

**Zebra<sup>®</sup> 170PAX4<sup>™</sup>**  
Print Engine

**User Guide**



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## ZEBRA TECHNOLOGIES CORPORATION

Declares that the following Information Technology Equipment

### **Zebra PAX4 Series**

complies with the following applicable directives and standards for the  
ITE: Heavy Industry environment

### **Applicable Directives and Supporting Standards:**

89/336/EEC EMC Directive, EN55022:1998 Class A, EN61000-6-2,  
EN61000-3-2, EN61000-3-3 W/Amendment 12  
73/23/EEC LVD Directive, EN60950-1:03, CB Scheme

FCC Part 15, Subpart B, Class A, ICES-003

NOM 019-SCFI-1998  
C-TICK, VCCI

**Manufactured By:** Zebra Technologies Corporation  
333 Corporate Woods Parkway  
Vernon Hills, IL 60061 USA

The equipment specified conforms to all Directives and Standards listed above effective as of the date below.



January 4, 2005

Charles A. Derrow  
Manager, Compliance Eng  
Zebra Technologies Corporation  
333 Corporate Woods Parkway  
Vernon Hills, IL 60061 USA



January 27, 2005

Rod Rodericks  
Managing Director  
Zebra Technologies Europe Limited  
Zebra House, The Valley Center, Gordon Road  
High Wycombe, Buckinghamshire HP13 6EQ UK

**Effective Date:** 1 Jan 2005

## Compliance Information

### FCC Compliance Statement

This device complies with Part 15 rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for Class A Digital Devices, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the product manuals, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

The user is cautioned that any changes or modifications not expressly approved by Zebra Technologies could void the user's authority to operate the equipment. To ensure compliance, this print engine must be used with Shielded Communication Cables.

### Canadian DOC Compliance Statement

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

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# About This Document

This section provides you with contact information, document structure and organization, and additional reference documents.

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## Who Should Use This Document

This User Guide is intended for use by any person who needs to operate or troubleshoot problems with the print engine.

## How This Document Is Organized

The User Guide is set up as follows:

<b>Section</b>	<b>Description</b>
<i>Introduction on page 7</i>	This chapter shows the operational controls and location of major components used when loading media and ribbon.
<i>Print Engine Setup on page 13</i>	This section provides the tasks that you must complete and the issues that you must consider before you load and configure your print engine.
<i>Operations on page 31</i>	If you have completed the tasks and resolved the issues in Print Engine Setup on page 13, follow the instructions in this chapter to load and calibrate your print engine.
<i>Configuration on page 49</i>	This section describes the control panel parameters that are used to configure the print engine for operation.
<i>Routine Maintenance on page 85</i>	This chapter provides routine cleaning and maintenance procedures.
<i>Troubleshooting on page 95</i>	This section provides information about errors that you might need to troubleshoot. Assorted diagnostic tests are included.
<i>Data Ports on page 119</i>	This section describes the standard communication ports available to connect the print engine to your computer or network.
<i>Specifications on page 135</i>	This chapter provides routine cleaning and maintenance procedures.

## Contacts

You can contact Zebra Technologies at the following.

### Web Site

<http://www.zebra.com>

Technical Support via the Internet is available 24 hours per day, 365 days per year. Go to <http://www.zebra.com/support>.

### The Americas

Regional Headquarters	Technical Support	Customer Service Dept.
Zebra Technologies International, LLC 333 Corporate Woods Parkway Vernon Hills, Illinois 60061.3109 U.S.A T: +1 847 793 2600 Toll-free +1 800 423 0422 F: +1 847 913 8766	T: +1 847 913 2259 F: +1 847 913 2578 Hardware: hwtsamerica@zebra.com Software: swtsamerica@zebra.com	For printers, parts, media, and ribbon, please call your distributor, or contact us. T: +1 866 230 9494 E: VHCustServ@zebra.com

### Europe, Africa, Middle East, and India

Regional Headquarters	Technical Support	Internal Sales Dept.
Zebra Technologies Europe Limited Zebra House The Valley Centre, Gordon Road High Wycombe Buckinghamshire HP13 6EQ, UK T: +44 (0)1494 472872 F: +44 (0) 1494 450103	T: +44 (0) 1494 768298 F: +44 (0) 1494 768210 Germany: Tsgermany@zebra.com France: Tsfrance@zebra.com Spain/Portugal: Tsspain@zebra.com All other areas: Tseurope@zebra.com	For printers, parts, media, and ribbon, please call your distributor, or contact us. T: +44 (0) 1494 768316 F: +44 (0) 1494 768244 E: mseurope@zebra.com

### Asia Pacific

Regional Headquarters	Technical Support	Customer Service
Zebra Technologies Asia Pacific, LLC 16 New Industrial Road #05-03 Hudson TechnoCentre Singapore 536204 T: +65 6858 0722 F: +65 6885 0838	T: +65 6858 0722 F: +65 6885 0838 E: tsasiapacific@zebra.com	For printers, parts, media, and ribbon, please call your distributor, or contact us. T: +65 6858 0722 F: +65 6885 0837

## Document Conventions

The following conventions are used throughout this document to convey certain information.

**Alternate Color** (online only) Cross-references contain hot links to other sections in this guide. If you are viewing this guide online in .pdf format, you can click the cross-reference ([blue text](#)) to jump directly to its location.

**LCD Display Examples** Text from a print engine's Liquid Crystal Display (LCD) appears in **Bubbledot ICG** font.

**Command Line Examples** Command line examples appear in `Courier New` font. For example, type `ZTools` to get to the Post-Install scripts in the `bin` directory.

**Files and Directories** File names and directories appear in `Courier New` font. For example, the `Zebra<version number>.tar` file and the `/root` directory.

### Icons Used



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**Caution** • Warns you of the potential for electrostatic discharge.

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**Caution** • Warns you of a potential electric shock situation.

---



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**Caution** • Warns you of a situation where excessive heat could cause a burn.

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**Caution** • Advises you that failure to take or avoid a specific action could result in physical harm to you.

---

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**Caution** • (No icon) Advises you that failure to take or avoid a specific action could result in physical harm to the hardware.

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**Important** • Advises you of information that is essential to complete a task.



**Note** • Indicates neutral or positive information that emphasizes or supplements important points of the main text.



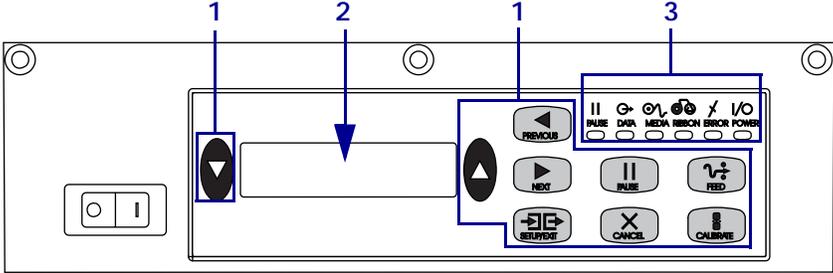
**Example** • Provides an example, often a scenario, to better clarify a section of text.



**Tools** • Tells you what tools you need to complete a given task.

**Illustration Callouts** Callouts are used when an illustration contains information that needs to be labeled and described. A table that contains the labels and descriptions follows the graphic. [Figure 1](#) provides an example.

**Figure 1 • Sample Figure with Callouts**



1	Buttons
2	Liquid Crystal Display (LCD)
3	Lights/LEDs





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# Introduction

This chapter shows the operational controls and location of major components used when loading media and ribbon.

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## Print Engine Exterior View

Print engines are available in a right-hand configuration (media moves from left to right, [Figure 2](#)) and a left-hand configuration (media moves from right to left, [Figure 3](#)).

Figure 2 • Right-Hand (RH) Print Engine

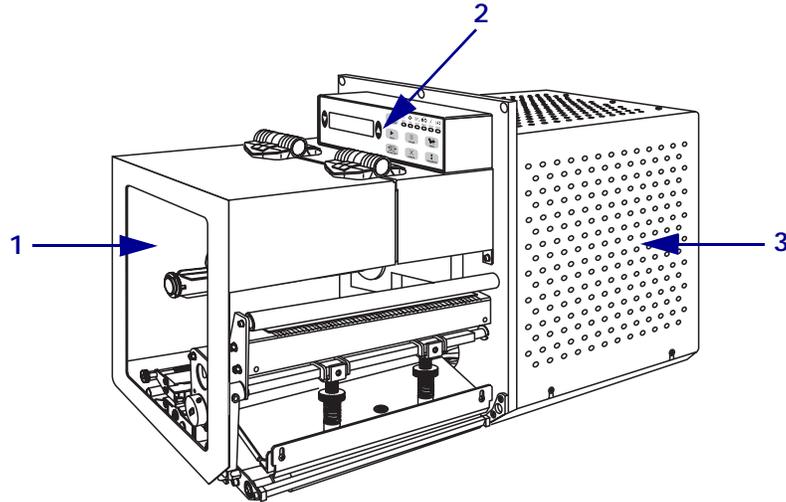
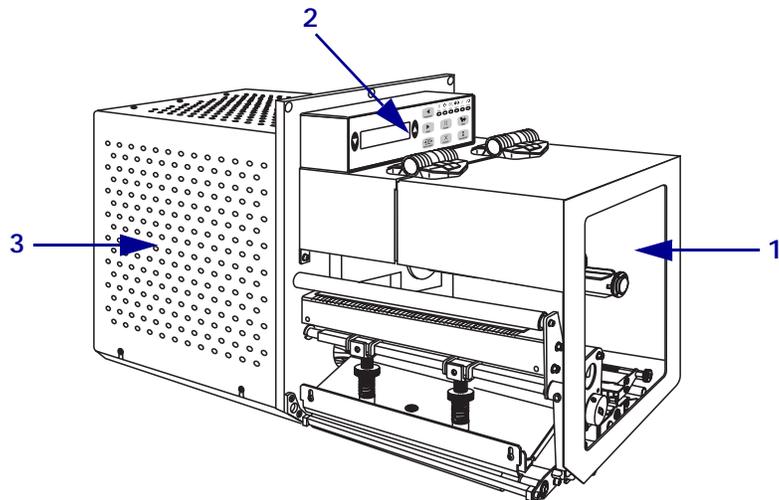


Figure 3 • Left-Hand (LH) Print Engine

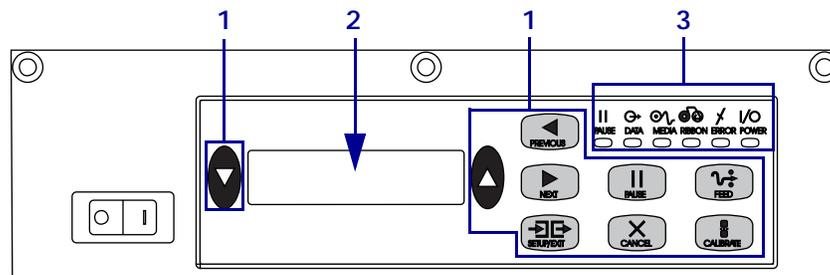


1	Media door
2	Control panel
3	Electronics cover

## Control Panel

All controls and indicators for the print engine are located on the control panel (Figure 4). The Liquid Crystal Display (LCD) shows print engine operating status and feature parameters. The buttons are used to control the print engine operations and change parameters. The lights (LEDs) indicate the print engine's status.

Figure 4 • Control Panel (Right-Hand)



1	Buttons
2	LCD
3	Lights/LEDs

## Control Panel Buttons

The control panel buttons are described in Table 1.

Table 1 • Control Panel Buttons

Button	Description/Function
<b>LEFT and RIGHT OVAL</b>	The left and right ovals are used to change parameter values for a parameter being displayed on the LCD. Common uses include increasing or decreasing a value, answering yes or no, indicating ON or OFF, and scrolling through choices.
<b>PREVIOUS</b>	Scrolls the LCD to the previous parameter.
<b>NEXT</b>	Scrolls the LCD to the next parameter.
<b>SETUP/EXIT</b>	Enters and exits configuration mode.
<b>PAUSE</b>	Stops and restarts the printing process or removes error messages and clears the LCD. If a label is printing, it is completed before the printing process stops. When the print engine is paused, the PAUSE light is ON.
<b>CANCEL</b>	CANCEL functions only in Pause mode. Pressing CANCEL has these effects: <ul style="list-style-type: none"> <li>• Cancels the label format that is currently printing.</li> <li>• If no label format is printing, the next one to be printed is canceled.</li> <li>• If no label formats are waiting to be printed, CANCEL is ignored.</li> </ul> To clear the print engine's entire label format memory, press and hold CANCEL until the DATA light turns off.

**Table 1 • Control Panel Buttons (Continued)**

Button	Description/Function
<b>FEED</b>	Feeds a blank label. <ul style="list-style-type: none"> <li>• If the print engine is idle or paused, the label is fed immediately.</li> <li>• If the print engine is printing, the label is fed after the current batch prints.</li> </ul>
<b>CALIBRATE</b>	CALIBRATE functions only in Pause mode. Press CALIBRATE to recalibrate for proper media length, to set media type (continuous/non-continuous), and to set print method (direct thermal/thermal transfer).

## Control Panel Indicator Lights (LEDs)

The control panel lights are described in [Table 2](#).

**Table 2 • Control Panel Lights**

LED	OFF Indicates	ON Indicates	FLASHING Indicates
<b>POWER</b> (Green)	The print engine is OFF, or no power to print engine.	Power switch is ON, and power is being supplied to the print engine.	—
<b>PAUSE</b> (Yellow)	Normal operation.	One of the following: <ul style="list-style-type: none"> <li>• The print engine is paused because of an error condition (printhead, ribbon, or paper error). Usually occurs in conjunction with another LED.</li> <li>• PAUSE was pressed.</li> <li>• A pause was requested from the Applicator Port.</li> <li>• A pause was received as part of the label format.</li> </ul>	—
<b>DATA</b> (Green)	No data being received or processed.	Data is processing or printing is taking place. No data is being received.	The print engine is receiving data from or sending status information to the host computer.
<b>MEDIA</b> (Yellow)	Normal operation. Media properly loaded.	Out of media (print engine is paused, LCD displays error message, and PAUSE light is ON).	—

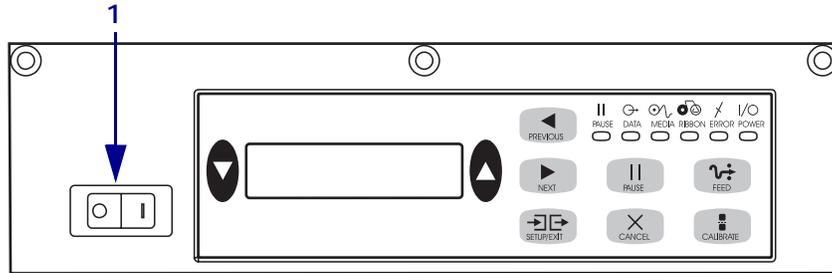
Table 2 • Control Panel Lights (Continued)

LED	OFF Indicates	ON Indicates	FLASHING Indicates
<b>RIBBON</b> (Yellow)	Normal operation. Ribbon properly loaded.	Ribbon in while print engine is in direct thermal mode, or no ribbon loaded while the print engine is in thermal transfer mode. The print engine is paused, LCD displays error message, and PAUSE light is ON.	—
<b>ERROR</b> (Orange)	No print engine errors.	—	A print engine error exists. Check the LCD for status.

## Power On/Off Switch

The print engine power switch is located to the side of the control panel, as shown in [Figure 5](#). When this switch is placed in the ON (I) position, the POWER light turns on, and the print engine automatically performs a Power-On Self Test (POST). For more information, see [Power-On Self Test](#) on page 124.

Figure 5 • Power Switch Location (Right-Hand)



1	Power switch
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# Print Engine Setup

This section provides the tasks that you must complete and the issues that you must consider before you load and configure your print engine.

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## Before You Begin

Review this checklist, and resolve any issues before you set up or use your print engine.

- Unpack and Inspect the Print Engine** Have you unpacked the print engine and inspected it for damage? If you have not, see [Unpack and Inspect the Print Engine on page 15](#).
- Install the Print Engine** Have you considered what factors will affect how the print engine is installed into an applicator? Is the print engine mounted in an applicator? For information, see [Print Engine Installation on page 16](#).
- Attach a Power Cord** Do you have the correct power cord for your print engine? If you are unsure, see [Power Cord Specifications on page 22](#). To attach the power cord and connect the print engine to a power source, see [Connect the Print Engine to a Power Source on page 21](#).
- Connect to a Data Source** Have you determined how the print engine will connect to a data source (usually a computer)? For more information, see [Select a Communication Interface on page 23](#).
- Select Media** Do you have the correct media for your application? If you are unsure, see [Types of Media on page 27](#).
- Select Ribbon** Do you need to use ribbon, and is the appropriate ribbon available, if needed? If you are unsure, see [Ribbon Overview on page 29](#).

## Handling the Print Engine

This section describes how to handle your print engine.

### Unpack and Inspect the Print Engine

When you receive the print engine, immediately unpack it and inspect for shipping damage.

- Save all packing materials.
- Check all exterior surfaces for damage.
- Raise the media door, and inspect the media compartment for damage to components.

If you discover shipping damage upon inspection:

- Immediately notify the shipping company and file a damage report.
- Keep all packaging material for shipping company inspection.
- Notify your authorized Zebra reseller.



**Important** • Zebra Technologies is not responsible for any damage incurred during the shipment of the equipment and will not repair this damage under warranty.

### Store the Print Engine

If you are not placing the print engine into immediate operation, repackage it using the original packing materials. You may store the print engine under the following conditions:

- Temperature: -40° to 160°F (-40° to 71°C)
- Relative humidity: 5% to 95% non-condensing

### Ship the Print Engine

If you must ship the print engine:

- Remove any media or ribbon from the print engine to avoid damaging the print engine.
- Carefully pack the print engine into the original container or a suitable alternate container to avoid damage during transit. A shipping container can be purchased from Zebra if the original packaging has been lost or destroyed.

### Recycle the Print Engine



This print engine is recyclable. If you must dispose of the print engine, do not do so in unsorted municipal waste. Please recycle according to your local standards. For more information, see <http://www.zebra.com/environment>.

## Print Engine Installation

This section provides basic information for mounting the print engine into an applicator. The illustrations in this section show the print engine from different angles and include dimensions and clearance needs.

### Requirements

**Stability** When the print engine is mounted, the complete assembly must be physically stable. When the print engine is loaded with ribbon and media, the equipment must not become physically unstable.

**Ventilation and Temperature** Provide ventilation for the print engine mounting enclosure to remove heat and ensure uninterrupted, trouble-free operation of the print engine. Ambient air temperature surrounding the print engine must not exceed the following:

- Temperature: 32° to 104°F (0° to 40°C)
- Relative humidity: 20% to 95% non-condensing

**Power Requirements** Consider the current rating of the print engine during installation. When power is applied to the print engine and the enclosing equipment, an overload condition must not be created.

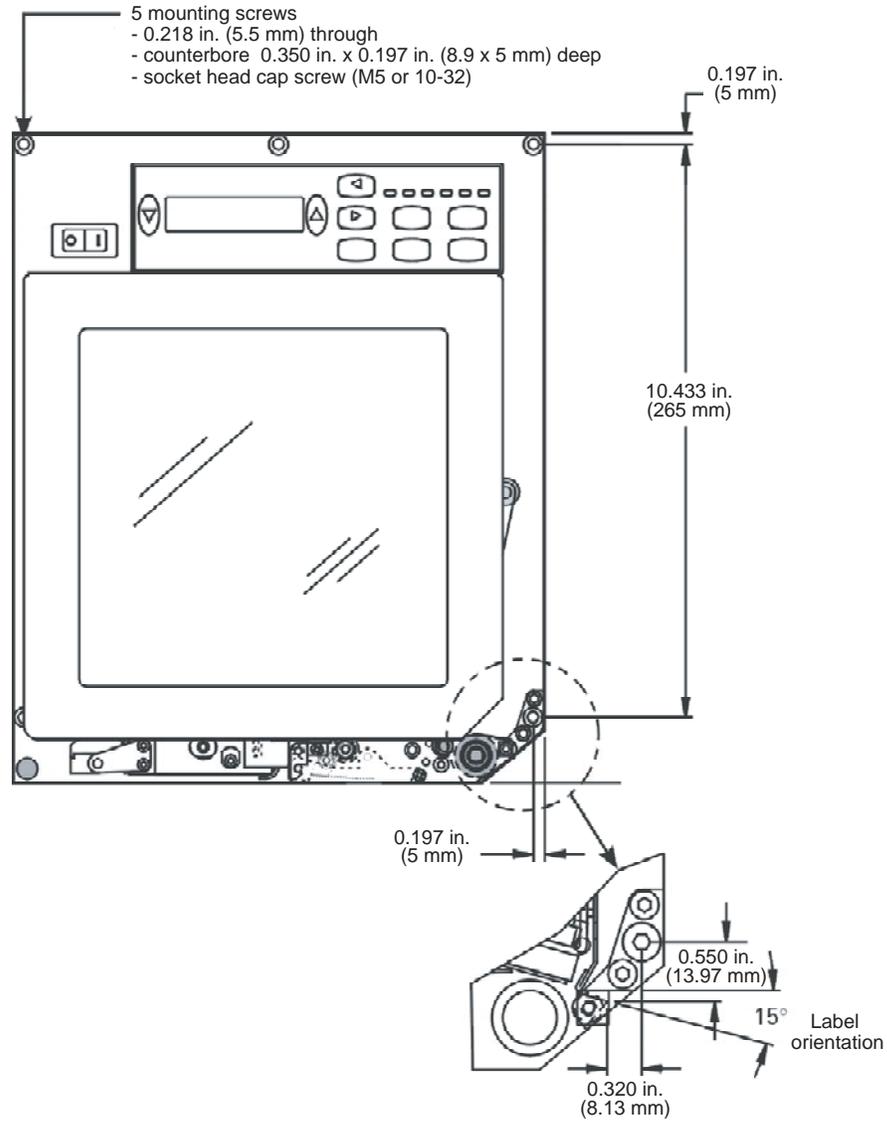
**Grounding Requirements** Maintain reliable grounding of the print engine. Pay particular attention to the AC power supply connections so that earth ground is maintained through the AC power input connector.

**Clearance for Cables and Connectors** Allow ample space at the rear of the print engine for electronic connectors and dressing of the following cables: IEC power cord, serial and/or parallel host communication cable, optional host communication cable (Ethernet), and the discrete signal (applicator) interface cable.

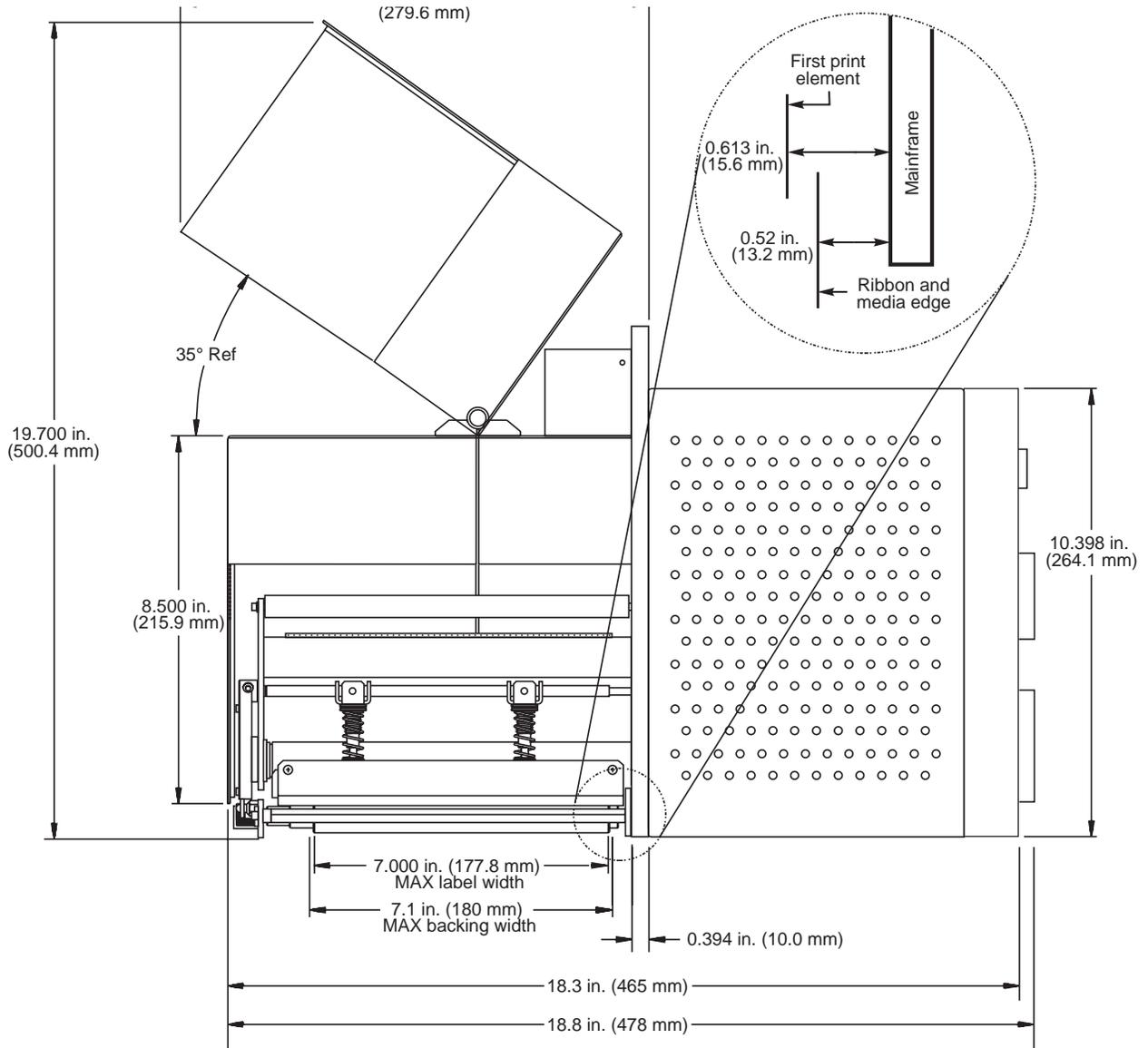
**Power Cord Requirements** The IEC power cord does not have a strain relief on the print engine. If the operating characteristics of the applicator include vibration or strain on the power cord, provide an appropriate clamping mechanism to avoid unintentional disconnection of the power cord from the print engine.

## Dimensions and Clearance Needs

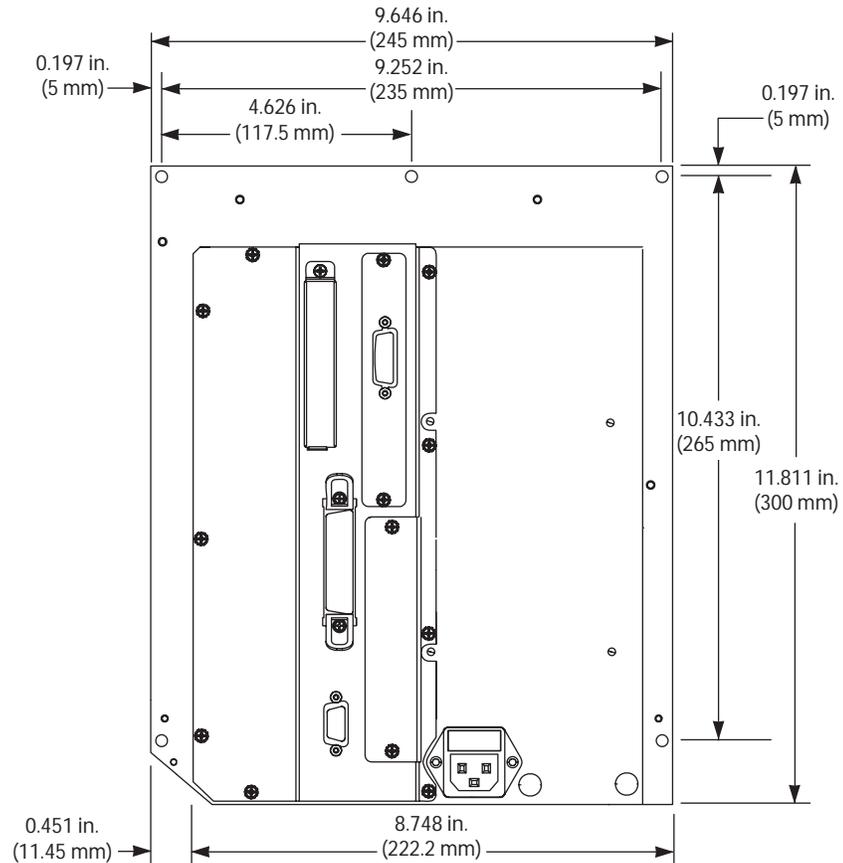
Figure 6 • Front View of Right-Hand Print Engine



**Figure 7 • Right Side View of Right-Hand Print Engine**



**Figure 8 • Rear View of Right-Hand Print Engine**



## Install the Print Engine in an Applicator

This section provides the basic instructions for installing the print engine into an applicator.



**Caution •** If the print engine is installed improperly, it could fall out of the applicator and cause injury. The center mounting bolt and four mounting screws must be installed and secured. See [Figure 9](#) for the location of the bolt and screws.

### To install the print engine into an applicator, complete these steps:

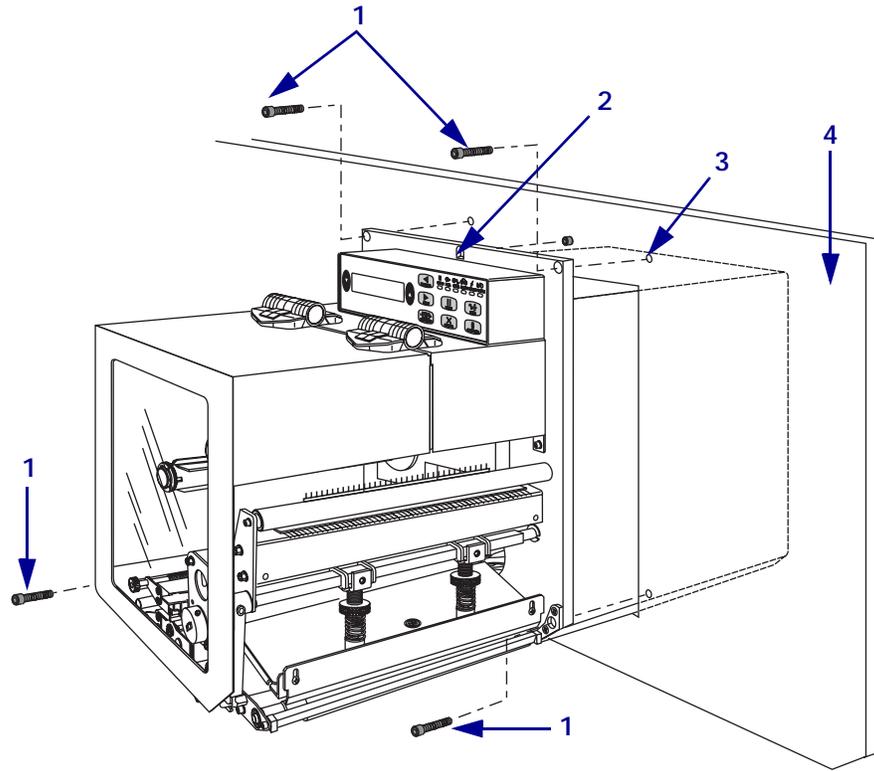
1. See [Figure 9](#). Install the center mounting bolt into the center hole on the applicator.
2. Carefully place the keyhole on the center mounting bolt.



**Note •** The keyhole and the center mounting bolt are designed to support the print engine and assist in installing and removing the four mounting screws.

3. Install the four corner mounting screws to secure the print engine to the applicator.

Figure 9 • Front View of Print Engine in Applicator



1	Mounting screws (four total)
2	Keyhole
3	Center mounting bolt (shown inside hole on applicator)
4	Applicator

## Connect the Print Engine to a Power Source

The power supply in the print engine automatically detects the applied line voltage and works in the 90 to 264 VAC, 47 to 63 Hz range.

The AC power cord must have a three-prong female connector on one end that plugs into the mating AC power connector at the rear of the print engine. If a power cable was not included with your print engine, refer to [Power Cord Specifications on page 22](#).

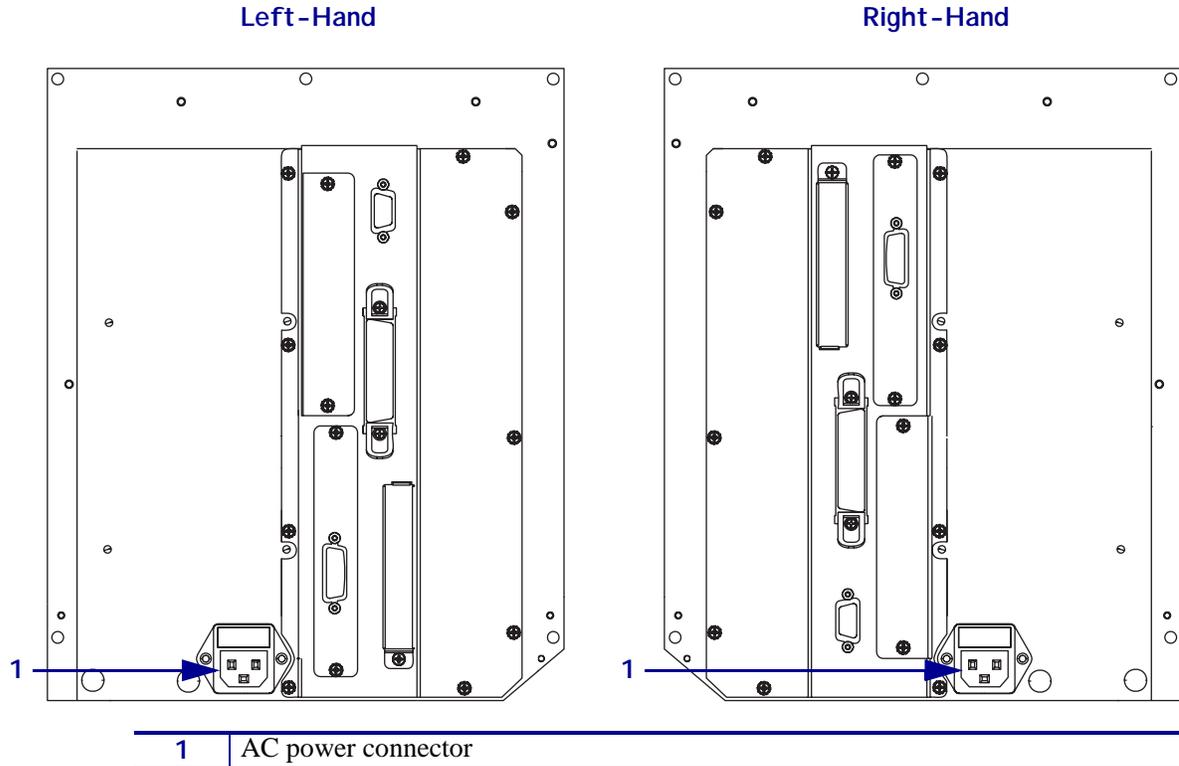


**Caution** • For personnel and equipment safety, always use an approved three-conductor power cord specific to the region or country intended for installation. This cord must use an IEC 320 female connector and the appropriate region-specific three-conductor grounded plug configuration.

