

Zebra[®] 170PAX4[™]
Print Engine

User Guide



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Contents



About This Document	1
Who Should Use This Document	2
How This Document Is Organized	2
Contacts	3
Support	3
Document Conventions	4
Related Documents	5
1 • Print Engine Basics	7
Print Engine Exterior View	8
Front Panel	9
Front Panel Buttons	9
Front Panel Indicator Lights (LEDs)	10
Power On/Off Switch	11
2 • Getting Started	13
Before You Begin	14
Unpack and Inspect the Print Engine	15
Report Shipping Damage	15
Store the Print Engine	15
Shipping	15
Print Engine Installation	16
Requirements	16
Install the Print Engine in an Applicator	20
Connect the Print Engine to a Power Source	21
Power Cord Specifications	22

Select a Communication Interface	23
Standard Connections	23
Optional Print Servers.....	24
DB-15 Applicator Interface Connector	24
System Considerations.....	24
Interface Considerations.....	24
Data Cable Requirements.....	25
Types of Media	26
Ribbon.....	28
When to Use Ribbon.....	28
Coated Side of Ribbon	28
3 • Print Engine Operation	31
Load Media	32
Load Ribbon	40
Remove Used Ribbon.....	45
Calibrate the Print Engine.....	46
Adjust Media Sensors.....	48
Reflective Media Sensor.....	48
Transmissive Media Sensor	48
4 • Print Engine Configuration	51
Overview.....	52
Enter Setup Mode.....	52
Exit Setup Mode	53
Print a Configuration Label	54
Print a Network Configuration Label	55
Changing Password-Protected Parameters	56
Default Password Value	56
Disable the Password Protection Feature	56
Front Panel LCD.....	57
ZebraNet® Print Server LCD Displays	76
5 • Routine Maintenance	79
Cleaning Schedule	80
Clean Exterior.....	80
Clean Interior	81
Clean the Sensors	81
Clean the Printhead and Platen Roller	83
Toggle Positioning.....	85
Printhead Pressure Adjustment	86
Power Fuse Replacement.....	87

6 • Troubleshooting	89
Troubleshooting Checklists	90
LCD Error Messages	91
Memory Errors	93
Print Quality Problems	94
Communications Problems	97
Miscellaneous Print Engine Problems	98
Print Engine Diagnostics	100
Power-On Self Test	100
Additional Print Engine Self Tests	100
Communications Diagnostics Test	106
A • Print Engine Specifications	107
General Specifications	108
Physical	108
Environmental Conditions	108
Agency Approvals	108
Electrical Specifications	109
Communications Specifications	109
Memory	109
Zebra Programming Language (ZPL II)	109
Bar Codes	110
Printing Specifications	111
Media Specifications	112
Ribbon Specifications	113
B • Data Ports	115
Parallel Port	116
Serial Port	117
Serial Pin Configuration	118
RS-232 Interface Connections	119
Applicator Interface Connector	122
Applicator Interface Connector Pin Configuration	122
Jumper Configurations for +5 V I/O Applicator Interface Board	124
Proprietary Statement	127
Warranty Information	129
Printer Software and Firmware License Agreement	133
Glossary	139
Index	143



About This Document

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

Contents

Who Should Use This Document	2
How This Document Is Organized	2
Contacts	3
Support	3
Document Conventions	4
Related Documents	5

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:

Section	Description
<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 51</i>	This chapter describes the front panel parameters that are used to configure the print engine for operation.
<i>Routine Maintenance on page 79</i>	This chapter provides routine cleaning and maintenance procedures.
<i>Troubleshooting on page 89</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 107</i>	This appendix provides the features of and specifications for the print engine.
<i>Data Ports on page 115</i>	This appendix describes the standard communication ports available to connect the print engine to your computer or network.
<i>Glossary on page 139</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>

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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



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

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



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



Electric Shock Caution • Warns you of a potential electric shock situation.



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



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

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



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



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



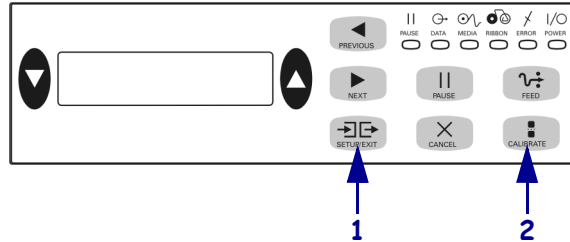
Example • Provides an example, often a scenario, to better clarify a section of text.



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

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

Figure 1 • Sample Figure with Callouts



1	SETUP/EXIT button
2	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 57518L-001)



Print Engine Basics

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

Contents

Print Engine Exterior View	8
Front Panel.	9
Front Panel Buttons	9
Front Panel Indicator Lights (LEDs)	10
Power On/Off Switch	11

Print Engine Exterior View

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

Figure 2 • Right-Hand (RH) Print Engine

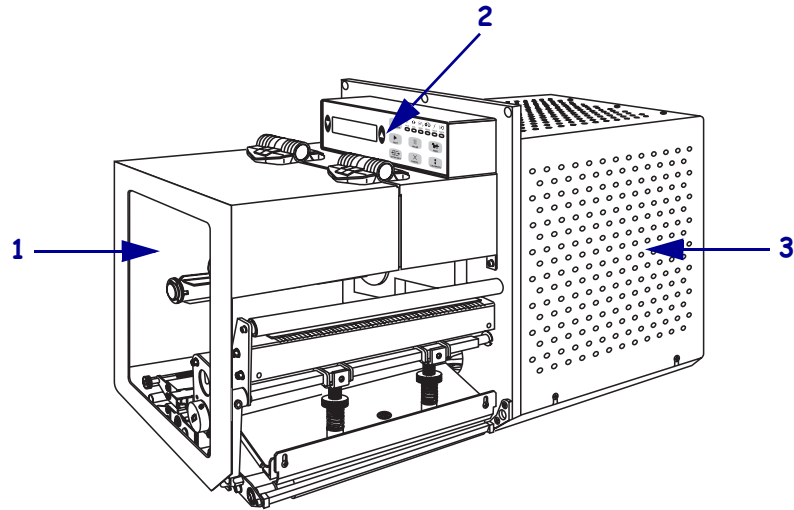
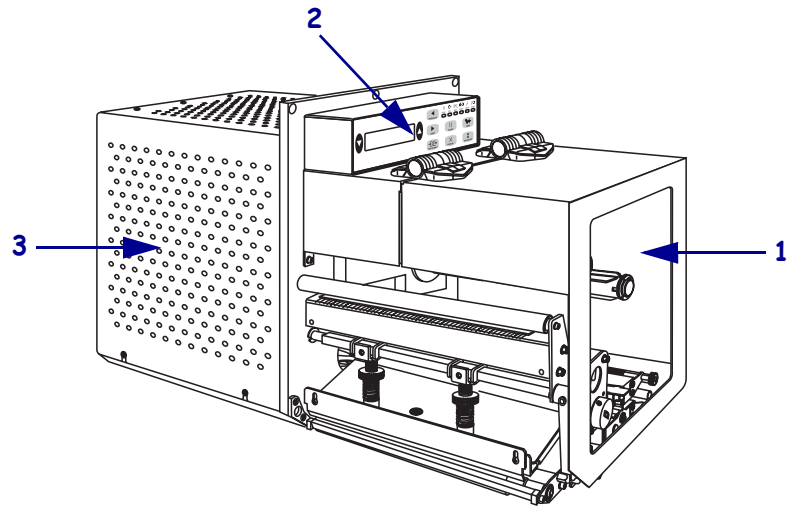


Figure 3 • Left-Hand (LH) Print Engine

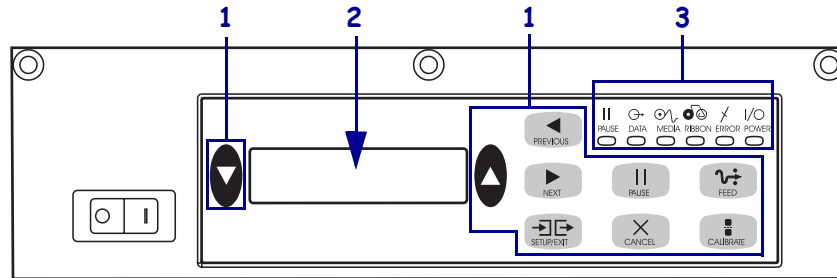


1	Media door
2	Front panel
3	Electronics cover

Front Panel

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

Figure 4 • Front Panel (Right-Hand)



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

Front Panel Buttons

The front panel buttons are described in Table 1.

Table 1 • Front Panel Buttons

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

Table 1 • Front Panel Buttons (Continued)

Button	Description/Function
FEED	Feeds a blank label. <ul style="list-style-type: none"> • If the print engine is idle or paused, the label is fed immediately. • If the print engine is printing, the label is fed after the current batch prints.
CALIBRATE	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).

Front Panel Indicator Lights (LEDs)

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

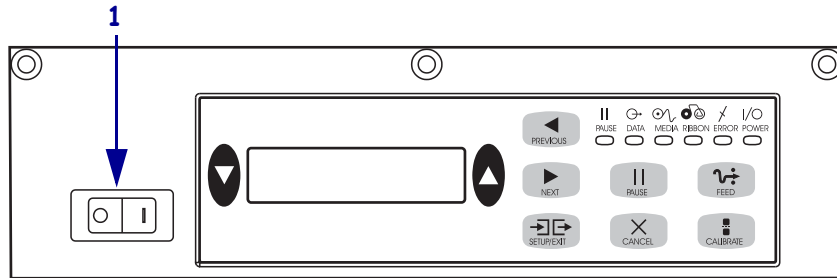
Table 2 • Front Panel Lights

LED	OFF Indicates	ON Indicates	FLASHING Indicates
POWER (Green)	Print engine is OFF, or no power to print engine.	Power switch is ON, and power is being supplied to print engine.	—
PAUSE (Yellow)	Normal operation.	One of the following: <ul style="list-style-type: none"> • Print engine is paused because of an error condition (printhead, ribbon, or paper error). Usually occurs in conjunction with another LED. • PAUSE was pressed. • A pause was requested from the Applicator Port. • A pause was received as part of the label format. 	—
DATA (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.
MEDIA (Yellow)	Normal operation. Media properly loaded.	Out of media. (Print engine is paused, LCD displays error message, and PAUSE light is ON).	—
RIBBON (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.	—
ERROR (Orange)	No print engine errors.	—	Print engine error exists. Check the LCD for status.

Power On/Off Switch

The print engine power switch is located to the side of the front panel, as shown in [Figure 5](#). When this switch is placed in the ON (I) position, the POWER light turns on, and the print engine automatically performs a Power-On Self Test (POST). For more information, see [Power-On Self Test on page 100](#).

Figure 5 • Power Switch Location (Right-Hand)



1	Power switch
----------	--------------



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.

Contents

Before You Begin	14
Unpack and Inspect the Print Engine	15
Report Shipping Damage	15
Store the Print Engine	15
Shipping	15
Print Engine Installation	16
Requirements	16
Install the Print Engine in an Applicator	20
Connect the Print Engine to a Power Source	21
Power Cord Specifications	22
Select a Communication Interface	23
Standard Connections	23
Optional Print Servers	24
DB-15 Applicator Interface Connector	24
System Considerations	24
Interface Considerations	24
Data Cable Requirements	25
Types of Media	26
Ribbon	28
When to Use Ribbon	28
Coated Side of Ribbon	28

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 22](#). To attach the power cord and connect the print engine to a power source, see [Connect the Print Engine to a Power Source on page 21](#).
- Connect to a Data Source** Have you determined how the print engine will connect to a data source (usually a computer)? For more information, see [Select a Communication Interface on page 23](#).
- Select Media** Do you have the correct media for your application? If you are unsure, see [Types of Media on page 26](#).
- Select Ribbon** Do you need to use ribbon, and is the appropriate ribbon available, if needed? If you are unsure, see [Ribbon on page 28](#).

Unpack and Inspect the Print Engine

When you unpack the print engine, save all packing materials. 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° to 160°F (-40° to 71°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 104°F (0° to 40°C)
- Relative humidity: 20% to 95% non-condensing

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

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

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

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

Figure 6 • Front View of Right-Hand Print Engine

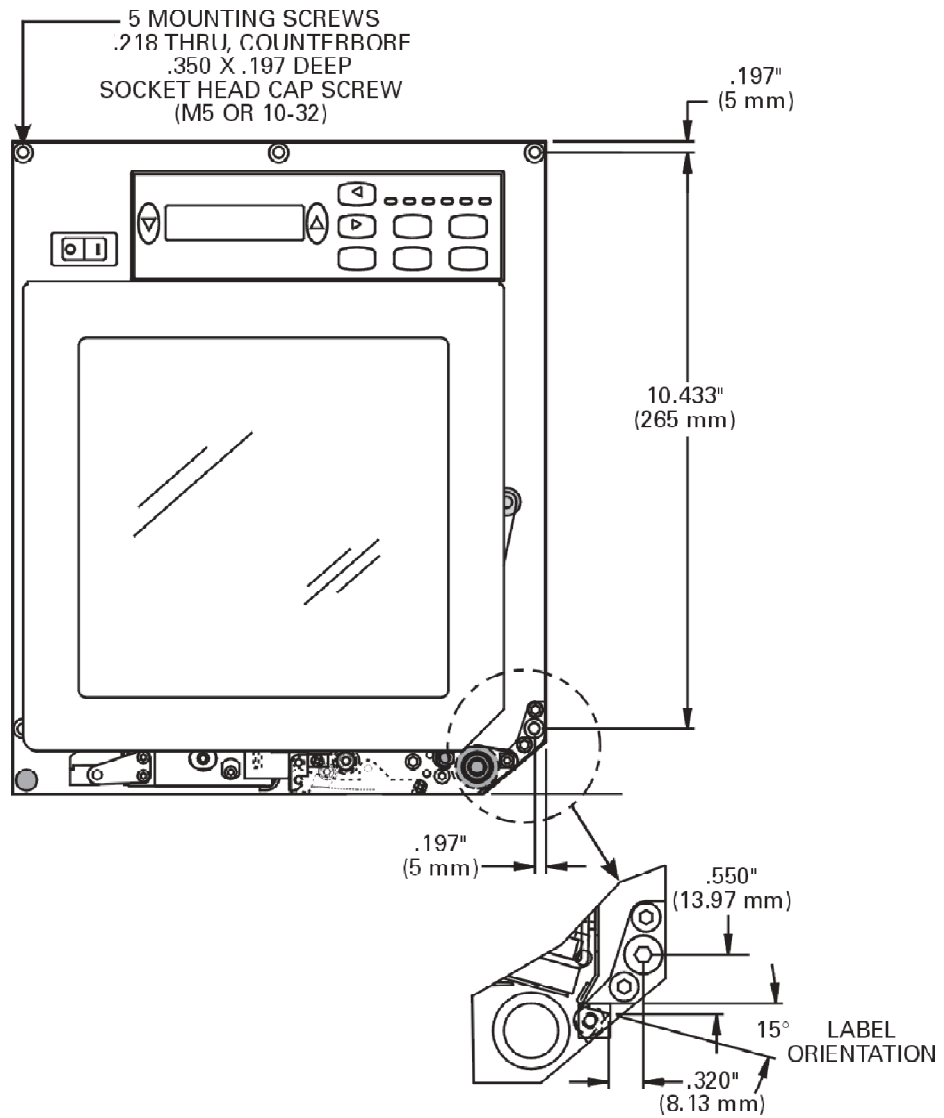


Figure 7 • Right Side View of Right-Hand Print Engine

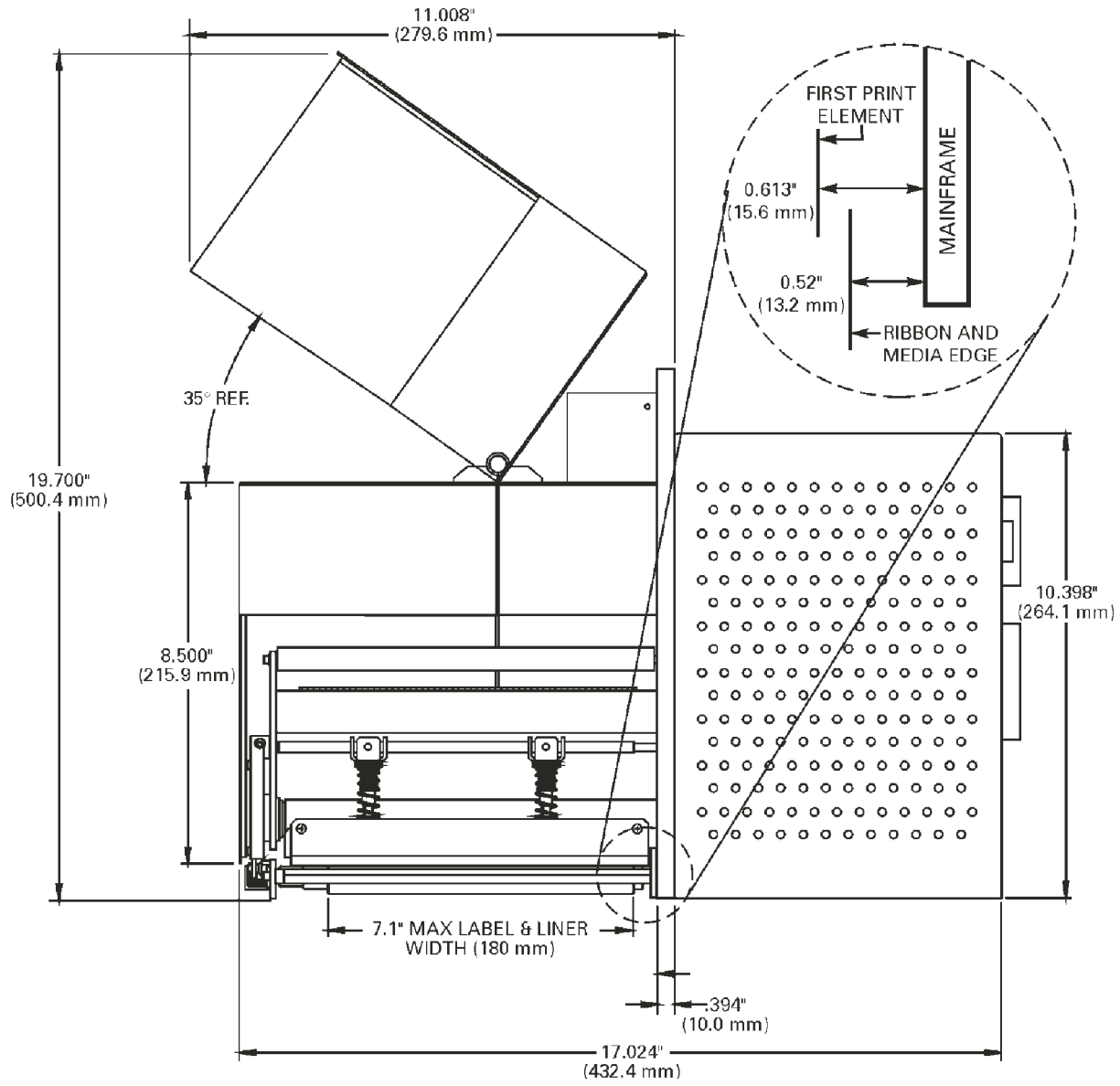
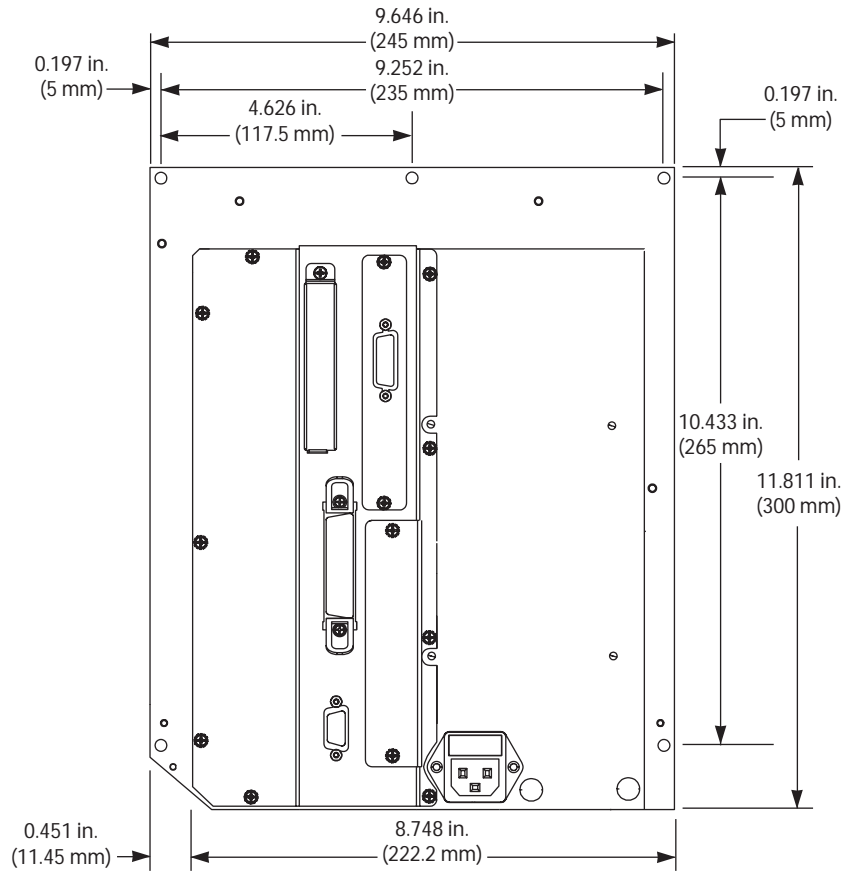


