LRC, enter **<Kc1>**.

Operations Commands

Triggering Mode

Format: <**Kg***triggering mode,filter time*>

triggering mode:	*trigger filter time (in 5 ms increments):*
0 = Continuous Read	Any number between 0 and 255.
1 = Continuous Read 1	Default is **4** (4 x 5 ms = 20 ms).
2 = External Level	
3 = External Edge	
4 = Serial Data	
5 = Serial Data & Edge	

Example: To select External Edge, enter **<Kg3>**.

End of Read Cycle

Format: <**Kh***end of read cycle mode,timeout*>

end of read cycle mode:	*timeout (in 10 millisecond increments):*
0 = Timeout	Any number between 0 and 65535.
1 = New Trigger	Default is **100** (one second).
2 = Timeout & New Trigger	

Example: To select Timeout and change the timeout value to 6 seconds, enter **<Kh0,600>**.

Serial Trigger Character

Format: <**Ki***serial trigger character*>[1]

serial trigger character:

Any available ASCII character (see "ASCII Table with Control Characters" on page A-12). Default is **^]**.

Example: To define the Serial Trigger Character as a lowercase c, enter **<Kic>**.

Good Decode Reads

Format: <**Km***number of reads*>

number of reads (before a good decode):

Any number from 1 to 31.
Default is **1**.

Example: To change Good Decode Reads to 3, enter **<Km3>**.

External Trigger Level

Format: <**Kj***external trigger level*>

external trigger level (initiates a read cycle):

0 = Negative
1 = Positive

Example: To change External Trigger Level to Negative, enter **<Kj0>**.

Match Code

Format: *Format:* <**Kn***status*>

status:

0 = Disabled
1 = Enabled

Example: To enable Match Code, enter **<Kn1>**.

The maximum master label length is 31.

Number of Labels

Format: <**KL***number,multilabel separator*>

number of labels:	*multilabel separator:*
1 or 2. Default is **1**.	Any valid ASCII character.

Example: To change Number of Labels to 2, enter **<KL2>**.

(See "Number of Labels," on page 2-15 for limitations.)

1. Avoid selecting the < > characters as a serial trigger character or any character that is already an operational command. For example, an uppercase C cannot be used as a serial trigger character because it is the operational command for Enter Decode Rate Test. However, a lowercase c could be used without initiating the decode rate test.

Code Types Commands

Code 39

Format: <**Kp***status,check digit status,check digit output status,large intercharacter gap,fixed code length status,code length,full ASCII status*>

status:	*check digit status:*	*check digit output status:*	To set Fixed Code Length to 30, enter **0 = Disabled** or **<Kp1,0,0,0,1,30>**.
0 = Disabled	**0 = Disabled**	**0 = Disabled**	
1 = Enabled	1 = Enabled	1 = Enabled	

large intercharacter gap:	*fixed code length status:*	*code length:*	*full ASCII status*
0 = Disabled	**0 = Disabled**	Any number from 1 to 31. Default is **10**.	**0 = Disabled**
1 = Enabled	1 = Enabled		1 = Enabled

Example: To set Fixed Code Length to 30, enter **<Kp,,,,1,30>** or **<Kp1,0,0,0,1,30>**.

Codabar

Format: <**Kq***status,start & stop match status,start & stop output status,large intercharacter gap,fixed code length status,code length,check digit type,check digit output*>

status:	*start & stop match status:*	*start & stop output status:*
0 = Disabled	0 = Disabled	0 = Disabled
1 = Enabled	**1 = Enabled**	**1 = Enabled**

large inter-character gap:	*fixed code length status:*	*code length:*
0 = Disabled	**0 = Disabled**	Any number from 1 to 31. Default is **10**.
1 = Enabled	1 = Enabled	

check digit type:	*check digit output:*
0 = Disabled 2 = NW7	**0 = Disabled**
1 = Mod 16 3 = Both	1 = Enabled

Example: To set Fixed Code Length to 9, enter **<Kq,,,1,9>** or **<Kq1,1,1,1,9>**.

I 2 of 5

Format: <**Kr***status,check digit status,check digit output status,code length #1,code length #2*>

status:	*check digit status:*	*check digit output status:*
0 = Disabled 1 = Enabled	**0 = Disabled** 1 = Enabled	**0 = Disabled** 1 = Enabled

code length #1:	*code length #2:*
Any even number from 2 to 64. Default is **10**.	Zero or any even number from 2 to 64. Default is **6**.

Example: To set Fixed Code Length #1 to 8 and Fixed Code Length #2 to 4, enter **<Kr,,,8,4>** or **<Kr1,0,0,8,4>**.

Code 93

Format: <**Kz***status,fixed code length status,code length*>

Code 93 status:	*fixed code length status:*	*code length:*
0 = Disabled 1 = Enabled	**0 = Disabled** 1 = Enabled	Any number from 1 to 31. Default is **10**.

Example: To change Code 93 to enabled enter **<Kz1>**.

Code 128

Format: <**Kt***status,fixed code length status,code length*>

status:	*fixed code length status:*	*code length:*
0 = Disabled 1 = Enabled	**0 = Disabled** 1 = Enabled	Any number from 1 to 31. Default is **10**.

Example: To enable Code 128, enable Fixed Code Length, and set Code Length to 9, enter **<Kt1,1,9>**.

Narrow Margins

Format: <**Ko***status*>

status:

0 = Disabled
1 = Enabled

Example: To enable Narrow Margins, enter **<Ko1>**.

Scanner Output Commands

Relay-1

Format: <**Kv***output on,polarity,pulse width*>

output on (mode):	*polarity:*	*pulse width (in 10 millisecond increments):*
0 = Mismatch or Noread	**0 = Negative**	Any number from 0 to 255. Default is **5** (50 ms).
1 = Good Match	1 = Positive	
2 = Mismatch		
3 = Noread		

Example: To set Relay-1 to Mismatch and change Pulse Width to 40 ms, enter **<Kv2,0,4>** or **<Kv2,,4>**.

Relay-2 (RS-232 only)

Format: <**Kw***output on,polarity,pulse width*>

output on (mode):	*polarity:*	*pulse width (in 10 millisecond increments):*
0 = Mismatch or Noread	**0 = Negative**	Any number from 0 to 255. Default is **5** (50 ms).
1 = Good Match	1 = Positive	
2 = Mismatch		
3 = Noread		

Example: To set Relay-2 to Mismatch and change Pulse Width to 40 ms, enter **<Kw2,0,4>** or **<Kw2,,4>**.

Bar Code Output

Format: <**Kl***status,when to output*>

status:	*when to output:*
0 = Disabled	**0 = As Soon As Possible**
1 = Match	1 = End of Read Cycle
2 = Mismatch	
3 = Good Read	

Example: To set When to Output to End of Read Cycle, enter **<Kl3,1>**.

Noread Message

Format: <**Kk***status,output*>

status:	*noread output:*
0 = Disabled	Any ASCII string up to 7 digits. Default is **NOREAD**. (< and > are not recommended)
1 = Enabled	

Example: To enable Noread Message and send the message “FAIL,” enter **<Kk1,FAIL>**.

Beeper

Format: <**Ku***beeper status,beeper speed*>

beeper status:	*beeper speed:*
0 = Disabled	0 = Fast
1 = On good	**1 = Slow**
2 = On noread	

Example: To set the beeper status to Noread and beeper speed to Slow, enter **<Ku2,1>**.

Laser On/Off

Format: <**KC***status*>

status:

0 = Disabled
1 = Enabled

Example: To enable Laser On/Off, enter **<KC1>**.

Scanner Setup Commands

Note: The following command is not available in the VS-310 ESP software.

Scanner Type

Caution: Do not change the scanner density type unless instructed to do so by a Microscan representative.

Format: <**KP***density*>

*scanner density type:**

0 = Standard (100 scans per second)
1 = High Density (60 scans per second)

** The "default" will depend on the type of scanner.*

Note: The scanner must be reset for this parameter to take effect.

Chapter

4

Utilities

Chapter Contents

Summary of Operational Serial Commands 4-2
Using ESP for Operations 4-3
Read Rate 4-4
Trigger 4-5
Scanner 4-6
Counters 4-7
Master Label 4-9
Reset 4-11
Checksum/Part Number Commands 4-13
Other Operational Commands 4-13
Terminal Mode 4-14

Operational commands for the VS-310 can be entered as serial command strings (Table 4-1 on page 4-2) or, in most cases, as menu selections via the Easy Setup Program.

This chapter includes both operational serial command strings and corresponding ESP commands.

Menu commands are listed where appropriate. For configuration changes using ESP, see Chapter 2, “Configuration Setup File.”

Summary of Operational Serial Commands

Table 4-1 Summary of Operational commands

Command Type	ESP Cmd?	Serial Command	Name
Read Rate	Yes	<C>	Enter Decode Rate Test
	Yes	<Cp>	Enter Percent Rate Test
	Yes	<J>	Exit Decode Rate and Percent Rate Test
Trigger	Yes	<char>	Serial Trigger Character
Scanner Control	Yes	<H>	Enable Laser Scanning (Laser On)
	Yes	<I>	Disable Laser Scanning (Laser Off)
	Yes	<KE>	Motor On
	Yes	<KF>	Motor Off
	Yes	<L1>	Relay-1 Pulse
	Yes	<L2>	Relay-2 Pulse (not available with RS-422 option)
Counters	Yes	<N>	Noread Counter
	Yes	<O>	Noread Counter Reset
	Yes	<T>	Trigger Counter
	Yes	<U>	Trigger Counter Reset
	Yes	<V>	Good Read Counter
	Yes	<W>	Good Read Counter Reset
	Yes	<X>	Mismatch Counter
	Yes	<Y>	Mismatch Counter Reset
Master Label	Yes	<E>	Enable Match Code *
	Yes	<F>	Disable Match Code*
	Yes	<G>	Store Next Label Scanned as Master Label
	Yes	<)XXXX)>	Download Master Label Information
	Yes	<)>	Request Master Label Information
	Yes	<))>	Delete Master Label Information
Reset	Yes	<A>	Software Reset (does not save for power-on)
	Yes	<Ad>	Software Reset/Restore Default
	Yes	<An>	Software Reset/Read NOVRAM
	Yes	<Z>	Software Reset/Save Stnd Parameters for Power-on
	No	<Zp>	Save Scanner Type for Power-on
Check Sum	Yes	<!>	Display Checksum of EPROM
Part #	Yes	<#>	Display Software Part Number
Code Types	No	<P>	Autodiscriminate All Codes
	No	<Q>	Enable Code 39 Only*
	No	<R>	Enable Codabar Only*
	No	<S>	Enable I 2 Of 5 Only*

*Can also be set in the configuration menu or with a serial configuration command.

