

**Zebra® 110PAX4™**  
Print Engine

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**User Guide**



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**Customer Order # 57512L-001**

**Manufacturer Part # 57512L-001 Rev. 2**

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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>Print Engine Basics on page 7</i>	This chapter provides a high-level overview of the print engine and its components.
<i>Getting Started on page 13</i>	This chapter provides the tasks that you must complete and the issues that you must consider before you load and configure your print engine.
<i>Print Engine Operation on page 31</i>	If you have completed the tasks and resolved issues in the checklist in Before You Begin on page 14, use this chapter to load the print engine, to calibrate the print engine, and to print configuration labels.
<i>Print Engine Configuration on page 49</i>	This chapter describes the front panel parameters that are used to configure the print engine for operation.
<i>Routine Maintenance on page 77</i>	This chapter provides routine cleaning and maintenance procedures.
<i>Troubleshooting on page 87</i>	This chapter provides you with information about LCD, print quality, communications, and other errors that you might need to troubleshoot. If you need technical assistance, contact your equipment supplier.
<i>Print Engine Specifications on page 105</i>	This appendix provides the features of and specifications for the print engine.
<i>Data Ports on page 113</i>	This appendix describes the standard communication ports available to connect the print engine to your computer or network.
<i>Glossary on page 137</i>	The glossary provides a list of common terms.



## Contacts

You can contact Zebra Technologies at any of the following:

**Visit us at:** <http://www.zebra.com>

**Our Mailing Addresses:**

**Zebra Technologies Corporation**

333 Corporate Woods Parkway

Vernon Hills, Illinois 60061.3109 U.S.A

Telephone: +1 847.634.6700

Fax: +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

Fax: +44 (0)1494 450103

## Support

You can contact Zebra support at:

**Web Address:** [www.zebra.com/SS/service\\_support.htm](http://www.zebra.com/SS/service_support.htm)



**Note** • The web address is case-sensitive.

**US Phone Number** +1 847.913.2259

**UK/International Phone Number** +44 (0) 1494 768289

## Document Conventions

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

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

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

```
Ztools
```

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

### Cautions, Important, Note, and Example



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

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**Electric Shock 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** • Advises you that failure to take or avoid a specific action could result in physical harm to the hardware.

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**Caution** • Advises you need to wear protective eyewear.

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

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

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

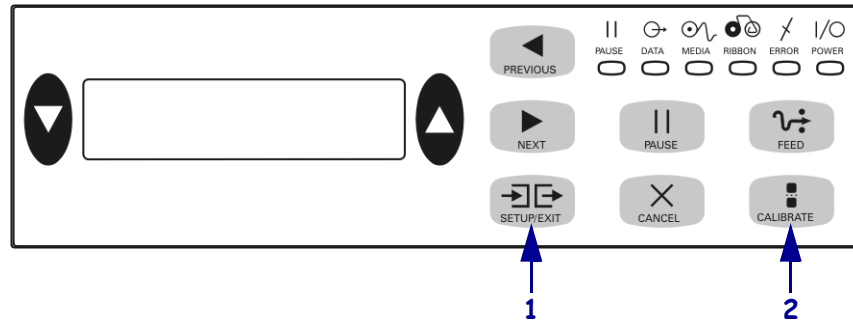
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**Tools** • Tells you what tools you need to complete a given task.

**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**



<b>1</b>	SETUP/EXIT button
<b>2</b>	CALIBRATE button

## Related Documents

The following documents might be helpful references:

- *ZPL II® Programming Guide Volume I* (part number 45541L) and *Volume II* (part number 45542L).
- *ZebraNet® Wireless Print Server User Guide* (part number 13422L)
- *ZebraNet 10/100 Print Server User and Reference Guide* (part number 47619L-001)
- *Maintenance Manual* (part number 57515L-001)





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# Print Engine Basics

This chapter provides a high-level overview of the print engine and its components.

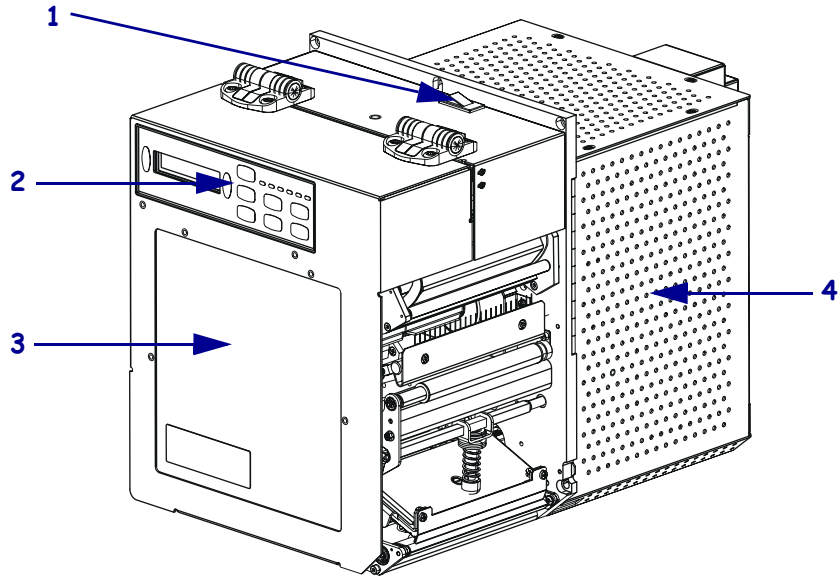
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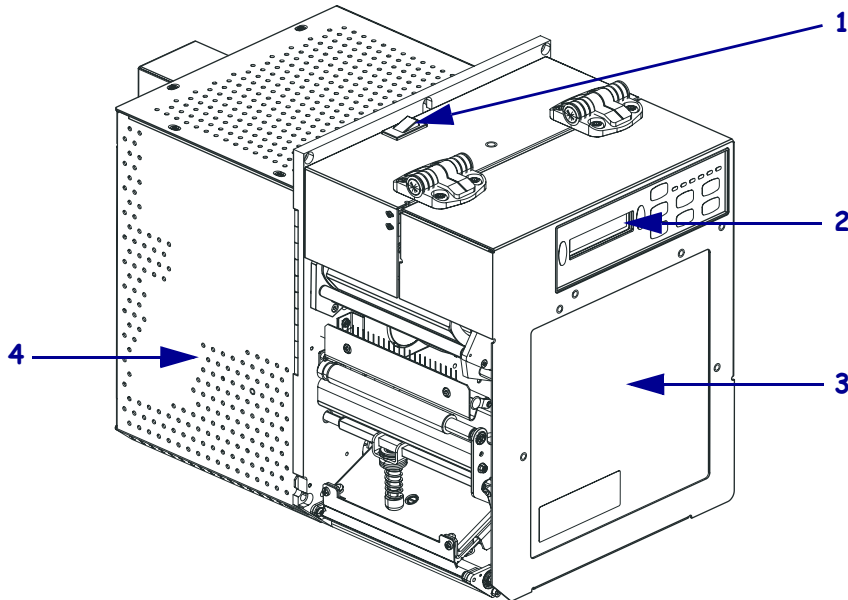
## Print Engine Exterior View

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**

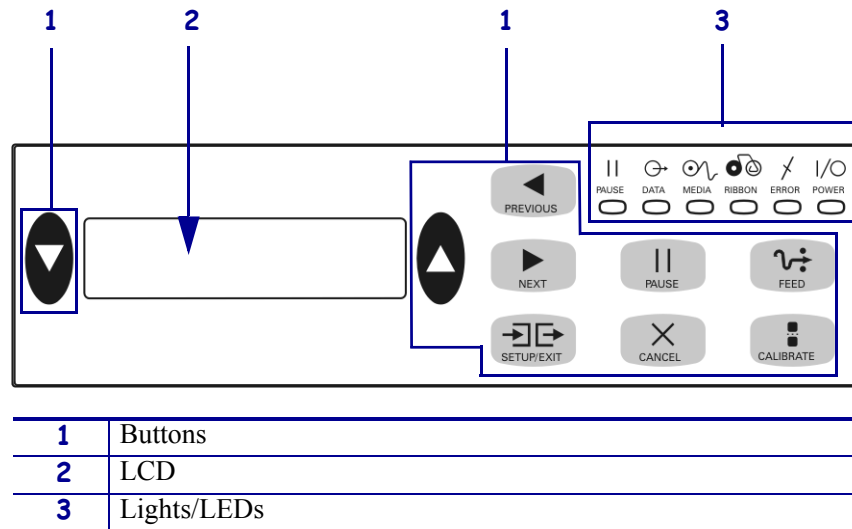


<b>1</b>	Power on/off switch
<b>2</b>	Front panel
<b>3</b>	Media door
<b>4</b>	Electronics cover

## Front Panel

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

Figure 4 • Front Panel



## Front Panel Buttons

The front panel buttons are described in Table 1.

Table 1 • Front Panel Buttons

Button	Description/Function
<b>BLACK OVALS</b>	The two black ovals are used to change values for the parameter 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 Setup mode.
<b>PAUSE</b>	Stops and restarts the printing process or removes error messages and clears the LCD. When the print engine is paused, the PAUSE light is on. <ul style="list-style-type: none"> <li>• If the print engine is idle, it enters Pause mode immediately.</li> <li>• If the print engine is printing, the label is completed before the printing process stops.</li> </ul>

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

<b>Button</b>	<b>Description/Function</b>
<b>CANCEL</b>	<p>CANCEL functions only in Pause mode. Pressing CANCEL has these effects:</p> <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> <p>To clear the print engine's entire label format memory, press and hold CANCEL until the DATA light turns off.</p>
<b>FEED</b>	<p>Feeds a blank label.</p> <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 finishes printing.</li> </ul>
<b>CALIBRATE</b>	<p>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).</p>

## Front Panel Indicator Lights (LEDs)

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

**Table 2 • Front Panel Lights**

<b>LED</b>	<b>OFF Indicates</b>	<b>ON Indicates</b>	<b>FLASHING Indicates</b>
<b>POWER</b> (Green)	Power switch is off, or no power to print engine.	Power switch is on, and power is being supplied to print engine.	—
<b>PAUSE</b> (Yellow)	Normal operation.	<p>One of the following:</p> <ul style="list-style-type: none"> <li>• Print engine 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.	Print engine is receiving data from or sending status information to the host computer.



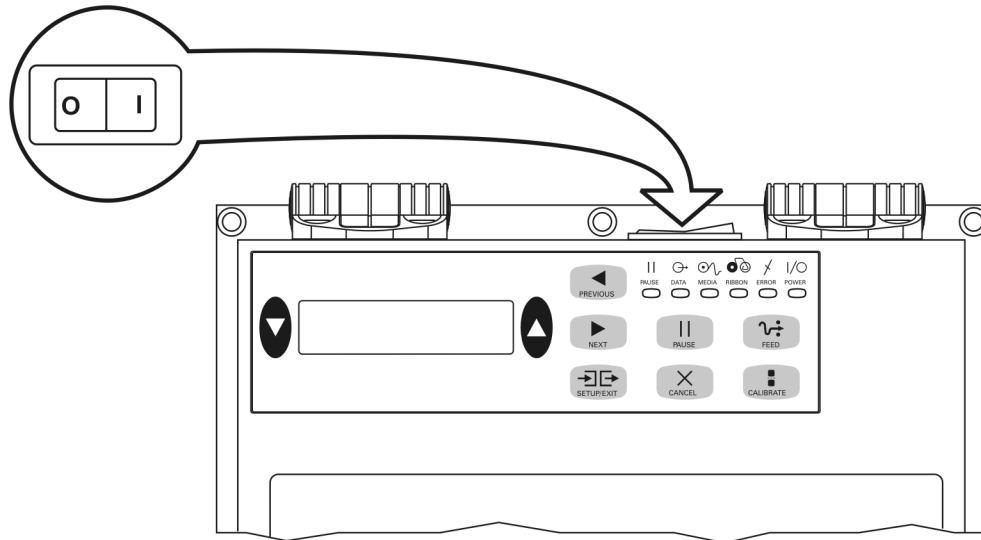
Table 2 • Front Panel Lights (Continued)

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

## Power On/Off Switch

The power on/off switch is located on the top of the print engine housing, 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 98](#).

**Figure 5 • Print Engine Power Switch**



## RFID-Ready Capability

You may choose to have the print engine factory-configured as RFID-ready. The standard print engine is altered so that an RFID reader/antenna may be installed easily at a later date. Contact your authorized Zebra RFID reseller for more information about the RFID-ready option.




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# Getting Started

This chapter 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 begin setting up your print engine. When you are ready, continue with [Print Engine Operation on page 31](#).

- ❑ **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 23](#). 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 22](#).
- ❑ **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 24](#).
- ❑ **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 on page 29](#).

## Unpack and Inspect the Print Engine

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

### Inspect the Print Engine

Inspect the print engine for possible damage incurred during shipment:

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

### Report Shipping Damage

If you discover shipping damage upon inspection:

- Immediately notify the shipping company of the damage, and file a damage report with them. Zebra is not responsible for any damage incurred during shipment of the equipment and does not repair this damage under warranty.
- Keep all packaging material for shipping company inspection.
- Notify your authorized Zebra reseller.

### 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:  $-40^{\circ}$  to  $160^{\circ}\text{F}$  ( $-40^{\circ}$  to  $71^{\circ}\text{C}$ )
- Relative humidity: 5% to 95% non-condensing

### Shipping

If you must ship the print engine:

- Remove any ribbon from the spindles 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.

## 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 measurements 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 105°F (0° to 41°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.

