Zebra® R*Xi*III*Plus*™
High-Performance Printer

User Guide

Zebra

Customer Order # 23063L-001

Manufacturer Part # 23063L-001 Rev. 2

DECLARATION OF CONFORMITY

I have determined that the Zebra printers identified as the

*Xi*III*Plus* Series
90*Xi*III*Plus,* 96*Xi*III*Plus,* 110*Xi*III*Plus,*
140*Xi*III*Plus,* 170*Xi*III*Plus,* 220*Xi*III*Plus*

manufactured by:

Zebra Technologies
333 Corporate Woods Parkway
Vernon Hills, Illinois 60061-3109 U.S.A.

Have been shown to comply with the applicable technical standards of the FCC

For Home, Office, Commercial, and industrial use

If no unauthorized changed is made in the equipment,
and if the equipment is properly maintained and operated.

Notes •

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Contents

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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 radio/TV technician for help.

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Warranty Information

Effective December 30, 2002

All new Zebra products are warranted by the manufacturer to be free from defect in material and workmanship.

Printers and Related Hardware Products

Proof of purchase or shipment date is required to validate the warranty period. The warranty becomes void if the equipment is modified, improperly installed or used, damaged by accident or neglect, or if any parts are improperly installed or replaced by the user.

Products returned must be packaged in the original or comparable packing and shipping container. In the event equipment is not so packaged, or if shipping damage is evident, it will not be accepted for service under warranty. Surface transportation charges for return to customers in the continental United States is paid by Zebra. Otherwise, Zebra pays CPT (carriage paid to) nearest airport; customer pays customs, duties, taxes, and freight from airport to destination. If Zebra determines that the product returned for warranty service or replacement is not defective as herein defined, the customer will pay all handling and transportation costs.

Printers

All printers (excluding printheads) are warranted against defect in material or workmanship for twelve (12) months from the purchase date.

Printheads

Since printhead wear is part of normal operation, the original printhead is covered by a limited warranty as indicated below. Warranty period begins on purchase date.

Printhead	Warranty Period
Bar code label and receipt printer printheads	6 months
Plastic card printer printheads	12 months

To qualify for this warranty, the printhead must be returned to the factory or to an authorized service center. Customers are not required to purchase Genuine Zebra Supplies (media and/or ribbons) for warranty qualification.

However, if it is determined that the use of inappropriate or inferior supplies has caused any defect in the printhead for which a warranty claim is made, the user is responsible for Zebra's labor and material charges required to repair the defect. The warranty becomes void if the printhead is physically worn or damaged; also if it is determined that failure to follow the preventive maintenance schedule listed in the User Guide has caused defect in the thermal printhead for which a warranty claim is made.

Related Hardware Items

Products are warranted to be free of defects in material and workmanship from the date of purchase according to this chart:

Product	Warranty Period
Accessories	1 month
Batteries	3 months
Cables	1 month
Chargers/Power Supplies	1 year
Hardware Keys	1 year
Keyboard Display Units	6 months
Parts	3 months
Pocket Eye®	1 year
Software	1 month
ZebraNet® Print Servers	3 years

Defective product must be returned to Zebra for evaluation. In the event of notification of defect within the warranty period, Zebra will replace the defective item provided there had not been damage resulting from user abuse, modification, improper installation or use, or damage in shipping or by accident or neglect.

Supplies Products

Supplies are warranted to be free from defect in material and workmanship for a period of six (6) months for media and twelve (12) months for ribbon from the date of shipment by Zebra. This is provided the user has complied with storage guidelines, handling, and usage of the supplies in Zebra printers.

Zebra's sole obligation under these warranties is to furnish parts and labor for the repair or possible replacement of products found to be defective in material or workmanship during the warranty period. Zebra may in its discretion issue a credit for any such defective products in such amount as it deems reasonable.

Repair Services

Zebra repairs are warranted against defects in material and workmanship for 90 days from the date of repair by Zebra. This excludes printheads, which are warranted separately. This warranty does not cover normal wear and tear. This warranty becomes void if the item is modified, improperly installed or used, or damaged by accident, neglect, or abuse.

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Preface

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

Contacts

You can contact Zebra Technologies at any of the following:

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Note • The web address is case-sensitive.

US Phone Number +1 847.913.2259

UK/International Phone Number +44 (0) 1494 768289

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 All command line examples appear in `Courier New` font. For example, you would type the following to get to the Post-Install scripts in the `bin` directory:

```
Ztools
```

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

Cautions, Important, Note, and Example

Electrostatic Discharge Caution • Warns you of the potential for electrostatic discharge.

Electric Shock Caution • Warns you of a potential electric shock situation.

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

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

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

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

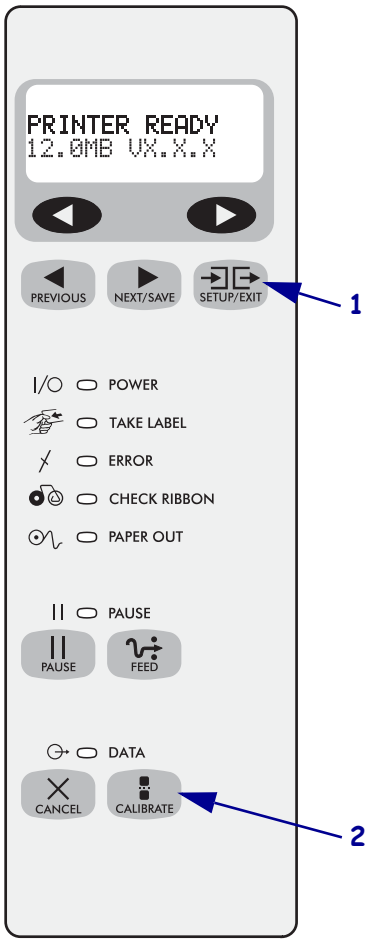
Note • Indicates neutral or positive information that emphasizes or supplements important points of the main text.

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

Tools • Tells you what tools you need to complete a given task.

Illustration Callouts Callouts are used when an illustration contains information that needs to be labeled and described. A table that contains the labels and descriptions follows the graphic. Figure 1 provides an example.

Figure 1 • Sample Figure with Callouts



1	SETUP/EXIT button
2	CALIBRATE button

Related Documents

The following documents might be helpful references:

- *ZPL II® Programming Guide Volume I* (part number 45541L) and *Volume II* (part number 45542L)
- *ZebraNet PrintServer II™ Installation and User Guide* (part number 45537L)
- Maintenance Manual (part number 48152L)

1 Introduction

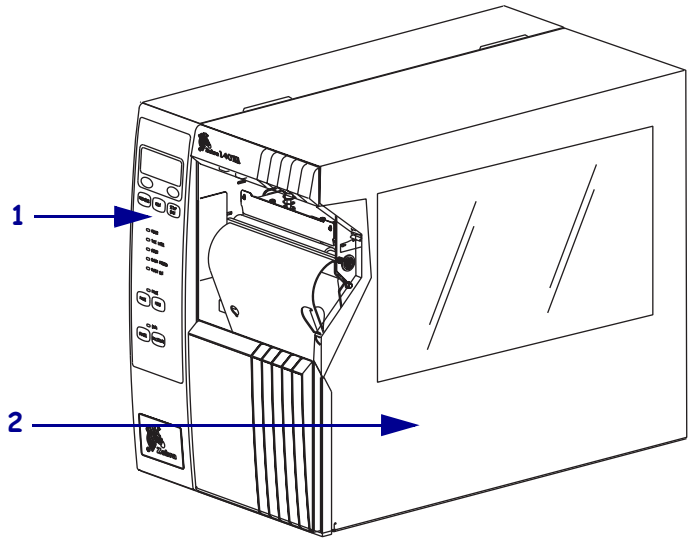
This chapter provides a high-level overview of the printer and its components.

Contents

Exterior View

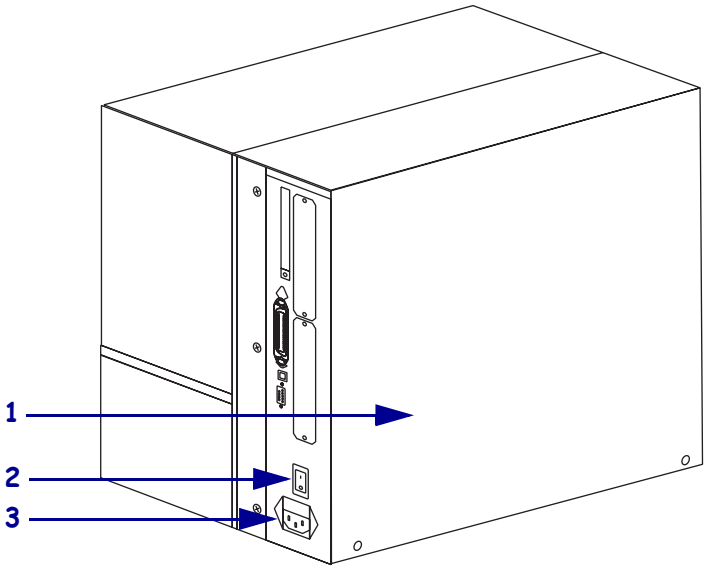
The following illustrations show the exterior of the printer.

Figure 2 • Printer Exterior—Front View



1	Front panel
2	Media door

Figure 3 • Printer Exterior—Rear View

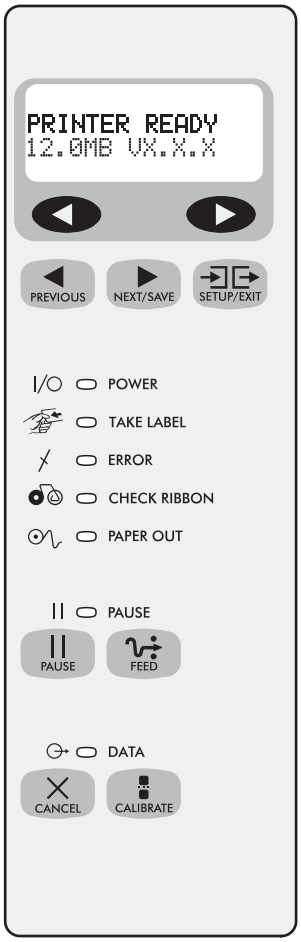


1	Electronics cover
2	Power switch
3	AC power cord connection

Front Panel

Figure 4 shows the buttons and lights on the front panel. For a description of the front panel buttons, see Table 1 on page 4, and for a description of the front panel lights, see Table 2 on page 5.

Figure 4 • Front Panel Buttons and Lights



Front Panel Buttons

This table describes the function of the buttons shown in Figure 4.

Table 1 • Front Panel Buttons

Button	Details
LEFT OVAL 	Changes parameter values. Common uses are to increase/decrease a value, answer **yes** or **no**, indicate **on** or **off**, scroll through several choices, input the password, or set up the printer for a firmware download.
RIGHT OVAL 	Changes parameter values. Common uses are to increase/decrease a value, answer **yes** or **no**, indicate **on** or **off**, scroll through several choices, input the password, or set up the printer for a firmware download.
SETUP/EXIT 	Enters and exits the setup mode.
PREVIOUS 	While in setup mode, scrolls to the previous parameter. Press and hold this button to scroll back quickly through parameter sets.
NEXT/SAVE 	While in setup mode, scrolls to the next parameter. Press and hold this button to scroll forward quickly through parameter sets. When exiting setup mode, this button scrolls through the save options.
PAUSE 	Starts and stops the printing process and allows other buttons to be used. If an error messages is on the LCD, pressing this button after the problem is resolved clears the error and allows printing to resume.
FEED 	Forces the printer to feed a blank label each time the button is pressed. • If the printer is not printing, one blank label immediately feeds. • If the printer is printing, one blank label feeds after the current batch of labels is complete.
CANCEL 	In the pause mode, this button cancels print jobs. • If there are multiple print jobs in the print queue, press CANCEL once for each print job to be deleted. • To delete all print jobs, hold CANCEL for several seconds. The DATA light turns off.
CALIBRATE 	This button can be used to calibrate the printer for the following: • Media length • Media type (continuous or non-continuous) • Print mode (direct thermal or thermal transfer) • Sensor values For more information on calibration, see *Calibrate the Printer* on page 33.

Front Panel Lights

This table details the lights shown in Figure 4 on page 3.