### To connect the print engine to a power source, complete these steps:

1. Turn the print engine power switch to the Off (O) position.
2. Refer to [Figure 10](#). Plug the power cord into the AC power connector on the rear of the print engine.
3. Plug the other end of the power cord into a power outlet near the print engine.

Figure 10 • Power Connection



## Power Cord Specifications

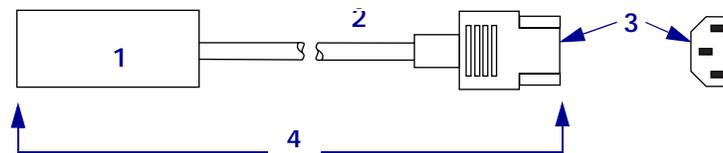


**Caution** • For personnel and equipment safety, always use an approved three-conductor power cord specific to the region or country intended for installation. This cord must use an IEC 320 female connector and the appropriate region-specific, three-conductor grounded plug configuration.

Depending on how your print engine was ordered, a power cord may or may not be included. If one is not included or if the one included is not suitable for your requirements, refer to the following guidelines:

- The overall cord length must be less than 9.8 ft. (3.0 m).
- The cord must be rated for at least 10 A, 250 V.
- The chassis ground (earth) **must** be connected to ensure safety and reduce electromagnetic interference. The third wire in the power cord grounds the connection (Figure 11).

Figure 11 • Power Cord Specifications



1	AC power plug for your country—This should bear the certification mark of at least one of the known international safety organizations (Figure 12).
2	3-conductor HAR cable or other cable approved for your country.
3	IEC 320 connector—This should bear the certification mark of at least one of the known international safety organizations (Figure 12).
4	Length ≤ 9.8 ft. (3 m). Rating 10 Amp, 250 VAC.

Figure 12 • International Safety Organization Certifications



## Select a Communication Interface

The way that you connect your print engine to a data source depends on the communication options installed in the print engine. You may use any available connection to send commands and label formats from a host computer to the print engine.

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**Caution** • Connecting a data communications cable while the power is ON may damage the print engine.

---

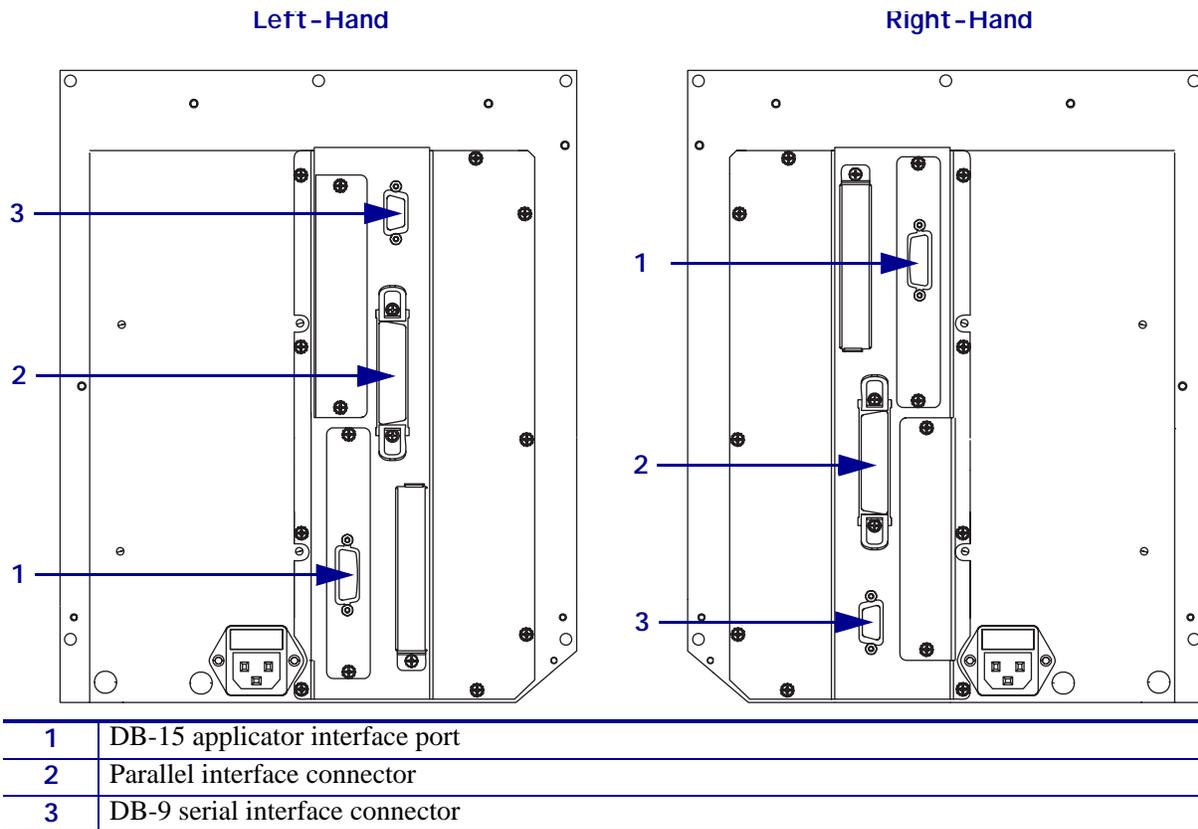


**Note** • You must supply all interface cables for your application. Refer to *Data Cable Requirements* on page 26 for specific cable requirements.

### Connector Locations

Refer to [Figure 13](#). The print engine comes standard with both an Electronics Industries Association (EIA) RS-232 serial interface (DB-9 connector) and an IEEE 1284 bidirectional parallel interface. You may use either of these interface methods to send commands and label formats from a host to the print engine.

**Figure 13 • Cable Connections**



## Types of Connections

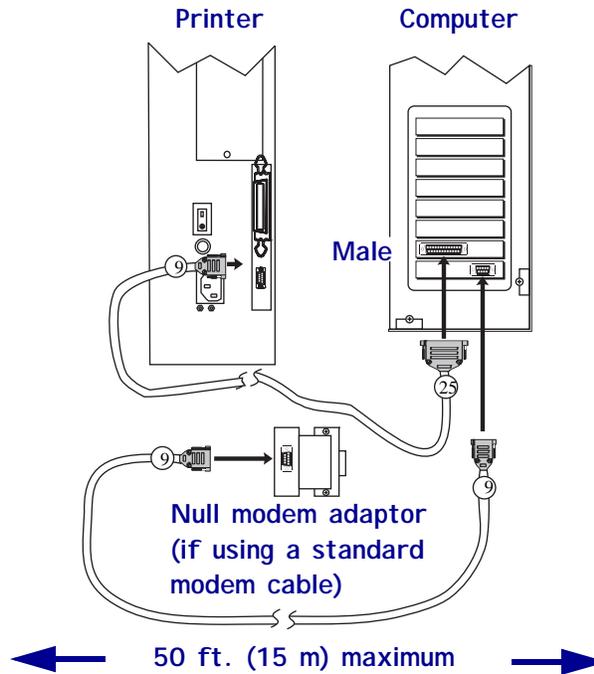
The method of connecting the print engine to a data source depends on the communication options installed in the print engine and the host. This section provides basic information about common interfaces.

When communicating via the serial data port (RS-232), the baud rate, number of data and stop bits, the parity, and the XON/XOFF or DTR control should be set to match those of the host computer. See [Table 6, Print Engine Parameters on page 55](#) to configure these parameters. When communicating via the parallel port, the previously mentioned parameters do not apply.

**RS-232 Serial** A serial communication method consisting of data and control signals; available as a standard feature on most PCs and other hosts.

- *Advantages:* Cables and connectors are readily available from computer equipment stores and suppliers; easy to connect; two-way communication between the host and the print engine.
- *Disadvantages:* Slower than the parallel connection; limited to 50 feet (15.24 m) of cable.

**Figure 14 • Communicating Using a Serial Data Port**

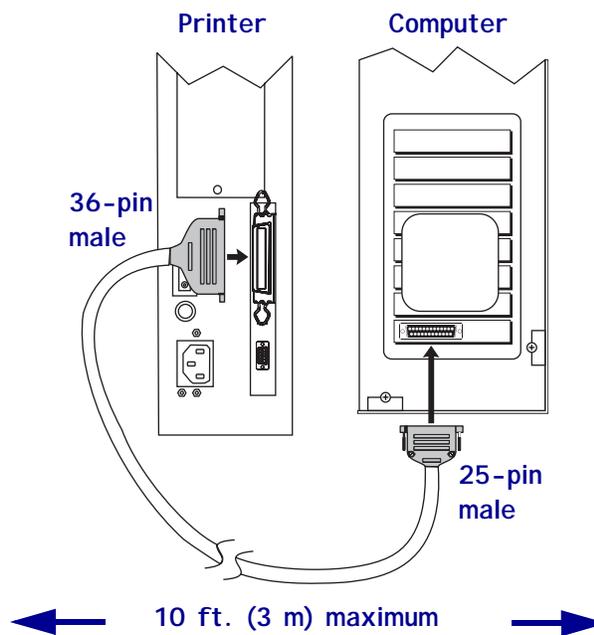


1	Null-modem adaptor (if using a standard modem cable)
2	9-pin male connector, connected to print engine or null-modem adaptor
3	25-pin female connector, connected to computer
4	9-pin female connector, connected to computer
5	Maximum cable length = 50 ft. (15 m)

**IEEE 1284 Bidirectional Parallel** A common communication method available on most PCs and other hosts.

- *Advantages:* Fastest of the communication interfaces; cables and connectors are readily available from computer equipment stores and suppliers; two-way communication between the host and the print engine; easy to connect.
- *Disadvantages:* Shorter recommended cable length of 6 feet (1.83 m) with a maximum of length 10 ft (3 m); many computers are equipped with only one parallel port, allowing only one IEEE 1284 bidirectional device to be connected at a time.

**Figure 15 • Communicating Using a Parallel Port**



1	36-pin male connector, attaching to print engine
2	25-pin male connector, attaching to computer
3	Maximum cable length = 10 ft. (3 m)

**DB-15 Applicator Interface Connector** This connection provides communication between the print engine and the associated applicator hardware. In some applications, control signal timing may be a critical element in the performance of the print engine. See [Applicator Interface Connector](#) on page 126.

**Optional Print Servers** Ethernet-based print servers also are available to connect your print engine to a data source. Both wired and wireless options are available.

- With the ZebraNet Wireless Print Server board installed, a wireless PCMCIA card can be used to communicate with a network. For more information on this option, see the *ZebraNet Wireless Print Server User Guide*.
- ZebraNet 10/100 Print Server (10/100 PS). For more information on 10/100 PS, see the *ZebraNet 10/100 Print Server User and Reference Guide*.

## Data Cable Requirements

Data cables must be fully shielded and fitted with metal or metallized connector shells. Shielded cables and connectors are required to prevent radiation and reception of electrical noise.

To minimize electrical noise pickup in the cable:

- Keep data cables as short as possible.
- Do not bundle the data cables tightly with the power cords.
- Do not tie the data cables to power wire conduits.

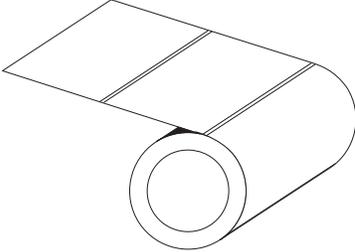
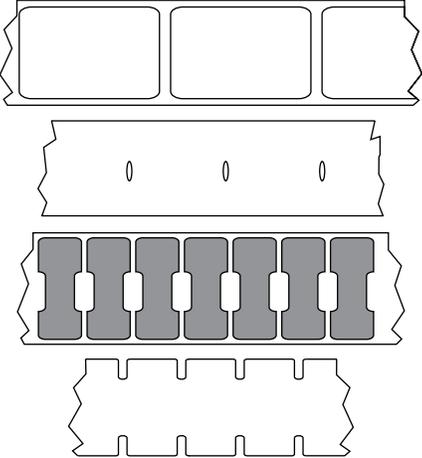
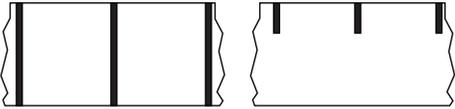


**Note** • Zebra print engines comply with FCC Rules and Regulations, Part 15, Subpart J, for Class A equipment, using fully-shielded 6-foot (2-meter) data cables. Use of longer cables or unshielded cables may increase radiated emissions above the Class A limits.

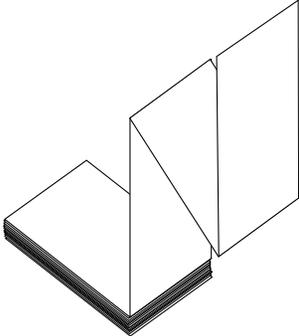
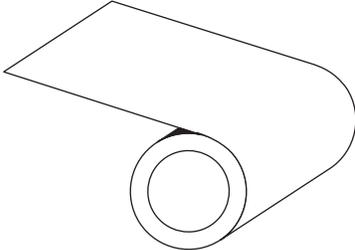
## Types of Media

The print engine can use various types of media (Table 3). Zebra strongly recommends the use of Zebra-brand supplies for continuous high-quality printing. A wide range of paper, polypropylene, polyester, and vinyl stock has been specifically engineered to enhance the printing capabilities of the print engine and to prevent premature printhead wear.

**Table 3 • Types of Media**

Media Type	How It Looks	Description
<p><b>Non-Continuous Roll Media</b></p>		<p>Roll media is wound on a 3-in. (76-mm) core. Labels have adhesive backing that sticks them to a liner, and they are separated by gaps, holes, notches, or black marks. Tags are separated by perforations.</p> <p><b>Figure 16 • Non-Continuous Web Media</b></p>  <p><b>Figure 17 • Black Mark Media</b></p>  <p><b>Figure 18 • Tag Stock</b></p> 

**Table 3 • Types of Media (Continued)**

<b>Media Type</b>	<b>How It Looks</b>	<b>Description</b>
<p><b>Non-Continuous Fanfold Media</b></p>		<p>Fanfold media is folded in a zigzag pattern. Fanfold media can have the same label divisions as non-continuous roll media. The divisions would fall on or near the folds.</p>
<p><b>Continuous Roll Media</b></p>		<p>Continuous media is wound on a core and is without gaps, holes, notches, or black marks. This allows the image to be printed anywhere on the label. With continuous media, use the transmissive sensor so the print engine can detect when the media runs out.</p>

## Ribbon Overview

Ribbon is a thin film that is coated on one side with wax, resin, or wax resin, which is transferred to the media during the thermal transfer process. The media determines whether you need to use ribbon and how wide the ribbon must be.

When ribbon is used, it must be as wide as or wider than the media being used. If the ribbon is narrower than the media, areas of the printhead are unprotected and subject to premature wear.

### When to Use Ribbon

Thermal transfer media requires ribbon for printing while direct thermal media does not. To determine if ribbon must be used with a particular media, perform a media scratch test.

#### To perform a label scratch test, complete these steps:

1. Scratch the print surface of the media rapidly with your fingernail.
2. Did a black mark appear on the media?

If a black mark...	Then the media is...
Does not appear on the media	<b>Thermal transfer.</b> A ribbon is required.
Appears on the media	<b>Direct thermal.</b> No ribbon is required.

### Coated Side of Ribbon

Ribbon can be wound with the coated side on the inside or outside (Figure 19). This print engine can only use ribbon that is coated on the outside. If you are unsure which side of a particular roll of ribbon is coated, perform an adhesive test or a ribbon scratch test to determine which side is coated.

Figure 19 • Ribbon Coated on Outside or Inside



## Adhesive Test

If you have labels available, perform the adhesive test to determine which side of a ribbon is coated. This method works well for ribbon that is already installed.

### To perform an adhesive test, complete these steps:

1. Peel a label from its liner.
2. Press a corner of the sticky side of the label to the outer surface of the roll of ribbon.
3. Peel the label off of the ribbon.
4. Observe the results. Did flakes or particles of ink from the ribbon adhere to the label?

If ink from the ribbon...	Then...
Adhered to the label	The ribbon is coated on the <b>outer</b> surface.
Did not adhere to the label	The ribbon is coated on the <b>inner</b> surface and cannot be used in this print engine. To verify this, repeat the test on the other surface of the roll of ribbon.

## Ribbon Scratch Test

Perform the ribbon scratch test when labels are unavailable.

### To perform a ribbon scratch test, complete these steps:

1. Unroll a short length of ribbon.
2. Place the unrolled section of ribbon on a piece of paper with the outer surface of the ribbon in contact with the paper.
3. Scratch the inner surface of the unrolled ribbon with your fingernail.
4. Lift the ribbon from the paper.
5. Observe the results. Did the ribbon leave a mark on the paper?

If the ribbon...	Then...
Left a mark on the paper	The ribbon is coated on the <b>outer</b> surface.
Did not leave a mark on the paper	The ribbon is coated on the <b>inner</b> surface and cannot be used in this print engine. To verify this, repeat the test on the other surface of the roll of ribbon.



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# Operations

If you have completed the tasks and resolved the issues in *Print Engine Setup* on page 13, follow the instructions in this chapter to load and calibrate your print engine.

## Contents

Load Media .....	32
Load Ribbon .....	39
Remove Used Ribbon .....	44
Calibrate the Print Engine .....	45
Adjust Ribbon and Media Sensors .....	47
Ribbon Sensor .....	47
Reflective Media Sensor .....	47
Transmissive Media Sensor .....	47

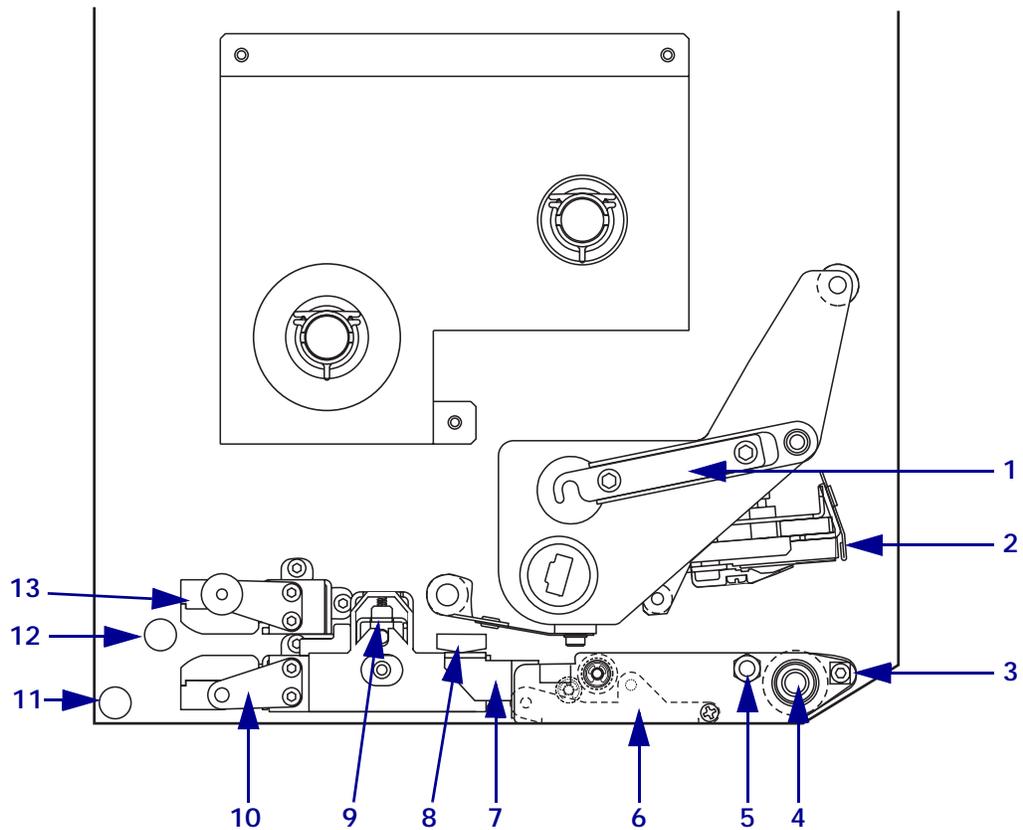
## Load Media



**Important** • If the print engine power is Off (O), rollers in the print engine can turn if you pull on the media. This could cause loaded ribbon to become slack and possibly wrap around the auxiliary roller. If you load or unload media with the power off, inspect the auxiliary roller to make sure that no ribbon is wrapped around it before turning On (I) the power.

Figure 20 identifies the media-handling components. Figure 21 on page 33 shows the print engine with media loaded.

**Figure 20 • Components for Media Loading**

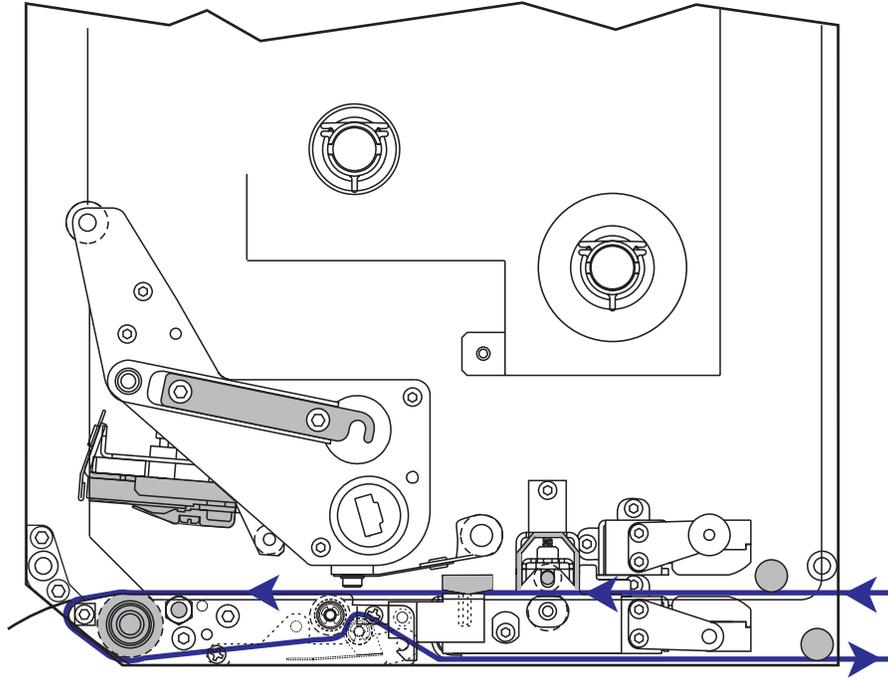


1	Printhead latch
2	Printhead assembly
3	Peel bar
4	Platen roller
5	Printhead locking pin
6	Peel roller assembly
7	Peel roller latch

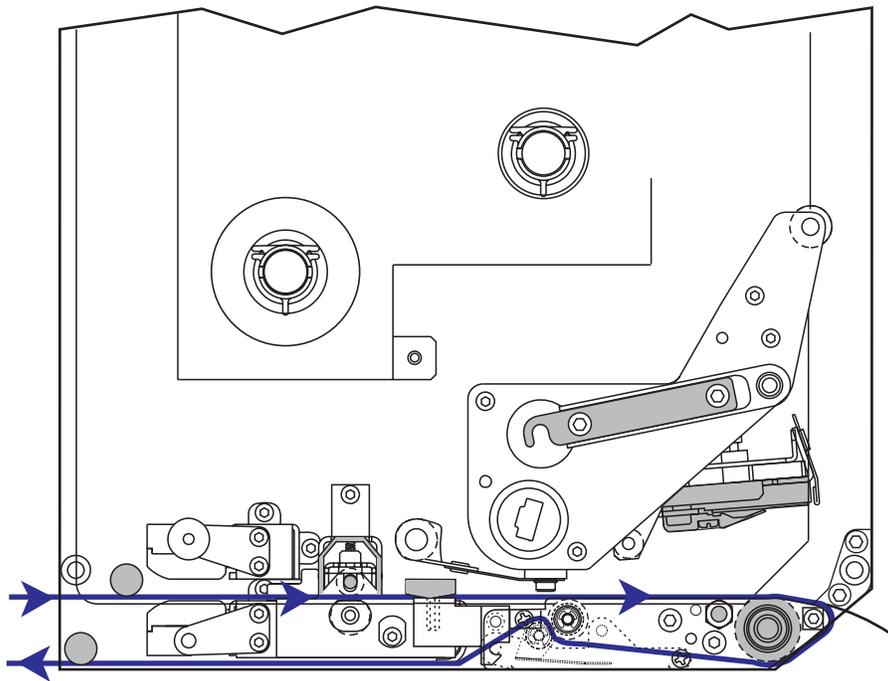
8	Outer media guide
9	Pinch roller assembly
10	Label guide shelf assembly
11	Lower guide post
12	Upper guide post
13	Top media sensor track assembly

Figure 21 • Loaded Media

Left-Hand

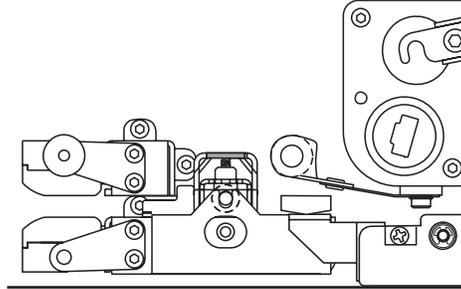


Right-Hand

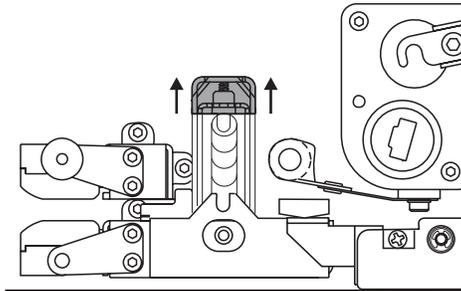


**To load media, complete these steps:**

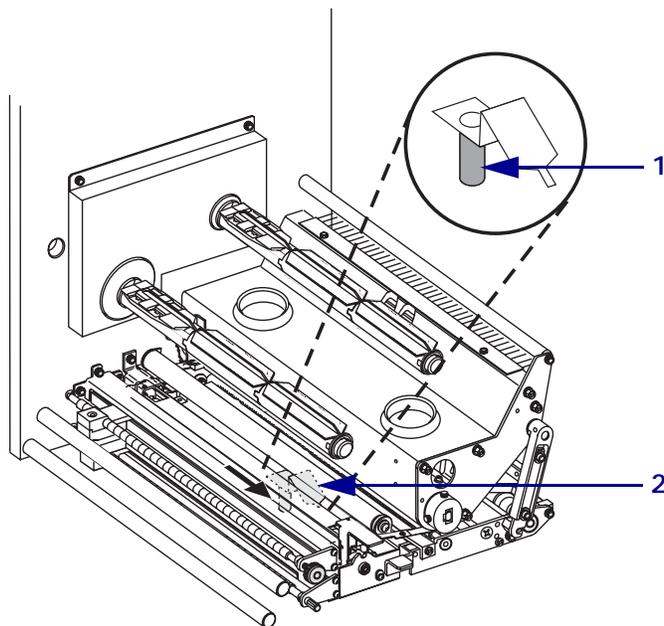
1. Load media on the media supply reel of the applicator (refer to the applicator's user guide).
2. Open the media door.
3. Press down on the pinch roller release latch.



The pinch roller assembly springs up.



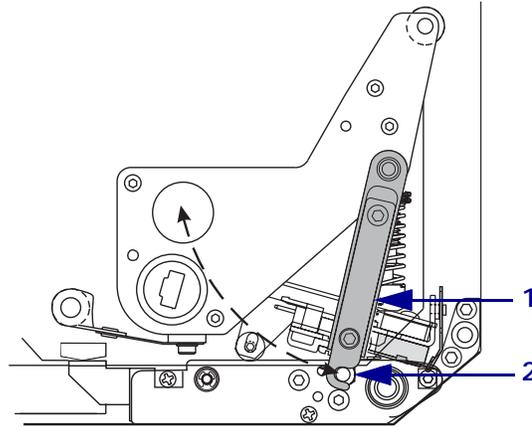
4. Under the print engine, grasp the brass thumb nut (1) of the outer media guide (2), and slide the outer media guide all the way out.





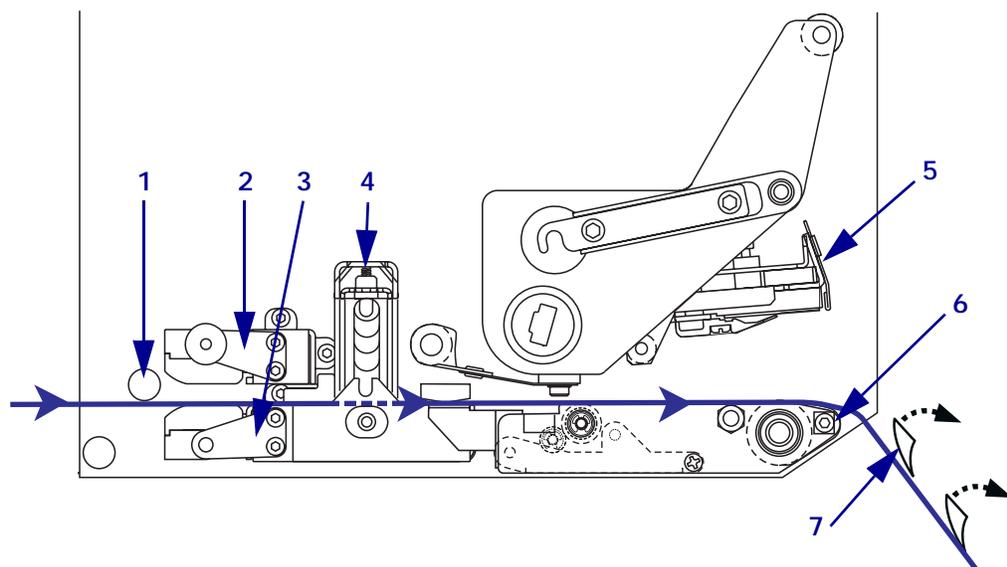
5. **Caution** • The printhead may be hot and could cause severe burns. Allow the printhead to cool.

Open the printhead assembly by unlatching the printhead latch (1) from the locking pin (2).

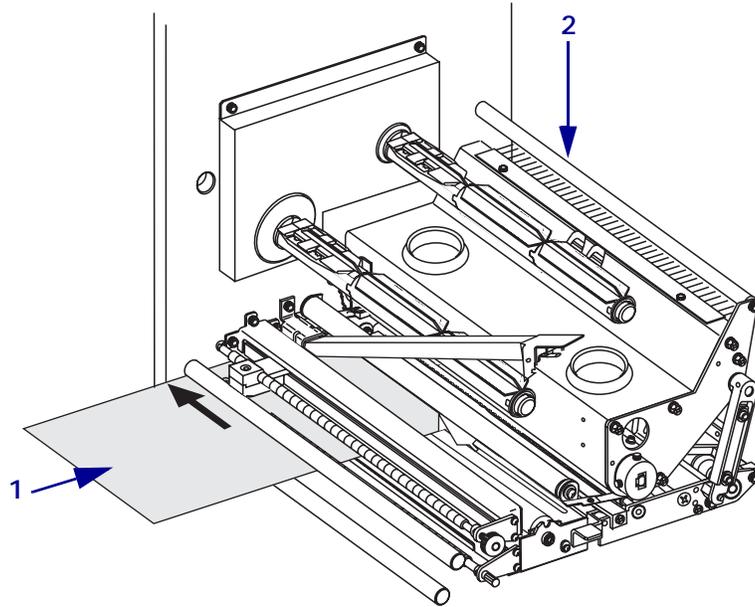


6. See [Figure 22](#). Thread the media through the upper media path as follows:
  - a. Under the upper guide post (1)
  - b. Between the top media sensor track assembly (2) and the label guide shelf assembly (3)
  - c. Below the pinch roller assembly (4)
  - d. Under the printhead assembly (5)
7. See [Figure 22](#). Extend approximately 30 in. (75 cm) of media past the peel bar (6). Remove and discard the labels from the liner (7).

