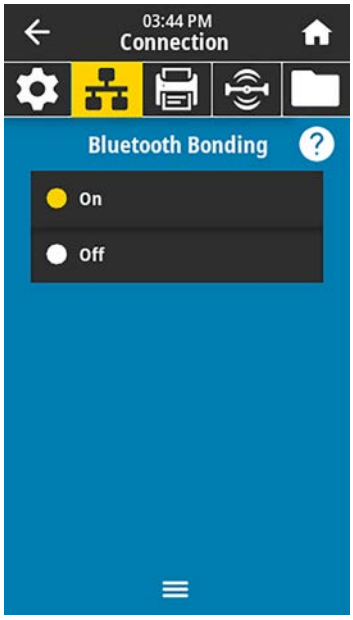
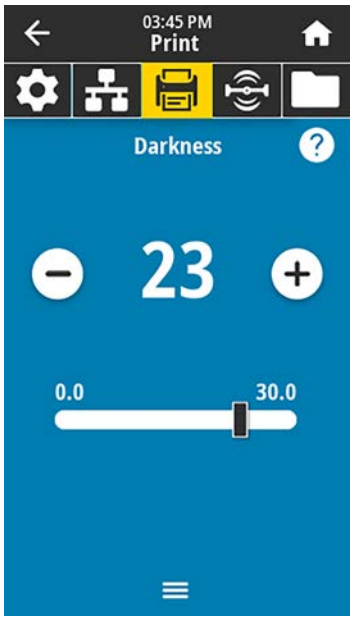
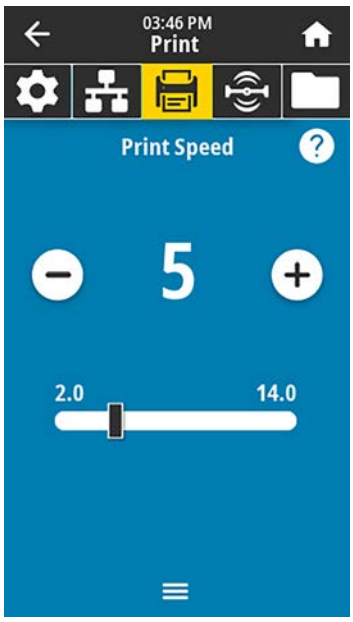
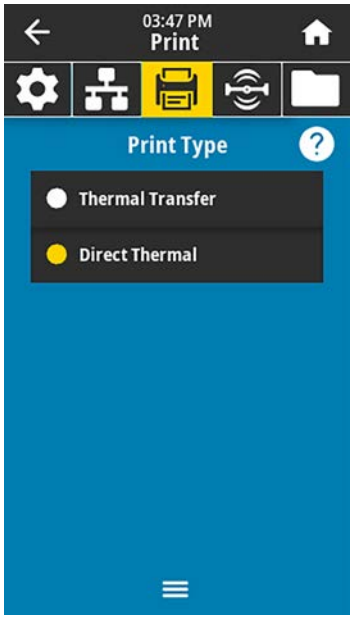
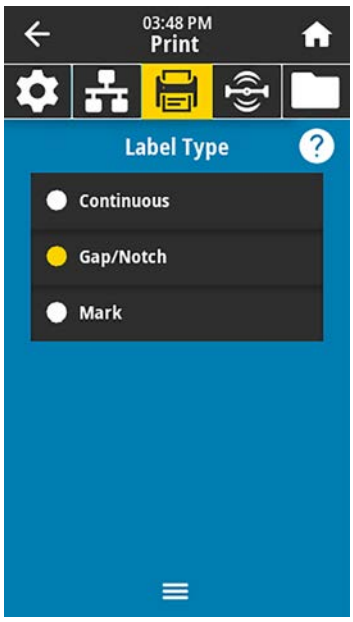
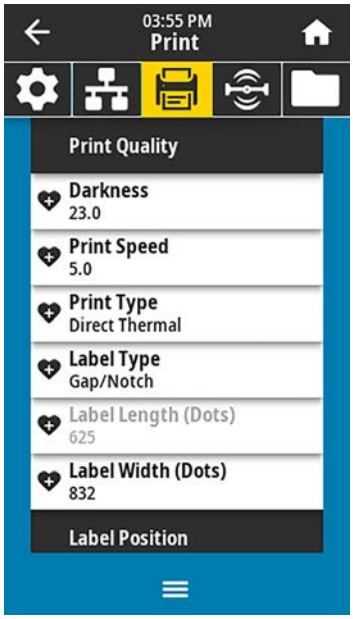
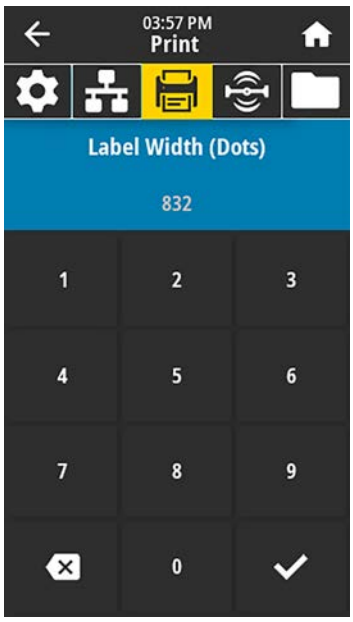
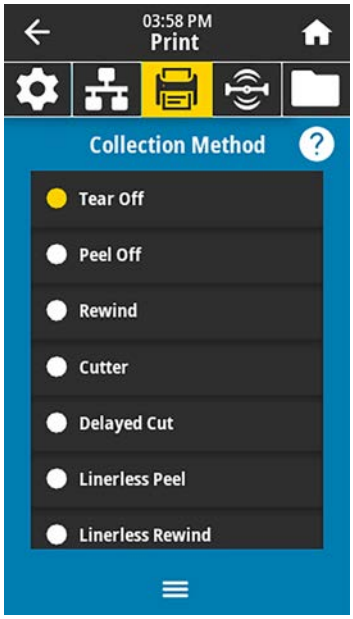
Menu Display	Menu Option Description	
	**Connection** > **Bluetooth** > **Bluetooth Bonding** Controls whether the Bluetooth stack will “bond” or save link keys for devices that successfully connect to the printer.	
	Accepted values:	ON—Enables Bluetooth bonding. OFF—Disables Bluetooth bonding.
	SGD command used:	`bluetooth.bonding`

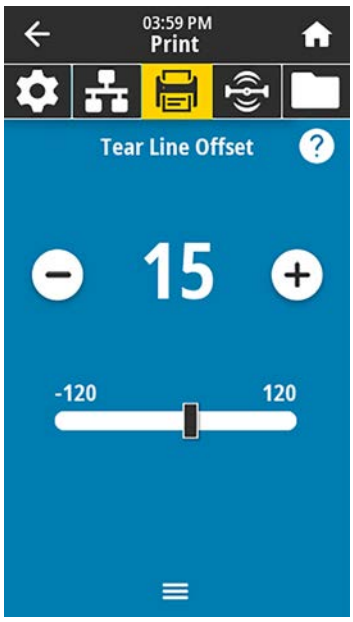
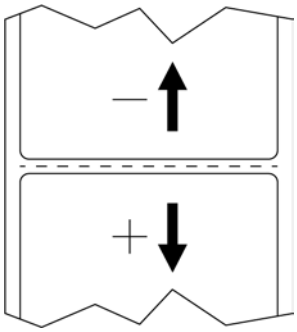
Print Menu

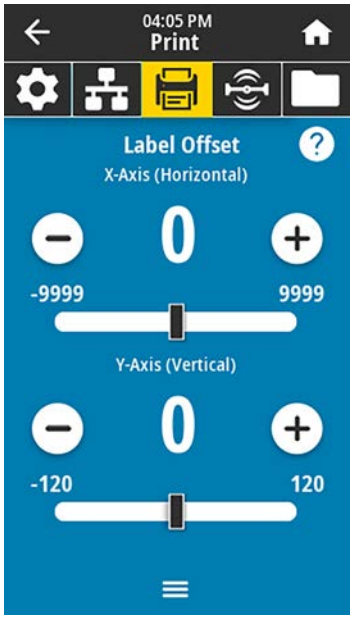
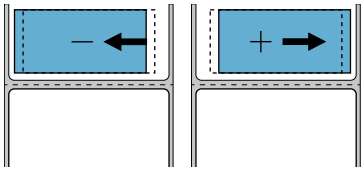
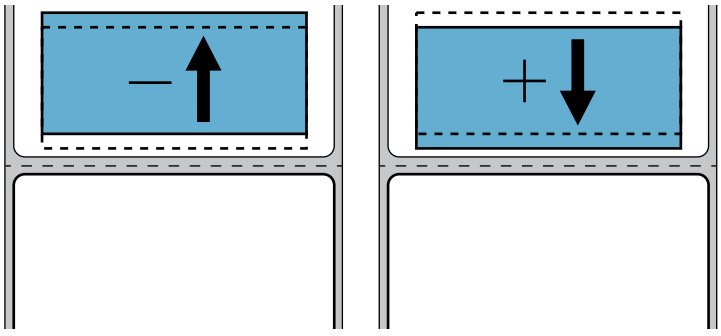
Menu Display	Menu Option Description	
	**Print** > **Print Quality** > **Darkness** Set the print darkness to the lowest setting that provides good print quality. If you set the darkness too high, the label image may print unclearly, barcodes may not scan correctly, the ribbon may burn through, or the printhead may wear prematurely.	
	Accepted values:	0.0 to 30.0
	Related ZPL command(s):	`^MD` `^SD`
	SGD command used:	`print.tone`
	Printer web page:	**View and Modify Printer Settings** > **General Setup** > **Darkness**

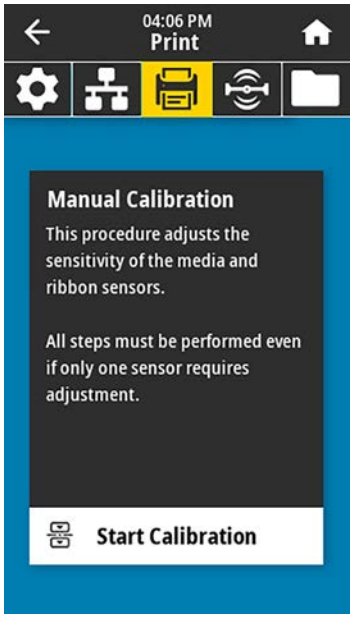
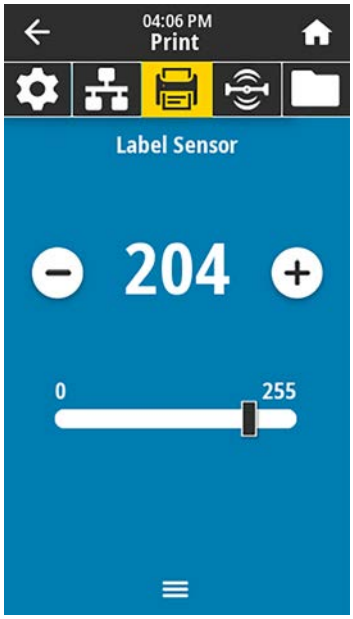
Menu Display	Menu Option Description	
	**Print** > **Print Quality** > **Print Speed** Select the speed, in inches per second (ips), for printing a label. Slower print speeds typically yield better print quality.	
	Accepted values:	2 to 6 ips
	Related ZPL command(s):	^PR
	SGD command used:	`media.speed`
	Printer web page:	**View and Modify Printer Settings** > **General Setup** > **Print Speed**
	**Print** > **Print Quality** > **Print Type** Specify if the printer needs to use ribbon for printing.	
	Accepted values:	• Thermal Transfer—Uses ribbon and thermal transfer media. • Direct Thermal—Uses direct thermal media and no ribbon.
	Related ZPL command(s):	^MT
	SGD command used:	`ezpl.print_method`
	Printer web page:	**View and Modify Printer Settings** > **Media Setup** > **Print Method**

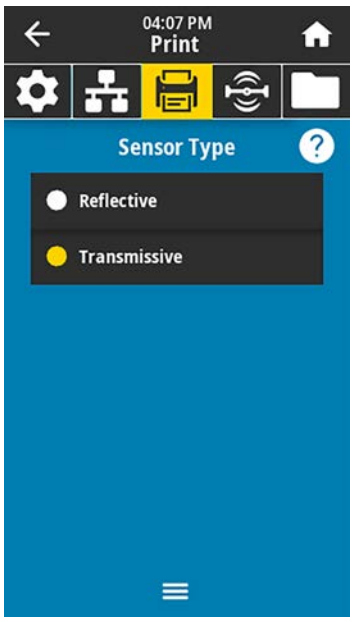
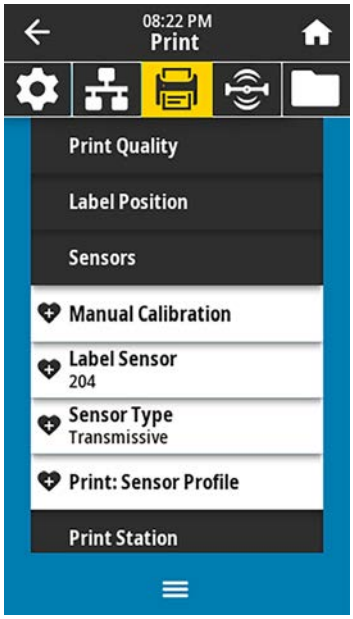
<table>
<tr><th>Menu Display</th><th colspan="2">Menu Option Description</th></tr>
<tr><td rowspan="5"> 
</td><td colspan="2">Print > Print Quality > Label Type
Select the type of media that you are using.</td></tr>
<tr><td>Accepted values:</td><td>Continuous, Gap/Notch, Mark
If you select Continuous, you must include a label length in your label format (^LL if you are using ZPL). If you select Gap/Notch or Mark for various noncontinuous media, the printer feeds media to calculate the label length.</td></tr>
<tr><td>Related ZPL command(s):</td><td>^MN</td></tr>
<tr><td>SGD command used:</td><td>ezpl.media_type</td></tr>
<tr><td>Printer web page:</td><td>View and Modify Printer Settings > Media Setup > Media Type</td></tr>
<tr><td> 
</td><td colspan="2">Print > Print Quality > Label Length
View the calibrated label length in dots. This value cannot be modified.</td></tr>
</table>

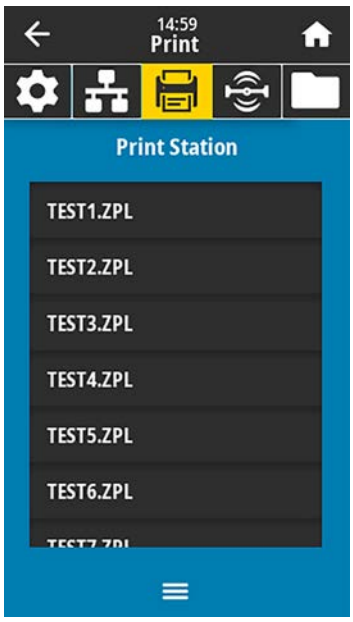
<table>
<tr><th>Menu Display</th><th colspan="2">Menu Option Description</th></tr>
<tr><td rowspan="5"> 
</td><td colspan="2">Print > Print Quality > Label Width (Dots)
Specify the width of the labels being used, in dots. The default value is the maximum width for the printer, based on the printhead’s DPI value.</td></tr>
<tr><td>Accepted values:</td><td>NOTE: Setting the width too narrow can result in portions of a label format not being printed on the media. Setting the width too wide wastes formatting memory and can cause the printer to print beyond the label and onto the platen roller. This setting can affect the horizontal position of the label format if the image was inverted using the <code>^POI</code> ZPL II command.
ZT411 203 dpi = 0002 to 832
ZT411 300 dpi = 0002 to 1248
ZT411 600 dpi = 0002 to 2496
ZT421 203 dpi = 0002 to 1344
ZT421 300 dpi = 0002 to 1984</td></tr>
<tr><td>Related ZPL command(s):</td><td><code>^PW</code></td></tr>
<tr><td>SGD command used:</td><td><code>ezpl.print_width</code></td></tr>
<tr><td>Printer web page:</td><td>View and Modify Printer Settings > Media Setup > Print Width</td></tr>
<tr><td rowspan="4"> 
</td><td colspan="2">Print > Label Position > Collection Method
Select a collection method that is compatible with the options available on your printer.</td></tr>
<tr><td>Accepted values:</td><td>Tear Off, Peel Off, Rewind, Cutter, Delayed Cut, Linerless Peel, Linerless Rewind, Linerless Tear, Applicator, Linerless Cut, Linerless Delayed Cut</td></tr>
<tr><td>Related ZPL command(s):</td><td><code>^MM</code></td></tr>
<tr><td>SGD command used:</td><td><code>media.printmode</code></td></tr>
<tr><td>Printer web page:</td><td>View and Modify Printer Settings > General Setup > Print Mode</td></tr>
</table>

Menu Display	Menu Option Description	
	**Print** > **Label Position** > **Tear Line Offset** If necessary, shift the position of the media over the tear-off bar after printing. • Lower numbers move the media into the printer by the specified number of dots (the tear line moves closer to the edge of the label just printed). • Higher numbers move the media out of the printer (the tear line moves closer to the leading edge of the next label). 	
	Accepted values:	–120 to +120
	Related ZPL command(s):	~TA
	SGD command used:	`ezpl.tear_off`
	Printer web page:	**View and Modify Printer Settings** > **General Setup** > **Tear Off**

Menu Display	Menu Option Description
	**Print** > **Label Position** > **Label Offset** If necessary, shift the position of the image horizontally or vertically on the label. Horizontal • Negative numbers move the left edge of the image toward the left edge of the label by the number of dots selected. • Positive numbers move the edge of the image toward the right edge of the label. 
	Accepted values: –9999 to 9999
	Related ZPL command(s): ^LS
	SGD command used: `zpl.left_position`
	Printer web page: **View and Modify Printer Settings** > **Advanced Setup** > **Left Position**
	Vertical • Lower numbers move the image higher on the label (toward the printhead). • Higher numbers move the image farther down on the label (away from the printhead) by the specified number of dots. 
	Accepted values: –120 to +120
	Related ZPL command(s): ^LT

<table>
<tr><th>Menu Display</th><th colspan="2">Menu Option Description</th></tr>
<tr><td></td><td>Printer web page:</td><td>View and Modify Printer Settings > General Setup > Label Top</td></tr>
<tr><td rowspan="5"> 
</td><td colspan="2">Print > Sensors > Manual Calibration
Calibrate the printer to adjust the sensitivity of the media and ribbon sensors.
For complete instructions on how to perform a calibration procedure, see Calibrating the Ribbon and Media Sensors on page 118.</td></tr>
<tr><td>Related ZPL command(s):</td><td>~JC</td></tr>
<tr><td>SGD command used:</td><td>ezpl.manual_calibration</td></tr>
<tr><td>Control panel key(s):</td><td>Hold PAUSE + FEED + CANCEL for 2 seconds to initiate calibration.</td></tr>
<tr><td>Printer web page:</td><td>The calibration procedure cannot be initiated through the web pages. See the following web page for settings that are set during sensor calibration:
View and Modify Printer Settings > Calibration
IMPORTANT: Do not change these settings unless you are told to do so by Zebra Technical Support or by an authorized service technician.</td></tr>
<tr><td rowspan="4"> 
</td><td colspan="2">Print > Sensors > Label Sensor
Set the sensitivity of the label sensor.
IMPORTANT: This value is set during sensor calibration. Do not change these settings unless you are told to do so by Zebra Technical Support or by an authorized service technician.</td></tr>
<tr><td>Accepted values:</td><td>0 to 255</td></tr>
<tr><td>SGD command used:</td><td>ezpl.label_sensor</td></tr>
<tr><td>Printer web page:</td><td>View and Modify Printer Settings > Calibration</td></tr>
</table>

Menu Display	Menu Option Description	
	**Print** > **Sensors** > **Sensor Type** Select the media sensor that is appropriate for the media that you are using. The reflective sensor typically is used only for black mark media. The transmissive sensor is typically used for other media types.	
	Accepted values:	TRANSMISSIVE, REFLECTIVE
	Related ZPL command(s):	`^JS`
	SGD command used:	`device.sensor_select`
	Printer web page:	**View and Modify Printer Settings** > **Media Setup**
	**Print** > **Sensors** > **Print: Sensor Profile** Shows the sensor settings compared to actual sensor readings. To interpret the results, see Sensor Profile on page 146.	
	Related ZPL command(s):	`~JG`
	Control panel key(s):	Hold **FEED** + **CANCEL** during printer power-up.
	Printer web page:	**View and Modify Printer Settings** > **Print Listings on Label** >

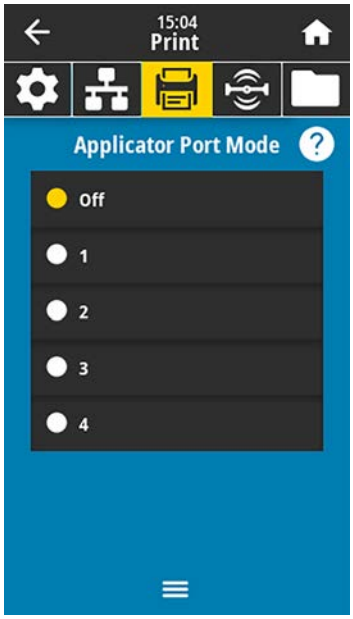
<table>
<tr><th>Menu Display</th><th>Menu Option Description</th></tr>
<tr><td rowspan="2"> 
</td><td>Print > Print Station

Use this menu item to fill in variable fields in a label format and print the label using a Human Input Device (HID), such as a USB keyboard, scale, or barcode scanner. A suitable label format must be stored on the E: drive of the printer to use this option. See the exercises in Using a USB Host Port and the Print Touch Feature on page 171 for an exercise using this capability.

When you plug an HID into one of the printer's USB host ports, use this user menu to select a form on the printer's E: drive. After you have been prompted to fill in each variable ^FN field on the form, you can specify the desired quantity of labels to print.

For more information about using the ^FN command or the SGD commands related to this feature, see the Zebra Programming Guide at zebra.com/manuals for more information.

NOTE: This menu item can be used only if a USB device is connected to a USB host port on the printer.</td></tr>
<tr><td>SGD command used:

usb.host.keyboard_input
(must be set to ON)
usb.host.template_list
usb.host.fn_field_list
usb.host.fn_field_data
usb.host.fn_last_field
usb.host.template_print_amount</td></tr>
<tr><td rowspan="4"> 
</td><td>Print > Applicator > Applicator Port Mode

Controls the way in which the applicator port's "End Print" signal functions.</td></tr>
<tr><td>Accepted values:

Off

1 = End Print signal normally high, and low only when the printer is moving the label forward.