**Figure 6 • Front View of Right-Hand Print Engine**

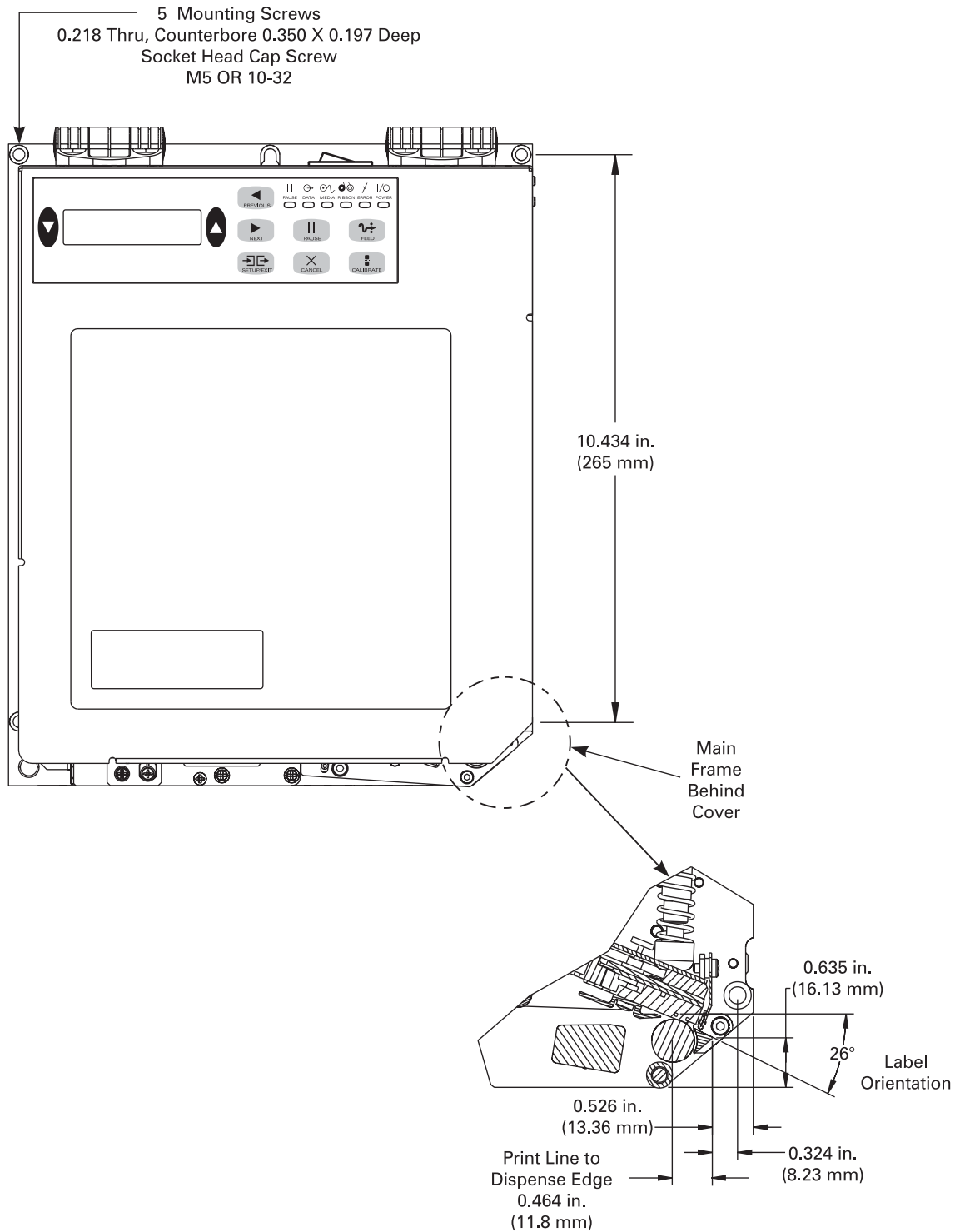


Figure 7 • Right Side View of Right-Hand Print Engine

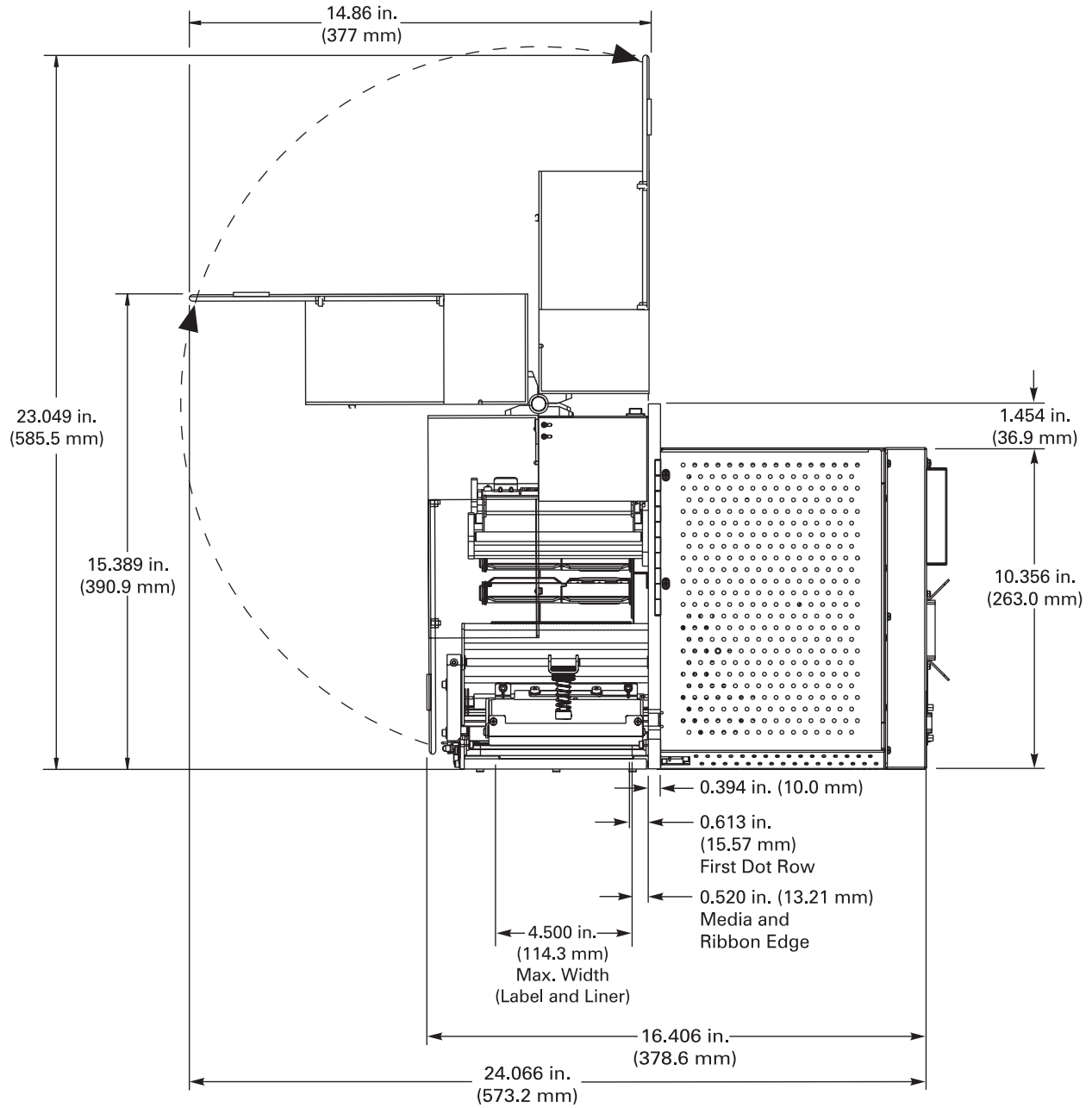




Figure 8 • Rear View of Right-Hand Print Engine

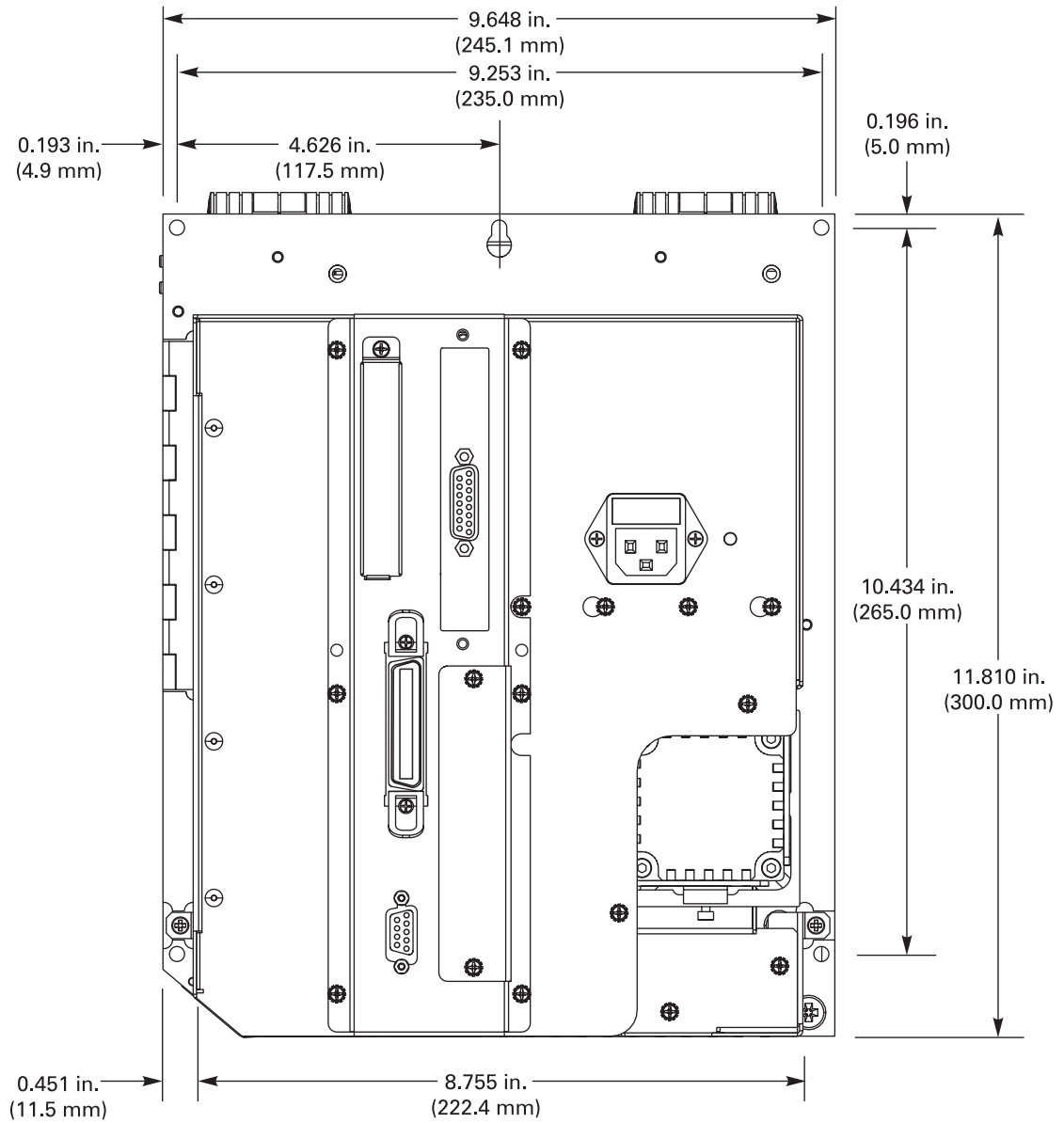
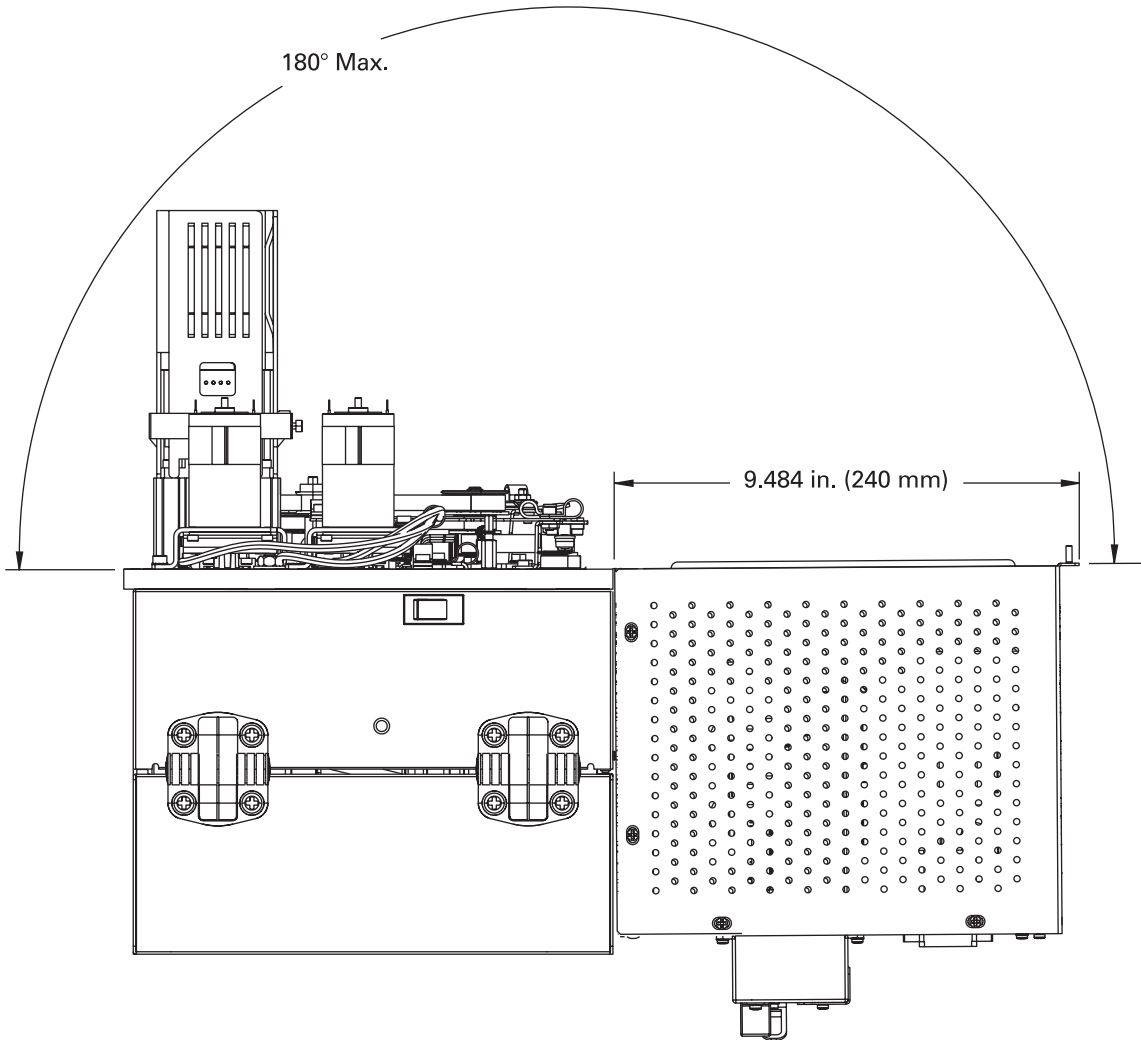


Figure 9 • Top View of Right-Hand Print Engine



## 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 10](#) for the location of the bolt and screws.

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

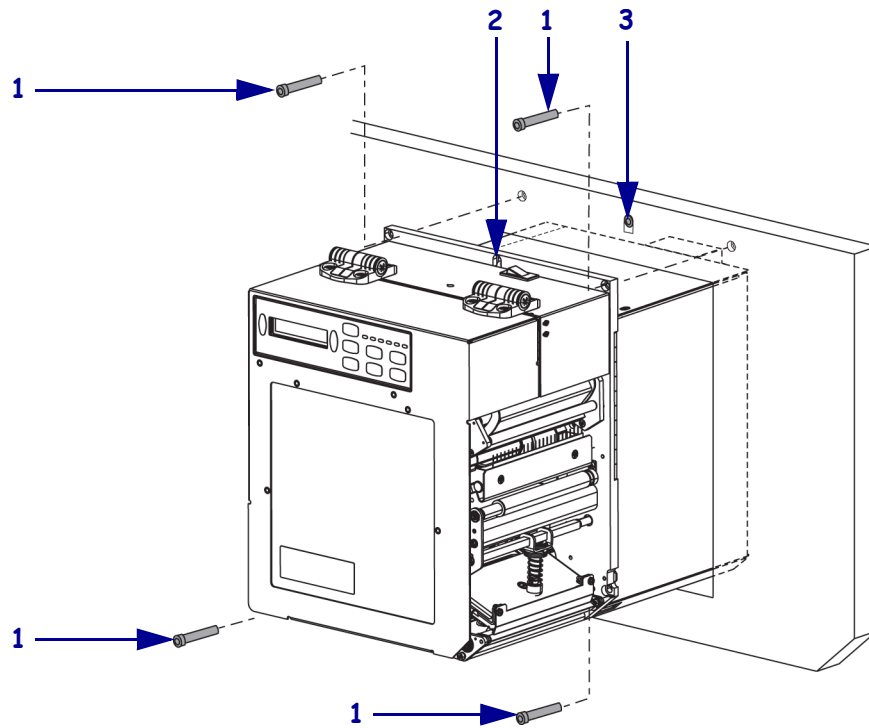
1. See [Figure 10](#). Install the center mounting bolt into the center hole on the applicator.
2. Carefully place the keyhole on the center mounting bolt.



**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 10 • Front View of 110PAX4 Print Engine in Applicator**



1	Mounting screws (four total)
2	Keyhole
3	Center mounting bolt (shown inside hole on 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, 48 to 62 Hz range.

Refer to [Figure 11](#). 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 23](#).

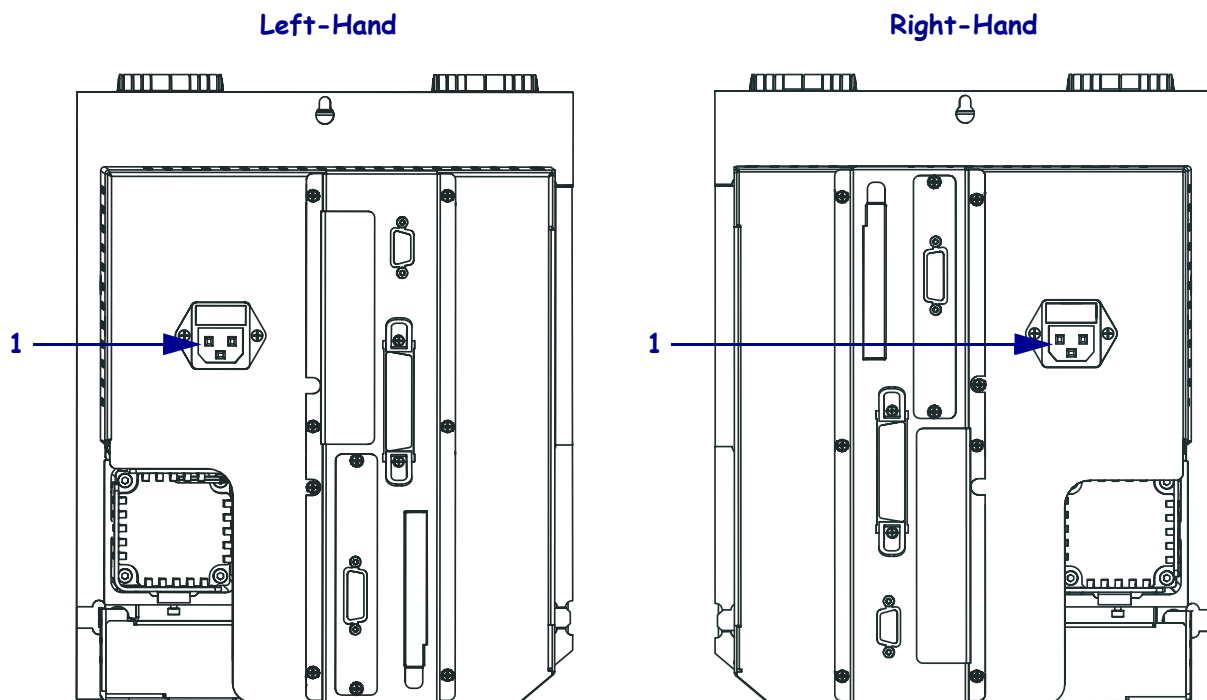


**Caution** • For personnel and equipment safety, always use an approved three-conductor power cord specific to the region or country intended for installation. This cord must use an IEC 320 female connector and the appropriate region-specific three-conductor grounded plug configuration.

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

1. Turn Off (O) the print engine power switch (located on the top of the print engine housing).
2. Plug the power cord into the AC power connector on the rear of the print engine.

**Figure 11 • Power Connection**



**1** AC power connector

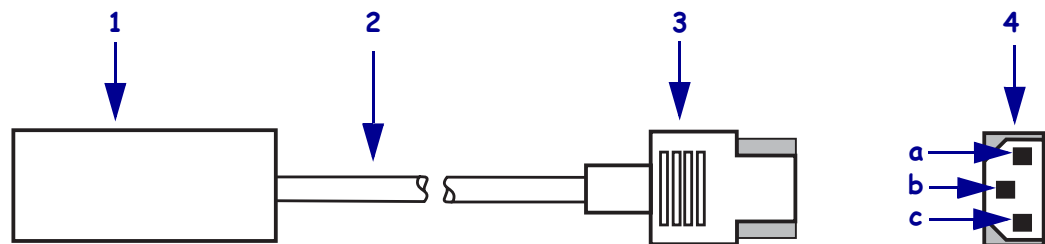
3. Plug the other end of the power cord into the power source.

## Power Cord Specifications

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 5 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 12).

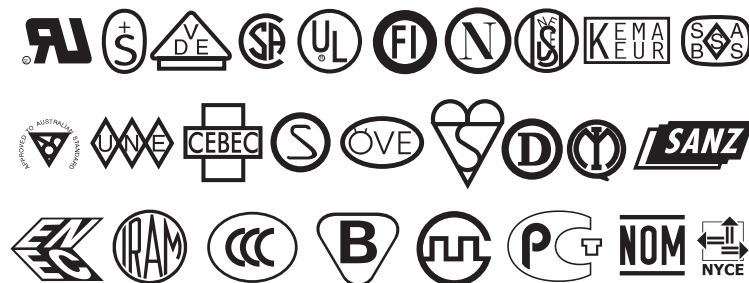
Figure 12 • Power Cord Specifications



1	AC power plug for your country
2	3-conductor HAR cable
3	IEC 320 connector
4	Contact view of plug—(a) neutral, (b) earth, (c) live

- The AC power plug and the IEC 320 connector must bear the certification mark of at least one of the known international safety organizations shown in Figure 13.

Figure 13 • International Safety Organization Marks



## 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. See [Data Ports on page 113](#) for control signal descriptions and other additional information.

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

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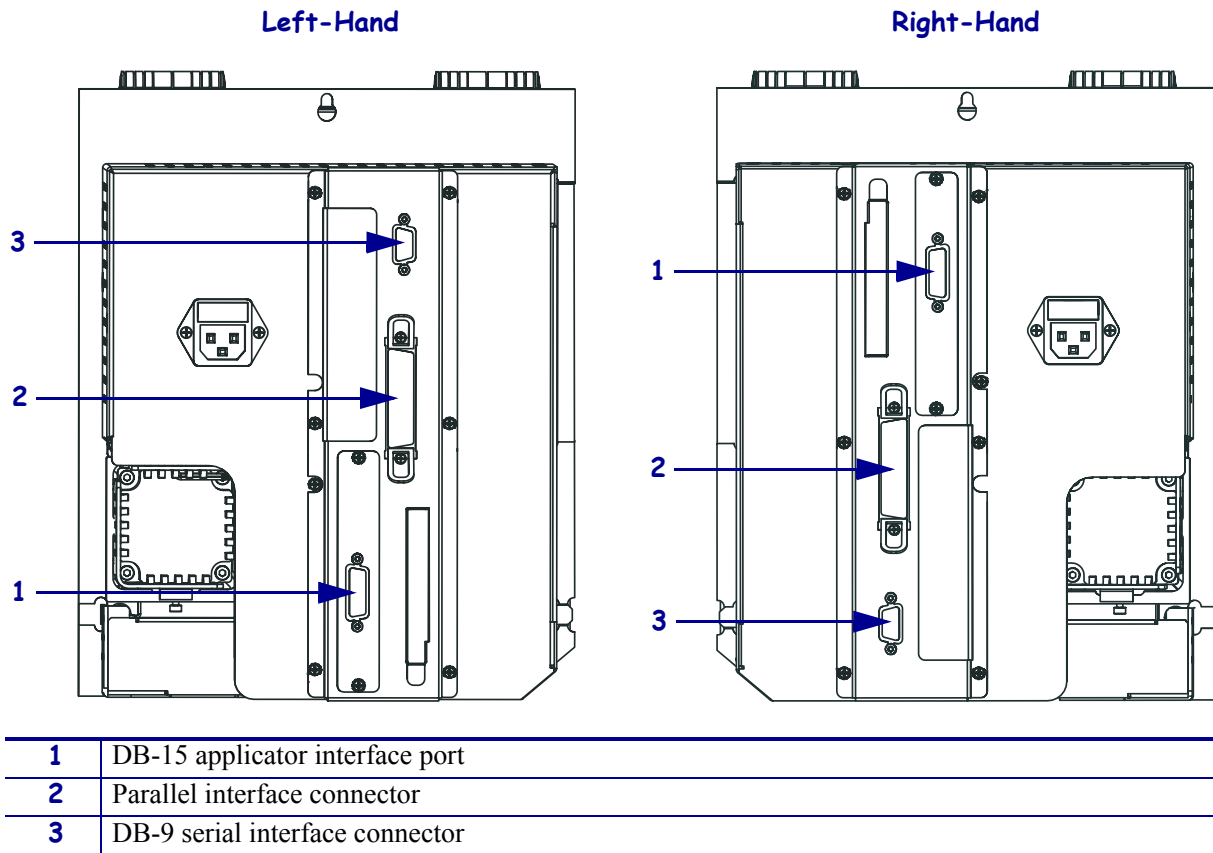


**Note** • You must supply all interface cables for your application. Refer to [Data Cable Requirements on page 26](#) for specific cable requirements.

### Standard Connections

Refer to [Figure 14](#). The print engine comes standard with both an Electronics Industries Association (EIA) RS-232 serial interface (DB-9 connector) and an IEEE 1284 bi-directional parallel interface. You may use either of these interface methods to send commands and label formats from a host to the print engine.

**Figure 14 • Cable Connections**



## Optional Print Servers

- ZebraNet Wireless Print Server. For more information on this option, see the *ZebraNet Wireless Print Server User Guide* (part number 13422L-001).
- 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* (part number 47619L-001).

## DB-15 Applicator Interface Connector

A DB-15 Applicator Interface Connector 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.

## System Considerations

**Communications Code** The print engine sends and receives American Standard Code for Information Interchange (ASCII). This code consists of 128 characters (256 for Code Page 850) including uppercase and lowercase letters, numbers, punctuation marks, and various control codes.

**Interfaces** The method of interfacing the print engine to a data source depends on the communication options installed in the print engine and the host. The standard interfaces are an RS-232 serial data port and an IEEE 1284 bi-directional parallel port.

**Communication Specifications** When communicating via an asynchronous serial data port (RS-232), the baud rate, number of data and stop bits, the parity, and the XON/XOFF or DTR control are user-selectable and should be set to match those of the host computer. When communicating via the IEEE 1284 bi-directional parallel port, the previously mentioned parameters do not apply. Refer to [Print Engine Configuration on page 49](#) to configure the communication parameters for the print engine.

## Interface Considerations

**RS-232** 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.

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

- *Advantages:* Fastest of the four 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); many computers are equipped with only one parallel port, allowing only one IEEE 1284 bi-directional device to be connected at a time.

