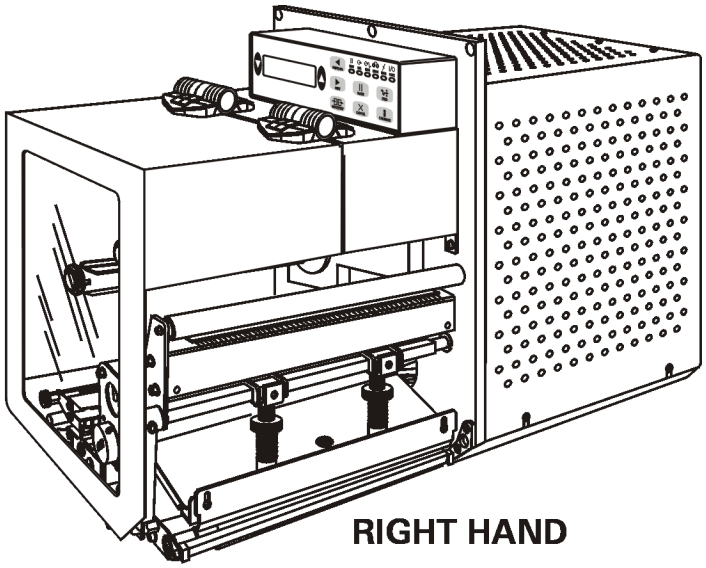
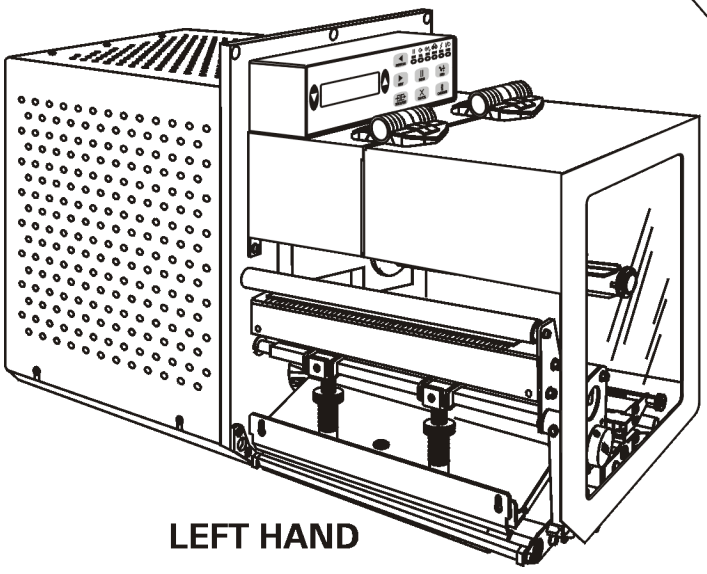
Zebra Technologies Corporation

Zebra 170*PAX3*™ -Series User's Guide



RIGHT HAND



LEFT HAND

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Product Improvements

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

FCC Compliance Statement

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 instructions 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.

In order to insure compliance, this print engine must be used with a Shielded Power Cord and Shielded Communication Cables.

"The user is cautioned that any changes or modifications not expressly approved by Zebra Technologies Corporation could void the user's authority to operate the equipment."

Canadian DOC Compliance Statement

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus as set out in the radio interference regulations of the Canadian Department of Communications.

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Table of Contents

Congratulations! You have just purchased a high-quality thermal demand print engine manufactured by the industry leader in quality, service, and value. For over 30 years, Zebra Technologies Corporation has provided customers with the highest caliber of products and support.

To create and print label formats, refer to the *ZPL II Programming Guide Volume I & II* (part #s 45541L and 45542L). This guide is available by contacting your distributor or Zebra Technologies Corporation. It is also available as a file to download from Zebra's web site "www.support.zebra.com". In addition, label preparation software is available. Contact your distributor or Zebra Technologies Corporation for further information.

The *Zebra 170PAX™-Series Maintenance Manual* (part # 49803L) contains the information you may need to properly maintain the print engine.

Zebra 170*PAX3* Print Engine

This user's guide contains information specific to the 172*PAX3* (203 dot/inch) and the 173*PAX3* (300 dot/inch) print engines manufactured by Zebra Technologies Corporation. Each of these print engines comes in either a right hand configuration (media moves from left to right) or a left hand configuration (media moves from right to left.)

Getting Started

Unpacking

Save the carton and all packing materials in case shipping is required.

Inspect the print engine for possible shipping damage:

- Check all exterior surfaces for damage.
- Raise the front cover and inspect for damage

If you discover shipping damage:

- Immediately notify the shipping company and file a damage report.
- Retain the carton and all packing material for inspection.
- Notify your local Zebra distributor of the damage.

Zebra Technologies Corporation is not responsible for any damage incurred during shipment of the print engine and will not cover the repair of this damage under its warranty policy. Any damage claim should be filed with the shipping company.

For shipping information, refer to "Appendix A" on page 69.

Print Engine Mounting

For specific information on mounting the print engine into an applicator, refer to "Appendix E" on page 85.

Communications

Refer to Figure 1 on page 7. The 170*PAX3*™-Series print engine comes standard with both an Electronics Industries Association (EIA) RS-232 serial interface (DB-25 Connector) and an IEEE 1284 Centronics®-compatible parallel interface. The serial interface is also configured for both RS-422/RS-485 single drop and RS-485 multi-drop serial interfaces.

Any of these four interface methods may be used to send commands and label formats from a host to the print engine. Print engine status can be sent back to the host by RS-232, RS-422, RS-485 and parallel interfaces.

A DB-15 Applicator Interface Connector provides communication between the print engine and the associated applicator hardware. In some applications, control signal timing may be a critical element in the performance of the print engine. Refer to "Appendix B" on page 73 for control signal descriptions.

WARNING! Connecting a data communications cable while the power is ON may damage the *PAX3* print engine.

NOTE: You must supply the interface cables for your applicator hardware. Refer to "Appendix B" on page 73 for specific cable requirements.

Print Engine Power

The Power Supply in the *PAX3*-Series print engine automatically detects the applied line voltage and works in the 90 to 264 VAC, 48 to 62 Hz range.

Refer to Figure 1 on page 7. The AC Power Cord must have an IEC230 connector on one end which plugs into the mating connector at the rear of the print engine. If a power cable was not included with your print engine, refer to "Appendix A" on page 69.

WARNING! For personnel and equipment safety, always use a three-prong plug with an earth ground connection to the AC Power Source.

Refer to Figure 7 on page 18 and insure that the front panel AC Power ON/OFF Switch is in the OFF (O) position before connecting the AC Power cord to a nearby electrical outlet.

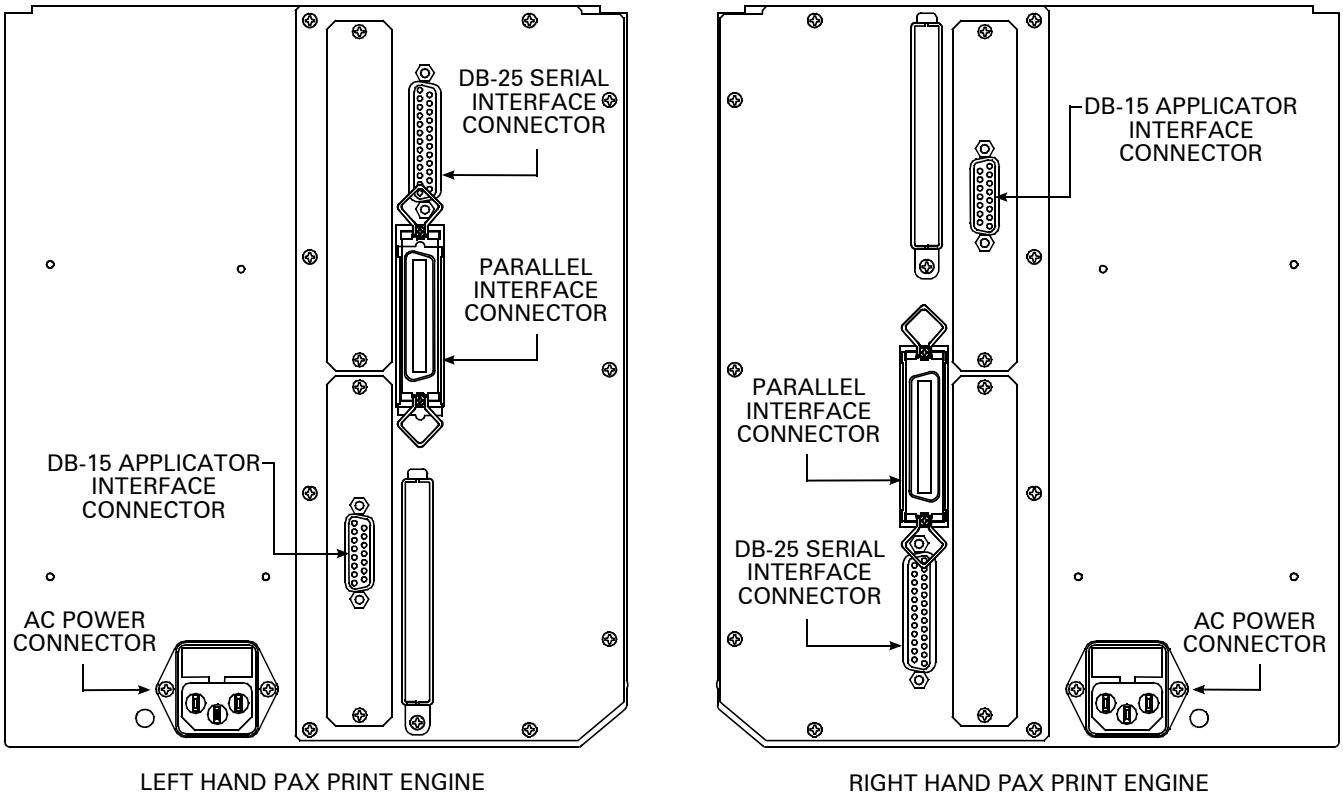

Figure 1. Cable Connections

If you have a right hand print engine (printed labels are presented on the right hand side of the unit), refer to Figure 2 while performing the procedure shown below. If you have a left hand unit (printed labels are presented on the left hand side of the unit), refer to Figure 3 on page 10.

1. Load the media on the media supply reel of the applicator (refer to the applicator's user's manual).
2. Grasp the thumb nut (A) and slide the outer media edge guide (B) as far out from the print engine frame as possible. (The thumb nut does not have to be loosened.)
3. Open the printhead assembly (C) by unlatching the printhead lock lever (D) from the locking pin (E).
4. Raise the pinch roller (F) by pressing down on the pinch roller assembly latch (G). Thread the media under the upper guide post (H), between the pinch roller and the associated rubber pinch roller, and under the printhead assembly (C) until approximately 30" (75 cm) of media extends out of the print engine.

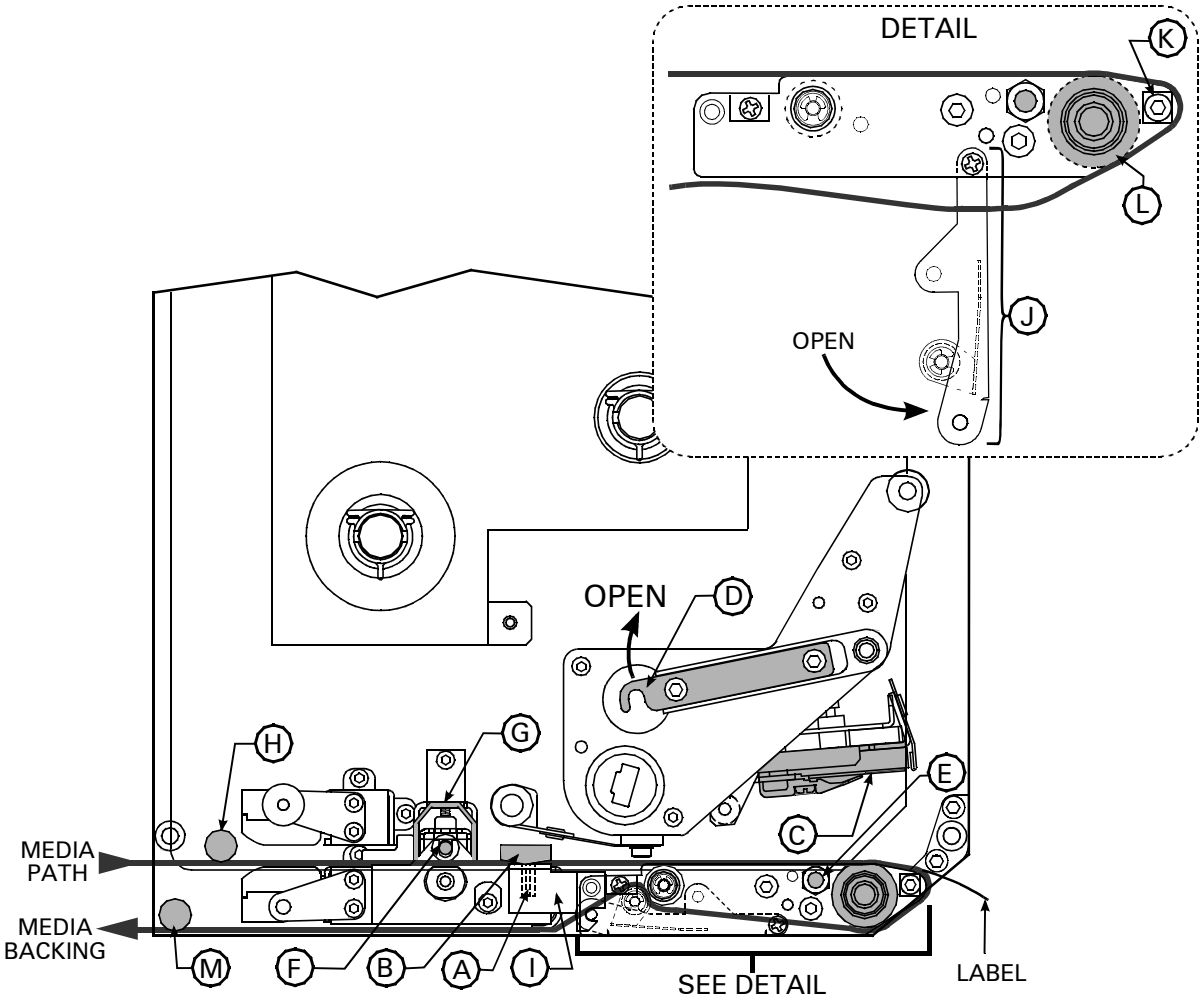

Figure 2. Media Loading (Right-Hand Units)

5. Ensure the media is aligned within the print path then close the printhead assembly (C) by rotating the printhead lock lever (D) until it latches onto the locking pin (E).
6. Secure the pinch roller (F) in position by pressing down on the top of the pinch roller latch (G) until the assembly snaps closed.
7. Position the outer media edge guide (B) so it just touches the outer edge of the media.
8. Raise the peel roller latch (I) and the peel roller assembly (J) will pivot down to a vertical position.
9. Thread the backing material around the peel bar (K), under the platen roller (L), and through the peel roller assembly (J). (See DETAIL.)

NOTE: If the applicator has an air tube, route the media between the air tube and the peel bar. <u>Do not thread the media over this tube!</u>

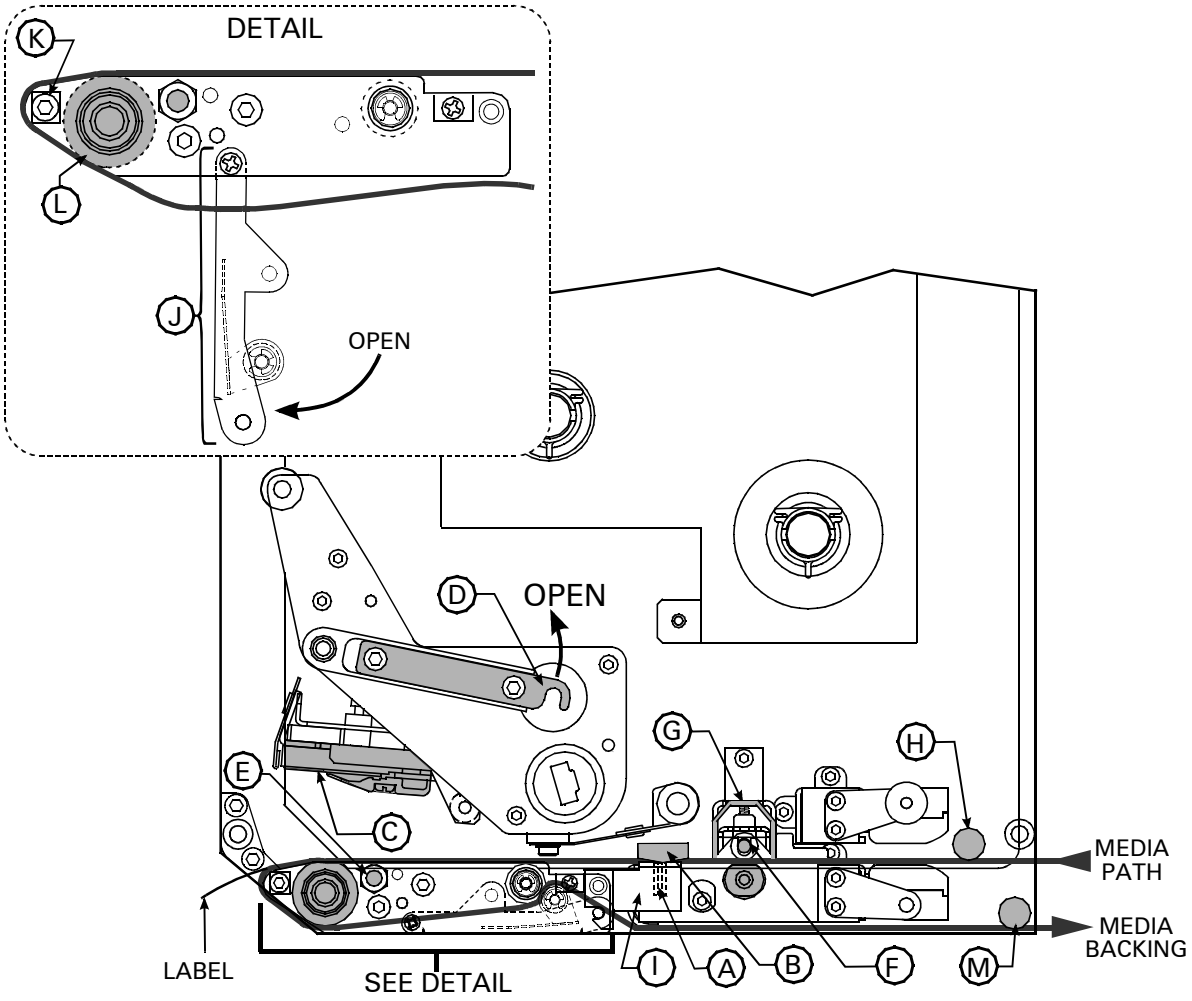

Figure 3. Media Loading (Left-Hand Units)

10. Rotate the peel roller assembly (J) up until it latches closed.

11. Thread the backing material under the lower guide post (M) and around the take-up spindle of the applicator (refer to the applicator's user's manual).

Ribbon Loading

To load ribbon, refer to Figure 4 on page 12 (for right-hand units) or Figure 5 on page 13 (for left-hand units).

NOTE: Do not load ribbon if the print engine is to be used in the direct thermal mode.

CAUTION: When installing the ribbon roll on the ribbon supply spindle, make sure to push the ribbon roll against the stop with the ribbon aligned squarely with its core. *Do not* use ribbon narrower than the media. If the printhead is not protected by the smooth backing of the ribbon, premature printhead failure may result due to excessive abrasion.

Right Hand Units

1. Push the ribbon roll onto the supply spindle (N) as far as it will go, so the ribbon feeds as shown in Figure 4 on page 12.

2. Install an empty ribbon core onto the ribbon take-up spindle (O).

3. Open the printhead assembly (C) by unlatching the print- head lock lever (D) from the locking pin (E).

4. Thread the ribbon below the lower ribbon guide roller (P), under the printhead assembly (C), and up and over the upper ribbon guide roller (Q) as shown in Figure 4. *Use caution not to crease or wrinkle the ribbon!*

5. Attach the ribbon to the take-up spindle core (use a label if needed) and wind for several turns in the direction shown in Figure 4.

