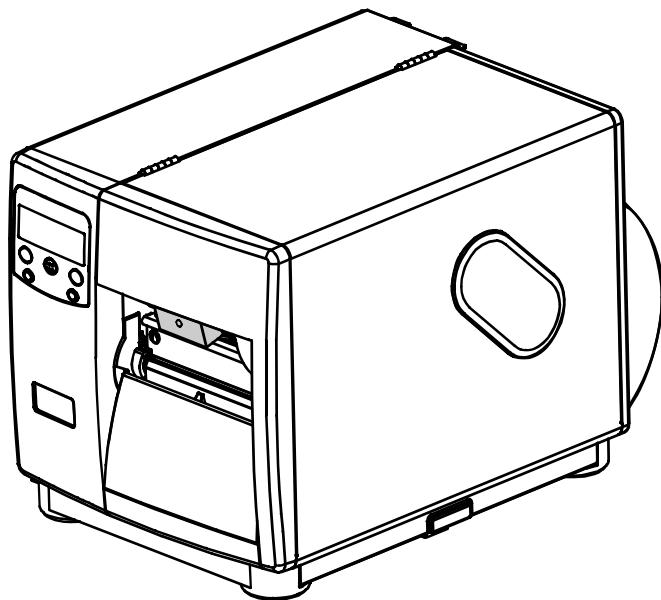


# I-Class™

## Linear Scanner User Guide ■■■



right by our customers. ■■■



datamax•o'neil

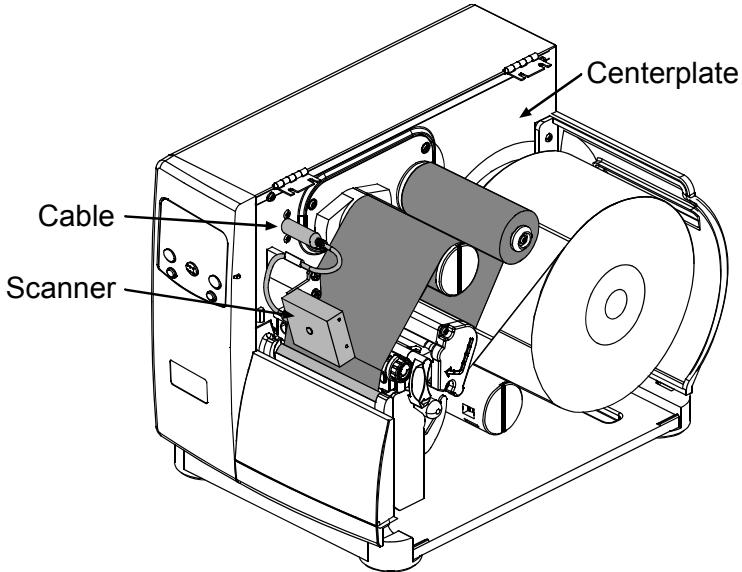


## **Overview**

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The Linear Scanner, using CCD technology, interrogates labels at up to 700 times per second to ensure that your printed bar codes have the correct bar and space widths, good contrast, and quiet zones to be readable. A 32-bit microprocessor and proven decoding algorithms provide accurate, high-speed, operation.

Easy to use and fully integrated, the Scanner has menu-selectable set-up and control features including fault-handling options that can void any label containing an unreadable bar code and, if desired, automatically generate a replacement.



This document provides all the information needed to operate the Scanner on a daily basis. The illustration above highlights the Scanner's connection to the printer.

## **Performance**

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Several factors can affect scanning performance. For best results use carbon-based inks, label stocks with a matte finish, and Print Contrast Signal (PCS – a comparison of the reflectance of the printed bars to that of the background stock) that is as high as practical. In addition, you can program the Scanner using the printer's front panel to meet your specific application requirements; see Setup and Configuration and Label Layout, below.

### **High Throughput Applications**

If your primary objective is to achieve the highest possible throughput rate with the minimum scanable region, the following list identifies the parameters and settings that can maximize scanning and decoding speed. When emphasizing throughput, however, other areas of performance may be affected. For example, the number of non-reads could increase. If high throughput is critical, consider these settings:

- Enable only those bar codes that you will be scanning.
- Decrease the Redundancy Level or the Min Readable Height setting.

