

Zebra® R2844-Z™

Smart Label Printer
and Encoder

User Guide



Proprietary Statement

This manual contains proprietary information of the manufacturer. It is intended solely for the information and use of parties operating and maintaining the equipment described herein. Such proprietary information may not be used, reproduced, or disclosed to any other parties for any other purpose without the expressed written permission of the manufacturer.

Product Improvements

Continuous improvement of products is a policy of the manufacturer. All specifications and signs are subject to change without notice.

FCC Compliance Statement

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that the interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different than that to which the receiver is connected.
- Consult the dealer or an experienced Radio/TV technician for help.

NOTE: This unit was tested with shielded cables on the peripheral devices. Shielded cables must be used with the unit to insure compliance.

“The user is cautioned that any changes or modifications not expressly approved by the manufacturer could void the user’s authority to operate the equipment.”

Industry Canada Statement

IC: I28-R284Z

Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

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Battery

The main printed circuit board assembly includes a three-volt lithium battery.

CAUTION • Risk of explosion if battery is replaced with an incorrect type.

Note • Recycle batteries according to local your guidelines and regulations.



Shock Hazard

The printer and power supply should never be operated in a location where either one can get wet. Personal injury could result.



Media and Ribbon

Always use high-quality, approved labels, tags and ribbons. If adhesive backed labels are used that **DO NOT** 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. Permanent damage to the print head may result if a non-approved ribbon is used as it may be wound incorrectly for the printer or contain chemicals corrosive to the print head. Approved supplies can be ordered from your dealer.

If labels or ribbon run out while printing, **DO NOT** turn the power switch OFF (0) while reloading or data loss may result. After loading new supplies, press the feed button to resume printing.



Static Discharge

The discharge of electrostatic energy that accumulates on the surface of the human body or other surfaces can damage or destroy the print head or electronic components used in this device. **DO NOT TOUCH** the print head or the electronic components under the top cover.



Thermal Printing

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

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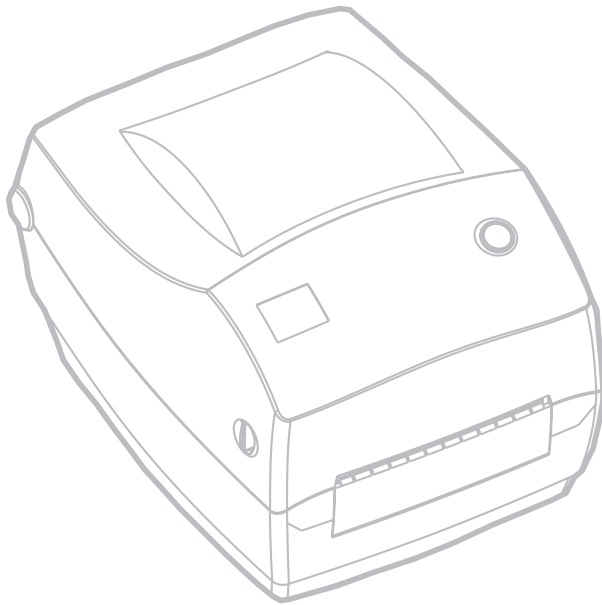
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Introduction

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

Hello!

Thank you for choosing a Zebra® R2844-Z™ printer, a high-quality on-demand printer with RFID (radio-frequency identification) capability manufactured by the industry leader in quality, service, and value—Zebra Technologies Corporation. For over 25 years, Zebra Technologies Corporation has provided customers with the highest caliber of products and support.

Your R2844-Z printer provides thermal-transfer printing (which uses ribbon) and direct-thermal printing.

This manual provides all of the information you will need to operate your printer on a daily basis. To create label formats, refer to the RFID-specific ZPL II commands in this guide and the *ZPL II Programming Guide*. The programming guide is available by contacting your distributor or Zebra Technologies Corporation.

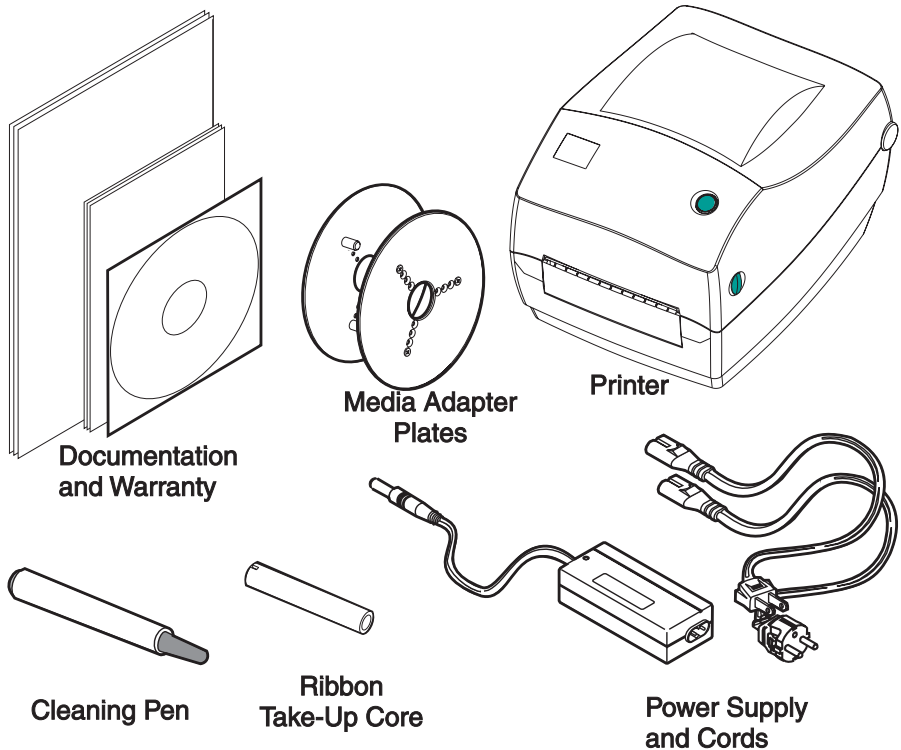


NOTE • Many printer settings may also be controlled by your printer's driver or label preparation software. Refer to the driver or software documentation for more information.

Your printer, when connected to a host computer, functions as a complete system for printing labels and tags, especially those with RFID applications.

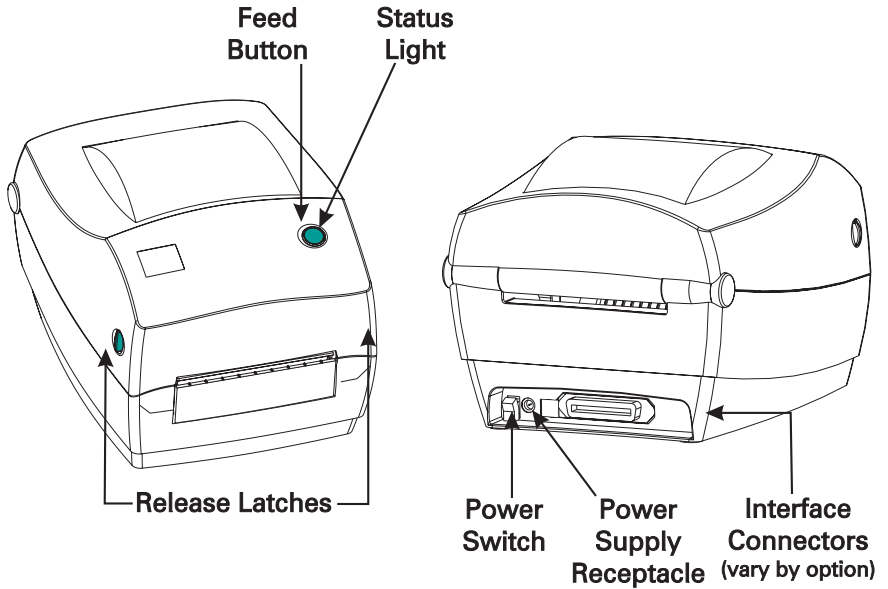
What's in the Box?

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.

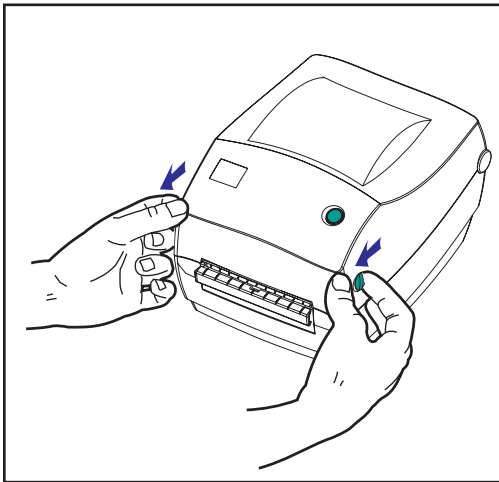


Inspecting the Printer

Look at the outside of the printer and make sure that all parts are present.



Opening the printer



To access the media compartment, you must open the printer.

Pull the release levers towards you and lift the cover.

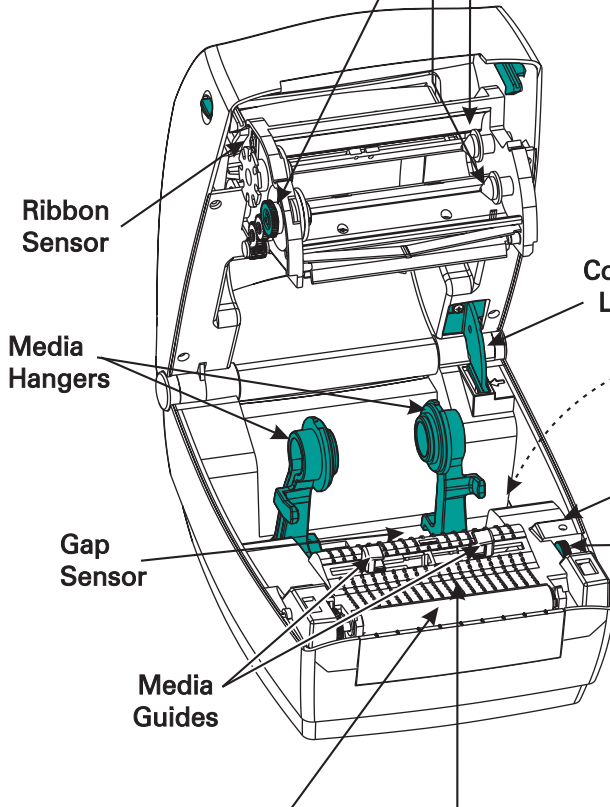
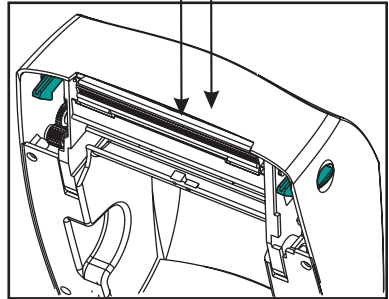
INSPECTING THE PRINTER (continued)

After opening the printer, check the media compartment.

Ribbon Carriage

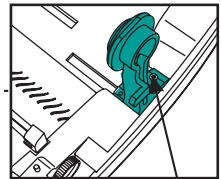
- Supply Hub
- Take-Up Hub
- Take-Up Gear

- Tear Bar
- Print Head



Ribbon Sensor

Cover Lock



Media Hangers

Head-Up Sensor
Lock-down Screw

Gap Sensor

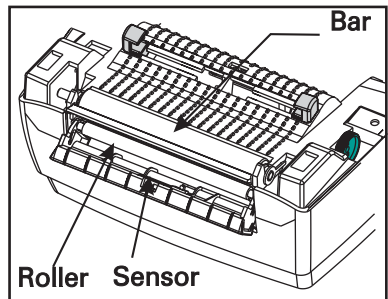
Media Guide Adjuster

Media Guides

Platen Roller

The RFID reader/writer is under the media path (inside the frame)

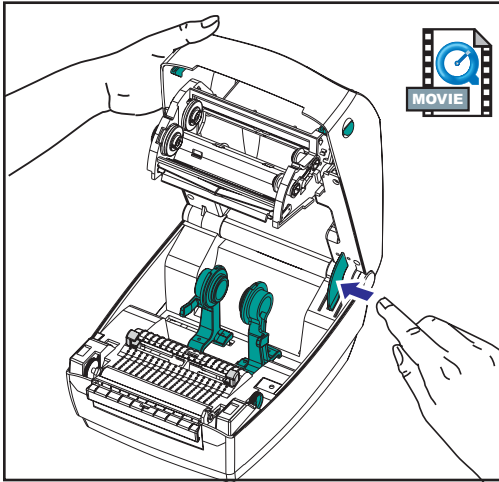
Peel-Off Option



Bar

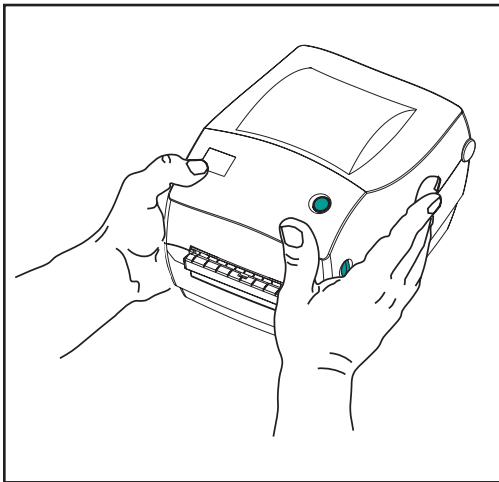
Roller Sensor

Closing the printer



Hold the top cover and press the “kick-stand” cover lock to release.