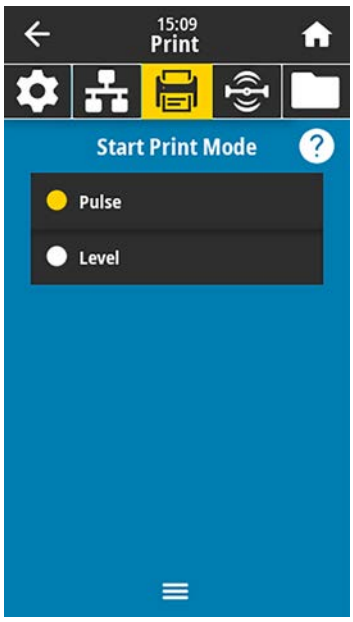
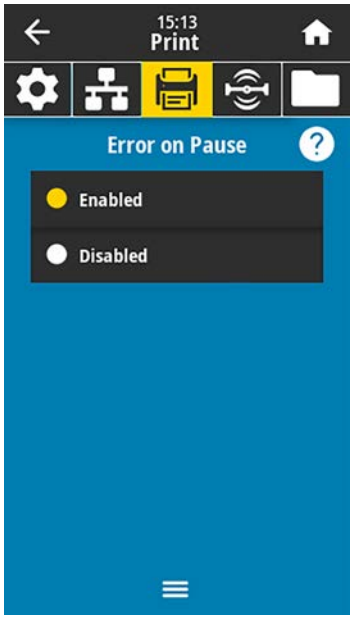
2 = End Print signal normally low, and high only when the printer is moving the label forward.

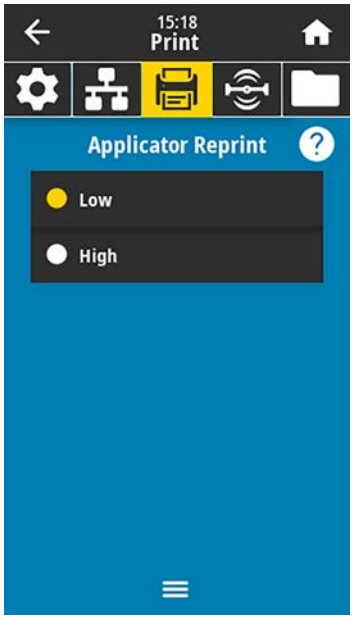
3 = End Print signal normally high, and low for 20 ms when a label has been printed and positioned.

4 = End Print signal normally low, and high for 20 ms when a label has been printed and positioned.</td></tr>
<tr><td>Related ZPL command(s):

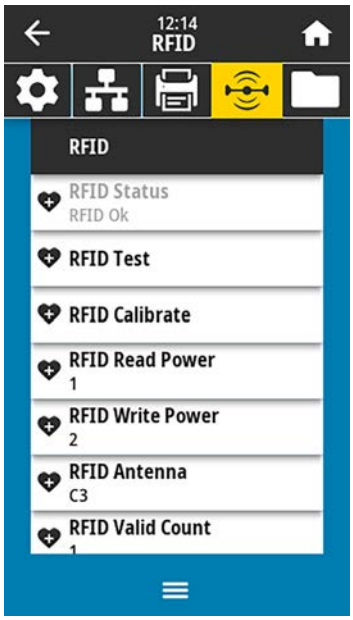
^JJ</td></tr>
<tr><td>SGD command used:

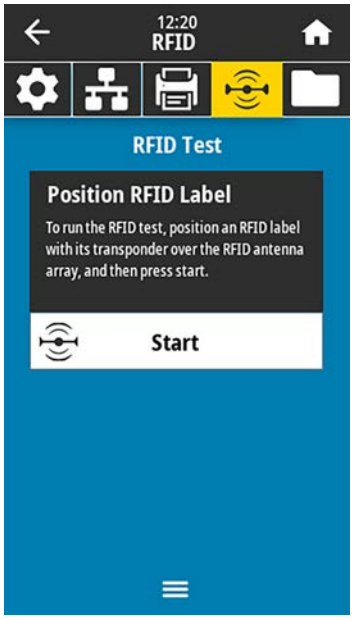
device.applicator.end_print</td></tr>
</table>

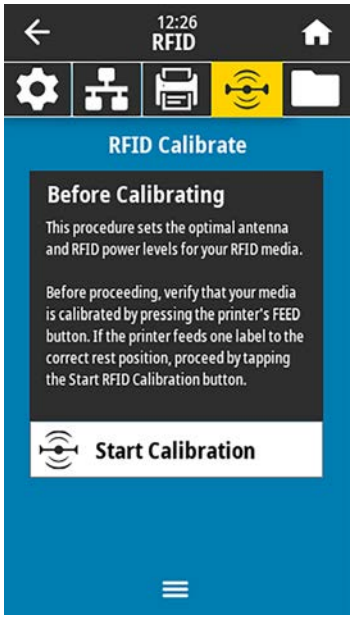
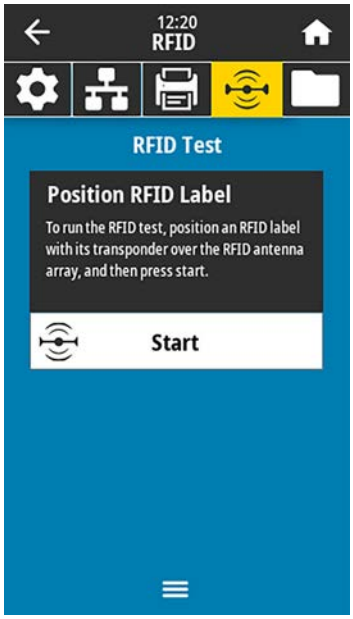
<table>
<tr><th>Menu Display</th><th colspan="2">Menu Option Description</th></tr>
<tr><td rowspan="4"> 
</td><td colspan="2">Print > Applicator > Start Print Mode
Determines if the applicator port’s “Start Print” signal is in level mode or pulse mode.</td></tr>
<tr><td>Accepted values:</td><td>Pulse—Start Print signal must be deasserted before it can be asserted for the next label.
Level—Start Print signal does not need to be deasserted to print the next label. As long as the Start Print signal is low and a label is formatted, a label prints.</td></tr>
<tr><td>Related ZPL command(s):</td><td>^JJ</td></tr>
<tr><td>SGD command used:</td><td>device.applicator.start_print</td></tr>
<tr><td rowspan="4"> 
</td><td colspan="2">Print > Applicator > Error on Pause
Determines how applicator port errors are treated by the printer. Enabling this feature also causes the “Service Required” pin to be asserted.</td></tr>
<tr><td>Accepted values:</td><td>ENABLED, DISABLED</td></tr>
<tr><td>SGD command used:</td><td>device.applicator.error_on_pause</td></tr>
<tr><td>Printer web page:</td><td>View and Modify Printer Settings > Advanced Setup > Error on Pause</td></tr>
</table>

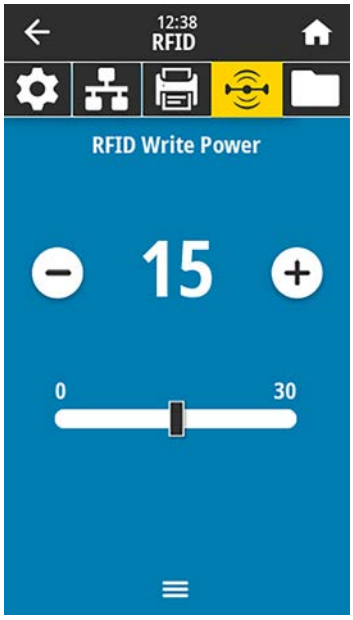
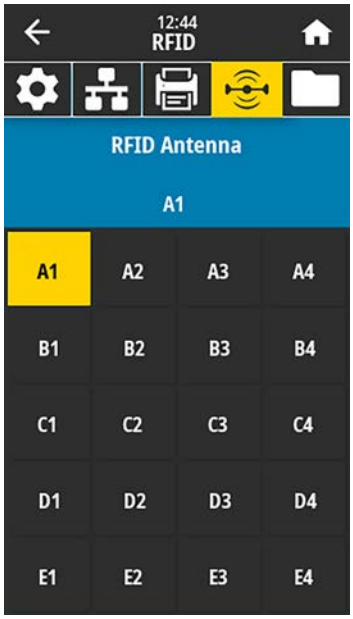
Menu Display	Menu Option Description	
	**Print** > **Applicator** > **Applicator Reprint** Specifies if a high or low value is required for an applicator to reprint a label. Enables or disables the ~PR command, which when enabled reprints the last printed label. It also enables the Reprint button on the Home screen.	
	Related ZPL command(s):	^JJ and ~PR
	SGD command used:	`device.applicator.reprint`

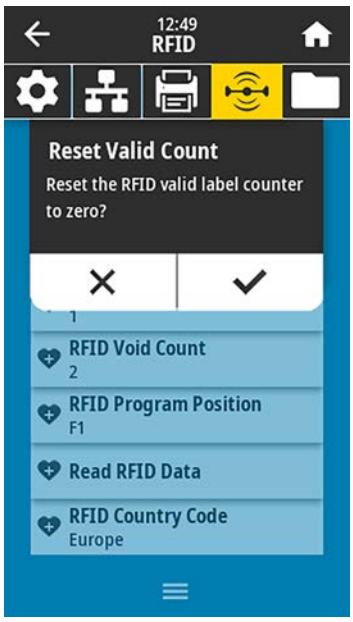
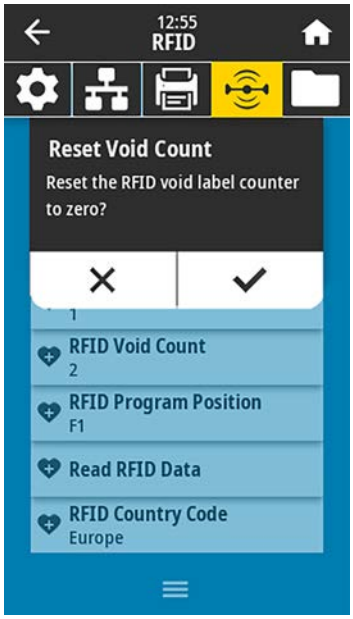
RFID Menu

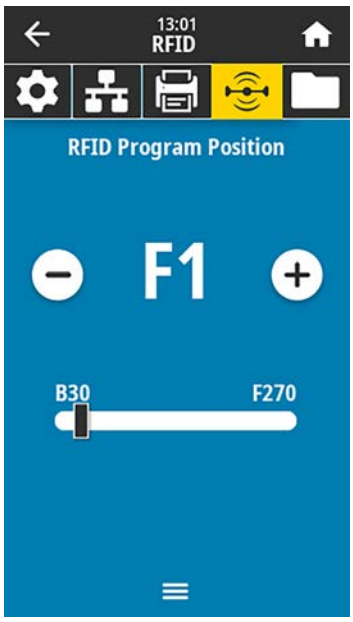
Menu Display	Menu Option Description	
	**RFID** > **RFID Status** Display the status of the RFID subsystem of the printer.	
	Related ZPL command(s):	^HL or ~HL
	SGD command used:	`rfid.error.response`

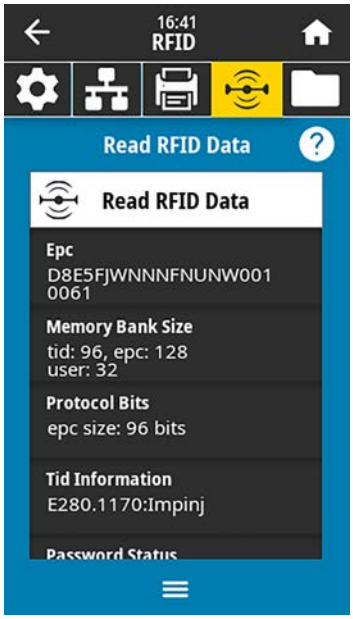
Menu Display	Menu Option Description
	**RFID** > **RFID Test** During the RFID test, the printer attempts to read and write to a transponder. No printer movement occurs with this test. To test an RFID label: **1.** Position the RFID label with its transponder over the RFID antenna array. **2.** Touch **Start** . The results of the test appear on the display. 
	SGD command used: `rfid.tag.test.content` and `rfid.tag.test.execute`

Menu Display	Menu Option Description	
	**RFID** > **RFID Calibrate** Initiate tag calibration for RFID media. (This is not the same as media and ribbon calibration.) During the process, the printer moves the media, calibrates the RFID tag position, and determines the optimal settings for the RFID media being used. These settings include the programming position, the antenna element to use, and the read/write power level to use. (See RFID Programming Guide 3 for more information.) **NOTE:** Before running this command, load the printer with RFID media, calibrate your printer, close the printhead, and feed at least one label to make sure that tag calibration will begin from the correct position. Leave all transponders before and after the tag that is being calibrated. This allows the printer to determine RFID settings which do not encode the adjacent tag. Allow a portion of media to extend out the front of the printer to allow for backfeed during the tag calibration procedure.	
	Related ZPL command(s):	^HR
	SGD command used:	`rfid.tag.calibrate`
	**RFID** > **Read Power** If the desired read power is not achieved through RFID tag calibration, a value may be specified.	
	Accepted values:	0 to 30
	Related ZPL command(s):	^RW
	SGD command used:	`rfid.reader_1.power.read`
	Printer web page:	**View and Modify Printer Settings** > **RFID Setup** > **RFID READ PWR**

Menu Display	Menu Option Description	
	**RFID** > **RFID Write Power** If the desired write power is not achieved through RFID tag calibration, a value may be specified.	
	Accepted values:	0 to 30
	Related ZPL command(s):	^RW
	SGD command used:	`rfid.reader_1.power.write`
	Printer web page:	**View and Modify Printer Settings** > **RFID Setup** > **RFID WRITE PWR**
	**RFID** > **RFID Antenna** If the desired antenna is not achieved through RFID tag calibration, a value may be specified.	
	Accepted values:	A1, A2, A3, A4 B1, B2, B3, B4 C1, C2, C3, C4 D1, D2, D3, D4 E1, E2, E3, E4
	Related ZPL command(s):	^RW
	SGD command used:	`rfid.reader_1.antenna_port`
	Printer web page:	**View and Modify Printer Settings** > **RFID Setup** > **RFID ANTENNA**

Menu Display	Menu Option Description	
	**RFID** > **RFID Valid Count** Resets the RFID valid label counter to zero.	
	Related ZPL command(s):	~R0
	SGD command used:	`odometer.rfid.valid_resettable`
	**RFID** > **RFID Void Count** Resets the RFID void label counter to zero.	
	Related ZPL command(s):	~R0
	SGD command used:	`odometer.rfid.void_resettable`

Menu Display	Menu Option Description	
	**RFID** > **RFID Program Position** If the desired programming position (read/write position) is not achieved through RFID tag calibration, a value may be specified.	
	Accepted values:	F0 to Fxxx (where xxx is the label length in millimeters or 999, whichever is less)—The printer feeds the label forward for the specified distance and then begins programming. B0 to B30—The printer backfeeds the label for the specified distance and then begins programming. To account for the backfeed, allow empty media liner to extend out of the front of the printer when using a backward programming position.
	Related ZPL command(s):	^RS
	SGD command used:	`rfid.position.program`
	Printer web page:	**View and Modify Printer Settings** > **RFID Setup** > **PROGRAM POSITION**

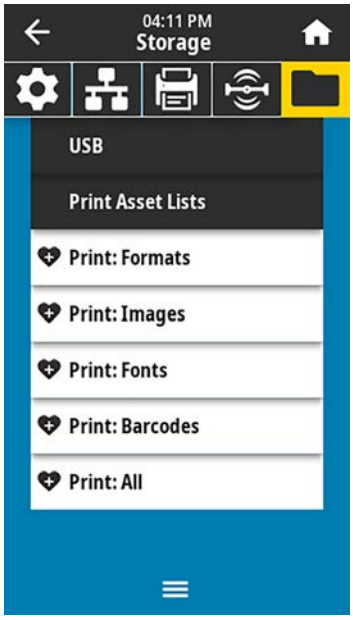
Menu Display	Menu Option Description
	**RFID** > **Read RFID Data** Read and return the specified tag data from the RFID tag located over the RFID antenna. No printer movement occurs while tag data is being read. The printhead can be open or closed. To read and display the information stored on an RFID tag: **1.** Position the RFID label with its transponder over the RFID antenna. **2.** Touch **Read RFID Data**. The results of the test are shown on the display. 

Related ZPL command(s):	^RF
SGD command used:	`rfid.tag.read.content` `rfid.tag.read.execute`

Storage Menu

<table>
<tr><th>Menu Display</th><th colspan="2">Menu Option Description</th></tr>
<tr><td rowspan="2"> 
</td><td colspan="2">Storage > USB > Copy: Files to USB
Select files from the printer to store on a USB Flash drive.
To copy files from the printer to a USB Flash drive:
1. Insert a USB flash drive into the printer’s USB host port.
The printer lists available files.
2. Touch the box next to the desired files. Select All is also available.
3. Touch the check mark to copy the selected files.</td></tr>
<tr><td>SGD command used:</td><td><code>usb.host.write_list</code></td></tr>
<tr><td rowspan="2"> 
</td><td colspan="2">Storage > USB > Copy: Files to Printer
Select files to copy to the printer from a USB Flash drive.
To copy files to the printer from a USB Flash drive:
1. Insert a USB flash drive into the printer’s USB host port.
The printer lists available files.
2. Touch the box next to the desired files. Select All is also available.
3. Touch the check mark to copy the selected files.</td></tr>
<tr><td>SGD command used:</td><td><code>usb.host.read_list</code></td></tr>
</table>

<table>
<tr><th>Menu Display</th><th colspan="2">Menu Option Description</th></tr>
<tr><td rowspan="3"> 
</td><td colspan="2">Storage > USB > Copy: Configuration to USB
Use this function to copy the printer’s configuration information to a USB mass storage device, such as a USB Flash drive, that is plugged into one of the printer’s USB host ports. This makes the information accessible without having to print physical labels.</td></tr>
<tr><td>Related ZPL command(s):</td><td>^HH—Returns the printer configuration information returned to the host computer.</td></tr>
<tr><td>Printer web page:</td><td>Printer Home Page > View Printer Configuration
(to view printer configuration information on your web browser)
View and Modify Printer Settings > Print Listings on Label
(to print the configuration information on labels)</td></tr>
<tr><td rowspan="2"> 
</td><td colspan="2">Storage > USB > Print: From USB
Select files to print from a USB Flash drive.
To print files from a USB Flash drive:
1. Insert a USB flash drive into the printer’s USB host port.
The printer lists available files.
2. Touch the box next to the desired files. Select All is also available.
3. Touch the check mark to print the selected files.</td></tr>
<tr><td>SGD command used:</td><td><code>usb.host.read_list</code></td></tr>
</table>

Menu Display	Menu Option Description	
	**Storage** > **Print Asset Lists** Print the specified information on one or more labels.	
	Accepted values:	Formats—Prints the available formats stored in the printer's RAM, Flash memory, or optional memory card. Images—Prints the available images stored in the printer's RAM, Flash memory, or optional memory card. Fonts—Prints the available fonts in the printer, including standard printer fonts plus any optional fonts. Fonts may be stored in RAM or Flash memory. Barcodes—Prints the available barcodes in the printer. Barcodes may be stored in RAM or Flash memory. All—Prints the previous labels plus the printer configuration label and the network configuration label.
	Related ZPL command(s):	`^WD`
	Printer web page:	**View and Modify Printer Settings** > **Print Listings on Label**

Calibrating the Ribbon and Media Sensors

Printer calibration adjusts the sensitivity of the media and ribbon sensors. It also helps ensure proper alignment of the image being printed and optimal print quality.

Perform calibration in the following situations:

- You switched to a different size or type of ribbon or media.
- The printer experiences any of the following issues:
  - skips labels
  - the printed image wanders/drifts either side to side or up and down
  - ribbon is not being detected when it is installed or when it runs out
  - non-continuous labels are being treated as continuous

Performing Auto Calibration

You can set the printer to perform an auto calibration (CALIBRATE) or a short calibration (SHORT CAL) using the POWER UP ACTION or HEAD CLOSE ACTION parameters.

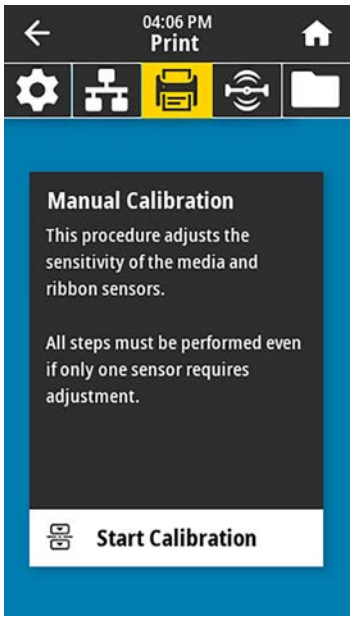
- CALIBRATE—Adjusts sensor levels and thresholds, determines the label length, and feeds the media to the next web.
- SHORT CAL—Sets the media and web thresholds without adjusting sensor gain, determines the label length, and feeds the media to the next web.

See Power-Up Action or Head-Close Action for details.

Performing Manual Sensor Calibration

You may need to manually calibrate the printer if you see issues with the print output.

1. Touch **Print** > **Sensors** > **Manual Calibration**.



2. Touch **Start Calibration**.
3. Follow the steps in the calibration procedure as prompted.

IMPORTANT: Follow the calibration procedure exactly as presented. You may press and hold **CANCEL** at any step in the procedure to cancel the calibration process.