Using ESP for Operations

When the program is first loaded, the menu bar and toolbar will appear as in figure 4-1.

Figure 4-1 Partial Menu Selection

Most operational commands can be accessed from the **UTILITIES** button (figure 4-2) or from Utilities in the pull down menu.

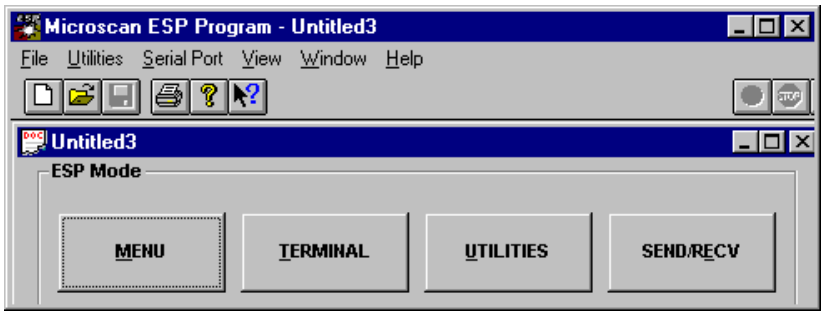


Figure 4-2 Utilities Menu

Clicking **Terminal** in the **Utilities menu** or from the status menu opens up a terminal window on the right side of your screen and activates Go, Stop, and clear screen buttons on the right end of the tool bar as shown in figure 4-3.

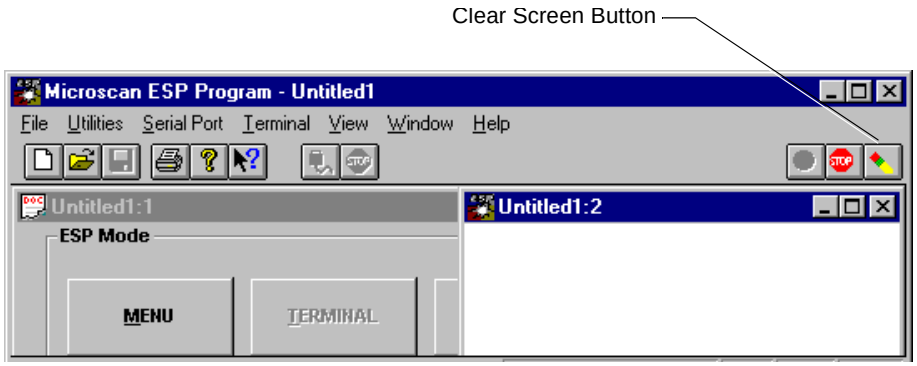


Figure 4-3 Full Menu Selection

Read Rate

You can test read rate by clicking **Utilities** and **Read Rate** from the pull-down menus, or from the settings window clicking the **Utilities** button and clicking the **Read Rate** tab as in figure 4-4.

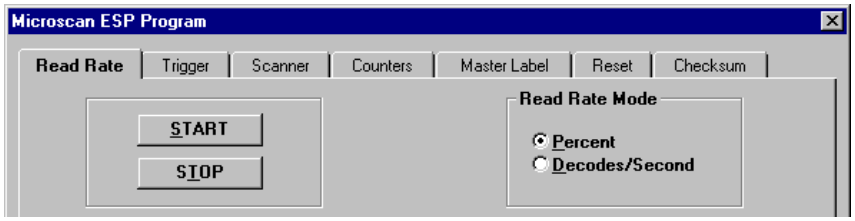


Figure 4-4 Read Rate

Enter Percent Test

Clicking **Percent** and **Start** or sending serial command **<Cp>** instructs the scanner to output the percent of decodes and any scanned label data.

Enter Decodes/Second Test

Clicking **Decodes/Second** and **Start** or sending serial command **<C>** instructs the scanner to output 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 beam (or scan line, if using a scan head with a moving beam). This test is very useful in aligning and positioning the scanning device during installation.

33 Decodes/Sec 0123456
33 Decodes/Sec 0123456
33 Decodes/Sec 0123456
33 Decodes/Sec 0123456
33 Decodes/Sec 0123456

End Read Rate Test

Clicking **Stop** or sending serial command **<J>** ends both the **Percent** test and the **Decodes/Second** test.

Trigger

You can define, set up, and send the serial trigger character via ESP by clicking **Utilities** and **Serial Trigger** from the pull-down menus or, from the settings window, clicking **Utilities** and **Trigger** as shown in figure 4-5. The Trigger card also provides a blank screen to review label data in response to triggers generated by the **Send** command.

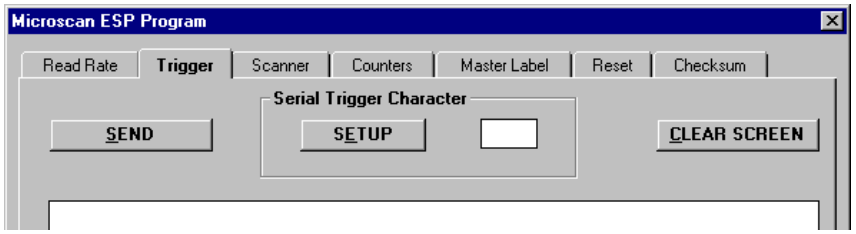


Figure 4-5 Serial Trigger Commands

A serial trigger initiates a read cycle in the scanner. It is defined in the ESP Operations menu (see “Multilabel Separator,” on page 2-15) or by serial configuration command (as <Ki_>).

Setup

Clicking **SETUP** uploads the current serial trigger character from the scanner.

Note: Must be in point-to-point protocol for Setup to work.

Send

Clicking **SEND** sends a trigger character to the scanner, with Serial Trigger Mode enabled, click the **SEND** button.

Note: The serial trigger character can be changed in the Operations menu, or by serial configuration command (<Ki..>).

Scanner

You can control the laser status, relay pulses, and the mirror motor via ESP by clicking **Utilities** and **Scanner** from the pull-down menus or, from the settings window, clicking the **Utilities** button and clicking the **Scanner** tab as in figure 4-6.

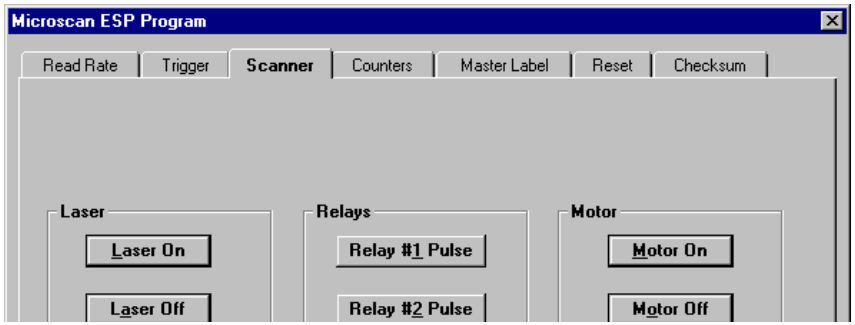


Figure 4-6 Scanner Controls

Enable Laser Scanning

Clicking the **Laser On** button or sending serial command **<H>** will turn the laser on continuously.

Note: Enable Laser Scanning does not relate to Laser On/Off command (see page 2-23).

Disable Laser Scanning

Clicking **Laser Off** or sending serial command **<I>** will turn the laser off. 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 command (see page 2-23).

Motor On

Clicking **Motor On** or sending serial command **<KE>** turns the motor on (reaches full speed after a short time delay).

Motor Off

Clicking **Motor Off** or sending serial command **<KF>** turns the motor off. This command is useful for long idle periods.

Relay-1 Pulse

Clicking **Relay #1 Pulse** or sending serial command **<L1>** sends a pulse to pin 2 (at any time regardless of Match Code or Relay-1 Driver status).

Relay-2 Pulse (not available with RS-422 option)

Clicking **Relay #2 Pulse** or sending serial command **<L2>** sends a pulse to pin 8 (at any time regardless of Match Code or Relay-2 Driver status).

Counters

You can request counter numbers or reset counters via ESP by clicking **Utilities** and **Counters** from the pull-down menus or from the settings window clicking the **Utilities** button and the **Counters** tab as in figure 4-7.

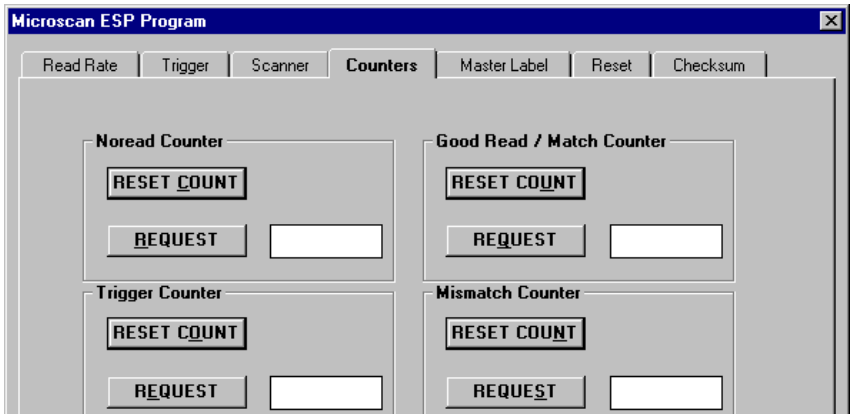


Figure 4-7 Counter Controls

The Xs in all counter commands denote a numeric value from 00000 to 65,535. After reaching the maximum numeric limit of 65,535, an error message will be displayed and the counter will automatically rollover and start counting again at 00000. To obtain the cumulative total of counts after the rollover has occurred, add 65,536 per each rollover (the scanner does not keep track of the number of rollovers) to the current count.