Lower the top cover. The ribbon carriage automatically folds up into place.



Press down until the cover snaps closed.

Reporting Damage

If you discover damage or missing parts:

- Immediately notify and file a damage report with the shipping company. The manufacturer is not responsible for any damage incurred during shipment of the printer and will not cover the repair of this damage under its warranty policy.
- Keep the carton and all packing material for inspection.
- Notify the authorized reseller

Related Documentation

Depending on the options you have ordered or choose to use with your new printer, you will find the following documents helpful:

- *ZPL II® Programming Guide*
- *ZebraNet® PrintServer II™ for Ethernet Networks Installation and Operation Guide*
- *Universal Serial Bus Specification* available from the USB Implementation Forum

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 in tear-off mode and loading ribbon.

Modes of Printing

You can operate this printer in different modes:

- Standard tear-off mode allows you to tear off each label (or a strip of labels) after it is printed.
- In optional peel-off mode, the backing material is peeled away from the label as it is printed. After this label is removed, the next one is printed.

The printer typically uses roll media, but you can use fan-fold or other continuous media as well.

For procedures to use optional modes and features, refer to the Operation and Options section.

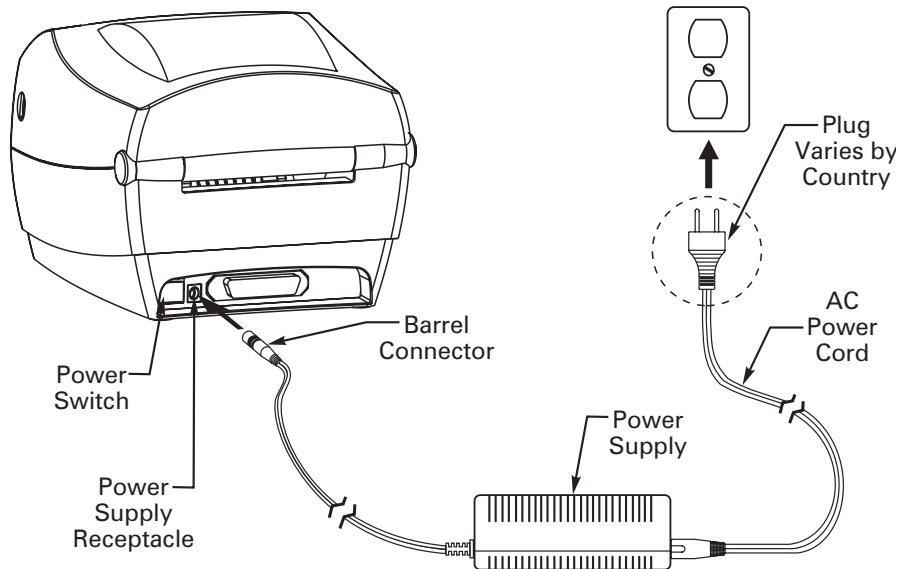
Attaching Power Supply

Check the power supply to make certain it is appropriate for your input voltage.



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

1. Make sure the power switch is in the off position (down).
2. The DC power supply has a barrel connector on one end that must be inserted into the power supply receptacle on the back of the printer.
3. Insert the separate AC power cord into the power supply.
4. Plug the other end of the cord into an appropriate AC electrical outlet.



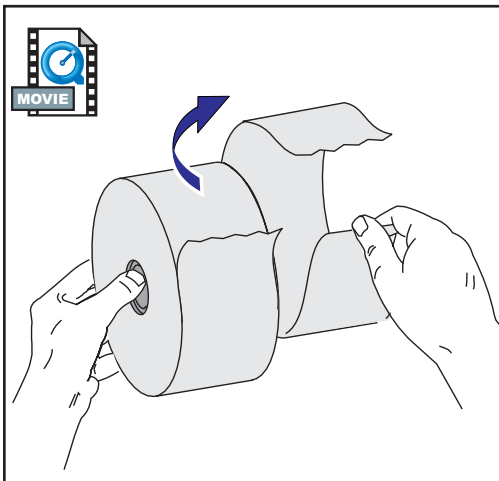
Loading Roll Media



When you load media, you must place the roll on the media hangers and then adjust the media guides.

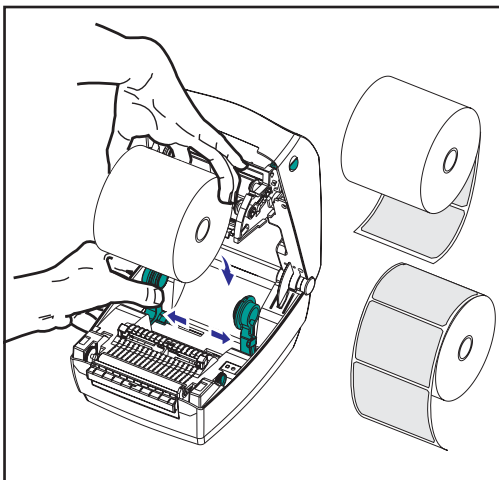
You must use the correct media for the type of printing you require. When printing without a ribbon, you must use direct thermal media. When using ribbon, you must use thermal transfer media. The printer's ribbon sensor detects motion of the supply spindle.

Placing the Roll in the Media Compartment

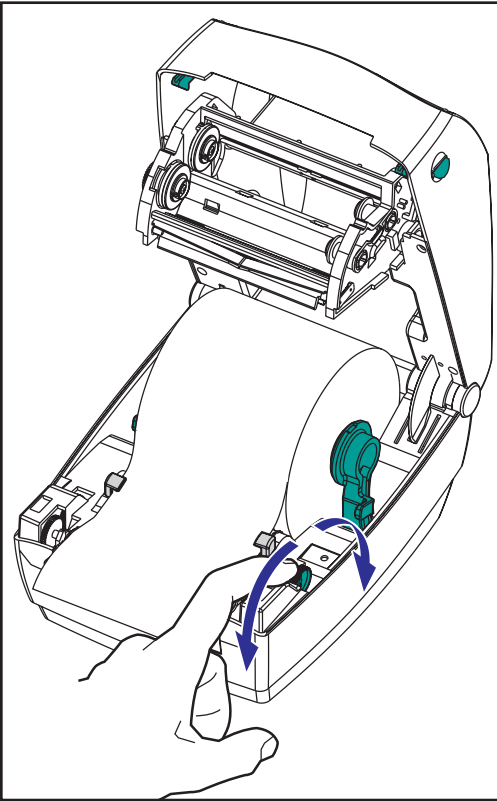


Whether your roll media is inside or outside wound you load it into the printer the same way.

1. Open the printer. Remember that you need to pull the release levers toward the front of the printer.
2. Remove the outside length of media. During shipment, the roll may become dirty when handled or dusty when stored. Removing the outside length avoids dragging adhesive or dirty media between the print head and platen.
3. Separate and hold open the media hangers.
4. Orient the media roll so that its printing surface will be up as it passes over the platen.
5. Lower the roll between the hangers and close them onto the core.



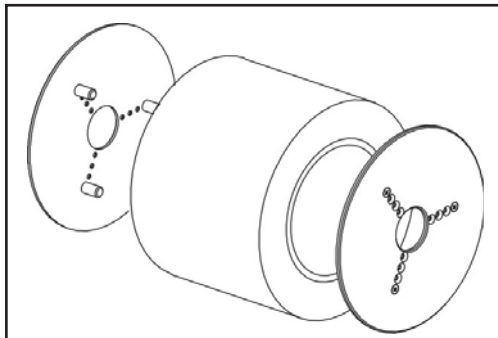
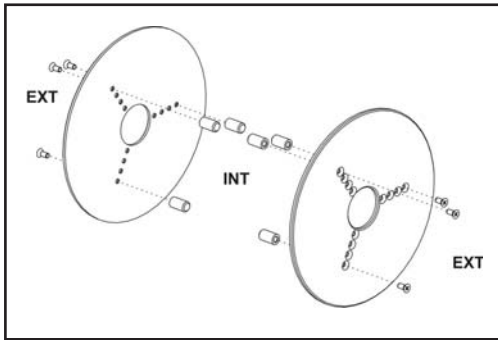
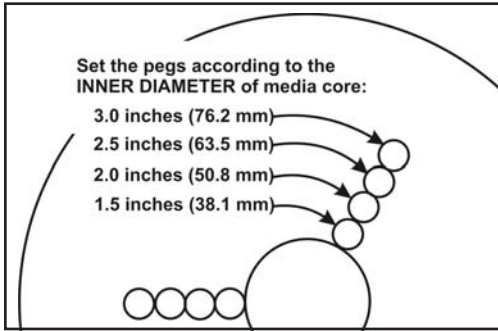
Adjusting the Guides



The adjustable guides direct the media toward the platen and print head.

1. Open the media guides by turning the guide adjuster knob to the rear.
2. Thread the media through the guides.
3. 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.
4. Unless you need to load ribbon, close the top cover. Remember that you need to release the cover lock, lower the top cover, and press down until the latches snap into place.

Using the Optional Media Adapter Plates



If your media roll has a larger diameter core, you can use an accessory to adapt the core to the media holders.

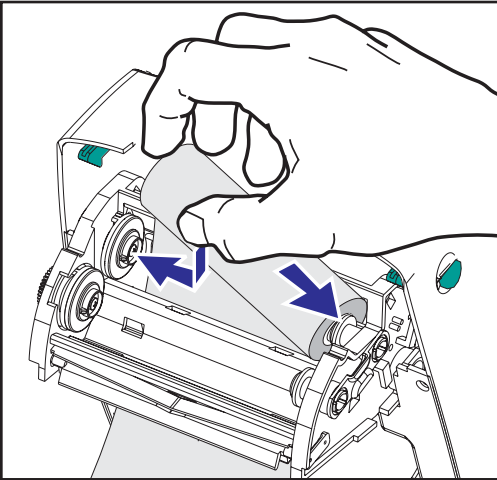
1. Note which position will fit the diameter of the roll core.
2. On the left side plate, align the pegs with the screws and use a small Phillips driver to tighten them.
3. On the right side plate, align the pegs with the screws and use a small Phillips driver to tighten them.
4. Align the plates so that the pegs hold the roll core and press together.
5. Place the roll into the media compartment.

Loading Ribbon



You must use thermal transfer media (accepts wax and/or resin transferred off a ribbon) when you use a ribbon. When loading ribbon, you install the supply and take-up rolls, then tighten the ribbon on the carriage.

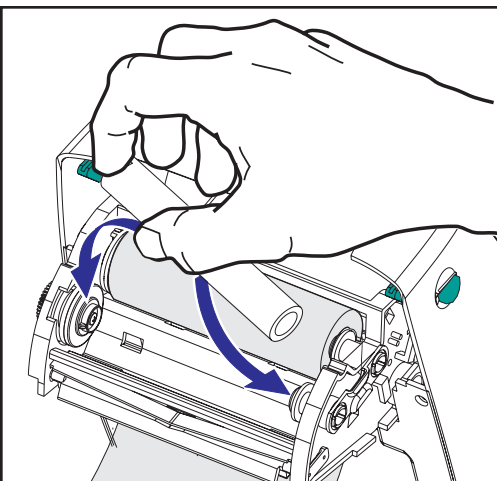
Install the Ribbon Supply Roll



Before following these steps, prepare the ribbon by removing its wrapping and pulling its adhesive strip free.

1. Thread the ribbon through the carriage.
2. Press the right side onto the supply hub.
3. Align the notches on the left side and mount onto the spokes of the left hub.

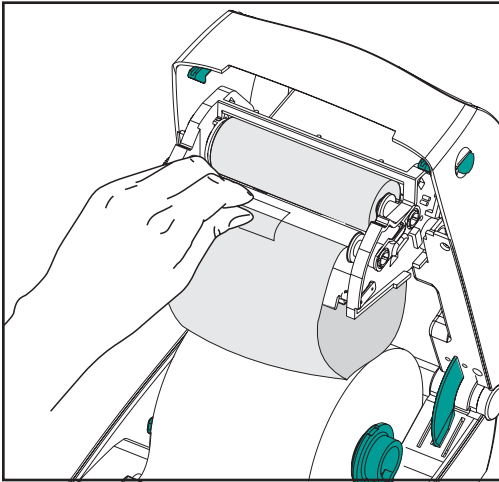
Install the Take-Up Core



1. Press the right side onto the take-up hub.
2. Align the notches on the left side and mount onto the spokes of the left hub.