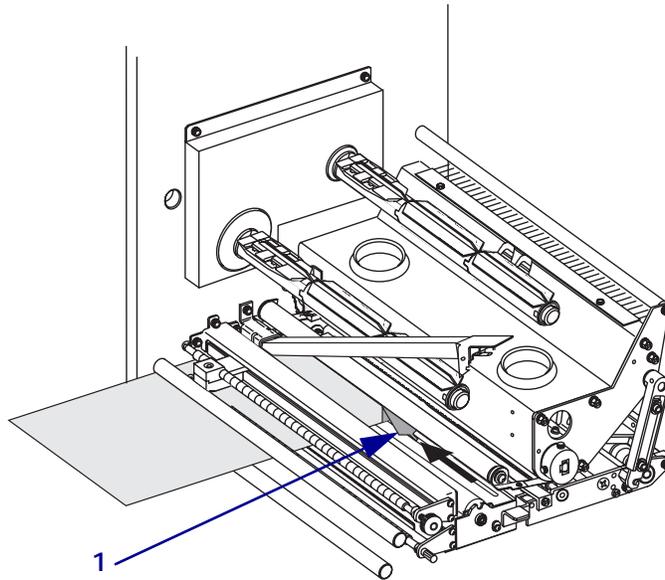
**Figure 22 • Threading the Media**



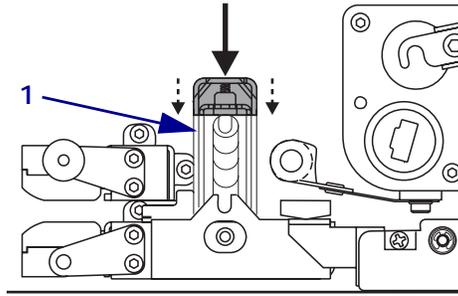
8. Position the media (1) so that it is aligned with and just touching the inner media guide (2—not visible from this angle).



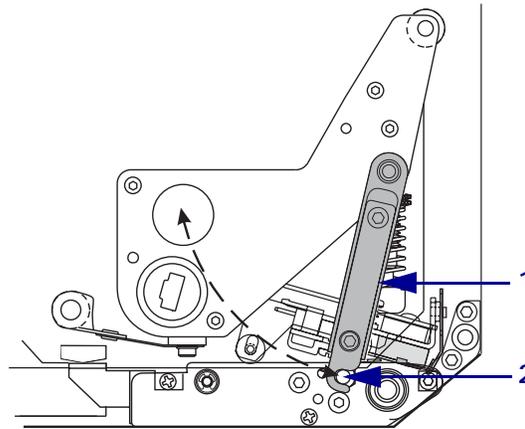
9. Under the print engine, grasp the brass thumb nut of the outer media guide (1), and position the outer media guide so that it just touches the outer edge of the media.



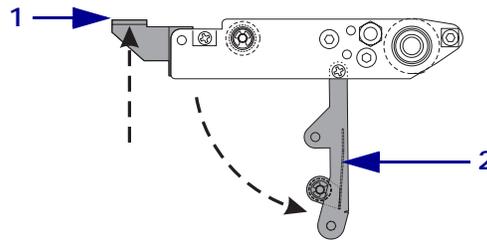
10. Press down on the pinch roller assembly (1) until it locks closed.



11. Close the printhead assembly by rotating the printhead latch (1) until it latches onto the locking pin (2).



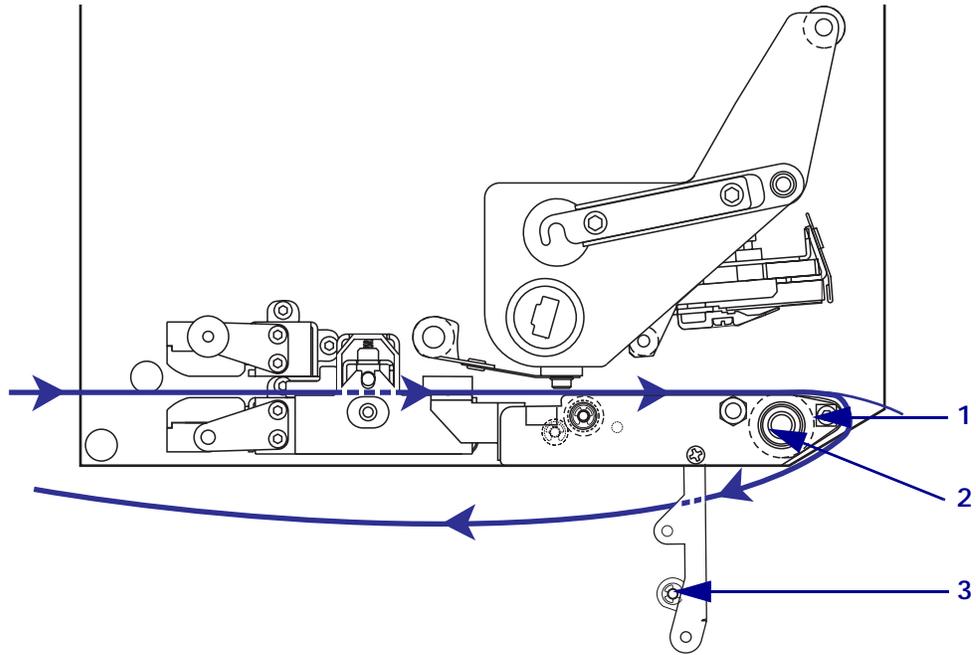
12. Raise the peel roller latch (1) so that the peel roller assembly (2) pivots downward.



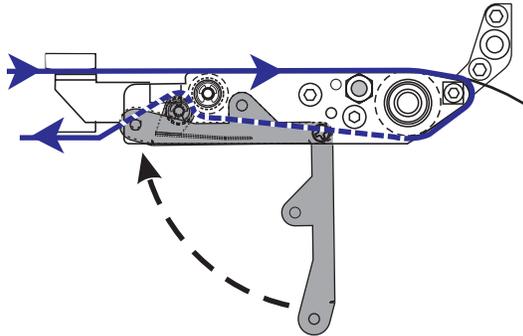
13. Thread the liner around the peel bar (1), under the platen roller (2), and through the peel roller assembly (3).



**Note** • If the applicator has an air tube, route the liner between the air tube and the peel bar. Do not thread the liner over the air tube.



14. Rotate the peel roller assembly up until it locks into the closed position.



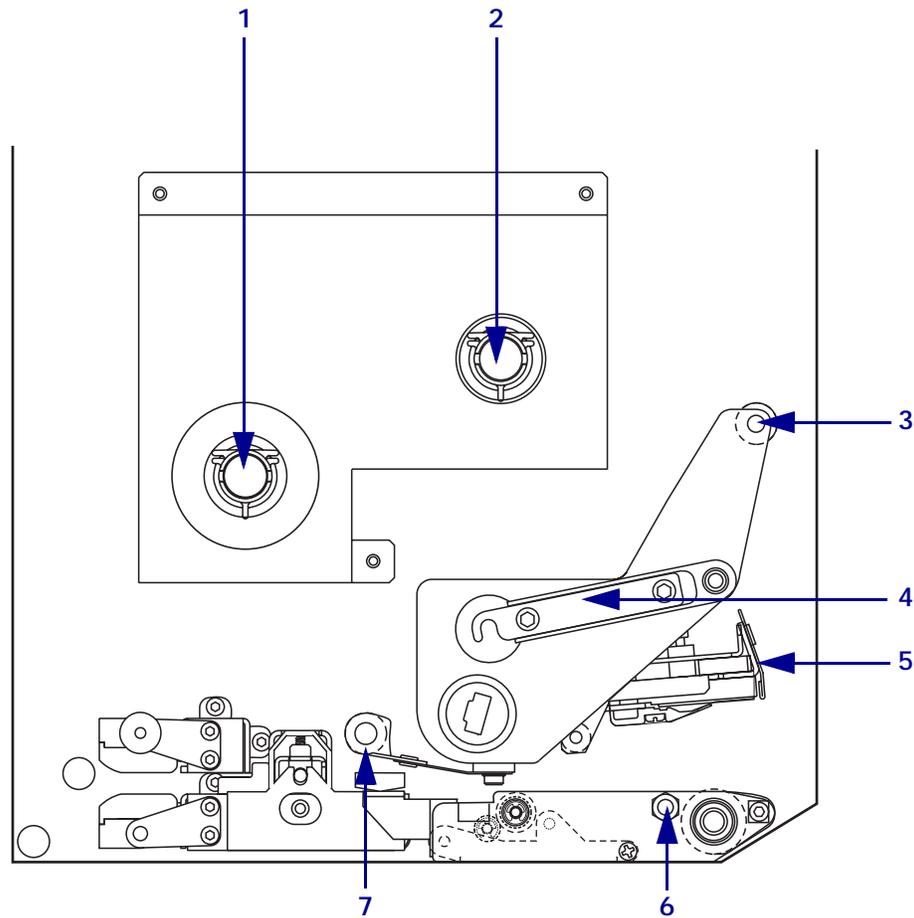
15. Thread the liner around the take-up spindle of the applicator (refer to the applicator's user guide).
16. Close the media door.

## Load Ribbon

Use ribbon with thermal transfer media. The ribbon must be coated on the outside and wider than the media. If the ribbon is narrower than the media, areas of the printhead are unprotected and subject to premature wear.

Figure 23 identifies the ribbon system components inside the media compartment of a right-hand print engine. Figure 24 on page 40 shows the print engine with ribbon loaded.

**Figure 23 • Components for Ribbon Loading**

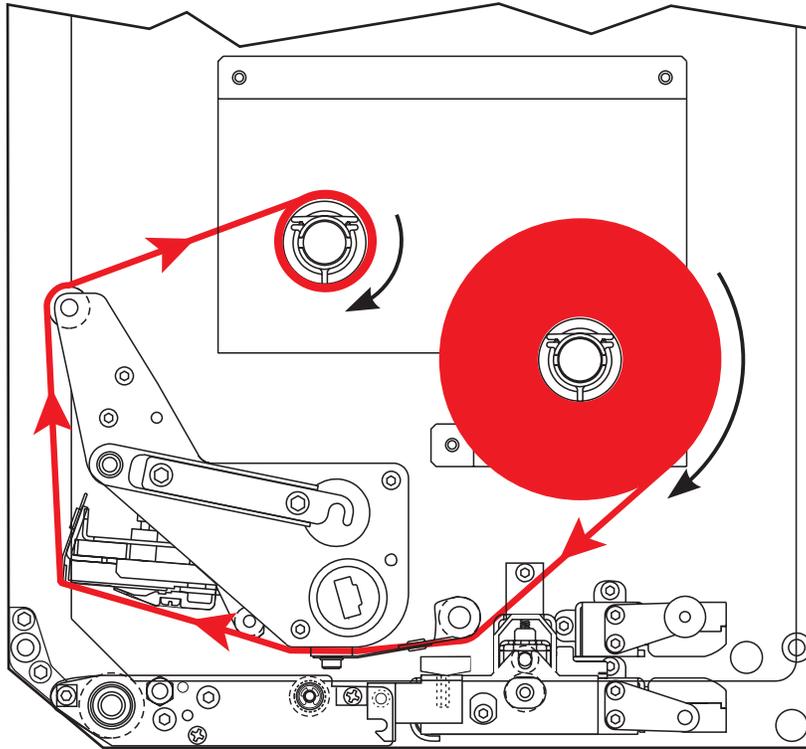


1	Ribbon supply spindle
2	Ribbon take-up spindle
3	Upper ribbon guide roller
4	Printhead latch

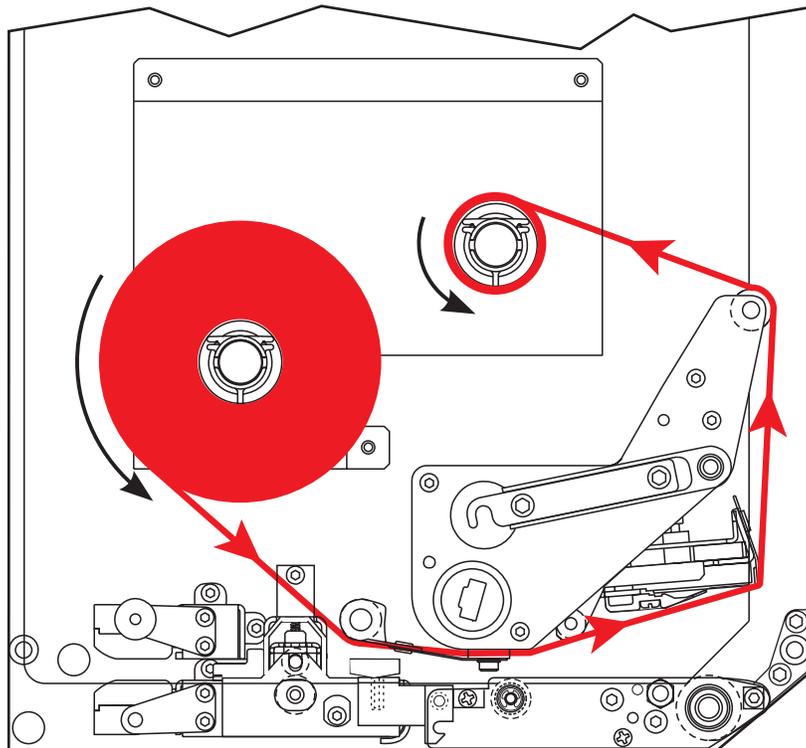
5	Printhead assembly
6	Locking pin
7	Lower ribbon guide roller

Figure 24 • Loaded Ribbon

Left-Hand

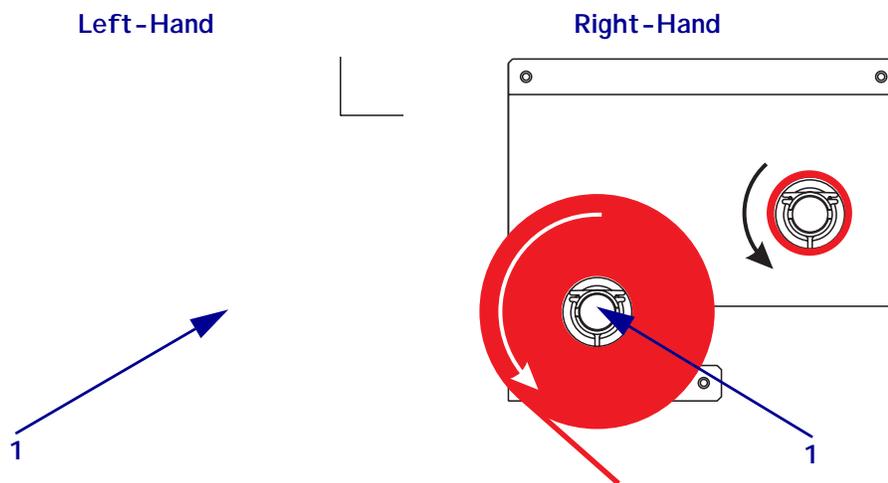


Right-Hand

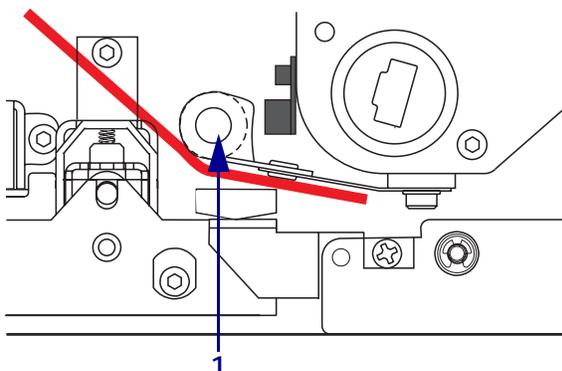


**To load ribbon, complete these steps:**

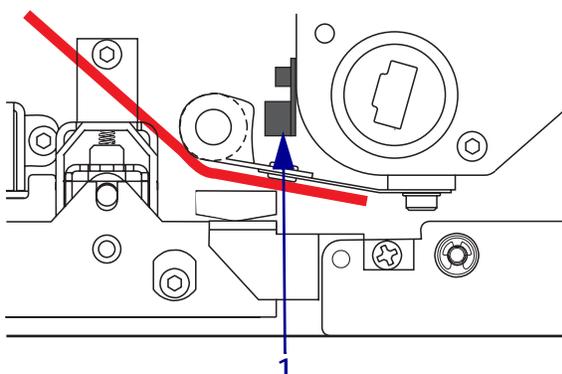
1. Place a full ribbon roll onto the ribbon supply spindle (1) so the ribbon rotates as shown, and then push the roll toward the print engine frame until it is fully seated.



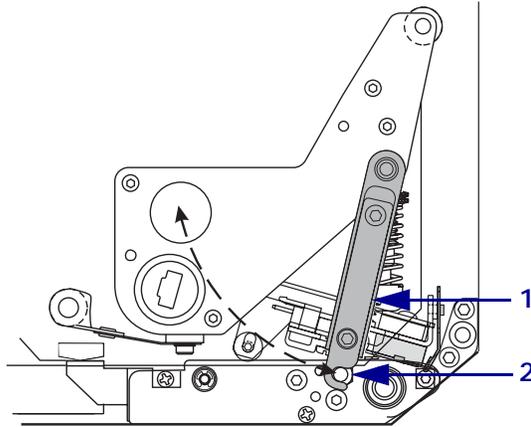
2. Thread the ribbon under the lower ribbon guide roller (1).



3. Make sure that the ribbon passes directly below the ribbon sensor (1), which is located near the back wall of the print engine.

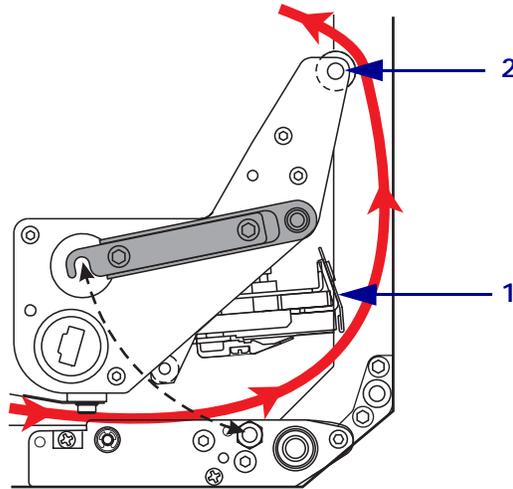


4. Open the printhead assembly by unlatching the printhead latch (1) from the locking pin (2).

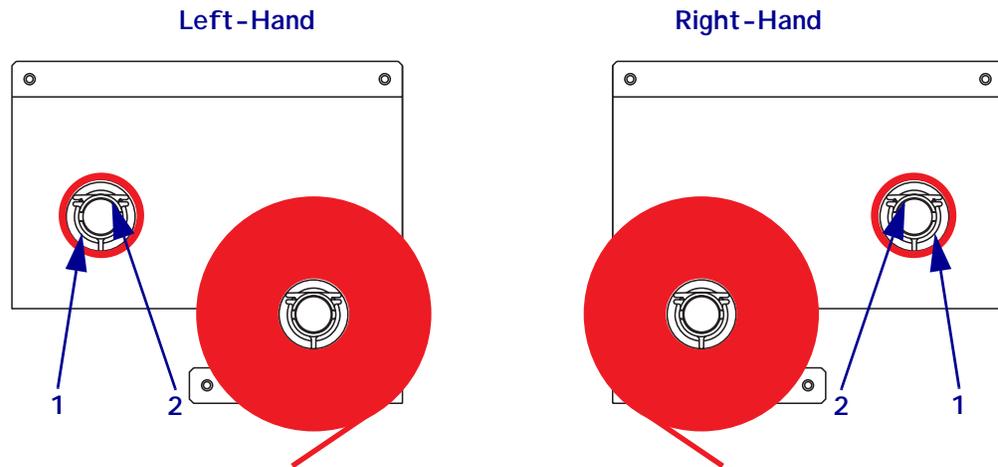


5. **Caution** • The printhead may be hot and could cause severe burns. Allow the printhead to cool.

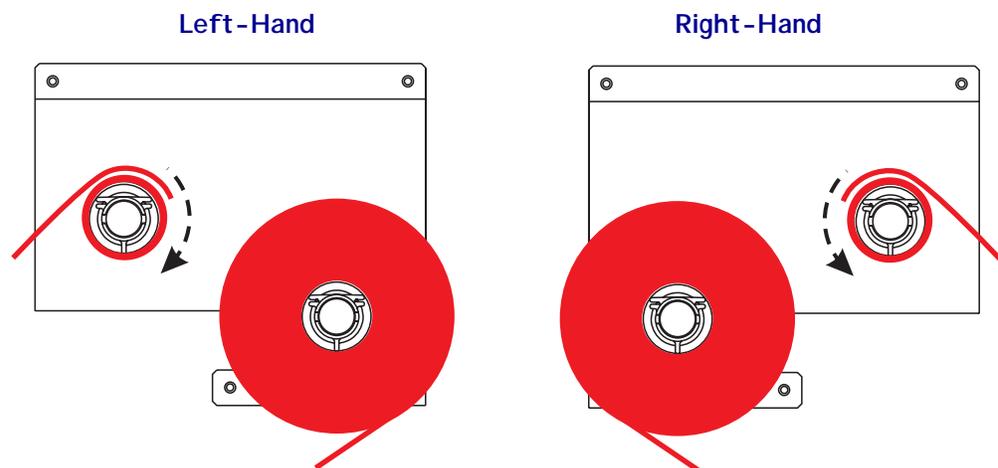
Thread the ribbon under the printhead assembly (1) and then around the upper ribbon guide roller (2).



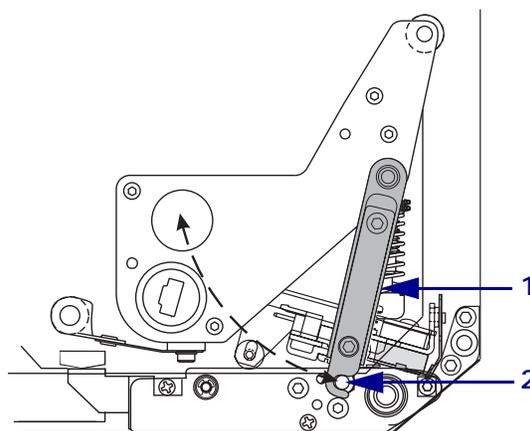
- Place an empty ribbon core (1) onto the ribbon take-up spindle (2), and then push the core toward the print engine frame until it is fully seated.



- Attach the end of the ribbon to the empty ribbon core with adhesive tape or a label, and wind for several turns in the direction shown. Wind the ribbon evenly on the spindle.



- Close the printhead assembly by rotating the printhead latch (1) until it latches onto the locking pin (2).



- Close the media door.

## Remove Used Ribbon

To remove used ribbon, complete these steps:

1. Open the media door.
2. Examine the ribbon. Did the ribbon run out?

If...	Then...
<b>Yes</b>	<ol style="list-style-type: none"><li>a. Remove the empty core from the ribbon supply spindle. Save the core to use on the ribbon take-up spindle when you load ribbon.</li><li>b. Remove the used ribbon and core from the ribbon take-up spindle.</li><li>c. Install new ribbon following the instructions in <a href="#">Load Ribbon on page 39</a>.</li></ol>
<b>No</b>	<ol style="list-style-type: none"><li>a. Cut the ribbon near the ribbon take-up spindle.</li><li>b. Remove the used ribbon and core from the ribbon take-up spindle.</li><li>c. Locate an empty ribbon core. If necessary, remove and discard the used ribbon from the core removed in the previous step.</li><li>d. Place the empty ribbon core onto the ribbon take-up spindle, and push the core toward the print engine frame until it is fully seated.</li><li>e. Thread the remaining ribbon on the ribbon supply spindle following the instructions in <a href="#">Load Ribbon on page 39</a>.</li></ol>

## Calibrate the Print Engine

Calibrate the print engine when it is first put into service. Calibration allows the print engine to establish the proper settings for the specific media and ribbon used in your application. You may calibrate the print engine at other times as needed. [Table 4](#) shows the different methods for calibration.

**Table 4 • Types of Calibration**

Type of Calibration	Description	When/How It Occurs
<b>Auto-calibration</b>	The print engine automatically sets the value it detects for the spaces between labels.	Occurs at the following times: <ul style="list-style-type: none"> <li>• When the print engine is first turned on if CALIBRATION is selected for MEDIA POWER UP (see <a href="#">Select Media Power-Up Option on page 73</a>)</li> <li>• When the print engine feeds media after the printhead is closed if CALIBRATION is selected for HEAD CLOSE (see <a href="#">Select Head Close Option on page 74</a>).</li> <li>• As part of both the sensor profile and media and ribbon sensor calibration procedures.</li> </ul>
<b>Long (Standard) Calibration</b>	The print engine does the following: <ul style="list-style-type: none"> <li>• feeds media and ribbon</li> <li>• sets the values it detects for media length, media type (continuous or non-continuous), and print mode (thermal transfer or direct thermal)</li> <li>• updates the sensor values</li> </ul>	To perform a long calibration, do one of the following: <ul style="list-style-type: none"> <li>• Press PAUSE on the control panel to pause the print engine, and then press CALIBRATE.</li> <li>• Select CALIBRATION for the MEDIA POWER UP or HEAD CLOSE parameter (see <a href="#">Select Media Power-Up Option on page 73</a> or <a href="#">Select Head Close Option on page 74</a>).</li> </ul>
<b>Short Calibration</b>	The print engine calibrates using the current sensor values rather than detecting the spaces between labels and resetting the sensors. This calibration sequence uses fewer labels than the long calibration sequence, but it is less reliable because the values that are stored in the sensors could be incorrect.	Select SHORT CAL for the MEDIA POWER UP or HEAD CLOSE parameter (see <a href="#">Select Media Power-Up Option on page 73</a> or <a href="#">Select Head Close Option on page 74</a> ).

**Table 4 • Types of Calibration (Continued)**

<b>Type of Calibration</b>	<b>Description</b>	<b>When/How It Occurs</b>
<b>Sensor Profile Calibration</b>	The print engine auto-calibrates and prints a media sensor profile.	Select the SENSOR PROFILE option on the control panel. See <i>Print Sensor Profile on page 67</i> for instructions.
<b>Media and Ribbon Sensor Sensitivity Calibration</b>	One of the most common adjustments to print engine settings. The print engine resets the sensitivity of the sensors to detect correctly the media and ribbon that you are using. If you change the type of ribbon and/or media, you might need to reset the sensitivity of the media and ribbon sensors. When the sensors are at their new sensitivity, the print engine performs an auto-calibration.	Select the MEDIA AND RIBBON CALIBRATE option on the control panel. See <i>Calibrate Media and Ribbon Sensor Sensitivity on page 68</i> for instructions.

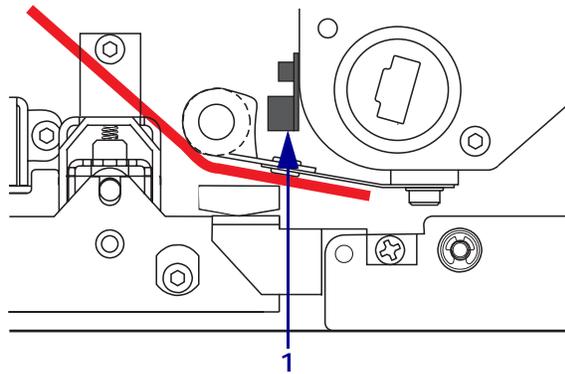
## Adjust Ribbon and Media Sensors

This section describes how to adjust the sensors.

### Ribbon Sensor

The ribbon sensor ([Figure 25](#)) is mounted in a fixed position, and no adjustment is required.

**Figure 25 • Ribbon Sensor Location**



1	Ribbon sensor
---	---------------

### Reflective Media Sensor

Some types of media have black marks printed on the underside of the media liner, which act as “start of label” indicators. The reflective media sensor senses these black marks. The position of this sensor is not adjustable. If you use this type of media, refer to [Media Specifications on page 139](#) for information about black mark requirements.

### Transmissive Media Sensor

The transmissive media sensor finds “start of label” indicators, such as notches or holes in the media or interlabel gaps. This sensor consists of a light source (positioned below the media) and a light sensor (positioned above the media).

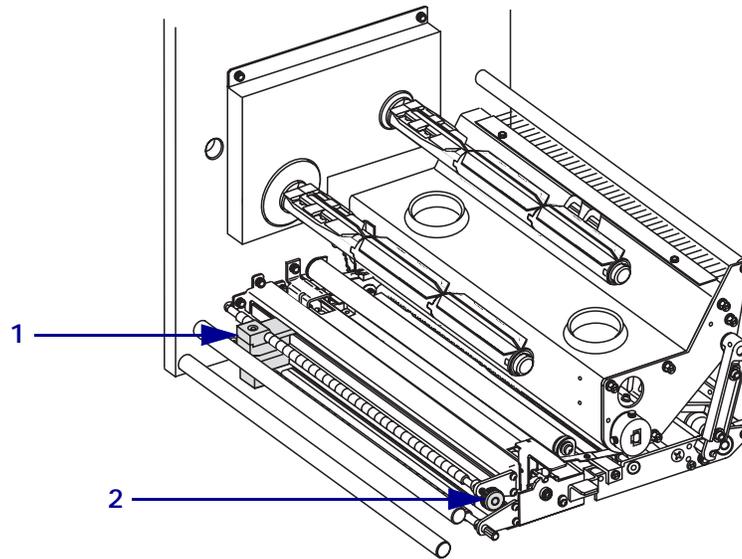
#### To position the sensor, complete these steps:

1. Refer to [Figure 26](#). Turn the adjustment knob on the media guide shelf assembly to move the media sensor.

2. How does the current media indicate the start of labels?

If the media...	Then...
<b>Has notches or holes between labels</b>	Align the sensor with the notch or hole in the media.
<b>Uses interlabel gaps</b>	Position the sensor approximately at the center of the media width.

**Figure 26 • Media Sensor Adjustment (Right-Hand Unit Shown)**



1	Transmissive media sensor
2	Adjustment knob



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# Configuration

This section describes the control panel parameters that are used to configure the print engine for operation.

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## Setup Mode

After you have installed the media and ribbon and the Power-On Self Test (POST) is complete, the control panel displays **PRINTER READY**. You may now set print engine parameters for your application using the control panel display and the buttons directly below it. If it becomes necessary to restore the initial print engine defaults, see [PAUSE Self Test on page 110](#) and [FEED Self Test on page 111](#).



**Important** • Certain printing conditions may require that you adjust printing parameters, such as print speed, darkness, or print mode. These conditions include (but are not limited to):

- printing at high speeds
- peeling the media
- the use of extremely thin, small, synthetic, or coated labels

Because these and other factors affect print quality, run tests to determine the best combination of print engine settings and media for your application. A poor match may limit print quality or print rate, or the print engine may not function properly in the desired print mode.



**Note** • If the print engine is operating on an IP network, you can change the print engine's parameters in these additional ways:

- with ZebraLink™ WebView (ZebraNet® 10/100 PrintServer or ZebraNet Wireless Print Server required). For information, see the appropriate print server user guide.
- with the SetWLAN configuration utility (ZebraNet Wireless Print Server required). For information, see the *ZebraNet Wireless Print Server User Guide*.

## Enter Setup Mode

**To enter Setup Mode, complete these steps:**

1. Press SETUP/EXIT.
2. Press NEXT or PREVIOUS to scroll through the parameters.

## Exit Setup Mode

To leave Setup mode, complete these steps:

1. Press SETUP/EXIT.  
The LCD displays **SAVE CHANGES**.
2. Press the left or right oval to display the save options (Table 5).

**Table 5 • Save Options When Leaving Setup Mode**

LCD	Description
PERMANENT	Stores values in the print engine even when power is turned off.
TEMPORARY	Saves the changes until power is turned off.
CANCEL	Cancels all changes made since you entered Setup mode, except for changes made to the darkness and tear-off settings, which go into effect as soon as they are made.
LOAD DEFAULTS	Restores all parameters other than the network settings back to the factory defaults. Use care when loading defaults because you will need to reload all settings that you changed manually.  <b>Note</b> • Loading factory defaults causes the print engine to auto-calibrate.
LOAD LAST SAVE	Loads values from the last permanent save.
DEFAULT NET	Restores the wired and wireless network settings back to factory defaults.

3. Press NEXT to select the displayed choice.  
When the configuration and calibration sequence is done, **PRINTER READY** displays.

## Change Password-Protected Parameters

Certain parameters, including the communication parameters, are password-protected by factory default.

---

**Caution** • Do not change password-protected parameters unless you have a complete understanding of the parameters' functions. If the parameters are set incorrectly, the print engine may function unpredictably.

---

The first time that you attempt to change a password-protected parameter, the print engine displays **ENTER PASSWORD**. Before you can change the parameter, you must enter the four-digit numeric password. After you have entered the password correctly, you do not have to enter it again unless you leave Setup mode by pressing **SETUP/EXIT** or by turning Off (**O**) the print engine.

### To enter a password for a password-protected parameter, complete these steps:

1. At the password prompt, use the left oval to change the selected digit position.
2. When you have selected the digit that you wish to change, use the right oval to increase the selected digit value. Repeat these two steps for each digit of the password.
3. After entering the password, press **NEXT**.

The parameter you selected to change is displayed. If the password was entered correctly, you can change the value.

## Default Password Value

The default password value is **1234**. The password can be changed using the **^KP** (Define Password) ZPL II instruction or through ZebraLink™ WebView (ZebraNet® PrintServer II, 10/100 Print Server, or Wireless Print Server required).

## Disable the Password Protection Feature

You can disable the password protection feature so that it no longer prompts you for a password by setting the password to **0000** via the **^KP ZPL/ZPL II** command. To re-enable the password-protection feature, send the ZPL/ZPL II command **^KPx**, where **x** can be any number from 1 to 9999.

## Print a Configuration Label

A configuration label lists the print engine settings that are stored in configuration memory. After you load the media and ribbon (if necessary), print a configuration label as a record of your print engine's current settings. Keep the label to use when troubleshooting printing problems.

### To print a configuration label, complete these steps:

1. On the control panel, press SETUP/EXIT.
2. Press NEXT or PREVIOUS to scroll through the parameters until you reach **LIST SETUP**.
3. Press the right oval to confirm printing.  
 A configuration label prints (Figure 27).

Figure 27 • Configuration Label



## Print a Network Configuration Label

If you are using a print server, you can print a network configuration label after the print engine is connected to the network.

### To print a network configuration label, complete these steps:

1. On the control panel, press SETUP/EXIT.
2. Press NEXT or PREVIOUS to scroll through the parameters until you reach **LIST NETWORK**.
3. Press the right oval to confirm printing.