6. Close the printhead assembly (C) by latching the printhead lock lever (D) onto the locking pin (E).

7. Insure the ribbon is located between the Ribbon Sensor and the Sensor Reflector positioned above it.

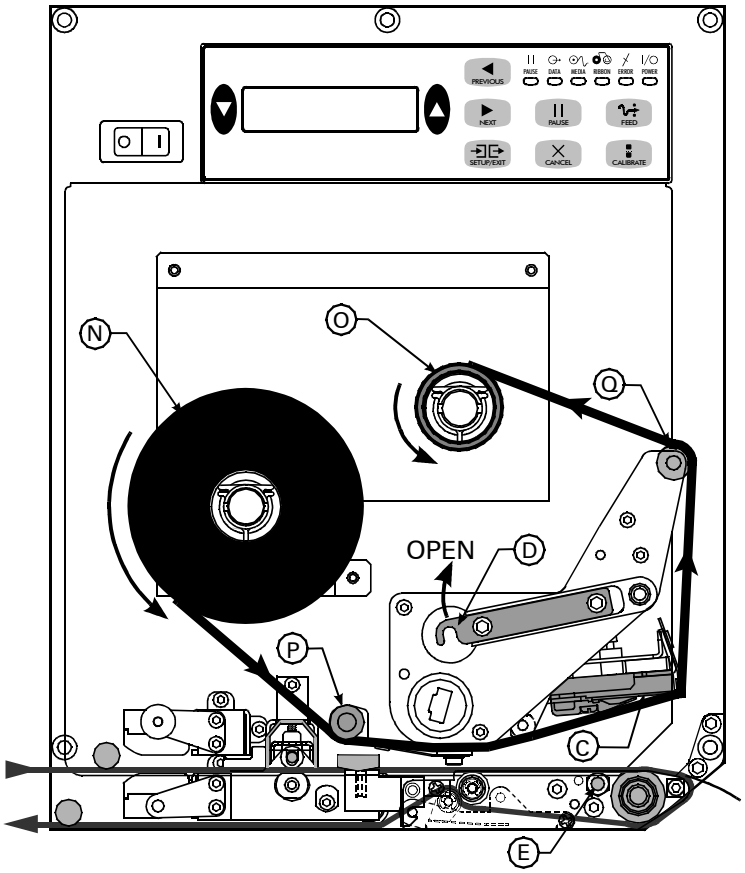

Figure 4. Ribbon Loading (Right-Hand Units)

Left Hand Units

1. Push the ribbon roll onto the supply spindle (N) as far as it will go, so the ribbon feeds as shown in Figure 5 on page 13.
2. Install an empty ribbon core onto the ribbon take-up spindle (O).
3. Open the printhead assembly (C) by unlatching the print- head lock lever (D) from the locking pin (E).
4. Thread the ribbon below the lower ribbon guide roller (P), under the printhead assembly (C), and up and over the upper ribbon guide roller (Q) as shown in Figure 5. *Use caution not to crease or wrinkle the ribbon!*
5. Attach the ribbon to the take-up spindle core (use a label if needed) and wind for several turns in the direction shown in Figure 5.
6. Close the printhead assembly (C) by latching the printhead lock lever (D) onto the locking pin (E).
7. Insure the ribbon is located between the Ribbon Sensor and the Sensor Reflector positioned above it.

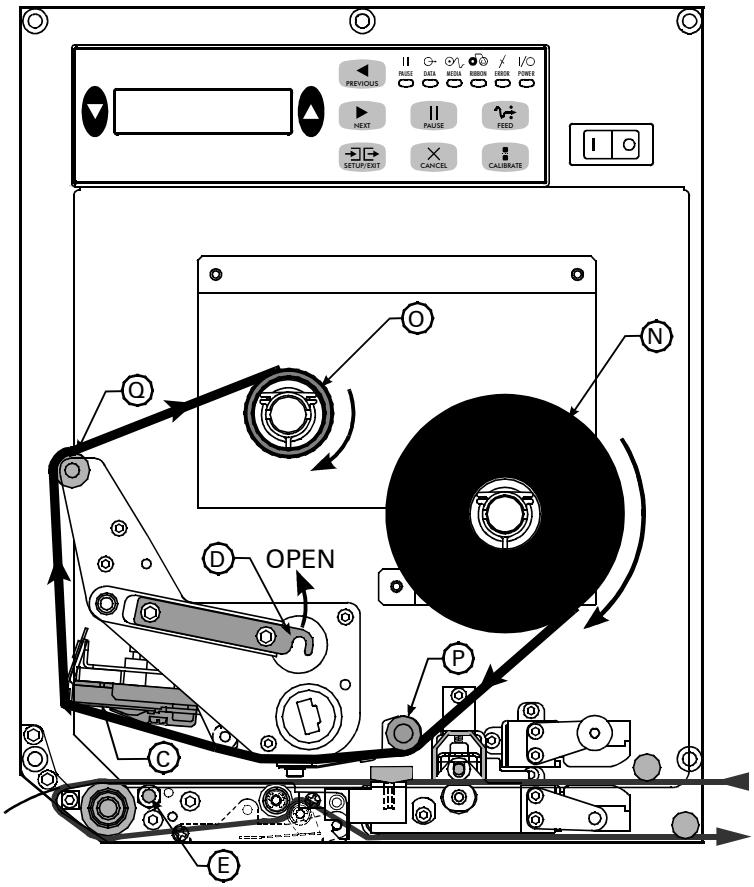

Figure 5. Ribbon Loading (Left-Hand Units)

Removing Used Ribbon

To remove used ribbon:

1. Open the printhead assembly (C) by unlatching the lock lever (D) from the locking pin (E).
2. Remove the ribbon between the upper ribbon guide roller (Q) and the ribbon take-up spindle (O).
3. Remove the used ribbon and the core together from the ribbon take-up spindle (O).
4. Remove the empty ribbon core from the ribbon supply spindle (N). This empty ribbon core can be saved to use for loading new ribbon.
5. To load the new ribbon, refer to the “Ribbon Loading” on page 11.

Reflective Media Sensor

Some types of media have black marks printed on the underside of the backing material that act as “Start of Label” indicators. These black marks are sensed by the reflective media sensor mounted to the lead screaw. The position of this sensor is not adjustable. If you are using this type of media, refer to the “Print Engine Specifications” on page 63 of this guide for information about black mark requirements.

Transmissive Media Sensor

The transmissive media sensor identifies “start of label” indicators such as a notch or hole in the media or an interlabel gap (backing only) between labels. This sensor consists of a light source (positioned below the media) and a light sensor (positioned above the media). To properly align the position of this sensor, refer to Figure 6 and turn the adjustment knob (S) on the media guide shelf assembly until the sensor (T) is aligned with the notch or hole in the media. If your media uses an interlabel gap, position the media sensor approximately at the center of the media width.

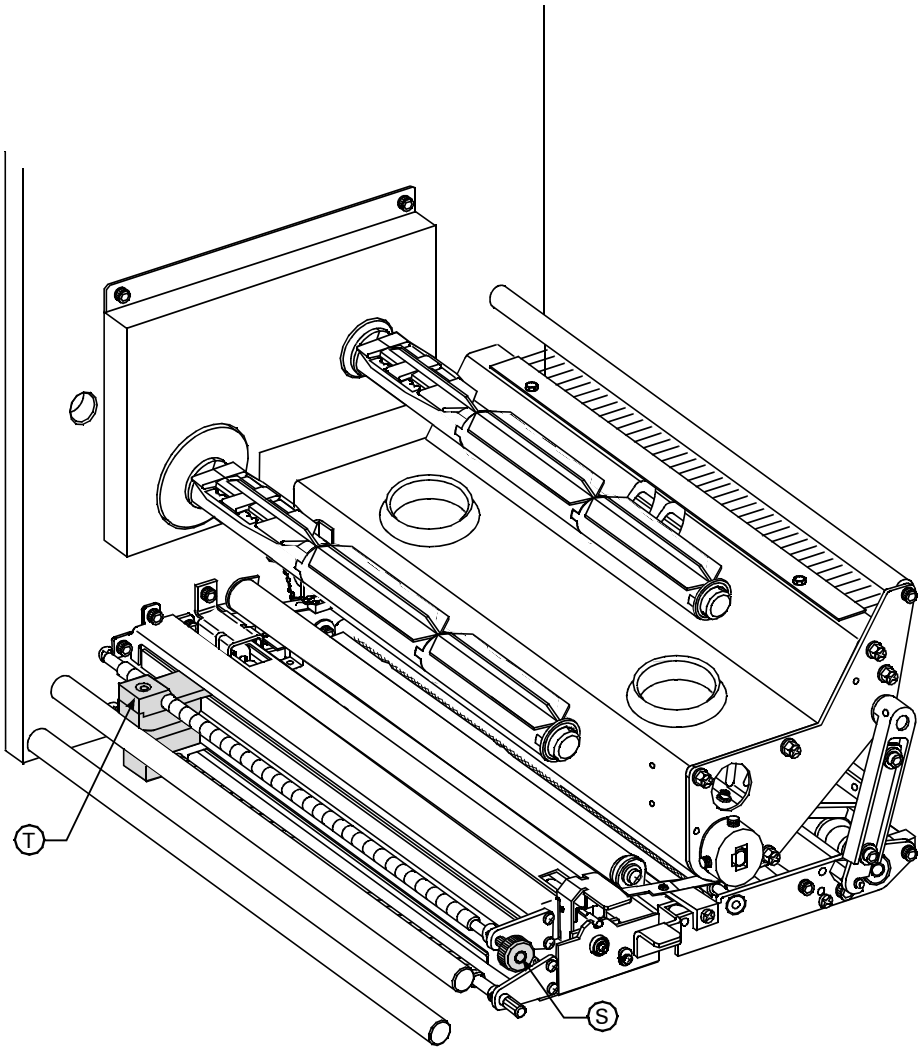

Figure 6. Media Sensor Adjustment (Right-Hand Unit Shown)

Power On/Off Switch

The Power On/Off Switch is located just to the left (or right) of the print engine's control panel (see Figure 7 on page 18). When this switch is placed in the ON (1) position, the POWER light goes ON and the print engine automatically performs a Power On Self Test (POST). The Liquid Crystal Display validates the steps in the self test.

NOTE: Refer to "Troubleshooting" on page 49 if the print engine stops due to failing a test in the Power On Self Test.

Control Panel Keys

Refer to Figure 7 on page 18. Specific uses of these keys are explained with each parameter setting description in "Configuration & Calibration" on page 21.

Table 1: Control Panel Key Description

Key	Function
	Starts and stops the printing process. • If the print engine is not printing: no printing can occur. • If the print engine is printing: printing stops once the current label is complete. Press to remove error messages from the display. **NOTE: Pause mode can also be activated via ZPL II (~PP, ^PP).**
	Forces the print engine to feed one blank label each time the key is pressed. • Print engine not printing: one blank label immediately feeds. • Printing: one blank label feeds after the current batch of labels is complete. **NOTE: Equivalent to the Slew to Home Position (~PH, ^PH) ZPL II instruction.**
	When in the pause mode, this key will cancel print jobs. • Print job in queue: press once for each print job to be deleted. • Press and hold for several seconds to cancel all print jobs in the print engine's memory. The DATA light will turn off.
	When in Pause mode, this key will calibrate the print engine for: • Media length. • Media type (continuous or non-continuous). • Print mode (direct thermal or thermal transfer). • Sensor values.
NOTE: The keys below are used only when configuring the print engine. Specific uses of these keys are explained in "Configuration & Calibration" on page 21.	

Table 1: Control Panel Key Description (Continued)

Key	Function
PREVIOUS	• Scrolls back to the previous parameter. • Press *and hold* to quickly go backward through parameter sets.
NEXT/SAVE	• Scrolls forward to the next parameter. (Saves any changes you've made in the configuration and calibration sequence.) • Press *and hold* to quickly advance through parameter sets.
SETUP/EXIT	Enters and exits the configuration mode.
▼ ▲	These keys change the parameter values. They are used in different ways depending on the parameter displayed. Common uses are: to increase/decrease a value, answer "yes" or "no," indicate "on" or "off," scroll through several choices, input the password, or set up the print engine for a firmware download.

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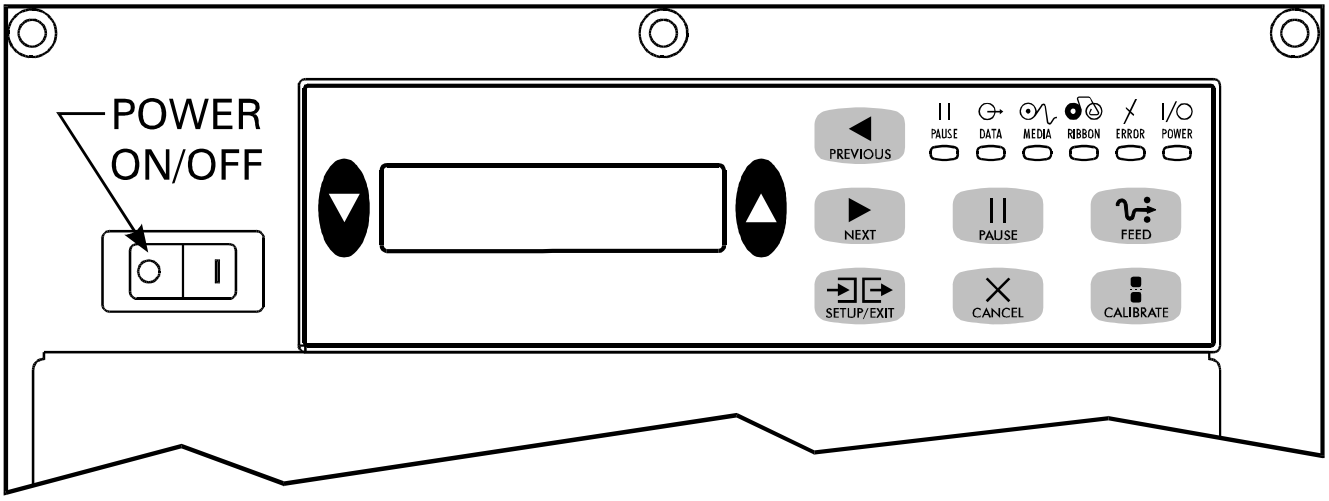


Figure 7. Control Panel (Right-Hand Unit)

Liquid Crystal Display

The control panel shown in Figure 7 contains a backlit Liquid Crystal Display (LCD). It shows operational status as well as programming modes and feature parameters.

Control Panel Indicator LEDs

LEDs on the front panel are a quick indication of the print engine's status (see Figure 7 on page 18).

Table 2: Control Panel LED Description

LED	Status	Indication
POWER	Off	The print engine is off or power is not applied.
I/O	On	The print engine is on.
ERROR	Off	Normal operation — no print engine errors.
✗	Flashing	A print engine error exists. Check the display screen for more information.
RIBBON	Off	Normal operation — ribbon (if used) is properly loaded.
	On	Printing is paused, the front panel displays a warning message, and the PAUSE light is on. • If the print engine is in direct thermal mode: Ribbon is loaded. • If the print engine is in thermal transfer mode: No ribbon is loaded.
MEDIA	Off	Normal operation — media is properly loaded.
	On	No media is under the media sensor. Printing is paused, the display shows an error message, and the PAUSE light is on.
DATA	Off	Normal operation. No data being received or processed.
	On	Data processing or printing is taking place. No data is being received.
	Flashing	The print engine is receiving data from *or* sending status information to the host computer. Flashing slows when the print engine cannot accept more data, but returns to normal once data is again being received.
PAUSE	Off	Normal operation.
II	On	The print engine has stopped all printing operations. Either the PAUSE key was pressed, a pause command was included in the label format, the on-line verifier detected an error, or a print engine error was detected. Refer to the display screen for more information.

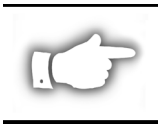
After you have installed the media and ribbon and the power-on self test (POST) is complete, the front panel display will show "PRINTER READY." (If the print engine fails its POST, refer to "Troubleshooting" on page 49) You may now set print engine parameters for your application using the control panel. *Not all choices pertain to all applications. Choose only those settings that apply to your particular application*

NOTE: Print Engines that are operating on an IP network can be quickly configured via ZebraNet® WebView™ (optional ZebraNet PrintServer II required). For information, refer to ZebraNet Networking: PrintServer II Installation and User's Guide

If it becomes necessary to restore the initial print engine defaults, see "FEED Key and PAUSE Key" on page 58.

Entering the Setup Mode

To enter the programming mode, press the SETUP/EXIT key. Press either the NEXT/SAVE key or PREVIOUS key to scroll to the parameter you wish to set.



NOTE: You may also press and hold the NEXT/SAVE and PREVIOUS keys to quickly advance through the configuration parameters.

Parameters in this section are shown in the order displayed when pressing the NEXT/SAVE key. Throughout this process, press the NEXT/SAVE key to continue to the next parameter, or press the PREVIOUS key to return to the previous parameter in the cycle.

An asterisk (*) in the upper left-hand corner of the display indicates that the value displayed is different than the currently stored value.

Changing Password-Protected Parameter

Certain parameters are password-protected by factory default.

CAUTION: Do not change password-protected parameters unless you are sure you know what you are doing! If they are set incorrectly, these parameters could cause the print engine to function in an unpredictable way.

The first attempt to change one of these parameters (pressing one of the BLACK OVAL keys) will require you to enter a four-digit password. This is done via the "ENTER PASSWORD" display. The LEFT BLACK OVAL key changes the selected digit position. The RIGHT BLACK OVAL key increases the selected digit value. After entering the password, press the NEXT/SAVE key. The parameter you wish to change will be displayed. If the password was entered correctly, you can now change the value.

The default password value is 1234. The password can be changed using the ^KP (Define Password) ZPL II instruction.

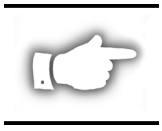
NOTE: Once the password has been entered correctly, it will not have to be entered again unless you leave and re-enter the programming mode using the SETUP/EXIT key.

NOTE: You can disable the password protection feature so that it no longer prompts you for a password by setting the password to ØØØØ via the ^KPØ ZPL/ZPL II command. To re-enable the password-protection feature, send the ZPL/ZPL II command ^KPx, where "x" can be any number, one to four digits in length, except Ø.

Leaving the Setup Mode

You can leave the program mode at any time by pressing the SETUP/EXIT key. The "SAVE CHANGES" display will appear. There are five choices, described below. Pressing the LEFT or RIGHT BLACK OVAL key displays other choices and pressing the NEXT/SAVE key selects the displayed choice.

- PERMANENT - Permanently saves the changes. Values are stored in the print engine even when power is turned off.
- TEMPORARY - Saves the changes until changed again or until power is turned off.
- CANCEL - Cancels all changes since pressing the SETUP/EXIT key except the darkness and tear-off settings (if they were changed).
- LOAD DEFAULTS - Loads factory defaults. The factory defaults are shown on the following pages.



NOTE: Loading factory defaults will require print engine calibration.

- LOAD LAST SAVE - Loads values from the last permanent save.

Configuration and Calibration Sequence

Table 3: Configuration and Calibration Description

Press	Display Shows	Action/Explanation
---	PRINTER READY	Normal print engine operation.
	DARKNESS	**Adjusting Print Darkness** Press the RIGHT BLACK OVAL key to increase darkness. Press the LEFT BLACK OVAL key to decrease darkness. **Default**: +10 **Range**: 0 to +30 Darkness settings are dependent upon a variety of factors including ribbon type, media, and the condition of the printhead. You may adjust the darkness for consistent high-quality printing. If printing is too light, or if there are voids in printed areas, you should increase the darkness. If printing is too dark, or if there is spreading or bleeding of printed areas, you should decrease the darkness. The FEED key self test can also be used to determine the best darkness setting. Since the darkness setting takes effect immediately, you can see the results on labels that are currently printing. **CAUTION: Set the darkness to the lowest setting that provides good print quality. Darkness set too high may cause ink smearing and/or it may burn through the ribbon.** Darkness settings may also be changed by the driver or software settings.
	TEAR OFF	**Adjusting the Tear-Off Position** Press the RIGHT BLACK OVAL key to increase the value, press the LEFT BLACK OVAL key to decrease the value. Each press of the key adjust the tear-off position by four dot rows. **Default**: +0 **Range**: -120 to +120 This parameter establishes the position of the media over the tear-off/peel-off bar after printing. The label and backing can be torn off or cut between labels.
	PRINT MODE	**Selecting Print Mode** Press the RIGHT or LEFT BLACK OVAL key to display other choices. Default: Tear-off Selections: Tear-off, rewind, applicator “Applicator” is the recommended mode for an applicator.

