



# **Zebra® GC420d™**

Desktop Thermal Printer

## **User Guide**





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

## FCC Compliance Statement

This device complies with Part 15 rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for Class 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 do one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into 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.

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For more information, please see our website at:

**Web address:** [www.zebra.com/environment](http://www.zebra.com/environment)

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# About This Document



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

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## Who Should Use This Document

This User Guide is intended for use by any person who needs to operate or to troubleshoot problems with the printer.

## How This Document Is Organized

The User Guide is set up as follows:

Section	Description
<i>Introduction on page 1</i>	This section describes what you get in your shipping box and provides an overview of printer features. This section also has procedures that describe how to open and close the printer and report any problems.
<i>Getting Started on page 9</i>	This section describes how to set up your printer for the first time and use the most common operating procedures for loading media.
<i>Print Operations on page 25</i>	This section provides media and print handling, font and language support, and the set up of less common printer configurations.
<i>Printer Options on page 39</i>	This section covers the common printer options and accessories with brief descriptions and how to get you started using or configuring your printer option or accessory.
<i>Maintenance on page 47</i>	This section provides routine cleaning and maintenance procedures.
<i>Troubleshooting on page 59</i>	This section provides information about printer error reporting that you might need for printer troubleshooting. Assorted diagnostic tests are included.
<i>Appendix: Interface Wiring on page 73</i>	This section provides additional interface information and wiring diagrams to assist with printer to host system integration (typically a PC).
<i>Appendix: Dimensions on page 77</i>	This section provides external printer dimensions for the standard printer and printer with options.
<i>Appendix: ZPL Configuration on page 81</i>	This section briefly covers printer configuration and includes a cross-reference to ZPL printer configuration commands.

# Contacts

Technical Support via the Internet is available 24 hours per day, 365 days per year.

**Web Site:** [www.zebra.com](http://www.zebra.com)

**E-mail Back Technical Library:**

E-mail address: [emb@zebra.com](mailto:emb@zebra.com)

Subject line: Emailist

**Self Service Knowledge Base:** [www.zebra.com/knowledgebase](http://www.zebra.com/knowledgebase)

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<b>Customer Service Department (US)</b> <b>Internal Sales Department (UK)</b> For printers, parts, media, and ribbon, please call your distributor or contact us.	T: +1 877 ASK ZEBRA (275 9327) E: <a href="mailto:clientcare@zebra.com">clientcare@zebra.com</a>	T: +44 (0) 1628 556032 F: +44 (0) 1628 556001 E: <a href="mailto:cseurope@zebra.com">cseurope@zebra.com</a>	T: +65 6858 0722 F: +65 6885 0836 E: China: <a href="mailto:order-csr@zebra.com">order-csr@zebra.com</a> <i>All other areas:</i> <a href="mailto:csasiapacific@zebra.com">csasiapacific@zebra.com</a>

**Key:** T: Telephone  
F: Facsimile  
E: E-mail

## Document Conventions

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

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

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

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

### Icons Used



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

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**Caution** • Warns you of a potential electric shock situation.

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

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

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**Caution** • (No icon) Advises you that failure to take or avoid a specific action could result in physical harm to the hardware.

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



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



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



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**Notes •** \_\_\_\_\_

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# Introduction

This section describes what you get in your shipping box and provides an overview of printer features. This includes procedures that describe how to open and close the printer and report any problems.

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## GC420d™ Thermal Printers

The Zebra® GC420d™ model is the best value in a desktop thermal printer. The GC420d™ printer provides direct thermal printing at speeds up to 4 ips (inches per second) at a 203 dpi (dots per inch) print density. The GC420d™ supports both ZPL™ and EPL™ Zebra printer programming languages and a wide variety of interface and feature options.

The GC420 printers feature:

- Automatic printer language detection and switching between ZPL and EPL programming and label formats.
- OpenAccess™ design for simplified media loading.
- Color-coded operator controls and media guides.
- Zebra™ Global Printing Solution – supports Microsoft Windows keyboard encoding (and ANSI), Unicode UTF-8 and UTF 16 (Unicode Transformation Formats), XML, ASCII (7 and 8 bit used by legacy programs and systems), basic single and double byte font encoding, Hexadecimal encoding, and custom character maps (DAT table creation, font linking, and character remapping).
- Improved printer performance: faster print speeds and a 32-bit processor.
- A complete suite of free software applications and drivers to configure printer settings, design and print labels and receipts, get printer status, import graphics and fonts, send programming commands, update firmware, and download files. Clone printer settings and send graphics, files, fonts, and firmware (updates) to one or more Zebra® Ethernet and locally connected printers with ZebraNet™ Bridge.
- Maintenance reporting enabled and customizable by the user.
- The GC420 direct thermal printer models also include support for Line Mode printing to support EPL1 legacy programming based printing applications.

The GC420 printers offer these basic printer options:

- Label Dispense (Peel-Off).
- Zebra® ZBI 2.0™ (Zebra BASIC Interpreter) programming language. ZBI™ allows you to create custom printer operations that can automate processes, use peripherals (i.e. scanners, scales, keyboards, Zebra® KDU or KDU Plus™, etc.) all without being attached to a PC or network.

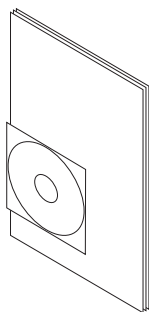
This user's guide provides all the information you need to operate your printer on a daily basis. To create label formats, refer to your programming guides or label design applications such as ZebraDesigner™.

Your printer, when connected to a host computer, functions as a complete system for printing labels and tags.

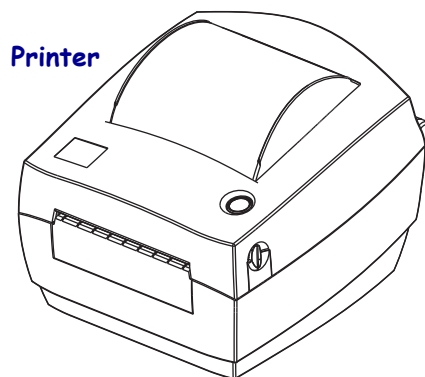
**Note** • Many printer settings may also be controlled by your printer's driver or label design software. Refer to the driver or software documentation for more information.

## What's in the Box?

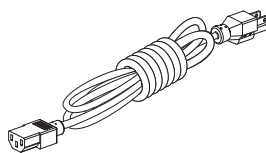
Save the carton and all packing materials in case you need to ship or store the printer later. After unpacking, make sure you have all parts. Follow the procedures for inspecting the printer to familiarize yourself with printer parts so you can follow the instructions in this book.



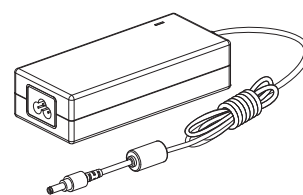
**Documentation  
and Software**



**Printer**



**Power Cord  
varies by locale or region**



**Power  
Supply**

## Unpack and Inspect the Printer

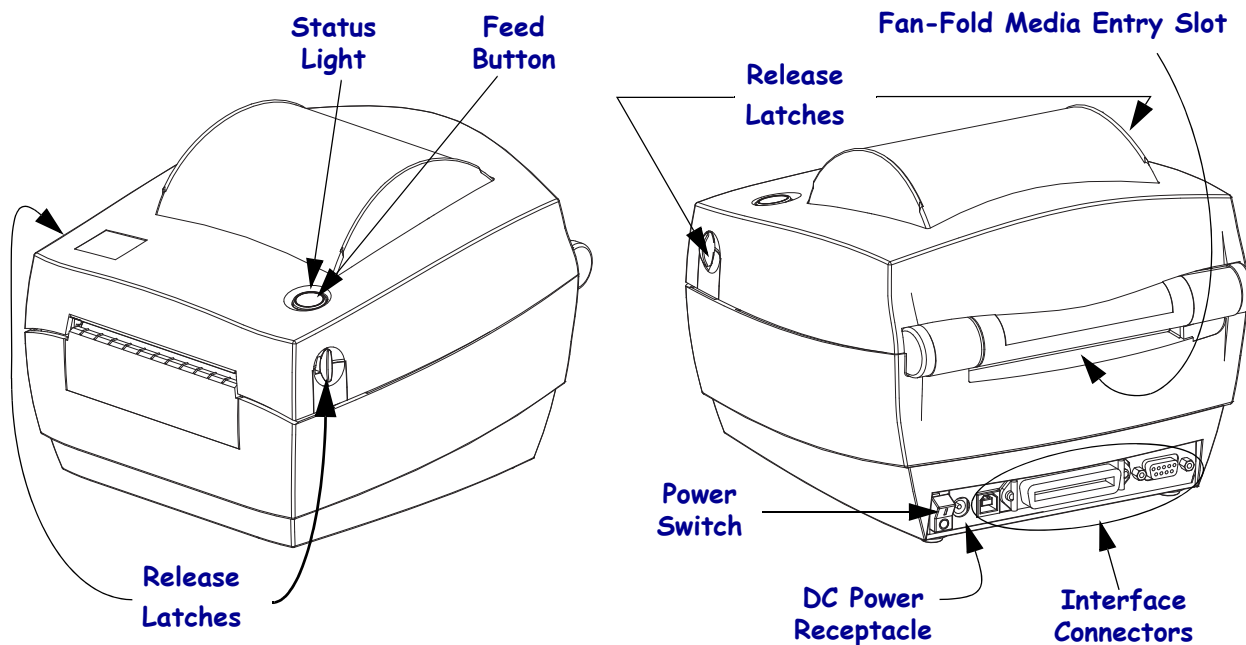
When you receive the printer, immediately unpack it and inspect for shipping damage.

- Save all packing materials.
- Check all exterior surfaces for damage.
- Open the printer and inspect the media compartment for damage to components.

If you discover shipping damage upon inspection:

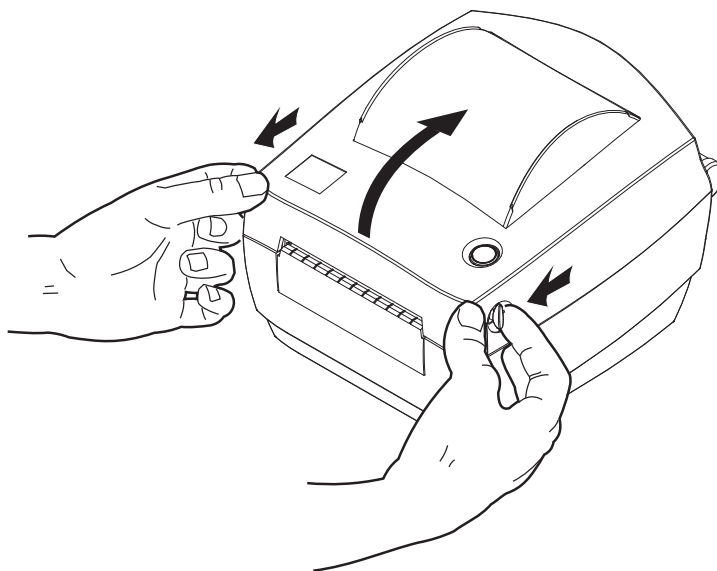
- Immediately notify the shipping company and file a damage report. Zebra Technologies Corporation is not responsible for any damage to the printer incurred during shipment, and will not cover the repair of this damage under its warranty policy.
- Keep all packaging material for shipping company inspection.
- Notify your authorized Zebra<sup>®</sup> reseller.

## Your Printer



## Opening the printer

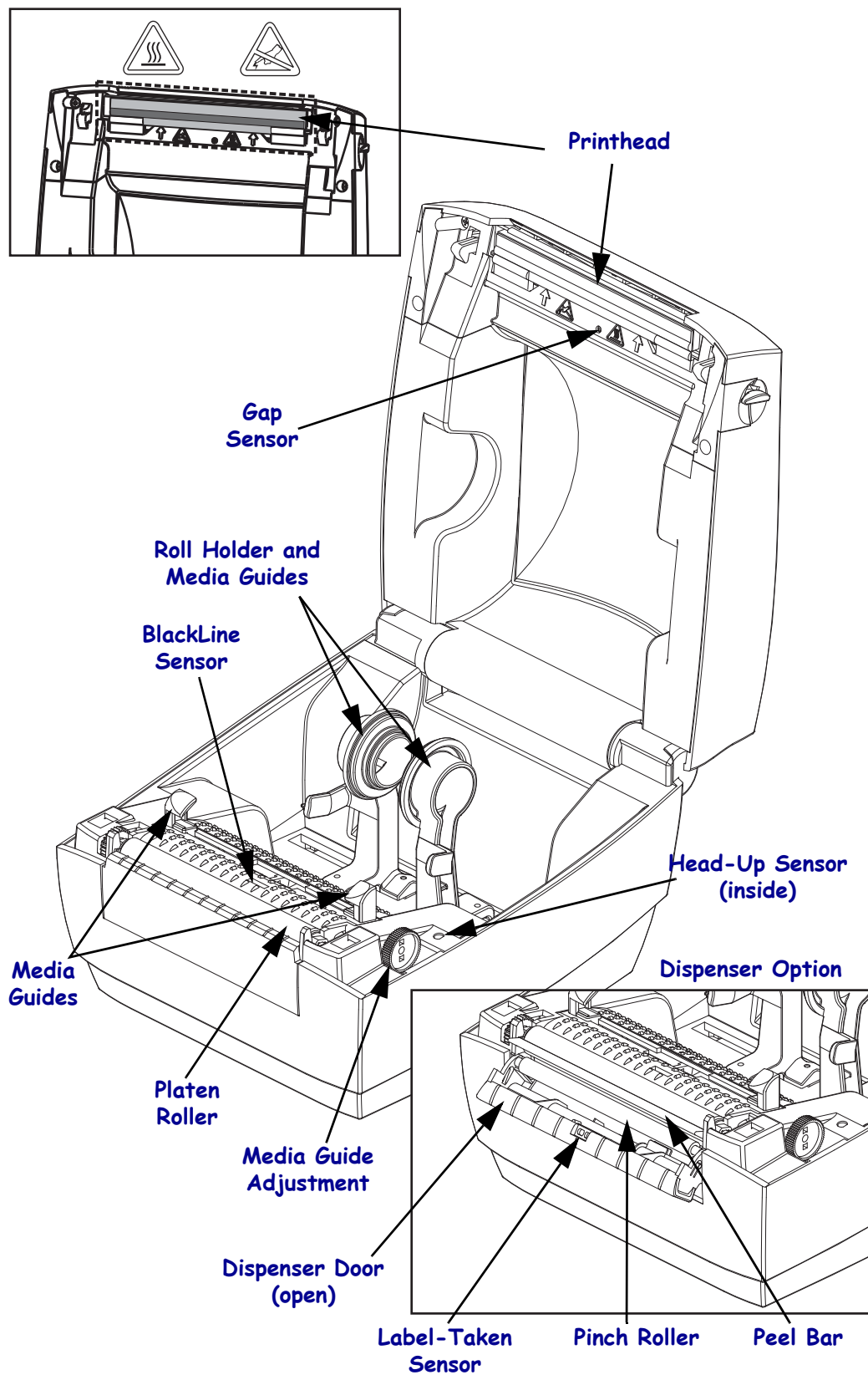
To access the media compartment, you must open the printer. Pull the release latches towards you and lift the cover. Check the media compartment for loose or damaged components.



**Caution** • The discharge of electrostatic energy that accumulates on the surface of the human body or other surfaces can damage or destroy the printhead or electronic components used in this device. You must observe static-safe procedures when working with the printhead or the electronic components under the top cover.



## Printer Features



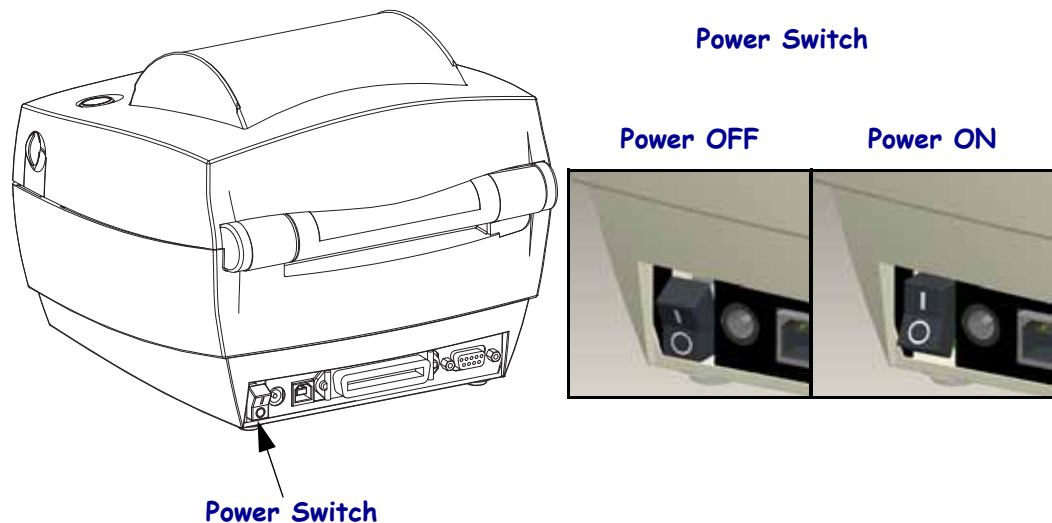
## Operator Controls

### Power Switch

Press *up* to turn **ON** or *down* to turn **OFF** the printer.



**Caution** • The printer power should be turned off before connecting or disconnecting the communications and power cables.

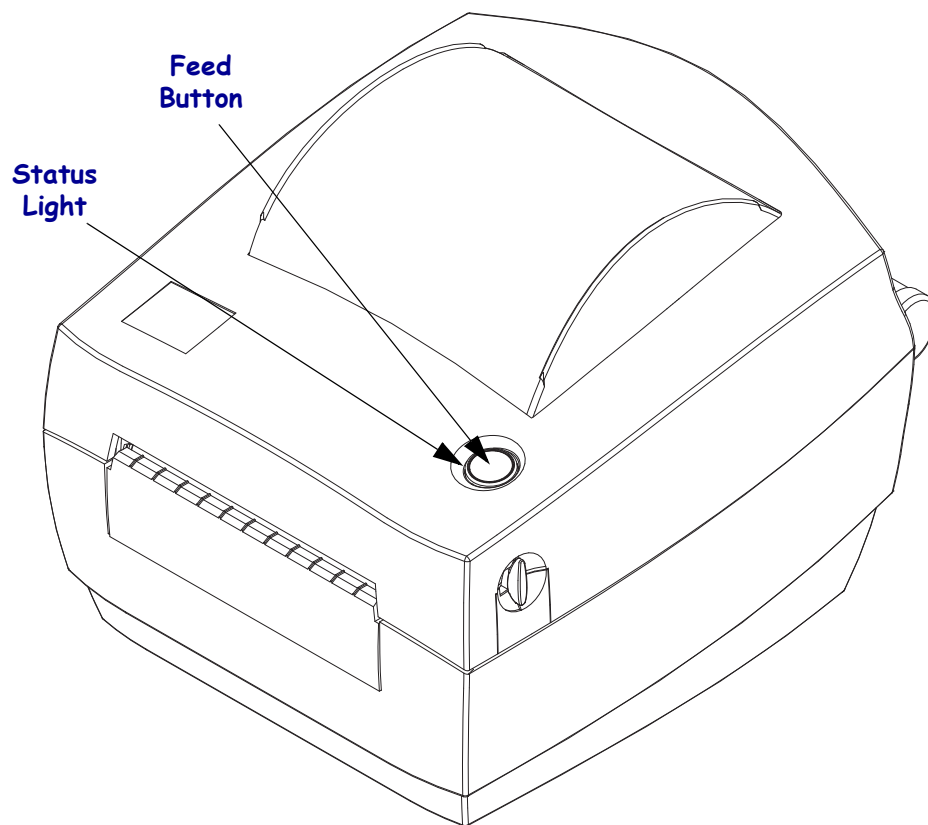


### Feed Button

- Tap the Feed button once to force the printer to feed one blank label.
- Press the Feed button to take the printer out of a “pause” condition. The printer is put into “pause” by either a programming command or an error condition. See *What the Status Light is Telling You* [on page 60](#) in the Troubleshooting chapter.
- Use the Feed button for printer setup and status (see *Feed Button Modes* [on page 70](#) in the Troubleshooting chapter).

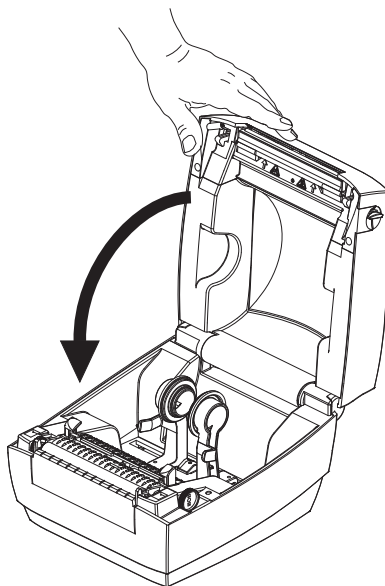
## Status Light

Located on the top case next to the feed button, the status light functions as a printer operational indicator (see *Status Light Descriptions* on page 60).

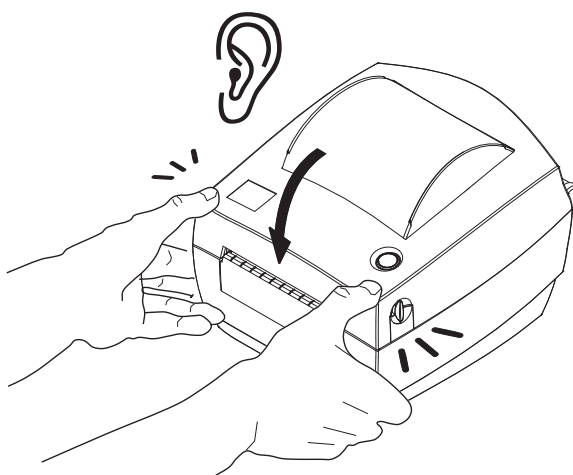


## Closing the printer

1. Lower the top cover.



2. Press down until the cover snaps closed.





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# Getting Started

This section describes how to set up your printer for the first time and use the most common operating procedures for loading media.