4. When calibration is complete, press **PAUSE** to exit pause mode and enable printing.

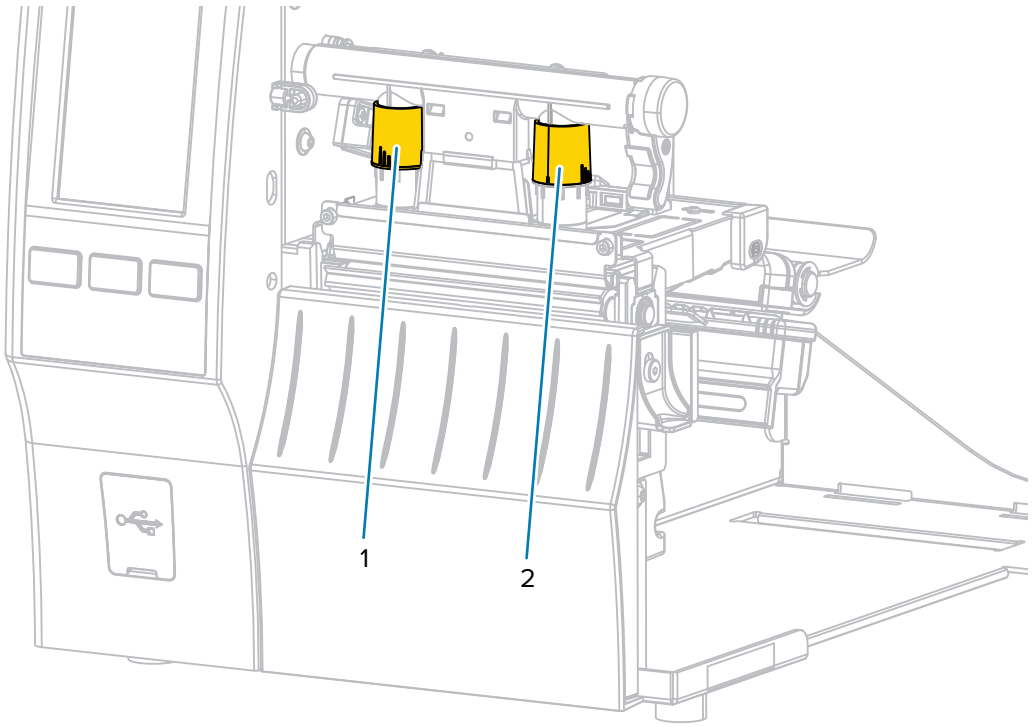
Adjusting the Printhead Pressure

You may need to adjust printhead pressure if:

- printing is too light on one side
- you use thick media, or
- if the media drifts from side to side during printing

Use the inside and outside printhead pressure adjustment dials to set the printhead pressure. Set the pressure to the lowest level necessary to achieve good print quality. The setting marks on these dials range from 1 to 4.

Figure 2 Printhead Pressure Adjustment Dials



Begin with the pressure settings for your printer model and media width as specified in the following table, and make adjustments to the inside dial (1) and the outside dial (2) as necessary.

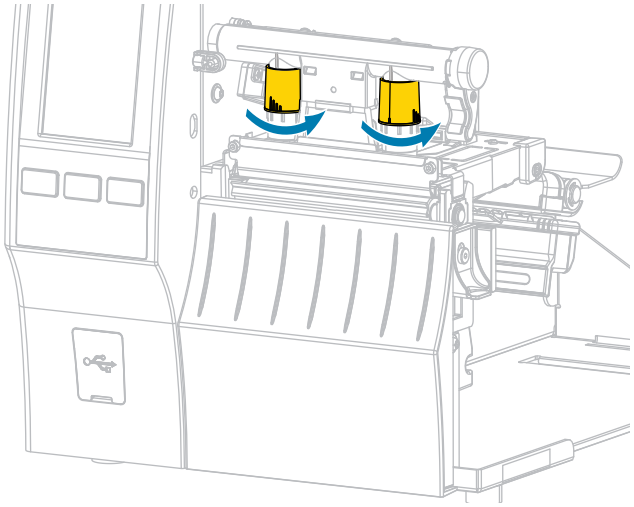
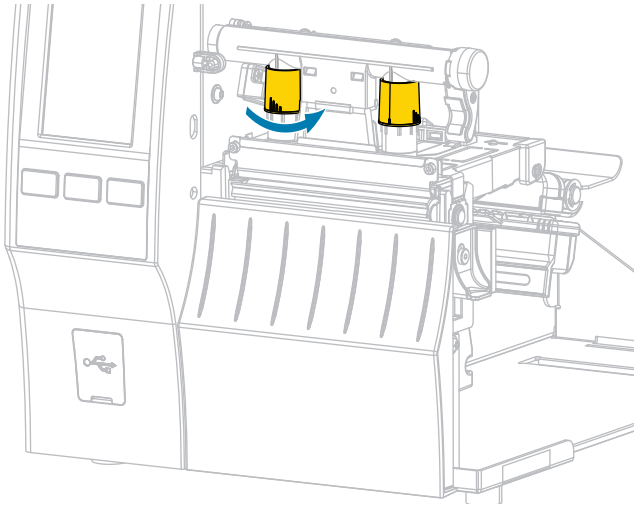
Table 3 Pressure Setting Starting Points

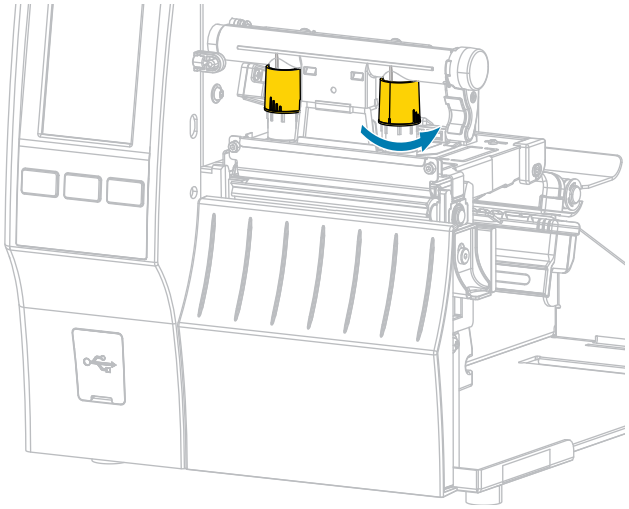
Printer	Media Width	Inside Dial Setting	Outside Dial Setting
ZT411	1 in. (25 mm)	4	1
	2 in. (51 mm)	3	1
	3 in. (76 mm)	2.5	1.5
	≥ 3.5 in. (89 mm)	2	2

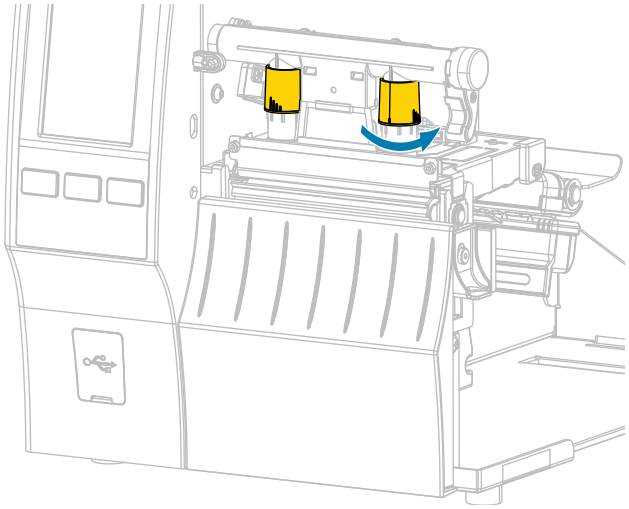
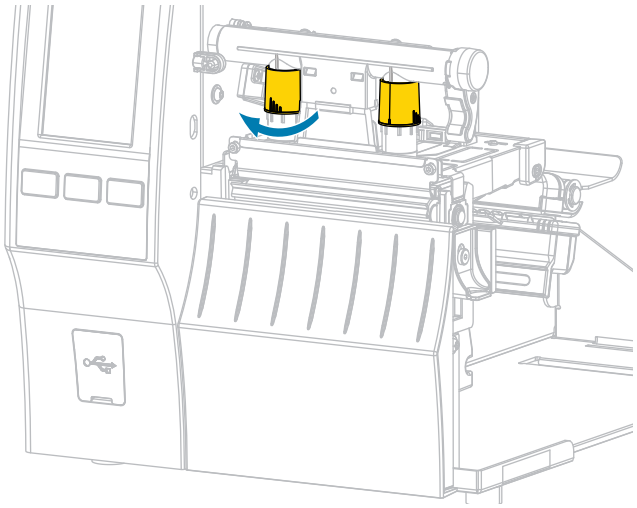
Table 3 Pressure Setting Starting Points (Continued)

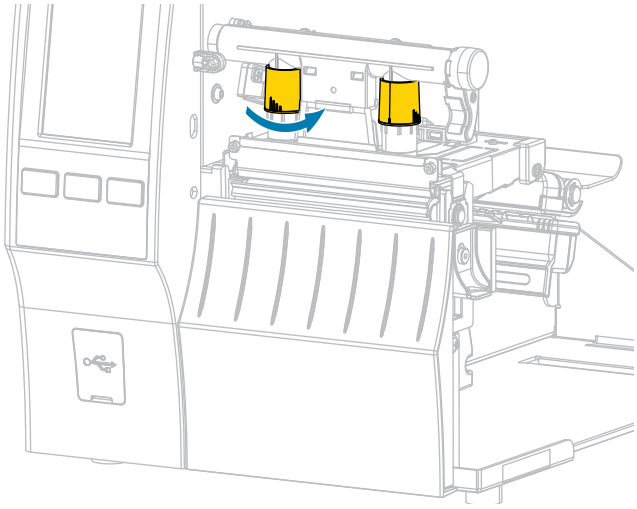
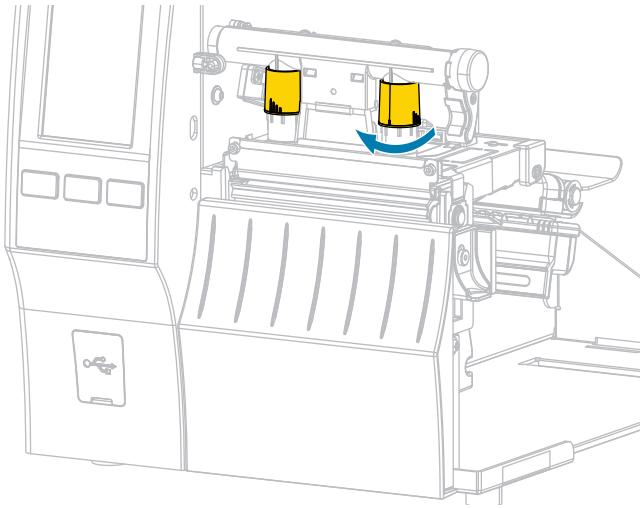
Printer	Media Width	Inside Dial Setting	Outside Dial Setting
ZT421	2 in. (51 mm)	4	1
	3 in. (76 mm)	3.5	1
	4 in. (102 mm)	3	2
	≥ 5 in. (127 mm)	2.5	2.5

If necessary, adjust the printhead pressure adjustment dials as follows:

If the media...	Then...
Requires higher pressure to print well	Increase both dials one position. 
Prints too lightly on the left side of the label.	Increase the inside dial setting one position. 

If the media...	Then...
Prints too lightly on the right side of the label.	Increase the outside dial setting one position. 

If the media...	Then...
Shifts left while printing	Increase the outside dial setting one position.  OR Decrease the inside dial setting one position. 

If the media...	Then...
Shifts right while printing	Increase the inside dial setting one position.  OR Decrease the outside dial setting one position. 

Adjusting the Sensor Position

The transmissive media sensor assembly consists of two parts:

- Light source (lower part of the media sensor)
- Light sensor (upper part of the media sensor)

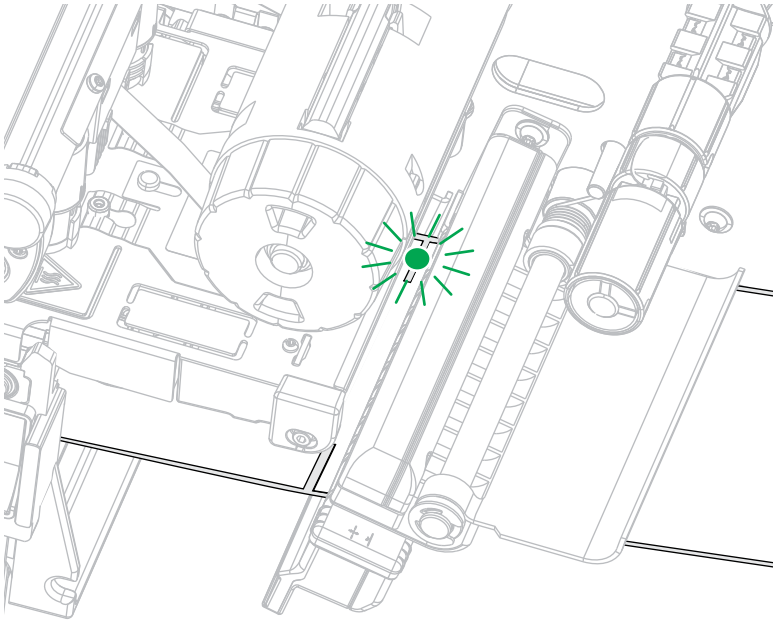
The media passes between these two parts.

Adjust the position of the sensor only if the printer cannot detect the top of the labels. If that occurs, the printer display shows a "media out error" despite media being loaded.

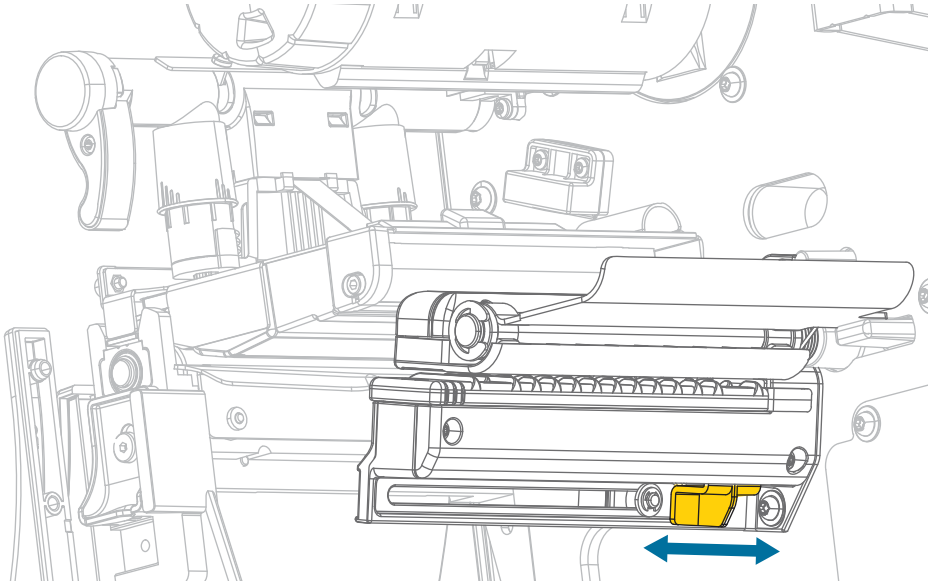
For non-continuous media with a notch or hole, the sensor must be positioned directly at the notch or hole.

1. Remove the ribbon so you can clearly see the media path.

2. Load the media so that the green light from the media sensor is shining through a gap, notch, or hole.



3. If necessary, slide the media sensor horizontally using the media sensor adjustment.



Routine Maintenance

This section provides routine cleaning and maintenance procedures.

Cleaning Schedule and Procedures

Routine preventive maintenance is a crucial part of normal printer operation. By taking good care of your printer, you can minimize potential problems and achieve/maintain the desired print quality standards.

Over time, the movement of media or ribbon across the printhead wears through the protective ceramic coating, exposing and eventually damaging the print elements (dots). To avoid abrasion:

- Clean the printhead frequently.
- Minimize printhead pressure and burn temperature (darkness) settings by optimizing the balance between the two.
- When using Thermal Transfer mode, ensure that the ribbon is either as wide or wider than the media. This is to avoid exposing printhead elements to the more abrasive label material.

IMPORTANT: Zebra is not responsible for damage caused by the use of cleaning fluids on this printer.

Specific cleaning procedures are included in this section. Follow the recommended cleaning schedule listed in the table below.

NOTE: These recommended cleaning intervals are intended as guidelines only. You may have to clean more often depending on your specific application and the media you use for printing.

Table 4 Recommended Cleaning Schedule

Area	Method	Interval
Printhead (see Cleaning the Printhead and Platen Roller on page 129)	Solvent*	Direct Thermal Mode: After every roll of media (or 500 feet of fanfold media). Thermal Transfer Mode: After every roll of ribbon.
Platen roller	Solvent*	
Media sensors	Air blow	
Ribbon sensor	Air blow	
Media path	Solvent*	
Ribbon path	Solvent*	

Table 4 Recommended Cleaning Schedule (Continued)

Area		Method	Interval
Pinch roller (part of Peel-Off option)		Solvent*	
Cutter module	If cutting continuous, pressure-sensitive media	Solvent*	After every roll of media (or more often, depending upon your application and media).
	If cutting tag stock or label liner material	Solvent* and air blow	After every two or three rolls of media.
Tear-off/peel-off bar		Solvent*	Once a month.
Take-label sensor		Air blow	Once every six months.

NOTE:

* Zebra recommends using the Preventive Maintenance Kit (p/n 47362 or p/n 105950-035 - multipack). In place of the Preventive Maintenance Kit, you may use a lint-free cloth dipped in 99.7% isopropyl alcohol.

For 600 dpi printers, use Save-a-Printhead cleaning film. This specially-coated material removes contamination buildup without damaging the printhead. Call your authorized reseller or distributor for more information.

Clean the Exterior, the Media Compartment, and the Sensors

Over time, dust, grime, and other debris may build up on the outside and inside of your printer, particularly in a harsh operating environment.

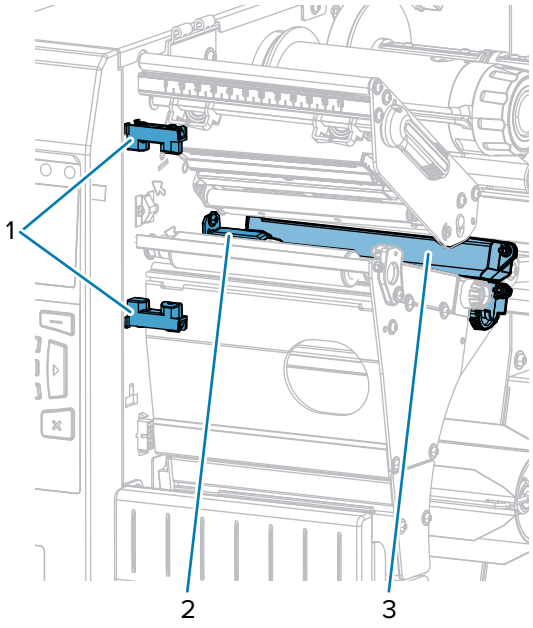
Clean the Printer Exterior

You may clean the exterior surfaces of the printer with a lint-free cloth and a small amount of a mild detergent, if necessary. Do not use harsh or abrasive cleaning agents or solvents.

IMPORTANT: Zebra is not responsible for damage caused by the use of cleaning fluids on this printer.

Cleaning the Media Compartment and Sensors

1. Brush, air blow, or vacuum any accumulated paper lint and dust away from the media and ribbon paths.
2. Brush, air blow, or vacuum any accumulated paper lint and dust away from the sensors.



1	Take-label sensor
2	Ribbon sensor
3	Media sensor

Cleaning the Printhead and Platen Roller

Inconsistent print quality, such as voids in the barcode or graphics, may indicate a dirty printhead. For the recommended cleaning schedule, see Cleaning Schedule and Procedures on page 126.

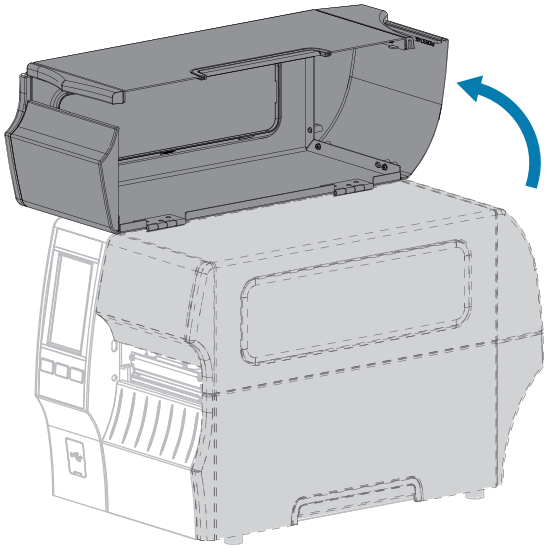
IMPORTANT:

While you are not required to turn off printer power when working near an open printhead, Zebra recommends it as a precaution.

If you turn off power, you will lose all temporary settings, such as label formats, and you must reload them before you resume printing.

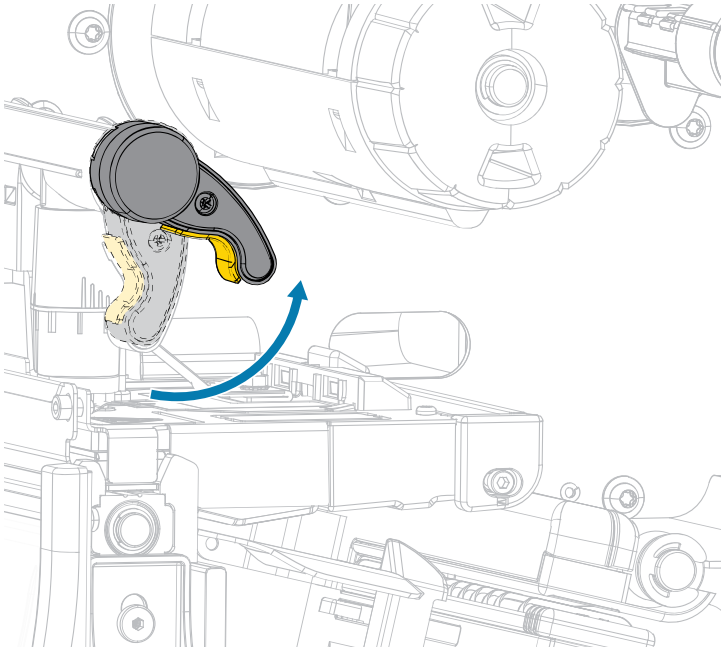
CAUTION—ESD: Before touching the printhead assembly, discharge any built-up static electricity by touching the metal printer frame or by using an anti-static wrist-strap and mat.