Table 2 • Front Panel Lights

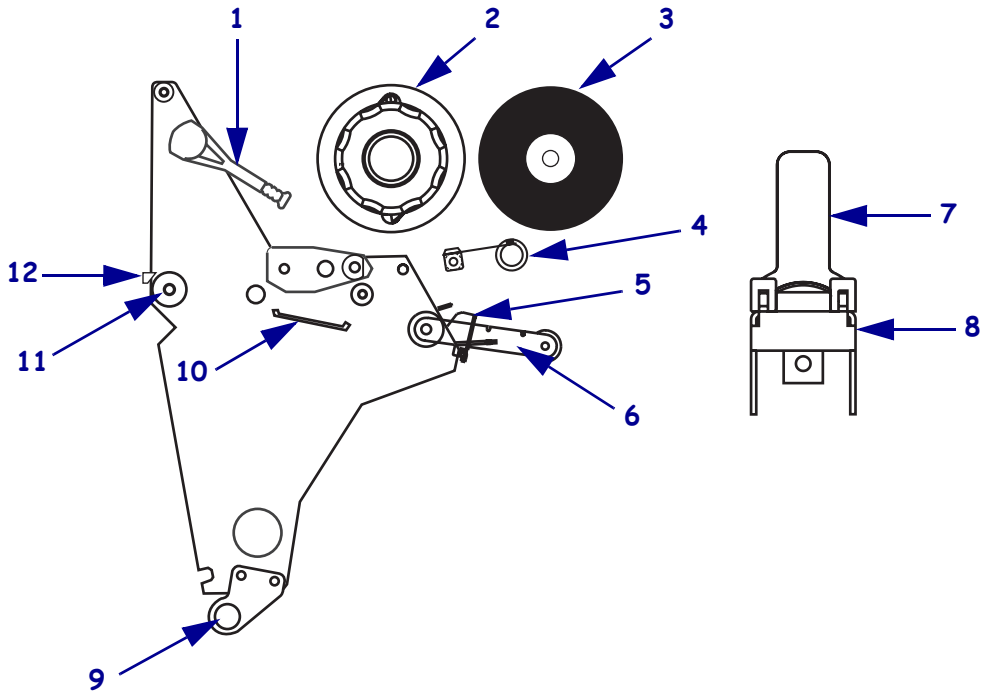
Light	Details
POWER 	Indicates printer power status. • **Off** — printer is off. • **On** — printer is on.
TAKE LABEL 	• **Off** — Normal operation. • **Flashing** — (*Peel-Off Mode only.*) The label is available. Printing is paused until the label is removed.
ERROR 	Indicates printer operation. • **Off** — Normal operation. • **Flashing** — printer pauses until the error condition is resolved and the PAUSE button is pressed.
CHECK RIBBON 	• **Off** — Normal operation; ribbon (if used) is properly loaded. • **On** — No ribbon is detected under the ribbon sensor. Printing is paused, the LCD shows an error message, and the PAUSE light is on.
PAPER OUT 	Indicates that labels need to be reloaded.
PAUSE 	• **Off** — normal operation. • **On** — all printing operations have stopped. Either PAUSE was pressed, a pause command was included in the label format, the on-line verifier detected an error, or a printer error was detected.
DATA 	• **Off** — Normal operation. No data being received or processed. • **On/Blinking** — Data processing or printing is taking place. Data is being received.

Printer Components

Figure 5 shows a side view of the printer's internal components.

Note • Depending on the printer options that you selected, your printer could look slightly different. For more about printer options, go to www.zebra.com.

Figure 5 • Internal Components



1	Printhead lever
2	Ribbon take-up spindle
3	Ribbon supply spindle
4	Ribbon dancer assembly (only on select models)
5	Media guide
6	Media dancer roller assembly
7	Media supply guide
8	Media supply hanger
9	Lower roller
10	Snap plate
11	Platen roller
12	Tear-off bar

2

Printer Setup

This chapter provides the tasks that you must complete and the issues that you must consider before you load and configure your printer.

Contents

Before You Begin

Review this checklist, and resolve any issues before you begin setting up your printer. When you are ready, continue with *Printer Operation* on page 21.

❑ **Unpack and Inspect** Have you unpacked the printer and inspected it for damage? If you have not, see *Unpack and Inspect the Printer* on page 9.

❑ **Select a Site** Have you selected an appropriate location for the printer? If you have not, see *Select a Site for the Printer* on page 10.

❑ **Attach Power Cord** Do you have the correct power cord for your printer? If you are unsure, see *Power Cord Specifications* on page 11. To attach the power cord and connect the printer to a power source, see *Connect the Printer to a Power Source* on page 11.

❑ **Connect to a Data Source** Have you determined how the printer will be connected to a data source (usually a computer)? For more information, see *Select a Communication Interface* on page 12.

❑ **Select Media** Do you have the correct media for your application? If you are unsure, see *Types of Media* on page 14.

❑ **Select Ribbon** Do you need to use ribbon, and is the appropriate ribbon available, if needed? If you are unsure, see *Ribbon* on page 17.

Unpack and Inspect the Printer

When you unpack the printer, save all packing materials. When the printer is out of the box, raise the printer's media door, and remove the power cord.

Inspect the printer for possible damage incurred during shipment. Check all exterior surfaces for damage. Raise the media door, and inspect the media compartment for damage to components.

Report Shipping Damage

If you discover shipping damage upon inspection:

- Immediately notify the shipping company of the damage, and file a damage report with them. Zebra is not responsible for any damage incurred during shipment of the equipment and does not repair this damage under warranty.
- Keep all packaging material for shipping company inspection.
- Notify your authorized Zebra reseller.

Store or Reship the Printer

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

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

If you must ship the printer, remove any ribbon and media from the supply spools to avoid damaging the printer. Carefully pack the printer into the original container or a suitable alternate container to avoid damage during transit.

Select a Site for the Printer

Consider the following when selecting an appropriate location for your printer.

Select a Surface

Select a solid, level surface of sufficient size and strength to accommodate the printer and other equipment (such as a computer), if necessary. The choices include a table, countertop, desk, or cart.

Provide Proper Operating Conditions

Because the printer was designed and is fabricated as an industrial-type unit, it functions satisfactorily in a location that conforms to specified environmental and electrical conditions, including a warehouse or factory floor. For more information on the required conditions, see *General Specifications* on page 116.

Table 3 shows the temperature and relative humidity requirements for the printer when it is operating.

Table 3 • Operating Temperature and Humidity

Mode	Temperature	Relative Humidity
Thermal Transfer	41° to 104°F (5° to 40°C)	20 to 85% non-condensing
Direct Thermal	32° to 104°F (0° to 40°C)	20 to 85% non-condensing

Allow Proper Space

The printer should have enough space around it for you to be able to open the media door. To allow for proper ventilation and cooling, leave open space on all sides of the printer.

Caution • Do not place any padding or cushioning material behind or under the printer because this restricts air flow and could cause the printer to overheat.

Provide a Data Source

If the printer will be located away from the data source, the selected site must provide the appropriate connections to that data source. For more information on the types of communication interfaces, see *Select a Communication Interface* on page 12.

Connect the Printer to a Power Source

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

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

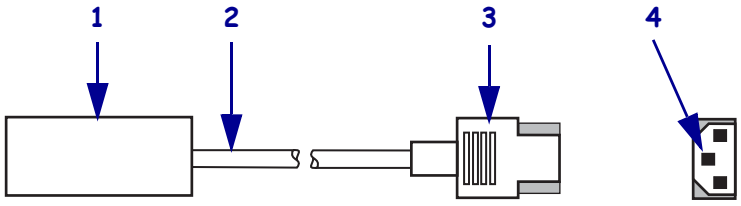
1. Turn the printer power switch (located on the rear of the printer) to the Off (**O**) position.
2. Plug the power cord into the mating connector on the rear of the printer.
3. Plug the other end of the power cord into the power source.

Power Cord Specifications

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

- The overall cord length must be less than 9.8 ft (3.0 m).
- The cord must be rated for at least 5 A, 250 V.
- The chassis ground (earth) **must** be connected to ensure safety and reduce electromagnetic interference. The third wire in the power cord grounds the connection (Figure 6).

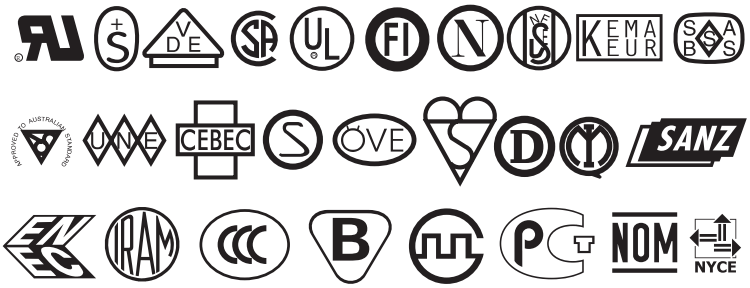
Figure 6 • Power Cord Specifications



1	AC power plug for your country
2	3-conductor HAR cable
3	IEC 320 connector
4	Neutral, earth, live in contact view

- The AC power plug and the IEC 320 connector must bear the certification mark of at least one of the known international safety organizations shown in Figure 7.

Figure 7 • International Safety Organization Marks



Select a Communication Interface

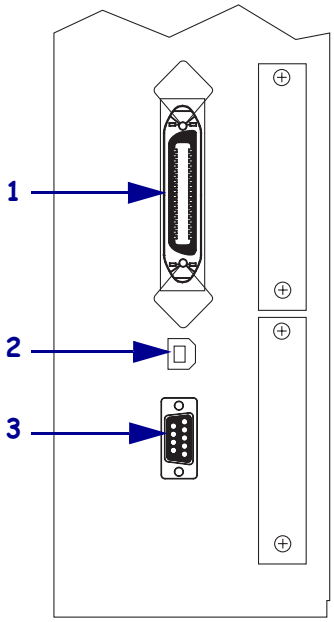
The way that you connect your printer to a data source depends on the communication options installed in the printer.

Standard interfaces: The standard communication interfaces are an RS-232 serial data port, a bidirectional parallel port, and a USB 2.0 port.

Note • RS-422 and RS-485 serial data ports are available through an adapter. A DB-25 cable and a USB 2.0 cable are also available.

Figure 8 shows the location of the communication interfaces on the back of the printer. For more information about these interfaces, see *Data Ports* on page 73.

Figure 8 • Communication Interfaces



1	Parallel port
2	USB 2.0 port
3	Serial port

Optional Print Servers:

- ZebraNet PrintServer II (PSII). For more information on PSII, see the *PrintServer II User and Reference Guide* (Zebra part number 45537L).

Data Cable Requirements

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

To minimize electrical noise pickup in the cable:

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

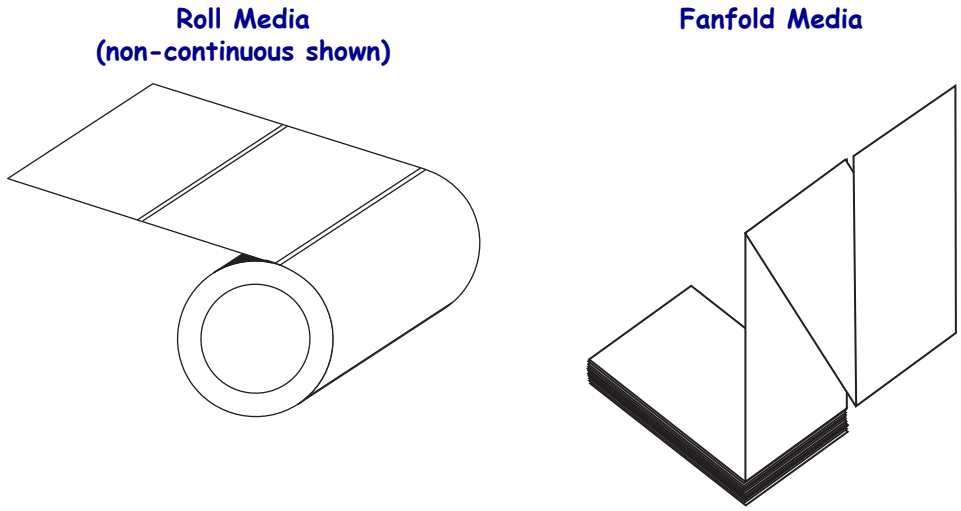
Note • Zebra printers comply with FCC Rules and Regulations, Part 15 for Class B Equipment using fully shielded, 6.5 ft (2 m) data cables. Use of unshielded cables may increase radiation above the Class B limits.

