ZE500™

Print Engine

User Guide

ZEBRA

P1051584-004

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Part Number: P1051584-004 Rev. B

DECLARATION OF CONFORMITY

ZEBRA TECHNOLOGIES CORPORATION

Declares that the following Information Technology Equipment

Zebra ZE500-4 and ZE500-6

complies with the following applicable directives and standards for the

ITE: Heavy Industry environment

Manufactured for Zebra Technologies Corporation by:

Jabil Circuit (Guangzhou) Ltd No. 1 Branch Company
Lianyun Road 388, Eastern Zone,
Guangzhou Economic &Technological Development District
Guangdong Province, China

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

Effective Date: 12 June 2017

Compliance Information

FCC Compliance Statement

This device complies with Part 15 of the FCC 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.

Note • This equipment has been tested and found to comply with the limits for a Class A digital device, 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 instruction manual, 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.

FCC Radiation Exposure Statement (for print engines with RFID encoders)

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator and your body.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Canadian DOC Compliance Statement

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

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

Contents

Notes •

1

Introduction

This section provides a high-level overview of the printer and its components.

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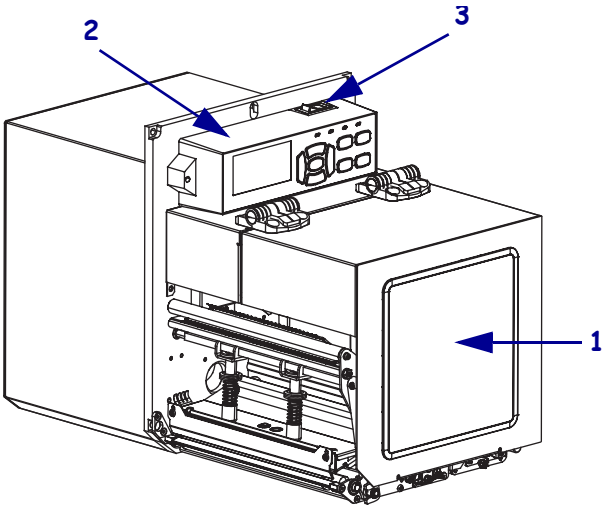
Print Engine Orientation

The ZE500 print engines are available in a right-hand configuration (the print mechanism is on the right) and a left-hand configuration (the print mechanism is on the left).

Figure 1 • Left-Hand (LH) Print Engine



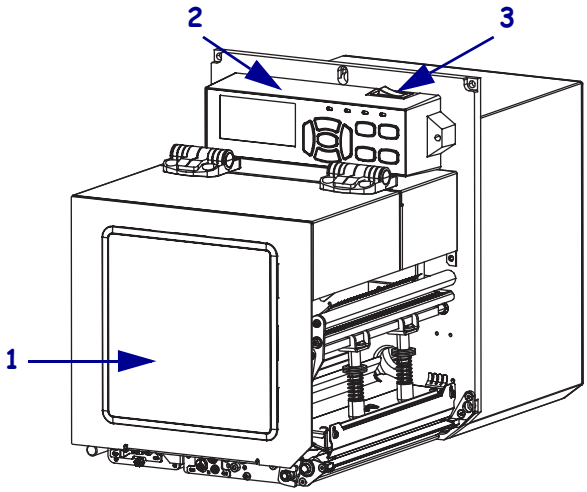


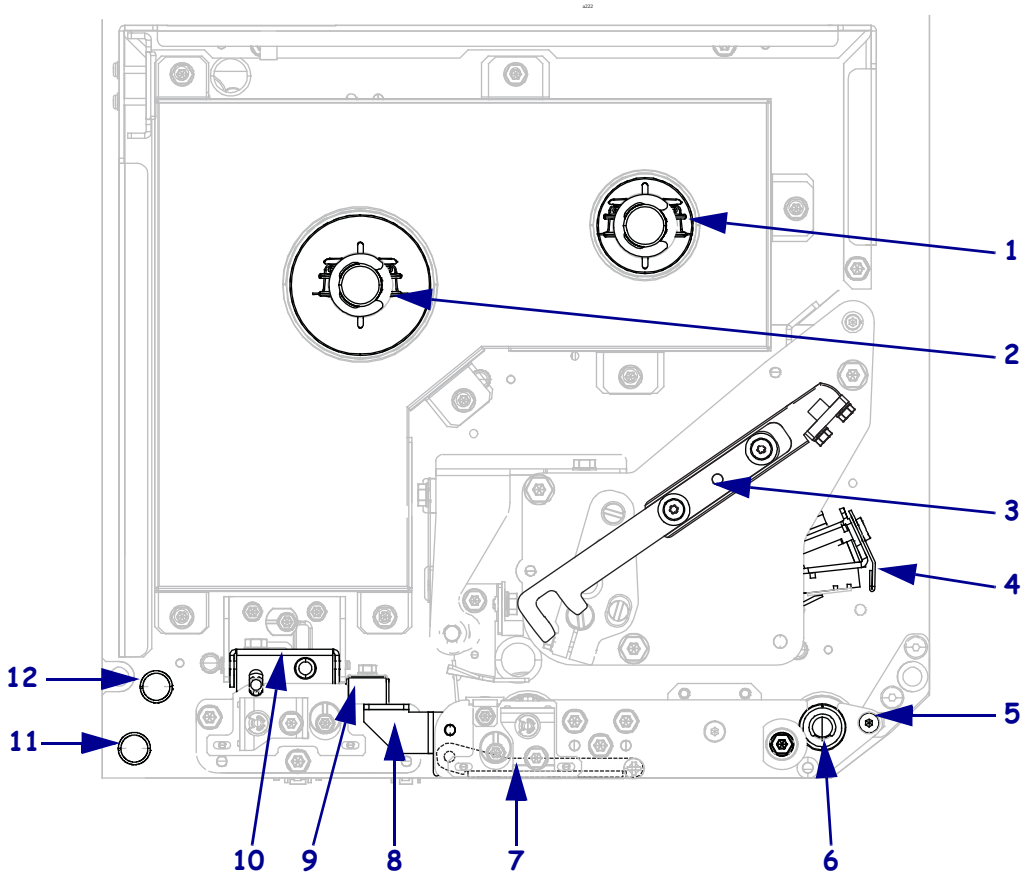
Figure 2 • Right-Hand (RH) Print Engine

1	media door
2	control panel
3	power switch

Print Engine Components

Figure 3 shows the components inside the media compartment of a right-hand print engine. A left-hand unit contains a mirror image of these components. Familiarize yourself with these components before continuing with the print engine setup procedure.

Figure 3 • Print Engine Components (RH model shown)

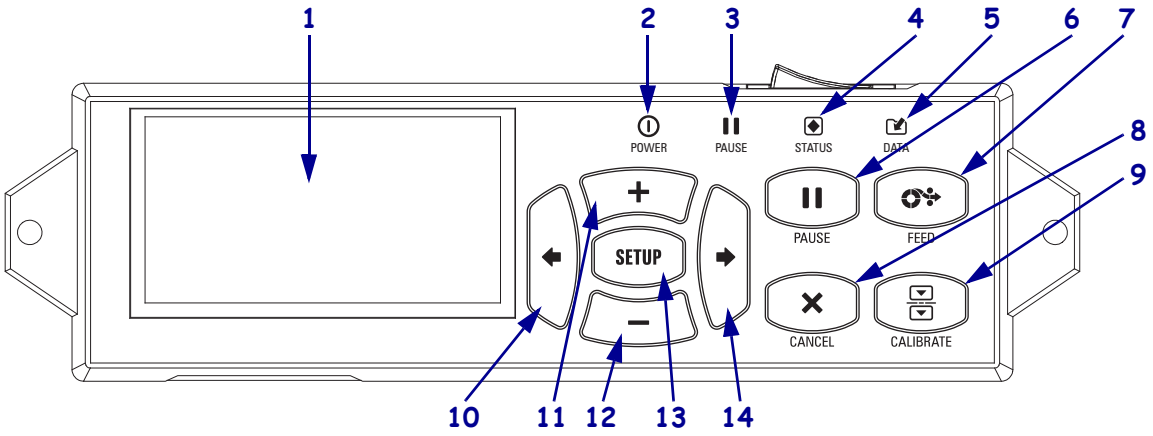


1	ribbon take-up spindle	7	peel roller assembly (hidden when closed)
2	ribbon supply spindle	8	peel roller latch
3	printhead-release latch	9	media guide
4	printhead assembly (shown open)	10	pinch roller assembly
5	peel bar	11	lower guide post
6	platen roller	12	upper guide post

Control Panel

All controls and indicators for the print engine are located on the control panel (Figure 4). The power switch is located on top of the control panel.

Figure 4 • Control Panel



1	The **display** shows the print engine's operating status and allows the user to navigate the menu system.		
2	**POWER light**	On when the print engine is on.	
3	**PAUSE light**	On when the print engine is paused.	
4	**STATUS light**	Off	Normal operation—no print engine errors.
		On	A print engine error exists. Check the display for more information.
5	**DATA light**	Off	Normal operation. No data being received or processed.
		On	The print engine is processing data or is printing. No data is being received.
		Blinking	The print engine is receiving data from or sending status information to the host computer.
6	The **PAUSE button** starts or stops print engine operation when pressed.		
7	The **FEED button** forces the print engine to feed one blank label each time the button is pressed.		
8	The **CANCEL button** cancels print jobs when the print engine is paused.		
9	The **CALIBRATE button** calibrates the print engine for media length and sensor values.		
10	The **LEFT ARROW** navigates to the previous parameter in the menus.		
11	The **PLUS (+) button** changes the parameter values. Common uses are to increase a value, to scroll through choices, or to change values while entering the print engine password.		
12	The **MINUS (-) button** changes the parameter values. Common uses are to decrease a value, to scroll through choices, or to change the cursor position while entering the print engine password.		
13	The **SETUP/EXIT button** enters and exits configuration mode.		
14	The **RIGHT ARROW** navigates to the next parameter in the menus.		

Control Panel Display

The control panel includes a display, where you can view the print engine's status or change its operating parameters. In this section, you will learn how to navigate through the menu system and change values for menu items.

After the print engine completes the power-up sequence, it moves to the Idle Display (Figure 5).

Figure 5 • Idle Display

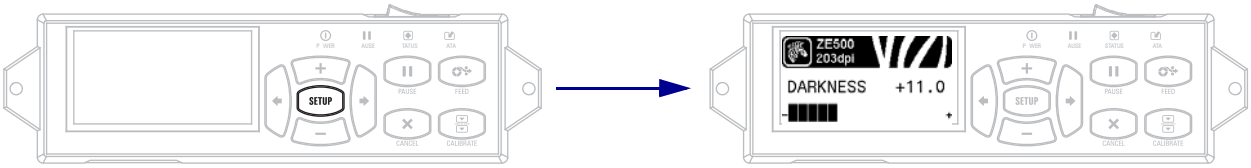
1	The printer's current status
2	Information that you set through *Idle Display* *on page 82*

Navigating in the Display

Table 1 shows the options available for navigating through the parameters in the display.

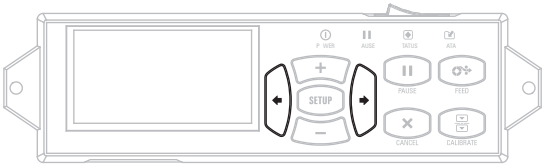
Table 1 • Navigation

Enter Setup Mode



At the Idle Display (Figure 5), press **SETUP** to enter Setup Mode. The printer displays the first parameter.

Scroll through the Parameters



To scroll through the parameters, press the **LEFT ARROW** or the **RIGHT ARROW**.

Table 1 • Navigation (Continued)

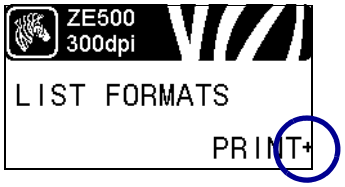
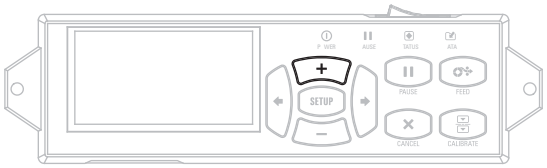
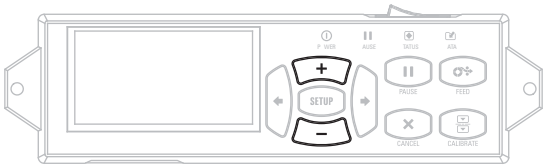
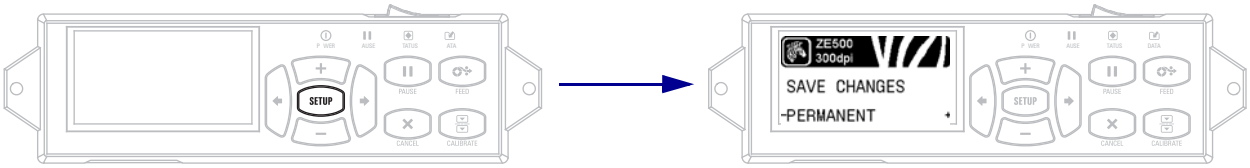
Perform an action	
	+ indicates that an action can be performed.
	Press **PLUS (+)** to perform the specified action.
Change Parameter Values	
	- and + indicate that a value can be changed.
	Press **PLUS (+)** or **MINUS (-)** to scroll through the accepted values.

Table 1 • Navigation (Continued)

Exit Setup Mode



1. While in Setup Mode, press **SETUP** to exit the operating parameters.
   The LCD displays SAVE CHANGES.
2. To return to the parameters, plus the **LEFT ARROW**.
   OR
   Press **PLUS (+)** or **MINUS (-)** to scroll through the exit options.

PERMANENT	Stores values in the print engine even when power is turned off.
TEMPORARY	Saves the changes until power is turned off.
CANCEL	This option cancels all changes made since you entered Setup mode, except for changes made to DARKNESS, TEAR OFF, COMMUNICATION, and LANGUAGE settings, which go into effect as soon as they are made.
LOAD DEFAULTS	Use this option to restore all settings other than the network settings back to the factory defaults. Use care when loading defaults because you will need to reload all settings that you changed manually.
LOAD LAST SAVE	Loads the values from the last permanent save.
DEFAULT NET	Use this option to restore all print server and network settings back to the factory defaults. Use care when loading defaults because you will need to reload all settings that you changed manually.

3. Press the **RIGHT ARROW** to select the displayed choice and exit Setup Mode.

   When the configuration and calibration sequence finishes, the print engine returns to the Idle Display.

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 **MINUS (-)** to change the selected digit position.
2. When you have selected the digit that you wish to change, use **PLUS (+)** to increase the selected digit value. Repeat these two steps for each digit of the password.
3. After entering the password, press **SELECT**.

   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 Zebra Programming Language (ZPL) command ^KP (Define Password) or using the print engine's web pages (ZebraNet wired or wireless print server required).

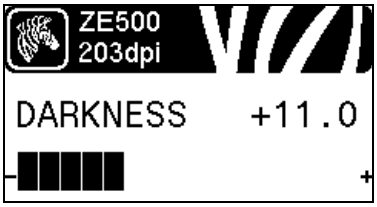
Disable the Password Protection Feature

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 command. To re-enable the password-protection feature, send the ZPL command ^KPx, where x can be any number from 1 to 9999.

Operating Parameters on the Control Panel

Items in this menu are shown in the order in which they appear when you press the **RIGHT ARROW**. For more information about these settings, see *Print Settings on page 67*.

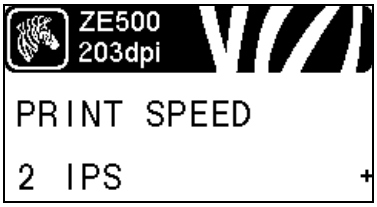
For information about RFID parameters, refer to *RFID Programming Guide 2*. You can download the latest copy from http://www.zebra.com/manuals.



Adjust the Print Darkness

Set the darkness to the lowest setting that provides good print quality. If you set the darkness too high, the label image may print unclearly, bar codes may not scan correctly, the ribbon may burn through, or the printhead may wear prematurely.

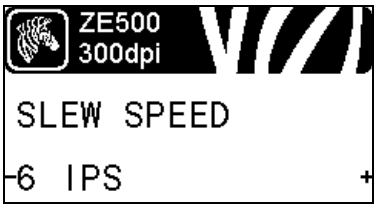
See *Print Darkness on page 67* for more information.



Select the Print Speed

Select the speed for printing a label (given in inches per second). Slower print speeds typically yield better print quality.

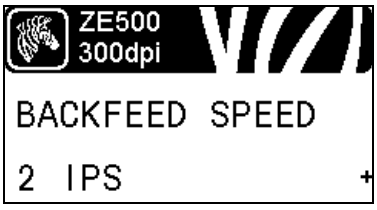
See *Print Speed on page 67* for more information.



Set the Slew Speed

The slew speed is the speed at which the printer skips over the areas in a label format that are blank across the full width of the image. A faster slew speed may reduce printing time. The print engine automatically senses when to apply this higher speed.

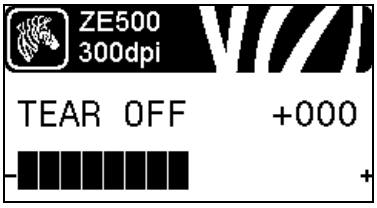
See *Slew Speed on page 67* for more information.



Set the Backfeed Speed

Backfeed refers to the backward motion of the media from the tear-off or peel-off position to the print position. This motion occurs so that more of the lead edge of each label can be used for printing. Reducing backfeed speed can mitigate some issues. In general, reducing the backfeed speed may improve print quality at the start of the label. This speed defaults to 2 ips.

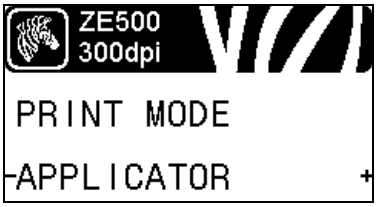
See *Backfeed Speed on page 68* for more information.



Adjust the Tear-Off Position

If necessary, adjust the position of the media over the tear-off bar after printing.

See *Tear-Off Position* *on page 68* for more information.



Select the Print Mode

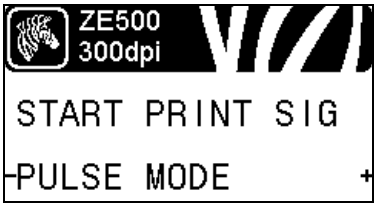
Select a print mode that is compatible with your print engine options.

See *Print Mode* *on page 69* for more information.

Select the Applicator Port Mode

Select the appropriate action for the applicator port, as suggested by the applicator manufacturer.

See *Applicator Port* *on page 69* for more information.

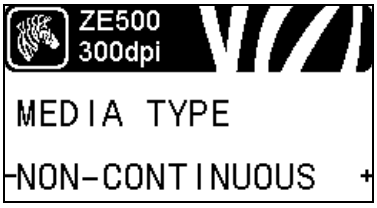


Select the Start Print Signal

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.

Important • The Start Print Signal is determined by the applicator manufacturer. The print engine must use the correct setting for it to work properly.

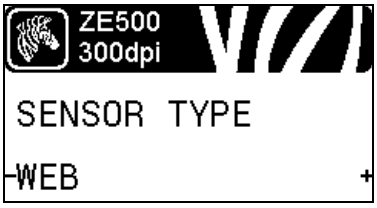
See *Start Print Signal* *on page 70* for more information.



Set the Media Type

Select the type of media that you are using.

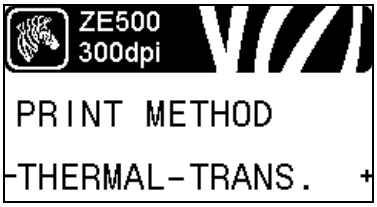
See *Media Type* *on page 70* for more information.



Select the Media Sensor

Select the media sensor that is appropriate for the media that you are using.

See *Sensor Type* *on page 90* for more information.

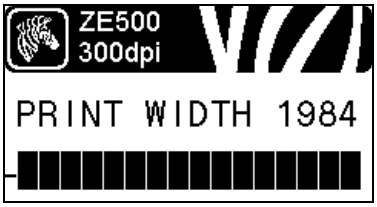


Select the Print Method

Specify if ribbon is being used. Thermal Transfer media requires ribbon for printing while Direct Thermal media does not.

To determine if you need to use ribbon, see *When to Use Ribbon* on page 37.

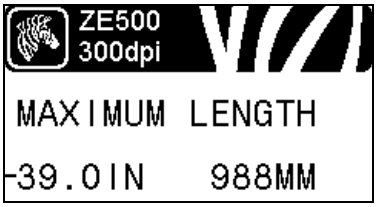
See *Print Method* *on page 70* for more information.



Adjust the Print Width

Specify the width of the labels being used.

See *Print Width* *on page 71* for more information.



Set the Maximum Label Length

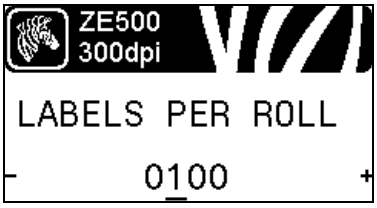
Set the maximum label length to a value that is at least 1.0 in. (25.4 mm) greater than the actual label length plus the interlabel gap. If you set the value to one that is smaller than the label length, the print engine assumes that continuous media is loaded, and the print engine cannot calibrate.

See *Maximum Label Length* *on page 72* for more information.

Set Early Warning for Media and Ribbon

When this feature is enabled, the print engine provides warnings when the media or ribbon is reaching near the end of the roll.

See *Early Warning for Media and Ribbon* *on page 76* for more information.



Set Number of Labels Per Roll for Early Warning

This value should correspond to the number of labels per roll of the media that you are using.

See *Early Warning for Media and Ribbon on page 76* for more information.

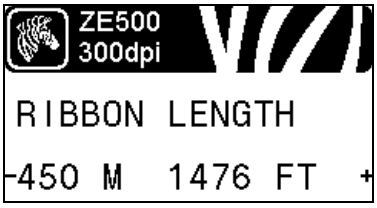
* *This parameter appears only if Early Warning for Media and Ribbon is enabled.*

Reset Media Counter for Early Warning

Reset the media counter after you replace the media roll.

- If you replaced the media, press **PLUS (+)** to select YES.
- If you did not replace the media, press **MINUS (-)** to select NO, or press the **LEFT ARROW** or **RIGHT ARROW** to move to another parameter.

* *This parameter appears only if Early Warning for Media and Ribbon is enabled.*

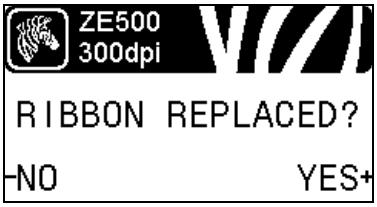


Set Ribbon Length for Early Warning

This value should correspond to the ribbon length for the ribbon that you are using.

See *Early Warning for Media and Ribbon on page 76* for more information.

* *This parameter appears only if Early Warning for Media and Ribbon is enabled.*

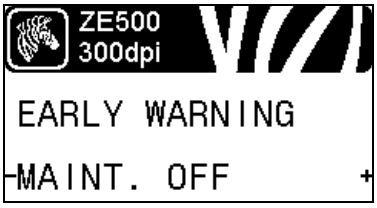


Reset Ribbon Counter for Early Warning

Reset the ribbon counter after you replace the roll of ribbon.

- If you replaced the ribbon, press **PLUS (+)** to select YES.
- If you did not replace the ribbon, press **MINUS (-)** to select NO, or press the **LEFT ARROW** or **RIGHT ARROW** to move to another parameter.

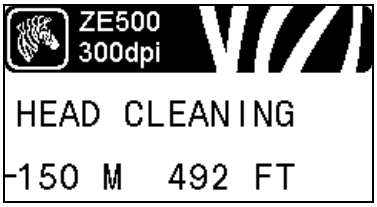
* *This parameter appears only if Early Warning for Media and Ribbon is enabled.*



Set Early Warning for Maintenance

When this feature is enabled, the print engine provides warnings when the printhead needs to be cleaned.

See *Early Warning for Maintenance* *on page 76* for more information.

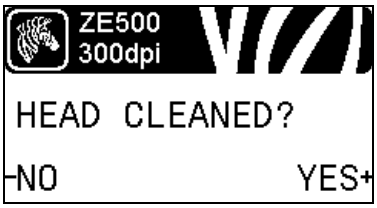


Set Printhead Cleaning Interval*

When Early Warning for Maintenance is enabled, set this value to the length of the media or ribbon roll that you are using.

See *Printhead Cleaning Interval* *on page 76* for more information.

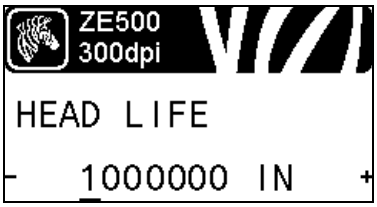
* *This parameter appears only if Early Warning for Maintenance is enabled.*



Reset Printhead Cleaning Counter for Early Warning*

- If you received the message WARNING CLEAN PRINTHEAD, clean the printhead, and then press **PLUS** to select YES to reset the Early Warning for Maintenance printhead cleaning counter.
- If you have not cleaned the printhead, press **MINUS** to select NO.

* *This parameter appears only if Early Warning for Maintenance is enabled.*



Set Printhead Life Expectancy*

When Early Warning for Maintenance is enabled, set this value to the number of inches of media that the printhead is expected to print.

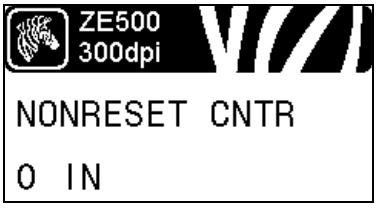
See *Printhead Life Expectancy* *on page 76* for more information.

* *This parameter appears only if Early Warning for Maintenance is enabled.*

Reset New Printhead Counter for Early Warning*

- If you received the message WARNING REPLACE HEAD, replace the printhead, and then press **PLUS (+)** to select YES to reset the Early Warning for Maintenance printhead replacement counter.
- If you have not replaced the printhead, press **MINUS (-)** to select NO.

* *This parameter appears only if Early Warning for Maintenance is enabled.*



View the Non-Resettable Counter

This parameter displays the total length of media that the printer has printed.

See *Non-Resettable Counter* *on page 77* for more information.

View User-Controlled Counter 1

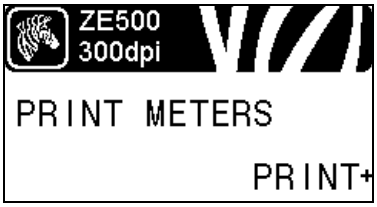
This parameter displays the total length of media that the printer has printed since this counter was last reset.

See *User-Controlled Counters* *on page 77* for more information.

View User-Controlled Counter 2

This parameter displays the total length of media that the printer has printed since this counter was last reset.

See *User-Controlled Counters* *on page 77* for more information.

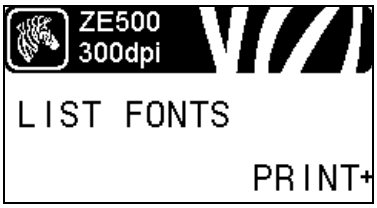


Print Counter Readings

Prints a label that lists the odometer readings for the following:

- the non-resettable counter
- the two user-controlled counters
- the Early Warning for Maintenance counters, which indicate when the printhead was last cleaned and the printhead life (If the Early Warning for Maintenance feature is disabled, the counters related to it do not print.)

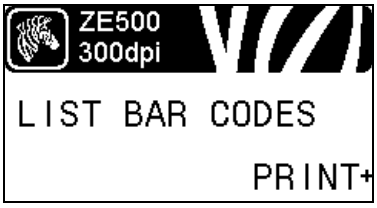
See *Print Counter Readings* *on page 77* for more information.



Print Font List

This option prints a label that lists the available fonts in the print engine, including standard print engine fonts plus any optional fonts. Fonts may be stored in RAM or Flash memory.

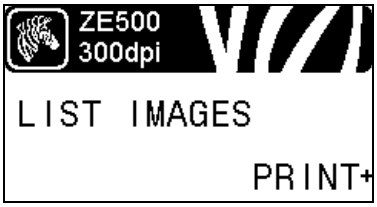
See *Print Information* *on page 78* for more information.



Print Bar Code List

This option prints a label that lists the available bar codes in the print engine. Bar codes may be stored in RAM or Flash memory.

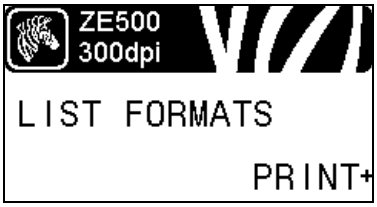
See *Print Information* *on page 78* for more information.



Print Image List

This option prints a label that lists the available images stored in the print engine's RAM, Flash memory, or optional memory card.

See *Print Information* *on page 78* for more information.



Print Format List

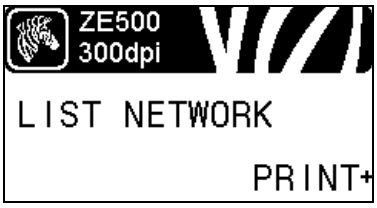
This option prints a label that lists the available formats stored in the print engine's RAM, Flash memory, or optional memory card.

See *Print Information* *on page 78* for more information.

Print Configuration Label

This option prints a configuration label (see Figure 14 on page 128), which lists the current print engine configuration.

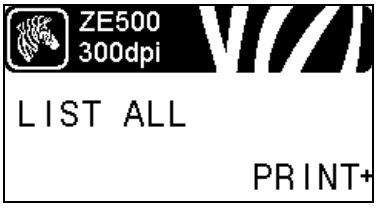
See *Print Information* *on page 78* for more information.



Print Network Configuration Label

This option prints a network configuration label (see Figure 12 on page 83), which lists the settings for any print server that is installed.

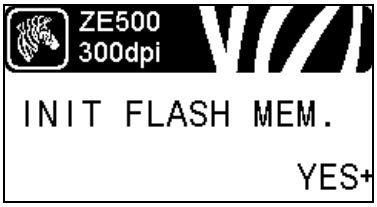
See *Print Information* *on page 78* for more information.



Print All Labels

This option prints labels that list the available fonts, bar codes, images, formats, and the current print engine and network configurations.

See *Print Information* *on page 78* for more information.



Initialize Flash Memory

This option erases all previously stored information from Flash memory.

1. If prompted for a password, enter the printer password. For instructions, see *Changing Password-Protected Parameters* *on page 16*.

The display shows INITIALIZE FLASH?

2. Press PLUS (+) to select YES**.**

The display shows ARE YOU SURE?.

3. Do you want to continue?

- Press **MINUS (-)** to select NO to cancel the request and return to the INITIALIZE FLASH prompt.
- Press **PLUS (+)** to select YES and begin initialization. When initialization is complete, the control panel displays INITIALIZING COMPLETED.

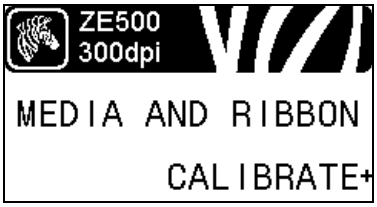
Note • Initializing memory can take several minutes.

See *Initialize Flash Memory* *on page 78* for more information.

Print a Sensor Profile

Use this menu item to print a sensor profile.

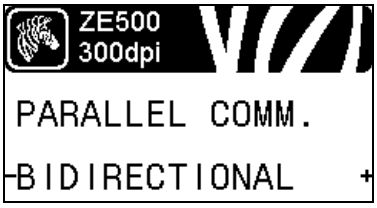
See *Print a Sensor Profile* *on page 78* for more information.



Calibrate the Media and Ribbon Sensors

Use this menu item to adjust the sensitivity of the media and ribbon sensors.

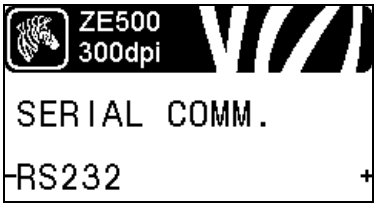
See *Media and Ribbon Sensor Calibration* *on page 81* for more information. For instructions on how to perform a calibration procedure, see *Calibrate the Ribbon and Media Sensors* *on page 94*.



Set Parallel Communications

Select the communications port that matches the one being used by the host computer.

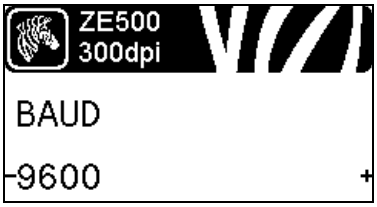
See *Parallel Communications* *on page 91* for more information.



Set Serial Communications

Select the communications port that matches the one being used by the host computer.

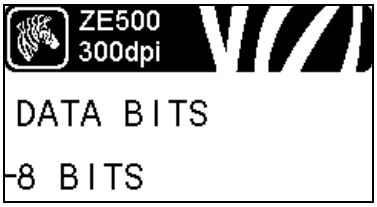
See *Parallel Communications* *on page 91* for more information.



Set the Baud Rate

Select the baud value that matches the one being used by the host computer.

See *Baud Rate* *on page 92* for more information.



Set the Data Bits Value

Select the data bits value that matches the one being used by the host computer.

See *Data Bits* *on page 92* for more information.

Set the Parity Value

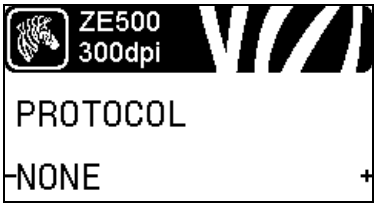
Select the parity value that matches the one being used by the host computer.

See *Parity* *on page 92* for more information.