A network configuration label prints (Figure 28). An asterisk designates whether the wired or wireless print server is active. If no wireless print server is installed, the wireless portion of the label does not print.

Figure 28 • Network Configuration Label (With a Wireless Print Server Installed)

Network Configuration	
Zebra Technologies PRINTER MODEL XXXdpi USER-DEFINED TEXT	
NO.....	WIRED PS CHECK?
Printer.....	LOAD LAN FROM?
Wired	
ALL.....	IP PROTOCOL
000.000.000.000.....	IP ADDRESS
000.000.000.000.....	SUBNET MASK
000.000.000.000.....	DEFAULT GATEWAY
000.000.000.000.....	WINS SERVER IP
YES.....	TIMEOUT CHECKING
0300.....	TIMEOUT VALUE
0000.....	ARP INTERVAL
9100.....	BASE RAW PORT
Wireless*	
ALL.....	IP PROTOCOL
010.003.015.089.....	IP ADDRESS
255.255.255.000.....	SUBNET MASK
010.003.015.001.....	DEFAULT GATEWAY
010.003.001.015.....	WINS SERVER IP
YES.....	TIMEOUT CHECKING
0300.....	TIMEOUT VALUE
0000.....	ARP INTERVAL
9100.....	BASE RAW PORT
YES.....	CARD INSERTED
015FH.....	CARD MFG ID
000AH.....	CARD PRODUCT ID
000e83df3bc7.....	MAC ADDRESS
YES.....	DRIVER INSTALLED
INFRASTRUCTURE.....	OPERATING MODE
vh-CTC-PRD.....	ESSID
100.....	TX POWER
0N.....	1 Mb/s
0N.....	2 Mb/s
0N.....	5.5 Mb/s
0N.....	11 Mb/s
11 Mb/s.....	CURRENT TX RATE
DIVERSITY.....	RECEIVE ANTENNA
DIVERSITY.....	XMIT ANTENNA
OPEN.....	AUTH. TYPE
OFF.....	LEAP MODE
128-bit.....	ENCRYPTION MODE
1.....	ENCRYPT. INDEX
020.....	POOR SIGNAL
LONG.....	PREAMBLE
YES.....	ASSOCIATED

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## Control Panel LCD Displays

Use the LCD display on the control panel to adjust print engine settings. [Table 6](#) shows parameters in the order in which they are displayed when you press NEXT after entering Setup mode. [Table 8 on page 81](#) shows the additional parameters that appear when a wired or wireless print server is installed in the print engine.

While viewing parameters, press NEXT to continue to the next parameter, or press PREVIOUS to return to the previous parameter in the cycle. When a parameter is changed, an asterisk (\*) appears in the upper left corner of the display to indicate that the value is different from the one currently active in the print engine.

**Table 6 • Print Engine Parameters (Page 1 of 26)**

Parameter	Action/Explanation
	<p><b>Adjust Print Darkness</b></p> <p>Darkness (burn duration) settings depend on a variety of factors, including ribbon type, media type, and the condition of the printhead. You may adjust the darkness for consistent high-quality printing.</p> <p> <b>Important</b> • Set the darkness to the lowest setting that provides good print quality. If the darkness is set too high, the ink may smear, the ribbon may burn through, or the printhead may wear prematurely.</p> <p>If printing is too light or if there are voids in printed areas, increase the darkness. If printing is too dark or if there is spreading or bleeding of printed areas, decrease the darkness.</p> <p>The <a href="#">FEED Self Test on page 111</a> can be used to determine the best darkness setting. You may want to adjust darkness while performing the <a href="#">PAUSE Self Test on page 110</a>. Because the darkness setting takes effect immediately, you can see the results on labels that are currently printing. Darkness settings also may be changed by the driver or software settings.</p> <p><b>Default:</b> +04.0</p> <p><b>Range:</b> 00.0 to +30.0</p> <p><b>To change the value shown:</b></p> <ol style="list-style-type: none"> <li>1. Press the right oval to increase darkness.</li> <li>2. Press the left oval to decrease darkness.</li> </ol>
	<p><b>Adjust Print Speed</b></p> <p>Adjusts the speed for printing a label (given in inches per second). Slower print speeds typically yield better print quality. Print speed changes take effect upon exiting Setup mode.</p> <p><b>Default:</b> 2 IPS</p> <p><b>Range:</b> 2 to 12 IPS for 203 dpi, 2 to 8 IPS for 300 dpi</p> <p><b>To change the value shown:</b></p> <ol style="list-style-type: none"> <li>1. Press the right oval to increase the value.</li> <li>2. Press the left oval to decrease the value.</li> </ol>

Table 6 • Print Engine Parameters (Page 2 of 26)

Parameter	Action/Explanation
<div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span>SLEW SPEED</span> <span>6 IPS</span> <span>+</span> </div>	<p><b>Adjust Slew Speed</b> Adjusts the speed for feeding a blank label (given in inches per second). <b>Default:</b> 6 IPS <b>Range:</b> 1 to 12 IPS</p> <p><b>To change the value shown:</b></p> <ol style="list-style-type: none"> <li>1. Press the right oval to increase the value.</li> <li>2. Press the left oval to decrease the value.</li> </ol>
<div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span>BACKFEED SPEED</span> <span>2 IPS</span> <span>+</span> </div>	<p><b>Adjust Backfeed Speed</b> If backfeed is on, adjusts the speed at which the label backs up before printing (given in inches per second). <b>Default:</b> 2 IPS <b>Range:</b> 1 to 12 IPS</p> <p><b>To change the value shown:</b></p> <ol style="list-style-type: none"> <li>1. Press the right oval to increase the value.</li> <li>2. Press the left oval to decrease the value.</li> </ol>

Table 6 • Print Engine Parameters (Page 3 of 26)

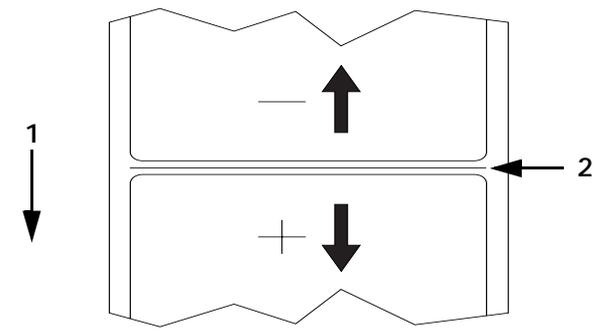
Parameter	Action/Explanation				
<div style="border: 1px solid black; padding: 5px; width: fit-content;">                     TEAR OFF      +000                      - ■■■■■      +                 </div>	<p><b>Adjust the Tear-Off Position</b></p> <p>This parameter establishes the position of the media over the tear-off/peel-off bar after printing.</p> <p>See <a href="#">Figure 29</a>. Higher numbers move the media out (the tear line moves closer to the leading edge of the next label), and lower numbers move the media in (the tear line moves closer to the edge of the label just printed).</p> <div style="text-align: center;"> <p><b>Figure 29 • Tear-Off Position Adjustment</b></p>  <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="width: 20px; text-align: center;">1</td> <td>Media direction</td> </tr> <tr> <td style="width: 20px; text-align: center;">2</td> <td>Factory-set tear line location at position 00</td> </tr> </table> </div> <p><b>Default:</b> +0 <b>Range:</b> -120 to +120</p> <p><b>To change the value shown:</b></p> <ol style="list-style-type: none"> <li>1. Press the right oval to increase the value. Each press adjusts the tear-off position by four dot rows.</li> <li>2. Press the left oval to decrease the value. Each press adjusts the tear-off position by four dot rows.</li> </ol>	1	Media direction	2	Factory-set tear line location at position 00
1	Media direction				
2	Factory-set tear line location at position 00				
<div style="border: 1px solid black; padding: 5px; width: fit-content;">                     PRINT MODE                      -APPLICATOR      +                 </div>	<p><b>Select Print Mode</b></p> <p>Print mode settings tell the print engine the method of media delivery that you wish to use. Make sure that your print engine can support the selected option.</p> <p><b>Default:</b> APPLICATOR <b>Selections:</b> TEAR-OFF, REWIND, APPLICATOR</p> <p><b>To change the value shown:</b></p> <ol style="list-style-type: none"> <li>1. Press the left or right oval to scroll through the options.</li> </ol>				

Table 6 • Print Engine Parameters (Page 4 of 26)

Parameter	Action/Explanation
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <b>MEDIA TYPE</b>                      -NON-CONTINUOUS +                 </div>	<p><b>Set Media Type</b></p> <p>This parameter tells the print engine the type of media that you are using (see <i>Types of Media</i> on page 27 for more information). Selecting continuous media requires that you include a label length instruction in your label format (^LLxxxx if you are using ZPL or ZPL II).</p> <p>When non-continuous media is selected, the print engine feeds media to calculate label length (the distance between two recognized registration points of the inter-label gap, webbing, or alignment notch or hole).</p> <p><b>Default:</b> NON-CONTINUOUS</p> <p><b>Selections:</b> CONTINUOUS, NON-CONTINUOUS</p> <p><b>To change the value shown:</b></p> <ol style="list-style-type: none"> <li>1. Press the left or right oval to toggle between the options.</li> </ol>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <b>PRINT METHOD</b>                      -THERMAL-TRANS. +                 </div>	<p><b>Select Print Method</b></p> <p>The print method parameter tells the print engine the method of printing that you wish to use: direct thermal (no ribbon) or thermal transfer (using thermal transfer media and ribbon).</p> <p><b>Default:</b> THERMAL TRANSFER</p> <p><b>Selections:</b> THERMAL TRANSFER, DIRECT THERMAL</p> <p> <b>Note</b> • Selecting direct thermal when using thermal transfer media and ribbon creates an error condition, but printing continues.</p> <p><b>To change the value shown:</b></p> <ol style="list-style-type: none"> <li>1. Press the left or right oval to toggle between the options.</li> </ol>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <b>PRINT WIDTH</b>                      - 168 0/8 MM +                 </div>	<p><b>Set Print Width</b></p> <p>Determines the printable area across the width of the label given the resolution of the print engine.</p> <p><b>Default:</b> 168 0/8 MM for 203 dpi print engines; 168 0/12 MM for 300 dpi print engines</p> <p> <b>Note</b> • Setting the width too narrow can result in portions of the label not being printed on the media. Setting the width too wide wastes formatting memory and can cause printing off the label and on the platen roller. This setting can affect the horizontal position of the label format if the image was inverted using the ^POI ZPL II command.</p> <p><b>To change the value shown:</b></p> <ol style="list-style-type: none"> <li>1. Press the left oval to move the cursor.</li> <li>2. Press the right oval to increase the value of the digit.</li> </ol> <p><b>To change the unit of measurement:</b></p> <ol style="list-style-type: none"> <li>1. Press the left oval until the unit of measurement is active.</li> <li>2. Press the right oval to toggle to a different unit of measure (mm, inches, or dots).</li> </ol>

Table 6 • Print Engine Parameters (Page 5 of 26)

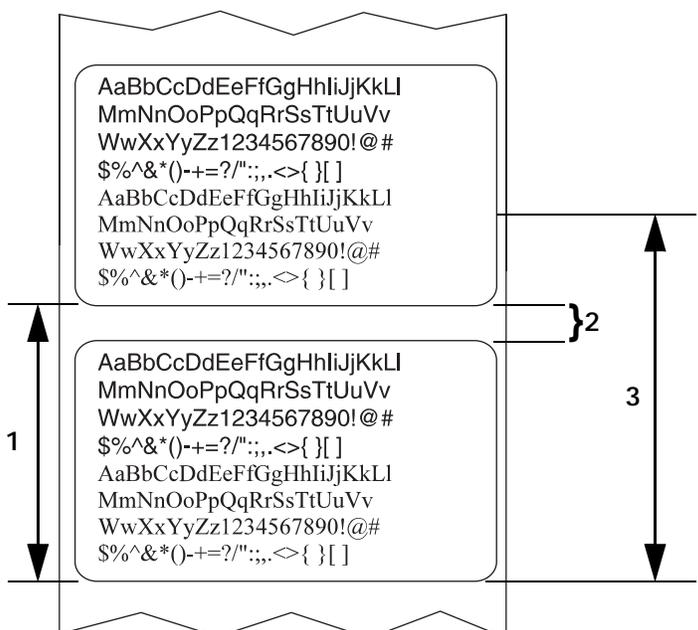
Parameter	Action/Explanation						
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <b>MAXIMUM LENGTH</b>                      -39.0 IN      988 MM                 </div>	<p><b>Set Maximum Label Length</b></p> <p>This parameter is used during the media portion of the calibration process. Always set maximum label length to a value that is at least 1.0 in. (25.4 mm) greater than the actual label length (Figure 30). If the value is set to a smaller value than the label length, the print engine assumes that continuous media is loaded, and the print engine cannot calibrate.</p> <p>For example, if the label length is 5.0 inches (126 mm) including the interlabel gap, set the parameter for 6.0 inches (152 mm). If the label length is 7.5 inches (190 mm), set the parameter for 9.0 inches (229 mm).</p> <div style="text-align: center; margin: 20px 0;"> <p><b>Figure 30 • Label Length</b></p>  <p>The diagram shows two identical labels stacked vertically. Each label contains the following text: AaBbCcDdEeFfGgHhIiJjKkLl, MmNnOoPpQqRrSsTtUuVv, WwXxYyZz1234567890!@#, \$%^&amp;*()-+=?/!";,.&lt;&gt;{ }[ ] and repeats. Dimension 1 is a vertical arrow on the left indicating the total height of both labels including the gap between them. Dimension 2 is a horizontal arrow on the right between the two labels, indicating the gap. Dimension 3 is a vertical arrow on the right of the top label, indicating the height of a single label.</p> </div> <table border="1" style="margin: 20px auto; width: 80%; border-collapse: collapse;"> <tr> <td style="text-align: center; width: 30px;">1</td> <td>Label length (including interlabel gap)</td> </tr> <tr> <td style="text-align: center;">2</td> <td>Interlabel gap</td> </tr> <tr> <td style="text-align: center;">3</td> <td>Set maximum label length to approximately this value</td> </tr> </table>	1	Label length (including interlabel gap)	2	Interlabel gap	3	Set maximum label length to approximately this value
1	Label length (including interlabel gap)						
2	Interlabel gap						
3	Set maximum label length to approximately this value						
	<p><b>Default:</b> 39.0 inches (988 mm).</p> <p><b>Range:</b> Values are adjustable in one-inch (25.4 mm) increments.</p> <p><b>To change the value shown:</b></p> <ol style="list-style-type: none"> <li>1. Press the right oval to increase the value.</li> <li>2. Press the left oval to decrease the value.</li> </ol>						

Table 6 • Print Engine Parameters (Page 6 of 26)

Parameter	Action/Explanation
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <b>EARLY WARNING MEDIA DISABLED</b> </div>	<p><b>Set Early Warning System</b> When this parameter is enabled, the print engine provides warnings when labels are running low.</p> <p> <b>Note</b> • Update the number of labels per roll when beginning use of the Early Warning System. The print engine does not make any adjustments when power is turned off and on.</p> <p><b>Default:</b> MEDIA DISABLED <b>Selections:</b> MEDIA DISABLED, MEDIA ENABLED</p> <p><b>To change the Early Warning settings:</b></p> <ol style="list-style-type: none"> <li>1. When the LCD displays <b>EARLY WARNING MEDIA</b>, press the left or right oval to toggle between <b>ENABLED</b> and <b>DISABLED</b>. (If you are prompted for a password, enter your password using the instructions in <i>Change Password-Protected Parameters</i> on page 52.)</li> <li>2. If you enable the Early Warning System, do the following:             <ol style="list-style-type: none"> <li>a. Exit Setup mode and save changes to enable additional parameters.</li> <li>b. Enter Setup mode again. The media and ribbon parameters (<b>LABELS PER ROLL</b>, <b>MEDIA REPLACED</b>, <b>RIBBON LENGTH</b>, and <b>RIBBON REPLACED</b>) appear.</li> <li>c. Adjust the settings as necessary (descriptions of each of these parameters follows).</li> </ol> </li> </ol>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <b>LABELS PER ROLL</b>                      -      0900      +                 </div>	<p><b>Set Number of Labels Per Roll for Early Warning</b> This parameter appears only when Early Warning is enabled for media. This value should correspond to the number of labels per roll of the media that you are using.</p> <p><b>Default:</b> 0900 <b>Range:</b> 100 to 9999</p> <p><b>To change the value shown:</b></p> <ol style="list-style-type: none"> <li>1. Press the left oval to move the cursor.</li> <li>2. Press the right oval to increase the value of the digit. Based on the number entered, when the print engine detects that less than 15% of the labels remain, <b>WARNING MEDIA LOW</b> appears on the LCD. If the alert function is enabled, an alert is also sent. When the printhead is opened and then closed after a media warning is received, the LCD prompts with <b>MEDIA REPLACED?</b>.</li> <li>3. If you replaced the media, press the right oval to select <b>YES</b> to clear the warning and reset the label counter. If you did not replace the media, press the left oval to select <b>NO</b>.</li> </ol>

Table 6 • Print Engine Parameters (Page 7 of 26)

Parameter	Action/Explanation
<div style="border: 1px solid black; padding: 5px;"> <p>MEDIA REPLACED? NO YES</p> </div>	<p><b>Reset Media Counter for Early Warning</b> This parameter appears only when Early Warning is enabled for media.</p> <p><b>To reset the media counter:</b></p> <ol style="list-style-type: none"> <li>1. Did you replace the media?               <ol style="list-style-type: none"> <li>a. If you replaced the media, press the right oval to select <b>YES</b>.</li> <li>b. If you did not replace the media, press the left oval to select <b>NO</b>.</li> </ol> </li> </ol>
<div style="border: 1px solid black; padding: 5px;"> <p>RIBBON LENGTH - 450M 1476 FT +</p> </div>	<p><b>Set Ribbon Length for Early Warning</b> This parameter appears only when Early Warning is enabled for media and the print engine is set for Thermal Transfer operation.</p> <p><b>Default:</b> 450 M/1476 FT <b>Range:</b> 100 M/328 FT to 450 M/1476 FT in 50 M increments</p> <p><b>To change the value shown:</b></p> <ol style="list-style-type: none"> <li>1. Press the left or right oval to set the value to match the length of the ribbon that you are using.  Based on the number entered, when the print engine detects that less than 15% of the ribbon remains, <b>WARNING RIBBON LOW</b> appears on the LCD. If the alert function is enabled, an alert is also sent. When the printhead is opened and then closed after a ribbon warning is received, the LCD prompts with <b>RIBBON REPLACED?</b>.</li> </ol>
<div style="border: 1px solid black; padding: 5px;"> <p>RIBBON REPLACED? NO YES</p> </div>	<p><b>Reset Ribbon Counter for Early Warning</b> This parameter appears only when Early Warning is enabled for media and the print engine is set for Thermal Transfer operation.</p> <p><b>To reset the ribbon counter:</b></p> <ol style="list-style-type: none"> <li>1. Did you replace the ribbon?               <ol style="list-style-type: none"> <li>a. If you replaced the ribbon, press the right oval to select <b>YES</b>.</li> <li>b. If you did not replace the ribbon, press the left oval to select <b>NO</b>.</li> </ol> </li> </ol>

Table 6 • Print Engine Parameters (Page 8 of 26)

Parameter	Action/Explanation
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <b>EARLY WARNING MAINT. OFF</b> </div>	<p><b>Set Early Warning for Maintenance</b> When this parameter is enabled, the print engine provides warnings when the printhead needs to be cleaned.</p> <p> <b>Note</b> • Update the number of labels per roll when beginning use of the Early Warning System. Also, the print engine does not make any adjustments when power is turned off and on.</p> <p><b>Default:</b> MAINT. OFF <b>Selections:</b> MAINT. OFF, MAINTENANCE ON</p> <p><b>To change the Early Warning settings:</b></p> <ol style="list-style-type: none"> <li>1. When the LCD displays <b>EARLY WARNING MAINTENANCE</b>, press the left or right oval to toggle between <b>OFF</b> and <b>ON</b>. (If you are prompted for a password, enter your password using the instructions in <a href="#">Change Password-Protected Parameters on page 52.</a>)</li> <li>2. Exit Setup mode and save changes to enable additional parameters related to the early warning system.</li> <li>3. Enter Setup mode again and go to the following parameters to enter the printhead cleaning interval and the printhead life.</li> </ol>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <b>HEAD CLEANING - 450M 1476 FT +</b> </div>	<p><b>Set Printhead Cleaning Interval for Early Warning</b> This parameter appears only when Early Warning is enabled for maintenance. This value should correspond to the length of the media or ribbon roll that you are using.</p> <p><b>Default:</b> 450 M/1476 FT <b>Range:</b> 100 M/328 FT to 450 M/1476 FT in 50 M increments</p> <p><b>To change the value shown:</b></p> <ol style="list-style-type: none"> <li>1. Press the left or right oval to set the printhead cleaning interval to the desired number of inches of media or ribbon.  When the printhead reaches the set length, <b>WARNING CLEAN PRINTHEAD</b> appears on the LCD. If the alert function is enabled, an alert is also sent. When the printhead is opened and then closed after a printhead cleaning warning is received, the LCD prompts with <b>HEAD CLEANED?</b>.</li> </ol>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <b>HEAD CLEANED? NO YES</b> </div>	<p><b>Reset Printhead Cleaning Counter for Early Warning</b> This parameter appears only when Early Warning is enabled for maintenance.</p> <p><b>To reset the printhead cleaning counter:</b></p> <ol style="list-style-type: none"> <li>1. Did you clean the printhead?             <ol style="list-style-type: none"> <li>a. If you cleaned the printhead, press the right oval to select <b>YES</b>.</li> <li>b. If you did not clean the printhead, press the left oval to select <b>NO</b>.</li> </ol> </li> </ol>

Table 6 • Print Engine Parameters (Page 9 of 26)

Parameter	Action/Explanation
<div style="border: 1px solid black; padding: 5px;">                     HEAD LIFE                      - 1000000 IN +                 </div>	<p><b>Set Printhead Life for Early Warning</b></p> <p>This parameter appears only when Early Warning is enabled for maintenance. Set this value to the number of inches of media that the printhead is expected to print.</p> <p><b>Default:</b> 1,000,000 inches  <b>Range:</b> 100 to 1,000,000 inches</p> <p><b>To change the value shown:</b></p> <ol style="list-style-type: none"> <li>1. Press the left oval to move the cursor.</li> <li>2. Press the right oval to increase the value of the digit.                      When the printhead reaches the set length, <b>WARNING REPLACE HEAD</b> appears on the LCD. If the alert function is enabled, an alert is also sent. When the printhead is opened and then closed after a printhead life warning is received, the LCD prompts with <b>NEW PRINTHEAD?</b></li> <li>3. If you replaced the printhead, press the right oval to select <b>YES</b> to clear the warning and reset the printhead life counter. If you did not replace the printhead, press the left oval to select <b>NO</b>.</li> </ol>
<div style="border: 1px solid black; padding: 5px;">                     NEW PRINTHEAD?                      NO YES                 </div>	<p><b>Reset Printhead Life Counter for Early Warning</b></p> <p>This parameter appears only when Early Warning is enabled for maintenance.</p> <p><b>To reset the printhead life counter:</b></p> <ol style="list-style-type: none"> <li>1. Did you replace the printhead?                         <ol style="list-style-type: none"> <li>a. If you replaced the printhead, press the right oval to select <b>YES</b>.</li> <li>b. If you did not replace the printhead, press the left oval to select <b>NO</b>.</li> </ol> </li> </ol>
<div style="border: 1px solid black; padding: 5px;">                     LIST FONTS                      PRINT                 </div>	<p><b>List Fonts</b></p> <p>This option prints a label that lists the available fonts in the print engine, including standard print engine fonts plus any optional fonts. Fonts may be stored in RAM, Flash memory, optional PCMCIA font cards, or Compact Flash cards.</p> <p><b>To print a list of the available fonts:</b></p> <ol style="list-style-type: none"> <li>1. Press the right oval to select <b>PRINT</b>.</li> </ol>
<div style="border: 1px solid black; padding: 5px;">                     LIST BAR CODES                      PRINT                 </div>	<p><b>List Bar Codes</b></p> <p>This option prints a label that lists the available bar codes in the print engine. Bar codes may be stored in RAM, Flash memory, optional PCMCIA cards, or Compact Flash cards.</p> <p><b>To print a list of the available bar codes:</b></p> <ol style="list-style-type: none"> <li>1. Press the right oval to select <b>PRINT</b>.</li> </ol>

Table 6 • Print Engine Parameters (Page 10 of 26)

Parameter	Action/Explanation
<div style="border: 1px solid black; padding: 5px; width: fit-content;">                     LIST IMAGES  <span style="float: right;">PRINT</span> </div>	<p><b>List Images</b> This option prints a label that lists the available images stored in the print engine's RAM, Flash memory, optional memory card, PCMCIA cards, or Compact Flash cards.</p> <p><b>To print a list of the available images:</b></p> <ol style="list-style-type: none"> <li>1. Press the right oval to select <b>PRINT</b>.</li> </ol>
<div style="border: 1px solid black; padding: 5px; width: fit-content;">                     LIST FORMATS  <span style="float: right;">PRINT</span> </div>	<p><b>List Formats</b> This option prints a label that lists the available formats stored in the print engine's RAM, Flash memory, or optional memory card.</p> <p><b>To print a list of the available formats:</b></p> <ol style="list-style-type: none"> <li>1. Press the right oval to select <b>PRINT</b>.</li> </ol>
<div style="border: 1px solid black; padding: 5px; width: fit-content;">                     LIST SETUP  <span style="float: right;">PRINT</span> </div>	<p><b>List Setup</b> This option prints a configuration label (see <a href="#">Figure 27 on page 53</a>), which lists the current print engine configuration.</p> <p><b>To print a configuration label:</b></p> <ol style="list-style-type: none"> <li>1. Press the right oval to select <b>PRINT</b>.</li> </ol>
<div style="border: 1px solid black; padding: 5px; width: fit-content;">                     LIST NETWORK  <span style="float: right;">PRINT</span> </div>	<p><b>List Network Settings</b> This option prints a network configuration label (see <a href="#">Figure 28 on page 54</a>), which lists the settings for any print server that is installed.</p> <p><b>To print a network configuration label:</b></p> <ol style="list-style-type: none"> <li>1. Press the right oval to select <b>PRINT</b>.</li> </ol>
<div style="border: 1px solid black; padding: 5px; width: fit-content;">                     LIST ALL  <span style="float: right;">PRINT</span> </div>	<p><b>List All</b> This option prints labels that list the available fonts, bar codes, images, formats, and the current print engine and network configurations.</p> <p><b>To print labels for all settings:</b></p> <ol style="list-style-type: none"> <li>1. Press the right oval to select <b>PRINT</b>.</li> </ol>

**Table 6 • Print Engine Parameters (Page 11 of 26)**

Parameter	Action/Explanation
<p style="text-align: center;"><b>FORMAT CARD:</b> <b>A:</b>                      <b>B:</b></p>	<p><b>Format Memory Card</b></p> <p>This option erases all previously stored information from the optional PCMCIA card or Compact Flash card.</p> <p><b>Caution •</b> This option completely erases the selected card.</p> <p><b>To format a memory card:</b></p> <ol style="list-style-type: none"> <li>1. Press the left oval to select <b>A:</b> or the right oval to select <b>B:</b>. If your print engine is set to require a password, you are prompted to enter the password.</li> <li>2. Enter the password. For instructions, see <i>Change Password-Protected Parameters on page 52</i>.</li> <li>3. Press the appropriate button again to select the desired card. The display shows <b>ARE YOU SURE?</b>.</li> <li>4. Do you wish to continue? <ul style="list-style-type: none"> <li>• Press the left oval to select <b>NO</b> to cancel the request and return to <b>FORMAT CARD</b> prompt.</li> <li>• Press the right oval to select <b>YES</b> and begin initialization. When initialization is complete, the print engine automatically exits Setup mode, and the control panel displays <b>PRINTER READY</b>. If you exit Setup mode while initialization is still in process, the control panel display flashes between the phrases <b>CHECKING B: MEMORY</b> and <b>PRINTER IDLE</b>.</li> </ul> </li> </ol> <p> <b>Note •</b> Depending on the amount of memory in the memory card, initialization may take up to 5 minutes to complete.</p>

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Parameter	Action/Explanation
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <b>INIT FLASH MEM.</b>  <b>YES</b> </div>	<p><b>Initialize Flash Memory</b>            This option erases all previously stored information from Flash memory.  <b>Caution</b> • This option completely erases the Flash memory.</p> <p><b>To initialize Flash memory:</b></p> <ol style="list-style-type: none"> <li>1. Press the right oval to select <b>YES</b>.                If your print engine is set to require a password, you are prompted to enter the password.</li> <li>2. Enter the password. For instructions, see <i>Change Password-Protected Parameters on page 52</i>.                The display shows <b>INITIALIZE FLASH?</b></li> <li>3. Press the right oval to select <b>YES</b>.                The display shows <b>ARE YOU SURE?</b></li> <li>4. Do you wish to continue?               <ul style="list-style-type: none"> <li>• Press the left oval to select <b>NO</b> to cancel the request and return to the <b>INITIALIZE FLASH</b> prompt.</li> <li>• Press the right oval to select <b>YES</b> and begin initialization.                    When initialization is complete, the print engine automatically exits Setup mode, and the control panel displays <b>PRINTER READY</b>. If you exit Setup mode while initialization is still in process, the control panel display flashes between the phrases <b>CHECKING E: MEMORY</b> and <b>PRINTER IDLE</b>.</li> </ul> </li> </ol> <p> <b>Note</b> • Depending on the amount of free FLASH memory, initialization may take up to 1 minute to complete.</p>

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Parameter	Action/Explanation								
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <b>SENSOR PROFILE PRINT</b> </div>	<p><b>Print Sensor Profile</b></p> <p>The sensor profile may be used to troubleshoot registration problems that may be caused when the media sensor detects preprinted areas on the media or if it experiences difficulty in determining web location.</p> <p>Figure 31 shows a sensor profile. If the sensitivity of the media and/or ribbon sensors must be adjusted, use <i>Calibrate Media and Ribbon Sensor Sensitivity</i> on page 68 to adjust sensor sensitivity.</p> <div style="text-align: center;"> <p><b>Figure 31 • Sensor Profile</b></p> <table border="1" style="margin: 10px auto;"> <caption>Approximate Sensor Profile Data</caption> <thead> <tr> <th>Sensor Type</th> <th>Sensitivity Level</th> </tr> </thead> <tbody> <tr> <td>RIBBON</td> <td>0.85</td> </tr> <tr> <td>MEDIA</td> <td>0.20</td> </tr> <tr> <td>WEB</td> <td>0.55</td> </tr> </tbody> </table> </div> <p><b>To print a sensor profile:</b></p> <ol style="list-style-type: none"> <li>1. Press the right oval to start this standard calibration procedure and print a media sensor profile.</li> </ol>	Sensor Type	Sensitivity Level	RIBBON	0.85	MEDIA	0.20	WEB	0.55
Sensor Type	Sensitivity Level								
RIBBON	0.85								
MEDIA	0.20								
WEB	0.55								

Table 6 • Print Engine Parameters (Page 14 of 26)

Parameter	Action/Explanation
<p><b>MEDIA AND RIBBON CALIBRATE</b></p>	<p><b>Calibrate Media and Ribbon Sensor Sensitivity</b> Use this procedure to adjust sensitivity of media and ribbon sensors.</p> <p> <b>Important</b> • Follow this procedure exactly as presented. All of the steps must be performed even if only one of the sensors requires adjustment. You may press the left oval at any step in this procedure to cancel the process.</p> <p><b>To perform a media and ribbon sensor calibration:</b></p> <ol style="list-style-type: none"> <li>1. Press the right oval to start the calibration procedure. The <b>LOAD BACKING</b> prompt displays.</li> <li>2. Open the printhead.</li> <li>3. Remove approximately 8 in. (203 mm) of labels from the backing, and pull the media into the print engine so that only the backing is between the media sensors.</li> <li>4. Leave the printhead open.</li> <li>5. Press the right oval to continue. The <b>REMOVE RIBBON</b> prompt displays.</li> <li>6. Remove the ribbon (if used).</li> <li>7. Close the printhead.</li> <li>8. Press the right oval to continue. The message <b>CALIBRATING PLEASE WAIT</b> displays. The print engine adjusts the scale (gain) of the signals that it receives from the media and ribbon sensors based on the specific media and ribbon combination being used. On the sensor profile, this essentially corresponds to moving the peak of the graph up or down to optimize the readings for your application. When calibration is complete, <b>RELOAD ALL</b> displays.</li> <li>9. Open the printhead and pull the media forward until a label is positioned under the media sensor.</li> <li>10. Reload the ribbon (if used).</li> <li>11. Close the printhead.</li> <li>12. Press the right oval to continue. The print engine performs an auto-calibration. During this process, the print engine checks the readings for the media and ribbon based on the new scale established, determines the label length, and determines the print mode. To see the new readings on the new scale, print a sensor profile.</li> </ol>