## 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.



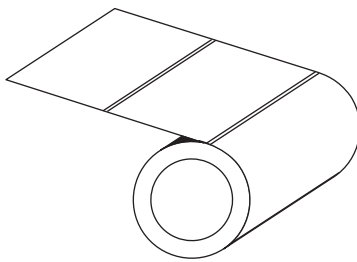
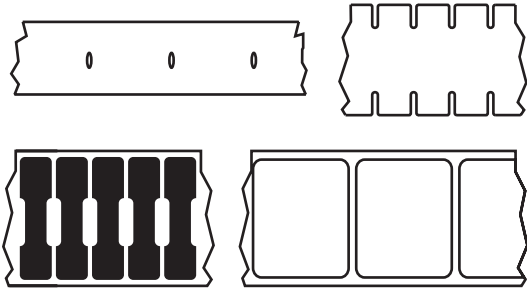
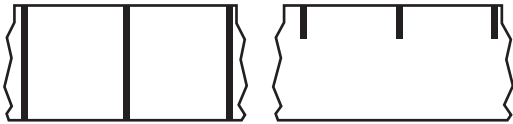
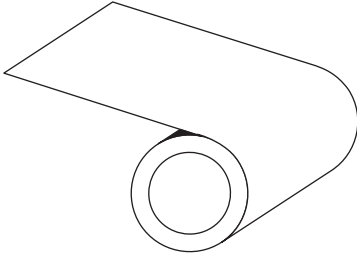
**Note** • Print engines comply with FCC Rules and Regulations, Part 15, Subpart J, for Class A equipment, using fully-shielded 6-foot (2-meter) data cables. Use of longer cables or unshielded cables may increase radiated emissions above the Class A limits.



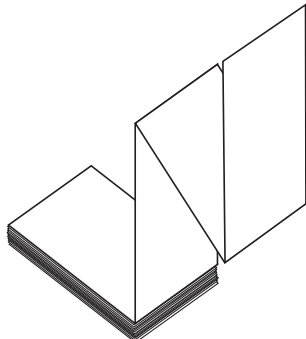
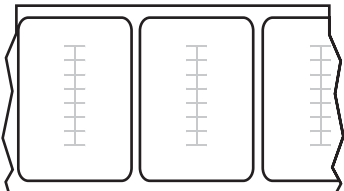
## Types of Media

The print engine can use various types of media (Table 3). We strongly recommend 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 printer and to ensure against premature printhead wear.

Table 3 • Types of Media

Media Type	How It Looks	Description
<p><b>Non-Continuous Roll Media</b></p>		<p>The media is wound on a core. Individual labels are separated by a gap, notch, or hole, which enables you to see where one label ends and the next one begins. When using media that has holes or notches, position the media sensor directly over a hole or notch. Figure 15 and Figure 16 show different types of non-continuous media.</p> <p><b>Figure 15 • Non-Continuous Web Media</b></p>  <p><b>Figure 16 • Non-Continuous Black Mark Media</b></p> 
<p><b>Continuous Roll Media</b></p>		<p>The 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.</p>

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

Media Type	How It Looks	Description
<b>Fanfold Media</b>		The media is folded in a zigzag pattern.
<b>RFID “Smart” Media (for use with RFID-capable print engines only)</b>		Each label has a radio frequency identification (RFID) chip and antenna inlay embedded between the label and the liner. The media is made from the same materials and adhesives as non-RFID labels. The outline of the transponder (which varies by manufacturer) can be seen through the label. All “smart” labels have memory that can be read, and many have memory that can be encoded.

## Ribbon

Ribbon is a thin film that is coated on one side with wax 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 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, though ribbon may be used to help protect the printhead from abrasion with the media.

### Coated Side of Ribbon

Ribbon can be wound with the coated side on the inside or outside (Figure 17). 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 17 • 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. To verify this, repeat the test on the inner surface of the roll of ribbon.

## Ribbon Scratch Test

If you do not have labels available, perform the ribbon scratch test. This method works best for ribbon that is not installed.

### 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 outer surface.
Did not leave a mark on the paper	The ribbon is coated on the <b>inner</b> surface. To verify this, repeat the test on the other surface of the roll of ribbon.



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## Print Engine Operation

If you have completed the tasks and resolved issues in the checklist in *Before You Begin* on page 14, use this chapter to load the print engine, to calibrate the print engine, and to print configuration labels.

### Contents

Load Media .....	32
Load Ribbon .....	38
Remove Used Ribbon .....	43
Calibrate the Print Engine .....	44
Adjust Media Sensors .....	46
Transmissive Media Sensor .....	46
Reflective Media Sensor .....	46

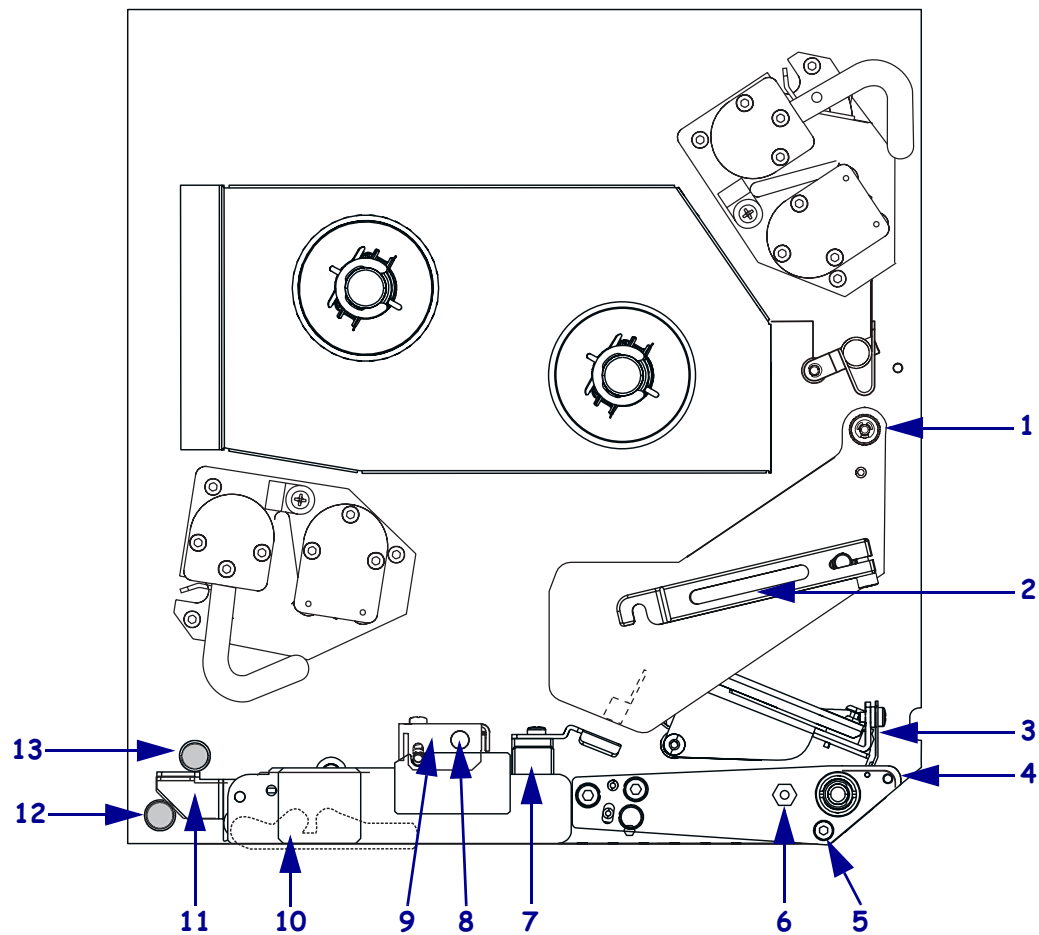
## Load Media



**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 18 identifies the media-handling components of a right-hand print engine. A left-hand unit contains a mirror image of these components. Figure 19 on page 33 shows the print engine with media loaded.

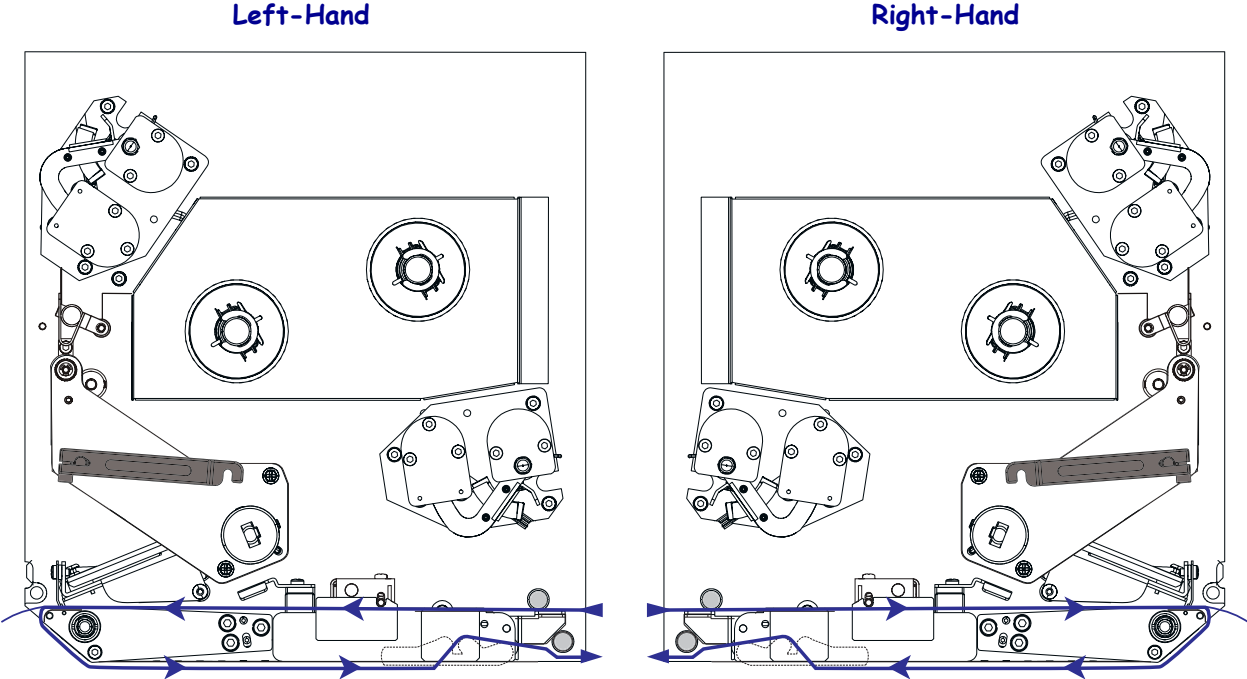
**Figure 18 • Components for Media Loading (Right-Hand)**



<b>1</b>	Auxiliary roller
<b>2</b>	Printhead latch
<b>3</b>	Printhead assembly
<b>4</b>	Peel bar
<b>5</b>	Media liner roller
<b>6</b>	Printhead locking pin
<b>7</b>	Media guide

<b>8</b>	Pinch roller release button
<b>9</b>	Pinch roller assembly
<b>10</b>	Peel roller assembly
<b>11</b>	Peel roller latch
<b>12</b>	Lower guide post
<b>13</b>	Upper guide post

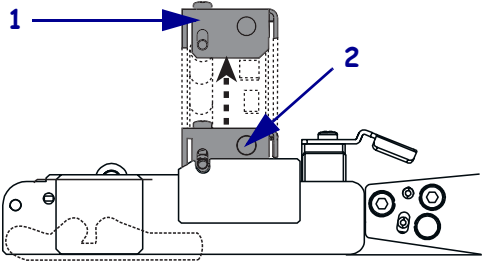
Figure 19 • Loaded Media



**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. See Figure 20. Press the release button on the pinch roller assembly, and allow the assembly to pivot up.

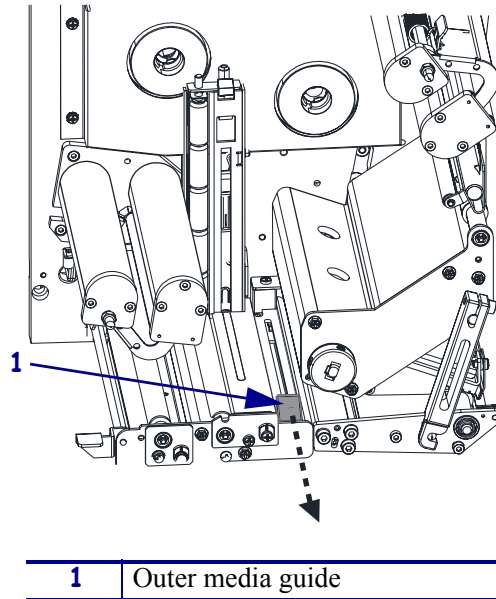
Figure 20 • Opening the Pinch Roller



1	Pinch roller assembly
2	Pinch roller release button

4. See [Figure 21](#). Slide the outer media guide all the way out.

**Figure 21 • Sliding the Outer Media Guide**

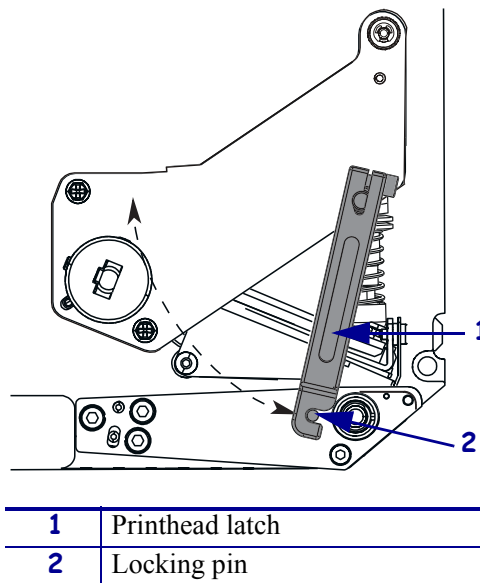


5. See [Figure 22](#). Open the printhead assembly by unlatching the printhead latch from the locking pin.



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

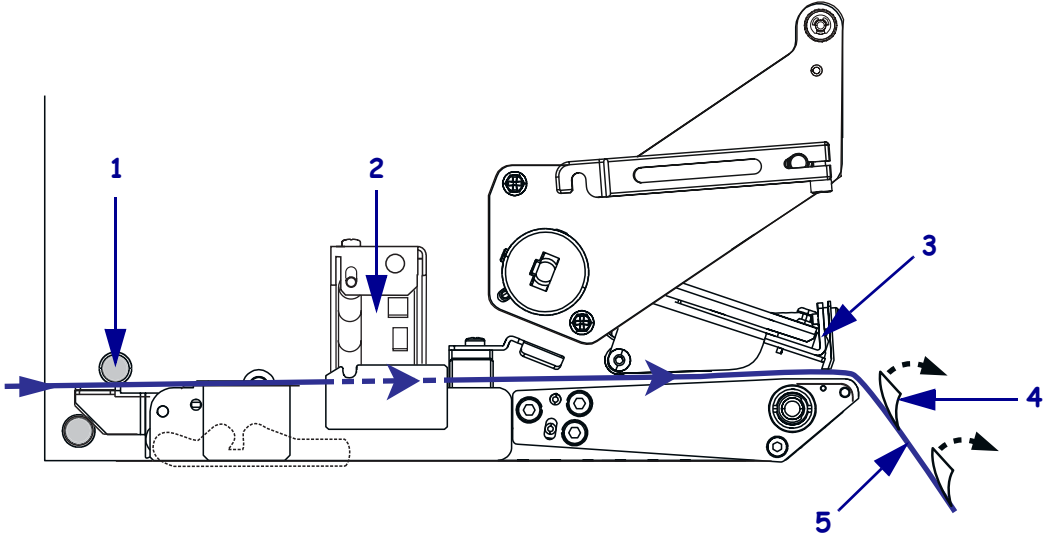
**Figure 22 • Opening the Printhead Assembly**





- 6. See [Figure 23](#). Thread the media under the upper guide post, below the pinch roller assembly, and under the printhead assembly.
- 7. See [Figure 23](#). Extend approximately 30 in. (75 cm) of media past the peel bar. Remove and discard the labels from this exposed media.

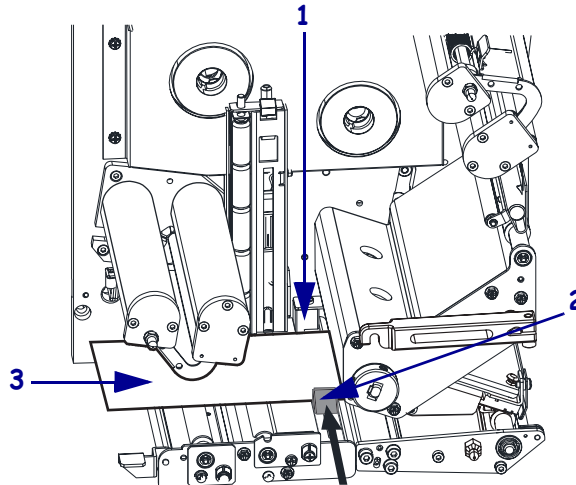
Figure 23 • Threading the Media



1	Upper guide post
2	Pinch roller assembly
3	Printhead assembly
4	Label
5	Liner

8. See [Figure 24](#). Position the media so that it is aligned with and just touching the inner media guide.
9. See [Figure 24](#). Position the outer media guide so that it just touches the outer edge of the media.

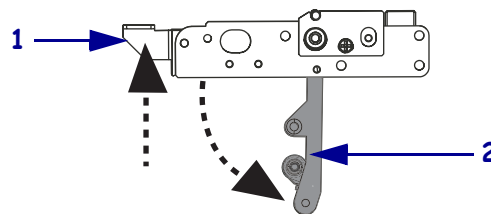
**Figure 24 • Adjusting the Outer Media Guide**



<b>1</b>	Inner media guide
<b>2</b>	Outer media guide
<b>3</b>	Media

10. See [Figure 20 on page 33](#). Press down on the pinch roller assembly until it locks closed.
11. See [Figure 22 on page 34](#). Close the printhead assembly by rotating the printhead latch until it latches onto the locking pin.
12. See [Figure 25](#). Raise the peel roller latch so that the peel roller assembly pivots down.

**Figure 25 • Releasing the Peel Roller Assembly**



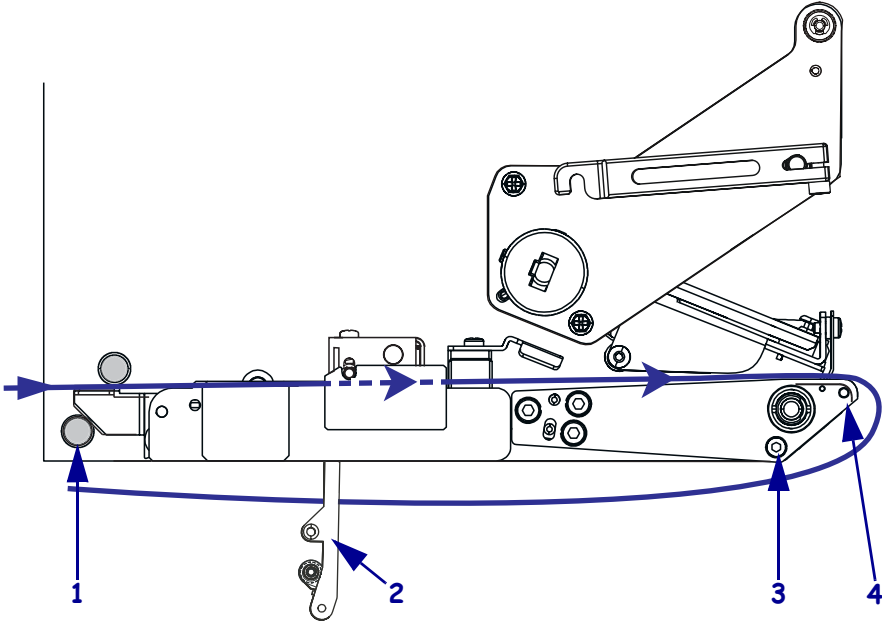
<b>1</b>	Peel roller latch
<b>2</b>	Peel roller assembly

- 13. See [Figure 26](#). Thread the media liner around the peel bar, under the media liner roller, and through the peel roller assembly.



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

**Figure 26 • Threading the Liner**



1	Lower guide post
2	Peel bar
3	Media liner roller
4	Peel roller assembly

- 14. See [Figure 27](#). Rotate the peel roller assembly up until it locks into the closed position.