Figure 8 • Rear View of Right-Hand Print Engine



Install the Print Engine in an Applicator

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



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

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

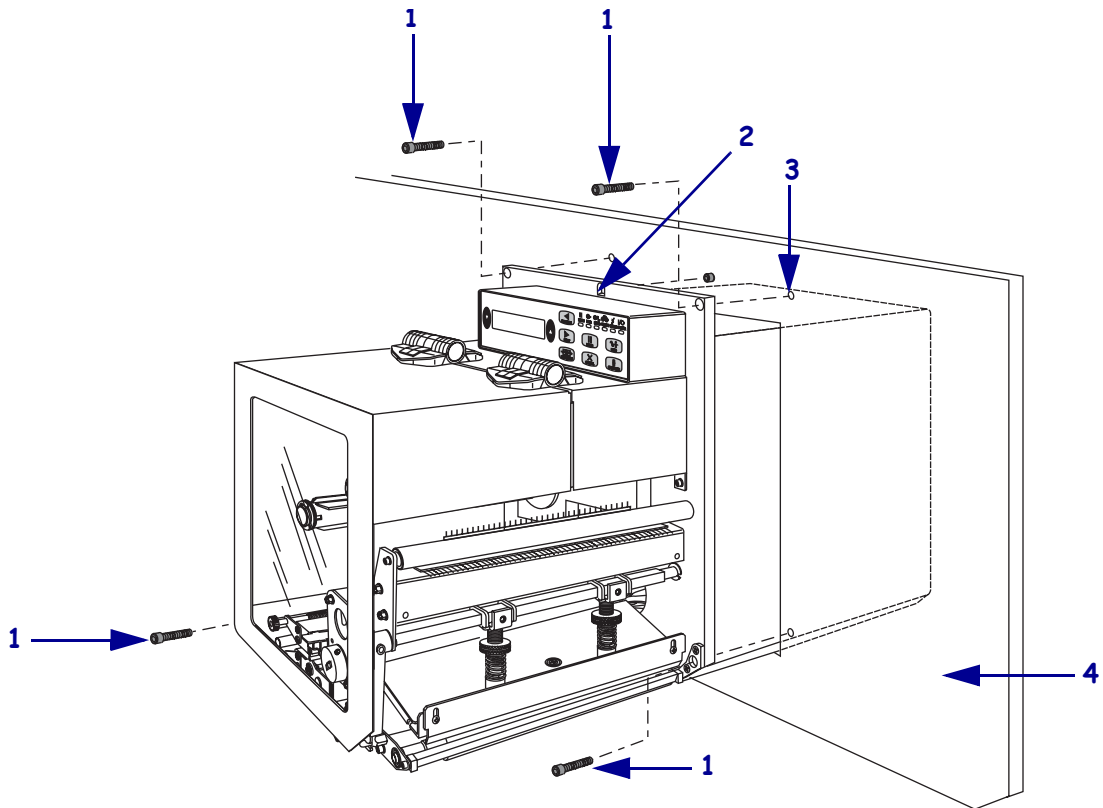
1. See [Figure 9](#). Install the center mounting bolt into the center hole on the applicator.
2. Carefully place the keyhole on the center mounting bolt.



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

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

Figure 9 • Front View of 170PAX4 Print Engine in Applicator



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

Connect the Print Engine to a Power Source

The power supply in the print engine automatically detects the applied line voltage and works in the 90 to 264 VAC, 48 to 62 Hz range.

Refer to [Figure 10](#). The AC power cord must have a three-prong female connector on one end that plugs into the mating AC power connector at the rear of the print engine. If a power cable was not included with your print engine, refer to [Power Cord Specifications on page 22](#).

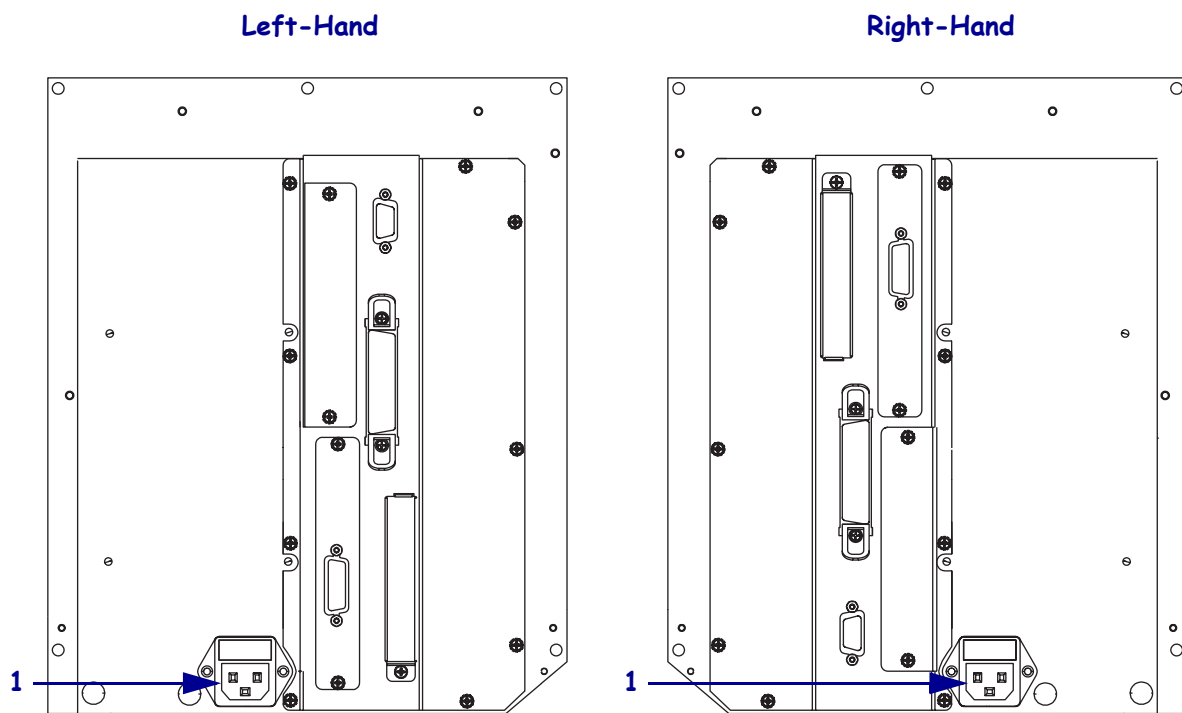


Caution • For personnel and equipment safety, always use an approved three-conductor power cord specific to the region or country intended for installation. This cord must use an IEC 320 female connector and the appropriate region-specific three-conductor grounded plug configuration.

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

1. Turn 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 10 • Power Connection



1	AC power connector
---	--------------------

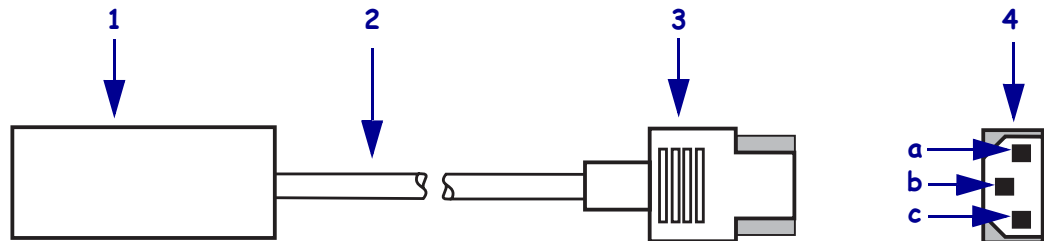
3. Plug the other end of the power cord into the power source.

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 11).

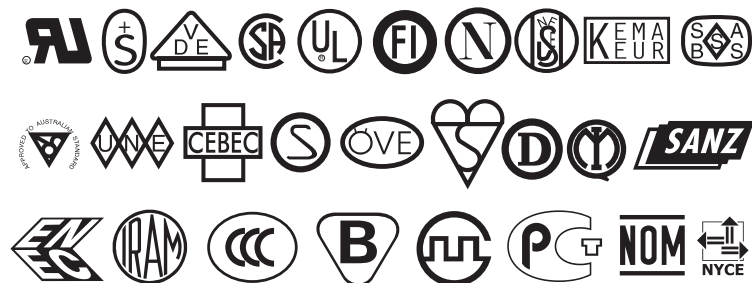
Figure 11 • Power Cord Specifications



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 12.

Figure 12 • 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 115](#) for control signal descriptions and other additional information.

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

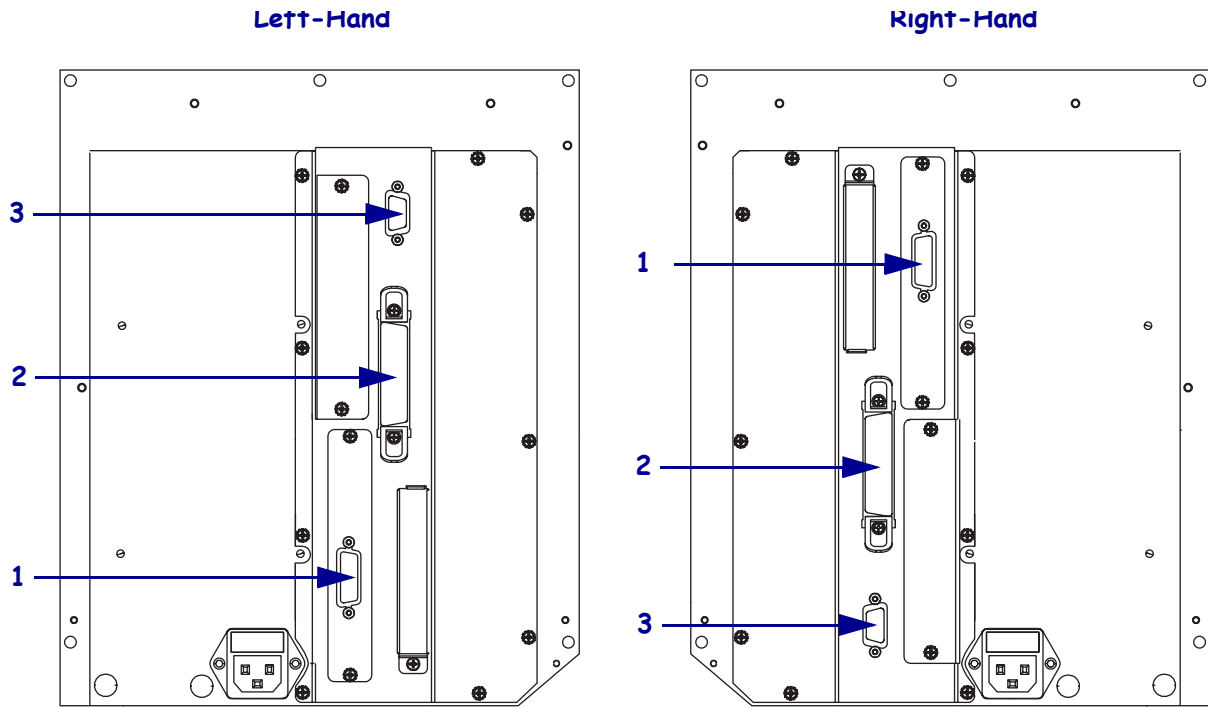


Note • You must supply all interface cables for your application. Refer to [Data Cable Requirements on page 25](#) for specific cable requirements.

Standard Connections

Refer to [Figure 13](#). The print engine comes standard with both an Electronics Industries Association (EIA) RS-232 serial interface (DB-9 connector) and an IEEE 1284 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 13 • Cable Connections



1	DB-15 applicator interface port
2	Parallel interface connector
3	DB-9 serial interface connector

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 51](#) 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

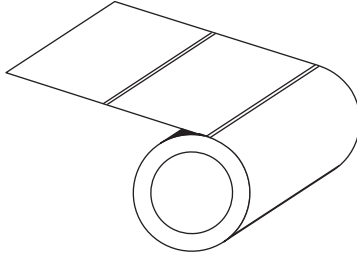
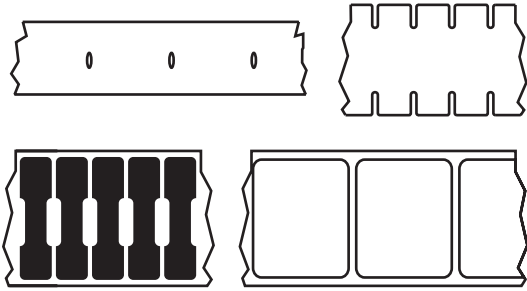
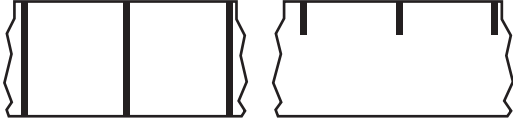
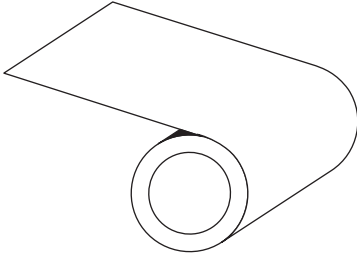
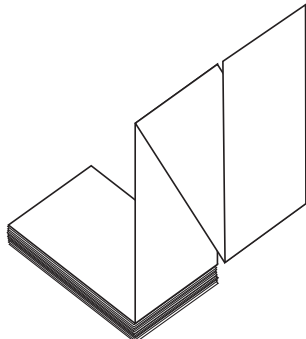
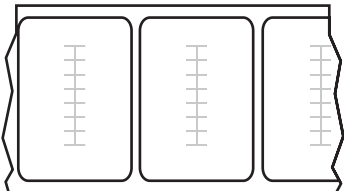
Media Type	How It Looks	Description
<p>Non-Continuous Roll Media</p>		<p>The media is wound on a core. Individual labels are separated by a gap, notch, or hole, which enables you to see where one label ends and the next one begins. When using media that has holes or notches, position the media sensor directly over a hole or notch. Figure 14 and Figure 15 show different types of non-continuous media.</p> <p>Figure 14 • Non-Continuous Web Media</p>  <p>Figure 15 • Non-Continuous Black Mark Media</p> 
<p>Continuous Roll Media</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
<p>Fanfold Media</p>		<p>The media is folded in a zigzag pattern.</p>
<p>RFID “Smart” Media (for use with RFID-capable print engines only)</p>		<p>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.</p>

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	Thermal transfer. A ribbon is required.
Appears on the media	Direct thermal. 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 16). 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 16 • 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 outer surface.
Did not adhere to the label	The ribbon is coated on the inner 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 inner surface. To verify this, repeat the test on the other surface of the roll of ribbon.



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.

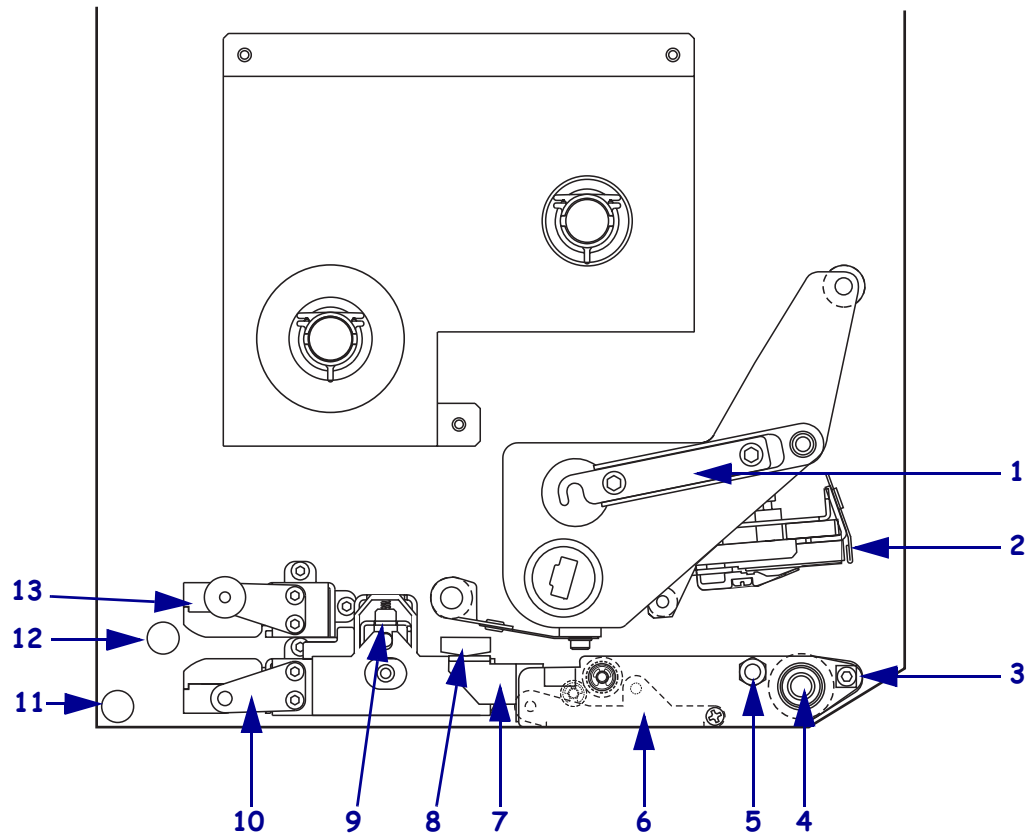
Contents

Load Media	32
Load Ribbon	40
Remove Used Ribbon	45
Calibrate the Print Engine	46
Adjust Media Sensors	48
Transmissive Media Sensor	48
Reflective Media Sensor	48

Load Media

Figure 17 identifies the media-handling components of a right-hand print engine. A left-hand unit contains a mirror image of these components. Figure 18 on page 33 shows the print engine with media loaded.