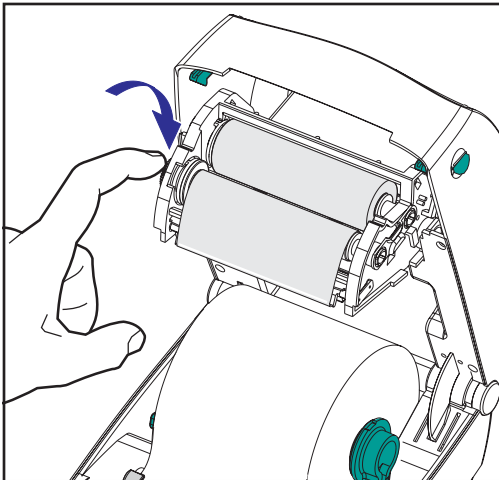
You can find your first ribbon take-up core in the packing box. Subsequently, use the empty supply core to take up the next roll of ribbon.

Attach and Tighten the Ribbon



You must align the ribbon so that it will be taken straight onto the core.

1. Attach the ribbon to the take up core. Use the adhesive strip on new rolls; otherwise, use tape.



2. Turn the ribbon take-up gear counter-clockwise (top moves toward rear) to remove slack from the ribbon.
3. Close the top cover. Remember that you need to release the cover lock, lower the top cover, and press down until the latches snap into place.

Operator Controls

Power Switch

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



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

Feed Button

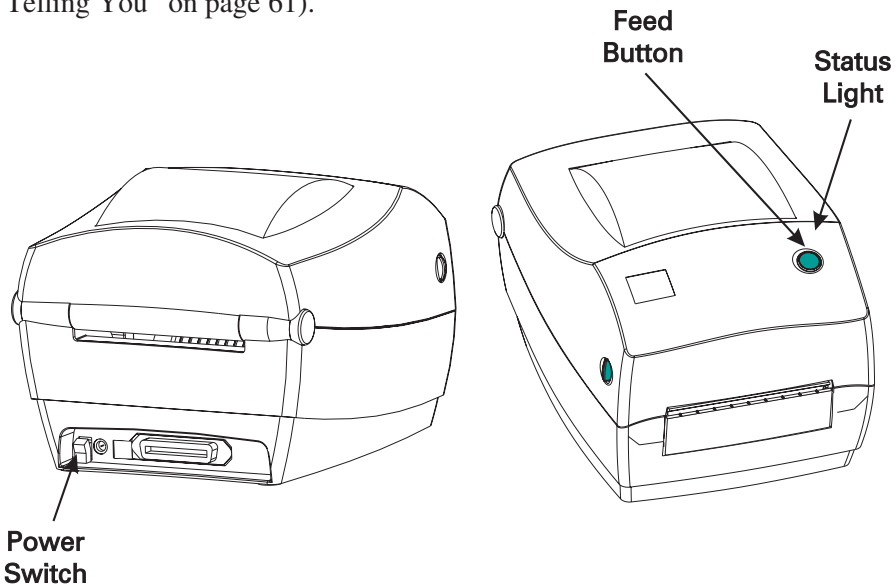
Press once to feed one blank label.

Press once 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 61.

Use the Feed button for printer setup and status (see “Feed Button Modes” on page 70).

Status Light

Functions as a printer operational indicator (see “What the Status Light is Telling You” on page 61).



Printing a Test Label

PRINTER CONFIGURATION	
Zebra Technologies ZTC R2844-Z-200dpi	
+10.....	DARKNESS
+000.....	TEAR OFF
TEAR OFF.....	PRINT MODE
NON-CONTINUOUS.....	MEDIA TYPE
WEB.....	SENSOR TYPE
THERMAL-TRANS.....	PRINT METHOD
104 0/8 MM.....	PRINT WIDTH
1248.....	LABEL LENGTH
39.0IN 988MM.....	MAXIMUM LENGTH
NOT CONNECTED.....	USM COMM.
PARALLEL.....	PARALLEL COMM.
RS232.....	SERIAL COMM.
8600.....	BAUD
8 BITS.....	DATA BITS
NONE.....	PARITY
XON/XOFF.....	HOST HANDSHAKE
NONE.....	PROTOCOL
000.....	NETWORK ID
NORMAL MODE.....	COMMUNICATIONS
<~> 7EH.....	CONTROL PREFIX
<^> 5EH.....	FORMAT PREFIX
<,> 2CH.....	DELIMITER CHAR
ZPL II.....	ZPL MODE
FEED.....	MEDIA POWER UP
FEED.....	HEAD CLOSE
DEFAULT.....	BACKFEED
+020.....	LABEL TOP
+0000.....	LEFT POSITION
029.....	WEB S.
068.....	MEDIA S.
050.....	RIBBON S.
050.....	MARK S.
001.....	MARK MED S.
062.....	MEDIA LED
000.....	RIBBON LED
081.....	MARK LED
CS.....	MODES ENABLED
.....	MODES DISABLED
832 8/MM FULL.....	RESOLUTION
SP.814.B <-.....	FIRMWARE
V2.2.6.98.C.....	HARDWARE ID
CUSTOMIZED.....	CONFIGURATION
1024.....	R: RAM
0768.....	E: ONBOARD FLASH
NONE.....	FORMAT CONVERT
.....	TWINAX/COAX ID
NONE.....	OPTION
NONE.....	ZEBRA NET II
OEM400:Ver. 2.4F.....	RFID VERSION

FIRMWARE IN THIS PRINTER IS COPYRIGHTED

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 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.
2. When the status light is solid green, press and hold the feed button until the status light flashes once.
3. Release the feed button. A configuration label will print.

If you cannot get this label to print, refer to Troubleshooting on page 61.

Hooking Up the Printer and Computer

Your printer will have one of two combinations of interfaces:



- Universal Serial Bus (USB), parallel and serial
- USB, ethernet, and serial

Each specific interface option—USB, parallel, ethernet, serial—is discussed individually.

You must supply the required interface cable for your application.



CAUTIONS • Keep the power switch in the OFF position when attaching the interface cable.

The power supply barrel connector must be inserted into the power supply receptacle on the back of the printer before connecting or disconnecting the communications cables.

This printer complies with FCC “Rules and Regulations,” Part 15, for Class B Equipment, using fully shielded six-foot data cables. Use of longer cables or unshielded cables may increase radiated emissions above the Class B limits.

Interface Cable Requirements

Data cables must be of fully shielded construction and fitted with metal or metalized 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' [1.83 m] recommended).

Do not tightly bundle the data cables with power cords.

Do not tie the data cables to power wire conduits.

USB Interface Requirements

Universal Serial Bus (version 1.1) provides a high-speed 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.

Parallel Interface Requirements

The required cable (IEEE 1284-compliant is recommended) must have a standard 36-pin parallel connector on one end, which is plugged into the parallel port located on the back of the printer. The other end of the parallel interface cable connects to the printer connector at the host computer.

For pinout information, refer to page 72.

Ethernet Interface Requirements

Ethernet provides a powerful networking capability that can be of use in a variety of internet/intranet printing solutions. After you load media and close the top cover, you can press the test button next to the connector on the rear of the printer to get an ethernet configuration label.

Serial Interface Requirements

The required cable must have a nine-pin “D” type (DB-9P) male connector on one end, which is plugged 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 at the host computer. Depending on the specific interface requirements, this will most likely be a null modem cable.

For pinout information, refer to page 74

Communicating with the Printer

Universal Serial Bus (USB) Communications

The printer is a terminal device when using a universal serial bus interface. You can refer to the Universal Serial Bus Specification for details regarding this interface.

Parallel Communications

When using the parallel port, typically there is no setup is required once the cable is plugged in. If you should encounter any problems, consult the user's guide that came with your computer.

Internal Ethernet Communications

For details regarding this interface, refer to the ethernet guide from the manufacturer.

Serial Communications

Serial communications between the printer and the host computer can be set by either autobaud synchronization or the **^SC** command.

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 a ZPL II format to the printer.
3. When the printer and host are synchronized, the LED changes to solid green. (No labels will print during autobaud synchronization.)

^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 II Programming Guide* for more information about this command.

Defaulting the Serial Parameters

To reset the communications parameters on the printer to the factory defaults (9600 baud, 8 bit word length, no parity, 1 stop bit, and XON/XOFF), do the following:

1. Press and hold the feed button until the green status LED flashes once, twice, and then three times.
2. While the status LED rapidly flashes amber and green, press the feed button.

Adjusting the Print Width

Print width must be calibrated when:

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

Print width may be set by way of the five-flash sequence in “Feed Button Modes” (see page 70) or refer to the Print Width (**^PW**) command (consult your *ZPL II Programming Guide*).

Adjusting the Print Quality

Print quality is influenced by the heat of the print head, the speed of the media and the type of media you are using. Only by experimenting will you find the optimal mix for your application.

The relative darkness setting is controlled by either the six-flash sequence in “Feed Button Modes” (see page 70) or the Set Darkness (**~SD**) ZPL II command (follow the instructions in the *ZPL II Programming Guide*).

If you find that the print speed needs to be adjusted, refer to the Print Rate (**^PR**) command in the *ZPL II Programming Guide*.

Operation & Options

This section helps you get the most from your printer.

You must use programming to control many of the printer's functions. A few examples:

- The `~JL` command controls label length.
- The `^XA^MTD^XZ` command changes the printing mode to direct thermal; the `^XA^MTT^XZ` command changes the printing mode to thermal transfer.
- The `^XA^JUS^XZ` command saves the new settings to flash memory.

For detailed information about creating labels using ZPL II, refer to the *ZPL II Programming Guide* or visit our web site at www.zebra.com.

To improve print quality, changing both print speed and density may be required to achieve the desired results. Your application's printer driver provides control of the speed and heat (density).

Thermal Printing



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



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

You must use the correct media for the type of printing you require. When printing without a ribbon, you must use direct thermal media. When using ribbon, you must use thermal transfer media. The printer's ribbon sensor detects motion of the supply spindle.

Replacing Supplies

If labels or ribbon run out while printing, leave the printer power on while reloading (data loss results if you turn off the printer). After you load a new label or ribbon roll, press the Feed button to restart .

Always use high quality, approved labels, tags and ribbons. 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. Permanent damage to the print head may result if a non-approved ribbon is used as it may be wound incorrectly for the printer or contain chemicals corrosive to the print head. Approved supplies can be ordered from your dealer.

Adding a New Transfer Ribbon

If ribbon runs out in the middle of a print job, the indicator lights red and the printer waits for you to add a fresh roll.

1. Keep the power on as you change ribbon.
2. Open the top cover, then cut the used ribbon so you can remove the cores.
3. Load a new ribbon roll. If necessary, review the Ribbon Loading steps.
4. Close the top cover.
5. Press the Feed button to restart printing.

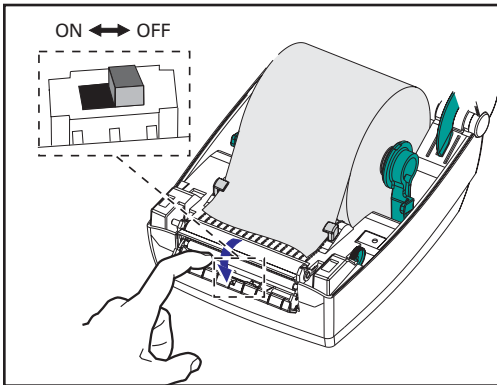
Replacing a Partially Used Transfer Ribbon

To remove used transfer ribbon, perform the following steps.

1. Cut the ribbon from the take-up roll.
2. Remove the take-up roll and discard used ribbon.
3. Remove the supply roll and tape the end of any fresh ribbon to prevent it from unwrapping.

When reinstalling a partially used supply roll, tape the cut end onto the empty take-up roll.

Printing in Peel-Mode



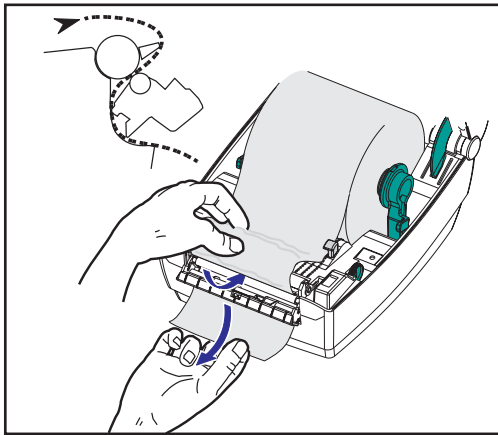
The optional dispenser allows you to print in “peel-mode” where the label backing follows a different path and the labels are presented one at a time for subsequent placement.