**Figure 27 • Closed Peel Roller Assembly**



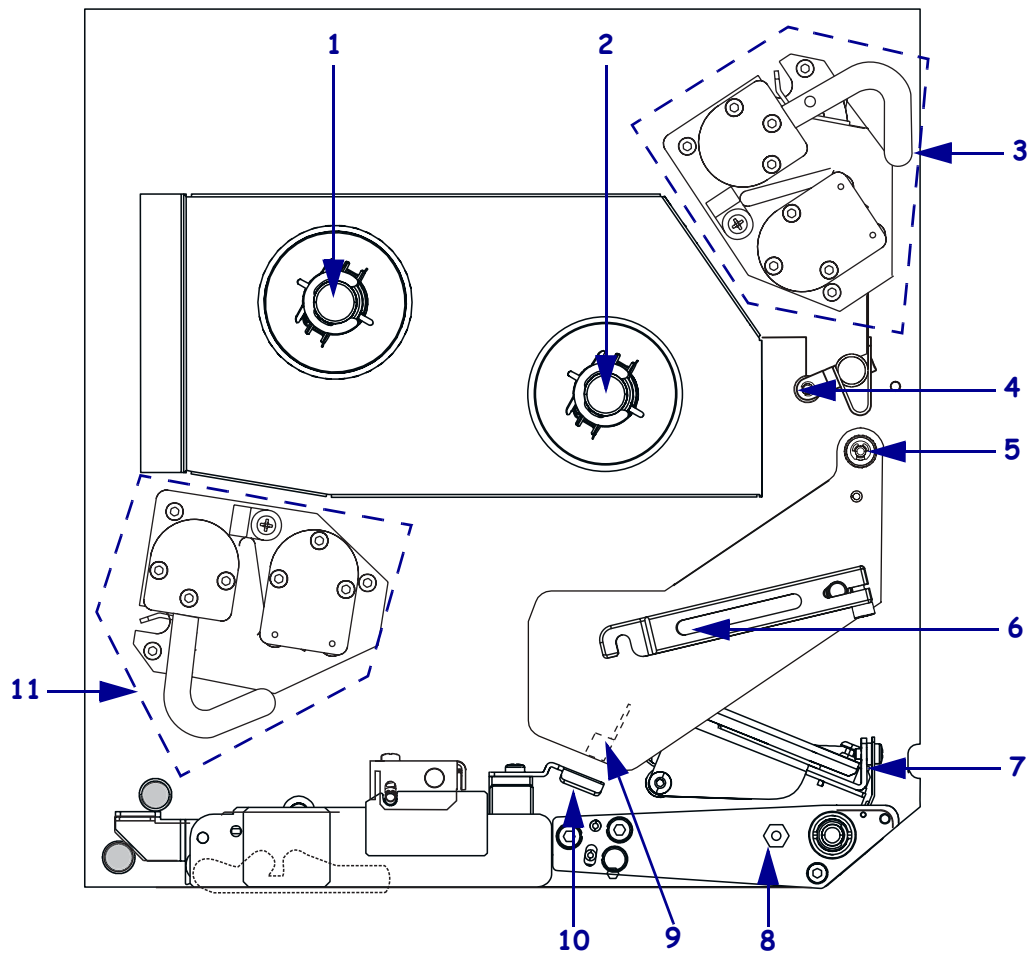
- 15. See [Figure 26](#). Thread the media liner past the lower guide post and around the take-up spindle of the applicator (refer to the applicator's user guide).
- 16. Close the media door.

## 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 28 identifies the ribbon system components inside the media compartment of a right-hand print engine. A left-hand unit contains a mirror image of these components. Figure 29 on page 39 shows the print engine with ribbon loaded.

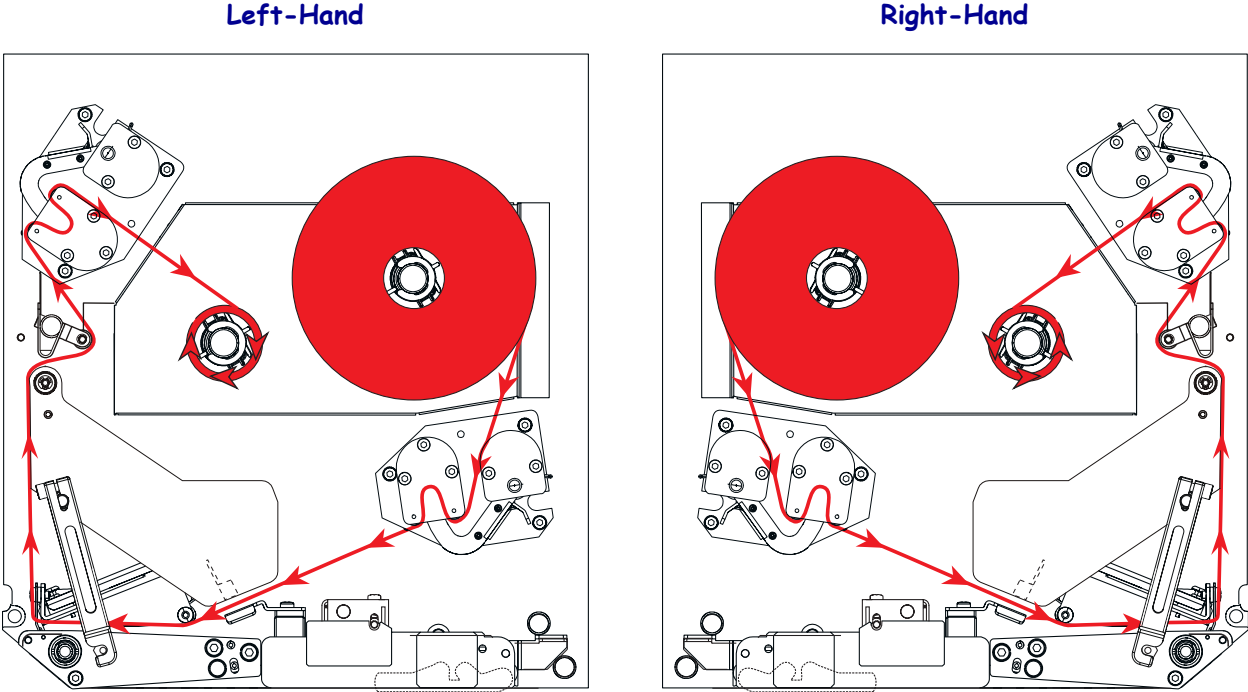
**Figure 28 • Components for Ribbon Loading**



<b>1</b>	Ribbon supply spindle
<b>2</b>	Ribbon take-up spindle
<b>3</b>	Upper dancer assembly
<b>4</b>	Idler roller
<b>5</b>	Auxiliary roller
<b>6</b>	Printhead latch

<b>7</b>	Printhead assembly
<b>8</b>	Locking pin
<b>9</b>	Ribbon sensor
<b>10</b>	Ribbon sensor reflector
<b>11</b>	Lower dancer assembly

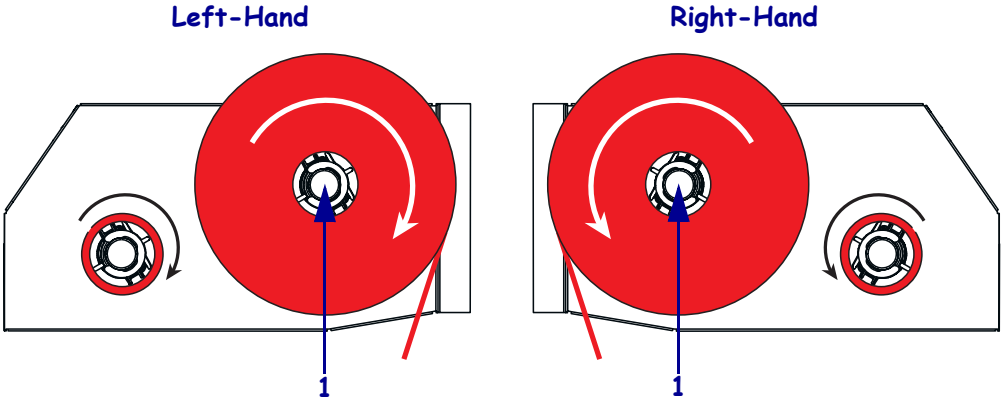
Figure 29 • Loaded Ribbon



To load ribbon, complete these steps:

- 1. See Figure 30. Place a full ribbon roll onto the ribbon supply spindle so the ribbon rotates as shown, and then push the roll toward the print engine frame until it is fully seated.

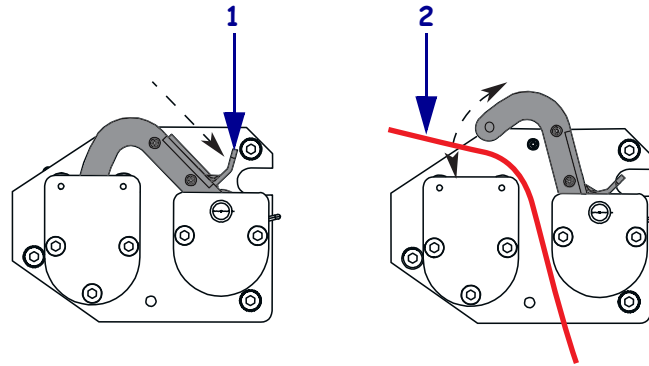
Figure 30 • Placing Ribbon on the Ribbon Supply Spindle



1	Ribbon supply spindle with media
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2. See [Figure 31](#). On the lower dancer assembly, squeeze the opening tabs to pivot open the dancer arm.
3. See [Figure 31](#). Carefully thread the ribbon through the lower dancer assembly, and then slowly release the dancer arm.

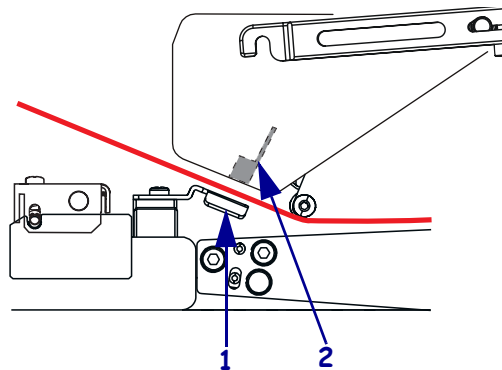
**Figure 31 • Opening a Dancer Assembly**



<b>1</b>	Opening tabs
<b>2</b>	Ribbon

4. See [Figure 32](#). Thread the ribbon between the ribbon sensor and the ribbon sensor reflector.

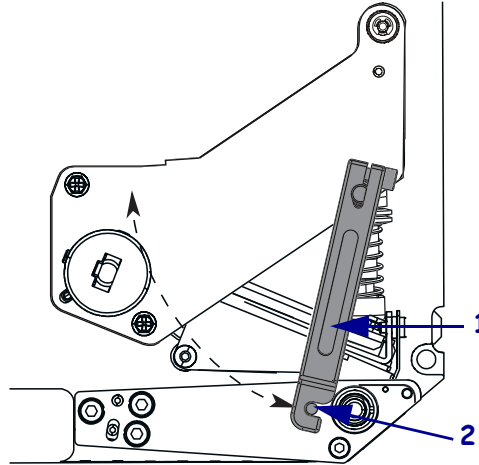
**Figure 32 • Ribbon Sensor**



<b>1</b>	Ribbon sensor reflector
<b>2</b>	Ribbon sensor

- See [Figure 33](#). Open the printhead assembly by unlatching the printhead latch from the locking pin.

**Figure 33 • Opening the Printhead Assembly**



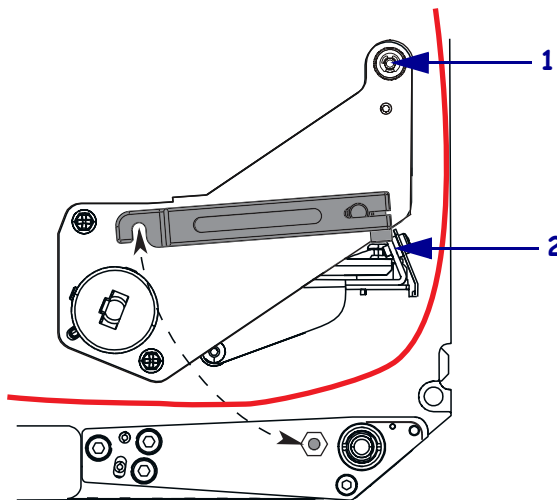
1	Printhead latch
2	Locking pin

- See [Figure 34](#). Thread the ribbon under the printhead assembly and then up toward the auxiliary roller.



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

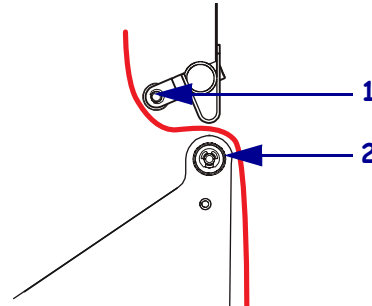
**Figure 34 • Threading Ribbon under the Printhead Assembly**



1	Auxiliary roller
2	Printhead assembly

- See [Figure 35](#). Thread the ribbon over the auxiliary roller, around the idler roller, and then up toward the upper dancer assembly.

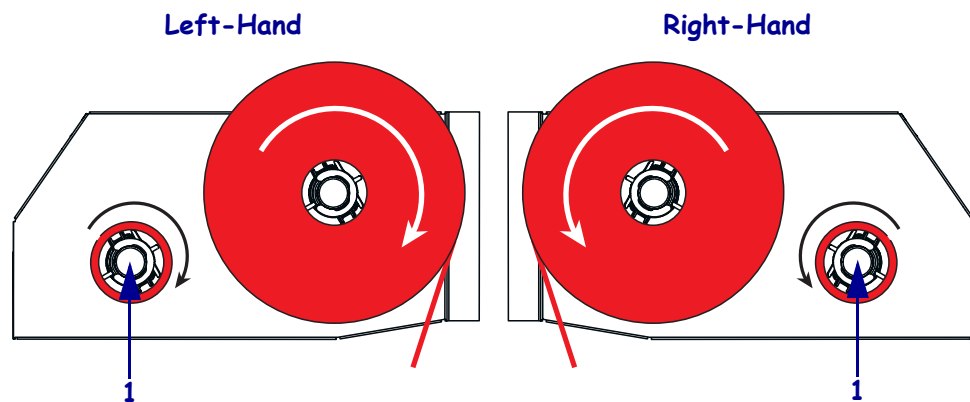
**Figure 35 • Threading Ribbon around Rollers**



<b>1</b>	Idler roller
<b>2</b>	Auxiliary roller

- See [Figure 31 on page 40](#). On the upper dancer assembly, squeeze the opening tabs to pivot open the dancer arm.
- See [Figure 31 on page 40](#). Carefully thread the ribbon through the upper dancer assembly, and then slowly release the dancer arm.
- See [Figure 36](#). Install an empty ribbon core onto the ribbon take-up spindle, and push the core toward the print engine frame until it is fully seated.
- See [Figure 36](#). 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. Ensure that the ribbon winds evenly on the spindle.

**Figure 36 • Loading Ribbon on the Ribbon Take-Up Spindle**



<b>1</b>	Ribbon take-up spindle with empty ribbon core
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- See [Figure 33 on page 41](#). Close the printhead assembly by pivoting the printhead latch onto the locking pin.
- 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...
Yes	<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 38</a>.</li> </ol>
No	<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. See <a href="#">Figure 36 on page 42</a>. Install 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 38</a>.</li> <li>f. See <a href="#">Figure 36 on page 42</a>. 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. Ensure that the ribbon winds evenly on the spindle.</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 <b>MEDIA POWER UP</b> (see <a href="#">Select Media Power-Up Option on page 67</a>)</li> <li>• When the print engine feeds media after the printhead is closed if CALIBRATION is selected for <b>HEAD CLOSE</b> (see <a href="#">Select Head Close Option on page 67</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 front panel to pause the print engine, and then press CALIBRATE.</li> <li>• Select CALIBRATION for the <b>MEDIA POWER UP</b> or <b>HEAD CLOSE</b> parameter (see <a href="#">Select Media Power-Up Option on page 67</a> or <a href="#">Select Head Close Option on page 67</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 <b>MEDIA POWER UP</b> or <b>HEAD CLOSE</b> parameter (see <a href="#">Select Media Power-Up Option on page 67</a> or <a href="#">Select Head Close Option on page 67</a> ).

Table 4 • Types of Calibration

Type of Calibration	Description	When/How It Occurs
<b>Sensor Profile Calibration</b>	The print engine auto-calibrates and prints a media sensor profile.	Select the <b>SENSOR PROFILE</b> option on the front panel. See <i>Print Sensor Profile</i> on page 62 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 <b>MEDIA AND RIBBON CALIBRATE</b> option on the front panel. See <i>Calibrate Media and Ribbon Sensor Sensitivity</i> on page 63 for instructions.

## Adjust Media Sensors

This section describes how to adjust the media sensors.

### 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 110](#) for information about black mark requirements.

### Transmissive Media Sensor

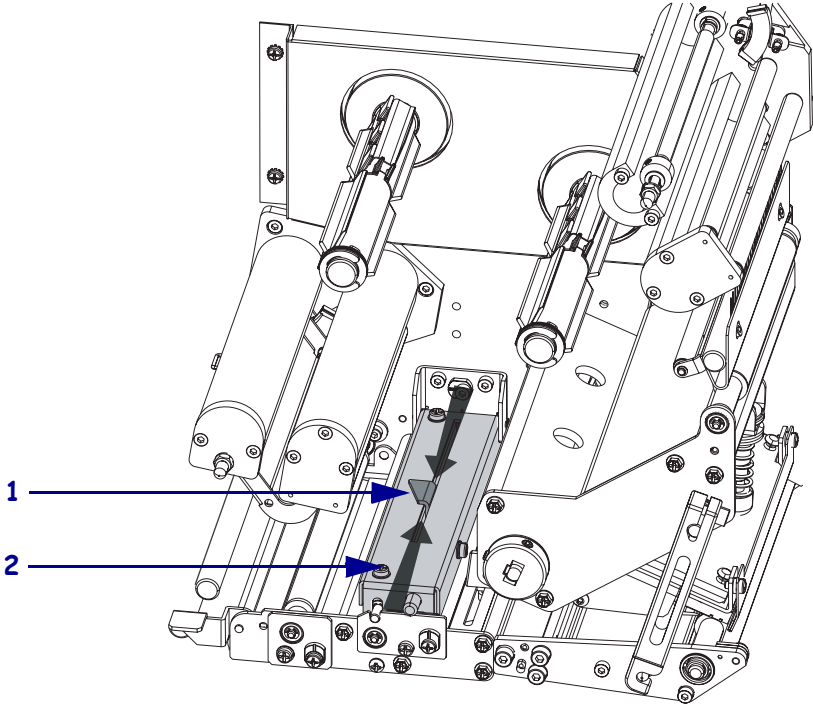
The transmissive media sensor finds “start of label” indicators, such as notches or holes in the media or interlabel gaps. This sensor consists of a light source (positioned below the media) and a light sensor (positioned above the media).

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

1. Refer to [Figure 37](#). How does the current media indicate the start of labels?

<b>If the media...</b>	<b>Then...</b>
<b>Has notches or holes between labels</b>	Slide the sensor position indicator along the pinch roller assembly so the point of the indicator aligns with the notch or hole in the media.
<b>Uses interlabel gaps</b>	Position the sensor position indicator approximately at the center of the media width.

Figure 37 • Media Sensor Adjustment (Right-Hand Unit Shown)



1	Sensor position indicator
2	Pinch roller assembly



**Notes •** \_\_\_\_\_

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# Print Engine Configuration

This chapter describes the front panel parameters that are used to configure the print engine for operation.

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## Overview

After you have installed the media and ribbon and the Power-On Self Test (POST) is complete, the front panel displays **PRINTER READY**. You may now set print engine parameters for your application using the front 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 100](#) and [FEED Self Test on page 101](#).



**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 to enter Setup mode.
2. Press either 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
<b>PERMANENT</b>	Stores values in the print engine even when power is turned off.
<b>TEMPORARY</b>	Saves the changes until power is turned off.
<b>CANCEL</b>	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.
<b>LOAD DEFAULTS</b>	Restores all parameters other than the network settings back to the factory defaults.  <b>Note</b> • Loading factory defaults causes the print engine to auto-calibrate.
<b>LOAD LAST SAVE</b>	Loads values from the last permanent save.
<b>DEFAULT NET</b>	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.

## 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 front 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 38).

**Figure 38 • Configuration Label**

PRINTER CONFIGURATION	
Zebra Technologies	
ZTC 110PAX4 RH-200dpi	
ZBR1935900	
12 6	DARKNESS
2 IPS	PRINT SPEED
6 IPS	SLEM SPEED
2 IPS	BACKFEED SPEED
+000	TEAR OFF
TEAR OFF	PRINT MODE
CONTINUOUS	MEDIA TYPE
WEB	SENSOR TYPE
THERMAL-TRANS.	PRINT METHOD
062 4/8 MM	PRINT WIDTH
1600	LABEL LENGTH
9-01N 220MM	MAXIMUM LENGTH
MEDIA DISABLED	EARLY WARNING
MAINT. OFF	EARLY WARNING
BIDIRECTIONAL	PARALLEL COMM.
RS232	SERIAL COMM.
9600	BAUD
8 BITS	DATA BITS
NONE	PARITY
NON/XOFF	HOST HANDSHAKE
NONE	PROTOCOL
000	NETWORK ID
NORMAL MODE	COMMUNICATIONS
<<> 7EH	CONTROL PREFIX
<> 5EH	FORMAT PREFIX
<> 2CH	DELIMITER CHAR
ZPL II	ZPL MODE
CALIBRATION	MEDIA POWER UP
CALIBRATION	HEAD CLOSE
BEFORE	BACKFEED
+000	LABEL TOP
+0000	LEFT POSITION
0690	HEAD RESISTOR
OFF	APPLICATOR PORT
PULSE MODE	START PRINT SIG
FEED MODE	RESYNCH MODE
29M	RIBBON LOW MODE
DISABLED	REPRINT MODE
039	WEB S.
079	MEDIA S.
072	RIBBON S.
050	MARK S.
000	MARK MED S.
072	MEDIA LED
000	RIBBON LED
008	MARK LED
+10	LCD ADJUST
DPSWFXM	MODES ENABLED
MODES DISABLED	MODES DISABLED
832 8/11M FULL	RESOLUTION
V60.13.0.4A ->	FIRMWARE
V30 33037 56	HARDWARE ID
CUSTOMIZED	CONFIGURATION
NONE	A: COMPACT FLASH
11776k	R: RAM
NONE	B: MEMORY CARD
2048k	E: ONBOARD FLASH
NONE	FORMAT CONVERT
*** APPLICATOR	P31 INTERFACE
005 DISPLAY	P32 INTERFACE
002 PAX110 RTS	P34 INTERFACE
007 POWER SUPPLY	P35 INTERFACE
FW VERSION	IDLE DISPLAY
03/19/00	RTC DATE
06:47	RTC TIME
2025 IN	NONRESET CNTR
2025 IN	RESET CNTR1
2025 IN	RESET CNTR2
5140 CM	NONRESET CNTR
5140 CM	RESET CNTR1
5140 CM	RESET CNTR2
446 LABELS	NONRESET CNTR
446 LABELS	RESET CNTR1
446 LABELS	RESET CNTR2
HK00000.04MAY000012.11111.01.VH1....	