Figure 17 • Components for Media Loading (Right-Hand)

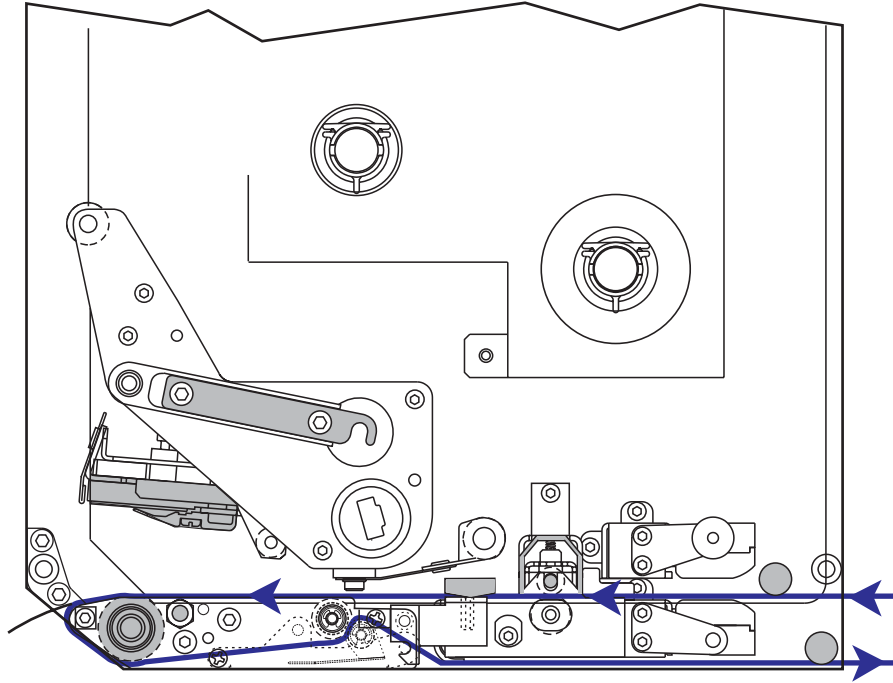


1	Printhead latch
2	Printhead assembly
3	Peel bar
4	Platen roller
5	Printhead locking pin
6	Peel roller assembly
7	Peel roller latch

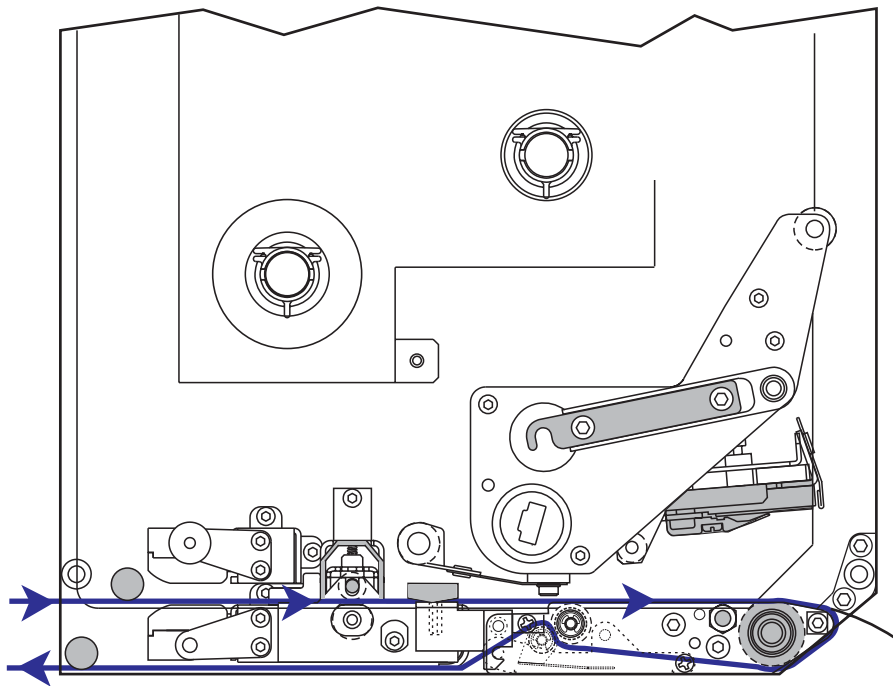
8	Media guide
9	Pinch roller assembly
10	Label guide shelf assembly
11	Lower guide post
12	Upper guide post
13	Top media sensor track assembly

Figure 18 • Loaded Media

Left-Hand



Right-Hand



To load media, complete these steps:

1. Load media on the media supply reel of the applicator (refer to the applicator's user guide).
2. Open the media door.
3. See [Figure 19](#). Press down on the pinch roller release latch.
The pinch roller assembly springs up ([Figure 20](#)).

Figure 19 • Pressing the Pinch Roller Release Latch

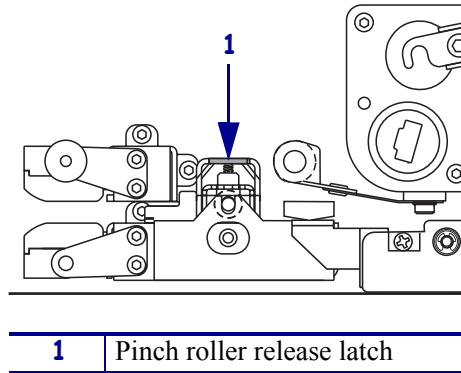
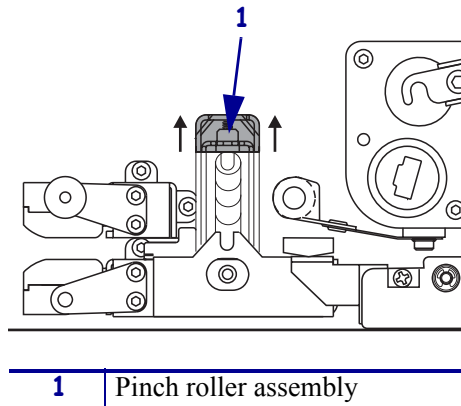
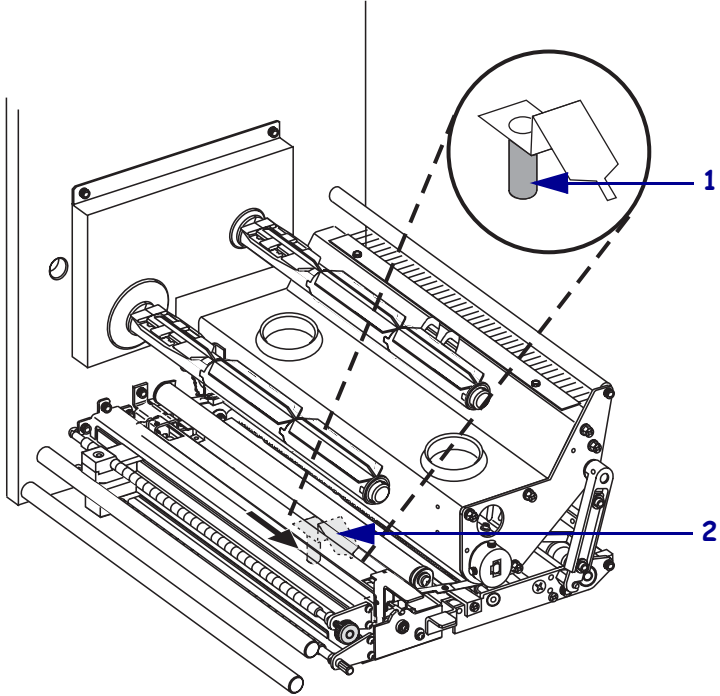


Figure 20 • Opened Pinch Roller Assembly



- 4. See [Figure 21](#). Under the print engine, grasp the brass thumb nut of the outer media guide, and slide the outer media guide all the way out.

Figure 21 • Sliding the Outer Media Guide



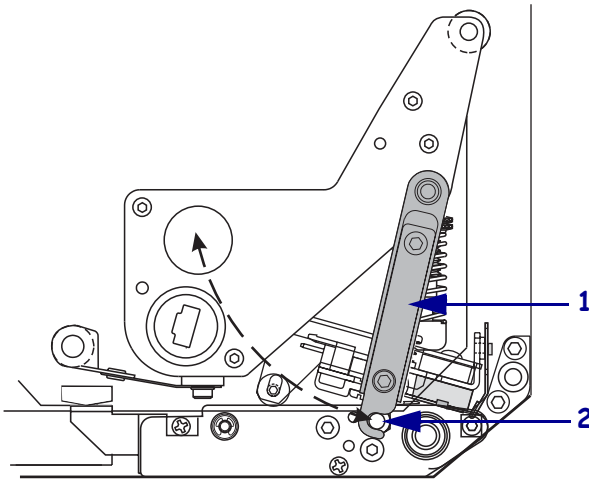
1	Brass thumb nut
2	Outer media guide

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.

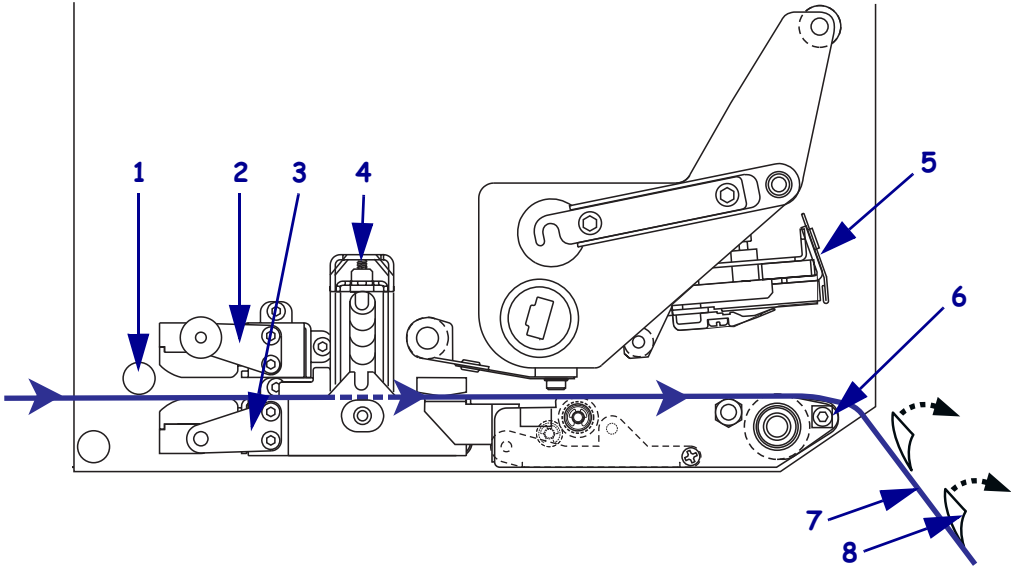
Figure 22 • Opening the Printhead Assembly



1	Printhead latch
2	Locking pin

- 6. See [Figure 23](#). Thread the media through the upper media path as follows:
 - a. Under the upper guide post
 - b. Between the top media sensor track assembly and the label guide shelf assembly
 - c. Below the pinch roller assembly
 - d. 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.

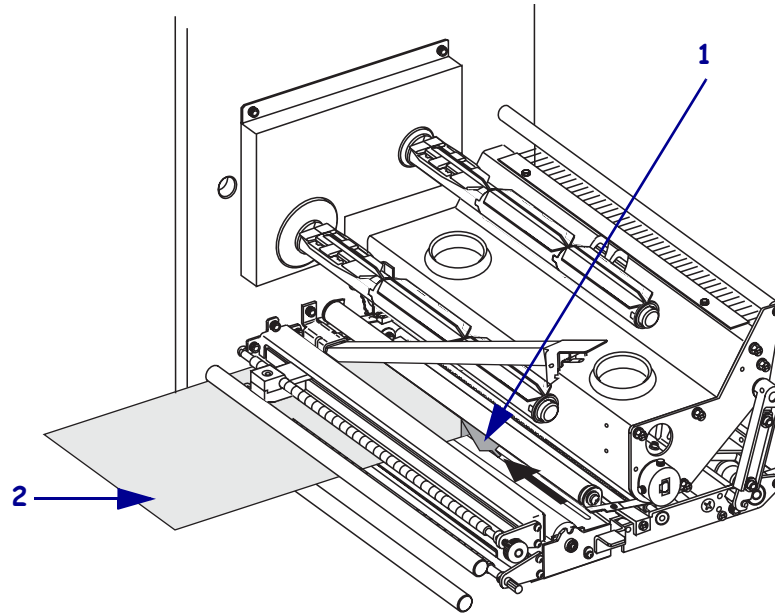
Figure 23 • Threading the Media



1	Upper guide post
2	Top media sensor track assembly
3	Label guide shelf assembly
4	Pinch roller assembly
5	Printhead assembly
6	Peel bar
7	Liner
8	Label

8. See [Figure 24](#). Position the media so that it is aligned with and just touching the inner media guide.
9. See [Figure 24](#). Under the print engine, grasp the brass thumb nut of the outer media guide, and position the outer media guide so that it just touches the outer edge of the media.

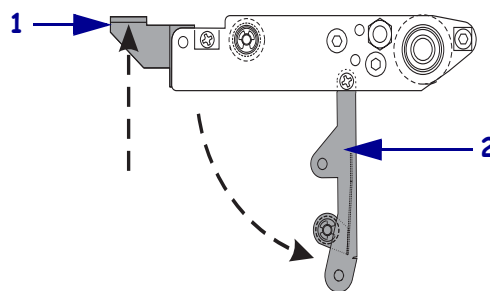
Figure 24 • Adjusting the Outer Media Guide



1	Outer media guide
2	Media

10. See [Figure 19 on page 34](#). Press down on the pinch roller assembly until it locks closed.
11. See [Figure 22 on page 36](#). 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 downward.

Figure 25 • Releasing the Peel Roller Assembly



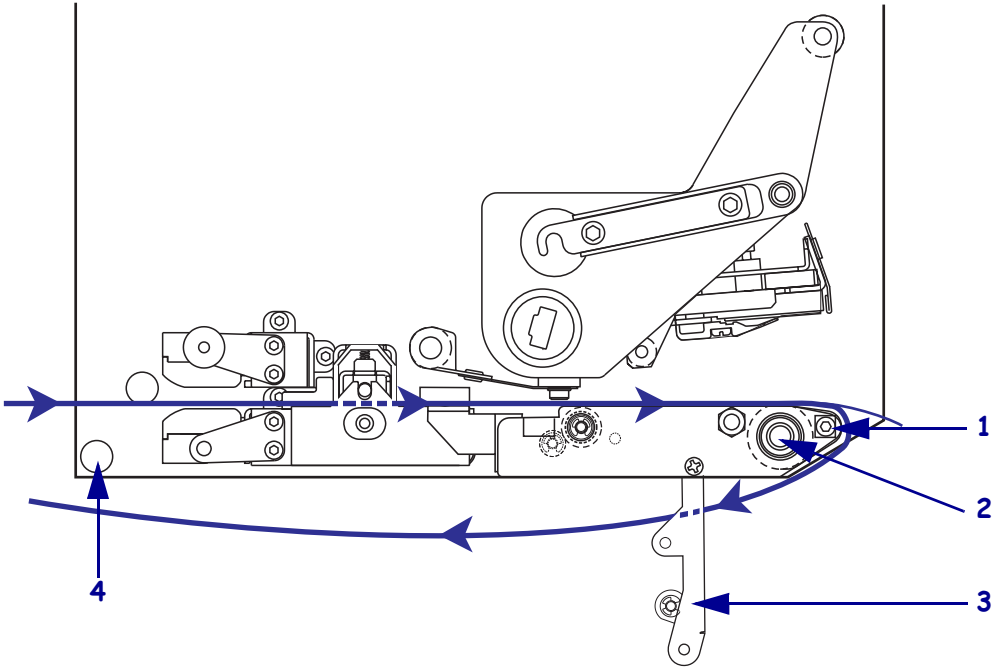
1	Peel roller latch
2	Peel roller assembly

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

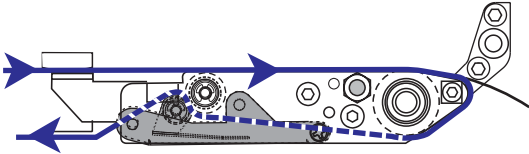
Figure 26 • Threading the Liner



1	Peel bar
2	Platen roller
3	Peel roller assembly
4	Lower guide post

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

Figure 27 • Closed Peel Roller Assembly



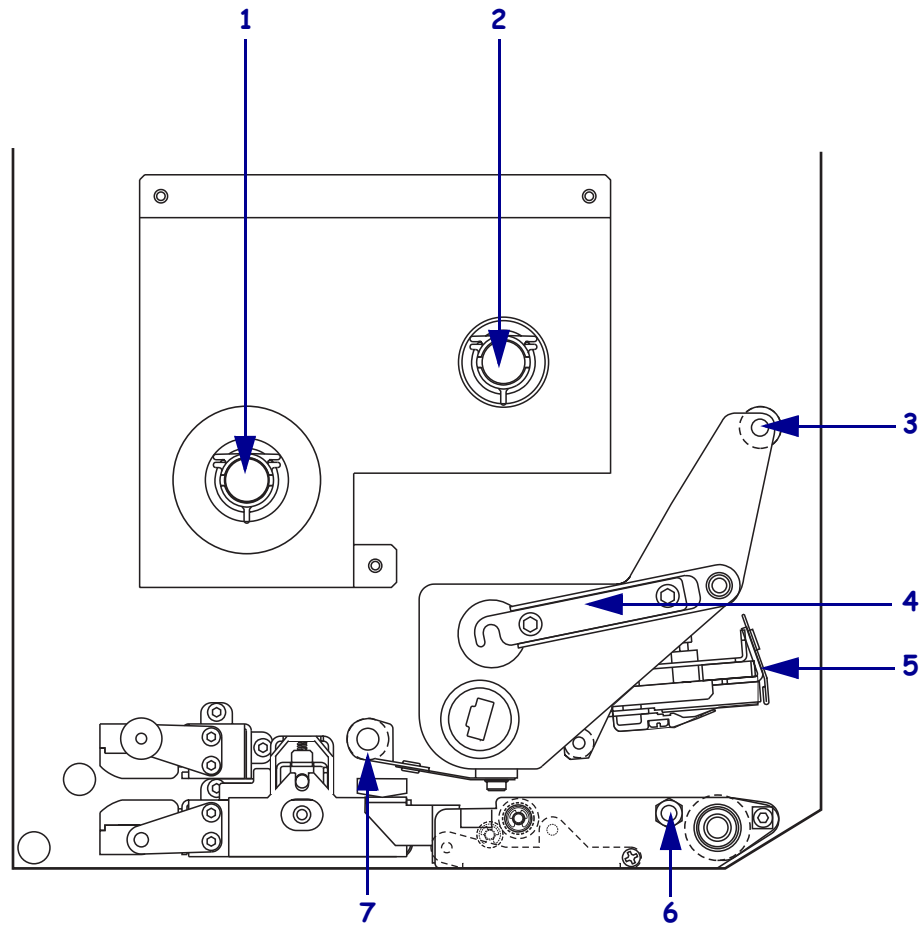
- 15. See [Figure 26](#). Thread the media liner under the lower guide post and around the take-up spindle of the applicator (refer to the applicator’s user guide).
- 16. Close the media door.