Before using peel-mode, you must send the programming commands

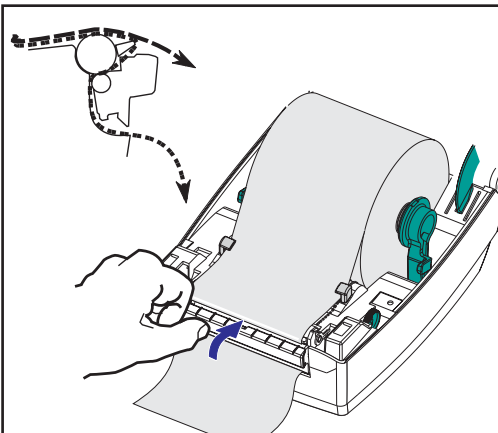
^XA ^MMP ^XZ

^XA ^JUS ^XZ

to the printer. Refer to your *ZPL II Programmer's Manual*.



1. Remove several labels from the backing material.
2. Open the top cover.
3. Open the dispenser door.
4. Switch on the label-taken sensor.
5. Insert the backing in front of the peel bar and behind the peel roller.

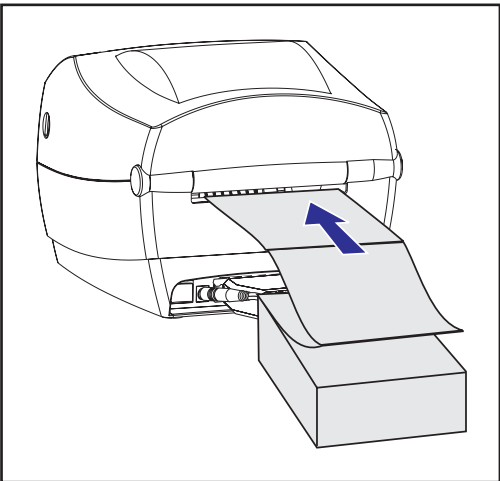
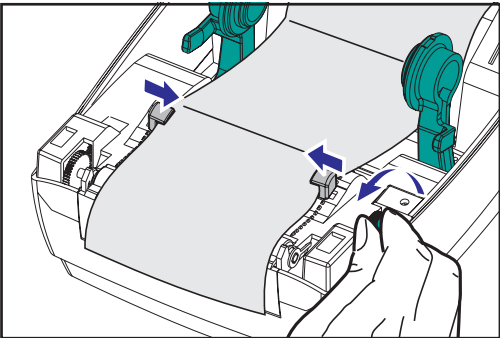
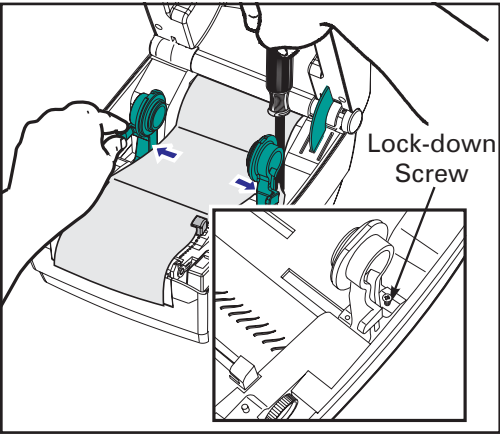


6. Close the dispenser door.
7. Close the top cover.
8. Press the Feed button to advance the label.

During the print job, the printer will peel off the backing and present a single label. Take the label from the printer so it will print the next label.



Printing on Fan-Fold Media



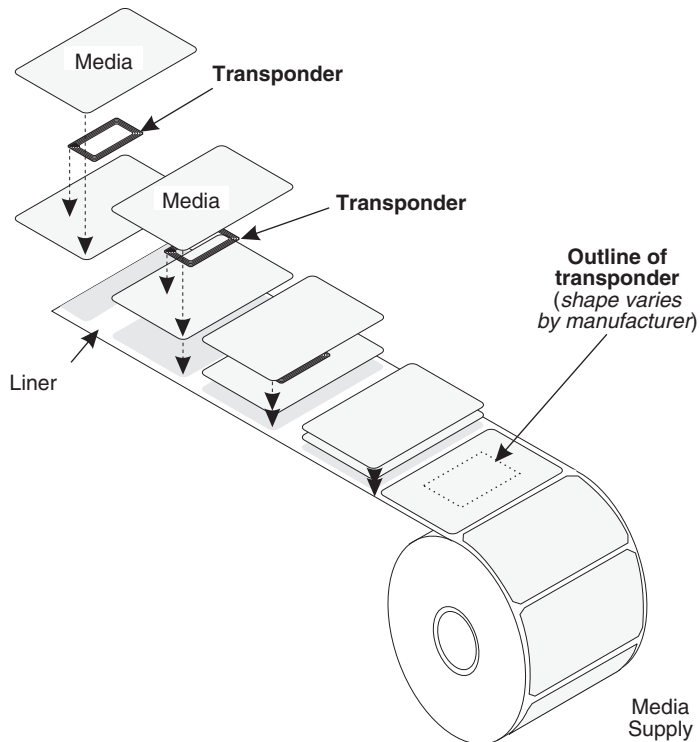
Printing on fan-fold media requires you to set both the media hangers and the media guides in position.

1. Open the top cover.
2. With a sample of your media, adjust the media hangers to the width of the media. The hangers should just touch, but not restrict, the edges of the media.
3. Tighten the screw using a small Phillips driver #1.
4. 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.
5. Insert the media through the slot at the rear of the printer.
6. Run the media between the hangers and guides.
7. Close the top cover.

RFID Guidelines

The Zebra R2844-Z Smart Label Printer and Encoder serves as dynamic tool for both printing and programming smart labels and tags. These labels and tags are usually made from two components, media and an RFID (radio frequency identification) transponder.

- The media is comprised of synthetic- or paper-based material that can be printed upon using direct thermal or thermal transfer printing techniques. The media is typically made from the same materials and adhesives used by a standard barcode printer.
- The transponder is usually comprised of an antenna coil that is bonded to an integrated circuit (IC) chip. The IC contains the drivers, coders, decoders and memory. At a minimum, the transponder has memory that can be read, while the vast majority also have memory that can be programmed by the user as well.

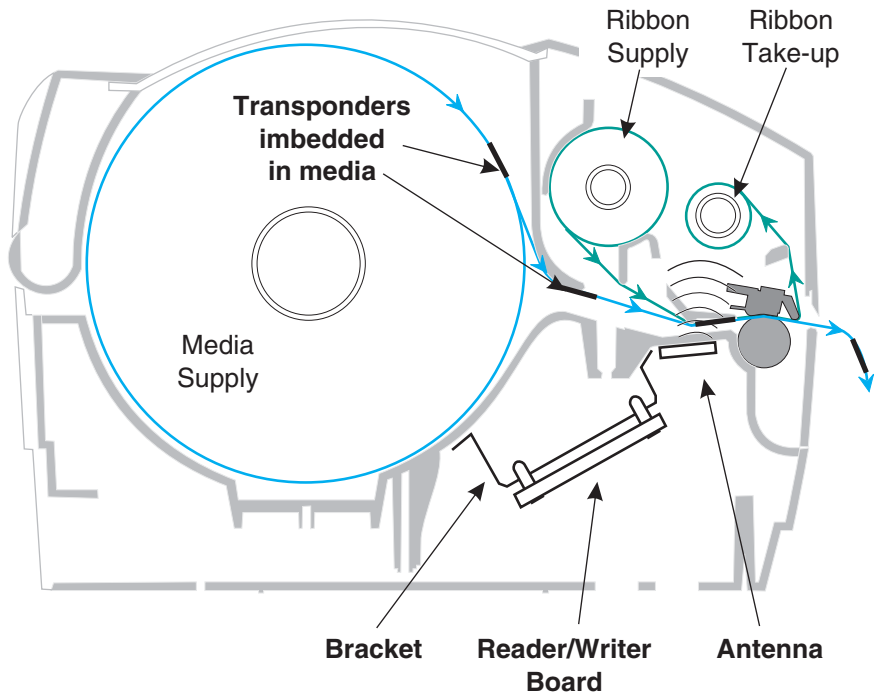


The communication between the RFID tag and the printer is established when the transponder lines up with the printer's antenna.



Note • The transponder position, prior to encode/decode, is critical. The optimal transponder position varies with antenna coil size and type of RFID IC used. It is important to use media and tags that have been specifically designed for use in this printer. Failure to do so may result in the inability to read or program the embedded RFID tags.

Printing and programming of smart labels is handled through the use of Zebra's printer programming language, ZPL. The printer segments the received ZPL's RFID-specific and printing-related commands. The printer will execute the RFID commands first, followed by those for printing barcodes and text. Each transponder has blocks of addressable memory that are written to and read from through ZPL commands. Many transponders also contain a pre-programmed unique ID/serial number. The ZPL commands also provide for exception handling, such as setting the number of read/write retries before declaring the transponder defective.

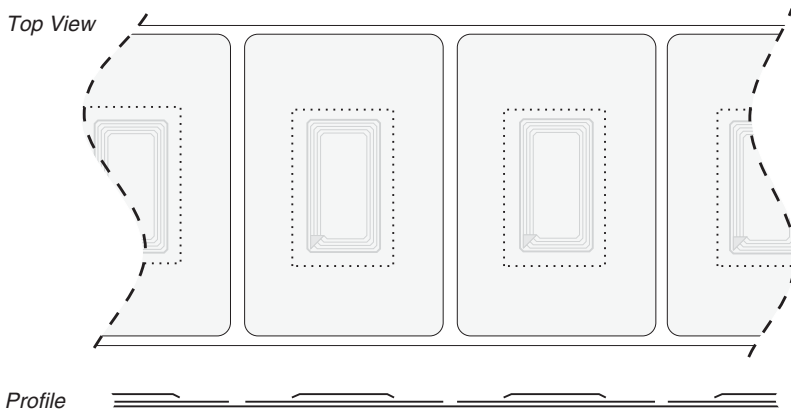


If an RFID tag is declared defective (fails to program correctly or cannot be detected) the printer ejects it and prints the word "void" across the entire label (see samples on page 45). If problems persist, this process—using the same data and format—will continue from one to ten tags; you set the retries using a parameter in the RFID Setup command (^RS). After the last tag is ejected the printer removes the customer format from the print queue, and proceeds with the next format (if one exists in the buffer).

Print Quality Over the Transponder

There is a raised area on each label immediately around the location of the IC chip where the printer may print with low quality.

Design your printed label around the location of the chip in the type of approved smart label you select. For best results, do not print barcodes directly over the transponder. If in doubt, check the print quality and adjust the label format, or obtain smart labels with an alternate transponder placement.



Supported Transponders

Use transponders specifically approved for use in the R2844-Z printer. Failure to do so may result in the inability to read or write to imbedded RFID tags. For a current list of approved transponders, contact Zebra Technologies Corporation or visit the website (<http://www.rfid.zebra.com>). As new transponders become commercially available, Zebra will evaluate them for compatibility with the R2844-Z printer.



Important • Function of an encoded smart label in an application depends on factors such as where the label is placed on an item (such as a carton or a pallet) as well as on the contents of the items (such as metals or liquids). Contact the supplier of your external RFID reader for assistance with these types of issues. Zebra can only support issues regarding printing and encoding smart labels.

Transmission and Identification Standards

ISO-15693

ISO-15693 is an international standard for 13.56 MHz RFID devices. As this is a public standard, tags and integrated circuits may be produced by a wide variety of manufacturers. The current standard stipulates that manufacturers may configure memory in various ways (up to 256 blocks comprising a block size up to 256 bits (32 bytes)). The standard also stipulates that a manufacturer may, or may not, use the recommended methods of reading and writing to the tag as stipulated in the standard. For these reasons, the printer may not be compatible with every manufacturer's ISO-15693 transponders. Contact your technical support representative for the latest list of supported ISO-15693 transponders.

For more information, see the International Standards Organization web site at:

<http://www.iso.org>

Electronic Product Code™ (EPC™)

The Electronic Product Code™ (EPC™) is a product numbering standard that can be used to identify a variety of items using RFID technology. The EPC format contains 12-bytes (96-bits) of data defining the manufacturer, product, and serial number. The EPC can link to an online database, providing a secure way of sharing product-specific information along the supply chain.