Note: All counter values will be lost if you can cycle power to the scanner or send an **<A>, <Ad>, <Z>, or <Zp>** command.

Clicking Reset for any counter will reset that counter to 0.

Clicking **Request** for any counter will return the current number for that counter.

Noread Counter

Clicking Request or sending serial command **<N>** displays the total number of noreads that have occurred since power-on or the last Noread Counter Reset command.

Noread Counter Reset

Clicking Reset or sending serial command **<O>** sets Noread Counter to 00000.

Trigger Counter

Clicking **Request** or sending serial command **<T>** displays the total number of triggers since power-on or the last Trigger Counter Reset command.

Trigger Counter Reset

Clicking **Reset** or serial command **<U>** sets the trigger counter to 00000.

Match Counter (or Good Read Counter)

Clicking **Request** or sending serial command **<V>** displays the total number of good reads matching the master label or, if Match Code is not enabled, the number of good reads since power-on or the last Match Counter Reset command. This counter is always enabled, but will only work as a match count when Match Code is enabled. If Match Code is not enabled, this counter records the number of good reads. This count can be requested at any time.

Match Counter Reset

Clicking **Reset** or sending serial command **<W>** sets the Match Counter to 00000.

Mismatch Counter

Clicking **Request** or sending serial command **<X>** displays the message the number of labels successfully read that do not match the master label since power-on or the last Mismatch Counter command.

Mismatch Counter Reset

Clicking **Reset** or sending serial command **<Y>** sets the Mismatch Counter to zero.

Master Label

Note: Match code operations are intended for use when the scanner is in a triggered mode, that is with an external or serial trigger enabled. If Match Code is enabled while the scanner is in Continuous Read, the scanner defaults to Continuous Read 1 Output and label data must change before the scanner will output data again, unless a timeout, if enabled, occurs.

When a master label has been defined, scanned labels are compared with the master label and under certain conditions relay driver signals may be output and internal counters advanced.

You can enable Match Code in the Operations menu after clicking the MENU button on the settings window or by sending the serial command **<E>.** This allows you to subsequently enter a master label and begin comparing labels against the master label.[1]

You can access master label functions in ESP by clicking **Utilities** and **Master Label** from the pull-down menus, or from the settings window, clicking the **Utilities** button and the **Master Label** tab as shown in figure 4-8.

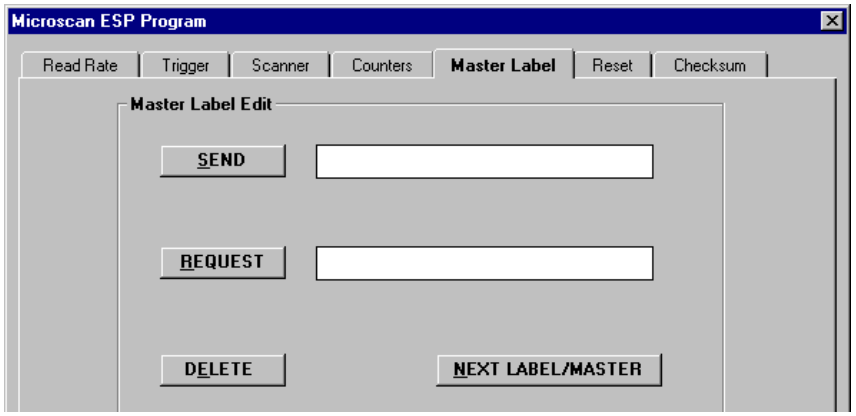


Figure 4-8 Master Label Commands

After enabling Match Code, a master label can be downloaded to the scanner by entering the master label data by keystroke in the **SEND** box or by clicking **NEXT LABEL / MASTER** to instruct the scanner to load the next label scanned as the master label.

Note: You will still need to trigger a read cycle (see “Trigger,” on page 4-5) before the new master label will appear upon clicking **REQUEST**.

1. If no master label is entered following the Enable Master Label, every subsequent decoded label will be a “mismatch” and will increment the mismatch counter by one.

Send Master Label Information

Typing in data after **Send** or sending a serial command **<)XXXX)>** downloads master label information from the host or a terminal. Master label information can be downloaded at any time and saved in nonvolatile memory with a **<Z>** command. A stored master label will not affect standard operations unless Match Code is enabled.

The Xs denote alphanumeric data, from 1 to 31 characters.

Request Master Label Information

Clicking **Request** or sending serial command **<)>** immediately sends the master label information to the host. To prevent conflicts with outputting label data, first send the <**I**> command (Disable Laser Scanning (Laser Off)).

Note: If the master label information has previously been stored in nonvolatile RAM (by a <Z> command), cycling the power will restore that information.

Store Next Label Scanned as Master Label

Clicking **Next Label/Master** or sending serial command **<G>** causes the scanner to read the next bar code label scanned as the master label if Match Code has been enabled. All subsequently decoded labels are compared against the master label information stored in RAM. (See “Match Code” on page 2-15.)

Delete Master Label Information

Clicking **Delete Master Label** or sending serial command **<))>** deletes master label information that has previously been loaded by either <)XXXX)> Download Master Label Information Command or <G> Store Next Label as Master Label command.

Reset

You can send reset commands by clicking **Utilities** and **Reset** from the pull-down menus or, from the status window, clicking the **Utilities** button and clicking the **Reset** tab as in figure 4-9.

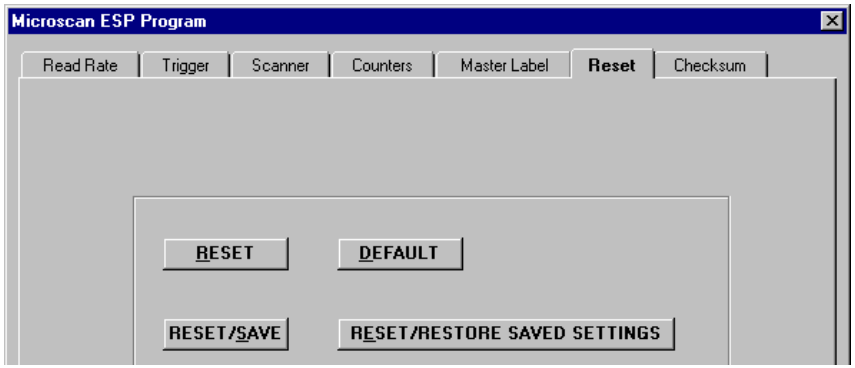


Figure 4-9 Reset/Default Menu Commands

Reset

Clicking **Reset** or sending serial command **<A>** resets all configuration commands in RAM and resets all counters and operating parameters (figure 4-10).

Note: A reset will cause the numeric counters in use to loose their count; record all data that you wish to save prior to sending this command.

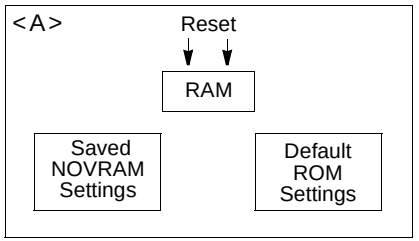


Figure 4-10 Reset

Default

Clicking **Default** or sending serial command **<Ad>** restores the ROM default status to RAM, resets the scanner (figure 4-11), and writes to NOVRAM.[1]

Note: If you are unable to communicate with the scanner, you may need to perform a hardware reset [2]

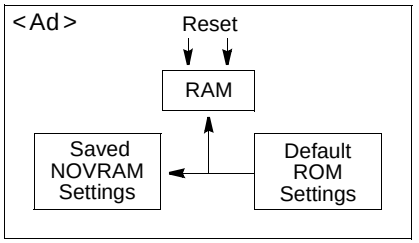


Figure 4-11 Default

1. See NOVRAM limitation note at the end of the Reset section.

Reset/Save

Clicking **Reset/Save** or sending serial command **<Z>** saves all current settings for power-on and resets the scanner (figure 4-12). (See note at end of this section.)

The values of numeric counters are not saved by this command.

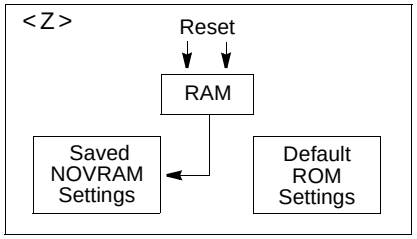


Figure 4-12 Reset/Save

Reset/Restore Saved Settings

Clicking **Reset/Restore Saved Settings** or sending serial command **<An>** copies saved settings to RAM and resets the scanner (figure 4-13).

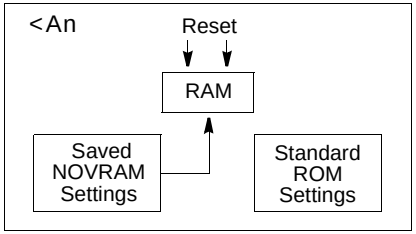


Figure 4-13 Reset/Restore

Save Scanner Type

Note: This command is not available in ESP software.

<Zp> Save Scanner Type, for Power-on. Allows you to save the current settings for Scanner Type[1] to NOVRAM. Once you send this command, default values can only be recalled if you reenter them individually and then save them again with this command.

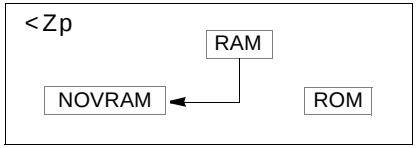


Figure 4-14 Save Scanner Type

Note: The total NOVRAM saves (the combined number of Default <Ad>, Reset/Save <Z>, and <Zp> commands executed) can be at least 10,000. In normal usage this will exceed the life of the scanner. If frequent changes to the operating parameters are required, it is recommended that the <Z> command be used only when the current configuration has been changed and the changes will be permanent.