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## Attaching Power

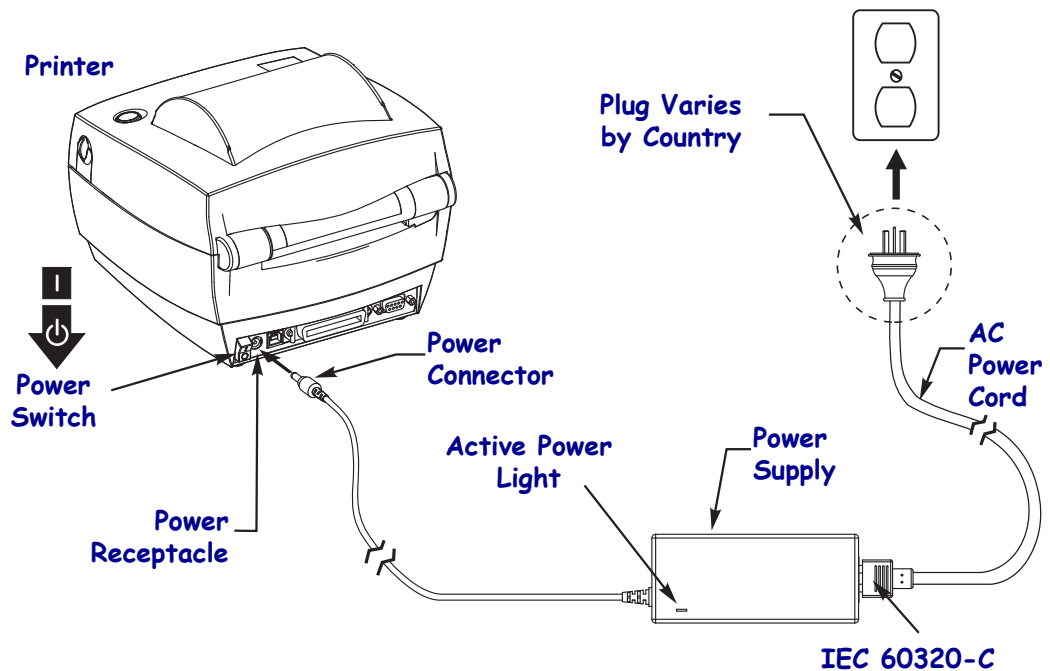


**Important** • Set up your printer so that you can handle the power cord easily if needed. To make certain the printer cannot carry electrical current, you must separate the power cord from the power supply receptacle or AC electrical outlet.



**Caution** • Never operate the printer and power supply in an area where they can get wet. Serious personal injury could result!

1. Make sure the printer's power switch is in the off position (down).
2. Insert the AC power cord into the power supply.
3. Plug the other end of the cord into an appropriate AC electrical outlet. Note: The active power light will go on if power is on at the AC outlet.
4. Insert the power supply's power connector into the printer's power receptacle.



**Note** • Ensure the appropriate power cord with a three (3) prong plug and an IEC 60320-C5 connector are used at all times. These power cords must bear the relevant certification mark of the country in which the product is being used.

## Loading Roll Media

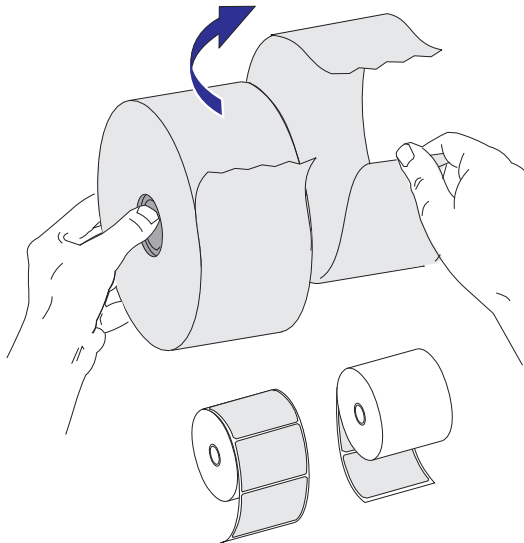
When you load media, you must place the roll onto the media hangers.

You must use the correct media for the type of printing you require.

### Preparing Media

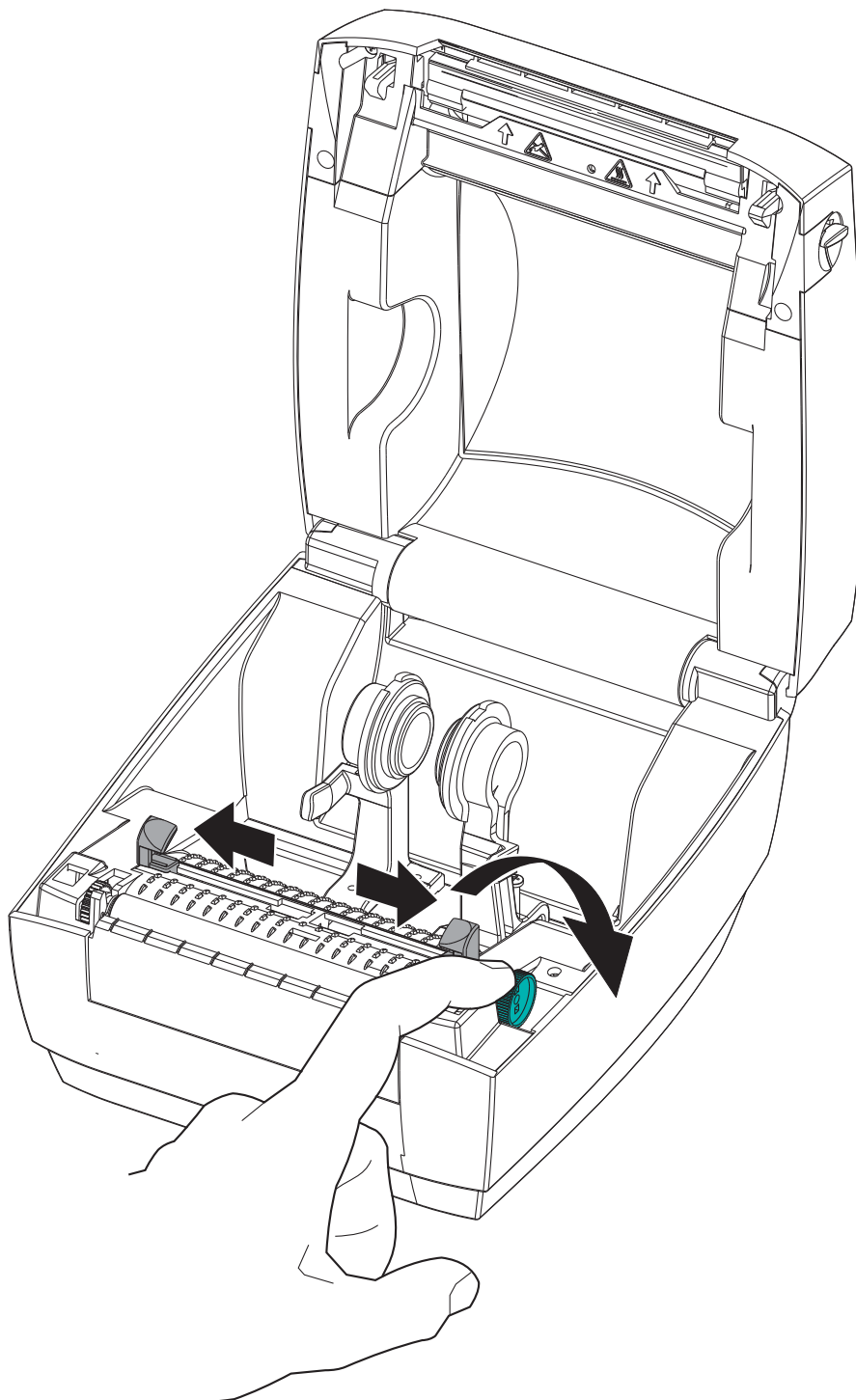
Whether your roll media is inside or outside wound, you load it into the printer the same way.

- Remove the outside length of media. During shipment, handling, or storage, the roll may become dirty or dusty. Removing the outside length of media avoids dragging adhesive or dirty media between the printhead and platen.



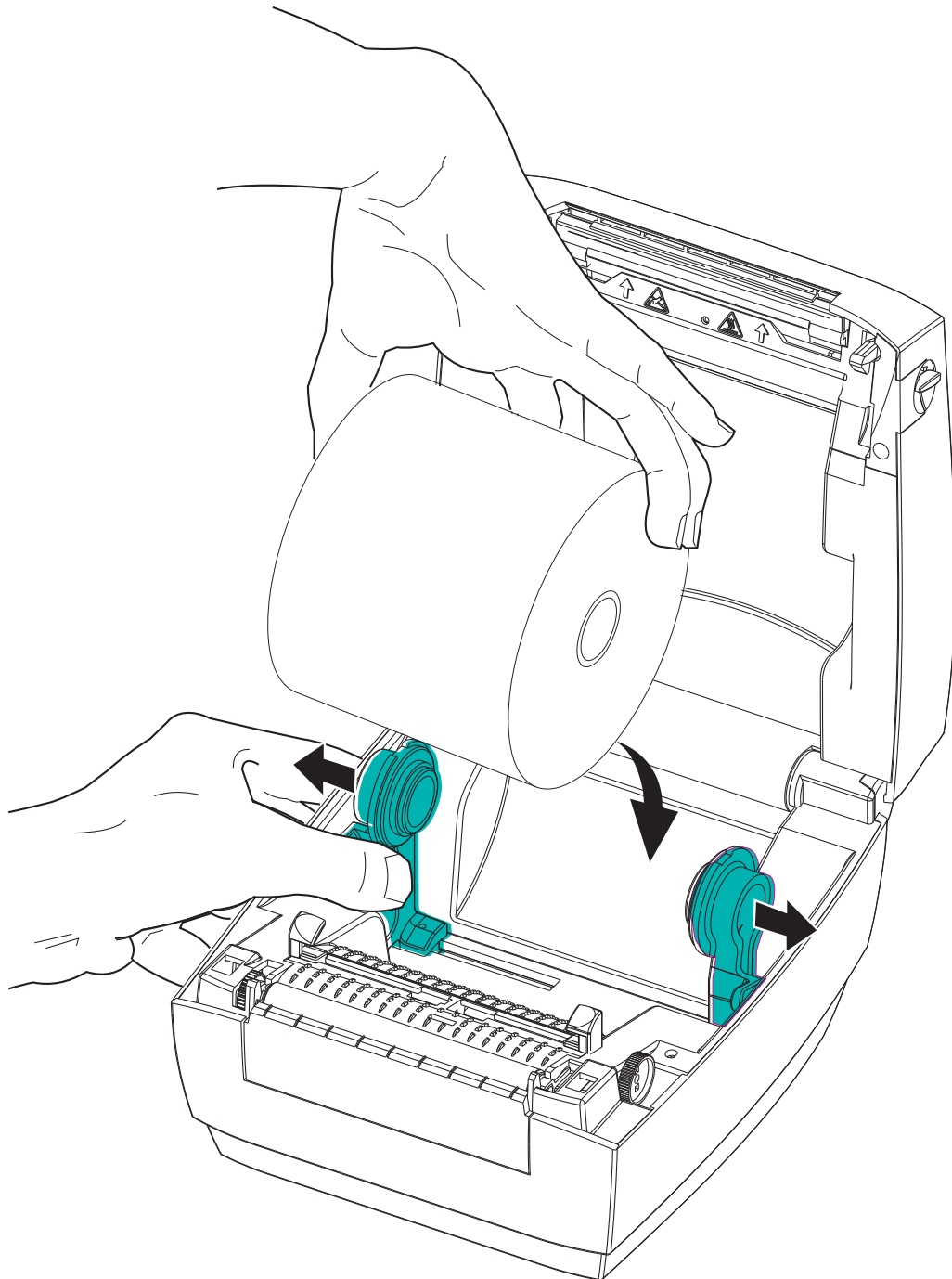
## Placing the Roll in the Media Compartment

1. Open the printer. Remember that you need to pull the release latch levers toward the front of the printer.
2. Open the media guides by turning the media guide adjustment knob toward the rear of the printer.

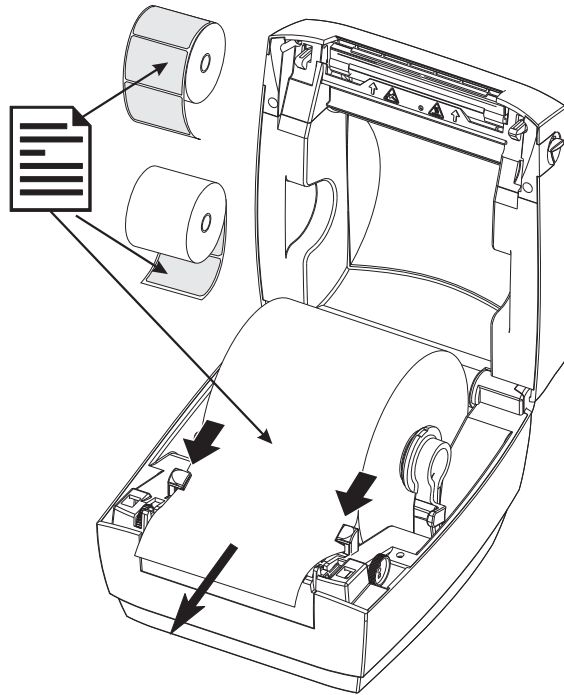




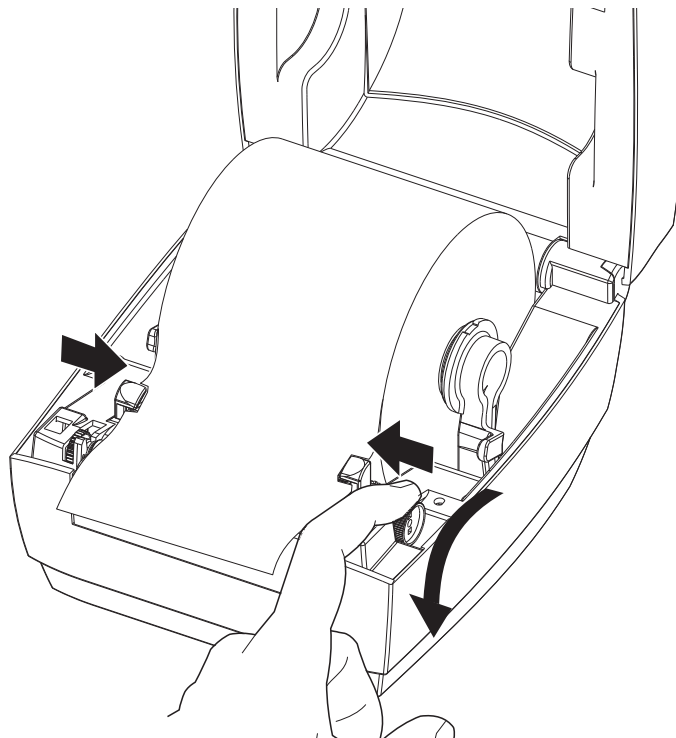
3. Pull the media roll holders open with your free hand and place the media roll on the roll holders and release. Orient the media roll so that its printing surface will face up as it passes over the platen (drive) roller.



4. Pull the media so that it extends out of the front of the printer. Thread the media under the media guides. Verify the roll turns freely. The roll must not sit in the bottom of the media compartment. Verify that the media's printing surface is facing up.



5. Close the media guides by turning the guide adjuster knob to the front. They should just touch, but not restrict, the edges of the media.



6. Close the printer. Press down until the cover snaps closed.

## Printing a Test (Printer Configuration) Label

**Before you connect the printer to your computer**, make sure that the printer is in proper working order.

You can do this by printing a configuration status label.

1. Make sure the media is properly loaded and the top cover of the printer is closed. Then, turn the printer power on if you have not already done so. If the printer initializes with the status light blinking green (pause mode), press the Feed button once to set the printer in Ready (to print) mode. See the *Troubleshooting* [on page 59](#) if the printer's status light does not turn solid green (Ready).
2. Press the Feed button two to three times to allow the printer to calibrate the printer for the installed media. The printer may feed several labels during this process.
3. When the status light is solid green, press and hold the Feed button until the status light flashes once.
4. Release the Feed button. A configuration label will print.

If you cannot get this label to print, refer to *Getting Started* [on page 9](#).

PRINTER CONFIGURATION	
Zebra Technologies ZTC GC420d ZBR3573999	
10.0.....	DARKNESS
4 IPS.....	PRINT SPEED
+000.....	TEAR OFF
TEAR OFF.....	PRINT MODE
GAP/NOTCH.....	MEDIA TYPE
WEB.....	SENSOR TYPE
AUTO.....	SENSOR SELECT
832.....	PRINT WIDTH
1236.....	LABEL LENGTH
39.0IN 989MM.....	MAXIMUM LENGTH
CONNECTED.....	USB COMM.
NONE.....	PROTOCOL
LINER/TAG FULL.....	CUTTER TYPE
<~> 7EH.....	CONTROL CHAR
<^> 5EH.....	COMMAND CHAR
<.> 2CH.....	DELIM. CHAR
ZPL II.....	ZPL MODE
NO MOTION.....	MEDIA POWER UP
FEED.....	HEAD CLOSE
DEFAULT.....	BACKFEED
+000.....	LABEL TOP
+0000.....	LEFT POSITION
NO.....	HEXDUMP
043.....	WEB S.
096.....	MEDIA S.
023.....	WEB GAIN
037.....	MARK S.
015.....	MARK GAIN
096.....	MARK MED S.
070.....	MARK MEDIA GAIN
096.....	CONT MEDIA S.
019.....	CONT MEDIA GAIN
066.....	TAKE LABEL
CWF.....	MODES ENABLED
.....	MODES DISABLED
832 8/MM FULL.....	RESOLUTION
V71.17.10ZP10 <-.....	FIRMWARE
1.3.....	XML SCHEMA
V27.00.01.....	HARDWARE ID
CUSTOMIZED.....	CONFIGURATION
2104k.....R:	RAM
5632k.....E:	ONBOARD FLASH
NONE.....	FORMAT CONVERT
DISABLED.....	ZBI
2.1.....	ZBI VERSION
4.824 IN.....	LAST CLEANED
4.824 IN.....	HEAD USAGE
4.824 IN.....	TOTAL USAGE
4.824 IN.....	RESET CNTR1
4.824 IN.....	RESET CNTR2
.....	SERIAL NUMBER
MAINT. OFF.....	EARLY WARNING
2010-09-07 17:32:33	TIME STAMP
FIRMWARE IN THIS PRINTER IS COPYRIGHTED	

## Pre-install Windows® Printer Drivers

Zebra is changing the way you install and use your printer with your Windows based PC systems. We recommend that at minimum, the ZebraDesigner™ Windows® driver be pre-installed to take advantage of the advancements in ease of use and simplicity of the Windows operating systems since the release of Windows XP® SP2.

Zebra provides the Zebra Setup Utilities (ZSU); a suite of Zebra® printer drivers, utilities, and communications and installation tools for use with most Windows PC operating systems. Zebra Setup Utilities and Zebra Windows printer drivers are available on the user's CD and the Zebra web site ([www.zebra.com](http://www.zebra.com)) for latest versions.

ZebraDesigner™ Driver and Zebra Setup Utilities (includes the driver): Supports Windows 7®, Windows Vista®, Windows XP®, Windows® 2000®, Windows Server® 2008, and Windows Server® 2003 operating systems. The driver supports 32 bit and 64 bit Windows operating systems and is Microsoft Certified. Zebra Setup Utilities and the ZebraDesigner driver support the following printer communication interfaces: USB, parallel, serial, Wired and Wireless Ethernet and Bluetooth (using a Bluetooth virtual printer port).

Install the Zebra Setup Utilities before applying power to the printer connected to the PC (running a Zebra driver supported Windows operating system). The Zebra Setup Utility will prompt you to apply the printer power. Continue to follow the instructions to complete your printer installation.

### Plug'N'Play (PnP) Printer Detection and Windows® operating systems

More recent Windows operating systems automatically detect the printer when it is connected via the USB interface. Depending on the hardware configuration and the Windows version, your printer may be Plug-and-Play (PnP) detected when connecting to the USB, parallel, or serial port interfaces. The printer drivers do not support serial port PnP installation at this time. The printer's PC interface configuration for the parallel port must support and have bidirectional communications for PnP operations.

The operating system automatically starts a "Add new hardware" wizard when connecting the printer for the first time to the PC. If you have pre-loaded the driver suite with the Zebra Setup Utility, then the printer driver will automatically install. Go to your Windows printer directory and right-click and select 'Properties'. Click on the 'Print test page' button to verify a successful installation.

The Windows operating system will detect and re-link a previously installed printer if it is reconnected to the USB interface or if printer power is turned on after the PC has finished its restart of the operating system. Ignore the new device detected warnings and close the Task bar prompts. Wait several seconds for the operating system to match the printer to the driver software. The warnings will quit and the printer now should be ready to begin printing.

## Universal Serial Bus (USB) Device Communications

The printer is a terminal device (not a host or hub) when using a USB interface. You can refer to the USB Specification for details regarding this interface.

Scanners, scales or other data input (terminal) devices must use the serial port (not the USB port) to send data to the printer.

## Serial Port and Windows® operating systems

The Windows operating system default settings for the serial port communication closely match the printer's default settings with one exception; the data Flow Control settings. The Windows default data Flow Control setting is NONE. The printer requires data Flow Control set to Hardware.



**Note** • The printer does not support Windows® Serial Port Plug and Play (PnP) device detection at this time.

## Ethernet

This printer option has a variety of methods and utilities to assist with printer connection and configuration of networked Zebra printers on a LAN (local area network) or WAN (wide area network). The Zebra Setup Utility configuration wizards support creating a connection to the printer on a shared network with Windows based systems by using the printer's IP address. The printer includes internal Web pages to provide easy access to printer and network configuration. The web pages are accessible via the printers IP address using any web browser. The free version of ZebraNet™ Bridge software allows you to centrally deploy, manage, and monitor your Zebra® printers with automatic Zebra® printer discovery up to 3 printers from a single PC screen anywhere on your global network. ZebraNet™ Bridge Enterprise is available for purchase to manage larger numbers of Zebra® printers.

## Connecting your Printer to a Computer

The printer support a variety of interface options and configurations. These include: Universal Serial Bus (USB) interface, RS232 Serial and Parallel (IEEE 1284.4).