Note • RS-422 and RS-485 applications should use twisted shielded pairs as recommended in the TIA/EIA-485 Specification.

Types of Media

Your printer is capable of using various forms of media. These include roll and fanfold media (Figure 9) that may be labels or card stock and that may have optional perforations or registration holes. The media also may have a radio frequency identification (RFID) chip and antenna inlay embedded in it (sometimes called “smart” labels). The following sections contain descriptions of the various types of media approved for use in your printer.

Figure 9 • Roll and Fanfold Media



Selecting Media

We strongly recommend 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 ensure against premature printhead wear.

Important • Certain printing conditions may require that you adjust printing parameters, such as print speed, darkness, or print mode. These conditions include (but are not limited to):

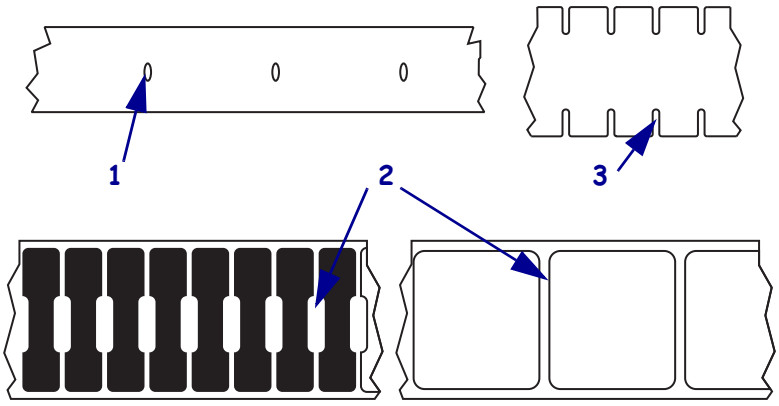
- printing at high speeds
- cutting or peeling the media
- the use of extremely thin, small, synthetic, or coated labels

Because print quality is affected by these and other factors, it is important that you run tests to determine the best combination of printer settings and media for your application. A poor match may limit print quality or print rate, or the printer may not function properly in the desired print mode.

Non-Continuous Media

Non-continuous web media refers to individual labels that are separated by a gap, notch, or hole (Figure 10). When you look at the media, you can tell where one label ends and the next one begins.

Figure 10 • Non-Continuous Web Media



1	Hole
2	Label Gap
3	Notch

Important • When using media that has holes or notches, position the sensor directly over a hole or notch.

Continuous Media

Continuous media (Figure 11) is one uninterrupted roll of material without gaps, holes, notches, or black marks. This allows the image to be printed anywhere on the label. The individual labels can be cut apart or stored in a roll for later use.

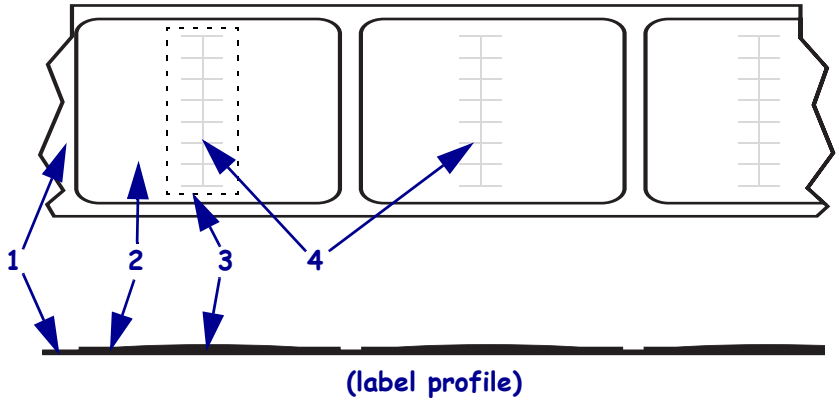
Figure 11 • Continuous Media

RFID “Smart” Labels

“Smart” labels are usually made from two components: media and an embedded RFID transponder (Figure 12). For more information about reading and encoding RFID tags, see *RFID Guidelines* on page 69.

- The media (usually a label with a UHF transponder embedded between the label and liner) is usually 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 that a non-RFID barcode printer would use.
- The UHF transponder, which is sometimes called the RFID tag, is usually comprised of an antenna that is bonded to an integrated circuit (IC) chip. If you hold a “smart” label up to the light, you can see the transponder’s antenna embedded within the label, and you can feel a bump in the label where the IC chip is located.
- The IC chip contains the RF circuit, coders, decoders, and memory. At a minimum, “smart” labels have memory that can be read, while the vast majority also have memory that can be encoded by the user as well. For more information about encoding “smart” labels, see *ZPL II Commands for RFID* on page 63.

Figure 12 • RFID “Smart” Labels



1	Liner
2	Label
3	Location of embedded transponder
4	Outline of transponder antenna (shape varies by manufacturer)

Ribbon

Ribbon is a thin film that is coated on one side with wax or wax resin, which is transferred to the media during the thermal transfer process. The media determines whether you need to use ribbon and how wide the ribbon must be.

When to Use Ribbon

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

To perform a label scratch test, complete these steps:

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

If a black mark...	Then...
Does not appear on the media	The media is **thermal transfer**. A ribbon is required with this type of media.
Appears on the media	The media is **direct thermal**. No ribbon is required for this type of media, though ribbon may be used to help protect the printhead from abrasion with the media.

Ribbon Width

When ribbon is used, it must be as wide as or wider than the media being used. If the ribbon is narrower than the media, areas of the printhead are unprotected and subject to premature wear.

Coated Side of Ribbon

Ribbon can be wound with the coated side on the inside or outside (see Figure 13). If you are unsure which side of a particular roll of ribbon is coated, perform an adhesive test or a ribbon scratch test to determine which side is coated.

Figure 13 • Ribbon Coated on Outside or Inside

Adhesive Test

If you have labels available, perform the adhesive test to determine which side of a ribbon is coated. This method works well for ribbon that is already installed.

To perform an adhesive test, complete these steps:

1. Peel a label from its backing.
2. Press a corner of the sticky side of the label to the outer surface of the roll of ribbon.
3. Peel the label off of the ribbon.
4. Observe the results. Did flakes or particles of ink from the ribbon adhere to the label?

If ink from the ribbon...	Then...
Adhered to the label	The ribbon is coated on the outer surface.
Did not adhere to the label	The ribbon is likely coated on the inner surface. **a.** Press a corner of the sticky side of the label to the inner surface of the roll of ribbon. **b.** Peel the label off of the ribbon. **c.** Observe the results again. The ink from the ribbon should have adhered to the label. If the ink did not stick either time, repeat the adhesive test with a stickier adhesive, or perform the ribbon scratch test.

Ribbon Scratch Test

If you do not have labels available, perform the ribbon scratch test. This method works best if the ribbon is not installed.

To perform a ribbon scratch test, complete these steps:

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

5. Observe the results. Did the ribbon leave a mark on the paper?

If the ribbon...	Then...
Left a mark on the paper	The ribbon is coated on the outer surface.
Did not leave a mark on the paper	The ribbon is likely coated on the inner surface. **a.** Flip the ribbon over on the paper so the inner side of the ribbon comes in contact with the paper. **b.** Scratch the outer surface of the unrolled ribbon with your fingernail. **c.** Lift the ribbon from the paper. **d.** Observe the results again. The ribbon should have left a mark on the paper. If not, repeat the test, starting with the first side again. You may need to scratch the surface of the ribbon harder.

Notes • _____

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3

Printer Operation

If you have completed the tasks and resolved the issues in the checklist in *Before You Begin* on page 8, follow the instruction in this chapter to load and calibrate your printer and to print configuration labels.

Contents

Load the Printer

This section gives you a series of instructions to load labels and ribbon (if used). The instructions that follow are for a standard printer in Tear-Off Mode.

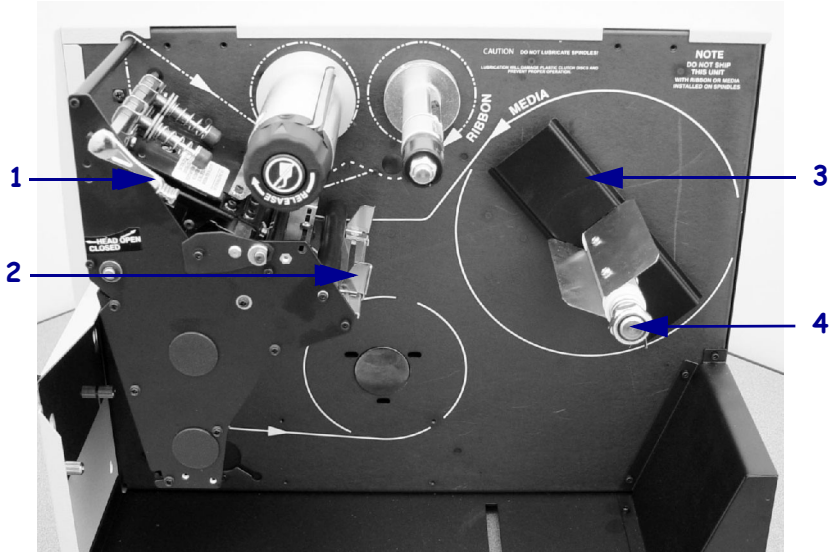
Caution • Be sure the printer is Off (**O**) if you have connected the power cable.

Load Roll Media

Roll media feeds through the printer from the media hanger or media supply spindle.

Figure 14 identifies the components of the printer that you need to be familiar with to load roll media.

Figure 14 • Interior Components for Media Loading



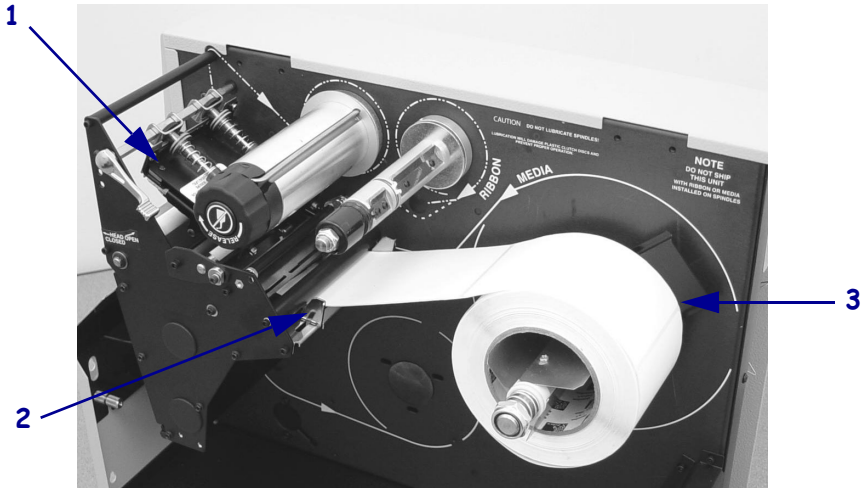
1	Printhead lever
2	Media guide
3	Media back plate
4	Optional media spindle

To load roll media, complete these steps:

1. Open the printhead.
2. Slide the media guide away from the printer frame. You might need to loosen the media guide screw.
3. Put the roll of media on the media hanger or spindle. If using a media hanger, adjust the media guide on the hanger so it just touches the media.
4. Push the label core toward the printer frame. The labels must be aligned with the label core.
5. Feed the media under the media guide roller and under the printhead.

6. Adjust the media guide so it is just touching, but does not restrict, the edge of the media. The labels should lie flat as shown in Figure 15.

Figure 15 • Media Position



1	Printhead
2	Media guide
3	Labels/media

7. Which type of media are you using?

If you are...	Then...
Using **direct thermal** media	Close the printhead and go to *Print a Printer Configuration Label* on page 31.
Using **thermal transfer** media	Go to *Load Ribbon* on page 26.
Not sure	Go to *When to Use Ribbon* on page 17.