### **Bar Code Integrity Applications**

If your primary objective is to ensure that the correct bar code data is read over a significant region of the symbology, the following list identifies the parameters and settings that can maximize scanning and decoding integrity. When emphasizing accuracy and data security, other areas of performance may be affected. For example, throughput may be slowed. If bar code integrity is critical, consider these settings:

- Increase the Redundancy Level or the Min Readable Height setting.
- Slow the print speed and/or increase the bar code height.

## **Setup and Configuration**

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The Scanner is setup at the factory to read the bar codes on most labels. And, in most cases, further setup will not be required.

However, if you need to modify the setup to meet your application, this section details the operational settings of the unit.

To access these menu items, use the printer's front panel, enter 'MENU MODE' and go to 'PRINTER OPTIONS' → 'SCANNER' (see the *I-Class Operator's Manual* for menu system navigation details).

- 'MODE' is used for Scanner detection. The settings have differing functions, as follows:
  - Enabled – Upon power-up, the printer will attempt to detect the Scanner. If not detected, a "Scanner Fault" occurs.
  - Disabled – Upon power-up, the printer will not attempt to detect the Scanner. No scanning will occur.
  - Auto – Upon power-up, the printer will attempt to detect the Scanner. If detected, the printer will function normally with the scanning function.
- 'BARCODES' is used to enable the reading of a particular bar code symbology. The default setting enables the reading of all bar codes, except IATA. The table below lists the supported symbologies.

Symbology	Linear Scanner Supported
Code 39	✓
UPC-A	✓
UPC-E	✓
Interleaved 2 of 5 (I2 of 5)	✓
Code 128	✓
EAN-13	✓
EAN-8	✓
HBIC	✓
Codabar	✓
Interleaved 2 of 5 with a modulo 10 checksum	✓
Interleaved 2 of 5 with modulo 10 checksum & bearer bars	✓
IATA	[1]
Plessey	✓
2 digit UPC addendum	[1]
5 digit UPC addendum	[1]
Code 93	✓
UCC/EAN 128	✓
UCC/EAN 128 K-Mart non-EDI	✓
UCC/EAN 128 Random Weight	✓

<sup>[1]</sup>Readable only when using the 'Barcode Count' menu parameter (see below).

- ‘BARCODE COUNT’ is used to set the number (1 – 99) of bar codes to be read on each label. The default setting (00) puts the Scanner in Auto Mode, which allows a *variable* number of bar codes to be read. Auto Mode is appropriate for most applications, however, see the note below for exceptions. Also, if doing multiple-up bar codes, see Label Layout, below.

**Note:** Imaged bar codes – that is, bar codes that are sent from the host application as bitmaps to the printer – must be specified by inputting the minimum number of bar codes to be read on each label. Check with your software vendor if you have questions regarding how the bar codes are generated by your software application.

- ‘MIN READABLE HEIGHT’ is used to ensure bar code integrity by selecting the vertical distance of the bar code that must have identical reads. For example, a setting of  $\frac{1}{4}$  ensures that  $\frac{1}{4}$  inch of the bar code is 100% readable. The selectable range is 1/16 –  $\frac{1}{2}$  inch (1.5 – 12.5 mm), and Disabled. If this parameter is selected, the printer will automatically calculate the optimum scan rate and the number of consecutive reads required for the selected height based on the print speed. When ‘Disabled’ is selected, then the printer defaults to a REDUNDANCY LEVEL setting of 2.

**Note:** As a rule, this distance should not exceed 50% of the measured bar code height.

- ‘REDUNDANCY LEVEL’ is used to ensure bar code integrity by manually setting a specified number of required redundant reads that must occur. For example, a setting of 2 ensures that the bar code is identical in two consecutive reads. The setting range is 1 – 6 times, and Auto. When ‘Auto’ is selected, then the printer defaults to a MIN READABLE HEIGHT setting of 1/16.
- ‘SET DEFAULTS’ is used to restore the Scanner settings to the factory default values, as follows:

Scanner Menu Item	Default Value
Mode Auto	
Barcodes	All codes, except IATA
Barcode Count	00 (Auto Mode)
Min Readable Height	Disabled
Redundancy Level	Read Barcode 2X

Fault Handling is another important Scanner setting. It determines what happens when an unreadable bar code is detected. To access this menu item, use the printer’s front panel, enter ‘MENU MODE’ and go to ‘SYSTEM SETTINGS’ → ‘FAULT HANDLING’ (see the *I-Class Operator’s Manual* for menu system navigation details).