2. A hardware reset can be done by pressing an indented switch on an IB-105 (if attached) two times within three seconds or shorting pin 7 (default pin) to pin 4 (ground) of the scanner's host connector two times within 3 seconds.

1. Scanner Type should not be changed from its factory setting.

Checksum/Part Number Commands

Clicking **Part #** or sending **<#>** displays software part number.

Clicking **Checksum** or sending **<!>** a four-digit hex number (corresponding to a given software version) used to verify a scanner's EPROM.

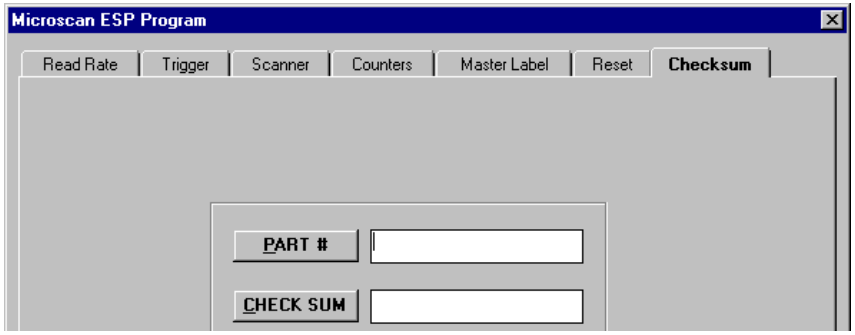


Figure 4-15 Checksum/Part Number

Other Operational Commands

Note: The following serial commands are also enabled from "Code Types Menu" in chapter 2 as menu commands.

<P> Autodiscriminate All Codes. Enables the scanner to decode all available bar code types without changing scanner configuration settings.

Note: For maximum scanning speed, enable only those bar code symbologies used in the application.

<Q> Enable Code 39 Only. Allows only Code 39 labels to be read.

<R> Enable Codabar Only. Allows only Codabar labels to be read.

<S> Enable I 2 of 5 Only. Allows only Interleaved 2 of 5 labels to be read.

Terminal Mode

You can enter serial commands and read scanned data from the terminal window. Clicking **Terminal** in the settings window brings up an active terminal window and displays it alongside the settings window as shown in figure 4-16.

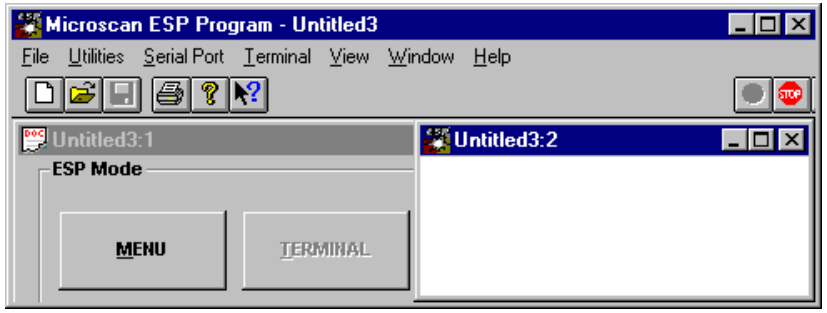


Figure 4-16 Terminal Mode

Serial commands to the scanner and label and read rate data from the scanner are displayed dynamically. Pressing the **Stop** button ends the terminal session and returns ESP to menu configuration mode. Clicking the **Go** button on the toolbar re-activates the terminal window.

Appendices

Contents

Appendix A — Scanner Specifications A-2
Appendix B — Mating Connector A-4
Appendix C — Accessory Cables A-5
Appendix D — Connectivity with the IB-105 ..... A-6
Appendix E — ASCII Table A-12
Appendix F — Multidrop Communications A-13
Appendix G — Orientation A-17
Appendix H — Grounding and Shielding A-19
Appendix I — Bar Code Symbology A-20
Appendix J — Glossary of Terms A-21

Appendix A — Scanner Specifications

MECHANICAL:

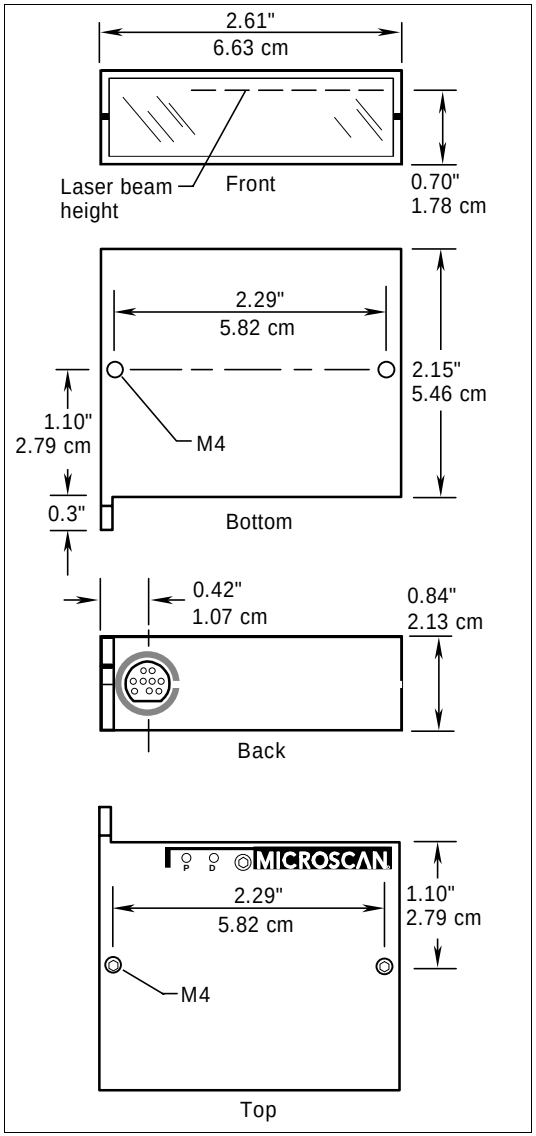


Figure A-1 VS-310 Dimensions

ENVIRONMENT:

Weight: Approximately 3 oz. (85 g)

Housing: IP54

Operating Temperature: 32° to 104°F (0° to 40°C)

Humidity: Up to 90% (non-condensing) storage/ operating humidity

LASER LIGHT: Type: Semiconductor visible laser diode (670 nm nominal)

Safety class: Designed for CDRH Class II

SCANNING PARAMETERS: Type: 10-sided, single line or raster, spinning mirror

Scan rate: 60 scans per second (low density), 100 scans per second (high density)

Scan width: 4" (10.6 cm) @ 2.75" (6.99 cm) from window

Pitch: ±50°; Skew: ±40°

Label contrast: 25% min. absolute dark to light differential at 670 nm wavelength

COMMUNICATIONS : Interface: RS-232 or RS-422/485

CONNECTORS: A single 9-pin mini Din connects the VS-310 with included Mating Connector kit 98-200021-01 (page A-4). It also connects to accessory cables (page A-5) which in turn connect the VS-310 to the IB-105 interface box (page A-6).

CODE TYPES: Code 39, Codabar, Interleaved 2 of 5, Code 93, Code 128

PROTOCOLS: Point-to-Point, Point-to-Point w/XON/ XOF, Polling Mode D, Multidrop, User Defined, and User-defined Multidrop

ELECTRICAL: Power Supply requirement: +5 VDC ±4% @ 200 ma

STATUS LIGHTS:

LED	Color	Condition
Power LED	Yellow	On power-on
Status LED	Green	**Normal operations:** illuminates whenever a bar code label is decoded and remains on until a new trigger occurs. **Continuous Read or Continuous Read 1 Output:** flashes for each good read.

CERTIFICATIONS: Designed for: CDRH, FCC, TüV, UL/cUL, CE

Table A-2 9-pin mini-Din Pin Assignments

Pin No.	RS-232 Options	RS-422/485 Options
1	+5 VCC	+5 VCC
2	Output-1[a]	Output-1[a]
3	RS-232 RXD	TXD +
4	Signal Ground	Signal Ground
5	RS-232 TXD	TXD –
6	Trigger input	Trigger input
7	Default pin	Default pin
8	Output-2[a]	RXD +
9	RS-485 Driver Enable	RXD –
Shield	Chassis Ground[b]	Chassis Ground[b]

a. can sink 3.5 mA or source 60 µA

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

Table A-3 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)

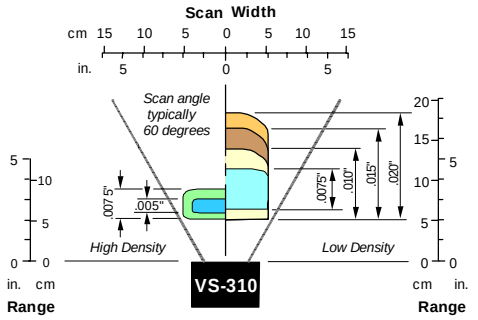


Figure A-2 Low Density and High Density Scan Range/Width Profile

Table A-4 FIS Options

FIS Option	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

Appendices

Appendix B — Mating Connector

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

To assemble:

1. Slide cable through backshell and expose wires for soldering.

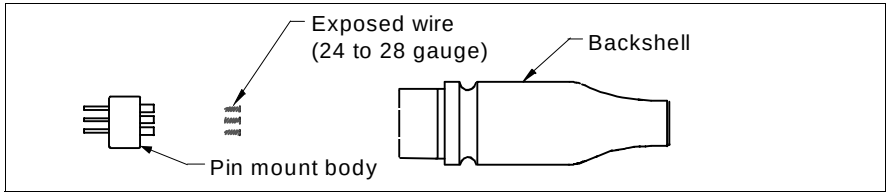


Figure A-3 Backshell

2. Solder wires to appropriate pins in pin mount body.

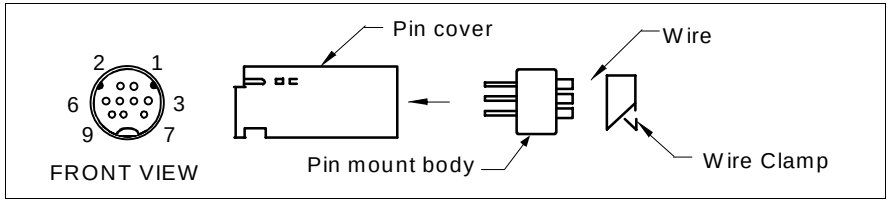


Figure A-4 Solder

3. Apply wire clamp around wires and push the pin mount body into the pin cover until it snaps into place.

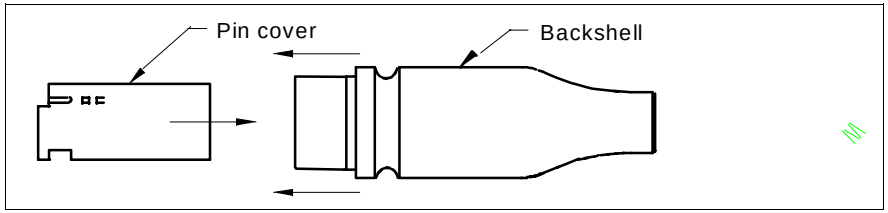


Figure A-5 Clamp and Lock

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

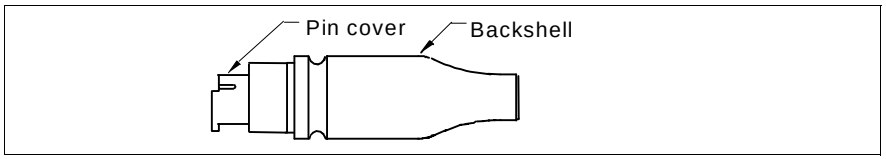


Figure A-6 Insert Cover

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

Appendix C — Accessory Cables

Accessory cables are available to connect your VS-310 to an IB-105 interface box (page A-6) or other device.

If your VS-310 is an RS-232 option, use Microscan cable 61-130014 or 61-130019; If it's an RS-422/485 option, use cable 61-130024.

Figures A-7 and A-8 represent all three accessory cables. See Step 4, "Attach Cabling," on page 1-6 for VS-310 pinouts.

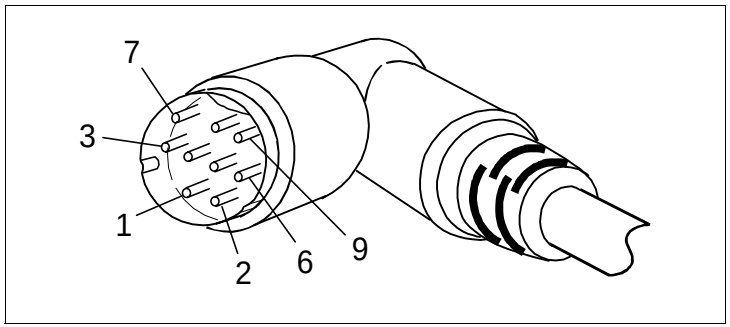


Figure A-7 VS-310 Accessory Cable, 9-pin Connector

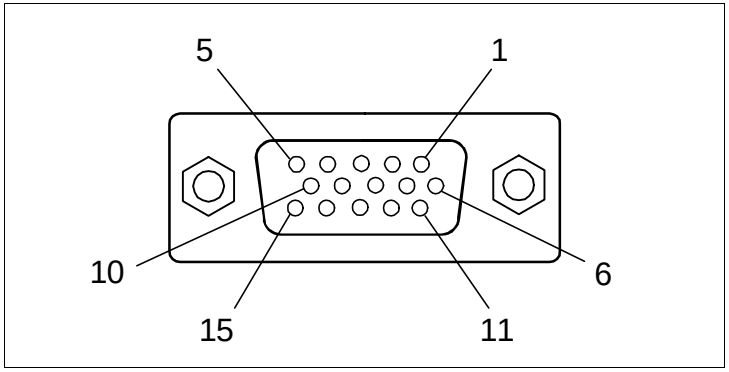


Figure A-8 VS-310 Accessory Cable, 15-pin Connector

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.

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 relay-1 signal to drive a one watt internal relay that connects pin 15 with pin 17 on the host connector and pin 2 with pin 6 on the trigger connector. The normally open relay contacts are closed when relay-1 is high.

Environmental:

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

Electrical:

Supply Voltage Input: Regulated +5 VDC @ 20 mA
Maximum ripple: 200 mV p-p with VS-310 +5 VDC @ 200 mA

Communications:

RS-232, RS-422, RS-485

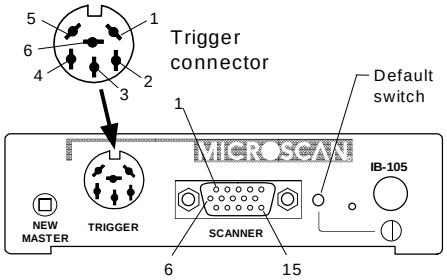


Figure A-9 Front of IB-105

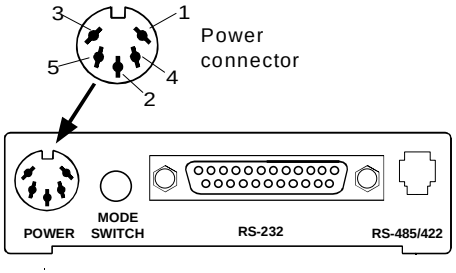


Figure A-10 Back of IB-105

IB-105 Connectors

Scanner Connector. A 15-pin connector provides connectivity to your scanner. Microscan has an optional cable, 61-120010-03, that links the IB-105 15-pin connector with your 9-pin VS-310 connector.

25-pin (host) "RS-232" Connector. The 25-pin (host) connector, labeled "RS-232" on the box, can also be used in certain configurations to route RS-422/485.

RS-485/422 (LAN) Connector. See table A-9 on page A-10 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

New Master Switch. Used in match code operations to indicate that the next label will be read as the new master label. Momentarily press the switch to activate it.

Default Switch. Provides a convenient way to restore factory configuration settings to the scanner. This switch is recessed to prevent accidentally defaulting the scanner. For default instructions, see “Reset” on page 4-11.

Power Switch. Connects the +5V supply (pin 3 of power connector) to the IB-105.

Mode Switch. IN or **OUT** according to configuration (see table A-5).

Configurations

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-5.

Table A-5 IB-105 Configurations

Configuration	P/N 99-420001	Mode Switch	Function
1	-01	OUT	RS-232 breakout device to provide connectivity between the scanner, host, power, and trigger sources.
2	-01	IN	RS-232 to RS-422/485 converter
3	-04	OUT	Multidrop setup device
4	-01	IN	Long distance communications converter from RS-232 to RS-422
	-05	OUT	Long distance communications converter from RS-422 to RS-232

Because the IB-105 is a very flexible device used with more than one scanner model, you will need to verify that you have the correct cable type, the correct IB-105 model, and the correct mode switch setting for your particular option. Figure A-11 through figure A-14 show connectivity diagrams as well as the correct IB-105 part number(s) and mode switch settings for each configuration. For specific pinouts, see tables A-6 through A-10.

Configuration 1 — RS-232 Breakout Device

Provides RS-232 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.

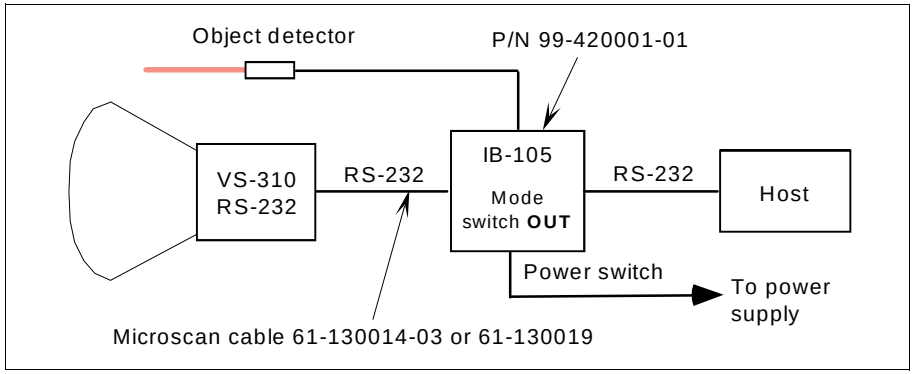


Figure A-11 IB-105, Configuration 1

Configuration 2 — RS-232 to 422/485 Converter

The IB-105 converts RS-232 signals (TXD, pin 2, RXD, pin 3 of the 15-pin scanner connector) to RS-485 levels which are available at both the RS-485/422 (LAN) connector and the 25-pin RS-232 (host) connector. (See tables A-6, A-7, A-8, and A-10 for pinouts.)

Note: In this mode the scanner must be set up for Multidrop communications.

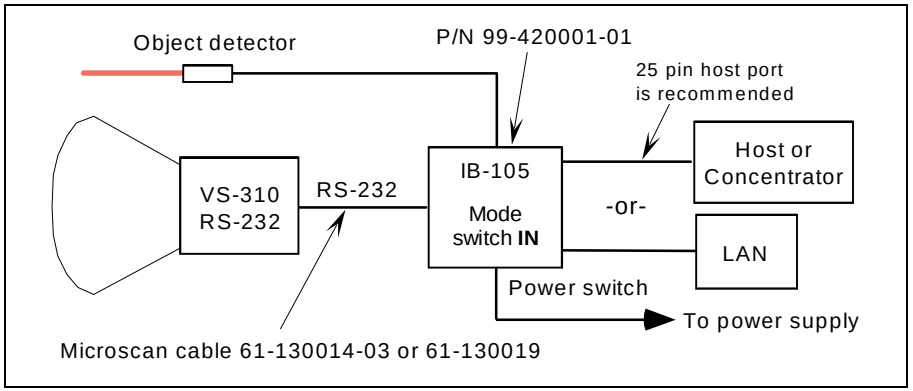


Figure A-12 IB-105 Configuration 2

Configuration 3 — Multidrop Setup Device using RS-232

The IB-105 can be used to setup a VS-310 that has an on board RS-422/485 option. To communicate between an RS-232 host and the VS-310, the IB-105 converts the host's RS-232 levels to RS-422/485 levels.