Table 3: Configuration and Calibration Description (Continued)

Press	Display Shows	Action/Explanation
	MEDIA TYPE	**Setting Media** Type Press the RIGHT or LEFT BLACK OVAL key to display other choices. **Default**: Continuous **Selections**: Continuous, non-continuous This parameter tells the print engine the type of media you are using. Selecting continuous media requires that you include a label length instruction in your label format (^LLxxxx if you are using ZPL or ZPL II). When non-continuous media is selected, the print engine feeds media to calculate label length (the distance between two detections of the inter-label gap, webbing, or alignment notch or hole). "Non-continuous" is the recommended mode for an applicator
	SENSOR TYPE	**Setting the Sensor** Type Press RIGHT or LEFT BLACK OVAL key to display other choices. **Default**: Web **Selections**: Web, mark This parameter tells the print engine whether you are using media with a web (gap/space between labels, notch, or hole) to indicate the separations between labels or if you are using media with a black mark printed on the back. If your media does not have black marks on the back, leave your print engine at the default (web).
	PRINT METHOD	**Setting the Print Method** Press the RIGHT BLACK OVAL key for the next value, press the LEFT BLACK OVAL key for the previous value. **Default**: Thermal transfer **Selections**: Thermal transfer, direct thermal The print method parameter tells the print engine the method of printing you wish to use: direct thermal (no ribbon) or thermal transfer (using thermal transfer media and ribbon). **NOTE: Selecting direct thermal when using thermal transfer media and ribbon creates a warning condition, but printing will continue.**
	PRINT WIDTH	**Setting Print Width** Press the RIGHT BLACK OVAL key to increase the value, press the LEFT BLACK OVAL key to decrease the value. To change the unit of measure, press the LEFT BLACK OVAL key until the unit of measure is active, then press the RIGTH BLACK OVAL key to toggle to a different unit of measure (inches, mm, or dots). **Default**: 6.62" (168 mm) **Range**: 1 dot (1/8 mm or 1/12 mm) to 6.62" (168 mm)

Table 3: Configuration and Calibration Description (Continued)

Press	Display Shows	Action/Explanation
	MAXIMUM LENGTH	**Setting Maximum Length** Press the RIGHT BLACK OVAL key to increase the value, press the LEFT BLACK OVAL key to decrease the value. **Default**: 39.0” (988 mm) **Range**: 2.0” (50 mm) to 39.0” (988 mm) in 1.0” (25.4 mm) increments Maximum length is used in conjunction with the calibration procedure. The value of this setting determines the maximum label length that will be used during the media portion of the calibration process. The maximum length is the distance from the leading edge of one label to the leading edge of the next label. The interlabel gap is considered part of the label length. Only a few labels are required to set media sensors. Always set the value that is closest to, but not lower than, the length of the label you are using. For example, if the length of the label is 14.5 inches (368 mm), set the parameter for 15.0 inches (381 mm).
	LIST FONTS	**List Fonts** Press the RIGHT BLACK OVAL key to print a label listing all of the available fonts. This selection is used to print a label that lists all of the fonts currently available in the print engine, including standard print engine fonts plus any optional fonts. Fonts may be stored in RAM, FLASH memory, font EPROMS, or font cards.
	LIST BAR CODES	**List Bar Codes** Press the RIGHT BLACK OVAL key to print a label listing all of the available bar codes. This selection is used to print a label that lists all of the bar codes currently available in the print engine
	LIST IMAGES	**List Images** Press the RIGHT BLACK OVAL key to print a label listing all of the available images. This selection is used to print a label that lists all of the images currently stored in the print engine’s RAM, FLASH memory, optional EPROMS, or font cards.
	LIST FORMATS	**List Formats** Press the RIGHT BLACK OVAL key to print a label listing all of the available formats. This selection is used to print a label that lists all of the formats currently stored in the print engine’s RAM, FLASH memory, optional EPROMS, or font cards.
	LIST SETUP	**List Images** Press the RIGHT BLACK OVAL key to print a label listing the current print engine configuration. This selection is used to print a label that lists the current print engine configuration. (Same as CANCEL key self test.)
	LIST ALL	**List Images** Press the RIGHT BLACK OVAL key to print a label listing all of the available fonts, bar codes, images, formats, and the current print engine configuration. This selection is used to print a label that lists the five previous selections as described.

Table 3: Configuration and Calibration Description (Continued)

Press	Display Shows	Action/Explanation
	INITIALIZE CARD	**Initialize Memory Card** **CAUTION: Perform this operation only when it is necessary to erase all previously stored information from the optional memory card. Press the NEXT/SAVE key to bypass this function.** **1.** Press the RIGHT BLACK OVAL key to select "**YES**." If your print engine is set to require a password, you will now be prompted to enter the password. enter the password and then press the NEXT/SAVE key. **2.** The display will ask "INITIALIZE CARD?". Press the RIGHT BLACK OVAL key to select "**YES**." **3.** The control panel LCD will ask "ARE YOU SURE?". **4.** Press the RIGHT BLACK OVAL key to select "**YES**." or Press the LEFT BLACK OVAL key to select "**NO"** cancel the request and return to the "INITIALIZE CARD" prompt. **5.** Press the SETUP/EXIT key followed by the NEXT/SAVE key. If initialization is still in process, the control panel display will flash back and forth between the two phrases "CHECKING B: MEMORY" and "PRINTER IDLE." When initialization is complete, the print engine will automatically exit the configuration mode and the control panel will display "PRINTER READY." **NOTE: Depending on the amount of memory in the memory card, initialization may take up to five minutes to complete.**

Table 3: Configuration and Calibration Description (Continued)

Press	Display Shows	Action/Explanation
	INIT FLASH	**Initialize Flash** **CAUTION: Perform this operation only when it is necessary to erase all previously stored information from the FLASH memory. Press the NEXT/SAVE key to bypass this function.** **1.** Press the RIGHT BLACK OVAL key to select "**YES**." If your print engine is set to require a password, you will now be prompted to enter the password. enter the password and then press the NEXT/SAVE key. **2.** The display will ask "INITIALIZE FLASH?". Press the RIGHT BLACK OVAL key to select "**YES**." **3.** The control panel LCD will ask "ARE YOU SURE?". **4.** Press the RIGHT BLACK OVAL key to select "**YES**." or Press the LEFT BLACK OVAL key to select "**NO"** cancel the request and return to the "INITIALIZE FLASH" prompt. **5.** Press the SETUP/EXIT key followed by the NEXT/SAVE key. If initialization is still in process, the control panel display will flash back and forth between the two phrases "CHECKING E: MEMORY" and "PRINTER IDLE." When initialization is complete, the print engine will automatically exit the configuration mode and the control panel will display "PRINTER READY." **NOTE: Depending on the amount of free FLASH memory, initialization may take up to one minute to complete.**

Media and Ribbon Sensor Calibration

Before you begin this procedure, make sure that the maximum length is set to a value equal to or greater than the length of the labels you are using. If the maximum length is set to a lower value, the calibration process will assume that continuous media is in the print engine. See "MAXIMUM LENGTH" on page 25 for more information.

1. **Standard Calibration**. Pressing the CALIBRATE key on the print engine's control panel causes the print engine to feed media and ribbon and set the values it detects for media, media backing material (the spaces between labels), media out, and ribbon or no ribbon (which determines the print mode - thermal transfer or direct thermal). This type of calibration also occurs as part of the sensor profile and media and ribbon calibration procedures.
2. **Media and Ribbon Sensor Sensitivity Calibration.** Performing the media and ribbon calibration procedure first resets the sensitivity of the sensors to better detect the media and ribbon you are using. With the sensors at their new sensitivity, the print engine then performs the standard calibration described above. Changing the type of ribbon and/or media may require resetting the sensitivity of the media and ribbon sensors. Indications that the sensitivity may need to be reset would be a CHECK RIBBON light on with the ribbon properly installed or non-continuous media being treated as continuous media.

Table 3: Configuration and Calibration Description (Continued)

Press	Display Shows	Action/Explanation
NEXT/SAVE	SENSOR PROFILE	**Sensor Profile** Press NEXT/SAVE to skip this standard calibration procedure and continue with the media and ribbon calibration parameter which follows. Press the RIGHT BLACK OVAL key to initiate this standard calibration procedure and print a media sensor profile. See Figure 8. The media sensor profile may be used to troubleshoot registration problems that may be caused when the media sensor detects preprinted areas on the media or experiences difficulty in determining web location. If the sensitivity of the media and/or ribbon sensors MUST be adjusted, use the **Media and Ribbon Sensor Calibration** procedure.

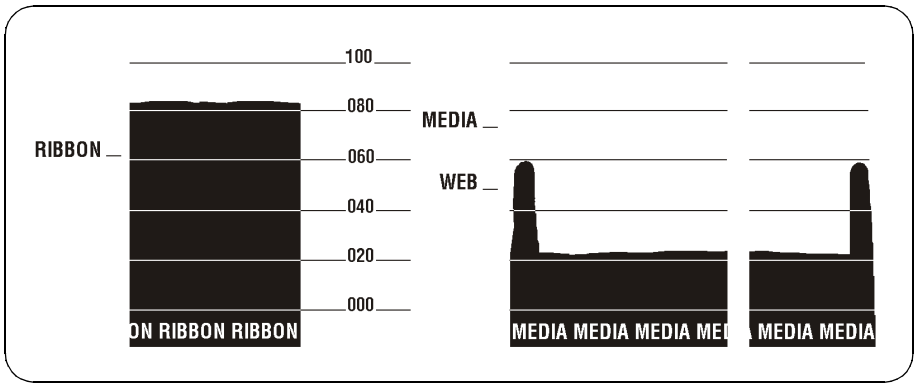


Figure 8. Sensor Profile

Press	Display Shows	Action/Explanation
NEXT/SAVE	MEDIA AND RIBBON CALIBRATE	**Media and Ribbon Sensor Calibration** Press NEXT/SAVE to skip the calibration procedure and continue with the host port selection parameters that follow. Press the RIGHT BLACK OVAL key to start the calibration procedure. This procedure is used to adjust the sensitivity of the media and ribbon sensors. **NOTE: The procedure must be followed exactly as presented. All steps must be performed even if only one of the sensors requires adjustment.** **NOTE: These settings must be saved "permanently" (see page 41).**
Media and Ribbon Calibration Procedure		
▲	LOAD BACKING	Press the LEFT BLACK OVAL key to cancel the operation, or do the following: **1.** Open the printhead. **2.** Remove approximately 8" (203 mm) of labels from the media roll, enough so that only the backing material is threaded between the media sensors when the media is loaded.
▲	REMOVE RIBBON	Press the LEFT BLACK OVAL key to cancel the operation, or do the following: **1.** Remove the ribbon (sliding it as far to the right on left-hand units or left on right-hand units as possible will have the same effect as removing it). **2.** Close the printhead.

Table 3: Configuration and Calibration Description (Continued)

Press	Display Shows	Action/Explanation
	CALIBRATING PLEASE WAIT	The print engine automatically adjusts the scale (gain) of the signals it receives from the media and ribbon sensors based on the specific media and ribbon combination you are using. On the sensor profile, this essentially corresponds to moving the graph up or down to optimize the readings for your application.
---	RELOAD ALL	When "RELOAD ALL" is displayed: **1.** Open the printhead and pull the media forward until a label is positioned under the media sensor. **2.** Move the ribbon back to its proper position. **3.** Close the printhead.
	MEDIA AND RIBBON CALIBRATE	Now that the scale has changed, the print engine performs a calibration equivalent to pressing the CALIBRATE key. During this process, the print engine checks the readings for the media and ribbon based on the new scale you have established, determines the label length, and whether you are in direct thermal or thermal transfer print mode. The process is now complete. To see the new readings on the new scale, print a sensor profile.
Setting Communication Parameters Communication parameters must be set correctly for the print engine to communicate with the host. These parameters make sure that the print engine and the host are "speaking the same language." All communications parameters are password protected.		
	PARALLEL COMM	**Setting Parallel Communications** Press the RIGHT or LEFT BLACK OVAL key to display other choices. **Default**: Parallel **Selections**: Parallel, twinax/coax Select the communications port that matches the one being used by the host computer.
	SERIAL COMM	**Setting Serial Communications** Press the RIGHT or LEFT BLACK OVAL key to display other choices. Default: RS232 **Selections**: RS232, RS422/485, RS485 multidrop Select the communications port that matches the one being used by the host computer.
	BAUD	**Setting Baud** Press the RIGHT or LEFT BLACK OVAL key to display other choices. **Default**: 9600 **Selections**: 110, 300, 600, 1200, 2400, 4800, 9600, 14400, 19200, 28800, 38400, 57600 The baud setting of the print engine must match the baud setting of the host for accurate communications to take place. Select the value that matches the one being used by the host.

Table 3: Configuration and Calibration Description (Continued)

Press	Display Shows	Action/Explanation
NEXT/SAVE	DATA BITS	**Setting Data Bits** Press the RIGHT or LEFT BLACK OVAL key to display other choices. **Default**: 7-bits **Selections**: 7-bits, 8-bits The data bits of the print engine must match the data bits of the host for accurate communications to take place. Set the data bits to match the setting being used by the host. **NOTE: Must be set to 8 data bits to use Code Page 850.**
NEXT/SAVE	PARITY	**Setting Parity** Press the RIGHT or LEFT BLACK OVAL key to display other choices. **Default**: Even **Selections**: Even, odd, none The parity of the print engine must match the parity of the host for accurate communications to take place. Select the parity that matches the one being used by the host.
NEXT/SAVE	STOP BITS	**Setting Stop Bits** Press the RIGHT or LEFT BLACK OVAL key to display other choices. **Default**: 1 stop bit **Selections**: 1 stop bit, 2 stop bits The stop bits of the print engine must match the stop bits of the host for accurate communications to take place. Select the stop bits that matches the one being used by the host.
NEXT/SAVE	HOST HANDSHAKE	**Setting Host Handshake** Press the RIGHT or LEFT BLACK OVAL key to display other choices. **Default**: XON/XOFF **Selections**: XON/XOFF, DTR/DSR The handshake protocol of the print engine must match the handshake protocol of the host for communications to take place. Select the handshake protocol that matches the one being used by the host.
NEXT/SAVE	PROTOCOL	**Setting Protocol** Press the RIGHT or LEFT BLACK OVAL key to display other choices. **Default**: None **Selections**: None, Zebra, ACK/NACK Protocol is a type of error checking system. Depending on the selection, an indicator may be sent from the print engine to the host signifying that data has been received. Select the protocol that the host requests. Further detail on protocol can be found in the *ZPL II Programming Guide Volume I.* **NOTE: Unlike ACK/NACK, Zebra response messages are sequenced.** **NOTE: If Zebra is selected, the print engine must use "DTR/DSR" host handshake protocol.**

Table 3: Configuration and Calibration Description (Continued)

Press	Display Shows	Action/Explanation
NEXT/SAVE	NETWORK ID	**Setting Network ID** Press the LEFT BLACK OVAL key to move to the next digit position, press the RIGHT BLACK OVAL key to increase the value of the digit. **Default**: 000 **Selections**: 000 - 999 Network ID is used to assign a unique number to a print engine used in an RS-422/RS-485 network. This gives the host the means to address a specific print engine. If the print engine is used in a network, you must select a network ID number. This does not affect TCP/IP or IPX/SPX networks.
NEXT/SAVE	COMMUNICATIONS	**Setting Communications Mode** Press the RIGHT or LEFT BLACK OVAL key to display other choices. **Default**: Normal mode **Selections**: Normal mode, diagnostics The communication diagnostics mode is a troubleshooting tool for checking the interconnection between the print engine and the host. When "diagnostics" is selected, all data sent from the host to the print engine will be printed as straight ASCII hex characters. The print engine prints all characters received including control codes, like CR (carriage return). A sample printout is shown in Figure 16 on page 60. **NOTE: Diagnostic printouts:** • **An FE indicates a framing error.** • **An OE indicates an overrun error.** • **A PE indicates a parity error.** • **An NE indicates noise.** For any errors, check that your communication parameters are correct. Set the print width equal to or less than the label width used for the test. See "PRINT WIDTH" on page 24 for more information.
Selecting Prefix and Delimiter Characters Prefix and delimiter characters are 2-digit hex values used within the ZPL/ZPL II formats sent to the print engine. The print engine uses the last prefix and delimiter characters sent to it, whether from a ZPL II instruction or from the front panel. **NOTE: DO NOT use the same hex value for the control, format, and delimiter character. The print engine must see different characters to function properly.**		
NEXT/SAVE	CONTROL PREFIX	**Control Prefix Character** Press the LEFT BLACK OVAL key to move to the next digit position, press the RIGHT BLACK OVAL key to increase the value of the digit. **Default:** 7E (tilde) **Range:** 00-FF The print engine looks for this 2-digit hex character to indicate the start of a ZPL/ZPL II control instruction.

Table 3: Configuration and Calibration Description (Continued)

Press	Display Shows	Action/Explanation
NEXT/SAVE	FORMAT PREFIX	**Format Prefix Character** Press the LEFT BLACK OVAL key to move to the next digit position, press the RIGHT BLACK OVAL key to increase the value of the digit. **Default:** 5E (caret) **Range:** 00 - FF The print engine looks for this 2-digit hex character to indicate the start of a ZPL/ZPL II format instruction.
NEXT/SAVE	DELIMITER CHAR	**Delimiter Character** Press the LEFT BLACK OVAL key to move to the next digit position, press the RIGHT BLACK OVAL key to increase the value of the digit. **Default:** 2C (comma) **Range:** 00 - FF The delimiter character is a 2-digit hex value used as a parameter place marker in ZPL/ZPL II format instructions. Refer to the *ZPL II Programming Guide Volume I* for more information.
Selecting ZPL Mode		
NEXT/SAVE	ZPL MODE	**Selecting ZPL Mode** Press the RIGHT or LEFT BLACK OVAL key to display other choices. **Default:** ZPL II **Selections:** ZPL II, ZPL The print engine will remain in the selected mode until it is changed by this front panel instruction or by using a ZPL/ZPL II command. The print engine accepts label formats written in either ZPL or ZPL II. This eliminates the need to rewrite any ZPL formats you already have. Refer to the *ZPL II Programming Guide Volume I* for more information on the differences between ZPL and ZPL II.
NEXT/SAVE	RIBBON TENSION	**Setting Ribbon Tension** Press the RIGHT or LEFT BLACK OVAL key to display other choices. **Default:** High **Selections:** Low, Medium, High This parameter sets the tension applied to the Ribbon Supply Spindle. A setting of Low, Medium, or High is determined by the combination of ribbon width and length. See Figure 9 on page 33 and use the chart to determine the recommended setting for your specific application. If smudging or scuffing of ink on the label material is evident, reduce the tension to the next lower setting. If ribbon wrinkle is evident, increase the tension to the next higher setting.

Table 3: Configuration and Calibration Description (Continued)

<table>
<tr><th>Press</th><th>Display Shows</th><th>Action/Explanation</th></tr>
<tr><td colspan="3">
<table>
<tr><td rowspan="2">Ribbon Width</td><td colspan="4">Ribbon Tension Setting</td></tr>
<tr><td>300 Meter Roll</td><td>450 Meter Roll</td><td>600 Meter Roll</td><td>900 Meter Roll</td></tr>
<tr><td>3" to 5"</td><td>LOW</td><td>LOW</td><td>LOW</td><td>LOW</td></tr>
<tr><td>4" to 6"</td><td>LOW</td><td>LOW-MEDIUM</td><td>LOW-MEDIUM</td><td>MEDIUM</td></tr>
<tr><td>5" to 7"</td><td>LOW-MEDIUM</td><td>MEDIUM</td><td>MEDIUM-HIGH</td><td>HIGH</td></tr>
</table>
Figure 9. Ribbon Tension Setting Chart
</td></tr>
<tr><td colspan="3">Power-Up and Head Close Parameters</td></tr>
<tr><td>  </td><td>MEDIA POWER UP</td><td>Media Power-Up Press the RIGHT or LEFT BLACK OVAL key to display other choices.