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## 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 front 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 39). 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 39 • 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
ON.....	1 Mb/s
ON.....	2 Mb/s
ON.....	5.5 Mb/s
ON.....	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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## Changing Password-Protected Parameters

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

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**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.

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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.

## Front Panel LCD

Use the LCD display on the front 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. Throughout this process, 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 (\*) is shown 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 7 on page 74](#) shows the additional parameters that appear when a wired or wireless print server is installed in the print engine.

**Table 6 • Print Engine Parameters (Page 1 of 19)**

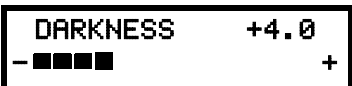


Parameter	Action/Explanation
	<p><b>Adjust Print Darkness</b></p> <p>Darkness (burn duration) settings depend on a variety of factors, including ribbon type, media, and the condition of the printhead. You may adjust the darkness for consistent high-quality printing.</p> <p>If printing is too light or if there are voids in printed areas, you should increase the darkness. If printing is too dark or if there is spreading or bleeding of printed areas, you should decrease the darkness. Darkness settings also may be changed by the driver or software settings.</p> <p>The <i>FEED Self Test</i> on <a href="#">page 101</a> can be used to determine the best darkness setting. Because the darkness setting takes effect immediately, you can see the results on labels that are currently 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> <ul style="list-style-type: none"> <li>• Press the right oval to increase darkness.</li> <li>• Press the left oval to decrease darkness.</li> </ul> <p><b>Default:</b> +4.0 <b>Range:</b> 00.0 to +30.0</p>
	<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> <ul style="list-style-type: none"> <li>• Press the right oval to increase the value.</li> <li>• Press the left oval to decrease the value.</li> </ul> <p><b>Default:</b> 2 IPS <b>Range:</b> 2 to 12 IPS for 203 dpi, 2 to 8 IPS for 300 dpi</p>
	<p><b>Adjust Slew Speed</b></p> <p>Adjusts the speed for feeding a blank label (given in inches per second).</p> <ul style="list-style-type: none"> <li>• Press the right oval to increase the value.</li> <li>• Press the left oval to decrease the value.</li> </ul> <p><b>Default:</b> 6 IPS <b>Range:</b> 1 to 12 IPS</p>

Table 6 • Print Engine Parameters (Page 2 of 19)

Parameter	Action/Explanation
<div style="border: 1px solid black; padding: 5px;">           BACKFEED SPEED            2 IPS                   +         </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).</p> <ul style="list-style-type: none"> <li>• Press the right oval to increase the value.</li> <li>• Press the left oval to decrease the value.</li> </ul> <p><b>Default:</b> 2 IPS <b>Range:</b> 1 to 12 IPS</p>
<div style="border: 1px solid black; padding: 5px;">           TEAR OFF                   +000            -■■■■■■                   +         </div>	<p><b>Adjust the Tear-Off Position</b> This parameter establishes the position of the media over the tear-off/peel-off bar after printing. Positive numbers move the media out and negative numbers move the media in.</p> <p>Each press of an oval adjusts the tear-off position by four dot rows.</p> <ul style="list-style-type: none"> <li>• Press the right oval to increase the value.</li> <li>• Press the left oval to decrease the value.</li> </ul> <p><b>Default:</b> +0 <b>Range:</b> –120 to +120</p>
<div style="border: 1px solid black; padding: 5px;">           PRINT MODE            -APPLICATOR               +         </div>	<p><b>Select Print Mode</b> Print mode settings tell the print engine the method of media delivery that you wish to use.</p> <ul style="list-style-type: none"> <li>• Press either oval to display other choices.</li> </ul> <p><b>Default:</b> APPLICATOR <b>Selections:</b> TEAR-OFF, REWIND, APPLICATOR</p>
<div style="border: 1px solid black; padding: 5px;">           MEDIA TYPE            -NON-CONTINUOUS+         </div>	<p><b>Set Media Type</b> This parameter tells the print engine the type of media that you are using. 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> <ul style="list-style-type: none"> <li>• Press either oval to display other choices.</li> </ul> <p><b>Default:</b> NON-CONTINUOUS <b>Selections:</b> CONTINUOUS, NON-CONTINUOUS</p>

Table 6 • Print Engine Parameters (Page 3 of 19)



Parameter	Action/Explanation
<div style="border: 1px solid black; padding: 5px;">                     SENSOR TYPE                      -WEB +                 </div>	<p><b>Set the Sensor Type</b></p> <p>This parameter tells the print engine whether you are using media with a web (gap/space between labels, notch, or hole) to indicate the separations between labels or if you are using media with a black mark printed on the back. If your media does not have black marks for registration on the back, leave your print engine at the default (WEB).</p> <ul style="list-style-type: none"> <li>• Press either oval to display other choices.</li> </ul> <p><b>Default:</b> WEB <b>Selections:</b> WEB, MARK</p>
<div style="border: 1px solid black; padding: 5px;">                     PRINT METHOD                      -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> <ul style="list-style-type: none"> <li>• Press either oval to display other choices.</li> </ul> <p><b>Default:</b> THERMAL TRANSFER <b>Selections:</b> THERMAL TRANSFER, DIRECT THERMAL</p> <p> <b>Note</b> • Selecting direct thermal when using thermal transfer media and ribbon creates a print engine error condition, but printing continues.</p>
<div style="border: 1px solid black; padding: 5px;">                     PRINT WIDTH                      - 104 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>To change value shown:</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>To change the unit of measurement:</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> <p><b>Default:</b> 104 MM for 203 dpi print engines; 105 8/12 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>

Table 6 • Print Engine Parameters (Page 4 of 19)

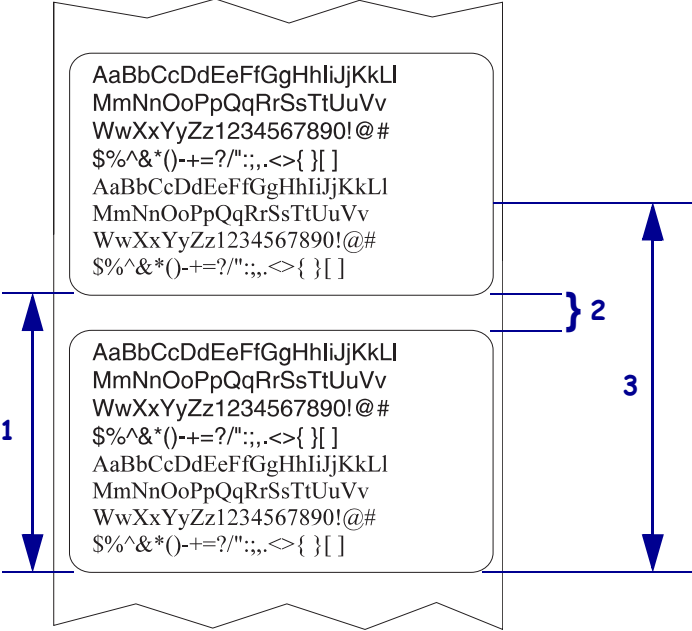
Parameter	Action/Explanation						
<table border="1"> <tr> <td style="text-align: center;">MAXIMUM LENGTH</td> </tr> <tr> <td style="text-align: center;">-39.0 IN      988 MM</td> </tr> </table>	MAXIMUM LENGTH	-39.0 IN      988 MM	<p><b>Set Maximum Label Length</b></p> <p>This parameter is used during 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 40). 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> <ul style="list-style-type: none"> <li>• Press the right oval to increase the value.</li> <li>• Press the left oval to decrease the value.</li> </ul> <p><b>Default:</b> 39.0 inches (988 mm). <b>Range:</b> Values are adjustable in one-inch (25.4 mm) increments.</p>				
MAXIMUM LENGTH							
-39.0 IN      988 MM							
	<p style="text-align: center;"><b>Figure 40 • Label Length</b></p>  <p>The diagram shows a label with two sections. The top section is labeled '1' and the bottom section is labeled '2'. A bracket labeled '3' spans both sections. The label contains alphanumeric characters and symbols.</p> <table border="1"> <tr> <td style="text-align: center;"><b>1</b></td> <td>Label length (including interlabel gap)</td> </tr> <tr> <td style="text-align: center;"><b>2</b></td> <td>Interlabel gap</td> </tr> <tr> <td style="text-align: center;"><b>3</b></td> <td>Set maximum label length to approximately this value</td> </tr> </table>	<b>1</b>	Label length (including interlabel gap)	<b>2</b>	Interlabel gap	<b>3</b>	Set maximum label length to approximately this value
<b>1</b>	Label length (including interlabel gap)						
<b>2</b>	Interlabel gap						
<b>3</b>	Set maximum label length to approximately this value						



Table 6 • Print Engine Parameters (Page 5 of 19)



Parameter	Action/Explanation
<p><b>EARLY WARNING MEDIA DISABLED</b></p>	<p><b>Set Early Warning for Media</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. Also, the print engine does not make any adjustments when power is turned off and on.</p> <ul style="list-style-type: none"> <li>• Press the right or left oval to display other choices.</li> </ul> <p><b>Default:</b> MEDIA DISABLED <b>Selections:</b> MEDIA DISABLED, MEDIA ENABLED</p> <p>To change the Early Warning settings:</p> <ol style="list-style-type: none"> <li>1. When the LCD displays <b>EARLY WARNING</b>, press the right or left oval until the desired setting is listed on the LCD. (If you are prompted for a password, enter your password using the instructions in <a href="#">Changing Password-Protected Parameters on page 54.</a>) 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 has been enabled, an alert is also sent. When the printhead is opened and then closed after a media warning has been received, the LCD prompts with <b>MEDIA REPLACED?</b> Press the right oval to select <b>YES</b> to clear the warning and reset the label counter.</li> <li>2. When setting the Early Warning for maintenance, the LCD prompts <b>HEAD CLEAN?</b></li> <li>3. Press the right oval to select <b>YES.</b></li> </ol>
<p><b>EARLY WARNING MAINT. OFF</b></p>	<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> <ul style="list-style-type: none"> <li>• Press the right or left oval to display other choices.</li> </ul> <p><b>Default:</b> MAINTENANCE DISABLED <b>Selections:</b> MAINTENANCE DISABLED, MAINTENANCE ENABLED</p> <p>To change the Early Warning settings:</p> <ol style="list-style-type: none"> <li>1. When the LCD displays <b>EARLY WARNING</b>, press the right or left oval until the desired setting is listed on the LCD. (If you are prompted for a password, enter your password using the instructions in <a href="#">Changing Password-Protected Parameters on page 54.</a>) When setting the Early Warning for maintenance, the LCD prompts <b>HEAD CLEAN?</b></li> <li>2. Press the right oval to select <b>YES.</b></li> </ol>

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

Parameter	Action/Explanation
LIST FONTS PRINT	<p><b>List Fonts</b></p> <ul style="list-style-type: none"> <li>Press the right oval to print 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 CompactFlash cards.</li> </ul>
LIST BAR CODES PRINT	<p><b>List Bar Codes</b></p> <ul style="list-style-type: none"> <li>Press the right oval to print 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 CompactFlash cards.</li> </ul>
LIST IMAGES PRINT	<p><b>List Images</b></p> <ul style="list-style-type: none"> <li>Press the right oval to print a label that lists the available images stored in the print engine's RAM, Flash memory, optional memory card, PCMCIA cards, or CompactFlash cards.</li> </ul>
LIST FORMATS PRINT	<p><b>List Formats</b></p> <ul style="list-style-type: none"> <li>Press the right oval to print a label that lists the available formats stored in the print engine's RAM, Flash memory, or optional memory card.</li> </ul>
LIST SETUP PRINT	<p><b>List Setup</b></p> <ul style="list-style-type: none"> <li>Press the right oval to print a configuration label, which lists the current print engine configuration.</li> </ul>
LIST NETWORK PRINT	<p><b>List Network Settings</b></p> <p>This selection is used to print a network configuration label, which lists the settings for any print server that is installed.</p> <ul style="list-style-type: none"> <li>Press the right oval to print a network configuration label.</li> </ul>
LIST ALL PRINT	<p><b>List All</b></p> <ul style="list-style-type: none"> <li>Press the right oval to print labels that list the available fonts, bar codes, images, formats, and the current print engine and network configurations.</li> </ul>

Table 6 • Print Engine Parameters (Page 7 of 19)



Parameter	Action/Explanation
<div style="border: 1px solid black; padding: 5px; text-align: center;">                     FORMAT CARD:                      A:                      B:                 </div>	<p><b>Initialize Memory Card</b></p> <p><b>Caution</b> • Perform this operation only when it is necessary to erase all previously stored information from the optional PCMCIA card or CompactFlash card.</p> <ol style="list-style-type: none"> <li>1. Press the right oval to select <b>YES</b>. (If you are prompted to enter the password, see <a href="#">Changing Password-Protected Parameters on page 54</a>. The front panel LCD asks <b>ARE YOU SURE?</b></li> <li>2. 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>INITIALIZE 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 front panel displays <b>PRINTER READY</b>. If you exit Setup mode while initialization is still in process, the front 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>
<div style="border: 1px solid black; padding: 5px; text-align: center;">                     INIT FLASH MEM                                          YES                 </div>	<p><b>Initialize Flash Memory</b></p> <p><b>Caution</b> • Perform this operation only when it is necessary to erase all previously stored information from Flash memory.</p> <ol style="list-style-type: none"> <li>1. Press the right oval to select <b>YES</b>. (If you are prompted to enter the password, see <a href="#">Changing Password-Protected Parameters on page 54</a>. The display shows <b>INITIALIZE FLASH?</b></li> <li>2. Press the right oval to select <b>YES</b>. The display shows <b>ARE YOU SURE?</b></li> <li>3. 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 front panel displays <b>PRINTER READY</b>. If you exit Setup mode while initialization is still in process, the front 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>

Table 6 • Print Engine Parameters (Page 8 of 19)

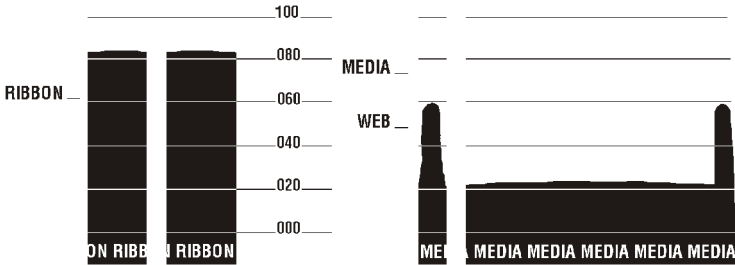
Parameter	Action/Explanation																
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <b>SENSOR PROFILE PRINT</b> </div>	<p><b>Print Sensor Profile</b></p> <p>The media sensor profile may be used to troubleshoot registration problems that may be caused when the media sensor detects preprinted areas on the media or experiences difficulty in determining web location.</p> <ul style="list-style-type: none"> <li>Press the right oval to start this standard calibration procedure and print a media sensor profile.</li> </ul> <p>Figure 41 shows a media 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 63 to adjust sensor sensitivity.</p> <p style="text-align: center;"><b>Figure 41 • Media Sensor Profile</b></p>  <table border="1" style="margin-left: auto; margin-right: auto;"> <caption>Data for Figure 41: Media Sensor Profile</caption> <thead> <tr> <th>Sensor Type</th> <th>Sensitivity Level (Approximate)</th> </tr> </thead> <tbody> <tr> <td>RIBBON (Left)</td> <td>0.85</td> </tr> <tr> <td>RIBBON (Right)</td> <td>0.85</td> </tr> <tr> <td>MEDIA (Left)</td> <td>0.20</td> </tr> <tr> <td>MEDIA (Middle)</td> <td>0.20</td> </tr> <tr> <td>MEDIA (Right)</td> <td>0.20</td> </tr> <tr> <td>WEB (Left)</td> <td>0.55</td> </tr> <tr> <td>WEB (Right)</td> <td>0.55</td> </tr> </tbody> </table>	Sensor Type	Sensitivity Level (Approximate)	RIBBON (Left)	0.85	RIBBON (Right)	0.85	MEDIA (Left)	0.20	MEDIA (Middle)	0.20	MEDIA (Right)	0.20	WEB (Left)	0.55	WEB (Right)	0.55
Sensor Type	Sensitivity Level (Approximate)																
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MEDIA (Left)	0.20																
MEDIA (Middle)	0.20																
MEDIA (Right)	0.20																
WEB (Left)	0.55																
WEB (Right)	0.55																

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Parameter	Action/Explanation
<p style="text-align: center;"><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> • This procedure must be followed 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 procedure.</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>
<p style="text-align: center;"><b>PARALLEL COMM. - BIDIRECTIONAL +</b></p>	<p><b>Set Parallel Communications</b> Select the communications port that matches the one being used by the host computer.</p> <ul style="list-style-type: none"> <li>• Press the right or left oval to display other choices.</li> </ul> <p><b>Default:</b> BIDIRECTIONAL <b>Selections:</b> BIDIRECTIONAL, UNIDIRECTIONAL</p>

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Parameter	Action/Explanation
<div style="border: 1px solid black; padding: 5px; text-align: center;">           SERIAL COMM - RS232 +         </div>	<p><b>Set Serial Communications</b> 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> RS-232 <b>Selections:</b> RS-232, RS-422/485, RS-485 MULTIDROP</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;">           BAUD - 9600 +         </div>	<p><b>Set Baud</b> 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> <ul style="list-style-type: none"> <li>• Press the right or left oval to display other choices.</li> </ul> <p><b>Default:</b> 9600 <b>Selections:</b> 110, 300, 600, 1200, 2400, 4800, 9600, 14400, 19200, 28800, 38400, 57600, 115200</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;">           DATA BITS - 8 BITS         </div>	<p><b>Set Data Bits</b> 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> <ul style="list-style-type: none"> <li>• Press the right or left oval to display other choices.</li> </ul> <p><b>Default:</b> 8 BITS <b>Selections:</b> 7 BITS, 8 BITS</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;">           PARITY - EVEN +         </div>	<p><b>Set Parity</b> 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> <ul style="list-style-type: none"> <li>• Press the right or left oval to display other choices.</li> </ul> <p><b>Default:</b> NONE <b>Selections:</b> EVEN, ODD, NONE</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;">           HOST HANDSHAKE - XON/XOFF +         </div>	<p><b>Set Host Handshake</b> 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> <ul style="list-style-type: none"> <li>• Press the right or left oval to display other choices.</li> </ul> <p><b>Default:</b> XON/XOFF <b>Selections:</b> XON/XOFF, DTR/DSR, RTS/CTS</p>

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Parameter	Action/Explanation
<div style="border: 1px solid black; padding: 5px; text-align: center;">           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> <ul style="list-style-type: none"> <li>• Press the right or left oval to display other choices.</li> </ul> <p><b>Default:</b> NONE</p> <p><b>Selections:</b> NONE, ZEBRA, ACK_NAK</p> <p> <b>Note</b> • Zebra is the same as ACK_NAK, except that Zebra response messages are sequenced. If Zebra is selected, the print engine must use <b>DTR/DSR</b> host handshake protocol.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;">           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> <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> <p><b>Default:</b> 000</p> <p><b>Range:</b> 000 to 999</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;">           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 <a href="#">Communications Diagnostics Test on page 104</a>.</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> <ol style="list-style-type: none"> <li>1. Press the right or left oval to toggle between the choices.</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 <a href="#">Set Print Width on page 57</a> for more information.</li> </ol> <p><b>Default:</b> NORMAL MODE</p> <p><b>Selections:</b> NORMAL MODE, DIAGNOSTICS</p>