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 41 shows the print engine with ribbon loaded.

Figure 28 • Components for Ribbon Loading

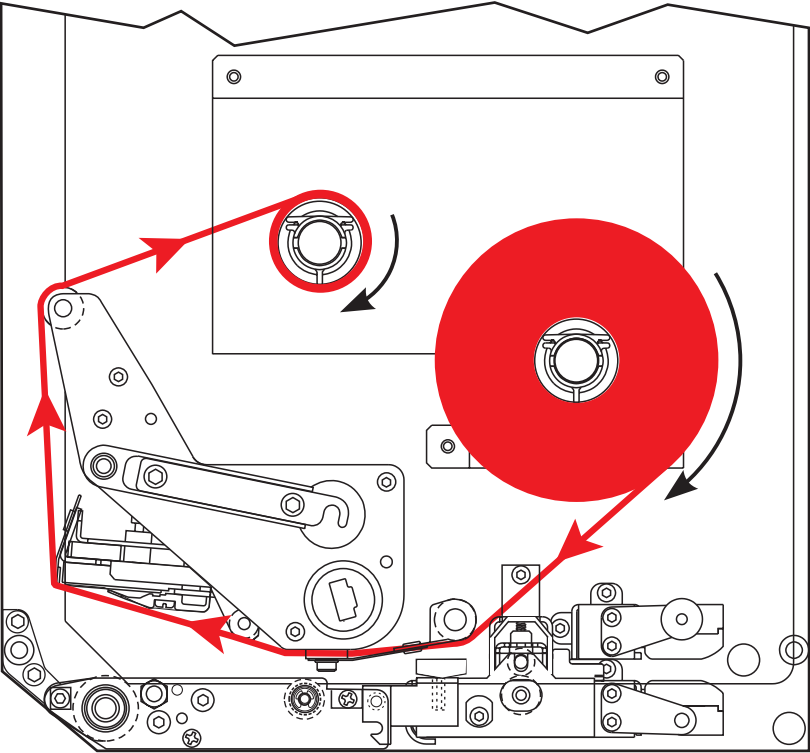


1	Ribbon supply spindle
2	Ribbon take-up spindle
3	Upper ribbon guide roller
4	Printhead latch

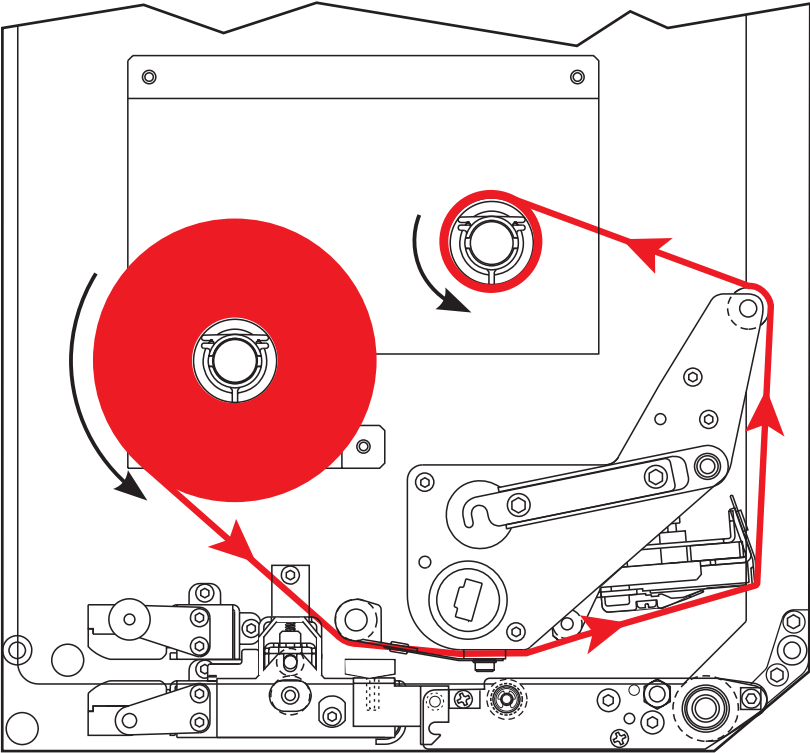
5	Printhead assembly
6	Locking pin
7	Lower ribbon guide roller

Figure 29 • Loaded Ribbon

Left-Hand



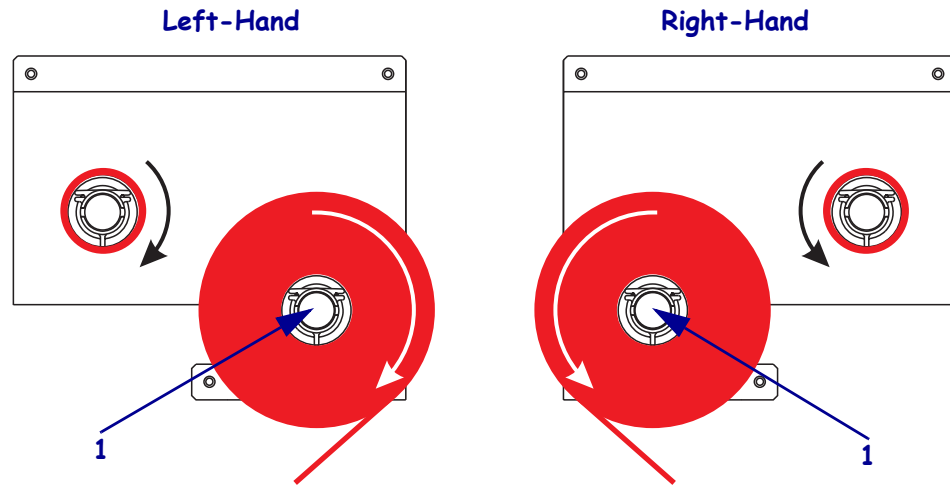
Right-Hand



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.

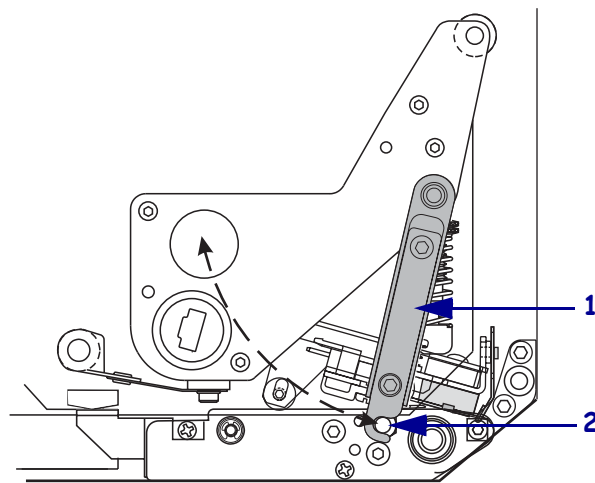
Figure 30 • Placing Ribbon on the Ribbon Supply Spindle



1	Ribbon supply spindle with ribbon
----------	-----------------------------------

2. See [Figure 31](#). Open the printhead assembly by unlatching the printhead latch from the locking pin.

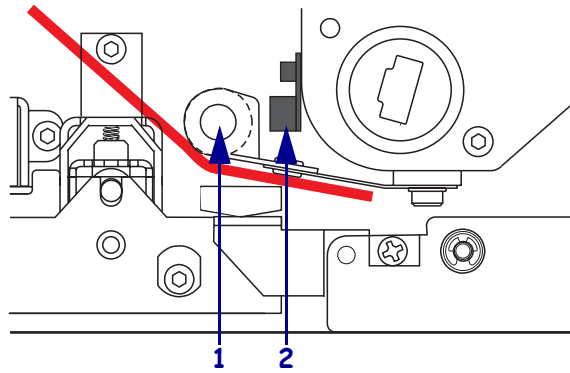
Figure 31 • Opening the Printhead Assembly



1	Printhead latch
2	Locking pin

3. See [Figure 32](#). Thread the ribbon under the lower ribbon guide roller.
4. See [Figure 32](#). Make sure that the ribbon passes directly below the ribbon sensor, which is located near the back wall of the print engine.

Figure 32 • Threading Ribbon under the Ribbon Sensor



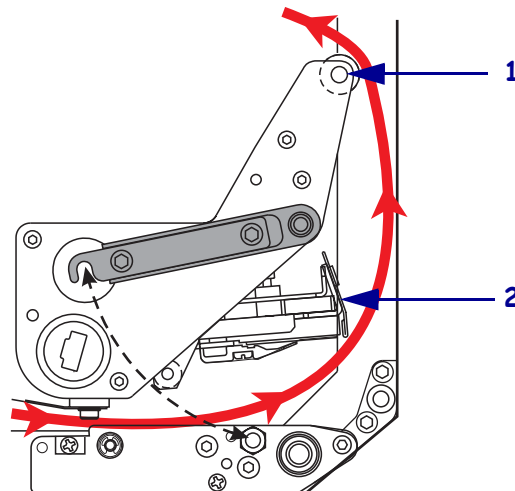
1	Lower ribbon guide roller
2	Ribbon sensor

5. See [Figure 33](#). Thread the ribbon under the printhead assembly and then around the upper ribbon guide roller.



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

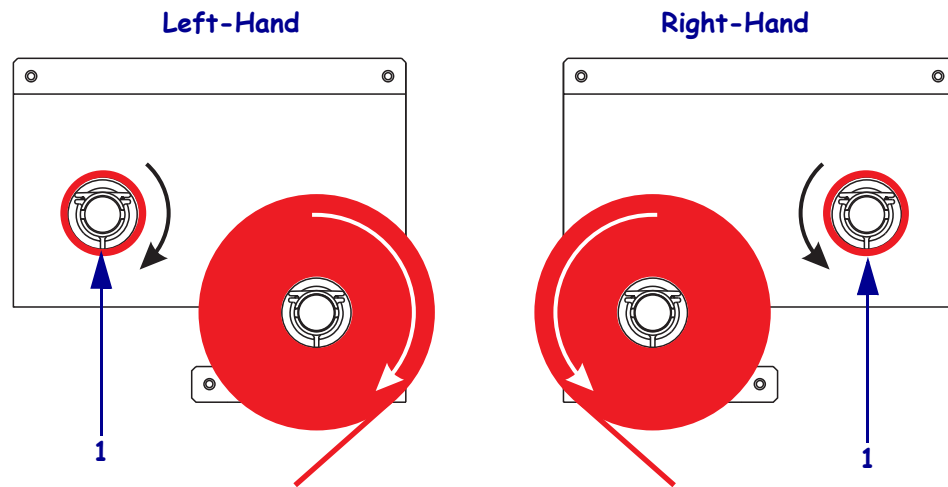
Figure 33 • Threading Ribbon under the Printhead Assembly



1	Upper ribbon guide roller
2	Printhead assembly

6. See [Figure 34](#). Place an empty ribbon core onto the ribbon take-up spindle, and then push the core toward the print engine frame until it is fully seated.
7. See [Figure 34](#). 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 34 • Loading Ribbon on the Ribbon Take-Up Spindle



1	Ribbon take-up spindle with empty ribbon core
----------	---

8. See [Figure 31 on page 42](#). Close the printhead assembly by pivoting the printhead latch onto the locking pin.
9. 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"> 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. b. Remove the used ribbon and core from the ribbon take-up spindle. c. Install new ribbon following the instructions in Load Ribbon on page 40.
No	<ol style="list-style-type: none"> a. Cut the ribbon near the ribbon take-up spindle. b. Remove the used ribbon and core from the ribbon take-up spindle. c. Locate an empty ribbon core. If necessary, remove and discard the used ribbon from the core removed in the previous step. d. See Figure 34 on page 44. 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. e. Thread the remaining ribbon on the ribbon supply spindle following the instructions in Load Ribbon on page 40. f. See Figure 34 on page 44. 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.

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
Auto-calibration	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"> • When the print engine is first turned on if CALIBRATION is selected for MEDIA POWER UP (see Select Media Power-Up Option on page 69) • When the print engine feeds media after the printhead is closed if CALIBRATION is selected for HEAD CLOSE (see Select Head Close Option on page 69). • As part of both the sensor profile and media and ribbon sensor calibration procedures.
Long (Standard) Calibration	The print engine does the following: <ul style="list-style-type: none"> • feeds media and ribbon • sets the values it detects for media length, media type (continuous or non-continuous), and print mode (thermal transfer or direct thermal) • updates the sensor values 	To perform a long calibration, do one of the following: <ul style="list-style-type: none"> • Press PAUSE on the front panel to pause the print engine, and then press CALIBRATE. • Select CALIBRATION for the MEDIA POWER UP or HEAD CLOSE parameter (see Select Media Power-Up Option on page 69 or Select Head Close Option on page 69).
Short Calibration	The print engine calibrates using the current sensor values rather than detecting the spaces between labels and resetting the sensors. This calibration sequence uses fewer labels than the long calibration sequence, but it is less reliable because the values that are stored in the sensors could be incorrect.	Select SHORT CAL for the MEDIA POWER UP or HEAD CLOSE parameter (see Select Media Power-Up Option on page 69 or Select Head Close Option on page 69).

Table 4 • Types of Calibration (Continued)

Type of Calibration	Description	When/How It Occurs
Sensor Profile Calibration	The print engine auto-calibrates and prints a media sensor profile.	Select the SENSOR PROFILE option on the front panel. See <i>Print Sensor Profile</i> on page 64 for instructions.
Media and Ribbon Sensor Sensitivity Calibration	One of the most common adjustments to print engine settings. The print engine resets the sensitivity of the sensors to detect correctly the media and ribbon that you are using. If you change the type of ribbon and/or media, you might need to reset the sensitivity of the media and ribbon sensors. When the sensors are at their new sensitivity, the print engine performs an auto-calibration.	Select the MEDIA AND RIBBON CALIBRATE option on the front panel. See <i>Calibrate Media and Ribbon Sensor Sensitivity</i> on page 65 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 112](#) for information about black mark requirements.

Transmissive Media Sensor

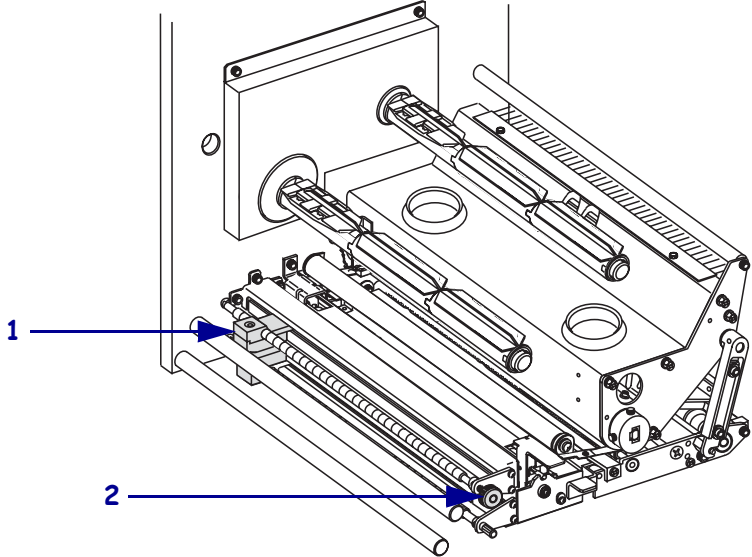
The transmissive media sensor finds “start of label” indicators, such as notches or holes in the media or interlabel gaps. This sensor consists of a light source (positioned below the media) and a light sensor (positioned above the media).

To position the sensor, complete these steps:

1. Refer to [Figure 35](#). Turn the adjustment knob on the media guide shelf assembly to move the media sensor.
2. How does the current media indicate the start of labels?

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

Figure 35 • Media Sensor Adjustment (Right-Hand Unit Shown)



1	Transmissive media sensor
2	Adjustment knob



Print Engine Configuration

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

Contents

Overview	52
Enter Setup Mode	52
Exit Setup Mode	53
Print a Configuration Label	54
Print a Network Configuration Label	55
Changing Password-Protected Parameters	56
Default Password Value	56
Disable the Password Protection Feature	56
Front Panel LCD	57
ZebraNet® Print Server LCD Displays	76

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 102](#) and [FEED Self Test on page 103](#).



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

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

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 36).