1. Raise the media door.

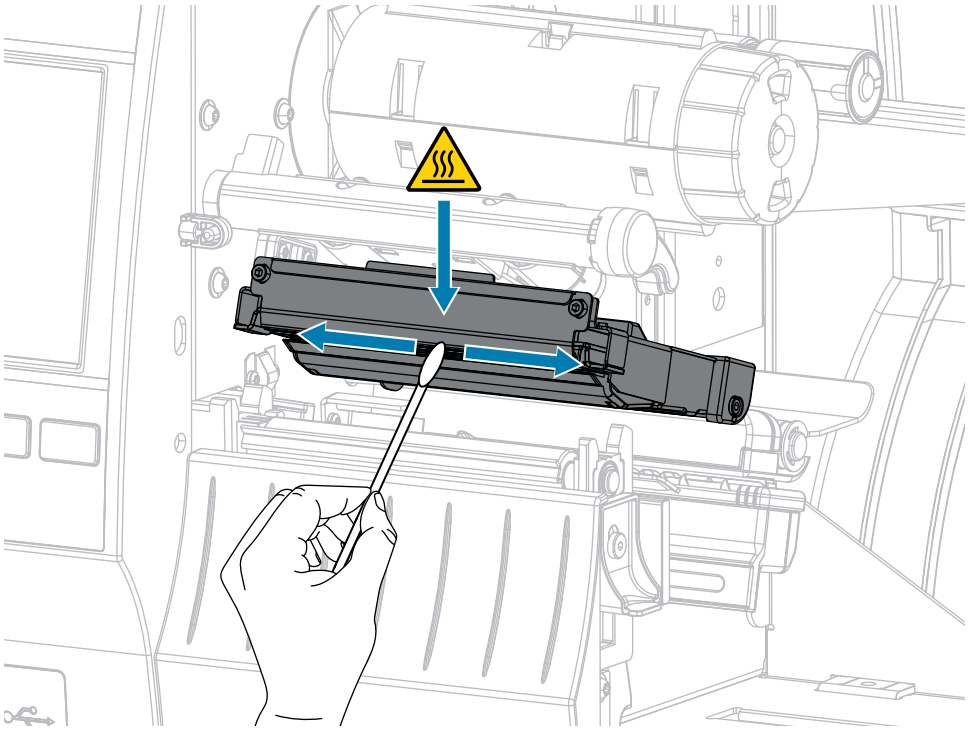


CAUTION: HOT SURFACE: The printhead may be hot and could cause severe burns. Allow the printhead to cool.

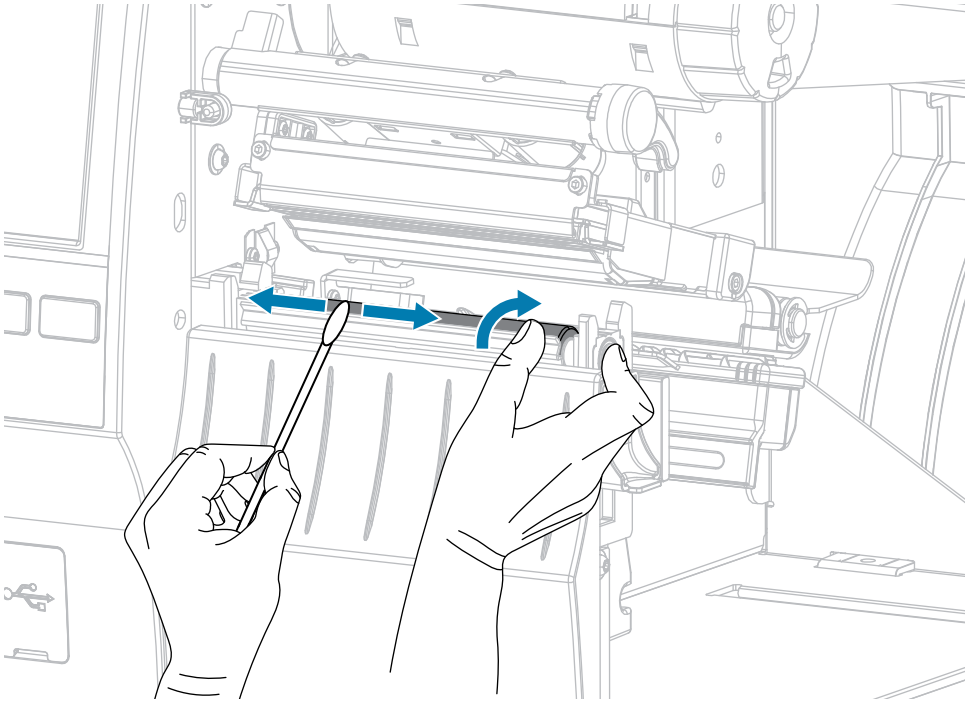
2. Open the printhead assembly by rotating the printhead-open lever upward.



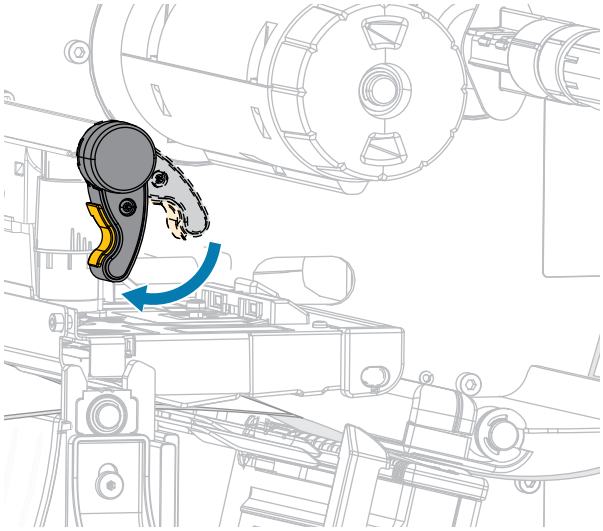
3. Remove the ribbon (if used) and the media.
4. Using the swab from a Zebra Preventive Maintenance Kit, wipe along the brown strip on the printhead assembly from end to end. In place of the Preventive Maintenance Kit, you may use a clean swab dipped in 99.7% isopropyl alcohol. Allow the solvent to evaporate.



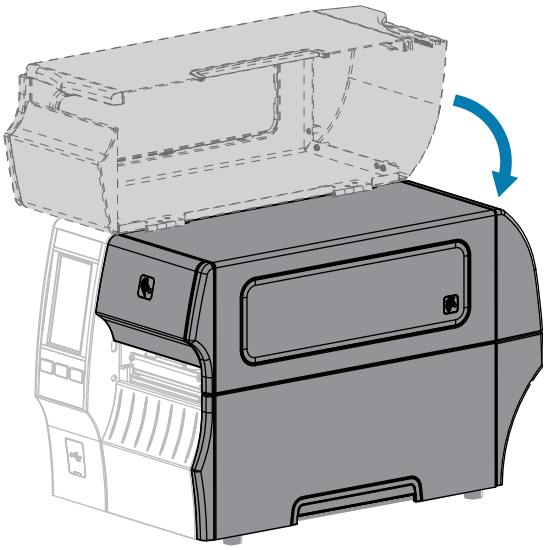
5. While manually rotating the platen roller, clean it thoroughly with the swab. Allow the solvent to evaporate.



6. Reload the ribbon (if used) and the media. For instructions, see Loading the Ribbon on page 62 or Loading the Media on page 31.
7. Rotate the printhead-open lever downward until it locks the printhead in place.



8. Close the media door.



The printer is ready to operate.

9. Press **PAUSE** to exit pause mode and enable printing.

The printer may perform a label calibration or feed a label, depending on your settings.

NOTE:

If performing this procedure does not improve print quality, try cleaning the printhead with Save-A-Printhead cleaning film. This specially coated material removes contamination buildup without damaging the printhead.

Call your authorized Zebra reseller for more information.

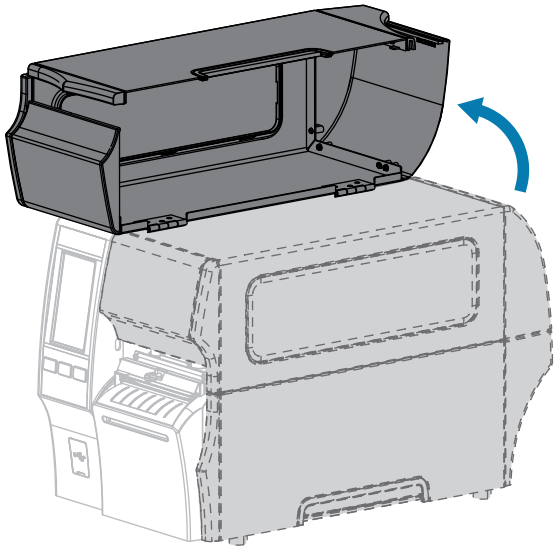
Cleaning and Lubricating the Cutter Module

If the cutter is not cutting the labels cleanly or if it jams with labels, clean the cutter blades. After cleaning the blades, apply lubrication to them to help extend the life of your cutter module.

CAUTION—ELECTRIC SHOCK: Turn off the printer (**O**) and disconnect it from the power source before performing the following procedure.

1. Turn off (**O**) the printer and disconnect the AC power cord.

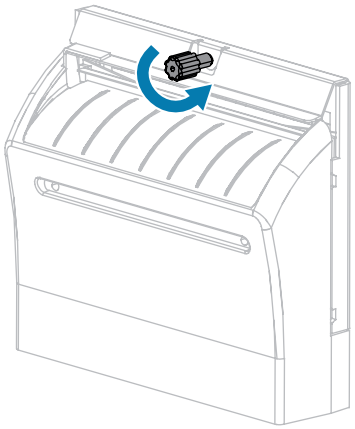
2. Raise the media door.



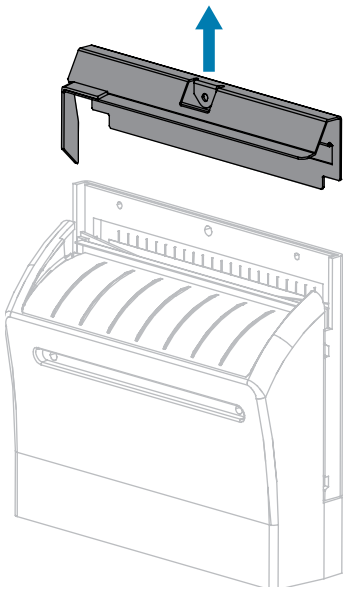
3. Remove media that is loaded through the cutter module.

CAUTION: The cutter blade is sharp. Do not touch or rub the blade with your fingers.

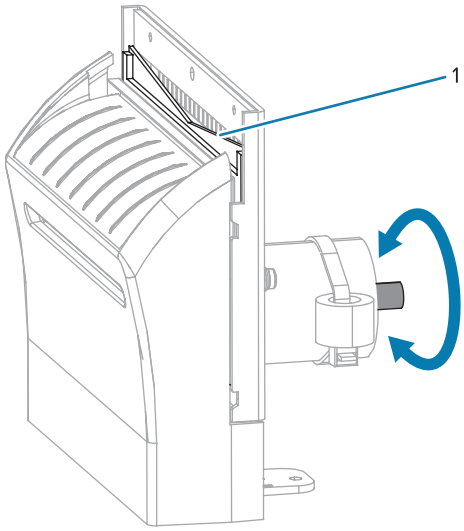
4. Loosen and remove the thumbscrew and lock washer on the cutter shield.



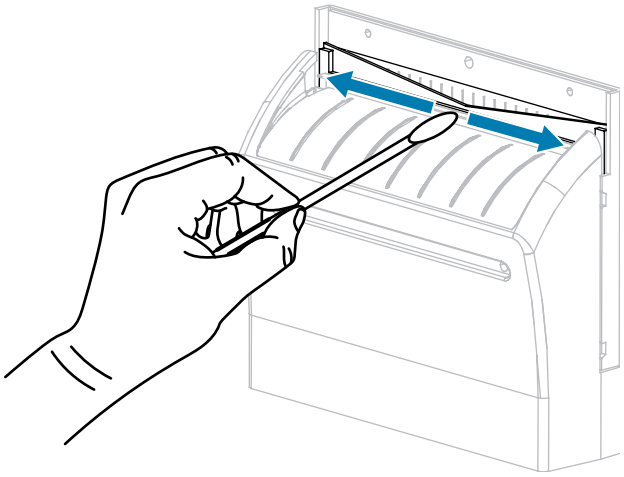
5. Remove the cutter shield.



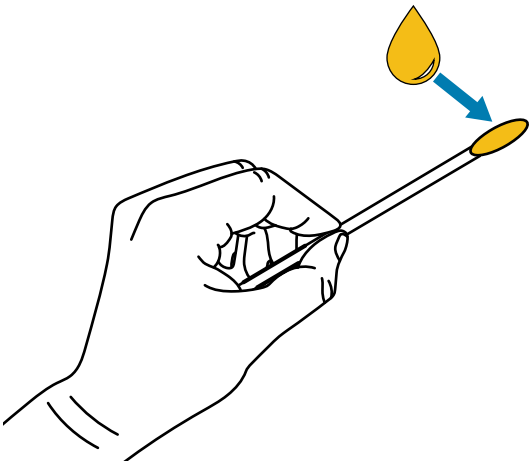
6. If necessary, rotate the cutter motor thumbscrew to fully expose the V-shaped cutter blade (**1**).



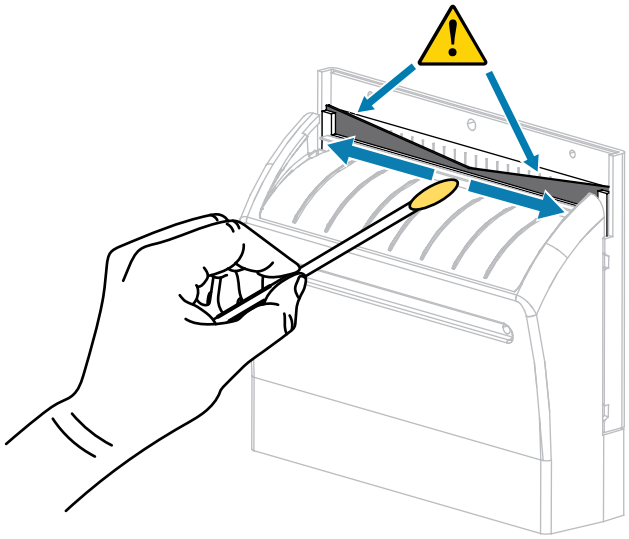
7. Using the swab from the Preventive Maintenance Kit (part number 47362), wipe along the upper cutting surface and the cutter blade. In place of the Preventive Maintenance Kit , you may use a clean swab dipped in 99.7% isopropyl alcohol. Allow the solvent to evaporate.



8. When the solvent has evaporated, soak a clean swab in a general-purpose, higher-viscosity silicone or PTFE oil lubricant.

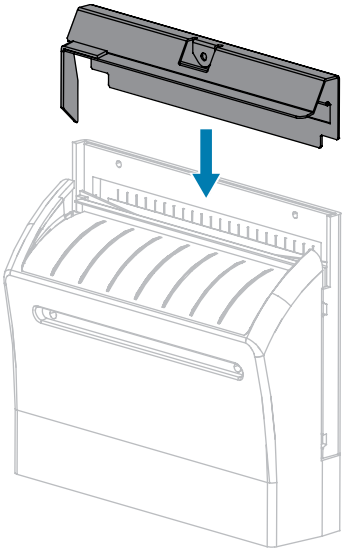


9. Apply an even layer along all exposed surfaces of both cutter blades. Remove any excess oil so that none of it comes in contact with the printhead or platen roller.

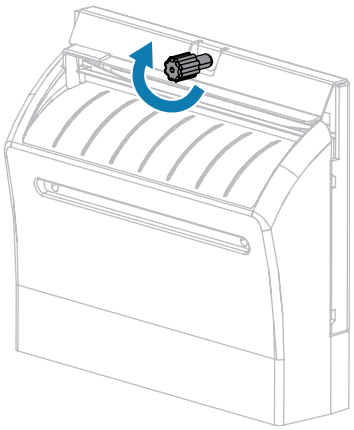


CAUTION: The cutter blade is sharp. For operator safety, replace the cutter shield.

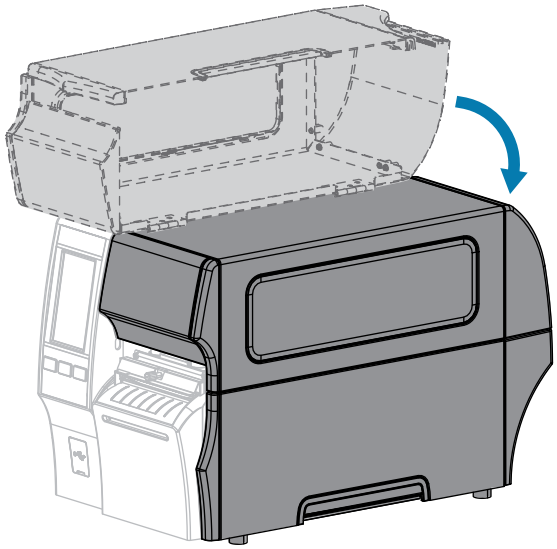
10. Replace the cutter shield.



11. Secure it with the thumbscrew and lock washer that you removed earlier.



12. Close the media door.



13. Plug the printer into its power source, and then turn on (**I**) the printer.

The cutter blade returns to its operating position.

14. If the cutter continues to perform unsatisfactorily, contact an authorized service technician for assistance.

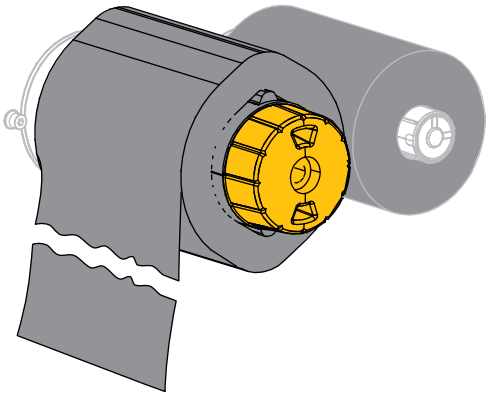
Removing Used Ribbon

At minimum, remove used ribbon from the ribbon take-up spindle each time you change the roll of ribbon.

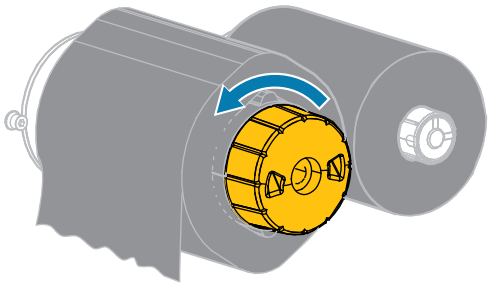
With ribbon that is half or less the width of the printhead, remove used ribbon each time you load a new roll of media. This ensures that uneven pressure on the ribbon take-up spindle does not interfere with the ribbon release bars on the spindle.

To remove used ribbon, complete these steps:

1. Has the ribbon run out?

If the ribbon...	Then
Ran out	Continue with step 2 on page 138.
Did not run out	Cut or break the ribbon before the ribbon take-up spindle.  **CAUTION—PRODUCT DAMAGE:** Do not cut the ribbon directly on the ribbon take-up spindle. Doing so may damage the spindle.

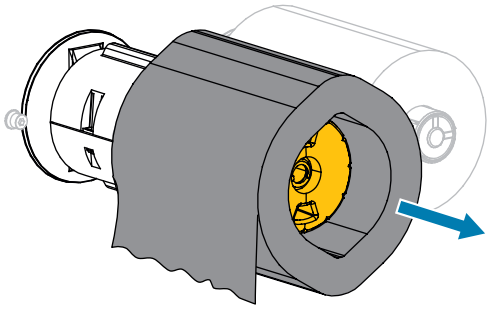
2. While holding the ribbon take-up spindle, turn the ribbon release knob to the left until it stops.



The ribbon release bars pivot down, easing the spindle's grip on the used ribbon.

3. After the ribbon release bars have pivoted down, if possible, turn the ribbon take-up spindle one full turn to the right to help loosen the ribbon on the spindle.

4. Slide the used ribbon off the ribbon take-up spindle and discard.



Replacing Printer Components

Some printer components, such as the printhead and platen roller, may wear out over time and can be replaced easily. Regular cleaning may extend the life of some of these components.

See Cleaning Schedule and Procedures on page 126 for the recommended cleaning intervals.

Ordering Replacement Parts

Zebra printers are designed to work only with genuine Zebra printheads, thus maximizing safety and print quality. Contact your authorized Zebra reseller for part ordering information.

Recycling Printer Components

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

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

Storing the Printer

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

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

Lubrication

The only lubrication needed for this printer is for the cutter module. Follow the instructions in Cleaning and Lubricating the Cutter Module on page 132.

NOTE: Do not lubricate any other parts of the printer.

CAUTION—PRODUCT DAMAGE: Some commercially available lubricants will damage the finish and the mechanical parts if used on this printer.

Diagnostics and Troubleshooting

This section provides diagnostic tests and other information that may help you to optimize printing or to troubleshoot issues with your printer.

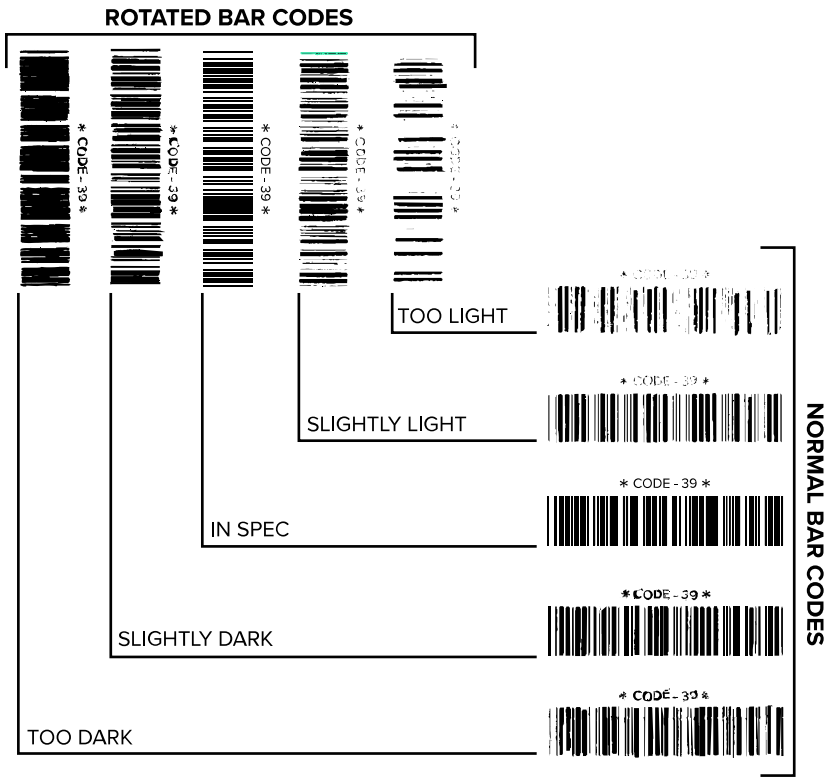
Go to zebra.com/zt400 for access to videos and additional online information designed to assist you.