**Table 6 • Print Engine Parameters (Page 15 of 26)**

Parameter	Action/Explanation
<b>PARALLEL COMM.</b> <b>-BIDIRECTIONAL</b> +	<p><b>Set Parallel Communications</b></p> <p>Select the communications port that matches the one being used by the host computer.</p> <p><b>Default:</b> BIDIRECTIONAL</p> <p><b>Selections:</b> BIDIRECTIONAL, UNIDIRECTIONAL</p> <p><b>To change the value shown:</b></p> <ol style="list-style-type: none"> <li>1. Press the left or right oval to scroll through the options.</li> </ol>
<b>SERIAL COMM</b> <b>-RS232</b> +	<p><b>Set Serial Communications</b></p> <p>Select the communications port that matches the one being used by the host computer.</p> <p> <b>Important</b> • Do not change this parameter from the default. The print engine supports only RS-232. This parameter will be eliminated in a future version of the firmware.</p> <p><b>Default:</b> RS232</p> <p><b>Selections:</b> RS232, RS422/485, RS485 MULTIDROP</p> <p><b>To change the value shown:</b></p> <ol style="list-style-type: none"> <li>1. Press the left or right oval to scroll through the options.</li> </ol>
<b>BAUD</b> <b>-9600</b> +	<p><b>Set Baud</b></p> <p>The baud setting of the print engine must match the baud setting of the host computer for accurate communications to take place. Select the value that matches the one being used by the host computer.</p> <p><b>Default:</b> 9600</p> <p><b>Selections:</b> 110, 300, 600, 1200, 2400, 4800, 9600, 14400, 19200, 28800, 38400, 57600, 115200</p> <p><b>To change the value shown:</b></p> <ol style="list-style-type: none"> <li>1. Press the left or right oval to scroll through the options.</li> </ol>
<b>DATA BITS</b> <b>- 8 BITS</b>	<p><b>Set Data Bits</b></p> <p>The data bits of the print engine must match the data bits of the host computer for accurate communications to take place. Set the data bits to match the setting being used by the host computer.</p> <p> <b>Note</b> • Code Page 850 requires the data bits to be set to 8 bits. See the <i>ZPL II Programming Guide</i> for more information.</p> <p><b>Default:</b> 8 BITS</p> <p><b>Selections:</b> 7 BITS, 8 BITS</p> <p><b>To change the value shown:</b></p> <ol style="list-style-type: none"> <li>1. Press the left or right oval to toggle between the options.</li> </ol>

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Parameter	Action/Explanation
<div style="border: 1px solid black; padding: 5px;">           PARITY            -      NONE      +         </div>	<p><b>Set Parity</b></p> <p>The parity of the print engine must match the parity of the host computer for accurate communications to take place. Select the parity that matches the one being used by the host computer.</p> <p><b>Default:</b> NONE</p> <p><b>Selections:</b> EVEN, ODD, NONE</p> <p><b>To change the value shown:</b></p> <ol style="list-style-type: none"> <li>1. Press the left or right oval to scroll through the options.</li> </ol>
<div style="border: 1px solid black; padding: 5px;">           HOST HANDSHAKE            -      XON/XOFF      +         </div>	<p><b>Set Host Handshake</b></p> <p>The handshake protocol of the print engine must match the handshake protocol of the host computer for communication to take place. Select the handshake protocol that matches the one being used by the host computer.</p> <p><b>Default:</b> XON/XOFF</p> <p><b>Selections:</b> XON/XOFF, DTR/DSR, RTS/CTS</p> <p><b>To change the value shown:</b></p> <ol style="list-style-type: none"> <li>1. Press the left or right oval to scroll through the options.</li> </ol>
<div style="border: 1px solid black; padding: 5px;">           PROTOCOL            -      NONE      +         </div>	<p><b>Set Protocol</b></p> <p>Protocol is a type of error checking system. Depending on the selection, an indicator may be sent from the print engine to the host computer signifying that data has been received. Select the protocol that is requested by the host computer. Further details on protocol can be found in the <i>ZPL II Programming Guide</i>.</p> <p><b>Default:</b> NONE</p> <p><b>Selections:</b> NONE, ZEBRA, ACK_NAK</p> <p> <b>Note • ZEBRA</b> is the same as <b>ACK_NAK</b>, except that <b>ZEBRA</b> response messages are sequenced. If <b>ZEBRA</b> is selected, the print engine must use <b>DTR/DSR</b> for host handshake protocol.</p> <p><b>To change the value shown:</b></p> <ol style="list-style-type: none"> <li>1. Press the left or right oval to scroll through the options.</li> </ol>
<div style="border: 1px solid black; padding: 5px;">           NETWORK ID            -      000      +         </div>	<p><b>Set Network ID</b></p> <p>Network ID is used to assign a unique number to a print engine. This gives the host computer the means to address a specific print engine. This does not affect TCP/IP or IPX networks.</p> <p><b>Default:</b> 000</p> <p><b>Range:</b> 000 to 999</p> <p><b>To change the value shown:</b></p> <ol style="list-style-type: none"> <li>1. Press the left oval to move to the next digit position.</li> <li>2. Press the right oval to increase the value of the digit.</li> </ol>

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Parameter	Action/Explanation
<div style="border: 1px solid black; padding: 2px;">                     COMMUNICATIONS                      - NORMAL MODE      +                 </div>	<p><b>Set Communications Mode</b></p> <p>The communication diagnostics mode is a troubleshooting tool for checking the interconnection between the print engine and the host computer. When <b>DIAGNOSTICS</b> is selected, all data sent from the host computer to the print engine prints as straight ASCII characters, with the hex value below the ASCII text. The print engine prints all characters received, including control codes, like CR (carriage return). A sample printout is shown in <i>Communications Diagnostics Test</i> on page 117.</p> <p>Notes on diagnostic printouts are defined as follows:</p> <ul style="list-style-type: none"> <li>• FE indicates a framing error.</li> <li>• OE indicates an overrun error.</li> <li>• PE indicates a parity error.</li> <li>• NE indicates noise.</li> </ul> <p><b>Default:</b> NORMAL MODE  <b>Selections:</b> NORMAL MODE, DIAGNOSTICS</p> <p><b>To change the value shown:</b></p> <ol style="list-style-type: none"> <li>1. Press the left or right oval to toggle between the options.</li> <li>2. For any errors, check that your communication parameters are correct.</li> <li>3. Set the print width equal to or less than the label width used for the test. See <i>Set Print Width</i> on page 58 for more information.</li> </ol>
<div style="border: 1px solid black; padding: 2px;">                     CONTROL PREFIX                      -      &lt; 7EH      +                 </div>	<p><b>Set Control Prefix Character</b></p> <p>The print engine looks for this two-digit hex character to indicate the start of a ZPL/ZPL II control instruction. The “H” that is displayed indicates Hexadecimal and is not part of the value.</p> <p> <b>Note</b> • Do not use the same hex value for the control, format, and delimiter character. The print engine must see different characters to work properly.</p> <p><b>Default:</b> 7E (tilde—displayed as a black square)  <b>Range:</b> 00 to FF</p> <p><b>To change the value shown:</b></p> <ol style="list-style-type: none"> <li>1. Press the left oval to move to the next digit position.</li> <li>2. Press the right oval to increase the value of the digit.</li> </ol>

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Parameter	Action/Explanation
<div style="border: 1px solid black; padding: 5px;">           FORMAT PREFIX            -     &lt;^&gt;5EH     +         </div>	<p><b>Set Format Prefix Character</b></p> <p>The format prefix is a two-digit hex value used as a parameter place marker in ZPL/ZPL II format instructions. The “H” that is displayed indicates Hexadecimal and is not part of the value. The print engine looks for this hex character to indicate the start of a ZPL/ZPL II format instruction. See the <i>ZPL II Programming Guide Volume I</i> for more information.</p> <p> <b>Note</b> • Do not use the same hex value for the control, format, and delimiter character. The print engine must see different characters to work properly.</p> <p><b>Default:</b> 5E (caret) <b>Range:</b> 00 to FF</p> <p><b>To change the value shown:</b></p> <ol style="list-style-type: none"> <li>1. Press the left oval to move to the next digit position.</li> <li>2. Press the right oval to increase the value of the digit.</li> </ol>
<div style="border: 1px solid black; padding: 5px;">           DELIMITER CHAR            -     &lt;, &gt;2CH     +         </div>	<p><b>Set Delimiter Character</b></p> <p>The delimiter character is a two-digit hex value used as a parameter place marker in ZPL/ZPL II format instructions. See the <i>ZPL II Programming Guide Volume I</i> for more information.</p> <p> <b>Note</b> • Do not use the same hex value for the control, format, and delimiter character. The print engine must see different characters to work properly.</p> <p><b>Default:</b> 2C (comma) <b>Range:</b> 00 to FF</p> <p><b>To change the value shown:</b></p> <ol style="list-style-type: none"> <li>1. Press the left oval to move to the next digit position.</li> <li>2. Press the right oval to increase the value of the digit.</li> </ol>
<div style="border: 1px solid black; padding: 5px;">           ZPL MODE            -     ZPL II     +         </div>	<p><b>Select ZPL Mode</b></p> <p>The print engine remains in the selected mode until it is changed by this parameter or by using a ZPL/ZPL II command. The print engine accepts label formats written in either ZPL or ZPL II, eliminating the need to rewrite any ZPL formats that already exist. See the <i>ZPL II Programming Guide</i> for more information on the differences between ZPL and ZPL II.</p> <p><b>Default:</b> ZPL II <b>Selections:</b> ZPL II, ZPL</p> <p><b>To change the value shown:</b></p> <ol style="list-style-type: none"> <li>1. Press the left or right oval to toggle between the options.</li> </ol>

**Table 6 • Print Engine Parameters (Page 19 of 26)**

Parameter	Action/Explanation																								
<b>RIBBON TENSION</b> -    HIGH    +	<p><b>Set Ribbon Tension</b></p> <p>This parameter sets the tension applied to the ribbon supply spindle. The correct setting is determined by a combination of the ribbon width and the ribbon length (<a href="#">Table 7</a>).</p> <p style="text-align: center;"><b>Table 7 • Ribbon Tension Settings</b></p> <table border="1" style="width: 100%; border-collapse: collapse; margin: 10px 0;"> <thead> <tr> <th rowspan="2" style="text-align: center;">Ribbon Width</th> <th colspan="4" style="text-align: center;">Ribbon Length</th> </tr> <tr> <th style="text-align: center;">300 Meters</th> <th style="text-align: center;">450 Meters</th> <th style="text-align: center;">600 Meters</th> <th style="text-align: center;">900 Meters</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">3 to 5 in.</td> <td style="text-align: center;">Low</td> <td style="text-align: center;">Low</td> <td style="text-align: center;">Low</td> <td style="text-align: center;">Low</td> </tr> <tr> <td style="text-align: center;">4 to 6 in.</td> <td style="text-align: center;">Low</td> <td style="text-align: center;">Low or Medium</td> <td style="text-align: center;">Low or Medium</td> <td style="text-align: center;">Medium</td> </tr> <tr> <td style="text-align: center;">5 to 7 in.</td> <td style="text-align: center;">Low or Medium</td> <td style="text-align: center;">Medium</td> <td style="text-align: center;">Medium or High</td> <td style="text-align: center;">High</td> </tr> </tbody> </table> <p><b>Default:</b> HIGH  <b>Selections:</b> LOW, MEDIUM, HIGH</p> <p><b>To change the value shown:</b></p> <ol style="list-style-type: none"> <li>1. Determine the correct tension setting for the ribbon being used.</li> <li>2. Press the left or right oval to scroll through the options.</li> <li>3. Press SETUP/EXIT to exit setup mode.</li> <li>4. Select the <b>PERMANENT</b> save option.</li> <li>5. Press NEXT.</li> <li>6. Turn the print engine Off (O) and back On (I).</li> </ol>	Ribbon Width	Ribbon Length				300 Meters	450 Meters	600 Meters	900 Meters	3 to 5 in.	Low	Low	Low	Low	4 to 6 in.	Low	Low or Medium	Low or Medium	Medium	5 to 7 in.	Low or Medium	Medium	Medium or High	High
Ribbon Width	Ribbon Length																								
	300 Meters	450 Meters	600 Meters	900 Meters																					
3 to 5 in.	Low	Low	Low	Low																					
4 to 6 in.	Low	Low or Medium	Low or Medium	Medium																					
5 to 7 in.	Low or Medium	Medium	Medium or High	High																					
<b>MEDIA POWER UP</b> -    CALIBRATION    +	<p><b>Select Media Power-Up Option</b></p> <p>This parameter sets the action of the media when you turn on the print engine.</p> <p><b>Default:</b> CALIBRATION  <b>Selections:</b> FEED, CALIBRATION, LENGTH, SHORT CAL, and NO MOTION</p> <ul style="list-style-type: none"> <li>• <b>Feed</b>—feeds the labels to the first registration point.</li> <li>• <b>Calibration</b>—determines the length of the label and adjusts the sensor settings.</li> <li>• <b>Length</b>—In continuous mode, feeds the last stored label length. In noncontinuous mode, calibrates based on the maximum label length setting (see <a href="#">Set Maximum Label Length on page 59</a>).</li> <li>• <b>Short Cal</b>—calibrates label length using the current sensor settings.</li> <li>• <b>No Motion</b>—the media does not move. You must press FEED to cause the print engine to resynch to the start of the next label.</li> </ul> <p><b>To change the value shown:</b></p> <ol style="list-style-type: none"> <li>1. Press the left or right oval to scroll through the options.</li> </ol>																								

Table 6 • Print Engine Parameters (Page 20 of 26)

Parameter	Action/Explanation
<div style="border: 1px solid black; padding: 2px;">                     HEAD CLOSE - CALIBRATION      +                 </div>	<p><b>Select Head Close Option</b> This parameter sets the action of the media when you close the printhead. <b>Default:</b> CALIBRATION <b>Selections:</b> FEED, CALIBRATION, LENGTH, SHORT CAL, and NO MOTION</p> <ul style="list-style-type: none"> <li>• <b>Feed</b>—feeds the labels to the first registration point.</li> <li>• <b>Calibration</b>—determines the length of the label and adjusts the sensor settings.</li> <li>• <b>Length</b>—In continuous mode, feeds the last stored label length. In noncontinuous mode, calibrates based on the maximum label length setting (see <i>Set Maximum Label Length on page 59</i>).</li> <li>• <b>Short Cal</b>—calibrates label length using the current sensor settings.</li> <li>• <b>No Motion</b>—the media does not move. You must press FEED to cause the print engine to resynch to the start of the next label.</li> </ul> <p><b>To change the value shown:</b></p> <ol style="list-style-type: none"> <li>1. Press the left or right oval to scroll through the options.</li> </ol>
<div style="border: 1px solid black; padding: 2px;">                     BACKFEED -      BEFORE      +                 </div>	<p><b>Select Backfeed Sequence</b> This parameter establishes when label backfeed occurs after a label is removed in applicator mode. It has no effect in Rewind mode. This setting is superseded by ~JS when received as part of a label format (see <i>ZPL II Programming Guide Volume I</i>). <b>Default:</b> BEFORE for non-RFID print engine, AFTER for print engine with RFID reader installed <b>Selections:</b> DEFAULT, AFTER, BEFORE, OFF</p> <p><b>To change the value shown:</b></p> <ol style="list-style-type: none"> <li>1. Press the left or right oval to scroll through the options.</li> </ol>
<div style="border: 1px solid black; padding: 2px;">                     LABEL TOP +000 -■■■■■■■■      +                 </div>	<p><b>Adjust Label Top Position</b> This parameter adjusts the print position vertically on the label. Positive numbers adjust the label top position farther down the label (away from the printhead); negative numbers adjust the position up the label (toward the printhead). The displayed value represents dots. <b>Default:</b> +000 <b>Range:</b> -120 to +120 dots</p> <p><b>To change the value shown:</b></p> <ol style="list-style-type: none"> <li>1. Press the right oval to increase the value.</li> <li>2. Press the left oval to decrease the value.</li> </ol>

**Table 6 • Print Engine Parameters (Page 21 of 26)**

Parameter	Action/Explanation
<div style="text-align: center;">LEFT POSITION -      ±0000      +</div>	<p><b>Adjust Left Position</b></p> <p>This parameter establishes how far from the left edge of a label the format begins to print by adjusting horizontal positioning on the label. Positive numbers adjust the printing away from the main frame by the number of dots selected; negative numbers shift printing toward the main frame. The displayed value represents dots.</p> <p><b>Default:</b> 0000 <b>Range:</b> -9999 to +9999 dots</p> <p><b>To change the value shown:</b></p> <ol style="list-style-type: none"> <li>1. Press the left oval to move the cursor.</li> <li>2. Press the right oval to change between +/- and to increase the value of the digit.</li> <li>3. For a negative value, enter the value before changing to the minus sign.</li> </ol>
<div style="text-align: center;">HEAD RESISTOR -      0500 OHMS      +</div>	<p><b>Set the Printhead Resistor Value</b></p> <p><b>Caution •</b> This parameter should be changed only by qualified service personnel. Do not set the value higher than that shown on the printhead. Setting a higher value may damage the printhead.</p> <p>This value is preset at the factory to match the resistance value of the printhead. It does not need to be changed unless the printhead or the main logic board is replaced.</p> <p><b>Initial Value:</b> Factory-set to match the printhead shipped with your print engine. <b>Default Value:</b> 0500 <b>Range:</b> 0500 to 2000</p> <p><b>To set the printhead resistor value:</b></p> <ol style="list-style-type: none"> <li>1. Before replacing the printhead, look for the label that shows the resistance value (<math>\Omega</math> value) of the new printhead. Make note of this setting before installing the new printhead.</li> <li>2. Press the left oval to move to the next digit position.</li> <li>3. Press the right oval to increase the value of the digit.</li> </ol>

Table 6 • Print Engine Parameters (Page 22 of 26)

Parameter	Action/Explanation
<div style="border: 1px solid black; padding: 5px; text-align: center;">           APPLICATOR PORT            -      OFF      +         </div>	<p><b>Set Applicator Port Mode</b> Determines the action of the applicator port.</p> <p> <b>Note</b> • Set this value as suggested by the applicator manufacturer.</p> <p><b>Default:</b> OFF</p> <p><b>Selections:</b> OFF, MODE 1, MODE 2, MODE 3, MODE 4</p> <ul style="list-style-type: none"> <li>• <b>OFF:</b> The applicator port is off.</li> <li>• <b>MODE 1:</b> Asserts the ~END_PRINT signal low while the print engine is moving the label forward.</li> <li>• <b>MODE 2:</b> Asserts the ~END_PRINT signal high while the print engine is moving the label forward.</li> <li>• <b>MODE 3:</b> Asserts the ~END_PRINT signal low for 20 milliseconds when a label has been completed and positioned. Not asserted during continuous printing modes.</li> <li>• <b>MODE 4:</b> Asserts the ~END_PRINT signal high for 20 milliseconds when a label has been completed and positioned. Not asserted during continuous printing modes.</li> </ul> <p><b>To change the value shown:</b></p> <ol style="list-style-type: none"> <li>1. Press the left or right oval to scroll through the options.</li> </ol>
<div style="border: 1px solid black; padding: 5px; text-align: center;">           ERROR ON PAUSE            -      ENABLED      +         </div>	<p><b>Set Applicator Error Signal When Print Engine Pauses</b> When this option is enabled and the print engine is paused, the print engine sets the applicator error state.</p> <p><b>Default:</b> ENABLED</p> <p><b>Selections:</b> ENABLED, DISABLED</p> <p><b>To change the value shown:</b></p> <ol style="list-style-type: none"> <li>1. Press the left or right oval to toggle between the options.</li> </ol>

Table 6 • Print Engine Parameters (Page 23 of 26)

Parameter	Action/Explanation
<div style="border: 1px solid black; padding: 2px;">                     START PRINT SIG                      - PULSE MODE      +                 </div>	<p><b>Select Start Print Signal</b></p> <p>This parameter determines how the print engine reacts to the Start Print Signal input on pin 3 of the applicator interface connector at the rear of the print engine.</p> <p><b>Caution</b> • Start Print Signal is set by the applicator manufacturer and should not be changed unless the factory defaults have been reloaded. Please make a note of it. While other choices are valid, the print engine must be returned to its designated setting for it to work properly.</p> <p><b>Default:</b> PULSE MODE</p> <p><b>Selections:</b> PULSE MODE, LEVEL MODE</p> <ul style="list-style-type: none"> <li>• <b>PULSE MODE</b>—Labels print when the signal transitions from HIGH to LOW.</li> <li>• <b>LEVEL MODE</b>—Labels print as long as the signal is asserted LOW.</li> </ul> <p><b>To change the value shown:</b></p> <ol style="list-style-type: none"> <li>1. Press the left or right oval to toggle between the options.</li> </ol>
<div style="border: 1px solid black; padding: 2px;">                     RESYNCH MODE                      - FEED MODE      +                 </div>	<p><b>Select Resynch Mode</b></p> <p>This parameter determines how the print engine reacts if the label synchronization is lost and the label top is not where expected.</p> <p><b>Default:</b> FEED MODE</p> <p><b>Selections:</b> FEED MODE, ERROR MODE</p> <ul style="list-style-type: none"> <li>• <b>FEED MODE</b>—If the label top is not where expected, the print engine feeds a blank label to find the label top position.</li> <li>• <b>ERROR MODE</b>—If the label top is not where expected, the print engine stops, enters Pause mode, displays the message <b>Error Condition Feed Label</b>, flashes the ERROR light, and asserts the Service Required signal (pin 10 on the Applicator Interface Connector).  To resynch the media to the top of the label in Error mode, press PAUSE to exit Pause mode. The ERROR light stops flashing, and the Service Required signal is deactivated. The action of the print engine is determined by the <b>Head Close</b> configuration selection (see <a href="#">Select Head Close Option on page 74</a>).</li> </ul> <p><b>To change the value shown:</b></p> <ol style="list-style-type: none"> <li>1. Press the left or right oval to toggle between the options.</li> </ol>

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Parameter	Action/Explanation
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <b>RIBBON LOW MODE</b>                      -      25M      +                 </div>	<p><b>Set Ribbon Low Mode</b></p> <p>When the Ribbon Low feature is off, the output signal (Pin 9) does not function, the <b>LOW RIBBON</b> warning is not displayed, and the print engine continues to print until it runs out of ribbon.</p> <p>When the Ribbon Low feature is set to any of the lengths, output signal (Pin 9) on the applicator port is functional. When the amount of ribbon on the supply spindle reaches the specific length, the output signal asserts to provide a <b>RIBBON LOW</b> warning. For print engines with the <b>RIBBON LOW OUTPUT</b> parameter, set the output signal to assert HIGH or LOW. For print engines without this parameter, the signal asserts HIGH.</p> <p><b>Default:</b> 25M</p> <p><b>Selections:</b> OFF, 25M, 50M, 75M, 100M</p> <p><b>To change the value shown:</b></p> <ol style="list-style-type: none"> <li>1. Press the left or right oval to scroll through the options.</li> </ol>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <b>RIB LOW OUTPUT</b>                      -      ACTIVE HIGH      +                 </div>	<p><b>Set Ribbon Low Output</b></p> <p> <b>Note</b> • This parameter is not available on older 110PAX4 firmware and will be added to a future release of the R110PAX4. Check for the latest firmware at <a href="http://www.zebra.com/firmware">http://www.zebra.com/firmware</a>.</p> <p>When the Ribbon Low feature is on, this parameter determines if the output signal on Pin 9 is HIGH or LOW.</p> <p><b>Default:</b> ACTIVE HIGH</p> <p><b>Selections:</b> ACTIVE HIGH, ACTIVE LOW</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <b>REPRINT MODE</b>                      -      DISABLED      +                 </div>	<p><b>Set Reprint Mode</b></p> <p>When the Reprint feature is enabled, the reprint input signal (Pin 6) on the applicator port is functional. When the input signal is asserted, the last label printed is printed again. (This includes non-printing labels.) When the Reprint feature is disabled, the reprint input signal is ignored.</p> <p> <b>Note</b> • The ^SP ZPL command is ignored when the Reprint feature is enabled. When the Reprint feature is disabled, the ^SP command can be used. In addition, when a received label format is canceled prior to printing, the reprint function for the previous label is also canceled. Refer to the <i>ZPL II Programming Guide</i> for additional information.</p> <p><b>Default:</b> DISABLED</p> <p><b>Range:</b> ENABLED, DISABLED</p> <p><b>To change the value shown:</b></p> <ol style="list-style-type: none"> <li>1. Press the left or right oval to toggle between the options.</li> </ol>

Table 6 • Print Engine Parameters (Page 25 of 26)

Parameter	Action/Explanation
<div style="border: 1px solid black; padding: 2px; margin-bottom: 2px;">                     WEB S.            073                      - ■■■■■■■■            +                 </div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 2px;">                     MEDIA S.            075                      - ■■■■■■■■            +                 </div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 2px;">                     RIBBON S.            071                      - ■■■■■■■■            +                 </div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 2px;">                     MARK S.            000                      - ■                    +                 </div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 2px;">                     MARK MED S.        000                      - ■                    +                 </div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 2px;">                     MEDIA LED        082                      - ■                    +                 </div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 2px;">                     RIBBON LED        008                      - ■                    +                 </div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 2px;">                     MARK LED        005                      - ■                    +                 </div>	<p>These parameters are automatically set during the calibration procedure and should be changed only by a qualified service technician. Refer to the <i>ZPL II Programming Guide</i> for information on these parameters.</p> <p><b>To skip these parameters:</b></p> <ol style="list-style-type: none"> <li>1. Press NEXT/SAVE repeatedly.</li> </ol>
<div style="border: 1px solid black; padding: 2px;">                     LCD ADJUST        +10                      - ■                    +                 </div>	<p><b>Adjust LCD Display</b></p> <p>This parameter allows you to adjust the brightness of your LCD if it is difficult to read.</p> <p><b>Default:</b> 10</p> <p><b>Range:</b> 00 to 19</p> <p><b>To change the value shown:</b></p> <ol style="list-style-type: none"> <li>1. Press the right oval to increase the value (increase brightness).</li> <li>2. Press the left oval to decrease the value (reduce brightness).</li> </ol>
<div style="border: 1px solid black; padding: 2px;">                     FORMAT CONVERT                      - NONE                +                 </div>	<p><b>Select Format Convert</b></p> <p>Selects the bitmap scaling factor. The first number is the original dots per inch (dpi) value; the second, the dpi to which you would like to scale.</p> <p><b>Default:</b> NONE</p> <p><b>Selections:</b> NONE, 150 → 300, 150 → 600, 200 → 600, 300 → 600</p> <p><b>To change the value shown:</b></p> <ol style="list-style-type: none"> <li>1. Press the left or right oval to scroll through the options.</li> </ol>

Table 6 • Print Engine Parameters (Page 26 of 26)

Parameter	Action/Explanation
<div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span>IDLE DISPLAY</span> <span>+</span> </div> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span>- FW VERSION</span> <span></span> </div>	<p><b>Select Idle Display</b> This parameter selects the LCD options for the real-time clock.</p> <p> <b>Note</b> • If the default value is not selected, pressing the left or right oval briefly displays the firmware version of the print engine.</p> <p><b>Default:</b> FIRMWARE VERSION <b>Selections:</b> MM/DD/YY (24 HOUR), MM/DD/YY (12 HOUR), DD/MM/YY (24 HOUR), DD/MM/YY (12 HOUR), FW VERSION</p> <p><b>To change the value shown:</b></p> <ol style="list-style-type: none"> <li>1. Press the left or right oval to scroll through the options.</li> </ol>
<div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span>RTC DATE</span> <span>+</span> </div> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span>- 01/31/01</span> <span></span> </div>	<p><b>Set RTC Date</b> This parameter allows you to set the date following the convention selected in <b>IDLE DISPLAY</b>.</p> <p><b>To change the value shown:</b></p> <ol style="list-style-type: none"> <li>1. Press the left oval to move to the next digit position.</li> <li>2. Press the right oval to change the value of the digit.</li> </ol>
<div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span>RTC TIME</span> <span>+</span> </div> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span>- 14:55</span> <span></span> </div>	<p><b>Set RTC Time</b> This parameter allows you to set the time following the convention selected in <b>IDLE DISPLAY</b>.</p> <p><b>To change the value shown:</b></p> <ol style="list-style-type: none"> <li>1. Press the left oval to move to the next digit position.</li> <li>2. Press the right oval to change the value of the digit.</li> </ol>
<div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span>LANGUAGE</span> <span></span> </div> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span>← ENGLISH →</span> </div>	<p><b>Select the Display Language</b> This parameter changes the language displayed on the LCD.</p> <p><b>Default:</b> ENGLISH <b>Selections:</b> ENGLISH, SPANISH, FRENCH, GERMAN, ITALIAN, NORWEGIAN, PORTUGUESE, SWEDISH, DANISH, SPANISH 2, DUTCH, FINNISH, JAPAN</p> <p><b>To change the value shown:</b></p> <ol style="list-style-type: none"> <li>1. Press the left or right oval to scroll through the options.</li> </ol>

## Print Server LCD Displays

The menu options shown in Table 8 display only if you have a print server installed.

**Table 8 • Print Server Parameters (Page 1 of 4)**

Parameter	Action/Explanation
LOAD LAN FROM? PRINTER	<p><b>Load LAN Source<sup>1</sup></b> This parameter, which serves the same function as the ^NP ZPL command, specifies whether to use the print engine's or the print server's IP settings at bootup.</p> <p><b>Default:</b> PRINTER <b>Selections:</b> PRINTER, PRINTSERVER</p> <p><b>To change the value shown:</b></p> <ol style="list-style-type: none"> <li>Press the left or right oval to toggle between the options.</li> </ol>
WIRED PS CHECK? NO	<p><b>Check for Wired PrintServer<sup>1</sup></b> This parameter, which serves the same function as the ^NB ZPL command, tells the print engine whether to search for a wired print server at bootup.</p> <p><b>Default:</b> NO <b>Selections:</b> YES, NO</p> <p><b>To change the value shown:</b></p> <ol style="list-style-type: none"> <li>Press the left or right oval to toggle between the options.</li> </ol>
IP PROTOCOL ALL	<p><b>Specify IP Protocol<sup>2</sup></b> Allows either the user (permanent) or the server (dynamic) to select the IP address. If a dynamic option is chosen, this selection determines the method(s) by which the print server (wired or wireless) receives the IP address from the server.</p> <p><b>Default:</b> ALL <b>Selections:</b> ALL, GLEANING ONLY, RARP, BOOTP, DHCP, DHCP AND BOOTP, PERMANENT</p> <p> <b>Note</b> • Use of GLEANING ONLY is not recommended when the Wireless Print Server is installed.</p> <p><b>To change the value shown:</b></p> <ol style="list-style-type: none"> <li>Press the left or right oval to scroll through the options.</li> </ol>

<sup>1</sup> Appears only when the ZebraNet Wireless Print Server is installed.

<sup>2</sup> These parameters appear after the system recognizes the existence of a ZebraNet print server (wired or wireless). After the print server is recognized, all zeroes (000.000.000.000) will display until the print engine obtains an IP address or defaults to address 192.168.254.254.

<sup>3</sup> If a wireless password is set, you must enter the wireless password (not the print engine password) to access this parameter.

<sup>4</sup> This parameter appears 1) when no wireless card is inserted or 2) when the wireless card is associated to the WLAN and the card supports LEAP.

Table 8 • Print Server Parameters (Page 2 of 4)

Parameter	Action/Explanation
<div style="border: 1px solid black; padding: 5px; width: fit-content;">                     IP ADDRESS 000.000.000.000                 </div>	<p><b>Specify IP Address<sup>2</sup></b> This parameter allows you to select the IP address if PERMANENT was chosen in IP PROTOCOL. (If a dynamic option was chosen, the user cannot select the address.)</p> <p><b>To change the value shown:</b></p> <ol style="list-style-type: none"> <li>1. Press the left oval to move the cursor.</li> <li>2. Press the right oval to increase the value of the digit.</li> </ol>
<div style="border: 1px solid black; padding: 5px; width: fit-content;">                     SUBNET MASK 000.000.000.000                 </div>	<p><b>Specify Subnet Mask<sup>2</sup></b> This parameter selects the part of the IP address that is considered to be part of the local network. It can be reached without going through the default gateway.</p> <p><b>To change the value shown:</b></p> <ol style="list-style-type: none"> <li>1. Press the left oval to move the cursor.</li> <li>2. Press the right oval to increase the value of the digit.</li> </ol>
<div style="border: 1px solid black; padding: 5px; width: fit-content;">                     DEFAULT GATEWAY 000.000.000.000                 </div>	<p><b>Specify Default Gateway<sup>2</sup></b> This parameter allows you to select the IP address that the network traffic is routed through if the destination address is not part of the local network.</p> <p><b>To change the value shown:</b></p> <ol style="list-style-type: none"> <li>1. Press the left oval to move the cursor.</li> <li>2. Press the right oval to increase the value of the digit.</li> </ol>
<div style="border: 1px solid black; padding: 5px; width: fit-content;">                     MAC ADDRESS 000000000000                 </div>	<p><b>View MAC Address<sup>1,3</sup></b> Displays the MAC address of the wireless card. This parameter cannot be changed through the control panel.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;">                     ESSID 125                 </div>	<p><b>View ESSID<sup>1,3</sup></b> This parameter cannot be changed through the control panel. Use the ^WS ZPL command to change the value. For more information, see the <i>Wireless Print Server User Guide</i>.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;">                     AUTH. TYPE OPEN                 </div>	<p><b>Select Authentication Type<sup>1,3</sup></b> If encryption is on, specify whether to use open or shared authentication. <b>Default:</b> OPEN <b>Selections:</b> OPEN, SHARED</p> <p><b>To change the value shown:</b></p> <ol style="list-style-type: none"> <li>1. Press the left or right oval to toggle between the options.</li> </ol>

1 Appears only when the ZebraNet Wireless Print Server is installed.  
 2 These parameters appear after the system recognizes the existence of a ZebraNet print server (wired or wireless). After the print server is recognized, all zeroes (000.000.000.000) will display until the print engine obtains an IP address or defaults to address 192.168.254.254.  
 3 If a wireless password is set, you must enter the wireless password (not the print engine password) to access this parameter.  
 4 This parameter appears 1) when no wireless card is inserted or 2) when the wireless card is associated to the WLAN and the card supports LEAP.