- USB, Serial and Parallel

**The Zebra Setup Utility is designed to assist you with installing these interfaces.** The cabling and unique parameters for each of these physical printer communication interfaces is discussed in the following pages to assist you with making configuration setup choices prior to and immediately following applying power. The Zebra Setup Utilities configuration wizards will instruct you to turn the printer's power on at the appropriate time to complete the installation of your printer.



---

**Caution** • Keep the power switch in the OFF position when attaching the interface cable. The power cord must be inserted into the power supply and the power receptacle on the back of the printer before connecting or disconnecting the communications cables.

---

### Interface Cable Requirements

Data cables must be of fully shielded construction and fitted with metal or metallized connector shells. Shielded cables and connectors are required to prevent radiation and reception of electrical noise.

To minimize electrical noise pickup in the cable:

- Keep data cables as short as possible (6 foot [1.83 m] recommended).
- Do not tightly bundle the data cables with power cords.
- Do not tie the data cables to power wire conduits.

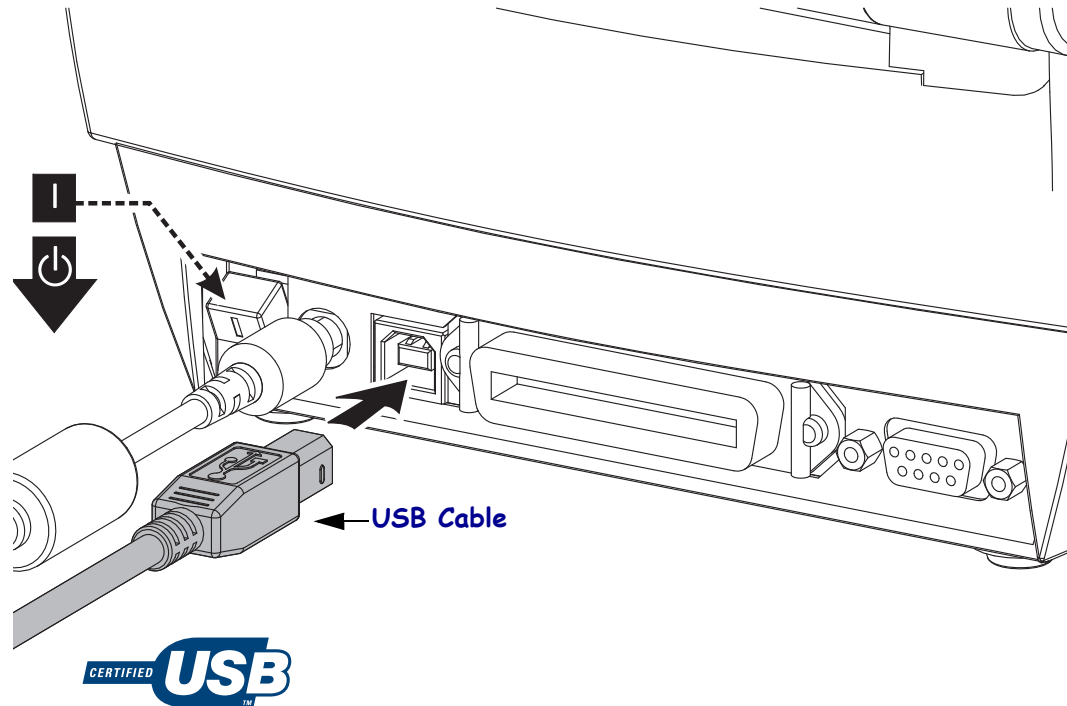


**Important** • This printer complies with FCC “Rules and Regulations,” Part 15, for Class B Equipment, using fully shielded data cables. Use of un-shielded cables may increase radiated emissions above the Class B limits.

## USB Interface Requirements

Universal Serial Bus (version 2.0 compliant) provides a fast interface that is compatible with your existing PC hardware. USB's "plug and play" design makes installation easy. Multiple printers can share a single USB port/hub.

When using a USB cable (not supplied with your printer), verify that the cable or cable packaging bears the "Certified USB™" mark (see below) to guarantee USB 2.0 compliance.



## Serial Communications

The GK888 has a DCE serial communication port for hardware compatibility with legacy 888 printers. The required cable must have a nine-pin “D” type (DB-9P) male connector on one end which plugs into the mating (DB-9S) serial port located on the back of the printer. The other end of this signal interface cable connects to a serial port on the host computer. The cable is a Null-Modem (cross-over signal connections) cable. For pinout information, refer to Appendix A.

The serial port communication settings between the printer and host (typically a PC) must match for reliable communication. The Bits per second (or Baud rate) and Flow control are the most common settings that get changed. The host (typically a Windows PC) needs to have the data Flow control changed to match the printer’s default communication method: Hardware and is noted by the Host Handshake setting **DTR/Xon/Xoff**. This combined hardware (DTR) and software (Xon/Xoff) mode may need to change depending upon use with non-Zebra application software or the serial cable variation in use.

Serial communications between the printer and the host computer can be set by:

- Autobaud synchronization
- ZPL programming **^SC** command
- EPL programming **Y** command
- Resetting the printer to its default printer configuration.

### Autobaud

Autobaud synchronization allows the printer to automatically match the communication parameters of the host computer. To autobaud:

1. Press and hold the feed button until the green status LED flashes once, twice, and then three times.
2. While the status LED flashes, send the **^XA^XZ** command sequence to the printer.
3. When the printer and host are synchronized, the LED changes to solid green. (No labels will print during autobaud synchronization.)

### ZPL ^SC Command

Use the Set Communications (**^SC**) command to change the communications settings on the printer.

1. With the host computer set at the same communications settings as the printer, send the **^SC** command to change the printer to the desired settings.
2. Change the host computer settings to match the new printer settings.

Refer to the *ZPL Programming Guide* for more information about this command.



## EPL Y Command

Use the serial port setup (**Y**) command to change the communications settings on the printer.

1. With the host computer set at the same communications settings as the printer, send the **Y** command to change the printer to the desired settings. Note: the Y command does not support setting the data flow control, use the **Xon/Xoff** setting.
2. Change the host computer settings to match the new printer settings.

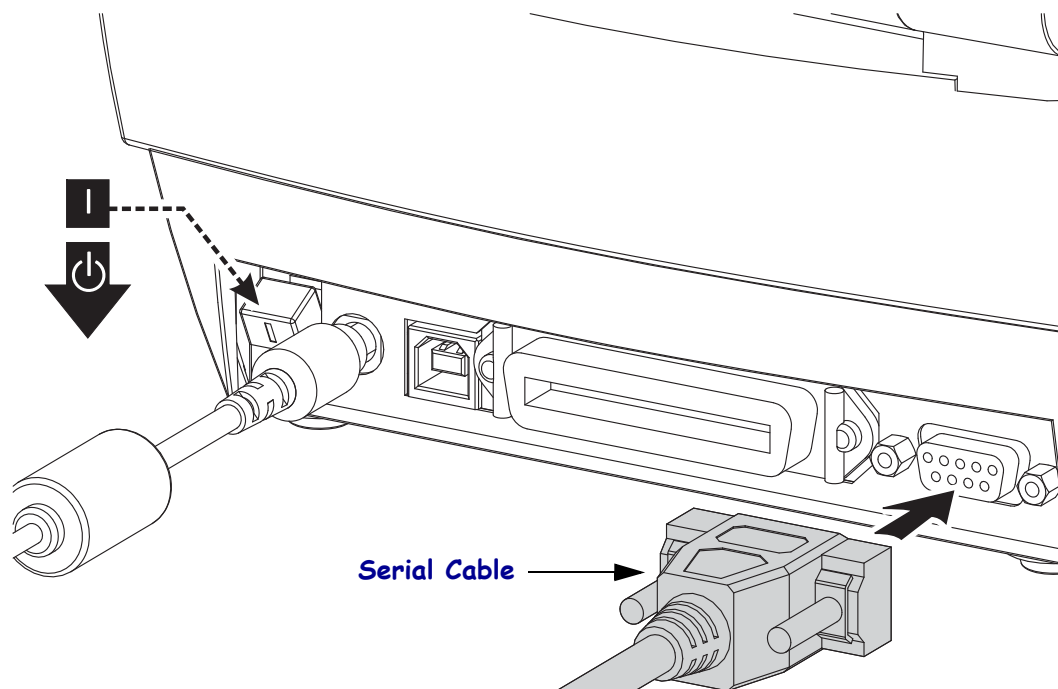
Refer to the *EPL Page Mode Programming Guide* for more information about this command.

## Resetting the Default Serial Port Parameters

Do the following to reset the communications parameters on the printer to the factory defaults (serial communication settings are: **9600** baud, **8** bit word length, **NO** parity, **1** stop bit, and **DTR/XON/XOFF** data flow control).

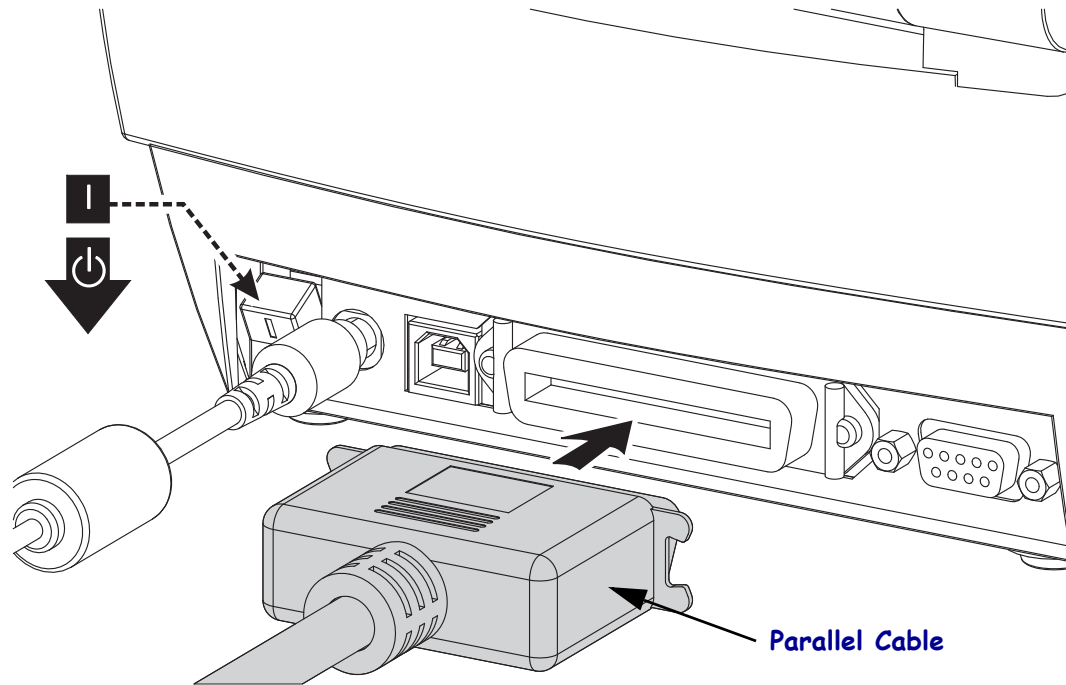
1. Press and hold the feed button until the green status LED flashes once, waits a moment and flashes twice, and then waits again before flashing three times (release immediately).
2. While the status LED rapidly flashes amber and green, press the feed button. Serial communications between the printer and the host computer can be set by the ZPL **^SC** command or the EPL **Y** command.

**Note** • Early models of Zebra® printers running the EPL programming language had **9600** baud, **NO** parity, **8** data bits, **1** stop bit and a **HARDWARE** and **SOFTWARE** (merged) data control (essentially DTR/Xon/Xoff) as the default serial port settings. The Windows operating system flow control setting was Hardware for most applications.



## Parallel Port

The required cable must have a 25 pin “D” type (DB-25P) male connector (host) on one end and a Centronics (printer) on the other end (IEEE 1284 A-B parallel interface specification).



## After Your Printer is Connected

Now that you have basic communication to your printer, you may want to test printer communications and then install other printer related applications, drivers or utilities.

### Testing Communications by Printing

Verifying the print system's operation is a relatively simple process. For Windows operating systems, the Zebra Setup Utility or the Windows 'Printers and Faxes' Control Panel to access and print a test label. For non-Windows operation systems, copying a basic ASCII text file with a single command (**~WC**) to the printer will print a configuration status label.

#### Test Printing with Zebra Setup Utility:

1. Open the Zebra Setup Utility.
2. Click on the newly installed printer's icon to select the printer and activate the printer configuration buttons below it in the window.
3. Click the 'Open Printer Tools' button.
4. In the 'Print' tab window, click on the 'Print configuration label' line and click on the 'Send' button. The printer should print a configuration status label.

#### Test Printing with Windows 'Printer and Faxes' menu:

1. Click on the Windows 'Start' menu button, to access the 'Printers and Faxes' menu or 'Control Panel' to access the 'Printers and Faxes' menu. Open the menu.
2. Select the newly installed printer's icon to select the printer and right-click the mouse to access the printer 'Properties' menu.
3. From the printer's 'General' tab window, click on the 'Print Test Page' button. The printer should print a Windows test print page.

#### Test Print with a Copied ZPL Command File for Non-Windows Operating Systems:

1. Create a text file with the following ASCII three characters: **~WC**
2. Save the file as: TEST.ZPL (an arbitrary file name and extension name).
3. Copy the file to the printer. For DOS, a file sent to a printer connected to the system's parallel port would be as simple as:

**COPY TEST.ZPL LPT1**

Other interface connection types and operating systems will have different command strings. See your operating system documentation for detailed instructions to copy to the appropriate printer interface for this test.



Notes • \_\_\_\_\_

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# Print Operations

This section provides media and print handling, font and language support, and the setup of less common printer configurations.

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## Determining Printer Configuration

The printer uses a ZPL printer configuration status label to report the printer's configuration status for both EPL and ZPL operations. The ZPL style label provides a more intuitive and functionally descriptive naming conventions than the EPL style printer status label. Operational status (darkness, speed, media type, etc.), installed printer options (network, interface settings, cutter, etc.) and printer description information (serial number, model name, firmware version, etc.) are all included on the status label. See *Printing a Test (Printer Configuration) Label* [on page 15](#) to print this label. See *Appendix: ZPL Configuration* [on page 81](#) for details on printer configuration and the ZPL commands that control the printer settings listed on the Printer Configuration Status Label.

To get an EPL style printer configuration status label, send the printer the EPL `␣` command. See the EPL programmer's guide for more information on the various EPL `␣` commands and interpreting the settings displayed on these labels.

## Long Term Printer In-activity or Storage

Overtime the printhead may stick to the platen (drive) roller. To prevent this, always store the printer with a piece of media (a label or paper) between the printhead and platen roller. Do not ship the printer with a roll of media installed or damage to the printer or media may result.

## Thermal Printing



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**Caution** • The printhead becomes hot while printing. To protect from damaging the printhead and risk of personal injury, avoid touching the printhead. Only use the cleaning pen to perform printhead maintenance.

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**Caution** • The discharge of electrostatic energy that accumulates on the surface of the human body or other surfaces can damage or destroy the printhead or electronic components used in this device. You must observe static-safe procedures when working with the printhead or the electronic components under the top cover.

---

## Modes of Printing

You can operate this printer in many different modes and media configurations:

- Direct thermal printing (which uses heat sensitive media to print).
- Standard Tear-Off mode allows you to tear off each label (or batch print a strip of labels) after it is printed.
- Label Dispense Mode: If an optional dispenser is installed, the backing material can be peeled away from the label as it is printed. After this label is removed, the next one is printed.
- Stand-alone: The printer can print without being connected to a computer using the printer's auto running label form feature (programming based) or by using a data input device connected to the printer's serial port. This mode accommodates data input devices, such as scanners, weigh scales, Zebra® KDU Plus™ or Zebra® KDU (Keyboard Display Unit), etc.

## Print Media Types



**Important** • Zebra strongly recommends the use of Zebra-brand supplies for continuous high-quality printing. A wide range of paper, polypropylene, polyester, and vinyl stock has been specifically engineered to enhance the printing capabilities of the printer and to prevent premature printhead wear. To purchase supplies, go to <http://www.zebra.com/howtobuy>.

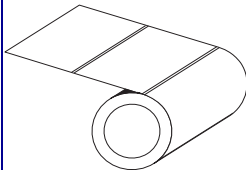
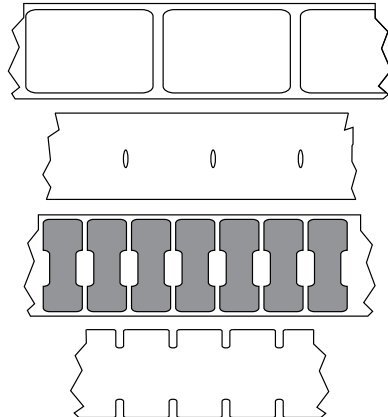
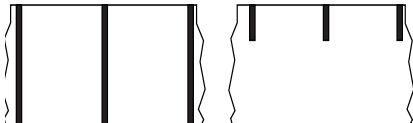
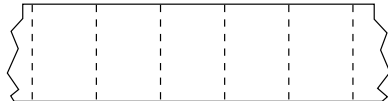
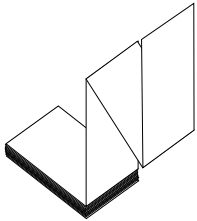
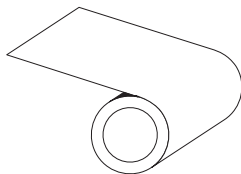
Your printer can use various types of media:

- *Standard media*—Most standard (non-continuous) media uses an adhesive backing that sticks individual labels or a continuous length of labels to a liner.
- *Continuous roll media*—Most continuous roll media is direct thermal media (similar to FAX paper) and is used for receipt or ticket style printing.
- *Tag stock*—Tags are usually made from a heavy paper (up to 0.0075in./0.19mm thick). Tag stock does not have adhesive or a liner, and it is typically perforated between tags.

For more information on basic media types, see [Table 1](#).

The printer typically uses roll media, but you can use fan-fold or other continuous media too. Use the correct media for the type of printing you require. You must use direct thermal media.

Table 1 • Types of Media Roll and Fanfold Media

Media Type	How It Looks	Description
<b>Non-Continuous Roll Media</b>		<p>Roll media is wound on a core that can be 0.5 to 1.5 in. (12.7 to 38.1 mm) in diameter. Labels have adhesive backing that sticks them to a liner, and they are separated by gaps, holes, notches, or black marks. Tags are separated by perforations. Individual labels are separated by one or more of the following methods:</p> <ul style="list-style-type: none"> <li><i>Web media</i> separates labels by gaps, holes, or notches.</li> </ul>  <ul style="list-style-type: none"> <li><i>Black mark media</i> uses pre-printed black marks on the back side of the media to indicate label separations.</li> </ul>  <ul style="list-style-type: none"> <li><i>Perforated media</i> has perforations that allow the labels or tags to be separated from each other easily. The media may also have black marks or other separations between labels or tags.</li> </ul> 
<b>Non-Continuous Fanfold Media</b>		<p>Fan-Fold media is folded in a zigzag pattern. Fanfold media can have the same label separations as non-continuous roll media. The separations would fall on or near the folds.</p>
<b>Continuous Roll Media</b>		<p>Roll media is wound on a core that can be 0.5 to 1.5 in. (12.7 to 38.1 mm) in diameter. Continuous roll media does not have gaps, holes, notches, or black marks to indicate label separations. This allows the image to be printed anywhere on the label. A cutter can be used to cut apart individual labels. With continuous media, use the transmissive (gap) sensor so the printer can detect when the media runs out.</p>



## Determining Thermal Media Types

Thermal transfer media requires ribbon for printing while direct thermal media does not. To determine if ribbon must be used with a particular media, perform a media scratch test.

### To perform a media scratch test, complete these steps:

1. Scratch the print surface of the media with a finger nail or pen cap. Press firmly and quickly while dragging it across the media surface. Direct thermal media is chemically treated to print (expose) when heat is applied. This test method uses friction heat to expose the media.
2. Did a black mark appear on the media?

If a black mark...	Then the media is...
Does not appear on the media	<b>Thermal transfer.</b> A ribbon is required. Your printer does not support this media.
Appears on the media	<b>Direct thermal.</b> No ribbon is required.

## Replacing Supplies

If labels run out while printing, leave the printer power on while reloading (data loss results if you turn off the printer). After you re-load media, press the Feed button to restart.

Always use high quality, approved labels and tags. If adhesive backed labels are used that don't lay flat on the backing liner, the exposed edges may stick to the label guides and rollers inside the printer, causing the label to peel off from the liner and jam the printer.

## Adjusting the Print Width

Print width must be set when:

- You are using the printer for the first time.
- There is a change in media width.

Print width may be set by:

- The Windows printer driver or application software such as ZebraDesigner™.
- The five-flash sequence in *Feed Button Modes* [on page 70](#).
- Controlling printer operations with ZPL programming; refer to the Print Width (^PW) command (consult your *ZPL Programming Guide*).
- Controlling printer operations with EPL Page Mode programming, refer to the Set Label Width (q) command (consult your *EPL Programmer's Guide*).

## Adjusting the Print Quality

Print quality is influenced by the heat (density) setting of the printhead, the print speed, and the media in use. Experiment with these settings to find the optimal mix for your application. Print quality can be set with the Zebra Setup Utility's 'Configure Print Quality' routine.



Note • Media manufactures may have specific recommendations for speed settings for your printer and the media. Some media types have lower maximum speeds than your printer's maximum speed.

The relative darkness (or density) setting can be controlled by:

- The six-flash sequence in *Feed Button Modes* [on page 70](#). This will overwrite any ZPL and EPL programmed darkness/density settings.
- The Set Darkness (~SD) ZPL command (consult your *ZPL Programming Guide*).
- The Density (D) EPL command (consult your *EPL Programmer's Guide*).

If you find that the print speed needs to be adjusted, use:

- The Windows printer driver or application software such as ZebraDesigner™.
- The Print Rate (^PR) command (consult your *ZPL Programming Guide*).
- The Speed Select (S) command (consult your *EPL Programmer's Guide*).

## Media Sensing

The printer has automatic media sensing capability. The printer is designed to continuously check and adjust media length sensing for minor variations. Once the printer is printing or feeding media, the printer continually checks and adjusts the media sensing to accommodate for minor changes in media parameters from label to label on a roll and from roll to roll of media. The printer will automatically initiate a media length calibration if the expected media length or the label to label gap distance has exceeded the acceptable variation range when starting a print job or feeding media. The automatic media sensing in the printer works the same for printer operations that use EPL and ZPL label formats and programming.