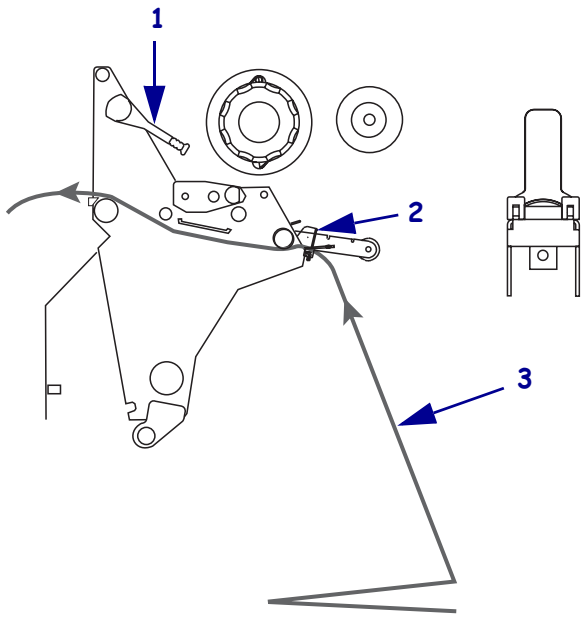
Load Fanfold Media

Fanfold media feeds through either the bottom or rear access slot from outside the printer. The media hanger and media supply spindle are **not** used with fanfold media.

To load fanfold labels, complete these steps:

1. Slide the printhead lever to the Open position.
2. Slide the media guide as far from the printer frame as possible.
3. How do you want to feed the fanfold labels?
   - **From the bottom slot in the printer body.**
     Figure 16 shows the printer with fanfold labels loaded through the bottom slot.

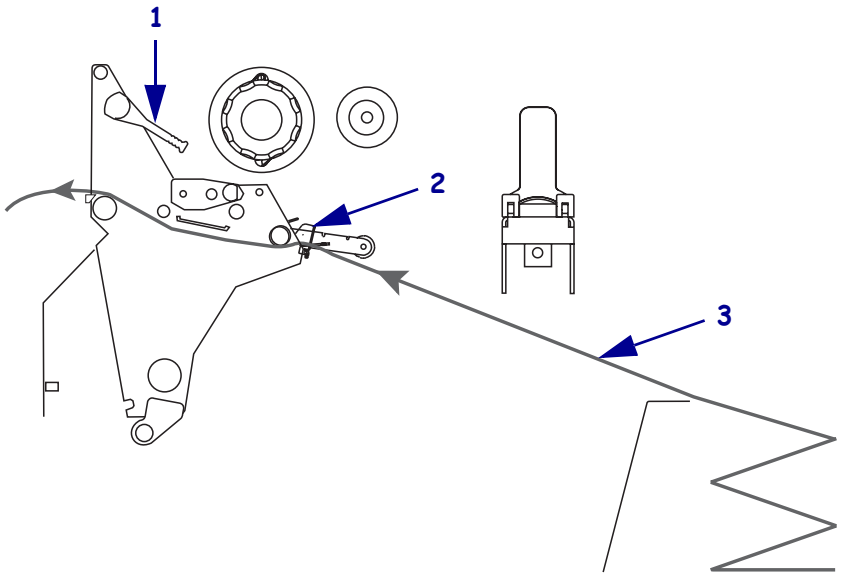
Figure 16 • Fanfold Media—Bottom Loading



1	Printhead lever (shown in the Open position)
2	Media guide
3	Fanfold labels

- **From the rear slot in the printer body.**
  Figure 17 shows the printer with fanfold labels loaded through the rear slot.

Figure 17 • Fanfold Media—Rear Loading



1	Printhead lever (shown in the Open position)
2	Media guide
3	Fanfold labels

4. Adjust the media guide so it just touches, but does not restrict, the edge of the labels. The labels should lie flat.
5. Which type of media are you using?

If you are...	Then...
Using direct thermal media	Close the printhead and go to *Print a Printer Configuration Label* on page 31.
Using thermal transfer media	Go to *Load Ribbon* on page 26.
Not sure	Go to *When to Use Ribbon* on page 17.

Load Ribbon

Before you load ribbon, make sure that the labels that you are using need ribbon. Only thermal transfer media requires ribbon. Ribbon is not required with direct thermal media, though it may be used to protect the printhead from abrasion. For more information, see *When to Use Ribbon* on page 17.

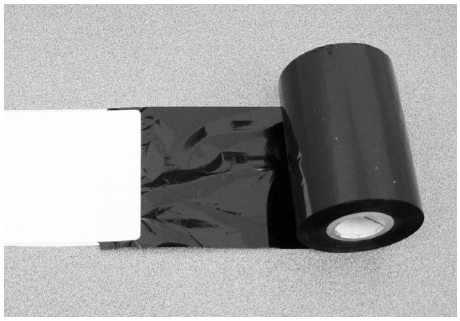
Caution • Use ribbon that is wider than the thermal transfer media. If the printhead is not protected by the ribbon, the resulting abrasion from the media may cause premature printhead wear.

A ribbon leader makes it easier to load and unload ribbon. Make a leader for your ribbon roll if it does not already have one.

To make a ribbon leader, complete these steps:

1. Unroll the ribbon about 6 in. (15 cm).
2. Tear off a strip of labels and backing about 6 in. (15 cm) long from the label roll.
3. Peel a label from the backing.
4. Overlap the ribbon and the backing with the ribbon on top, and use the label to tape them together. This serves as a ribbon leader (Figure 18).

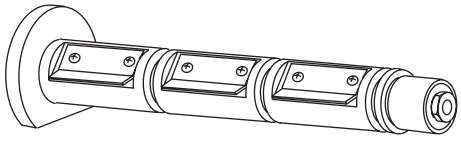
Figure 18 • Ribbon Leader



To load the ribbon, complete these steps:

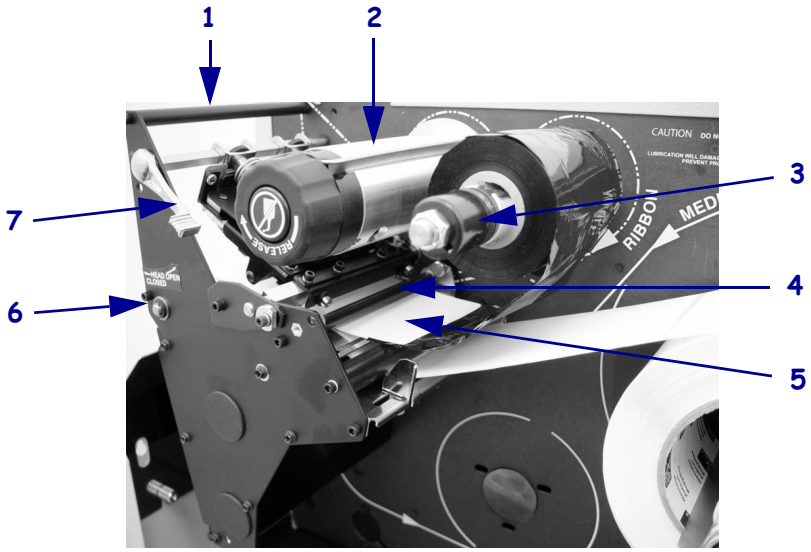
1. Align the segments of the ribbon supply spindle as shown in Figure 19.

Figure 19 • Ribbon Supply Spindle Segments



2. Place the roll of ribbon on the ribbon supply spindle, and push the core as far back as it can go. Figure 20 shows the printer components that are mentioned in this procedure.

Figure 20 • Interior Components for Ribbon Loading

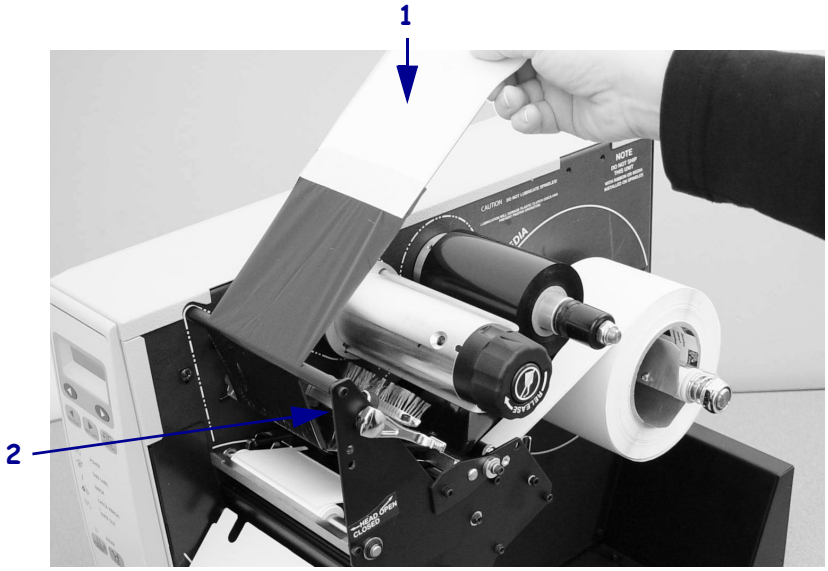


1	Top roller
2	Ribbon take-up spindle
3	Ribbon supply spindle
4	Ribbon guide roller
5	Ribbon leader attached to ribbon
6	Platen roller (not shown)
7	Printhead lever (shown in the Open position)

3. If the printhead is closed, open it using the printhead lever.
4. Thread the ribbon leader and attached ribbon under the ribbon guide roller, through the print mechanism, and past the platen roller.

5. Pull the ribbon leader over the printhead and above the top roller (Figure 21).

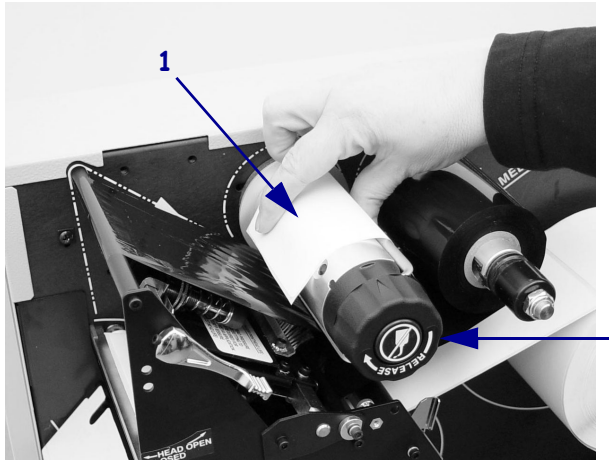
Figure 21 • Threading Ribbon Past Printhead and Platen Roller



1	Ribbon leader
2	Printhead

6. Bring the ribbon leader and ribbon under the ribbon take-up spindle, and wrap them around the spindle. Figure 22 shows the ribbon leader wrapped around the ribbon take-up spindle.

Figure 22 • Wrapping Ribbon around Spindle



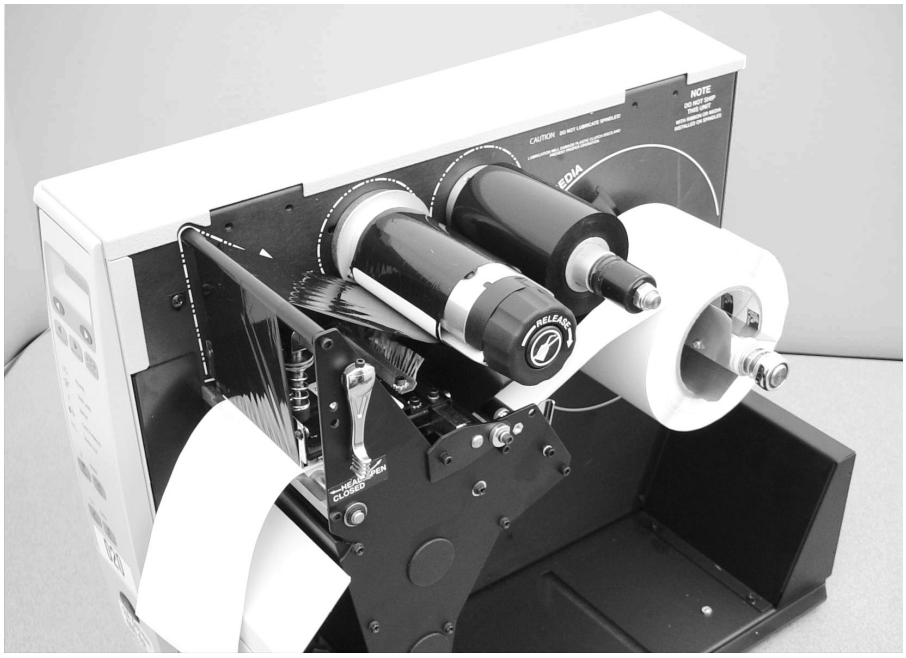
1	Ribbon leader
2	Ribbon take-up spindle

7. Turn the ribbon take-up spindle counterclockwise until the ribbon stays on it, as shown.

8. Close the printhead.

   Figure 23 shows how your printer should look with the media and ribbon loaded.