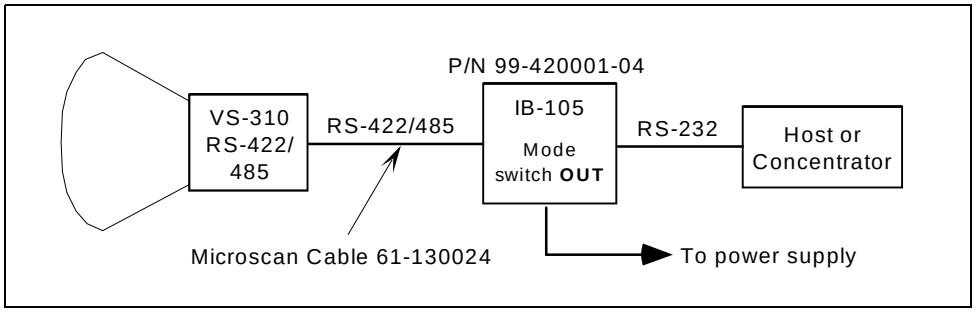


Figure A-13 IB-105 Configuration 3

Configuration 4 — Extended Range RS-232 using RS-422

This configuration allows you to use two IB-105s to extend communications distance between a VS-310 and a host configured for RS-232.

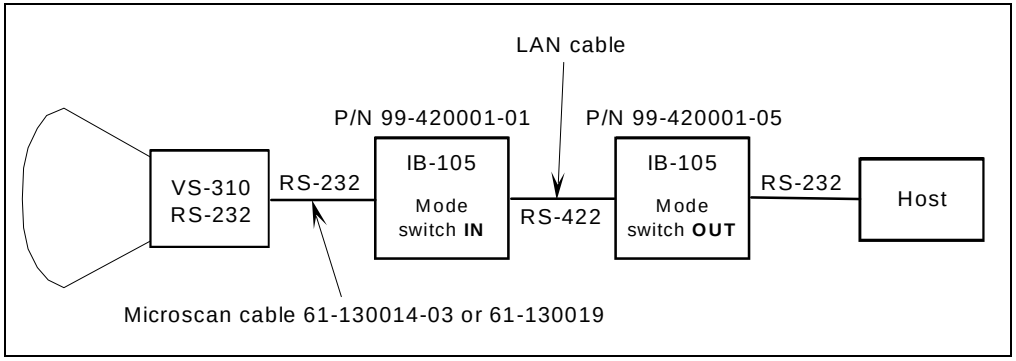


Figure A-14 IB-105 Configuration 4

IB-105 Connectors and Pinouts

The IB-105 has five connectors, a power, scanner, trigger, host, and LAN.

Table A-6 IB-105 15-pin Scanner Connector

Pin	Using RS-232 Cable (P/N 61-130014 or 61-130019)	Using RS-422/485 Setup Cable (P/N 61-130024)[a]
1	+5 VDC (out)	+5 VDC (out)
2	RS-232 TXD (in)	RS-422/485 TX – (in)
3	RS-232 RXD (out)	RS-422/485 RX – (out)
4	Signal ground	Signal ground
5	NC	NC
6	NC	RS-422/485 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	RS-422/485 RXD + (out)
11	NC	NC
12	RS-422 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 “RS-232” connector can be used to route RS-422/485 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-7 IB-105 Power Connector

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

Table A-8 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-9 IB-105 6-pin LAN Connector

Pin	Function
1	Chassis ground
2	RS-422/485 RX + (in)
3	RS-422/485 RX – (in)
4	RS-422/485 TX + (out)
5	RS-422/485 TX – (out)
6	Chassis ground

The LAN cable connections must be as shown in Figure A-15.

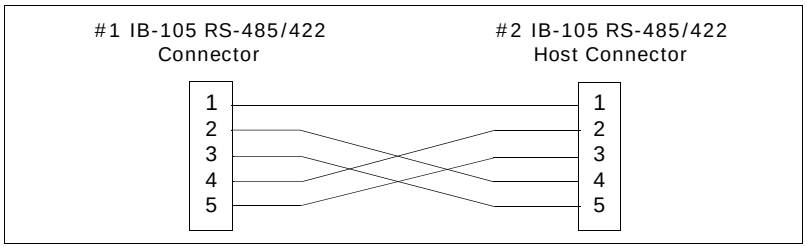


Figure A-15 LAN RJ-11 Cable

Signals are routed from LAN connector to LAN connector. The scanner and trigger connectors are not used in this configuration.

Table A-10 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	RS-232 TXD (out)[b]	NC	RS-422/485 TX (out)
3	RS-232 RXD (in)	NC	RS-422/485 RX (in)
4	NC	NC	RS-422/485 TX (out)
5	NC	NC	RS-422/485 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	RS-422/RS-485 RX + (in)	NC
14	NC	RS-422/RS-485 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	RS-422/RS-485 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	RS-422/RS-485 TX+ (out)	NC
20	NC	NC	NC
21	NC	NC	NC
22	Ground	Ground	Ground
23	NC	NC	NC
24	NC	NC	NC
25	RS-422 DE (out)	RS-422 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 RS-422 to RS-232.
b. See figure A-16 for null modem cable diagram.

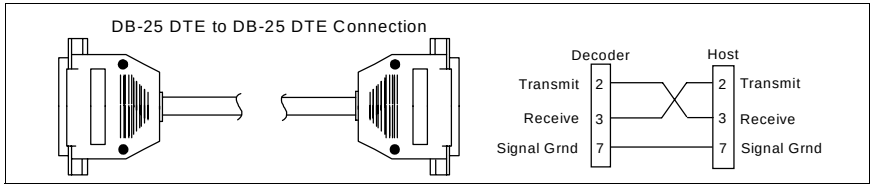


Figure A-16 IB-105 to Host Null Modem Cable

Appendix E — ASCII Table

Table A-11 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	^t	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	Δ

Appendix F — Multidrop Communications

This appendix describes the rules for setting up a concentrator or controller to communicate with a scanner in standard Multidrop protocol, as presented in "Protocol," on page 2-6.

Figure A-17 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.

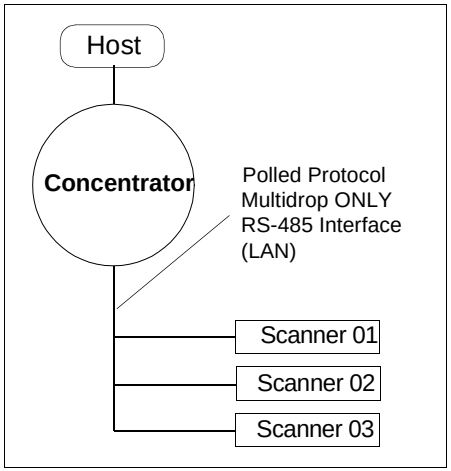


Figure A-17 Typical Multidrop Network

Multidrop Addresses

- No two scanners in the Multidrop Network can have the same address.
- Each scanner in the network must have an address (from 01 to 50) assigned in its configuration program.

Each address has its own separate poll and select address (from 1C to 7F hex as shown in table A-12 on page A-16).

For example, during a polling sequence, Scanner 03 expects a 20 hex ("SP" ASCII poll character) from the concentrator. And during a select command, it looks for a select value 21 hex ("!" ASCII select character).

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.

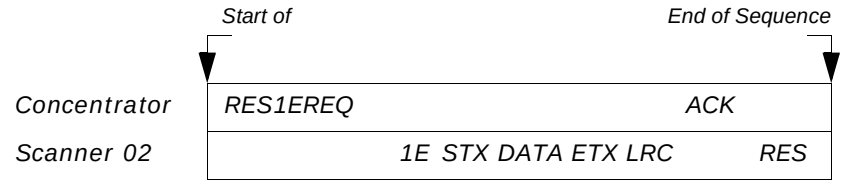


Figure A-18 Polling Sequence

The polling sequence example in figure A-18 begins with a RES (reset) from the concentrator followed 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 successful exchange with a RES (reset).

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 transmit the data string up to three times. If the scanner still does not receive an ACK, it will transmit 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 transmit 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).

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 Multidrop. The scanner complies with the command when it is polled during the cycle.

Figure A-19 is an example of a select sequence.

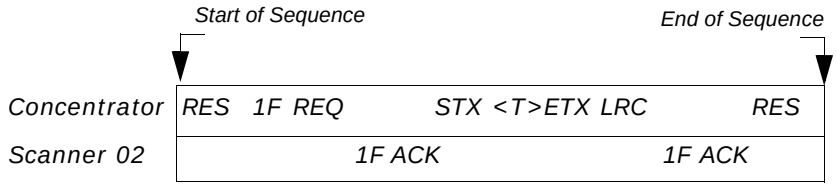


Figure A-19 Select Sequence

A RES (reset) is the first command in the select sequence. The 1F hex is the select address associated with Scanner 02 address (see table A-12 on page A-16). 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 transmit 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 retransmits the data up to three times. The concentrator will end the sequence with a RES (reset) if no ACK is received.[1]

1. For additional information on Multidrop, see the *MS-5000 Multidrop Concentrator User's Manual.*

Table A-12 Multidrop Address Characters

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	Δ	7F

Appendix G — Orientation

Label Orientation

If the bar code label bars are parallel to the direction of travel, as shown in 1720, the label is said to be in a *ladder* orientation; if the bars are perpendicular with the direction of travel, the label is said to be in a *picket fence* orientation (1721).

Ladder Orientation

In general, depending on label size and speed, ladder orientation is preferable because different portions of the label are scanned as the label goes by. In addition, label placement is not as critical. As shown in 1720, a label can be successfully read if fully placed (including quiet zones) anywhere within the readable portion of the scan line.