If the printer does not detect labels or black marks (or notches with blackline sensing) after feeding the media the default maximum label length distance of 39 inches (1 meter), then the printer will switch to continuous (receipt) media mode. The printer will keep these settings until changed by software, programming or a manual calibration with different media.

Optionally, the printer can be set to do a short media calibration after printer power up or when closing the printer with power on. The printer will then feed several labels while calibrating.

The printer's media settings can be verified by printing a Printer Configuration label. See the *Printing a Test (Printer Configuration) Label* [on page 15](#) for more details.

The maximum distance that the automatic media type detection and sensing will check can be reduced by using the ZPL Maximum Label Length command (^**ML**). It is recommended that this distance be set to no less than two times the longest label being printed. If the largest label being printed was a 4 by 6 inch label, then the maximum label (media) length detection distance can be reduced from the default distance of 39 inches down to 12 inches.

If the printer has difficulty automatically detecting the media type and auto-calibrating, see *Manual Calibration* [on page 66](#) to perform an extensive calibration. It includes a printed graph of sensor operation for your media. This method disables the printer's automatic media sensing capability until the printer's default parameters are reset to the factory defaults with the four flash Feed button mode. See the *Feed Button Modes* [on page 70](#) for more details.

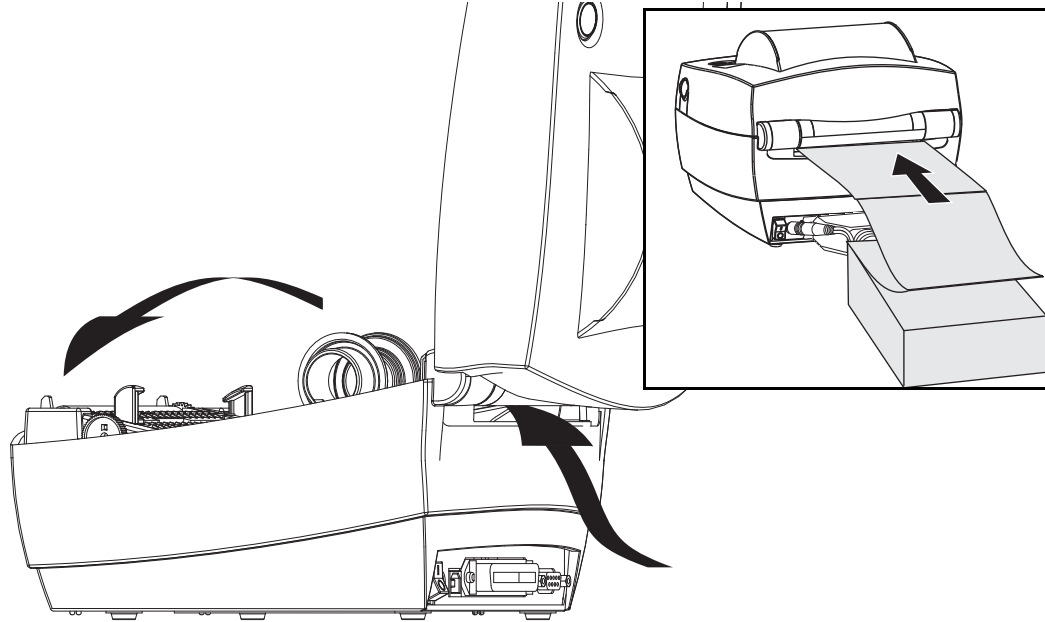
The automatic media calibration can be modified, turned on or turned off to meet your needs. Sometimes print job conditions require that the printer use all the media on a roll. The two automatic media conditions, power up with media loaded and closing the printer with power on, can be controlled individually with the ZPL Media Feed command, ^**MF**. The feed action discussed in the ZPL programmers guide for the ^**MF** command is primarily for automatic media sensing and calibration. The automatic media calibration that controls the dynamic media (label to label) calibration is the ^**XS** command. If multiple media types of different lengths, material or detection methods (web/gap, black mark, notches or continuous) are used, you should not change these settings.

The media calibration and detection process can also be refined to match the media type loaded into the printer. Use the ZPL Media Tracking command (^**MN**) to set the media type. Sometimes the printer can detect preprinted media as the gap between labels or the liner backing with print as a black marks. If the ^**MN** parameter for continuous media is set, then the print does not preform the automatic calibration. The ^**MN** command also includes an automatic calibration parameter (^**MNA**) to return the printer to its default setting to automatically detect all media types.

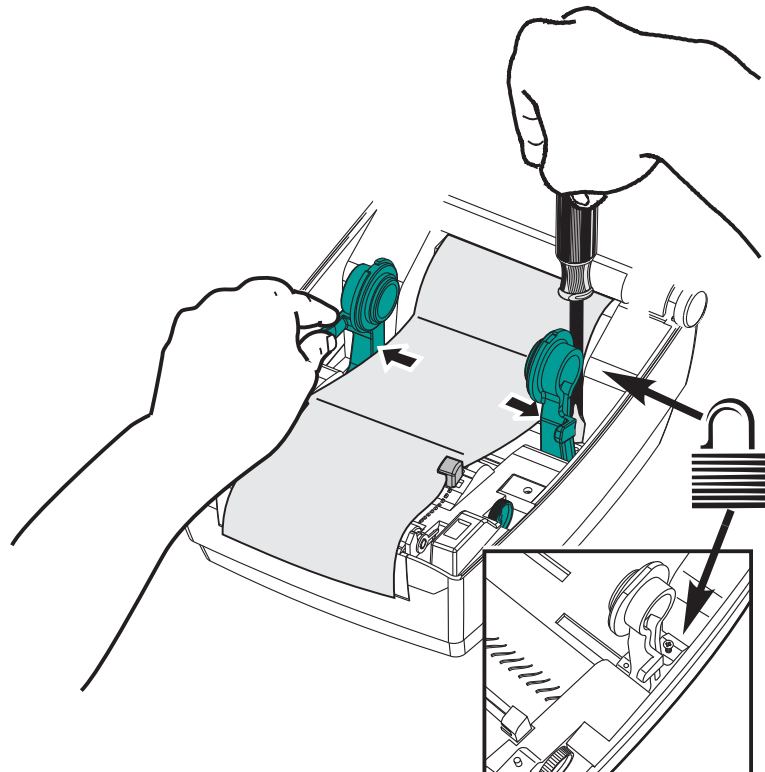
## Printing on Fan-Fold Media

Printing on fan-fold media requires you to adjust the media roll holders' stop position.

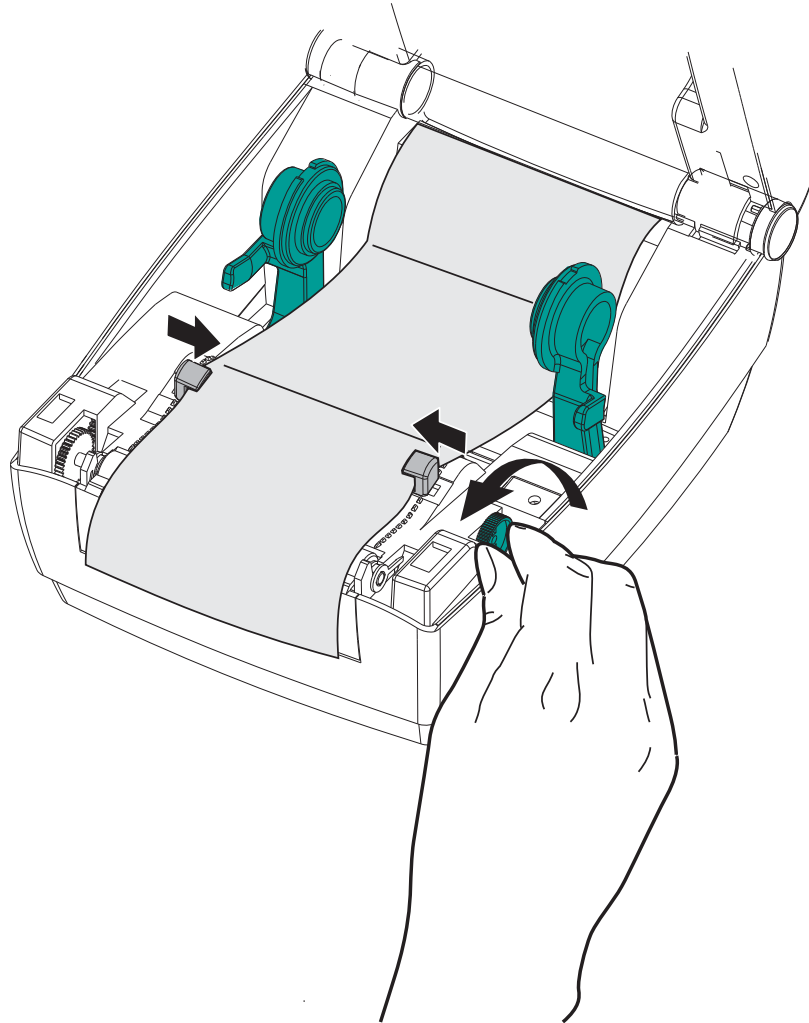
1. Open the top cover.



2. With a sample of your media, adjust the media roll holders to the width of the media. The hangers should just touch, but not restrict, the edges of the media. Tighten the screw using a small Phillips driver #1.



3. With a sample of your media, adjust the guides to the width of the media. The guides should just touch, but not restrict, the edges of the media.



4. Run the media between the media guide and roll holders.
5. Close the top cover.

**After printing or feeding several labels:** If the media does not track down the center (moves from side to side) or the sides of the media (liner, tag, paper, etc.) are frayed or damaged when exiting the printer, then the media guides or roll holders may need further adjustment.

## Printing with Externally Mounted Roll Media

The GC420 printer accommodates externally mounted roll media similar to the printer's support of fan-fold media. The printer requires the media roll and stand combination to have a low initial inertia to pull the media off the roll.

Zebra at this time does not offer an external media option for the GC420 printer.

### Externally Mounted Roll Media Considerations:

- The media ideally should enter the printer directly behind the printer through the fan-fold media slot in the rear of the printer. See *Printing on Fan-Fold Media* [on page 32](#) for media loading.
- Lower the print speed to decrease the chance of motor stalls. The roll typically has the highest inertia when trying to start the roll moving. Larger media roll diameters require the printer to have more torque applied to get the roll moving.
- The media should move smoothly and freely. The media should not slip, skip, jerk, bind and then move, etc. when mounted on your media stand.
- The printer should not touch the media roll.
- The printer should not slip or lift up off the operating surface.

## Fonts and Your Printer

The GC420 printer supports your language and font requirements with a variety of internal fonts, on-board font scaling, international font sets and character code page support, Unicode support, and font download.

The GC420 printer's font capabilities are programming language dependent. The EPL™ programming language provides for basic bitmapped fonts and international code pages. The ZPL™ programming language provides advanced font mapping and scaling technology to support outline fonts (TrueType™ or OpenType™) and Unicode character mapping as well as basic bitmapped fonts and character code pages. ZPL and EPL programming guides describe and document the fonts, code pages, character access, listing fonts, and limitations for their respective printer programming languages. See the printer programming guides for information on Text, Fonts and Character support.

The GC420 printer includes utilities and application software that support font download into the printer for both printer programming languages.

## Localizing the Printer with Code Pages

The GC420 printer supports two sets of language, region and character sets for permanent fonts loaded into the printer for each printer programming language, ZPL and EPL. The printer supports localization with common international character map code pages.

- For ZPL code page support, including Unicode, see the **^CI** command in the ZPL programmer's guide.
- For EPL code page support, see the **I** command in the EPL programmer's guide.

## Identifying Fonts in Your Printer

Fonts and memory are shared by the programming languages in the printer. Fonts can be loaded in many memory areas in the GC420 printer. ZPL programming can recognize EPL and ZPL fonts. EPL programming can only recognize EPL fonts. See the respective programmer guides for more information on fonts and printer memory.

### ZPL Fonts:

- To manage and download fonts for ZPL print operation, use the Zebra Setup utility or ZebraNet™ Bridge.
- To display all of the fonts loaded in your printer, send the printer the ZPL **^WD** command. See the *ZPL Programmers Guide* for details.
  - Bitmap fonts in the various printer memory areas are identified by the **.FNT** file extension in ZPL.
  - Scalable fonts are identified with the **.TTF**, **.TTE** or **.OTF** file extensions in ZPL. EPL does not support these fonts.

### EPL Fonts:

- To download fonts for EPL print operations, use the Zebra Setup Utility or ZebraNet™ Bridge to send files to the printer.
- To display Soft Fonts (ext.) available to EPL, send the printer the EPL command **EI**.
  - All EPL fonts displayed are bitmap fonts. They do not include the **.FNT** file extension or the horizontal (**H**) or vertical (**V**) designators that are displayed with the ZPL command **^WD** as described above in ZPL Fonts.
- To remove non Asian EPL fonts with EPL programming, use the **EK** command.
- To remove EPL Asian fonts from the printer, use the ZPL **^ID** command.



## Stand Alone Printing

Your printer can be configured to work without being attached to a computer. The printer has the ability to automatically run a single label form. One or more downloaded label forms can be accessed and run with a terminal or wedge device or a Zebra® KDU (keyboard display unit) to call a label form. These methods allow the developer to incorporate data input devices, such as scanners or weight scales, to the printer via the serial port.

Label formats can be developed and stored in the printer to support labels that have:

- No data entry required and print when the Feed button is pressed.
- No data entry required and print when a label is removed from the printer's optional label dispenser.
- One or more data variables to be entered via the terminal or wedge device. The label will print after the last variable data field has been input.
- One or more label formats that are called by scanning bar codes containing programming to run a label form.
- Label forms designed to work as a process chain with each label including a bar code containing the programming to run the next label in the process sequence.

Both printer programming languages support special label forms that will automatically run after a power cycle or reset. The ZPL looks for a file named **AUTOEXEC.ZPL** and EPL looks for a label form named **AUTOFR**. If both files are loaded in the printer, then only the **AUTOEXEC.ZPL** will run. The EPL **AUTOFR** form runs until it is disabled. Both files must be deleted from the printer followed by a reset or a power cycle to completely remove the files.



Note • The GC420 EPL **AUTOFR** command can only be disabled with **NULL** character (00 hex or ASCII 0). The printer will ignore the other character that normally disables the **AUTOFR** form operation in most other EPL printers, the **XOFF** character (13 hex or ASCII 19).

The printer can source up to 750mA through a 5 volt line shared between the parallel and serial ports. See Appendix A for more information on the printer's serial port interface.

## Sending Files to the Printer

Graphics, fonts and programming files can be sent to the printer from the Microsoft Windows operating systems by using the Zebra Setup Utilities (and driver), ZebraNet™ Bridge or Zebra® ZDownloader found on the user's CD or at [www.zebra.com](http://www.zebra.com). These methods are common for both programming languages and the GC420 printers.

## Print Meter

The GC420 printer has the capability to report printhead maintenance alerts. The printer can provide cleaning and early warning of end of calculated printhead life alerts. If the RTC (Real Time Clock) is installed in the printer, the printhead life and history reporting will also include the date. By default, print metering alerts are disabled.

Many of the print meter messages and reports are customize able. See the *ZPL or EPL Programming Guides* for more information on the Print Meter.

To active the Print Meter Alerts, send one of the following commands to the printer:

- EPL command **oLY**
- ZPL command **^JH,,,,,E**

## EPL Line Mode

Your direct thermal printer supports Line Mode printing. EPL Line Mode printing is designed to be command compatible with EPL1 programming language used in early model LP2022 and LP2042 printers. The Zebra 2800 series direct thermal printers also included Line Mode printer language support. The GC420 continues Zebra's support of Line Mode.

Line mode printing is ideal for basic retail (point of sale - POS), shipping, inventory, work flow control, and general labeling. EPL printers with Line Mode, are versatile and are capable of printing a wide range media and bar codes.

Line Mode printing only prints single lines the height of the largest element present in the line of text and data - bar code, text, a logo or simple vertical lines. Line mode has many limitations due to the single line of print: no fine element placement, no overlapping elements, and no horizontal (ladder) bar codes.

- Line Mode printer operation is entered by sending the printer the EPL **oEPL1** command. See the *EPL Programmers Guide* (Page Mode) or the *EPL Line Mode Programmers Guide*.
- Line Mode printer operation is exited by sending the printer the **esc oEPL2** Line Mode command. See the *EPL Line Mode Programmers Guide*.
- With Line Mode active, ZPL and EPL (EPL2) Page Mode programming will be processed as Line Mode programming and data.
- With the default ZPL and EPL (EPL2) Page Mode active, Line Mode programming will be processed as ZPL and/or EPL programming and data.
- Verify printer programming modes by printing out a printer configuration.



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# Printer Options

This section covers the common printer options and accessories with brief descriptions and how to get you started using or configuring your printer option or accessory.

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## Label Dispenser Option

The factory installed label dispenser option allows you to print a label with backing (liner/web) being removed from the label as it prints, ready for application. When printing multiple labels, removing the dispensed (peeled) label notifies the printer to print and dispense the next label.

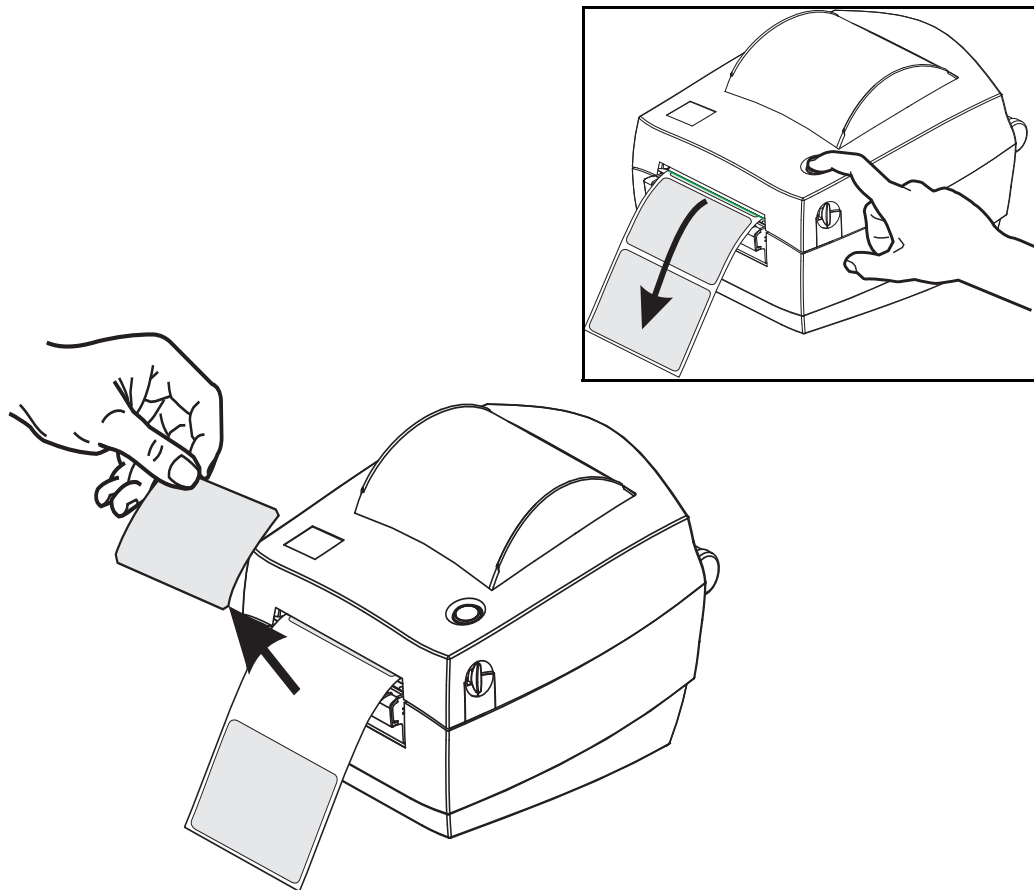
To use dispenser-mode correctly, use your printer driver to activate the label (taken) sensor along with these typical label settings which include but are not limited to length, non-continuous (gap), and web (liner). Otherwise, you must send the ZPL or EPL programming commands to the printer.

**When programming in ZPL**, you can use the following command sequences shown below and refer to your *ZPL Programming Guide* for more information on ZPL programming.

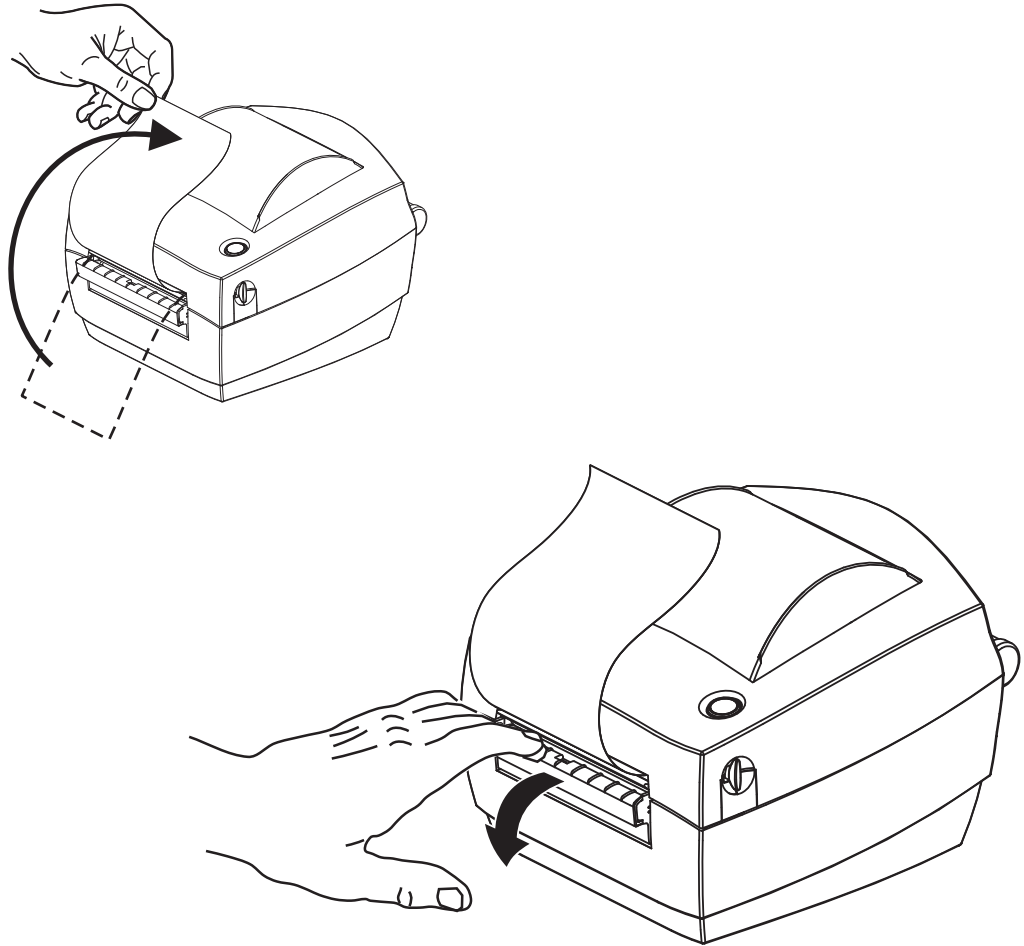
```
^XA ^MMP ^XZ  
^XA ^JUS ^XZ
```

**When programming in EPL**, send the Options (O) command with the 'P' command parameter (OP) to enable the Label Taken sensor. Other printer option parameters may also be included with the Options command string. Refer to your *EPL Programmer's Guide* for more information on programming with EPL and the Options (O) command behaviors.