Default: Feed

Selections: Feed, calibration, length, and no motion

This parameter establishes the action of the media when the print engine is turned on.
• Calibration: Recalibrates the media and ribbon sensors.
• Feed: Feeds the label to the first web.
• Length: Determines the length of the label.
• No Motion: Media does not move.</td></tr>
<tr><td>  </td><td>HEAD CLOSE</td><td>Head Close Press the RIGHT or LEFT BLACK OVAL key to display other choices.

Default: Feed

Selections: Feed, calibration, length, no motion

Determines the action of the media after the printhead has been opened and then closed.
• Calibration: Recalibrates the media and ribbon sensors.
• Feed: Feeds the label to the first web.
• Length: Determines the length of the label.
• No Motion: Media does not move.</td></tr>
</table>

Table 3: Configuration and Calibration Description (Continued)

Press	Display Shows	Action/Explanation
Label Positioning Parameters		
NEXT/SAVE	BACKFEED	**Backfeed Sequence** Press the RIGHT or LEFT BLACK OVAL key to display other choices. **Default:** Default (90%) **Selections:** Default, after, before, 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, off This parameter establishes when and how much label backfeed occurs after a label is removed or cut in the peel-off, cutter, and applicator modes. It has no effect in rewind or tear-off modes. This parameter setting can be superseded by the ~JS instruction when received as part of a label format (refer to the *ZPL II Programming Guide Volume I*). **NOTE: The difference between the value entered and 100% establishes how much backfeed occurs before the next label is printed. For example, a value of 40 means that 40% of the backfeed takes place after the label is removed or cut. The remaining 60% takes place before the next label is printed. A value of "before" means that all backfeed will take place before the next label is printed.**
NEXT/SAVE	LABEL TOP	**Adjusting Label Top Position** Press the RIGHT BLACK OVAL key to increase the value, press the LEFT BLACK OVAL key to decrease the value. The displayed value represents dots. **Default:** +0 **Range:** -120 to +120 dot rows The label top position adjusts the print position vertically on the label. Positive numbers adjust the label top position further down the label (away from the printhead), negative numbers adjust the position up the label (toward the printhead).
NEXT/SAVE	LEFT POSITION	**Adjusting Left Position** Press the LEFT BLACK OVAL key to move to the next position, press the RIGHT BLACK OVAL key to change between + and - and to increase the value of the digit. The displayed value represents dots. **Default:** 0000 **Range:** -9999 to +9999 **NOTE: For a negative value, enter the value before changing to the minus sign.** This parameter establishes how far from the left edge of a label the format will begin to print by adjusting horizontal positioning on the label. Positive numbers adjust the printing to the left by the number of dots selected, negative numbers shift printing to the right.

Table 3: Configuration and Calibration Description (Continued)

Press	Display Shows	Action/Explanation
	HEAD TEST COUNT	**Setting the Head Test Count** Press the LEFT BLACK OVAL key to move to the next digit position, press the RIGHT BLACK OVAL key to change the value of the digit. **Default:** 0000 (disables the test) **Range:** 0000 to 9999 The print engine periodically performs a test of the printhead functionality, called a "printhead test" or "head test." This parameter establishes how many labels are printed between these internal tests.
	HEAD RESISTOR	**Setting the Head Resistor Value** Press the LEFT BLACK OVAL key to move to the next digit position, press the RIGHT BLACK OVAL key to increase the value of the digit. **CAUTION:** This parameter should only be changed by qualified personnel! **Initial Value:** Factory-set to match the printhead shipped with your print engine. **Default Value:** 0500 **Range:** 0500 to 1175 This value has been pre-set at the factory to match the resistance value of the printhead. It will not need to be changed unless the printhead is replaced. **CAUTION: DO NOT set the value higher than that shown on the printhead. Setting a higher value may damage the printhead!** Before replacing a printhead, look on the bottom of the printhead element for the label that shows the resistance value (ohm value).
	VERIFIER PORT	**Setting the Verifier Port** Press the RIGHT or LEFT BLACK OVAL key to display other choices. **Default:** Off **Selections:** Off, 1 VER-RPRNT, 2 VER-THRUPUT The auxiliary port is used to determine how the print engine will react to the Zebra on-line verifier. There are currently three operating conditions for this port: • Off: The verifier port is off. • VER-RPRNT ERR: Label reprinted if verifier detects an error. If a bar code is near the upper edge of the label, the label will be fed out far enough to be verified and then backfed to allow the next label to be printed and verified. • VER-THRUPUT: Allows greatest throughput but may not indicate a verification error immediately upon detection. May print from one to three labels before an error is recognized and printing stops. For more information on the operation of the optional verifier, refer to the documentation provided with that option.

Table 3: Configuration and Calibration Description (Continued)

Press	Display Shows	Action/Explanation
NEXT/SAVE	APPLICATOR PORT	**Setting the Applicator Port** Press the RIGHT or LEFT BLACK OVAL key to display other choices. **Default:** Off **Selections:** Off, mode 1, mode 2, mode 3, mode 4 Determines the action of the verifier port. • Off: The applicator port is off. • Mode 1: Asserts the ~END_PRINT signal low while the printer is moving the label forward. • Mode 2: Asserts the ~END_PRINT signal high while the printer 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.
Printing Controls		
NEXT/SAVE	START PRINT SIG	**Setting the Start Print Signal** Press the RIGHT or LEFT BLACK OVAL key to display other choices. Default: Pulse Mode Selections: Pulse Mode, Level Mode This parameter determines how the print engine will react to the Start Print Signal input on pin 3 of the applicator interface connector at the rear of the print engine. This is set by the applicator manufacturer and should not be changed unless the factory defaults have been reloaded. Please make a note of it! While other choices are valid, the print engine must be returned to its designated setting in order for it to work properly. Refer to “Cabling Requirements” on page 78 for more applicator cable information. **PULSE MODE** - A label will print when the signal transitions from HIGH to LOW. **LEVEL MODE** - Labels will print as long as the signal is asserted LOW.

Table 3: Configuration and Calibration Description (Continued)

Press	Display Shows	Action/Explanation
	RESYNC MODE	**Setting the Resync Mode** Press the RIGHT or LEFT BLACK OVAL key to display other choices. Default: Feed Mode Selections: Feed Mode, Error Mode This parameter determines how the print engine will react if the label synchronization is lost and the label top is not where expected. This is set by the applicator manufacturer and should not be changed unless the factory defaults have been reloaded. Please make a note of it! While other choices are valid, the print engine must be returned to its designated setting in order for it to work properly. **FEED MODE** - If the label top is not where expected, the print engine will feed a blank label to find the label top position. **ERROR MODE -** If the label top is not where expected, the print engine will stop, enter the PAUSED mode, display the message "Error Condition Feed Label", flash the ERROR LED, and assert the "Service Required" signal (pin 10 on the Applicator Interface Connector). To resync the media to the top of the label in this mode, the user must press the PAUSE key to exit the PAUSED state. The ERROR LED will then stop flashing and the "Service Required" signal will be de-asserted. The action of the print engine is then determined by the "Head Close" configuration selection: • "Calibration" - the print engine feeds labels and recalibrates the media sensors. • "Feed"- the print engine feeds the labels to the next web. • "Length" - the print engine feeds labels and calculates the label length. • "No Motion" - the media does not move. The user must press the FEED key to cause the print engine to resync to the start of the next label.
	RIBBON LOW MODE	**Selecting the Ribbon Low Mode** Press the RIGHT or LEFT BLACK OVAL key to display other choices. Default: Enabled Selections: Enabled, Disabled When the Ribbon Low feature is enabled, the "Ribbon Low" output signal (Pin 9) on the applicator port is functional. When the amount of ribbon on the supply spindle reaches a specific low level, the output signal will assert HIGH to provide a "Ribbon Low" warning. When the Ribbon Low feature is disabled, the output signal (Pin 9) will not function, the "Low Ribbon" warning is not displayed, and the print engine will continue to print until it runs out of ribbon.

Table 3: Configuration and Calibration Description (Continued)

Press	Display Shows	Action/Explanation
	REPRINT MODE	**Setting the Reprint Mode** 🔒 Press the RIGHT or LEFT BLACK OVAL key to display other choices. Default: Disabled Selections: Disabled, Enabled When the Reprint feature is enabled, the "Reprint" input signal (Pin 6) on the applicator port is functional. When the input signal is asserted, the last label printed will be printed again. (This includes non-printing labels.) When the Reprint feature is disabled, the "Reprint" input signal is ignored. **NOTE: The ^SP command is ignored when the Reprint feature is enabled. When the Reprint feature is disabled, the ^SP command can be used. In addition, when a received label format is canceled prior to printing, the "reprint" function for the previous label is also canceled.**
Sensor Values		
	WEB S.	🔒 These parameters are automatically set during the calibration procedure. They should only be changed by a qualified service technician. Refer to the maintenance manual for more information on these parameters. Press the NEXT/SAVE key repeatedly to skip these parameters.
	MEDIA S.	
	RIBBON S.	
	MARK S.	
	MARK MED S.	
	MEDIA LED	
	RIBBON LED	
	MARK LED	

Table 3: Configuration and Calibration Description (Continued)

Press	Display Shows	Action/Explanation
	LCD ADJUST	**LCD Display Adjustment** Press the LEFT BLACK OVAL key to decrease the value (reduce brightness), press the RIGHT BLACK OVAL key to increase the value (increase brightness). **Range:** 00 to 19 This parameter allows you to adjust the brightness of your display if your display is difficult to read.
	FORMAT CONVERT	**Format Convert** Press the RIGHT or LEFT BLACK OVAL key to display other choices. **Default:** None **Selections:** None, 150 → 300, 150 → 600, 200 → 600, 300 → 600 Selects the bitmap scaling factor. The first number is the original dots per inch (d.p.i.) value; the second, the d.p.i. to which you would like to scale.
	IDLE DISPLAY	**Idle Display** Press the RIGHT or LEFT BLACK OVAL key to display other choices. **Default:** Firmware version **Selections:** mm/dd/yy (24 hour), mm/dd/yy (12 hour), dd/mm/yy (24 hour), dd/mm/yy (12 hour), Firmware Ver. This parameter selects the LCD display options for the real time clock. **NOTE:** If the default value is not selected, pressing either BLACK OVAL key will briefly display the firmware version of the print engine.
	RTC DATE	**RTC Date** Press the LEFT BLACK OVAL key to move to the next digit position, press the RIGHT BLACK OVAL key to increase the value of the digit. This parameter allows you to set the date following the convention selected in "IDLE DISPLAY."
	RTC TIME	**RTC Time** Press the LEFT BLACK OVAL key to move to the next digit position, press the RIGHT BLACK OVAL key to increase the value of the digit. This parameter allows you to set the time following the convention selected in "IDLE DISPLAY."
	IP RESOLUTION* *Option Required	**IP Resolution** Press the RIGHT or LEFT BLACK OVAL key to display other choices. **Default:** Dynamic **Selections:** Dynamic, permanent Depending on the selection, allows either the user ("permanent") or the server ("dynamic") to select the IP address. For more information, refer to *ZebraNet Networking: PrintServer II Installation and User's Guide*.

Table 3: Configuration and Calibration Description (Continued)

Press	Display Shows	Action/Explanation
NEXT/SAVE	IP PROTOCOLS* *Option Required	**IP Protocols** Press the RIGHT or LEFT BLACK OVAL key to display other choices. **Default:** All **Selections:** All, gleaning only, RARP, BOOTP, DHCP, DHCP/BOOTP If "dynamic" was chosen in the previous parameter, this selection determines the method(s) by which the PrintServer II will receive the IP address from the server. For more information, refer to *ZebraNet Networking: PrintServer II Installation and User's Guide*.
NEXT/SAVE	IP ADDRESS* *Option Required	**IP Address** Press the LEFT BLACK OVAL key to move to the next digit position, press the RIGHT BLACK OVAL key to increase the value of the digit. This parameter allows you to select the IP address *if* "permanent" was chosen in "IP RESOLUTION." (If "dynamic" was chosen, the user cannot select the address.) For more information, refer to *ZebraNet Networking: PrintServer II Installation and User's Guide*.
NEXT/SAVE	SUBNET MASK* *Option Required	**Subnet Mask** Press the RIGHT or LEFT BLACK OVAL key to display other choices. **Default:** Permanent (user *must* set) **Selections:** Dynamic (user *may* set, but server can assign), permanent This parameter selects the part of the IP address that is considered to be part of the local network It can be reached without going through the default gateway.
NEXT/SAVE	DEFAULT GATEWAY* *Option Required	**Default Gateway** Press the LEFT BLACK OVAL key to move to the next digit position, press the RIGHT BLACK OVAL key to increase the value of the digit. This parameter allows you to select the IP address that the network traffic is routed through if the destination address is not part of the local network.
NEXT/SAVE	LANGUAGE	**Selecting the Display Language** Press the RIGHT or LEFT BLACK OVAL key to display other choices. **Default:** English **Selections:** English, Spanish, French, German, Italian, Norwegian, Portuguese, Swedish, Danish, Spanish 2, Dutch, Finnish, Custom This parameter allows you to change the language used on the control panel display.
You have now completed the entire configuration and calibration sequence. You may either press the NEXT/SAVE key or the SETUP/EXIT key.		
NEXT/SAVE	DARKNESS	You are now back at the first parameter in the configuration sequence. **NOTE: If you pressed the NEXT/SAVE key but are through programming the printer configuration, you may press the SETUP/EXIT key and continue with the "SAVE SETTINGS" function.**

Table 3: Configuration and Calibration Description (Continued)

Press	Display Shows	Action/Explanation
	SAVE SETTINGS	**Save Settings** Press the RIGHT or LEFT BLACK OVAL key to display other choices. **Default:** Permanent **Selections:** Permanent, temporary, cancel, load defaults, load last save. This display appears when you attempt to exit the configuration mode. • Permanent: Permanently saves the changes, even when printer power is turned off. • Temporary: Saves the changes until changed again or until power is turned off. • Cancel: Cancels all changes since you entered the configuration mode except for darkness and tear-off position (if they were changed). • Load defaults: Loads factory defaults. **NOTE: Loading factory defaults will require calibration.** • Load last save: Loads the values from the last permanent save.
	PRINTER READY	Press the NEXT/SAVE key to activate the displayed choice. You have exited the configuration and calibration sequence and are now ready for normal printer operation

Cleaning

CAUTION: Use only the cleaning agents indicated. Zebra Technologies Corporation will not be responsible for damage caused by any other cleaning materials used on the 170*PAX3*-Series print engine.

Table 4 provides a recommended cleaning schedule. Cleaning swabs saturated with 70% Isopropyl Alcohol are available from your Zebra distributor as a Preventive Maintenance Kit (part # 01429).

Table 4: Preventive Maintenance Schedule

Area	Method	Interval
See Figure 10 on page 44 and Figure 11 on page 45 for parts locations		
Printhead (1)	Alcohol	After every roll of ribbon when printing in the thermal transfer mode. After every roll of media when printing in the direct thermal mode.
Platen Roller (2)	Alcohol	
Media Path	Alcohol	
Transmissive Media Sensor (3)	Air blow	
Reflective Media Sensor (4)	Air blow	
Ribbon Sensor (5)	Air blow	
Door-Open Sensor (6)	Air blow	
Peel Bar (7)	Alcohol	After every roll of media or more often if needed.

Cleaning the Exterior

The exterior surfaces of the print engine may be cleaned with a lint free cloth. *Do not use harsh or abrasive cleaning agents or solvents!* If necessary, a mild detergent solution or desktop cleaner may be used sparingly.

Cleaning the Interior

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

Cleaning the Sensors

To ensure proper operation of the print engine, all sensors should be cleaned on a regular basis. To locate the position of these sensors, refer to Figure 10 on page 44.

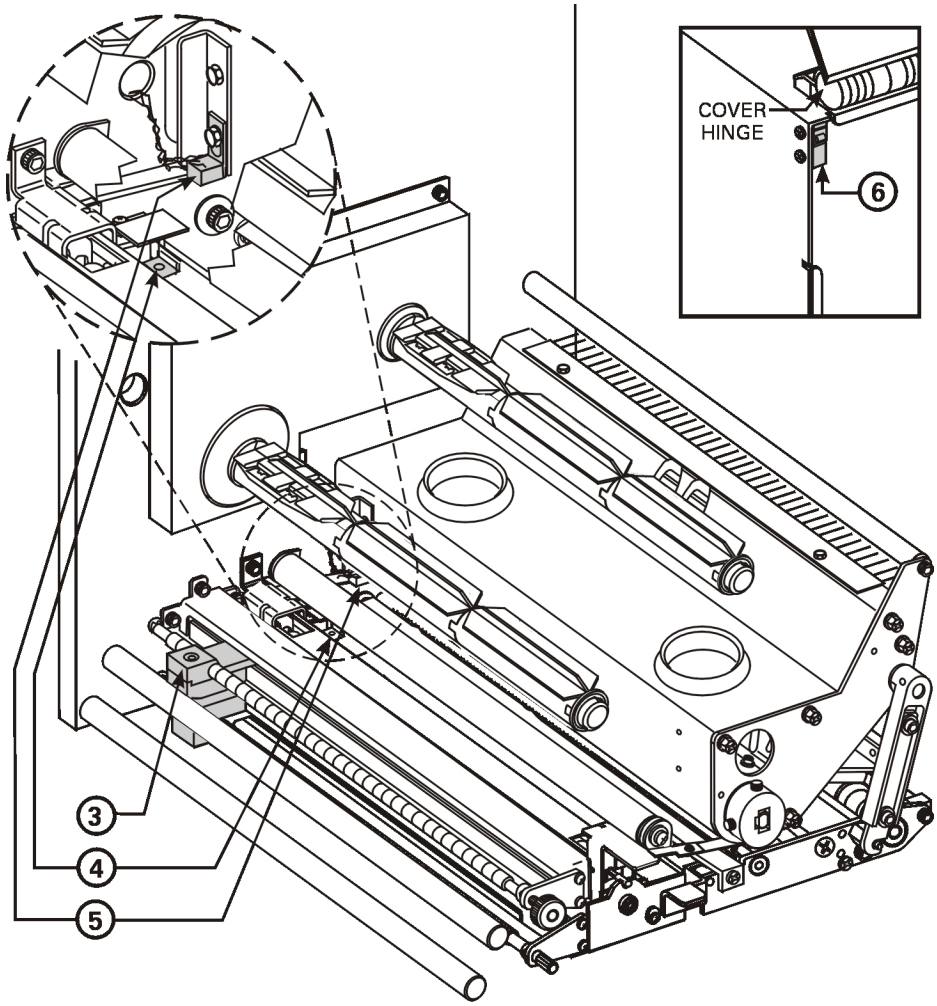


Figure 10. Sensor Locations (Right-Hand Unit Shown)

Cleaning the Printhead and Platen Roller

Inconsistent print quality, such as voids in the bar code or graphics, or light print may indicate a dirty printhead. Media movement problems may indicate a dirty platen. For optimum print quality, perform the following cleaning procedure after every roll of ribbon.

NOTE: If print quality has degraded and you have not changed to a different type of media or ribbon, it should not be necessary to change the darkness setting or the toggle pressure.

To clean the printhead and platen roller, refer to Figure 11 on page 45 and perform the following steps.