For more information, see the EPCglobal web site at:

<http://www.epcglobalinc.org>

Manufacturers and Brands

In your printer, you can use these brands of transponders:

- Texas Instruments® Tag-it™
- Philips® I•Code
- Inside Technologies Picotag® 2K
- Infineon Technologies® my-d vicinity

Texas Instruments® Tag-it™ Transponders

Texas Instruments transponders are high frequency (13.56MHz) RFID devices. Each transponder has 256 bits of memory. Data is segmented into 4-byte (32-bit) blocks that are uniquely addressable, for a total of 8 blocks. Each memory block is lockable using the write protect function during the writing process.

Texas Instruments Tag-it™ Blocks		
Block #	Description	Bytes
0	User Data	32 User
1	User Data	
2	User Data	
3	User Data	
4	User Data	
5	User Data	
6	User Data	
7	User Data	

Texas Instruments ISO15693				
Block	Byte number within a block			
	0-7	8-15	16-23	24-31
1	User Data (2048 bits)			
2				
3				
...				
62				
63				
64	Unique Identifier Number (64 bits)			
1				
2	Application Configuration			
Data Storage Format Identifier				
Application Family Identifier				
IC Version		Factory Programmed		

Philips® I•Code Transponders

Philips I•Code transponders are high frequency (13.56MHz) RFID devices. Each transponder has 512 bits of memory. Data is segmented into 4 byte (32 bit) blocks that are uniquely addressable for a total of 16 blocks. Each memory block is lockable using the write protect function during the writing process. The first two blocks of data (block 0 and 1) are pre-programmed, non-changeable, and are used for storage of a unique 64 bit serial number. The next two blocks (blocks 2 and 3) are used for storage of configuration information; block 4 is used for family or application identification and blocks 5 to 15 are free for user application use.

If you are using these transponders for your own use, and don't require universal special function or family codes, then you can program blocks 3 through 15.

Philips I•Code Blocks		
Block #	Description	Bytes
0	Serial Number (write protected)	
1	Serial Number (write protected)	
2	Write Protect Block (Caution)	
3	Special Function Block	8 Optional
4	Family Code	
5	User Data	40 User
6	User Data	
7	User Data	
8	User Data	
9	User Data	
10	User Data	
11	User Data	
12	User Data	
13	User Data	
14	User Data	
15	User Data	



Note • The bits in block 2 determine the write access conditions for itself and each of the remaining blocks. You can leave blocks 2 through 15 open or you can write-protect them. Write-protected blocks (included block 2) can never be written to from the moment they are locked

Philips I•Code ISO15693

Block	Byte number within a block			
	0	1	2	3
-4	Unique Identifier 0	Unique Identifier 1	Unique Identifier 2	Unique Identifier 3
-3	Unique Identifier 4	Unique Identifier 5	Unique Identifier 6	Unique Identifier 7
-2	Internally Used	Electronic Article Surveillance	Application Family Identifier	Data Storage Format Identifier
-1	Write Access Conditions			
	00	00	00	00
0	User Data			
1				
2				
...				
26				
27				

Inside Technologies Picotag® Transponders

Inside Technologies Picotag® transponders are high frequency (13.56MHz) RFID devices. Each transponder has 2048 bits of memory. Data is segmented into 8 byte (64 bit) blocks that are uniquely addressable for a total of 31 blocks. Blocks 6 to 12 are lockable using the write protect function during the writing process. The first block of data (block 0) is pre-programmed and is used for storage of a unique 64 bit serial number. The next two blocks (blocks 1 and 2) are used for storage of configuration information; blocks 3 to 31 are free for user application use.

Inside Technologies Picotag® 2K								
Block	Byte number within a block							
	0	1	2	3	4	5	6	7
0	Serial Number (64 bits)							
1	FFh	Application 16-bit OTP Area		Block Write Lock	Tuning Cap	1Fh	E.A.S.	Fuses
2	Application Issuer Area							
3	Application Area							
4								
5								
6								
7								
8	Block Write Lockable Application Area							
9								
10								
11								
12								
13	Application Area							
...								
31								

Infineon Technologies® my-d vicinity Transponders

Infineon Technologies® my-d vicinity transponders are high frequency (13.56MHz) RFID devices. Each transponder has 10,000 bits of memory. Data is segmented into 128 pages where each page has 8 bytes data storage and 2 bytes administrative storage.

Infineon Technologies® 10K ISO15693								
Block	Byte number within a block							
	0	1	2	3	4	5	6	7
0	Unique ID Number — Read Only							
1	Manufacturer's Information — Read Only							
2								
3	User Data							
4								
...								
7E								
7F								

Infineon Technologies® 2K ISO 15693								
Block	Byte number within a block							
	0	1	2	3	4	5	6	7
0	Unique ID Number — Read Only							
1	Manufacturer's Information — Read Only							
2								
3	User Data							
4								
...								
1E								
1F								

ZPL II Commands for RFID

Valid programming requires that printer instructions begin with the Start Format command (^XA) and finish with the End Format command (^XZ); they are the opening and closing brackets, respectively, of a label format instruction.

This subsection describes the RFID-related commands:

- ^WT – Write Tag
- ^RT – Read Tag
- ^RS – RFID Setup
- ^RI – RFID Get Tag ID
- ^RE – Enable/Disable Electronic Article Surveillance Bit

^WT – Write Tag

The format for the ^WT instruction is: **^WTb,r,m,w,f,v**

where the parameters are:

b = block number

Default value: 0

Other values: 1 to n, where n is the maximum number of blocks for the tag

This is the starting block number. If the user sends more than a block of data it will overflow into the next block. If the user overflows the block and subsequent blocks cause errors (write protects, beyond range, etc.), the write will be aborted, but blocks already written will not revert to original contents. It's up to the user to ensure blocks aren't accidentally overwritten.

r = retries

Default value: 0

Other values: 1 to 10, number of retries

m = motion

Default value: 0 (Feed label after writing)

Other value: 1 (No Feed after writing, other ZPL may cause a feed)

w = write protect

Default value: 0 (NOT write protected)

Other value: 1 (Write protect)

f = data format

Default value: 0 (ASCII)

Other value: 1 (Hexadecimal)

v =

Not used for this printer.

If there is an error within the data for the transponder, the printer acts according to the error handling parameter of the RFID Setup command (^RS).

^RT – Read Tag

The format for the ^RT instruction is: **^RT#*b,n,f,r,m,s***

where the parameters are:

= number to be assigned to the field

Default value: 0

Other Values: 1 to 9999

b = starting block number

Default value: 0

Other values: 1 to n, where n is the maximum number of blocks for the tag

n = number of blocks to read

Default value: 1

Other values: 2 to n, where n is maximum number of blocks minus starting block number. In other words, if the tag has 8 blocks (starting with block 0) and you're starting with block 6, n can be 2. This would give you block 6 and block 7 information.

f = format

Default value: 0 ASCII

Other value: 1 Hexadecimal

r = retries

Default value: 0

Other values: 1 to 10, number of retries

m = motion

Default value: 0 (Feed label after writing)

Other value: 1 (No Feed after writing, other ZPL may cause a feed)

s =

Default value: 0 (Least Significant Byte first)

Other value: 1 (Most Significant Byte first)

^RT – Read Tag (continued)

Example: This reads a block from a tag, and prints it on a label:

^XA

^RS1,0^FS

^FO20,120^A0N,60^FN1^FS

^FO20,100^A0N,20^FN2^FS

^RT1,7,3,0,5,0,0^FS

^RT2,2,2,0,5,0,0^FS

^XZ

The first ^RT command automatically detects the tag type, starting at block 7, reads three blocks of data in ASCII format. It will retry the command 5 times if necessary. A “void” label will be generated if the read is unsuccessful after ‘r’ retries. The data read will go into the ^FN1 location of the recalled format.

The second ^RT command automatically detects the tag type, starting at block 2, and reads two blocks of data in ASCII format. It retries up to 5 times. The data read will go into the ^FN2 location of the recalled format.

You can send data back to the host with the Host Verification command (^HV). Refer to the ZPL II manual to learn about this command.

^RS – RFID Setup

Use this command to set up RFID operation and error handling. You can move the tag into an effective area to read or write.

The format for the ^RS instruction is: **^RSt,p,v,n,e**

where the parameters are:

t = tag type

Default value: 1 –Auto Detect (automatically determine the tag type, by querying the tag)

Other values:

- 2- Texas Instruments Tag-it™ tags
- 3- Philips I•Code tags
- 4- Inside Technologies Picotag® 2K
- 5- ISO 15693 tag (see note)
- 6- EPC Tag (13.56 MHz)

p = read/write position of a transponder in vertical (Y-axis) in dot-rows from the top of the label.

Default value: label length minus eight dot-rows

Other values: zero to label length

Set to zero (0) so that the media will not move; that is, the transponder is already in the effective area.

v = length of void print out in vertical (Y-axis) dot-rows.

Default value: label length

Other values: zero to label length

n = number of labels to try in case of read/encode failure

Default value: 3

Other values: 1 to 10, number of labels

e = error handling

Default value: 'N' (no action)

Other values:

- 'P'- printer pauses
- 'E'- printer goes into error mode

^RS – RFID Setup (continued)

If the read/encode retries exceed the number set by the "n" parameter, an error will be sent to the host as an unsolicited message. To control the unsolicited message, use the ZebraNet Alert commands (^SX and ^SQ) and set the "condition type" parameter to "P."



Note • Use caution when using this function in combination with ^RI (reading the unique ID number) or ^RT (reading tag data). Problems can occur if the data read from the tag is going to be printed on the label. Any data read from the transponder must be positioned to be printed above the read/write position. Failure to do this will prevent read data from being printed on the label or tag.

^RI – RFID Get Tag ID

The format for the ^RI instruction is: ***^RI#f,r,m***

where the parameters are:

= field number to store the unique ID

Default value: 0

Other values: 1 to 9999

f = format

Default value: 0- MSB first for ISO15693. LSB first in other tags.

Other value: 1- LSB first for ISO15693. MSB first in other tags.

r = retries

Default value: 0

Other values: 1 to 10, number of tries

m = motion

Default value: 0 (feed)

Other value: 1 (no feed)

The printer reads the ID from the tag so that it can be printed or returned to the host by using the Host Verification command (^HV).

^RI – RFID Get Tag ID (continued)

The example below reads the unique ID/serial number from a tag, and prints it on a label:

^XA

^FO100,100^A0N, 60^FN0^FS

^RI0^FS

^FD ^FS

^XZ

^RE – Enable/Disable Electronic Article Surveillance Bit

Use this command to set the Electronic Article Surveillance (E.A.S.) bit. This command has no effect on transponders (such as the Texas Instruments ISO 15693) that do not support E.A.S. capabilities.

The format for the ^RE instruction is: **^REt,r**

where the parameters are:

t = set the E.A.S. bit

Default value: 'n' (Disable E.A.S.)

Other value: 'y' (Enable E.A.S.)

r = retries

Default value: 0

Other values: 0 to 10, number of retries

RFID Programming Examples

ZPL II™ is Zebra Technologies Corporation's Zebra Programming Language II label design language. ZPL II lets you create a wide variety of labels from the simple to the very complex, including text, bar codes, and graphics.

This subsection is not intended as an introduction to ZPL II. If you are a new ZPL II user, order a copy of the *ZPL II Programming Guide* or go to the internet address <http://support.zebra.com> and select the Documentation Button to download the guide.

Sending ZPL Commands to the Printer

For your programming, do the following:

1. Set up the printer and turn the power on.
2. Use any word processor or text editor capable of creating ASCII-only files (for example, Microsoft Word® and save as a .txt file) and type in the label format exactly as shown in the sample label format that follows.
3. Save the file in a directory for future use. Use the “.zpl” extension.
4. Copy the file to the printer.

From the DOS command window, use the “COPY” command to send a file to the Zebra printer. For example, if your file name is format1.zpl then type, “COPY FORMAT 1.ZPL XXXX”, where “XXXX” is the port to which your Zebra printer is connected, for example, “LPT1.”

5. Compare your results with those shown. If your printout does not look like the one shown, confirm that the file you created is identical to the format shown, then repeat the printing procedure. If nothing prints, refer to the “Getting Started” on page 7 to make sure your system is set up correctly, otherwise refer to the “Troubleshooting” on page 61.