Set the Host Handshake Protocol Value

Select the handshake protocol that matches the one being used by the host computer.

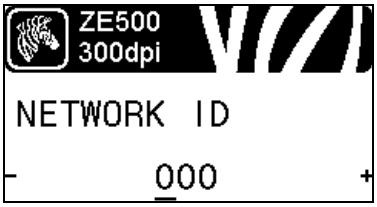
See *Host Handshake* *on page 93* for more information.



Set the Zebra Protocol Value

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.

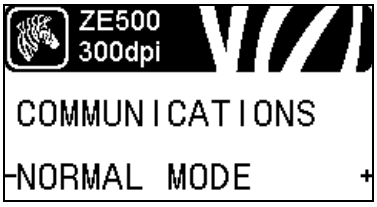
See *Protocol* *on page 93* for more information.



Set the Network ID

This parameter assigns a unique number to the print engine when the print engine is operating in an RS422/485 multi-drop network environment (an external RS422/485 adapter is required). This gives the host computer the means to address a specific print engine. This does not affect TCP/IP or IPX networks. Set a unique network ID number for this print engine.

See *Network ID* *on page 93* for more information.



Enable Communication Diagnostics Mode

Use this diagnostics tool to cause the printer to output the hexadecimal values for all data received by the printer.

See *Communication Diagnostics Mode* *on page 81* for more information.

Set the Control Character Value

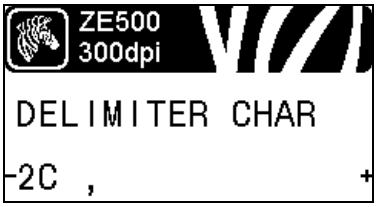
Set the control prefix character to match what is used in your label formats.

See *Control Character* *on page 88* for more information.

Set the Format Command Prefix Value

Set the format command prefix character to match what is used in your label formats.

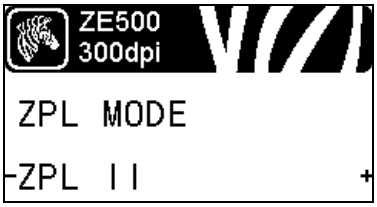
See *Command Character* *on page 89* for more information.



Set the Delimiter Character Value

Set the delimiter character to match what is used in your label formats.

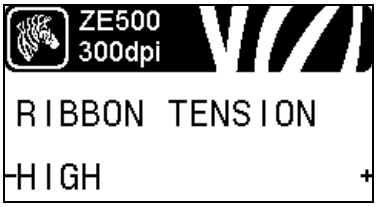
See *Delimiter Character* *on page 89* for more information.



Set the ZPL Mode

Select the ZPL mode that matches what is used in your label formats.

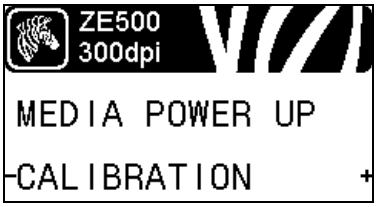
See *ZPL Mode* *on page 89* for more information.



Set the Ribbon Tension

Select the ribbon tension setting that is appropriate for the width or type of media being printed. HIGH can be used for most media. The correct setting is determined by a combination of the ribbon width and the ribbon length (Table 5). If necessary, use a lower value for narrow media or for glossy media.

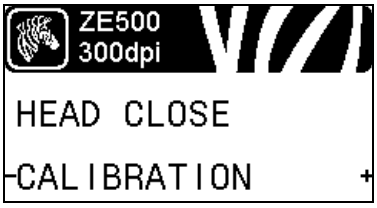
See *Ribbon Tension* *on page 73* for more information.



Set the Power-Up Action

Set the action for the printer to take during the power-up sequence.

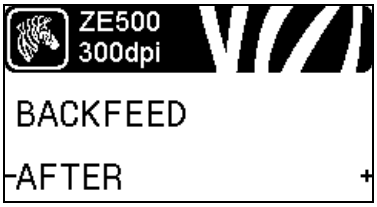
See *Power-Up Action* *on page 79* for more information.



Set the Head-Close Action

Set the action for the printer to take when you close the printhead.

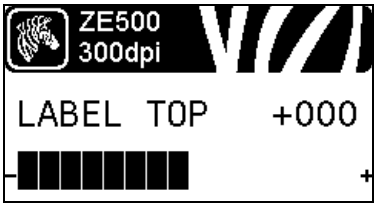
See *Head-Close Action* *on page 79* for more information.



Set the Backfeed Sequence

This parameter sets when label backfeed occurs after a label is removed in some print modes. It has no effect in Rewind mode. This setting is superseded by ~JS when received as part of a label format.

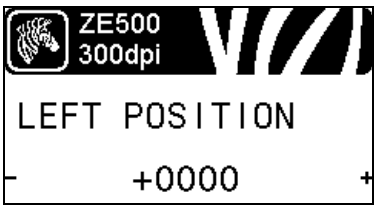
See *Backfeed Sequence* *on page 73* for more information.



Adjust the Label Top Position

This parameter adjusts the print position vertically on the label. Positive numbers adjust the label top position farther down the label (away from the printhead) by the specified number of dots. Negative numbers adjust the position up the label (toward the printhead).

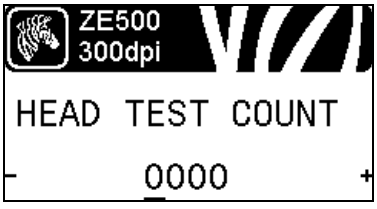
See *Label Top Position* *on page 74* for more information.



Adjust the Label Left Position

If necessary, shift the print position horizontally on the label. Positive numbers move the left edge of the image toward the center of the label by the number of dots selected, while negative numbers move the left edge of the image toward the left edge of the label.

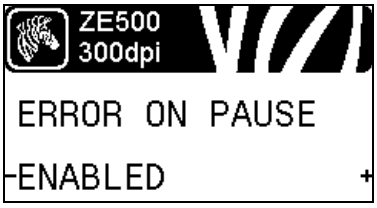
See *Label Left Position* *on page 74* for more information.



Set the Head Test Count*

The ZE500-6 print engine periodically performs a test of the printhead functionality. This parameter establishes how many labels are printed between these internal tests.

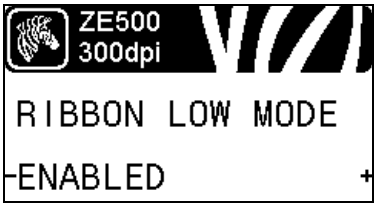
* *This menu item appears only on ZE500-6 print engines.*



Set Applicator Error Signal When Print Engine Pauses

When this option is enabled and the print engine is paused, the print engine sets the applicator error state.

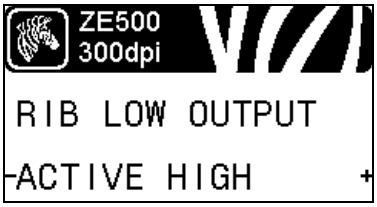
See *Error on Pause* *on page 74* for more information.



Set the Ribbon Low Mode

The Ribbon Low feature determines if the print engine will generate a warning when the amount of ribbon left on the roll gets low.

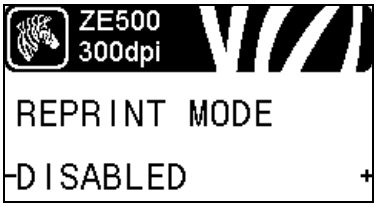
See *Ribbon Low Mode* *on page 75* for more information.



Set the Ribbon Low Output

When the Ribbon Low feature is enabled, this parameter determines if the output signal on Pin 9 is HIGH or LOW.

See *Ribbon Low Output* *on page 75* for more information.



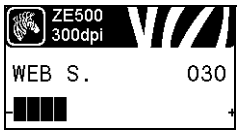
Set the Reprint Mode

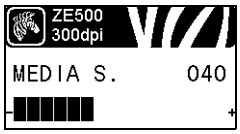
When reprint mode is enabled, you can reprint the last label printed either by issuing certain commands or by pressing the **LEFT ARROW** on the control panel.

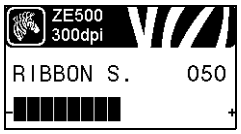
See *Reprint Mode* *on page 75* for more information.

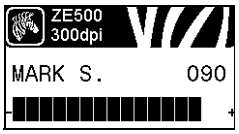
View Sensor Settings

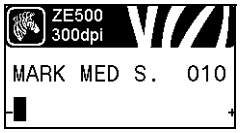
The following parameters are automatically set during the calibration procedure and should be changed only by a qualified service technician.

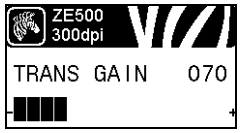


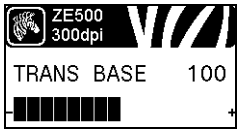


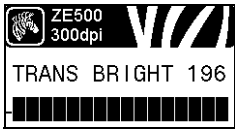


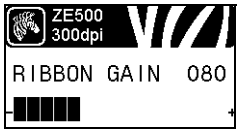


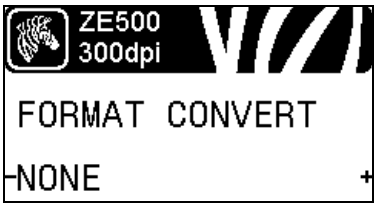








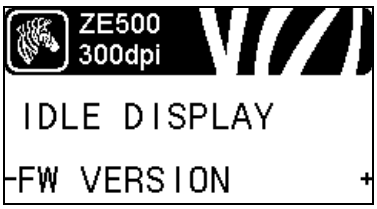




Select Format Conversion Scaling Factor

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.

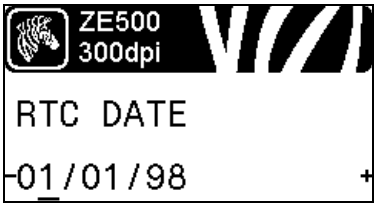
See *Format Conversion on page 81* for more information.



Select the Idle Display

Select the information shown on the printer's display when the printer is idle.

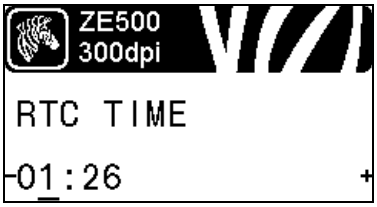
See *Idle Display on page 82* for more information.



Set the Real-Time Clock (RTC) Date

This parameter allows you to set the date to display in the Idle Display.

See *RTC Date on page 82* for more information.



Set the Real-Time Clock (RTC) Time

This parameter allows you to set the date to display in the Idle Display.

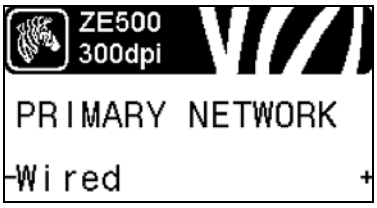
See *RTC Time on page 82* for more information.

Run the Specified ZBI Program*

- To run the ZBI program selected by the previous menu item, press **PLUS (+)**.
- If you did not replace the ribbon, press **MINUS (-)** to select CANCEL, or press the **LEFT ARROW** or **RIGHT ARROW** to move to another parameter.

See *Run a ZBI Program on page 82* for more information.

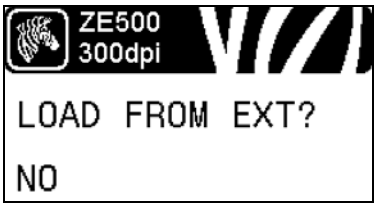
* *This menu item appears only if ZBI is enabled on your printer and no ZBI program is running.*



Select the Primary Network Device

This parameter determines which device should be considered primary in the active device selection.

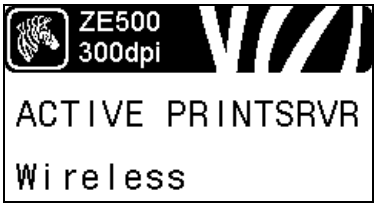
See *Primary Network on page 83* for more information.



View if IP Settings Are Loaded from the Printer or Print Server

This parameter tells whether to use the print engine's or the print server's LAN/WLAN settings at power-up. The default is to use the print engine's settings.

See *Load from External Device on page 84* for more information.



View the Active Print Server*

This menu item displays which print server is being used. This tells which device's settings such as IP protocol and IP address are being displayed under those menu items.

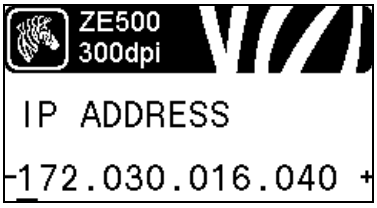
* *This menu item, which cannot be modified from the control panel, appears only if a wired or wireless print server is installed in your printer.*

Set the IP Resolution Method*

This parameter tells if the user (permanent) or the server (dynamic) selects the IP address. If a dynamic option is chosen, this parameter tells the method(s) by which the wired or wireless print server receives the IP address from the server.

See *IP Protocol* *on page 85* for more information.

* *This menu item appears only if a wired or wireless print server is installed in your printer.*



Set the Printer's IP Address*

View and, if necessary, change the printer's IP address.

Changes are saved only if IP PROTOCOL is set to PERMANENT. To allow any saved changes to take effect, use *RESET NETWORK* on page 33 to reset the print server.

See *IP Address* *on page 85* for more information.

* *This menu item appears only if a wired or wireless print server is installed in your printer.*

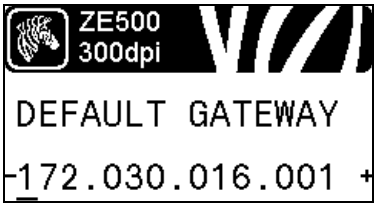
Set the Subnet Mask*

View and, if necessary, change the subnet mask.

Changes are saved only if IP PROTOCOL is set to PERMANENT. To allow any saved changes to take effect, use *RESET NETWORK* on page 33 to reset the print server.

See *Subnet Mask* *on page 86* for more information.

* *This menu item appears only if a wired or wireless print server is installed in your printer.*



Set the Default Gateway*

View and, if necessary, change the default gateway.

Changes are saved only if IP PROTOCOL is set to PERMANENT. To allow any saved changes to take effect, use *RESET NETWORK* on page 33 to reset the print server.

See *Default Gateway* *on page 86* for more information.

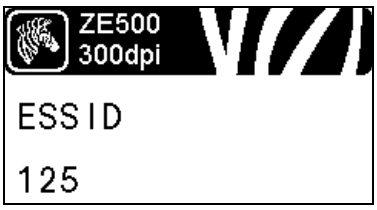
* *This menu item appears only if a wired or wireless print server is installed in your printer.*

View the MAC Address*

View the Media Access Control (MAC) address of the print server that is installed in the printer (wired or wireless).

See *MAC Address* *on page 86* for more information.

* *This menu item, which cannot be modified from the control panel, appears only if a wired or wireless print server is installed in your printer.*



View the ESSID Value*

The Extended Service Set Identification (ESSID) is an identifier for your wireless network. This setting, which cannot be modified from the control panel, gives the ESSID for the current wireless configuration.

See *ESSID* *on page 87* for more information.

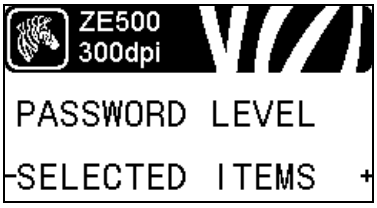
* *This menu item, which cannot be modified from the control panel, appears only if a wireless print server is installed in your printer.*

Reset the Network Settings*

This option resets the wired or wireless print server. You must reset the print server to allow any changes to the network settings to take effect.

See *Reset Network* *on page 87* for more information.

* *This menu item appears only if a wired or wireless print server is installed in your printer.*



Specify the Password Level

This option resets the wired or wireless print server. You must reset the print server to allow any changes to the network settings to take effect.

See *Password Level on page 82* for more information.

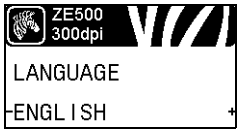
* *This menu item appears only if a wired or wireless print server is installed in your printer.*

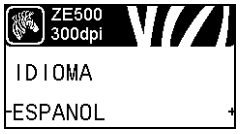
Select the Display Language

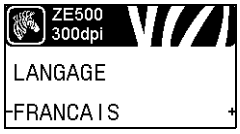
If necessary, change the language that the printer displays.

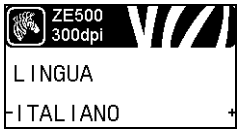
See *Language on page 88* for more information.

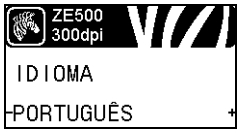
Note • The selections for this parameter are displayed in the actual languages to make it easier for you to find one that you are able to read.

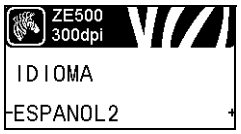


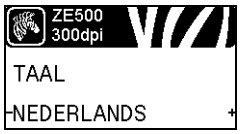


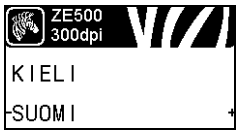


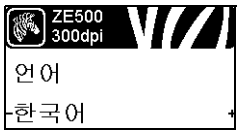


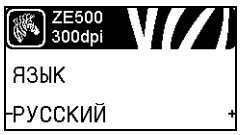


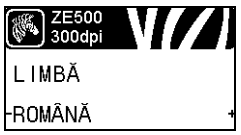










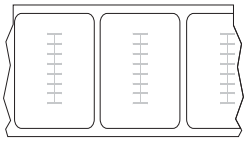


Types of Media

Important • Zebra strongly recommends the use of Zebra Certified supplies for continuous high-quality printing. A wide range of paper, polypropylene, polyester, and vinyl stock has been specifically engineered to enhance the printing capabilities of the print engine and to prevent premature printhead wear. To order Zebra Certified ribbon or media, visit http://www.zebra.com/supplies.

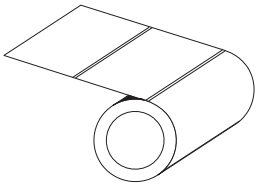
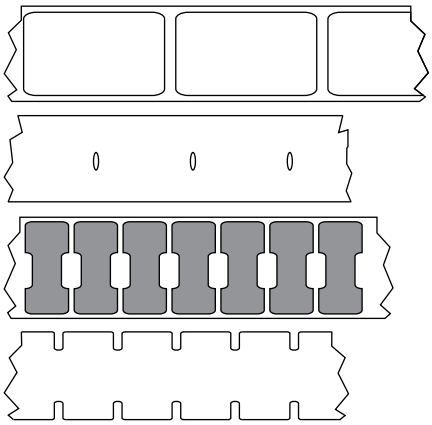
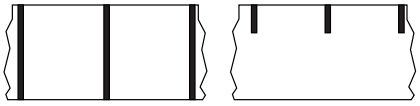
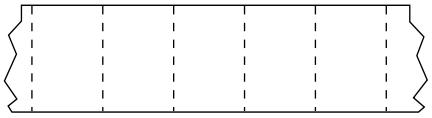
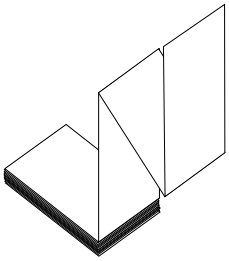
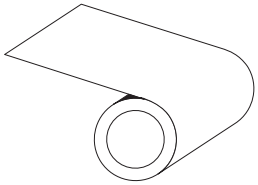
Your print engine can use various types of media:

- *Standard media*—Most standard media uses an adhesive backing that sticks individual labels or a continuous length of labels to a liner. Standard media can come on rolls or in a fanfold stack (Table 2).
- *Tag stock*—Tags are usually made from a heavy paper. Tag stock does not have adhesive or a liner, and it is typically perforated between tags. Tag stock can come on rolls or in a fanfold stack (Table 2).
- *Radio frequency identification (RFID) "smart" media*—RFID media can be used in a printer that is equipped with an RFID reader/encoder. RFID labels are made from the same materials and adhesives as non-RFID labels. Each label has an RFID transponder (sometimes called an "inlay"), made of a chip and an antenna, embedded between the label and the liner. The shape of the transponder varies by manufacturer and is visible through the label. All "smart" labels have memory that can be read, and many have memory that can be encoded.



Important • Transponder placement within a label depends on the transponder type and the printer model. Make sure that you are using the correct "smart" media for your printer. For more information, refer to the *RFID Programming Guide 2*. A copy of the manual is available at http://www.zebra.com/manuals or on the user CD that came with your print engine. For transponder placement details, go to http://www.zebra.com/transponders.

Table 2 • Roll and Fanfold Media

Media Type	How It Looks	Description
Non-Continuous Roll Media		Roll media is wound on a 3-in. (76-mm) core. Individual labels or tags are separated by one or more of the following methods: • *Web media* separates labels by gaps, holes, or notches.  • *Black mark media* uses pre-printed black marks on the back side of the media to indicate label separations.  • *Perforated media* has perforations that allow the labels or tags to be separated from each other easily. The media may also have black marks or other separations between labels or tags. 
Non-Continuous Fanfold Media		Fanfold media is folded in a zigzag pattern. Fanfold media can have the same label separations as non-continuous roll media. The separations would fall on or near the folds.
Continuous Roll Media		Roll media is wound on a 3-in. (76-mm) core. Continuous roll media does not have gaps, holes, notches, or black marks to indicate label separations. This allows the image to be printed anywhere on the label. Sometimes a cutter is used to cut apart individual labels.

Ribbon Overview

Ribbon is a thin film that is coated on one side with wax, resin, or wax resin, which is transferred to the media during the thermal transfer process. The media determines whether you need to use ribbon and how wide the ribbon must be. To order Zebra Certified ribbon or media, visit http://www.zebra.com/supplies.

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 media scratch test, complete these steps:

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

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

Coated Side of Ribbon

Ribbon can be wound with the coated side on the inside or outside (Figure 6). 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 6 • 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 outside and **can** be used in this printer. 
Did not adhere to the label	The ribbon is coated on the inside and **cannot** be used in this print engine. To verify this, repeat the test on the other surface of the roll of ribbon. 

Ribbon Scratch Test

Perform the ribbon scratch test when labels are unavailable.

To perform a ribbon scratch test, complete these steps:

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

If the ribbon...	Then...
Left a mark on the paper	The ribbon is coated on the outside and **can** be used in this printer. 
Did not leave a mark on the paper	The ribbon is coated on the inside and **cannot** be used in this print engine. To verify this, repeat the test on the other surface of the roll of ribbon. 

2

Printer Setup and Operation

This section assists the technician with initial setup and operation of the print engine.

Contents

Handling the Print Engine

This section describes how to handle your print engine.

Unpack and Inspect the Print Engine

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

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

If you discover shipping damage upon inspection:

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

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

Store the Print Engine

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

- Temperature: –40°F to 140°F (–40° to 60°C)
- Relative humidity: 5% to 85% non-condensing

Ship the Print Engine

If you must ship the print engine:

- Turn off (**O**) the print engine, and disconnect all cables.
- Remove any media, ribbon, or loose objects from the print engine interior.
- Close the printhead.
- 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 dimensions and clearance needs.

Requirements

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

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

- Temperature: 32° to 105°F (0° to 41°C)
- Relative humidity: 20% to 95% non-condensing

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

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

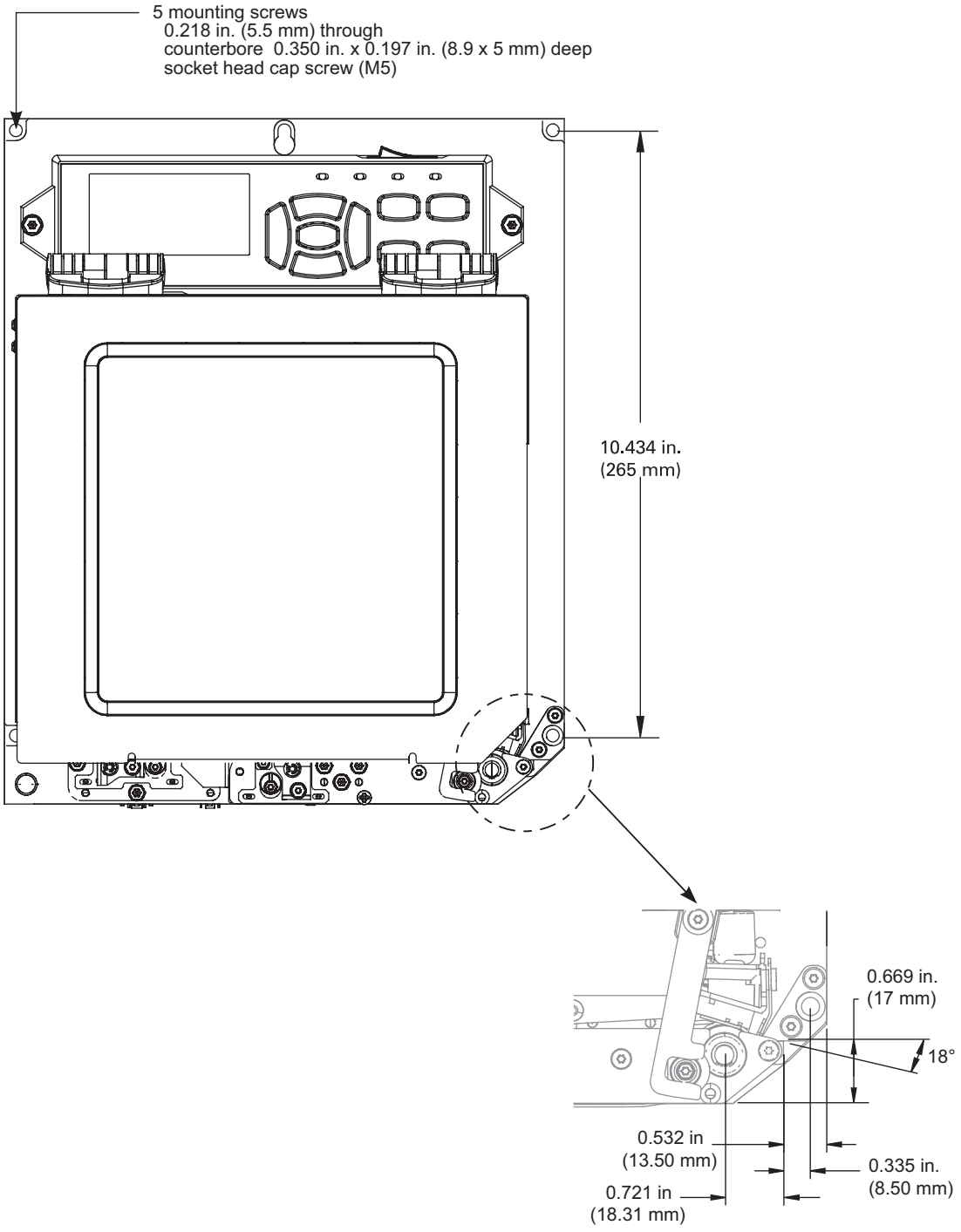
Clearance for Cables and Connectors Allow ample space at the rear of the print engine for electronic connectors and dressing of the following cables: IEC power cord, serial and/or parallel host communication cable, optional host communication cable (Ethernet), and the discrete signal (applicator) interface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

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

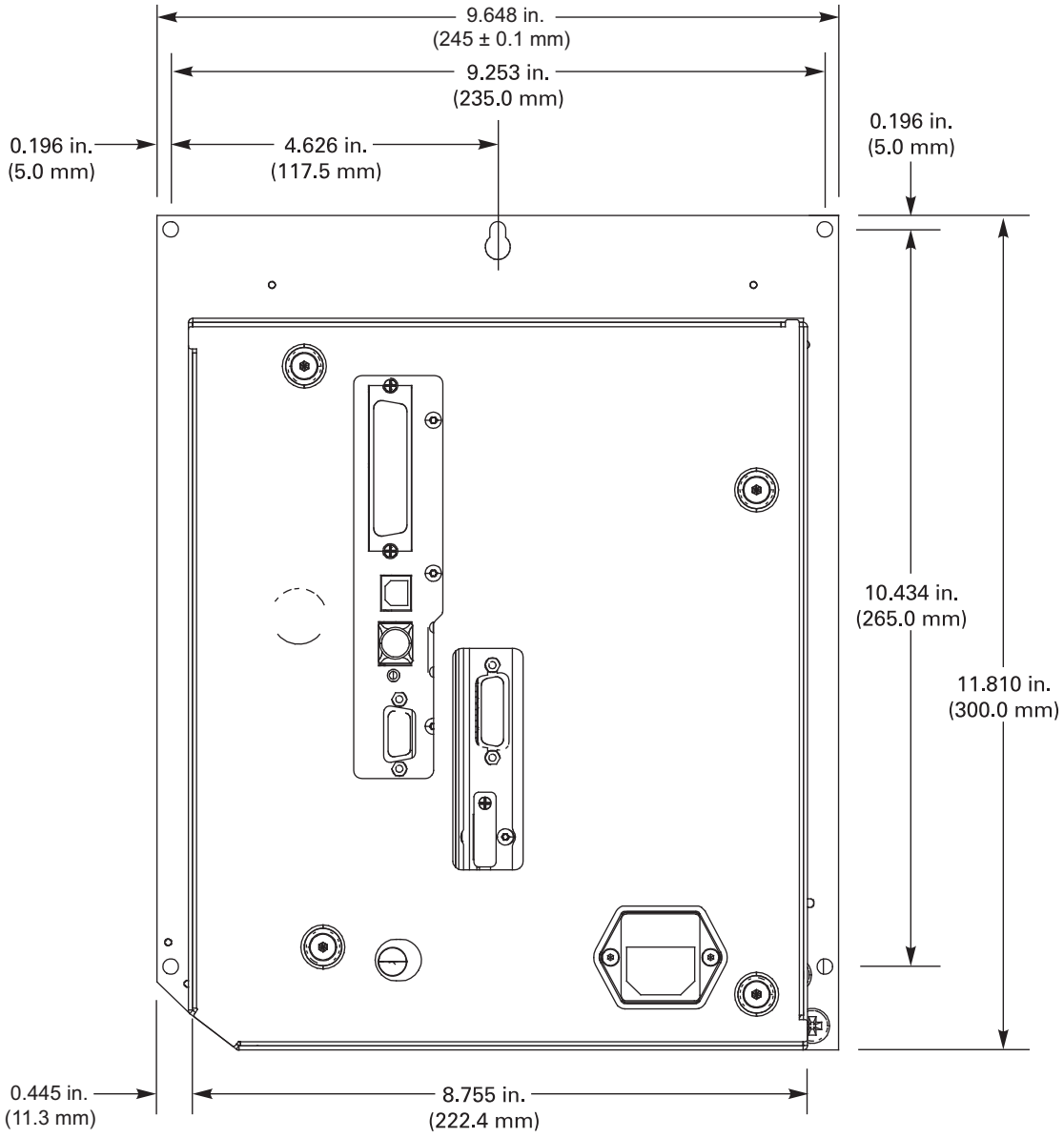
Dimensions and Clearance Needs

This section shows measurements relevant when installing the ZE500 print engine in an applicator.