Evaluating Barcode Quality

The figure below shows how printer settings such as darkness and print speed can affect the quality of the printed barcodes.

Set the print darkness to the lowest setting that delivers good print quality. The Print Quality Assistant in Running the Print Wizard and Printing a Test Label on page 66 can help you determine the most optimal settings.

Figure 3 Barcode Darkness Comparison



Appearance	Description
Too dark labels	Fairly obvious. These may be readable but are not “in-spec.” • The normal barcode bars increase in size. • The openings in small alphanumeric characters may fill in with ink. • Rotated barcode bars and spaces run together.
Slightly dark labels	Not as obvious as the too-dark labels. • The normal barcode will be "in-spec". • Small alphanumeric characters will be bold, and may appear slightly filled in. • The rotated barcode spaces are small when compared to the “in-spec” code, possibly making the code unreadable.

Appearance	Description
"In-spec" labels	Whether or not a label is "in-spec" can only be confirmed by a verifier, but they typically exhibit some visible characteristics. • The normal barcode will have complete, even bars along with clear, distinct spaces. • The rotated barcode will have complete, even bars along with clear, distinct spaces. Although it may not look as good as a slightly dark barcode, the barcode will be “in-spec.” • In both normal and rotated styles, small alphanumeric characters will look complete.
Slightly light labels	In some cases, these are preferred to slightly dark ones for “in-spec” barcodes. • Both normal and rotated barcodes will be "in spec", but small alphanumeric characters may not be complete.
Too light labels	These are obvious. • Both normal and rotated barcodes have incomplete bars and spaces. • Small alphanumeric characters are unreadable.

Configuration Labels

Two of the most commonly used printer diagnostic items are the printer and network configuration labels (see Figure 4 Sample Printer Configuration Label on page 144 and Figure 5 Sample Network Configuration Label on page 144 in this section).

Analyzing the information on these labels can help you to troubleshoot potential issues.

Figure 4 Sample Printer Configuration Label

To print a Printer Configuration label, touch **Menu** > **Settings** > **Print System Settings**.

```
PRINTER CONFIGURATION

Zebra Technologies
ZTC ZT620R-203dpi ZPL
76J162700886

+30.0.............. DARKNESS
6.0 IPS............ PRINT SPEED
-007............... TEAR OFF
TEAR OFF........... PRINT MODE
CONTINUOUS......... MEDIA TYPE
TRANSMISSIVE....... SENSOR SELECT
DIRECT-THERMAL..... PRINT METHOD
1344............... PRINT WIDTH
2000............... LABEL LENGTH
P1085892/00005 2... PRINT HEAD ID
15.0IN   380MM..... MAXIMUM LENGTH
MAINT. OFF......... EARLY WARNING
CONNECTED.......... USB COMM.
BIDIRECTIONAL...... PARALLEL COMM.
RS232.............. SERIAL COMM.
9600............... BAUD
8 BITS............. DATA BITS
NONE............... PARITY
XON/XOFF........... HOST HANDSHAKE
NONE............... PROTOCOL
NORMAL MODE........ COMMUNICATIONS
<~>  7EH........... CONTROL PREFIX
<^>  5EH........... FORMAT PREFIX
<,>  2CH........... DELIMITER CHAR
ZPL II............. ZPL MODE
INACTIVE........... COMMAND OVERRIDE
FEED............... MEDIA POWER UP
LENGTH............. HEAD CLOSE
DEFAULT............ BACKFEED
+000............... LABEL TOP
+0000.............. LEFT POSITION
OFF................ APPLICATOR PORT
ENABLED............ ERROR ON PAUSE
PULSE MODE......... START PRINT SIG
DISABLED........... REPRINT MODE
080................ WEB SENSOR
090................ MEDIA SENSOR
255................ TAKE LABEL
027................ MARK SENSOR
027................ MARK MED SENSOR
000................ TRANS GAIN
005................ TRANS BASE
060................ TRANS LED
002................ MARK GAIN
100................ MARK LED
DPCSWFXM........... MODES ENABLED
................... MODES DISABLED
1344 8/MM FULL..... RESOLUTION
4.0................ LINK-OS VERSION
V80.20.03 <-....... FIRMWARE
1.3................ XML SCHEMA
6.6.0 22.89........ HARDWARE ID
32768k..........R: RAM
524288k.........E: ONBOARD FLASH
NONE............... FORMAT CONVERT
MM/DD/YYYY 24HR.... IDLE DISPLAY
05/11/17........... RTC DATE
06:40.............. RTC TIME
ENABLED............ ZBI
2.1................ ZBI VERSION
READY.............. ZBI STATUS
TM:M6E MICRO....... RFID READER
20.00.00.01........ RFID HW VERSION
01.03.00.18........ RFID FW VERSION
USA/CANADA......... RFID REGION CODE
USA/CANADA......... RFID COUNTRY CODE
RFID OK............ RFID ERR STATUS
16................. RFID READ PWR
16................. RFID WRITE PWR
FO................. PROG. POSITION
0.................. RFID VALID CTR
0.................. RFID VOID CTR
NONE............... ADAPTIVE ANTENNA
A4................. RFID ANTENNA
570 LABELS......... NONRESET CNTR
570 LABELS......... RESET CNTR1
570 LABELS......... RESET CNTR2
2,798 IN........... NONRESET CNTR
2,798 IN........... RESET CNTR1
2,798 IN........... RESET CNTR2
7,107 CM........... NONRESET CNTR
7,107 CM........... RESET CNTR1
7,107 CM........... RESET CNTR2
001 WIRELESS....... SLOT 1
*** EMPTY.......... SLOT 2
0.................. MASS STORAGE COUNT
0.................. HID COUNT
OFF................ USB HOST LOCK OUT
FIRMWARE IN THIS PRINTER IS COPYRIGHTED
```

Figure 5 Sample Network Configuration Label

To print a Network Configuration label, touch **Menu** > **Networks** > **Print: Network Info**.

```
Network Configuration

Zebra Technologies
ZTC ZT620R-203dpi ZPL
76J162700886

Wired.............. PRIMARY NETWORK
PrintServer........ LOAD LAN FROM?
INTERNAL WIRED..... ACTIVE PRINTSRVR

Wired*
ALL................ IP PROTOCOL
192.168.000.017.... IP ADDRESS
255.255.255.000.... SUBNET
192.168.000.254.... GATEWAY
000.000.000.000.... WINS SERVER IP
YES................ TIMEOUT CHECKING
300................ TIMEOUT VALUE
000................ ARP INTERVAL
9100............... BASE RAW PORT
9200............... JSON CONFIG PORT

Wireless
ALL................ IP PROTOCOL
000.000.000.000.... IP ADDRESS
255.255.255.000.... SUBNET
000.000.000.000.... GATEWAY
000.000.000.000.... WINS SERVER IP
YES................ TIMEOUT CHECKING
300................ TIMEOUT VALUE
000................ ARP INTERVAL
9100............... BASE RAW PORT
9200............... JSON CONFIG PORT
INSERTED........... CARD INSERTED
02dfH.............. CARD MFG ID
9134H.............. CARD PRODUCT ID
ac:3f:a4:82:05:9c.. MAC ADDRESS
YES................ DRIVER INSTALLED
INFRASTRUCTURE..... OPERATING MODE
125................ ESSID
1.0................ CURRENT TX RATE
OPEN............... WEP TYPE
WPA PSK............ WLAN SECURITY
1.................. WEP INDEX
000................ POOR SIGNAL
LONG............... PREAMBLE
NO................. ASSOCIATED
ON................. PULSE ENABLED
15................. PULSE RATE
OFF................ INTL MODE
USA/CANADA......... REGION CODE
USA/CANADA......... COUNTRY CODE
0x7FF.............. CHANNEL MASK

Bluetooth
4.3.1p1............ FIRMWARE
02/13/2015......... DATE
on................. DISCOVERABLE
3.0/4.0............ RADIO VERSION
on................. ENABLED
AC:3F:A4:82:05:9D.. MAC ADDRESS
76J162700886....... FRIENDLY NAME
no................. CONNECTED
1.................. MIN SECURITY MODE
nc................. CONN SECURITY MODE
supported.......... iOS

FIRMWARE IN THIS PRINTER IS COPYRIGHTED
```

PAUSE Self Test

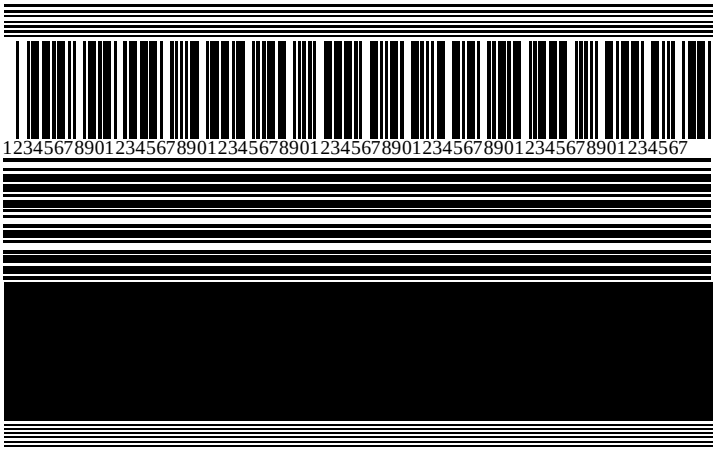
This self test can be used to provide the test labels required when making adjustments to the printer's mechanical assemblies or to determine if any printhead elements are not working.

Figure 6 PAUSE Test Label on page 145 shows a sample printout.

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

   The initial self test prints 15 labels at the printer's slowest speed, and then automatically pauses the printer. Each time **PAUSE** is pressed, an additional 15 labels print. (See sample label below.)

   Figure 6 PAUSE Test Label

   While the printer is paused:

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

Sensor Profile

Tap **Menu** > **Print** > **Sensors** > **Print: Sensor Profile** to print a sensor profile image. The image will extend across several actual labels or tags.

Use the sensor profile image to troubleshoot the following situations:

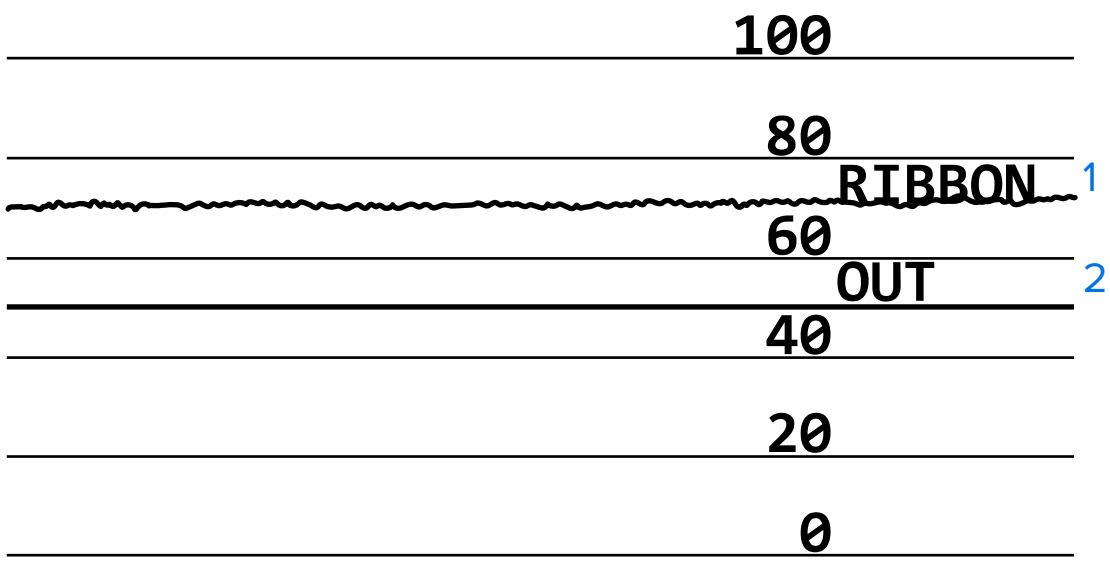
- The printer experiences difficulty in determining gaps (web) between labels.
- The printer incorrectly identifies preprinted areas on a label as gaps (web).
- The printer cannot detect ribbon.

Compare your results to the examples shown in this section. If the sensitivity of the sensors must be adjusted, calibrate the printer. (See Calibrating the Ribbon and Media Sensors on page 118.)

Ribbon Sensor Profile

See Figure 7 Sensor Profile (Ribbon Section) on page 146. The line labeled RIBBON (1) on the sensor profile indicates the ribbon sensor readings. The ribbon sensor threshold setting is indicated by OUT (2). If the ribbon readings are below the threshold value, the printer does not acknowledge that ribbon is loaded.

Figure 7 Sensor Profile (Ribbon Section)



Media Sensor Profile

See Figure 8 Media Sensor Profile (Gap/Notch Media) on page 147 and Figure 9 Media Sensor Profile (Black Mark Media) on page 147. The line labeled MEDIA (1) on the sensor profile indicates the media sensor readings. The media sensor threshold settings are indicated by WEB (2). The media out threshold is indicated by OUT (3). The upward or downward spikes (4) indicate divisions between labels (the web, notch, or black mark), and the lines between the spikes (5) indicate where labels are located.

If you compare the sensor profile printout to a length of your media, the spikes should be the same distance apart as the gaps on the media. If the distances are not the same, the printer may be having difficulty determining where the gaps are located.

Figure 8 Media Sensor Profile (Gap/Notch Media)

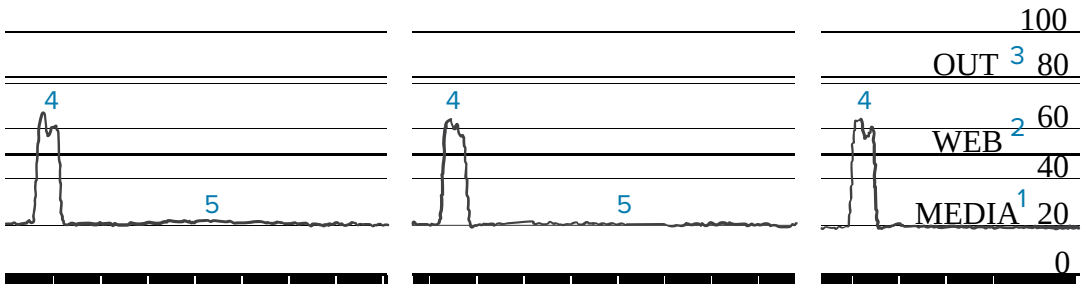
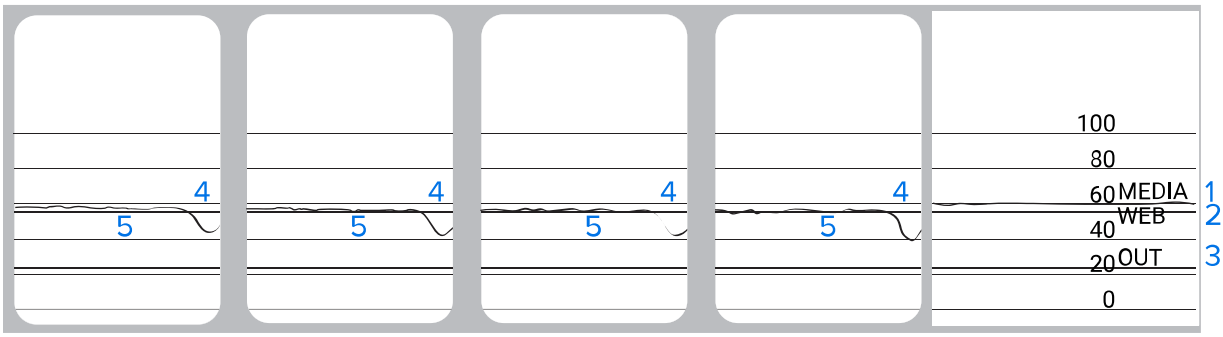


Figure 9 Media Sensor Profile (Black Mark Media)



Using Communication Diagnostics Mode

The communication diagnostics test is a troubleshooting tool for checking the interconnection between the printer and the host computer. When the printer is in diagnostics mode, it prints all data received from the host computer as straight ASCII characters with the hex values below the ASCII text. The printer prints all characters received, including control codes such as CR (carriage return). Figure 10 Sample Communications Diagnostics Mode Label on page 147 shows a typical test label from this test.

NOTE: The test label prints upside-down.

Figure 10 Sample Communications Diagnostics Mode Label

```
^FS^FO394,25^AA
5E 46 53 5E 46 4F 33 39 34 2C 32 35 5E 41 41
N,18,10^FD(0000
4E 2C 31 38 2C 31 30 5E 46 44 28 30 30 30 30
)999-9999^FS
29 39 39 39 2D 39 39 39 39 5E 46 53 0D 0A
^FO0,50^AAN,18,
5E 46 4F 30 2C 35 30 5E 41 41 4E 2C 31 38 2C
10^FDCENTER STA
31 30 5E 46 44 43 45 4E 54 45 52 20 53 54 41
```

1. Set the label width equal to or less than the actual media width being used for the test. Tap **Menu** > **Print** > **Print Quality** > **Label Width** to access the label width setting.
2. Tap **Menu** > **System** > **Program Language**, and set the **Diagnostic Mode** option to **ENABLED**.

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

   Errors show on the test label as follows:

   - FE indicates a framing error.
   - 0E indicates an overrun error.
   - PE indicates a parity error.
   - NE indicates noise.
4. To exit this self test and return to normal operation, power cycle the printer or set the Diagnostic Mode option to **DISABLED**.

Loading Defaults or Last Saved Values

Restoring the printer to default values or to the last saved values can help if things are not working as expected.

Touch **Menu** > **System** > **Restore Defaults** to see the available options.

RESTORE PRINTER	Restores all printer settings other than the network settings back to the factory defaults. Use care when loading defaults because you will need to reload all settings that you changed manually.
RESTORE NETWORK	Reinitializes the printer's wired or wireless print server. With a wireless print server, the printer also re-associates with your wireless network.
RESTORE LAST SAVED	Loads settings from the last permanent save.

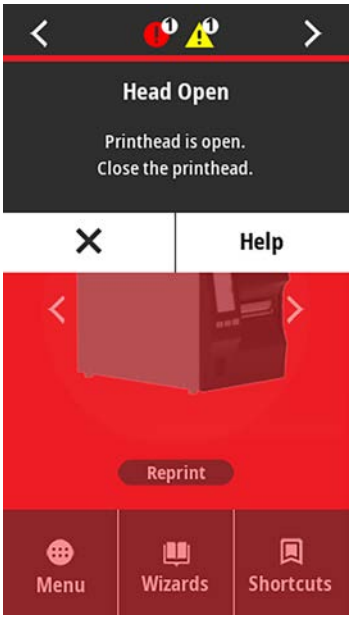
See System > Settings > Restore Defaults for additional ways to restore these values.

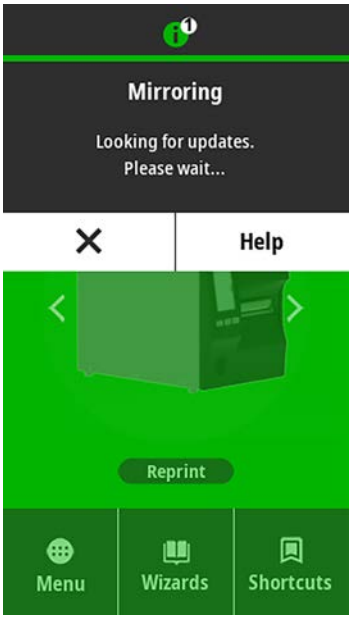
Alert and Error States

If the background color of the Home screen changes, you may need to take an action to restore the printer to a Ready status.

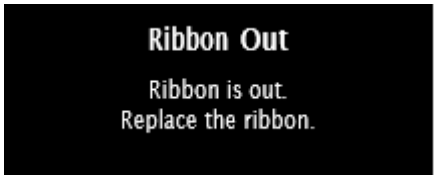
- Red and yellow backgrounds typically halt printing until the issue is resolved.
- Informational messages with a green background usually disappear without user intervention, and printing continues as normal.

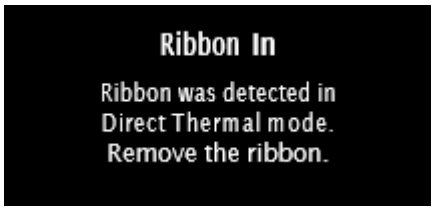
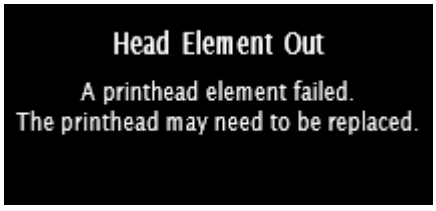
Touch the icons in the bar at the top of the Home screen to view the error, alert, or informational message. See Alerts and Error Messages on page 150 for recommended actions.

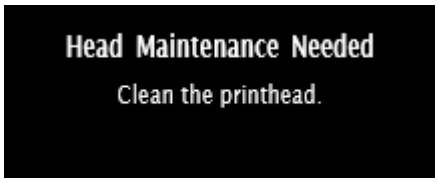




Alerts and Error Messages

Display/Indicator Lights	Possible Causes	Recommended Solutions
	The printhead is not fully closed.	Close the printhead completely.
	The printhead open sensor is not working properly.	Call a service technician to replace the sensor.
	The media is not loaded or is loaded incorrectly.	Load media correctly. See Loading the Media on page 31.
	Misaligned media sensor.	Check the position of the media sensor.
	The printer is set for non-continuous media, but continuous media is loaded.	**1.** Install the proper media type, or reset printer for the current media type. **2.** Calibrate the printer. See Calibrating the Ribbon and Media Sensors on page 118.
	There is an issue with the media in the media path.	**1.** Check for media that is loaded incorrectly or stuck to components in the media path. **2.** Check if media is wrapped around the platen roller. Carefully remove any labels. If necessary, clean the platen roller to remove adhesive (see Cleaning the Printhead and Platen Roller on page 129).
	In thermal transfer mode: • ribbon is not loaded • ribbon is loaded incorrectly • the ribbon sensor is not detecting ribbon • media is blocking the ribbon sensor	**1.** Load ribbon correctly. See Loading the Ribbon on page 62. **2.** Calibrate the printer. See Calibrating the Ribbon and Media Sensors on page 118.