Figure 36 • Configuration Label

PRINTER CONFIGURATION	
Zebra Technologies	
ZTC 170PAX4 RH=200dpi	
ZBR2325570	
00.0.....	DARKNESS
2 IPS.....	PRINT SPEED
2 IPS.....	SLEW SPEED
2 IPS.....	BACKFEED SPEED
-016.....	TEAR OFF
APPLICATOR.....	PRINT MODE
CONTINUOUS.....	MEDIA TYPE
WEB.....	SENSOR TYPE
THERMAL-TRANS.....	PRINT METHOD
2 094/203 IN.....	PRINT WIDTH
1600.....	LABEL LENGTH
39.0IN 988MM.....	MAXIMUM LENGTH
MEDIA DISABLED.....	EARLY WARNING
MAINT. OFF.....	EARLY WARNING
BIDIRECTIONAL.....	PARALLEL COMM.
RS232.....	SERIAL COMM.
9600.....	BAUD
8 BITS.....	DATA BITS
NONE.....	PARITY
XON/XOFF.....	HOST HANDSHAKE
NONE.....	PROTOCOL
000.....	NETWORK ID
NORMAL MODE.....	COMMUNICATIONS
<*> 7EH.....	CONTROL PREFIX
<*> 5EH.....	FORMAT PREFIX
<*> 2CH.....	DELIMITER CHAR
ZPL II.....	ZPL MODE
HIGH.....	RIBBON TENSION
CALIBRATION.....	MEDIA POWER UP
CALIBRATION.....	HEAD CLOSE
BEFORE.....	BACKFEED
+015.....	LABEL TOP
+0020.....	LEFT POSITION
0000.....	HEAD TEST COUNT
0615.....	HEAD RESISTOR
MODE 1.....	APPLICATOR PORT
PULSE MODE.....	START PRINT SIG
FEED MODE.....	RESYNCH MODE
2SN.....	RIBBON LQ MODE
DISABLED.....	REPRINT MODE
04E.....	WEB S.
079.....	MEDIA S.
071.....	RIBBON S.
050.....	MARK S.
000.....	MARK MED S.
081.....	MEDIA LED
035.....	RIBBON LED
009.....	MARK LED
+10.....	LCD ADJUST
DPSWFXM.....	MODES ENABLED
1344 8/MM FULL.....	MODES DISABLED
V80.13 0.5 ->.....	RESOLUTION
V30 3303? 56.....	FIRMWARE
CUSTOMIZED.....	HARDWARE ID
NONE.....	CONFIGURATION
11778k.....	A: COMPACT FLASH
NONE.....	R: RAM
2048k.....	B: MEMORY CARD
NONE.....	E: ONBOARD FLASH
*** APPLICATOR.....	FORMAT CONVERT
005 DISPLAY.....	P30 INTERFACE
007 POWER SUPPLY.....	P31 INTERFACE
017 PAX170 RTS.....	P32 INTERFACE
FW VERSION.....	P34 INTERFACE
09/30/04.....	IDLE DISPLAY
09/30.....	RTC DATE
115740 IN.....	RTC TIME
115740 IN.....	NONRESET CNTR
115740 IN.....	RESET CNTR1
293691 CM.....	RESET CNTR2
293691 CM.....	NONRESET CNTR
293691 CM.....	RESET CNTR1
293691 CM.....	RESET CNTR2
46855 LABLS.....	NONRESET CNTR
46855 LABLS.....	RESET CNTR1
46855 LABLS.....	RESET CNTR2
HW 12418.04JDR080120.S7340.D.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 37). 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 37 • Network Configuration Label (With a Wireless Print Server Installed)

Network Configuration	
Zebra Technologies PRINTER TYPE XXXdpi USER 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 RAM PORT
Wireless*	
ALL.....	IP PROTOCOL
192.168.001.051.....	IP ADDRESS
255.255.255.000.....	SUBNET MASK
192.168.001.001.....	DEFAULT GATEWAY
192.168.001.003.....	WINS SERVER IP
YES.....	TIMEOUT CHECKING
0300.....	TIMEOUT VALUE
0000.....	ARP INTERVAL
9100.....	BASE RAM PORT
YES.....	CARD INSERTED
015FH.....	CARD MFG ID
000AH.....	CARD PRODUCT ID
XXXXXXXXXXXXX.....	MAC ADDRESS
YES.....	DRIVER INSTALLED
INFRASTRUCTURE.....	OPERATING MODE
125.....	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
OFF.....	ENCRYPTION MODE
1.....	ENCRYPT. INDEX
020.....	POOR SIGNAL
LONG.....	PREAMBLE
YES.....	ASSOCIATED
2004-06-15 08:48:48	TIME STAMP

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Changing Password-Protected Parameters

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

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

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

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

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

Default Password Value

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

Disable the Password Protection Feature

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

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 76](#) shows the additional parameters that appear when a wired or wireless print server is installed in the print engine.

Table 6 • Print Engine Parameters (Sheet 1 of 19)

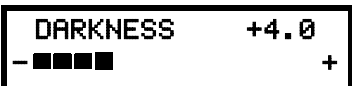


Parameter	Action/Explanation
	<p>Adjust Print Darkness</p> <p>Darkness (burn duration) settings depend on a variety of factors, including ribbon type, media, and the condition of the printhead. You may adjust the darkness for consistent high-quality printing.</p> <p>If printing is too light or if there 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 page 103 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>Important • 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"> • Press the right oval to increase darkness. • Press the left oval to decrease darkness. <p>Default: +4.0 Range: 00.0 to +30.0</p>
	<p>Adjust Print Speed</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"> • Press the right oval to increase the value. • Press the left oval to decrease the value. <p>Default: 2 IPS Range: 2 to 12 IPS for 203 dpi, 2 to 8 IPS for 300 dpi</p>
	<p>Adjust Slew Speed</p> <p>Adjusts the speed for feeding a blank label (given in inches per second).</p> <ul style="list-style-type: none"> • Press the right oval to increase the value. • Press the left oval to decrease the value. <p>Default: 6 IPS Range: 1 to 12 IPS</p>

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

Parameter	Action/Explanation
<div style="border: 1px solid black; padding: 5px;"> BACKFEED SPEED 2 IPS + </div>	<p>Adjust Backfeed Speed</p> <p>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"> • Press the right oval to increase the value. • Press the left oval to decrease the value. <p>Default: 2 IPS Range: 1 to 12 IPS</p>
<div style="border: 1px solid black; padding: 5px;"> TEAR OFF +000 -■■■■■ + </div>	<p>Adjust the Tear-Off Position</p> <p>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"> • Press the right oval to increase the value. • Press the left oval to decrease the value. <p>Default: +0 Range: -120 to +120</p>
<div style="border: 1px solid black; padding: 5px;"> PRINT MODE -APPLICATOR + </div>	<p>Select Print Mode</p> <p>Print mode settings tell the print engine the method of media delivery that you wish to use.</p> <ul style="list-style-type: none"> • Press either oval to display other choices. <p>Default: APPLICATOR Selections: TEAR-OFF, REWIND, APPLICATOR</p>
<div style="border: 1px solid black; padding: 5px;"> MEDIA TYPE -NON-CONTINUOUS + </div>	<p>Set Media Type</p> <p>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"> • Press either oval to display other choices. <p>Default: NON-CONTINUOUS Selections: CONTINUOUS, NON-CONTINUOUS</p>

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



Parameter	Action/Explanation
<div style="border: 1px solid black; padding: 5px;"> SENSOR TYPE -WEB + </div>	<p>Set the Sensor Type</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"> • Press either oval to display other choices. <p>Default: WEB Selections: WEB, MARK</p>
<div style="border: 1px solid black; padding: 5px;"> PRINT METHOD -THERMAL-TRANS. + </div>	<p>Select Print Method</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"> • Press either oval to display other choices. <p>Default: THERMAL TRANSFER Selections: THERMAL TRANSFER, DIRECT THERMAL</p> <p> Note • 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 - 168 0/8 MM + </div>	<p>Set Print Width</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"> 1. Press the left oval to move the cursor. 2. Press the right oval to increase the value of the digit. <p>To change the unit of measurement:</p> <ol style="list-style-type: none"> 1. Press the left oval until the unit of measurement is active. 2. Press the right oval to toggle to a different unit of measure (mm, inches, or dots). <p>Default: 168 0/8 MM for 203 dpi print engines; 168 0/12 MM for 300 dpi print engines</p> <p> Note • 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 (Sheet 4 of 19)

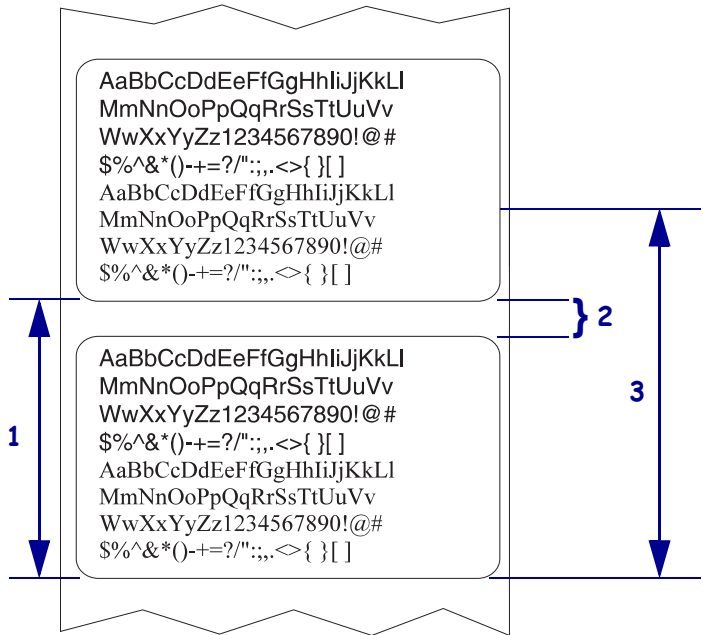
Parameter	Action/Explanation						
MAXIMUM LENGTH -39.0 IN 988 MM	<p>Set Maximum Label Length</p> <p>This parameter is used during the media portion of the calibration process. Always set maximum label length to a value that is at least 1.0 in. (25.4 mm) greater than the actual label length (Figure 38). 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"> • Press the right oval to increase the value. • Press the left oval to decrease the value. <p>Default: 39.0 inches (988 mm). Range: Values are adjustable in one-inch (25.4 mm) increments.</p> <p style="text-align: center;">Figure 38 • Label Length</p>  <table border="1" style="margin-left: auto; margin-right: auto;"> <tbody> <tr> <td style="text-align: center;">1</td> <td>Label length (including interlabel gap)</td> </tr> <tr> <td style="text-align: center;">2</td> <td>Interlabel gap</td> </tr> <tr> <td style="text-align: center;">3</td> <td>Set maximum label length to approximately this value</td> </tr> </tbody> </table>	1	Label length (including interlabel gap)	2	Interlabel gap	3	Set maximum label length to approximately this value
1	Label length (including interlabel gap)						
2	Interlabel gap						
3	Set maximum label length to approximately this value						

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



Parameter	Action/Explanation
<div style="border: 2px solid black; padding: 5px; text-align: center;"> EARLY WARNING MEDIA DISABLED </div>	<p>Set Early Warning for Media When this parameter is enabled, the print engine provides warnings when labels are running low.</p> <p> Note • 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"> • Press the right or left oval to display other choices. <p>Default: MEDIA DISABLED Selections: MEDIA DISABLED, MEDIA ENABLED</p> <p>To change the Early Warning settings:</p> <ol style="list-style-type: none"> 1. When the LCD displays EARLY WARNING, 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 Changing Password-Protected Parameters on page 56.) When the print engine detects that less than 15% of the labels remain, WARNING MEDIA LOW 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 MEDIA REPLACED? Press the right oval to select YES to clear the warning and reset the label counter. 2. When setting the Early Warning for maintenance, the LCD prompts HEAD CLEAN? 3. Press the right oval to select YES.
<div style="border: 2px solid black; padding: 5px; text-align: center;"> EARLY WARNING MAINT. OFF </div>	<p>Set Early Warning for Maintenance When this parameter is enabled, the print engine provides warnings when the printhead needs to be cleaned.</p> <p> Note • 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"> • Press the right or left oval to display other choices. <p>Default: MAINTENANCE DISABLED Selections: MAINTENANCE DISABLED, MAINTENANCE ENABLED</p> <p>To change the Early Warning settings:</p> <ol style="list-style-type: none"> 1. When the LCD displays EARLY WARNING, 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 Changing Password-Protected Parameters on page 56.) When setting the Early Warning for maintenance, the LCD prompts HEAD CLEAN? 2. Press the right oval to select YES.

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

Parameter	Action/Explanation
<div style="border: 1px solid black; padding: 5px; text-align: center;"> LIST FONTS PRINT </div>	<p>List Fonts</p> <ul style="list-style-type: none"> • 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.
<div style="border: 1px solid black; padding: 5px; text-align: center;"> LIST BAR CODES PRINT </div>	<p>List Bar Codes</p> <ul style="list-style-type: none"> • 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.
<div style="border: 1px solid black; padding: 5px; text-align: center;"> LIST IMAGES PRINT </div>	<p>List Images</p> <ul style="list-style-type: none"> • 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.
<div style="border: 1px solid black; padding: 5px; text-align: center;"> LIST FORMATS PRINT </div>	<p>List Formats</p> <ul style="list-style-type: none"> • 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.
<div style="border: 1px solid black; padding: 5px; text-align: center;"> LIST SETUP PRINT </div>	<p>List Setup</p> <ul style="list-style-type: none"> • Press the right oval to print a configuration label, which lists the current print engine configuration.
<div style="border: 1px solid black; padding: 5px; text-align: center;"> LIST NETWORK PRINT </div>	<p>List Network Settings</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"> • Press the right oval to print a network configuration label.
<div style="border: 1px solid black; padding: 5px; text-align: center;"> LIST ALL PRINT </div>	<p>List All</p> <ul style="list-style-type: none"> • Press the right oval to print labels that list the available fonts, bar codes, images, formats, and the current print engine and network configurations.

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

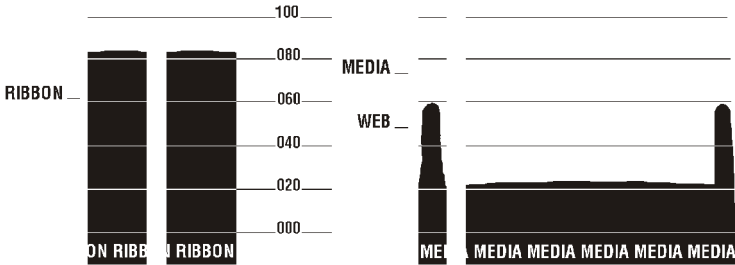
Parameter	Action/Explanation																
<div style="border: 1px solid black; padding: 5px; text-align: center;"> SENSOR PROFILE PRINT </div>	<p>Print Sensor Profile</p> <p>The media sensor profile may be used to troubleshoot registration problems that may be caused when the media sensor detects preprinted areas on the media or experiences difficulty in determining web location.</p> <ul style="list-style-type: none"> • Press the right oval to start this standard calibration procedure and print a media sensor profile. <p>Figure 39 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 65 to adjust sensor sensitivity.</p> <p style="text-align: center;">Figure 39 • Media Sensor Profile</p>  <table border="1" style="margin-left: auto; margin-right: auto;"> <caption>Data for Figure 39: 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)																
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																

Table 6 • Print Engine Parameters (Sheet 9 of 19)

Parameter	Action/Explanation
<p>MEDIA AND RIBBON CALIBRATE</p>	<p>Calibrate Media and Ribbon Sensor Sensitivity Use this procedure to adjust sensitivity of media and ribbon sensors.</p> <p>Important • 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"> 1. Press the right oval to start the calibration procedure. The LOAD BACKING prompt displays. 2. Open the printhead. 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. 4. Leave the printhead open. 5. Press the right oval to continue. The REMOVE RIBBON prompt displays. 6. Remove the ribbon (if used). 7. Close the printhead. 8. Press the right oval to continue. The message CALIBRATING PLEASE WAIT 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, RELOAD ALL displays. 9. Open the printhead and pull the media forward until a label is positioned under the media sensor. 10. Reload the ribbon (if used). 11. Close the printhead. 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.
<p>PARALLEL COMM. - BIDIRECTIONAL +</p>	<p>Set Parallel Communications Select the communications port that matches the one being used by the host computer.</p> <ul style="list-style-type: none"> • Press the right or left oval to display other choices. <p>Default: BIDIRECTIONAL Selections: BIDIRECTIONAL, UNIDIRECTIONAL</p>

Table 6 • Print Engine Parameters (Sheet 10 of 19)


Parameter	Action/Explanation
<div style="border: 1px solid black; padding: 5px; text-align: center;"> SERIAL COMM - RS232 + </div>	<p>Set Serial Communications Select the communications port that matches the one being used by the host computer.</p> <p>Important • 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>Default: RS-232 Selections: RS-232, RS-422/485, RS-485 MULTIDROP</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> BAUD - 9600 + </div>	<p>Set Baud 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"> • Press the right or left oval to display other choices. <p>Default: 9600 Selections: 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>Set Data Bits 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> Note • 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"> • Press the right or left oval to display other choices. <p>Default: 8 BITS Selections: 7 BITS, 8 BITS</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> PARITY - EVEN + </div>	<p>Set Parity 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"> • Press the right or left oval to display other choices. <p>Default: NONE Selections: EVEN, ODD, NONE</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> HOST HANDSHAKE - XON/XOFF + </div>	<p>Set Host Handshake 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"> • Press the right or left oval to display other choices. <p>Default: XON/XOFF Selections: XON/XOFF, DTR/DSR, RTS/CTS</p>

Table 6 • Print Engine Parameters (Sheet 11 of 19)


Parameter	Action/Explanation
<div style="border: 1px solid black; padding: 5px; text-align: center;"> - PROTOCOL + NONE </div>	<p>Set Protocol</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"> • Press the right or left oval to display other choices. <p>Default: NONE</p> <p>Selections: NONE, ZEBRA, ACK_NAK</p> <p> Note • Zebra is the same as ACK_NAK, except that Zebra response messages are sequenced. If Zebra is selected, the print engine must use DTR/DSR host handshake protocol.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> - NETWORK ID + 000 </div>	<p>Set Network ID</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"> 1. Press the left oval to move to the next digit position. 2. Press the right oval to increase the value of the digit. <p>Default: 000</p> <p>Range: 000 to 999</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> - COMMUNICATIONS + NORMAL MODE </div>	<p>Set Communications Mode</p> <p>The communication diagnostics mode is a troubleshooting tool for checking the interconnection between the print engine and the host computer. When DIAGNOSTICS 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 Communications Diagnostics Test on page 106.</p> <p>Notes on diagnostic printouts are defined as follows:</p> <ul style="list-style-type: none"> • FE indicates a framing error. • OE indicates an overrun error. • PE indicates a parity error. • NE indicates noise. <ol style="list-style-type: none"> 1. Press the right or left oval to toggle between the choices. 2. For any errors, check that your communication parameters are correct. 3. Set the print width equal to or less than the label width used for the test. See Set Print Width on page 59 for more information. <p>Default: NORMAL MODE</p> <p>Selections: NORMAL MODE, DIAGNOSTICS</p>

Table 6 • Print Engine Parameters (Sheet 12 of 19)




Parameter	Action/Explanation
<div style="border: 1px solid black; padding: 5px; text-align: center;"> CONTROL PREFIX - <■>7EH + </div>	<p>Set Control Prefix Character</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> Note • 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"> 1. Press the left oval to move to the next digit position. 2. Press the right oval to increase the value of the digit. <p>Default: 7E (tilde—displayed as a black square)</p> <p>Range: 00 to FF</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> FORMAT PREFIX - <^>5EH + </div>	<p>Set Format Prefix Character</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> Note • 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"> 1. Press the left oval to move to the next digit position. 2. Press the right oval to increase the value of the digit. <p>Default: 5E (caret)</p> <p>Range: 00 to FF</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> DELIMITER CHAR - <,>2CH + </div>	<p>Set Delimiter Character</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> Note • 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"> 1. Press the left oval to move to the next digit position. 2. Press the right oval to increase the value of the digit. <p>Default: 2C (comma)</p> <p>Range: 00 to FF</p>

Table 6 • Print Engine Parameters (Sheet 13 of 19)

Parameter	Action/Explanation
<div style="border: 1px solid black; padding: 5px; text-align: center;"> ZPL MODE - ZPL II + </div>	<p>Select ZPL Mode</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"> • Press the right or left oval to display other choices. <p>Default: ZPL II Selections: ZPL II, ZPL</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> MEDIA POWER UP - CALIBRATION + </div>	<p>Select Media Power-Up Option</p> <p>This parameter sets the action of the labels when the print engine is turned on.</p> <ul style="list-style-type: none"> • Press the right or left oval to display the choices. <p>Default: CALIBRATION Selections: FEED, CALIBRATION, LENGTH, SHORT CAL, and NO MOTION</p> <ul style="list-style-type: none"> • Feed—feeds the labels to the first registration point. • Calibration—determines the length of the label and adjusts the sensor settings. • Length—In continuous mode, feeds the last stored label length. In non-continuous mode, calibrates based on the maximum label length setting (see Set Maximum Label Length on page 60). • Short Cal—calibrates label length using the current sensor settings. • No Motion—the media does not move. You must press FEED to cause the print engine to resynch to the start of the next label.
<div style="border: 1px solid black; padding: 5px; text-align: center;"> HEAD CLOSE - CALIBRATION + </div>	<p>Select Head Close Option</p> <ul style="list-style-type: none"> • Press the right or left oval to display the choices. <p>Default: CALIBRATION Selections: FEED, CALIBRATION, LENGTH, SHORT CAL, and NO MOTION</p> <ul style="list-style-type: none"> • Feed—feeds the labels to the first registration point. • Calibration—determines the length of the label and adjusts the sensor settings. • Length—In continuous mode, feeds the last stored label length. In non-continuous mode, calibrates based on the maximum label length setting (see Set Maximum Label Length on page 60). • Short Cal—calibrates label length using the current sensor settings. • No Motion—the media does not move. You must press FEED to cause the print engine to resynch to the start of the next label.