- ‘FAULT HANDLING’ is used to determine the level of interaction, as well as the disposition of the label when a fault (ribbon out, paper out, unreadable barcode, etc.) occurs.

**Level –** Determines the printer’s action, the action required by the operator, and the label’s reprint status with the following three selections:

**Void and Retry** – Depending upon the RETRY COUNT, one of the following actions when faulted:

- If the Retry Count setting (see below) has not been exceeded, ‘VOID’ is printed on the label in process and reprinting occurs automatically;
- If the Retry Count has been exceeded, printing stops and a fault message is displayed. After the problem is corrected, the FEED Key must be pressed to clear the fault. The label in process is reprinted; or,
- If the CANCEL Key is pressed, the operator now has the option of canceling the reprint:

To allow the reprint, press the ESC Key; or, to cancel the reprint, press the ENTER Key. (If the ENTER Key was pressed, the operator now has the option of canceling the entire label batch by pressing the ENTER key again.)

**Note:** VOID will not be printed when insufficient space exists for the height of the text (see Void Distance, below) or if the fault occurred after the entire label was completed (i.e., when the label reaches its Present Distance at or above the Top Of Form).

**No Reprint** – Printing stops and a fault message is displayed. After the problem is corrected, the FEED Key must be pressed to clear the fault. The label in process is *not* reprinted.

**Standard** – Printing stops and a fault message is displayed. After the problem is corrected, the FEED Key must be pressed to clear the fault. The label in process is reprinted. (This is the default setting.)

**Void Distance** – .10 – 2.00 Sets the distance to backup the faulted label to print ‘VOID’ on its trailing edge, which also indirectly establishes the font size of the void message. (The default setting is .50 inch.)

**Retry Count** – 0 – 3 Establishes the number of times the printer will attempt to reprint a label. If the last label printed in this count has been voided, the printer will stop and display a fault message. (The default setting is 1.)

## **Label Layout**

As mentioned earlier, to be properly recognized the printed bar codes printed must be a supported symbology, have a narrow bar resolution of no less than 10 mils, and have proper quiet zone areas.

Another important factor concerns label formats with multiple-up bar codes: If printing multiple-up bar codes in ordered columns where the same encoded information exists in each bar code (see below), there must be at least  $\frac{1}{4}$  inch white space in the rows between these symbologies.



Finally, when considering your layout, if you are going to print bar codes at high speeds that are  $\frac{1}{8}$  inch or less, consult the following table to ensure that the Scanner will be able to properly detect the codes.

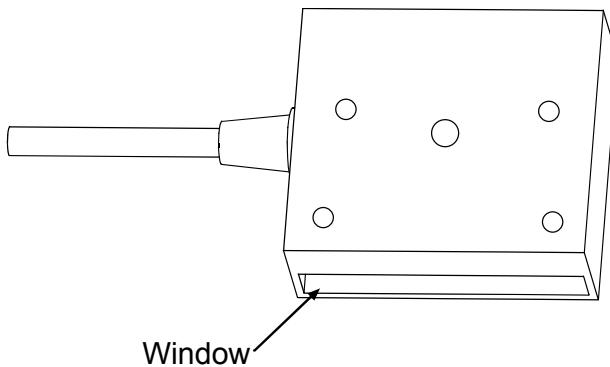
<b>Minimum Bar Code Height</b>	<b>Maximum Allowable Print Speed</b>
1/16 inch (1.5 mm)	8 IPS (inches per second)
1/8 inch (3 mm)	10 IPS

**Note:** In addition to the conditions above, some special considerations should be made if you are scanning small labels.