Display/Indicator Lights	Possible Causes	Recommended Solutions
	In thermal transfer mode, the printer did not detect the ribbon even though it is loaded correctly.	Calibrate the printer. See Calibrating the Ribbon and Media Sensors on page 118 or load printer defaults by touching **Menu** > **System** > **Settings** > **Restore Defaults** > **Restore Printer**.
	If you are using direct thermal media, the printer is waiting for ribbon to be loaded because it is incorrectly set for thermal transfer mode.	Set the printer for Direct Thermal mode. See Print > Print Quality > Print Type. .
	Ribbon is loaded, but the printer is set for direct thermal mode.	Ribbon is not required with direct thermal media. If you are using direct thermal media, remove the ribbon. This error message will not affect printing.
		If the message persists with no ribbon in the printer, Calibrate the printer. See Calibrating the Ribbon and Media Sensors on page 118.
		If you are using thermal transfer media, which requires ribbon, set the printer for Thermal Transfer mode. See Determining the Label Collection Method on page 28.
	The printhead was replaced with one that is not a genuine Zebra printhead.	Install a genuine Zebra printhead.
	A printhead element is no longer working.	If the location of the failed element affects printing, replace the printhead.

Display/Indicator Lights	Possible Causes	Recommended Solutions
	The printhead is nearing the end of its life and should be replaced.	Replace the printhead.
	The printhead needs to be cleaned.	Follow the cleaning instructions in Cleaning the Printhead and Platen Roller on page 129.
	**CAUTION: HOT SURFACE:** The printhead may be hot enough to cause severe burns. Allow the printhead to cool.	
	The printhead is over temperature.	Allow the printer to cool. Printing automatically resumes when the printhead elements cool to an acceptable operating temperature. If this error persists, consider changing where the printer is located or using a slower print speed.
The printer shows one of these messages, or it cycles back and forth between them:  	**CAUTION: HOT SURFACE:** An improperly connected printhead data or power cable can cause these error messages. The printhead may be hot enough to cause severe burns. Allow the printhead to cool.	
	The printhead data cable is not properly connected.	Call a service technician to hook up the printhead properly.
	The printhead has a faulty thermistor.	Call a service technician to replace the printhead.

Display/Indicator Lights	Possible Causes	Recommended Solutions
	**CAUTION: HOT SURFACE:** An improperly connected printhead data or power cable can cause this error message. The printhead may be hot enough to cause severe burns. Allow the printhead to cool.	
	The printhead temperature is approaching its lower operating limit.	Continue printing while the printhead reaches the correct operating temperature. If the error remains, the environment may be too cold for proper printing. Relocate the printer to a warmer area.
	The printhead data cable is not properly connected.	Call a service technician to hook up the printhead properly.
	The printhead has a faulty thermistor.	Call a service technician to replace the printhead.
	**CAUTION:** The cutter blade is sharp. Do not touch or rub the blade with your fingers.	
	The cutter blade is in the media path.	Turn off the printer power and unplug the printer. Inspect the cutter module for debris and clean as needed following the cleaning instructions in Cleaning and Lubricating the Cutter Module on page 132.
	There is not enough memory to perform the function specified.	Free up some of the printer's memory by adjusting the label format or printer parameters. One way to free up memory is to adjust the print width to the actual width of the label instead of leaving the print width set to the default.
		Ensure that the data is not directed to a device that is not installed or is unavailable.
		If the problem persists, call a service technician.

Indicator Lights

The indicator lights located above the printer's display also communicate the printer's status.

Table 5 Status of Printer As Shown by Indicator Lights

Indicator Lights	What they indicate
	STATUS light steady green (other lights steady yellow for 2 seconds during printer power-up). The printer is ready.
	PAUSE light steady yellow. The printer is paused.
	STATUS light steady red. SUPPLIES light steady red. The media supply is out. The printer needs attention and cannot continue without user intervention.
	STATUS light steady red. SUPPLIES light flashing red. The ribbon supply is out. The printer needs attention and cannot continue without user intervention.
	STATUS light steady yellow. SUPPLIES light flashing yellow. The printer is in Direct Thermal mode, which does not require ribbon; however, ribbon is installed in the printer.
	STATUS light steady red. PAUSE light steady yellow. The printhead is open. The printer needs attention and cannot continue without user intervention.
	STATUS light steady yellow. The printhead is over temperature. **CAUTION: HOT SURFACE:** The printhead may be hot and could cause severe burns. Allow the printhead to cool.
	STATUS light flashing yellow. Indicates one of the following: • The printhead is under temperature. • The power supply is over temperature. • The main logic board (MLB) is over temperature.

Table 5 Status of Printer As Shown by Indicator Lights (Continued)

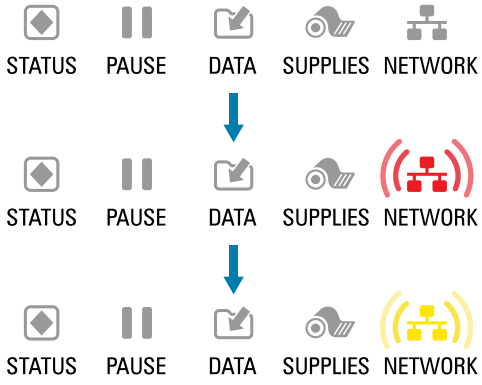
Indicator Lights	What they indicate
	STATUS light steady red. PAUSE light steady red. DATA light steady red. The printhead was replaced with one that is not a genuine Zebra printhead. Install a genuine Zebra printhead to continue.
	STATUS light flashing red. The printer is unable to read the dpi setting of the printhead.
Printers with a ZebraNet wired Ethernet option	
	NETWORK light off. No Ethernet link is available.
	NETWORK light steady green. A 100 Base-T link was found.
	NETWORK light steady yellow. A 10 Base-T link was found.
	NETWORK light steady red. An Ethernet error condition exists. The printer is not connected to your network.
Printers with a ZebraNet wireless option	
	NETWORK light off. A radio was found during power-up. The printer is attempting to associate with the network. The light flashes red while the printer associates with the network. The light then flashes yellow while the printer is authenticating with the network.
	NETWORK light steady green. The radio is associated with your network and authenticated, and the WLAN signal is strong.
	NETWORK light flashing green. The radio is associated with your network and authenticated, but the WLAN signal is weak.

Table 5 Status of Printer As Shown by Indicator Lights (Continued)

Indicator Lights	What they indicate
	NETWORK light steady red. A WLAN error condition exists. The printer is not connected to your network.

Troubleshooting

Use this information to troubleshoot issues with the printer.

Printing or Print Quality Issues

Issue	Possible Cause	Recommended Solution
Barcode Does Not Scan		
The barcode printed on a label does not scan.	The barcode is not within specifications because the printer is set at an incorrect darkness level.	**1.** Perform the steps in Running the Print Wizard and Printing a Test Label on page 66. **2.** If necessary, manually adjust the darkness or print speed settings. • Set the print darkness to the lowest setting that provides good print quality. If you set the darkness too high, the label image may print unclearly, barcodes may not scan correctly, the ribbon may burn through, or the printhead may wear prematurely. • Slower print speeds typically yield better print quality. Access the darkness and print speed settings from the Home screen by touching **Menu** > **Print** > **Print Quality**. **3.** If the issue is not resolved, check the printhead pressure and toggle position. See Adjusting the Printhead Pressure on page 120
	There is not enough blank space around the barcode.	Leave at least 1/8 in. (3.2 mm) between the barcode and other printed areas on the label and between the barcode and the edge of the label.
Wrong Image Size		
My label prints too small (or too large)	The wrong printer driver is being used, or other settings are not correct for your printing application.	Check the printer driver or software communications settings (if applicable) for your connection. You may wish to reinstall the printer driver following the instructions in Connecting the Printer to a Device on page 13.
Poor Print Quality		
Smudge marks on labels	The media or ribbon is not designed for high-speed operation.	Replace supplies with those recommended for high-speed operation. For more information, see zebra.com/supplies.

Issue	Possible Cause	Recommended Solution
Poor results with thick labels	The print line is not at an optimal position for your media.	Refer to the Maintenance Manual for instructions on how to adjust the print line for thick media.
Print Consistently Too Light or Too Dark		
Printing is too light or too dark over the entire label	The media or ribbon is not designed for high-speed operation.	Replace supplies with those recommended for high-speed operation. For more information, see zebra.com/supplies.
	The printer is set at an incorrect darkness level.	For optimal print quality, set the darkness to the lowest possible setting for your application. **1.** Perform the steps in Running the Print Wizard and Printing a Test Label on page 66. **2.** If necessary, manually adjust the darkness or print speed settings. • Set the print darkness to the lowest setting that provides good print quality. If you set the darkness too high, the label image may print unclearly, barcodes may not scan correctly, the ribbon may burn through, or the printhead may wear prematurely. • Slower print speeds typically yield better print quality. Access the darkness and print speed settings from the Home screen by touching **Menu** > **Print** > **Print Quality**.
	You are using an incorrect combination of media and ribbon for your application.	Switch to a different type of media or ribbon to try to find a compatible combination. If necessary, consult your authorized Zebra reseller or distributor for information and advice.
	Incorrect printhead pressure.	Set the printhead pressure to the minimum needed for good print quality. See Adjusting the Printhead Pressure on page 120.
Printing is too light or too dark on one side of the label	Uneven printhead pressure.	Adjust the printhead pressure as needed for good print quality. See Adjusting the Printhead Pressure on page 120

Issue	Possible Cause	Recommended Solution
General print quality issues	The printer is set at an incorrect print speed or darkness level. Keep in mind that printer settings may be affected by the driver or software being used.	For optimal print quality, set the print speed and the darkness to the lowest possible settings for your application. **1.** Perform the steps in Running the Print Wizard and Printing a Test Label on page 66. **2.** If necessary, manually adjust the darkness or print speed settings. • Set the print darkness to the lowest setting that provides good print quality. If you set the darkness too high, the label image may print unclearly, barcodes may not scan correctly, the ribbon may burn through, or the printhead may wear prematurely. • Slower print speeds typically yield better print quality. Access the darkness and print speed settings from the Home screen by touching **Menu** > **Print** > **Print Quality**.
	You are using an incorrect combination of labels and ribbon for your application.	Switch to a different type of media or ribbon to try to find a compatible combination. If necessary, consult your authorized Zebra reseller or distributor for information and advice.
	The printhead is dirty.	Clean the printhead and platen roller. See Cleaning the Printhead and Platen Roller on page 129.
	Incorrect or uneven printhead pressure.	Set the printhead pressure to the minimum needed for good print quality. See Adjusting the Printhead Pressure on page 120.
	The label format is scaling a font that is not scalable.	Check the label format for font issues.
Angled Gray Lines on Blank Labels		
Fine, angular gray lines on blank labels	Wrinkled ribbon.	See wrinkled ribbon causes and solutions in Miscellaneous Issues on page 167.
Missing Print		
Long tracks of missing print on several labels	Print element damaged.	Call a service technician for assistance.
	Wrinkled ribbon.	See wrinkled ribbon causes and solutions in Ribbon Issues on page 161.
Loss of Registration		

Issue	Possible Cause	Recommended Solution
Loss of printing registration on labels Excessive vertical drift in top-of-form registration	The platen roller is dirty.	Clean the printhead and platen roller. See Cleaning the Printhead and Platen Roller on page 129.
	Media guides are positioned improperly.	Ensure that the media guides are properly positioned. See Loading the Media on page 31.
	The media type is set incorrectly.	Set the printer for the correct media type (gap/notch, continuous, or mark).
	The media is loaded incorrectly.	Load media correctly. See Loading the Media on page 31.
Misregistration/skips labels	The printer is not calibrated.	Calibrate the printer. See Calibrating the Ribbon and Media Sensors on page 118.
	Improper label format.	Check your label format, and correct it as necessary.
Misregistration and misprint of one to three labels	The platen roller is dirty.	Clean the printhead and platen roller. See Cleaning the Printhead and Platen Roller on page 129.
	Media does not meet specifications.	Use media that meets specifications. See Media Specifications on page 192.
Vertical drift in top-of-form position	The printer is out of calibration.	Calibrate the printer. See Calibrating the Ribbon and Media Sensors on page 118.
	The platen roller is dirty.	Clean the printhead and platen roller. See Cleaning the Printhead and Platen Roller on page 129.
Horizontal movement in placement of the label image.	The previous labels were torn off incorrectly.	Pull down and to the left when tearing off labels so that the tear-off bar assists in tearing through the label backing. Pulling up or down and to the right can shift the media sideways.
Vertical image or label drift	The printer is using non-continuous labels but is configured in continuous mode.	Set the printer for the correct media type (gap/notch, continuous, or mark) and calibrate the printer, if necessary. See Calibrating the Ribbon and Media Sensors on page 118.
	The media sensor is calibrated improperly.	Calibrate the printer. See Calibrating the Ribbon and Media Sensors on page 118.
	The platen roller is dirty.	Clean the printhead and platen roller. See Cleaning the Printhead and Platen Roller on page 129.
	Improper printhead pressure settings (toggles).	Adjust the printhead pressure to ensure proper functionality. See Adjusting the Printhead Pressure on page 120.

Issue	Possible Cause	Recommended Solution
	The media or ribbon is loaded incorrectly.	Ensure that the media and ribbon are loaded correctly. See Loading the Ribbon on page 62 and Loading the Media on page 31.
	Incompatible media.	You must use media that meets the printer specifications. Ensure that the interlabel gaps or notches are 2 to 4 mm and consistently placed. See Media Specifications on page 192.

Ribbon Issues

For videos of some common procedures, go to zebra.com/zt400.

Issue	Possible Cause	Recommended Solution
Broken Ribbon		
Broken or melted ribbon	Darkness setting too high.	1. Perform the steps in Running the Print Wizard and Printing a Test Label on page 66. 2. If necessary, manually adjust the darkness or print speed settings. • Set the print darkness to the lowest setting that provides good print quality. If you set the darkness too high, the label image may print unclearly, barcodes may not scan correctly, the ribbon may burn through, or the printhead may wear prematurely. • Slower print speeds typically yield better print quality. Access the darkness and print speed settings from the Home screen by touching **Menu** > **Print** > **Print Quality**. 3. Clean the printhead thoroughly. See Cleaning the Printhead and Platen Roller on page 129.
	The ribbon is coated on the wrong side and cannot be used in this printer.	Replace the ribbon with one coated on the correct side. For more information, see Determining the Type of Ribbon to Use on page 61.

Issue	Possible Cause	Recommended Solution
Wrinkled Ribbon		
Wrinkled ribbon	Ribbon was loaded incorrectly.	Load the ribbon correctly. See Loading the Ribbon on page 62.
	Incorrect burn temperature.	**1.** Perform the steps in Running the Print Wizard and Printing a Test Label on page 66. **2.** If necessary, manually adjust the darkness or print speed settings. • Set the print darkness to the lowest setting that provides good print quality. If you set the darkness too high, the label image may print unclearly, barcodes may not scan correctly, the ribbon may burn through, or the printhead may wear prematurely. • Slower print speeds typically yield better print quality. Access the darkness and print speed settings from the Home screen by touching **Menu** > **Print** > **Print Quality**.
	Incorrect or uneven printhead pressure.	Set the printhead pressure to the minimum needed for good print quality. See Adjusting the Printhead Pressure on page 120.
	Media not feeding properly; “walking” from side to side.	Make sure that media is snug by adjusting the media guide, or call a service technician.
	The printhead or platen roller may be installed incorrectly.	Call a service technician.
Ribbon Detection Issues		
The printer does not detect when the ribbon runs out.	The printer may have been calibrated without ribbon or without the ribbon loaded properly.	**1.** Make sure that ribbon is loaded correctly so that it can be detected by the ribbon sensor. Under the printhead, the ribbon should track all the way back, near the printer’s firewall. See Loading the Ribbon on page 62. **2.** Calibrate the printer. See Calibrating the Ribbon and Media Sensors on page 118.
In thermal transfer mode, the printer did not detect the ribbon even though it is loaded correctly.		
The printer indicates that ribbon is out, even though ribbon is loaded correctly.	The printer was not calibrated for the label and ribbon being used.	Calibrate the printer. See Calibrating the Ribbon and Media Sensors on page 118.

RFID Issues

Issue	Possible Cause	Recommended Solution
Printer Stops at RFID Inlay		
The printer stops at the RFID inlay.	The printer calibrated the label length only to the RFID inlay instead of to the interlabel gap.	1. Tap **Menu** > **System** > **Settings**, and then select FEED for the Power Up and Head Close actions. 2. Manually calibrate the printer. See Performing Manual Sensor Calibration on page 119.
Voided Labels		
The printer voids every label.	The printer is not calibrated for the media being used.	Manually calibrate the printer. See Performing Manual Sensor Calibration on page 119.)
	You are using an RFID label with a tag type that is not supported by your printer.	These printers support only Gen 2 RFID labels. For more information, refer to RFID Programming Guide 3, or contact an authorized Zebra RFID reseller.
	The printer is unable to communicate with the RFID reader.	1. Turn off (**O**) the printer. 2. Wait 10 seconds. 3. Turn on (**I**) the printer. 4. If the problem persists, you may have a bad RFID reader or a loose connection between the RFID reader and the printer. Contact Technical Support or an authorized Zebra RFID service technician for assistance.
	Radio frequency (RF) interference from another RF source.	Do one or more of the following as necessary: • Move the printer away from fixed RFID readers or other RF sources. • Make sure that the media door is closed at all times during RFID programming.
	The settings are incorrect in your label designer software.	The software settings override the printer settings. Make sure that the software and printer settings match.

Issue	Possible Cause	Recommended Solution
	You are using an incorrect programming position, particularly if the tags being used are within printer specifications.	Do one or more of the following as necessary: • Check the RFID programming position or the program position setting in your label designer software. If the position is incorrect, change the setting. • Restore the RFID programming position back to the default value. For more information, refer to RFID Programming Guide 3. For transponder placement details, go to zebra.com/transponders.
	You are sending RFID ZPL or SGD commands that are incorrect.	Check your label formats. For more information, refer to RFID Programming Guide 3.
Low yields. Too many RFID tags per roll are voided.	The RFID labels are not within specifications for the printer, which means that the transponder is not in an area that can be programmed consistently.	Make sure that the labels meet transponder placement specifications for your printer. See zebra.com/transponders for transponder placement information. For more information, refer to RFID Programming Guide 3, or contact an authorized Zebra RFID reseller.
	Incorrect read and write power levels.	Change the RFID read and write power levels. For instructions, refer to RFID Programming Guide 3.
	Radio frequency (RF) interference from another RF source.	Do one or more of the following as necessary: • Move the printer away from fixed RFID readers. • Make sure that the media door is closed at all times during RFID programming.
	The printer is using outdated printer firmware and reader firmware versions.	Go to zebra.com/firmware for updated firmware.
Other RFID Issues		

Issue	Possible Cause	Recommended Solution
RFID parameters do not appear in Setup mode, and RFID information does not appear on the printer configuration label. The printer does not void RFID labels that are not programmed correctly.	The printer was powered off (**O**) and then back on (**I**) too quickly for the RFID reader to initialize properly.	Wait at least 10 seconds after turning the printer power off before turning it back on. **1.** Turn off (**O**) the printer. **2.** Wait 10 seconds. **3.** Turn on (**I**) the printer. **4.** Check for the RFID parameters in Setup mode or for RFID information on a new configuration label.
	An incorrect version of printer or reader firmware was loaded on the printer.	**1.** Verify that the correct firmware version is loaded on your printer. For more information, refer to RFID Programming Guide 3. **2.** Download the correct printer or reader firmware if necessary. **3.** If the problem persists, contact Technical Support.
	The printer is unable to communicate with the RFID subsystem.	**1.** Turn off (**O**) the printer. **2.** Wait 10 seconds. **3.** Turn on (**I**) the printer. **4.** If the problem persists, you may have a bad RFID reader or a loose connection between the RFID reader and the printer. Contact Technical Support or an authorized service technician for assistance.
The DATA light flashes indefinitely after you attempt to download printer or reader firmware.	The download was not successful. For optimal results, cycle power on the printer before downloading any firmware.	**1.** Turn off (**O**) the printer. **2.** Wait 10 seconds. **3.** Turn on (**I**) the printer. **4.** Attempt to download the firmware again. **5.** If the problem persists, contact Technical Support.

Communications Issues

Issue	Possible Cause	Recommended Solution
Label Formats Not Recognized		
A label format was sent to the printer but was not recognized. The DATA light does not flash.	The communication parameters are incorrect.	Check the printer driver or software communications settings (if applicable) for your connection. You may wish to reinstall the printer driver following the instructions in Connecting the Printer to a Device on page 13.
A label format was sent to the printer but was not recognized. The DATA light flashes but no printing occurs.	The prefix and delimiter characters set in the printer do not match the ones in the label format.	Verify the prefix and delimiter characters using the following SGD commands. Modify the values if necessary. • `! U1 getvar "zpl.format_prefix"` • `! U1 getvar "zpl.delimiter"`
	Incorrect data is being sent to the printer.	Check the communication settings on the computer. Ensure that they match the printer settings.
		If the problem persists, check the label format.
Labels Stop Printing Correctly		
A label format was sent to the printer. Several labels print, then the printer skips, misplaces, misses, or distorts the image on the label.	The serial communication settings are incorrect.	Ensure that the flow control settings match.
		Check the communication cable length. See Communication Interface Specifications on page 185 for requirements.
		Check the printer driver or software communications settings (if applicable).