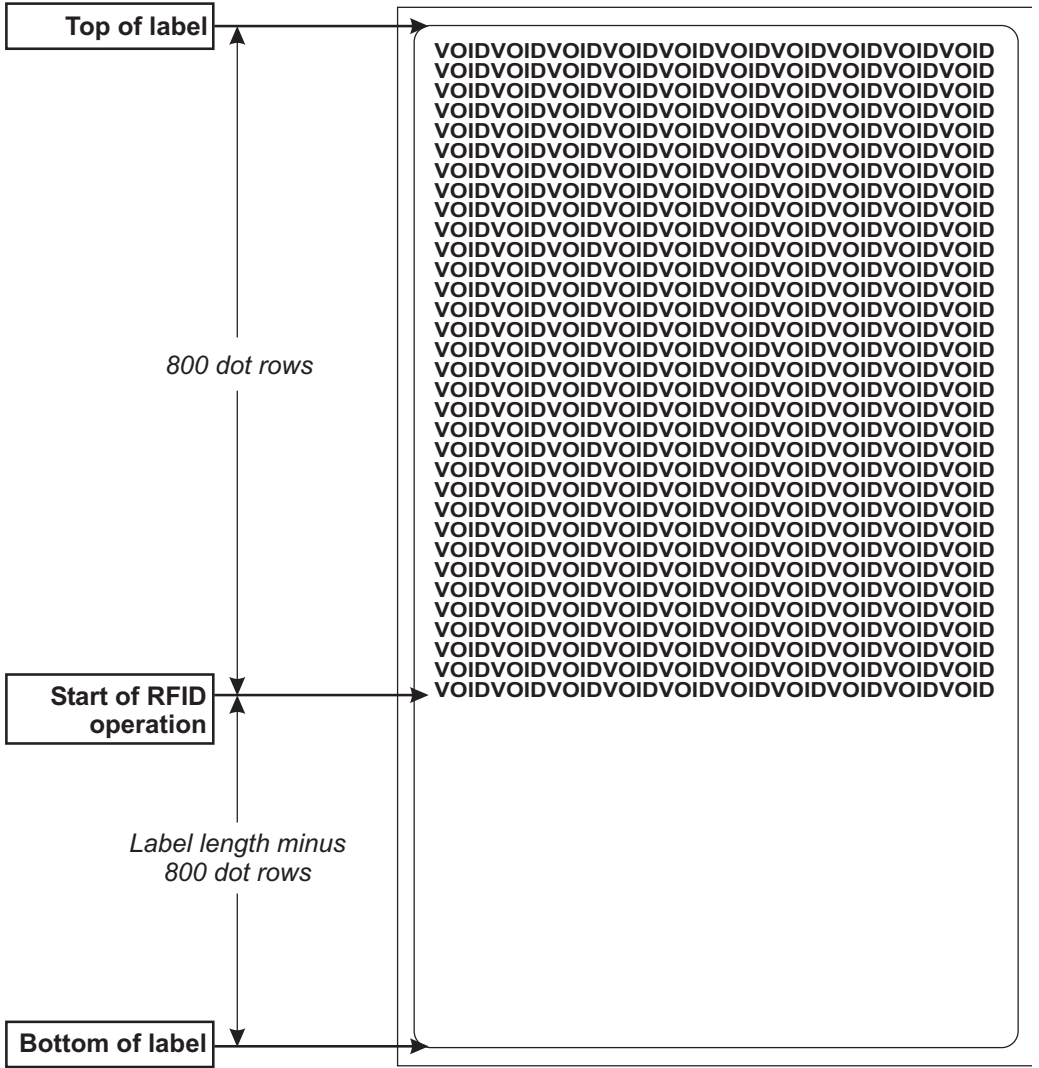
Line #	Type this label format	Resulting printout
1.	^XA	ZEBRA 5A65627261000000
2.	^WT6^FDZebra^FS	
3.	^FO100,100^A0n,60^FN0^FS	
4.	^FO100,200^A0n,40^FN1^FS	
5.	^RT0,6,2^FS	
6.	^RT1,6,2,1	
7.	^XZ	
<p>Line 1 Indicates start of label format.</p> <p>Line 2 Writes the data "Zebra" to block 6 for the tag (one byte will spill into block 7, since we have 4 bytes/block).</p> <p>Line 3 Print field number '0' at location 100,100. ^FN0 is replaced by what we read on line #5.</p> <p>Line 4 Print field number '1' at location 100,200. ^FN1 is replaced by what we read on line #6.</p> <p>Line 5 Read Tag into field number 0, starting at block 6, lasting for 2 blocks in ASCII format (default).</p> <p>Line 6 Read Tag into field number 1, starting at block 6, lasting for 2 blocks in hexadecimal format.</p> <p>Line 7 End of label format.</p>		

Handling Voided Transponders

Line #	Type this label format	Resulting printout
1.	<code>^XA</code>	<i>See next page</i>
2.	<code>^RS,800,,2,P^FS</code>	
3.	<code>^XZ</code>	

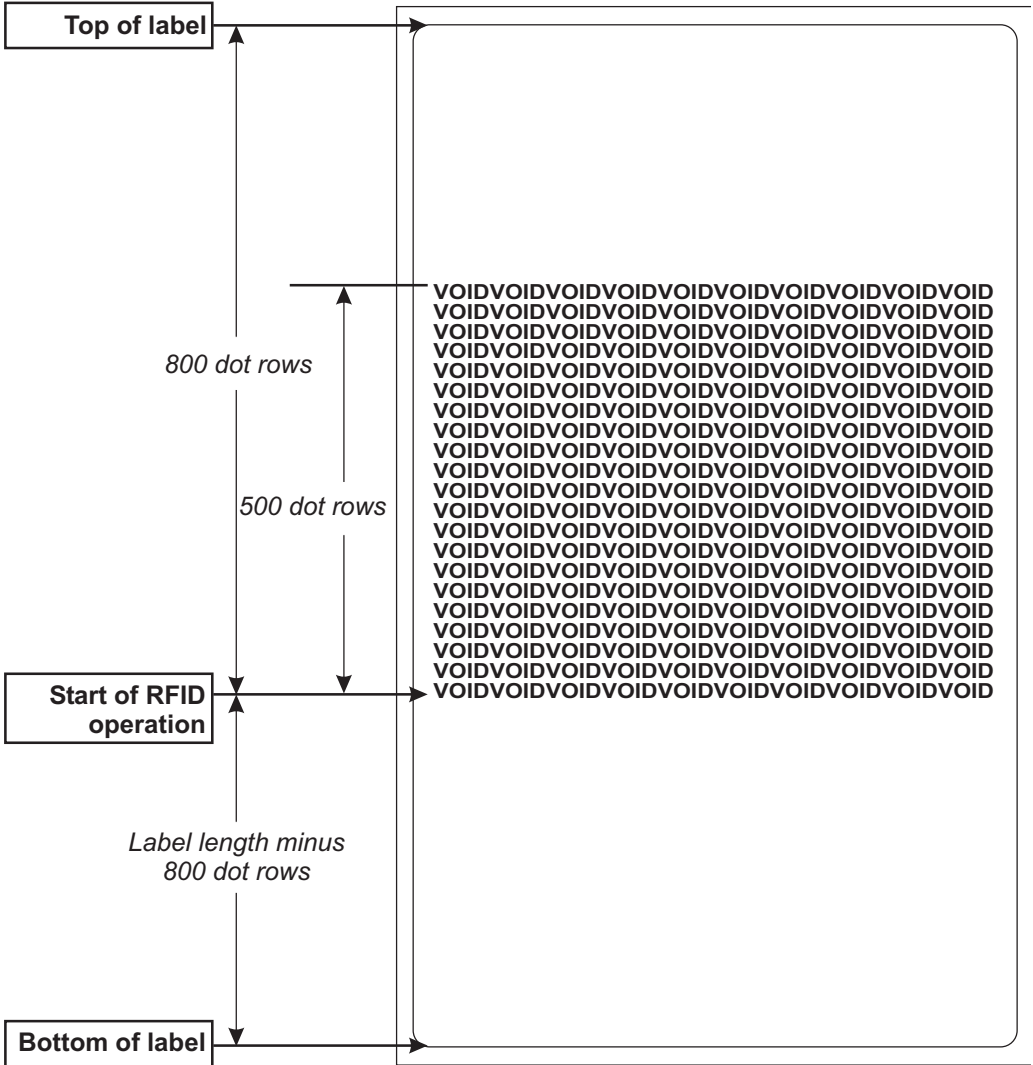
Line 1 Indicates start of label format.
Line 2 Moves the media to 800 dots from the top of the media (or label length minus 800 from the bottom (leading edge) and voids the rest of the media in case of error. The printer will try to print two labels, then will pause the printer if printing and encoding fail.
Line 3 End of label format.

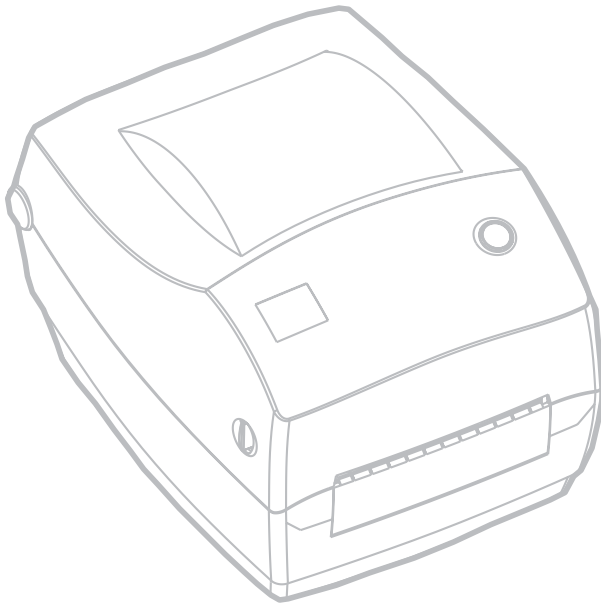
The following figure shows the resulting voided label. Note where the void starts. The media has been moved 800 dot rows from the top of the label (label length minus 800 dot rows from the bottom (leading edge) of a label) to bring the transponder into the effective area to read/write a tag. If the printer fails the operation, the rest of the media is voided.



Line #	Type this label format	Resulting printout
1.	^XA	<i>See next page</i>
2.	^RS,800,500,2,P^FS	
3.	^XZ	
<p>Line 1 Indicates start of label format.</p> <p>Line 2 Sets the printer to move the media to 800 dots from the top of the media (or label length -800 from the bottom (leading edge) of the media) and prints "VOID" 500 dots in vertical length (Y axis) on case of an error.</p> <p>Line 3 End of label format.</p>		

The following figure shows the resulting voided label. Note where the void starts. The media has been moved 800 dot rows from the top of the label (label length minus 800 dot rows from the bottom (leading edge) of a label) to bring the transponder into the effective area to read/write a tag. If the printer fails the operation, an area that is 500 dot rows of the media is voided instead of the rest of the media (as in the previous example).





Cleaning

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

CLEANING SUPPLIES
Cleaning pens (12)
Cleaning swabs (25)
Cleaning cards, 4-in wide (25)
Save-a-Print Head film, 4-in wide (3)

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

Printer Part	Method	Interval
Print head	Let the print head to cool for one minute, then use a new cleaning pen to swab the print elements (the thin gray line on the print head) from end to end. NOTE: <i>You do not have to turn off the printer to do this.</i> If print quality remains poor after cleaning, try the Save-a-Print Head cleaning film to remove buildup without damaging the print head. Call your authorized reseller for more information.	As necessary or after every five rolls of media
Platen roller	Manually rotate the platen roller. Clean it thoroughly with 70% isopropyl alcohol and a cleaning swab, cleaning card, or lint-free cloth.	
Peel bar	Clean it thoroughly with 70% isopropyl alcohol and a cotton swab.	As needed
Tear bar		
Exterior	Water-dampened cloth	
Interior	Brush or air blow	
Cutter	Use tweezers to remove scraps	

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

Print Head Considerations



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

Media Path Considerations

Use a cleaning swab or pen 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 or pen to soak the debris so that it breaks up.
2. Wipe the area with the cleaning swab or pen to remove the debris.
3. Discard the cleaning swab or pen after use.

Cleaning Card Considerations

Use a cleaning card to remove debris that has built-up on the platen. Avoid scrubbing or vigorously rubbing the platen; otherwise, the surface could be damaged.

1. Open the printer and remove labels.
2. Place the cleaning card into the label path so that it is under the guides and it extends between the print head and platen roller.
3. Close and latch the printer.
4. With the power switch on, press the feed switch to move the cleaning card through the printer.
5. Discard the card after use.

Platen Considerations

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 print head or cause the media to slip when printing. Adhesive, dirt, general dust, oils and other contaminants should be cleaned immediately off the platen.

Keep a new platen available as a spare and install it whenever the printer has significantly poorer performance, print quality or media handling. 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 (70% pure or better).

1. Open the media door and remove the media.
2. Clean the platen surface with the alcohol moistened swab. Rotate the platen while swabbing. Repeat this process two to three times with a new swab to remove residual contaminants. Adhesives and oils, for example, may be thinned by the initial cleaning but not completely removed.
3. Discard the cleaning swab or pen after use.