- (1) In some cases, the printer must back-up to scan the bar code because the small label size will not allow reading until it emerges from the printer.
- (2) If possible, arrange the layout so that the bar code(s) appear in the first portion on the label (as the label exits the printer).
- (3) If the barcode is large enough, or if the barcode is positioned to emerge from under the printhead before next label starts to print, a reduction of print speed may actually improve throughput by avoiding label back-up repositioning.

## **Maintenance**

No scheduled maintenance is required for the Scanner. Should it require cleaning, use a water dampened lens (or lint free) cloth and carefully clean the Window (see illustration). Avoid excessive moisture that could penetrate the housing and obscure the window. While the use of cleaning fluids other than water are not recommended, if necessary a neutral detergent or ethanol would be preferred; never use bleach at any strength because damage to the painted case and/or window can result.

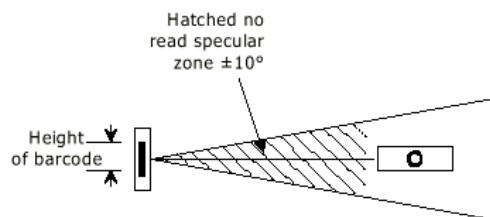


## **Alignment**

### **Avoiding Specular Reflection**

The Scanner is factory-adjusted for optimum performance. If, however, the label exit angle changes (due to, for example, the addition of a peel mechanism or an external rewinder), normally good bar codes may fail because of excessive specular reflection. A high level of reflection can "blind" the internal optics. The diagram (right) illustrates the no read specular zone, between 0 to 10 degrees off perpendicular.

### **Front View**

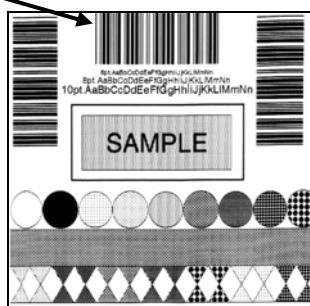


**CAUTION** The use of controls, adjustments, or the performance of procedures other than those specified herein may result in hazardous LED light exposure. Class 1 LED power up to 15 mW in a 0.1 ms pulse at 635-670 nm could be accessible in the interior.

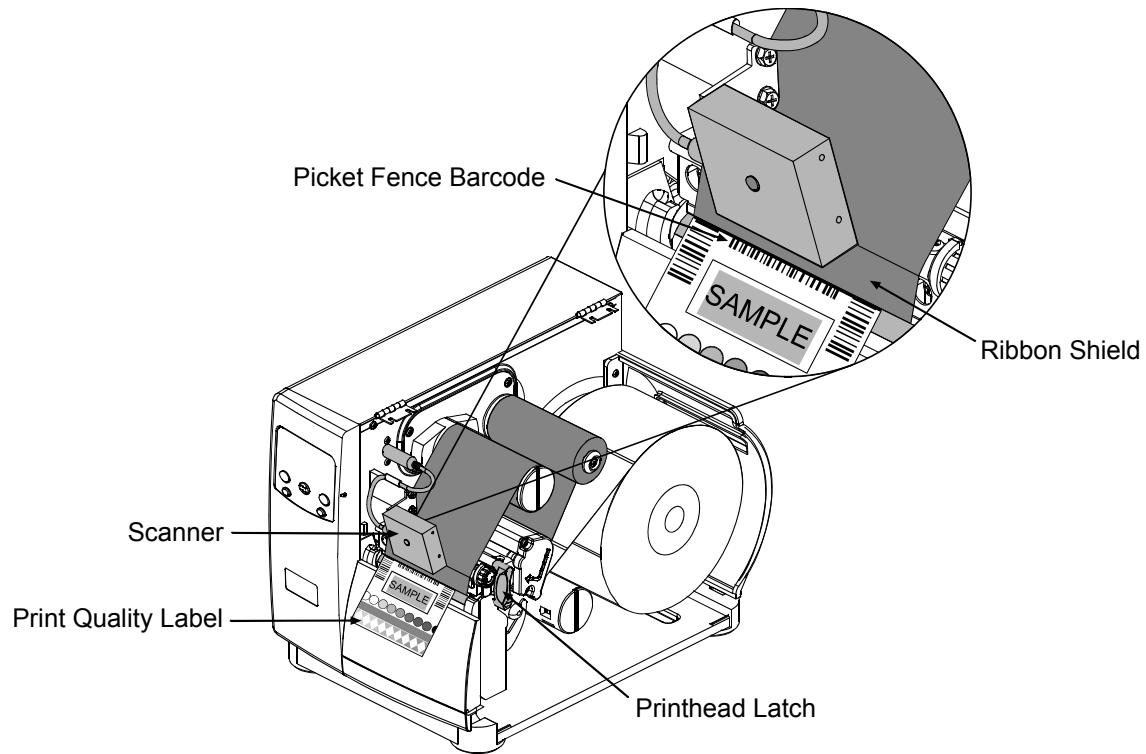
To reduce specular reflection, follow the steps listed below:

- 1) Ensure that the Tear Bar, Peel Mechanism, or Rewind Plate has been mounted to the printer (if using an external rewinder, attach the labels to the rewinder). See the *I-Class Operator's Manual* for mounting details.  
**Note:** The cutter option cannot be used when the Scanner is installed.
- 2) With four-inch wide label stock installed, use the printer's front panel and enter 'QUICK TEST MODE.' Print a Print Quality Label, as shown below (see the *I-Class Operator's Manual* for details).

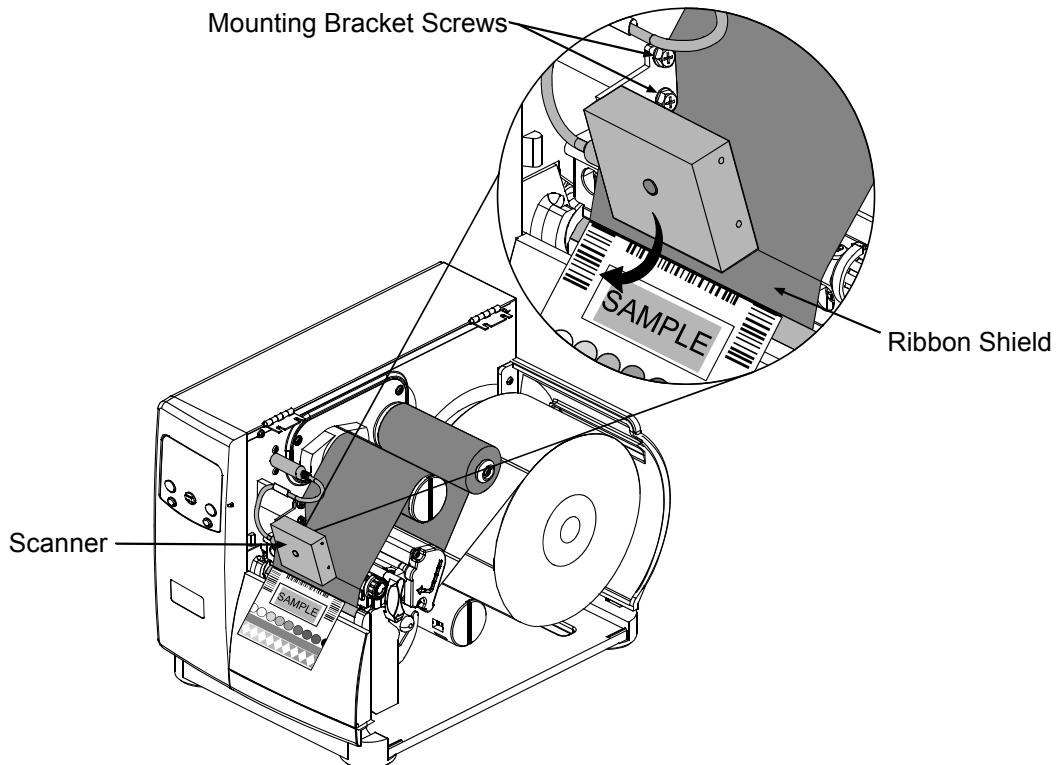
Picket Fence Bar Code



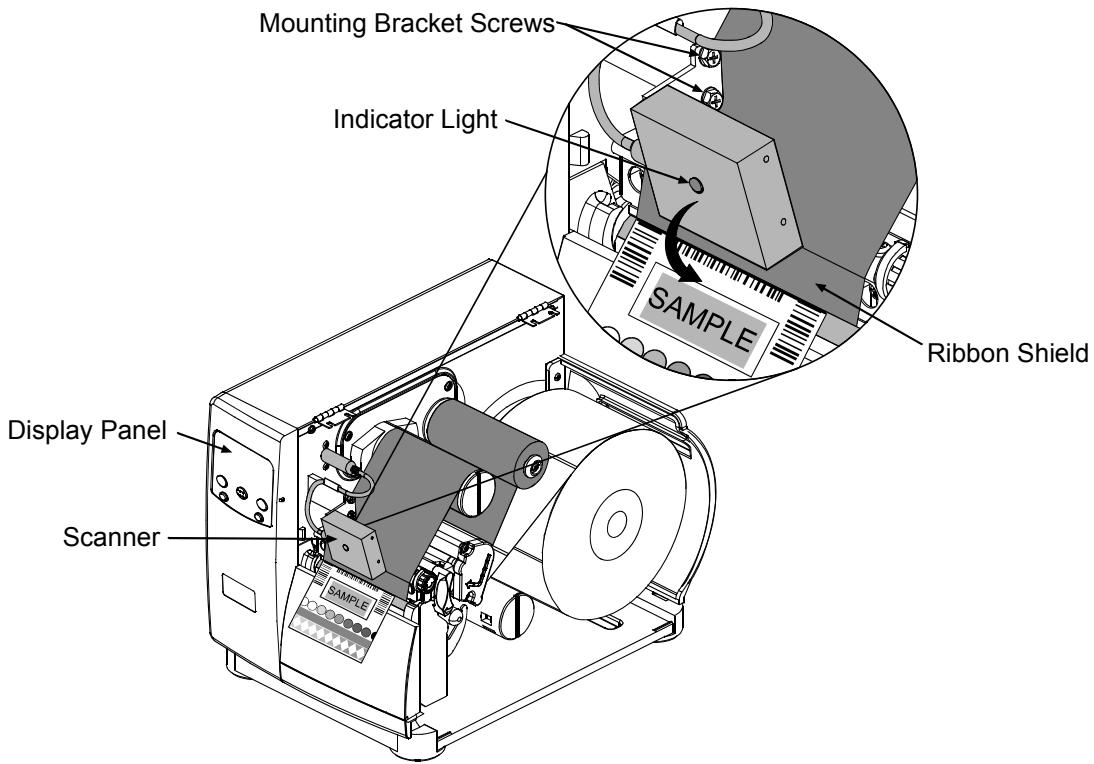
- 3) Unlock the Printhead Latch and raise the printhead assembly. Carefully position the Print Quality Label so that it comes straight out of the printer, and so that only the bottom 1/4 inch of the Picket Fence Bar Code is showing from the Ribbon Shield (see drawing below). Lower the printhead assembly and lock the Printhead Latch.



- 4) Using the printer's front panel enter 'MENU MODE' and go to 'DIAGNOSTICS' → 'OPTIONS TESTING' → 'TEST SCANNER' → 'ALIGNMENT TEST' and then press the ENTER Key (see the *I-Class Operator's Manual* for menu system details).
- 5) Slightly loosen the top Mounting Bracket Screw (see drawing below) and tilt the Scanner away from the Ribbon Shield of the printer.



- 6) While watching the ‘Scan Count’ in the Display Panel, slowly tilt the Scanner forward (toward the Ribbon Shield) until the numbers increment continuously and rapidly (also, the green Indicator Light on the Scanner will illuminate). This is the optimum reading position.



- 7) Carefully tighten both of the Mounting Bracket Screws. (Ensure that the ‘Scan Count’ in the Display Panel is still incrementing rapidly.) Unlock the printhead latch, remove the print quality label and reinstall your operating media.
- 8) Using the printer’s front panel, exit the ‘ALIGNMENT TEST’ by repeatedly pressing the ESC Key (see the *I-Class Operator’s Manual* for menu system details). With the printer at ‘READY,’ run a batch of live labels to test the alignment. If necessary, repeat the procedure or, if problems persist, consult the Troubleshooting section.