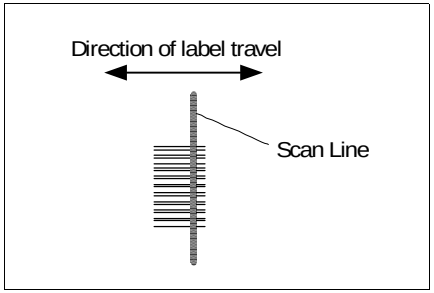


Figure A-20 Ladder Orientation

Picket Fence Orientation

Unlike ladder, picket fence allows only a small portion of the entire label to be scanned. As a result, labels must be of good quality since even slight label imperfections such as extraneous ink, voids, etc., can cause misreads or non-reads.

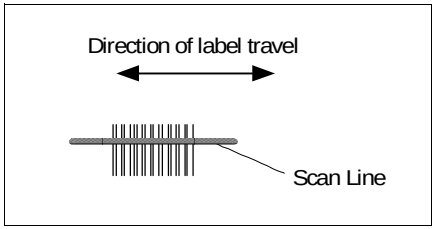


Figure A-21 Picket Fence Orientation

One advantage of the picket fence over the ladder orientation is in the area of label speed. In ladder mode, the label travel distance is the height of the bar code; in picket fence mode, the label can be read while it travels the full distance of the scan width.

Note: Either ladder or picket fence can be rotated without losing its orientation, provided that the label's direction of travel does not change in relation to the scan line.

Angled Picket Fence Orientation

The problems associated with picket fence can be minimized by slightly tilting the scan line (figure A-22). This allows a larger portion of the label to be scanned and increases the label placement area by "simulating" the ladder orientation. This of course is impractical with a short bar code height.

Angled picket fence is recommended only where the bar code is reasonably tall and the label speed is not too fast in relation to the scan field width, since angling the label will reduce the number of scans on the label.

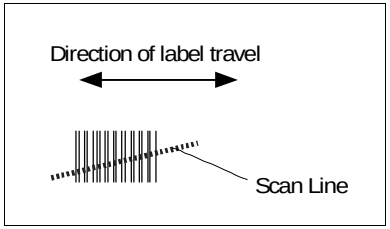


Figure A-22 Angled Picket Fence Orientation

Appendix H — Grounding and Shielding

Proper grounding is necessary for operator safety, noise reduction, and the protection of equipment from voltage transients. Buildings, including any steelwork, all circuits, and all junction boxes must be grounded directly to an earth ground in compliance with local and national electrical codes.

RS-232 signals have a common signal ground, pin 4, which is normally connected to chassis ground and connector shielding in the scanner; however, under certain conditions (e.g., when potential differences exist between power outlet grounds) signal and chassis grounds can be isolated from each other inside the scanner by Microscan technicians.

Noise Interference

Noise interference can be minimized if cabling subject to noise interference is twisted and/or shielded or encased in grounded conduit, and the conduit or shielding ("drain" line) is earth grounded.

For long runs the VS-310 to adapter shielding is not connected to the adapter (see 1923). In shorter runs, particularly in environments where extremely high frequencies are present/critical, the shielding may need to be connected to both the VS-310 and the adapter.

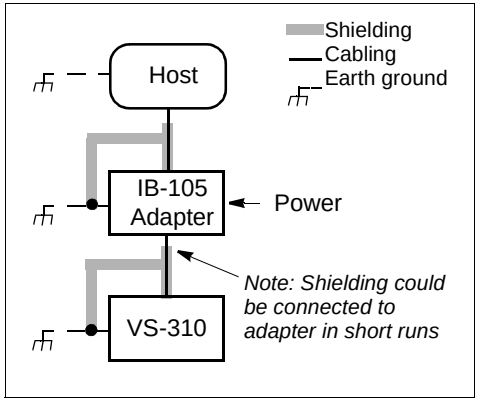


Figure A-23 Grounding Diagram

Ground Loops

Ground loops, signal degradation due to different ground potentials in communicating devices, can be eliminated or minimized by ensuring that the host, adapter, scanner, and power supplies are connected to a common earth ground.

Appendix I — Bar Code Symbology

Before choosing a bar code symbol, consider:[1]

- the type of information to be scanned (numeric only, alphanumeric)
- the length of the messages to be encoded
- how and where labels are to be applied
- label printer capabilities
- scan speed
- beam width
- the space available on the object to be identified
- host software limitations
- range of the scanner
- the speed of the conveyor

Microscan standard scanner firmware supports the following five bar code symbologies. (Firmware can also be custom ordered to support other symbologies.)

Code 39. An alphanumeric code with unique start/stop code patterns, composed of nine black and white elements per character, three of which are always wide. Considered the de facto standard for non-retail symbology.

Codabar. A 16-character set (0 through 9, and the characters $, :, /, ., +, and –) with start/stop codes and at least two distinctly different bar widths. It is commonly used in libraries, photo finishing, and air parcel express applications. (A check digit is highly recommended.)

I 2 of 5. Interleaved 2 of 5 is a high-density, continuous numeric symbology used mainly in the distribution industry. I 2 of 5 encodes two digits: one in the bars, and one in the spaces. (A check digit is highly recommended.)

Code 93. Code 93 is a variable length, continuous symbology employing four element widths. Each Code 93 character has nine modules that may be either black or white. Each character contains three bars and three spaces. Each character begins with a bar and ends with a space. This is a (9,3) code hence the name. Code 93 has 47 characters in its character set. The start/stop code is represented by the symbol ?, and the four unique circle codes, ($), (%), (/), and (+), are used as precedence characters to unambiguously represent all 128 ASCII characters in a similar fashion to Code 39's Full ASCII feature.

Code 128. A very high density alphanumeric symbology. Will encode all 128 ASCII characters, it is continuous, has variable length, and uses multiple element widths measured edge to edge. It is widely used in the non-food distribution industry and shipping containers.

1. For further information about symbology, see *The Bar Code Book,* by Roger C. Palmer, Helmers Publishing, Inc., 1989 or www.barcodeusa.com.

Appendix J — Glossary of Terms

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

Bandwidth. Range of frequencies (energy transitions) that are allowed to pass through bandpass filters during signal processing.

Bar Code. Data that has been encoded into an array of parallel bars and spaces of varying widths.

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

Baud Rate. The term used to describe the number of discrete signal events per second. In RS-232 and RS-422/485 systems, baud rate is the same as bits per second (bps).

Clock Speed. Internal decoder timing relative to individual bars and spaces.

Code 39. An alphanumeric bar code with a character set containing a start/stop character, 10 numbers, 26 letters, 6 symbols, and a space. This code is discrete, variable length, and self-checking.

Configuration. The method used to change factory default settings for operational features to match a specific application. Configuration can be done through menu selection or with serial commands.

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

Counter. Memory space provided to keep track of read cycle events.

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

Default. The original factory settings.

Defaulting. Act of resetting the scanner to the original factory settings.

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

Edge. External Triggering mode in which a detected object is recognized by a single edge pulse.

EPROM. Erasable, programmable, read only memory.

End of Read Cycle. The time at which the scanner stops expecting label information to decode. This can be caused by a timeout, a trigger event, or a good read.

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

Good Match. The event occurring when a scanned label matches the master label information that is stored in the memory of the scanner.

Good Read. The event that occurs when a label's data is accurately scanned and decoded.

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.

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. The rate in inches or centimeters per second at which a label moves through the scan beam.

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

Level. The period of time between the arrival and departure of an object is referred to as "level," a reference to the horizontal signal that is displayed on an oscilloscope.

Master Label. A label or label data that is stored in the scanner's memory and is compared with subsequently scanned labels.

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

Menu Configuration. The process of changing factory default settings via a sequence of menus displayed on a terminal monitor.

Mil. One thousandths of an inch or 0.0254 mm. In bar-coding, a measurement 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.

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

NOVRAM. Non-volatile RAM. 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, and no labels are scanned during the read cycle.

Null. A non-printed character that acts as a space-holder.

Number of Scans Calculation. 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 to presence or absence of an object.

Operational Commands. Serial commands from the host to the scanner that control current operating parameters, counters, master label operations, and program management that are not stored in non-volatile RAM.

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 reader 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.)

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

Quiet Zones. Specified "clear" (nonprinted) 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 remains 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.

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 Driver. A TTL signal sent by the scanner. The output is determined by the relay driver selection (by operational command).

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. Number of scans per second that the scanner projects.

Scan Width. The total symmetrical distance from side to side in which a label can be reliably read.

Serial Commands. Online data strings (including configuration and operations) from a host or other terminal to the scanner, that are always preceded by a < left angle bracket symbol and followed by a > right angle bracket symbol.

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. Most of these commands begin with the upper case K character immediately following the left angle bracket symbol, as in <Kg3>.

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

Specular Reflection. The direct, mirror-like reflection of laser light back to the scanner, causing over-light saturation.

Symbology. A set of bar code symbols, such as Code 39 or Code 128, that have special rules to define the widths and positions of bars and spaces to represent specific numeric or alphanumeric information.

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.

Upload. To copy scanner's settings into RAM. (Same as RECEIVE FROM SCANNER.)