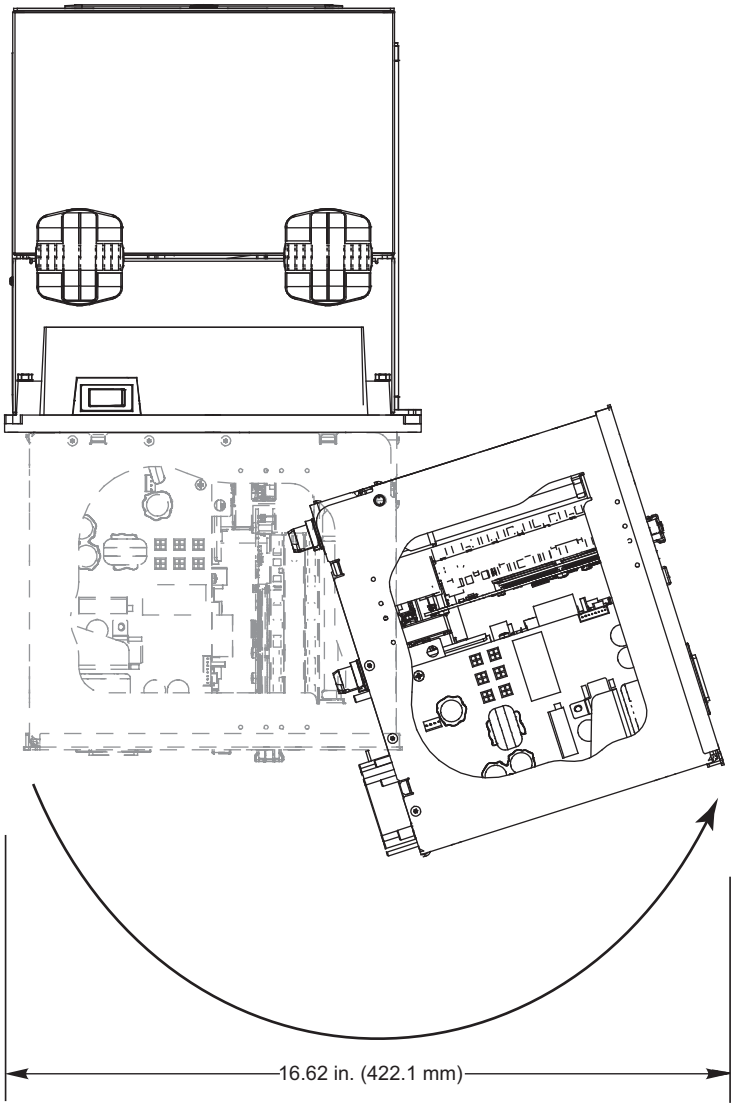
Front View (Right-Hand Print Engine Shown)



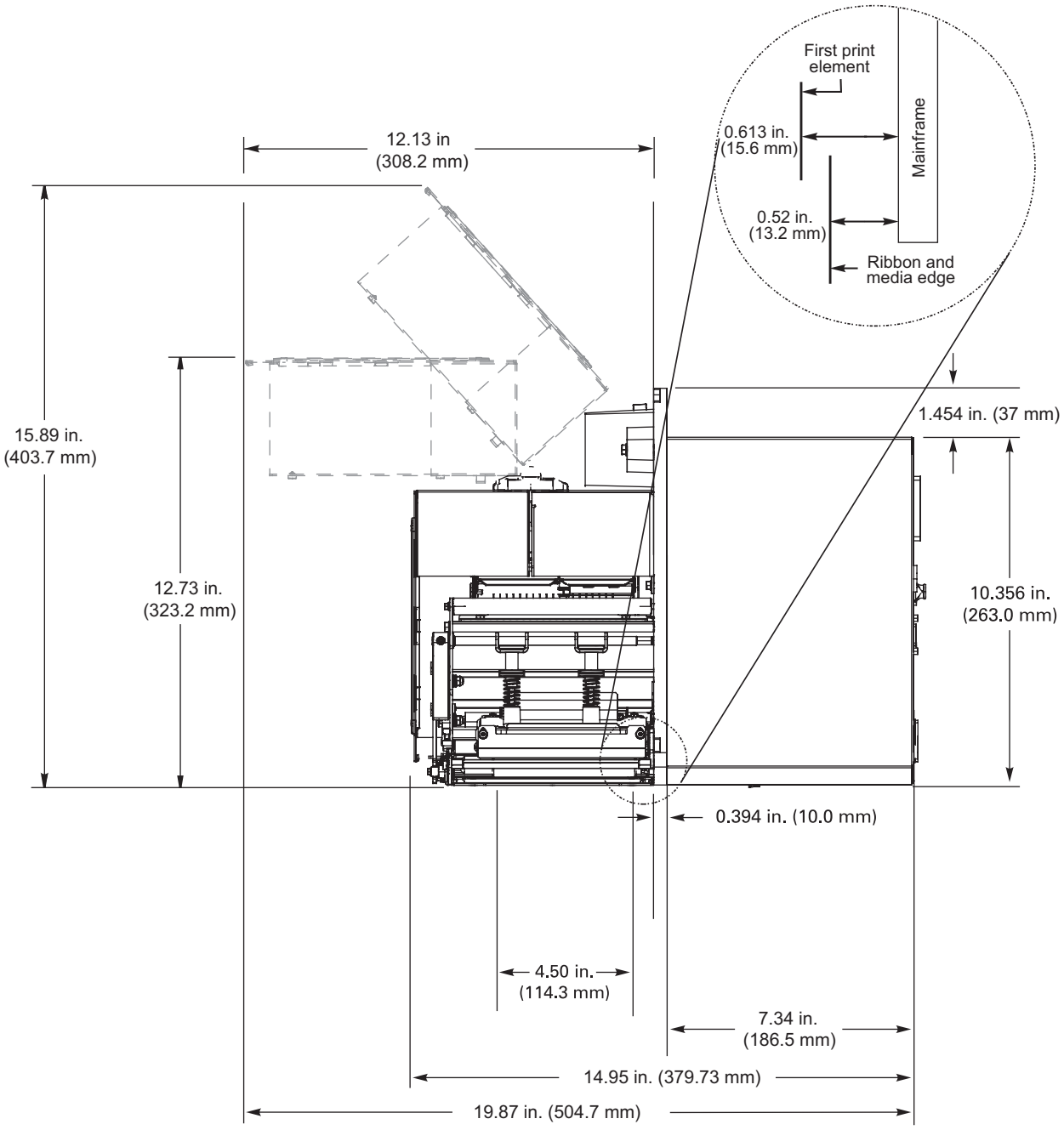
Rear View


9.648 in.
(245 ± 0.1 mm)
9.253 in.
(235.0 mm)
0.196 in.
(5.0 mm)
4.626 in.
(117.5 mm)
0.196 in.
(5.0 mm)
10.434 in.
(265.0 mm)
11.810 in.
(300.0 mm)
0.445 in.
(11.3 mm)
8.755 in.
(222.4 mm)

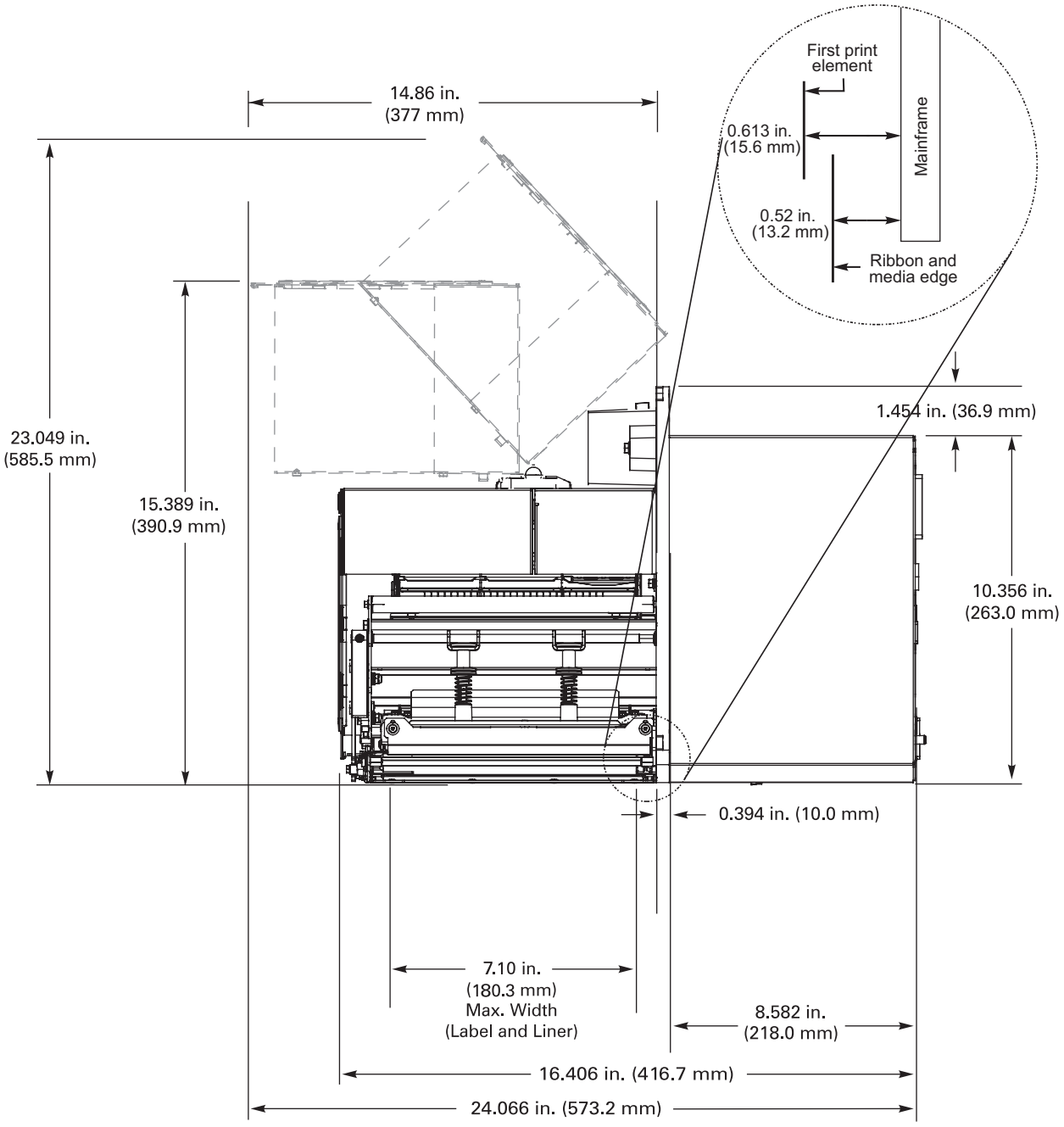
Top View



Side View—ZE500-4 Print Engine



Side View—ZE500-6 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 7 for the location of the bolt and screws.

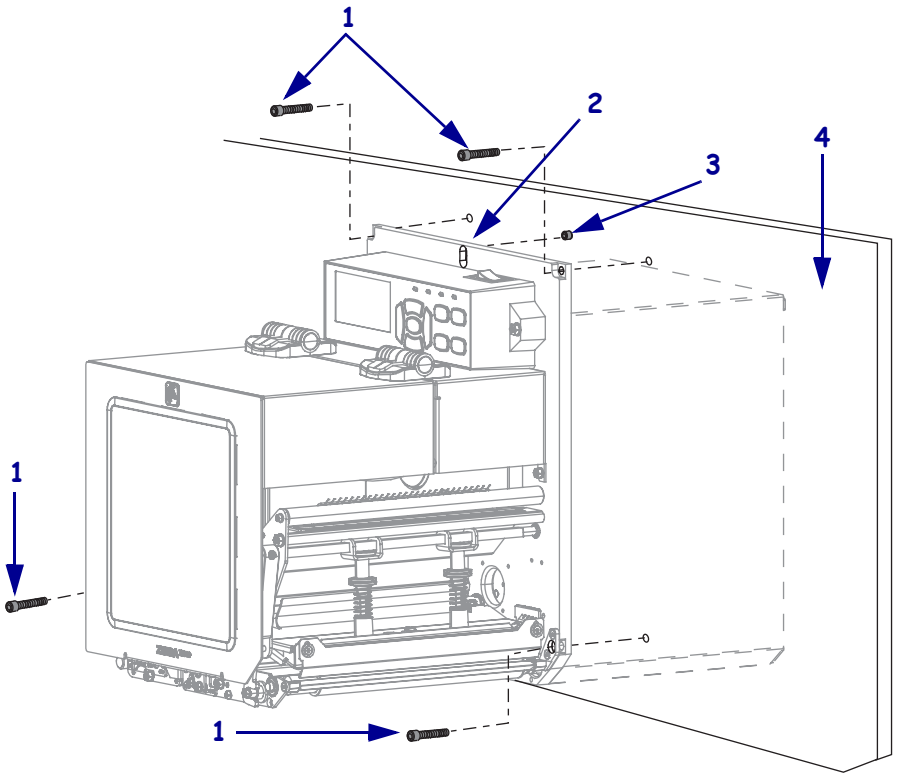
To install the print engine into an applicator, complete these steps:

1. See Figure 7. 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 7 • Front View of Print Engine in Applicator

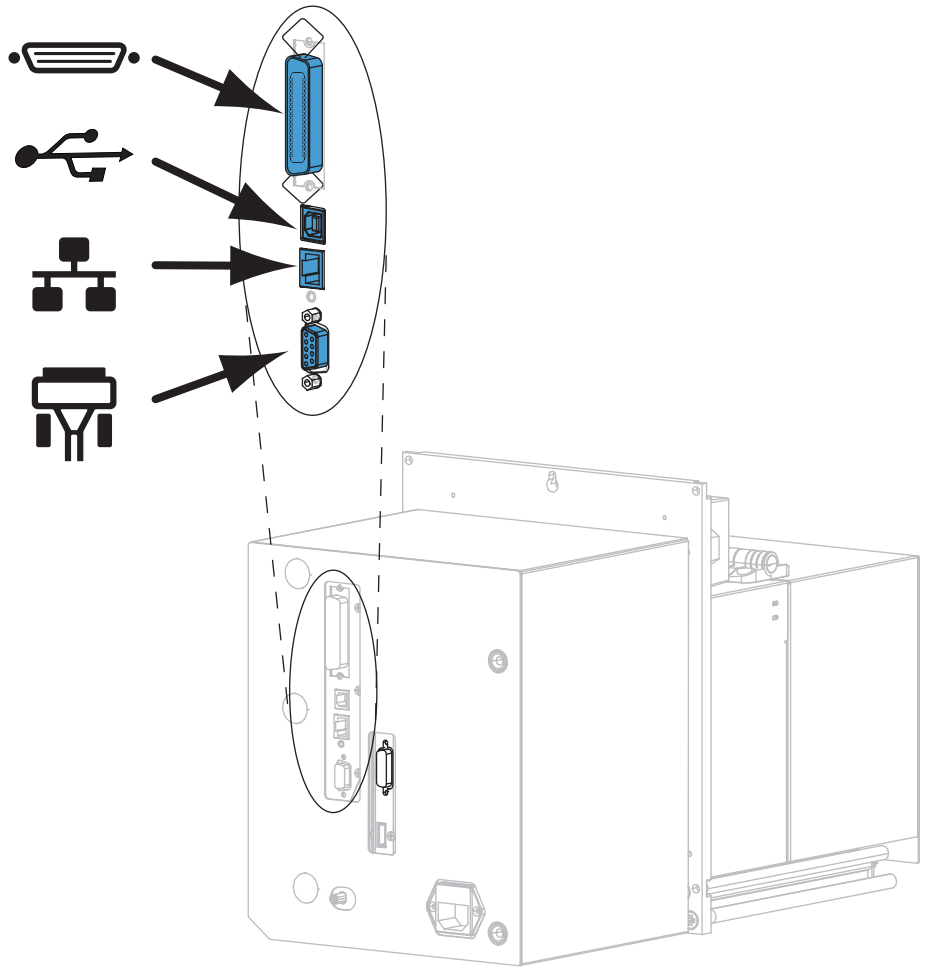


1	Mounting screws (four total)
2	Keyhole
3	Center mounting bolt (shown inside hole on applicator)
4	Applicator

Select a Data Communication Interface

You may connect your print engine to a computer using one or more of the available connections. The standard connections are shown in Figure 8. A ZebraNet wired or wireless print server option or a parallel port may also be present on your print engine.

Figure 8 • Communication Interfaces



	parallel port
	USB 2.0 port
	wired Ethernet port
	serial port

Table 3 on page 49 provides basic information about data communication interfaces that you can use to connect your print engine to a computer. You may send label formats to the print engine through any data communication interface that is available. Select an interface that is supported by both your print engine and your computer or your Local Area Network (LAN).

Caution • Ensure that the print engine power is off (**O**) before connecting data communications cables. Connecting a data communications cable while the power is on (**I**) may damage the print engine.

Table 3 • Data Communication Interfaces

Interface	Standard or Option	Description
RS-232 Serial	Standard	**Limitations and Requirements** • Maximum cable length of 50 ft (15.24 m). • You may need to change print engine parameters to match the host computer. • You need to use a null-modem adaptor to connect to the print engine if using a standard modem cable.
		Connections and Configuration The baud rate, number of data and stop bits, the parity, and the XON/XOFF or DTR control must match those of the host computer.
USB	Standard	**Limitations and Requirements** • Maximum cable length of 16.4 ft (5 m). • No print engine parameter changes required to match the host computer.
		Connections and Configuration No additional configuration is necessary.
8-bit Parallel data interface	Standard	**Limitations and Requirements** • Maximum cable length of 10 ft (3 m). • Recommended cable length of 6 ft (1.83 m). • No print engine parameter changes required to match the host computer. • A wired or wireless print server (if installed) takes up this port on the print engine.
		Connections and Configuration No additional configuration is necessary.

Table 3 • Data Communication Interfaces (Continued)

Interface	Standard or Option	Description
Wired Ethernet print server	Option	**Limitations and Requirements** • Can print to the print engine from any computer on your LAN. • Can communicate with the printer through the print engine's web pages. • The printer must be configured to use your LAN. • A parallel connection or a wireless print server (if installed) takes up this port on the print engine. **Caution** • Be careful not to plug a USB cable into a wired Ethernet print server connector on the print engine because doing so will damage the Ethernet connector.
		Connections and Configuration Refer to the *ZebraNet Wired and Wireless Print Servers User Guide* for configuration instructions. A copy of this manual is available at http://www.zebra.com/manuals. **Note** • To use this connection, you may need to remove a factory-installed plug that is designed to keep someone from accidentally plugging a USB connector into this port.
Wireless print server	Option	**Limitations and Requirements** • Can print to the print engine from any computer on your Wireless Local Area Network (WLAN). • Can communicate with the printer through the print engine's web pages. • The print engine must be configured to use your WLAN. • A parallel connection or a wired print server (if installed) takes up this port on the print engine.
		Configuration Refer to the *ZebraNet Wired and Wireless Print Servers User Guide* for configuration instructions. A copy of this manual is available at http://www.zebra.com/manuals.

Data Cables

You must supply all data cables for your application.

Ethernet cables do not require shielding, but all other data cables must be fully shielded and fitted with metal or metallized connector shells. Unshielded data cables may increase radiated emissions above the regulated limits.

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.

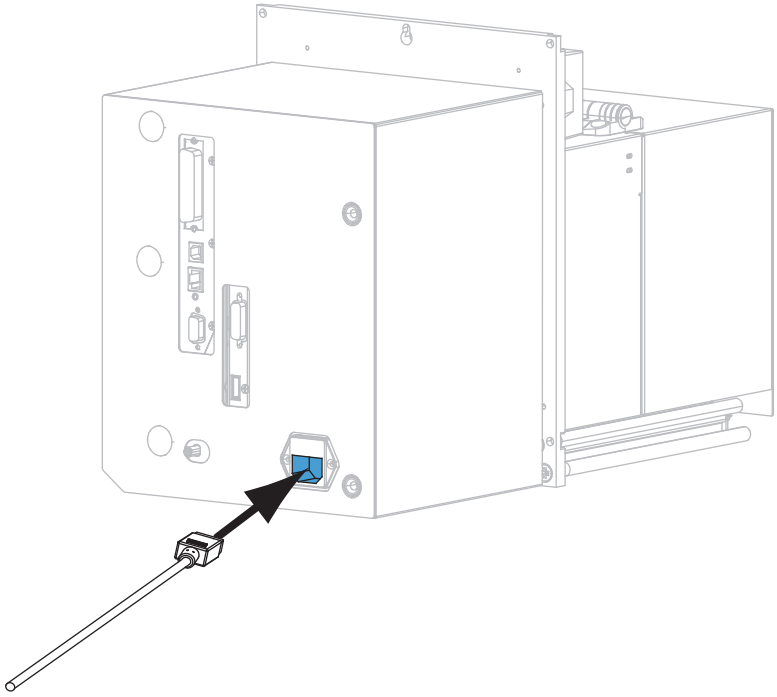
Connect the Print Engine to a Power Source

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 53.

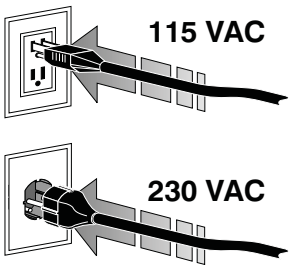
Caution • For personnel and equipment safety, always use an approved three-conductor power cord specific to the region or country intended for installation. This cord must use an IEC 320 female connector and the appropriate region-specific three-conductor grounded plug configuration.

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

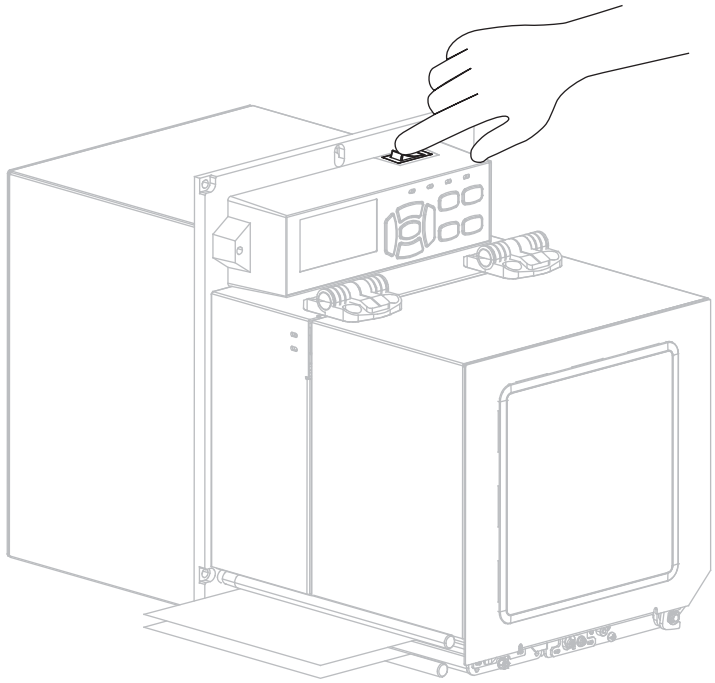
1. Plug the female end of the A/C power cord into the A/C power connector on the back of the print engine.



2. Plug the male end of the A/C power cord into an appropriate power outlet.



3. Turn on (**I**) the print engine.



The print engine boots up and performs a self-test.

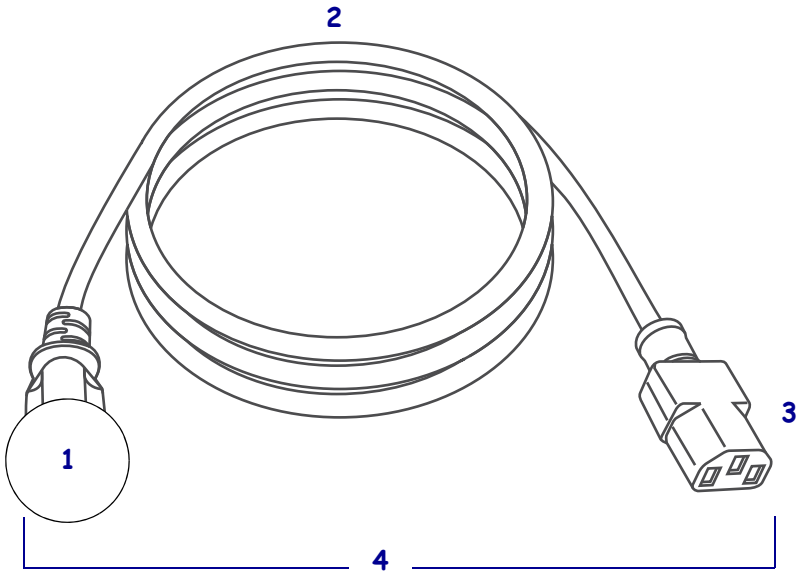
Power Cord Specifications

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

Depending on how your print engine was ordered, a power cord may or may not be included. If one is not included or if the one included is not suitable for your requirements, see Figure 9 and refer to the following guidelines:

- The overall cord length must be less than 9.8 ft. (3 m).
- The cord must be rated for a minimum of 10 A, 250 V.
- The chassis ground (earth) **must** be connected to ensure safety and reduce electromagnetic interference.

Figure 9 • Power Cord Specifications



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

Figure 10 • International Safety Organization Certification Symbols

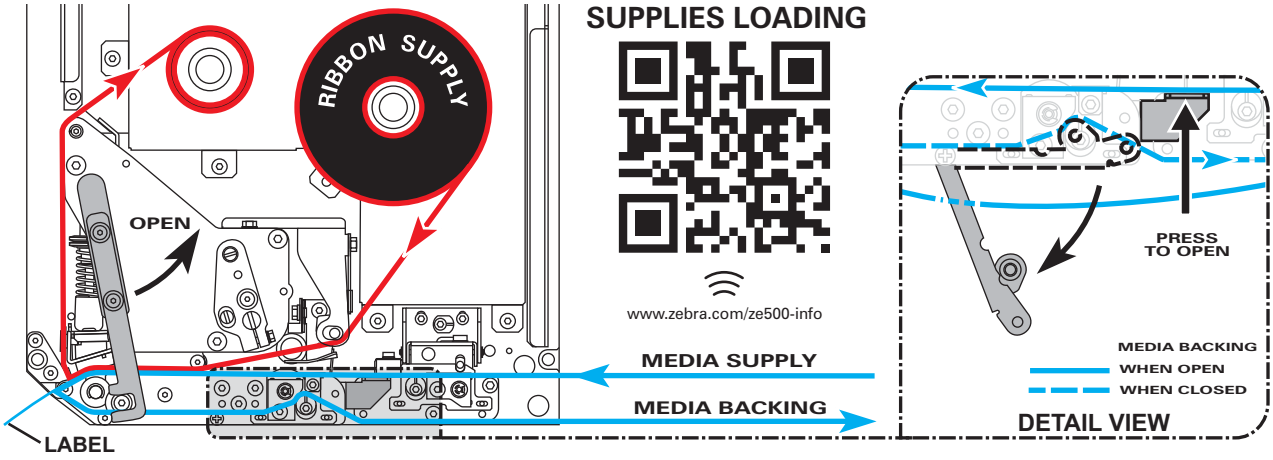
Load Ribbon and Media

Use the instructions in this section to load ribbon (if used) and media in a ZE500™ print engine (Figure 11). Ribbon is used with thermal transfer labels. For direct thermal labels, do not load ribbon in the print engine. To determine if ribbon must be used with a particular media, see *When to Use Ribbon* on page 37. To order Zebra Certified ribbon or media, visit http://www.zebra.com/supplies.

Caution • While performing any tasks near an open printhead, remove all rings, watches, hanging necklaces, identification badges, or other metallic objects that could touch the printhead. You are not required to turn off the print engine power when working near an open printhead, but Zebra recommends it as a precaution. If you turn off the power, you will lose all temporary settings, such as label formats, and you must reload them before you resume printing.

Important • Use ribbon that is wider than the media to protect the printhead from wear. Ribbon must be coated on the outside. See *Coated Side of Ribbon* on page 37 for more information.

Figure 11 • Supplies Loading Overview

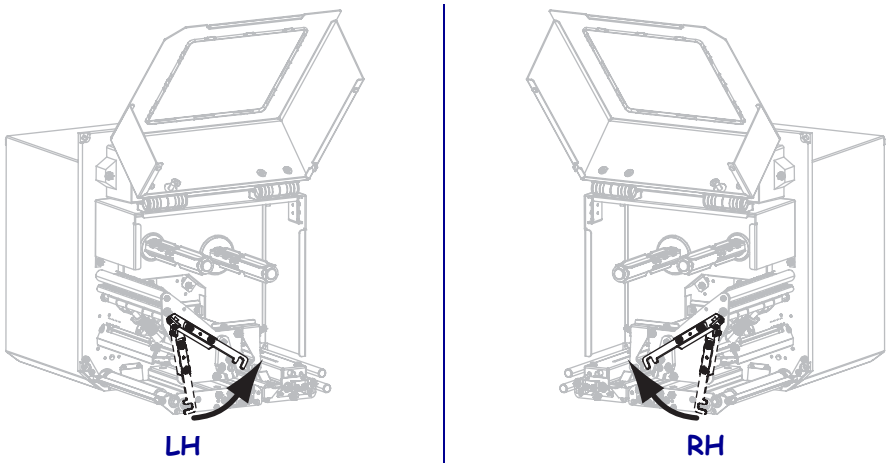


To load ribbon and media, complete these steps:

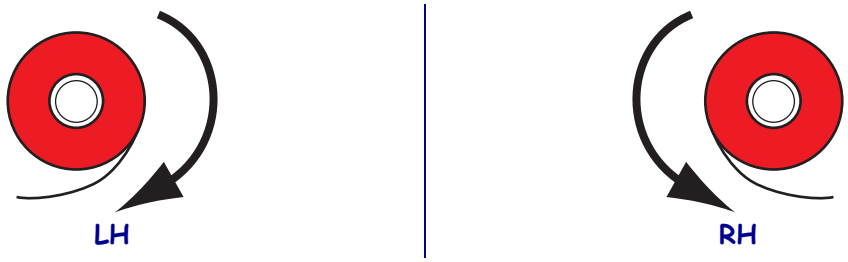
Loading Ribbon

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

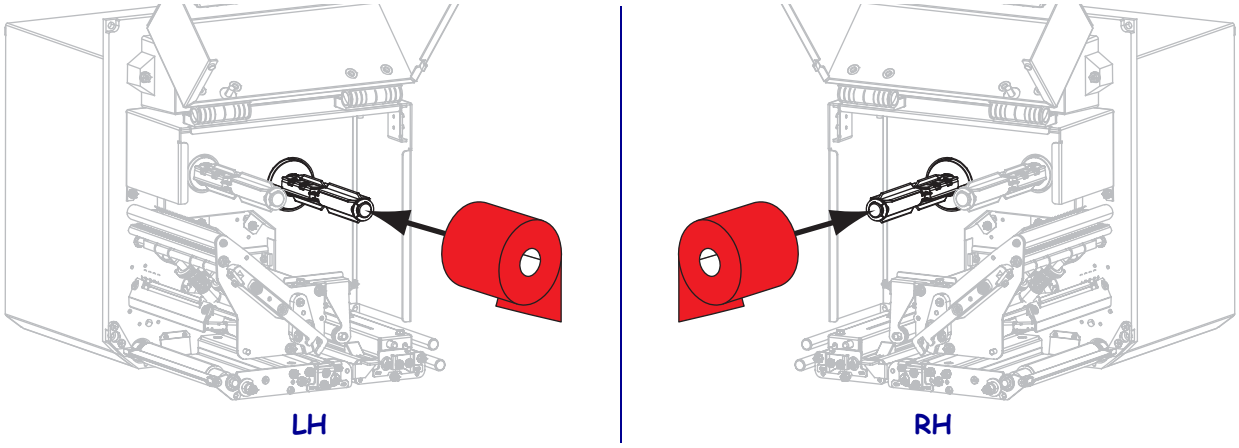
   Rotate the printhead-release latch to the open position.



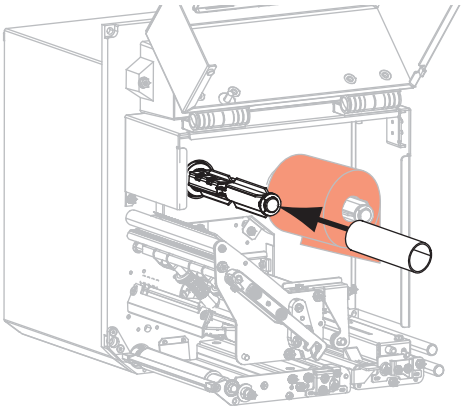
2. Position the ribbon roll with the loose end unrolling in the direction shown.



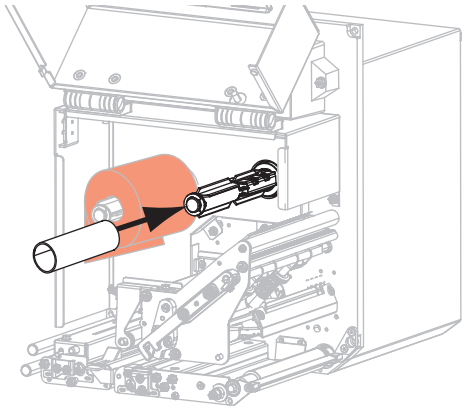
3. Place the roll of ribbon on the ribbon supply spindle. Push the roll back as far as it will go.



4. Place an empty ribbon core on the ribbon take-up spindle. Push the core back as far as it will go.



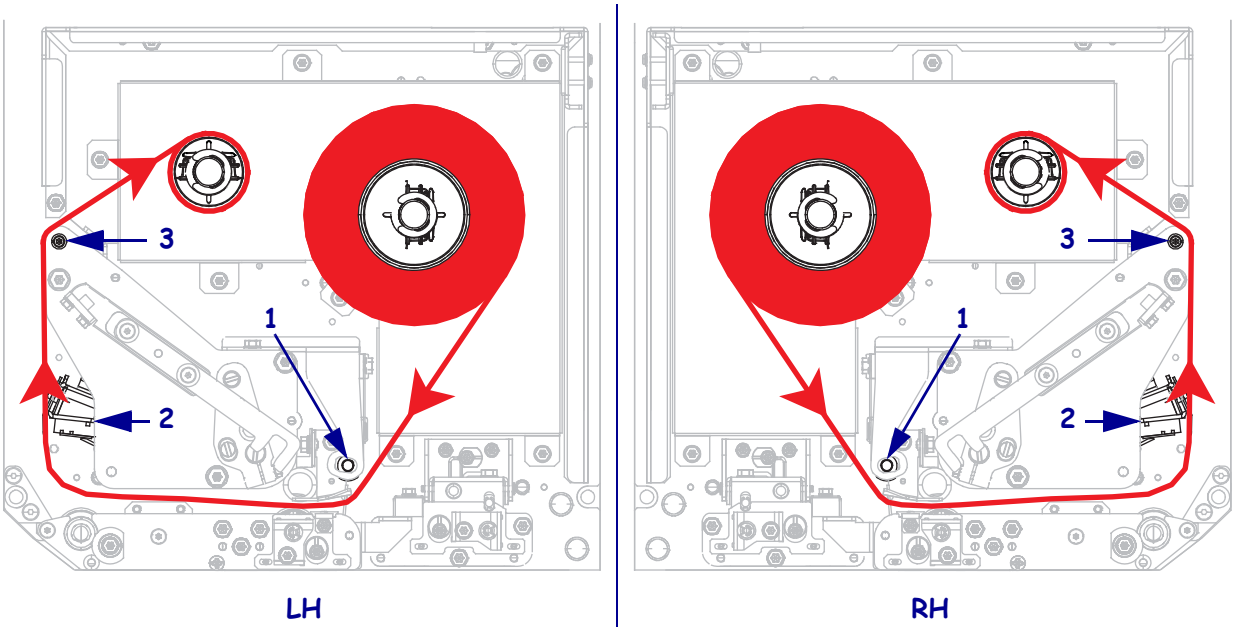
LH



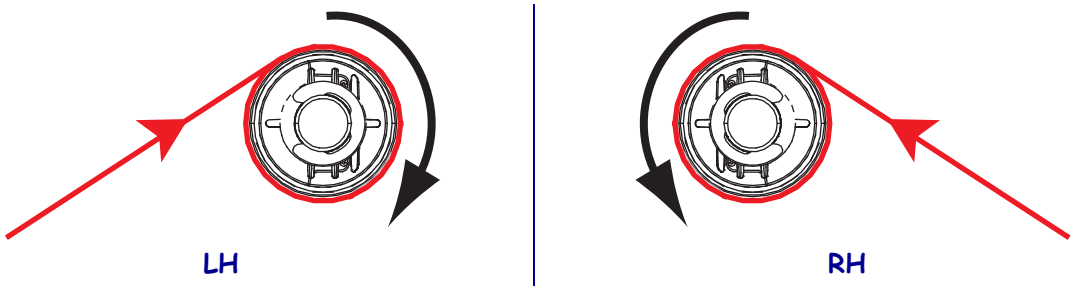
RH

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

Thread the ribbon under the lower ribbon guide roller **(1)**, under the printhead assembly **(2)**, and then over the upper ribbon guide roller **(3)**.