*This completes the Alignment procedure.*

## Troubleshooting



This unit, a Class 1 LED Product per IEC 825-1 (1997) with power up to 15 mW in a 0.1 ms pulse at 635-670 nm, contains no user serviceable parts. All product service must be performed by Datamax-O’Neil. Opening the Scanner will void the warranty and could expose the operator to LED light.

The most common reasons and solutions for Scanner Faults are listed below:

Scanner Fault	Try these solutions...
<p>The Scanner could not successfully read the bar code.</p> <p><b>Note:</b> This is a normal condition when a bar code is unreadable.</p>	<p>Press the FEED Key to clear the fault. Examine the print quality of the label being failed (refer to the <i>I-Class Operator's Manual</i> for details). If the bar code(s) appear(s) to be free of voids with sufficient quiet zone space, try the following:</p> <ol style="list-style-type: none"> <li>1) Make sure the scanner cable is securely connected (the scanner should emit a red light after the printer is powered-up); refer to the drawing in Overview.</li> <li>2) The scanner setup could be corrupt or out of sync; cycle the printer's power off and on.</li> <li>3) Check for dirt or debris on the scanner's window and clean if necessary; see Maintenance.</li> <li>4) Ensure that ambient light is not interfering; reduce or redirect any bright light source that could 'blind' the optics.</li> <li>5) Ensure that the Tear Bar, Peel Mechanism, or Rewind Plate has been mounted to the printer (if using an external rewinder, attach the labels to the spindle) and verify the alignment; see Alignment.</li> <li>6) Ensure the bar code is supported and enabled; see Setup and Configuration.</li> <li>7) If the bar code is being sent to the printer as an image (bitmap), or if the bar code uses certain addendums, ensure that 'Barcode Count - Auto' mode has <u>not</u> been selected; see Setup and Configuration.</li> <li>8) Ensure that the "X" dimension of the bar code is 10 mils or greater with adequate quiet zones. Consult your host software application.</li> <li>9) If using multiple-up bar codes that contain the same data, ensure that sufficient white space exists between the rows; see Label Layout.</li> <li>10) Adjust the Heat and/or Print Speed settings for better print quality. Consult your host software application (or make changes through the printer's front panel; see the <i>I-Class Operator's Manual</i>).</li> <li>11) The scanner settings may be too restrictive at the current print speed. Decrease the 'Min Readable Height' or 'Redundancy Level,' or if possible lower the print speed or increase the height of the bar code; see Setup and Configuration or the <i>I-Class Operator's Manual</i>.</li> <li>12) Ensure that the label stock has a matte finish (highly reflective or glossy finish may cause excessive specular reflection); try a different media.</li> </ol> <p>If the fault continues to occur, yet the bar code is readable on other devices, it is possible that the scanner is misaligned. Realign the scanner; see Alignment.</p> <p>Datamax-O'Neil is ready to answer questions and help resolve any problems that you may encounter.</p>

## **Specifications**

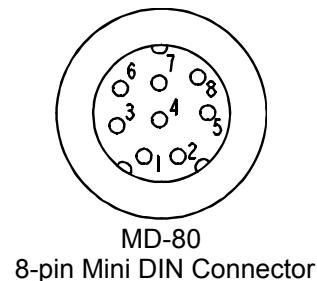
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### **Physical**

Case Material Steel (Black)  
Dimensions (L x H x W) 47 x 20 x 55 mm (1.95 x 0.78 x 2.2 in)  
Cable Length 7.0 inches with 8 pin Mini DIN connection

Mini DIN Connector  
1  
2  
3  
4  
5  
6  
7  
8

Pin Number:  
Signal:  
1 +5 VDC  
2 TXD  
3 Trigger  
4 RTS  
5 Signal Ground  
6 Chassis Ground  
7 RXD  
8 CTS