**Table 8 • Print Server Parameters (Page 3 of 4)**

Parameter	Action/Explanation
LEAP MODE OFF	<p><b>Enable LEAP Mode</b><sup>3,4</sup></p> <p>LEAP is an encryption method that is available with some wireless cards. Set the LEAP user name and password through the print engine web pages.</p> <p><b>Default:</b> OFF</p> <p><b>Selections:</b> ON, OFF</p> <p><b>To change the value shown:</b></p> <ol style="list-style-type: none"> <li>Press the left or right oval to toggle between the options.</li> </ol>
ENCRYPTION MODE OFF	<p><b>Select Encryption Mode</b><sup>1,3</sup></p> <p>Select whether to use 40-bit encryption, 128-bit encryption, or no encryption.</p> <p> <b>Important</b> • If using encryption, use the ^WE ZPL command to set the value for the active encryption key. Failure to do so can disable the wireless system. For more information, see the <i>Wireless Print Server User Guide</i>.</p> <p><b>Default:</b> OFF</p> <p><b>Selections:</b> OFF, 40-BIT, 128-BIT</p> <p><b>To change the value shown:</b></p> <ol style="list-style-type: none"> <li>Press the left or right oval to scroll through the options.</li> </ol>
ENCRYPT. INDEX 1	<p><b>Select Encryption Index</b><sup>1,3</sup></p> <p>Use this parameter to tell the print engine which encryption key to use.</p> <p> <b>Important</b> • Use the ^WE ZPL command to set the value for the active encryption key. Failure to do so can disable the wireless system. For more information, see the <i>Wireless Print Server User Guide</i>.</p> <p><b>Default:</b> 1</p> <p><b>Selections:</b> 1, 2, 3, 4</p> <p><b>To change the value shown:</b></p> <ol style="list-style-type: none"> <li>Press the left or right oval to scroll through the options.</li> </ol>

- 1 Appears only when the ZebraNet Wireless Print Server is installed.
- 2 These parameters appear after the system recognizes the existence of a ZebraNet print server (wired or wireless). After the print server is recognized, all zeroes (000.000.000.000) will display until the print engine obtains an IP address or defaults to address 192.168.254.254.
- 3 If a wireless password is set, you must enter the wireless password (not the print engine password) to access this parameter.
- 4 This parameter appears 1) when no wireless card is inserted or 2) when the wireless card is associated to the WLAN and the card supports LEAP.

Table 8 • Print Server Parameters (Page 4 of 4)

Parameter	Action/Explanation
<div style="border: 1px solid black; padding: 5px; width: fit-content;">                     RESET NETWORK YES                 </div>	<p><b>Reset Network</b><sup>2,3</sup></p> <p>This option resets the wireless card and the print server when the wireless option is running. Selecting this option has no effect when the wireless option is not running, when there is no card inserted, or when the wireless password is anything other than the default (zero).</p> <ol style="list-style-type: none"> <li>Press the right oval to select <b>YES</b>. The LCD prompts <b>ARE YOU SURE?</b> <ul style="list-style-type: none"> <li>Press the left oval to select <b>NO</b> and cancel the request.</li> <li>Press the right oval to select <b>YES</b> and reset the network.</li> </ul> </li> </ol>

- 1 Appears only when the ZebraNet Wireless Print Server is installed.
- 2 These parameters appear after the system recognizes the existence of a ZebraNet print server (wired or wireless). After the print server is recognized, all zeroes (000.000.000.000) will display until the print engine obtains an IP address or defaults to address 192.168.254.254.
- 3 If a wireless password is set, you must enter the wireless password (not the print engine password) to access this parameter.
- 4 This parameter appears 1) when no wireless card is inserted or 2) when the wireless card is associated to the WLAN and the card supports LEAP.



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# Routine Maintenance

This chapter provides routine cleaning and maintenance procedures.

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## Lubrication

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**Caution** • This print engine does not require lubrication. Applying lubricants may damage your print engine’s finish and decrease the performance of its electromechanical parts.

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## Cleaning Schedule

Cleaning your print engine regularly maintains print quality and may extend the life of the print engine. The recommended cleaning schedule is shown in [Table 9](#). See the following pages for specific procedures.

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**Caution** • Use only the cleaning agents indicated. Zebra is not responsible for damage caused by any other fluids being used on this print engine.

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**Table 9 • Recommended Print Engine Cleaning Schedule**

Area	Method	Interval
Printhead	Solvent*	Perform these procedures at the following times: <ul style="list-style-type: none"> <li>• When <b>CLEAN HEAD NOW</b> appears.</li> <li>• <b>Direct Thermal Print Mode:</b> After every roll of labels or 500 ft (150 m) of fanfold labels.</li> <li>• <b>Thermal Transfer Print Mode:</b> After every roll (1500 ft or 450 m) of ribbon.</li> </ul>
Platen roller	Solvent*	
Transmissive media sensor	Air blow	
Reflective media sensor	Air blow	
Media path	Solvent*	
Ribbon sensor	Air blow	
Door-open sensors	Air blow	Monthly and as needed
Tear-off/peel-off bar	Solvent*	
Clear plastic antenna cover	Air blow	

\* Use Preventative Maintenance kit (part number 47362) or a solution of 90% isopropyl alcohol and 10% deionized water.

## Clean the Exterior

Clean the outside surfaces of the print engine with a lint-free cloth. Use a mild detergent solution or desktop cleaner sparingly, as needed.

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**Caution** • Do not use harsh or abrasive cleaning agents or solvents.

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## Clean the Media Compartment

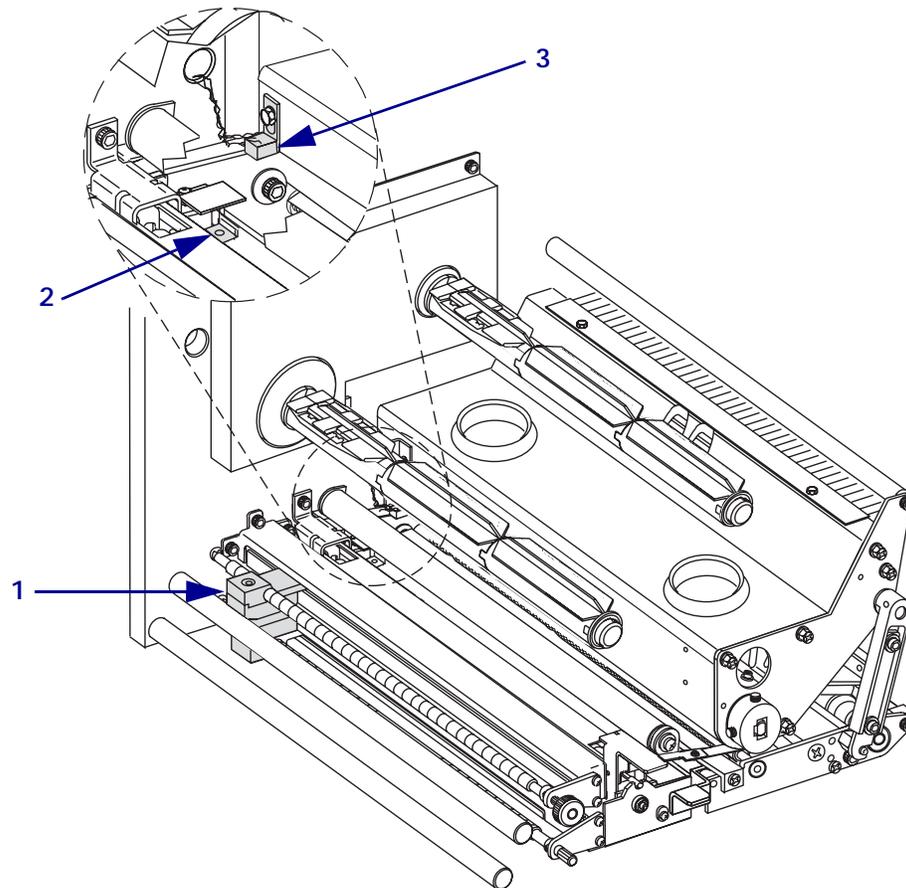
Remove any accumulated dirt and lint from the interior of the print engine using a soft bristle brush and/or vacuum cleaner. This area should be inspected every time a new ribbon is loaded.

## Clean the Sensors

To ensure proper operation of the print engine, all sensors should be cleaned on a regular basis. The sensors are shown in the following:

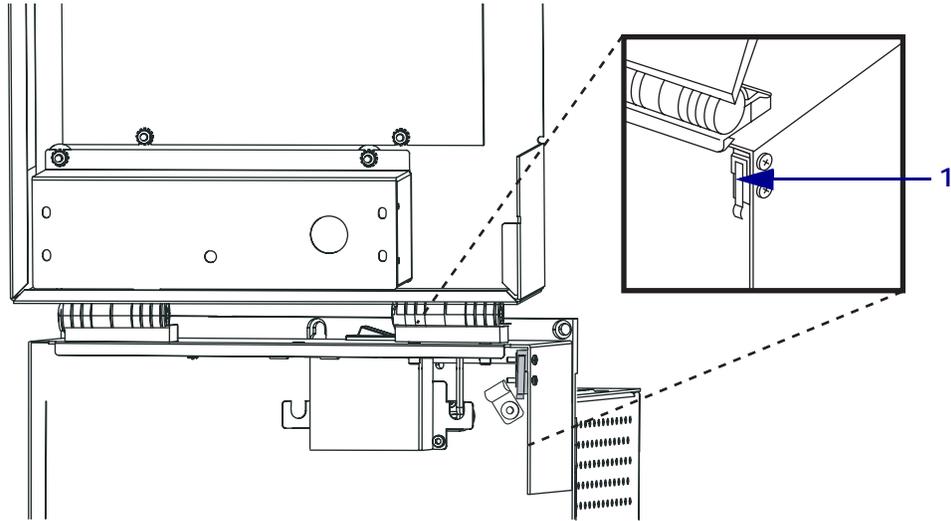
- See [Figure 32](#) for the media and ribbon sensors.
- See [Figure 33 on page 88](#) for the door-open sensor.

**Figure 32 • Media Sensor Locations (Right-Hand Unit Shown)**



1	Transmissive media sensor
2	Reflective media sensor
3	Ribbon sensor

**Figure 33 • Door-Open Sensor Location (Right-Hand Unit Shown)**



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1	Door-open sensor
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## Clean the Printhead and Platen Roller

Clean the printhead and platen roller according to the schedule in [Table 9 on page 86](#). Clean the printhead more often if you see inconsistent print quality, such as voids or light print. Clean the platen roller if you see media movement problems.

### To clean the printhead and platen roller, complete these steps:



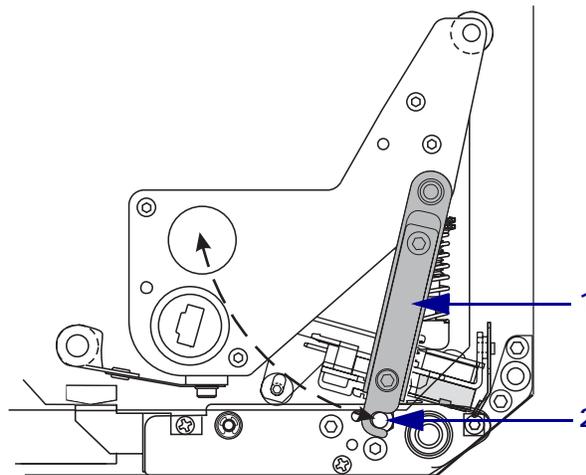
**Caution** • The printhead may be hot and could cause severe burns. Allow the printhead to cool.



**Caution** • Observe proper electrostatic safety precautions when handling any static-sensitive components such as circuit boards and printheads.

1. Turn Off (O) the print engine.
2. See [Figure 34](#). Open the printhead assembly by unlatching the printhead latch from the locking pin.

**Figure 34 • Opening the Printhead Assembly**

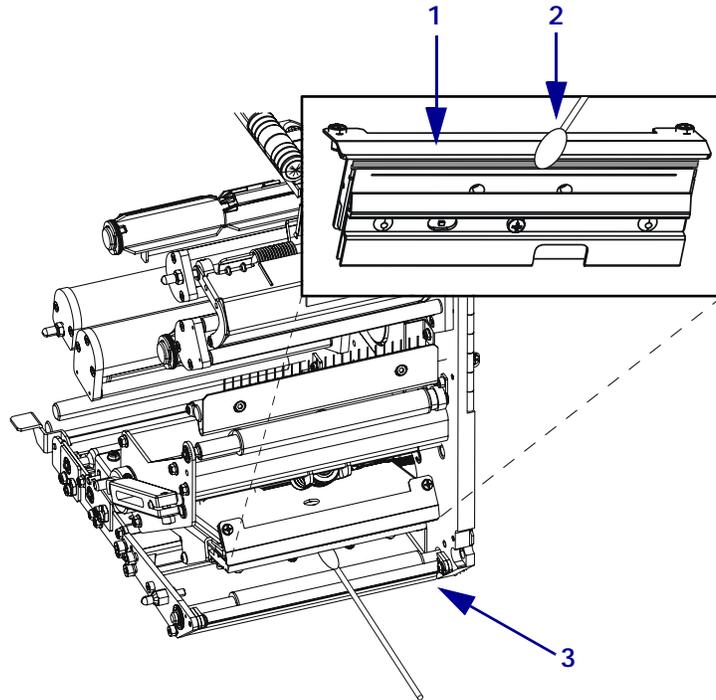


1	Printhead latch
2	Locking pin

3. Remove the media and ribbon from the print engine.

- See [Figure 35](#). Using Preventative Maintenance kit (part number 47362) or a solution of 90% isopropyl alcohol and 10% deionized water on a cotton swab, wipe the print elements from end to end. Allow the solvent to evaporate.

**Figure 35 • Printhead and Platen Roller Cleaning (Right-Hand Unit Shown)**



1	Printhead elements (gray strip)
2	Cotton swab
3	Platen Roller

- Use a lint-free cloth moistened with alcohol to clean the platen roller and other rollers. Rotate the rollers while cleaning.
- Reload the ribbon and media (if used).
- Turn On (I) the print engine.



**Note** • If print quality does not improve after you perform this procedure, clean the printhead with *Save-a-Printhead* cleaning film. Call your authorized Zebra distributor for more information.

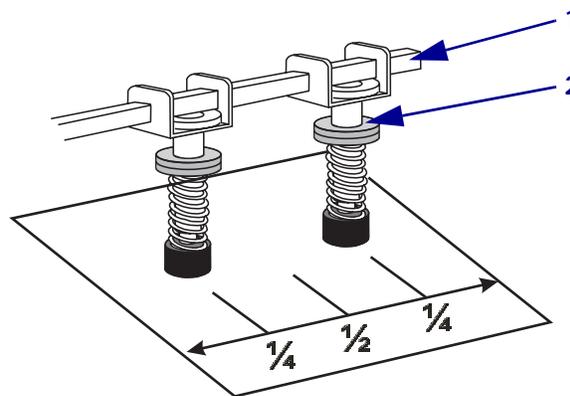
## Toggle Positioning

Proper toggle positioning is important for proper print quality. The toggles should be positioned approximately 1/4 of the way in from each media edge.

### To adjust the toggles, complete these steps:

1. See [Figure 36](#). Loosen the position locking nut by rotating it to the left.
2. Slide the toggle to the desired position on the toggle shaft.
3. Finger tighten the position locking nut by rotating it to the right.

**Figure 36 • Toggle Positioning (Right-Hand Unit Shown)**



1	Toggle shaft
2	Position locking nut

## Printhead Pressure Adjustment

Before adjusting the printhead pressure, check that the toggles are positioned correctly. See [Toggle Positioning on page 91](#).

You may need to adjust the printhead pressure in the following instances:

- if there is noticeable bleed or swelling in the printed image (too much pressure)
- if there are voids (too little pressure)
- if the darkness setting (burn duration) is set properly, but printing is too light (too little pressure)

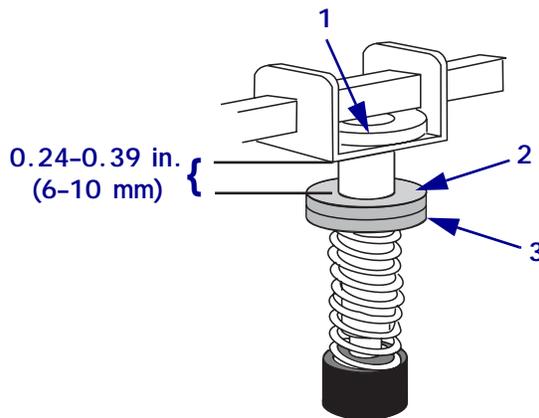


**Note** • Printhead and drive system (belts and bearings) life can be maximized by using the lowest pressure that produces the desired print quality.

### To adjust printhead pressure, complete these steps:

1. See [Figure 37](#). As a starting point for adjustment, set the position of the adjusting nuts so that when the locking nut is tightened, it is approximately 7/16 in. (11 mm) from the yoke.
2. Refer to [Adjust Print Darkness on page 55](#) to set the darkness value (burn duration) appropriately for your media and ribbon.
3. Refer to the [PAUSE Self Test on page 110](#) to print test labels.
4. Adjust the position of the adjusting nuts on both toggles until the print quality is acceptable (turning it clockwise increases the spring pressure, and counterclockwise decreases the pressure). Use the lowest pressure that provides the desired print quality.
5. Hold the adjusting nut in position, and tighten the locking nut against it.

**Figure 37 • Printhead Pressure Adjustment**



1	Yoke
2	Locking nut
3	Adjusting nut

## Power Fuse Replacement

The print engine uses a metric-style fuse (5 × 20 mm IEC) rated for 5 Amps at 250 Volts that bears the certification mark of a known international safety organization (see [Figure 12 on page 22](#)). The power entry module comes with two approved fuses in the fuse holder: one is in-circuit, and the other is a spare.




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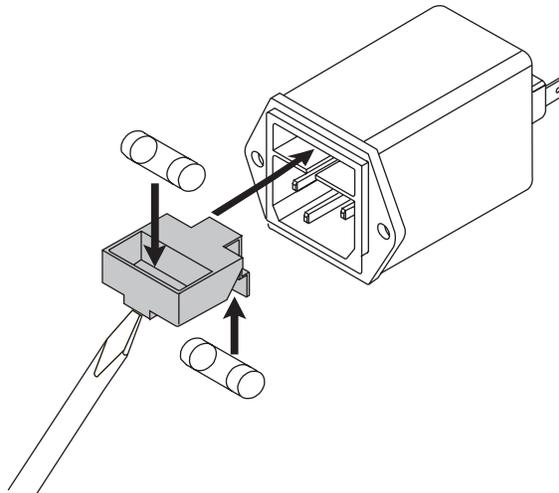
**Caution** • Turn Off (O) the print engine and disconnect it from the power source before performing the following maintenance.

---

### To replace a fuse, complete these steps:

1. Turn Off (O) the print engine and unplug the power cord from the back of the print engine.
2. See [Figure 38](#). Using a small-blade screwdriver, remove the fuse holder from the power entry module at the rear of the print engine.

**Figure 38 • Installing a Fuse**



3. Carefully remove the fuse from the in-circuit location.
4. To remove the spare fuse, gently push the point of a pencil or the end of a paperclip through one of the two holes in the fuse holder. Repeat through the other hole.
5. Insert the spare fuse in the in-circuit location.
6. Place a new fuse in the spare fuse location.
7. Reinstall the fuse holder into the power entry module at the rear of the print engine.
8. Reconnect the power cord, and then turn On (I) the print engine.  
The print engine should be ready for operation and the POWER light should be on. If power is not restored, an internal component failure may have occurred, and the print engine may require servicing.



**Notes •** \_\_\_\_\_

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# Troubleshooting

This section provides information about errors that you might need to troubleshoot. Assorted diagnostic tests are included.

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## Troubleshooting Checklists

**If an error condition exists with the print engine, review this checklist:**

- Is there an error message on the LCD? If yes, see [LCD Error Messages on page 97](#).
- Are noncontinuous labels being treated as continuous labels? If yes, see [Calibrate Media and Ribbon Sensor Sensitivity on page 68](#).
- Is the CHECK RIBBON light on when ribbon is loaded properly, or are noncontinuous labels being treated as continuous labels? If yes, see [Calibrate Media and Ribbon Sensor Sensitivity on page 68](#).
- Are you experiencing problems with print quality? If yes, see [Print Quality Problems on page 101](#).
- Are you experiencing communications problems? If yes, see [Communications Problems on page 105](#).

**If the labels are not printing or advancing correctly, review this checklist:**

- Are you using the correct type of labels? Review the types of label in [Types of Media on page 27](#).
- Are you using a label that is narrower than the maximum print width? See [Set Print Width on page 58](#).
- Review the label- and ribbon-loading illustrations in [Load Media on page 32](#) and [Load Ribbon on page 39](#).
- Check the position of the media sensor and move if necessary, as shown in [Adjust Ribbon and Media Sensors on page 47](#).
- Does the printhead need to be adjusted? See [Printhead Pressure Adjustment on page 92](#) for more information.
- Do the sensors need to be calibrated? See [Calibrate Media and Ribbon Sensor Sensitivity on page 68](#) for more information.

**If none of the above suggestions correct the problem, review this checklist:**

- Perform one or more of the self-tests given in [Print Engine Diagnostics on page 108](#). Use the results to help identify the problem.
- If you are still having problems, see [Contacts on page 3](#) for customer support information.

## LCD Error Messages

The LCD displays messages when there is an error. See [Table 10](#) for LCD errors, the possible causes, and the recommended solutions.

**Table 10 • LCD Error Messages**

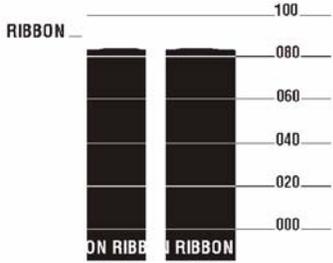
LCD Display/ Print Engine Condition	Possible Cause	Recommended Solution
<div style="border: 2px solid black; padding: 5px; text-align: center; width: fit-content; margin-bottom: 10px;"> <b>ERROR CONDITION RIBBON OUT</b> </div> <p>The print engine stops; RIBBON light ON, ERROR light flashes.</p>	<p>In thermal transfer mode, ribbon is not loaded or incorrectly loaded.</p>	<p>Load ribbon correctly. See <a href="#">Load Ribbon on page 39</a>.</p>
	<p>In thermal transfer mode, the ribbon sensor is not detecting ribbon that is loaded incorrectly.</p>	<ol style="list-style-type: none"> <li>1. Load ribbon correctly. See <a href="#">Load Ribbon on page 39</a>.</li> <li>2. Calibrate the sensors. See <a href="#">Calibrate Media and Ribbon Sensor Sensitivity on page 68</a>.</li> </ol>
	<p>In thermal transfer mode, media is blocking the ribbon sensor.</p>	<ol style="list-style-type: none"> <li>1. Load media correctly. See <a href="#">Load Media on page 32</a>.</li> <li>2. Calibrate the sensors. See <a href="#">Calibrate Media and Ribbon Sensor Sensitivity on page 68</a>.</li> </ol>
	<p>In thermal transfer mode, the print engine did not detect the ribbon even though it is loaded correctly.</p>	<ol style="list-style-type: none"> <li>1. Print a sensor profile. See <a href="#">Print Sensor Profile on page 67</a>. The ribbon out threshold (marked by the word RIBBON) is likely too high, above the black area that indicates where the ribbon is detected. <div style="text-align: center; margin: 10px 0;">  </div> </li> <li>2. Calibrate the sensors or load print engine defaults. See <a href="#">Calibrate Media and Ribbon Sensor Sensitivity on page 68</a> or <a href="#">LOAD DEFAULTS on page 51</a>.</li> </ol>
	<p>If you are using direct thermal media, the print engine is waiting for ribbon to be loaded because it is incorrectly set for thermal transfer mode.</p>	<p>Set the print engine for Direct Thermal mode. See <a href="#">Select Print Method on page 58</a>.</p>

Table 10 • LCD Error Messages (Continued)

LCD Display/ Print Engine Condition	Possible Cause	Recommended Solution
<div style="border: 1px solid black; padding: 5px; text-align: center; width: fit-content; margin: 0 auto;"> <b>WARNING RIBBON IN</b> </div> <p>RIBBON light ON, ERROR light flashes.</p>	<p>Ribbon is loaded, but the print engine is set for direct thermal mode.</p>	<p>Ribbon is not required with direct thermal media. If you are using direct thermal media, remove ribbon unless you are using it to protect the printhead. This error message will not affect printing.</p> <p>If you are using thermal transfer media, which requires ribbon, set the print engine for Thermal Transfer mode. See <i>Select Print Method</i> on page 58.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center; width: fit-content; margin: 0 auto;"> <b>ERROR CONDITION PAPER OUT</b> </div> <p>The print engine stops; MEDIA light ON, ERROR light flashes.</p>	<p>Media is not loaded or is loaded incorrectly.</p> <p>Misaligned media sensor.</p> <p>The print engine is set for noncontinuous media, but continuous media is loaded.</p>	<p>Load media correctly. See <i>Load Media</i> on page 32.</p> <p>Check position of the media sensor.</p> <p>Install proper media type, or reset print engine for current media type and perform calibration.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center; width: fit-content; margin: 0 auto;"> <b>ERROR CONDITION HEAD OPEN</b> </div> <p>The print engine stops and the ERROR light flashes.</p>	<p>The printhead is not fully closed.</p> <p>The head open sensor is not working properly.</p>	<p>Close printhead completely.</p> <p>Call a service technician.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center; width: fit-content; margin: 0 auto;"> <b>WARNING HEAD TOO HOT</b> </div> <p>The print engine stops and the ERROR light flashes.</p>	<div style="display: flex; align-items: flex-start;"> <div style="margin-right: 10px;">    </div> <div> <p><b>Caution</b> • The printhead may be hot enough to cause severe burns. Allow the printhead to cool.</p> <p><b>Caution</b> • Observe proper electrostatic safety precautions when handling any static-sensitive components such as circuit boards and printheads.</p> </div> </div> <p>The printhead is over temperature.</p>	<p>Allow the print engine to cool. Printing automatically resumes when the printhead elements cool to an acceptable operating temperature.</p>

Table 10 • LCD Error Messages (Continued)

LCD Display/ Print Engine Condition	Possible Cause	Recommended Solution
<div style="border: 1px solid black; padding: 5px; text-align: center; margin-bottom: 10px;"> <b>WARNING HEAD COLD</b> </div> <p>The print engine stops and the ERROR light flashes.</p>	<div style="display: flex; flex-direction: column; gap: 10px;"> <div style="display: flex; align-items: center;">  <div style="margin-left: 10px;"> <p><b>Caution</b> • An improperly connected printhead data or power cable can cause this error message. The printhead may be hot enough to cause severe burns. Allow the printhead to cool.</p> </div> </div> <div style="display: flex; align-items: center;">  <div style="margin-left: 10px;"> <p><b>Caution</b> • Observe proper electrostatic safety precautions when handling any static-sensitive components such as circuit boards and printheads.</p> </div> </div> </div>	<p>Continue printing while the printhead reaches the correct operating temperature. If the error remains, the environment may be too cold for proper printing. Relocate the print engine to a warmer area.</p>
	<p>The printhead is under temperature.</p>	
	<p>The printhead data cable is not properly connected.</p>	<div style="display: flex; align-items: center;">  <div style="margin-left: 10px;"> <p><b>Caution</b> • Turn off (O) the print engine before performing this procedure. Failure to do so can damage the printhead.</p> </div> </div> <ol style="list-style-type: none"> <li>1. Turn Off (O) the print engine.</li> <li>2. Disconnect and reconnect the data cable to the printhead.</li> <li>3. Ensure that the cable connector is fully inserted into the printhead connector.</li> <li>4. Turn on (I) the print engine.</li> </ol>
<div style="border: 1px solid black; padding: 5px; text-align: center; margin-bottom: 10px;"> <b>OUT OF MEMORY (function)</b> </div>	<p>There is not enough memory to perform the function specified on the second line of the error message.</p>	<p>Ensure that sufficient DRAM exists for the label length, downloaded fonts/graphics, and images.</p> <p>Ensure that the device, such as FLASH memory or PCMCIA card, is installed and not write protected or full.</p> <p>Ensure that the data is not directed to a device that is not installed or available.</p> <p>Refer to the <i>Maintenance Manual</i> for more information about the specified function.</p>

## Memory Errors

The memory errors in [Table 11](#) indicate that the print engine does not have enough memory to perform the function shown on the second line of the LCD.

**Table 11 • Memory Errors**

Problem/LCD Display	Possible Cause	Recommended Solution
OUT OF MEMORY CREATING BITMAP	<b>Creating Bitmap</b> The bitmap size (label length/width) does not fit in available memory.	<p>You may do any of the following:</p> <ul style="list-style-type: none"> <li>• Press PAUSE. Send a ~HM ZPL command to the print engine to display the amount of free memory. Then redesign the graphic/format to fit available memory, or remove items from memory to create more space.</li> <li>• Press PAUSE to skip the formatting step in process and proceed to the next step. With the print engine paused, press <b>CANCEL</b>. The print engine skips the current label formatting process and goes to the next label.</li> <li>• Turn the print engine Off (O) and then On (I) to clear the print engine's memory.</li> </ul>
OUT OF MEMORY STORING BITMAP	<b>Storing Bitmap</b> Not enough memory is available to store the bitmap created.	
OUT OF MEMORY BUILDING FORMAT	<b>Building Format</b> Label is too complex.	
OUT OF MEMORY STORING FORMAT	<b>Storing Format</b> Format is too large to fit in available memory.	
OUT OF MEMORY STORING GRAPHIC	<b>Storing Graphic</b> The graphic image is too large to fit in available memory.	
OUT OF MEMORY STORING FONT	<b>Storing Font</b> Not enough memory available to store the font.	

## Print Quality Problems

Table 12 identifies problems with print quality, the possible causes, and the recommended solutions.

**Table 12 • Print Quality Problems**

Problem	Possible Cause	Recommended Solution
<b>General print quality issues</b>	The print engine is set at the incorrect print speed.	For optimal print quality, set the print speed to the lowest possible setting for your application via control panel, the driver, or the software. See <a href="#">Adjust Print Speed on page 55</a> . You may wish to perform the <a href="#">FEED Self Test on page 111</a> .
	You are using an incorrect combination of labels and ribbon for your application.	<ol style="list-style-type: none"> <li>1. Switch to a different type of media or ribbon to try to find a compatible combination.</li> <li>2. If necessary, consult your authorized Zebra reseller or distributor for information and advice.</li> </ol>
	The print engine is set at an incorrect darkness level.	For optimal print quality, set the darkness to the lowest possible setting for your application via the control panel, the driver, or the software. See <a href="#">Adjust Print Darkness on page 55</a> . You may wish to perform the <a href="#">FEED Self Test on page 111</a> to determine the ideal darkness setting.
	The printhead is dirty.	<p>Clean the printhead according to the instructions in <a href="#">Clean the Printhead and Platen Roller on page 89</a>.</p> <p> <b>Caution</b> • The printhead may be hot enough to cause severe burns. Allow the printhead to cool.</p> <p> <b>Caution</b> • Observe proper electrostatic safety precautions when handling any static-sensitive components such as circuit boards and printheads.</p>

**Table 12 • Print Quality Problems (Continued)**

<b>Problem</b>	<b>Possible Cause</b>	<b>Recommended Solution</b>
<b>Wrinkled ribbon</b>	Ribbon fed through the machine incorrectly.	See <a href="#">Load Ribbon on page 39</a> .
	Incorrect burn temperature.	Set the darkness to the lowest possible setting for good print quality. See <a href="#">Adjust Print Darkness on page 55</a> .
	Incorrect or uneven pressure.	Set the pressure to the minimum needed for good print quality. See <a href="#">Printhead Pressure Adjustment on page 92</a> .
	Media not feeding properly; “walking” from side to side.	Make sure that media is snug by adjusting the media guide, or call a service technician.
	The strip plate needs adjusting.	Call a service technician.
	The printhead needs vertical adjustment.	Call a service technician.
	The printhead and platen roller need to be realigned.	Call a service technician.
<b>Long tracks of missing print on several labels</b>	Print element damaged.	Call a service technician.
	Wrinkled ribbon.	See wrinkled ribbon causes and solutions in this table.
<b>Fine, angular gray lines on blank labels</b>	Wrinkled ribbon.	See wrinkled ribbon causes and solutions in this table.
<b>The image prints on the platen roller instead of on the label.</b>	Incorrect print width.	If you are using a label that is narrower than the maximum width (based on dpi) with a right-hand print engine, you must set the print width to the correct value. If you do not do so, the image will print too far to the left. See <a href="#">Set Print Width on page 58</a> .
<b>Only the right side of the image prints on the left side of the label. The image is shifted to the left.</b>		
<b>Light printing or no printing on the left or right side of the label</b>	Printhead pressure needs adjustment, printhead out of alignment, or toggle in incorrect position.	See <a href="#">Toggle Positioning on page 91</a> and <a href="#">Printhead Pressure Adjustment on page 92</a> .
		Call a service technician.

Table 12 • Print Quality Problems (Continued)

Problem	Possible Cause	Recommended Solution
<b>Printing too light or too dark over the entire label</b>	Media or ribbon is not designed for high-speed operation.	Replace supplies with those recommended for high-speed operation.
	You are using an incorrect combination of labels and ribbon for your application.	<ol style="list-style-type: none"> <li>Switch to a different type of media or ribbon to try to find a compatible combination.</li> <li>If necessary, consult your authorized Zebra reseller or distributor for information and advice.</li> </ol>
	You are using ribbon with direct thermal media.	<p>Direct thermal media does not require ribbon. To check if you are using direct thermal media, perform the label scratch test in <i>When to Use Ribbon</i> on page 29.</p> <p>If you are using ribbon intentionally with direct thermal media, increase the darkness level, but note that high darkness levels may decrease printhead life. You may wish to perform the <i>FEED Self Test</i> on page 111 to determine the ideal darkness setting.</p>
	Incorrect or uneven printhead pressure.	Set the pressure to the minimum needed. See <i>Printhead Pressure Adjustment</i> on page 92.
<b>Smudge marks on labels</b>	Media or ribbon is not designed for high-speed operation.	Replace supplies with those recommended for high-speed operation.
<b>Misregistration/skips labels</b>	The print engine is not calibrated.	Recalibrate the print engine.
	Improper label format.	Use correct label format.
<b>Misregistration and misprint of one to three labels</b>	The platen roller is dirty.	See <i>Clean the Printhead and Platen Roller</i> on page 89.
	Media does not meet specifications.	Use media that meets specifications.
<b>Vertical drift in top-of-form position</b>	<p>Normal tolerances of mechanical parts and print engine modes.</p>  <p><b>Note</b> • A vertical drift of <math>\pm 4</math> to 6 dot rows (approximately 0.5 mm) is within normal tolerances.</p>	<ol style="list-style-type: none"> <li>Calibrate the print engine.</li> <li>Adjust the label top position setting. See <i>Adjust Label Top Position</i> on page 74.</li> </ol>
	The print engine is out of calibration.	Recalibrate the print engine.
	The platen roller is dirty.	See <i>Clean the Printhead and Platen Roller</i> on page 89.