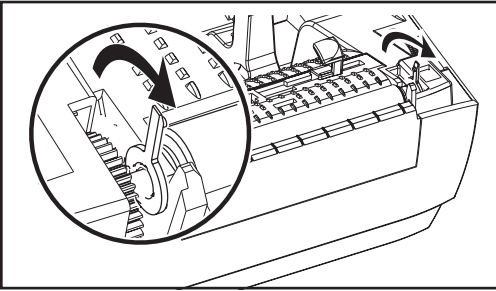
Allow the printer to dry for one minute before loading labels.

Lubrication



No lubricating agents of any kind should be used on this printer! Some commercially available lubricants, if used, will damage the finish and the mechanical parts inside the printer.

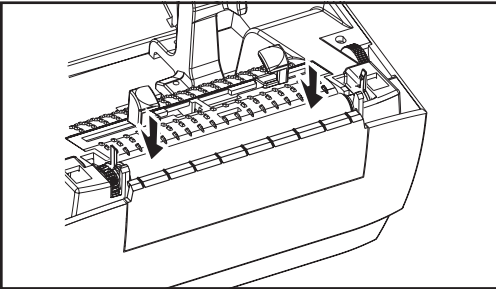
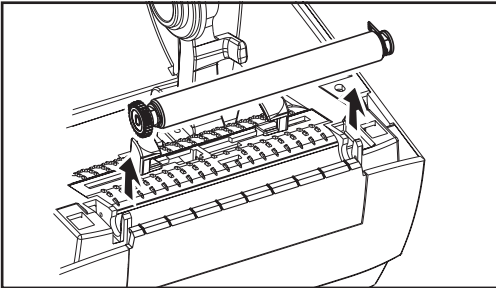
Replacing the Platen



Removal

Open the printer and remove any media.

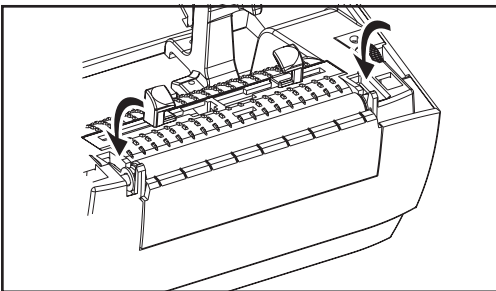
1. Using a pointed stylus (such as tweezers, small slot-head screwdriver, or razor-knife), unhook the tabs on the right and left sides. Then rotate them forward.
2. Lift the platen out of the printer's bottom frame.



Assembly

Make sure the right bearing is on the shaft of the platen.

1. Align the platen with the gear to the left and lower it into the printer's bottom frame.
2. Rotate the tabs back and snap them into place.



Replacing the Print Head



In the event you need to replace the print head, read the procedure and review the removal and installation steps before actually replacing the print head.

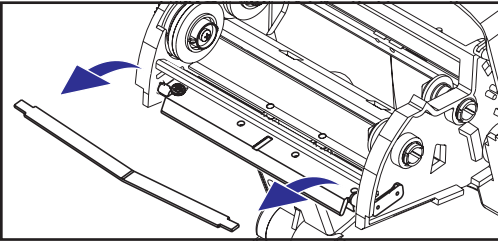


Prepare your work area by protecting against static discharge. Your work area must be static-safe and include a properly grounded conductive cushioned mat to hold the printer and a conductive wrist strap for yourself.

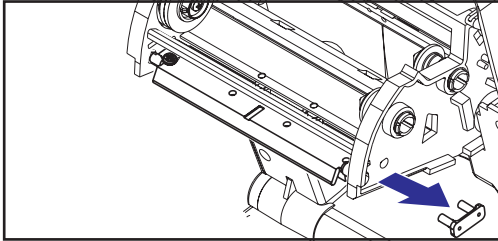


CAUTION • Turn the printer power off and unplug the power cord before replacing the print head.

Thermal-Transfer TLP Model

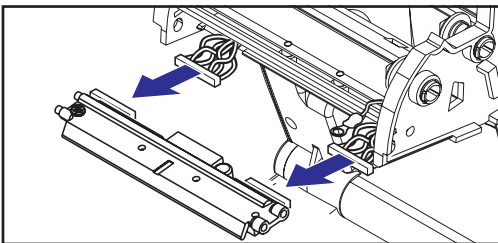
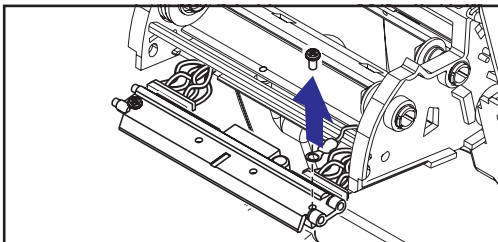
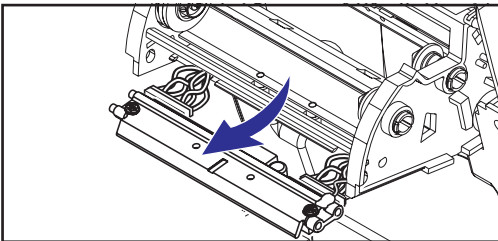


Before following the steps in this procedure, open the printer by pulling the release latches forward then lifting the top cover. Remove any ribbon from the carriage.



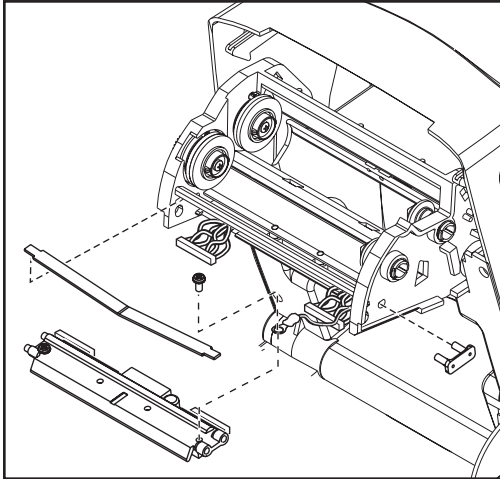
Removal

1. Grasp the print head spring and pull it to the left; then, slide it free of the carriage.
2. Use the spring to pry the print head clip off the right side of the carriage.
3. Pull the print head and bracket forward.
4. Use a #2 Phillips driver to remove the screw that holds the ground wire.
5. Unplug both bundles of print head wires from their connectors.



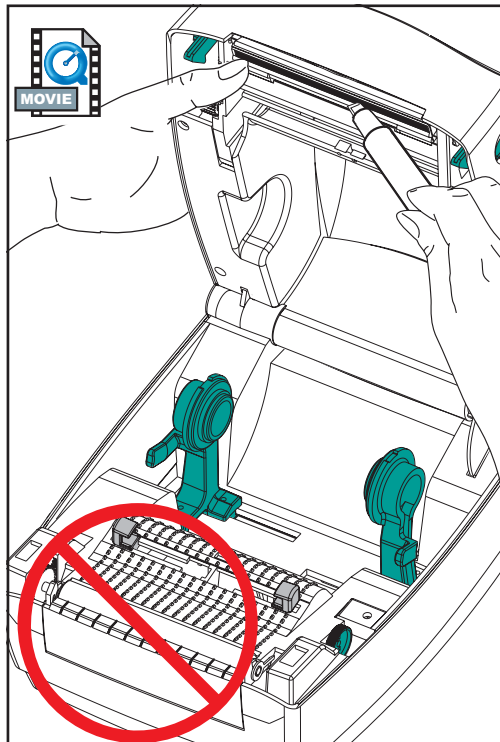
Replacing the TLP Print Head (Continued)

Assembly

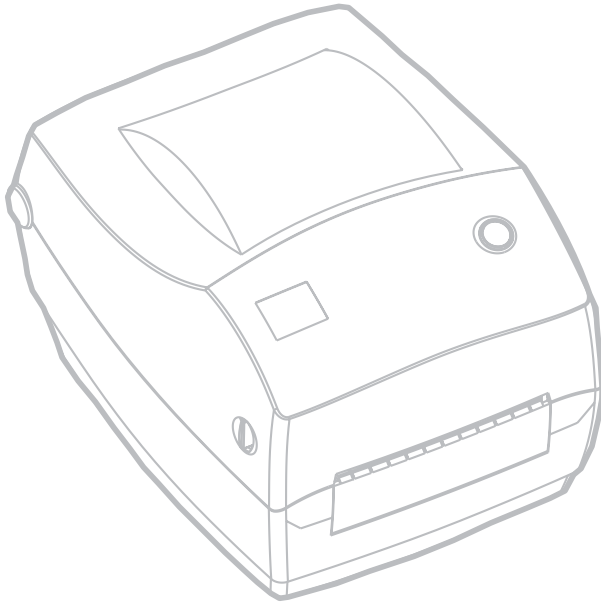


The new print head comes with the clip and ground screw attached.

1. Align the print head and bracket to plug the left and right connectors into the black and white wire bundles.
2. Attach the ground wire and secure it with the screw. Use a #2 Phillips driver to tighten it.
3. Insert the bracket pegs into the left side of the carriage.
4. Align the right side of the bracket and insert the print head clip through the right side of the ribbon carriage into the bracket.
5. Slip the left end of the print head spring into the left side of the ribbon carriage; then slide the right end into the other side. The angle of the “V” fits into the indent on top of the print head bracket.
6. Clean the print head with the cleaning pen.



Reload media and ribbon. Plug in the power cord. Print a status report to ensure proper function.



Troubleshooting

What the Status Light is Telling You		
Status LED Condition and Color	Printer Status	For a Resolution, Refer to number:
Off	Off	1
Solid Green	On	2
Flashing Yellow	Stopped	3
Flashing Green	Normal Operation	4
Flashing Red	Stopped	5
Double Flashing Green	Paused	6
Solid Yellow	Various	7
Alternately Flashing Green and Red	Needs Service	8

Resolutions

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.

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.

There is a shortage of memory.

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

4. The printer is receiving data.

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

5. Either the media or ribbon is out.

- Load a roll of media, following the instructions in “Loading the Media” on page 9. Then, press the feed button to resume printing.
- Load a roll of ribbon, following the instructions in “Loading the Ribbon” on page 12. Then, press the feed button to resume printing.

The print head is open.

- Close the top cover. Then, press the feed button to resume printing.

6. The printer is paused.

- Press the feed button to resume printing.

7. The print head is under temperature.

- Continue printing while the print head reaches the correct operating temperature.

The print head is over temperature.

- Printing will stop until the print head 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.

Print Quality Problems

No print on the label.

- You must use the correct media for the method of printing you require. When printing without a ribbon, you must use direct thermal media. When using ribbon, you must use thermal transfer media. The printer's ribbon sensor detects motion of the supply spindle.
- Is the media loaded correctly? Follow the instructions in “Loading the Media” on page 9.

The printed image does not look right.

- The print head is dirty. Clean the print head according to the instructions on page 59.
- The print head is under temperature.
- Adjust the print darkness and/or print speed. Refer to the six-flash sequence in “Feed Button Modes” on page 70, or the **^PR** and **~SD** commands in the *ZPL II Programming Guide*.
- 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.

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

- The print head is dirty. Clean the print head as shown on page 59.
- The print head elements are damaged. Replace the print head (see “Replacing the Print Head” on page 58).

The ribbon sensor settings did not print.

- The printer is set for direct thermal printing; use the **^XA^MTT^XZ** command to reset the printer for thermal transfer printing and calibrate again.

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

- The media may not be threaded under the media guides. Refer to “Loading the Media” on page 9.
- The printer needs to be calibrated. Refer to “Auto Calibration” on page 14.
- 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 II Programming Guide*).
- Verify that the Label Top (**^LT**) command is correctly set for your application (consult the *ZPL II Programming Guide*).

A 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 LED is Telling You” on page 61.
- 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 “Communicating with the Printer” on page 18.

RFID Symptoms

External reader cannot confirm RFID tags are programmed.

- Is the printer set up correctly? Print a configuration label to verify RFID version. See “Auto Calibration” on page 14.
- Check if supported RFID media is loaded correctly.

VOID messages are printed across media.

- Verify tag type is properly selected in ZPL II. Use RFID media with supported tag type. Edit ZPL II to select proper tag type or increase retries.
- ZPL II is attempting to write to a non-existent block. Some tags’ blocks are identified as 0-7. If ZPL II attempts to write to block “8,” it will fail.
- Check voided tag on external reader. If this is a media problem, discard or return bad tags.
- Media's transponder is out of range from printer's antenna. Contact Zebra for the latest media and transponder specifications.

Nothing is printed.

- See if the correct media is loaded or load new, fresh media.
- See if tags can be read/programmed using other hardware.
- Verify ZPL II RFID commands. Debug the printing program.
- Tag is out of reach of the antenna or too close. Verify tag alignment.
- Wrong type of tag was selected. Check ZPL II.
- Block is write protected. Ensure that the tag is not write protected.
- Aluminum and other metals within tag may interfere with read/write. Make sure media meets requirements.
- Increase the number of retries in the ZPL II commands.
- Time out may have occurred during internal communication. Cycle power and try printing label again.