### **Optical**

Scan Rate 700 scans per second ±10%  
Wavelength of LED Illumination 660 nanometers  
Read Sensor CCD linear array  
Narrow Bar Resolution 10.0 mil  
Maximum Character Input 51 digits  
Maximum Scanning Width 4.0 inches  
Minimum Print Contrast Signal 0.45 (min. background reflectance of 70%)  
Symbology Orientation Picket fence

### **Electrical**

Operating Voltage +5 VDC ± 5%  
Current:  
Operating 158 mA typical, 220 mA maximum  
Static 150 mA maximum  
Surge 3 A maximum

### **Environmental**

Temperature:  
Operating 0° to +40° C (+32 to +104° F)  
Storage -10° to +60° C (+14 to +140° F)  
Humidity (non-condensing):  
Operating 20 to 80%  
Storage 20 to 90%  
Ambient light restrictions: Fluorescent or incandescent: below 5 kilolux

### **Supported Symbologies**

Codabar (NW-7)	Code 39	Code 93
Code 128	Industrial 2 of 5	Interleaved 2 of 5
MSI / Plessey	WPC (UPC / EAN / JAN)	IATA

### **Supported Printers\***

I-4208, I-4212, I-4308, I-4406, and I-4604

\*With installed firmware versions of 7.03 and above.

## **Warranty Information**

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### **Warranty Service Procedures**

Datamax-O'Neil warrants to Purchaser that under normal use and service, the Scanner purchased hereunder shall be free from defects in material and workmanship for a period of one year (365 days) from the date of shipment by Datamax-O'Neil. Expendable and/or consumable items or parts such as lamps and fuses, are not covered under this warranty. This warranty does not cover equipment or parts that have been misused, altered, neglected, handled carelessly, or used for purposes other than those for which they were manufactured. This warranty also does not cover loss, damages resulting from accident, or damages resulting from unauthorized service.

If a defect should occur during the warranty period, the defective unit shall be returned, freight and insurance prepaid, in the original shipping container to:

Datamax-O'Neil  
4501 Parkway Commerce Boulevard  
Orlando, Florida USA 32808

A Return Material Authorization (RMA) number must be issued before the product can be returned. To open an RMA, please call the Datamax-O'Neil Technical Support Department at (407) 523-5540. Include your RMA number on the outside of the box and on the shipping document. Include a contact name, action desired, a detailed description of the problem(s), and media examples when possible with the defective unit. Datamax-O'Neil shall not be responsible for any loss or damages incurred in shipping. Any warranty work to be performed by Datamax-O'Neil shall be subject to Datamax-O'Neil's confirmation that such product meets Datamax-O'Neil warranty. In the event of a defect covered by its warranty, Datamax-O'Neil will return the repaired or replaced product to the Purchaser at Datamax-O'Neil's cost.

With respect to a defect in hardware covered by the warranty, the warranty shall continue in effect until the end of the original warranty period, or for ninety (90) days after the repair or replacement, whichever is later.

### **General Warranty Provisions**

Datamax-O'Neil makes no warranty as to the design, capability, capacity or suitability of any of its hardware, supplies, or software.

Software is licensed on an "as is" basis without warranty. Except and to the extent expressly provided in this warranty and in lieu of all other warranties, there are no warranties, expressed or implied, including, but not limited to, any warranties of merchantability or fitness for a particular purpose.

Purchaser shall be solely responsible for the selection, use, efficiency and suitability of Datamax-O'Neil's products.

### **Limitation of Liability**

In no event shall Datamax-O'Neil be liable to the purchaser for any indirect, special or consequential damages or lost profits arising out of or relating to Datamax-O'Neil's products, or the performance or a breach thereof, even if Datamax-O'Neil has been advised of the possibility thereof. Datamax-O'Neil's liability, if any, to the purchaser or to the customer of the purchaser hereunder shall in no event exceed the total amounts paid to Datamax-O'Neil hereunder by the purchaser for a defective product.

In no event shall Datamax-O'Neil be liable to the purchaser for any damages resulting from or related to any failure or delay of Datamax-O'Neil in the delivery or installation of the computer hardware, supplies or software or in the performance of any services.

Some states do not permit the exclusion of incidental or consequential damages, and in those states the foregoing limitations may not apply. The warranties here give you specific legal rights, and you may have other legal rights which vary from state to state.