Miscellaneous Issues

Issue	Possible Cause	Recommended Solution
Issues with the Display		
The control panel display shows a language that I cannot read	The language parameter was changed through the control panel or a firmware command.	1. On the Home screen, touch **Menu** (the icon on the bottom-left).  2. Touch the top selection on the screen. 3. Scroll through the language selections under this menu option. The selections for this parameter are displayed in the actual languages to make it easier for you to find one that you are able to read. 4. Touch the language that you want to display to select it. 5. Touch the **Home** icon to return to the Home screen.
The display is missing characters or parts of characters	The display may need replacing.	Call a service technician.
The USB Host Port Is Not Acknowledging a USB Device		
The printer is not acknowledging a USB device or is not reading the files on a USB device that is plugged into the USB host port.	The printer currently supports USB drives only up to 1 TB in size.	Use a USB drive that is 1 TB or smaller.
	The USB device may require its own external power.	If your USB device requires external power, make sure that it is plugged into a working power supply.
Printer Parameters Are Not Set As Expected		
Changes in parameter settings did not take effect. OR Some parameters changed unexpectedly.	A firmware setting or command prevented the ability to change the parameter.	Check your label formats or the settings of the software that you use to send formats to the printer. If necessary, refer to the Programming Guide for ZPL, ZBI, Set-Get-Do, Mirror, and WML or call a service technician. A copy of the manual is available at zebra.com/manuals.
	A command in a label format changed the parameter back to the previous setting.	
IP Address Changing		

Issue	Possible Cause	Recommended Solution
My printer reassigns a new IP address to the print server after the printer has been off for a while.	The settings for your network are causing the network to reassign a new IP address.	If the printer changing IP addresses causes issues for you, follow these steps to assign it a static IP address: **1.** Find out what values need to be assigned to the IP address, subnet mask, and gateway for your print server (wired, wireless, or both). **2.** Change the appropriate IP protocol value to PERMANENT. **3.** Change the values for the IP address, subnet mask, and gateway for the appropriate print server to what you want them to remain. **4.** Reset the network by touching **Menu** > **Connections** > **Networks** > **Reset Network** and then touching the checkmark to save the changes.
Cannot Connect through Wired or Wireless Connections		
I manually entered a wireless IP address, subnet, and gateway on my printer, but it won't connect to my wired or wireless network.	The printer's network must be reset after values are changed.	Reset the network by touching **Menu** > **Connections** > **Networks** > **Reset Network** and then touching the checkmark to save the changes.
	An ESSID value has not been specified.	**1.** For a wireless connection, specify the ESSID value that matches the value used by your wireless router using the following Set/Get/Do command: `! U1 setvar "wlan.essid" "value"` where "value" is the ESSID (sometimes called a network SSID) for your router. You can look on the back of your router for a sticker with the router's default information. **NOTE:** If the information has been changed from the default, check with your network administrator for the ESSID value to use. **2.** If the printer still does not connect, reset the network by touching **Menu** > **Connections** > **Networks** > **Reset Network** and then touching the checkmark to save the changes, and then power-cycle the printer.

Issue	Possible Cause	Recommended Solution
	The ESSID or other value was not specified correctly.	1. Print a network configuration label and verify that your values are correct. 2. Make corrections as necessary. 3. Reset the network by touching **Menu** > **Connections** > **Networks** > **Reset Network** and then touching the checkmark to save the changes.
Calibration Issues		
Auto Calibrate failed.	The media or ribbon is loaded incorrectly.	Ensure that the media and ribbon are loaded correctly. See Loading the Ribbon on page 62 and Loading the Media on page 31.
	The sensors could not detect the media or ribbon.	Calibrate the printer manually. See Performing Manual Sensor Calibration on page 119.
	The sensors are dirty or positioned improperly.	Ensure that the sensors are clean and properly positioned.
	The media type is set incorrectly.	Set the printer for the correct media type (gap/notch, continuous, or mark).
Non-continuous labels are being treated as continuous labels.	The printer was not calibrated for the media being used.	Calibrate the printer. See Calibrating the Ribbon and Media Sensors on page 118.
	The printer is configured for continuous media.	Set the printer for the correct media type (gap/notch, continuous, or mark).
Printer Locks Up		
All indicator lights are on, nothing is on the display, and the printer locks up.	Internal electronic or firmware failure.	Power cycle the printer. If the problem persists, call a service technician.
The printer locks up while booting up.	Main logic board failure.	

Servicing the Printer

If you have a problem using the printer, contact your facility's technical or systems support. If there is a problem with the printer, they will contact the Zebra Global Customer Support Center at zebra.com/support.

Gather the following information before contacting Zebra Global Customer Support:

- Serial number of the unit
- Model number or product name
- Firmware version number

Zebra responds to calls by e-mail, telephone, or fax within the time limits set forth in service agreements. If your problem cannot be solved by Zebra Global Customer Support, you may need to return your equipment for servicing and will be given specific directions.

If you purchased your product from a Zebra business partner, please contact that business partner for support.

Shipping the Printer

If you must ship the printer:

1. Turn off (**O**) the printer, and disconnect all cables.
2. Remove any media, ribbon, or loose objects from the printer interior.
3. Close the printhead.
4. Carefully pack the printer into the original container or a suitable alternate container to avoid damage during transit.

   A shipping container can be purchased from Zebra if the original packaging has been lost or destroyed.

NOTE:

Zebra is not responsible for any damages incurred during shipment if an approved shipping container is not used. Shipping the units improperly can possibly void the warranty.

Using a USB Host Port and the Print Touch Feature

The exercises presented here will help you learn how to use a USB host port and the printer's Print Touch feature with an Android™-based NFC-enabled device (such as a smartphone or a tablet).

Some SGD commands are listed as part of these exercises for advanced users.

Items Required for the Exercises

To perform the exercises in this document, you will need:

- a USB Flash drive (sometimes called a "thumb drive" or "memory stick") that is up to 1 Terabyte (1 TB).

NOTE: The printer will not recognize drives larger than 1 TB.

- a USB keyboard
- the various files listed in Files for Completing the Exercises on page 172
- the free Zebra Utilities app for your smartphone (search for Zebra Tech in the Google Play store)

Files for Completing the Exercises

Most of the files you need to complete the exercises in these section are available zebra.com in the form of a .ZIP file located here. Copy these files to your computer before you begin the exercises. Where possible, the contents of the files are shown. Contents of files that include coded content—which cannot be viewed either as text or as an image—are not included.

File 1: ZEBRA.BMP

File 2: SAMPLELABEL.TXT

This simple label format prints the Zebra logo and a line of text at the end of the mirroring exercise.

```
^XA
^FO100,75^XGE:zebra.bmp^FS
^FO100,475^A0N,50,50^FDMirror from USB Completed^FS
^XZ
```

File 3: LOGO.ZPL

File 4: USBSTOREDFILE.ZPL

This label format prints an image and text. This file will be stored on the USB memory device at the root level so that it can be printed.

```
CT~~CD,~CC^~CT~
^XA~TA012~JSN^LT0^LH0,0^JMA^PR4,4~SD15^LRN^CI0^XZ
~DG000.GRF,07680,024,,[image data]
^XA
^LS0
^SL0
^BY3,3,91^FT35,250^BCN,,Y,N^FC%,{,#^FD%d/%m/%Y^FS
^FT608,325^XG000.GRF,1,1^FS
^FT26,75^A0N,28,28^FH\^FDThis label was printed from a format stored^FS
^FT26,125^A0N,28,28^FH\^FDon a USB Flash Memory drive. ^FS
^BY3,3,90^FT33,425^BCN,,Y,N
^FD>:Zebra Technologies^FS
^PQ1,0,1,Y^XZ
^XA^ID000.GRF^FS^XZ
```

File 5: VLS_BONKGRF.ZPL

File 6: VLS_EIFFEL.ZPL

File 7: KEYBOARDINPUT.ZPL

This label format, used for the USB keyboard input exercise, does the following:

- creates a barcode with the current date, based on your Real-Time Clock (RTC) setting
- prints the Zebra logo graphic
- prints fixed text
- ^FN prompts you to enter your name, and the printer prints what you entered

```
^XA
^CI28
^BY2,3,91^FT38,184^BCN,,Y,N^FC%,{,#^FD%d/%m/%Y^FS
^FO385,75^XGE:zebra.bmp^FS
^FT40,70^A0N,28,28^FH\^FDThis label was printed using a keyboard input. ^FS
^FT35,260^A0N,28,28^FH\^FDThis label was printed by:^FS
^FT33,319^A0N,28,28^FN1"Enter Name"^FS
^XZ
```

File 8: SMARTDEVINPUT.ZPL

This is the same label format as the previous label, only with different text printing. This format is used for the smart device input exercise.

```
^XA
^CI28
^BY2,3,91^FT38,184^BCN,,Y,N^FC%,{,#^FD%d/%m/%Y^FS
^FO385,75^XGE:zebra.bmp^FS
^FT40,70^A0N,28,28^FH\^FDThis label was printed using a smart device input.
 ^FS
^FT35,260^A0N,28,28^FH\^FDThis label was printed by:^FS
^FT33,319^A0N,28,28^FN1"Enter Name"^FS
^XZ
```

File 9: Firmware File

You may want to download a firmware file for your printer and copy it to your computer for use during the exercises. You may omit doing this if you wish.

You can download the latest firmware file from zebra.com/firmware.

USB Host

Your printer may be equipped with one or two USB host ports on the front panel. A USB host port allows you to connect USB devices—such as a keyboard, scanner, or USB Flash drive—to the printer. The exercises in this section will teach you how to perform USB mirror, how to transfer files to and from the printer, and how to provide information for which you are prompted and then print a label using that information.

IMPORTANT: When using a USB host port, files should be named only with 1 to 16 alphanumeric characters (A, a, B, b, C, c, ..., 0, 1, 2, 3, ...). Do not use Asian characters, Cyrillic characters, or accented characters in file names.

NOTE: Some functions may not work properly if there are underscores in a file name. Use periods instead.

Exercise 1: Copy Files to a USB Flash Drive and Perform USB Mirror

1. On your USB Flash Drive, create the following:

   - a folder called `Zebra`
   - in that folder, three subfolders:
     - `appl`
     - `commands`
     - `files`
2. In the `/appl` folder, place a copy of the latest firmware for your printer.
3. In the `/files` folder, place the following file:

   File 1: ZEBRA.BMP on page 172
4. In the `/commands` folder, place the following files:
   - File 2: SAMPLELABEL.TXT on page 172
   - File 3: LOGO.ZPL on page 172
5. Insert the USB Flash drive into a USB host port on the front of your printer.
6. Observe the control panel and wait.

   The following should happen:
   - If the firmware on the USB Flash drive is different than what is on the printer, the firmware downloads to the printer. The printer then restarts and prints a printer configuration label. (If there

is no firmware on the USB Flash drive or if the firmware version is the same, the printer skips this action.)

- The printer downloads the files in the `/files` folder and briefly shows the names of the files that are downloading on the display.
- The printer executes any files in the `/commands` folder.
- The printer restarts and then displays this message: `MIRROR PROCESSING FINISHED`

7. Remove the USB Flash drive from the printer.

Advanced User Information	
See the Zebra® Programming Guide for more information about these commands.	
To enable/disable mirroring:	`! U1 setvar "usb.mirror.enable" "value"` Values: `"on"` or `"off"`
To enable/disable automatic mirroring that occurs when a USB Flash drive is inserted into the USB host port:	`! U1 setvar "usb.mirror.auto" "value"` Values: `"on"` or `"off"`
To specify the number of times that the mirror operation will be repeated if it fails:	`! U1 setvar "usb.mirror.error_retry" "value"` Values: `0` to `65535`
To change the path to the location on the USB device from which mirror files are retrieved:	`! U1 setvar "usb.mirror.appl_path" "new_path"` Default: `"zebra/appl"`
To change the path to the location on the printer from which mirror files are retrieved:	`! U1 setvar "usb.mirror.path" "path"` Default: `"zebra"`
To enable/disable the ability to use the USB port:	`! U1 setvar "usb.host.lock_out" "value"` Values: `"on"` or `"off"`

Exercise 2: Print a Label Format from a USB Flash Drive

The Print USB File option allows you to print files from a USB mass storage device, such as a USB Flash drive. Only printable files (`.ZPL` and `.XML`) may be printed from the USB mass storage device, and the files must be located at the root level, not in a directory.

1. Copy the following files to your USB Flash drive:
   - `File 4: USBSTOREDFILE.ZPL` on page 172
   - `File 5: VLS_BONKGRF.ZPL` on page 172
   - `File 6: VLS_EIFFEL.ZPL` on page 172
2. Insert the USB Flash drive into a USB host port on the front of your printer.

3. Tap **Menu** > **Storage** > **USB** > **Print: From USB**.

The printer loads any executable files and processes them. The available files are listed. **SELECT ALL** is available to print all files on the USB Flash drive.

4. Select `USBSTOREDFILE.zpl`.
5. Touch the checkmark to copy the files.

The label prints.

Exercise 3: Copy Files to/from a USB Flash Drive

The Copy USB File option allows you to copy files from a USB mass storage device to the printer's Flash memory E: drive.

1. Copy the following files to the root directory of your USB Flash drive.
   - `File 7: KEYBOARDINPUT.ZPL` `on page 173`
   - `File 8: SMARTDEVINPUT.ZPL` `on page 173`

NOTE: Do not put these files into a subfolder.

2. Insert the USB Flash drive into a USB host port on the front of your printer.

3. Tap **Menu** > **Storage** > **USB** > **Copy: Files to Printer**.

   The printer loads any executable files and processes them. The available files are listed. (If desired, you can use **Select All** to copy all the available files from the USB Flash drive.)

4. Select the files `STOREFMT.ZPL`. and `STOREFMTM1.ZPL`.
5. Touch the checkmark to copy the files.

   The printer stores the files in `E:` memory.

6. Remove the USB Flash drive from the USB host port.

You can now copy these files from the printer to a USB Flash drive by tapping **Menu** > **Storage** > **USB** > **Copy: Files to USB**.

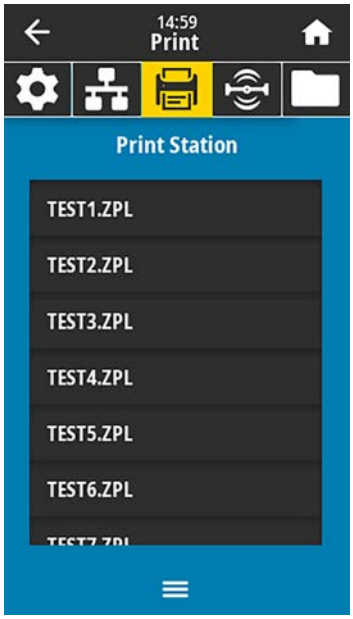
The option **SELECT ALL** is available to store all the available files from the printer to the USB Flash drive. Any `.ZPL` file that is copied will be post-processed so that the contents of the file will be suitable to be sent to a printer for normal execution.

Exercise 4: Enter Data for a Stored File with a USB Keyboard and Print a Label

The Print Station feature allows you to use a USB Human Interface Device (HID), such as a keyboard or a barcode scanner, to enter `^FN` field data into a `*.ZPL` template file.

1. After performing Exercise 3: Copy Files to/from a USB Flash Drive on page 176, plug a USB keyboard into a USB host port.
2. Tap **Menu** > **Print** > **Print Station**.

   The printer loads any executable files and processes them. The available files are listed.



3. Select the file `KEYBOARDINPUT.ZPL`.

   The printer accesses the file and prompts you for the information in the `^FN` fields in the file. In this case, it prompts you for your name.
4. Type your name on the keyboard, and then press **<ENTER>**.

   The printer prompts for the number of labels to print.
5. Specify the desired quantity of labels, then press **<ENTER>** again.

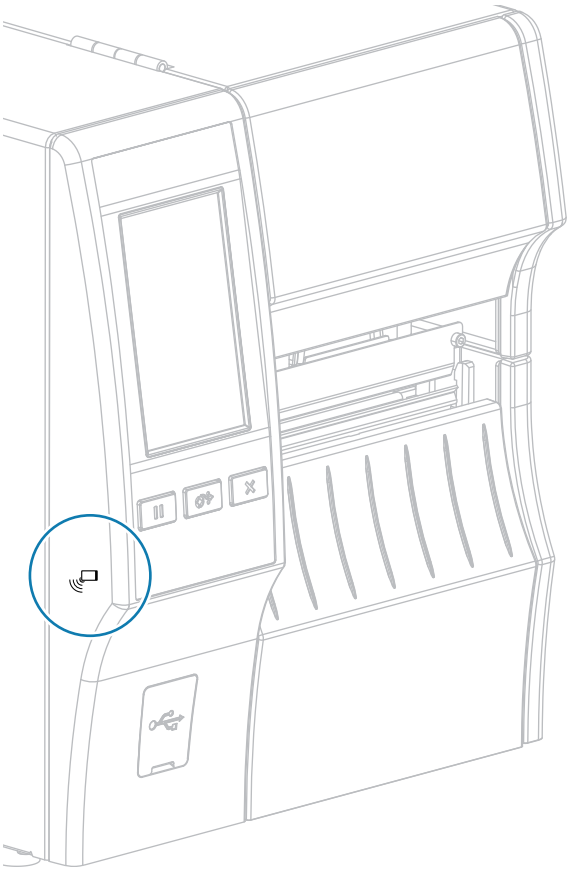
   The specified number of labels is printed, with your name in the appropriate fields.

Print Touch/Near Field Communication (NFC)

The Zebra Print Touch feature allows you to touch an Android™-based, NFC-enabled device (such as a smart phone or tablet) to the printer's NFC logo (Figure 11 NFC Logo Location on page 179) to pair the device to the printer. This capability allows you to use your device to provide information for which you are prompted and then print a label using that information.

IMPORTANT: Some devices may not support NFC communication with the printer until you alter their settings. If you encounter difficulties, consult your service provider or your smart device manufacturer for more information.

Figure 11 NFC Logo Location



Exercise 5: Enter Data for a Stored File with a Smart Device and Print a Label

The steps in this exercise may vary somewhat based on:

- your smart device
- your service provider
- whether you already have the free Zebra Utilities app installed on your smart device.

Refer to the Zebra Bluetooth User Guide for specific instructions for configuring your printer to use a Bluetooth interface. A copy of this manual is available at zebra.com/manuals.

1. If you do not have the Zebra Utilities app installed on your device, go to the app store for your device, search for the Zebra Utilities app, and install it.

2. Pair your smart device with the printer by holding the smart device next to the NFC icon on the printer.

   a) If necessary, access the Bluetooth information about your printer using your smart device. For instructions, refer to the manufacturer's documentation for your device.

   b) If necessary, select the Zebra printer's serial number to pair it with the device.

   c) After your smart device has been detected by the printer, the printer may prompt you to accept or reject the pairing. If necessary, tap **ACCEPT**. Some smart devices will pair with the printer without this prompt.

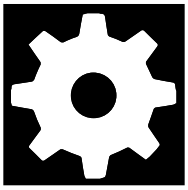
      The printer and your device are paired.

3. Start the Zebra Utilities app on your device.

   The Zebra Utilities main menu displays.

4. Perform these steps if you have an Apple device:

   a) Tap the **Settings** icon in the lower-right corner.



   b) Change the setting for **Get Labels From Printer** to **ON**.

   c) Tap **Done**.

5. Tap **Files**.

   The smart device gets data from the printer and displays it.

NOTE: This retrieval process may take a minute or more to complete.

6. Scroll through the formats shown and select `E:SMARTDEVINPUT.ZPL`.

   Based on the `^FN` field in the label format, the smart device prompts you for your name.
7. Enter your name at the prompt.
8. Change the quantity of labels to print, if desired.
9. Tap **PRINT** to print the label.

Specifications

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

General Specifications

		ZT411	ZT421
Height*		12.8 in.(325 mm)	12.8 in. (325 mm)
Width		10.7 in. (272 mm)	13.2 in. (335 mm)
Depth		19.7 in. (500 mm)	19.7 in. (500 mm)
Weight		36 lb (16 kg)	40 lb (18 kg)
Temperature	Operating	Thermal Transfer: 40°F to 105°F (5° to 40°C) Direct Thermal: 32°F to 105°F (0° to 40°C)	
	Storage	–40°F to 140°F (–40° to 60°C)	
Relative Humidity	Operating	20% to 85%, non-condensing	
	Storage	5% to 85%, non-condensing	
Memory		256 MB RAM (8 MB user available) 512 MB Flash (64 MB user available on-board Flash)	

NOTE:
* Applies to base printer model. Dimensions may vary depending on configuration, such as adding optional rewind.

Power Specifications

The following are typical values. Actual values vary from unit to unit and are affected by such things as the options installed and the printer settings

	ZT411	ZT421
Electrical	100–240 VAC, 50-60 Hz	
Power consumption	120 VAC, 60 Hz	
Inrush Current	< 35A peak8A RMS (half cycle)	< 40A peak8A RMS (half cycle)
Energy Star Off Power (W)	0.08	0.08
Energy Star Sleep Power (W)	4.14	4.14
Print Power* (W)	98	215
Print Power* (VA)	108	261
Power consumption	230 VAC, 50 Hz	
Inrush Current	< 80A peak12A RMS (half cycle)	< 90A peak15A RMS (half cycle)
Energy Star Off Power (W)	0.18	0.18
Energy Star Sleep Power (W)	4.26	4.26
Print Power* (W)	97	209
Print Power* (VA)	127	261

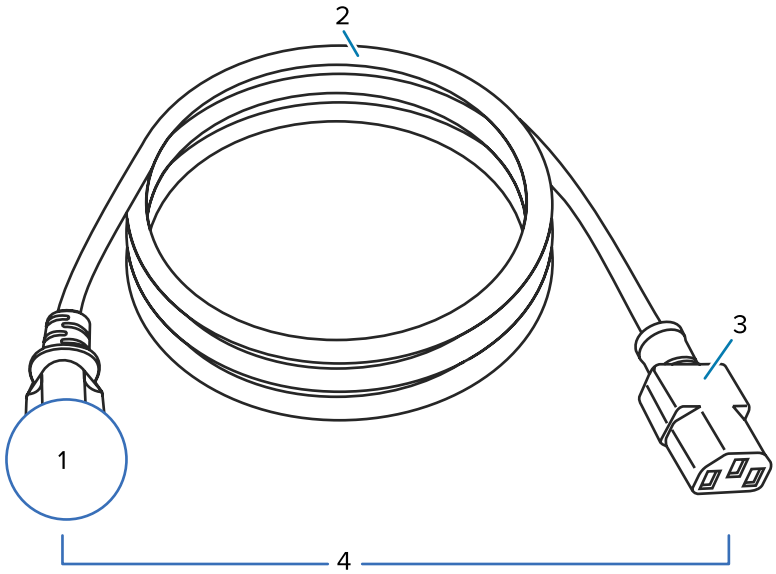
NOTE: * Printing Pause self test labels at 6 ips with 4x6-in. or 6.5x4 in. labels, darkness 10, and direct thermal media.

Power Cord Specifications

Depending on how your printer was ordered, a power cord may or may not be included. If one is not included, or if the one that is included is not suitable for your requirements, see Figure 12 Power Cord Specifications on page 184.