**Table 12 • Print Quality Problems (Continued)**

<b>Problem</b>	<b>Possible Cause</b>	<b>Recommended Solution</b>
<b>Vertical image or label drift</b>	The print engine is using noncontinuous labels but is configured in continuous mode.	Configure the print engine for non-continuous and run calibration routine, if necessary.
	Improperly calibrated media sensor.	See <i>Calibrate Media and Ribbon Sensor Sensitivity</i> on page 68.
	The platen roller is dirty.	Clean the platen roller. See <i>Clean the Printhead and Platen Roller</i> on page 89.
	Improper printhead pressure settings (toggles).	Adjust the printhead pressure to ensure proper functionality.
	Improperly loaded ribbon or media.	Verify that the print engine is loaded properly.
	Incompatible media.	Ensure that the interlabel gaps or notches are 2 to 4 mm and consistently placed. Media must not exceed minimum specifications for mode of operation.
<b>The bar code printed on a label does not scan.</b>	The bar code is not within specifications because the print is too light or too dark.	Perform the <i>FEED Self Test</i> on page 111. Adjust the darkness or print speed settings as necessary.
	Not enough blank space around the bar code.	Leave at least 1/8 in. (3.2 mm) between the bar code and other printed areas on the label and between the bar code and the edge of the label.

## Communications Problems

Table 13 identifies problems with communications, the possible causes, and the recommended solutions.

**Table 13 • Communications Problems**

Problem	Possible Cause	Recommended Solution
<b>A label format was sent to the print engine but was not recognized. The DATA light does not flash.</b>	The communication parameters are incorrect.	Check the print engine driver or software communications settings (if applicable).
		If you are using serial communication, check the serial port setting in the control panel menu. See <a href="#">Set Serial Communications on page 69</a> .
		Make sure you are using the correct communication cable. See <a href="#">Data Cable Requirements on page 26</a> for the requirements.
		Using the control panel controls, check the protocol setting. It should be set to <b>NONE</b> . See <a href="#">Set Protocol on page 70</a> .
		If a driver is used, check the driver communication settings for your connection.
<b>A label format was sent to the print engine. Several labels print, then the print engine skips, misplaces, misses, or distorts the image on the label.</b>	The serial communication settings are incorrect.	Ensure that the flow control settings match.
		Check the communication cable length. See <a href="#">Data Cable Requirements on page 26</a> for requirements.
		Check the print engine driver or software communications settings (if applicable).
<b>A label format was sent to the print engine but was not recognized. The DATA light flashes but no printing occurs.</b>	The prefix and delimiter characters set in the print engine do not match the ones in the label format.	Verify the prefix and delimiter characters. See <a href="#">Set Format Prefix Character on page 72</a> and <a href="#">Set Delimiter Character on page 72</a> for the requirements.
		Incorrect data is being sent to the print engine.
	Check the communication settings on the computer. Ensure that they match the print engine settings.	
	If the problem continues, check the ZPL II format for changed ^CC, ^CT, and ^CD.	

## Miscellaneous Print Engine Problems

Table 14 identifies miscellaneous problems with the print engine, the possible causes, and the recommended solutions.

**Table 14 • Miscellaneous Print Engine Problems**

<b>Problem</b>	<b>Possible Cause</b>	<b>Recommended Solution</b>
<b>The LCD displays a language that I cannot read</b>	The language parameter was changed through the control panel or a ZPL command.	<ol style="list-style-type: none"> <li>1. Press <b>SETUP/EXIT</b> to enter configuration mode.</li> <li>2. Press the left oval. The print engine displays the <b>LANGUAGE</b> parameter in the current language. Even if you cannot recognize the characters displayed, you can still scroll to another language.</li> <li>3. Press the left or right oval to scroll through the choices.</li> <li>4. Press <b>SETUP/EXIT</b>. The LCD displays <b>SAVE CHANGES</b> in the original language.</li> <li>5. Press <b>NEXT</b> to exit configuration mode and save the changes (if the language does not change, you may need to scroll to a different save option by pressing the left or right oval in the previous step).</li> <li>6. Repeat this process, if necessary, until you reach the desired language.</li> </ol>
<b>The LCD is missing characters or parts of characters</b>	The LCD may need replacing.	Call a service technician.
<b>Changes in parameter settings did not take effect</b>	Parameters are set incorrectly.	<ol style="list-style-type: none"> <li>1. Set parameters and save permanently.</li> <li>2. Turn the print engine power Off (O) and then On (I).</li> </ol>
	A ZPL command turned off the ability to change the parameter.	Refer to the <i>ZPL Programming Guide</i> , or call a service technician.
	A ZPL command changed the parameter back to the previous setting.	Refer to the <i>ZPL Programming Guide</i> , or call a service technician.
	If the problem continues, there may be a problem with the main logic board.	Call a service technician.

**Table 14 • Miscellaneous Print Engine Problems (Continued)**

<b>Problem</b>	<b>Possible Cause</b>	<b>Recommended Solution</b>
<b>The print engine fails to calibrate or detect the top of the label.</b>	The print engine was not calibrated for the label being used.	Perform the calibration procedure in <i>Calibrate Media and Ribbon Sensor Sensitivity</i> on page 68.
	The print engine is configured for continuous media.	Set the media type to noncontinuous media. See <i>Set Media Type</i> on page 58.
	The driver or software configuration is not set correctly.	Driver or software settings produce ZPL commands that can overwrite the print engine configuration. Check the driver or software media-related setting.
<b>Non-continuous labels are being treated as continuous labels.</b>	The print engine is configured for continuous media.	Set the media type to noncontinuous media. See <i>Set Media Type</i> on page 58.
	The print engine was not calibrated for the media being used.	Perform the calibration procedure in <i>Calibrate Media and Ribbon Sensor Sensitivity</i> on page 68.
<b>All lights are on, but nothing displays on the LCD, and the print engine locks up.</b>	Internal electronic or firmware failure.	Call a service technician.
<b>The print engine locks up while running the Power-On Self Test.</b>	Main logic board failure.	Call a service technician.

## Print Engine Diagnostics

Self tests and other diagnostics provide specific information about the condition of the print engine. The self tests produce sample printouts and provide specific information that helps determine the operating conditions for the print engine. The most commonly used are the Power-On and the CANCEL self tests.



**Important** • Use full-width media when performing self tests. If your media is not wide enough, the test labels may print on the platen roller. To prevent this from happening, check the print width using [Set Print Width on page 58](#), and ensure that the width is correct for the media that you are using.

Each self test is enabled by pressing a specific control panel key or combination of keys while turning the power On (I). Keep the key(s) pressed until the first indicator light turns off. The selected self test automatically starts at the end of the Power-On Self Test.



**Note** •

- When performing these self tests, do not send data to the print engine from the host.
- If your media is shorter than the label to be printed, the test label continues on the next label.
- When canceling a self test prior to its actual completion, always reset the print engine by turning the print engine power Off (O) and then On (I).
- If print engine is in applicator mode and the liner is being taken up by the applicator, the operator must manually remove the labels as they become available.

### Power-On Self Test

A Power-On Self Test (POST) is performed each time the print engine is turned On (I). During this test, the control panel lights (LEDs) turn on and off to ensure proper operation. At the end of this self test, only the POWER LED remains lit. When the Power-On Self Test is complete, the media is advanced to the proper position.

**To initiate the Power-On Self Test, complete these steps:**

1. Turn On (I) the print engine using the power switch located to the side of the control panel.  
The POWER LED illuminates. The other control panel LEDs and the LCD monitor the progress and indicate the results of the individual tests. All messages during the POST display in English; however, if the test fails, the resulting messages cycle through the international languages as well.

## CANCEL Self Test

The CANCEL self test prints a configuration label (Figure 39).

### To perform the CANCEL Self Test, complete these steps:

1. Turn Off (O) the print engine.
2. Press and hold CANCEL while turning the print engine On (I). Hold CANCEL until the first control panel light turns off.  
 A print engine configuration label prints (Figure 39).

Figure 39 • Configuration Label

PRINTER CONFIGURATION	
Zebra Technologies	
ZTC 170PAX4 RH-200dpi	
ZBR2325570	
00.0	DARKNESS
2 IPS	PRINT SPEED
2 IPS	SLEW SPEED
2 IPS	BACKFEED SPEED
-016	TEAR OFF
APPLICATOR	PRINT MODE
CONTINUOUS	MEDIA TYPE
WEB	SENSOR TYPE
THERMAL TRANS	PRINT METHOD
2 094/203 IN	PRINT WIDTH
1600	LABEL LENGTH
39.0IN 988MM	MAXIMUM LENGTH
MEDIA DISABLED	EARLY WARNING
MAINT. OFF	EARLY WARNING
BIDIRECTIONAL	PARALLEL COMM.
RS232	SERIAL COMM.
9600	BAUD
8 BITS	DATA BITS
NONE	PARITY
XON/XOFF	HOST HANDSHAKE
NONE	PROTOCOL
000	NETWORK ID
NORMAL MODE	COMMUNICATIONS
<*>	CONTROL PREFIX
<*>	FORMAT PREFIX
<*>	DELIMITER CHAR
ZPL II	ZPL MODE
HIGH	RIBBON TENSION
CALIBRATION	MEDIA POWER UP
CALIBRATION	HEAD CLOSE
BEFORE	BACKFEED
+015	LABEL TOP
+0020	LEFT POSITION
0000	HEAD TEST COUNT
0615	HEAD RESISTOR
MODE 1	APPLICATOR PORT
PULSE MODE	START PRINT SIG
FEED MODE	RESYNCH MODE
25M	RIBBON LOW MODE
DISABLED	REPRINT MODE
046	WEB S.
079	MEDIA S.
071	RIBBON S.
050	MARK S.
000	MARK MED S.
081	MEDIA LED
035	RIBBON LED
008	MARK LED
+10	LCD ADJUST
DPSWFXM	MODES ENABLED
	MODES DISABLED
1344 8/MM FULL	RESOLUTION
V60.13.0.5 ->	FIRMWARE
V30 33037 56	HARDWARE ID
CUSTOMIZED	CONFIGURATION
NONE	COMPACT FLASH
11776k	RAM
NONE	MEMORY CARD
2048k	ONBOARD FLASH
NONE	FORMAT CONVERT
*** APPLICATOR	P30 INTERFACE
005 DISPLAY	P31 INTERFACE
007 POWER SUPPLY	P32 INTERFACE
017 PAX170 RTS	P34 INTERFACE
FW VERSION	IDLE DISPLAY
09/30/04	RTC DATE
09:30	RTC TIME
115740 IN	NONRESET CNTR
115740 IN	RESET CNTR1
115740 IN	RESET CNTR2
293691 CM	NONRESET CNTR
293691 CM	RESET CNTR1
293691 CM	RESET CNTR2
46855 LABLS	NONRESET CNTR
46855 LABLS	RESET CNTR1
46855 LABLS	RESET CNTR2
HW 12418.04JDR080120.57340.D.VH1....	

FIRMWARE IN THIS PRINTER IS COPYRIGHTED

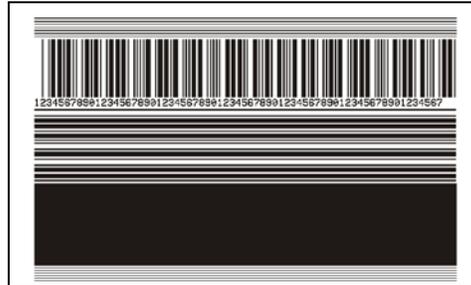
## PAUSE Self Test

This self test can be used to provide the test labels required when making adjustments to the print engine's mechanical assemblies or to determine if any printhead elements are not working. [Figure 40](#) shows a sample printout.

### To perform a PAUSE self test, complete these steps:

1. Turn Off (O) the print engine.
2. Press and hold PAUSE while turning the power On (I). Hold PAUSE until the first control panel light turns off.
  - The initial self test prints 15 labels at the print engine's slowest speed, and then automatically pauses the print engine. Each time PAUSE is pressed, an additional 15 labels print. [Figure 40](#) shows a sample of the labels.

Figure 40 • PAUSE Test Label



- While the print engine is paused, pressing CANCEL alters the self test. Each time PAUSE is pressed, 15 labels print at 6 in. (152 mm) per second.
- While the print engine is paused, pressing CANCEL again alters the self test a second time. Each time PAUSE is pressed, 50 labels print at the print engine's slowest speed.
- While the print engine is paused, pressing CANCEL again alters the self test a third time. Each time PAUSE is pressed, 50 labels print at 6 in. (152 mm) per second.
- While the print engine is paused, pressing CANCEL again alters the self test a fourth time. Each time PAUSE is pressed, 15 labels print at the print engine's maximum speed.
- To exit this self test at any time, press and hold CANCEL.

## FEED Self Test

Different types of media may require different darkness settings. This section contains a simple but effective method for determining the ideal darkness for printing bar codes that are within specifications.

During the FEED self test, labels are printed at different darkness settings at two different print speeds. The relative darkness and the print speed are printed on each label. The bar codes on these labels may be ANSI-graded to check print quality.

The darkness value starts at three settings lower than the print engine's current darkness value (relative darkness of -3) and increase until the darkness is three settings higher than the current darkness value (relative darkness of +3).

The speed at which labels are printed during this print quality test depend on the dot density of the printhead.

- 300 dpi print engines: 7 labels are printed at the 2 ips and 8 ips print speeds.
- 203 dpi print engines: 7 labels are printed at the 2 ips and 12 ips print speeds.

### To perform a FEED self test, complete these steps:

1. Print a configuration label to show the print engine's current settings.
2. Turn Off (O) the print engine.
3. Press and hold FEED while turning the power On (I). Hold FEED until the first control panel light turns off.

The print engine prints a series of labels (Figure 41) at various speeds and at darkness settings higher and lower than the darkness value shown on the configuration label.



Figure 42 • Bar Code Darkness Comparison

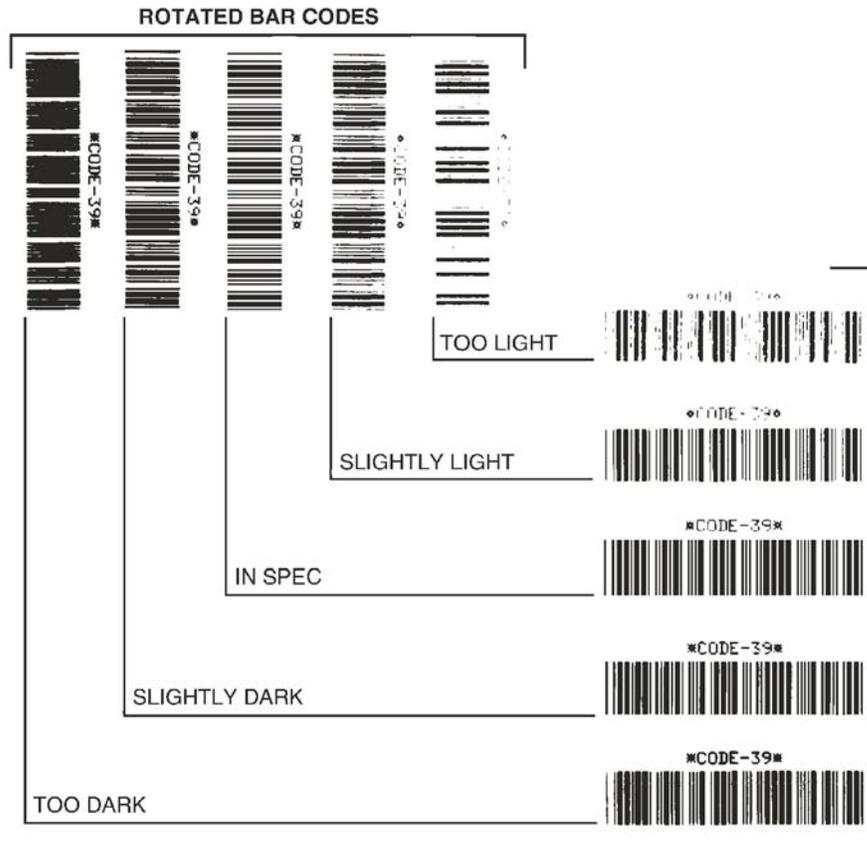


Table 15 • Judging Bar Code Quality

Print Quality	Description
<b>Too dark</b>	<p>Labels that are too dark are fairly obvious. They may be readable but not “in-spec.”</p> <ul style="list-style-type: none"> <li>• The normal bar code bars increase in size.</li> <li>• The openings in small alphanumeric characters may fill in with ink.</li> <li>• Rotated bar code bars and spaces run together.</li> </ul>
<b>Slightly dark</b>	<p>Slightly dark labels are not as obvious.</p> <ul style="list-style-type: none"> <li>• The normal bar code will be “in-spec.”</li> <li>• Small character alpha numerics will be bold and could be slightly filled in.</li> <li>• The rotated bar code spaces are small when compared to the “in-spec” code, possibly making the code unreadable.</li> </ul>

**Table 15 • Judging Bar Code Quality (Continued)**

Print Quality	Description
<b>“In-spec”</b>	<p>The “in-spec” bar code can only be confirmed by a verifier, but it should exhibit some visible characteristics.</p> <ul style="list-style-type: none"> <li>• The normal bar code will have complete, even bars and clear, distinct spaces.</li> <li>• The rotated bar code will have complete, even bars and clear, distinct spaces. Although it may not look as good as a slightly dark bar code, the bar code will be “in-spec.”</li> <li>• In both normal and rotated styles, small alphanumeric characters look complete.</li> </ul>
<b>Slightly light</b>	<p>Slightly light labels are, in some cases, preferred to slightly dark ones for “in-spec” bar codes.</p> <ul style="list-style-type: none"> <li>• Both normal and rotated bar codes will be in spec, but small alphanumeric characters may not be complete.</li> </ul>
<b>Too light</b>	<p>Labels that are too light are obvious.</p> <ul style="list-style-type: none"> <li>• Both normal and rotated bar codes have incomplete bars and spaces.</li> <li>• Small alphanumeric characters are unreadable.</li> </ul>

5. Note the relative darkness value and the print speed printed on the best test label.
6. Add or subtract the relative darkness value from the darkness value specified on the configuration label. The resulting numeric value (0 to 30) is the best darkness value for that specific label/ribbon combination and print speed.
7. If necessary, change the darkness value to the darkness value on the best test label. See [Adjust Print Darkness on page 55](#).
8. If necessary, change the print speed to the same speed as on the best test label. See [Adjust Print Speed on page 55](#).

## FEED and PAUSE Self Test

Performing this self test temporarily resets the print engine configuration to the factory default values. These values are active only until power is turned off unless you save them permanently in memory. If the factory default values are permanently saved, a media calibration procedure must be performed, and you must reset the head resistance value and the applicator port setting to their required values.

### To perform a FEED and PAUSE self test, complete these steps:

1. Turn Off (O) the print engine.
2. Press and hold FEED and PAUSE while turning the power On (I).
3. Hold FEED and PAUSE until the first control panel light turns off.

The print engine configuration is temporarily reset to the factory default values. No labels print at the end of this test.

Table 16 indicates which print engine function controls each of the configuration parameters:

**Table 16 • Control of Parameters**

Parameter	Controlled By
Darkness	Configuration, ZPL, and WebView
Tear Off	Configuration, ZPL, and WebView
Print Mode	Configuration, ZPL, and WebView
Media Type	Calibration, Configuration, ZPL, and WebView
Sensor Type	Configuration, ZPL, and WebView
Print Method	Calibration, Configuration, ZPL, and WebView
Print Width	Configuration, ZPL, and WebView
Label Length	Calibration, Configuration, ZPL, and WebView
Maximum Length	Configuration, and WebView and Memory Size
Host Port	Configuration, and WebView
Baud	Configuration, ZPL, and WebView
Data Bits	Configuration, ZPL, and WebView
Parity	Configuration, ZPL, and WebView
Stop Bits	Configuration, ZPL, and WebView
Host Handshake	Configuration, ZPL, and WebView
Protocol	Configuration, ZPL, and WebView
Network ID	Configuration, ZPL, and WebView
Communications	Configuration, ZPL, and WebView
Control Prefix	Configuration, ZPL, and WebView
Format Prefix	Configuration, ZPL, and WebView
Delimiter Character	Configuration, ZPL, and WebView

**Table 16 • Control of Parameters (Continued)**

<b>Parameter</b>	<b>Controlled By</b>
ZPL Mode	Configuration, ZPL, and WebView
Media Power Up	Configuration, ZPL, and WebView
Head Close	Configuration, ZPL, and WebView
Backfeed	Configuration, ZPL, and WebView
Label Top	Configuration, ZPL, and WebView
Left Position	Configuration, ZPL, and WebView
Head Resistance	Configuration (must match head resistance label value), ZPL, and WebView
Verifier Port	Configuration, ZPL, and WebView
Applicator Port	Configuration, ZPL, and WebView
Start Print Signal	Configuration, ZPL, and WebView
Resynch Mode	Configuration, ZPL, and WebView
Ribbon Low Mode	Configuration, ZPL, and WebView
Reprint Mode	Configuration, ZPL, and WebView
Web Sensor	Configuration, ZPL, and WebView
Media Sensor	Configuration, ZPL, and WebView
Ribbon Sensor	Configuration, ZPL, and WebView
Mark Sensor	Configuration, ZPL, and WebView
Mark Media Sensor	Configuration, ZPL, and WebView
Media LED	Configuration, ZPL, and WebView
Ribbon LED	Configuration, ZPL, and WebView
Mark LED	Configuration, ZPL, and WebView
LCD Adjust	Configuration, and WebView
Modes Enabled	ZPL, and WebView
Modes Disabled	ZPL, and WebView
Resolution	Fixed (head type switch)
Socket 1 ID	Fixed (option EPROMS)
Firmware	Fixed (code EPROMS)
Configuration	Configuration, and WebView
Memory	Fixed (SIMM size and 1 MB standard)
B:Memory	Fixed (option card)
J12 Interface	Fixed
J11 Interface	Fixed
J10 Interface	Fixed
J9 Interface	Fixed

Table 16 • Control of Parameters (Continued)

Parameter	Controlled By
J8 Interface	Fixed
J7 Interface	Fixed
Twinax/Coax ID	ZPL

## Communications Diagnostics Test

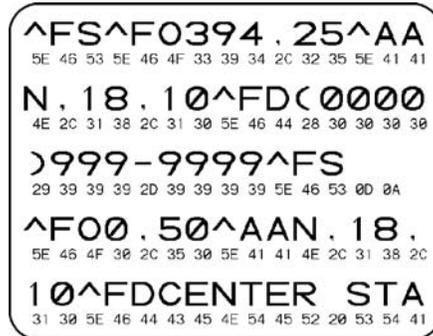
Do not perform the following test until all configuration and calibration parameters have been set. For configuration information, see [Control Panel LCD Displays on page 55](#).

This test is controlled from the control panel LCD display. See [Set Communications Mode on page 71](#). [Figure 43](#) shows a typical printout from this test. Turn the print engine power Off (O) and then back On (I) to exit this self test and return to normal operation.



**Note** • This test label prints upside-down.

Figure 43 • Communications Diagnostics Test Label





**Notes •** \_\_\_\_\_

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# Data Ports

This section describes the standard communication ports available to connect the print engine to your computer or network.

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## Parallel Data Port

The parallel data interface supports IEEE 1284 bidirectional parallel communications in nibble mode. The parallel interface provides a means of communication that typically is faster than the serial interface methods. In this method, the bits of data that make up a character are sent all at one time over several wires in the cable, one bit per wire.

When communicating via the parallel port, the values selected on the print engine must be the same as those used by the host equipment connected to the print engine. Port selection for status information is determined by the channel sending the request. The parallel port can be set for bidirectional or unidirectional communication. The default setting is bidirectional.

### Parallel Cabling Requirements

See [IEEE 1284 Bidirectional Parallel on page 25](#) for basic cabling information.

A standard 36-pin parallel connector is available on the back of the print engine for connection to the data source. An IEEE-1284 compatible bidirectional parallel data cable is required when this communication method is used. The required cable must have a standard 36-pin parallel connector on one end that is plugged into the mating connector located at the rear of the print engine. The other end of the cable connects to the print engine connector at the host computer. Port selection for status information is determined each time the print engine is turned on.

### Parallel Port Interconnections

[Table 17](#) shows the pin configuration and function of a standard computer-to-printer parallel cable.

**Table 17 • Parallel Cable Pin Configuration**

36-Pin Connectors	Description
1	nStrobe/HostClk
2–9	Data Bits 1–8
10	nACK/PtrClk
11	Busy/PtrBusy
12	PError/ACKDataReq
13	Select/Xflag
14	nAutoFd/HostBusy
15	Not used
16, 17	Ground
18	+5 V at 750 mA The maximum current draw may be limited by option configuration.
19–30	Ground

Table 17 • Parallel Cable Pin Configuration (Continued)

36-Pin Connectors	Description
31	nInit
32	nFault/NDataAvail
33, 34	Not used
35	+5 V through a 1.8 K $\Omega$ Resistor
36	NSelectin/1284 active

## Serial Data Port

See *RS-232 Serial* on page 24 for basic cabling information.

To communicate using the serial data port of the print engine, you must choose the number of data bits, parity, and handshaking. Parity applies only to data transmitted by the print engine because the parity of received data is ignored.

The values selected must be the same as those used by the host equipment connected to the print engine. Default print engine settings are 9600 baud, 8 data bits, no parity, and XON/XOFF. The print engine will accept any host setting for stop bits.

## Hardware Control Signal Descriptions

For all RS-232 input and output signals, the print engine follows both the Electronics Industries Association (EIA) RS-232 and the Consultative Committee for International Telegraph and Telephone (CCITT) V.24 standard signal level specifications.

When DTR/DSR handshaking is selected, the Data Terminal Ready (DTR) control signal output from the print engine controls when the host computer may send data. DTR ACTIVE (positive voltage) permits the host to send data. When the print engine places DTR in the INACTIVE (negative voltage) state, the host must not send data.



**Note** • When XON/XOFF handshaking is selected, data flow is controlled by the ASCII Control Codes DC1 (XON) and DC3 (XOFF). The DTR Control lead has no effect.

Request To Send (RTS) is a control signal from the print engine that is connected to the Clear To Send (CTS) input at the host computer.

## Pin Configuration

Connect the serial data cable to the female DB-9 connector on the back of the print engine. For all RS-232 connections through a DB-25 cable, use a DB-9 to DB-25 interface module (see [DB-9 to DB-25 Connections on page 125](#)).

Table 18 shows the pin configuration of the serial data connector.

**Table 18 • Serial Connector Pin Configuration**

Pin No.	Name	Description
1	+5 VDC	Connected to Pin 9
2	RXD	Receive data—data input to print engine
3	TXD	Transmit data—data output from print engine
4	DTR	Data terminal ready—output from print engine
5	SG	Signal ground
6	DSR	Data set ready—input to print engine
7	RTS	Request to send—output from print engine
8	CTS	Clear to send—input to print engine
9	+5 VDC	+5 VDC at 750 mA (connected to Pin 1) The maximum current draw may be limited by option configuration.

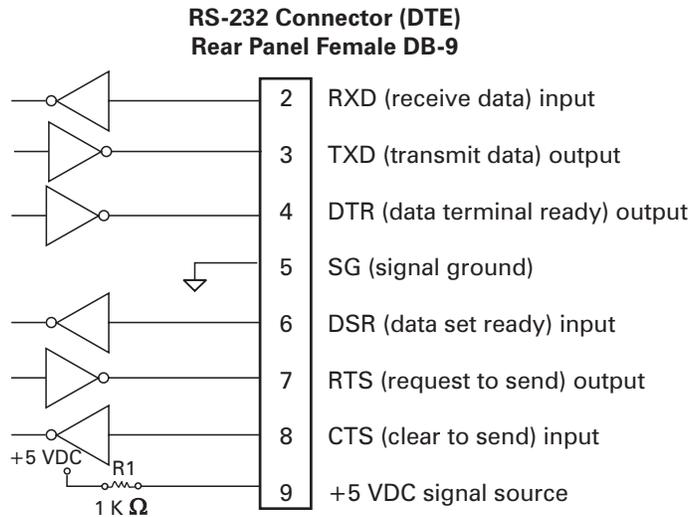
## RS-232 Interface Connections

The print engine is configured as Data Terminal Equipment (DTE). Figure 44 shows the internal connections of the print engine's RS-232 connector.



**Note** • Use a null modem (crossover) cable to connect the print engine to a computer or any other DTE device.

**Figure 44 • RS-232 DB9 MLB Connections**



**NOTE:** Pin 1 is unused and unterminated.

Pin 9 is also available as a +5 VDC signal source at 750 mA. The maximum current draw may be limited by option configuration.

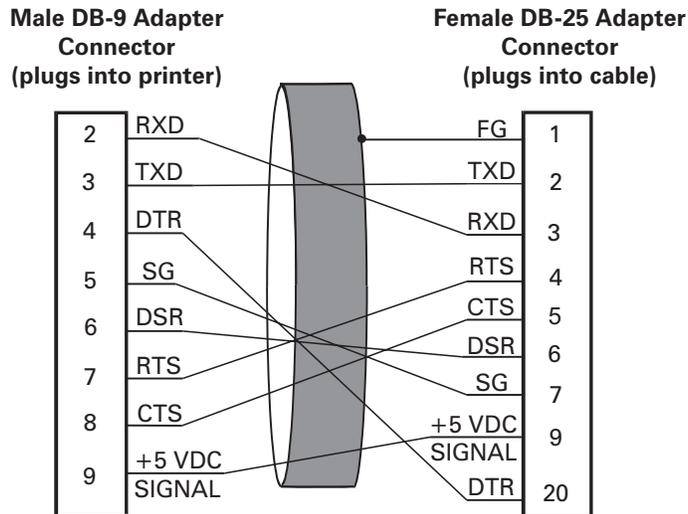


**Important** • To enable this capability, a qualified service technician must install a jumper on the print engine's main logic board on JP1, pins 2 and 3.

## DB-9 to DB-25 Connections

To connect the print engine's RS-232 DB-9 interface to a DB-25 connector, an interface adapter is required. A generic DB-25 adapter can be used, although the +5 VDC signal source would not be passed through the adapter. [Figure 45](#) shows the connections required for the DB-9 to DB-25 interface.

**Figure 45 • DB-9 to DB-25 Cable Connections**

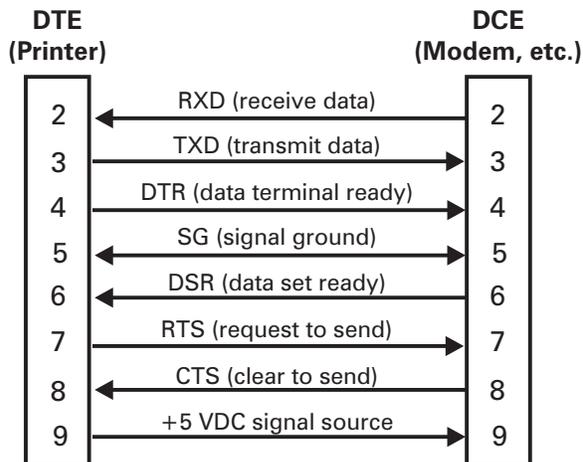


**NOTE:** Pin 1 of DB-9 connector is unused and unterminated.

## Modem Connection

When the print engine is connected via its RS-232 interface to Data Communication Equipment (DCE) such as a modem, use a standard RS-232 (straight-through) interface cable. [Figure 46](#) shows the connections required for this cable.

**Figure 46 • RS-232 Cable Connections**



**NOTE:** Pin 1 is unused and unterminated at the printer.

## Applicator Interface Connector

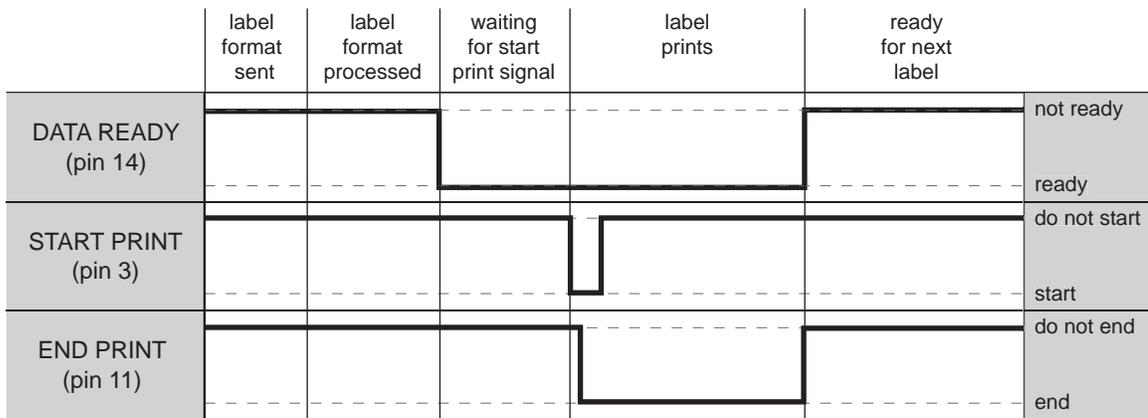
An external DB-15 connector is present on the rear panel of the print engine for communication with a customer applicator. An optional DB-15 to DB-9 adapter cable (Zebra part number 49609) is available to accommodate existing DB-9 interfaces.