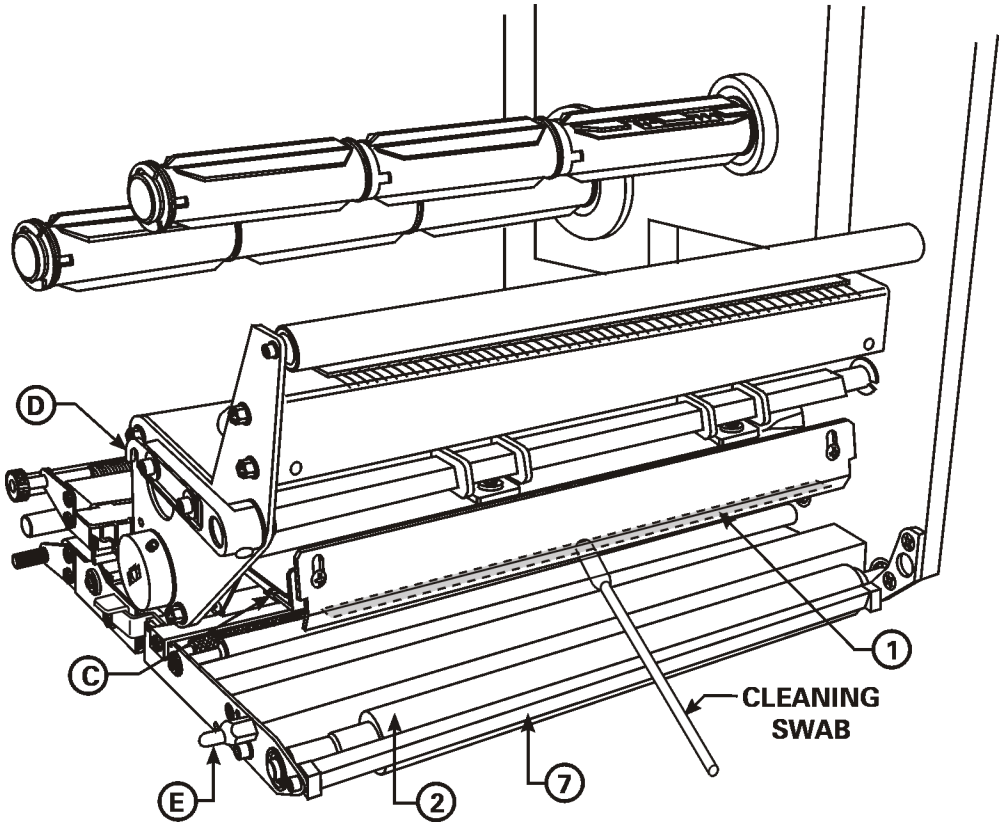


Figure 11. Print Engine Cleaning (Right-Hand Unit Shown)

1. Open the printhead assembly (C) by lifting the printhead lock lever (D) upward away from the locking pin (E), and remove the media and ribbon.
2. Brush, vacuum, or air blow any accumulated lint and paper dust away from the rollers. It is good practice to clean the various media, ribbon, and door-open sensors at this time. See Figure 10 on page 44.
3. Use a cleaning swab saturated with alcohol and wipe the print elements from end to end. The print elements form the grayish/black strip (1) just behind the chrome strip on the underside of the printhead. Allow a few seconds for the alcohol to evaporate.
4. Use a lint-free cloth moistened with alcohol to clean the platen roller (2) and other rollers. Rotate the rollers while cleaning.
5. Reload the ribbon and/or media, latch the printhead, and continue printing. (Turn the print engine ON if previously turned OFF.)

NOTE: If print quality has not improved, try cleaning the printhead with the Save-a-Printhead cleaning film. This specially coated material removes contamination buildup without damaging the printhead. Call your authorized Zebra distributor to order the Save-a-Printhead cleaning kit (part # 38902) for the 170PAX3 print engine.

Toggle Positioning

Proper Toggle positioning is important for proper print quality. The toggles should be positioned 1/4 of the width in from the media edges (see Figure 12 inset).

To position the toggles, loosen the locking nuts (T) and slide them to the desired position on the toggle pivot shaft (U); then, tighten the locking nuts.

NOTE: Perform the Printhead Pressure Adjustment which follows, and make sure the toggle pressure is even, otherwise the media may drift or the ribbon may wrinkle.

Printhead Pressure Adjustment

If printing is too light, or if thick or thin media is used, printhead pressure may need to be adjusted. During this adjustment procedure, refer to Figure 12 on page 47. (Use the lowest pressure possible that provides the desired print quality.)

1. Refer to the Configuration process starting on page 11 and lower the darkness setting (burn duration) to a value of “2” or “3”.
2. Refer to the PAUSE Key Self Test on page 43 and print test labels at 2” (50.8 mm) per second.
3. Loosen the upper toggle adjusting nuts (R) on the threaded shafts of both toggle assemblies.
4. Use the lower toggle adjusting nuts (S) to increase or decrease the spring pressure until the left and right edges of the printed area are equally dark.
5. Increase darkness to the optimum level for the media being used.
6. Hold the lower toggle adjusting nuts (S) in position, and tighten the upper toggle adjusting nuts (R) against them.

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

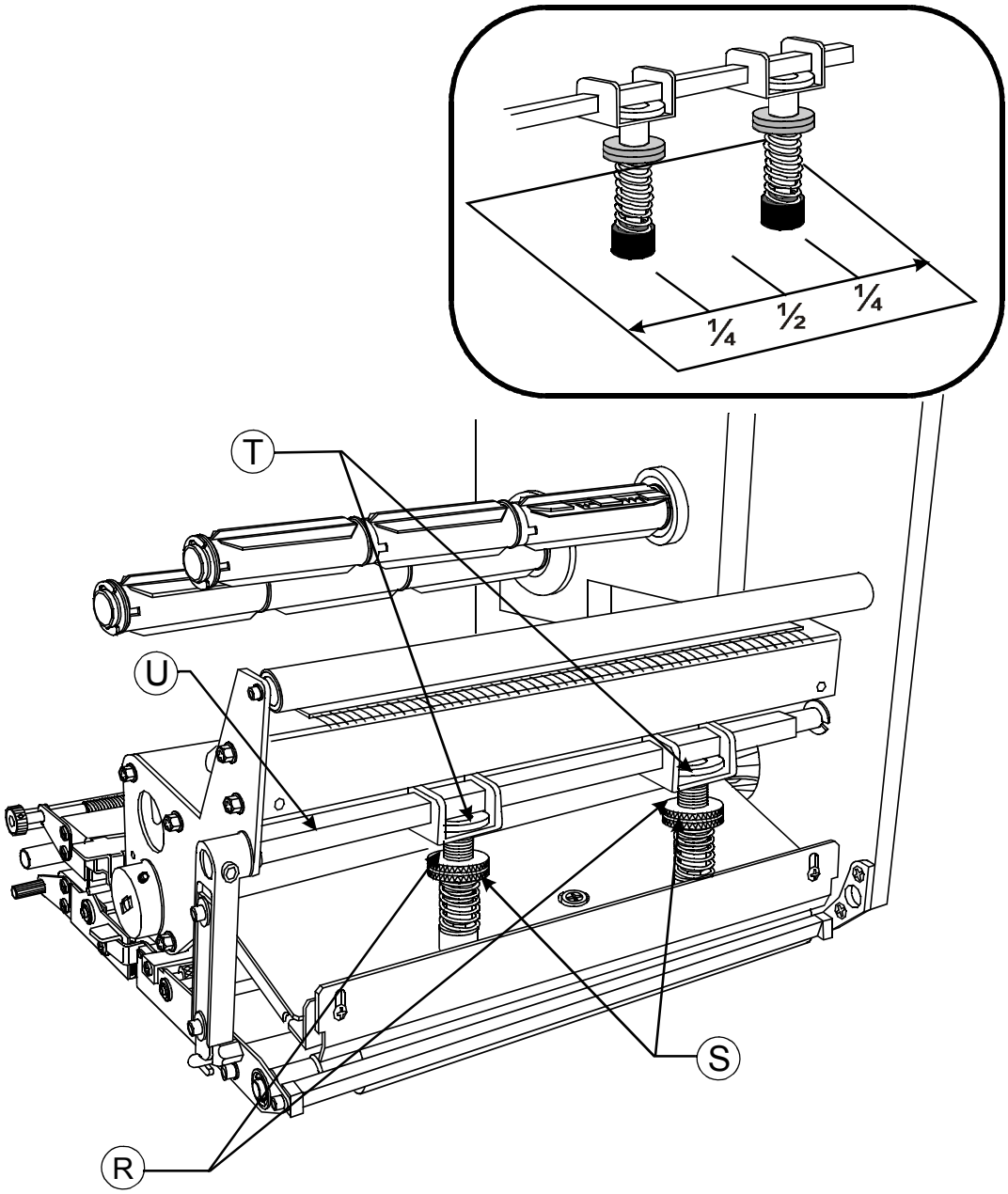


Figure 12. Printhead Pressure (Right-Hand Unit Shown)

Power On Self Test

A Power On Self Test (POST) is performed each time the print engine is turned ON. During this test, the front panel lights (LEDs) will turn ON and OFF to ensure proper operation. At the end of this self test, only the POWER LED will remain lit. Once the Power On Self Test is complete, the media is advanced to the proper resting position, as determined by the programmed Media Feed setting.

To initiate the Power On Self Test, turn the print engine ON using the power switch on the control panel. The POWER LED will go ON. The other control panel LEDs and the LCD monitor the progress and indicate the results of the individual tests. All displayed prompts occur in English; however when a test fails, the prompt will also rotate through the international languages.

The normal self test sequence, which occurs each time the print engine is turned on, is as follows:

Table 5: Self Test Sequence

	Display	Description
1		All lights turn on simultaneously and then turn off in sequence through the following steps.
2	SRAM TEST	SRAM functionality test performed.
3	OPTION ROM TEST	Option ROM functionality test performed. The words “Not Installed” will be added to the display if optional ROM is not used.
4	PRINTHEAD TEST	Printhead is checked for proper operation.
5	PROCESSOR TEST	Processor functionality test performed. The word “Failed” will be added to the display if the test fails.
6	E-CUBED TEST	E-cubed functionality test performed. The word “Failed” will be added to the display if the test fails.
7	EEPROM TEST	EEPROM/PROM functionality test performed. The word “Failed” will be added to the display if the test fails.
8	MEMORY CARD TEST	Optional PCMCIA Memory Card functionality test performed. The words “Not Installed” will be added to the display if no card is present.
9		Depending on how the **^MF** (Media Feed) instruction is set, the print engine will feed to the first web or label length, calibrate ribbon and media sensors, or set label length and feed one or more labels.
10	CHECKING ON BOARD FLASH	Checking flash memory.
11	PRINTER READY	Print engine is ready for operation. Refer to “Configuration & Calibration” on page 21 to set specific parameters. Designate prompt language with the **^KL** command or from the menu.

The following tables provide trouble symptoms, a diagnosis of specific causes, and a recommended action which should result in proper print engine operation.

If you are in need of technical assistance, contact your equipment supplier.

Power On Troubleshooting

Table 6: Power On Troubleshooting

Symptom	Diagnosis	Action
All lights on, but nothing displays on the LCD, and the print engine locks up.	Internal electronic or firmware failure.	Call a service technician.
Print engine locks up while running the Power On Self Test.	Main Logic Board failure.	Call a service technician.
EEPROM TEST FAILED	EEPROM checksum is incorrect.	Call a service technician.

Print Engine Troubleshooting

Table 7: Print Engine Troubleshooting

Symptom	Diagnosis	Action
ERROR CONDITION RIBBON OUT Print engine stops; RIBBON light ON, ERROR light flashes.	**For Thermal Transfer:** Ribbon not loaded or incorrectly loaded**.** Ribbon Sensor not detecting ribbon that is loaded correctly.	Load ribbon correctly. See “Ribbon Loading” on page 11.
		Perform “Media and Ribbon Sensor Calibration” on page 27.
WARNING RIBBON IN RIBBON light ON, ERROR light flashes. Print Engine still prints.	**For Direct Thermal:** Ribbon loaded. *or* Media blocking the Ribbon Sensor.	Remove ribbon. Load media correctly. Perform “Media and Ribbon Sensor Calibration” on page 18.
ERROR CONDITION PAPER OUT Print engine stops; MEDIA light ON, ERROR light flashes.	No media loaded or incorrectly loaded.	Load media correctly. See “Media & Ribbon Loading” on page 9.
	Misadjusted Media Sensor.	Check position of the Media Sensor.
	Print engine set for non-continuous media, but continuous media is loaded.	Install proper media or reset print engine for current media type and perform calibration.
ERROR CONDITION HEAD OPEN Print engine stops and ERROR light flashes.	Printhead is not fully closed.	Close printhead completely.
	Head Open Sensor not working properly.	Call a service technician.
WARNING HEAD TOO HOT Print engine stops and ERROR light flashes.	Printhead is overheated.	Allow print engine to cool. Printing resumes when the printhead elements cool to operating temperature.

Table 7: Print Engine Troubleshooting (Continued)

Symptom	Diagnosis	Action
WARNING HEAD COLD ERROR light flashes. Print Engine continues to print.	Printhead is not hot enough to print properly**.**	Printing continues while printhead heats up. If error remains, environment may be too cold for proper printing. Relocate print engine to warmer area. Verify print quality.
ERROR CONDITION HEAD ELEMENT BAD Experiencing print quality problems.	Printhead element is bad or going bad.	To **correct** the situation, call a service technician to replace the printhead.
		To **override** this error message, turn off the Head Test in the Print engine Configuration.
Print engine stops and PAUSE light goes ON. The LCD displays:	Not enough memory to perform function shown on the second line. **Explanation of Errors:**	You may do any of the following:
OUT OF MEMORY CREATING BITMAP	1. **Creating Bitmap -** Bitmap size (label length/width) does not fit in available memory.	A. With PAUSE on, send a ~HM command to the print engine to display the amount of free memory. *Then either:*
OUT OF MEMORY STORING BITMAP	2. **Storing Bitmap -** Not enough memory available to store the bitmap created.	Redesign graphic/format to fit available memory or remove items from memory to create more space. *or*
OUT OF MEMORY BUILDING FORMAT	3. **Building Format -** Label is too complex.	Press PAUSE to skip the formatting step in process and proceed to the next step.
OUT OF MEMORY STORING FORMAT	4. **Storing Format -** Format is too large to fit in available memory.	B. With PAUSE on, press CANCEL. The print engine skips the current label formatting process and goes on to the next label.
OUT OF MEMORY STORING GRAPHIC	5. **Storing Graphic -** Graphic image is too large to fit in available memory.	C. Turn power OFF and then ON to clear print engine memory and start over.
OUT OF MEMORY STORING FONT	6. **Storing Font -** Not enough memory available to store the font.	D. Upgrade the print engine to a larger memory size. E. Reduce print width to match label width.
Long tracks of missing print on several labels.	Wrinkled ribbon.	See “Wrinkled ribbon.” on page 52.
	Print element damaged.	Call a service technician.
Fine, angular gray lines on blank labels.	Wrinkled ribbon.	See “Wrinkled ribbon.” on page 52.

Table 7: Print Engine Troubleshooting (Continued)

Symptom	Diagnosis	Action
Wrinkled ribbon.	Ribbon fed through the machine incorrectly.	See“Ribbon Loading” on page 11.
	Incorrect burn temperature.	Set the burn temperature to the lowest possible setting for good print quality.
	Incorrect or uneven printhead pressure.	Set the pressure to the minimum needed. See “Printhead Pressure Adjustment” on page 46.
	Media not feeding properly; “walking” from side to side.	Make sure that the media is snug by adjusting the Media Guide, or call a service tech.
	Strip Plate needs adjusting.	Call a service technician.
	Printhead needs vertical adjustment.	Call a service technician.
	Printhead and Platen Roller need to be realigned.	Call a service technician.
	Ribbon Supply Spindle motor is inoperative.	Call a service technician.
Broken or melted ribbon.	Darkness setting too high.	Reduce setting for best print quality, and clean the printhead thoroughly.
Light printing or no printing on the left or right side of the label.	Printhead pressure needs adjustment or printhead out of alignment.	See “Printhead Pressure Adjustment” on page 46.
		Call a service technician.
Misregistration/skips labels.	Media Sensor is not positioned correctly.	Perform Media Sensor position adjustment.
	Print engine not calibrated.	Recalibrate print engine.
	Improper label format.	Use correct label format.
Misregistration and misprint of one to three labels.	Media Sensor is not positioned correctly.	Place Media Sensor in proper position.
	Dirty Platen.	Clean the Platen.
	Media does not meet specifications.	Use media that meets specifications.
Vertical drift in top-of-form registration.	A plus or minus 4-6 dot row (approximately 0.5 mm) vertical drift is acceptable due to the different tolerances of the mechanical parts and print engine modes.	First calibrate the print engine, then use the “Label Top Position” setting to correct. See “Configuration & Calibration” on page 21.
	Print engine out of Calibration.	Recalibrate print engine.
	Platen dirty.	Clean Platen.
Missing LCD characters or parts of characters.	Liquid Crystal Display may be bad and need replacing.	Call a service technician.

Table 7: Print Engine Troubleshooting (Continued)

Symptom	Diagnosis	Action
Changes in parameter settings did not take effect.	Parameters are set incorrectly.	Set parameters and save permanently. Cycle the print engine power OFF and back ON.
	Incorrect ZPL format sent to the print engine.	Check for the ^MP command. The ^MP command can disable changes to parameters.
	If problem continues, there may be a problem with the main logic board.	Call a service technician.
ZPL II was sent to the print engine, but not recognized. DATA light always OFF. or DATA light always flashing.	Communications parameters are incorrect.	Print a Communications Diagnostic Label. Check for format or overrun errors. Reset communication parameters. “Setting Communication Parameters” on page 29.
	Incorrect Communications Cable in use.	Verify proper cable and replace if necessary.
	Prefix and delimiter characters set in print engine do not match the ones used in ZPL II format sent to the print engine.	Set the characters in the print engine to match ZPL II format. See “Selecting Prefix and Delimiter Characters” on page 31.
	Incorrect/incomplete ZPL format sent to the print engine.	Check the ZPL II format for changed **^CC**, **^CT**, and **^CD**.
Vertical image or label drift.	Print engine using non-continuous labels but configured in continuous mode.	Configure the print engine for non-continuous and run calibration routine, if necessary.
	Incorrectly-positioned media sensor.	Assure the media sensor is properly positioned to read a single/consistent inter-label gap.
	Improperly-calibrated media sensor.	Perform “Media and Ribbon Sensor Calibration” on page 27.
	Platen roller dirty.	Clean the Platen roller.
	Improper printhead pressure settings (toggles).	Adjust the printhead pressure to assure proper functionality.
	Improperly-loaded ribbon or media.	Verify that the ribbon and media are properly loaded.
	Incompatible media.	Assure the inter-label gaps or notches are 2 mm - 4 mm and constantly placed. Also, media must not exceed minimum specifications for mode of operation.

Print Engine Self Tests

Introduction

These self tests, illustrated on the following pages, produce sample labels and provide specific information that help determine the operating conditions for the print engine.

Each self test is enabled by pressing a specific control panel key or combination of keys while turning the power switch ON. Keep the key pressed until the first indicator light turns OFF. The selected self test will automatically start at the end of the Power On Self Test.

NOTE: The following apply to your print engine:

- ***When performing these self tests, do not send data to the print engine from the Host.***
- ***Full width media should be used when performing Print engine Self Tests. If your media is not wide enough, the test labels may print on the label and the platen roller, or in the case of narrow media, not on the label at all. To prevent this from happening, check the configuration parameter "Setting the Print Width", and insure it is correct for the media you are using.***
- ***If your media is too short, the test label will continue on the next label.***
- ***When canceling a self test prior to its actual completion, always reset the print engine by turning the print engine power OFF and then ON.***
- ***When performing these self tests, the operator must manually remove the labels as they become available.***
- ***You may have to set the print mode to Tear-Off and Applicator Port to OFF for the labels to print.***

CANCEL Key Self Test

Press and hold the CANCEL key while turning the print engine power ON. Release the key anytime after the first front panel LED turns OFF.

This self test prints a label that contains a listing of the print engine's current configuration parameters stored in configuration (EEPROM) memory (refer to Figure 13).

The configuration may be changed either temporarily (for specific label formats or ribbon and label stock) or permanently (by saving the new parameters in EEPROM memory). Saving new parameters occurs whenever a print engine calibration procedure is performed. Refer to "Configuration & Calibration" on page 21 for further details.

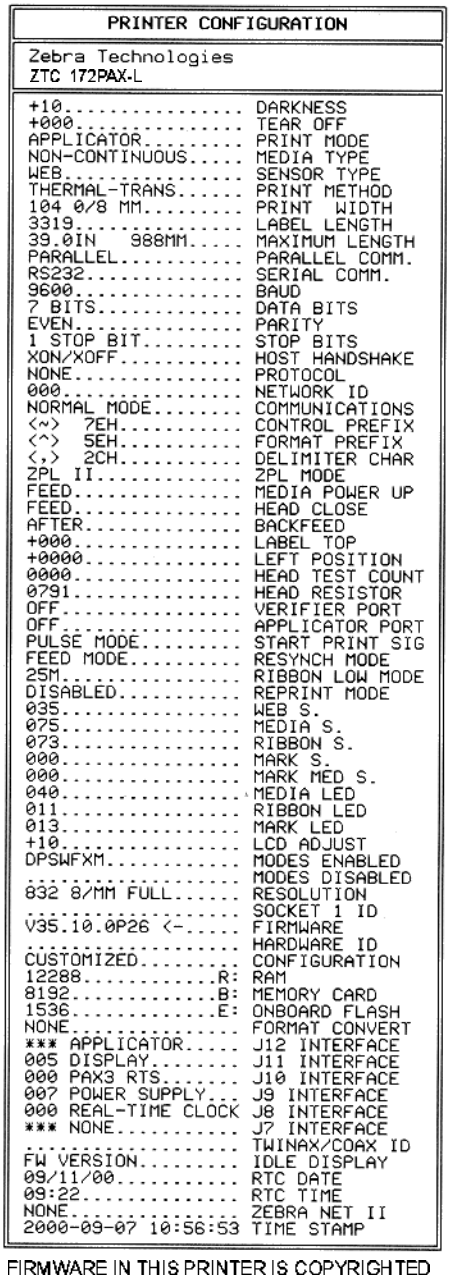


Figure 13. CANCEL Key Self Test

PAUSE Key Self Test

Press and hold the PAUSE key while turning the print engine power ON. Release the key anytime after the first front panel LED turns OFF.