Index

A

About the VS-310 Scanner vii
Angled Picket Fence
number of scans calculation 1-5
orientation A-18
As Soon As Possible
by menu selection 2-22
by serial command 3-12
ASCII Table A-12
Autodiscriminate 2-20
Autodiscriminate (definition) A-21
Autodiscriminate All Codes
operational command 4-13

B

Bar Code Output
by menu selection 2-21
by serial command 3-12
Bar Code Symbology A-20
Baud Rate
by menu selection 2-5
Baud Rate (host port)
by serial command 3-5
Beeper
by serial command 3-13
Beeper Speed
by menu selection 2-22
Beeper Status
by menu selection 2-22
Breakout Device A-8
IB-105 A-8

C

Cabling 1-6, A-19
ground loops A-19
noise interference A-19
Caution Summary viii
Check Digit
of codabar (menu) 2-17
of codabar (serial) 3-10
of code 39 (menu) 2-16
of code 39 (serial) 3-10
of interleaved 2 of 5 (menu) 2-18
of interleaved 2 of 5 (serial) 3-11
Check Digit Output
of codabar (menu) 2-18
of codabar (serial) 3-10
of code 39 (menu) 2-17
of code 39 (serial) 3-10
of interleaved 2 of 5 (menu) 2-19
of interleaved 2 of 5 (serial) 3-11
Checksum Command 4-13
Codabar
by menu selection 2-17
by serial command 3-10
definition A-20
operational command 4-13
Code 128
by menu selection 2-20
by serial command 3-11
definition A-20
Code 39
by menu selection 2-16
by serial command 3-10
definition A-20
operational command 4-13
Code 93
by menu selection 2-19
by serial command 3-11
definition A-20
Code Length
of codabar (menu) 2-18
of codabar (serial) 3-10
of code 128 (menu) 2-20
of code 128 (serial) 3-11
of code 39 (menu) 2-17, 2-19
of code 39 (serial) 3-10
Code Length #1 (I 2 of 5)
by menu selection 2-19
by serial command 3-11
Code Length #2 (I 2 of 5)
by menu selection 2-19
by serial command 3-11
Code Type Commands 4-13

Code Types
by menu selection 2-16
by serial command 1-14, 3-11
specifications A-2
Communications 1-8
by menu selection 2-4
by serial command 3-5
specifications A-2
Configure Scanner 1-9
Connector, 9-pin 1-6
Connectors
specifications A-2
Continuous Read
by menu selection 2-11
by serial command 3-8
Continuous Read 1 Output
by menu selection 2-11
by serial command 3-8
Converter, RS-232 to 422/485 A-8
Counter Commands 4-7

D

Data Bits
by menu selection 2-5
Data Bits (host port)
by serial command 3-5
Decode Rate Test 1-11
Decodes per Second Test 4-4
Default Command 4-11
Delete Master Label Information 4-10
Dimensions
specifications A-2

E

Edge
by menu selection 2-12
by serial command 3-8
Electrical
specifications A-2
End of Read Cycle 2-12
by serial command 3-8
when to output option (menu) 2-22
when to output option (serial) 3-12
End Read Rate Test 4-4
Environment
specifications A-2
Error Messages, ESP 1-8
ESP vii, 2-1
description 2-1
menu 2-2
ESP (Easy Setup Program) 1-7
External Edge
by menu selection 2-12
by serial command 3-8
External Level
by menu selection 2-11
by serial command 3-8
External Trigger Level
by menu selection 2-14
by serial command 3-9

F

FIS Options A-3
Fixed Code Length
of codabar (menu) 2-18
of codabar (serial) 3-10
of code 128 (menu) 2-20
of code 128 (serial) 3-11
of code 39 (menu) 2-17, 2-19
of code 39 (serial) 3-10

G

Glossary A-21
Good Decode Reads
by menu selection 2-14
by serial command 3-9
Good Read
by menu selection 2-24
Good Read Counter 4-8
Grounding A-19

H

High Density
by serial command 3-13
Host Connector
IB-105 A-11
Host Port Parameters
by serial command 3-5

I

IB-105 1-2
25-pin Host Connector A-11
communications A-6
Configurations A-7
connectors A-6
electrical A-6
environmental A-6
Extended Range, RS-422 A-9
internal relay A-6
LAN cable A-10
LAN Connector A-10
Long distance communications A-7
mechanical A-6
Multidrop configuration device A-7
Multidrop Setup Device A-9
scanner connector A-10
specifications A-6
switches A-7
IB-105 interface 1-2
IB-105 interface box A-6
Intercharacter Delay 2-9
by serial command 3-8
Intercharacter Gap (definition) A-22
Interface box 1-2
Interleaved 2 of 5
by menu selection 2-18
by serial command 3-11
definition A-20
operational command 4-13

K

Keystroke Entries vii

L

Label
angled picket fence orientation A-18
density 1-12
height 1-5
how to position 1-10
ladder orientation A-17
length 1-5
picket fence orientation A-17
position 1-10
speed 1-5
Label Dimensions 1-12
Label Ratio 1-12
Label speed 1-12
Ladder
number of scans calculation 1-4
orientation A-17
Ladder Orientation A-17
LAN cable
IB-105 A-10
LAN Connector
IB-105 A-10
Large Intercharacter Gap
of codabar (menu) 2-17
of codabar (serial) 3-10
of code 39 (menu) 2-17
of code 39 (serial) 3-10
Laser (Enable/Disable Commands) 4-6
Laser Light
specifications A-2
Laser On/Off
by menu selection 2-23
by serial command 3-13
Level
by menu selection 2-11
by serial command 3-8
Longitudinal Redundancy Check 2-9
by serial command 3-8

M

Master Label Commands 4-9

Match
by menu selection 2-22, 2-24
Match Code
(definition) A-22
by menu selection 2-15
by serial command 3-9
Match Counter 4-8
Match Counter Reset 4-8
Mechanical Specifications A-2
Mini-din Connector 1-6
Mismatch
by menu selection 2-22, 2-24
Mismatch Counter 4-8
Mismatch Counter Reset 4-8
Modulus 43 2-16
Motor Off Command 4-6
Motor On Command 4-6
Multidrop 2-7, A-9
by serial command 3-5
Multidrop Address A-16
Multidrop Communications A-13
concentrator A-13
controller A-13
multidrop addresses A-13
polling sequences A-14
select sequences A-15
Multilabel Separator
by menu selection 2-15
by serial command 3-9

N

Narrow Margins
by menu selection 2-20
by serial command 1-14, 3-11
New Trigger
by menu selection 2-13
by serial command 3-8
Noise Interference A-19
Noread
by menu selection 2-23, 2-24
Noread Counter 4-7
Noread Counter Reset 4-7
Noread Message
by menu selection 2-22
Noread Message/Noread Output
by serial command 3-12
Number of Labels
by menu selection 2-15
by serial command 3-9
Number of Scans 1-4

O

Object Detector 1-14
Operational Serial Commands 4-2
Operational Tips 1-15
Operations 4-3
by menu selection 2-10
by serial command 3-8
Output On
by menu selection 2-24
by serial command 3-12

P

Parity
by menu selection 2-5
Parity (host port)
by serial command 3-5
Part Number Command 4-13
Percent Rate Test 4-4
Picket Fence
number of scans calculation 1-4
orientation A-17
Picket Fence Orientation A-17
Pin Assignments
scanner A-3
Pitch
specifications A-2
pitch 1-10
Point-to-Point 2-6
by serial command 3-5
Point-to-Point with XON/XOFF 2-7
by serial command 3-5
Polarity
by menu selection 2-23

by serial command 3-12
See also External Trigger Level
Polling Mode D 2-7
by serial command 3-5
Position
pitch 1-10
Postamble 2-9
by serial command 3-7
power requirements viii
Preamble 2-8
by serial command 3-7
Protocol 2-6
by menu selection 2-6
by serial command 3-5
Protocol Commands 3-7
Protocols
specifications A-2
Pulse Width
by menu selection 2-23
by serial command 3-12

Q

Quiet Zones 2-20

R

Range 1-12
Read Cycle 1-14
(definition) A-23
Read Range 1-3
specifications A-3
Read Rate Commands 4-4
Relay-1
by menu selection 2-23
by serial command 3-12
Relay-1 Pulse Command 4-6
Relay-2
by menu selection 2-23
by serial command 3-12
Relay-2 Pulse Command 4-6
Request Master Label Information 4-10
Reset Command 4-11
Reset/Default Commands 4-11
Reset/Restore Saved Settings Command 4-12
Reset/Save Command 4-12
Response Timeout 2-9
RJ-11 Cable A-10

S

Safety Labels ix
Save Scanner Type Command 4-12
Scan Rate
definition 1-5
Scan rate
specifications A-2
Scan Width 1-3, 1-12
definition 1-5
specifications A-3
Scan width
specifications A-2
Scanner
position 1-10
Scanner Connector, IB-105 A-10
Scanner Control Commands 4-6
Scanner Output
by serial command 3-12
See also Bar Code Output, Beeper/ Beeper Volume, Full Screens, Laser On/Off, Noread Message/Noread Output, Relay-1, Relay-2, and When to Output
Scanner Outputs
by menu selection 2-21
Scanner Setup Commands
by serial command 3-13
Scanner Specifications A-2
Scanner Type
by serial command 3-13
Scanning Parameters 1-12
specifications A-2
Send Master Label Information 4-10
Serial 3-1

Serial Commands
concatenating (adding together) 3-4
configuration commands 3-2
format 3-3
initializing changes 3-4
saving changes 3-4
Serial Commands, operational 4-2
Serial Data
by menu selection 2-12
by serial command 3-8
Serial Data & Edge
by menu selection 2-12
by serial command 3-8
Serial Trigger Character
by menu selection 2-13
by serial command 3-9
Serial Trigger Commands 4-5
Shielding A-19
Specifications A-2
Standard density
by serial command 3-13
Start & Stop Match
by menu selection 2-18
by serial command 3-10
Start & Stop Output
by menu selection 2-18
by serial command 3-10
Status Lights
specifications A-2
Stop Bits
by menu selection 2-5
Store Next Label Scanned as Master Label 4-10
System Setup 1-2

T

Terminal Window 4-3
Testing 4-3
Timeout & New Trigger
by menu selection 2-13
by serial command 3-8
Timeout (end of read cycle option)
by menu selection 2-12
by serial command 3-8
Timeout in 10 ms incs
by menu selection 2-14
by serial command 3-8
Trigger Characters 4-5
Trigger Counter 4-8
Trigger Counter Reset 4-8
Trigger Filter Timing Value
by menu selection 2-14
by serial command 3-8
Triggering Mode
by serial command 3-8

U

Upload from scanner 1-8
Upload Status 1-8
User Defined 2-7
by serial command 3-5
User Defined Multidrop 2-8
by serial command 3-5
Utilities Menu 4-3

W

Warning Summary viii
Warranty Statement ii
When to Output
by menu selection 2-22
by serial command 3-12