### Applicator Signals

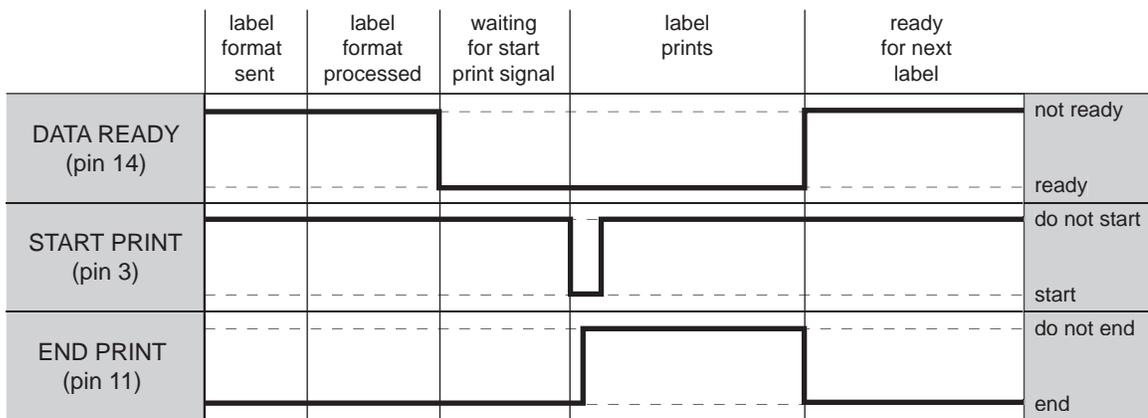
The print engine communicates with a customer applicator through a series of signals on the pins in the DB-15 connector. Each pin causes different things to happen when the signal is active (asserted) or not active (deasserted). [Applicator Interface Connector Pin Configuration on page 127](#) provides additional information about each pin and signal.

The following timing diagrams show how applicator signals function in each applicator mode during the stages of printing a label.

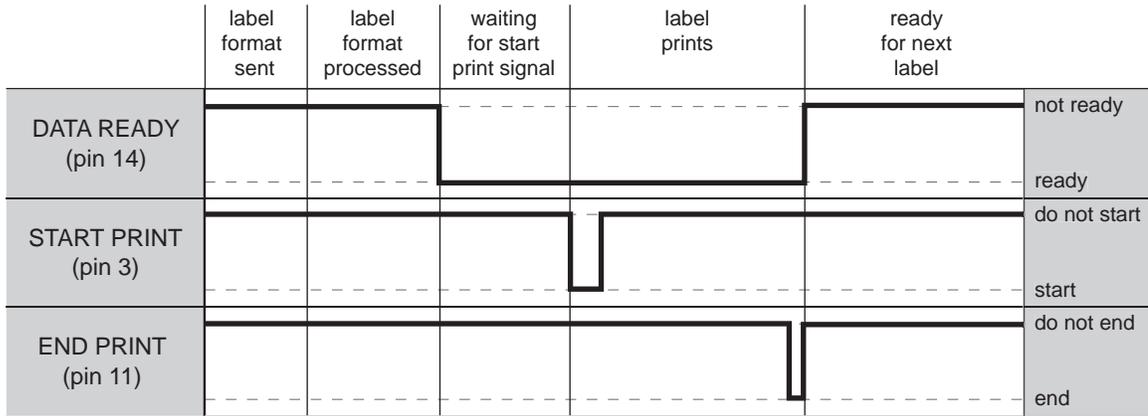
**Figure 47 • Applicator Signals (Mode 1)**



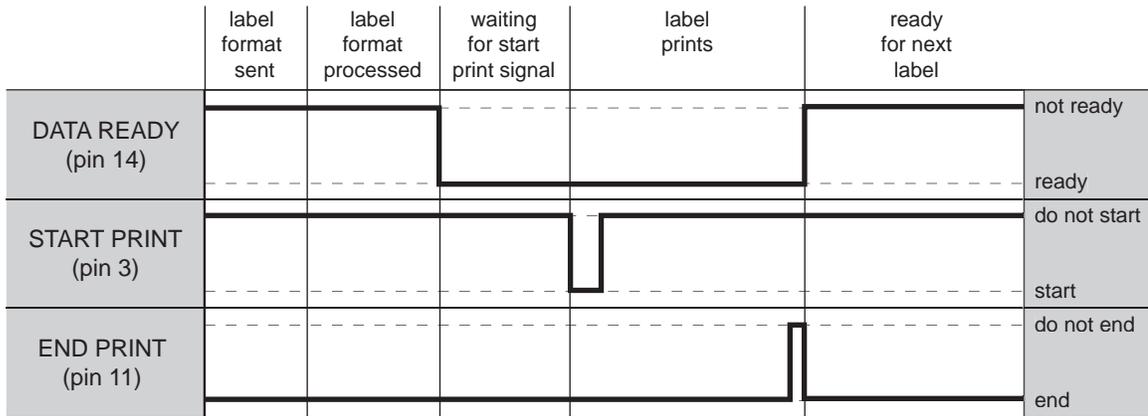
**Figure 48 • Applicator Signals (Mode 2)**



**Figure 49 • Applicator Signals (Mode 3)**



**Figure 50 • Applicator Signals (Mode 4)**



## Applicator Interface Connector Pin Configuration

The Applicator Interface Assembly is available in two versions: a +5 V I/O and a +24–28 V I/O. [Table 19](#) lists the pin configurations and functions of the applicator interface connector for both +5 V and 24–28 V operation.

**Table 19 • Applicator Interface Connector Pin Configuration**

Pin No.	Signal Name	Signal Type	Description
1	I/O SIGNAL GROUND (+5V Return)	I/O Signal Ground	Using jumper J5, this pin can be configured as isolated or non-isolated from the print engine signal ground. See <a href="#">Jumper Configurations and Pinouts for +5 V I/O Operation</a> on page 131 for more information.
1	I/O SIGNAL GROUND (+24-28V Return)	I/O Signal Ground	No jumpers to configure. <div style="display: flex; align-items: center;"> <div> <p><b>Important</b> • Customer must provide this external ground (can come from pin 8). See <a href="#">Pinouts for +24-28 V I/O Operation</a> on page 132 for more information.</p> </div> </div>

Table 19 • Applicator Interface Connector Pin Configuration (Continued)

Pin No.	Signal Name	Signal Type	Description
2	+5V I/O (Fused at 1 A) <b>Caution</b> • Replace the fuse only with one of the same type and rating.	Power	See <a href="#">Figure 51 on page 133</a> for fuse location. Using jumper J4, this pin can be configured as isolated or non-isolated from the Applicator Interface Circuit +5 V Supply. See <a href="#">Jumper Configurations and Pinouts for +5 V I/O Operation on page 131</a> for more information.
2	+24-28V I/O	Power	No jumpers to configure. This +24-28V power source also supplies voltage for output signal pull-up resistors.  <b>Important</b> • Customer must provide this external power (can come from pin 7). See <a href="#">Pinouts for +24-28 V I/O Operation on page 132</a> for more information.
3	START PRINT	Input	See <a href="#">Applicator Signals on page 126</a> for more information about the start and end print signals. <ul style="list-style-type: none"> <li>• <b>Pulse Mode</b>—The label printing process begins on the HIGH to LOW transition of this signal if a format is ready. Deassert this signal HIGH to inhibit printing of a new label.</li> <li>• <b>Level Mode</b>—Assert LOW to enable the print engine to print if a label format is ready. When deasserted HIGH, the print engine completes the label that is printing then stops and waits for this input to be reasserted LOW.</li> </ul>
4	FEED	Input	When the print engine is idle or has been paused, assert this input LOW to trigger repeated feeding of blank labels. Deassert HIGH to stop feeding blank labels and register to the top of the next label.
5	PAUSE	Input	To toggle the current Pause state, this input must be asserted LOW for 200 milliseconds, or until the SERVICE REQUIRED output (pin 10) changes state.
6	REPRINT	Input	<ul style="list-style-type: none"> <li>• If the Reprint feature is enabled, this input must be asserted LOW to cause the print engine to reprint the last label. See <a href="#">Set Reprint Mode on page 78</a> for more information.</li> <li>• If the Reprint feature is disabled, this input is ignored.</li> </ul>
7	+28 V (Fused at 500 mA. See <a href="#">Figure 51 on page 133</a> for fuse location.) <b>Caution</b> • Replace the fuse only with one of the same type and rating.	Power	The Interface Power Supply. Supplies power to external sensors as required.  <b>Note</b> • If operating with 28V signals only, pin 7 may be used to supply power to pin 2, which creates a non-isolated mode of operation.

**Table 19 • Applicator Interface Connector Pin Configuration (Continued)**

Pin No.	Signal Name	Signal Type	Description
8	POWER GROUND (+28 V DC Return)	Ground	The Interface Power Ground.   <b>Note</b> • If pin 7 is used to supply power to pin 2, use this pin to ground pin 1.
9	RIBBON LOW	Output	Asserted if the Ribbon Low feature is enabled and the amount of ribbon remaining on the supply spool is below a specific threshold level (see <a href="#">Set Ribbon Low Mode on page 78</a> ).  <ul style="list-style-type: none"> <li>• For print engines with the Ribbon Low Output parameter, asserted HIGH or LOW depending on the ribbon low output mode selected. See <a href="#">Set Ribbon Low Output on page 78</a> for more information.</li> <li>• For print engines without the Ribbon Low Output parameter, asserted HIGH.</li> </ul> If the Ribbon Low feature is disabled, this output lead is disabled.
10	SERVICE REQUIRED	Output	Asserted LOW in the following circumstances:  <ul style="list-style-type: none"> <li>• the media cover is open</li> <li>• the printhead is open</li> <li>• the ribbon or media is out</li> <li>• the print engine is paused (to disable this function, see <a href="#">Set Applicator Error Signal When Print Engine Pauses on page 76</a>)</li> <li>• an operational fault occurs</li> <li>• a Resynch error occurs while the applicator Resynch mode is set to Error mode (see <a href="#">Select Resynch Mode on page 77</a>)</li> </ul>

Table 19 • Applicator Interface Connector Pin Configuration (Continued)

Pin No.	Signal Name	Signal Type	Description
11	END PRINT	Output	<p>See <a href="#">Applicator Signals on page 126</a> for more information about the start and end print signals. See <a href="#">Set Applicator Port Mode on page 76</a> for more information about the modes.</p> <ul style="list-style-type: none"> <li>• <b>MODE 0</b>—The applicator port is OFF.</li> <li>• <b>MODE 1</b>—Asserted LOW only while the print engine is moving the label forward; otherwise deasserted HIGH.</li> <li>• <b>MODE 2</b>—Asserted HIGH only while the print engine is moving the label forward; otherwise deasserted LOW.</li> <li>• <b>MODE 3</b>—(Default) Asserted LOW for 20 milliseconds when a label is completed and positioned. Not asserted during continuous printing.</li> <li>• <b>MODE 4</b>—Asserted HIGH for 20 milliseconds when a label is completed and positioned. Not asserted during continuous printing.</li> </ul>
12	MEDIA OUT	Output	Asserted LOW while there is no media in the print engine.
13	RIBBON OUT	Output	Asserted LOW while there is no ribbon in the print engine.
14	DATA READY	Output	<p>See <a href="#">Applicator Signals on page 126</a> for more information about this signal.</p> <ul style="list-style-type: none"> <li>• Asserted LOW when sufficient data has been received to begin printing the next label.</li> <li>• Deasserted HIGH whenever printing stops after the current label, due to either a pause condition or the absence of a label format.</li> </ul>
15	SPARE	Output	To be determined.

## Jumper Configurations and Pinouts for +5 V I/O Operation

Jumpers J4 and J5 are used together to produce isolated or non-isolated modes of operation for applicator input and output control signals. J4 configures the +5 V source for the optoisolator circuits, and J5 configures the ground. For proper operation, when J4 is installed, J5 must be installed, and when J4 is removed, J5 must be removed.

Table 20 describes the pin and jumper configurations for +5 V I/O operation. See Figure 51 on page 133 for jumper locations.

**Table 20 • Non-Isolated and Isolated Modes for +5V Operation**

	Non-Isolated (Jumpers In)	Isolated (Jumpers Out)
<b>Pin 1</b>	<b>Ground +5V, Jumper J5 In</b> I/O ground is connected to the print engine signal ground.	<b>External Ground +5V, Jumper J5 Out</b> I/O ground is disconnected from the print engine signal ground. Ground must be provided externally to this pin.
<b>Pin 2</b>	<b>+5V Output, Jumper J4 In</b> +5 V I/O is connected to the applicator interface circuit +5 V Supply.	<b>External +5V Input, Jumper J4 Out</b> +5 V I/O is disconnected from the applicator interface circuit +5 V Supply. The +5 V for the applicator interface optoisolator circuits must be provided externally. This input also supplies voltage for output signal pull-up resistors.
<b>Pinouts</b>		

## Pinouts for +24-28 V I/O Operation

Table 21 describes the pin configurations for +24-28 V I/O operation. There are no jumpers to configure for this mode.

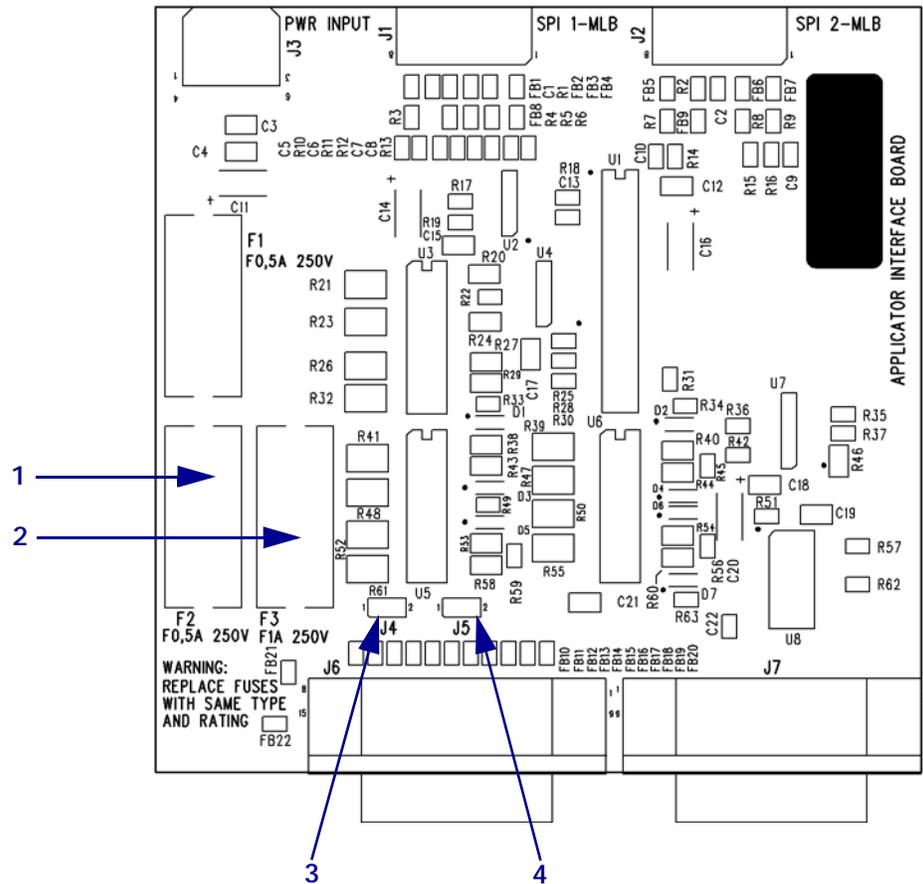
**Table 21 • Non-Isolated and Isolated Modes for +24-28V Operation**

	Isolated (External Power)	Non-Isolated (Internal Print Engine Power)
<b>Pin 1</b>	<b>External Ground +24-28V</b> I/O ground must be connected to an external ground.	<b>Ground +28V from Pin 8</b> If pin 7 is used to supply power to pin 2, use pin 8 to ground pin 1.
<b>Pin 2</b>	<b>+24-28V External Input</b> +24-28 V I/O must be connected to an external power supply. This input also supplies voltage for output signal pull-up resistors.	<b>+28V Input from Pin 7</b> If operating with 28V signals only, pin 7 may be shorted to pin 2, which creates a non-isolated mode of operation. This input also supplies voltage for output signal pull-up resistors.
<b>Pinouts</b>		

## Fuse and Jumper Locations

Figure 51 shows the location of the fuses on the applicator interface board and the location of jumpers J4 and J5.

Figure 51 • Applicator Interface Board



1	Fuse F2 for +28 V at pin 7
2	Fuse F3 for +5 V at pin 2 (+5 V I/O only)
3	Jumper J4
4	Jumper J5



**Notes •** \_\_\_\_\_

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# Specifications

This chapter provides routine cleaning and maintenance procedures.

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## General Specifications

### Physical

<b>Height</b>	11.8 in. (300 mm)
<b>Width</b>	9.6 in. (245 mm)
<b>Depth</b>	18.3 in. (465 mm)
<b>Weight</b>	35.5 lb. (16.1 kg)

### Environmental Conditions

<b>Operating Temperature</b>	32° F to 105° F (0° C to 41° C)
<b>Non-Condensing Relative Humidity</b>	
Operation	20% to 95%
Storage	5% to 95%
<b>Storage Temperature</b>	-40° F to 160° F (-40° C to 71° C)

### Electrical Specifications

<b>Power Supply</b>	Universal Power Supply with power-factor correcting 90–264 VAC, 47–63 Hz
<b>Power Consumption</b>	
Idle	19 W
Printing	375 W (maximum)
<b>Fuses</b>	5 Amp, 250 VAC, 5 × 20 mm IEC style, as supplied with the print engine

### Communications Specifications

<b>Serial</b>	High-speed RS-232C DB9 pin (standard)
<b>Applicator Interface</b>	Female DB-15 connector
<b>Parallel</b>	<ul style="list-style-type: none"> <li>• Bi-directional high-speed (36-pin connector)</li> <li>• IEEE 1284-compliant software protocol (standard)</li> </ul>

## Other Standard Features

- Real Time Clock
- Fast 32 bit 133 MHz RISC processor
- 10MB RAM memory
- Flash memory including 2MB non-volatile memory storage for downloadable objects
- Type I & II Series C & D PC Card Interface, memory only
- Zebra printer driver for windows 3.X and 95/98/NT 2000 operating systems
- Advanced counter

## Additional Options

- Linear PCMCIA cards available 8MB and 32MB.
- ATA-style PCMCIA or Compact Flash memory cards 32, 64, 128, 256MB.
- Additional fonts available
- UNICODE
- WGL4 through Swiss 721
- Firmware Support for Downloadable TrueType Font

## Agency Approvals

<b>Agency Approvals</b>	<ul style="list-style-type: none"><li>• IEC 60950-1</li><li>• EN55022, Class A</li><li>• EN61000-6-2</li></ul>
<b>Product Markings</b>	<ul style="list-style-type: none"><li>• cULus</li><li>• CE Mark</li><li>• FCC-A</li><li>• ICES-003</li><li>• VCCI</li><li>• C-Tick</li><li>• CCC</li><li>• Gost-R</li><li>• TUV-AR/S Mark</li></ul>

## Media Specifications

<b>Media width</b> (label and liner)	Minimum		3.0 in. (76 mm)
	Maximum		7.1 in. (180 mm)
		Non-RFID, rewind mode	0.25 in. (6.4 mm) (“loose loop”)
<b>Label length</b>	Minimum	Applicator mode	3.0 in. (76.2 mm) with backfeed on 1.0 in. (25.4 mm) with backfeed off
		Rewind mode	1.0 in. (25.4 mm)
		Tear-off mode	3.0 in. (76.2 mm) with backfeed on 1.0 in. (25.4 mm) with backfeed off
<b>Registration tolerance</b> (not including label/liner position tolerances)	Vertical (concurrent labels)		±0.040 in. (±1.0 mm) (in Applicator mode)
	Horizontal		±0.040 in. (±1.0 mm)
<b>Total thickness</b> (including liner)			0.003 in. to 0.012 in. (0.076 mm to 0.305 mm)
<b>Interlabel Gap</b> (Transmissive Sensor)	Minimum		0.079 in. (2 mm)
	Preferred		0.118 in. (3 mm)
	Maximum		0.157 in. (4 mm)
<b>Notch</b>	Size (W x L)		0.25 in. × 0.12 in. (6 mm × 3 mm)
	Position		On inside edge, <0.8 in (<20 mm) from leading edge of media
<b>Hole</b>	Minimum		0.125 in. (3.2 mm)
	Position		0.25 to 3.0 in. (6.3 to 76.2 mm) from inside edge <0.8 in. (<20 mm) from leading edge of media
<b>Black Mark</b> (Reflective Sensor)	Vertical length (parallel to inside media edge)		0.12 in. to 0.43 in. (3 mm to 11 mm)
	Horizontal width (perpendicular to inside media edge)		0.43 in. (≥ 11 mm) minimum
	Position		One of the following: <ul style="list-style-type: none"> <li>• within 0.04 in. (1 mm) of the inside edge and &lt;0.8 in (20 mm) from leading edge of media</li> <li>• centered within 0.23 in. to 2.25 in. (5.8 to 57 mm) from the media inner edge</li> </ul>
	Density		> 1.0 Optical Density Units (ODU) Maximum media density: 0.5 ODU
<b>Print Line to Peel Bar Distance</b>			0.464 in. (11.8 mm)
<b>Media Unwind Force</b>	<b>Steady State</b>		Must be uniform and must not exceed 2 lb. (907 g)
	<b>Transient (Start/Stop)</b>		Must not exceed 4 lb (1814 g)
<b>Media Rewind Force</b>			Applicator take-up pull tension must be uniform from 1 to 4 lb (454 to 1818 g) and must not vary more than ±20% during operation.

## Ribbon Specifications

<b>Thickness</b>	4.5 microns
<b>Width</b> (wound coated side out)	3.0 in. to 7.1in. (76 mm to 180 mm)
<b>Maximum length</b>	2955 ft (900 m)
<b>Roll size</b>	
Inner core diameter	1.0 in. (25.4 mm)
Maximum roll size	4.0 in. (101.6 mm)

## Printing Specifications

Specification	203 DPI	300 DPI
<b>Resolution</b>	203 dots per inch (8 dots per mm)	300 dots per inch (12 dots per mm)
<b>Dot size</b>	0.0049 in. x 0.0049 in. (0.125 mm x 0.125 mm)	0.0033 in. x 0.0039 in. (0.084 mm x 0.100 mm)
<b>Maximum print speed</b>	12 ips	8 ips
<b>First dot location</b> (from inside media edge)	0.093 in. (2.4 mm)	0.093 in. (2.4 mm)
<b>Maximum print width</b>	6.6 in. (168 mm)	6.6 in. (168 mm)
<b>Maximum print length</b> (with full width media)		
Non-continuous	39 in. (990 mm)	39 in. (990 mm)
Continuous	150 in. (3810 mm)	100 in. (2540 mm)
<b>Programmable constant printing speeds</b> (per second)	2.4 in. (61 mm) 3 in. (76 mm) 4 in. (102 mm) 5 in. (127 mm) 6 in. (152 mm) 7 in. (178 mm) 8 in. (203 mm) 9 in. (229 mm) 10 in. (254 mm) 11 in. (279 mm) 12 in. (305 mm)	2.4 in. (61 mm) 3 in. (76 mm) 4 in. (102 mm) 5.5 in. (139 mm) 6 in. (152 mm) 7 in. (178 mm) 8 in. (203 mm)

## Zebra Programming Language (ZPL II)

<ul style="list-style-type: none"> <li>• Communicates in printable ASCII characters</li> <li>• Controlled via mainframe, mini, or PC</li> <li>• Downloadable graphics, scalable and bitmap fonts, label templates and formats</li> <li>• Object copying between memory areas (RAM and PC memory card)</li> <li>• Adjustable print cache</li> <li>• Data compression</li> <li>• Automatic memory allocation for “format while printing”</li> </ul>	<ul style="list-style-type: none"> <li>• Status messages to host upon request</li> <li>• Format inversion (white on black)</li> <li>• Mirror image printing</li> <li>• Four-position field rotation (normal/0°, 90°, 180°, and 270°)</li> <li>• Slew command</li> <li>• Programmable label quantities with print and pause control</li> <li>• Automatic serialization of fields</li> <li>• User-programmable password</li> </ul>
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## Bar Codes

<p><b>Bar code modulus “X” dimensions</b></p> <ul style="list-style-type: none"> <li>• Picket fence (non-rotated) orientation: <ul style="list-style-type: none"> <li>• 203 dpi = 0.0049 in. mil to 0.049 in.</li> <li>• 300 dpi = 0.0033 in. mil to 0.033 in.</li> </ul> </li> <li>• Ladder (rotated) orientation: <ul style="list-style-type: none"> <li>• 203 dpi = 0.0049 in. mil to 0.049 in.</li> <li>• 300 dpi = 0.0039 in. mil to 0.039 in.</li> </ul> </li> </ul>	<p><b>Linear bar codes</b></p> <ul style="list-style-type: none"> <li>• Code 11</li> <li>• Code 39</li> <li>• Code 93</li> <li>• Code 128 with subsets A/B C and UCC Case Codes</li> <li>• ISBT-128</li> <li>• UPC-A</li> <li>• UPC-E</li> <li>• EAN-8</li> <li>• EAN-13</li> <li>• UPC and EAN 2 or 5 digit extensions</li> <li>• Plessey</li> <li>• Postnet</li> <li>• Standard 2 of 5</li> <li>• Industrial 2 of 5</li> <li>• Interleaved 2 of 5</li> <li>• LOGMARS</li> <li>• MSI</li> <li>• Codabar</li> <li>• RSS-14</li> </ul>
<p><b>Two-dimensional bar codes</b></p> <ul style="list-style-type: none"> <li>• Code 49</li> <li>• Maxi Code</li> <li>• PDF-417</li> <li>• QR Code</li> <li>• Codablock</li> <li>• DataMatrix</li> <li>• Micro-PDF417</li> </ul>	
<p><b>Bar code ratios</b></p> <ul style="list-style-type: none"> <li>• 2:1</li> <li>• 7:3</li> <li>• 5:2</li> <li>• 3:1</li> </ul>	

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# Glossary



**alphanumeric** Indicating letters, numerals, and characters such as punctuation marks.

**backfeed** When the print engine pulls the media and ribbon (if used) backward into the print engine so that the beginning of the label to be printed is properly positioned behind the printhead. Backfeed occurs when operating the print engine in Tear-Off and Applicator modes.

**bar code** A code by which alphanumeric characters can be represented by a series of adjacent stripes of different widths. Many different code schemes exist, such as the universal product code (UPC) or Code 39.

**black mark** A registration mark found on the underside of the print media that acts as a start-of-label indication for the print engine. (See *continuous media*.)

**calibration (of a print engine)** A process in which the print engine determines some basic information needed to print accurately with a particular media and ribbon combination. To do this, the print engine feeds some media and ribbon (if used) through the print engine and senses whether to use the direct thermal or thermal transfer print method, and (if using non-continuous media) the length of individual labels or tags.

**character set** The set of all letters, numerals, punctuation marks, and other characters that can be expressed by a particular font or bar code.

**check digit** A character added to a bar code symbol that indicates to the scanner that it has read the symbol correctly.

**configuration** The print engine configuration is a group of operating parameters specific to the print engine application. Some parameters are user selectable, while others are dependent on the installed options and mode of operation. Parameters may be switch selectable, control panel programmable, or downloaded as ZPL II commands. A configuration label listing all the current print engine parameters may be printed for reference.

**continuous media** Label or tag-stock media that has no notch, gap, or web (media liner only) to separate the labels or tags. The media is one long piece of material.

**core diameter** The inside diameter of the cardboard core at the center of a roll of media or ribbon.

**diagnostics** Information about which print engine functions are not working that is used for troubleshooting print engine problems.

**die-cut media** A type of label stock that has individual labels stuck to a media liner. The labels may be either lined up against each other or separated by a small distance. Typically the material surrounding the labels has been removed. (See *non-continuous media*.)

**direct thermal** A printing method in which the printhead presses directly against the media. Heating the printhead elements causes a discoloration of the heat-sensitive coating on the media. By selectively heating the printhead elements as the media moves past, an image is printed onto the media. No ribbon is used with this printing method. Contrast this with *thermal transfer*.

**direct thermal media** Media that is coated with a substance that reacts to the application of direct heat from the printhead to produce an image.

**dynamic RAM** The memory devices used to store the label formats in electronic form while they are being printed. The amount of DRAM memory available in the print engine determines the maximum size and number of label formats that can be printed. This is volatile memory that loses the stored information when power is turned off.

**fanfold media** Media that comes folded in a rectangular stack. Contrast this with *roll media*.

**firmware** This is the term used to specify the print engine's operating program. This program is downloaded to the print engine from a host computer and stored in FLASH memory. Each time the print engine power is turned on, this operating program starts. This program controls when to feed the media forward or backward and when to print a dot on the label stock.

**FLASH memory** FLASH memory is non-volatile and maintains the stored information intact when power is off. This memory area is used to store the print engine's operating program. In addition, this memory can be used to store optional print engine fonts, graphic formats, and complete label formats.

**Font** A complete set of alphanumeric characters in one style of type. Examples include CG Times™, CG Triumvirate Bold Condensed™.

**inlay** An RFID transponder.

**integrated circuit (IC) chip** The part of an RFID transponder that contains the RF circuit, coders, decoders, and memory.

**ips (inches-per-second)** The speed at which the label or tag is printed. Zebra print engines can print from 1 ips to 12 ips.

**label** An adhesive-backed piece of paper, plastic, or other material on which information is printed.

**label backing (liner)** The material on which labels are affixed during manufacture and which is discarded or recycled by the end-users.

**liquid crystal display (LCD)** The LCD is a back-lit display that provides the user with either operating status during normal operation or option menus when configuring the print engine to a specific application.

**light emitting diode (LED)** Indicators of specific print engine status conditions. Each LED is either off, on, or blinking depending on the feature being monitored.

**lock-up** This is the term generally used to describe a fault condition that, for no apparent reason, causes the print engine to stop working.

**media** Material onto which data is printed by the print engine. Types of media include: tag stock, die-cut labels, RFID “smart” labels, continuous labels (with and without media liner), non-continuous media, fanfold media, and roll media.

**media sensor** This sensor is located behind the printhead to detect the presence of media and, for non-continuous media, the position of the web, hole, or notch used to indicate the start of each label.

**media supply hanger** The stationary arm that supports the media roll.

**non-continuous media** Media that contains an indication of where one label/printed format ends and the next one begins. Examples are die-cut labels, notched tag-stock, and stock with black mark registration marks.

**non-volatile memory** Electronic memory that retains data even when the power to the print engine is turned off.

**notched media** A type of tag stock containing a cutout area that can be sensed as a start-of-label indicator by the print engine. This is typically a heavier, cardboard-like material that is either cut or torn away from the next tag. (See *non-continuous media*.)

**print speed** The speed at which printing occurs. For thermal transfer print engines, this speed is expressed in terms of ips (inches per second). Zebra offers print engines that can print from 1 ips to 12 ips.

**printhead wear** The degradation of the surface of the printhead and/or the print elements over time. Heat and abrasion can cause printhead wear. Therefore, to maximize the life of the printhead, use the lowest print darkness setting (sometimes called burn temperature or head temperature) and the lowest printhead pressure necessary to produce good print quality. In the thermal transfer printing method, use ribbon that is as wide or wider than the media to protect the printhead from the rough media surface.

**registration** Alignment of printing with respect to the top of a label or tag.

**Radio Frequency Identification (RFID)** The technology that allows an item to be identified by a transponder that communicates with a reader via radio waves.

**ribbon** A band of material consisting of a base film coated with wax or resin “ink.” The inked side of the material is pressed by the printhead against the media. The ribbon transfers ink onto the media when heated by the small elements within the printhead. Zebra ribbons have a coating on the back that protects the printhead from wear.

**ribbon wrinkle** A wrinkling of the ribbon caused by improper alignment or improper printhead pressure. This wrinkle can cause voids in the print and/or the used ribbon to rewind unevenly. This condition should be corrected by performing adjustment procedures.

**roll media** Media that comes supplied rolled onto a core (usually cardboard). Contrast this with *fanfold media*.

**“smart” label** Media that comes with an RFID transponder embedded between the label and the liner.

**supplies** A general term for media and ribbon.

**symbology** The term generally used when referring to a bar code.

**tag** 1) A type of media having no adhesive backing but featuring a hole or notch by which the tag can be hung on something. Tags are usually made of cardboard or other durable material. 2) An RFID transponder.

**tear-off** A mode of operation in which the user tears the label or tag stock away from the remaining media by hand.

**thermal transfer** A printing method in which the printhead presses an ink or resin coated ribbon against the media. Heating the printhead elements causes the ink or resin to transfer onto the media. By selectively heating the printhead elements as the media and ribbon move past, an image is printed onto the media. Contrast this with *direct thermal*.

**transponder** An RFID component that is usually comprised of an antenna that is bonded to an integrated circuit (IC) chip. The transponder is usually located between the label and liner in “smart” labels (sometimes called a tag or an inlay).

**void** 1) A space on which printing should have occurred, but did not due to an error condition such as wrinkled ribbon or faulty print elements. A void can cause a printed bar code symbol to be read incorrectly or not at all. 2) An RFID label is “voided” if an error occurs during writing or encoding. The label is ejected, and the word “VOID” is printed across it.

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**Zebra Technologies Corporation**

333 Corporate Woods Parkway  
Vernon Hills, Illinois 60061.3109 U.S.A.  
Telephone: +1 847.793.2600  
Facsimile: +1 847.913.8766

**Zebra Technologies Europe Limited**

Zebra House  
The Valley Centre, Gordon Road  
High Wycombe  
Buckinghamshire HP13 6EQ, UK  
Telephone: +44 (0) 1494 472872  
Facsimile: +44 (0) 1494 450103

**Zebra Technologies Asia Pacific, LLC**

16 New Industrial Road  
#05-03 Hudson TechnoCentre  
Singapore 536204  
Telephone: +65 6858 0722  
Facsimile: +65 6885 0838