Table 6 • Print Engine Parameters (Sheet 14 of 19)

Parameter	Action/Explanation
<div style="border: 1px solid black; padding: 5px; text-align: center;"> BACKFEED - BEFORE + </div>	<p>Select Backfeed Sequence</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"> • Press the right or left oval to display other choices. <p>Default: BEFORE</p> <p>Selections: DEFAULT, AFTER, BEFORE, OFF</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> LABEL TOP +000 -■■■■■■■■ + </div>	<p>Adjust Label Top Position</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"> • Press the right oval to increase the value. • Press the left oval to decrease the value. <p>Default: +000</p> <p>Range: –120 to +120 dots</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> LEFT POSITION - ±0000 + </div>	<p>Adjust Left Position</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"> 1. Press the left oval to move the cursor. 2. Press the right oval to change between + and to increase the value of the digit. 3. For a negative value, enter the value before changing to the minus sign. <p>Default: 0000</p> <p>Range: –9999 to +9999 dots</p>

Table 6 • Print Engine Parameters (Sheet 15 of 19)


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

Table 6 • Print Engine Parameters (Sheet 16 of 19)

Parameter	Action/Explanation
<div style="border: 1px solid black; padding: 5px; text-align: center;"> START PRINT SIG - PULSE MODE + </div>	<p>Select Start Print Signal</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"> • Pulse Mode—Labels print when the signal transitions from HIGH to LOW. • Level Mode—Labels print as long as the signal is asserted LOW. <p>Caution • 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"> • Press the right or left oval to display other choices. <p>Default: PULSE MODE Selections: PULSE MODE, LEVEL MODE</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> RESYNCH MODE - FEED MODE + </div>	<p>Select Resynch Mode</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"> • Feed Mode—If the label top is not where expected, the print engine feeds a blank label to find the label top position. • Error Mode—If the label top is not where expected, the print engine stops, enters Pause mode, displays the message Error Condition Feed Label, flashes the ERROR light, and asserts the Service Required signal (pin 10 on the Applicator Interface Connector). <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 Head Close configuration selection (see Select Head Close Option on page 69).</p> <ul style="list-style-type: none"> • Press the right or left oval to toggle between choices. <p>Default: FEED MODE Selections: FEED MODE, ERROR MODE</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> RIBBON LOW MODE - 25M + </div>	<p>Set Ribbon Low Mode</p> <p>When the Ribbon Low feature is off, the output signal (Pin 9) does not function, the LOW RIBBON 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 RIBBON LOW warning.</p> <ul style="list-style-type: none"> • Press the right or left oval to display other choices. <p>Default: 25M Selections: OFF, 25M, 50M, 75M, 100M</p>

Table 6 • Print Engine Parameters (Sheet 17 of 19)


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

Table 6 • Print Engine Parameters (Sheet 18 of 19)




Parameter	Action/Explanation
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> FORMAT CONVERT - NONE + </div>	<p>Select Format Convert 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"> Press the right or left oval to display other choices. <p>Default: NONE Selections: 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>Set RTS Takeup Dancer Arm Calibration Value 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>Set RTS Supply Dancer Arm Calibration Value 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>Select Idle Display This parameter selects the LCD options for the real-time clock.</p> <p> Note • 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"> Press the right or left oval to display other choices. <p>Default: FIRMWARE VERSION Selections: 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>Set RTC Date This parameter allows you to set the date following the convention selected in IDLE DISPLAY.</p> <ol style="list-style-type: none"> Press the left oval to move to the next digit position. Press the right oval to change the value of the digit.


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

Parameter	Action/Explanation
	<p>Set RTC Time This parameter allows you to set the time following the convention selected in IDLE DISPLAY.</p> <ol style="list-style-type: none"> 1. Press the left oval to move to the next digit position. 2. Press the right oval to change the value of the digit.
	<p>Select the Display Language This parameter allows you to change the language displayed on the front panel LCD.</p> <ul style="list-style-type: none"> • Press the right or left oval to display other choices. <p>Default: ENGLISH</p> <p>Selections: 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>Load LAN Source¹ 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"> Press the right or left oval to display other choices. <p>Default: PRINTER Selections: PRINTER, PRINTSERVER</p>
WIRED PS CHECK? NO	<p>Wired PrintServer Check¹ 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"> Press the right or left oval to display other choices. <p>Default: NO Selections: YES, NO</p>
IP PROTOCOL ALL	<p>IP Protocol² 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"> Press the right or left oval to display other choices. <p>Default: ALL Selections: ALL, GLEANING ONLY, RARP, BOOTP, DHCP, DHCP AND BOOTP, PERMANENT</p> <p> Note • 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;"> IP ADDRESS 000.000.000.000 </div>	<p>IP Address² 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"> 1. Press the left oval to move to the next digit position. 2. Press the right oval to increase the value of the digit.
<div style="border: 1px solid black; padding: 5px;"> SUBNET MASK 000.000.000.000 </div>	<p>Subnet Mask² 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"> 1. Press the left oval to move to the next digit position. 2. Press the right oval to increase the value of the digit.
<div style="border: 1px solid black; padding: 5px;"> DEFAULT GATEWAY 000.000.000.000 </div>	<p>Default Gateway² 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"> 1. Press the left oval to move to the next digit position. 2. Press the right oval to increase the value of the digit.
<div style="border: 1px solid black; padding: 5px;"> MAC ADDRESS 000000000000 </div>	<p>View MAC Address^{1,3} This parameter cannot be changed through the front panel.</p>
<div style="border: 1px solid black; padding: 5px;"> ESSID 125 </div>	<p>View ESSID^{1,3} This parameter cannot be changed through the front panel.</p>
<div style="border: 1px solid black; padding: 5px;"> AUTH. TYPE OPEN </div>	<p>Select Authentication Type^{1,3}</p> <ul style="list-style-type: none"> • Press the right or left oval to display other choices. <p>Default: OPEN Selections: OPEN, SHARED</p>
<div style="border: 1px solid black; padding: 5px;"> LEAP MODE OFF </div>	<p>Enable LEAP Mode^{3,4} 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"> • Press the right or left oval to display other choices. <p>Default: OFF Selections: 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> ENCRYPTION MODE OFF </pre>	<p>Select Encryption Mode^{1,3}</p> <ul style="list-style-type: none"> • Press the right or left oval to display other choices. <p>Default: OFF</p> <p>Selections: OFF, 40-BIT, 128-BIT</p>
<pre> ENCRYPT. INDEX 1 </pre>	<p>Select Encryption Index^{1,3}</p> <ul style="list-style-type: none"> • Press the right or left oval to display other choices. <p>Default: 1</p> <p>Selections: 1, 2, 3, 4</p>
<pre> RESET NETWORK YES </pre>	<p>Reset Network^{2,3}</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"> 1. Press the right oval to select YES. The LCD prompts ARE YOU SURE? <ul style="list-style-type: none"> • Press the left oval to select NO to cancel the request. • Press the right oval to select YES and reset the network.

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.



Routine Maintenance

This chapter provides routine cleaning and maintenance procedures.

Contents

Cleaning Schedule	80
Clean Exterior	80
Clean Interior	81
Clean the Sensors	81
Clean the Printhead and Platen Roller	83
Toggle Positioning	85
Printhead Pressure Adjustment	86
Power Fuse Replacement	87

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.

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

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">• When CLEAN HEAD NOW appears.• Direct Thermal Print Mode: After every roll of labels or 500 ft (150 m) of fanfold labels.• Thermal Transfer Print Mode: After every roll (1500 ft or 450 m) of ribbon.
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 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.

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

Clean Interior

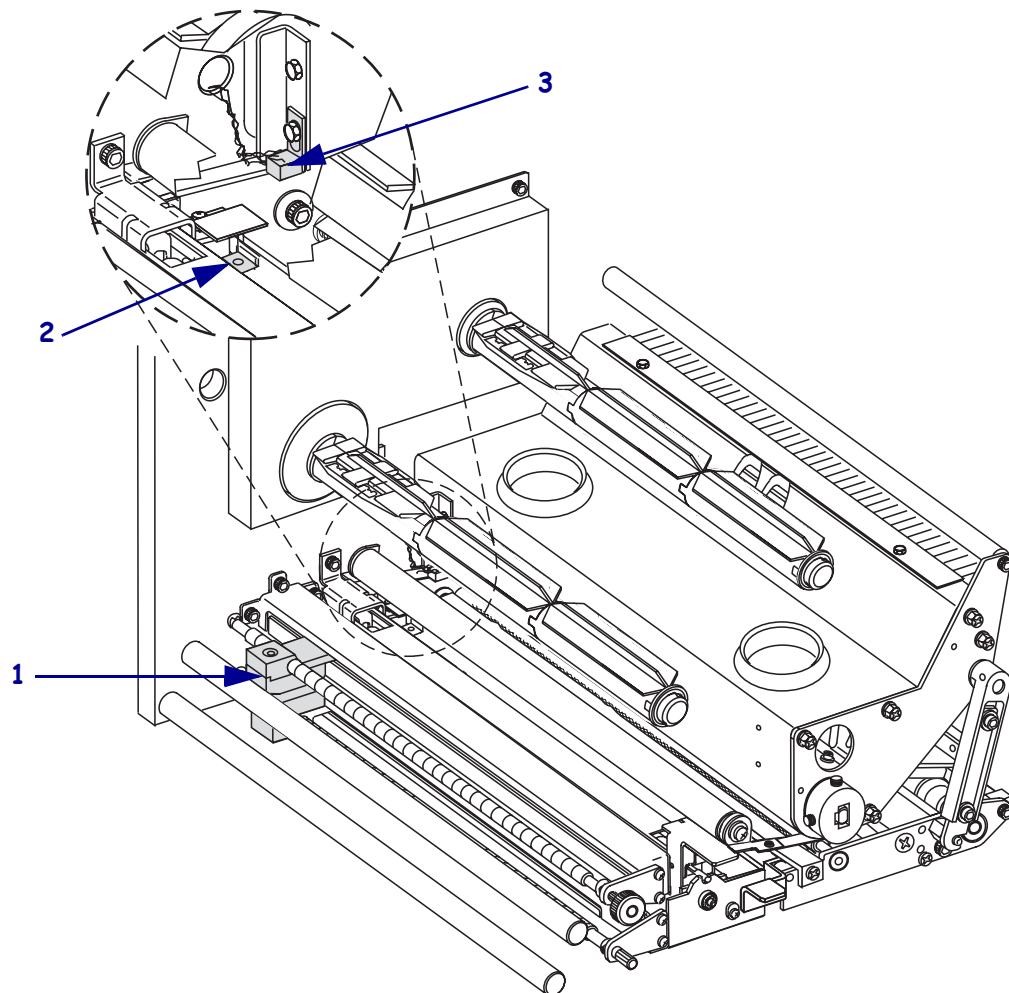
Remove any accumulated dirt and lint from the interior of the print engine using a soft bristle brush and/or vacuum cleaner. This area should be inspected every time a new ribbon is loaded.

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:

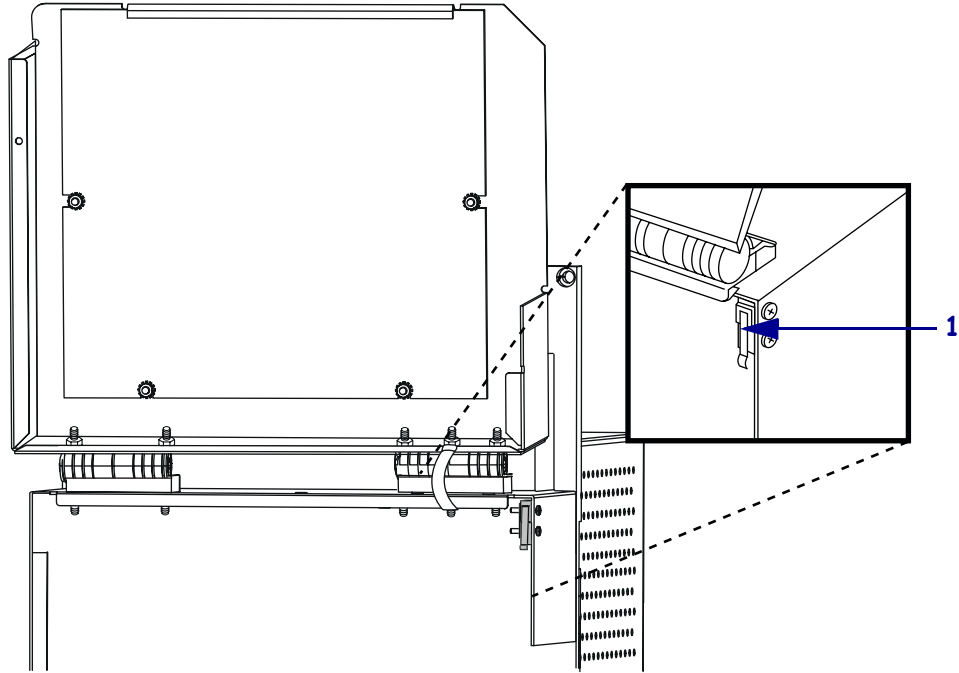
- See [Figure 40](#) for the media sensors.
- See [Figure 41 on page 82](#) for the door-open sensor.
- See [Figure 42 on page 82](#) for the ribbon sensor and ribbon sensor reflector.

Figure 40 • Sensor Locations (Right-Hand Unit Shown)



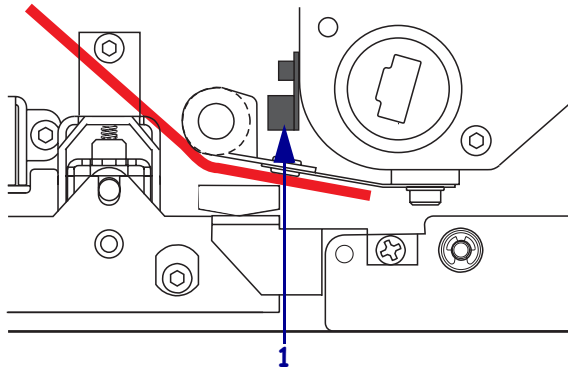
1	Transmissive media sensor
2	Reflective media sensor
3	Ribbon sensor

Figure 41 • Door-Open Sensor Location (Right-Hand Unit Shown)



1	Door-open sensor
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Figure 42 • Ribbon Sensor Location (Right-Hand Unit Shown)



1	Ribbon sensor
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Clean the Printhead and Platen Roller

Clean the printhead and platen roller according to the schedule in [Table 8 on page 80](#). 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:



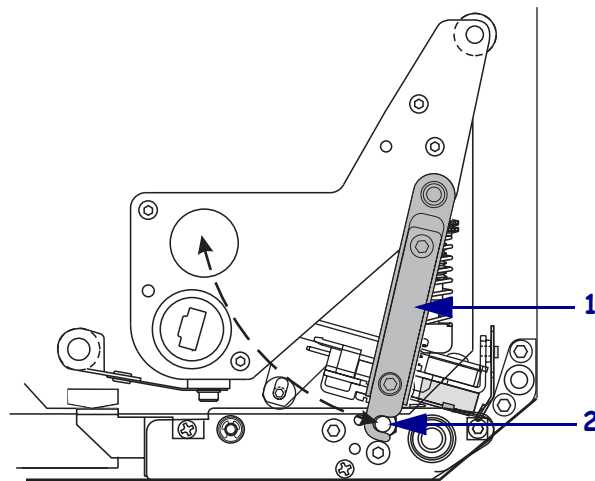
Caution • The printhead may be hot and could cause severe burns. Allow the printhead to cool.



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 43](#). Open the printhead assembly by unlatching the printhead latch from the locking pin.

Figure 43 • Opening the Printhead Assembly

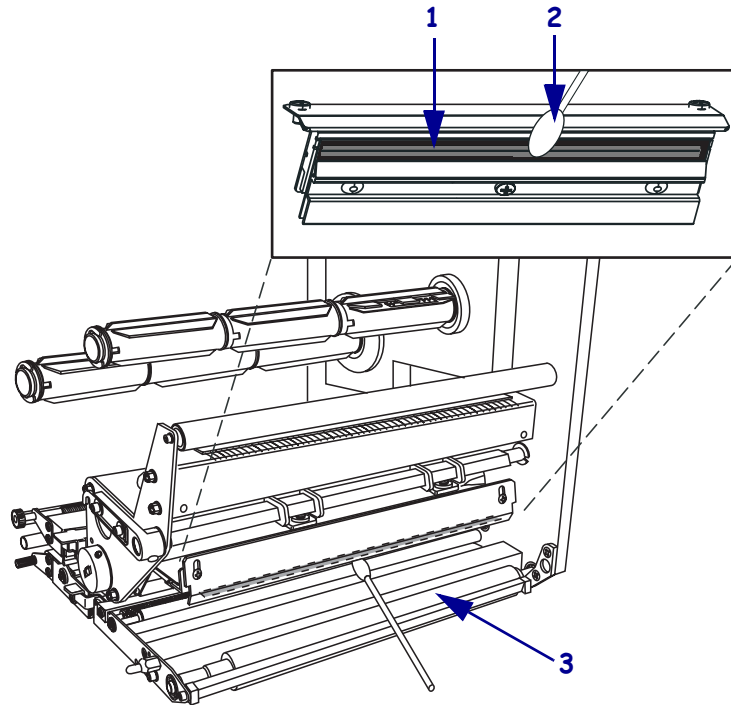


1	Printhead latch
2	Locking pin

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

4. See [Figure 44](#). 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 44 • Printhead and Platen Roller Cleaning (Right-Hand Unit Shown)



1	Printhead elements (gray strip)
2	Cotton swab
3	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.

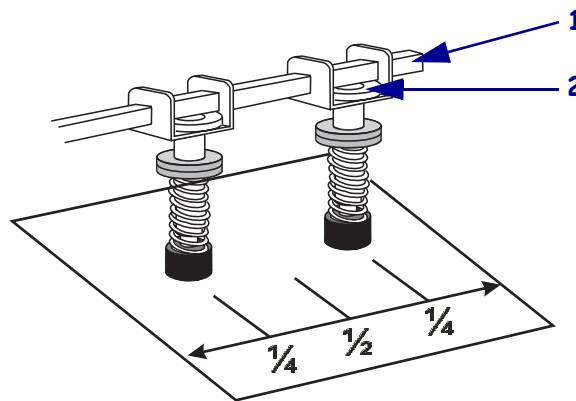
Toggle Positioning

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

To adjust the toggle, complete these steps:

1. See [Figure 45](#). 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 45 • Toggle Positioning (Right-Hand Unit Shown)



1	Toggle shaft
2	Position locking nut

Printhead Pressure Adjustment

Before adjusting the printhead pressure, check that the toggles are positioned correctly. See [Toggle Positioning on page 85](#).