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Parameter	Action/Explanation
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <b>CONTROL PREFIX</b>            -    &lt;■&gt;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> <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> <p><b>Default:</b> 7E (tilde—displayed as a black square)</p> <p><b>Range:</b> 00 to FF</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <b>FORMAT PREFIX</b>            -    &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> <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> <p><b>Default:</b> 5E (caret)</p> <p><b>Range:</b> 00 to FF</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <b>DELIMITER CHAR</b>            -    &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> <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> <p><b>Default:</b> 2C (comma)</p> <p><b>Range:</b> 00 to FF</p>



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Parameter	Action/Explanation
<div style="border: 1px solid black; padding: 5px; text-align: center;">           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 front panel instruction 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> <ul style="list-style-type: none"> <li>• Press the right or left oval to display other choices.</li> </ul> <p><b>Default:</b> ZPL II <b>Selections:</b> ZPL II, ZPL</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;">           MEDIA POWER UP            - CALIBRATION +         </div>	<p><b>Select Media Power-Up Option</b></p> <p>This parameter sets the action of the labels when the print engine is turned on.</p> <ul style="list-style-type: none"> <li>• Press the right or left oval to display the choices.</li> </ul> <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 non-continuous mode, calibrates based on the maximum label length setting (see <a href="#">Set Maximum Label Length on page 58</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>
<div style="border: 1px solid black; padding: 5px; text-align: center;">           HEAD CLOSE            - CALIBRATION +         </div>	<p><b>Select Head Close Option</b></p> <ul style="list-style-type: none"> <li>• Press the right or left oval to display the choices.</li> </ul> <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 non-continuous mode, calibrates based on the maximum label length setting (see <a href="#">Set Maximum Label Length on page 58</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>

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Parameter	Action/Explanation
<div style="border: 1px solid black; padding: 5px; text-align: center;">           BACKFEED            - BEFORE +         </div>	<p><b>Select Backfeed Sequence</b></p> <p>This parameter establishes when label backfeed occurs after a label is removed in applicator mode. It has no effect in Rewind mode. This parameter setting can be superseded by the ~JS instruction when received as part of a label format (refer to <i>ZPL II Programming Guide Volume I</i>).</p> <ul style="list-style-type: none"> <li>• Press the right or left oval to display other choices.</li> </ul> <p><b>Default:</b> BEFORE</p> <p><b>Selections:</b> DEFAULT, AFTER, BEFORE, OFF</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;">           LABEL TOP +000            -■■■■■■■■ +         </div>	<p><b>Adjust Label Top Position</b></p> <p>The label top position adjusts the print position vertically on the label. Positive numbers adjust the label top position further down the label (away from the printhead); negative numbers adjust the position up the label (toward the printhead). The displayed value represents dots.</p> <ul style="list-style-type: none"> <li>• Press the right oval to increase the value.</li> <li>• Press the left oval to decrease the value.</li> </ul> <p><b>Default:</b> +000</p> <p><b>Range:</b> –120 to +120 dots</p>
<div style="border: 1px solid black; padding: 5px; 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> <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> <p><b>Default:</b> 0000</p> <p><b>Range:</b> –9999 to +9999 dots</p>

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Parameter	Action/Explanation
<div style="border: 1px solid black; padding: 5px; text-align: center;">           HEAD RESISTOR            - 0500 OHMS +         </div>	<p><b>Set the Head 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 has been 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> <ol style="list-style-type: none"> <li>1. Look on the printhead for the label that shows the resistance value (<math>\Omega</math> value). Take note of this value before installing the replacement 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> <p><b>Initial Value:</b> Factory-set to match the printhead shipped with your print engine.</p> <p><b>Default Value:</b> 0500</p> <p><b>Range:</b> 0500 to 2000</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;">           APPLICATOR PORT            - OFF +         </div>	<p><b>Set the Applicator Port</b></p> <p>Determines the action of the applicator port.</p> <p> <b>Note</b> • Set this value as suggested by the applicator manufacturer.</p> <ul style="list-style-type: none"> <li>• <b>Off:</b> The applicator port is off.</li> <li>• <b>Mode 1:</b> Asserts the <math>\sim</math>END_PRINT signal low while the print engine is moving the label forward.</li> <li>• <b>Mode 2:</b> Asserts the <math>\sim</math>END_PRINT signal high while the print engine is moving the label forward.</li> <li>• <b>Mode 3:</b> Asserts the <math>\sim</math>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 <math>\sim</math>END_PRINT signal high for 20 milliseconds when a label has been completed and positioned. Not asserted during continuous printing modes.</li> </ul> <ul style="list-style-type: none"> <li>• Press the right or left oval to display other choices.</li> </ul> <p><b>Default:</b> OFF</p> <p><b>Selections:</b> OFF, MODE 1, MODE 2, MODE 3, MODE 4</p>

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Parameter	Action/Explanation
<div style="border: 1px solid black; padding: 5px; text-align: center;">           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> <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>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> <ul style="list-style-type: none"> <li>• Press the right or left oval to display other choices.</li> </ul> <p><b>Default:</b> PULSE MODE <b>Selections:</b> PULSE MODE, LEVEL MODE</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;">           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> <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).</li> </ul> <p>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 67</a>).</p> <ul style="list-style-type: none"> <li>• Press the right or left oval to toggle between choices.</li> </ul> <p><b>Default:</b> FEED MODE <b>Selections:</b> FEED MODE, ERROR MODE</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;">           RIBBON LOW MODE            - 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 HIGH to provide a <b>RIBBON LOW</b> warning.</p> <ul style="list-style-type: none"> <li>• Press the right or left oval to display other choices.</li> </ul> <p><b>Default:</b> 25M <b>Selections:</b> OFF, 25M, 50M, 75M, 100M</p>

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Parameter	Action/Explanation
<div style="border: 1px solid black; padding: 5px; text-align: center;"> REPRINT MODE  - DISABLED + </div>	<p><b>Set Reprint Mode</b>  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> <ul style="list-style-type: none"> <li>• Press the right or left oval to display other choices.</li> </ul> <p><b>Default:</b> DISABLED  <b>Range:</b> ENABLED, DISABLED</p>
<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;"> MARK LED    005  - ■            + </div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 2px;"> RIBBON LED  008  - ■            + </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> <ul style="list-style-type: none"> <li>• Press NEXT repeatedly to skip these parameters.</li> </ul>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> LCD ADJUST    +10  - ■            + </div>	<p><b>Adjust LCD Display</b>  This parameter allows you to adjust the brightness of your LCD if it is difficult to read.</p> <ul style="list-style-type: none"> <li>• Press the left oval to decrease the value (reduce brightness).</li> <li>• Press the right oval to increase the value (increase brightness).</li> </ul> <p><b>Default:</b> 10  <b>Range:</b> 00 to 19</p>

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Parameter	Action/Explanation
<div style="border: 1px solid black; padding: 5px; width: fit-content;">           FORMAT CONVERT            - NONE +         </div>	<p><b>Select Format Convert</b>            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> <ul style="list-style-type: none"> <li>Press the right or left oval to display other choices.</li> </ul> <p><b>Default:</b> NONE  <b>Selections:</b> NONE, 150 → 300, 150 → 600, 200 → 600, 300 → 600</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;">           RTS TAKEUP ARM            XXX         </div>	<p><b>Set RTS Takeup Dancer Arm Calibration Value</b>            This parameter is used as a diagnostic tool to monitor the voltage supplied to the Ribbon Tensioning System Takeup Dancer Arm. Refer to the <i>Maintenance Manual</i> for information.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;">           RTS SUPPLY ARM            XXX         </div>	<p><b>Set RTS Supply Dancer Arm Calibration Value</b>            This parameter is used as a diagnostic tool to monitor the voltage supplied to the Ribbon Tensioning System Supply Dancer Arm. Refer to the <i>Maintenance Manual</i> for information.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;">           IDLE DISPLAY            - FW VERSION +         </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 either oval briefly displays the firmware version of the print engine.</p> <ul style="list-style-type: none"> <li>Press the right or left oval to display other choices.</li> </ul> <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>
<div style="border: 1px solid black; padding: 5px; width: fit-content;">           RTC DATE            - 01/31/01 +         </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> <ol style="list-style-type: none"> <li>Press the left oval to move to the next digit position.</li> <li>Press the right oval to change the value of the digit.</li> </ol>


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

Parameter	Action/Explanation
<div style="border: 1px solid black; padding: 5px; display: inline-block;">                     RTC TIME - 14:55 +                 </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> <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: inline-block;">                     LANGUAGE -ENGLISH +                 </div>	<p><b>Select the Display Language</b> This parameter allows you to change the language displayed on the front panel LCD.</p> <ul style="list-style-type: none"> <li>• Press the right or left oval to display other choices.</li> </ul> <p><b>Default:</b> ENGLISH</p> <p><b>Selections:</b> ENGLISH, SPANISH, FRENCH, GERMAN, ITALIAN, NORWEGIAN, PORTUGUESE, SWEDISH, DANISH, SPANISH 2, DUTCH, FINNISH, JAPAN</p>

## ZebraNet® Print Server LCD Displays

The menu options shown in [Table 7](#) display only if you have the ZebraNet 10/100 PrintServer or Wireless Print Server installed.

**Table 7 • Print Server LCD Displays**

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 printer's or the print server's IP settings at bootup.</p> <ul style="list-style-type: none"> <li>Press the right or left oval to display other choices.</li> </ul> <p><b>Default:</b> PRINTER <b>Selections:</b> PRINTER, PRINTSERVER</p>
WIRED PS CHECK? NO	<p><b>Wired PrintServer Check<sup>1</sup></b> This parameter, which serves the same function as the ^NB ZPL command, tells the printer whether to search for a wired print server at bootup.</p> <ul style="list-style-type: none"> <li>Press the right or left oval to display other choices.</li> </ul> <p><b>Default:</b> NO <b>Selections:</b> YES, NO</p>
IP PROTOCOL ALL	<p><b>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> <ul style="list-style-type: none"> <li>Press the right or left oval to display other choices.</li> </ul> <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>

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 printer 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 7 • Print Server LCD Displays (Continued)

Parameter	Action/Explanation
<div style="border: 1px solid black; padding: 5px;"> <b>IP ADDRESS</b>            000.000.000.000         </div>	<p><b>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> <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;"> <b>SUBNET MASK</b>            000.000.000.000         </div>	<p><b>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> <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;"> <b>DEFAULT GATEWAY</b>            000.000.000.000         </div>	<p><b>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> <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;"> <b>MAC ADDRESS</b>            000000000000         </div>	<p><b>View MAC Address<sup>1,3</sup></b>            This parameter cannot be changed through the front panel.</p>
<div style="border: 1px solid black; padding: 5px;"> <b>ESSID</b>            125         </div>	<p><b>View ESSID<sup>1,3</sup></b>            This parameter cannot be changed through the front panel.</p>
<div style="border: 1px solid black; padding: 5px;"> <b>AUTH. TYPE</b>            OPEN         </div>	<p><b>Select Authentication Type<sup>1,3</sup></b></p> <ul style="list-style-type: none"> <li>• Press the right or left oval to display other choices.</li> </ul> <p><b>Default:</b> OPEN  <b>Selections:</b> OPEN, SHARED</p>
<div style="border: 1px solid black; padding: 5px;"> <b>LEAP MODE</b>            OFF         </div>	<p><b>Enable LEAP Mode<sup>3,4</sup></b>            LEAP is an encryption method that is available with some wireless cards. Set the LEAP user name and password through the printer web pages.</p> <ul style="list-style-type: none"> <li>• Press the right or left oval to display other choices.</li> </ul> <p><b>Default:</b> OFF  <b>Selections:</b> ON, OFF</p>

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 printer 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 7 • Print Server LCD Displays (Continued)**

Parameter	Action/Explanation
<pre> <b>ENCRYPTION MODE</b> <b>OFF</b>           </pre>	<p><b>Select Encryption Mode</b><sup>1,3</sup></p> <ul style="list-style-type: none"> <li>• Press the right or left oval to display other choices.</li> </ul> <p><b>Default:</b> OFF</p> <p><b>Selections:</b> OFF, 40-BIT, 128-BIT</p>
<pre> <b>ENCRYPT. INDEX</b> <b>1</b>           </pre>	<p><b>Select Encryption Index</b><sup>1,3</sup></p> <ul style="list-style-type: none"> <li>• Press the right or left oval to display other choices.</li> </ul> <p><b>Default:</b> 1</p> <p><b>Selections:</b> 1, 2, 3, 4</p>
<pre> <b>RESET NETWORK</b> <b>YES</b>           </pre>	<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>1. 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> to 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 printer 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.

### Contents

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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 8](#). 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 8 • 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*	

\* Use Zebra's Preventative Maintenance kit, part number 47362, or a solution of 90% isopropyl alcohol and 10% deionized water.

## Clean 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 Interior

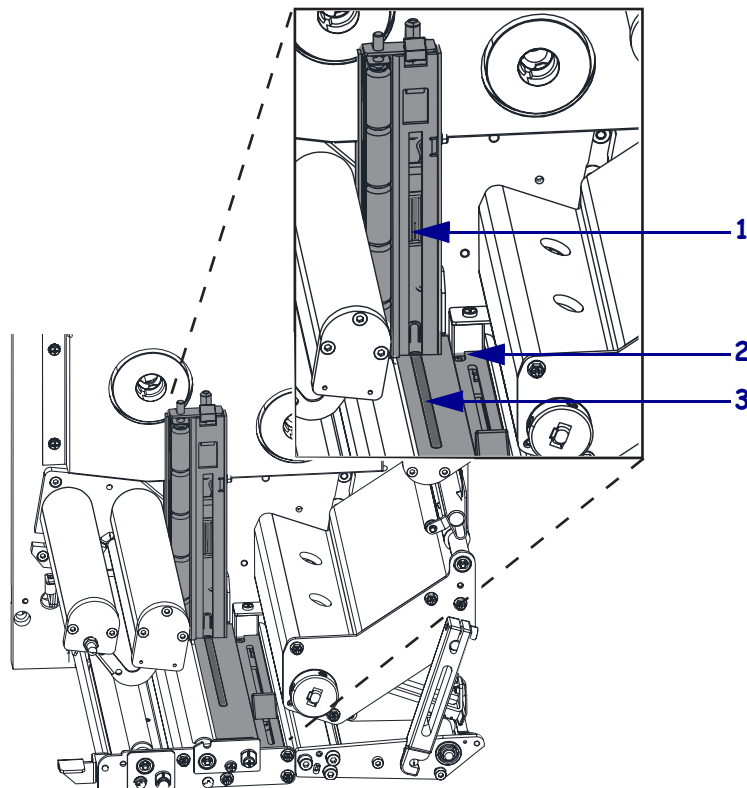
Remove any accumulated dirt and lint from the interior of the print engine using a soft bristle brush and/or vacuum cleaner. This area should be inspected every time a new ribbon is loaded.

### 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:

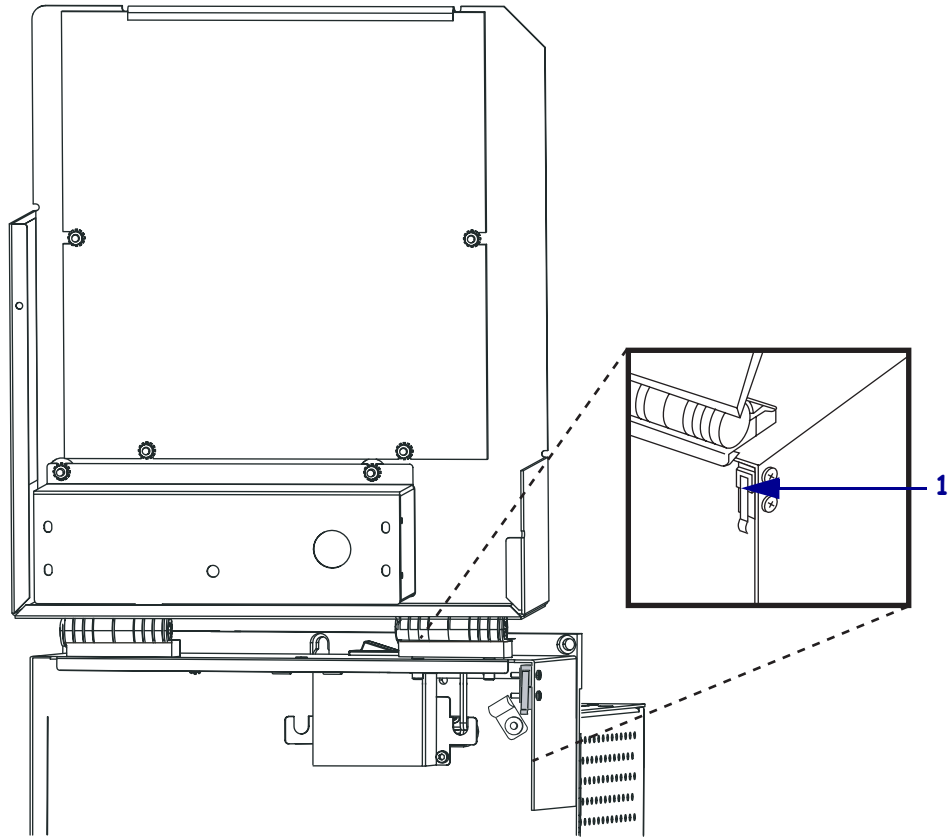
- See [Figure 42](#) for the media sensors.
- See [Figure 43 on page 80](#) for the door-open sensor.
- See [Figure 44 on page 80](#) for the ribbon sensor and ribbon sensor reflector.

**Figure 42 • Media Sensor Locations (Right-Hand Unit Shown)**



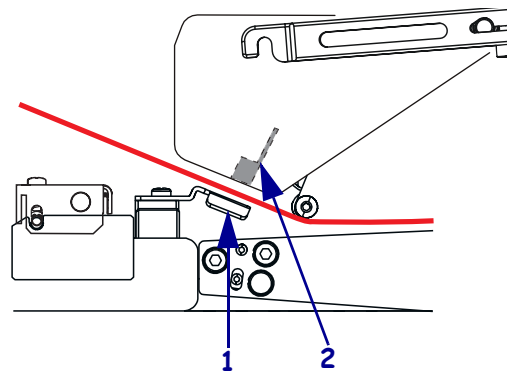
<b>1</b>	Upper transmissive media sensor
<b>2</b>	Reflective media sensor
<b>3</b>	Lower transmissive media sensor

**Figure 43 • Door-Open Sensor Location (Right-Hand Unit Shown)**



<b>1</b>	Door-open sensor
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**Figure 44 • Ribbon Sensor Location (Right-Hand Unit Shown)**



<b>1</b>	Ribbon sensor reflector
<b>2</b>	Ribbon sensor

## Clean the Printhead and Platen Roller

Clean the printhead and platen roller according to the schedule in [Table 8 on page 78](#). 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:



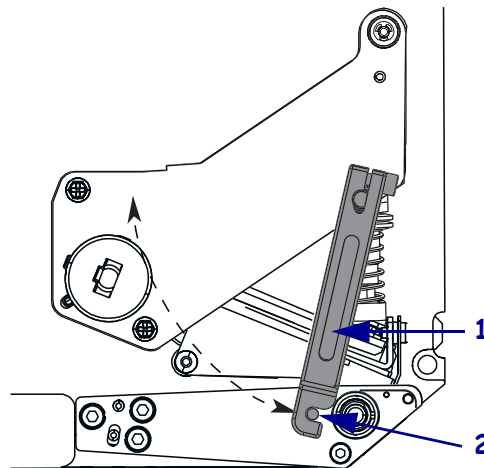
**Caution** • The printhead may be hot and could cause severe burns. Allow the printhead to cool.



**Electrostatic Discharge 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 45](#). Open the printhead assembly by unlatching the printhead latch from the locking pin.

**Figure 45 • Opening the Printhead Assembly**

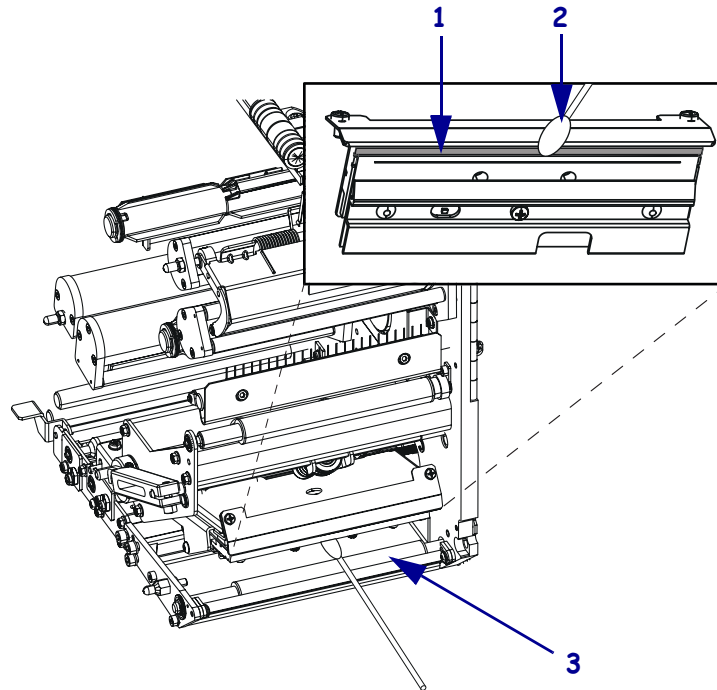


<b>1</b>	Printhead latch
<b>2</b>	Locking pin

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

4. See [Figure 46](#). Using Zebra's 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 46 • Printhead and Platen Roller Cleaning (Right-Hand Unit Shown)**



<b>1</b>	Printhead elements (gray strip)
<b>2</b>	Cotton swab
<b>3</b>	Platen roller

5. Use a lint-free cloth moistened with alcohol to clean the platen roller and other rollers. Rotate the rollers while cleaning.
6. Reload the ribbon and media (if used).
7. 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.