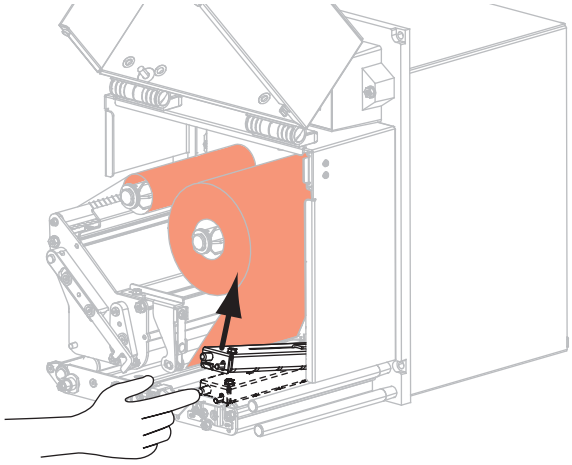
6. Wind the ribbon around the core on the ribbon take-up spindle.



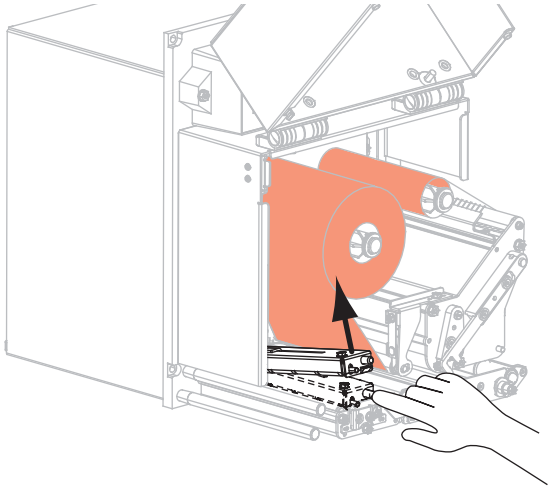
Loading Media

7. Load media on the media supply reel of the applicator (refer to the applicator's documentation for more information).

8. Press the release button on the pinch roller assembly. Allow the assembly to pivot upward.

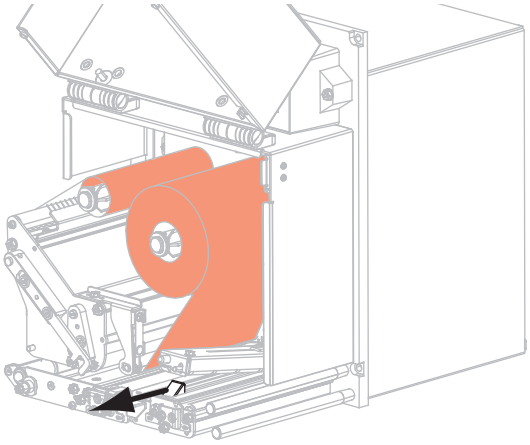


LH

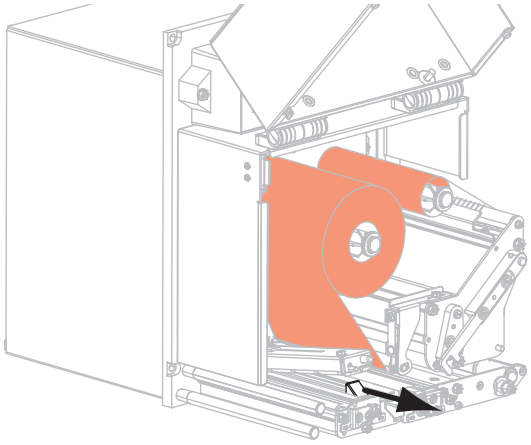


RH

9. Slide the media guide all the way out.

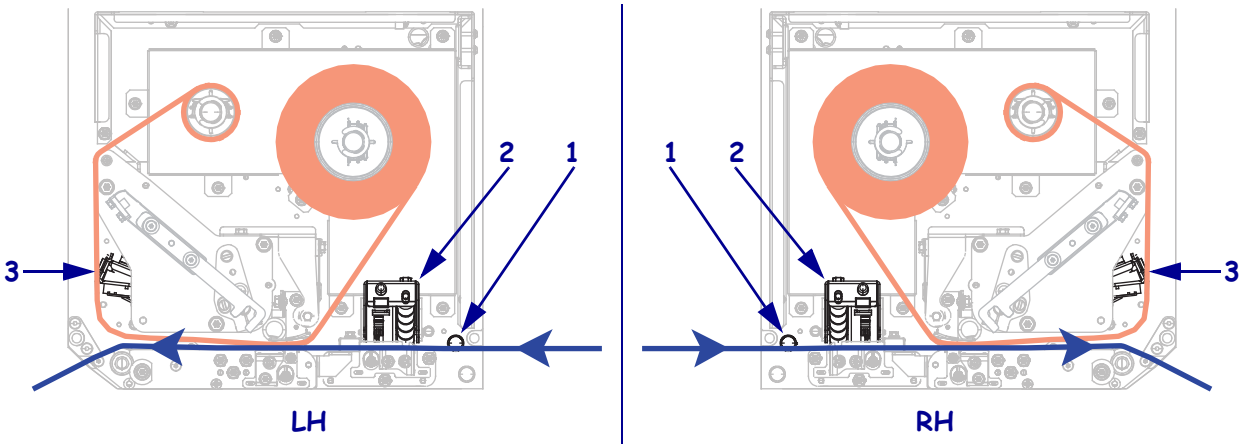


LH

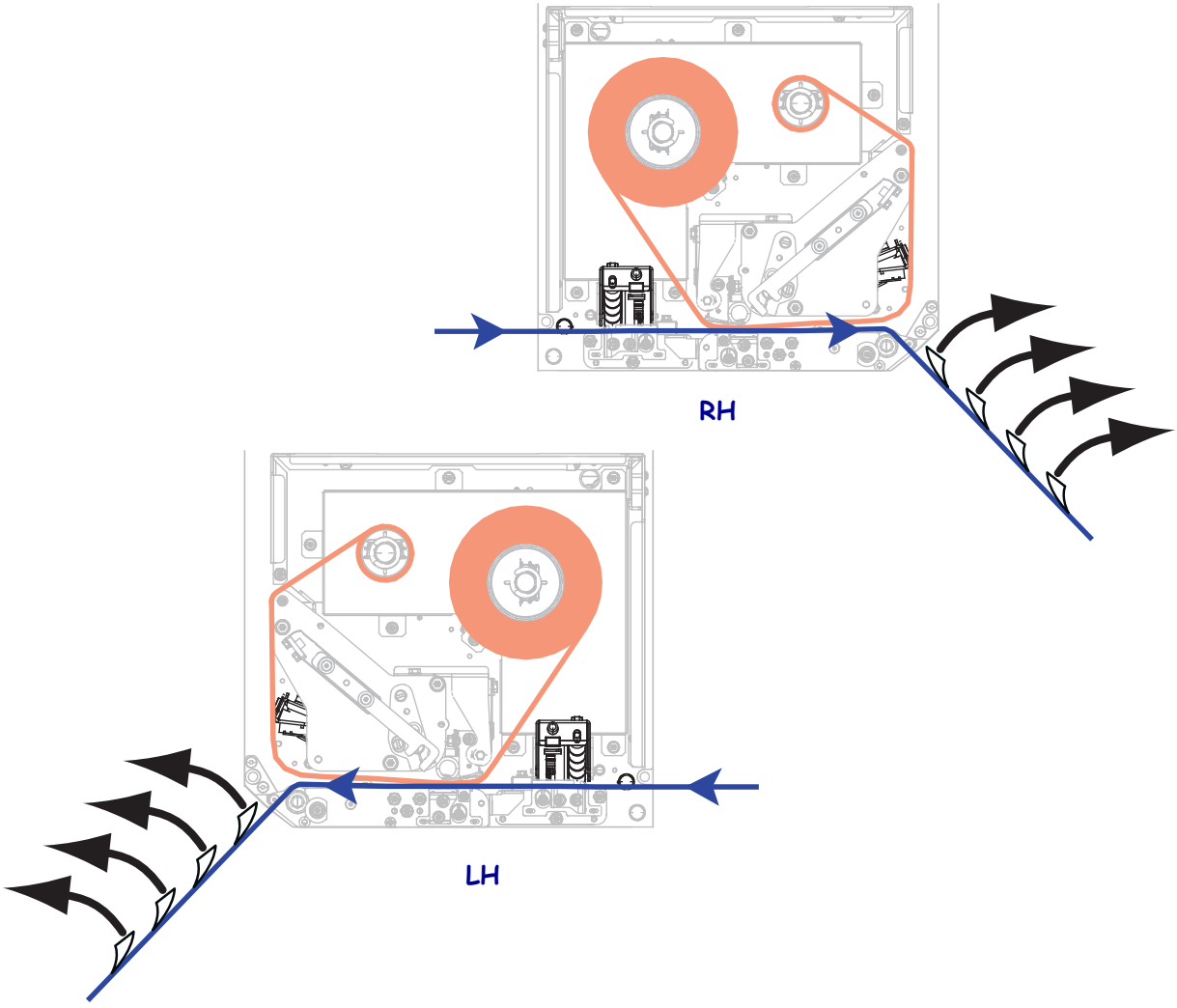


RH

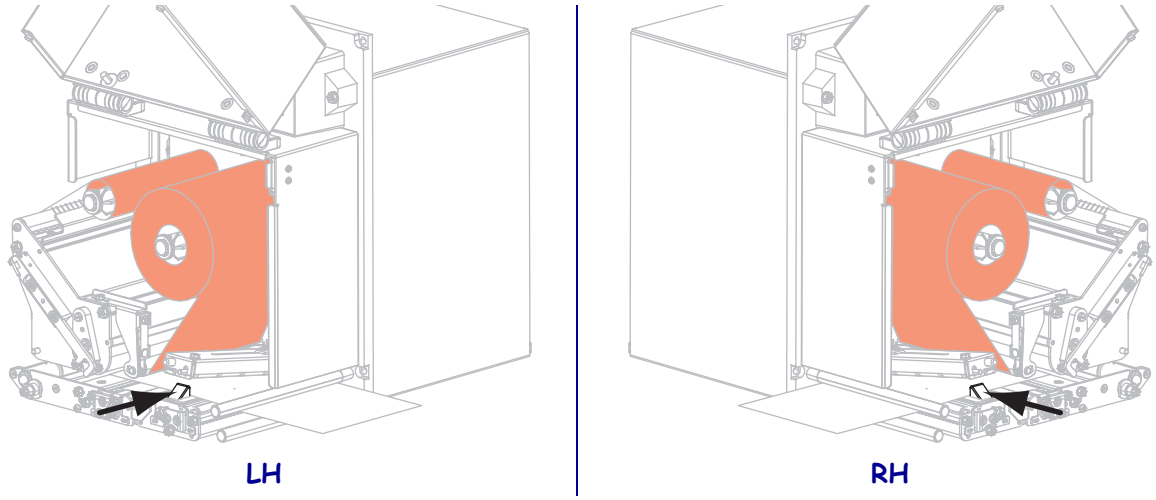
10. Thread the media under the upper guide post **(1)**, below the pinch roller assembly **(2)**, and under the printhead assembly **(3)**.



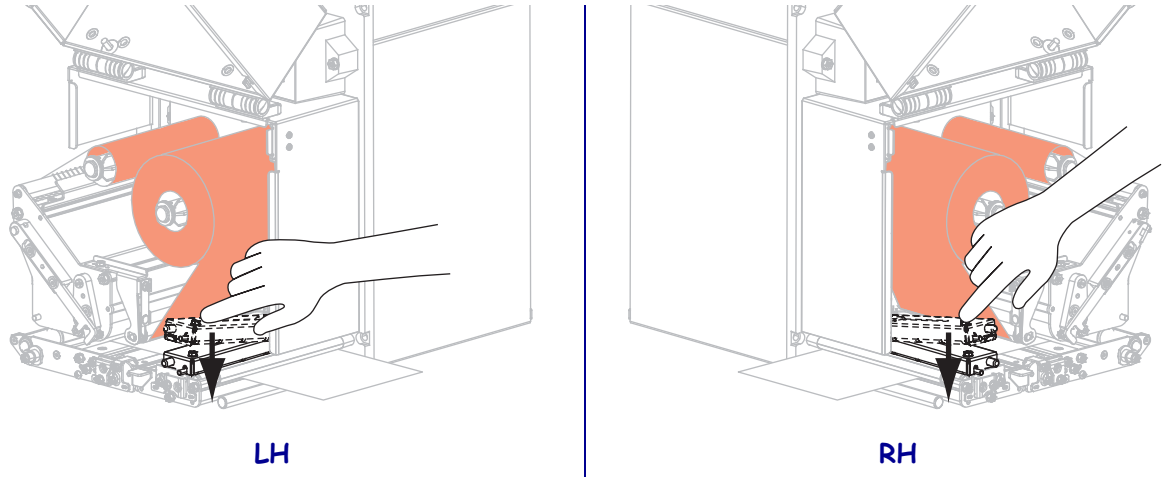
11. Extend approximately 30 in. (75 cm) of media past the peel bar. Remove and discard the labels from the liner on this exposed media.



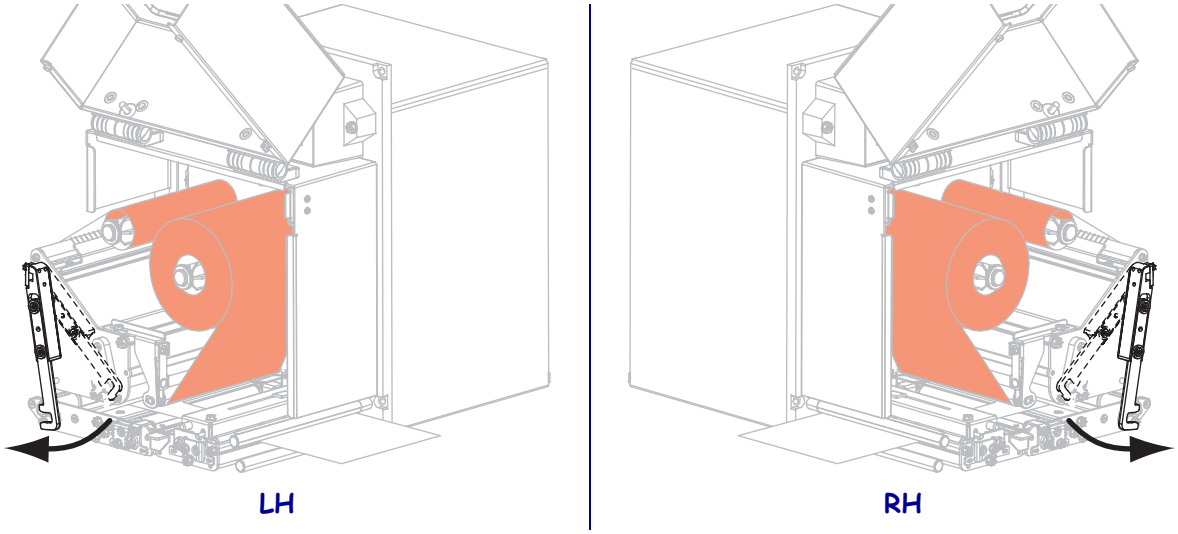
12. Slide in the media guide until it just touches the edge of the media.



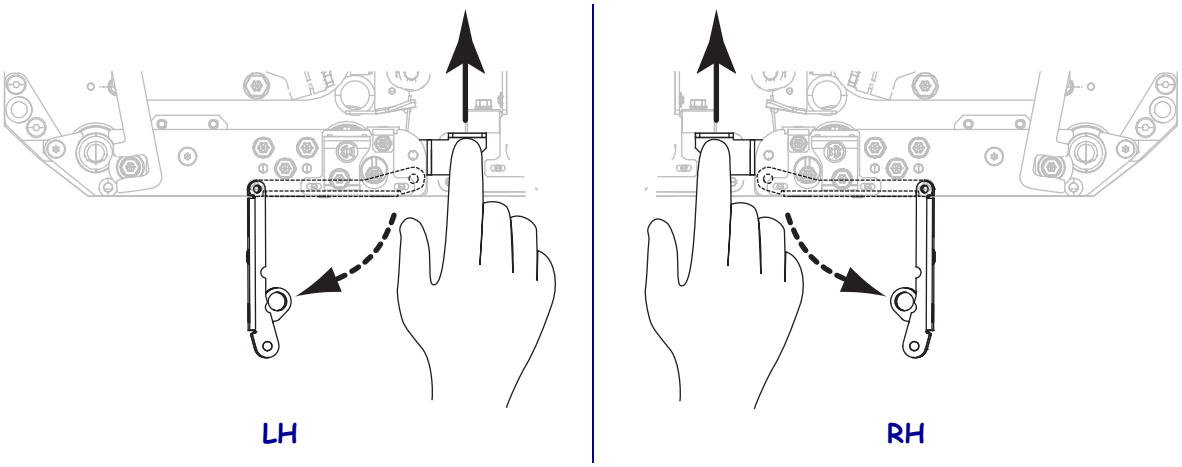
13. Press down on the pinch roller assembly until it locks closed.



14. Rotate the printhead-release latch to the closed position.

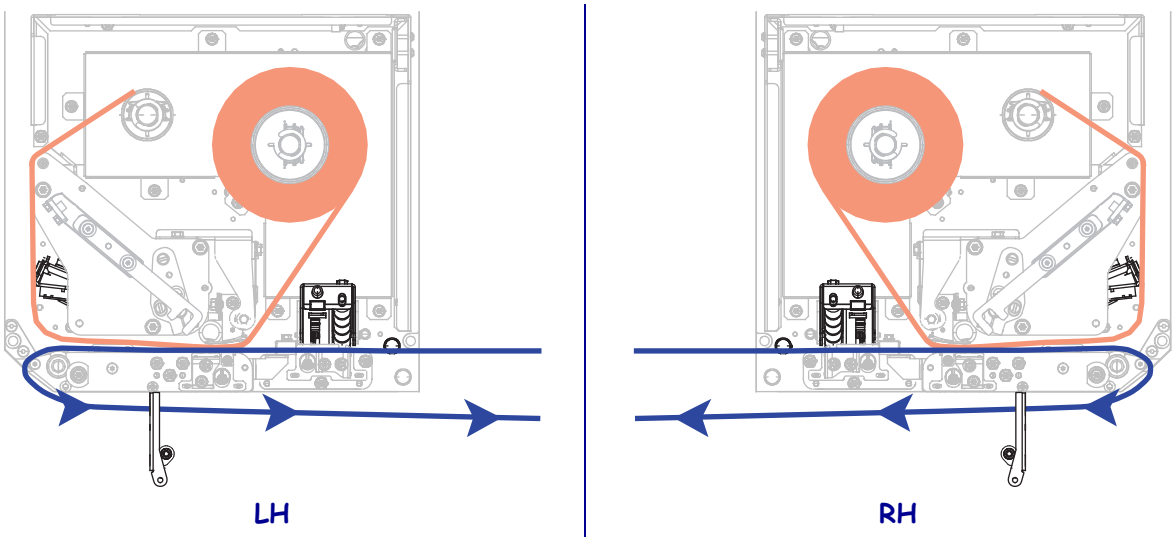


15. Raise the peel roller latch so that the peel roller assembly pivots downward.

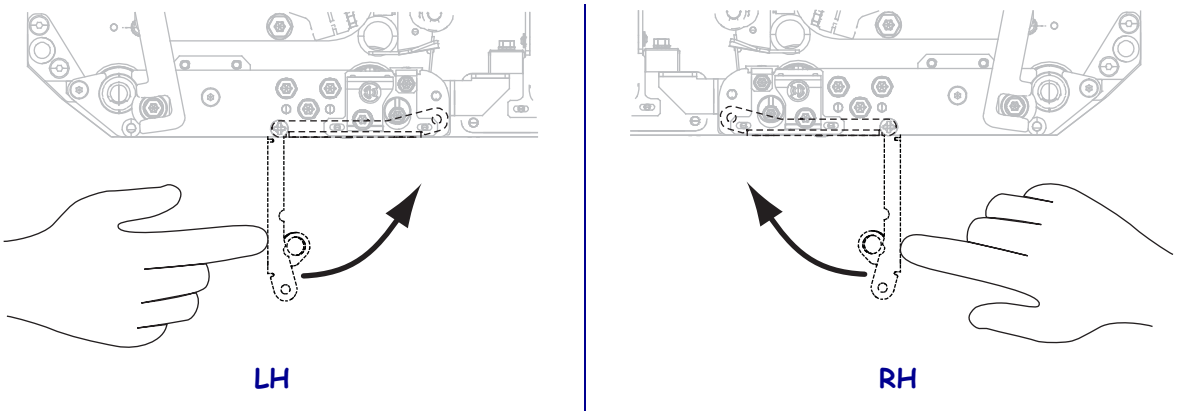


16. Thread the liner around the peel bar, under the platen roller, and through the peel roller assembly.

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

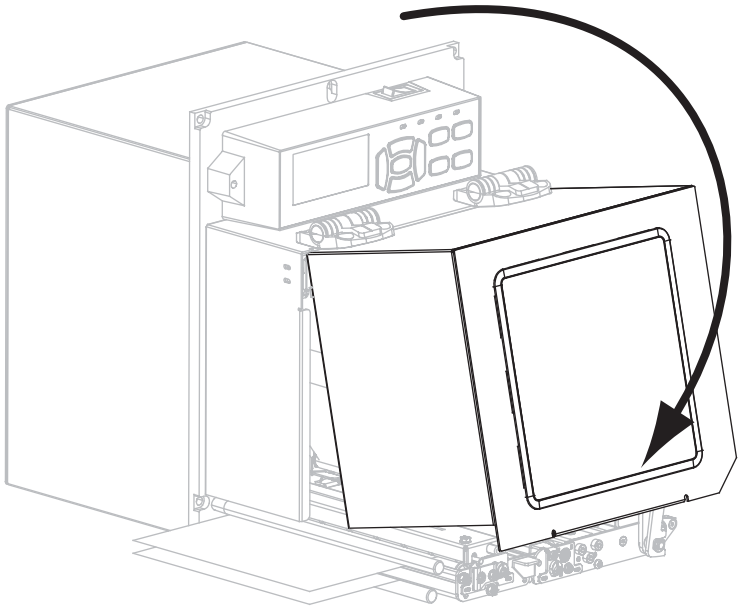


17. Rotate the peel roller assembly up until it locks into the closed position.



18. Thread the liner around the take-up spindle of the applicator (refer to the applicator's documentation for more information).

19. Close the media door.



20. If desired, perform the *CANCEL Self Test* *on page 46* to verify that your printer is able to print.

Notes •

3

Printer Configuration and Adjustment

This section assists you with configuration of and adjustments to the print engine.

Contents

Changing Printer Settings

This section presents the printer settings that you can change and identifies the tools for changing them. These tools include the following:

- ZPL and Set/Get/Do (SGD) commands (See the *Zebra® Programming Guide* for more information.)
- The printer's **control panel display** (See *Control Panel Display* on page 13 for more information.)
- The printer's **web pages** when the printer has an active wired or wireless print server connection (See the *ZebraNet Wired and Wireless Print Servers User Guide* for more information.)

This section contains the following subsections:

For information about RFID parameters, see the *RFID Programming Guide 2*.

Note • You can download the latest copy of the referenced manuals from http://www.zebra.com/manuals.

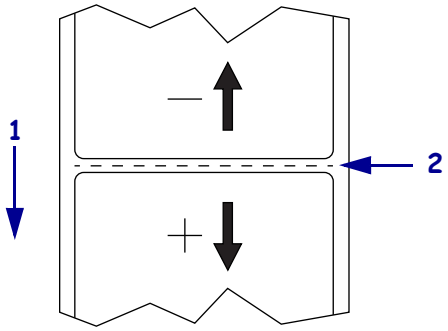
Print Settings

Table 4 • Print Settings

Print Darkness	Set the darkness to the lowest setting that provides good print quality. If you set the darkness too high, the label image may print unclearly, bar codes may not scan correctly, the ribbon may burn through, or the printhead may wear prematurely. If desired, use the *FEED Self Test* on page 130 to determine the best darkness setting.
Accepted values:	0.0 – 30.0
Related ZPL command(s):	^MD, ~SD
SGD command used:	print.tone
Control panel menu item:	DARKNESS on page 17
Printer web page:	View and Modify Printer Settings > General Setup > Darkness
Print Speed	Select the speed for printing a label (given in inches per second). Slower print speeds typically yield better print quality.
Accepted values:	• ZE500-4 203 dpi: 2–12 ips • ZE500-4 300 dpi: 2–12 ips • ZE500-6 203 dpi: 2–12 ips • ZE500-6 300 dpi: 2–10 ips
Related ZPL command(s):	^PR
SGD command used:	media.speed
Control panel menu item:	PRINT SPEED on page 17
Printer web page:	View and Modify Printer Settings > General Setup > Print Speed
Slew Speed	The slew speed is the speed at which the printer skips over the areas in a label format that are blank across the full width of the image. A faster slew speed may reduce printing time. The print engine automatically senses when to apply this higher speed.
Accepted values:	• ZE500-4 203 dpi: 2–12 ips • ZE500-4 300 dpi: 2–12 ips • ZE500-6 203 dpi: 2–12 ips • ZE500-6 300 dpi: 2–10 ips
Related ZPL command(s):	^PR
SGD command used:	none
Control panel menu item:	SLEW SPEED on page 17
Printer web page:	none

Table 4 • Print Settings (Continued)

Backfeed Speed	Backfeed refers to the backward motion of the media from the tear-off or peel-off position to the print position. This motion occurs so that more of the lead edge of each label can be used for printing. Reducing backfeed speed can mitigate some issues. In general, reducing the backfeed speed may improve print quality at the start of the label. This speed defaults to 2 ips.	
	Accepted values:	• ZE500-4 203 dpi: 2–12 ips • ZE500-4 300 dpi: 2–12 ips • ZE500-6 203 dpi: 2–12 ips • ZE500-6 300 dpi: 2–10 ips
	Related ZPL command(s):	^PR
	SGD command used:	none
	Control panel menu item:	BACKFEED SPEED on page 17
	Printer web page:	none
Tear-Off Position	If necessary, adjust the position of the media over the tear-off bar after printing. • Higher numbers move the media out (the tear line moves closer to the leading edge of the next label). • Lower numbers move the media in (the tear line moves closer to the edge of the label just printed).	
	Accepted values:	–120 to 120
	Related ZPL command(s):	~TA
	SGD command used:	none
	Control panel menu item:	TEAR OFF on page 18
	Printer web page:	View and Modify Printer Settings > General Setup > Tear Off



1	Media direction
2	Factory-set tear line location at position 000

Table 4 • Print Settings (Continued)

Print Mode	Select a print mode that is compatible with your print engine options.	
	Accepted values:	• APPLICATOR—The print engine prints a label when it receives a signal from the applicator. • TEAR OFF—The print engine prints label formats as it receives them. The print engine operator can tear off the printed labels any time after they print. • STREAM—The print engine prints a batch of labels with backfeed occurring only at the start and end of the batch instead of between individual labels. This setting increases label throughput in batch printing. • REWIND—The print engine prints without pausing between labels. The media is wound onto a core after printing. • RFID—The print engine does not backfeed between labels. When the last label prints, the print engine waits 1 second for another label format before feeding the last printed label to the tear-off position. Use this mode when printing multiple RFID labels in Tear-Off mode to improve throughput time.
	Related ZPL command(s):	`^MM`
	SGD command used:	`media.printmode`
	Control panel menu item:	PRINT MODE on page 18
	Printer web page:	View and Modify Printer Settings > General Setup > Print Mode
Applicator Port	Select the appropriate action for the applicator port, as suggested by the applicator manufacturer.	
	Accepted values:	• OFF: The applicator port is off. • MODE 1: Asserts the ~END_PRINT signal low while the print engine is moving the label forward. • MODE 2: Asserts the ~END_PRINT signal high while the print engine is moving the label forward. • MODE 3: Asserts the ~END_PRINT signal low for 20 milliseconds when a label has been completed and positioned. Not asserted during continuous printing modes. • MODE 4: Asserts the ~END_PRINT signal high for 20 milliseconds when a label has been completed and positioned. Not asserted during continuous printing modes.
	Related ZPL command(s):	`^JJ`
	SGD command used:	`device.applicator.end_print`
	Control panel menu item:	APPLICATOR PORT on page 18
	Printer web page:	View and Modify Printer Settings > Advanced Setup > Applicator

Table 4 • Print Settings (Continued)

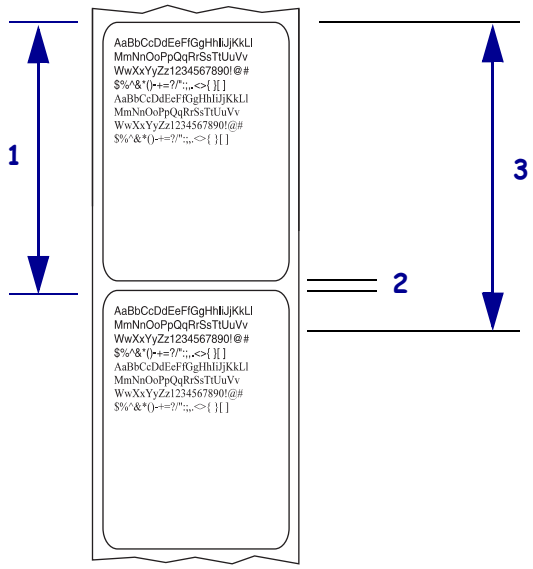
Start Print Signal	This parameter determines how the print engine reacts to the Start Print Signal input on pin 3 of the applicator interface connector at the rear of the print engine. **Important •** The Start Print Signal is determined by the applicator manufacturer. The print engine must use the correct setting for it to work properly.	
	Accepted values:	• PULSE MODE—Labels print when the signal transitions from HIGH to LOW or LOW to HIGH, as specified by the SGD command `device.applicator.start_print`. • LEVEL MODE—Labels print as long as the signal is asserted LOW.
	Related ZPL command(s):	`^JJ`
	SGD command used:	none
	Control panel menu item:	START PRINT SIG on page 18
	Printer web page:	View and Modify Printer Settings > Advanced Setup > Start Print Sig
Media Type	Select the type of media that you are using. • If you select CONTINUOUS, you must include a label length in your label format (`^LL` if you are using ZPL). • If you select NON-CONTINUOUS for various non-continuous media, the print engine feeds media to calculate the label length. See *Types of Media on page 40* for more information.	
	Accepted values:	• CONTINUOUS • NON-CONTINUOUS
	Related ZPL command(s):	`^MN`
	SGD command used:	none
	Control panel menu item:	MEDIA TYPE on page 18
	Printer web page:	View and Modify Printer Settings > Media Setup > Media Type
Print Method	Specify if ribbon is being used. Thermal Transfer media requires ribbon for printing while Direct Thermal media does not. To determine if you need to use ribbon, see *When to Use Ribbon* on page 37.	
	Accepted values:	• THERMAL TRANS • DIRECT THERMAL
	Related ZPL command(s):	`^MT`
	SGD command used:	none
	Control panel menu item:	PRINT METHOD on page 19
	Printer web page:	View and Modify Printer Settings > Media Setup > Print Method

Table 4 • Print Settings (Continued)

Print Width	Specify the width of the labels being used. **Note •** Setting the width too narrow can result in portions of a label format not being printed on the media. Setting the width too wide wastes formatting memory and can cause the printer to print off of the label and onto 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.	
	Accepted values:	minimum: 2 dots maximum: • ZE500-4 203 dpi: 832 dots • ZE500-4 300 dpi: 1228 dots • ZE500-6 203 dpi: 1344 dots • ZE500-6 300 dpi: 1984 dots
	Related ZPL command(s):	`^PW`
	SGD command used:	none
	Control panel menu item:	PRINT WIDTH on page 19
	Printer web page:	View and Modify Printer Settings > Media Setup > Print Width

Table 4 • Print Settings (Continued)

Maximum Label Length	Set the maximum label length to a value that is at least 1.0 in. (25.4 mm) greater than the actual label length plus the interlabel gap. If you set the value to one that is smaller than the label length, the print engine assumes that continuous media is loaded, and the print engine cannot calibrate. For example, if the label length is 6.0 inches (152 mm) including the interlabel gap, set the parameter for at least 7.0 inches (178 mm).



1	Label length (including interlabel gap)
2	Interlabel gap
3	Set the maximum label length to approximately this value

Accepted values:	0 to the maximum label length supported by the printer
Related ZPL command(s):	^ML
SGD command used:	none
Control panel menu item:	MAXIMUM LENGTH on page 19
Printer web page:	View and Modify Printer Settings > Media Setup > Maximum Length

Table 4 • Print Settings (Continued)

<table>
<tr><td>Ribbon Tension</td><td>Select the ribbon tension setting that is appropriate for the width or type of media being printed. HIGH can be used for most media. The correct setting is determined by a combination of the ribbon width and the ribbon length (Table 5). If necessary, use a lower value for narrow media or for glossy media.