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)

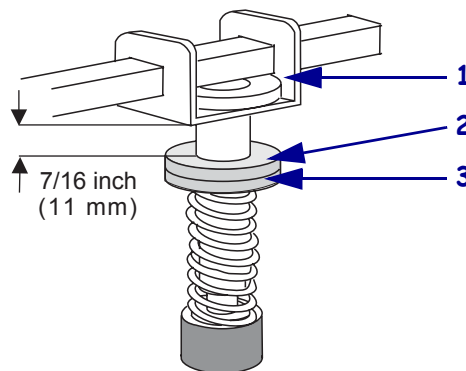


Note • Printhead and drive system (belts and bearings) life can be maximized by using the lowest pressure that produces the desired print quality.

To adjust printhead pressure, complete these steps:

1. See [Figure 46](#). As a starting point for adjustment, set the position of the adjusting nuts so that when the locking nut is tightened, it is approximately 7/16 in. (11 mm) from the yoke.
2. Refer to [Adjust Print Darkness on page 57](#) to set the darkness value (burn duration) appropriately for your media and ribbon.
3. Refer to [PAUSE Self Test on page 102](#) to print test labels.
4. Adjust the position of the adjusting nuts on both toggles until the print quality is acceptable (turning it clockwise increases the spring pressure, and counterclockwise decreases the pressure). Use the lowest pressure that provides the desired print quality.
5. Hold the adjusting nut in position, and tighten the locking nut against it.

Figure 46 • Printhead Pressure Adjustment



1	Yoke
2	Locking nut
3	Adjusting nut

Power Fuse Replacement

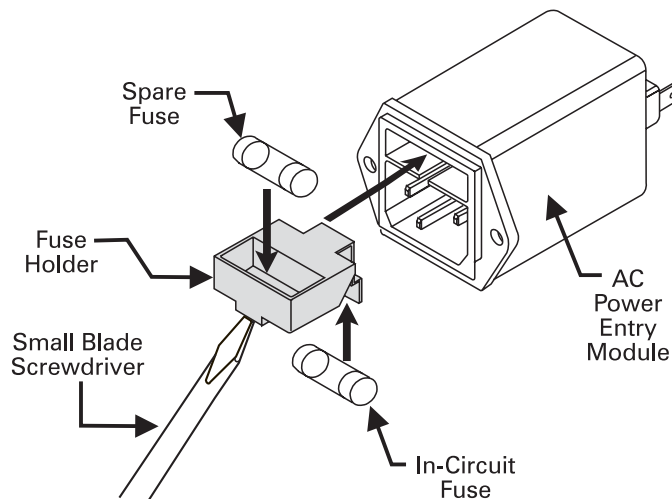
The print engine uses a metric-style fuse (5 × 20 mm IEC) rated for 5 Amps at 250 Volts that bears the certification mark of a known international safety organization (see [Figure 12 on page 22](#)). The power entry module comes with two approved fuses in the fuse holder: one is in-circuit and the other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

To replace a fuse, complete these steps:

1. See [Figure 47](#). 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 89](#).

Figure 47 • Installing a Fuse





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

Troubleshooting Checklists	90
LCD Error Messages	91
Memory Errors	93
Print Quality Problems	94
Communications Problems	97
Miscellaneous Print Engine Problems	98
Print Engine Diagnostics	100
Power-On Self Test	100
Additional Print Engine Self Tests	100
Communications Diagnostics Test	106

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 91 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 65.
- Are you experiencing problems with print quality? If yes, see *Print Quality Problems* on page 94.
- Are you experiencing communications problems? If yes, see *Communications Problems* on page 97.

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 26.
- Review the label- and ribbon-loading illustrations in *Load Media* on page 32 and *Load Ribbon* on page 40.
- Check the position of the media sensor and move if necessary, as shown in *Adjust Media Sensors* on page 48.
- Does the printhead need to be adjusted? See *Printhead Pressure Adjustment* on page 86 for more information.
- Do the sensors need to be calibrated? See *Calibrate Media and Ribbon Sensor Sensitivity* on page 65 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 100. 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 Load Ribbon on page 40 .
	In thermal transfer mode, the ribbon sensor is not detecting ribbon that is loaded incorrectly.	<ol style="list-style-type: none"> 1. Load ribbon correctly. See Load Ribbon on page 40. 2. Calibrate the sensors. See Calibrate Media and Ribbon Sensor Sensitivity on page 65.
	In thermal transfer mode, media is blocking the ribbon sensor.	<ol style="list-style-type: none"> 1. Load media correctly. See Load Media on page 32. 2. Calibrate the sensors. See Calibrate Media and Ribbon Sensor Sensitivity on page 65.
<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 Load Media on page 32 .
	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>	 <p>Caution • The printhead may be hot enough to cause severe burns. Allow the printhead to cool.</p>  <p>Electrostatic Discharge Caution • Observe proper electrostatic safety precautions when handling any static-sensitive components such as circuit boards and printheads.</p>	<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>	 <p>Caution • 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>  <p>Electrostatic Discharge Caution • Observe proper electrostatic safety precautions when handling any static-sensitive components such as circuit boards and printheads.</p>	<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>Caution • 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"> 1. Turn off (O) the print engine. 2. Disconnect and reconnect the data cable to the printhead. 3. Ensure that the cable connector is fully inserted into the printhead connector. 4. Turn on (I) the print engine.

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	Creating Bitmap 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"> With PAUSE on, 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"> Redesign graphic/format to fit available memory or remove items from memory to create more space. Press PAUSE to skip the formatting step in process and proceed to the next step. With PAUSE on, press CANCEL. The print engine skips the current label formatting process and goes to the next label. Turn the print engine OFF (O) and then ON (I) to clear the print engine's memory. Upgrade the print engine to a larger memory size.
OUT OF MEMORY STORING BITMAP	Storing Bitmap Not enough memory is available to store the bitmap created.	
OUT OF MEMORY BUILDING FORMAT	Building Format Label is too complex.	
OUT OF MEMORY STORING FORMAT	Storing Format Format is too large to fit in available memory.	
OUT OF MEMORY STORING GRAPHIC	Storing Graphic The graphic image is too large to fit in available memory.	
OUT OF MEMORY STORING FONT	Storing Font 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



Problem	Possible Cause	Recommended Solution
General print quality issues	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 Adjust Print Speed on page 57 .
	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 Adjust Print Darkness on page 57 .
	The printhead is dirty.	<p>Clean the printhead according to the instructions in Clean the Printhead and Platen Roller on page 83.</p> <p> Caution • The printhead may be hot enough to cause severe burns. Allow the printhead to cool.</p> <p> Electrostatic Discharge Caution • Observe proper electrostatic safety precautions when handling any static-sensitive components such as circuit boards and printheads.</p>

Table 11 • Print Quality Problems (Continued)

Problem	Possible Cause	Recommended Solution
Wrinkled ribbon	Ribbon fed through the machine incorrectly.	See <i>Load Ribbon</i> on page 40.
	Incorrect burn temperature.	Set the darkness to the lowest possible setting for good print quality. See <i>Adjust Print Darkness</i> on page 57.
	Incorrect or uneven pressure.	Set the pressure to the minimum needed for good print quality. See <i>Printhead Pressure Adjustment</i> on page 86.
	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.
Long tracks of missing print on several labels	Wrinkled ribbon.	See wrinkled ribbon causes and solutions in this table.
	Print element damaged.	Call a service technician.
Fine, angular gray lines on blank labels	Wrinkled ribbon.	See wrinkled ribbon causes and solutions in this table.
Light printing or no printing on the left or right side of the label	Printhead pressure needs adjustment, printhead out of alignment, or toggle in incorrect position.	See <i>Toggle Positioning</i> on page 85 and <i>Printhead Pressure Adjustment</i> on page 86.
		Call a service technician.
Printing too light or too dark over the entire label	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 86.
Smudge marks on labels	Media or ribbon not designed for high-speed operation.	Replace supplies with those recommended for high-speed operation.
Misregistration/skips labels	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)

Problem	Possible Cause	Recommended Solution
Misregistration and misprint of one to three labels	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 83.
	Media does not meet specifications.	Use media that meets specifications.
Vertical drift in top-of-form position	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"> 1. Calibrate print engine. 2. Adjust the label top position setting. See <i>Adjust Label Top Position</i> on page 70.
	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 83.
Vertical image or label drift	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 65.
	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 Set Serial Communications on page 66 .
		Make sure you are using the correct communication cable. See Data Cable Requirements on page 25 for the requirements.
		Using the front panel controls, check the protocol setting. It should be set to NONE. See Set Protocol on page 67 .
		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 Data Cable Requirements on page 25 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 Set Format Prefix Character on page 68 and Set Delimiter Character on page 68 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

Problem	Possible Cause	Recommended Solution
Broken or melted ribbon	Darkness setting too high.	<ol style="list-style-type: none"> 1. Reduce the darkness setting. 2. Clean the printhead thoroughly.
Ribbon tension dancer(s) oscillate erratically	Ribbon core is not standard size and is slipping on the spindle.	Replace ribbon with one that has a standard core size.
Missing LCD characters or parts of characters	The LCD may need replacing.	Call a service technician.
Changes in parameter settings did not take effect	Parameters are set incorrectly.	<ol style="list-style-type: none"> 1. Set parameters and save permanently. 2. Turn the print engine power OFF (O) and then ON (I).
	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.
The print engine fails to calibrate or detect the top of the label.	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 65.
	The print engine is configured for continuous media.	Set the media type to non-continuous media. See <i>Set Media Type</i> on page 58.
	The driver or software configuration is not set correctly.	Driver or software settings produce ZPL commands that can overwrite the print engine configuration. Check the driver or software media-related setting.
Non-continuous labels are being treated as continuous labels.	The print engine is configured for continuous media.	Set the media type to non-continuous media. See <i>Set Media Type</i> on page 58.
	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 65.

Table 13 • Miscellaneous Print Engine Problems (Continued)

Problem	Possible Cause	Recommended Solution
The ribbon light is on even though ribbon is loaded correctly.	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 65.
All lights on, but nothing displays on the LCD, and the print engine locks up.	Internal electronic or firmware failure.	Call a service technician.
Print engine locks up while running the Power-On Self Test.	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 59](#), 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. 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 located to the side of the front 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 and then ON.
- If print engine is in applicator mode and the liner is being taken up by the applicator, the operator must manually remove the labels as they become available.

CANCEL Self Test

The CANCEL self test prints a configuration label (Figure 48).

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 48).

Figure 48 • Configuration Label

PRINTER CONFIGURATION	
Zebra Technologies	
ZTC 170PAX4 RH-200dpi	
ZBR2325570	
00.0	DARKNESS
2 IPS	PRINT SPEED
2 IPS	SLEW SPEED
2 IPS	BACKFEED SPEED
-016	TEAR OFF
APPLICATOR	PRINT MODE
CONTINUOUS	MEDIA TYPE
WEB	SENSOR TYPE
THERMAL-TRANS	PRINT METHOD
2 094/203 IN	PRINT WIDTH
1600	LABEL LENGTH
39.01IN 990MM	MAXIMUM LENGTH
MEDIA DISABLED	EARLY WARNING
MAINT. OFF	EARLY WARNING
BIDIRECTIONAL	PARALLEL COMM.
RSC32	SERIAL COMM.
9600	BAUD
8 BITS	DATA BITS
NONE	PARITY
XON/XOFF	HOST HANDSHAKE
NONE	PROTOCOL
000	NETWORK ID
NORMAL MODE	COMMUNICATIONS
<>	CONTROL PREFIX
<>	FORMAT PREFIX
<>	DELIMITER CHAR
ZPL II	ZPL MODE
HIGH	RIBBON TENSION
CALIBRATION	MEDIA POWER UP
CALIBRATION	HEAD CLOSE
BEFORE	BACKFEED
+015	LABEL TOP
+0020	LEFT POSITION
0000	HEAD TEST COUNT
0615	HEAD RESISTOR
MODE 1	APPLICATOR PORT
PULSE MODE	START PRINT SIG
FEED MODE	RESYNCH MODE
25H	RIBBON LOW MODE
DISABLED	REPRINT MODE
046	WEB S.
079	MEDIA S.
071	RIBBON S.
050	MARK S.
000	MARK MED S.
081	MEDIA LED
035	RIBBON LED
009	MARK LED
+10	LCD ADJUST
DPS4FXM	MODES ENABLED
	MODES DISABLED
1344 8/MM FULL	RESOLUTION
V60.13.0.5	FIRMWARE
V30 33037 56	HARDWARE ID
CUSTOMIZED	CONFIGURATION
NONE	COMPACT FLASH
11776k	RAM
NONE	MEMORY CARD
2049k	ONBOARD FLASH
NONE	FORMAT CONVERT
*** APPLICATOR	P30 INTERFACE
005 DISPLAY	P31 INTERFACE
007 POWER SUPPLY	P32 INTERFACE
017 PAX170 RTS	P34 INTERFACE
FW VERSION	IDLE DISPLAY
09/30/04	RTC DATE
09:30	RTC TIME
115740 IN	NONRESET CNTR
115740 IN	RESET CNTR1
115740 IN	RESET CNTR2
293691 CM	NONRESET CNTR
293691 CM	RESET CNTR1
293691 CM	RESET CNTR2
46855 LABLS	NONRESET CNTR
46855 LABLS	RESET CNTR1
46855 LABLS	RESET CNTR2
HW 12418.04JDR080120.57340.D.VH1	

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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 49](#) 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 49](#) shows a sample of the labels.

Figure 49 • 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 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

Parameter	Controlled By
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 (option EPROMS)
Firmware	Fixed (code EPROMS)
Configuration	Configuration and WebView
Memory	Fixed (SIMM size and 1 MB standard)

Table 14 • Control of Print Engine Parameters

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

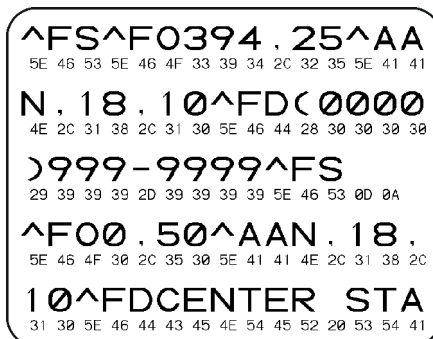
Do not perform the following test until all configuration and calibration parameters have been set. For configuration information, see [Front Panel LCD on page 57](#).

This test is controlled from the front panel display. See [Set Communications Mode on page 67](#). [Figure 51](#) 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 51 • Communications Diagnostics Test Label





Print Engine Specifications

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

Contents

General Specifications	108
Physical	108
Environmental Conditions	108
Agency Approvals	108
Electrical Specifications	109
Communications Specifications	109
Memory	109
Zebra Programming Language (ZPL II)	109
Bar Codes	110
Printing Specifications	111
Media Specifications	112
Ribbon Specifications	113

General Specifications

Physical

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

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

Environmental Conditions

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

Agency Approvals

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

Electrical Specifications

Power Supply	Universal Power Supply with power-factor correcting 90–264 VAC, 48–62 Hz
Power Consumption	
Idle	19 W
Printing	375 W (maximum)
Fuses	5 Amp, 250 VAC, 5 × 20 mm IEC style, as supplied with the print engine

Communications Specifications

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

Memory

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

Zebra Programming Language (ZPL II)

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

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

Printing Specifications

Specification	172PAX4	173PAX4
Resolution	203 dots per inch (8 dots per mm)	300 dots per inch (12 dots per mm)
Dot size	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)
Maximum print speed	12 ips	8 ips
First dot location (from inside media edge)	0.093 in. (2.4 mm)	0.093 in. (2.4 mm)
Maximum print width	6.6 in. (168 mm)	6.6 in. (168 mm)
Maximum print length (with full width media)		
Non-continuous	39 in. (990 mm)	39 in. (990 mm)
Continuous	150 in. (3810 mm)	100 in. (2540 mm)
Programmable constant printing speeds (per second)	2.4 in. (61 mm) 3 in. (76 mm) 4 in. (102 mm) 5 in. (127 mm) 6 in. (152 mm) 7 in. (178 mm) 8 in. (203 mm) 9 in. (229 mm) 10 in. (254 mm) 11 in. (279 mm) 12 in. (305 mm)	2.4 in. (61 mm) 3 in. (76 mm) 4 in. (102 mm) 5.5 in. (139 mm) 6 in. (152 mm) 7 in. (178 mm) 8 in. (203 mm)

Media Specifications

Media width (label and liner)	Minimum		3.0 in. (76 mm)
	Maximum		7.1 in. (180 mm)
Label length	Minimum	Applicator mode	3.0 in. (76.2 mm) with backfeed on 1.0 in. (25.4 mm) with backfeed off
		Rewinde mode	1.0 in. (25.4 mm)
		Tear-off mode	3.0 in. (76.2 mm) with backfeed on 1.0 in. (25.4 mm) with backfeed off
Registration tolerance (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)
Total thickness (including liner)			0.003 in. to 0.012 in. (0.076 mm to 0.305 mm)
Interlabel Gap (Transmissive Sensor)	Minimum		0.079 in. (2 mm)
	Preferred		0.118 in. (3 mm)
	Maximum		0.157 in. (4 mm)
Notch	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
Hole	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
Black Mark (Reflective Sensor)	Vertical length (parallel to inside media edge)		0.12 in. to 0.43 in. (3 mm to 11 mm)
	Horizontal width (perpendicular to inside media edge)		0.43 in. (11 mm) minimum
	Position		One of the following: <ul style="list-style-type: none"> • within 0.04 in. (1 mm) of the inside edge and <0.8 in (20 mm) from leading edge of media • centered within 0.23 in. to 2.25 in. (5.8 to 57 mm) from the media inner edge
	Density		> 1.0 Optical Density Units (ODU) Maximum media density: 0.5 ODU
Print Line to Peel Bar Distance			0.464 in. (11.8 mm)
Media Unwind Force	Steady State		Must be uniform and must not exceed 2 lb (907 g)
	Transient (Start/Stop)		Must not exceed 4 lb (1814 g)
Media Rewind Force			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

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



Data Ports

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

Contents

Parallel Port	116
Serial Port	117
Serial Pin Configuration	118
RS-232 Interface Connections	119
Applicator Interface Connector	122
Applicator Interface Connector Pin Configuration	122
Jumper Configurations for +5 V I/O Applicator Interface Board	124

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

36-Pin Connectors	Description
1	nStrobe/HostClk
2–9	Data Bits 1–8
10	nACK/PtrClk
11	Busy/PtrBusy
12	PError/ACKDataReq
13	Select/Xflag
14	nAutoFd/HostBusy
15	Not used
16, 17	Ground
18	+5 V at 750 mA The maximum current draw may be limited by option configuration.
19–30	Ground
31	ninit
32	nFault/NDataAvail
33, 34	Not used
35	+5 V through a 1.8 K Ω 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

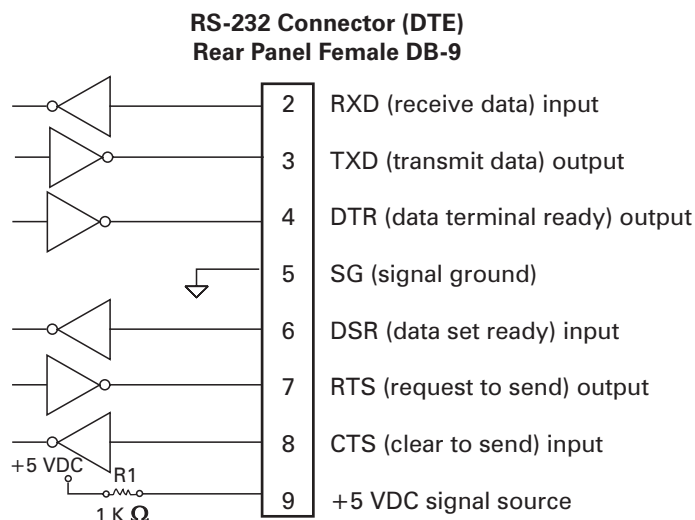
The print engine is configured as Data Terminal Equipment (DTE).