This self test is actually comprised of five individual test features:

1. The initial self test prints 15 labels at 2" (5.08 cm) per second, then automatically pauses the print engine. Each time the PAUSE key is pressed, an additional 15 labels print.
2. While the print engine is paused, alter the self test by pressing the CANCEL key once. Now each time the PAUSE key is pressed, the print engine prints 15 labels at 6" (15.24 cm) per second.
3. While the print engine is paused, alter the self test a second time by pressing the CANCEL key once. Now each time the PAUSE key is pressed, the print engine prints 50 labels at 2" (5.08 cm) per second.
4. While the print engine is paused, alter the self test a third time by pressing the CANCEL key once. Now each time the PAUSE key is pressed, the print engine prints 50 labels at 6" (15.24 cm) per second.
5. While the print engine is paused, alter the self test a fourth time by pressing the CANCEL key once. Now each time the PAUSE key is pressed, the print engine prints 15 labels at the maximum speed of the print engine.

This self test can be used to provide the test labels required when making adjustments to the print engine's mechanical assemblies. See Figure 14.

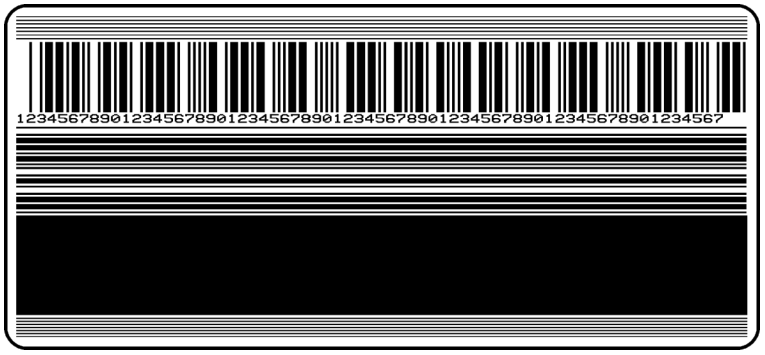


Figure 14. PAUSE Key Self Test Sample Label

FEED Key Self Test

Press and hold the FEED key while turning the print engine power ON. Release the key anytime after the first front panel LED turns OFF.

NOTE: The CANCEL Key Self Test should be performed prior to this self test. Information on the printed configuration label can be used with the results of this self test to determine the best darkness setting for a specific media/ribbon combination.

The labels printed during this print quality test depends on the dot density of the printhead.

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

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

Compare these labels to determine which has the best print quality. Then add or subtract the value printed on that label from the darkness value specified on the configuration label. The resulting numeric value (0 to 30) is the best darkness value for that specific media/ribbon combination. Use the front panel configuration process to set the Print Darkness parameter to the new value. Refer to Figure 15 for an example of the label.

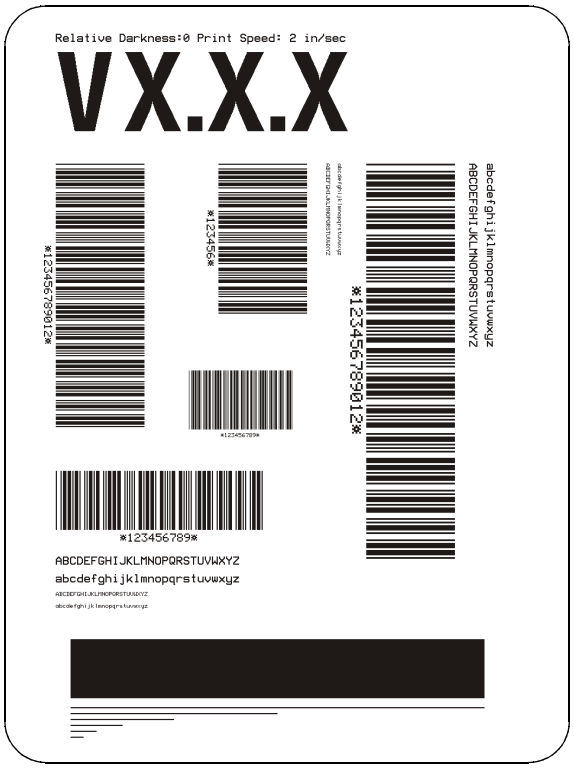


Figure 15. FEED Key Self Test

FEED Key and PAUSE Key

Press and hold these two keys while turning the print engine power ON. The print engine configuration will be *temporarily* reset to the factory default values. These values will be active until power is turned OFF.

NOTE: If the factory default values are permanently saved, a media calibration procedure must be performed. You must also reset the head resistance value, and the verifier and applicator port settings to their required values (see "Configuration & Calibration" on page 21).

Table 8: Configuration Parameters

Parameter	Controlled by
Darkness	Configuration and ZPL
Tear Off	Configuration and ZPL
Print Mode	Configuration and ZPL
Media Type	Calibration, Configuration and ZPL
Sensor Type	Configuration and ZPL
Print Method	Calibration, Configuration and ZPL
Print Width	Configuration and ZPL
Label Length	Calibration, Configuration and ZPL
Maximum Length	Configuration and Memory Size
Host Port	Configuration
Baud	Configuration
Data Bits	Configuration
Parity	Configuration
Stop Bits	Configuration
Host Handshake	Configuration
Protocol	Configuration
Network ID	Configuration and ZPL
Communications	Configuration and ZPL
Control Prefix	Configuration and ZPL
Format Prefix	Configuration and ZPL
Delimiter Character	Configuration and ZPL
ZPL Mode	Configuration and ZPL
Ribbon Tension	Configuration and ZPL
Media Power Up	Configuration and ZPL
Head Close	Configuration and ZPL
Backfeed	Configuration and ZPL
Label Top	Configuration and ZPL
Left Position	Configuration and ZPL
Head Test Count	Configuration and ZPL

Table 8: Configuration Parameters (Continued)

Parameter	Controlled by
Head Resistance (must match head resistance label value)	Configuration or ZPL
Verifier Port	Configuration and ZPL
Applicator Port	Configuration and ZPL
Start Print Signal	Configuration and ZPL
Resynch Mode	Configuration and ZPL
Ribbon Low Mode	Configuration and ZPL
Reprint Mode	Configuration and ZPL
Web Sensor	Configuration and ZPL
Media Sensor	Configuration and ZPL
Ribbon Sensor	Configuration and ZPL
Mark Sensor	Configuration and ZPL
Mark Media Sensor	Configuration and ZPL
Media LED	Configuration and ZPL
Ribbon LED	Configuration and ZPL
Mark LED	Configuration and ZPL
LCD Adjust	Configuration
Modes Enabled	ZPL
Modes Disabled	ZPL
Resolution	Fixed (head type switch)
Socket 1 ID	Fixed (option EPROMS)
Firmware	Fixed (code EPROMS)
Configuration	Configuration
Memory	Fixed (SIMM size and 1 MB standard)
B: Memory	Fixed (option card)
J12 Interface	Fixed
J11 Interface	Fixed
J10 Interface	Fixed
J9 Interface	Fixed
J8 Interface	Fixed
J7 Interface	Fixed
Twinax/Coax ID	ZPL
Real Time Clock	Configuration and ZPL

Communications Diagnostics Test

The following test cannot be performed until all configuration and calibration parameters have been set. For information, refer to “Configuration & Calibration” on page 21.

NOTE: This test is performed via the control panel. Refer to “Setting the Communications Mode” on page 31. A typical printout from this test is shown in Figure 16. This label will be inverted when printed.

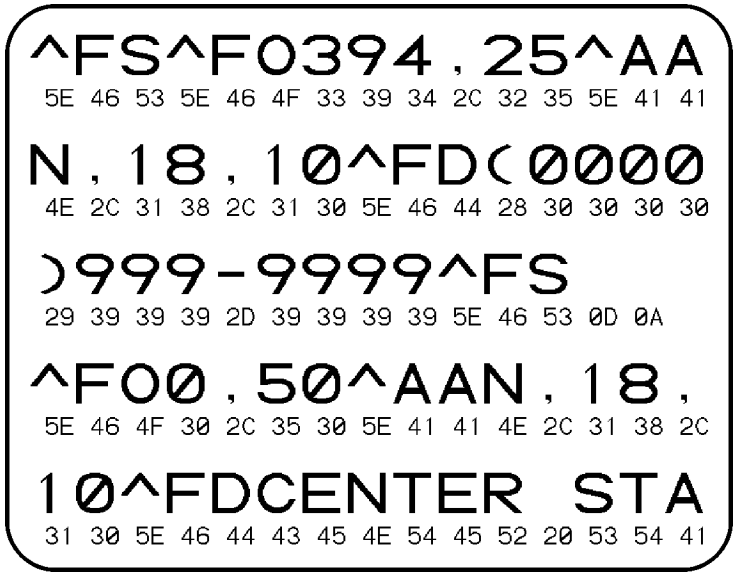


Figure 16. Results of Communications Diagnostic Test

Your print engine can be equipped with the following options. Contact your equipment supplier for further information and pricing.

Single In-line Memory Module (SIMM)

An optional 8 MByte SIMM increases the graphic and font storage capacity of the print engine and/or increases the print length. As this is volatile memory, contents will be lost when the print engine is turned off.

Personal Computer Memory Card Interface Association (PCMCIA) Memory Card

The Type I or Type II PCMCIA memory card is used for graphic, font, and label format storage. This card is an 8 MByte, non-volatile memory device, so the contents are not lost when the print engine is turned OFF.

Communication Interfaces

IBM® Twinax Interface

This interface emulates IBM System 3/X and AS/400 (5224, 5225, 5256, and 4214) print engines. This option comes with an auto-terminating one-foot "Y" connector cable.

IBM® Coax Interface

This interface emulates an IBM System 3287 print engine used in the IBM 3270 environment. This option comes with a BNC connector to interface to your host mainframe's controller.

ZebraNet™ PrintServer II

Allows you to connect a Zebra print engine to your Ethernet network. Available for 10BaseT networks.

Printing Considerations

Media Type (continuous, die-cut, or black mark)	172*PAX3*	173*PAX3*
Resolution	203 dots per inch (8 dots per mm)	300 dots per inch (12 dots per mm)
Dot size	0.0049” x 0.0049” (0.125 mm x 0.125 mm)	0.0033” x 0.0039” (0.084 mm x 0.100 mm)
First dot location (from inside media edge)	0.093” ±0.035” (2.4 mm ±0.89 mm)	0.093” ±0.035” (2.4 mm ±0.89 mm)
Maximum print width	6.6” (168 mm)	6.6” (168 mm)
Maximum print length (with full width media) Non-continuous (*4 MB Memory*) Non-continuous (*12 MB Memory*) Continuous (*4 MB Memory*) Continuous (*12 MB Memory*	 39” (990 mm) 39” (990 mm) 92” (2336 mm) 338” (8585 mm)	 39” (990 mm) 39” (990 mm) 41” (1041 mm) 150” (3810 mm)

Print Speeds

172*PAX3* (203 DPI) – Programmable constant printing speeds (per second) of 2.4" (61 mm), 3" (76 mm), 4" (102 mm), 5" (127 mm), 6" (152 mm), 7" (178 mm), 8"(203 mm), 9" (229 mm), 10" (254 mm), 11" (279 mm), and 12" (305 mm).

173*PAX3* (300 DPI) – Programmable constant printing speeds (per second) of 2.4" (61 mm), 3" (76 mm), 4" (102 mm), 5" (127 mm), 6" (152 mm), 7" (178 mm), and 8" (203 mm).

Media Specifications

Media width (label and liner)	3” (76 mm) to 7.1” (180 mm)
Minimum label length Applicator mode Rewind mode Tear-off mode	 3.0” (76.2 mm); 1.0” (25.4 mm) with backfeed off 1.0” (25.4 mm); no backfeed 3.0” (76.2 mm); 1.0” (25.4 mm) with backfeed off
Media registration tolerance Vertical (concurrent labels) Horizontal	 ±0.040” (±1.0 mm) (in Applicator mode) ±0.040” (±1.0 mm)
Total thickness (including liner)	0.003” to 0.012” (0.076 mm to 0.305 mm)
Interlabel Gap (Transmissive Sensor) Minimum Preferred Maximum	 0.079” (2 mm) 0.118” (3 mm) Refer to “MAXIMUM LENGTH” on page 25 for Interlabel Gap and Label Length discussion.
Black Mark (Reflective Sensor) Length (parallel to inside media edge) Width (perpendicular to inside media edge)	 .12” (3 mm) to .43” (11 mm) >= 0.43” (11 mm)
Print Line to Peel Bar Distance	.63” (16 mm)

Ribbon Specifications

Width (wound coated side out)	3.0” (76 mm) to 7.1” (180 mm)
Standard length	984’ (300 m), 1476’ (450 m), 1969’ (600 m), and 2955’ (900 m)
Roll size *Inner core diameter / Maximum roll size*	1.0” (25.4 mm) / 4.0” (101.6 mm)

Zebra Programming Language (ZPL II)

- Communicates in printable ASCII characters
- Controlled via mainframe, mini, or PC
- Downloadable graphics, scalable and bit-map fonts, label templates, and formats
- Object copying between memory areas
- (Flash RAM and PC memory card)
- Adjustable print cache
- Data compression
- Automatic memory allocation for “format while printing”
- Format inversion (white on black)
- Mirror image printing
- Four-position field rotation (normal - 0°, 90°, 180°, and 270°)
- Slew command
- Programmable label quantities with print and pause control
- Automatic serialization of fields
- User-programmable password
- Status messages to host upon request

Bar Codes

- Bar code modulus “X” dimensions:

  Picket fence (non-rotated) orientation:
  203 dpi = 0.0049” mil to 0.049”
  300 dpi = 0.0033” mil to 0.033”
  Ladder (rotated) orientation:
  203 dpi = 0.0049” mil to 0.049”
  300 dpi = 0.0039” mil to 0.039”
- 2-dimensional bar codes:

  Code 49, Maxi Code, PDF-417, QR Code, Codablock, DataMatrix, Micro-PDF417

- Linear bar codes:

  Code 11, Code 39, Code 93, Code 128 with subsets A/B/C and UCC Case Codes, ISBT-128, UPC-A, UPC-E, EAN-8, EAN-13, UPC and EAN 2 or 5 digit extensions, Plessey, Postnet, Standard 2 of 5, Industrial 2 of 5, Interleaved 2 of 5, LOGMARS, MSI, and Codabar
- Bar code ratios: 2:1, 7:3, 5:2, and 3:1

Communication Specifications

- High-speed parallel interface, Centronics® compatible
- High-speed serial interfaces:

  RS-232C and RS422 with DB25S (Female) connector

  RS-485 multi-drop capability

  Configurable baud rate (110 - 57.6 K bits/sec.), parity, data bits, and stop bits

  Software (XON/XOFF) or hardware (DTR/DSR) communications handshake protocols
- ZebraNet™ PrintServer II ethernet network print server (10Base-T)
- IBM® Twinax interface - emulates IBM® System 3X and AS/400 print engines
- IBM® Coax interface - emulates IBM® System 3270 print engines
- Applicator interface with DB15S (Female) connector

Standard Print Engine Fonts

Font Matrices for 12 dot/mm (300 DR) Printhead

Font	Matrix (in dots)			Type*	Character Size					
					Inches			Millimeters		
	Height	Width	Inter-character Gap		Height	Width	Char/inch	Height	Width	Char/inch
A	9	5	1	U-L-D	0.030	0.020	50.00	0.76	0.51	1.97
B	11	7	2	U	0.037	0.030	33.33	0.93	0.76	1.31
C, D	18	10	2	U-L-D	0.060	0.040	25.00	1.53	1.02	0.98
E	41	20	6	OCR-B	0.137	0.087	11.54	3.47	2.20	0.45
F	26	13	3	U-L-D	0.087	0.053	18.75	2.20	1.36	0.74
G	60	40	8	U-L-D	0.200	0.160	6.25	5.08	4.07	0.25
H	30	19	9	OCR-A	0.100	0.093	10.71	2.54	2.37	0.42
GS	24	24	0	SYMBOL	0.080	0.080	12.50	2.03	2.03	0.49
∅	Default: 15 X 12			U-L-D	Scalable					

* U = Uppercase, L = Lowercase, D = Descenders

Font Matrices for 8 dot/mm (203 DPI) Printhead										
Font	Matrix (in dots)			Type*	Character Size					
					Inches			Millimeters		
	Height	Width	Inter-character Gap		Height	Width	Char/inch	Height	Width	Char/inch
A	9	5	1	U-L-D	0.044	0.029	33.90	1.13	0.75	1.33
B	11	7	2	U	0.054	0.044	22.60	1.38	1.13	0.89
C, D	18	10	2	U-L-D	0.088	0.059	16.95	2.25	1.50	0.67
E	28	15	5	OCR-13	0.138	0.098	10.17	3.50	2.50	0.40
F	26	13	3	U-L-D	0.128	0.079	12.71	3.25	2.00	0.50
G	60	40	8	U-L-D	0.295	0.236	4.24	7.50	6.00	0.17
H	21	13	6	OCR-A	0.103	0.093	10.71	2.63	2.38	0.42
GS	24	24	0	SYMBOL	0.118	0.118	8.48	3.00	3.00	0.33
∅	Default: 15 X 12			U-L-D	Scalable					
* U = Uppercase, L = Lowercase, D = Descenders										

- Bitmap fonts A through H and GS symbols are expandable up to 10 times, height and width independent
- Smooth, scalable font 0 (CG TriumvirateTm Bold Condensed) is expandable dot by dot, height and width independent
- IBM8 Code Page 850 International Characters

Memory

- 4 MByte RAM standard
- Optional 8 MByte SIMM available for longer labels or additional storage of fonts, graphics, logos, and label formats
- Type II Series C & D PC Card Interface (memory only) standard
- Optional 8 MByte PC Memory Card - available for additional storage of fonts, graphics, logos, templates, and label formats. Also available pre-programmed with optional and international scalable fonts.
- 1.5 MB Non-volatile Flash Memory - available for additional storage of fonts, graphics, logos, templates, and label formats.
- Additional fonts available on Optional EPROMs

Physical Dimensions

Height	11.8” (300 mm)
Width	9.6” (245 mm)
Depth	17.0” (432 mm)
Weight	32 lbs. (14.5 kg)

NOTE: For installation information, refer to “Appendix E” on page 85.

Electrical Specifications

- Dual 32-bit RISC and CISC microprocessors
- Universal Power Supply with power-factor correcting 90-264 VAC, 48-62 Hz
- Power consumption: Idle = 19 W, Printing = 220 W (printing Pause Test label at speed A)
- Agency approvals: UL 1950 3rd edition, CSA 22.2 950-95, EN60950 (IE 950), FCC (Class A), DOC (Class A), EN55022 (CISPR) (Class A), EN50082-2, AS/NZS 3548
- CE, and FCC Class “A” approved

Fuses

5 Amp, 250 VAC, 5 x 20 mm IEC style, as supplied with the print engine

Environmental Operating Range

Operating temperature Thermal transfer Direct thermal	 41° F to 104° F (5° C to 40° C) 32° F to 104° F (0° C to 40° C)
Non-condensing relative humidity Operation Storage	 20% to 85% 5% to 85%
Storage temperature	-40° F to 140° F (-40° C to 60° C)

Appendix A

AC Power Cord Requirements

Since many areas of the world have specific power requirements, an AC Power Cord may not be included with your print engine. Refer to Figure 17. A power cord must be provided by you that meets your local electrical requirements.