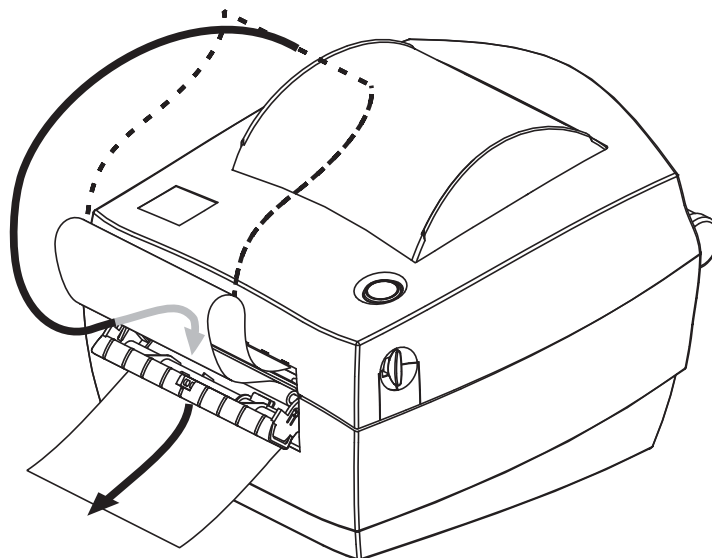
1. Load your labels into the printer. Close the printer and press the Feed button until a minimum of 4 inches or 100 millimeters of exposed labels exit the printer. Remove the exposed labels from the liner.



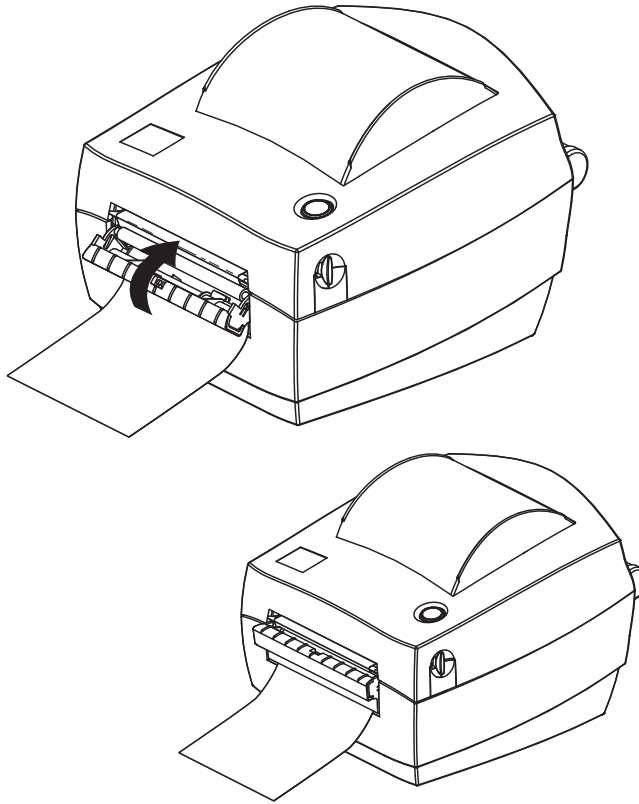
2. Lift the liner over the top of the printer and open the dispenser door.



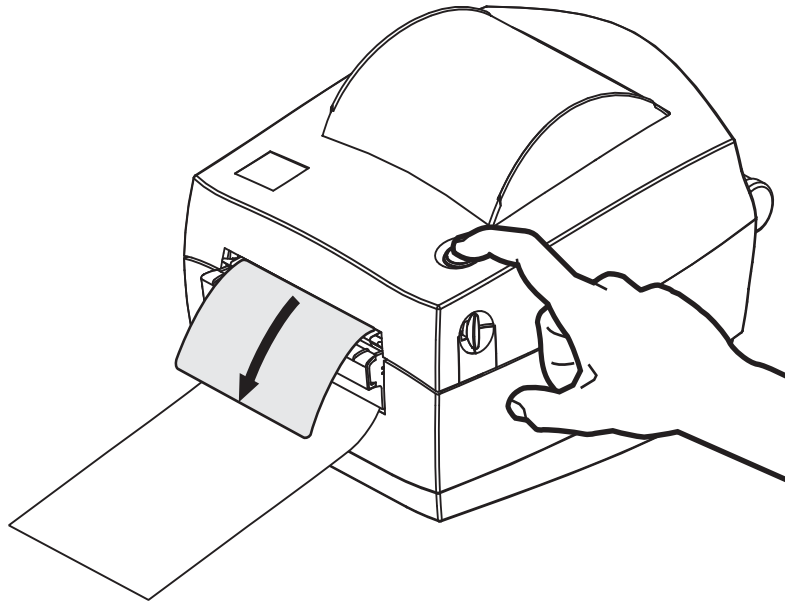
3. Insert the label liner between the dispenser door and the printer body.



4. Close the dispenser door.



5. Press the Feed button to advance the media.



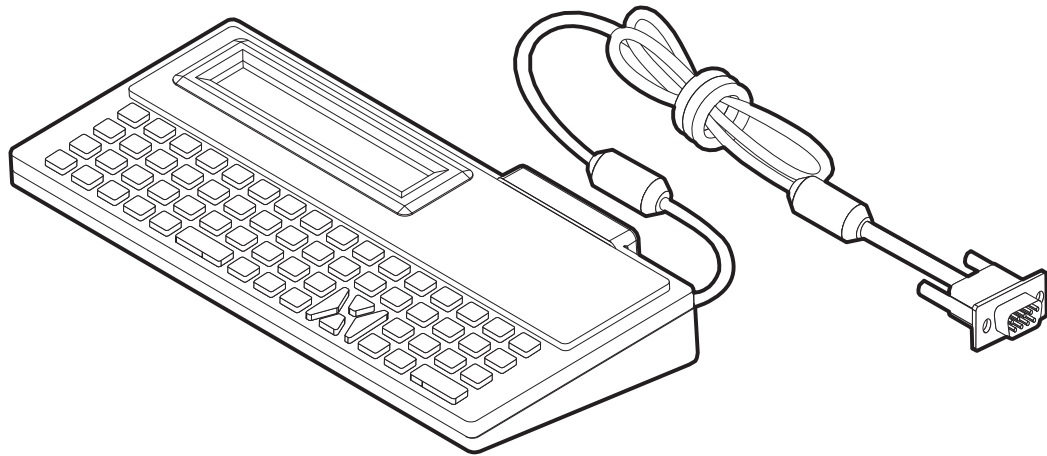
6. During the print job, the printer will peel off the backing and present a single label. Take the label from the printer to allow the printer to print the next label. Note: If you did not activate the label taken sensor to detect the removal of the dispensed (peeled) label with software commands, the printer will stack and eject peeled labels.

## Zebra® KDU — Printer Accessory

The KDU (keyboard display unit) is a small terminal unit that interfaces with the printer for accessing EPL label forms stored in the printer.

The KDU is strictly a terminal and does not have the capability to store data or set up parameters. The KDU is used for the following functions:

- List label forms stored in printer
- Retrieve label forms stored in printer
- Input variable data
- Printing labels



## KDU Plus™ — Printer Accessory

The KDU Plus is a terminal device with memory for storing files and maintaining one or more remote printers. The KDU Plus has a larger laptop style keyboard than the Zebra's original KDU design.

The KDU Plus is designed for the following functions:

- List label forms stored in printer
- Retrieve label forms stored in printer
- Input variable data
- Printing labels
- File storage and transfer

The KDU Plus is designed to work with ZPL and EPL printers by dynamically detecting and switching the printer's communications configuration (DTE or DCE) to match your Zebra printer. By default, the KDU Plus will start up forms mode. This is compatible with the operation of Zebra's original KDU. The KDU Plus is configurable to work in ZPL or terminal modes too.

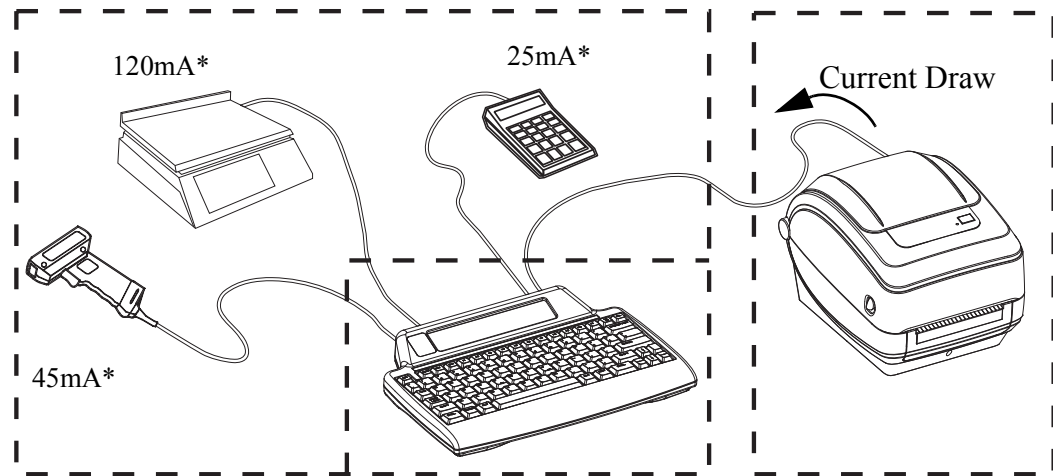
The KDU Plus has file transfer and storage capabilities. This is great for maintaining remote and stand alone printers with label forms, logos and smaller font sets.

The KDU Plus has two configurable serial port and a PS/2 port to connect to other data input devices such as scanners, weigh scales, etc..

The +5 volts from the printer's serial (pin 9) provides power for the KDU Plus and any additional input devices attached to the KDU Plus.

Maximum total current draw for the GC420 printer's serial (and parallel) port: **750mA**

The KDU Plus's current without external input devices attached is: **50mA**



\* - Not real values

50mA

**( 45mA + 120mA + 25mA ) + 50mA < Max. Current**



**Caution** • The KDU Plus's input ports (AUX1, AUX2, and PS/2 style) are not fused. Exceeding the total current draw available could damage an input device, KDU Plus, or the printer.



## ZBI 2.0™ — Zebra Basic Interpreter

Customize and enhance your printer with ZBI 2.0 optional programming language, ZBI 2.0 allows Zebra printers to run applications and take input from scales, scanners and other peripherals—all without a PC or network connection. ZBI 2.0 works with the ZPL printer command language so that printers can understand non-ZPL data streams and convert them into labels. That means the Zebra printer can create bar codes and text from input received, non-ZPL label formats, sensors, keyboards and peripherals. Printers can also be programmed to interact with PC based database applications to retrieve information to be used on printed labels.

ZBI 2.0 can be activated by ordering a ZBI 2.0 Key Kit, or activated by purchasing a key from the ZBI 2.0 store at [www.zebrasoftware.com](http://www.zebrasoftware.com).

Use the ZDownloader utility to apply the key. Zdownloader is available on the users CD or at the Zebra Web site: [www.zebra.com](http://www.zebra.com).

An intuitive ZBI-Developer™ programming utility is used to create, test and distribute ZBI 2.0 applications is available on the users CD or at the Zebra Web site: [www.zebra.com](http://www.zebra.com).



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# Maintenance

This section provides routine cleaning and maintenance procedures.

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Cleaning the Printhead . . . . .	49
Media Path Considerations . . . . .	50
Platen Cleaning and Replacement . . . . .	52
Other Printer Maintenance . . . . .	53
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## Cleaning

When you clean the printer, use one of the following supplies that best suits your needs:

Cleaning Supplies	Order Quantity	Intended Purpose
Cleaning pens (105950-035)	Set of 12	Clean printhead
Cleaning swabs (105909-057)	Set of 25	Clean media path, guides and sensors

You can obtain cleaning supplies at [www.zipzebra.com](http://www.zipzebra.com).

The cleaning process takes just a couple of minutes using the steps outlined below.

Printer Part	Method	Interval
Printhead	Let the printhead to cool for a minute, then use a new cleaning pen to swab the dark line on the printhead cleaning from the center to the outside edges of the printhead. See <i>Cleaning the Printhead</i> <a href="#">on page 49</a>	After every roll of media.
Platen roller	Remove the platen roller to clean. Clean the roller thoroughly with 90% medical-grade alcohol and a cleaning swab or lint-free cloth. See <i>Platen Cleaning and Replacement</i> <a href="#">on page 52</a>	As needed.
Peel bar	Clean it thoroughly with 90% medical-grade alcohol and a fiber-free cleaning swab. Let alcohol dissipate and the printer dry completely.	
Media path		
Exterior	Water-dampened cloth.	
Interior	Gently brush out printer.	



**Caution** • Adhesives and media material can over time transfer onto the printer components along the media path including the platen and printhead. This build-up can accumulate dust and debris. Failure to clean the printhead, media path and platen roller could result in inadvertent loss of labels, label jams and possible damage to the printer.



**Important** • Using too much alcohol can result in contamination of the electronic components requiring a much longer drying time before the printer will function properly.

## Cleaning the Printhead

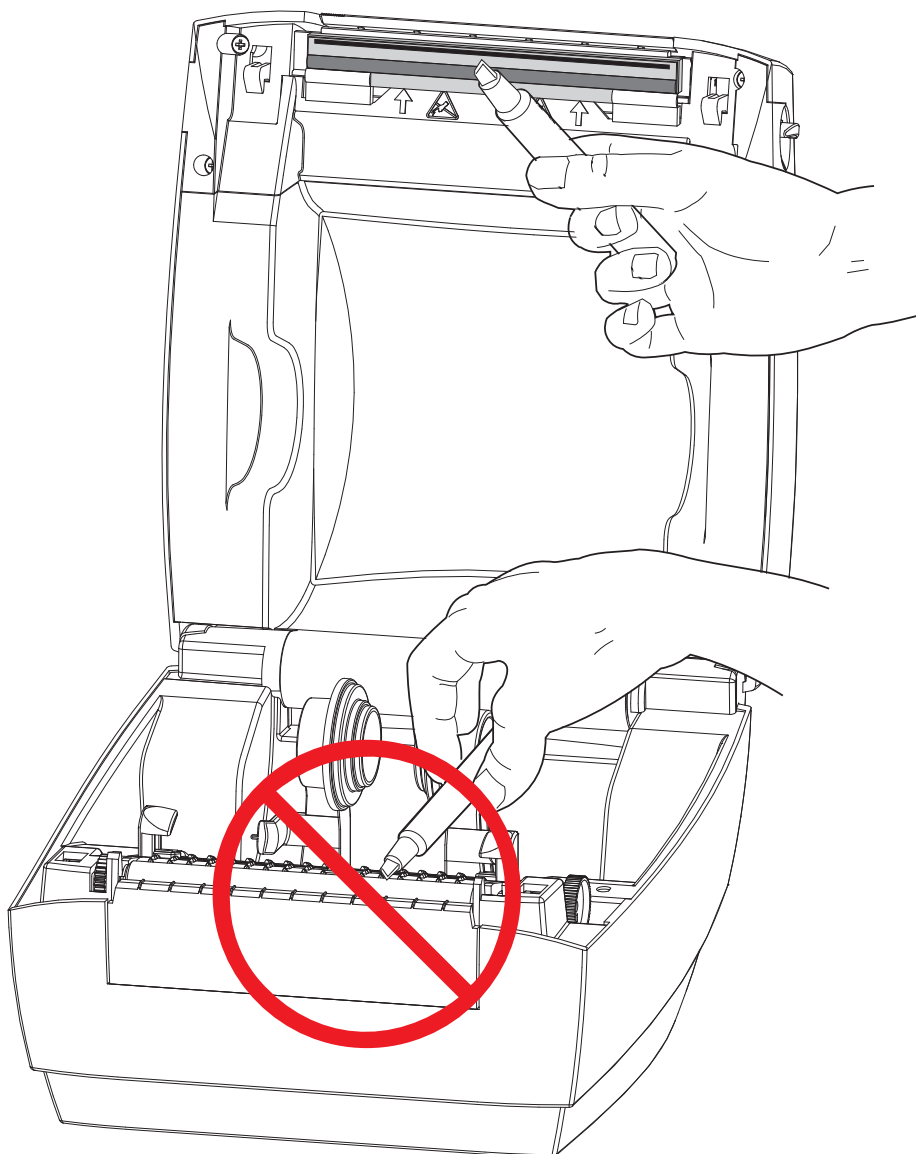
Always use a new cleaning pen on the printhead (an old pen carries contaminants from its previous uses that may damage the printhead).



**Caution** • The printhead becomes hot while printing. To protect from damaging the printhead and risk of personal injury, avoid touching the printhead. Use only the cleaning pen to perform maintenance.

When you load new media, you can also clean the printhead.

1. Rub the cleaning pen across the dark area of the printhead. Clean from the middle to the outside. This will move adhesive transferred from the edges of media to the printhead outside of media path.
2. Wait one minute before closing the printer.

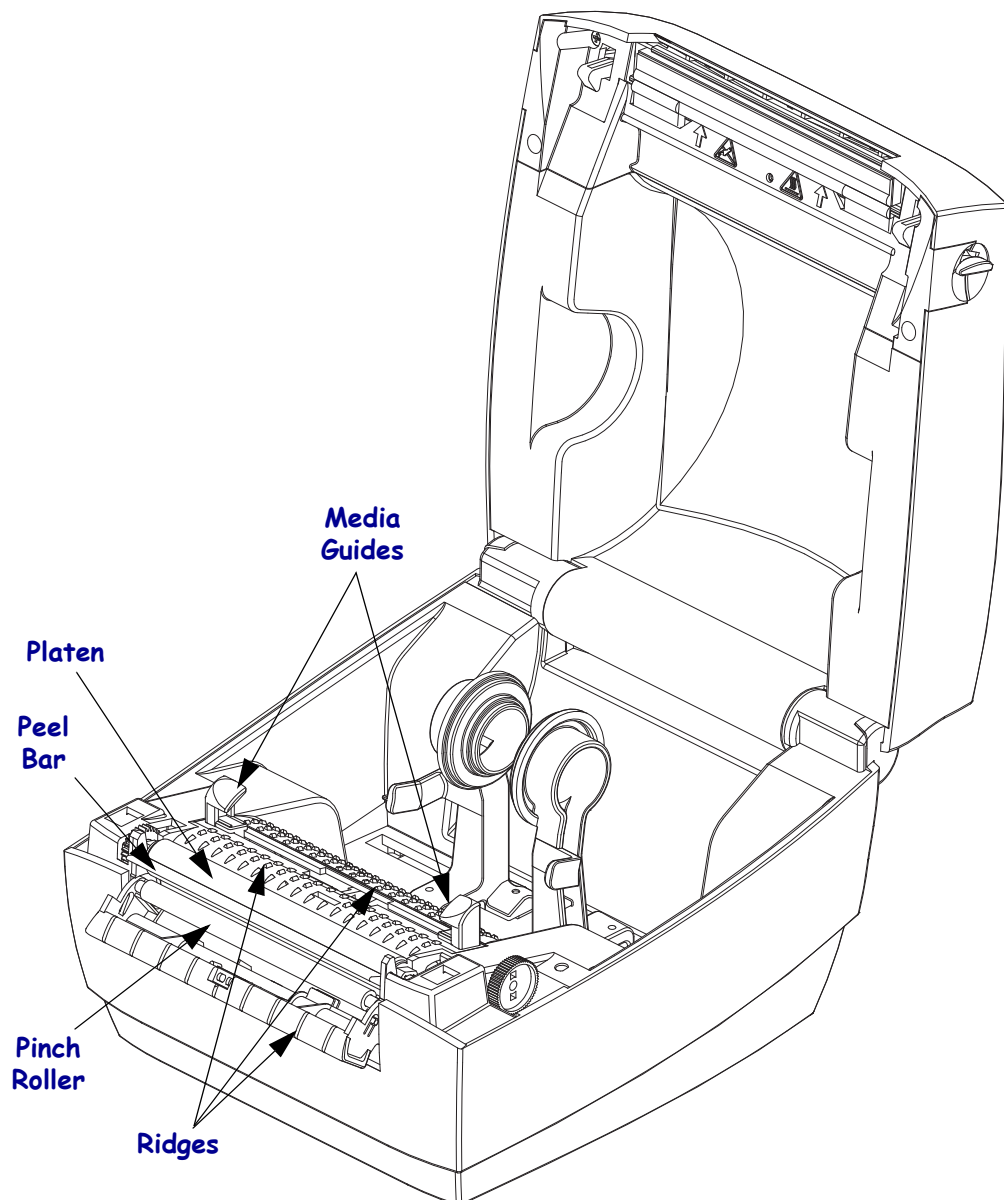


## Media Path Considerations

Use a cleaning swab to remove debris, dust or crust that has built-up on the holders, guides and media path surfaces.

1. Use the alcohol in the cleaning swab to soak the debris to break up the adhesive.
2. Wipe the ridges to remove accumulated debris.
3. Wipe the inside edges of both edge guides to remove any built-up residue.
4. Wait one minute before closing the printer.