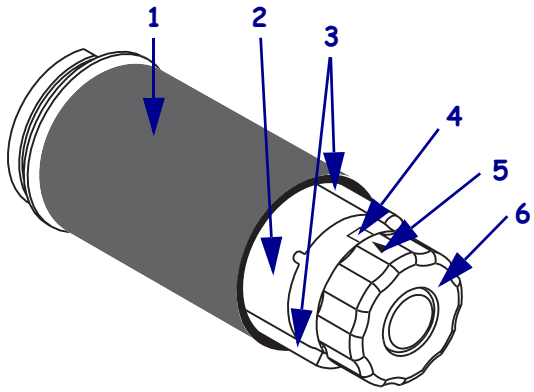
Figure 23 • Ribbon Loaded in Printer



Remove Used Ribbon

When the ribbon has run out or must be changed, remove the used ribbon from the take-up spindle (Figure 24).

Figure 24 • Ribbon Take-Up Spindle



1	Used ribbon
2	Ribbon take-up spindle
3	Ribbon release bars
4	Notch in ribbon take-up spindle
5	Arrow on ribbon take-up spindle
6	Ribbon release knob

To remove used ribbon, complete these steps:

1. Open the printhead.
2. Has the ribbon run out?

If the ribbon...	Then
Ran out	Continue with the next step.
Did not run out	Tear or cut the ribbon as close to the ribbon take-up spindle as possible. **Caution** • Do not cut through the ribbon that is on the take-up spindle because you may damage the spindle. Use the release knob to slide the ribbon off of the spindle.

3. While holding the ribbon take-up spindle, turn the ribbon release knob clockwise until it stops.

   The ribbon release bars pivot down, easing the spindle's grip on the used ribbon.
4. Slide the used ribbon off of the ribbon take-up spindle.
5. Align the arrow on the ribbon take-up spindle knob with the notch in the ribbon take-up spindle.
6. To load new ribbon, see *Load Ribbon* on page 26.

Print a Printer Configuration Label

When you have loaded the media and ribbon (if necessary), print a printer configuration label to use as a record of your printer settings. Keep the label for baseline information on your printer when troubleshooting printing problems.

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

To print a configuration label, complete these steps:

1. Connect the power cord to the power connection on the back of the printer.
2. To confirm the power connection, turn the printer On (**I**).

   The printer performs the power-up self test (POST). When the test is complete, PRINTER READY displays on the front panel LCD.
3. Does the front panel LCD display PRINTER READY?

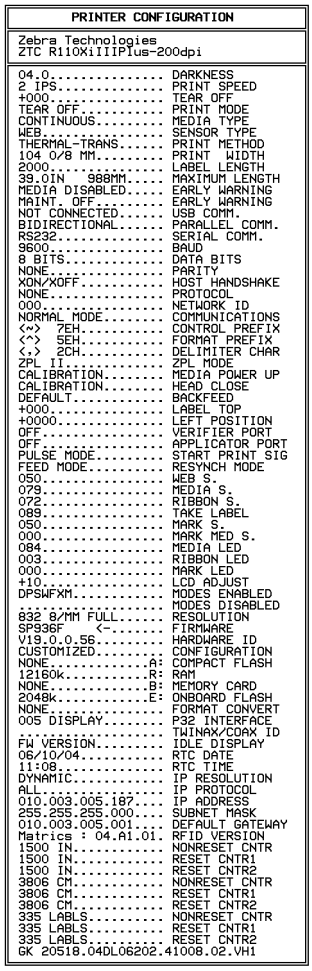
If...	Then...
Yes	Continue with the next step.
No	Go to *Troubleshooting* on page 99.

4. Turn the printer Off (**O**).
5. Press and hold **CANCEL** while turning the printer On (**I**).
6. Release **CANCEL** when the DATA light turns off (approximately five seconds).

   The configuration label prints (Figure 25).
7. Did the label print?

If a configuration label...	Then...
Printed	Connect the printer to your data source. Communication can be handled in many different ways. More information about the options is available in *Select a Communication Interface* on page 12.
Did not print	Sensors out of position is a common cause of printing problems. Refer to *Adjust and Calibrate Sensors* on page 34. For additional assistance, refer to *Troubleshooting* on page 99.

Figure 25 • Printer Configuration Label



```
PRINTER CONFIGURATION

Zebra Technologies
ZTC R110XiIIIPlus-200dpi

04.0............... DARKNESS
2 IPS.............. PRINT SPEED
+000............... TEAR OFF
TEAR OFF........... PRINT MODE
CONTINUOUS......... MEDIA TYPE
WEB................ SENSOR TYPE
THERMAL-TRANS...... PRINT METHOD
104 0/8 MM......... PRINT  WIDTH
2000............... LABEL LENGTH
39.0IN   988MM..... MAXIMUM LENGTH
MEDIA DISABLED..... EARLY WARNING
MAINT. OFF......... EARLY WARNING
NOT CONNECTED...... USB COMM.
BIDIRECTIONAL...... PARALLEL COMM.
RS232.............. SERIAL COMM.
9600............... BAUD
8 BITS............. DATA BITS
NONE............... PARITY
XON/XOFF........... HOST HANDSHAKE
NONE............... PROTOCOL
000................ NETWORK ID
NORMAL MODE........ COMMUNICATIONS
<~>  7EH........... CONTROL PREFIX
<^>  5EH........... FORMAT PREFIX
<,>  2CH........... DELIMITER CHAR
ZPL II............. ZPL MODE
CALIBRATION........ MEDIA POWER UP
CALIBRATION........ HEAD CLOSE
DEFAULT............ BACKFEED
+000............... LABEL TOP
+0000.............. LEFT POSITION
OFF................ VERIFIER PORT
OFF................ APPLICATOR PORT
PULSE MODE......... START PRINT SIG
FEED MODE.......... RESYNCH MODE
050................ WEB S.
079................ MEDIA S.
072................ RIBBON S.
089................ TAKE LABEL
050................ MARK S.
000................ MARK MED S.
084................ MEDIA LED
003................ RIBBON LED
000................ MARK LED
+10................ LCD ADJUST
DPSWFXM............ MODES ENABLED
.................. MODES DISABLED
832 8/MM FULL...... RESOLUTION
SP936F    <-------- FIRMWARE
V19.0.0.5B......... HARDWARE ID
CUSTOMIZED......... CONFIGURATION
NONE............A: COMPACT FLASH
12160k..........R: RAM
NONE............B: MEMORY CARD
2048k...........E: ONBOARD FLASH
NONE............... FORMAT CONVERT
005 DISPLAY........ P32 INTERFACE
.................. TWINAX/COAX ID
FW VERSION......... IDLE DISPLAY
06/10/04........... RTC DATE
11:08.............. RTC TIME
DYNAMIC............ IP RESOLUTION
ALL................ IP PROTOCOL
010.003.005.187.... IP ADDRESS
255.255.255.000.... SUBNET MASK
010.003.005.001.... DEFAULT GATEWAY
Matrics : 04.A1.01. RFID VERSION
1500 IN............ NONRESET CNTR
1500 IN............ RESET CNTR1
1500 IN............ RESET CNTR2
3806 CM............ NONRESET CNTR
3806 CM............ RESET CNTR1
3806 CM............ RESET CNTR2
335 LABLS.......... NONRESET CNTR
335 LABLS.......... RESET CNTR1
335 LABLS.......... RESET CNTR2
GK 20518.04DL06202.41008.02.VH1
```

Calibrate the Printer

There are five different ways that the printer can be calibrated. You may calibrate the printer as needed.

- **Auto-calibration** occurs when the printer feeds media after the printhead is closed and when the printer is first turned on (see *Media Power Up* on page 54 and *Head Close* on page 54 for options). The printer automatically sets the value it detects for the spaces between labels. This type of calibration also happens as part of both the sensor profile and media and ribbon sensor calibration procedures.
- **Long Calibration,** which you select by pressing PAUSE then CALIBRATE, calibrates the printer for media length, media type (continuous or non-continuous), and print mode (thermal or direct thermal transfer) and updates the sensor values. This calibration is the same as what is performed when **Calibration** is selected for the MEDIA POWER UP and HEAD CLOSE parameters. For more information, see *Media Power Up* on page 54 or *Head Close* on page 54.
- **Short Calibration,** which is a selection for the MEDIA POWER UP and HEAD CLOSE parameters, uses current sensor values rather than detecting the spaces between labels and resetting the sensors. This calibration sequence may use fewer labels than the long calibration sequence, but it is less reliable because the values that are stored in the sensors could be incorrect. For more information, see *Media Power Up* on page 54 or *Head Close* on page 54.
- **Sensor Profile Calibration,** which you select through the front panel, auto-calibrates the printer and prints a media sensor profile. See *Sensor Profile* on page 49 for instructions.
- **Media and Ribbon Sensor Sensitivity Calibration,** which you select through the front panel, resets the sensitivity of the sensors to detect correctly the media and ribbon that you are using. See *Media and Ribbon Sensor Calibration* on page 34 for instructions. If you change the type of ribbon and/or media, you might need to reset the sensitivity of the media and ribbon sensors. When the sensors are at their new sensitivity, the printer performs an auto-calibration.

Adjust and Calibrate Sensors

This section describes how to adjust and calibrate sensors.

Media and Ribbon Sensor Calibration

Media and ribbon sensor calibration is one of the most common adjustments to the printer settings. This procedure is performed through the front panel.

Indications that the sensitivity may need to be reset are:

- The CHECK RIBBON light is on even though the ribbon is properly installed.
- Non-continuous labels are being treated as continuous labels.

Note • Before you begin the calibration procedure, make sure that the maximum length is set to a value 1 in. (25.4 mm) greater than the length of the labels that you are using. If the maximum length is set to a lower value, the calibration process assumes that continuous media is in the printer.

Important • This procedure must be followed exactly as presented. All of the steps must be performed even if only one of the sensors requires adjustment. You may press the left oval at any step in this procedure to cancel the procedure.

To adjust the sensitivity of media and ribbon sensors, complete these steps:

1. From the front panel, press the right oval to start the calibration procedure.
   The LOAD BACKING prompt displays.
2. Open the printhead.
3. Remove approximately 8 in. (203 mm) of labels from the media backing, and pull the media into the printer so that only the backing is between the media sensors.
4. Leave the printhead open.
5. Press the right oval to continue.
   The REMOVE RIBBON prompt displays.
6. Remove the ribbon (if used).
7. Close the printhead.
8. Press the right oval to continue.
   The message CALIBRATING PLEASE WAIT displays.
   The printer adjusts the scale (gain) of the signals that it receives from the media and ribbon sensors. On the sensor profile, this essentially corresponds to moving the peak of the graph up or down to optimize the readings for your application (for more information, see *Sensor Profile* on page 49).
   When calibration is complete, RELOAD ALL displays.
9. Open the printhead and pull the media forward until a label is positioned under the media sensor.
10. Reload the ribbon (if used) into to its proper position.

11. Close the printhead.
12. Press the right oval to continue.

    The printer does a calibration equivalent to pressing CALIBRATE; during this process, the printer determines the label length. To see the new readings on the new scale, print a sensor profile.

Transmissive (Media) Sensors

The transmissive sensor consists of two sections: a light source (the lower media sensor) and a light sensor (the upper media sensor). The media passes between the two.