WARNING! For personnel and equipment safety, always use a three-prong plug with an earth ground connection to the AC Power Source.

AC Power Cord Specifications:

- The overall length must be less than 9.8 feet (3 m).
- It must be rated for at least 5 Amp, 250 VAC.
- The chassis ground (earth) ***must*** be connected to assure safety and reduce electro-magnetic interference. This is done by the third wire (earth) in the power cord.
- The AC power plug and IEC320 connector should bear the certification mark of at least one of the known international safety organization shown in Figure 18.

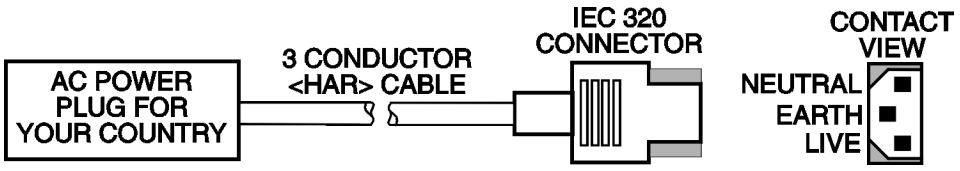


Figure 17. VAC Power Cord

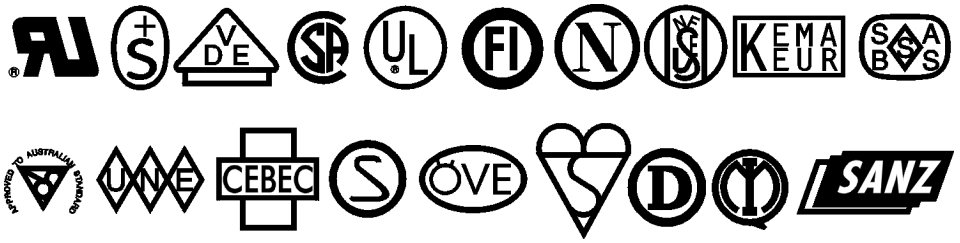


Figure 18. Safety Organization Logos

Power Fuse Replacement

The print engine uses a metric-style fuse (5 x 20 mm IEC) rated for 5 Amps at 250 Volts that bears the certification mark of a known international safety organization (see Figure 18 on page 69).

The power entry module comes with two approved fuses in the fuse holder; one is "in-circuit" and one is provided as a "spare."

To replace a fuse, follow this procedure and refer to Figure 19:

1. Turn off the print engine and unplug the power cord from the back of the print engine.
2. Using a small-blade screwdriver, remove the fuse holder from the power entry module at the rear of the print engine.
3. Carefully remove the fuse from the "in circuit" location. To remove the fuse from the "spare" location, insert the point of a pencil through one of the two holes in the fuse holder; gently push. Repeat this procedure through the other hole.
4. Insert this fuse in the "in circuit" location. (Remember to replace an approved 250 VAC, 5 Amp fuse in the "spare" location!)
5. Reinstall the fuse holder into the power entry module at the rear of the print engine.
6. Reconnect the power cord and turn the print engine on.
7. The print engine should now be ready for operation and the POWER light should be on.

NOTE: If power is not restored, an internal component failure may have occurred and the print engine requires servicing. Refer to "Troubleshooting" on page 49.

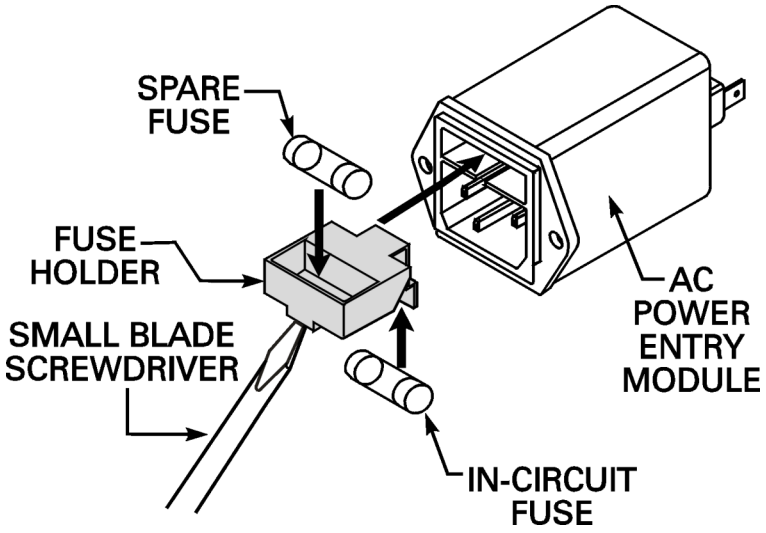


Figure 19. Installing a Fuse

Shipping

To ship the Zebra 170*PAX3*-Series print engine, remove all ribbon and media and make sure the printhead is closed for shipment. Carefully pack the print engine in a suitable container to avoid damage during transit. Whenever possible, use the original “carton within a carton” packing materials from the factory. A shipping container (PN:49367) can be purchased from Zebra Technologies Corporation if the original packaging is lost or destroyed. Contact your distributor or Zebra Technologies Corporation to order the 170*PAX3*-Series Packing Materials Kit.

If you use a different container, package the print engine carefully to avoid damage.

CAUTION: When packaging the print engine in a rigid container, use shock mounts or shock-absorbing packing material.

Appendix B

Print Engine Communications Interface Technical Information

System Considerations

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

Interfaces — The method of interfacing the print engine to a data source depends on the communication options installed in the print engine and the host. The standard interfaces are an RS-232/RS-422/RS-485 serial data port and a Centronics-compatible parallel port. Optional IBM Twinax, IBM Coax and Ethernet options are available for those applications which require them.

Data Specifications — When communicating via an asynchronous serial data port (RS-232/RS-422/RS-485), the baud rate, number of data and stop bits, the parity, and the XON/XOFF or DTR control are user-selectable and should be set to match those of the host computer. When communicating via the Centronics-compatible parallel port, the previously mentioned parameters are not considered. Refer to "Configuration and Calibration" to configure the communication parameters for the print engine.

Interface Considerations

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

Advantages: Cables and connectors are readily available from computer equipment stores and suppliers; easy to connect; two-way communication between the host and the print engine.

Disadvantages: Slower than the parallel connection; limited to 50 feet (15.24 meters) of cable.

RS-422 – A single-user current loop serial communication method.

Advantages: Longer cable length up to 4000 feet (1219.2 m); greater immunity to data corruption caused by industrial motors and fluorescent lights; two-way communication between the host and the print engine.

Disadvantages: Not commonly available on standard PCs without additional hardware; slower than the parallel connection.

RS-485 – A multiple-user current loop serial communication method that is used to support multiple print engines connected to a single host.

Advantages: Longer cable length up to 4000 feet (1219.2 m); greater immunity to data corruption caused by industrial motors and fluorescent lights; two-way communication between the host and the print engine.

Disadvantages: Not commonly available on standard PCs without additional hardware; slower than the parallel connection.

Centronics-compatible Parallel – This is a common communication method available on most PCs and other hosts.

Advantages: Fastest of the four communication interfaces; cables and connectors are readily available from computer equipment stores and suppliers; easy to connect.

Disadvantages: Shorter recommended cable length of 6 feet (1.83 m).

WARNING! Connecting a data communications cable while the power is ON may damage the *PAX3* print engine.

RS-232/RS-422/RS-485 Serial Data Port

The connections for these standard interfaces are made through the DB25 Female connector on the rear panel. Refer to Table 8. For all RS-232 input and output signals, the print engine follows both the Electronics Industries Association's (EIA) RS-232 and the Consultative Committee for International Telegraph and Telephone (CCITT) V.24 standard signal level specifications.

Table 8: RS-232/RS-422/RS-485 Pinouts

Pin Number	Description
1	Frame ground for cable shield
2	TXD (RS-232 transmit data) output from print engine
3	RXD (RS-232 receive data) input to print engine
4	RTS (RS-232 request to send) output from print engine
6	DSR (data set ready) input to print engine
7	Signal ground for RS-232
9	+5 VDC source output (750 mA maximum)
11	Signal ground reference for RS-422/RS-485
13	RS-422/RS-485 data input B (-)
14	RS-422/RS-485 data output B (-)
16	RS-422/RS-485 data input A (+)
19	RS-422/RS-485 data output A (+)
20	DTR (RS-232 data terminal ready) output from print engine
NOTE: Pins 5, 8, 10, 12, 15, 17-18, 21-25 are not used and are unterminated.	

RS-232 Interconnections — The print engine is configured as Data Terminal Equipment (DTE). Figure 20 illustrates the connections required to interconnect the print engine with the standard 9-pin serial port connector on a PC. Figure 21 illustrates the internal connections of the print engine's RS-232 connector.

NOTE: If using a 9-pin to 25-pin adapter plug attached to the computer, use a null modem cable between the adapter plug and the print engine. To connect the print engine to other DTE devices with DB25 connectors (such as an optional serial port of a PC), an RS-232 null modem (crossover) cable should be used.

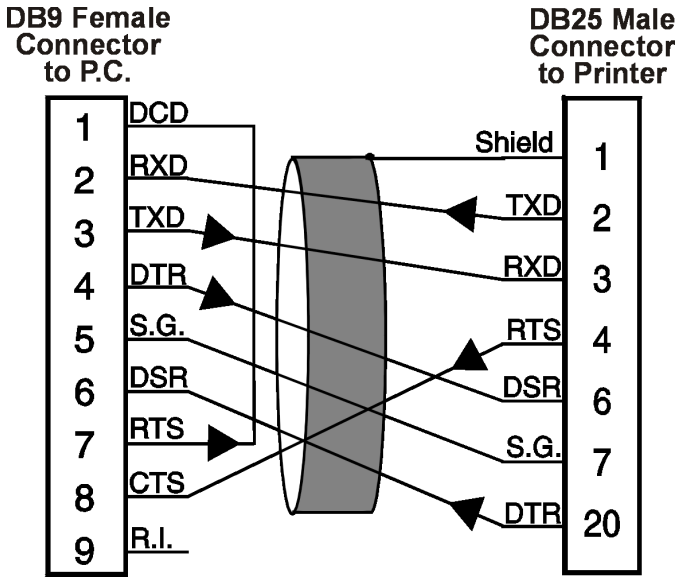


Figure 20. 9-Pin to 25-Pin Interconnecting Cable

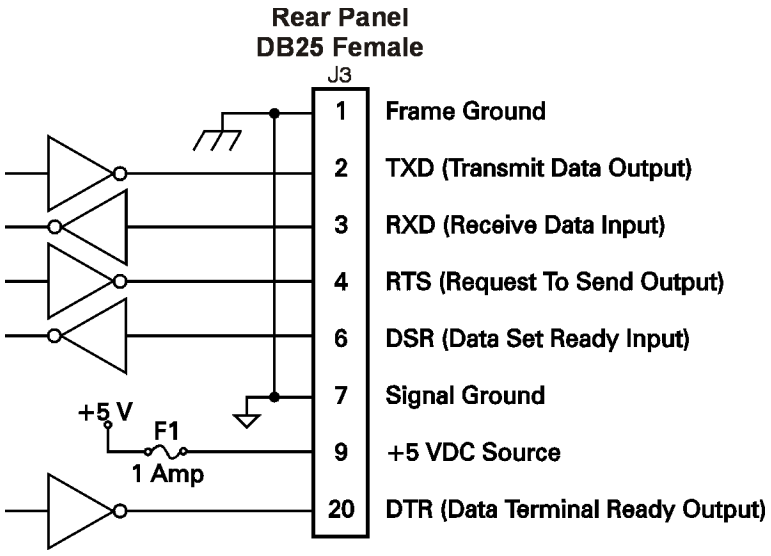


Figure 21. RS-232 Connections

RS-422/RS-485 Interconnections — The print engine may be connected to a host by a RS-422/RS-485 interface. The DB25 Female connector on the rear of the print engine uses specific pins for this purpose. Figure 22 illustrates the required cable wiring for interconnecting to the print engine's DB25 connector. Figure 23 illustrates the internal connections of the print engine's RS-422/RS-485 connector.

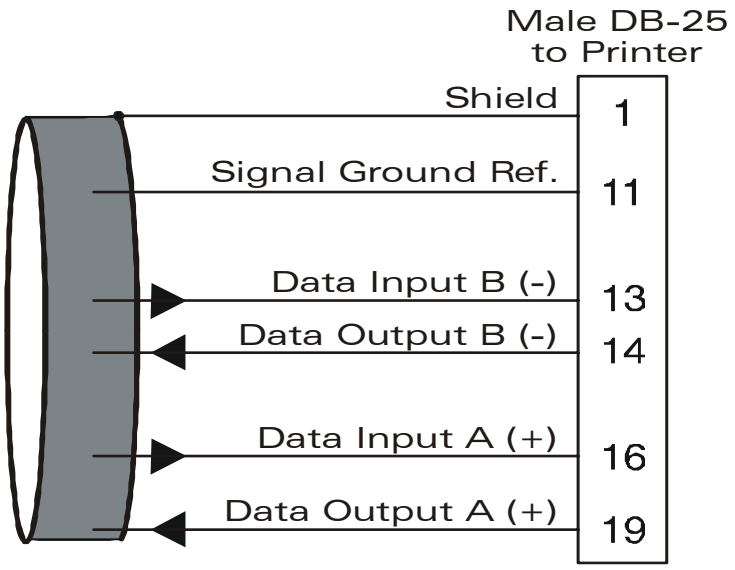


Figure 22. RS-422/RS-485 Interconnecting Cable

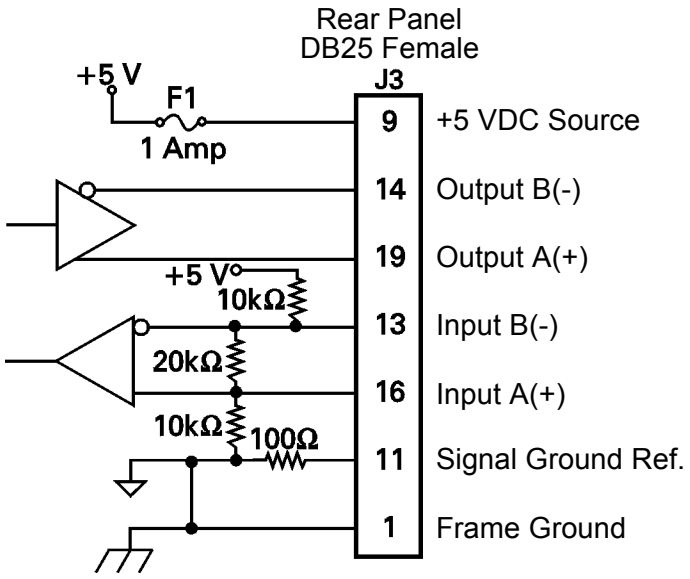


Figure 23. RS-422/RS-485 Connections

Centronics-Compatible Parallel Data Port

A standard 36-pin Centronics-compatible parallel connector is available at the rear of the print engine for connection to the data source. The standard RS-232 port will not accept data when the parallel port is enabled. The parallel interface receives data from the data source but cannot send back print engine status information over this port. However, if the print engine receives a “Print engine Status Request” command over the parallel interface, it will send back this information over the RS-232 port.

Parallel Port Interconnections — Table 9 shows the pin configuration and function of a standard computer-to-print engine Centronics-compatible parallel cable:

Table 9: Centronics-Compatible Pinouts

Pin Number	Description
1	STROBE — The high to low transition of this input signal will latch the data at the eight data inputs into the print engine.
2-9	DATA BITS 0-7 — Parallel data inputs to the print engine. They have TTL input characteristics where a HIGH (+5 V) level corresponds with a logic 1 and a LOW (0 V) level is a logic 0.
10	ACKNOWLEDGE — This output of the print engine is an active LOW pulse indicating that the print engine has received the previous character and is ready to accept another data character.
11	BUSY — This print engine output is active HIGH whenever it cannot accept data.
12	ERROR — This output signal is active HIGH whenever the print engine is out of paper or ribbon.
13	SELECT — The function of this output signal is determined by a Print engine Configuration Option. In the default condition, SELECT is active HIGH whenever the parallel port is powered up and enabled.
14	AUTOFEED — This input is unused by the print engine.
15, 33, 34	Not used
16, 19-30	SIGNAL GROUNDS — The logic GROUNDS and returns for all input and output signals.
17	Chassis ground (for cable shield connections)
18	+5 V fused output, 750 mA maximum
31	INITIALIZE (reset) — This input is unused by the print engine.
32	FAULT — This output from the print engine is active LOW whenever any of the following error conditions are present: Printhead Open, Printhead Over Temperature, Paper Out, Ribbon Out.
35	+5 V resistive
36	SEL IN — Connected but not used by the print engine.

Cabling Requirements

Data cables must be fully shielded and fitted with metal or metallized connector shells. Shielded cables and connectors are required to prevent radiation and reception of electrical noise. To minimize electrical noise pickup in the cable:

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

NOTE: Print engines comply with FCC "Rules and Regulations," Part 15, Subpart "J," for Class "A" equipment, using fully-shielded 6-foot data cables. Use of longer cables or unshielded cables may increase radiated emissions above the Class "A" limits.

NOTE: RS-422 and RS-485 applications should use shielded twisted pairs with 120 ohm controlled impedance as recommended in the Appendix of the ITA/EIA-485 specification.

Applicator Interface Connector

Refer to Table 10. An external DB-15 connector is present on the rear panel of the print engine for communication with the applicator. An optional DB-15 to DB-9 adapter cable (part number 49609) is available to accommodate existing DB-9 interfaces.

Table 10: DB-15 Connector (Printer to Applicator)

Pin #	Signal Name	Signal Type	Functional Description
1	SIGNAL GROUND (+5V Return)	Ground	JP1 IN – Ground return for Internal +5v power source and is available here for remote opto-isolators, if required. (JP2 IN) JP1 OUT – Ground return for External +5v power source. (JP2 OUT)
2	+5V (Fused at 750mA)	Power	JP2 IN – Internal +5v power source supplies power to internal opto-isolators and is available here for remote opto-isolators, if required. (JP1 IN) JP2 OUT – External +5v power source must be connected here to supply power to internal opto-isolators. (JP1 OUT)
3	START PRINT	Input	PULSE MODE – The label printing process begins on the HIGH to LOW transition of this signal, if a format is ready. De-assert this signal HIGH to inhibit printing of a new label. LEVEL MODE – Assert LOW to enable the print engine to begin printing, if a format is ready. The print engine will print new labels as long as the signal is asserted. When de-asserted, the currently printing label will be completed and the print engine will stop and wait for this input to be reasserted LOW.
4	FEED	Input	When the print engine is in an Idle state or has been PAUSED, assert this input LOW to trigger repeated feeding of blank labels. De-assert HIGH to stop feeding blank labels and register to the top of the next label.