Table 5 • Ribbon Tension Settings
<table><tr><th rowspan="2">Ribbon Width</th><th colspan="3">Ribbon Length</th></tr><tr><th>300 Meters</th><th>450 Meters</th><th>600 Meters</th></tr><tr><td>3 to 5 in.
(76 to 127 mm)</td><td>LOW</td><td>LOW</td><td>LOW</td></tr><tr><td>4 to 6 in.
(102 to 152 mm)</td><td>LOW</td><td>LOW or MEDIUM</td><td>LOW or MEDIUM</td></tr><tr><td>5 to 7 in.
(127 to 178 mm)</td><td>LOW or MEDIUM</td><td>MEDIUM</td><td>MEDIUM or HIGH</td></tr></table>
Accepted values:
• HIGH
• MEDIUM
• LOW

Related ZPL command(s): ^JW

SGD command used: none

Control panel menu item: RIBBON TENSION on page 27

Printer web page: none</td></tr>
<tr><td>Backfeed Sequence</td><td>This parameter sets when label backfeed occurs after a label is removed in some print modes. It has no effect in Rewind mode. This setting is superseded by ~JS when received as part of a label format.

Accepted values:
• AFTER (backfeed occurs immediately after the last label is completed)
• OFF (no backfeed)
• BEFORE (backfeed occurs before the forward motion of the first label)
• DEFAULT

Related ZPL command(s): ~JS

SGD command used: none

Control panel menu item: BACKFEED on page 28

Printer web page: View and Modify Printer Settings > Advanced Setup > Backfeed</td></tr>
</table>

Table 4 • Print Settings (Continued)

Label Top Position	This parameter adjusts the print position vertically on the label. Positive numbers adjust the label top position farther down the label (away from the printhead) by the specified number of dots. Negative numbers adjust the position up the label (toward the printhead).	
	Accepted values:	–120 to 120
	Related ZPL command(s):	^LT
	SGD command used:	none
	Control panel menu item:	LABEL TOP on page 28
	Printer web page:	View and Modify Printer Settings > General Setup > Label Top
Label Left Position	If necessary, shift the print position horizontally on the label. Positive numbers move the left edge of the image toward the center of the label by the number of dots selected, while negative numbers move the left edge of the image toward the left edge of the label.	
	Accepted values:	–9999 to 9999
	Related ZPL command(s):	^LS
	SGD command used:	none
	Control panel menu item:	LEFT POSITION on page 28
	Printer web page:	View and Modify Printer Settings > Advanced Setup > Left Position
Head Test Count	The ZE500-6 print engine periodically performs a test of the printhead functionality. This parameter establishes how many labels are printed between these internal tests.	
	Accepted values:	0000 (disables the test) to 9999
	Related ZPL command(s):	^JT
	SGD command used:	none
	Control panel menu item:	HEAD TEST COUNT on page 28
	Printer web page:	View and Modify Printer Settings > Advanced Setup > Head Test Count
Error on Pause	When this option is enabled and the print engine is paused, the print engine sets the applicator error state.	
	Accepted values:	• ENABLED • DISABLED
	Related ZPL command(s):	^JJ
	SGD command used:	none
	Control panel menu item:	ERROR ON PAUSE on page 29
	Printer web page:	View and Modify Printer Settings > Advanced Setup > Error on Pause

Table 4 • Print Settings (Continued)

Ribbon Low Mode	The Ribbon Low feature determines if the print engine will generate a warning when the amount of ribbon left on the roll gets low. 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. When the Ribbon Low feature is enabled, output signal (Pin 9) on the applicator port is functional. When the amount of ribbon on the supply spindle gets low, the output signal asserts to provide a `RIBBON LOW` warning. Set the output signal to assert HIGH or LOW.	
	Accepted values:	• ENABLED • DISABLED
	Related ZPL command(s):	`^JJ`
	SGD command used:	none
	Control panel menu item:	RIBBON LOW MODE on page 29
	Printer web page:	none
Ribbon Low Output	When the Ribbon Low feature is enabled, this parameter determines if the output signal on Pin 9 is HIGH or LOW.	
	Accepted values:	• ACTIVE HIGH • ACTIVE LOW
	Related ZPL command(s):	none
	SGD command used:	`device.applicator.ribbon_low`
	Control panel menu item:	RIBBON LOW OUTPUT on page 29
	Printer web page:	none
Reprint Mode	When reprint mode is enabled, you can reprint the last label printed by pressing and holding **PAUSE + CANCEL** on the printer's control panel.	
	Accepted values:	• ON • OFF
	Related ZPL command(s):	`^JZ`
	SGD command used:	none
	Control panel menu item:	REPRINT MODE on page 30
	Printer web page:	N/A

Maintenance and Diagnostic Tools

Table 6 • Maintenance and Diagnostic Tools

Early Warning for Media and Ribbon	When this feature is enabled, the print engine provides warnings when the media or ribbon is reaching near the end of the roll.	
	Accepted values:	MEDIA DISABLED, MEDIA ENABLED
	Related ZPL command(s):	^JH
	SGD command used:	none
	Control panel menu item:	EARLY WARNING MEDIA on page 19
	Printer web page:	View and Modify Printer Settings > General Setup > Early Warning (Media)
Early Warning for Maintenance	When this feature is enabled, the print engine provides warnings when the printhead needs to be cleaned.	
	Accepted values:	MAINT. OFF, MAINT. ON
	Related ZPL command(s):	^JH
	SGD command used:	none
	Control panel menu item:	EARLY WARNING MAINTENANCE on page 21
	Printer web page:	View and Modify Printer Settings > General Setup > Early Warning (Maintenance)
Printhead Cleaning Interval	When Early Warning for Maintenance is enabled, set this value to the length of the media or ribbon roll that you are using. When the printhead reaches the set length, WARNING CLEAN PRINTHEAD appears on the control panel display. If the alert function is enabled, the print engine generates an alert.	
	Accepted values:	0 M/0 FT to 450M/1476 FT in 50 M increments
	Related ZPL command(s):	^JH
	SGD command used:	none
	Control panel menu item:	HEAD CLEANING on page 21
	Printer web page:	View and Modify Printer Settings > General Setup > Head Cleaning
Printhead Life Expectancy	When Early Warning for Maintenance is enabled, set this value to the number of inches of media that the printhead is expected to print. When the printhead reaches the set length, WARNING REPLACE HEAD appears on the control panel display. If the alert function is enabled, the print engine generates an alert.	
	Accepted values:	0 M/0 FT to 450M/1476 FT in 50 M increments
	Related ZPL command(s):	^JH
	SGD command used:	none
	Control panel menu item:	HEAD LIFE on page 21
	Printer web page:	View and Modify Printer Settings > General Setup > Head Life

Table 6 • Maintenance and Diagnostic Tools (Continued)

Non-Resettable Counter	The non-resettable counter gives the total length of media that the printer has printed. You can use firmware commands to change the unit of measure for this counter.	
	Related ZPL command(s):	^MA (for changing unit of measure)
	SGD command used:	none
	Control panel menu item:	NONRESET CNTR on page 22
	Printer web page:	none
User-Controlled Counters	Two user-controlled counters give the total length of media that the printer has printed since the last time the counter was reset. You can use firmware commands to change the unit of measure and reset the counters.	
	Related ZPL command(s):	^MA (for changing unit of measure) ~RO (for resetting counters)
	SGD command used:	odometer.media_marker_count1 odometer.media_marker_count2
	Control panel menu item:	RESET CNTR1 on page 22 RESET CNTR2 on page 22
	Printer web page:	none
Print Counter Readings	Prints a label that lists the odometer readings for the following: • the non-resettable counter • the two user-controlled counters • the Early Warning for Maintenance counters, which indicate when the printhead was last cleaned and the printhead life (If the Early Warning for Maintenance feature is disabled, the counters related to it do not print.)	
	Related ZPL command(s):	~HQ
	SGD command used:	none
	Control panel menu item:	PRINT METERS on page 22
	Printer web page:	none

Table 6 • Maintenance and Diagnostic Tools (Continued)

Print Information	Print the specified information on one or more labels. • FONTS—Prints the available fonts in the print engine, including standard print engine fonts plus any optional fonts. Fonts may be stored in RAM or Flash memory. • BAR CODES—Prints the available bar codes in the print engine. Bar codes may be stored in RAM or Flash memory. • IMAGES—Prints the available images stored in the print engine's RAM, Flash memory, or optional memory card. • FORMATS—Prints the available formats stored in the printer's RAM, Flash memory, or optional memory card. • SETUP—Prints the printer configuration label. • NETWORK—Prints the network configuration label. • ALL—Prints the previous six labels.	
	Related ZPL command(s):	Printer configuration: `~WC` Network: `~WL` Others: `^WD`
	SGD command used:	none
	Control panel menu item:	LIST FONTS on page 22 LIST BAR CODES on page 23 LIST IMAGES on page 23 LIST FORMATS on page 23 LIST SETUP on page 23 LIST NETWORK on page 23 LIST ALL on page 24
	Printer web page:	View and Modify Printer Settings > Print Listings on Label
Print a Sensor Profile	Shows the sensor settings compared to actual sensor readings. To interpret the results of the sensor profile, see *Sensor Profile* on page 135.	
	Related ZPL command(s):	`~JG`
	SGD command used:	none
	Control panel menu item:	SENSOR PROFILE on page 24
	Printer web page:	View and Modify Printer Settings > Print Listings on Label
Initialize Flash Memory	This option erases all previously stored information from Flash memory. **Caution •** This option completely erases the Flash memory.	
	Related ZPL command(s):	`^JB`
	SGD command used:	none
	Control panel menu item:	INIT FLASH MEM. on page 24
	Printer web page:	View and Modify Printer Settings > Advanced Setup > Format Memory

Table 6 • Maintenance and Diagnostic Tools (Continued)

Power-Up Action	**Set the Power-Up Action** Set the action for the printer to take during the power-up sequence. • **CALIBRATE** adjusts sensor levels and thresholds, determines the label length, and feeds the media to the next web. • **FEED**—feeds the labels to the first registration point. • **LENGTH** determines the label length using current sensor values, and feeds the media to the next web. • **NO MOTION** tells the printer not to move the media. You must manually ensure that the web is positioned correctly, or press feed to position the next web. • **SHORT CAL** sets the media and web thresholds without adjusting sensor gain, determines the label length, and feeds the media to the next web.	
	Accepted values:	• CALIBRATE • FEED • LENGTH • NO MOTION • SHORT CAL
	Related ZPL command(s):	^MF
	SGD command used:	none
	Control panel menu item:	MEDIA POWER UP on page 27
	Printer web page:	View and Modify Printer Settings > Calibration
Head-Close Action	**Set the Head-Close Action** Set the action for the printer to take when you close the printhead. • **CALIBRATE** adjusts sensor levels and thresholds, determines the label length, and feeds the media to the next web. • **FEED**—feeds the labels to the first registration point. • **LENGTH** determines the label length using current sensor values, and feeds the media to the next web. • **NO MOTION** tells the printer not to move the media. You must manually ensure that the web is positioned correctly, or press feed to position the next web. • **SHORT CAL** sets the media and web thresholds without adjusting sensor gain, determines the label length, and feeds the media to the next web.	
	Accepted values:	• CALIBRATE • FEED • LENGTH • NO MOTION • SHORT CAL
	Related ZPL command(s):	^MF
	SGD command used:	none
	Control panel menu item:	HEAD CLOSE on page 28
	Printer web page:	View and Modify Printer Settings > Calibration

Table 6 • Maintenance and Diagnostic Tools (Continued)

Load Defaults	**Load Printer or Print Server Defaults** • FACTORY—Restores all printer settings other than the network settings back to the factory defaults. Use care when loading defaults because you will need to reload all settings that you changed manually. • NETWORK—Reinitializes the printer's wired or wireless print server. With a wireless print server, the printer will also reassociate with your wireless network. • LAST SAVED—Loads settings from the last permanent save.	
	Accepted values:	• FACTORY • NETWORK • LAST SAVED
	Related ZPL command(s):	Factory: ^JUF Network: ^JUN Last saved: ^JUR
	SGD command used:	none
	Control panel menu item:	Available as options when exiting Setup Mode. See *Exit Setup Mode* on page 15.
	Control panel key(s):	Factory: Hold **FEED** + **PAUSE** during printer power-up to reset the printer parameters to factory values. Network: Hold **CANCEL** + **PAUSE** during printer power-up to reset the network parameters to factory values. Last saved: N/A
	Printer web page:	Factory: View and Modify Printer Settings > Restore Default Configuration Network: Print Server Settings > Reset Print Server Last saved: View and Modify Printer Settings > Restore Saved Configuration

Table 6 • Maintenance and Diagnostic Tools (Continued)

Media and Ribbon Sensor Calibration	Calibrate the printer to adjust the sensitivity of the media and ribbon sensors. For complete instructions on how to perform a calibration procedure, see *Calibrate the Ribbon and Media Sensors* *on page 94*.	
	Accepted values:	N/A
	Related ZPL command(s):	~JC
	SGD command used:	none
	Control panel menu item:	MEDIA AND RIBBON CALIBRATE on page 24
	Control panel key(s):	Hold **PAUSE** + **FEED** + **CANCEL** for 2 seconds to initiate calibration.
	Printer web page:	The calibration procedure cannot be initiated through the web pages. See the following web page for settings that are set during sensor calibration: View and Modify Printer Settings > Calibration **Important** • Do not change these settings unless you are told to do so by Zebra Technical Support or by an authorized service technician.
Communication Diagnostics Mode	Use this diagnostics tool to cause the printer to output the hexadecimal values for all data received by the printer. For more information, see *Communication Diagnostics Test* on page 134.	
	Accepted values:	• DISABLED • ENABLED
	Related ZPL command(s):	~JD to enable, ~JE to disable
	SGD command used:	none
	Control panel menu item:	COMMUNICATIONS on page 26
	Printer web page:	N/A
Format Conversion	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.	
	Accepted values:	• NONE • 150 → 300 • 150 → 600 • 200 → 600 • 300 → 600
	Related ZPL command(s):	none
	SGD command used:	none
	Control panel menu item:	FORMAT CONVERT on page 30
	Printer web page:	none

Table 6 • Maintenance and Diagnostic Tools (Continued)

Idle Display	Select the information shown on the printer's display when the printer is idle.	
	Accepted values:	• FIRMWARE (FW) VERSION • MM/DD/YY 24 HR • M/DD/YY 12 HR • DD/MM/YY 24 HR • DD/MM/YY 12 HR
	Related ZPL command(s):	none
	SGD command used:	none
	Control panel menu item:	IDLE DISPLAY on page 30
	Printer web page:	N/A
RTC Date	This parameter allows you to set the date to display in the Idle Display.	
	Related ZPL command(s):	^ST
	SGD command used:	none
	Control panel menu item:	RTC DATE on page 31
	Printer web page:	none
RTC Time	This parameter allows you to set the time to display in the Idle Display.	
	Related ZPL command(s):	^ST
	SGD command used:	none
	Control panel menu item:	RTC TIME on page 31
	Printer web page:	none
Password Level	This parameter allows you to select whether certain factory-selected menu items or all menu items are password protected.	
	Accepted values:	• SELECTED ITEMS • ALL ITEMS
	Related ZPL command(s):	none
	SGD command used:	none
	Control panel menu item:	PASSWORD LEVEL on page 34
	Printer web page:	none
Run a ZBI Program	If you have ZBI 2.0 installed, you may choose to run a ZBI program that you have downloaded to your printer.	
	Accepted values:	N/A
	Related ZPL command(s):	^JI, ~JI
	SGD command used:	zbi.control.run
	Control panel menu item:	*Run the Specified ZBI Program** on page 31
	Printer web page:	Directory Listing

Network Settings

Network settings are shown on the network configuration label (Figure 12).

Figure 12 • Sample Network Configuration Label

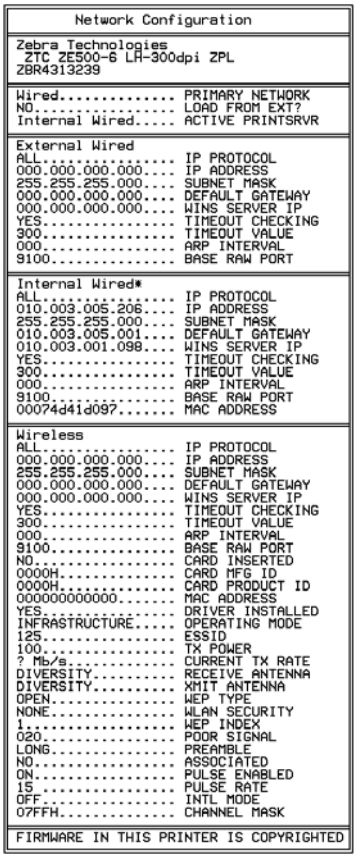


Table 7 • Network Settings

Primary Network	**Select the Primary Network Device** This parameter determines which device should be considered primary in the active device selection.	
	Accepted values:	• WIRED • WIRELESS
	Related ZPL command(s):	^NC
	SGD command used:	ip.primary_network
	Control panel menu item:	PRIMARY NETWORK on page 31
	Printer web page:	none

Table 7 • Network Settings (Continued)

Load from External Device	**View if IP Settings Are Loaded from the Printer or Print Server** This parameter tells whether to use the print engine's or the print server's LAN/WLAN settings at power-up. The default is to use the print engine's settings.	
	Accepted values:	• YES • NO
	Related ZPL command(s):	^NP
	SGD command used:	none
	Control panel menu item:	LOAD FROM EXT? on page 31
	Printer web page:	none
Active Print Server	**View the Active Print Server** This menu item displays which print server is being used. This tells which device's settings such as IP protocol and IP address are being displayed under those menu items.	
	Accepted values:	• WIRELESS indicates that the wireless print server is active. • INTERNAL WIRED indicates that the internal wired print server is active. • EXTERNAL WIRED indicates that an external wired print server is active. • NONE indicates that one of the network options is installed but is not active. When NONE is shown for this menu item, the device-specific items such as IP protocol and IP address will not display.
	Related ZPL command(s):	none
	SGD command used:	none
	Control panel menu item:	ACTIVE PRINTSRVR on page 32
	Printer web page:	none

Table 7 • Network Settings (Continued)

IP Protocol	**Set the IP Resolution Method** This parameter tells if the user (permanent) or the server (dynamic) selects the IP address. If a dynamic option is chosen, this parameter tells the method(s) by which the wired or wireless print server receives the IP address from the server.	
	Accepted values:	• ALL • GLEANING ONLY • RARP • BOOTP • DHCP • DHCP & BOOTP • PERMANENT
	Related ZPL command(s):	^ND
	SGD command used:	Wired: `internal_wired.ip.protocol` `external_wired.ip.protocol` Wireless: `wlan.ip.protocol`
	Control panel menu item:	IP PROTOCOL on page 32
	Printer web page:	View and Modify Printer Settings > Network Communications Setup > TCP/IP Settings > IP Protocol
IP Address	**View or Set the Printer's IP Address** View and, if necessary, change the printer's IP address. Changes to this setting are saved only if IP PROTOCOL is set to PERMANENT. To allow any saved changes to take effect, reset the print server (see *Reset Network* on page 87).	
	Accepted values:	000 to 255 for each field
	Related ZPL command(s):	^ND
	SGD command used:	Wired: `internal_wired.ip.addr` `external_wired.ip.addr` Wireless: `ip.addr`, `wlan.ip.addr`
	Control panel menu item:	IP ADDRESS on page 32
	Printer web page:	View and Modify Printer Settings > Network Communications Setup > TCP/IP Settings > IP Address

Table 7 • Network Settings (Continued)

Subnet Mask	**View or Set the Subnet Mask** View and, if necessary, change the subnet mask. This menu item appears only if a wired or wireless print server is installed on your printer. To save changes to this setting, set IP PROTOCOL to PERMANENT, and then reset the print server (see *Reset Network* on page 87).
Accepted values:	000 to 255 for each field
Related ZPL command(s):	^ND
SGD command used:	Wired: `internal_wired.ip.netmask` `external_wired.ip.netmask` Wireless: `wlan.ip.netmask`
Control panel menu item:	SUBNET MASK on page 32
Printer web page:	View and Modify Printer Settings > Network Communications Setup > TCP/IP Settings > Subnet Mask
Default Gateway	**View or Set the Default Gateway** View and, if necessary, change the default gateway. This menu item appears only if a wired or wireless print server is installed on your printer. To save changes to this setting, set IP PROTOCOL to PERMANENT, and then reset the print server (see *Reset Network* on page 87).
Accepted values:	000 to 255 for each field
Related ZPL command(s):	^ND
SGD command used:	Wired: `internal_wired.ip.gateway` `external_wired.ip.gateway` Wireless: `wlan.ip.gateway`
Control panel menu item:	DEFAULT GATEWAY on page 33
Printer web page:	View and Modify Printer Settings > Network Communications Setup > TCP/IP Settings > Default Gateway
MAC Address	**View the MAC Address** View the Media Access Control (MAC) address of the print server that is installed in the printer (wired or wireless).
Accepted values:	N/A
Related ZPL command(s):	none
SGD command used:	Wired: `internal_wired.mac_addr` `external_wired.mac_addr` Wireless: `wlan.mac_addr`
Control panel menu item:	MAC ADDRESS on page 33
Printer web page:	none

Table 7 • Network Settings (Continued)

ESSID	**View the ESSID Value** The Extended Service Set Identification (ESSID) is an identifier for your wireless network. This setting, which cannot be modified from the control panel, gives the ESSID for the current wireless configuration.	
	Accepted values:	32-character alphanumeric string (default 125)
	Related ZPL command(s):	none
	SGD command used:	`wlan.essid`
	Control panel menu item:	ESSID on page 33
	Printer web page:	none
Reset Network	This option resets the wired or wireless print server. You must reset the print server to allow any changes to the network settings to take effect.	
	Accepted values:	N/A
	Related ZPL command(s):	`~WR`
	SGD command used:	`device.reset`
	Control panel menu item:	*RESET NETWORK* on page 33
	Printer web page:	Print Server Settings > Factory Print Server Settings

Language Settings

Table 8 • Language Settings

Language	If necessary, change the language that the printer displays. This change affects the words shown on the following: • status and error messages • the printer parameters • the printer configuration label, the network configuration label, and other labels that you can select to print through the user menus (This does not apply to Japanese, Korean, Simplified Chinese, or Traditional Chinese. Labels for those languages print in English.)  **Note** • The selections for this parameter are displayed in the actual languages to make it easier for you to find one that you are able to read.	
	Accepted values:	ENGLISH, SPANISH, FRENCH, GERMAN, ITALIAN, NORWEGIAN, PORTUGUESE, SWEDISH, DANISH, SPANISH 2, DUTCH, FINNISH, JAPANESE, KOREAN, SIMPLIFIED CHINESE, TRADITIONAL CHINESE, RUSSIAN, POLISH, CZECH, ROMANIAN
	Related ZPL command(s):	^KL
	SGD command used:	none
	Control panel menu item:	LANGUAGE on page 34
	Printer web page:	View and Modify Printer Settings > General Setup > Language
Control Character	**Set the Control Prefix Character Value** The print engine looks for this two-digit hex character to indicate the start of a ZPL/ZPL II control instruction. Set the control prefix character to match what is used in your label formats.	
	Accepted values:	00 to FF
	Related ZPL command(s):	^CT or ~CT
	SGD command used:	none
	Control panel menu item:	CONTROL PREFIX on page 26
	Printer web page:	View and Modify Printer Settings > ZPL Control

Table 8 • Language Settings (Continued)

Command Character	**Set the Format Command Prefix Value** The format command prefix is a two-digit hex value used as a parameter place marker in ZPL/ZPL II format instructions. The print engine looks for this hex character to indicate the start of a ZPL/ZPL II format instruction. Set the format command prefix character to match what is used in your label formats. **Important** • You cannot use the same hex value for the format command prefix, control character, and delimiter characters. The print engine must see different characters to work properly. If you are setting the value through the control panel, the printer will skip any value that is already in use.	
	Accepted values:	00 to FF
	Related ZPL command(s):	^CC or ~CC
	SGD command used:	none
	Control panel menu item:	FORMAT PREFIX on page 27
	Printer web page:	View and Modify Printer Settings > ZPL Control
Delimiter Character	**Set the Delimiter Character Value** The delimiter character is a two-digit hex value used as a parameter place marker in ZPL/ZPL II format instructions. Set the delimiter character to match what is used in your label formats.	
	Accepted values:	00 to FF
	Related ZPL command(s):	^CD or ~CD
	SGD command used:	none
	Control panel menu item:	DELIMITER CHAR on page 27
	Printer web page:	View and Modify Printer Settings > ZPL Control
ZPL Mode	**Set the ZPL Mode** Select the ZPL mode that matches what is used in your label formats. This print engine accepts label formats written in either ZPL or ZPL II, eliminating the need to rewrite any ZPL formats that already exist. The print engine remains in the selected mode until it is changed in one of the ways listed here.	
	Accepted values:	• ZPL II • ZPL
	Related ZPL command(s):	^SZ
	SGD command used:	none
	Control panel menu item:	ZPL MODE on page 27
	Printer web page:	View and Modify Printer Settings > ZPL Control

Sensor Settings

Table 9 • Sensor Settings

Sensor Type	**Select the Media Sensor** Select the media sensor that is appropriate for the media that you are using.	
	Accepted values:	• WEB • MARK
	Related ZPL command(s):	^JS
	SGD command used:	none
	Control panel menu item:	SENSOR TYPE on page 19
	Printer web page:	View and Modify Printer Settings > Media Setup

Port Settings

Table 10 • Port Settings

Parallel Communications	**Set Parallel Communications** Select the communications port that matches the one being used by the host computer.
	Accepted values: • BIDIRECTIONAL • UNIDIRECTIONAL
	Related ZPL command(s): none
	SGD command used: none
	Control panel menu item: PARRALEL COMM. on page 25
	Printer web page: View and Modify Printer Settings > Serial Communications Setup
Serial Communications	**Set Serial Communications** Select the communications port that matches the one being used by the host computer.
	Accepted values: • RS232 • RS422/485 • RS485 MULTIDROP **Note •** Select RS232 if you are using an external adapter to enable RS422/485 operation.
	Related ZPL command(s): none
	SGD command used: none
	Control panel menu item: SERIAL COMM. on page 25
	Printer web page: View and Modify Printer Settings > Serial Communications Setup > Serial Comm.

Table 10 • Port Settings (Continued)

Baud Rate	**Set the Baud Rate** Select the baud value that matches the one being used by the host computer.
	Accepted values: • 115200 • 57600 • 38400 • 28800 • 19200 • 14400 • 9600 • 4800 • 2400 • 1200 • 600 • 300
	Related ZPL command(s): ^SC
	SGD command used: comm.baud
	Control panel menu item: BAUD on page 25
	Printer web page: View and Modify Printer Settings > Serial Communications Setup > Baud
Data Bits	**Set the Data Bits Value** Select the data bits value that matches the one being used by the host computer.
	Accepted values: • 7 • 8
	Related ZPL command(s): ^SC
	SGD command used: comm.data_bits
	Control panel menu item: DATA BITS on page 25
	Printer web page: View and Modify Printer Settings > Serial Communications Setup > Data Bits
Parity	**Set the Parity Value** Select the parity value that matches the one being used by the host computer.
	Accepted values: • NONE • EVEN • ODD
	Related ZPL command(s): ^SC
	SGD command used: comm.parity
	Control panel menu item: PARITY on page 25
	Printer web page: View and Modify Printer Settings > Serial Communications Setup > Parity

Table 10 • Port Settings (Continued)

Host Handshake	**Set the Host Handshake Protocol Value** Select the handshake protocol that matches the one being used by the host computer.
	Accepted values: • XON/XOFF • RTS/CTS • DSR/DTR
	Related ZPL command(s): ^SC
	SGD command used: none
	Control panel menu item: HOST HANDSHAKE on page 26
	Printer web page: View and Modify Printer Settings > Serial Communications Setup > Host Handshake
Protocol	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.
	Accepted values: • NONE • ZEBRA • ACK_NAK **Note •** ZEBRA is the same as ACK_NAK, except that ZEBRA response messages are sequenced. If ZEBRA is selected, the print engine must use DSR/DTR for host handshake protocol.
	Related ZPL command(s): ^SC
	SGD command used: none
	Control panel menu item: PROTOCOL on page 26
	Printer web page: View and Modify Printer Settings > Serial Communications Setup > Protocol
Network ID	This parameter assigns a unique number to the print engine when the print engine is operating in an RS422/485 multi-drop network environment (an external RS422/485 adapter is required). This gives the host computer the means to address a specific print engine. This does not affect TCP/IP or IPX networks. Set a unique network ID number for this print engine.
	Accepted values: 000 to 999
	Related ZPL command(s): ^NI
	SGD command used: none
	Control panel menu item: NETWORK ID on page 26
	Printer web page: View and Modify Printer Settings > Serial Communications Setup > Network ID

Calibrate the Ribbon and Media Sensors

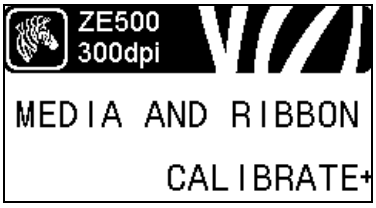
Use the procedure in this section to calibrate the printer, which adjusts the sensitivity of the media and ribbon sensors.

- For issues that may be resolved by sensor calibration, see *Printing Issues* on page 112.
- For a summary of the options for initiating calibration, see *Media and Ribbon Sensor Calibration* on page 81.

Important • Follow the calibration procedure exactly as presented. All of the steps must be performed even if only one of the sensors requires adjustment. You may press and hold CANCEL at any step in this procedure to cancel the process.

To perform sensor calibration, complete these steps:

1. With the printer in the Ready state, initiate media and ribbon calibration through the print engine's display:
   a. Navigate to the following parameter. See *Control Panel Display* on page 13 for information about using the control panel.



   b. Press **RIGHT SELECT** to select START.

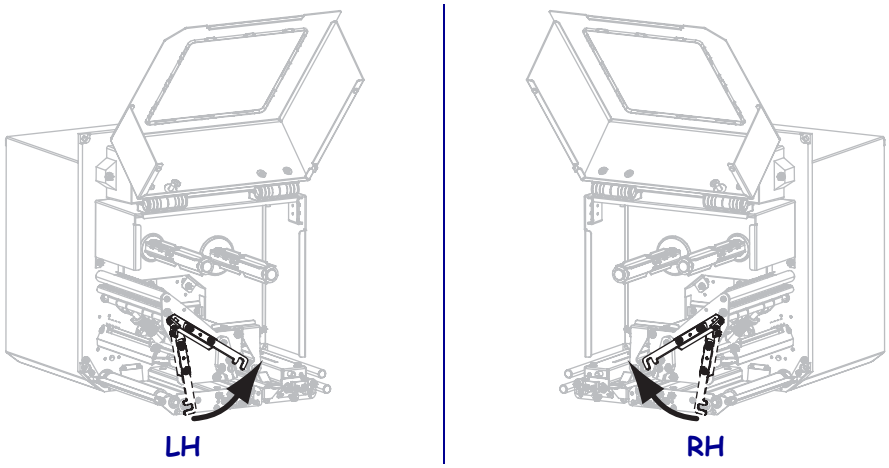
The printer does the following:

- The **STATUS light** and **SUPPLIES light** flash yellow once.
- The **PAUSE light** blinks yellow.
- The control panel displays:

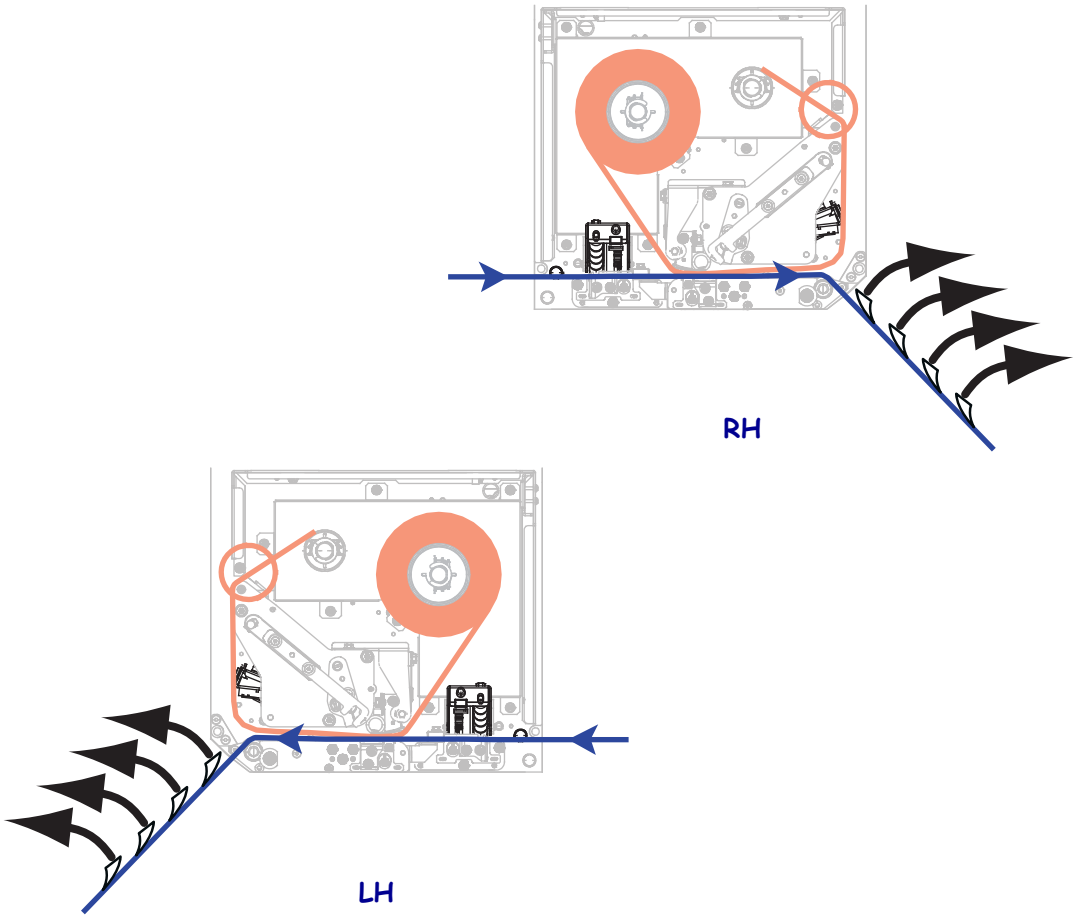
LOAD BACKING

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

   Rotate the printhead-release latch to the open position.