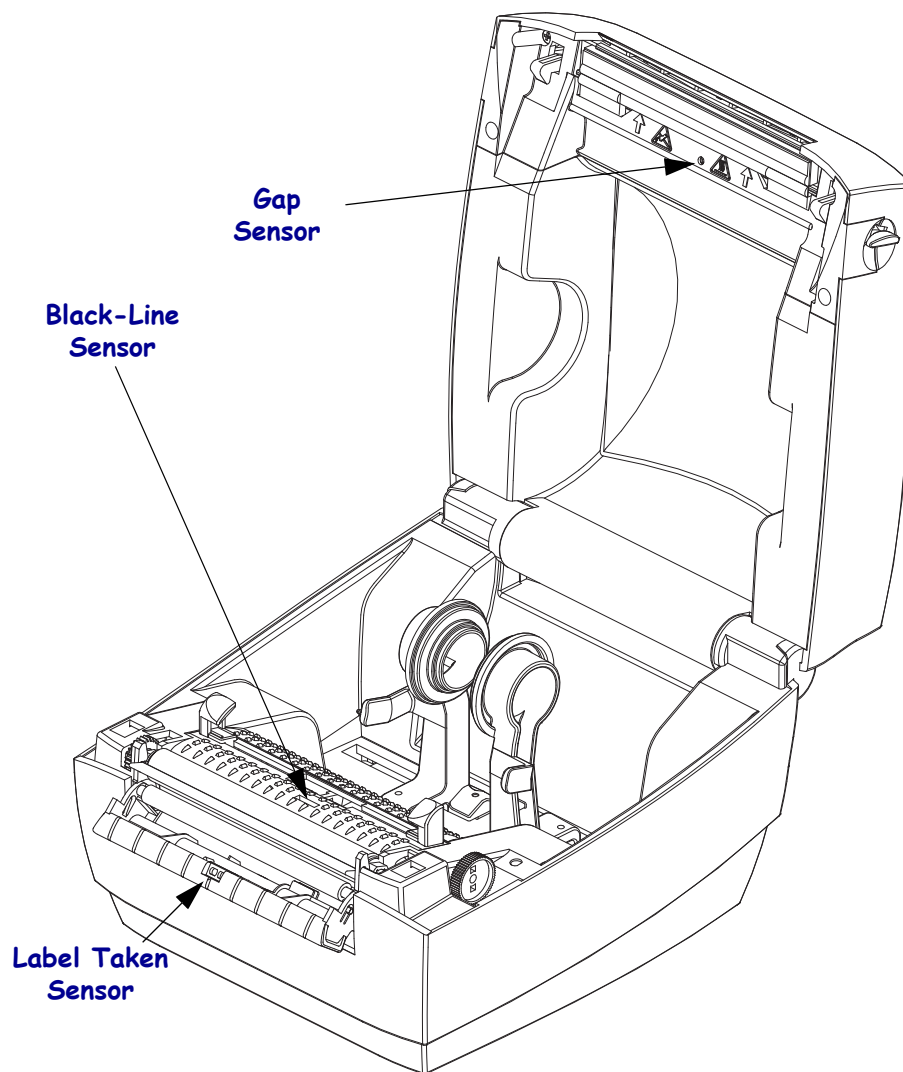
Discard the cleaning swab after use.



## Sensor Cleaning

Dust can accumulate on the media sensors.

1. Gently brush away dust; if necessary, use a dry swab to brush away dust. If adhesives or other contaminants remain, use an alcohol moistened swab to break it up.
2. Use a dry swab to remove any residue that may be left from the first cleaning.
3. Repeat steps 1 and 2 as required until all residue and streaks are removed from the sensor.



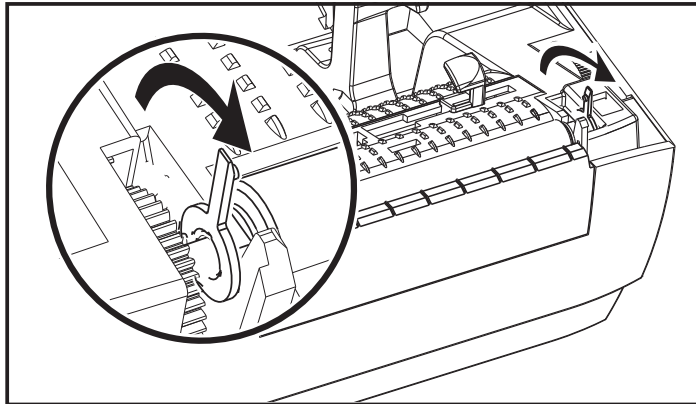
## Platen Cleaning and Replacement

The standard platen (drive roller) normally does not require cleaning. Paper and liner dust can accumulate without effecting print operations. Contaminates on the platen roller can damage the printhead or cause the media to slip or stick when printing. Adhesive, dirt, general dust, oils and other contaminants should be cleaned immediately off the platen.

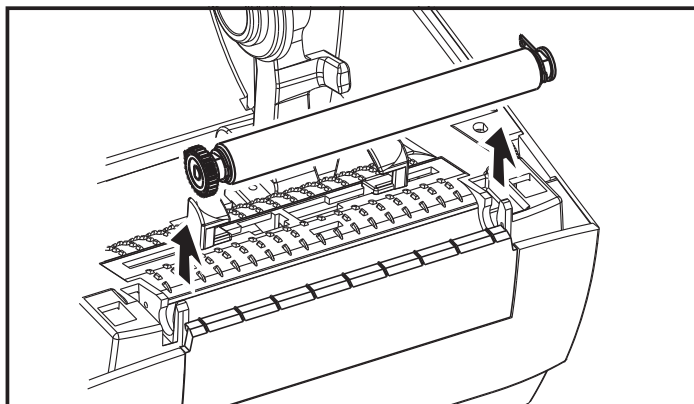
Clean the platen (and media path) whenever the printer has significantly poorer performance, print quality or media handling. The platen is the print surface and drive roller for your media. If sticking or jamming continues even after cleaning, you must replace the platen.

The platen can be cleaned with a fiber-free swab (such as a Texpad swab) or a lint free, clean, damp cloth very lightly moistened with medical grade alcohol (90% pure or better).

1. Open the cover (and dispenser door). Remove media from platen area.
2. Using a pointed stylus (such as tweezers, small slot-head screwdriver, or razor-knife), unhook the tabs on the right and left sides. Then rotate them forward.



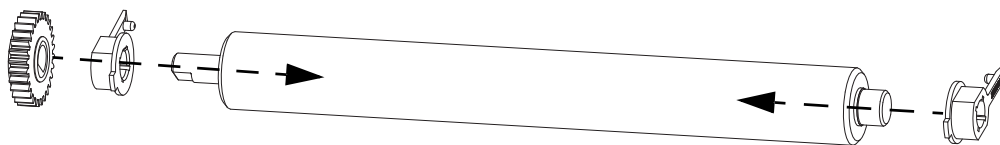
3. Lift the platen out of the printer's bottom frame.



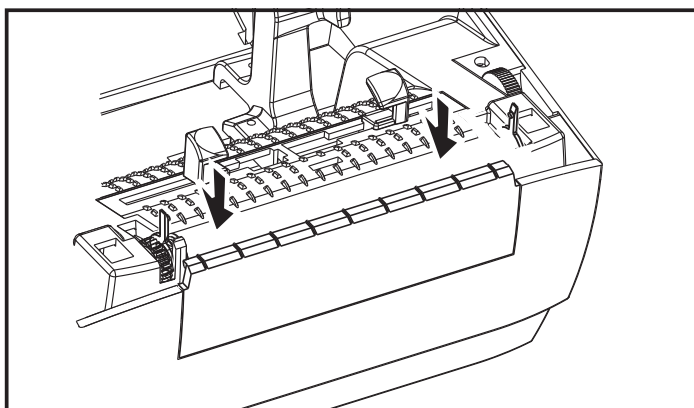
4. Clean the platen with the alcohol moistened swab. Clean from the center out. Repeat this process until the all of the roller surface has been cleaned. If there has been heavy adhesive build-up or label jam, repeat with a new swab to remove residual contaminants. Adhesives and oils, for example, may be thinned by the initial cleaning but not completely removed.



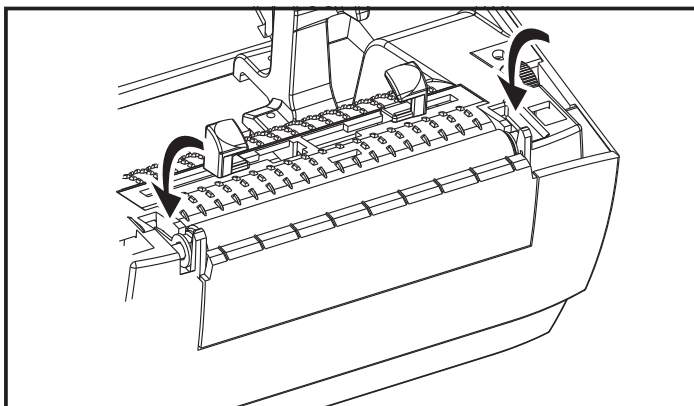
5. Install the platen in the printer. Discard the cleaning swabs after use - do not reuse.
6. Make sure the bearings and gear are on the shaft of the platen as shown.



7. Align the platen with the gear to the left and lower it into the printer's bottom frame.



8. Rotate the tabs back and snap them into place.



Allow the printer to dry for one minute before closing the dispenser door, media cover or loading labels.

## Other Printer Maintenance

There are no user level maintenance procedures beyond those detailed in this section. See the *Troubleshooting* [on page 59](#) for more information on diagnosing printer and print problems.

## Replacing the Printhead

If you need to replace the printhead, read the procedure and review the removal and installation steps before actually replacing the printhead.



**Caution** • Prepare your work area by protecting against static discharge. Your work area must be static-safe and include a properly grounded conductive cushioned mat to hold the printer and a conductive wrist strap for yourself.

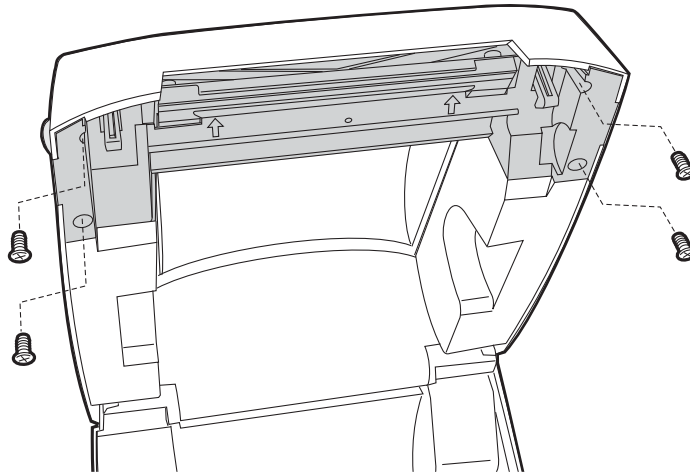


**Caution** • Turn the printer power off and unplug the power cord before replacing the printhead.

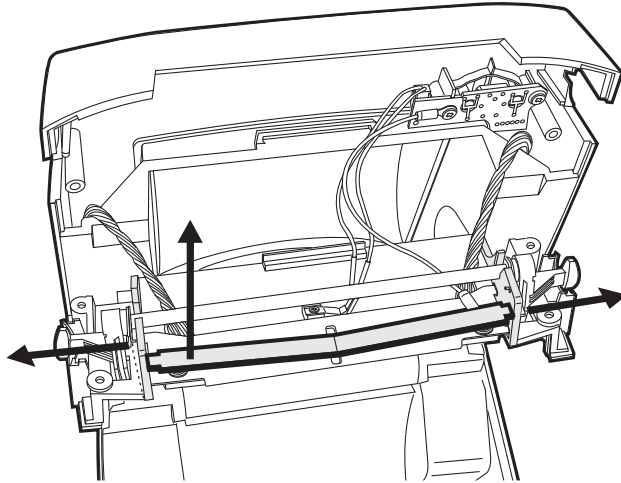
Before following the steps in this procedure, open the printer by pulling the release latches forward then lifting the top cover.

### Printhead Removal

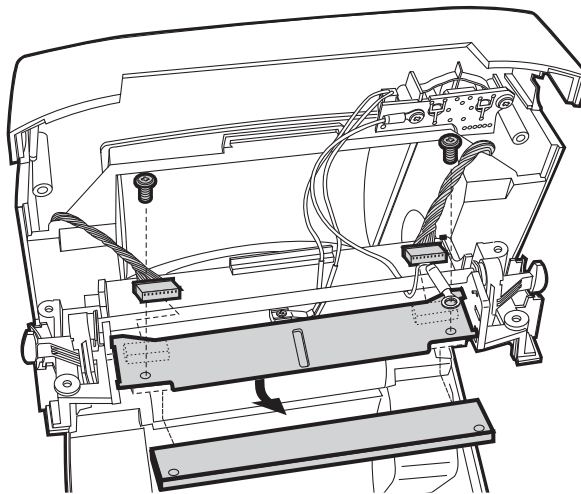
1. Use a #1 Phillips driver to loosen the four screws that hold the latch frame to the top case.



2. Grasp the print head spring and pull it to the left; then, slide it free of the latch frame.



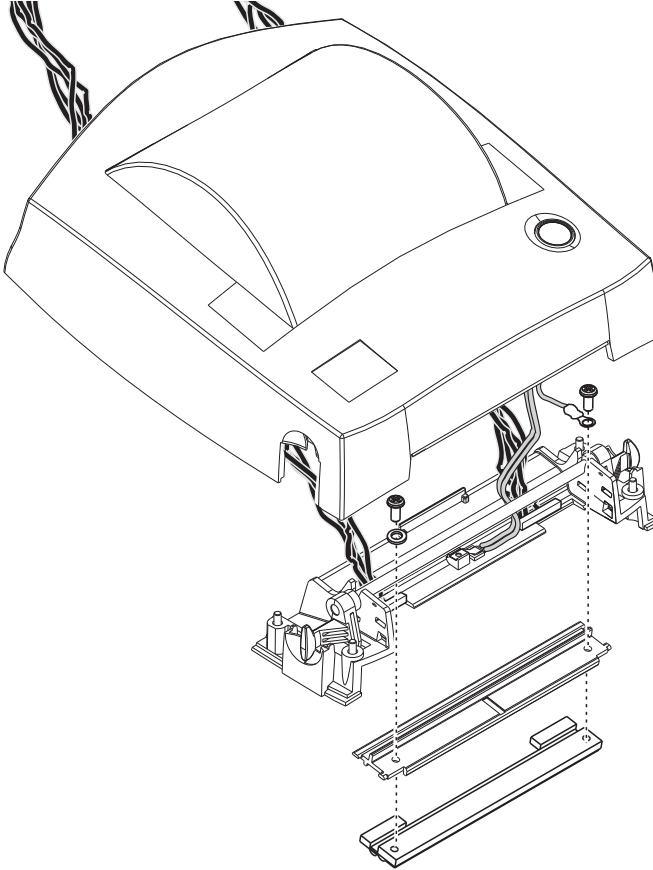
3. Gently pull the wire bundles from the printhead.



4. Use a #1 Phillips driver to loosen the two screws and washers and release the print head from the latch frame and bracket.

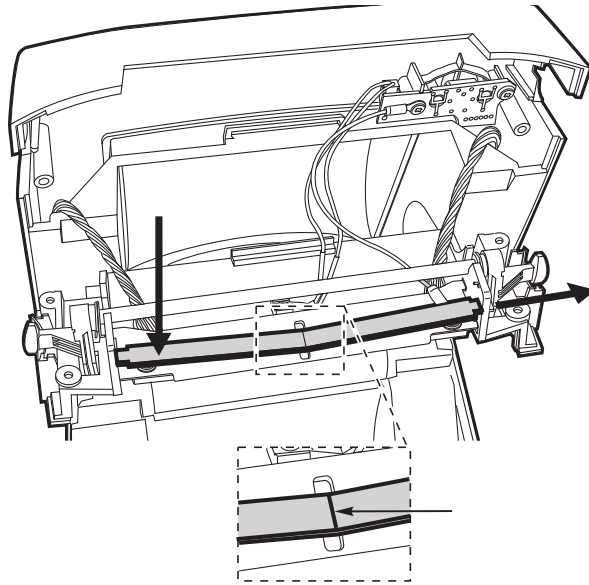
### Printhead Installation

1. Route the print head cables under the latch shaft and plug the printhead cables into the receptacles on the printhead.

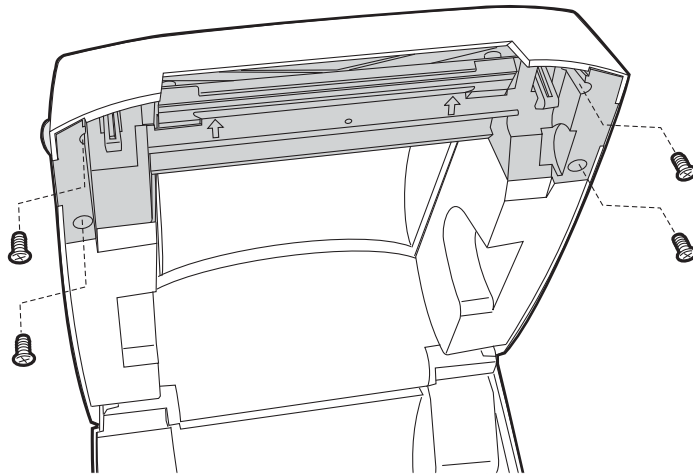


2. Hold the printhead against the bracket while replacing the screws and washers. Attach the ground wire using the right screw and washer. Use a #1 Phillips driver to tighten the screws.

3. Slip the left end of the printhead spring into the left side of the latch bracket; then slide the right end into the other side. The angle of the “V” fits into the indent on the top of the printhead bracket.



4. Align the latch bracket up to the top case and ensure that the cable are not bent or pinched.



5. Replace the four screws that hold the latch bracket to the top case and use a #1 Phillips driver to tighten them.
6. Clean the print head as described under *Cleaning the Printhead* [on page 49](#).
7. Reload media. Plug in the power cord, turn on the printer and print a status report to ensure proper function. See *Printing a Test (Printer Configuration) Label* [on page 15](#)



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# Troubleshooting

This section provides information about printer error reporting that you might need for printer troubleshooting. Assorted diagnostic tests are included.

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## Status Light Descriptions

What the Status Light is Telling You		
LED Status and Color	Printer Status	For a Resolution, Refer to Number:
Off	Off	1
Solid Green	On	2
Solid Amber	Stopped	3
Flashing Green	Normal Operation	4
Flashing Red	Stopped	5
Double Flashing Green	Paused	6
Flashing Amber	Paused	7
Alternately Flashing Green and Red	Needs Service	8
Flashing Red, Red and Green	Needs Service	9
Flashing Red, Amber Green (* - Do NOT reset or turn off power!)	Memory Defragmentation	10*



## Status Light Error Resolutions

The following Status Error Light Resolution numbers correspond to the Status Light Description table on the previous page. Each error number may have one or more resolution to correct that error listed.

### 1. The printer is not receiving power.

- Have you turned on the printer power?
- Check power connections from the wall outlet to the power supply, and from the power supply to the printer. See *Attaching Power* on page 10.
- Disconnect the printer from the wall outlet for 30 seconds and then reconnect the printer to the wall outlet.

### 2. The printer is on and in an idle state.

No action necessary.

### 3. The printer has failed its power on self test (POST).

- If this error occurs right after you turn on the printer, contact an authorized reseller for assistance. When the printer is operating normally, the printer status light will be amber for about 10 seconds before turning green (solid or blinking).

#### There is a memory error.

- If this error occurs after you have been printing, turn the printer power off and on, and then resume printing.

#### The printhead needs to cool down.

- If this error continues, turn the printer power off for five minutes or more, and then turn on. If the amber light persists, then the printer requires service.

### 4. The printer is receiving data.

- As soon as all of the data has been received, the status LED will turn green and the printer will automatically resume operation.

### 5. The media is out.

- Follow the instructions for *Loading Roll Media* on page 11 in the Getting Started section, and then press the Feed button to resume printing.

#### The printhead is open.

- Close the top cover and then press the Feed button to resume printing.

## 6. The printer is paused.

- Press the Feed button to resume printing.

## 7. The printhead is over temperature.

- Printing will stop until the printhead cools to an acceptable printing temperature. When it does, the printer will automatically resume operation.

## 8. FLASH memory is not programmed.

- Return the printer to an authorized reseller.

## 9. The printhead or motor has had a critical failure.

- Return the printer to an authorized reseller.

## 10. The printer is defragmenting memory.

**Caution** • Do NOT turn off the printer power during defragmentation. Doing so can damage the printer.

- Defragmentation is a normal operation of the printer – necessary to manage the memory space for optimal use. The printer will defragment its memory both after a factory default and when the printer detects that a defragment is required.

When the printer is in this condition, allow it to finish defragmenting. If this warning occurs frequently, check the label formats. Formats that frequently and repeatedly write to and erase from memory may cause the printer to defragment often. Using formats that avoid frequent and repeated memory write/erase event will minimize the need for defragmentation.

- If this warning condition does not go away, contact Technical Support. The printer requires service.

## Print Quality Problems

### No print on the label.

- The media may not be direct thermal media. See the test procedure *Determining Thermal Media Types* [on page 29](#).
- Is the media loaded correctly? Follow the instructions for *Loading Roll Media* [on page 11](#) in the Getting Started section. For printing using transfer ribbon, see *Printing a Test (Printer Configuration) Label* [on page 15](#).

### The printed image does not look right.

- The printhead is dirty. Clean the printhead.
- The printhead is under temperature.
- Adjust the print darkness and/or print speed.
  - Use the **^PR** (speed) and **~SD** (darkness) commands referenced in the ZPL Programming Guide.
  - Use the **D** (darkness/density) and **S** (speed) commands in the *EPL Programmer's Guide*.
  - Manually adjust print darkness with the six-flash sequence of *Feed Button Modes* [on page 70](#).
  - The Windows printer driver or application software may change these settings and may require a change to optimize print quality.
- The media being used is incompatible with the printer. Be sure to use the recommended media for your application, and always use Zebra-approved labels and tags.
- The printhead has worn out. The printhead is a consumable item and will wear out due to friction between the media and printhead. Using unapproved media may shorten life or damage your printhead. Replace the printhead.
- The platen may need cleaning or replacement. The platen (driver) roller maybe losing traction due to:
  - Foreign objects attached to its surface,
  - The rubbery smooth surface has become polished and slippery, or
  - There is damage to the normally smooth and flat print surface such as box knife cuts.