Table 10: DB-15 Connector (Printer to Applicator) (Continued)

Pin #	Signal Name	Signal Type	Functional Description
5	PAUSE	Input	To toggle the current PAUSE state, this input must be asserted LOW for 200 milliseconds, or until the SERVICE REQUIRED output (pin 10) changes state.
6	REPRINT	Input	If the REPRINT feature is enabled – this input must be asserted LOW to cause the print engine to reprint the last label. (*See "Configuration & Calibration" on page 21)* If the REPRINT feature is disabled – this Input is ignored.
7	+28V (Fused at 1.5A)	Power	Interface Power Supply – supplies power to external sensors as required.
8	POWER GROUND (+28V Return)	Ground	Interface Power Ground.
9	RIBBON LOW	Output	If the RIBBON LOW feature is enabled, and the amount of ribbon remaining on the supply spool is below a specific threshold level – this output will be asserted HIGH. If the RIBBON LOW feature is disabled – this output lead is disabled. (*See "Configuration & Calibration" on page 21)*
10	SERVICE REQUIRED	Output	While either the media cover is open, the printhead is open, the ribbon is out, the media is out, the print engine is paused, or an operational fault has occurred, this output will be asserted LOW. If the applicator RESYNCH mode is set to ERROR mode, this signal will also assert LOW for a RESYNCH error.
11	END PRINT	Output	MODE 0: (Default) The Applicator Port is OFF. MODE 1: Asserted LOW only while the print engine is moving the label forward; otherwise deasserted HIGH MODE 2: Asserted HIGH only while the print engine is moving the label forward; otherwise deasserted LOW. MODE 3: Asserted LOW for 20 milliseconds when a label has been completed and positioned. Not asserted during continuous printing. MODE 4: Asserted HIGH for 20 milliseconds when a label has been completed and positioned. Not asserted during continuous printing.
12	MEDIA OUT	Output	Asserted LOW while there is no media in the print engine.
13	RIBBON OUT	Output	Asserted LOW while there is no ribbon in the print engine.
14	DATA READY	Output	Asserted LOW when sufficient data has been received to begin printing the next label. De-asserted HIGH whenever printing stops after the current label, due to either a PAUSE condition or the absence of a label format.
15	SPARE	Output	To Be Determined

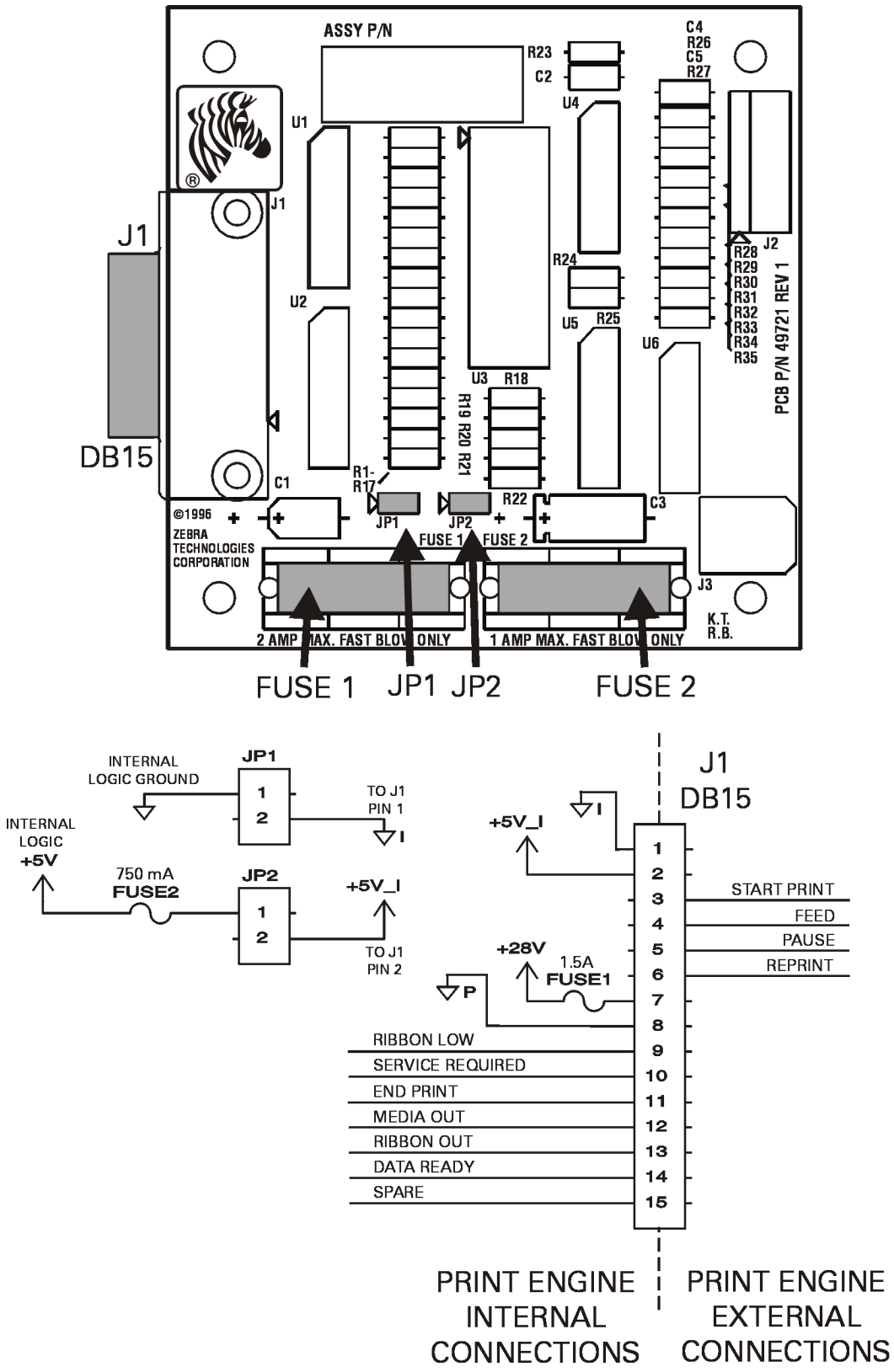


Figure 24. Applicator Interface Connections

Appendix C

ASCII Code Chart

HEX	CHAR		HEX	CHAR		HEX	CHAR		HEX	CHAR
00	NUL		20	space		40	@		60	‘
01	SOH		21	!		41	A		61	a
02	STX		22	“		42	B		62	b
03	ETX		23	#		43	C		63	c
04	EOT		24	$		44	D		64	d
05	ENQ		25	%		45	E		65	e
06	ACK		26	&		46	F		66	f
07	BEL		27	‘		47	G		67	g
08	BS		28	(		48	H		68	h
09	HT		29	)		49	I		69	i
0A	LF		2A	*		4A	J		6A	j
0B	VT		2B	++		4B	K		6B	k
0C	FF		2C	,		4C	L		6C	l
0D	CR		2D	-		4D	M		6D	m
0E	SO		2E	.		4E	N		6E	n
0F	SI		2F	/		4F	O		6F	o
10	DLE		30	0		50	P		70	p
11	DC1		31	1		51	Q		71	q
12	DC2		32	2		52	R		72	r
13	DC3		33	3		53	S		73	s
14	DC4		34	4		54	T		74	t
15	NAK		35	5		55	U		75	u
16	SYN		36	6		56	V		76	v
17	ETB		37	7		57	W		77	w
18	CAN		38	8		58	X		78	x
19	EM		39	9		59	Y		79	y
1A	SUB		3A	:		5A	Z		7A	z
1B	ESC		3B	;		5B	[		7B	{
1C	FS		3C	<		5C	\		7C	|
1D	GS		3D	=		5D	]		7D	}
1E	RS		3E	>		5E	^^		7E	~
1F	US		3F	?		5F	_		7F	DEL

Shaded values NOT recommended for command prefix, format prefix, or delimiter characters.

NOTE: DLE always represents the command prefix.
RS always represents the format prefix.
US always represents the delimiter prefix.

Appendix D

Adjusting Darkness For “In-Spec” Bar Codes

All direct thermal and thermal transfer materials do not require the same darkness setting. The best way to check for proper darkness is to use a bar code verifier that actually measures bars/spaces and will calculate the print contrast. Without the assistance of a verifier, your eyes and/or the system scanner are the best bet for choosing the optimal darkness setting. What follows is a simple yet effective method for adjusting the darkness to print “in-spec” bar codes.

1 Load media according to the appropriate media loading and ribbon loading instructions in “Getting Ready to Print.” Insure the proper print method has been selected (see “Configuration and Calibration”).

2 To print a label for evaluation, turn the power off; then, press and hold the FEED key. Next, turn the print engine power on and release the FEED key. The print engine will begin printing test labels.

3 Print a label, then press the PAUSE key. The label will contain two bar codes, as well as other print engine information. Normal bar codes are printed in a horizontal (“picket fence”) format as they feed out of the print engine. Rotated bar codes are printed in a vertical (“stepladder”) format.

4 Compare the test label printed to the bar codes in Figure 25 on page 84. If the test label appears too dark or too light, refer to “Configuration and Calibration” and increase or decrease the darkness setting accordingly.

5 Resume printing by pressing the PAUSE key again. Print a few labels at the new setting and verify that proper “in-spec” bar codes are being printed. Repeat steps 3, 4 and 5 until satisfied.

6 To terminate the printing of the test labels, first press the PAUSE key and then press the CANCEL key.

Too Dark

Labels that are too dark are fairly obvious. The normal bar code bars increase in size, and the openings in small alphanumeric characters may fill in with ink. It may be readable but not “in-spec.” Rotated bar code bars and spaces will 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.

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.

"In-Spec"

The "in-spec" bar code can only be confirmed by a verifier, but it should exhibit some very visible characteristics. The normal bar code will have complete, even bars and clear, distinct spaces. The rotated bar code will also have complete bars and clear distinct spaces. Although it may not look as good as a slightly dark bar code, it will be "in-spec." In both normal and rotated styles, small alphanumeric characters will look complete.

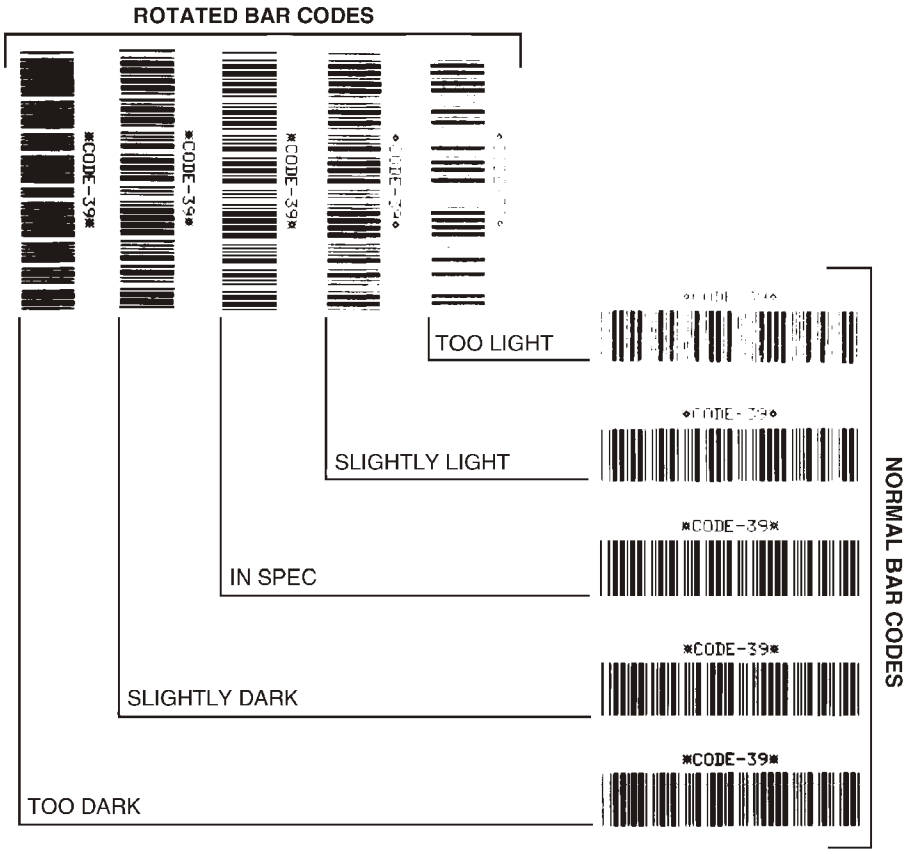


Figure 25. Bar Code Darkness Comparison

Installation Information

Ventilation openings of the print engine mounting enclosure shall be provided by the installer to remove heat and ensure uninterrupted, trouble-free operation of the print engine. Ambient air temperature surrounding the print engine **must not exceed** 40 degrees Centigrade or 104 degrees Fahrenheit.

When the print engine is mounted, consideration must be given to the stability of the complete assembly so that when a full roll of media is loaded, the equipment does not become physically unstable.

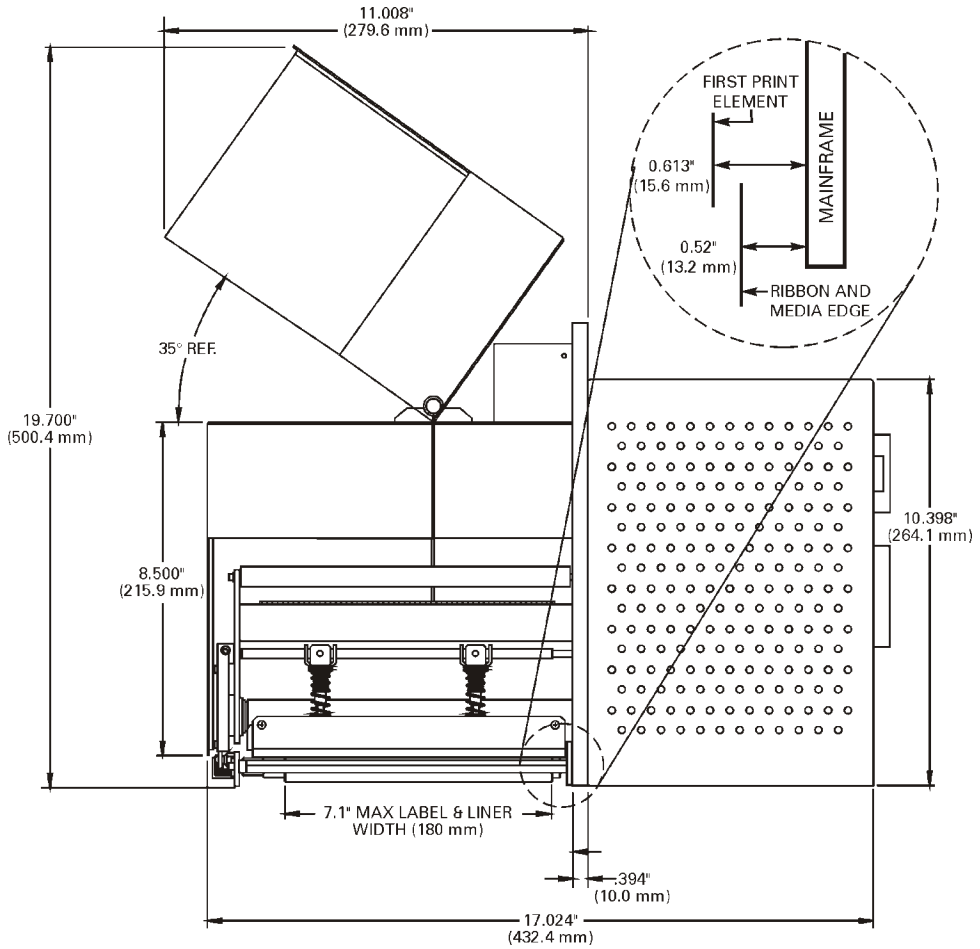


Figure 26. Right Side View of Right-Hand Printer

Consideration must be given to the current rating of the print engine during installation so that when power is applied to the print engine and the enclosing equipment, an overload condition is not effected on enclosing equipment circuits or supply wiring.

Reliable grounding of the print engine must be maintained. Particular attention must be given to the AC power supply connections so that earth ground is maintained through the AC power input connector.

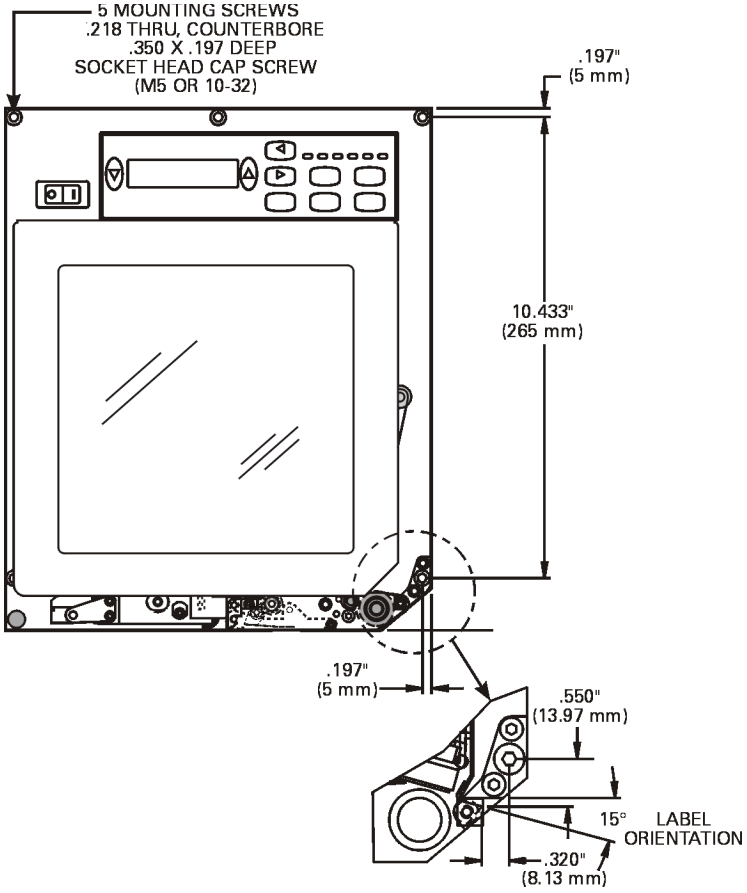


Figure 27. Front View of Right-Hand Printer

NOTE: Mounting hole locations are identical for both the right hand and left hand print engines.

Clearance at the rear panel of the electronics enclosure must provide ample space for electronic connectors and dressing of the following cables: IEC power cord, serial and/or parallel host communication cable, optional host communication cable (Coax, Twinax, Ethernet), and the discrete signal (applicator) interface cable.

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, then the installer shall provide an appropriate clamping mechanism to avoid unintentional disconnection of the power cord from the print engine.

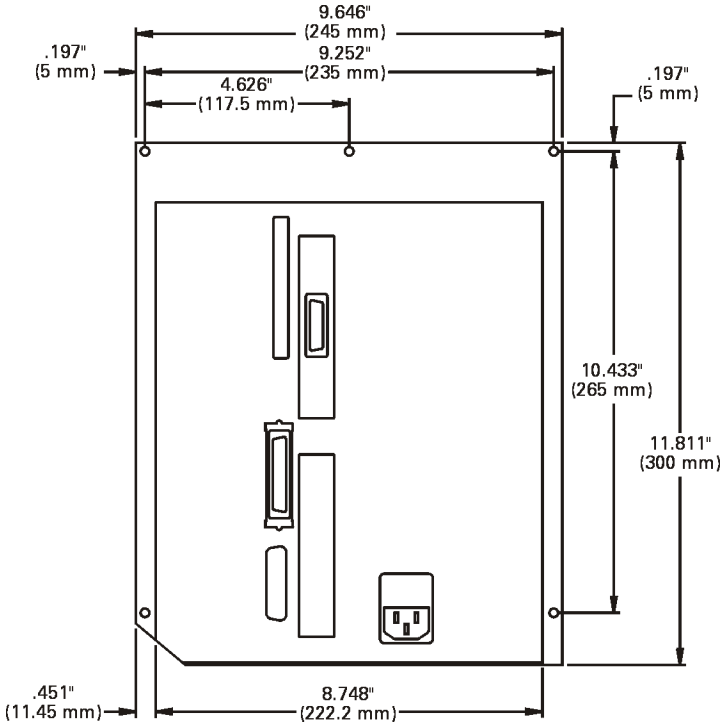


Figure 28. Rear View of Right-Hand Printer

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 or applicator mode.

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

black mark A registration mark found on the underside of the print media which 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.

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

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

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

continuous media Label or tag-stock media that has no notch, gap, or web (backing material 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 where individual labels are stuck to a backing material. 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 which reacts to the application of direct heat from the printhead to produce an image.

dynamic ram DRAM is the term used to describe 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 which 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, when to print a dot on the label stock, when to activate the cutter, etc.

flash memory FLASH memory is non-volatile and will maintain 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. Ex: CG Times™, CG Triumvirate Bold Condensed™.

ips "inches-per-second" The speed at which the label or tag is printed. Zebra offers print engines that can print from 2 ips to 12 ips.

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

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

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

light emitting diode LEDs are used as indicators of specific print engine status conditions. Each LED will be either off, on, or blinking depending on the feature being monitored.

lock-up This is the term generally used to describe a fault condition that, for apparently unknown reasons, causes the print engine to stop working.

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

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

non-continuous media Consumable printing stock which 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 which is either cut or torn away from the next tag. (See non-continuous media.)

print speed The speed at which printing occurs. For thermal transfer print engines, this speed is expressed in terms of ips (inches per second). Zebra offers print engines that can print from 2 ips to 12 ips.

print engine configuration (See configuration.)

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

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

rewind A mode of operation in which the label and backing material are wound onto a spindle within the print engine and then dispensed for use in a separate process. The rewind option must be installed to operate in this mode.

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

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

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

supplies A general term for media and ribbon.

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

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

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

thermal direct (See direct thermal.)

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 where printing should have occurred, but did not due to an error condition such as wrinkled ribbon or faulty print elements. A void can cause a printed bar code symbol to be read incorrectly or not at all.

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