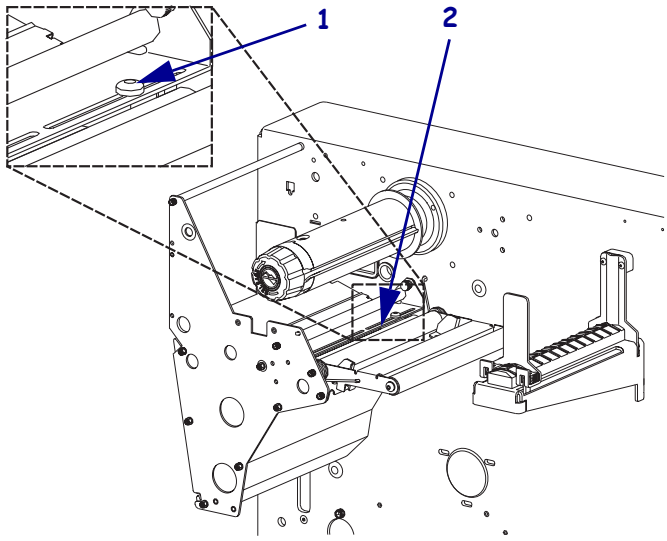
Adjust these sensors only when the printer cannot detect the top of the label. The front panel LCD displays ERROR CONDITION PAPER OUT, even though there are labels loaded in the printer.

Note • The upper media sensor can be positioned along the inside half of the media (the side closest to the back of the printer) or the outside half of the media (the side farthest from the back of the printer).

To adjust the upper media sensor for the inside half of the media, complete these steps:

1. Remove the ribbon (if ribbon is used).
2. Locate the upper media sensor (Figure 26). The upper media sensor eye is directly below the adjustment screw head.

Figure 26 • Upper Media Sensor Location



1	Upper media sensor adjustment screw
2	Upper media sensor

3. Slightly loosen the upper media sensor adjustment screw using a Phillips-head screwdriver.
4. Using the tip of the screwdriver, slide the upper sensor along the slot to the desired position (for non-continuous media with a notch or hole in the media, the sensor must be directly above the notch or hole).
5. Tighten the adjustment screw to secure the upper media sensor.

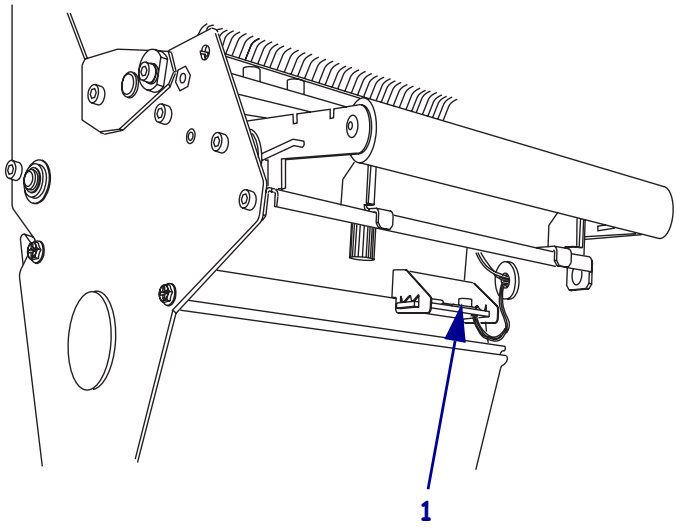
To adjust the upper media sensor for the outside half of the media:

1. Remove the ribbon (if ribbon is used).
2. Locate the upper media sensor. The upper media sensor eye is directly below the adjustment screw head.
3. Remove the upper media sensor adjustment screw using a Phillips-head screwdriver.
4. Lift the upper media sensor assembly from the slot, and move it and the wire cover to the outside slot. Carefully pull the wires through the cable tie. You may need to set aside the sensor wire cover if the adjustment is too far to the outside.
5. Replace and slightly tighten the adjustment screw.
6. Slide the upper media sensor along the slot to the desired position (for non-continuous media with a notch or hole in the media, the sensor must be directly above the notch or hole).
7. Tighten the adjustment screw.
8. Make sure that the wires are routed back into the groove of the media sensor bracket.

To adjust the lower media sensor, complete these steps:

1. Locate the lower media sensor assembly under the rear roller (Figure 27). The sensor is a spring clip holding a circuit board.

Figure 27 • Lower Media Sensor Location



1	Lower media sensor

2. Slide the lower sensor until it is under the upper media sensor. Gently pull wires out as needed (wires should have a little slack).
3. If you move the sensor inward and a large loop of wire develops, remove the electronics cover from the side of the printer, and gently pull the wires through. Clamp the wires so that they do not rub any drive belts.

Adjust Printhead Pressure and Toggle Position

Printhead pressure is one factor that affects print quality. If the toggle pressure is too light or uneven, the labels and ribbon may slip.

Important • Print quality depends on the labels and ribbon used as well as the toggle pressure. Make sure that your labels and ribbon are right for your application.

- **Direct thermal media** does not need ribbon.
- **Thermal transfer media** needs ribbon.

Toggle Position Adjustment

Toggle adjustment may be needed if printing is too light on one side or if thick labels are used. The toggles should be positioned so they provide even pressure on the labels. Slide the toggles to the desired location. If the labels are too narrow to fit both toggles, position one toggle over the center of the labels and decrease the pressure on the unused toggle.

Printhead Pressure Adjustment

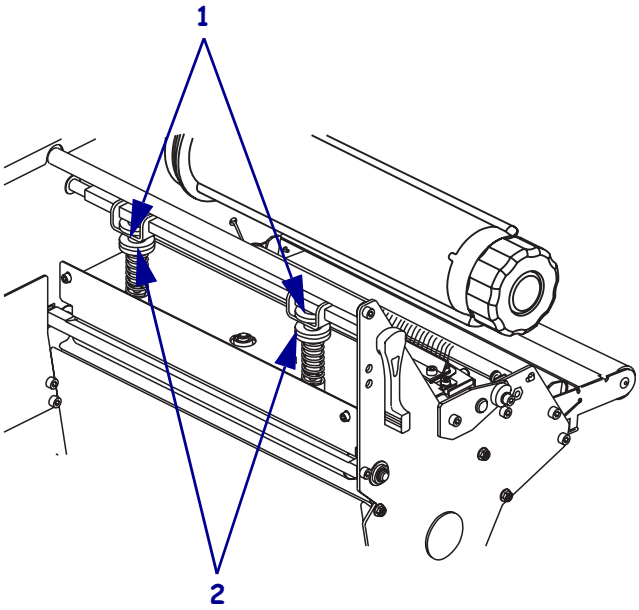
If positioning the toggles properly does not solve the problem, adjust printhead pressure. Maximize printhead life by using the lowest pressure that produces the desired print quality.

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

To adjust printhead pressure, complete these steps:

1. Print some labels at 2.4 in. (61 mm) per second by running the *PAUSE Self Test* on page 110.
2. While printing labels, use the front panel controls to lower the darkness setting until the labels are printing gray instead of black.
3. Loosen the locking nuts at the top of the toggle assemblies (Figure 28).

Figure 28 • Toggle Assemblies



1	Locking nuts
2	Adjusting nuts

4. Some media types require higher pressure to print well. For these media types, increase or decrease pressure using the adjusting nuts until the left and right edges of the printed area are equally dark.
5. Increase the darkness level using the front panel controls until the printing is clear.
6. Tighten the locking nuts.

Notes •

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Fax: 1.847.821.1795 Attention: TechPubs — CTC

4

Front Panel Controls

This chapter describes the function of the front panel.

Contents

Overview

After you have installed media and ribbon and printed a configuration label, you can change the printer's settings using the front panel controls. For an overview of the front panel, including descriptions of the buttons and lights, see *Front Panel* on page 3. If you need to restore the printer to its factory default settings, see *FEED and PAUSE Self Test* on page 112.

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

Enter Setup Mode

To enter Setup Mode, complete these steps:

1. Press SETUP/EXIT to enter Setup Mode.
2. Press either NEXT/SAVE or PREVIOUS to scroll through the parameters.

Exit Setup Mode

To leave Setup Mode, complete these steps:

1. Press SETUP/EXIT.
   The LCD displays SAVE CHANGES.
2. Press the left or right oval to display the save options (Table 4).

Table 4 • Save Options When Leaving Setup Mode

LCD Display	Description
PERMANENT	Permanently saves the changes. Values are stored in the printer even when power is turned off.
TEMPORARY	Saves the changes until you change them again or until power is turned off.
CANCEL	Cancels all changes from the time you pressed SETUP/EXIT except the darkness and tear-off settings (if they were changed).
LOAD DEFAULTS	Sets all parameters other than the network settings back to the factory defaults. To see the factory default values, see *Front Panel LCD* on page 44. **Note** • Loading factory defaults causes the printer to auto-calibrate.
LOAD LAST SAVE	Loads values from the last permanent save.
DEFAULT NET	Sets the wired and wireless network settings back to factory defaults.

3. Press NEXT/SAVE to select the displayed choice.
   When the configuration and calibration sequence is done, PRINTER READY displays.

Password-Protected Parameters

Certain parameters are password-protected by factory default, including the communication parameters.

Note • If the parameters are set incorrectly, the printer may function unpredictably.

The first attempt to change a password-protected parameter (pressing one of the ovals) requires you to enter a four-digit password at the ENTER PASSWORD display. The left oval changes the selected digit position; the right oval increases the selected digit value. After entering the password, press NEXT/SAVE. The parameter you wish to change is displayed. If the password was entered correctly, you can now change the value.

The first time that you attempt to change a password-protected parameter, the printer displays ENTER PASSWORD. Before you can change the parameter, you must enter the four-digit password. After you have entered the password correctly, you do not have to enter it again unless you leave Setup Mode by pressing SETUP/EXIT or by turning the printer Off (**O**).

To Enter a Password for a Password-Protected Parameter, complete these steps:

1. At the password prompt, use the left oval to change the selected digit position.
2. When you have selected the digit that you wish to change, use the right oval to increase the selected digit value. Repeat these two steps for each digit of the password.
3. After entering the password, press NEXT/SAVE.

   The parameter you selected to change is displayed. If the password was entered correctly, you can change the value.

Default Password Value

The default password value is **1234**. The password can be changed using the **^KP** (Define Password) ZPL II instruction or through ZebraLink™ WebView (ZebraNet® PrintServer II required).

Disable the Password Protection Feature

You can disable the password protection feature so that it no longer prompts you for a password by setting the password to **0000** via the **^KPØ** ZPL/ZPL II command. To reenable the password-protection feature, send the ZPL/ZPL II command **^KPx**, where **x** can be any number from 1 to 9999.

Front Panel LCD

Use the LCD display on the front panel to adjust printer settings. Table 5 shows parameters in the order in which they are displayed when you press NEXT/SAVE after entering setup mode. Throughout this process, press NEXT/SAVE to continue to the next parameter, or press PREVIOUS to return to the previous parameter in the cycle. Table 6 on page 59 shows the additional parameters that appear when a wireless print server is installed in the printer.

Table 5 • Printer Parameters (Sheet 1 of 15)

Parameter	Action/Explanation
DARKNESS	**Adjusting Print Darkness** Darkness settings depend on a variety of factors, including ribbon type, labels, and the condition of the printhead. You may adjust the darkness for consistent high-quality printing. If printing is too light, or if there are voids in printed areas, you should increase the darkness. If printing is too dark, or if there is spreading or bleeding of printed areas, you should decrease the darkness. Darkness settings also may be changed by the driver or software settings. The FEED Self Test described in *FEED Self Test* on page 111 can also be used to determine the best darkness setting. Because the darkness setting takes effect immediately, you can see the results on labels that are currently printing. **Important •** Set the darkness to the lowest setting that provides good print quality. If the darkness is set too high, the ink may smear, the ribbon may burn through, or the printhead may wear prematurely. • Press the right oval to increase darkness. • Press the left oval to decrease darkness. **Default:** +4 **Range:** 0 to +30.0
PRINT SPEED	**Adjusting Print Speed** Slower print speeds typically yield better print quality. Print speed changes take effect upon exiting the menu mode. • Press the right oval to increase print speed. • Press the left oval to decrease print speed. **Default:** 2 ips **Range:** 2 ips to +12 ips (depends on specific printer)
TEAR OFF	**Adjusting the Tear-Off Position** This parameter establishes the position of the labels over the tear-off/peel-off bar after printing. Each press of an oval adjusts the tear-off position by four dot rows. • Press the right oval to increase value. • Press the left oval to decrease value. **Default:** +0 **Range:** –120 to +120

Table 5 • Printer Parameters (Sheet 2 of 15)

Parameter	Action/Explanation
PRINT MODE	**Selecting Print Mode** Print mode settings tell the printer the method of label delivery that you wish to use. Be sure to select a print mode that your hardware configuration supports because some of the selections displayed are for optional printer features. • Press either oval to display choices. **Default:** Tear-Off **Selections:** Tear-Off, Peel-Off, Cutter, Applicator, Rewind **Note •** Only Tear-Off mode is supported.
MEDIA TYPE	**Setting Media Type** This parameter tells the printer the type of media that you are using. Selecting continuous media requires that you include a label length instruction in your label format (`^LLxxxx` if you are using ZPL or ZPL II). When non-continuous media is selected, the printer feeds media to calculate label length (the distance between two recognized registration points of the inter-label gap, webbing, or alignment notch or hole). • Press either oval to display choices. **Default:** Non-Continuous **Selections:** Continuous, Non-Continuous
SENSOR TYPE	**Setting the Sensor Type** This parameter tells the printer whether you are using media with a web (gap/space between labels, notch, or hole) to indicate the separations between labels or if you are using media with a black mark printed on the back. If your media does not have black marks for registration on the back, leave your printer at the default (web). • Press either oval to display other choices. **Default:** Web **Selections:** Web, mark **Note •** Only Web is supported.
PRINT METHOD	**Selecting Print Method** The print method parameter tells the printer the method of printing that you wish to use: direct thermal (no ribbon) or thermal transfer (using thermal transfer media and ribbon). • Press either oval to display choices. **Default:** Thermal transfer **Selections:** Thermal transfer, direct thermal **Note •** Selecting direct thermal when using thermal transfer media and ribbon creates a printer error condition, but printing continues.