3. Extend approximately 8 in. (203 mm) of media past the peel bar. Remove and discard the labels from the liner on this exposed media.

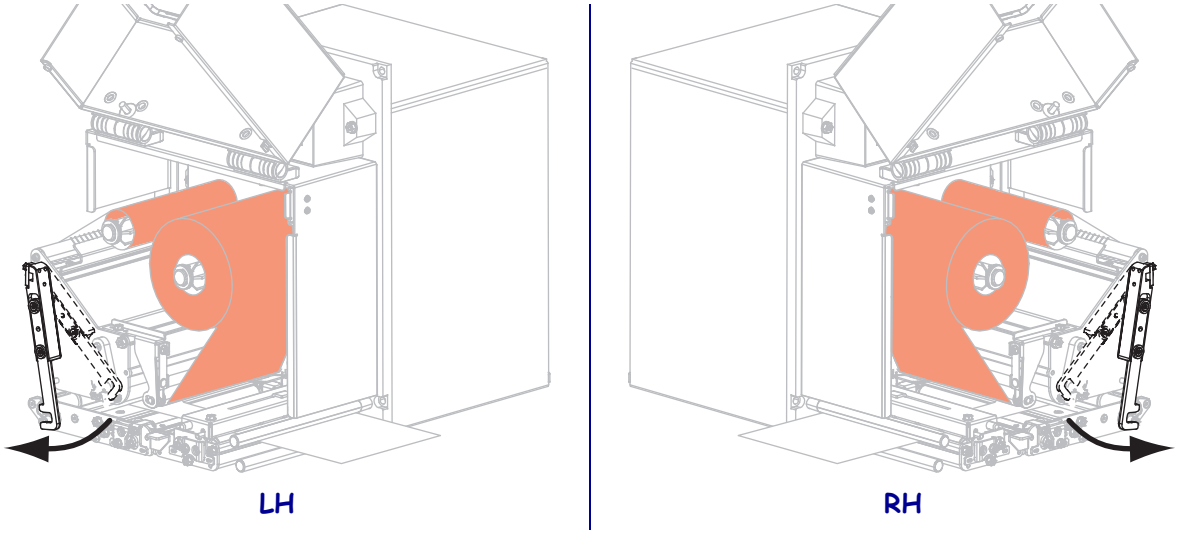


4. Pull the media back into the print engine so that only the liner is between the media sensors.
5. Press **PLUS (+)** to continue.

   The control panel displays:

   ```
   REMOVE RIBBON
   ```

6. Remove the ribbon (if used).
7. Rotate the printhead-release latch to the closed position, and close the media door.



8. Press **PAUSE** to begin the media calibration process.

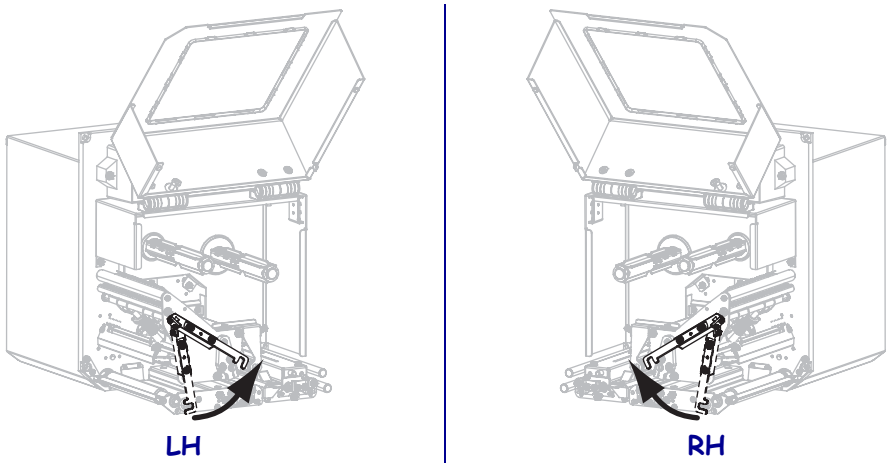
   The control panel displays:

   ```
   CALIBRATING
   PLEASE WAIT
   ```

When the process is complete, the control panel displays:

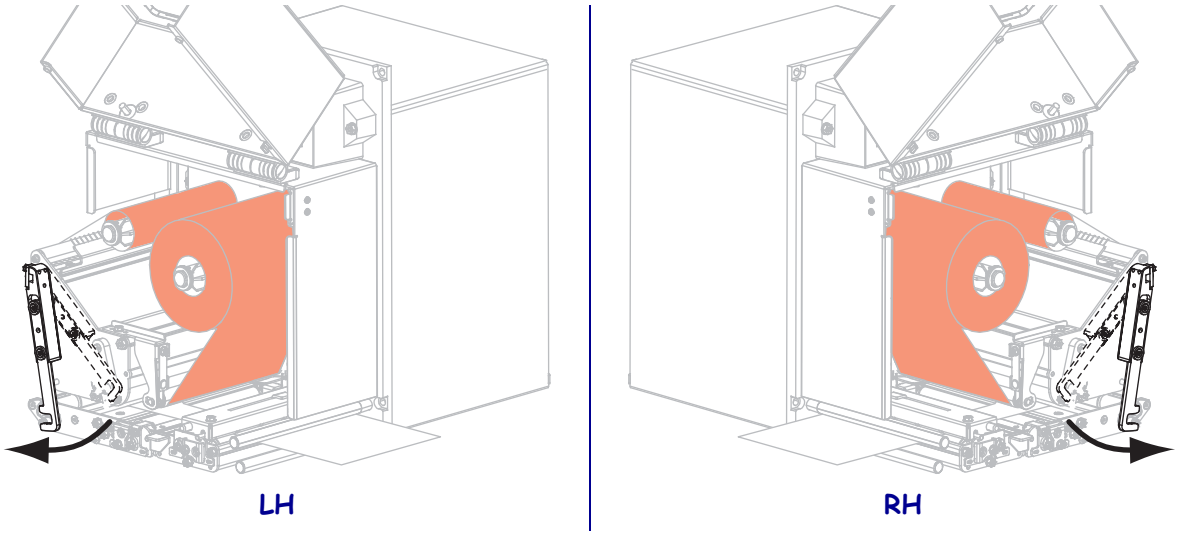
```
RELOAD ALL
```

9. Rotate the printhead-release latch to the open position.

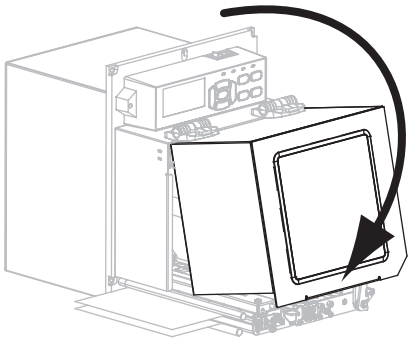


10. Reload the media and ribbon (if used).

11. Rotate the printhead-release latch to the closed position.



12. Close the media door.



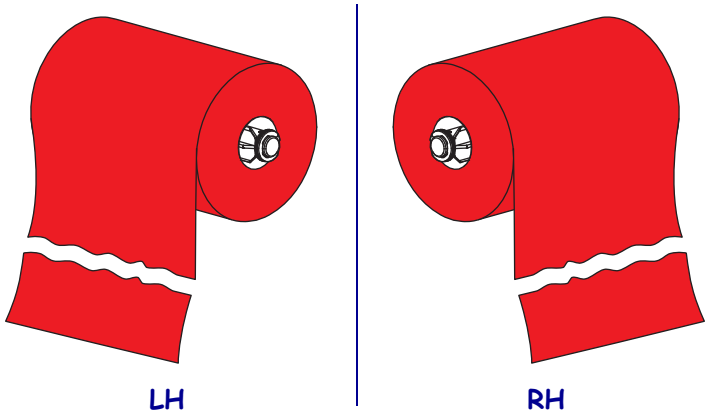
13. Press **PAUSE** to enable printing.

Remove Used Ribbon

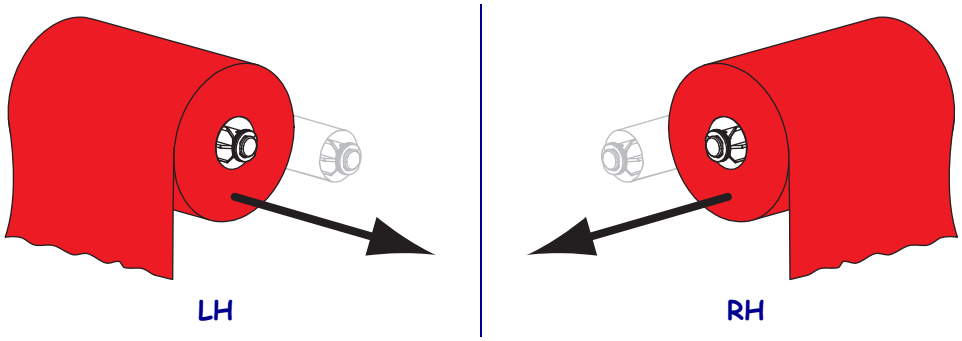
Remove used ribbon from the ribbon take-up spindle each time you change the roll of ribbon.

To remove used ribbon, complete these steps:

1. Has the ribbon run out?

If the ribbon...	Then
Ran out	Continue with step 2.
Did not run out	**a.** Cut or break the ribbon before the ribbon take-up spindle.  **b.** Continue with step 2.

2. Slide the core with the used ribbon off of the ribbon take-up spindle.



3. Discard the used ribbon. You may reuse the empty core from the ribbon supply spindle by moving it to the ribbon take-up spindle.

Adjust the Sensors

This section describes how to adjust the sensors.

Transmissive Media Sensor

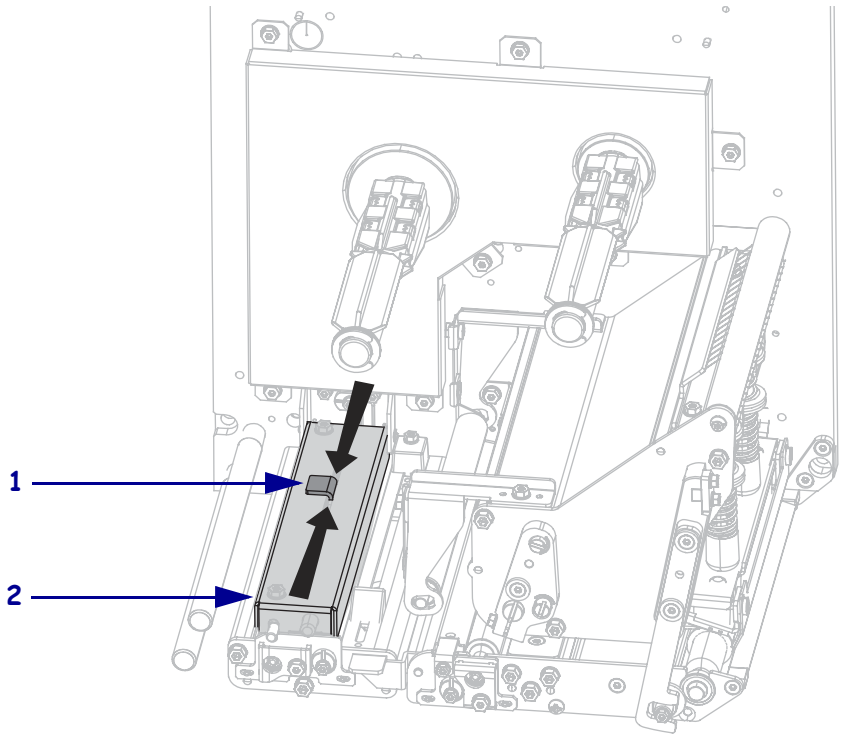
The transmissive media sensor finds “start of label” indicators, such as notches or holes in the media or interlabel gaps. This sensor consists of a light source (positioned below the media) and a light sensor (positioned above the media).

To position the sensor, complete these steps:

1. Refer to Figure 13. Slide the sensor position indicator on the pinch roller 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 13 • Media Sensor Adjustment (Right-Hand Unit Shown)



1	Sensor position indicator
2	Pinch roller assembly

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 140 for information about black mark requirements.

Ribbon Sensor

The ribbon sensor is mounted in a fixed position, and no adjustment is required.

Toggle Positioning

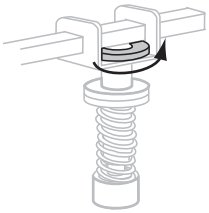
Proper toggle positioning is important for proper print quality.

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

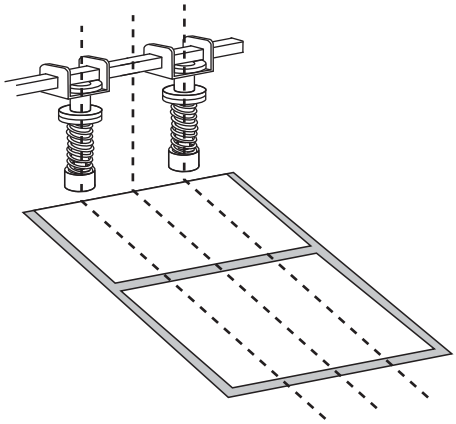
To adjust the toggles, complete these steps:

1. Print some labels at 2 in. (51 mm) per second by running the PAUSE Self Test (see *PAUSE Self Test* on page 129).
2. While printing labels, use the control panel to lower the darkness setting until the labels are printing gray instead of black (see *Print Darkness* on page 67).
3. **Caution** • The printhead may be hot and could cause severe burns. Allow the printhead to cool.

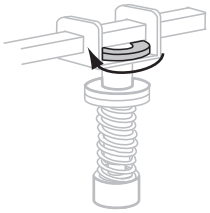
   Loosen the locking nut at the top of each toggle assembly.



4. Position the toggles approximately 1/4 of the way in from each edge of the media.



5. Tighten the locking nuts.



6. Print additional labels at 2 in. (51 mm) per second by again running the PAUSE Self Test. (Press and hold PAUSE while turning on (**I**) the printer.)

7. Do both sides of the label print at the same level of gray?

If…	Then…
Yes	The toggles are positioned correctly. Increase the darkness setting to the optimum level for the media being used.
No	**a.** Readjust the position of the toggle or toggles toward the side that printed lighter. **b.** Print additional labels at 2 in. (51 mm) per second by again running the PAUSE Self Test. (Press and hold PAUSE while turning on (**I**) the printer.) **c.** Repeat this step until both sides of the label print at the same level of gray. **d.** Increase the darkness setting to the optimum level for the media being used.

Printhead Pressure Adjustment

Before adjusting the printhead pressure, check that the toggles are positioned correctly. See *Toggle Positioning* on page 101.

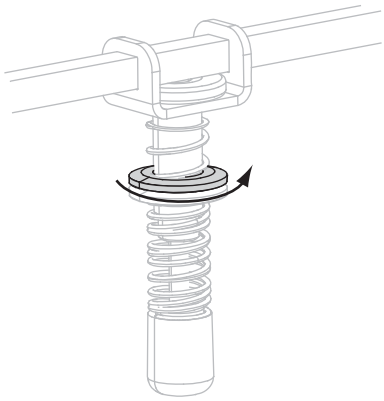
Printhead life and drive system life (belts and bearings) can be maximized by using the lowest pressure that produces the desired print quality without allowing the ribbon or media to slip.You may need to adjust the printhead pressure in the following instances:

- 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)
- if the ribbon slips (too little pressure)

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

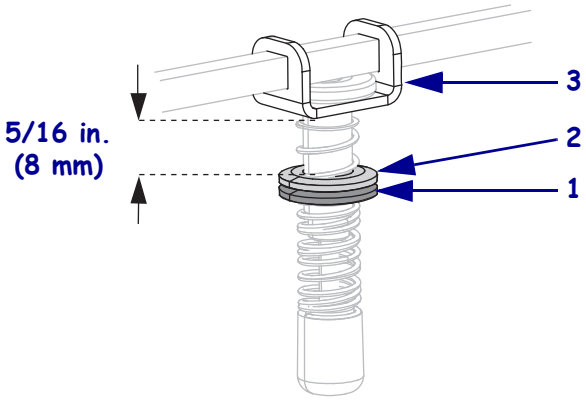
To adjust printhead pressure, complete these steps:

1. As needed throughout this procedure, refer to the *PAUSE Self Test* on page 129 to print test labels.
2. Refer to *Print Darkness* on page 67 to set the darkness value (burn duration) appropriately for your media and ribbon.
3. Loosen the locking nut on the toggle assembly.

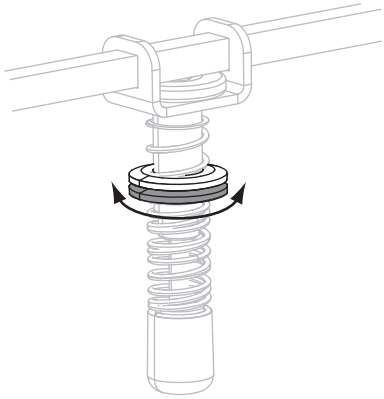


4. **Caution** • The printhead may be hot and could cause severe burns. Allow the printhead to cool.

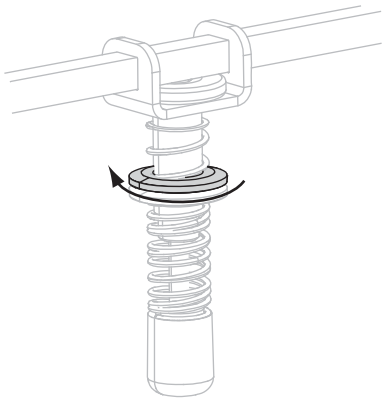
   As a starting point for adjustment, set the position of the adjusting nut (**1**) and the locking nut (**2**) so that when the locking nut is tightened, it is approximately 5/16 in. (8 mm) from the yoke (**3**).



5. Move the adjusting nut until the print quality is acceptable. Use the lowest pressure that provides the desired print quality.
   - To increase printhead pressure, move the adjusting nut downward.
   - To decrease printhead pressure, move the adjusting nut upward.



6. To lock the toggle pressure, tighten the locking nut against the adjusting nut.



4

Routine Maintenance

This section provides routine cleaning and maintenance procedures.

Contents

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 11. 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 11 • Recommended Print Engine Cleaning Schedule

Area	Method	Interval
Printhead	Solvent*	Perform these procedures at the following times: • 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*	
Pinch roller	Solvent*	
Peel 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 the Exterior

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

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

Clean the Media Compartment

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

Clean the Printhead and Rollers

Clean the printhead, platen roller, pinch roller, and peel roller according to the schedule in Table 11 on page 106. Clean the printhead more often if you see inconsistent print quality, such as voids or light print. Clean the rollers if you see media movement problems.

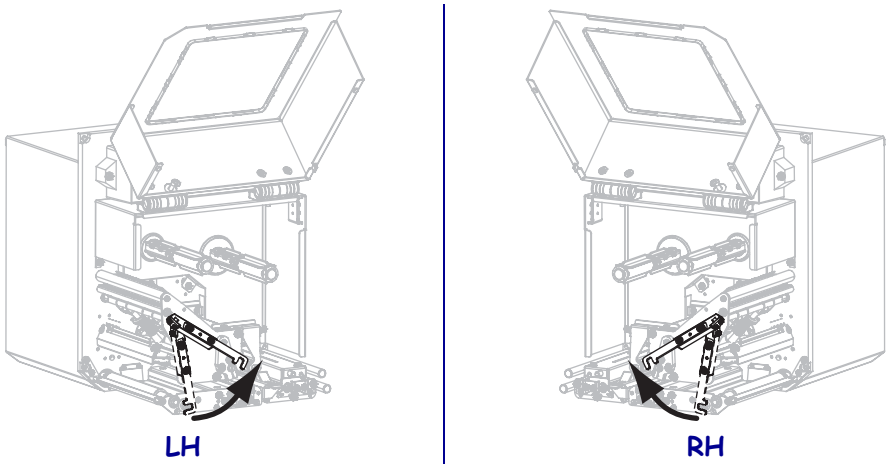
To clean the printhead and rollers, complete these steps:

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.

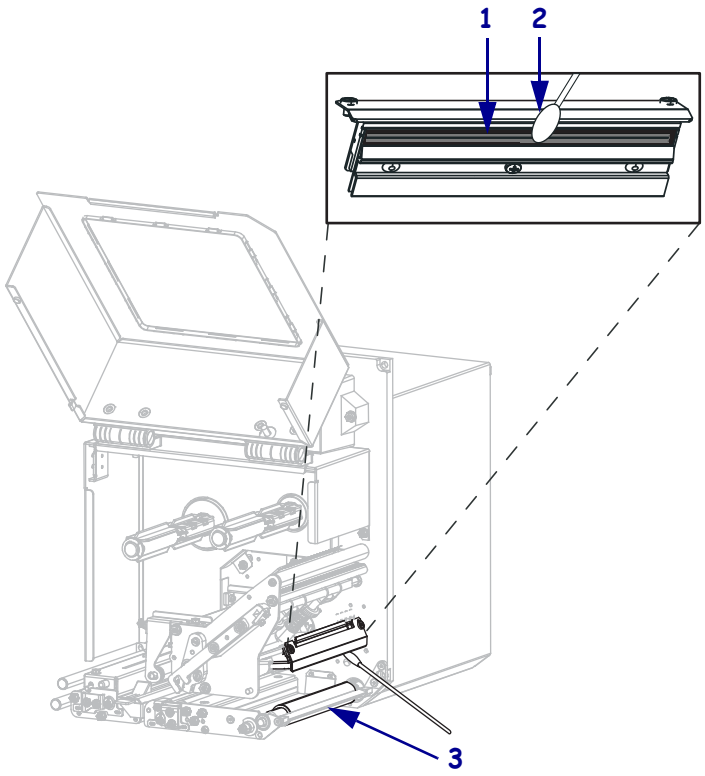
2. **Caution •** The printhead may be hot and could cause severe burns. Allow the printhead to cool.

   Rotate the printhead-release latch to the open position.



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

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

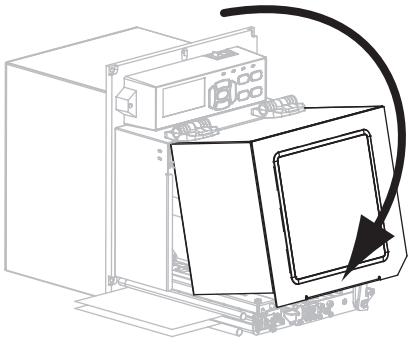


1	Printhead elements (gray strip)
2	Cotton swab
3	Platen Roller

5. Use a lint-free cloth moistened with alcohol to clean the platen roller, pinch roller, and peel roller. Rotate the rollers while cleaning.

6. Reload the ribbon and media (if used).

7. Close the media door.



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.

Replacing Print Engine Components

Some print engine components, such as the printhead and platen roller, may wear out over time and can be replaced easily. Regular cleaning may extend the life of some of these components. See Table 11 on page 106 for the recommended cleaning intervals.

Ordering Replacement Parts

For optimal printing quality and proper printer performance across our product line, Zebra strongly recommends the use of genuine Zebra™ supplies as part of the total solution. Specifically, the ZE500 print engines are designed to work only with genuine Zebra™ printheads, thus maximizing safety and print quality.

Contact your authorized Zebra reseller for part ordering information.

Recycling Print Engine Components

The majority of this print engine's components are recyclable. The print engine's main logic board may include a battery that you should dispose of properly.

Do not dispose of any print engine components in unsorted municipal waste. Please dispose of the battery according to your local regulations, and recycle the other print engine components according to your local standards. For more information, see http://www.zebra.com/environment.

Lubrication

No lubrication is needed for this print engine.

Caution • Some commercially available lubricants will damage the finish and the mechanical parts if used on this print engine.

Notes • _____

5

Troubleshooting

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

Contents

Printing Issues

Table 12 identifies possible issues with printing or print quality, the possible causes, and the recommended solutions.

Table 12 • Printing Issues

Issue	Possible Cause	Recommended Solution
General print quality issues	The print engine is set at an incorrect print speed.	For optimal print quality, set the print speed to the lowest possible setting for your application via control panel, the driver, or the software. You may want to perform the *FEED Self Test* on page 130 to determine the optimal settings for your print engine. See *Print Speed* on page 67 for how to change the print speed.
	You are using an incorrect combination of labels and ribbon for your application.	1. Switch to a different type of media or ribbon to try to find a compatible combination. 2. If necessary, consult your authorized Zebra reseller or distributor for information and advice.
	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. You may want to perform the *FEED Self Test* on page 130 to determine the ideal darkness setting. See *Print Darkness* on page 67 for how to change the darkness setting.
	The printhead is dirty.	Clean the printhead. See *Clean the Printhead and Rollers* on page 107.
	Incorrect or uneven printhead pressure.	1. Position the printhead toggles correctly. See *Toggle Positioning* on page 101. 2. Set the printhead pressure to the minimum needed for good print quality. See *Printhead Pressure Adjustment* on page 103.
Loss of printing registration on labels. Excessive vertical drift in top-of-form registration.	The platen roller, pinch roller, or peel roller is dirty.	Clean the printhead and rollers. See *Clean the Printhead and Rollers* on page 107.
	Media guides are positioned improperly.	Ensure that the media guides are properly positioned. See *Load Ribbon and Media* on page 55.
	The media type is set incorrectly.	Set the print engine for the correct media type (gap/notch, continuous, or mark). See *Media Type* on page 70.
	The media is loaded incorrectly.	Load media correctly. See *Load Ribbon and Media* on page 55.

Table 12 • Printing Issues (Continued)

Issue	Possible Cause	Recommended Solution
Long tracks of missing print on several labels	Print element damaged.	Call a service technician.
	Wrinkled ribbon.	See wrinkled ribbon causes and solutions in *Ribbon Problems* *on page 115*.
Fine, angular gray lines on blank labels	Wrinkled ribbon.	See wrinkled ribbon causes and solutions in *Ribbon Problems* *on page 115*.
Printing too light or too dark over the entire label	The media or ribbon is not designed for high-speed operation.	Replace supplies with those recommended for high-speed operation.
	You are using an incorrect combination of media and ribbon for your application.	1. Switch to a different type of media or ribbon to try to find a compatible combination. 2. If necessary, consult your authorized Zebra reseller or distributor for information and advice.
	You are using ribbon with direct thermal media.	Direct thermal media does not require ribbon. To determine if you are using direct thermal media, perform the label scratch test in *When to Use Ribbon* on page 37.
	Incorrect or uneven printhead pressure.	1. Position the printhead toggles correctly. See *Toggle Positioning* on page 101. 2. Set the printhead pressure to the minimum needed for good print quality. See *Printhead Pressure Adjustment* on page 103.
Smudge marks on labels	The media or ribbon is not designed for high-speed operation.	Replace supplies with those recommended for high-speed operation.
Misregistration/skips labels	The print engine is not calibrated.	Calibrate the print engine. See *Calibrate the Ribbon and Media Sensors* on page 94.
	Improper label format.	Check your label format and correct it as necessary.
Misregistration and misprint of one to three labels	The platen roller, pinch roller, or peel roller is dirty.	Clean the printhead and rollers. See *Clean the Printhead and Rollers* on page 107.
	Media does not meet specifications.	Use media that meets specifications. See *Media Specifications* on page 140.
Vertical drift in top-of-form position	The print engine is out of calibration.	Calibrate the print engine. See *Calibrate the Ribbon and Media Sensors* on page 94.
	The platen roller, pinch roller, or peel roller is dirty.	Clean the printhead and rollers. See *Clean the Printhead and Rollers* on page 107.

Table 12 • Printing Issues (Continued)

Issue	Possible Cause	Recommended Solution
Vertical image or label drift	The print engine is using non-continuous labels but is configured in continuous mode.	Set the print engine for the correct media type (gap/notch, continuous, or mark—see *Media Type* on page 70) and calibrate the printer, if necessary (see *Calibrate the Ribbon and Media Sensors* on page 94).
	The media sensor is calibrated improperly.	Calibrate the print engine. See *Calibrate the Ribbon and Media Sensors* on page 94.
	The platen roller, pinch roller, or peel roller is dirty.	Clean the printhead and rollers. See *Clean the Printhead and Rollers* on page 107.
	Incorrect or uneven printhead pressure.	1. Position the printhead toggles correctly. See *Toggle Positioning* on page 101. 2. Set the printhead pressure to the minimum needed for good print quality. See *Printhead Pressure Adjustment* on page 103.
	The media or ribbon is loaded incorrectly.	Ensure that the media and ribbon are loaded correctly. See *Load Ribbon and Media* on page 55.
	Incompatible media.	You must use media that meets the printer specifications. Ensure that the interlabel gaps or notches are 2 to 4 mm and consistently placed (see *Media Specifications* on page 140).
The bar code printed on a label does not scan.	The bar code is not within specifications because the print is too light or too dark.	Perform the *FEED Self Test* on page 130. Adjust the darkness or print speed settings as necessary.
	There is not enough blank space around the bar code.	Leave at least 1/8 in. (3.2 mm) between the bar code and other printed areas on the label and between the bar code and the edge of the label.
Auto Calibrate failed.	The media or ribbon is loaded incorrectly.	Ensure that the media and ribbon are loaded correctly. See *Load Ribbon and Media* on page 55.
	The sensors could not detect the media or ribbon.	Calibrate the print engine. See *Calibrate the Ribbon and Media Sensors* on page 94.
	The sensors are dirty or positioned improperly.	Ensure that the sensors are clean and properly positioned.
	The media type is set incorrectly.	Set the print engine for the correct media type (gap/notch, continuous, or mark). See *Media Type* on page 70.

Ribbon Problems

Table 13 identifies problems that may occur with ribbon, the possible causes, and the recommended solutions.

Table 13 • Ribbon Problems

Problem	Possible Cause	Recommended Solution
Broken or melted ribbon	Darkness setting too high.	1. Reduce the darkness setting. See *Print Darkness* on page 67 for how to change the darkness setting. 2. Clean the printhead thoroughly. See *Clean the Printhead and Rollers* on page 107.
	The ribbon is coated on the wrong side and cannot be used in this print engine.	Replace the ribbon with one coated on the correct side. For more information, see *Coated Side of Ribbon* on page 37.
Ribbon slips or does not advance correctly	Ribbon tension is set incorrectly.	Change the ribbon tension setting. See *Ribbon Tension* on page 73.
Wrinkled ribbon	Ribbon was loaded incorrectly.	Load the ribbon correctly. See *Load Ribbon and Media* on page 55.
	Incorrect burn temperature.	For optimal print quality, set the darkness to the lowest possible setting for your application. You may want to perform the *FEED Self Test* on page 130 to determine the ideal darkness setting. See *Print Darkness* on page 67 for how to change the darkness setting.
	Incorrect or uneven printhead pressure.	Set the printhead pressure to the minimum needed for good print quality. See *Printhead Pressure Adjustment* on page 103.
	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 printhead or platen roller may be installed incorrectly.	Call a service technician.
The printer does not detect when the ribbon runs out.	The printer may have been calibrated without ribbon. Later, ribbon was inserted without the user recalibrating the printer or loading printer defaults.	Calibrate the printer, this time using ribbon, or load printer defaults. See *Calibrate the Ribbon and Media Sensors* on page 94 or *Load Defaults* on page 80.
In thermal transfer mode, the printer did not detect the ribbon even though it is loaded correctly.		
The printer indicates that ribbon is out, even though ribbon is loaded correctly.	The print engine was not calibrated for the label and ribbon being used.	Calibrate the print engine. See *Calibrate the Ribbon and Media Sensors* on page 94.

RFID Problems

Table 14 identifies problems that may occur with RFID print engines, the possible causes, and the recommended solutions. For more information about RFID, refer to the *RFID Programming Guide 2*. A copy of the manual is available at http://www.zebra.com/manuals.

Table 14 • RFID Problems

Problem	Possible Cause	Recommended Solution
The RFID-enabled print engine voids every label.	The print engine is not calibrated for the media being used.	Manually calibrate the print engine (see *Media and Ribbon Sensor Calibration* on page 81).
	You are using an RFID label with a tag type that is not supported by your print engine.	The ZE500R print engine supports only Gen 2 RFID labels. For more information, refer to the *RFID Programming Guide 2*, or contact an authorized Zebra RFID reseller.
	The print engine is unable to communicate with the RFID reader.	1. Turn off (**O**) the print engine. 2. Wait 10 seconds. 3. Turn on (**I**) the print engine. 4. If the problem persists, you may have a bad RFID reader or a loose connection between the RFID reader and the print engine. Contact Technical Support or an authorized Zebra RFID service technician for assistance.
	Radio frequency (RF) interference from another RF source.	Do one or more of the following as necessary: • Move the print engine away from fixed RFID readers or other RF sources. • Make sure that the media door is closed at all times during RFID programming.
	The settings are incorrect in your label designer software.	The software settings override the print engine settings. Make sure that the software and print engine settings match.
	You are using an incorrect programming position, particularly if the tags being used are within print engine specifications.	Do one or more of the following as necessary: • Check the RFID programming position , or the program position setting in your label designer software. If the position is incorrect, change the setting. • Restore the RFID programming position back to the default value. For more information, refer to the *RFID Programming Guide 2*. For transponder placement details, go to http://www.zebra.com/transponders.
	You are sending RFID ZPL or SGD commands that are incorrect.	Check your label formats. For more information, refer to the *RFID Programming Guide 2*.