## There are long tracks of missing print (blank vertical lines) on several labels.

- The printhead is dirty. Clean the printhead.
- The printhead elements are damaged.

## The printing does not start at the top of the label or misprinting of one to three labels.

- The media may not be threaded correctly. Follow the instructions for *Loading Roll Media on page 11* in the Getting Started section.
- The printer needs to be calibrated. Refer to the two-flash sequence of *Feed Button Modes on page 70* in this section.
- ZPL Label Formats - The correct media sensor may not be activated. Manual calibration selects the media sensing method for the labels being used (refer to the **^MN** command in the *ZPL Programming Guide*).
- ZPL Label Formats - Verify that the Label Top (**^LT**) command is correctly set for your application (consult the *ZPL Programming Guide*).
- EPL Label Formats - The correct media sensor may not be activated for label dispensing, blackline or notch sensing, or for Gap/Web sensing. Manual calibration selects the media sensing method for the labels being used (refer to the **O** and **Q** commands in the *EPL Programmer's Guide*).
- EPL Label Formats - Verify that the Set Label Length (**Q**) command is correctly set for your application (consult the *EPL Programmer's Guide*).

## A ZPL label format was sent to, but not recognized by, the printer.

- Is the printer in pause mode? If so, press the Feed button.
- If the status LED is on or flashing, refer to *What the Status Light is Telling You on page 60*.
- Make sure the data cable is correctly installed.
- A communications problem has occurred. First, make sure that the correct communications port on the computer is selected. Refer to *Connecting your Printer to a Computer on page 18* in the Getting Started section.
- Verify the correct Format and Control Prefix on the printer match what you are using in your ZPL programmed label format. The default Format (COMMAND CHAR) is Caret (^) character and the Control (CONTROL CHAR) is a Tilde (~) character. Verify the characters with the Configuration Status label printout. Refer to the one-flash sequence of *Feed Button Modes on page 70* to print this label.

## **A EPL label format was sent to, but not recognized by, the printer.**

- Is the printer in pause mode? If so, press the Feed button.
- If the printer has label dispensing enabled, the printer may be waiting for the label to be removed. The liner/web must be properly threaded through the label dispenser mechanism (peeler) to correctly operate in label dispense mode, refer to *Label Dispenser Option on page 40*.
- If the status LED is on or flashing, refer to *What the Status Light is Telling You on page 60*.
- Make sure the data cable is correctly installed.
- A communications problem has occurred. First, make sure that the correct communications port (USB) on the computer is selected. Refer to *Connecting your Printer to a Computer on page 18* in the Getting Started section.

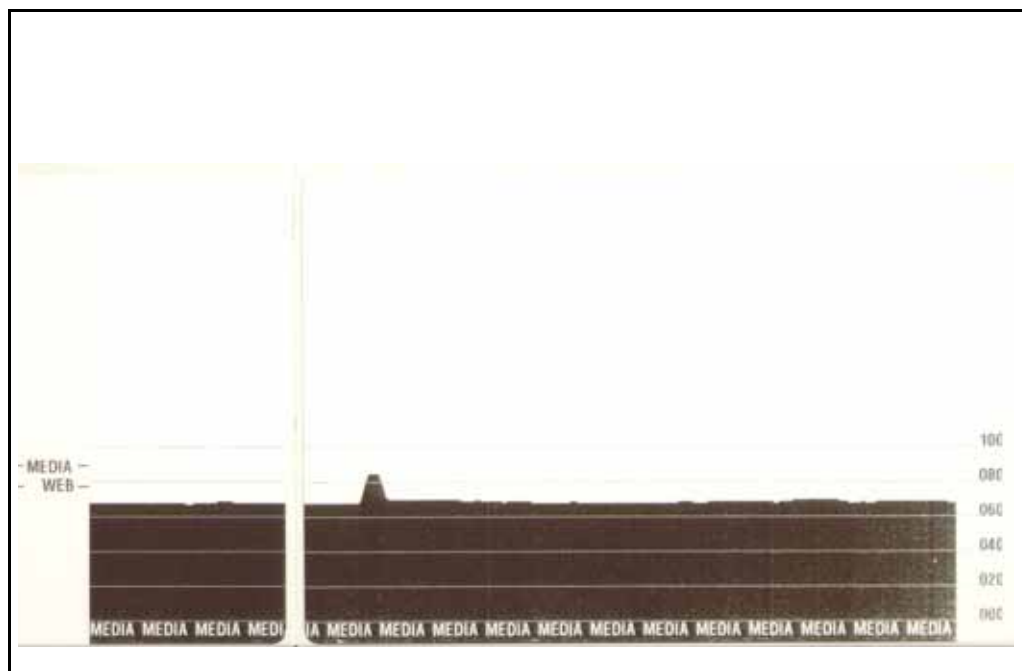
## Manual Calibration

Manual calibration is recommended whenever you are using pre-printed media or if the printer will not correctly auto calibrate.

1. Make sure media is loaded.
2. Turn on the printer power.
3. Press and hold the Feed button until the green status light flashes once, then twice and then continuing until the flash groups reach the group of seven flashes. Release the Feed button.
4. The printer will set the media sensor for the label backing being used. After it is done making this adjustment, the roll will automatically feed until a label is positioned at the printhead. A profile of the media sensor settings (similar to the example below) will print. Upon completion, the printer will save the new settings in memory and the printer is ready for normal operation.
5. Press the Feed button. One entire blank label will feed. If this does not happen, try defaulting (refer to the four-flash sequence in “Feed Button Modes” later in this chapter) and recalibrating the printer.



**Note** • Performing a manual calibration disables the auto calibration function. To return to auto calibration, default the printer (refer to the four-flash sequence in *Feed Button Modes* on page 70 in this section).



## Troubleshooting Tests

### Printing a Configuration Label

To print out a listing of the printer's current configuration, refer to the one-flash sequence in *Feed Button Modes* on page 70 in this section. See *Appendix: ZPL Configuration* on page 81 to interpret the label.

PRINTER CONFIGURATION	
Zebra Technologies ZTC GC420d ZBR3573999	
10.0.....	DARKNESS
4 IPS.....	PRINT SPEED
+000.....	TEAR OFF
TEAR OFF.....	PRINT MODE
GAP/NOTCH.....	MEDIA TYPE
WEB.....	SENSOR TYPE
AUTO.....	SENSOR SELECT
832.....	PRINT WIDTH
1236.....	LABEL LENGTH
39.0IN 989MM.....	MAXIMUM LENGTH
CONNECTED.....	USB COMM.
NONE.....	PROTOCOL
LINER/TAG FULL.....	CUTTER TYPE
<~> 7EH.....	CONTROL CHAR
<^> 5EH.....	COMMAND CHAR
<, > 2CH.....	DELIM. CHAR
ZPL II.....	ZPL MODE
NO MOTION.....	MEDIA POWER UP
FEED.....	HEAD CLOSE
DEFAULT.....	BACKFEED
+000.....	LABEL TOP
+0000.....	LEFT POSITION
NO.....	HEXDUMP
043.....	WEB S.
096.....	MEDIA S.
023.....	WEB GAIN
037.....	MARK S.
015.....	MARK GAIN
096.....	MARK MED S.
070.....	MARK MEDIA GAIN
096.....	CONT MEDIA S.
019.....	CONT MEDIA GAIN
066.....	TAKE LABEL
CWF.....	MODES ENABLED
.....	MODES DISABLED
832 8/MM FULL.....	RESOLUTION
V71.17.10ZP10 <-.....	FIRMWARE
1.3.....	XML SCHEMA
V27.00.01.....	HARDWARE ID
CUSTOMIZED.....	CONFIGURATION
2104k.....R:	RAM
5632k.....E:	ONBOARD FLASH
NONE.....	FORMAT CONVERT
DISABLED.....	ZBI
2.1.....	ZBI VERSION
4,824 IN.....	LAST CLEANED
4,824 IN.....	HEAD USAGE
4,824 IN.....	TOTAL USAGE
4,824 IN.....	RESET CNTR1
4,824 IN.....	RESET CNTR2
.....	SERIAL NUMBER
MAINT. OFF.....	EARLY WARNING
2010-09-07 17:32:33	TIME STAMP
FIRMWARE IN THIS PRINTER IS COPYRIGHTED	

### Recalibration

Recalibrate the printer if it starts to display unusual symptoms, such as skipping labels. Refer to the two-flash sequence in *Feed Button Modes* on page 70 in this section.

## Resetting the Factory Default Values

Sometimes, resetting the printer to the factory defaults may solve some problems. Refer to the four-flash sequence in *Feed Button Modes* [on page 70](#) in this section.

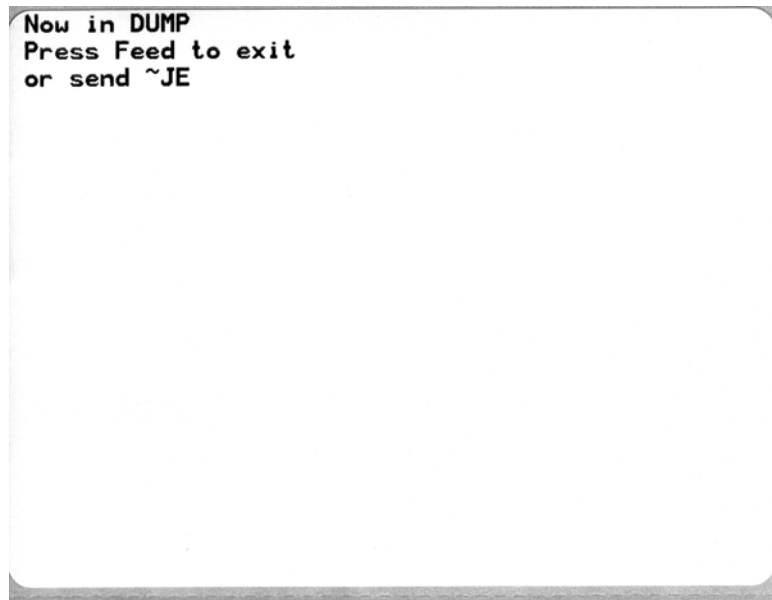
## Communications Diagnostics

If there is a problem transferring data between the computer and printer, try putting the printer in the communications diagnostics mode. The printer will print the ASCII characters and their respective hexadecimal values (a sample is shown below) for any data received from the host computer. To find out how,

There are multiple ways to enter hex data dump mode:

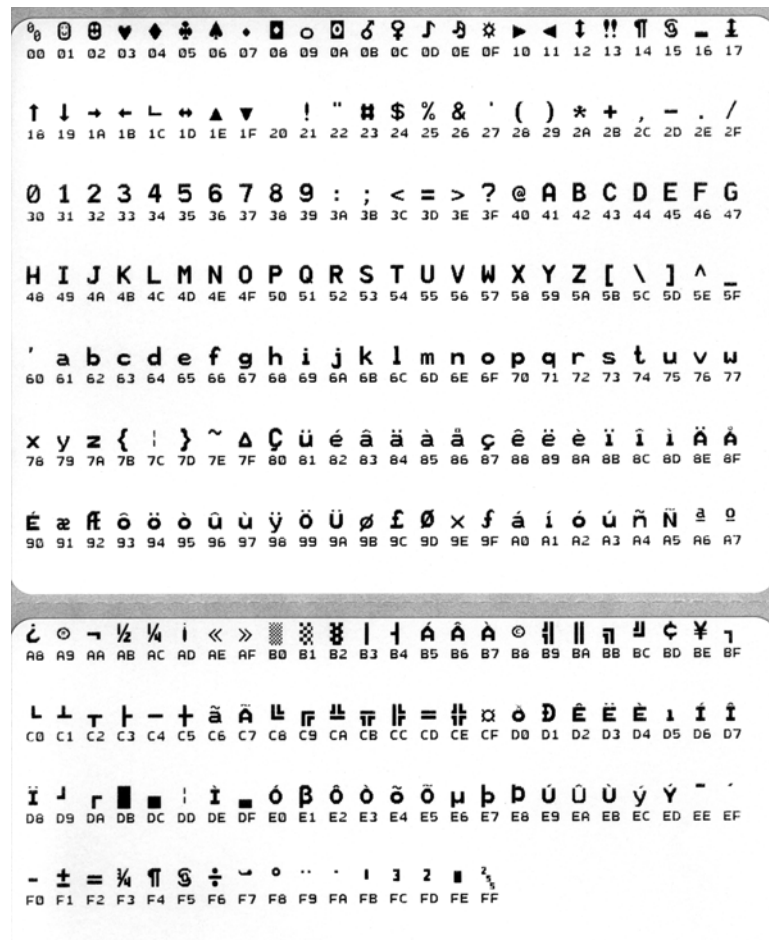
- The `~JD` ZPL command
- The `dump` EPL command
- On power up with the Feed button pressed. Refer to the power off mode procedure in *Feed Button Modes* [on page 70](#) in this section.

The printer will print 'Now in DUMP' (see below) and advance to the top of the next label.





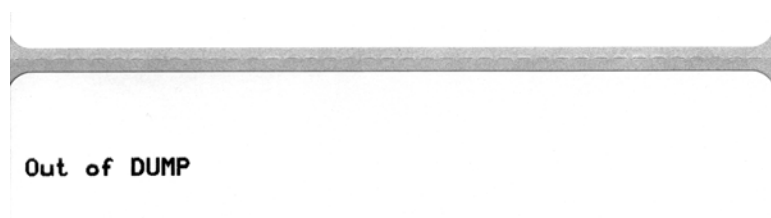
The following example of a communications DUMP mode printed out. The printout displays hexadecimal data 00h-FFh (0-255 decimal) with a unique character for each hexadecimal value displayed above the hexadecimal data.



The blank lines between the lines of data are where serial port and Bluetooth data handling errors get logged. The errors are:

- F = Frame Error
- P = Parity Error
- N = Noise Error
- O = Data Overrun Error

To exit the diagnostic mode and resume printing, turn off and then turn on the printer. An alternate method for exiting the diagnostic mode is to press the Feed button as many times as it takes to clear the printer's command buffer and print 'Out of DUMP' on the label.



## Feed Button Modes

Power Off Modes	
With the printer power off, press and hold the Feed button while you turn on the power.	
Flash Sequence	Action
<b>Amber - Red Flashing</b>	<p><b>Firmware Download Mode</b> - The printer starts rapidly flashing red to denote entry into the Firmware Download mode. Releasing the Feed button here will start initializing the printer for download. The printer is ready to start downloading firmware when the status light begins to slowly flash between red and green.</p> <p>See <i>Sending Files to the Printer</i> on page 38 for more information on using the Firmware (and File) Download utility available for use with this printer. Firmware updates for your printer, if available, are posted on the Zebra on our web site at: <a href="http://www.zebra.com">www.zebra.com</a></p>
<b>Amber</b>	<p><b>Normal Operations Mode</b> - The printer continues into a normal printer initialization. Releasing the Feed button here will allow the printer to start normally without firmware download or operating in communications diagnostics mode.</p>
<b>Green</b>	<p><b>Communications Diagnostic (Dump) Mode</b> - Release the Feed button immediately after the printer status light turns green. The printer will print 'Now in DUMP' at the top of the label and then advance to the next label. After printing the first label, the printer will automatically enter into diagnostic mode in which the printer prints out a literal representation of all data subsequently received.</p> <p><i>To exit the diagnostic mode and resume printing, turn off and then turn on the printer. An alternate method for exiting the diagnostic mode is to press the Feed button as many times as it takes to clear the printer's command buffer and print 'Out of DUMP' on the label.</i></p>

### Power On Modes

With the printer power on and top cover closed, press and hold the Feed button for several seconds. The green status LED will flash a number of times in sequence. The explanation at the right (Action) shows what happens when you release the key after the start specific number of flashes and before the next flash sequence starts.

Flash Sequence	Action
*	<b>Configuration Status</b> - Prints a detailed printer configuration status label. The label can be used to verify printing, assist printer to computer communication configuration, maintenance, troubleshooting, and help us with customer care communications.
* **	<b>Standard Auto Media Calibration</b> - The printer detects and sets media type and media length, and it adjusts the media sensors for optimal performance with the installed media (equivalent ZPL command <code>~JC</code> ). The printer will feed one to four labels while calibrating. <i>Note: Users familiar with the Zebra EPL desktop printer use this Feed mode to replace power-up AutoSensing calibration (equivalent EPL command <code>XA</code>).</i>
* ** ***	<b>Serial Port Configuration</b> - <i>Applies only to printers with serial interface ports.</i> To reset the serial port communication parameters, except for Flow Control. Press and release the Feed button while the LED rapidly flashes amber and green. For autobaud synchronization: Send the <code>^XA^XZ</code> command sequence to the printer while the LED rapidly flashes amber and green. When the printer and host are synchronized, the LED changes to solid green. NOTE: No labels will print during autobaud synchronization.
* ** *** ****	<b>Factory Defaults</b> - Resets the printer to the factory default settings (equivalent to ZPL command <code>^JUN</code> ). See <i>Appendix: ZPL Configuration on page 81</i> for a description of the primary configuration settings and their associated ZPL commands. Some configuration settings are not returned to their initial 'out of box' settings. Other settings are exclusively set, viewed and controlled by programming are also reset. The printer then performs a standard media calibration followed by .a memory defragmentation routine.
* ** *** **** *****	<b>Print Width Adjustment</b> - Prints a succession of boxes starting at the minimum print width and ending in the printer's maximum print width in 4mm increments. Press the Feed button once when the printer has reached the desired maximum print width. Note that the printer driver and applications can override this setting.
* ** *** **** ***** *****	<b>Print Darkness (Density) Adjustment</b> - Prints a succession of bar code simulation patterns starting at the minimum darkness (print density/heat) and ending in the printer's maximum darkness in increments of four (4) using the ZPL darkness setting range values. Press the Feed button once the pattern is clear and legible. Do not continue to increase the darkness setting or bar code line widths may become distorted reducing readability. Note that the printer driver and applications can override this setting.
* ** *** **** ***** ***** *****	<b>Manual Media Calibration</b> - The printer runs extensive tests to detect and set media type and media length, and then it adjusts the media sensors for optimal performance with the installed media (equivalent ZPL command <code>~JG</code> ). Manual calibration is recommended whenever you are using pre-printed media, print on the liner or if the printer will not correctly auto calibrate. A graphical profile of the media sensing will print. See <i>Manual Calibration on page 66</i> for more details and considerations.

If the Feed button remains pressed after 7th flash sequence cycle finishes, the printer exits the configuration mode when the Feed button is released.



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## Appendix: Interface Wiring

This section provides printer interface connection information.

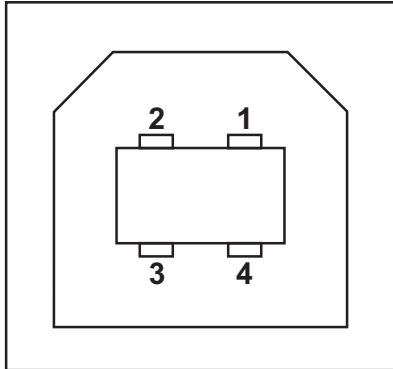
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## Universal Serial Bus (USB) Interface

The figure below displays the cable wiring required to use the printer's USB interface.

The printer requires cable or cable packaging that bears the "Certified USB™" mark to guarantee USB 2.0 compliance.

	Pin	Signal
	1	Vbus - N/C
	2	D-
	3	D+
	4	Ground
	Shell	Shield / Drain Wire

For printer supported operating systems and drivers, see the software and documentation CD or visit the Zebra Web site at:

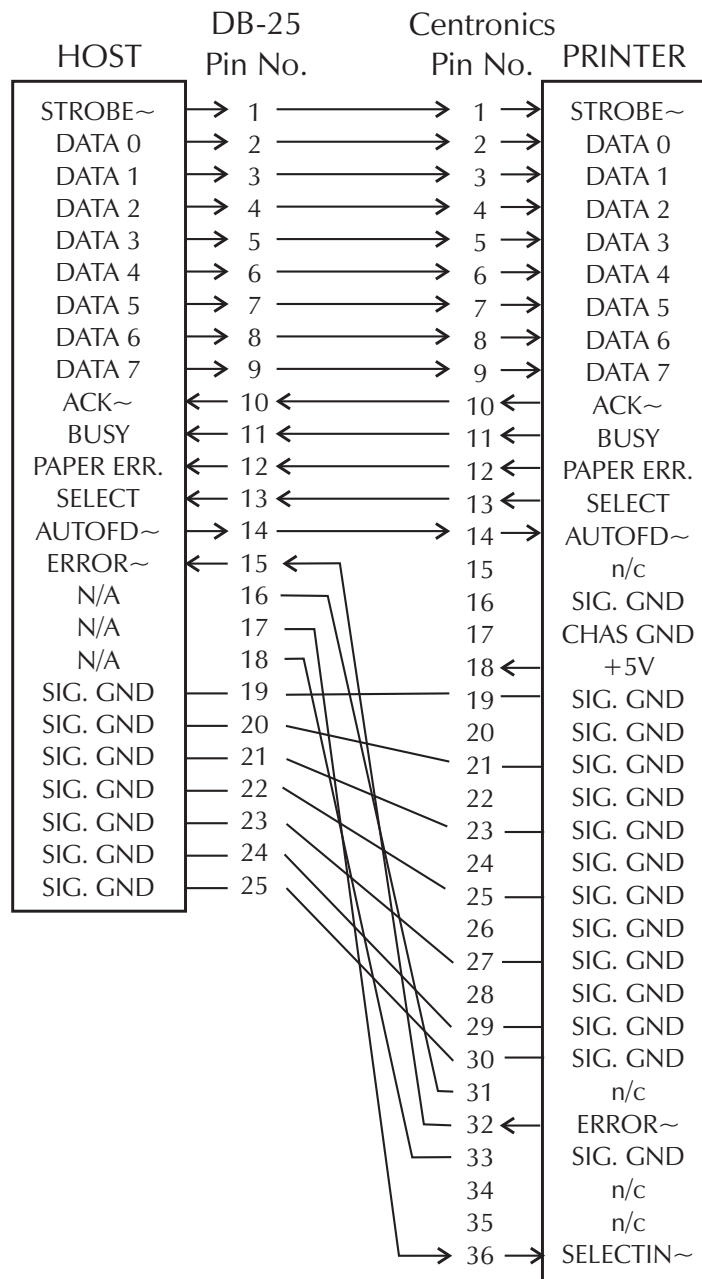
<http://www.zebra.com>

For information on the USB interface, go to the USB web site at:

<http://www.usb.org>

# Parallel Interface

The printer’s parallel interface uses the IEEE 1284-A to 1284-B parallel interface cables. the host connector has a DB-25 pin male connector. The printer connector is a Centronics style connector.