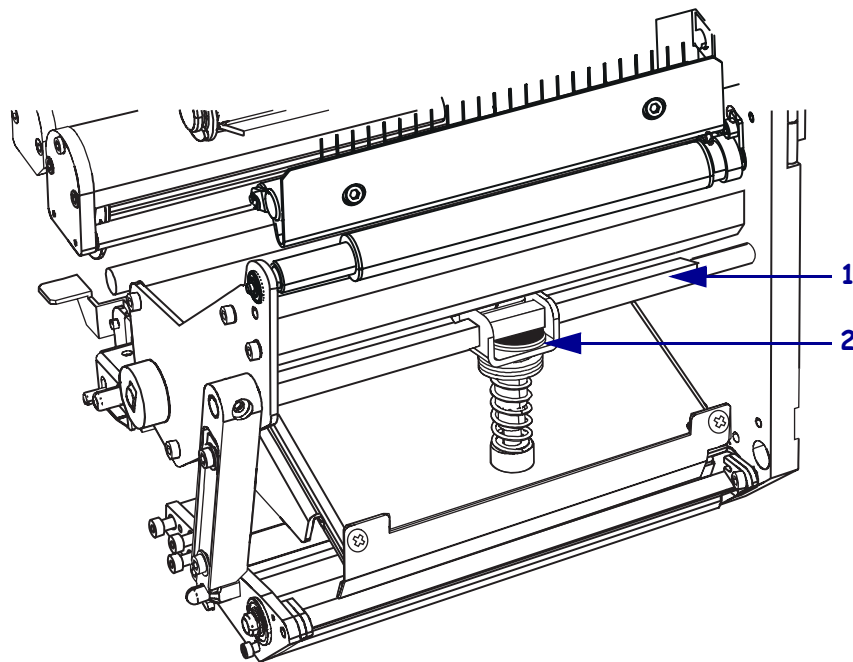
## Toggle Positioning

Proper toggle positioning is important for proper print quality. The toggle should be positioned approximately midway across the width of the media.

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

1. See [Figure 47](#). 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 47 • Toggle Positioning (Right-Hand Unit Shown)**



<b>1</b>	Toggle shaft
<b>2</b>	Position locking nut

## Printhead Pressure Adjustment

Before adjusting the printhead pressure, check that the toggle is positioned correctly. See [Toggle Positioning on page 83](#).

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)

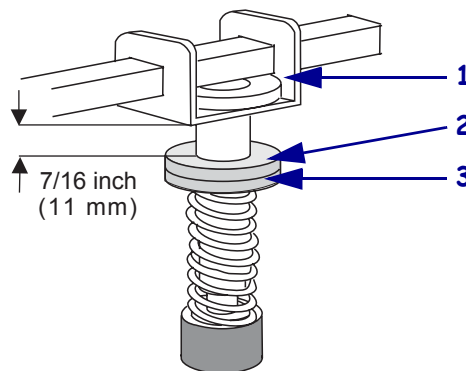


**Note** • Printhead and drive system (belts and bearings) life can be maximized by using the lowest pressure that produces the desired print quality.

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

1. See [Figure 48](#). As a starting point for adjustment, set the position of the adjusting nut 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 [PAUSE Self Test on page 100](#) to print test labels.
4. Adjust the position of the adjusting nut 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 48 • Printhead Pressure Adjustment**



<b>1</b>	Yoke
<b>2</b>	Locking nut
<b>3</b>	Adjusting nut

## Power Fuse Replacement

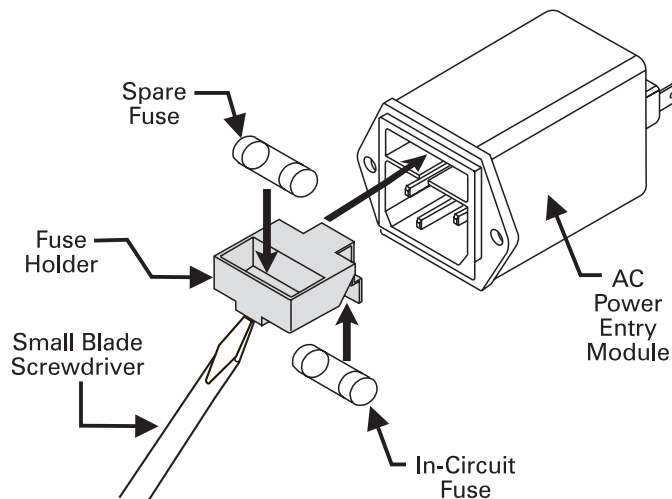
The print engine uses a metric-style fuse (5 × 20 mm IEC) rated for 5 Amps at 250 Volts that bears the certification mark of a known international safety organization (see [Figure 13 on page 23](#)). The power entry module comes with two approved fuses in the fuse holder: one is in-circuit and the other is a spare.

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

1. See [Figure 49](#). Turn off the print engine and unplug the power cord from the back of the print engine.
2. Using a small-blade screwdriver, remove the fuse holder from the power entry module at the rear of the print engine.
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 turn the print engine on.

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. See [Troubleshooting on page 87](#).

Figure 49 • Installing a Fuse





**Routine Maintenance**  
Power Fuse Replacement



**Notes •** \_\_\_\_\_

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# Troubleshooting

This chapter provides you with information about LCD, print quality, communications, and other errors that you might need to troubleshoot. If you need technical assistance, contact your equipment supplier.

## Contents

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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 89 for more information.
- Is the CHECK RIBBON light on when ribbon is loaded properly, or are non-continuous labels being treated as continuous labels? If yes, see *Calibrate Media and Ribbon Sensor Sensitivity* on page 63.
- Are you experiencing problems with print quality? If yes, see *Print Quality Problems* on page 92.
- Are you experiencing communications problems? If yes, see *Communications Problems* on page 95.

### **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.
- Review the label- and ribbon-loading illustrations in *Load Media* on page 32 and *Load Ribbon* on page 38.
- Check the position of the media sensor and move if necessary, as shown in *Adjust Media Sensors* on page 46.
- Does the printhead need to be adjusted? See *Printhead Pressure Adjustment* on page 84 for more information.
- Do the sensors need to be calibrated? See *Calibrate Media and Ribbon Sensor Sensitivity* on page 63 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 98. Use the results to help identify the problem.
- If you are still having problems, see *Support* on page 3 for customer support information.





## LCD Error Messages

The LCD displays messages when there is an error. See [Table 9](#) for LCD errors, the possible causes, and the recommended solutions.

**Table 9 • LCD Error Messages**

LCD Display/ Print Engine Condition	Possible Cause	Recommended Solution
<div style="border: 1px solid black; padding: 5px; text-align: center;">           ERROR CONDITION RIBBON OUT         </div> <p>Print engine stops; RIBBON light ON, ERROR light flashes.</p>	In thermal transfer mode, ribbon is not loaded or incorrectly loaded.	Load ribbon correctly. See <a href="#">Load Ribbon on page 38</a> .
	In thermal transfer mode, the ribbon sensor is not detecting ribbon that is loaded incorrectly.	<ol style="list-style-type: none"> <li>1. Load ribbon correctly. See <a href="#">Load Ribbon on page 38</a>.</li> <li>2. Calibrate the sensors. See <a href="#">Calibrate Media and Ribbon Sensor Sensitivity on page 63</a>.</li> </ol>
	In thermal transfer mode, media is blocking the ribbon sensor.	<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 63</a>.</li> </ol>
<div style="border: 1px solid black; padding: 5px; text-align: center;">           WARNING RIBBON IN         </div> <p>RIBBON light ON, ERROR light flashes.</p>	Ribbon is loaded, but the print engine is set for direct thermal mode.	Ribbon is not required with direct thermal media. Remove ribbon unless you are using it to protect the printhead. This error message will not affect printing.
<div style="border: 1px solid black; padding: 5px; text-align: center;">           ERROR CONDITION PAPER OUT         </div> <p>Print engine stops; MEDIA light ON, ERROR light flashes.</p>	Media is not loaded or is loaded incorrectly.	Load media correctly. See <a href="#">Load Media on page 32</a> .
	Misadjusted media sensor.	Check position of the media sensor.
	The print engine is set for non-continuous media, but continuous media is loaded.	Install proper media type, or reset print engine for current media type and perform calibration.
<div style="border: 1px solid black; padding: 5px; text-align: center;">           ERROR CONDITION HEAD OPEN         </div> <p>Print engine stops and ERROR light flashes.</p>	The printhead is not fully closed.	Close printhead completely.
	The head open sensor is not working properly.	Call a service technician.

**Table 9 • LCD Error Messages (Continued)**

LCD Display/ Print Engine Condition	Possible Cause	Recommended Solution
<div style="border: 1px solid black; padding: 5px; text-align: center;">           WARNING HEAD TOO HOT         </div> <p>Print engine stops and ERROR light flashes.</p>	<div style="display: flex; flex-direction: column; gap: 10px;"> <div style="display: flex; align-items: center;">  <p><b>Caution</b> • The printhead may be hot enough to cause severe burns. Allow the printhead to cool.</p> </div> <div style="display: flex; align-items: center;">  <p><b>Electrostatic Discharge 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>Printing automatically resumes when the printhead elements cool to an acceptable operating temperature.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;">           WARNING HEAD COLD         </div> <p>Print engine stops and ERROR light flashes.</p>	<div style="display: flex; flex-direction: column; gap: 10px;"> <div style="display: flex; align-items: center;">  <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 style="display: flex; align-items: center;">  <p><b>Electrostatic Discharge 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 under temperature.</p> <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 data cable is not properly connected.</p> <p><b>Caution</b> • You must turn off the print engine before performing this procedure. Failure to do so can damage the printhead.</p> <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>



## Memory Errors

The memory errors in [Table 10](#) indicate that the print engine does not have enough memory to perform the function shown on the second line of the LCD.



**Table 10 • 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> <ol style="list-style-type: none"> <li>1. Press PAUSE to place the print engine in Pause mode.</li> <li>2. Send a ~HM ZPL command to the print engine to display the amount of free memory. Then do one of the following: <ul style="list-style-type: none"> <li>• Redesign 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.</li> </ul> </li> <li>3. In Pause mode, press CANCEL. The print engine skips the current label formatting process and goes to the next label.</li> <li>4. Turn the print engine Off (O) and then On (I) to clear the print engine's memory.</li> <li>5. Upgrade the print engine to a larger memory size.</li> </ol>
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 11 identifies problems with print quality, the possible causes, and the recommended solutions.

**Table 11 • Print Quality Problems**

<b>Problem</b>	<b>Possible Cause</b>	<b>Recommended Solution</b>
<b>General print quality issues</b>	You are using an incorrect combination of labels and ribbon for your application.	Consult your authorized Zebra reseller or distributor for information and advice.
	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 ZPL II, the driver, or the software. See <a href="#">Adjust Print Speed on page 55</a> .
	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 front panel, the driver, or the software. See <a href="#">Adjust Print Darkness on page 55</a> .
	The printhead is dirty.	<p>Clean the printhead according to the instructions in <a href="#">Clean the Printhead and Platen Roller on page 81</a>.</p> <p> <b>Caution</b> • The printhead may be hot enough to cause severe burns. Allow the printhead to cool.</p> <p> <b>Electrostatic Discharge Caution</b> • Observe proper electrostatic safety precautions when handling any static-sensitive components such as circuit boards and printheads.</p>

**Table 11 • 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 <i>Load Ribbon</i> on page 38.
	Incorrect burn temperature.	Set the darkness to the lowest possible setting for good print quality. See <i>Adjust Print Darkness</i> on page 55.
	Incorrect or uneven pressure.	Set the pressure to the minimum needed for good print quality. See <i>Printhead Pressure Adjustment</i> on page 84.
	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>	Wrinkled ribbon.	See wrinkled ribbon causes and solutions in this table.
	Print element damaged.	Call a service technician.
<b>Fine, angular gray lines on blank labels</b>	Wrinkled ribbon.	See wrinkled ribbon causes and solutions in this table.
<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 <i>Toggle Positioning</i> on page 83 and <i>Printhead Pressure Adjustment</i> on page 84.
		Call a service technician.
<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.
	Incorrect or uneven printhead pressure.	Set the pressure to the minimum needed. See <i>Printhead Pressure Adjustment</i> on page 84.
<b>Smudge marks on labels</b>	Media or ribbon not designed for high-speed operation.	Replace supplies with those recommended for high-speed operation.
<b>Misregistration/skips labels</b>	Media sensor not positioned correctly.	Perform media sensor position adjustment.
	The print engine not calibrated.	Recalibrate the print engine.
	Improper label format.	Use correct label format.

**Table 11 • Print Quality Problems (Continued)**

<b>Problem</b>	<b>Possible Cause</b>	<b>Recommended Solution</b>
<b>Misregistration and misprint of one to three labels</b>	Media sensor is not positioned correctly.	Place media sensor in proper position.
	The platen roller is dirty.	Clean the platen roller according to the instructions in <i>Clean the Printhead and Platen Roller</i> on page 81.
	Media does not meet specifications.	Use media that meets specifications.
<b>Vertical drift in top-of-form position</b>	A plus or minus 4 to 6 dot row (approximately 0.5 mm) vertical drift is acceptable due to different tolerances of mechanical parts and print engine modes.	<ol style="list-style-type: none"> <li>1. Calibrate print engine.</li> <li>2. Adjust the label top position setting. See <i>Adjust Label Top Position</i> on page 68.</li> </ol>
	The print engine is out of calibration.	Recalibrate the print engine.
	The platen roller is dirty.	Clean the platen roller according to the instructions in <i>Clean the Printhead and Platen Roller</i> on page 81.
<b>Vertical image or label drift</b>	Print engine using non-continuous labels but configured in continuous mode.	Configure the print engine for non-continuous and run calibration routine, if necessary.
	Incorrectly positioned media sensor.	Ensure the media sensor is properly positioned to read a single/consistent interlabel gap.
	Improperly calibrated media sensor.	See <i>Calibrate Media and Ribbon Sensor Sensitivity</i> on page 63.
	The platen roller is dirty.	Clean the platen roller.
	Improper printhead pressure settings (toggles).	Adjust the printhead pressure to ensure proper functionality.
	Improperly loaded ribbon or media.	Verify that the ribbon and media are properly loaded.
	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.

## Communications Problems

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

**Table 12 • Communications Problems**

Problem	Possible Cause	Recommended Solution
A label format was sent to the print engine but was not recognized. The DATA light does not flash.	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 front panel menu. See <i>Set Serial Communications</i> on page 64.
		Make sure you are using the correct communication cable. See <i>Data Cable Requirements</i> on page 26 for the requirements.
		Using the front panel controls, check the protocol setting. It should be set to NONE. See <i>Set Protocol</i> on page 65.
		If a driver is used, check the driver communication settings for your connection.
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.	The serial communication settings are incorrect.	Ensure that the flow control settings match.
		Check the communication cable length. See <i>Data Cable Requirements</i> on page 26 for requirements.
		Check the print engine driver or software communications settings (if applicable).
A label format was sent to the print engine but was not recognized. The DATA light flashes but no printing occurs.	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 <i>Set Format Prefix Character</i> on page 66 and <i>Set Delimiter Character</i> on page 66 for the requirements.
	Incorrect data is being sent to the print engine.	Ensure that ZPL II is being used.
		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 13 identifies miscellaneous problems with the print engine, the possible causes, and the recommended solutions.

**Table 13 • Miscellaneous Print Engine Problems**

<b>Problem</b>	<b>Possible Cause</b>	<b>Recommended Solution</b>
<b>Broken or melted ribbon</b>	Darkness setting too high.	<ol style="list-style-type: none"> <li>1. Reduce the darkness setting.</li> <li>2. Clean the printhead thoroughly.</li> </ol>
<b>Ribbon tension dancer(s) oscillate erratically</b>	Ribbon core is not standard size and is slipping on the spindle.	Replace ribbon with one that has a standard core size.
<b>Missing LCD 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 back On (I).</li> </ol>
	A ZPL command has turned off the ability to change the parameter.	Refer to the <i>ZPL Programming Guide</i> or call a service technician.
	A ZPL command has 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.
<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 63.
	The print engine is configured for continuous media.	Set the media type to non-continuous media. See <i>Set Media Type</i> on page 56.
	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 being treated as continuous labels</b>	The print engine is configured for continuous media.	Set the media type to non-continuous media. See <i>Set Media Type</i> on page 56.
	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 63.

**Table 13 • Miscellaneous Print Engine Problems (Continued)**

<b>Problem</b>	<b>Possible Cause</b>	<b>Recommended Solution</b>
<b>Ribbon light is on even though ribbon is loaded correctly</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 63.
<b>All lights 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 most commonly used are the Power-On and the CANCEL self tests.

---

**Caution** • Full width media should be used when performing self tests. If your media is not wide enough, the test labels may print on the platen roller and damage it. To prevent this from happening, check the print width using [Set Print Width on page 57](#), and ensure that the width is correct for the media that you are using.

---

### 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 front 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, turn On (**I**) the print engine using the power switch on 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.

### Additional Print Engine Self Tests

These self tests produce sample printouts and provide specific information that helps determine the operating conditions for the print engine.

Each self test is enabled by pressing a specific front 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 back On (**I**).
- If the 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.



## CANCEL Self Test

The CANCEL self test prints a configuration label (Figure 50).

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

1. Turn Off (O) the print engine.
2. Press and hold CANCEL while turning the power On (I). Hold CANCEL until the first front panel light turns off.  
A print engine configuration label prints (Figure 50).

Figure 50 • Configuration Label

PRINTER CONFIGURATION	
Zebra Technologies	
ZTC 110PAX4 RH-200dpi	
ZDR1935900	
12.6.....	DARKNESS
2 IPS.....	PRINT SPEED
6 IPS.....	SLEW SPEED
2 IPS.....	BACKFEED SPEED
+000.....	TEAR OFF
TEAR OFF.....	PRINT MODE
CONTINUOUS.....	MEDIA TYPE
WEB.....	SENSOR TYPE
THERMAL-TRANS.....	PRINT METHOD
062 4/8 MM.....	PRINT WIDTH
1600.....	LABEL LENGTH
9.01N 228MM.....	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
<~> 7EH.....	CONTROL PREFIX
<^> 5EH.....	FORMAT PREFIX
<.> 2CH.....	DELIMITER CHAR
ZPL II.....	ZPL MODE
CALIBRATION.....	MEDIA POWER UP
CALIBRATION.....	HEAD CLOSE
BEFORE.....	BACKFEED
+000.....	LABEL TOP
+0000.....	LEFT POSITION
0680.....	HEAD RESISTOR
OFF.....	APPLICATOR PORT
PULSE MODE.....	START PRINT SIG
FEED MODE.....	RESYNCH MODE
25%.....	RIBBON LOW MODE
DISABLED.....	REPRINT MODE
039.....	WEB S.
079.....	MEDIA S.
072.....	RIBBON S.
050.....	MARK S.
000.....	MARK MED S.
072.....	MEDIA LED
000.....	RIBBON LED
008.....	MARK LED
+10.....	LCD ADJUST
DPSWFXM.....	MODES ENABLED
.....	MODES DISABLED
832 8/MM FULL.....	RESOLUTION
V80.13 0.4A.....	FIRMWARE
V30 33037 56.....	HARDWARE ID
CUSTOMIZED.....	CONFIGURATION
NONE.....	A: COMPACT FLASH
11778k.....	R: RAM
NONE.....	B: MEMORY CARD
2048k.....	E: ONBOARD FLASH
NONE.....	FORMAT CONVERT
*** APPLICATOR.....	P31 INTERFACE
005 DISPLAY.....	P32 INTERFACE
002 PAX110 RTS.....	P34 INTERFACE
007 POWER SUPPLY.....	P35 INTERFACE
FW VERSION.....	IDLE DISPLAY
03/19/00.....	RTC DATE
06:42.....	RTC TIME
2025 IN.....	NONRESET CNTR
2025 IN.....	RESET CNTR1
2025 IN.....	RESET CNTR2
5140 CM.....	NONRESET CNTR
5140 CM.....	RESET CNTR1
5140 CM.....	RESET CNTR2
446 LABLS.....	NONRESET CNTR
446 LABLS.....	RESET CNTR1
446 LABLS.....	RESET CNTR2
HK00000.04MAY000012.11111.01.VH1....	