Table 14 • RFID Problems (Continued)

Problem	Possible Cause	Recommended Solution
Low yields. Too many RFID tags per roll are voided.	The RFID labels are not within specifications for the print engine, which means that the transponder is not in an area that can be programmed consistently.	Make sure that the labels meet transponder placement specifications for your print engine. See http://www.zebra.com/transponders for transponder placement information. For more information, refer to the *RFID Programming Guide 2*, or contact an authorized Zebra RFID reseller.
	Incorrect read and write power levels for the RFID tag type.	Change the RFID read and write power levels. For instructions, refer to the *RFID Programming Guide 2*.
	Radio frequency (RF) interference from another RF source.	Do one or more of the following as necessary: • Move the print engine away from fixed RFID readers. • Make sure that the media door is closed at all times during RFID programming.
	The print engine is using outdated print engine firmware and reader firmware versions.	Go to http://www.zebra.com/firmware for updated firmware.
The print engine stops at the RFID inlay.	The print engine calibrated the label length only to the RFID inlay instead of to the interlabel gap.	1. Select FEED for the **MEDIA POWER UP** and **HEAD CLOSE** parameters (see *Power-Up Action* on page 79 or *Head-Close Action* on page 79). 2. Manually calibrate the print engine (see *Media and Ribbon Sensor Calibration* on page 81).
The DATA light flashes indefinitely after you attempt to download print engine or reader firmware.	The download was not successful. For best results, cycle power on the print engine before downloading any firmware.	1. Turn off (**O**) the print engine. 2. Wait 10 seconds. 3. Turn on (**I**) the print engine. 4. Attempt to download the firmware again. 5. If the problem persists, contact Technical Support.

Table 14 • RFID Problems (Continued)

Problem	Possible Cause	Recommended Solution
RFID parameters do not appear in Setup mode, and RFID information does not appear on the print engine configuration label. **The printer does not void RFID labels that are not programmed correctly.**	The print engine was powered off (**O**) and then back on (**I**) too quickly for the RFID reader to initialize properly.	Wait at least 10 seconds after turning the print engine power off before turning it back on. **1.** Turn off (**O**) the print engine. **2.** Wait 10 seconds. **3.** Turn on (**I**) the print engine. **4.** Check for the RFID parameters in Setup mode or for RFID information on a new configuration label.
	An incorrect version of print engine or reader firmware was loaded on the printer.	**1.** Verify that the correct firmware version is loaded on your printer. For more information, refer to the *RFID Programming Guide 2*. **2.** Download the correct print engine or reader firmware if necessary. **3.** If the problem persists, contact Technical Support.
	The print engine is unable to communicate with the RFID subsystem.	**1.** Turn off (**O**) the print engine. **2.** Wait 10 seconds. **3.** Turn on (**I**) the print engine. **4.** If the problem persists, you may have a bad RFID reader or a loose connection between the RFID reader and the print engine. Contact Technical Support or an authorized service technician for assistance.

Error Messages

The control panel displays messages when there is an error. See Table 15 for LCD errors, the possible causes, and the recommended solutions.

Table 15 • Error Messages

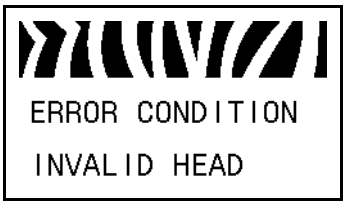
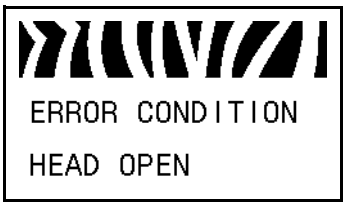
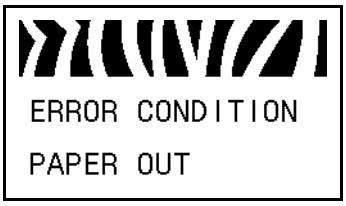
Display/ Print Engine Condition	Possible Cause	Recommended Solution
 The ERROR light flashes.	The printhead was replaced with one that is not a genuine Zebra™ printhead.	Install a genuine Zebra™ printhead.
	The Early Warning for Maintenance feature is enabled, and the printhead has reached the end of the specified interval for cleaning. See *Early Warning for Maintenance* on page 76 for more information.	1. Clean the printhead. 2. On the control panel, go to the **HEAD CLEANED?** menu item. 3. Press **PLUS** to select YES to reset the Early Warning for Maintenance printhead cleaning counter.
 The print engine stops; the ERROR light flashes.	The printhead is not fully closed.	Close printhead completely.
	The head open sensor is not working properly.	Call a service technician.
 The print engine stops; the MEDIA light is on; the ERROR light flashes.	The media is not loaded or is loaded incorrectly.	Load media correctly. See *Load Ribbon and Media* on page 55.
	Misaligned media sensor.	Check position of the media sensor.
	The print engine is set for noncontinuous media, but continuous media is loaded.	Install proper media type, or reset print engine for current media type and perform calibration.

Table 15 • Error Messages (Continued)

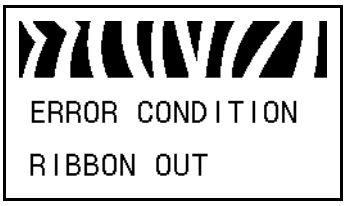
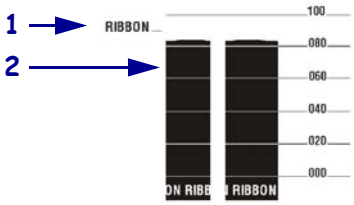
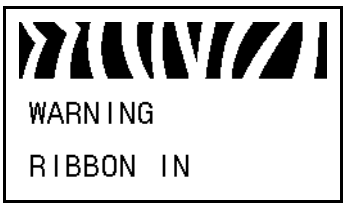
Display/ Print Engine Condition	Possible Cause	Recommended Solution
 The print engine stops; the RIBBON light is on; the ERROR light flashes.	In thermal transfer mode, ribbon is not loaded or incorrectly loaded.	Load ribbon correctly. See *Load Ribbon and Media* on page 55.
	In thermal transfer mode, the ribbon sensor is not detecting ribbon.	**1.** Load ribbon correctly. See *Load Ribbon and Media* on page 55. **2.** Calibrate the print engine. See *Calibrate the Ribbon and Media Sensors* on page 94.
	In thermal transfer mode, media is blocking the ribbon sensor.	**1.** Load media correctly. See *Load Ribbon and Media* on page 55. **2.** Calibrate the print engine. See *Calibrate the Ribbon and Media Sensors* on page 94.
	In thermal transfer mode, the print engine did not detect the ribbon even though it is loaded correctly.	**1.** Print a sensor profile. See *Print a Sensor Profile* on page 78. The ribbon out threshold (**1**) is likely too high, above the black area that indicates where the ribbon is detected (**2**).  **2.** Calibrate the print engine (see *Calibrate the Ribbon and Media Sensors* on page 94) or load print engine defaults (see options under *Exit Setup Mode* on page 15).
	If you are using direct thermal media, the print engine is waiting for ribbon to be loaded because it is incorrectly set for Thermal Transfer mode.	Set the print engine for Direct Thermal mode. See *Print Method* on page 70.
 The RIBBON light is on; the ERROR light flashes.	Ribbon is loaded, but the print engine is set for direct thermal mode.	Ribbon is not required with direct thermal media. If you are using direct thermal media, remove the ribbon. This error message will not affect printing.
		If you are using thermal transfer media, which requires ribbon, set the print engine for Thermal Transfer mode. See *Print Method* on page 70.

Table 15 • Error Messages (Continued)

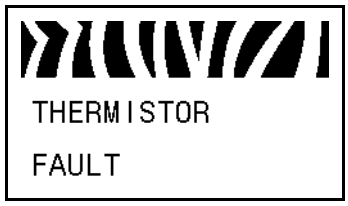
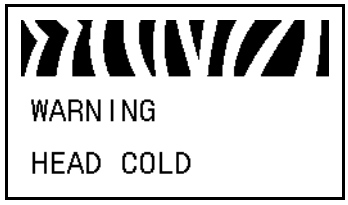
Display/ Print Engine Condition	Possible Cause	Recommended Solution
 The ERROR light flashes.	The printhead has a faulty thermistor.	Call a service technician.
 The print engine prints while the ERROR light flashes.	 **Caution** • An improperly connected printhead data or power cable can cause this error message. The printhead may be hot enough to cause severe burns. Allow the printhead to cool.	
	The printhead temperature is approaching its lower operating limit.	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.
	The printhead data cable is not properly connected.	**Caution** • Turn off (**O**) the print engine before performing this procedure. Failure to do so can damage the printhead. **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.
	The printhead has a faulty thermistor.	Call a service technician.
 The print engine stops; the ERROR light flashes.	 **Caution** • The printhead may be hot enough to cause severe burns. Allow the printhead to cool.	
	The printhead is over temperature.	Allow the print engine to cool. Printing automatically resumes when the printhead elements cool to an acceptable operating temperature.

Table 15 • Error Messages (Continued)

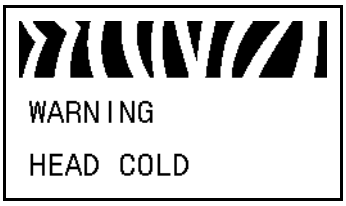
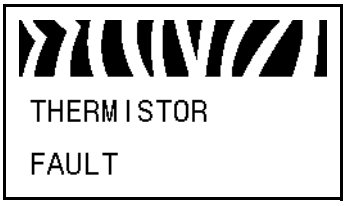
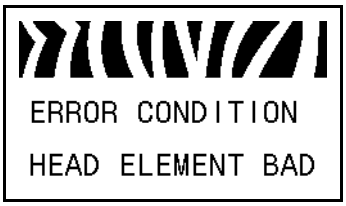
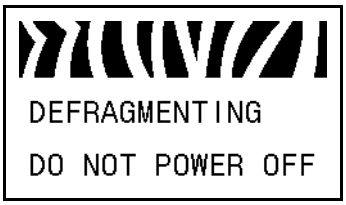
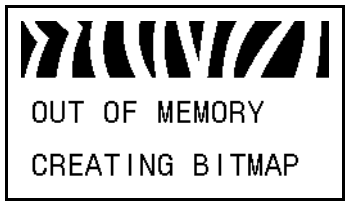
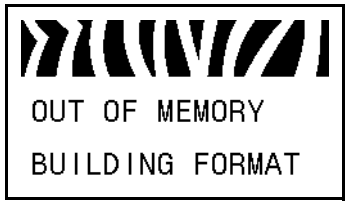
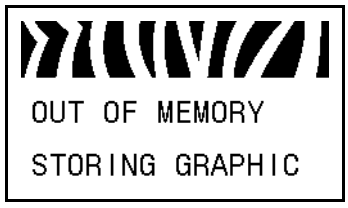
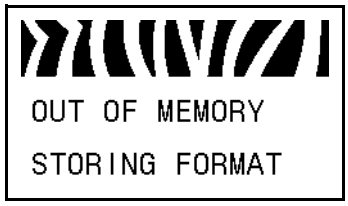
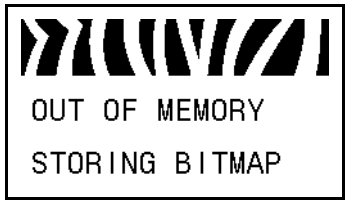
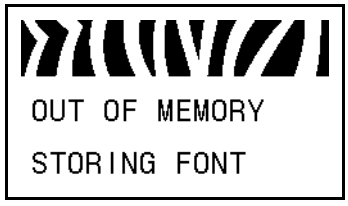
Display/ Print Engine Condition	Possible Cause	Recommended Solution
   The print engine stops; the ERROR light is on; the print engine cycles through these three messages.	 **Caution** • An improperly connected printhead data or power cable can cause these error messages. The printhead may be hot enough to cause severe burns. Allow the printhead to cool.	
	The printhead data cable is not properly connected.	**Caution** • Turn off (**O**) the print engine before performing this procedure. Failure to do so can damage the printhead. **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.
	The printhead has a faulty thermistor.	Call a service technician.
 The print engine stops.	The print engine is defragmenting memory.	**Caution** • Do NOT turn off the print engine power during defragmenting. Doing so can damage the print engine. Allow the print engine to finish defragmenting. If you get this error message frequently, check your label formats. Formats that write to and erase memory frequently may cause the printer to defragment often. Using properly coded label formats usually minimizes the need for defragmenting. If this error message does not go away, contact Technical Support. The print engine requires service.

Table 15 • Error Messages (Continued)

Display/ Print Engine Condition	Possible Cause	Recommended Solution
     	There is not enough memory to perform the function specified on the second line of the error message.	Free up some of the print engine's memory by adjusting the label format or print engine parameters. One way to free up memory is to adjust the print width to the actual width of the label instead of leaving the print width set to the default. See *Print Width* on page 71. Ensure that the device, such as a FLASH memory card, is installed and not write protected or full. Ensure that the data is not directed to a device that is not installed or is unavailable. Call a service technician.

Communications Problems

Table 16 identifies problems with communications, the possible causes, and the recommended solutions.

Table 16 • 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 settings. See *Port Settings* on page 91.
		If you are using serial communication, make sure that you are using a null modem cable or a null modem adapter.
		Check the printer's handshake protocol setting. The setting used must match the one being used by the host computer. See *Set the Host Handshake Protocol Value* on page 93.
		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 Table 3 on page 49 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 the Control Prefix Character Value* on page 88 and *Set the Delimiter Character Value* on page 89.
	Incorrect data is being sent to the print engine.	Check the communication settings on the computer. Ensure that they match the print engine settings.
		If the problem continues, check the label format.

Miscellaneous Issues

Table 17 identifies miscellaneous issues with the print engine, the possible causes, and the recommended solutions.

Table 17 • Miscellaneous Print Engine Problems

Problem	Possible Cause	Recommended Solution
The control panel display shows a language that I cannot read	The language parameter was changed through the control panel or a firmware command.	1. On the control panel display, press **SETUP**. 2. Press **LEFT ARROW** once to move to the LANGUAGE parameter. 3. Use **PLUS (+)** or **MINUS (-)** to scroll through the language selections. The selections for this parameter are displayed in the actual languages to make it easier for you to find one that you are able to read. 4. Select the language that you want to display.
The display is missing characters or parts of characters	The display may need replacing.	Call a service technician.
Changes in parameter settings did not take effect	Some parameters are set incorrectly.	1. Check the parameters and change or reset if necessary. 2. Turn the print engine off (**O**) and then on (**I**).
	A firmware command (such as `device.command_override`) turned off the ability to change the parameter.	Refer to the *Programming Guide for ZPL, ZBI, Set-Get-Do, Mirror, and WML* or call a service technician.
	A firmware command changed the parameter back to the previous setting.	
	If the problem persists, there may be a problem with the main logic board.	Call a service technician.
Non-continuous labels are being treated as continuous labels.	The print engine was not calibrated for the media being used.	Calibrate the printer. See *Calibrate the Ribbon and Media Sensors* on page 94.
	The print engine is configured for continuous media.	Set the print engine for the correct media type (gap/notch, continuous, or mark). See *Media Type* on page 70.

Table 17 • Miscellaneous Print Engine Problems (Continued)

Problem	Possible Cause	Recommended Solution
All indicator lights are on, nothing is on the display (if the printer has a display), and the print engine locks up.	Internal electronic or firmware failure.	Call a service technician.
The 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 self tests produce sample printouts and provide specific information that helps determine the operating conditions for the print engine.

Important • Use full-width media when performing self tests. If your media is not wide enough, the test labels may print on the platen roller. To prevent this from happening, check the print width, and ensure that the width is correct for the media that you are using.

Each self test is enabled by pressing a specific control panel key or combination of keys while turning on (**I**) the print engine power. 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 it off (**O**) and then on (**I**).

Power-On Self Test

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

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

1. Turn on (**I**) the print engine.

   The POWER LED illuminates. The other control panel LEDs and the LCD monitor the progress and indicate the results of the individual tests. All messages during the POST display in English; however, if the test fails, the resulting messages cycle through the international languages as well.

CANCEL Self Test

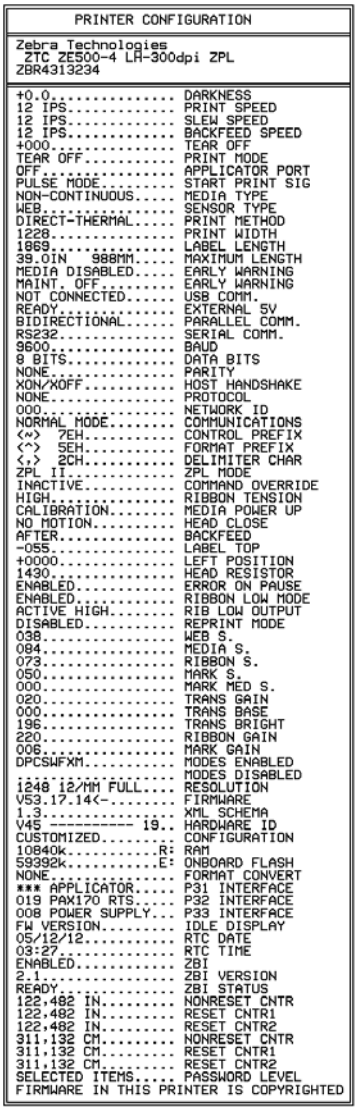
The CANCEL self test prints a printer configuration label. For other ways to print this label, see *Print Information* on page 78.

To perform the CANCEL Self Test, complete these steps:

1. Turn off (**O**) the print engine.
2. Press and hold **CANCEL** while turning on (**I**) the print engine. Hold **CANCEL** until the first control panel light turns off.

   The printer prints a printer configuration label (Figure 14).

Figure 14 • Sample Printer Configuration Label



```
        PRINTER CONFIGURATION

Zebra Technologies
 ZTC ZE500-4 LH-300dpi ZPL
ZBR4313234

+0.0............... DARKNESS
12 IPS............. PRINT SPEED
12 IPS............. SLEW SPEED
12 IPS............. BACKFEED SPEED
+000............... TEAR OFF
TEAR OFF........... PRINT MODE
OFF................ APPLICATOR PORT
PULSE MODE......... START PRINT SIG
NON-CONTINUOUS..... MEDIA TYPE
WEB................ SENSOR TYPE
DIRECT-THERMAL..... PRINT METHOD
1228............... PRINT WIDTH
1869............... LABEL LENGTH
39.0IN   988MM..... MAXIMUM LENGTH
MEDIA DISABLED..... EARLY WARNING
MAINT. OFF......... EARLY WARNING
NOT CONNECTED...... USB COMM.
READY.............. EXTERNAL 5V
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
INACTIVE........... COMMAND OVERRIDE
HIGH............... RIBBON TENSION
CALIBRATION........ MEDIA POWER UP
NO MOTION.......... HEAD CLOSE
AFTER.............. BACKFEED
-055............... LABEL TOP
+0000.............. LEFT POSITION
1430............... HEAD RESISTOR
ENABLED............ ERROR ON PAUSE
ENABLED............ RIBBON LOW MODE
ACTIVE HIGH........ RIB LOW OUTPUT
DISABLED........... REPRINT MODE
038................ WEB S.
084................ MEDIA S.
073................ RIBBON S.
050................ MARK S.
000................ MARK MED S.
020................ TRANS GAIN
000................ TRANS BASE
196................ TRANS BRIGHT
220................ RIBBON GAIN
006................ MARK GAIN
DPCSWFXM........... MODES ENABLED
................... MODES DISABLED
1248 12/MM FULL.... RESOLUTION
V53.17.14<-........ FIRMWARE
1.3................ XML SCHEMA
V45 ---------- 19.. HARDWARE ID
CUSTOMIZED......... CONFIGURATION
10840k..........R: RAM
59392k..........E: ONBOARD FLASH
NONE............... FORMAT CONVERT
*** APPLICATOR..... P31 INTERFACE
019 PAX170 RTS..... P32 INTERFACE
008 POWER SUPPLY... P33 INTERFACE
FW VERSION......... IDLE DISPLAY
05/12/12........... RTC DATE
03:27.............. RTC TIME
ENABLED............ ZBI
2.1................ ZBI VERSION
READY.............. ZBI STATUS
122,482 IN......... NONRESET CNTR
122,482 IN......... RESET CNTR1
122,482 IN......... RESET CNTR2
311,132 CM........ NONRESET CNTR
311,132 CM........ RESET CNTR1
311,132 CM........ RESET CNTR2
SELECTED ITEMS..... PASSWORD LEVEL
FIRMWARE IN THIS PRINTER IS COPYRIGHTED
```

PAUSE Self Test

This self test can be used to provide the test labels required when making adjustments to the print engine's mechanical assemblies or to determine if any printhead elements are not working. Figure 15 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 on (**I**) the print engine. Hold **PAUSE** until the first control panel light turns off.
   - The initial self test prints 15 labels at the print engine's slowest speed, and then automatically pauses the print engine. Each time **PAUSE** is pressed, an additional 15 labels print. Figure 15 shows a sample of the labels.

Figure 15 • 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, 50 labels print at the print engine's maximum speed.
3. To exit this self test at any time, press and hold **CANCEL**.

FEED Self Test

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

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

During this test, one set of labels is printed at 2 ips, and another set is printed at 6 ips. The darkness value starts at three settings lower than the print engine's current darkness value (relative darkness of –3) and increase until the darkness is three settings higher than the current darkness value (relative darkness of +3).

To perform a FEED self test, complete these steps:

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

   The print engine prints a series of labels (Figure 16) at various speeds and at darkness settings higher and lower than the darkness value shown on the configuration label.

Figure 16 • FEED Test Label

4. See Figure 17 and Table 18. Inspect the test labels and determine which one has the best print quality for your application. If you have a bar code verifier, use it to measure bars/spaces and calculate the print contrast. If you do not have a bar code verifier, use your eyes or the system scanner to choose the optimal darkness setting based on the labels printed in this self test.

Figure 17 • Bar Code Darkness Comparison

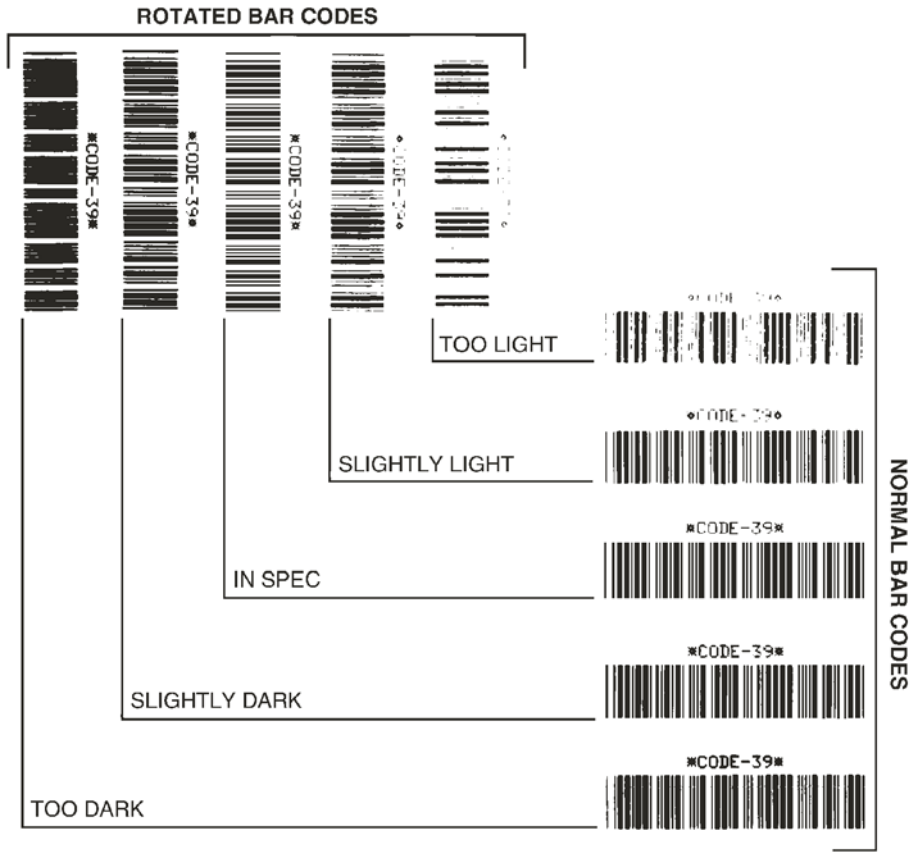


Table 18 • Judging Bar Code Quality

Print Quality	Description
Too dark	Labels that are too dark are fairly obvious. They may be readable but not “in-spec.” • The normal bar code bars increase in size. • The openings in small alphanumeric characters may fill in with ink. • Rotated bar code bars and spaces run together.
Slightly dark	Slightly dark labels are not as obvious. • The normal bar code will be “in-spec.” • Small character alpha numerics will be bold and could be slightly filled in. • The rotated bar code spaces are small when compared to the “in-spec” code, possibly making the code unreadable.

Table 18 • Judging Bar Code Quality (Continued)

Print Quality	Description
"In-spec"	The "in-spec" bar code can only be confirmed by a verifier, but it should exhibit some visible characteristics. • The normal bar code will have complete, even bars and clear, distinct spaces. • The rotated bar code will have complete, even bars and clear, distinct spaces. Although it may not look as good as a slightly dark bar code, the bar code will be "in-spec." • In both normal and rotated styles, small alphanumeric characters look complete.
Slightly light	Slightly light labels are, in some cases, preferred to slightly dark ones for "in-spec" bar codes. • Both normal and rotated bar codes will be in spec, but small alphanumeric characters may not be complete.
Too light	Labels that are too light are obvious. • Both normal and rotated bar codes have incomplete bars and spaces. • Small alphanumeric characters are unreadable.

5. Note the relative darkness value and the print speed printed on the best test label.
6. Add or subtract the relative darkness value from the darkness value specified on the configuration label. The resulting numeric value is the best darkness value for that specific label/ribbon combination and print speed.
7. If necessary, change the darkness value to the darkness value on the best test label.
8. If necessary, change the print speed to the same speed as on the best test label.

FEED + PAUSE Self Test

Performing this self test temporarily resets the print engine configuration to the factory default values. These values are active only until power is turned off unless you save them permanently in memory. If the factory default values are permanently saved, a sensor calibration procedure must be performed. (See *Calibrate the Ribbon and Media Sensors* on page 94.)

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

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

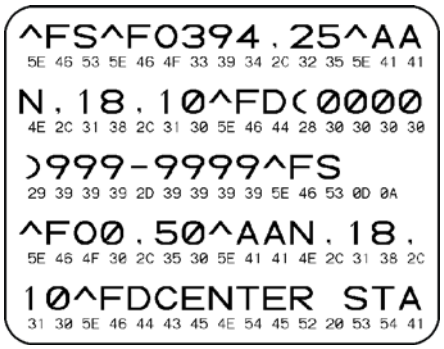
   The print engine configuration is reset to the factory default values. No labels print at the end of this test.

Communication Diagnostics Test

The communication diagnostics test is a troubleshooting tool for checking the interconnection between the print engine and the host computer. When the printer is in diagnostics mode, it prints all data received from the host computer as straight ASCII characters with the hex values below the ASCII text. The print engine prints all characters received, including control codes such as CR (carriage return). Figure 18 shows a typical test label from this test.

Note • The test label prints upside-down.

Figure 18 • Communication Diagnostics Test Label



To use communication diagnostics mode, complete these steps:

1. Set the print width equal to or less than the label width being used for the test. See *Print Width* on page 71 for more information.
2. Set the DIAGNOSTICS MODE option to ENABLED. For methods, see *Communication Diagnostics Mode* on page 81.

   The printer enters diagnostics mode and prints any data received from the host computer on a test label
3. Check the test label for error codes. For any errors, check that your communication parameters are correct.

   Errors show on the test label as follows:

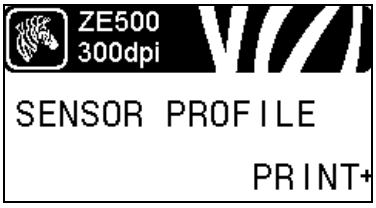
   - FE indicates a framing error.
   - OE indicates an overrun error.
   - PE indicates a parity error.
   - NE indicates noise.
4. Turn the print engine off (**O**) and then back on (**I**) to exit this self test and return to normal operation.

Sensor Profile

Use the sensor profile image (which will extend across several actual labels or tags) to troubleshoot the following situations:

- The printer experiences difficulty in determining gaps (web) between labels.
- The printer incorrectly identifies preprinted areas on a label as gaps (web).
- The printer cannot detect ribbon.

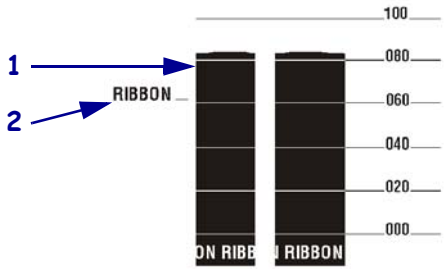
With the printer in the Ready state, print a sensor profile in one of these ways:

Using the buttons on the control panel	**a.** Turn off (**O**) the print engine. **b.** Press and hold **FEED + CANCEL** while turning on (**I**) the print engine. **c.** Hold **FEED + CANCEL** until the first control panel light turns off.
Using ZPL	**a.** Send the ~JG command to the printer. See the *Zebra Programming Guide* for more information about this command.
Using the control panel menu items	**a.** On the control panel display, navigate to the following item. See *Control Panel Display* on page 13 for information about using the control panel and accessing the menus.  **b.** Press **PLUS (+)** to select PRINT.

Compare your results to the examples shown in this section. If the sensitivity of the sensors must be adjusted, calibrate the printer (see *Calibrate the Ribbon and Media Sensors* on page 94).

Ribbon Sensor Profile (Figure 19) The bars (**1**) on the sensor profile indicate the ribbon sensor readings. The ribbon sensor threshold setting is indicated by the word RIBBON (**2**). If the ribbon readings are below the threshold value, the print engine does not acknowledge that ribbon is loaded.

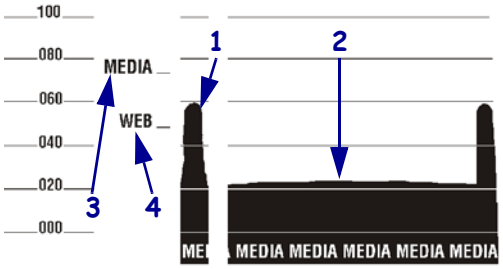
Figure 19 • Sensor Profile (Ribbon Section)



Media Sensor Profile (Figure 20) The media sensor readings are shown as bars and flat areas on the sensor profile (Figure 20). The bars (**1**) indicate gaps between labels (the web), and the low areas (**2**) indicate where labels are located. If you compare the sensor profile printout to a blank length of your media, the bars should be the same distance apart as the gaps on the media. If the distances are not the same, the print engine may be having difficulty determining where the gaps are located.

The media sensor threshold settings are shown by the words MEDIA (**3**) for the media threshold and WEB (**4**) for the web threshold. Use the numbers to the left of the sensor readings to compare the numeric readings to the sensor settings.

Figure 20 • Sensor Profile (Media Section)



6

Specifications

This section lists general printer specifications, printing specifications, ribbon specifications, and media specifications.

Contents

General Specifications

Model		ZE500-4	ZE500-6
Height		11.8 in. (300 mm)	11.8 in. (300 mm)
Width		9.6 in. (245 mm)	9.6 in. (245 mm)
Depth		14.95 in. (380 mm)	17.23 in (438 mm)
Weight		34 lb (15.4 kg)	38 lb (17.3 kg)
Electrical		Universal power supply with power-factor correction 100–240 VAC, 47-63 Hz	
Temperature	Operating	Thermal Transfer: 40° to 104°F (5° to 40°C) Direct Thermal: 32° to 104°F (0° to 40°C)	
	Storage	–40° to 160°F (–40° to 71°C)	
Relative Humidity	Operating	20% to 85%, non-condensing	
	Storage	5% to 95%, non-condensing	

Communication Interfaces		• High-speed bidirectional parallel interface, IEEE 1284:Compatibility mode, EPC, Nibble mode.
		• High-speed serial interfaces:
		  • RS-232C with DB9F connector
		  • Configurable baud rate (300-115,200), parity, data bits, and stop bits
		  • Software (XON/XOFF) or hardware (DTR/DSR) communication handshake protocols
		• USB 2.0
		• ZebraNet 10/100 Print Server
		• ZebraNet b/g Print Server
		• Applicator interface with DB15F connector
		+5V I/O and +24V to +28V I/O versions available	

Printing Specifications

Print resolution		203 dpi (dots per inch) (8 dots/mm)
		300 dpi (12 dots/mm)
Dot size (nominal) (width x length)	203 dpi	0.0049 in. x 0.0052 in. (0.125 mm x 0.132 mm)
	300 dpi	0.0033 in. x 0.0043 in. (0.084 mm x 0.110 mm)
Maximum print width	ZE500-4	4.1 in. (104 mm)
	ZE500-6	6.6 in. (168 mm)
Programmable constant print speeds	ZE500-4	2.0 in. (51 mm) through 12 in. (305 mm) per second in 1-inch (25 mm) increments
	ZE500-6, 203 dpi	2.0 in. (51 mm) through 12 in. (305 mm) per second in 1-inch (25 mm) increments
	ZE500-6, 300 dpi	2.0 in. (51 mm) through 10 in. (203 mm) per second in 1-inch (25 mm) increments

Ribbon Specifications

Ribbon wound coated side out		
Ribbon width*	ZE500-4	1.0 to 4.2 in. (25 to 107 mm)
	ZE500-6	3.0 to 7.1 in. (76 to 180 mm)
Maximum ribbon length		1970 feet (600 m)
Maximum ribbon roll size	outside diameter	4.0 in. (102 mm)
	inside diameter	1.0 in. (25 mm)

* Zebra recommends using ribbon that is at least as wide as the media to protect the printhead from wear.