Table 5 • Printer Parameters (Sheet 3 of 15)

Parameter	Action/Explanation
PRINT WIDTH	**Setting Print Width** Print width determines the printable area across the width of the label. To change value shown: **1.** Press the left oval to move the cursor. **2.** Press the right oval to increase the value of the digit. **Note •** The printer does not accept any value larger than the maximum print width listed in *General Specifications* on page 116. To change the unit of measurement: **a.** Press the left oval until the unit of measurement is active. **b.** Press the right oval to toggle to a different unit of measure (mm, inches, or dots). **Default Range:** The default and range of acceptable values vary depending on what printer you have. See *General Specifications* on page 116 for further information about the ranges available for your model.
MAXIMUM LENGTH	**Setting Maximum Length** Maximum length is used in conjunction with the calibration procedure. The value of this setting is the maximum label length that is used during the media portion of the calibration process. Only a few labels are required to set media sensors. Always set the value that is at least 1 in. (25.4 mm) longer than the longest label to be used on the printer. • To increase the value, press the right oval. • To decrease the value, press the left oval. **Default Range:** The default and range of acceptable values vary depending on your printer's configuration. Values are adjustable in 1 in. (25.4 mm) increments.

Table 5 • Printer Parameters (Sheet 4 of 15)

Parameter	Action/Explanation
EARLY WARNING	**Setting Early Warning** When this parameter is enabled, the printer provides warnings when labels or ribbons are running low or when the printhead needs to be cleaned. **Note •** Labels per roll and ribbon length need to be updated when beginning use of the Early Warning System. Also, the printer does not make any adjustments when power is turned off and on. • Press the right or left oval to display other choices. **Default:** MEDIA DISABLED, MAINTENANCE OFF **Selections:** MEDIA DISABLED, MEDIA ENABLED, MAINTENANCE OFF, MAINTENANCE ON To change the Early Warning settings, **1.** When the LCD displays EARLY WARNING, press the right or left oval until the desired setting is listed on the LCD. (If you are prompted for a password, enter your password using the instructions in *Password-Protected Parameters* on page 43.) **2.** Press NEXT/SAVE to access the next early warning option. **3.** Repeat this process to set the early warning for ribbon or maintenance (printhead cleaning). When the printer detects that less than 15% of the labels or ribbon remain, WARNING MEDIA LOW appears on the LCD. If the alert function has been enabled, an alert is also sent. When the printhead is opened then closed after a media or ribbon warning has been received, the LCD prompts with MEDIA REPLACED? Press the right oval to select YES to clear the warning and reset the label counter. When setting the Early Warning for maintenance, the LCD prompts HEAD CLEAN?. **4.** Press the right oval to select YES. **5.** Press SETUP/EXIT to exit setup mode. **6.** Press NEXT/SAVE to save changes.
LABELS PER ROLL	**Setting Labels Per Roll** This parameter needs to be updated when setting the Early Warning System so the printer can provide early warnings when labels are running low. • Press the right or left oval to display other choices. **Default:** 900 labels **Range:** 100 labels to 9999 labels
RIBBON LENGTH	**Setting Ribbon Length** This parameter must be updated when setting the Early Warning System so the printer can provide early warnings when ribbon is running low. • Press the right or left oval to display other choices. **Default:** 450 m **Range:** 100 m to 450 m
LIST FONTS	**List Fonts** • Press the right oval to print a label that lists the available fonts in the printer, including standard printer fonts plus any optional fonts. Fonts may be stored in RAM, Flash memory, font EPROMs, or font cards.

Table 5 • Printer Parameters (Sheet 5 of 15)

Parameter	Action/Explanation
LIST BAR CODES	**List Bar Codes** • Press the right oval to print a label that lists the available bar codes in the printer.
LIST IMAGES	**List Images** • Press the right oval to print a label that lists the available images stored in the printer's RAM, Flash memory, optional EPROM, or optional memory card.
LIST FORMATS	**List Formats** • Press the right oval to print a label that lists the available formats stored in the printer's RAM, Flash memory, optional EPROM, or optional memory card.
LIST SETUP	**List Setup** • Press the right oval to print a label that lists the current printer configuration. (Same label as shown in *Print a Printer Configuration Label* on page 31.)
LIST ALL	**List All** • Press the right oval to print labels that list the available fonts, bar codes, images, formats, and the current printer configuration.
FORMAT CARD A B	**Format Memory Card** **Caution** • Perform this operation only when it is necessary to erase all previously stored information from the memory card. **1.** When the LCD displays INITIALIZE CARD, press the left oval to select the A memory (internal CompactFlash) or the right oval to select B memory (PCMCIA card). (If you are prompted for a password, enter your password using the instructions in *Password-Protected Parameters* on page 43.) The front panel LCD asks ARE YOU SURE?. **2.** Do you wish to continue? • Press the left oval to select NO to cancel the request and return to INITIALIZE CARD prompt. • Press the right oval to select YES and begin initialization. FORMATTING CARD displays. When formatting is complete, INITIALIZE CARD displays. **Note** • Depending on the amount of memory in the memory card, initialization may take up to three minutes to complete.

Table 5 • Printer Parameters (Sheet 6 of 15)

Parameter	Action/Explanation
INIT FLASH MEM	**Initialize Flash Memory** **Caution** • Perform this operation only when it is necessary to erase all previously stored information from Flash memory. **1.** When the LCD displays INITIALIZE CARD, press the right oval to select YES. (If you are prompted for a password, enter your password using the instructions in *Password-Protected Parameters* on page 43.) The LCD asks INITIALIZE FLASH. **2.** Press the right oval to select YES. The LCD asks ARE YOU SURE?. **3.** Do you wish to continue? • Press the left oval to select NO to cancel the request and return to the INIT FLASH MEM prompt. • Press the right oval to select YES and begin initialization. When formatting is complete, INIT FLASH MEM displays.
SENSOR PROFILE	**Sensor Profile** The media sensor profile may be used to troubleshoot registration problems that may be caused when the media sensor detects preprinted areas on the media or experiences difficulty in determining web location. • Press the right oval to start this standard calibration procedure and print a media sensor profile. Figure 29 shows a media sensor profile. If the sensitivity of the media and/or ribbon sensors must be adjusted, use *Calibrate Media and Ribbon Sensors* on page 50 to adjust the media and ribbon sensor sensitivity.

Figure 29 • Media Sensor Profile

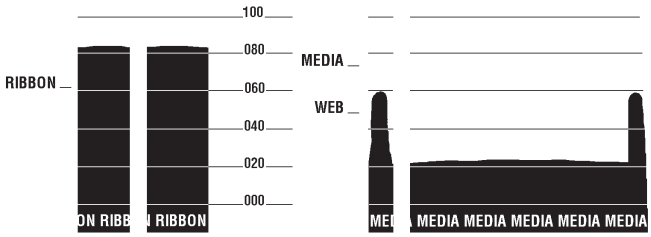

Table 5 • Printer Parameters (Sheet 7 of 15)

Parameter	Action/Explanation
MEDIA AND RIBBON CALIBRATE	**Calibrate Media and Ribbon Sensors** Use this procedure to adjust sensitivity of media and ribbon sensors. **Important •** This procedure must be followed exactly as presented. All of the steps must be performed even if only one of the sensors requires adjustment. You may press the left oval at any step in this procedure to cancel the procedure. **1.** Press the right oval to start the calibration procedure. The LOAD BACKING prompt displays. **2.** Open the printhead. **3.** Remove approximately 8 in. (203 mm) of labels from the backing, and pull the media into the printer so that only the backing is between the media sensors. **4.** Leave the printhead open. **5.** Press the right oval to continue. The REMOVE RIBBON prompt displays. **6.** Remove the ribbon. **7.** Close the printhead. **8.** Press the right oval to continue. The message CALIBRATING PLEASE WAIT displays. The printer adjusts the scale (gain) of the signals that it receives from the media and ribbon sensors. On the sensor profile, this essentially corresponds to moving the peak of the graph up or down to optimize the readings for your application. When calibration is complete, RELOAD ALL displays. **9.** Open the printhead and pull the media forward until a label is positioned under the media sensor. **10.** Reload the ribbon. **11.** Close the printhead. **12.** Press the right oval to continue. The printer does a calibration equivalent to pressing CALIBRATE; during this process, the printer determines the label length. To see the new readings on the new scale, print a sensor profile.
PARALLEL COMM	**Setting Parallel Communications** Select the communications port that matches the one being used by the host computer. • Press the right or left oval to display other choices. **Default:** Bidirectional **Selections:** Bidirectional, unidirectional, or Twinax/coax
SERIAL COMM	**Setting Serial Communications** Select the communications port that matches the one being used by the host computer. • Press the right or left oval to display other choices. **Default:** RS-232 **Selections:** RS-232, RS-422/485, RS-485 multidrop

Table 5 • Printer Parameters (Sheet 8 of 15)

Parameter	Action/Explanation
BAUD	**Setting Baud** The baud setting of the printer must match the baud setting of the host computer for accurate communications to take place. Select the value that matches the one being used by the host computer. • Press the right or left oval to display other choices. **Default:** 9600 **Selections:** 110, 300, 600, 1200, 2400, 4800, 9600, 14400, 19200, 28800, 38400, 57600, 115200
DATA BITS	**Setting Data Bits** The data bits of the printer must match the data bits of the host computer for accurate communications to take place. Set the data bits to match the setting being used by the host computer. **Note •** Code Page 850 requires the data bits to be set to 8 bits. • Press the right or left oval to display other choices. **Default:** 8 bits **Selections:** 7 bits, 8 bits
PARITY	**Setting Parity** The parity of the printer must match the parity of the host computer for accurate communications to take place. Select the parity that matches the one being used by the host computer. • Press the right or left oval to display other choices. **Default:** NONE **Selections:** NONE, ODD, EVEN
HOST HANDSHAKE	**Setting Host Handshake** The handshake protocol of the printer must match the handshake protocol of the host computer for proper communications to take place. Select the handshake protocol that matches the one being used by the host computer. • Press the right or left oval to display other choices. **Default:** XON/XOFF **Selections:** XON/XOFF, DSR/DTR, RTS/CTS
PROTOCOL	**Setting Protocol** Protocol is a type of error checking system. Depending on the selection, an indicator may be sent from the printer to the host computer signifying that data has been received. Select the protocol that is requested by the host computer. Further details on protocol can be found in the *ZPL II Programming Guide*. • Press the right or left oval to display other choices. **Default:** NONE **Selections:** NONE, ZEBRA, ACK_NAK **Note •** Zebra is the same as ACK_NAK, except that Zebra response messages are sequenced. If Zebra is selected, the printer must use **DSR/DTR** host handshake protocol.