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## 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. [Figure 51](#) 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 DATA 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 51](#) shows a sample of the labels.

**Figure 51 • 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

The labels 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.

Each label is printed at a different darkness setting, starting at three settings below the currently configured value and increasing until it is three settings darker than the configured value. The relative darkness and speed are printed on each label. The bar codes on these labels can be ANSI-graded to check print quality.

### 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 DATA light turns off.

The print engine prints a series of labels (Figure 52) at various speeds and at darkness settings higher and lower than the darkness value shown on the configuration label.

Figure 52 • FEED Test Label



4. Inspect the labels and determine which one has the best print quality for your application. The darkness value printed on that label is added to (plus) or subtracted from (minus) 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.
5. Enter the corresponding darkness and print speed values into the print engine through the front panel.

## FEED Key and PAUSE Key

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. You must also reset the head resistance value and the verifier and applicator port settings 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). Hold FEED and PAUSE until the DATA light turns off.

No labels print at the end of this test.

Table 14 indicates which print engine function controls each of the configuration parameters:

**Table 14 • Control of Print Engine 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, 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

**Table 14 • Control of Print Engine Parameters (Continued)**

<b>Parameter</b>	<b>Controlled By</b>
Delimiter Character	Configuration, ZPL, and WebView
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
Firmware	Fixed (code EPROMS)
Configuration	Configuration and WebView
Memory	Fixed (SIMM size and 1 MB standard)

**Table 14 • Control of Print Engine Parameters (Continued)**

Parameter	Controlled By
B:Memory	Fixed (option card)
J12 Interface	Fixed
J11 Interface	Fixed
J10 Interface	Fixed
J9 Interface	Fixed
J8 Interface	Fixed
J7 Interface	Fixed

## Communications Diagnostics Test

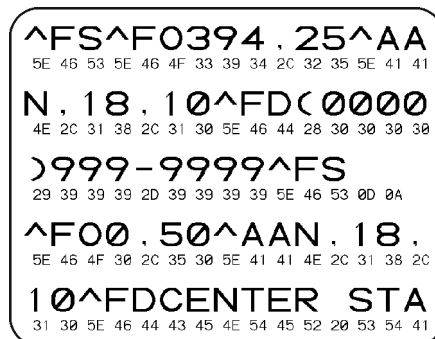
Do not perform the following test until all configuration and calibration parameters have been set. For configuration information, see [Front Panel LCD on page 55](#).

This test is controlled from the front panel display. See [Set Communications Mode on page 65](#). [Figure 53](#) shows a typical printout from this test. Turn off the power to exit this self test and return to normal operation.



**Note** • The communications test label prints upside-down.

**Figure 53 • Communications Diagnostics Test Label**





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# Print Engine Specifications

This appendix provides the features of and specifications for the print engine.

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## General Specifications

### Physical

For installation information, refer to *Print Engine Installation on page 16*.

<b>Height</b>	11.8 in. (300 mm)
<b>Width</b>	9.6 in. (245 mm)
<b>Depth</b>	16.4 in. (417 mm)
<b>Weight</b>	36 lb (16.3 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)

### 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></ul>



## Electrical Specifications

<b>Power Supply</b>	Universal Power Supply with power-factor correcting 90–264 VAC, 48–62 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>

## Memory

<b>Standard</b>	<ul style="list-style-type: none"> <li>• 10.0 MB RAM</li> <li>• 2.0 MB Flash</li> </ul>
<b>Flash Options</b>	<ul style="list-style-type: none"> <li>• Up to 256 MB CompactFlash</li> <li>• 32 MB PC memory card</li> </ul>

## 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> </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>	

## Printing Specifications

Specification	112PAX4	113PAX4
<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>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>	4.1 in. (104 mm)	4.2 in. (106 mm)
<b>Maximum print length</b> (with full width media)		
Non-continuous	39 in. (990 mm)	39 in. (990 mm)
Continuous	546 in. (13,868 mm)	246 in. (6249 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)	2.9 in. (74 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)

## Media Specifications

<b>Media width</b> (label and liner)	Minimum		0.63 in. (16 mm)
	Maximum		4.5 in. (114 mm)
<b>Label length</b>	Minimum	Applicator mode	0.5 in. (12.7 mm) with backfeed on 0.25 in. (6 mm) with backfeed off
		Tear-off mode	0.5 in. (12.7 mm) with backfeed on 0.25 in. (6 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)			0.0058 in. to 0.010 in. (0.148 mm to 0.256 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. x 0.12 in. (6 mm x 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)		0.37 in. (9.5 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>
<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)	1.0 in. to 4.2 in. (25.4 mm to 107 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	4.2 in. (107 mm)



**Notes •** \_\_\_\_\_

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## Data Ports

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

### Contents

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## Parallel Port

When communicating via the parallel port, the values selected 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.

A standard 36-pin parallel connector is available on the back of the print engine for connection to the data source.

Table 15 shows the pin configuration and function of a standard computer-to-printer parallel cable.

**Table 15 • Parallel Cable Pin Configuration**

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



## Serial Port

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.

Connect the serial data cable to the female DB-9 connector on the back panel of the print engine. Use a DB-9 to DB-25 interface module for all RS-232 connections through a DB-25 cable.



**Note** • For all RS-232 input and output signals, the print engine follows the specifications of the Electronics Industries Association (EIA) RS-232 and the Consultative Committee for International Telegraph and Telephone (CCITT) V.24.

## Serial Pin Configuration

Table 16 shows the pin configuration and function of the rear panel serial data connector on the print engine.

**Table 16 • Serial Connector Pin Configuration**

Pin No.	Name	Description
1	—	Not connected
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 The maximum current draw may be limited by option configuration.

## RS-232 Interface Connections



- Note** • Adapters are available from Zebra Technologies LLC.
- RS-422/RS-485 adapter, Zebra part number 33114M
  - RS-232 DB-9 to DB-25 adapter, Zebra part number 33109M

### Direct Connection to a Computer

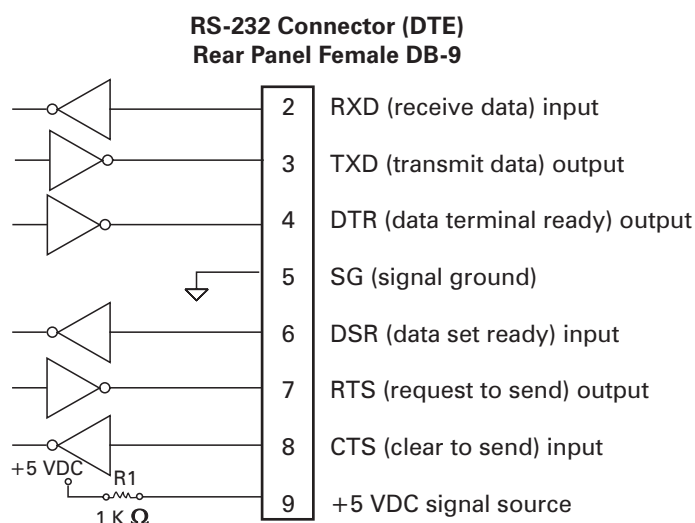
The print engine is configured as Data Terminal Equipment (DTE).



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

Figure 54 shows the internal connections of the print engine's RS-232 connector.

**Figure 54 • RS-232 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.



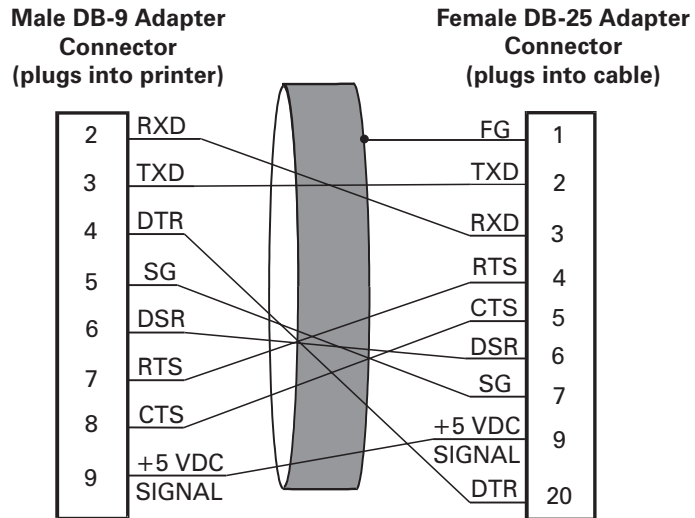
**Caution** • To enable this capability, a qualified service technician must install a jumper on the print engine's main logic board on JP1, pins 2 and 3.

### DB-9 to DB-25 Connections

An interface adapter is required (Zebra part number 33109M) to connect the print engine's DB-9 interface to a DB-25 connector. A generic DB-25 adapter CAN be used, although the +5 VDC signal source would not be passed through the adapter.

Figure 55 shows the connections required for the DB-9 to DB-25 interface.

**Figure 55 • DB-9 to DB-25 Connections**

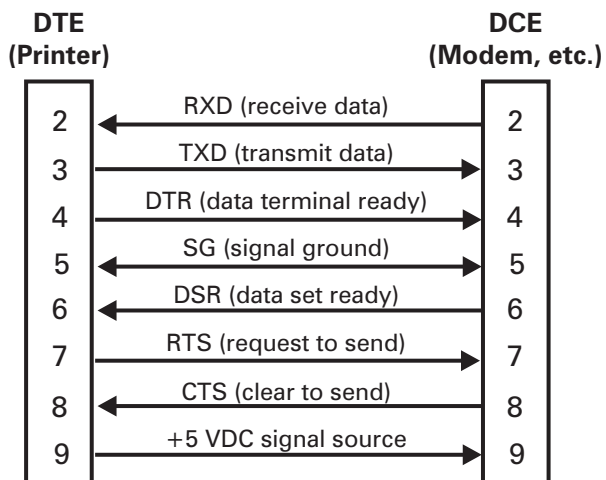


**NOTE:** Pin 1 of DB-9 connector is unused and unterminated.

## 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 56](#) shows the connections required for this cable.

**Figure 56 • RS-232 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 the applicator. An optional DB-15 to DB-9 adapter cable (Zebra part number 49609) is available to accommodate existing DB-9 interfaces.

### Applicator Interface Connector Pin Configuration

The Applicator Interface Assembly is available in two versions: a +5 V I/O and a +24 V (24–28 V) I/O. [Table 17](#) lists the pin configurations and functions of the applicator interface connector for both +5 V and 24–28 V operation.

**Table 17 • Applicator Interface Connector Pin Configuration**

Pin No.	Signal Name	Signal Type	Description
1	I/O SIGNAL GROUND	I/O Signal Ground	<p><b>+5 V Version</b> Using jumper J5, this pin can be configured as isolated or non-isolated from the Applicator Interface Circuit Ground. See <a href="#">Table 18 on page 122</a> for more information.</p> <p><b>24–28 V Version</b> Isolated I/O operation only. No jumpers to configure.</p>
2	+V I/O (Fused at 1 A for +5 V operation. See <a href="#">Figure 57 on page 123</a> for fuse location.) <b>Caution</b> • Replace the fuse only with one of the same type and rating.	Power	<p><b>+5 V Version</b> Using jumper J4, this pin can be configured as isolated or non-isolated from the Applicator Interface Circuit +5 V Supply. See <a href="#">Table 18 on page 122</a> for more information.</p> <p><b>24–28 V Version</b> Isolated I/O operation only. No jumpers to configure.</p>
3	START PRINT	Input	<p><b>Pulse Mode</b> The label printing process begins on the HIGH to LOW transition of this signal if a format is ready. De-assert this signal HIGH to inhibit printing of a new label.</p> <p><b>Level Mode</b> Assert LOW to enable the print engine to begin printing if a format is ready. The print engine prints new labels as long as the signal is asserted. When de-asserted, the currently printing label is completed and the print engine stops and waits for this input to be reasserted LOW.</p>
4	FEED	Input	When the print engine is in an idle state or has been paused, assert this input LOW to trigger repeated feeding of blank labels. De-assert HIGH to stop feeding blank labels and register to the top of the next label.

**Table 17 • Applicator Interface Connector Pin Configuration (Continued)**

Pin No.	Signal Name	Signal Type	Description
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	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 71</a> for more information.  If the Reprint feature is disabled, this input is ignored.
7	+28 V (Fused at 500 mA. See <a href="#">Figure 57 on page 123</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.
8	POWER GROUND (+28 V Return)	Ground	The Interface Power Ground.
9	RIBBON LOW	Output	Asserted HIGH 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 70</a> for more information.  If the Ribbon Low feature is disabled, this output lead is disabled.
10	SERVICE REQUIRED	Output	Asserted LOW if the media cover is open, the printhead is open, the ribbon is out, the media is out, the print engine is paused, or an operational fault occurs.  If the applicator Resynch mode is set to Error mode, this signal also asserts LOW for a Resynch error.
11	END PRINT	Output	MODE 0: The applicator port is OFF. <hr/> MODE 1: Asserted LOW only while the print engine is moving the label forward; otherwise de-asserted HIGH. <hr/> MODE 2: Asserted HIGH only while the print engine is moving the label forward; otherwise de-asserted LOW. <hr/> MODE 3: (Default) Asserted LOW for 20 milliseconds when a label has been completed and positioned. Not asserted during continuous printing. <hr/> MODE 4: Asserted HIGH for 20 milliseconds when a label has been completed and positioned. Not asserted during continuous printing.

**Table 17 • Applicator Interface Connector Pin Configuration (Continued)**

Pin No.	Signal Name	Signal Type	Description
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	Asserted LOW when sufficient data has been received to begin printing the next label. De-asserted HIGH whenever printing stops after the current label, due to either a pause condition or the absence of a label format.
15	SPARE	Output	To be determined. De-asserted HIGH when the end print signal is asserted.

## Jumper Configurations for +5 V I/O Applicator Interface Board

Table 18 shows the pin and jumper configurations for pins 1 and 2 in +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.

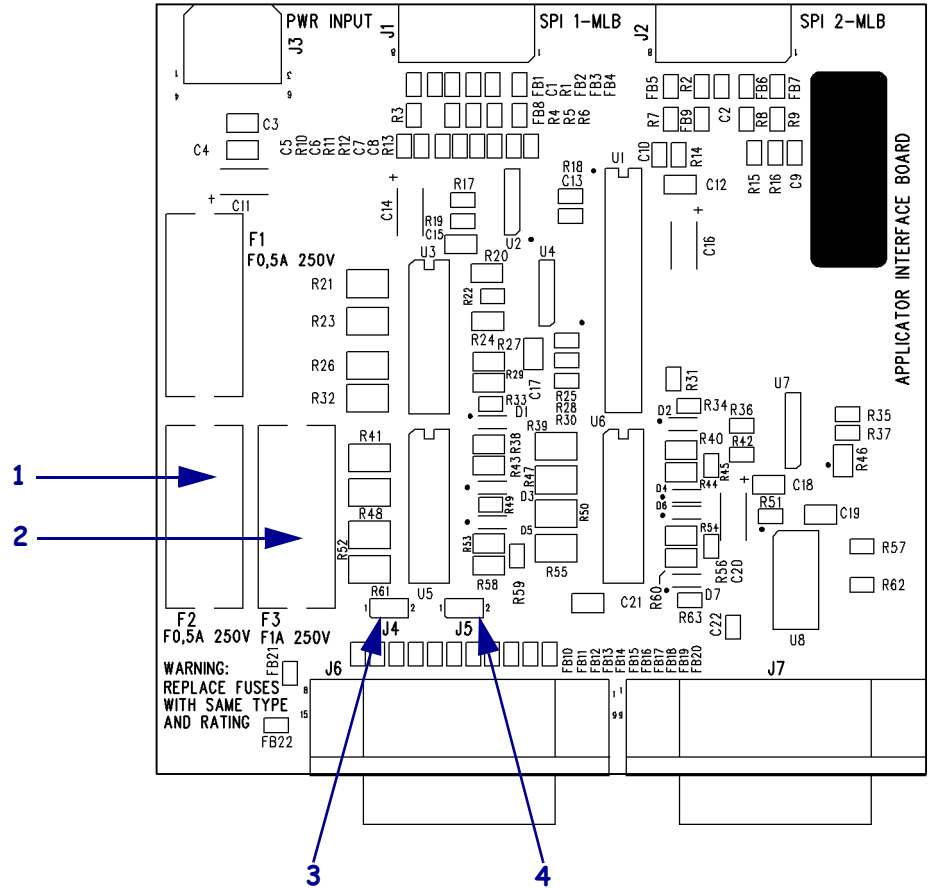
**Table 18 • Pin 1 and Pin 2 Jumper Configurations**

Pin No.	Non-Isolated	Isolated
1	<b>J5 In</b> I/O ground is connected to the Applicator Interface Circuit Ground.	<b>J5 Out</b> I/O ground is disconnected from the Applicator Interface Circuit Ground. Ground for the applicator interface optoisolator circuits is provided externally to this pin.
2	<b>J4 In</b> +5 V I/O is connected to the Applicator Interface Circuit +5 V Supply.	<b>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 is provided externally to this pin.



Figure 57 illustrates the location of the fuses and the location of jumpers J4 and J5 for the +5 V I/O applicator interface board.

Figure 57 • 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



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# Proprietary Statement



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## Product Improvements

Continuous improvement of products is a policy of Zebra Technologies. All specifications and designs are subject to change without notice.

## 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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# Warranty Information



## Effective December 30, 2002

All new Zebra products are warranted by the manufacturer to be free from defect in material and workmanship.

## Printers and Related Hardware Products

Proof of purchase or shipment date is required to validate the warranty period. The warranty becomes void if the equipment is modified, improperly installed or used, damaged by accident or neglect, or if any parts are improperly installed or replaced by the user.

Products returned must be packaged in the original or comparable packing and shipping container. In the event equipment is not so packaged, or if shipping damage is evident, it will not be accepted for service under warranty. Surface transportation charges for return to customers in the continental United States is paid by Zebra. Otherwise, Zebra pays CPT (carriage paid to) nearest airport; customer pays customs, duties, taxes, and freight from airport to destination. If Zebra determines that the product returned for warranty service or replacement is not defective as herein defined, the customer will pay all handling and transportation costs.

### Printers

All printers (excluding printheads) are warranted against defect in material or workmanship for twelve (12) months from the purchase date.

### Printheads

Because printhead wear is part of normal operation, the original printhead is covered by a limited warranty as indicated below. Warranty period begins on purchase date.

## Warranty Information

Printhead	Warranty Period
Bar code label and receipt printer printheads	6 months
Plastic card printer printheads	12 months

To qualify for this warranty, the printhead must be returned to the factory or to an authorized service center. Customers are not required to purchase Genuine Zebra Supplies (media and/or ribbons) for warranty qualification.

However, if it is determined that the use of inappropriate or inferior supplies has caused any defect in the printhead for which a warranty claim is made, the user is responsible for Zebra's labor and material charges required to repair the defect. The warranty becomes void if the printhead is physically worn or damaged; also if it is determined that failure to follow the preventive maintenance schedule listed in the User Guide has caused defect in the thermal printhead for which a warranty claim is made.

## Related Hardware Items

Products are warranted to be free of defects in material and workmanship from the date of purchase according to this chart:

Product	Warranty Period
Accessories	1 month
Batteries	3 months
Cables	1 month
Chargers/Power Supplies	1 year
Hardware Keys	1 year
Keyboard Display Units	6 months
Parts	3 months
Pocket Eye <sup>®</sup>	1 year
Software	1 month
ZebraNet <sup>®</sup> Print Servers	3 years

Defective product must be returned to Zebra for evaluation. In the event of notification of defect within the warranty period, Zebra will replace the defective item provided there had not been damage resulting from user abuse, modification, improper installation or use, or damage in shipping or by accident or neglect.

## Supplies Products

Supplies are warranted to be free from defect in material and workmanship for a period of six (6) months for media and twelve (12) months for ribbon from the date of shipment by Zebra. This is provided the user has complied with storage guidelines, handling, and usage of the supplies in Zebra printers.

Zebra's sole obligation under these warranties is to furnish parts and labor for the repair or possible replacement of products found to be defective in material or workmanship during the warranty period. Zebra may in its discretion issue a credit for any such defective products in such amount as it deems reasonable.

## Repair Services

Zebra repairs are warranted against defects in material and workmanship for 90 days from the date of repair by Zebra. This excludes printheads, which are warranted separately. This warranty does not cover normal wear and tear. This warranty becomes void if the item is modified, improperly installed or used, or damaged by accident, neglect, or abuse.

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# Printer Software and Firmware License Agreement



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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, front 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™.

**Ips “inches-per-second”** — The speed at which the label or tag is printed. Zebra offers print engines that 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 (label liner)** — The material on which labels are affixed during manufacture and which is discarded or recycled by the end-users.

**Liquid crystal display** — 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 apparently no 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, continuous (with and without media liner), fanfold, and roll.



**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.

**Non-continuous media** — Consumable printing stock 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.

**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*.

**Supplies** — A general term for media and ribbon.

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

**Tag** — 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.

**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*.

**Void** — 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.



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