Media Specifications

Model		ZE500-4	ZE500-6
Minimum label length	Applicator mode, backfeed on	0.50 in.* (12.7 mm*)	3.0 in. (76.2 mm)
	Applicator mode, backfeed off	0.25 in.* (6.4 mm*)	1.0 in. (25.4 mm)
	Stream mode	0.50 in.* (12.7 mm*)	3.0 in. (76.2 mm)
	Rewind mode	0.25 in.* (6.4 mm*) “loose loop”	1.0 in. (25.4 mm) “loose loop”
	Tear-off mode, backfeed on	0.50 in.* (12.7 mm*)	3.0 in. (76.2 mm)
	Tear-off mode, backfeed off	0.25 in.* (6.4 mm*)	1.0 in. (25.4 mm)
	RFID mode	**	N/A
Media width (label and liner)	Minimum	0.625 in.* (16 mm*)	3.0 in. (76 mm)
	Maximum	4.5 in.* (114 mm*)	7.1 in. (180 mm)
	RFID labels	**	N/A
Media thickness (includes liner, if any)	Minimum	0.0053 in (0.135 mm)	0.003 in (0.076 mm)
	Maximum	0.010 in. (0.254 mm)	0.012 in. (0.305 mm)
Inter-label gap	Minimum	0.079 in.* (2 mm*)	0.079 in. (2 mm)
	Preferred	0.118 in.* (3 mm*)	0.118 in. (3 mm)
	Maximum	0.157 in.* (4 mm*)	0.157 in. (4 mm)
	RFID labels	**	N/A
Ticket/tag notch size (width x length)		0.25 x 0.12 in. (6 x 3 mm)	
Hole diameter		0.125 in. (3 mm)	
Black mark length (parallel to inside media edge)		0.12 to 0.43 in. (3 to 11 mm)	
Black mark width (perpendicular to inside media edge)		> 0.43 in. (> 11 mm)	
Black mark location		within 0.040 in. (1 mm) of inside media edge	
Density, in Optical Density Units (ODU) (black mark media)		> 1.0 ODU	
Maximum media density (black mark media)		0.5 ODU	

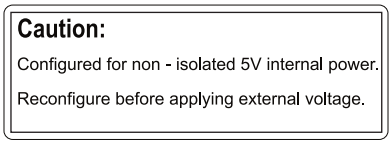
* Does not apply to RFID labels.

** This parameter varies for each transponder type.

A

Applicator Interface Board Reconfiguration

The print engine ships with the following caution label over the optional applicator port:



- For +5V non-isolated mode (internal power), no configuration is necessary.
- For +5V to +28V isolated mode (external power), the jumpers on the applicator interface board must be reconfigured. Follow the instructions in this section.

Caution • Do not remove the caution label or apply external power until after the applicator interface board is reconfigured for isolated mode. Applying external power when the print engine is configured for internal power will damage your print engine.

Note • The graphics and steps in this procedure are for the right-hand (RH) print engine. Steps for a left-hand (LH) print engine may be slightly different.

Tools Required

Tools • You may need these tools to complete this procedure:

- ❑ Phillips Screwdriver Set
- ❑ Metric Hex Key (Allen Wrench) Set
- ❑ Antistatic Wriststrap and Mat
- ❑ Needle-nose pliers
- ❑ Torx Key Set
- ❑ Flashlight

Changing Jumper Settings for Isolated Mode

Caution • This installation must be performed by a qualified service technician.

To change from non-isolated mode (internal power) to isolated mode (external power), complete these steps:

Remove Power and Data Cables

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

   Connect yourself to an antistatic device.

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

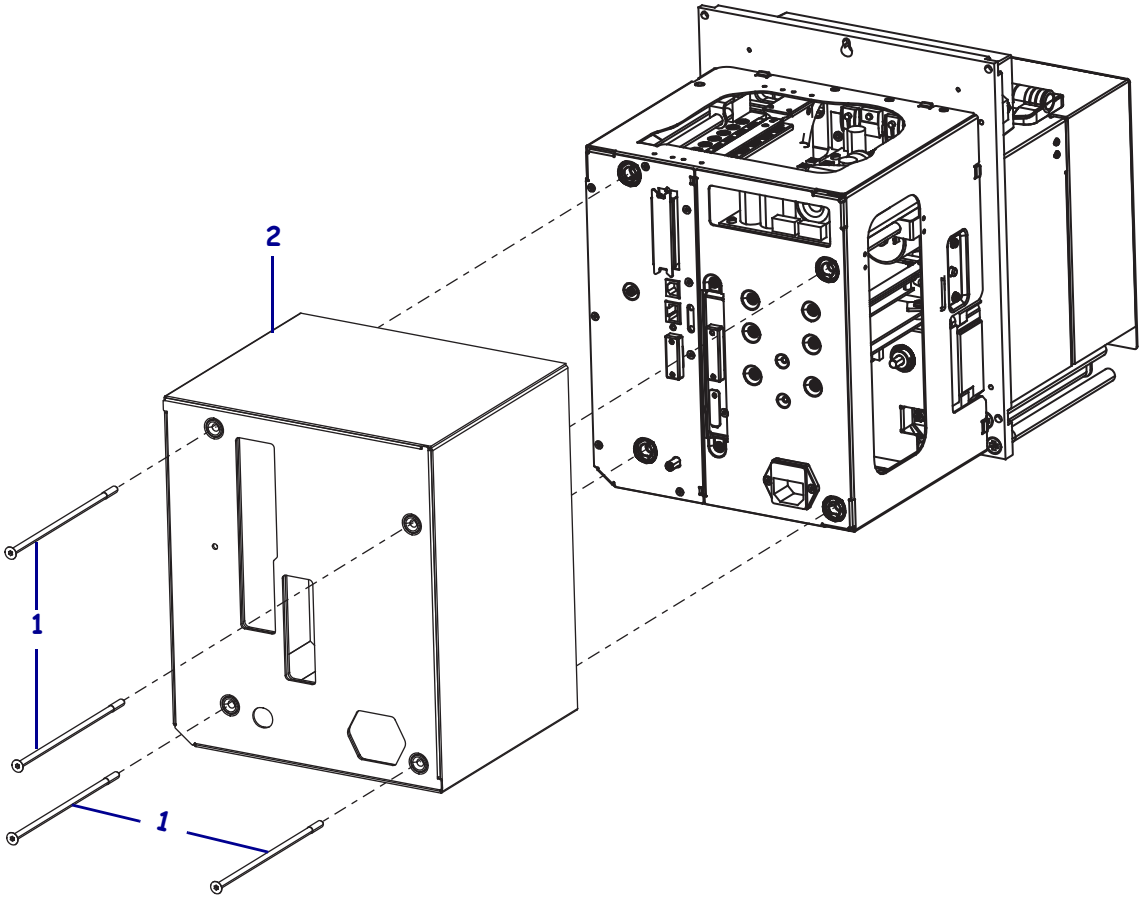
   Turn off (**O**) the printer and disconnect the AC power cord and all data cables.

Access the Electronics Compartment and Remove the Applicator Interface Board

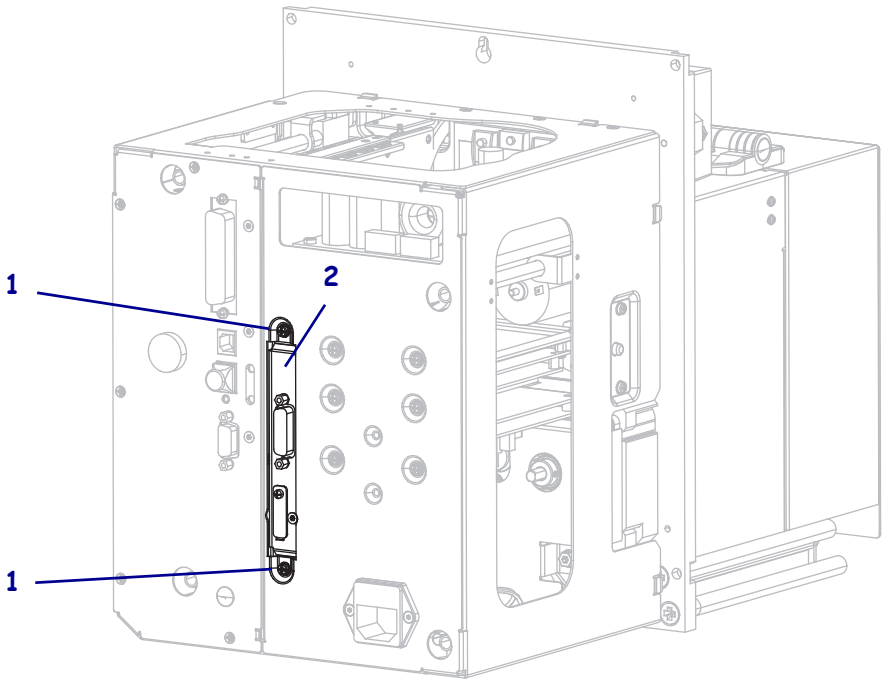
3. Does your applicator (or stand) permit open access to the rear of the print engine?

If you have…	Then…
Open access	You may swing the print engine open and work on it without removing the unit from the applicator. If you wish to remove the unit from the stand at any time, follow the instructions listed for the *Obstructed access* type applicator shown in this table. **a.** Go to step 4.
Obstructed access	You must remove the print engine from the applicator before you work on it. **a.** Remove the four corner mounting screws securing the print engine to the applicator. **b.** Loosen the center mounting bolt, but do not remove it. **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. **c.** Lift the print engine off the center mounting bolt and place on a workbench.

4. Remove the four long mounting screws (**1**) that secure the electronics cover, and then slide the electronics cover (**2**) off of the print engine.

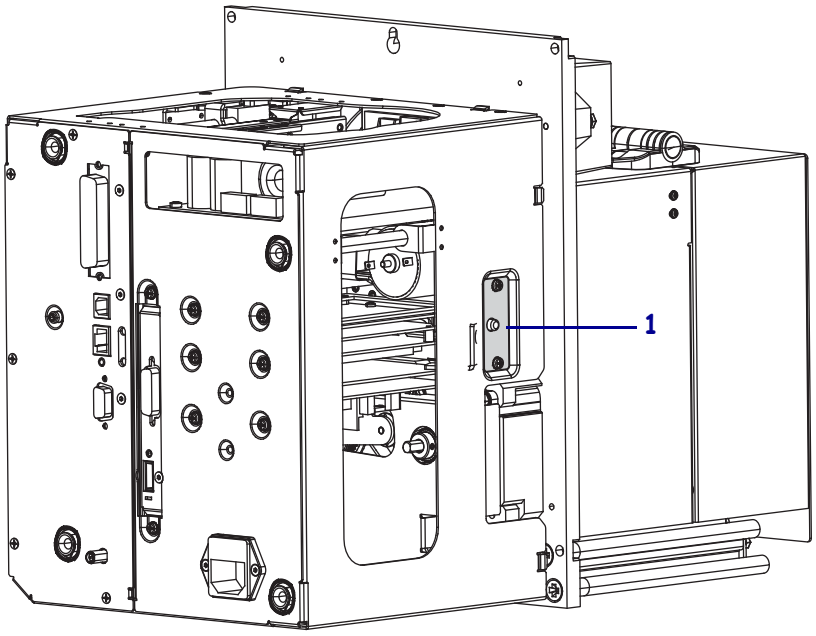


5. On the back of the applicator interface board, remove the two mounting screws (**1**) that secure the applicator interface board (**2**) to the back plane of the print engine.



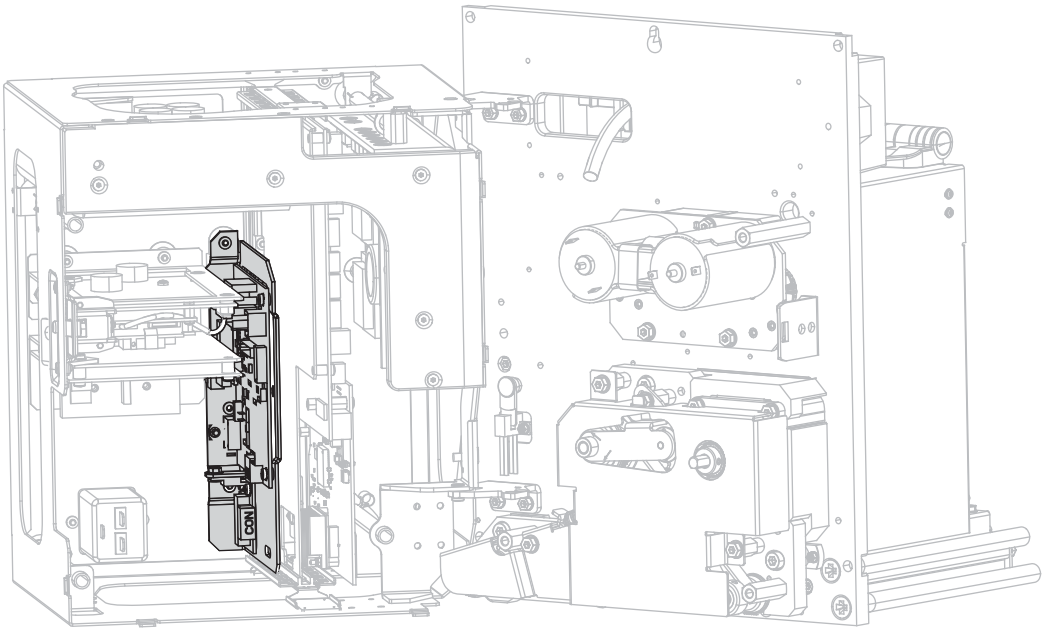
6. Locate the latch (**1**) on the side of the print engine.

Note • For right-hand models, the latch is on the right side when you are facing the back of the print engine. For left-hand models, the latch is on the left side.

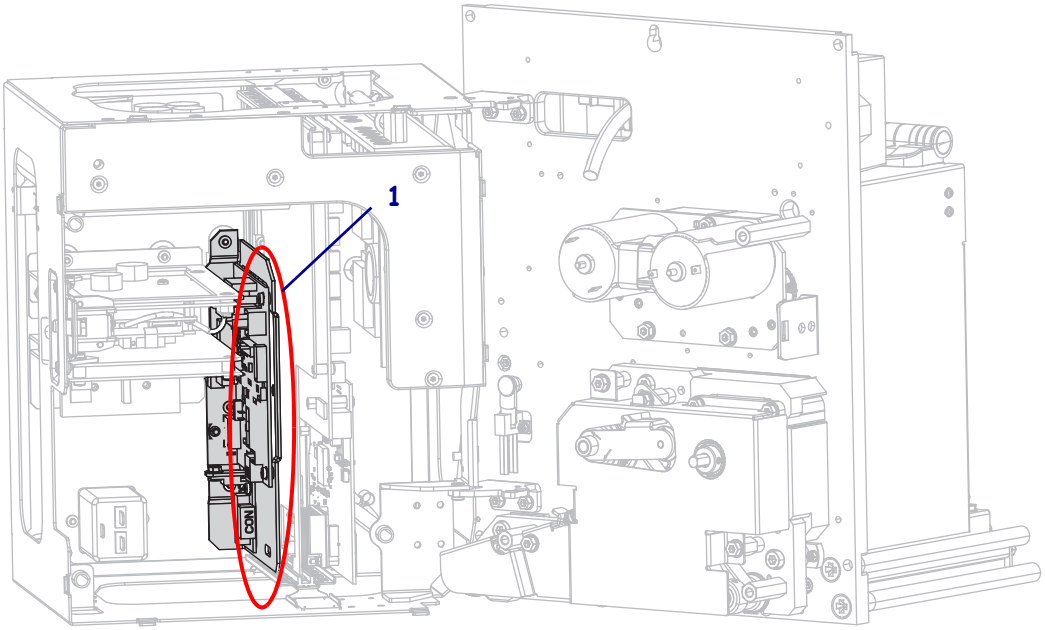


7. Press the latch, and then swing the electronics enclosure open.

8. Inside the print engine, locate the applicator interface board.



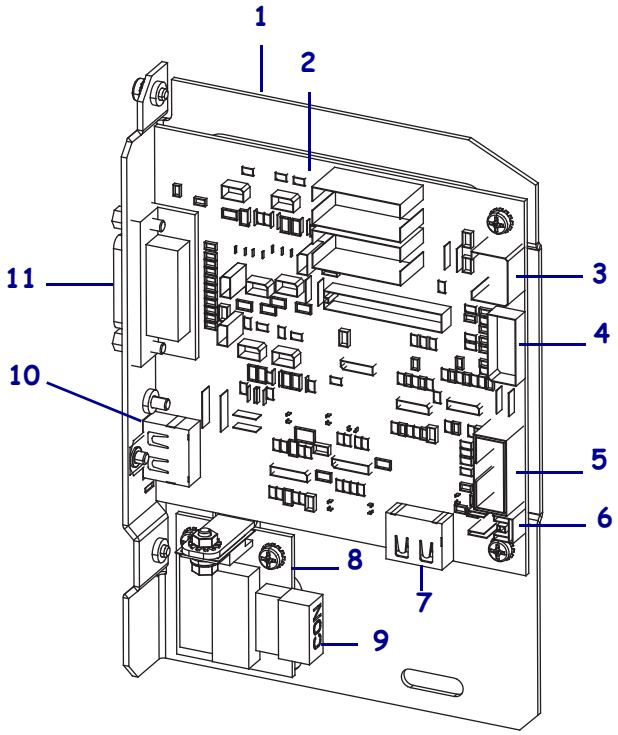
9. Disconnect the connectors (**1**) along the accessible edge of the applicator interface board. Note how the connectors are attached to assist with reattachment later in this procedure.



10. Gently pull the applicator interface board partially away from the back plane of the print engine.

Note • Avoid disconnecting or pinching any cables inside the electronics enclosure.

11. Disconnect the remaining connectors on the applicator interface board and the attached voltage regulator board.



1	Applicator interface board mounting plate	7	J7: Internal HDMI connector for control panel
2	Applicator interface board	8	Voltage regulator board
3	J3: Applicator interface power cable	9	J1 (on voltage reg. board): Power cable
4	J1: Locking SP comm cable	10	J2: External HDMI connector for deported control panel
5	J8: Control panel SPI extension (ribbon) cable	11	J6: Applicator interface cable
6	J9: Door-open sensor cable		

12. Remove the applicator interface board from the print engine.

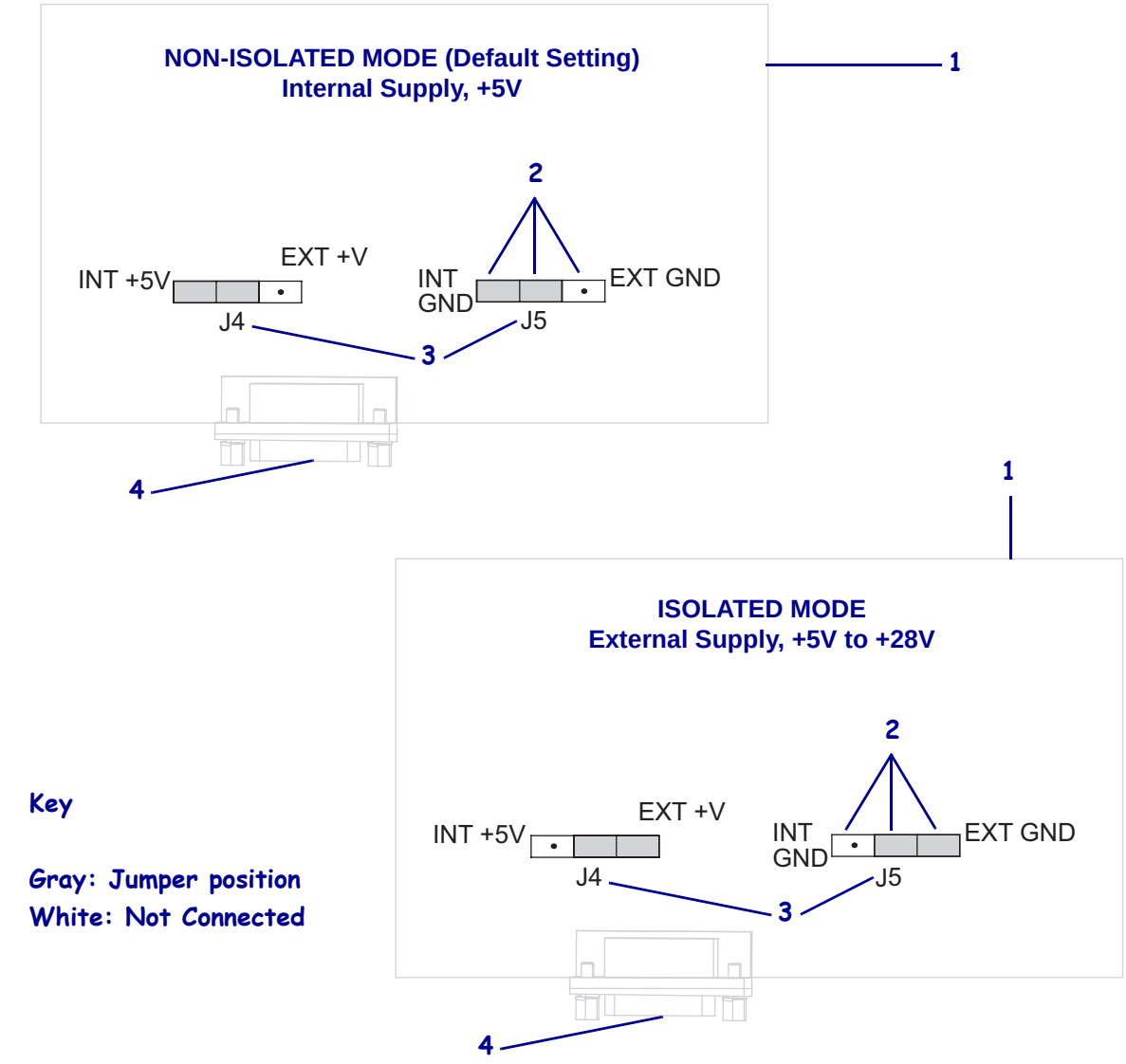
Adjust Jumper Placement for +5V to +28V Isolated Mode

13. Locate the areas marked J4 and J5.

14.

Caution • Do not apply external power until after the board is reconfigured for Isolated Mode.

Move the jumpers on both J4 and J5 to cover the pins as shown from the default of Non-Isolated Mode to Isolated Mode. You may use needle-nose pliers, if necessary.



1	Simulated applicator interface board
2	Pins
3	Labels on the applicator interface board
4	Applicator port

Reinsert and Reconnect the Applicator Interface Board

15. Gently insert the applicator interface board into the print engine, and slide it toward the back plane.

Note • Avoid disconnecting or pinching any cables inside the electronics enclosure.

16. Reconnect the cables that were disconnected in step 9 and step 11. See Figure 21 on page 149 for most of the connector locations.

a. Reconnect the control panel.
Which type of control panel are you using?

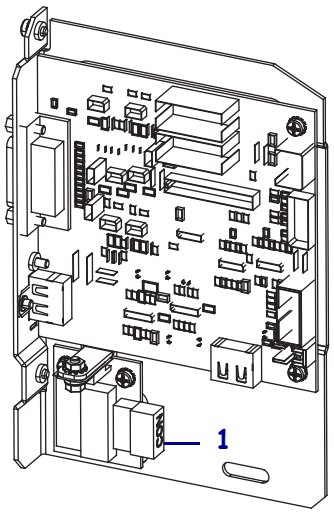
If your control panel is…	Then…
Standard (attached to the top of the print engine)	**1.** Connect the HDMI cable to J7 on the applicator interface board. **2.** Continue with step b.
Deported (attached away from the print engine)	**1.** Reconnect the HDMI cable to J2 on the applicator interface board. This connector is accessible from the back plane. **2.** Continue with step b.

b. Connect the locking SP comm cable to J1 on the applicator interface board.

Important • This applicator interface board requires the use of an SP comm cable with a ferrite. The locking connector is the one closest to the ferrite.

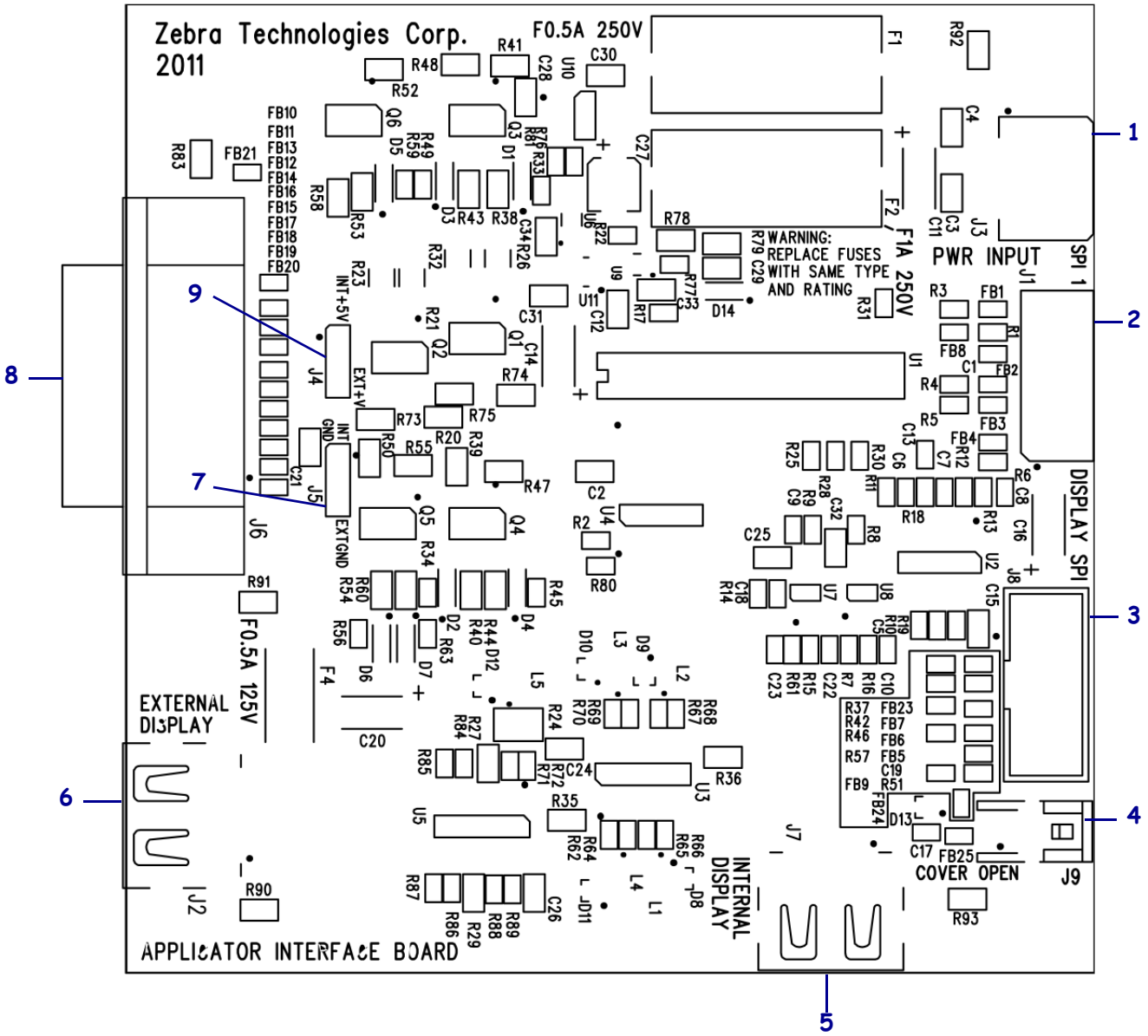
c. Connect the six-pin connector for the power cable to J3 on the applicator interface board.

d. Connect the four-pin connector (arranged in a line) for the power cable to J1 (**1**) on the voltage regulator board.



e. Connect the door-open sensor to J9 on the applicator interface board.

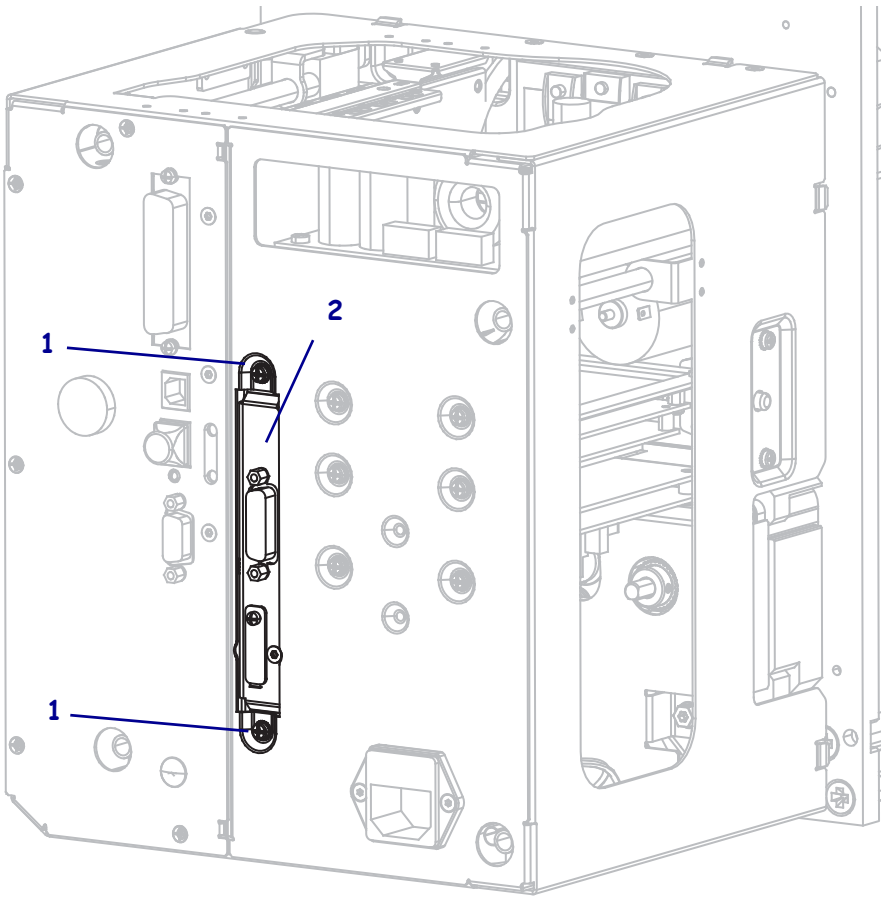
Figure 21 • Applicator Interface Board Connections



1	J3: Applicator interface power cable
2	J1: Locking SP comm cable
3	J8: Control panel SPI extension (ribbon) cable
4	J9: Door-open sensor cable
5	J7: Internal HDMI connector for control panel
6	J2: External HDMI connector for deported control panel
7	J5: Jumper
8	J6: Applicator interface cable
9	J4: Jumper

17. Align the mounting holes in the applicator interface board with the holes in the back plane of the print engine.

18. Reinstall the two mounting screws (**1**) to secure the applicator interface board (**2**) to the back plane of the print engine.



Close the Electronics Enclosure

19. Ensure that all wires are routed properly and are not causing any obstructions, and then carefully swing the electronics enclosure closed.

20. Slide the electronics cover onto the print engine.

21. Reinstall the four electronics cover mounting screws.

Reinstall the Print Engine in the Applicator (If Applicable)

22. To reinstall the print engine into the applicator, 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.

23. Replace the four corner mounting screws securing the print engine to the applicator.

24. Tighten the center mounting bolt.

Resume Printer Operation

25. Reconnect the AC power cord and interface cables.

26. Turn on (**I**) the print engine.

The installation is complete.

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.

barcode 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 *non-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.

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

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

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

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

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

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

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

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

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

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

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

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

ips (inches-per-second) The speed at which the label or tag is printed. Many Zebra print engines can print from 1 ips to 14 ips.

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

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

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.

linerless media Linerless media does not use backing to keep the layers of labels on a roll from sticking to one another. It is wound like a roll of tape, with the sticky side of one layer in contact with the non-sticky surface of the one below it. Individual labels may be separated by perforations, or they can be cut apart. Because there is no liner, more labels can potentially fit on a roll, cutting down the need to change media as often. Linerless media is considered an environmentally friendly option because no backing is wasted, and the cost per label can be considerably less than that of standard labels.

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

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

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

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

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

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

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

peel-off A mode of operation in which the print engine peels a printed label away from the backing and allows the user to remove it before another label is printed. Printing pauses until the label is removed.

print speed The speed at which printing occurs. For thermal transfer print engines, this speed is expressed in terms of ips (inches per second).

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 (vertical) or sides (horizontal) 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 barcode.

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 barcode symbol to be read incorrectly or not at all.

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