Call a service technician if you have been unsuccessful in getting your expected print out and data.

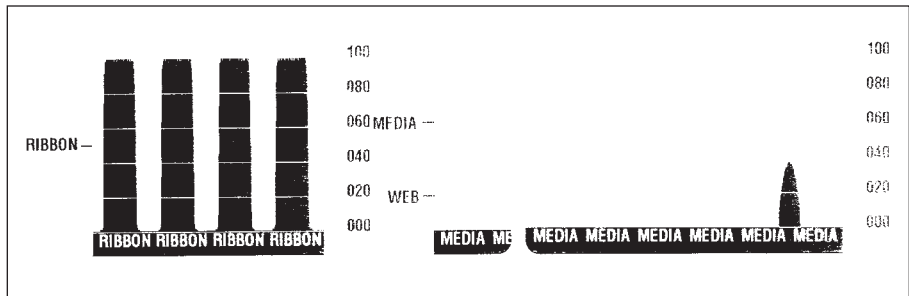
Manual Calibration

Manual calibration is recommended whenever you are using pre-printed labels (or label backing) or if the printer will not correctly auto calibrate.

1. Turn on the printer power.
2. Remove approximately 4" (102 mm) of labels from a section of backing material. Load the media so that only the backing material is threaded through the printer and under the print head.
3. Press and hold the feed button until the green status LED flashes once, then twice. 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 print head.
5. 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.
6. 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" on page 70) and recalibrating the printer.



NOTE • Performing a manual calibration disables the auto calibration function. To return to auto calibration, default the printer (see the four-flash sequence in "Feed Button Modes" on page 70).



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.

Recalibration

Recalibrate the printer if it starts to display unusual symptoms, such as skipping labels. See "Auto Calibration" on page 14.

PRINTER CONFIGURATION	
Zebra Technologies ZTC R2844-Z-200dpi	
+10.....	DARKNESS
+000.....	TEAR OFF
TEAR OFF	PRINT MODE
NON-CONTINUOUS.....	MEDIA TYPE
WEB.....	SENSOR TYPE
THERMAL-TRANS.....	PRINT METHOD
104 0/8 MM	PRINT WIDTH
1248.....	LABEL LENGTH
39.0IN 988MM	MAXIMUM LENGTH
NOT CONNECTED	USM COMM.
PARALLEL.....	PARALLEL COMM.
RS232	SERIAL COMM.
8600.....	BAUD
8 BITS	DATA BITS
NONE.....	PARITY
XON/XOFF.....	HOST HANDSHAKE
NONE.....	PROTOCOL
000.....	NETWORK ID
NORMAL MODE	COMMUNICATIONS
<> 7EH	CONTROL PREFIX
<^> 5EH	FORMAT PREFIX
<,> 2CH	DELIMITER CHAR
ZPL II	ZPL MODE
FEED.....	MEDIA POWER UP
FEED.....	HEAD CLOSE
DEFAULT.....	BACKFEED
+020.....	LABEL TOP
+0000.....	LEFT POSITION
029.....	WEB S.
068.....	MEDIA S.
050.....	RIBBON S.
050.....	MARK S.
001.....	MARK MED S.
062.....	MEDIA LED
000.....	RIBBON LED
081.....	MARK LED
CS.....	MODES ENABLED
.....	MODES DISABLED
832 8/MM FULL	RESOLUTION
SP.814.B <-	FIRMWARE
V2.2.6.98.C.....	HARDWARE ID
CUSTOMIZED.....	CONFIGURATION
1024.....	R: RAM
0768.....	E: ONBOARD FLASH
NONE.....	FORMAT CONVERT
.....	TWINAX/COAX ID
NONE.....	OPTION
NONE.....	ZEBRA NET II
OEM400:Ver. 2.4F	RFID VERSION

FIRMWARE IN THIS PRINTER IS COPYRIGHTED

Resetting the Factory Default Values

Sometimes, resetting the printer to the factory defaults solves some of the problems. Follow the four-flash sequence instructions in “Feed Button Modes” on page 70.

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, refer to the power off mode procedure in “Feed Button Modes” on page 70.

```
^FS^F0394 , 25^AA
5E 46 53 5E 46 4F 33 39 34 2C 32 35 5E 41 41








N , 18 , 10^FDC(0000
4E 2C 31 38 2C 31 30 5E 46 44 28 30 30 30 30

)999-9999^FS
29 39 39 39 2D 39 39 39 39 5E 46 53 0D 0A

^F00 , 50^AAN , 18 ,
5E 46 4F 30 2C 35 30 5E 41 41 4E 2C 31 38 2C

10^FDCENTER STA
31 30 5E 46 44 43 45 4E 54 45 52 20 53 54 41
```

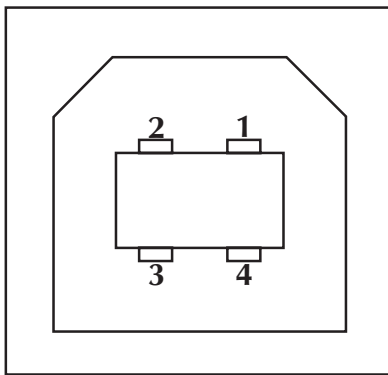
Feed Button Modes

Power Off Mode (Communications Diagnostics Mode)	
<p>With the printer power off, press and hold the feed button while you turn on the power. The printer prints out a listing of its current configuration (see Figure 22). After printing the label, the printer will automatically enter a diagnostic mode in which the printer prints out a literal representation (see Figure 23) of all data subsequently received. To exit the diagnostic mode and resume printing, turn off and then turn on the printer.</p>	
Power On Modes	
<p>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 specific number of flashes.</p>	
Flash Sequence	Action
* 	A configuration label prints.
* ** 	The media sensor calibrates and a media sensor profile prints (see “Manual Calibration” on page 67).
* ** *** 	To reset the communication parameters. Press and release the feed button while the LED rapidly flashes yellow and green.
* ** *** ****	For autobaud synchronization: Send a ZPL II format to the printer while the LED rapidly flashes yellow and green. When the printer and host are synchronized, the LED changes to solid green. NOTE: No labels will print during autobaud synchronization.
* ** *** **** *****	 Resets the factory defaults, auto calibrates, and saves settings into memory.
* ** *** **** ***** *****	 The print width calibrates. While the status LED alternately flashes green and yellow, a series of stacking rectangles print on the label. When the rectangle prints to the outer edges of the label, press and release the feed button. The label width and current communication parameters will be saved into memory.
* ** *** **** ***** ***** *****	 The print darkness calibrates. A series of nine samples print, starting with the lightest and ending with the darkest image. When the desired print darkness is achieved, press and release the feed button. The print darkness will be saved into memory.
 If the feed button remains pressed after a 7-flash sequence, the printer will ignore the button when it is released.	

Interfaces

Universal Serial Bus (USB) Connector

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



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 printer 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 Technical Information

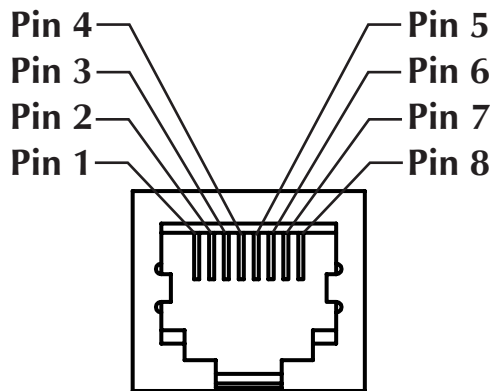
The maximum current available through the interface port is not to exceed a total of 0.75 amps.

Pin No.	Description
1	NStrobe/Host Clk
2-9	Data Bits 1-8
10	nACK/PtrClk
11	Busy/Per Busy
12	PError/ACK Dat Req.
13	Select/Xflag
14	NAuto Fd/Host Busy
15	Not Used
16-17	Ground
18	+5 V @ 0.75 A Fused
19-30	Ground
31	nInit
32	NFault/nData Avail.
33-34	Not Used
35	+5 V through 1.8 K Ohms Resistor
36	NSelectin/1284 active

ZebraNet® PrintServer II for Ethernet Networks

This interface uses an RJ-45 straight-through cable type. The table below provides the pinout assignments.

Signal	Pin	Pin	Signal
Tx+	1	1	Tx+
Tx-	2	2	Tx-
Rx+	3	3	Rx+
---	4	4	---
---	5	5	---
Rx-	6	6	Rx-
---	7	7	---
---	8	8	---



Looking into the Printer's RJ-45 Modular Connector

You can refer to the *ZebraNet® PrintServer II™ for Ethernet Networks Installation and Operation Guide* for details regarding this interface.

Serial (RS-232) Connector

Pin No.	Description
1	Not used
2	RXD (receive data) input to the printer
3	TXD (transmit data) output from the printer
4	DTR (data terminal ready) output from the printer -- controls when the host may send data
5	Chassis ground
6	DSR (data set ready) input to the printer
7	RTS (request to send) output from the printer -- always in the ACTIVE condition when the printer is turned on
8	Not Used
9	+5 V @ 0.75 A fused

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

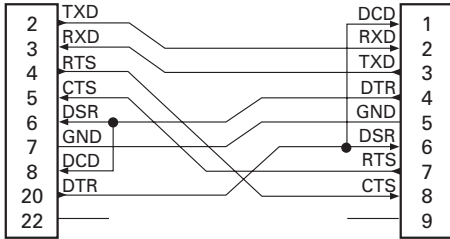
When XON/XOFF handshaking is selected, data flow is controlled by the ASCII control codes DC1 (XON) and DC3 (XOFF). The DTR control lead will have no effect.

Interconnecting to DTE Devices —The printer is configured as data terminal equipment (DTE). To connect the printer to other DTE devices (such as the serial port of a personal computer), use an RS-232 null modem (crossover) cable.

Interconnecting to DCE Devices —When the printer is connected via its RS-232 interface to data communication equipment (DCE) such as a modem, a STANDARD RS-232 (straight-through) interface cable must be used.

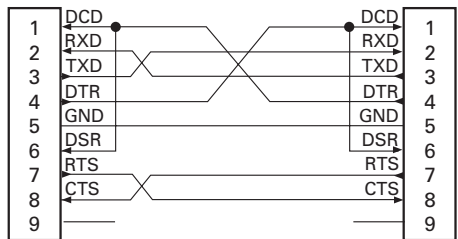
Connecting the Printer to a DTE Device

DB-25S
Connector
to DTE Device (PC)



DB-9P
Connector
to Printer

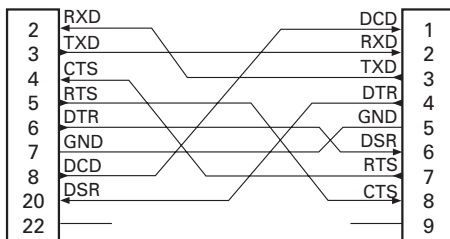
DB-9S
Connector
to DTE Device (PC)



DB-9P
Connector
to Printer

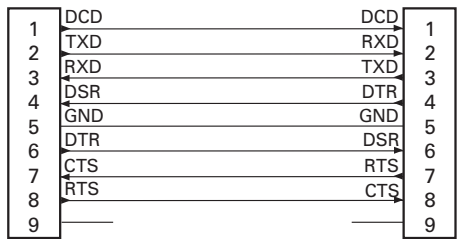
Connecting the Printer to a DCE Device

DB-25S
Connector
to DCE Device

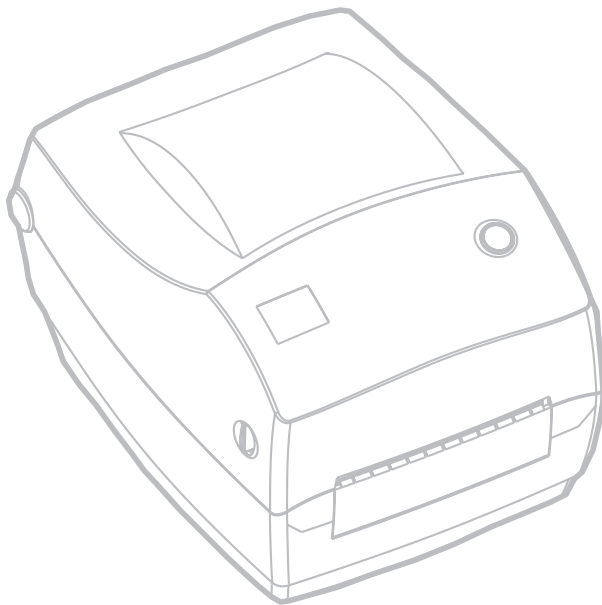


DB-9P
Connector
to Printer

DB-9S
Connector
to DCE Device



DB-9P
Connector
to Printer





Zebra Technologies Corporation