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

Figure 12 Power Cord Specifications

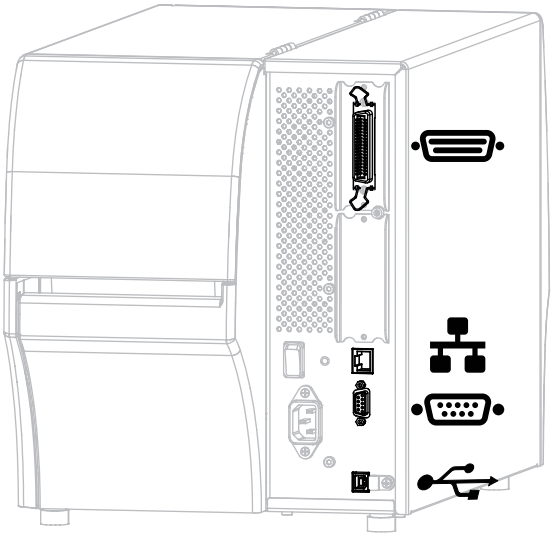


1	AC power plug for your country—This should bear the certification mark of at least one of the known international safety organizations (see Figure 13 International Safety Organization Certification Symbols on page 184). The chassis ground (earth) must be connected to ensure safety and reduce electromagnetic interference.
2	3-conductor HAR cable or other cable approved for your country.
3	IEC 320 connector—This should bear the certification mark of at least one of the known international safety organizations (see Figure 13 International Safety Organization Certification Symbols on page 184).
4	Length ≤ 9.8 ft. (3 m). Rating 10 Amp, 250 VAC.

Figure 13 International Safety Organization Certification Symbols

Communication Interface Specifications

Figure 14 Location of Communication Interfaces



	Parallel port		Internal wired Ethernet print server
	Serial port		USB port

NOTE: You must supply all data cables for your application. The use of cable strain relief clamps is recommended.

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

To minimize electrical noise pickup in the cable:

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

Standard Connections

The ZT411/ZT421 printers support a variety of standard connections.

Bluetooth® Version 5.1

This feature is available only on certain models. To determine if your printer includes this feature, look at the part number sticker inside the media compartment. It is usually located below the media hanger.

The part number follows this format:

`Part Number: ZTxxxxx – Xxxxxxxx`

If the ending string of the part number (Xxxxxxxx) begins with the letter P, your printer does NOT include this feature.

Limitations and requirements	Many mobile devices can communicate with the printer within a 30-foot radius of the printer.
Connections and configuration	Refer to the Zebra Bluetooth User Guide for specific instructions for configuring your printer to use a Bluetooth interface. This manual is available at zebra.com/manuals.

Two USB Host Ports

This feature is available only on certain models. To determine if your printer includes this feature, look at the part number sticker inside the media compartment. It is usually located below the media hanger.

The part number follows this format:

`Part Number: ZTxxxxx – Xxxxxxxx`

If the ending string of the part number (Xxxxxxxx) begins with the letter P, your printer does NOT include this feature.

Limitations and requirements	You can plug only one device into each of the printer's two USB host ports. You cannot use a third device by plugging it into a USB port on one of the devices, nor can you use an adapter to split a USB host port on the printer to accept more than one device at a time.
Connections and configuration	No additional configuration is necessary.

Zebra PrintTouch/Near Field Communication (NFC)

This feature is available only on certain models. To determine if your printer includes this feature, look at the part number sticker inside the media compartment. It is usually located below the media hanger.

The part number follows this format:

`Part Number: ZTxxxxx – Xxxxxxxx`

If the ending string of the part number (Xxxxxxxx) begins with the letter P, your printer does NOT include this feature.

Limitations and requirements	NFC communication must be initiated by touching your device to the appropriate location on the printer.
Connections and configuration	Some devices may not support NFC communication with the printer until you alter their settings.

USB 2.0 Data Interface

Limitations and requirements	A maximum cable length of 16.4 ft (5 m).
Connections and configuration	No additional configuration is necessary.

Wired 10/100 Internal Ethernet Print Server

Limitations and requirements	• The printer must be configured to use your LAN. • A second wired print server can be installed in the bottom option slot.
Connections and configuration	Refer to the ZebraNet Wired and Wireless Print Servers User Guide for configuration instructions. This manual is available at zebra.com/manuals.

RS-232/C Serial Data Interface

Specifications	• 2400 to 115000 baud • parity, bits/character • 7 or 8 data bit • XON-XOFF, RTS/CTS, or DTR/DSR handshake protocol required • 750mA at 5 V from pins 1 and 9
Limitations and requirements	You must use a null-modem cable to connect to the printer or a null-modem adapter if using a standard modem cable. • Maximum cable length of 50 ft (15.24 m). • You may need to change printer parameters to match the host computer.
Connections and configuration	The baud rate, number of data and stop bits, the parity, and the XON/XOFF or DTR control must match those of the host computer.

Optional Connections

The ZT411/ZT421 printers support these connectivity options.

Wireless print server

Specifications	See Wireless Specifications on page 189 for details.
Limitations and requirements	• Can print to the printer from any computer on your Wireless Local Area Network (WLAN). • Can communicate with the printer through the printer's web pages. • The printer must be configured to use your WLAN. • Can be installed only in the top option slot.
Connections and configuration	Refer to the ZebraNet Wired and Wireless Print Servers User Guide for configuration instructions. A copy of this manual is available at zebra.com/manuals.

IEEE 1284 Bidirectional Parallel data interface

Limitations and requirements	• Maximum cable length of 10 ft, (3 m). • Recommended cable length of 6 ft. (1.83 m). • No printer parameter changes required to match the host computer. • Can be installed in either the top or bottom option slot. • An IEEE 1284 cable is required.
Connections and configuration	No additional configuration is necessary.

Applicator interface

Requirements	Must have a DB15F connector.

External ZebraNet 10/100 Print Server

Requirements	Must have the parallel data interface option.

Wireless Specifications

Antenna Information

Type

- Omni directional antenna gain 3dBi @ 2.4GHz; 5dBi @ 5GHz
- PCBA antenna gain = –36dBi @ 900MHz

WLAN Specifications

2.4 Wi-Fi: 20dBm EIRP
5 GHz Wi-Fi: 20dBm EIRP
Bluetooth: 15dBm EIRP
RFID: Conducted Power is 28.11dBm

Printing Specifications

	ZT411	ZT421
Print resolution	203 dpi (dots/in.)/8 dots/mm	203 dpi (dots/in.) 8 dots/mm
	300 dpi/12 dots/mm	300 dpi 12 dots/mm

		ZT411	ZT421
		600 dpi/24 dots/mm	N/A
Maximum print width	203 dpi	4.09 in. (104 mm)	6.6 in. (168 mm)
	300 dpi	4.09 in. (104 mm)	6.6 in. (168 mm)
	600 dpi	4.09 in. (104 mm)	N/A
Programmable constant print speeds	203 dpi	2.4 in. to 14 in. (61 mm to 356 mm) per second in 1-in. (25.4 mm) increments	2.4 in. to 12 in. (61 mm to 305 mm) per second in 1-in. (25.4 mm) increments
	300 dpi	2.4 in. to 10 in. (61 mm to 254 mm) per second in 1-in. (25.4 mm) increments	2.4 in. to 10 in. (61 mm to 203 mm) per second in 1-in. (25.4 mm) increments
	600 dpi	1.5 in. to 4 in. (38 mm to 102 mm) per second in 1-in. (25.4 mm) increments	N/A
Dot size (nominal) (width x length)	203 dpi	0.0049 in. x 0.0049 in. (0.125 mm x 0.125 mm)	0.0049 in. x 0.0049 in. (0.125 mm x 0.125 mm)
	300 dpi	0.0033 in. x 0.0039 in. (0.084 mm x 0.099 mm)	0.0033 in. x 0.0039 in. (0.084 mm x 0.099 mm)
	600 dpi	0.0016 in. x 0.0016 in. (0.042 mm x 0.042 mm)	N/A
First dot location (measured from the inside edge of the media)	203 dpi	0.14 in. ±0.05 in. (3.5 mm ±1.25 mm)	0.10 in. ±0.035 in. (2.5 mm ±0.9mm)
	300 dpi	0.08 in. ±0.05 in. (2.1 mm ±1.25 mm)	0.10 in. ±0.035 in. (2.5 mm ±0.9mm)
	600 dpi	0.08 in. ±0.05 in. (2.1 mm ±1.25 mm)	N/A
Barcode modulus (X) dimension			
Picket fence (nonrotated) orientation	203 dpi	4.9 mil to 49 mil	5 mil to 50 mil
	300 dpi	3.3 mil to 33 mil	3.3 mil to 33 mil
	600 dpi	1.6 mil to 16 mil	N/A
Ladder (rotated) orientation	203 dpi	4.9 mil to 49 mil	5 mil to 50 mil
	300 dpi	3.9 mil to 39 mil	3.9 mil to 39 mil
	600 dpi	1.6 mil to 16 mil	N/A
Vertical registration	all print speeds and dpi	±1.0 mm	±1.0 mm

Media Specifications

			ZT411	ZT421
Label length	Minimum	Non-RFID		
		Tear-off	0.5 in. (12.7 mm)	0.5 in. (12.7 mm)
		Peel-off	0.5 in (12.7 mm)	0.5 in (12.7 mm)
		Rewind	0.5 in. (12.7 mm)	0.5 in. (12.7 mm)
		Cutter	1.0 in. (25.4 mm)	1.0 in. (25.4 mm)
		RFID	Varies for each transponder type	
	Maximum	200 or 300 dpi	39 in. (991 mm)	39 in. (991 mm)
		600 dpi	20 in. (508 mm)	N/A
Maximum continuous media print length		200 dpi	157 in. (3988 mm)	102 in. (2590 mm)
		300 dpi	73 in. (1854 mm)	45 in. (1143 mm)
		600 dpi	39 in. (991 mm)	N/A
Label width	Minimum	Non-RFID	1.0 in. (25.4 mm)	2 in. (51 mm)
		RFID	Varies for each transponder type	
	Maximum	Tear/Cutter	4.5 in. (114 mm)	7.0 in. (178 mm)
		Peel/Rewind	4.25 in. (108 mm)	6.75 in. (171 mm)
Total thickness (includes liner, if any)		Minimum	0.0023 in. (0.058 mm)	0.0023 in. (0.058 mm)
		Maximum	0.010 in. (0.25 mm)	
Maximum roll outside diameter			8 in. (203 mm) -- on a 3-in. (76-mm) inside diameter core	
Inter-label gap		Minimum	0.079 in. (2 mm)	
		Preferred	0.118 in. (3 mm)	
		Maximum	0.157 in. (4 mm)	
Ticket/tag notch size (width x length)			0.25 in. x 0.12 in. (6 mm x 3 mm)	
Hole diameter			0.125 in. (3.18 mm)	
Notch or hole position (centered from inner media edge)		Minimum	0.15 in. (3.8 mm)	
		Maximum	2.25 in. (57 mm)	3.5 in. (90 mm)
Density, in Optical Density Units (ODU) (black mark)			> 1.0 ODU	
Maximum media density			≤ 0.5 ODU	
Transmissive media sensor (fixed position)			7/16 in. (11 mm) from inside edge	

Ribbon Specifications

Standard printers use ribbon that is coated on the outside. An optional ribbon spindle is available to use ribbon that is coated on the inside. Contact your authorized Zebra reseller for ordering information.

	ZT411	ZT421
Ribbon width MINIMUM*	2 in.** (51 mm**)	2 in.** (51 mm**)
Ribbon width MAXIMUM	4.33 in. (110 mm)	6.85 in. (174 mm)
Ribbon length MAXIUMUM	1476 ft (450 m)	
Ribbon core inside diameter	1 in. (25 mm)	
Ribbon roll outside diameter MAXIMUM	3.2 in. (81.3 mm)	

NOTE:

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

** Depending on your application, you may be able to use ribbon narrower than 2 in. (51 mm), as long as the ribbon is wider than the media being used. To use a narrower ribbon, test the ribbon's performance with your media to assure that you get the desired results.

Glossary

alphanumeric

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

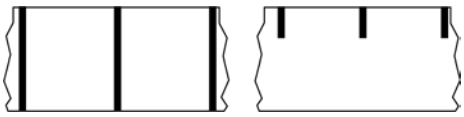
backfeed

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

barcode

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

black mark media



Media with registration marks found on the underside of the print media that act as start-of-label indications for the printer. The reflective media sensor is typically the preferred choice for use with black mark media.

Contrast this with continuous media on page 195 or gap/notch media on page 197.

calibration (of a printer)

A process in which the printer determines some basic information needed to print accurately with a particular media on page 198 and ribbon on page 200 combination. To do this, the printer feeds some media and ribbon (if used) through the printer and senses whether to use the direct thermal on page 196 or thermal transfer on page 202 print method, and (if using non-continuous media on page 199) the length of individual labels or tags.

collection method

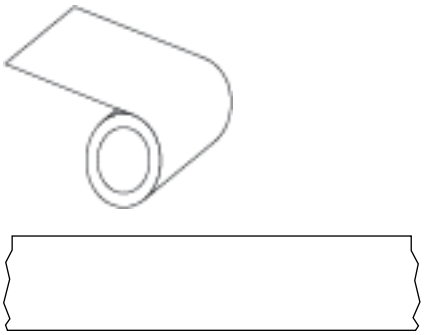
Select a media collection method that is compatible with your printer options. Selections include tear-off, peel-off, cutter, and rewind. The basic media and ribbon loading instructions are the same for all collection methods with some additional steps necessary for using any media collection options.

configuration

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

continuous media

Label or tag-stock media that does not have gaps, holes, notches, or black marks to indicate label separations. The media is one long piece of material wound into a roll. This allows the image to be printed anywhere on the label. Sometimes a cutter is used to cut apart individual labels or receipts.



Contrast this with black mark media on page 194 or gap/notch media on page 197.

core diameter

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

diagnostics

Information about which printer functions are not working that is used for troubleshooting printer problems.

die-cut media

A type of label stock that has individual labels stuck to a media liner. The labels may be lined up against each other or separated by a small distance. Typically the material surrounding the labels has been removed. (See non-continuous media on page 199.)

direct thermal

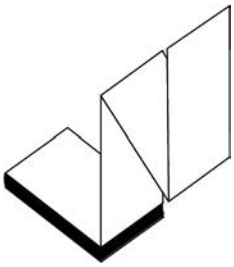
A printing method in which the printhead presses directly against the media. Heating the printhead elements causes a discoloration of the heat-sensitive coating on the media. By selectively heating the printhead elements as the media moves past, an image is printed onto the media. No ribbon is used with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

Contrast this with thermal transfer on page 202.

direct thermal media

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

fanfold media



Non-continuous media that comes folded in a rectangular stack. Fanfold media is either gap/notch media on page 197 or black mark media on page 194.

Contrast this with roll media on page 201.

firmware

This is the term used to specify the printer's operating program. This program is downloaded to the printer from a host computer and stored in FLASH memory on page 196. Each time the printer power is turned on, this operating program starts. This program controls when to feed the media on page 198 forward or backward and when to print a dot on the label stock.

FLASH memory

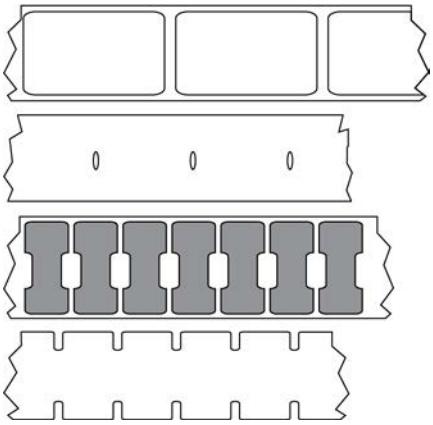
Non-volatile memory that maintains the stored information intact when power is off. This memory area is used to store the printer's operating program. Can also be used to store optional printer fonts, graphic formats, and complete label formats.

font

A complete set of alphanumeric on page 194 characters in one style of type. Examples include CG Times™, CG Triumvirate Bold Condensed™.

gap/notch media

Media that contains a separation, notch, or hole, indicating where one label/printed format ends and the next begins.



Contrast this with black mark media on page 194 or continuous media on page 195.

ips (inches-per-second)

The speed at which the label or tag is printed. Many Zebra printers can print from 1 ips to 14 ips.

label

An adhesive-backed piece of paper, plastic, or other material on which information is printed. A non-continuous label has a defined length, as opposed to a continuous label or a receipt which can have a varying length.

label backing (liner)

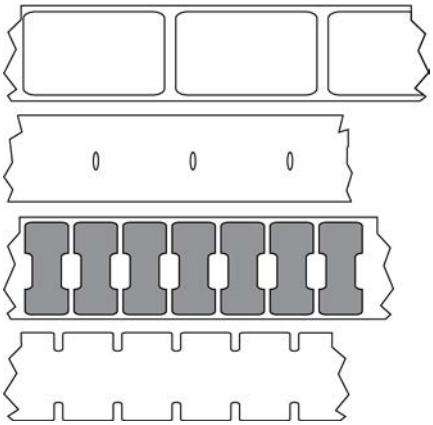
The material on which labels are affixed during manufacture and which is discarded or recycled.

label type

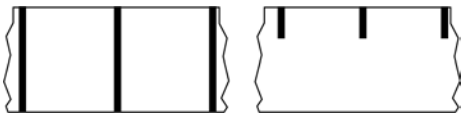
The printer recognizes the following label types.

Continuous

Gap/Notch



Mark



LED (light emitting diode)

Indicators of specific printer status conditions. Each LED is either off, on, or blinking depending on the feature being monitored.

linerless media

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

LCD (liquid crystal display)

A backlit display that provides the user with either operating status during normal operation or option menus when configuring the printer to a specific application.

mark media

See black mark media on page 194.

media

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

media sensor

This sensor is located behind the printhead to detect the presence of media and, for non-continuous media on page 199, the position of the web, hole, or notch used to indicate the start of each label.

media supply hangar

The stationary arm that supports the media roll.

non-continuous media

Media that contains an indication of where one label/printed format ends and the next one begins. Gap/notch media and black mark media on page 194 are types of non-continuous media. Contrast this with continuous media on page 195.

non-volatile memory

Electronic memory that retains data even when the power to the printer 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 printer. This is typically a heavier, cardboard-like material that is either cut or torn away from the next tag. See gap/notch media on page 197.

peel-off mode

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

perforated media

Media with perforations that allow the labels or tags to be separated from each other easily. The media may also have black marks or other separations between labels or tags.

print speed

The speed at which printing occurs. For thermal transfer printers, this speed is expressed in terms of ips (inches-per-second) on page 197.

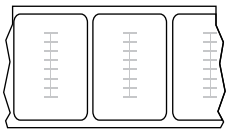
print type

The print type specifies whether the type of media on page 198 being used requires ribbon on page 200 to print. thermal transfer on page 202 media requires ribbon while direct thermal on page 196 media does not.

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 on page 202 printing method, use ribbon on page 200 that is as wide or wider than the media to protect the printhead from the rough media surface.

Radio frequency identification (RFID) "smart" media



Each RFID label has an RFID transponder (sometimes called an "inlay"), made of a chip and an antenna, embedded between the label and the liner. The shape of the transponder varies by manufacturer and is visible through the label. All "smart" labels have memory that can be read, and many have memory that can be encoded.

RFID media can be used in a printer that is equipped with an RFID reader/encoder. RFID labels are made from the same materials and adhesives as non-RFID labels.

receipt

A receipt is a variable length printout. One example of a receipt is in retail stores, where each purchased item occupies a separate line on the printout. Therefore, the more items purchased, the longer the receipt.

registration

Alignment of printing with respect to the top (vertical) or sides (horizontal) of a label or tag.

ribbon

Ribbon is a thin film that is coated on one side with wax, resin, or wax resin (usually called ink), which is transferred to the media during the thermal transfer process. Ink is transferred onto the media when heated by the small elements within the printhead.

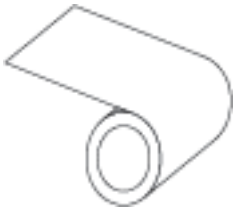
Ribbon is only used with the thermal transfer print method. Direct thermal media does not use ribbon. When ribbon is used, it must be as wide as or wider than the media being used. If the ribbon is narrower than the media, areas of the printhead are unprotected and subject to premature wear. Zebra ribbons have a coating on the back that protects the printhead from wear.

ribbon wrinkle

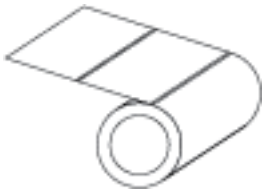
A wrinkling of the ribbon caused by improper alignment or improper printhead pressure. This wrinkle can cause voids in the print and/or the used ribbon to rewind unevenly. This condition should be corrected by performing adjustment procedures.

roll media

Media that comes supplied rolled onto a core (usually cardboard). It can be continuous (no separations between labels)



or non-continuous (some type of separation between labels).



Contrast this with fanfold media on page 196.

supplies

A general term for media and ribbon.

symbology

The term generally used when referring to a barcode.

tag stock

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 and are typically perforated between tags. Tag stock can come on rolls or in a fanfold stack. (See gap/notch media on page 197.)

tear-off mode

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

thermal transfer

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

Contrast this with direct thermal on page 196.

void

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

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Énoncé d'exposition aux rayonnements: Cet équipement est conforme aux limites d'exposition aux rayonnements ioniques RSS-102 Pour un environnement incontrôlé. Cet équipement doit être installé et utilisé avec un Distance minimale de 20 cm entre le radiateur et votre corps.

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The end product must be labeled, in a visible area, with the following:
Contains IC: 3798B-WYSBHVDXP
Contains IC: 109AN-RE40

Operation in the band 5150–5350 MHz is only for indoor use
Les opérations dans la bande 5150-5350 MHz sont uniquement destinées à une utilisation à l'intérieur des bâtiments.

FCC Compliance Statement (USA)
This device complies with FCC rule. Operation is subject to the following two conditions:
1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with Class B Digital Devices, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the product manuals, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, the user is encouraged to employ one or more of the following measures:
- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced RF service technician for help

The end product must be labeled, in a visible area, with the following:
Contains FCC ID: I28-WYSBHVDXP
Contains FCC ID: UZ7RE40

Modification Warning
The user is cautioned that any changes or modifications not expressly approved by Zebra Technologies could void the user's authority to operate the equipment. To ensure compliance, this printer must be used with fully shielded communication cables.

RF Exposure Statement
This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. End users must follow the specific operating instructions for satisfying RF exposure compliance. This transmitter must be at least 20 cm from the user and must not be co-located or operating in conjunction with any other antenna or transmitter.