DB-25 to Centronics  
(Cable)

## Serial Port Interface

Pin	Description
1	+5 V @ 0.75 A fused
2	TXD (transmit data) output from the printer
3	RXD (receive data) input to the printer
4	DSR (data set ready) input to the printer
5	Chassis ground
6	DTR (data terminal ready) output from the printer -- controls when the host may send data
7	CTS (clear to send) - Not used by the printer
8	RTS (request to send) output from the printer -- always in the ACTIVE condition when the printer is turned on
9	Not used

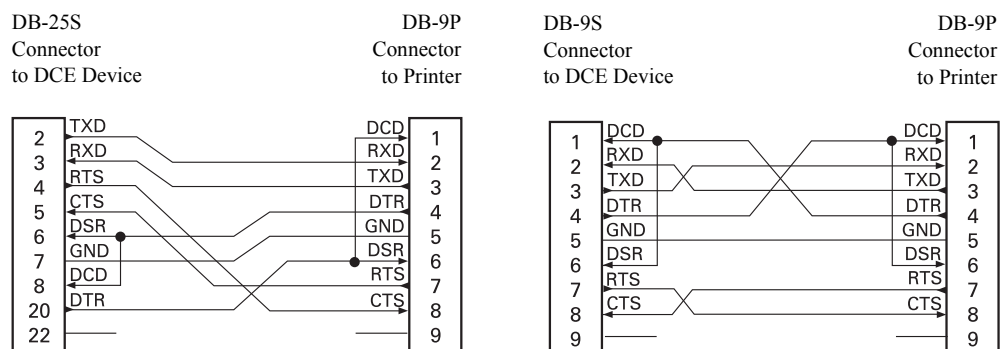
The maximum current available through the serial and/or parallel port is not to exceed a total of 0.75 Amps.

When XON/XOFF handshaking is selected, data flow is controlled by the ASCII control codes DC1 (XON) and DC3 (XOFF). The DTR control lead will have no effect.

Interconnecting to DCE Devices — When the printer is connected via its RS-232 interface to data communication equipment (DCE) such as a modem, a Null Modem RS-232 (straight-through) interface cable must be used. The figure below shows the connections required for this cable.

Connecting to the KDU (Keyboard Display Unit) — The KDU was designed for DCE printer connections (and does not require an adapter to communicate).

### Connecting the Printer to a DCE Device







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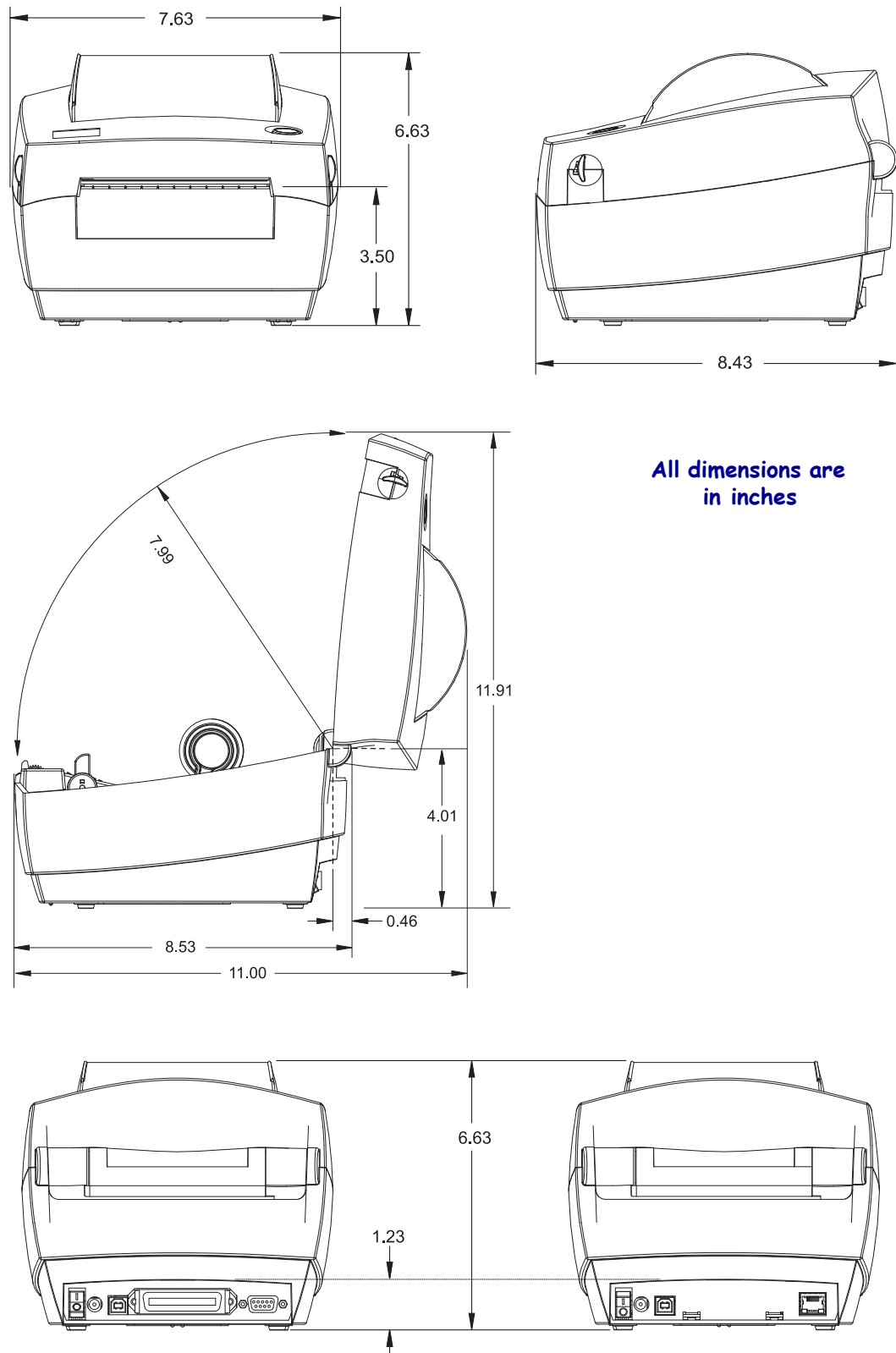
# Appendix: Dimensions

This section provides external printer dimensions.

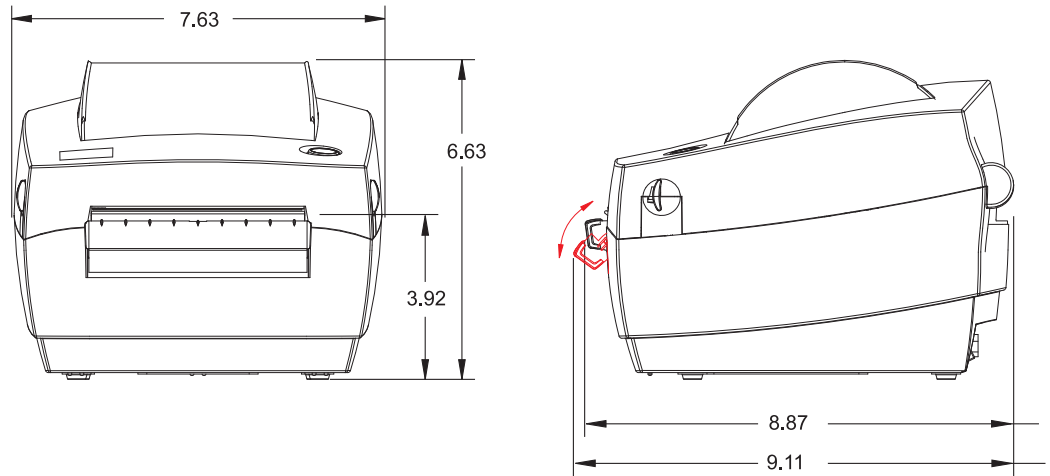
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## External GK Printer Dimensions



### Label Dispenser Option





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# Appendix: ZPL Configuration

This section provides a basic overview of managing printer configuration, the Configuring Status Printout, and Printer Memory Printouts.

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## Managing Printer Configuration with ZPL Programming

The printer is designed to allow you to change printer settings dynamically for fast first label out printing. Printer parameters that are persistent, will be retained for following formats to use. Those settings will remain in effect until they are changed by subsequent commands, the printer is reset, power is cycled, or when you restore a parameter that has a factory default by using the Feed Button Mode four (4) flash routine. The ZPL Configuration Update command (^JUS) saves and restores printer configurations to initialize (or re-initialize) the printer with pre-configured settings.

- To keep settings after a power cycle or printer reset, a ^JUS can be sent to the printer to save all current persistent settings.
- The values are recalled with a ^JUR command to restore the last saved values to you printer.

ZPL stores all parameters at once with a single command discussed above. The legacy EPL programming language (supported by this printer) changes and saves individual commands immediately. Most configuration and settings are shared between ZPL and EPL. For example, changing the speed setting with EPL will also change the speed set for ZPL operations. The changed EPL setting will persist even after a power cycle or reset issued by either printer language.

To assist the developer, the printer has a listing of the operating parameters, a Printer Configuration Label. It can be accessed by using the printer's Feed button and the *Printing a Test (Printer Configuration) Label* on page 15. The Zebra Setup Utility and the ZebraDesigner™ Windows driver also print this label and other printer status labels to help you manage your printer.

### ZPL Printer Configuration Format

Managing more than one printer can be done creating a printer configuration programming file to send to one or more printers or ZebraNet™ Bridge can be used to clone a printer's setup. Figure 1 below shows the basic structure of a ZPL programming configuration file.

See the ZPL programmer's guide and the *ZPL Configuration Status to Command Cross-reference* on page 83 to create a programming file. The Zebra Setup Utility (ZSU) can be used to send programming files to the printer. Windows Notepad (text editor) can be used to create programming files.

**Figure 1 • Configuration Parameter Format Structure**

**^XA** — Start Format Command

Format Commands are order sensitive

- General Print and command settings
- Media handling and behaviors
- Media print size

**^JUS** command to save

**^XZ** — End Format Command

## ZPL Configuration Status to Command Cross-reference

The Printer Configuration Label, shown below, provides a listing of a majority of the configurations settings that can be set by ZPL command. Some printer options and variations will only be displayed if they are present in the printer.

**Figure 2 • Configuration Label Printout**

PRINTER CONFIGURATION		
Zebra Technologies ZTC GC420d ZBR3573999		
10.0.....	DARKNESS	
4 IPS.....	PRINT SPEED	
+000.....	TEAR OFF	
TEAR OFF.....	PRINT MODE	
GAP/NOTCH.....	MEDIA TYPE	
WEB.....	SENSOR TYPE	
AUTO.....	SENSOR SELECT	
832.....	PRINT WIDTH	
1236.....	LABEL LENGTH	
39.0IN 989MM.....	MAXIMUM LENGTH	
CONNECTED.....	USB COMM.	
NONE.....	PROTOCOL	
LINER/TAG FULL.....	CUTTER TYPE	
<~> 7EH.....	CONTROL CHAR	
<^> 5EH.....	COMMAND CHAR	
<, > 2CH.....	DELIM. CHAR	
ZPL II.....	ZPL MODE	
NO MOTION.....	MEDIA POWER UP	
FEED.....	HEAD CLOSE	
DEFAULT.....	BACKFEED	
+000.....	LABEL TOP	
+0000.....	LEFT POSITION	
NO.....	HEXDUMP	
043.....	WEB S.	Sensor Settings used for Service Purposes
096.....	MEDIA S.	
023.....	WEB GAIN	
037.....	MARK S.	
015.....	MARK GAIN	
096.....	MARK MED S.	
070.....	MARK MEDIA GAIN	
096.....	CONT MEDIA S.	
019.....	CONT MEDIA GAIN	
066.....	TAKE LABEL	
CWF.....	MODES ENABLED	
.....	MODES DISABLED	
832 8/MM FULL.....	RESOLUTION	
V71.17.10ZP10 <-...	FIRMWARE	
1.3.....	XML SCHEMA	
V27.00.01.....	HARDWARE ID	
CUSTOMIZED.....	CONFIGURATION	
2104k.....R:	RAM	
5632k.....E:	ONBOARD FLASH	
NONE.....	FORMAT CONVERT	
DISABLED.....	ZBI	
2.1.....	ZBI VERSION	
4,824 IN.....	LAST CLEANED	
4,824 IN.....	HEAD USAGE	
4,824 IN.....	TOTAL USAGE	
4,824 IN.....	RESET CNTR1	
4,824 IN.....	RESET CNTR2	
.....	SERIAL NUMBER	
MAINT. OFF.....	EARLY WARNING	
2010-09-07 17:32:33	TIME STAMP	
FIRMWARE IN THIS PRINTER IS COPYRIGHTED		

**Table 2 • ZPL Commands and Configuration Receipt Callout Cross-Reference**

<b>Command</b>	<b>Listing Name</b>	<b>Description</b>
<b>~SD</b>	<b>DARKNESS</b>	<i>Default: 10.0</i>
<b>^PR</b>	<b>PRINT SPEED</b>	<i>Default: 4 IPS / 101.6 mm/s (max.)</i>
<b>~TA</b>	<b>TEAR OFF</b>	<i>Default: +000</i>
<b>^MM</b>	<b>PRINT MODE</b>	<i>Default: TEAR OFF</i>
<b>^MN</b>	<b>MEDIA TYPE</b>	<i>Default: GAP/NOTCH</i>
	<b>SENSOR TYPE</b>	<i>Default: WEB</i>
	<b>SENSOR SELECT</b>	<i>Default: AUTO (^MNA - Auto-Detect)</i>
<b>^PW</b>	<b>PRINT WIDTH</b>	<i>Default: 832 (dots)</i>
<b>^LL</b>	<b>LABEL LENGTH</b>	<i>Default: 1225 (dots) (the value constantly re-calibrates with automatic Web-Gap detection for label media)</i>
<b>^ML</b>	<b>MAXIMUM LENGTH</b>	<i>Default: 39.0IN 989MM</i>
<b>—</b>	<b>USB COMM.</b>	<i>Connection Status: Connected / Not Connected</i>
<b>—</b>	<b>PARALLEL COMM.</b>	<i>Connection Available: BIDIRECTIONAL</i>
<b>^SCa</b>	<b>BAUD</b>	<i>Default: 9600</i>
<b>^SC,b</b>	<b>DATA BITS</b>	<i>Default: 8 BITS</i>
<b>^SC,,c</b>	<b>PARITY</b>	<i>Default: NONE</i>
<b>^SC,,,,e</b>	<b>HOST HANDSHAKE</b>	<i>Default: DTR &amp; XON/XOFF</i>
<b>^SC,,,,,f</b>	<b>PROTOCOL</b>	<i>Default: NONE</i>
	<b>SER COMM. MODE</b>	<i>Default: AUTO</i>
	<b>CUTTER TYPE</b>	<i>Option Present: LINER/TAG FULL (cut)</i>
<b>^CT / ~CT</b>	<b>CONTROL CHAR</b>	<i>Default: &lt;~&gt; 7EH</i>
<b>^CC / ~CC</b>	<b>COMMAND CHAR</b>	<i>Default: &lt;^&gt; 5EH</i>
<b>^CD / ~CD</b>	<b>DELIM./CHAR</b>	<i>Default: &lt;,&gt; 2CH</i>
<b>^SZ</b>	<b>ZPL MODE</b>	<i>Default: ZPL II</i>
<b>^MFa</b>	<b>MEDIA POWER UP</b>	<i>Default: NO MOTION</i>
<b>^MF,b</b>	<b>HEAD CLOSE</b>	<i>Default: FEED</i>
<b>~JS</b>	<b>BACKFEED</b>	<i>Default: DEFAULT</i>
<b>^LT</b>	<b>LABEL TOP</b>	<i>Default: +000</i>
<b>^LS</b>	<b>LEFT POSITION</b>	<i>Default: +0000</i>
<b>~JD / ~JE</b>	<b>HEXDUMP</b>	<i>Default: NO (~JE)</i>

From this point in the Configuration Receipt listing, the printout has sensor settings and values are displayed to troubleshoot sensor and media operations. These are typically used by Zebra Tech Support to diagnose printer problems.



The configuration settings listed here resume after the **TAKE LABEL** sensor value. These listings contain printer features seldom changed from default or provide status information (e.g. Firmware Version).

**Table 3 • ZPL Commands and Configuration Receipt Callout Cross-Reference**

Command	Listing Name	Description
^MP	MODES ENABLED	<i>Default:</i> CWF (See ^MP Command) (CWFM for wireless printers with display)
	MODES DISABLED	<i>Default:</i> (nothing set)
^JM	RESOLUTION	Default: <b>832 8/mm FULL</b> (203 dpi) <b>1280 8/mm FULL</b> (300 dpi)
	FIRMWARE	Lists ZPL Firmware Version
—	XML SCHEMA	<b>1.3</b>
—	HARDWARE ID	Lists Firmware Boot-block Version
—	CONFIGURATION	<b>CUSTOMIZED</b> (after first use)
—	RAM	<b>2104k..... R:</b>
—	OPTION MEMORY	<b>56532k.....B:</b> ( <i>only displays this if installed</i> )
—	ONBOARD FLASH	<b>5632k.....E:</b>
^MU	FORMAT CONVERT	<b>NONE</b>
^JI / ~JI	ZBI	<b>DISABLED</b> ( <i>Requires key to enable</i> )
—	ZBI VERSION	<b>2.1</b>
^JH ^MA ~RO	LAST CLEANED	<b>X,XXX IN</b>
	HEAD USAGE	<b>X,XXX IN</b>
	TOTAL USAGE	<b>X,XXX IN</b>
	RESET CNTR1	<b>X,XXX IN</b>
	RESET CNTR1	<b>X,XXX IN</b>
—	SERIAL NUMBER	<b>XXXXXXXXXXXX</b>
^JH	EARLY WARNING	<b>MAINT. OFF</b>

The printer has the ability to set a command or a group of commands once for all receipts (or labels) that follow. Those settings will remain in effect until they are changed by subsequent commands, the printer is reset, or you restore factory defaults.

## Printer Memory Management and Related Status Reports

To help you manage printer resources, the printer supports a variety of format commands to manage memory, transfer objects (between memory areas, import and export), object naming, and provide various printer operating status reports. They are very similar to the old DOS commands like DIR (directory listing) and DEL (delete file). The most common reports are also part of the Zebra Setup Utility and ZebraDesigner™ Windows driver.

**Figure 3 • Memory Management Format Structure**

**^XA** — Start Format Command

A Single Format Command is recommended for purposes of reuse

**^XZ** — End Format Command

It is recommended that a single command be processed within a this type of format (form). A single command is easily reused as a maintenance and development tool.

Many of the commands that transfer objects, manage and report on memory are control (~) commands. They do not need to be within a format (form). They will be processed immediately upon receipt by the printer whether in a format (form) or not.



**Note** • To maximize available printer memory, the printer includes an automatic memory defragmentation (defrag). Several factors can trigger a defrag operation. Changing memory by deleting or adding objects to memory can cause a defrag. The printer status light will begin flashing Red, Amber and Green when a memory defrag is in process. Do not turn off the printer's power while the status light is flashing. This operation may take several minutes if memory use and file fragmentation are high.

## ZPL Programming for Memory Management

ZPL has various printer memory locations that are used to run the printer, assemble the print image, store formats (forms), graphics, fonts and configuration settings.

- ZPL treats Formats (Forms), Fonts, and Graphics like files; and memory locations like disk drives in the DOS operating system environment:
  - Memory Object Naming: Up to sixteen (16) alphanumeric characters followed by a three (3) alphanumeric character file extension:  
i.e. 123456789ABCDEF.TTF  
Legacy ZPL printers with V60.13 firmware and earlier can only use the 8.3 file name format versus today's 16.3 file name format.
- Allows moving objects between memory locations and deleting objects.
- Supports DOS directory style file list reports as printouts or status to the host.
- Allows use of 'wild cards' (\*) in file access

**Table 4 • Object Management and Status Report Commands**

<b>Command</b>	<b>Name</b>	<b>Description</b>
<b>^WD</b>	Print Directory Label	Prints a list of objects and resident bar codes and fonts in all addressable memory locations
<b>~WC</b>	Print Configuration Label	Prints a configuration Status Receipt (Label) Same as Feed Button mode one flash routine
<b>^ID</b>	Object Delete	Deletes objects from printer memory
<b>^TO</b>	Transfer Object	Used to copy an object or group of objects from one memory area to another.
<b>^CM</b>	Change Memory Letter Designation	Reassigns a letter designation to a printer memory area.
<b>^JB</b>	Initialize Flash memory	Similar to formatting a disk - erases all objects from the specified memory locations B: or E: .
<b>~JB</b>	Reset Optional Memory	Similar to formatting a disk - erases all objects from the B: memory (factory option).
<b>~DY</b>	Download Objects	Downloads and installs wide variety of printer usable programming objects: fonts (OpenType and TrueType), graphics, and other object data types. <i>Recommendation: Use ZebraNet™ Bridge for downloading graphics and fonts in the printer.</i>
<b>~DG</b>	Download Graphic	Downloads an ASCII Hex representation of a graphic image. <i>This is used by ZebraDesigner™ (label creation application) for graphics.</i>
<b>^FL</b>	Font Linking	Appends secondary TrueType font or fonts to the primary TrueType font to add glyphs (characters).
<b>^LF</b>	List Font Links	Prints a list of the linked fonts
<b>^CW</b>	Font Identifier	Assigns a single alphanumeric character as an alias to a font stored in memory.



**Important** • Some factory installed ZPL fonts in your printer cannot be copied, cloned or restored to your printer by reloading or updating firmware. If these license restricted ZPL fonts are removed by an explicit ZPL object delete command, they must be repurchased and reinstalled via a font activation and installation utility. EPL fonts do not have this restriction.



**Notes •** \_\_\_\_\_

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