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

Figure 52 shows the internal connections of the print engine's RS-232 connector.

Figure 52 • 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.



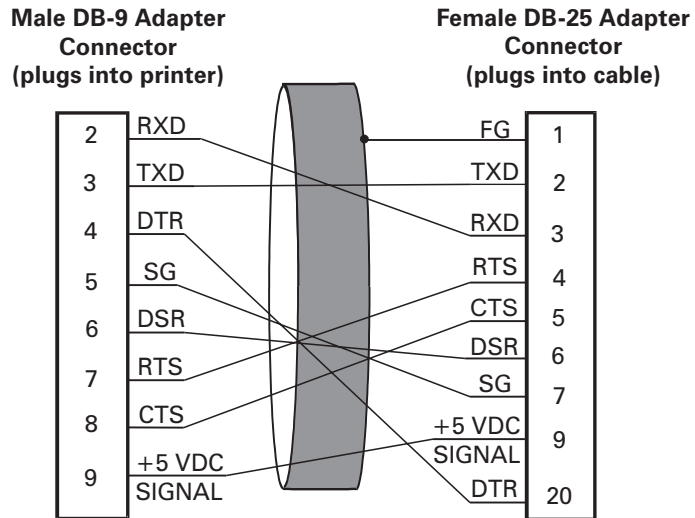
Caution • To enable this capability, a qualified service technician must install a jumper on the print engine's main logic board on JP1, pins 2 and 3.

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

Figure 53 • DB-9 to DB-25 Connections

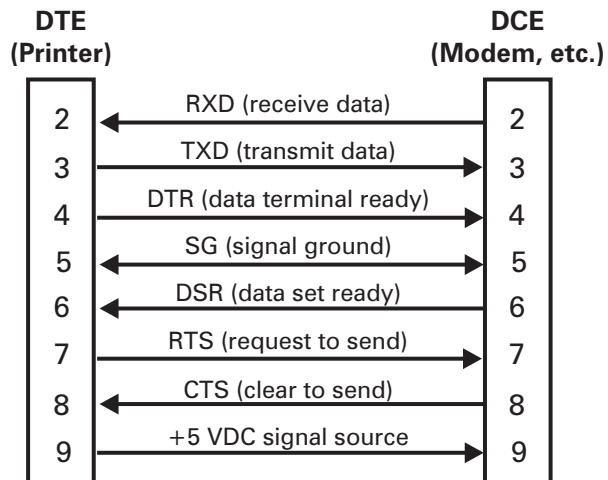


NOTE: Pin 1 of DB-9 connector is unused and unterminated.

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

Figure 54 • 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>+5 V Version Using jumper J5, this pin can be configured as isolated or non-isolated from the Applicator Interface Circuit Ground. See Table 18 on page 124 for more information.</p> <p>24–28 V Version Isolated I/O operation only. No jumpers to configure.</p>
2	+V I/O (Fused at 1 A for +5 V operation. See Figure 55 on page 125 for fuse location.) Caution • Replace the fuse only with one of the same type and rating.	Power	<p>+5 V Version Using jumper J4, this pin can be configured as isolated or non-isolated from the Applicator Interface Circuit +5 V Supply. See Table 18 on page 124 for more information.</p> <p>24–28 V Version Isolated I/O operation only. No jumpers to configure.</p>
3	START PRINT	Input	<p>Pulse Mode 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>Level Mode 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 Set Reprint Mode on page 73 for more information. If the Reprint feature is disabled, this input is ignored.
7	+28 V (Fused at 500 mA. See Figure 55 on page 125 for fuse location.) Caution • Replace the fuse only with one of the same type and rating.	Power	Interface Power Supply – supplies power to external sensors as required.
8	POWER GROUND (+28 V Return)	Ground	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 Set Ribbon Low Mode on page 72 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. MODE 1: Asserted LOW only while the print engine is moving the label forward; otherwise de-asserted HIGH. MODE 2: Asserted HIGH only while the print engine is moving the label forward; otherwise de-asserted LOW. MODE 3: (Default) Asserted LOW for 20 milliseconds when a label has been completed and positioned. Not asserted during continuous printing. 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.

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.

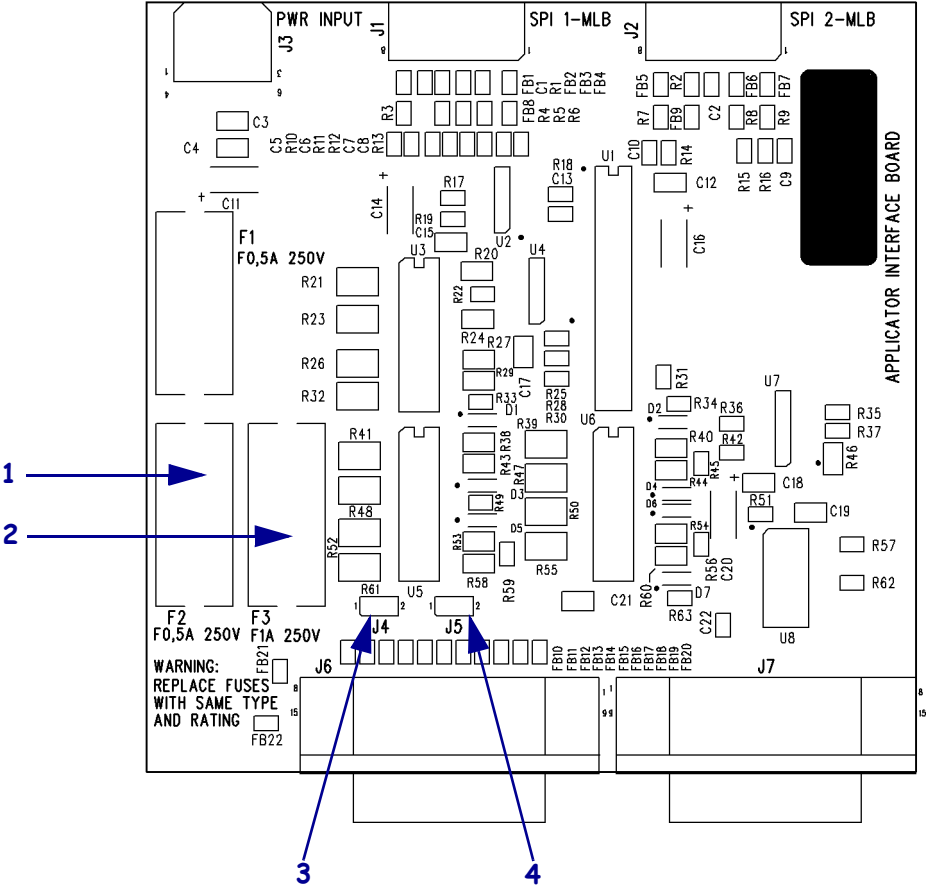
Jumpers J4 and J5 are used together to produce isolated or non-isolated modes of operation for applicator input and output control signals. J4 configures the +5 V source for the optoisolator circuits, and J5 configures the ground. For proper operation, when J4 is installed, J5 must be installed, and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

Table 18 • Pin 1 and Pin 2 Jumper Configurations

Pin No.	Non-Isolated	Isolated
1	J5 In I/O ground is connected to the Applicator Interface Circuit Ground.	J5 Out 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	J4 In +5 V I/O is connected to the Applicator Interface Circuit +5 V Supply.	J4 Out +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 55 illustrates the location of the fuses and the location of jumpers J4 and J5 for the +5 V I/O applicator interface board.

Figure 55 • 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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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.

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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.

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 [®]	1 year
Software	1 month
ZebraNet [®] 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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Notes • _____

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.

Index



A

- adhesive test for ribbon coating, 29
- adjustments
 - LCD, 73
 - left position, 70
 - media sensors, 48
 - print engine darkness, 57
 - printhead pressure, 86
 - tear-off position, 58
 - toggle positioning, 85
- applicator interface connector, 122
- applicator port setting, 71
- authentication type, 77
- auto-calibration, 46

B

- backfeed setting, 70
- bar codes
 - list available codes, 62
 - specifications, 110
- baud setting, 66
- before you begin setup, 14
- bitmap scaling factor, 74
- black mark media
 - described, 26
 - setting sensor type, 59
- BLACK OVAL Button Descriptions, 9
- buttons on front panel, 9

C

- cable requirements, 25
- calibration
 - CALIBRATE button description, 10
 - media and ribbon sensor, 65
 - methods, 46
 - setting for head close, 69
 - setting for media power up, 69
- CANCEL Button
 - Description, 9
- CANCEL self test, 101
- checklist
 - before you begin, 14
 - troubleshooting, 90
- cleaning
 - exterior of print engine, 80
 - interior, 81
 - printhead and platen roller, 83
 - recommended schedule, 80
- communication interfaces
 - overview and location, 23
 - types of connections, 115
- communications diagnostics test
 - overview, 106
 - selecting, 67
- communications problems, 97
- CompactFlash card initialization, 63
- configuration
 - changing parameters, 57
 - enter Setup mode, 52
 - exit Setup mode, 53

- configuration label
 - printing using CANCEL self test, 101
 - printing using List Setup command, 62
- connect print engine to power source, 21
- contact information, 3
- continuous media
 - described, 26
 - setting media type, 58
- control prefix setting, 68
- customer support, 3

D

- darkness setting, 57
- data bits setting, 66
- data cable requirements, 25
- data ports, 115
- data source
 - communication interfaces, 115
 - connections, 23
- date setting, 74
- DB-9 to DB-25 connection, 120
- default gateway, 77
- default password, 56
- delimiter character setting, 68
- diagnostics, 100
- direct connection to a computer, 119
- direct thermal mode
 - media scratch test, 28
 - setting, 59
- disable password protection, 56
- display language selection, 75
- door-open sensor
 - location, 81
 - when to clean, 80
- dpi format conversion, 74

E

- electrical noise, 25
- electrical specifications, 109
- encryption settings, 78
- enter Setup mode, 52
- environmental conditions, 108
- error messages, 91
- ESSID setting, 77
- exit Setup mode, 53
- exterior cleaning, 80

F

- fanfold media, 27
- FEED and PAUSE self test, 104
- FEED Button
 - Description, 10
- FEED self test, 103
- Flash memory, 63
- font list, 62
- format convert setting, 74
- format list, 62
- format prefix setting, 68
- front panel
 - buttons, 9
 - enter Setup mode, 52
 - exit Setup mode, 53
 - indicator lights, 10
 - LCD error messages, 91
 - LCD parameters, 57
- fuses
 - replacement, 87
 - specifications, 109

G

- gleaning, 76

H

- HEAD COLD message, 92
- host handshake setting, 66
- humidity requirements, 108

I

- idle display setting, 74
- images list, 62
- initialize Flash memory, 63
- initialize memory card, 63
- inspect the print engine, 15
- installation
 - procedure, 20
 - requirements, 16
- interfaces
 - IEEE 1284 bi-directional parallel, 24
 - RS-232 serial, 24
- interior cleaning, 81
- international safety organization marks, 22
- IP settings
 - default gateway, 77
 - IP address, 77
 - protocol, 76
 - subnet mask, 77

L

- label length maximum setting, 60
- label top
 - printer cannot detect, 98
 - setting, 70
- labels did not print, 97
- language selection, 75
- LCD messages
 - adjust LCD settings, 73
 - error messages, 91
 - language selection, 75
 - Setup mode, 57
- lights on front panel, 10
- list settings
 - all settings, 62
 - bar codes, 62
 - fonts, 62
 - formats, 62
 - images, 62
 - network, 62
 - setup, 62
- loading
 - media, 32
 - ribbon, 40
- long calibration, 46

M

- MAC address, 77
- mark LED setting, 73
- Mark Med S. setting, 73
- maximum label length setting, 60
- media
 - continuous roll media, 26
 - fanfold, 27
 - loading, 32
 - media LED setting, 73
 - non-continuous roll media, 26
 - setting media type, 58
 - specifications, 112
 - types of media, 26
- media and ribbon sensor calibration procedure, 65
- media path cleaning, 80
- media power up setting, 69
- Media S. setting, 73
- media scratch test, 28
- media sensor
 - adjustments, 48
 - locations, 81
 - print media sensor profile, 64
 - sensor sensitivity calibration, 47

- memory specifications, 109
- modem connection, 121

N

- network configuration label
 - printing, 55
 - printing using List Network command, 62
- network ID setting, 67
- NEXT Button Description, 9
- non-continuous media
 - described, 26
 - setting media type, 58

P

- parallel port
 - pin configuration, 116
 - setting parallel communications, 65
 - settings, 116
- parity setting, 66
- passwords
 - default, 56
 - disable, 56
 - entering, 56
- PAUSE Button
 - Description, 9
- Pause mode
 - PAUSE LED, 10
- PAUSE self test, 102
- PCMCIA card initialization, 63
- peel-off bar cleaning, 80
- pin configuration
 - parallel port, 116
 - serial port, 118
- platen roller
 - cleaning, 83
 - when to clean, 80
- ports, 115
- power
 - connect to power source, 21
 - electrical specifications, 109
 - on/off switch location, 11
 - power cord specifications, 22
- Power-On Self Test (POST), 100
- PREVIOUS Button Description, 9
- print configuration label
 - CANCEL self test, 101
 - List Setup command, 62
- print darkness setting, 57

- print engine settings
 - applicator port, 71
 - backfeed, 70
 - baud, 66
 - calibration methods, 46
 - control prefix, 68
 - data bits, 66
 - date, 74
 - delimiter character, 68
 - format convert, 74
 - format prefix, 68
 - head resistor, 71
 - host handshake, 66
 - idle display, 74
 - IP settings, 76
 - label top, 70
 - language, 75
 - LCD, 73
 - left position, 70
 - maximum label length, 60
 - media type, 58
 - network configuration label as baseline, 55
 - network ID, 67
 - parallel communications, 65
 - parity, 66
 - print darkness, 57
 - print method, 59
 - print server settings, 76
 - print width, 59
 - protocol, 67
 - resynch mode, 72
 - saving, 53
 - sensor type, 59
 - serial communications, 66
 - setting through front panel, 52
 - start print signal, 72
 - time, 75
 - ZPL mode, 69
 - print engine setup
 - before you begin, 14
 - installation, 16
 - unpack the print engine, 15
 - printhead
 - cleaning, 83
 - head close setting, 69
 - head resistor value setting, 71
 - pressure adjustment, 86
 - when to clean, 80
 - printing specifications, 111
 - print modes, 58
 - print network configuration label, 55, 62
 - print quality troubleshooting, 94
 - print server settings
 - default gateway, 77
 - IP address, 77
 - IP protocol, 76
 - subnet mask, 77
 - print width setting, 59
 - proprietary statement, 127
 - protocol setting, 67
- R**
- reflective media sensor, 48
 - related documents, 5
 - remove used ribbon, 45
 - report shipping damage, 15
 - reprint mode, 73
 - requirements for installation, 16
 - reset network option, 78
 - resynch mode setting, 72
 - ribbon
 - adhesive test, 29
 - determining coated side, 28
 - loading, 40
 - low ribbon warning, 72
 - removal, 45
 - ribbon LED setting, 73
 - ribbon tensioning system parameters, 74
 - scratch test, 29
 - specifications, 113
 - when to use, 28
 - Ribbon S. setting, 73
 - ribbon sensor
 - calibration procedure, 65
 - location, 81
 - sensitivity calibration, 47
 - when to clean, 80
 - RS-232 interface
 - connections, 119
 - considerations, 24
 - RTC (Real-time clock) setting
 - date, 74
 - idle display, 74
 - time, 75
- S**
- schedule for cleaning, 80
 - scratch test
 - media type, 28
 - ribbon coated side, 29

- self tests
 - CANCEL, 101
 - communications diagnostics, 106
 - FEED, 103
 - FEED and PAUSE, 104
 - PAUSE, 102
 - Power-On Self Test (POST), 100
 - Sensor Profile calibration
 - description, 47
 - procedure, 64
 - sensors
 - adjustment, 48
 - calibration methods, 46
 - locations, 81
 - setting sensor type, 59
 - serial port
 - pin configuration, 118
 - setting serial communications, 66
 - settings, 117
 - setup checklist, 14
 - Setup mode
 - enter Setup mode, 52
 - exit Setup mode, 53
 - LCD messages, 57
 - passwords, 56
 - SETUP/EXIT Button Description, 9
 - shipping
 - report damage, 15
 - reshipping the print engine, 15
 - short calibration, 46
 - specifications
 - bar codes, 110
 - communications options, 109
 - electrical, 109
 - environmental conditions, 108
 - fuses, 109
 - media, 112
 - memory, 109
 - physical, 108
 - power cord, 22
 - printing, 111
 - ribbon, 113
 - Zebra Programming Language (ZPL), 109
 - standard data ports, 115
 - start print signal setting, 72
 - storing the print engine, 15
 - subnet mask, 77
 - support, 3
 - system considerations
 - communication specifications, 24
 - communications code, 24
 - interfaces, 24
- ## T
- Tear-Off mode
 - tear-off bar cleaning, 80
 - tear-off position adjustment, 58
 - temperature requirements, 108
 - thermal transfer mode
 - media scratch test, 28
 - setting, 59
 - time setting, 75
 - toggle positioning, 85
 - top of label
 - printer cannot detect, 98
 - setting, 70
 - transmissive (media) sensor
 - adjusting, 48
 - when to clean, 80
 - troubleshooting
 - checklist, 90
 - communications problems, 97
 - diagnostic tests, 100
 - LCD error messages, 91
 - print quality problems, 94
 - types of media
 - continuous roll media, 26
 - fanfold media, 27
 - non-continuous roll media, 26
- ## U
- unpack the print engine, 15
- ## W
- web media, 26
 - setting sensor type, 59
 - Web S. setting, 73
 - Wireless Print Server settings
 - authentication type, 77
 - default gateway, 77
 - encryption, 78
 - ESSID, 77
 - IP address, 77
 - IP protocol, 76
 - MAC address, 77
 - reset network, 78
 - subnet mask, 77

Z

- Zebra Programming Language (ZPL II)
 - specifications, 109
 - ZPL mode setting, 69
- Zebra support, 3



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