Table 5 • Printer Parameters (Sheet 9 of 15)

Parameter	Action/Explanation
NETWORK ID	**Setting Network ID** Network ID is used to assign a unique number to a printer used in an RS-422/RS-485 network. This gives the host computer the means to address a specific printer. If the printer is used in an RS-422/RS-485 network, you must select a network ID number. This does not affect TCP/IP or IPX networks. **1.** Press the left oval to move to the next digit position. **2.** Press the right oval to increase the value of the digit. **Default:** 000 **Range:** 000 to 999
COMMUNI-CATIONS	**Setting Communications Mode** The communication diagnostics mode is a troubleshooting tool for checking the interconnection between the printer and the host computer. When DIAGNOSTICS is selected, all data sent from the host computer to the printer is printed as straight ASCII characters, with the hex value below the ASCII text. The printer prints all characters received, including control codes, like CR (carriage return). A sample printout is shown in *Communications Diagnostics Test* on page 112. **Notes** on diagnostic printouts are: • FE indicates a framing error. • OE indicates an overrun error. • PE indicates a parity error. • NE indicates noise. **1.** Press the right or left oval to toggle between the choices. **2.** For any errors, check that your communication parameters are correct. **3.** Set the print width equal to or less than the label width used for the test. See *Label Specifications* on page 119 for more information. **Default:** NORMAL MODE **Selections:** NORMAL MODE, DIAGNOSTICS
CONTROL PREFIX	**Control Prefix Character** The printer looks for this two-digit hex character to indicate the start of a ZPL/ZPL II control instruction. **Note •** Do not use the same hex value for the control, format, and delimiter character. The printer must see different characters to work properly. **1.** Press the left oval to move to the next digit position. **2.** Press the right oval to increase the value of the digit. **Default:** 7E (tilde—displayed as a black square) **Range:** 00 to FF

Table 5 • Printer Parameters (Sheet 10 of 15)

Parameter	Action/Explanation
FORMAT PREFIX	**Format Prefix Character** The format prefix is a two-digit hex value used as a parameter place marker in ZPL/ZPL II format instructions. The printer looks for this 2-digit hex character to indicate the start of a ZPL/ZPL II format instruction. See the *ZPL II Programming Guide Volume I* for more information. **Note •** Do **not** use the same hex value for the control, format, and delimiter character. The printer must see different characters to work properly. **1.** Press the left oval to move to the next digit position. **2.** Press the right oval to increase the value of the digit. **Default:** 5E (caret) **Range:** 00 to FF
DELIMITER CHAR	**Delimiter Character** The delimiter character is a 2-digit hex value used as a parameter place marker in ZPL/ZPL II format instructions. See the *ZPL II Programming Guide Volume I* for more information. **Note •** Do **not** use the same hex value for the control, format, and delimiter character. The printer must see different characters to work properly. **1.** Press the left oval to move to the next digit position. **2.** Press the right oval to increase the value of the digit. **Default:** 2C (comma) **Range:** 00 to FF
ZPL MODE	**Selecting ZPL Mode** The printer remains in the selected mode until it is changed by this front panel instruction or by using a ZPL/ZPL II command. The printer accepts label formats written in either ZPL or ZPL II. This eliminates the need to rewrite any ZPL formats you already have. See the *ZPL II Programming Guide* for more information on the differences between ZPL and ZPL II. • Press the right or left oval to display other choices. **Default:** ZPL II **Selections:** ZPL II, ZPL

Table 5 • Printer Parameters (Sheet 11 of 15)

Parameter	Action/Explanation
MEDIA POWER UP	**Media Power Up** This parameter sets the action of the labels when the printer is turned on. • Press the right or left oval to display the choices. **Default:** Calibration **Selections:** Feed, Calibration, Length, Short Cal, and No Motion • **Feed**—feeds the labels to the first registration point. • **Calibration**—determines the length of the label and adjusts the sensor settings. • **Length**—In continuous mode, feeds the last stored label length. In non-continuous mode, calibrates based on the maximum label length setting (see *Setting Maximum Length* on page 46). • **Short Cal**—calibrates label length using the current sensor settings. • **No Motion**—the media does not move. You must press FEED to cause the printer to resynch to the start of the next label.
HEAD CLOSE	**Head Close** This parameter sets the action of the labels when the printhead is closed. • Press the right or left oval to display the choices. **Default:** Calibration **Selections:** Feed, Calibration, Length, Short Cal, and No Motion • **Feed**—feeds the labels to the first registration point. • **Calibration**—determines the length of the label and adjusts the sensor settings. • **Length**—In continuous mode, feeds the last stored label length. In non-continuous mode, calibrates based on the maximum label length setting (see *Setting Maximum Length* on page 46). • **Short Cal**—calibrates label length using the current sensor settings. • **No Motion**—the media does not move. You must press FEED to cause the printer to resynch to the start of the next label.
BACKFEED	**Backfeed Sequence** This parameter establishes when and how much label backfeed occurs after a label is removed or cut in Peel-Off, Cutter, and Applicator modes. It has no effect in Rewind or Tear-Off modes. This parameter setting can be superseded by the **~JS** instruction when received as part of a label format (see the *ZPL II Programming Guide*). **Note •** The difference between the value entered and 100% establishes how much backfeed occurs before the next label prints. For example, a value of 40 means that 40% of the backfeed takes place after the label is removed or cut. The remaining 60% takes place before the next label prints. A value of BEFORE means that all backfeed takes place before the next label prints. • Press the right or left oval to display other choices. **Default:** DEFAULT (90%) **Selections:** DEFAULT, AFTER, OFF, BEFORE, 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%

Table 5 • Printer Parameters (Sheet 12 of 15)

Parameter	Action/Explanation
LABEL TOP	**Adjusting Label Top Position** The label top position adjusts the print position vertically on the label. Positive numbers adjust the label top position further down the label (away from the printhead), negative numbers adjust the position up the label (toward the printhead). The displayed value represents dots. • To increase the value, press the right oval. • To decrease the value, press the left oval. **Default:** +0 **Range:** –120 to +120 dot rows
LEFT POSITION	**Adjusting Left Position** This parameter establishes how far from the left edge of a label the format begins to print by adjusting horizontal positioning on the label. Positive numbers adjust the printing to the left by the number of dots selected, negative numbers shift printing to the right. The displayed value represents dots. **1.** Press the left oval to move the cursor. **2.** Press the right oval to change between + and to increase the value of the digit. **3.** For a negative value, enter the value before changing to the minus sign. **Default:** 0000 **Range:** –9999 to +9999
VERIFIER PORT	**Setting the Verifier Port** The auxiliary port is used to determine how the printer reacts to the online verifier. The three operating conditions for this port are: • **OFF:** The verifier port is off. • **VER-RPRNT ERR:** Label reprinted if verifier detects an error. If a bar code is near the upper edge of the label, the label is fed out far enough to be verified and then backfed to allow the next label to print and be verified. • **VER-THRUPUT:** Allows greatest throughput but may not indicate a verification error immediately upon detection. May print from one to three labels before an error is recognized and printing stops. • Press the right or left oval to display other choices. **Default:** Off **Selections:** Off, VER-RPRNT, VER-THRUPUT For more information on the operation of the optional verifier, see the documentation provided with that option.

Table 5 • Printer Parameters (Sheet 13 of 15)

Parameter	Action/Explanation
APPLICATOR PORT	**Setting the Applicator Port** Determines the action of the verifier port. **Note •** Set this value as suggested by the applicator manufacturer. • **Off:** The applicator port is off. • **Mode 1:** Asserts the **~END_PRINT** signal low while the printer is moving the label forward. • **Mode 2:** Asserts the **~END_PRINT** signal high while the printer is moving the label forward. • **Mode 3:** Asserts the **~END_PRINT** signal low for 20 milliseconds when a label has been completed and positioned. Not asserted during continuous printing modes. • **Mode 4:** Asserts the **~END_PRINT** signal high for 20 milliseconds when a label has been completed and positioned. Not asserted during continuous printing modes. • Press the right or left oval to display other choices. **Default:** Off **Selections:** Off, mode 1, mode 2, mode 3, mode 4
START PRINT SIG	**Start Print Signal** This parameter determines how the printer reacts to the Start Print Signal input on pin 3 of the applicator interface connector at the rear of the printer. • In **Pulse Mode**, labels print when the signal transitions from HIGH to LOW. • In **Level Mode**, labels print as long as the signal is asserted LOW. **Caution •** Start Print Signal is set by the applicator manufacturer and should not be changed unless the factory defaults have been reloaded. The printer must be returned to its designated setting for it to work properly. • Press the right or left oval to display other choices. **Default:** Pulse Mode **Selections:** Pulse Mode, Level Mode
RESYNCH MODE	**Resynch Mode** This parameter determines how the printer reacts if the label synchronization is lost and the label top is not where expected. • **Feed Mode**—If the label top is not where expected, the printer feeds a blank label to find the label top position. • **Error Mode**—If the label top is not where expected, the printer stops, enters Pause Mode, displays the message Error Condition Feed Label, flashes the ERROR light, and asserts the Service Required signal (pin 10 on the Applicator Interface Connector). To resynch the media to the top of the label in Error Mode, press **PAUSE** to exit Pause Mode. The ERROR light stops flashing, and the Service Required signal is deactivated. The action of the printer is determined by the Head Close configuration selection (see *Head Close* on page 54). • Press the right or left oval to toggle between choices. **Default:** Feed Mode **Selections:** Feed Mode, Error Mode

Table 5 • Printer Parameters (Sheet 14 of 15)

Parameter	Action/Explanation
WEB S. MEDIA S. RIBBON S. MARK S. TAKE LABEL MARK MED S. MEDIA LED RIBBON LED MARK LED	These parameters are automatically set during the calibration procedure. They should be changed only by a qualified service technician. See the *Maintenance Manual* for more information on these parameters. • Press **NEXT/SAVE** to scroll through these parameters.
LCD ADJUST	**LCD Adjustment** This parameter allows you to adjust the contrast of your LCD if it is difficult to read. **1.** Press the left oval to move the cursor. **2.** Press the right oval to toggle +/- or to increase the value of the digit. **Range:** 00 to 19
FORMAT CONVERT	**Format Convert** Selects the bitmap scaling factor. The first number is the original dots per inch (dpi) value; the second, the dpi to which you would like to scale. **Note •** Not applicable on all printers. • Press the right or left oval to display other choices. **Default:** None **Selections:** None, 150 → 300, 150 → 600, 200 → 600, 300 → 600
IDLE DISPLAY	**Idle Display** This parameter selects the LCD options for the real-time clock. **Note •** If the default value is not selected, pressing either oval briefly displays the firmware version of the printer. • Press the right or left oval to display other choices. **Default:** Firmware version **Selections:** mm/dd/yy (24 hour), mm/dd/yy (12 hour), dd/mm/yy (24 hour), dd/mm/yy (12 hour)
RTC DATE	**RTC (Real-time clock) Date** This parameter allows you to set the date following the convention selected in IDLE DISPLAY. **1.** Press the left oval to move to the next digit position. **2.** Press the right oval to increase the value of the digit.

Table 5 • Printer Parameters (Sheet 15 of 15)

Parameter	Action/Explanation
RTC TIME	**RTC (Real-time clock) Time** This parameter allows you to set the time following the convention selected in IDLE DISPLAY. **1.** Press the left oval to move to the next digit position. **2.** Press the right oval to increase the value of the digit.
RFID TEST QUICK SLOW	**RFID Test** In both versions of this test, the printer attempts to read and write to a transponder. In the slow test, the printer also checks the reader version number. If the printer fails the test, the front panel displays an error message. **1.** Place an RFID label over the reader (no movement occurs with the test). **2.** Press SELECT to select the parameter. **3.** Press MINUS (–) to select QUICK. OR Press PLUS (+) to select SLOW. **4.** If necessary, press PLUS (+) to select CONTINUE. **5.** Press SELECT to deselect the parameter.
RFID TAG TYPE	**Detect/Specify RFID Tag Type** **Default:** AUTO DETECT **Selections:** AUTO DETECT, TAG-IT, ICODE, PICO, ISO15693, EPC, NONE **Note •** For the RXiIIIPlus, leave this parameter set to AUTO DETECT.
RFID ERR STATUS	**RFID Error Status** If an error condition exists, a message may be displayed here.
LANGUAGE	**Selecting the Display Language** This parameter allows you to change the language used on the LCD. • Press the right or left oval to display other choices. **Default:** English **Selections:** English, Spanish, French, German, Italian, Norwegian, Portuguese, Swedish, Danish, Spanish 2, Dutch, Finnish, Japanese

ZebraNet® Wired Print Server LCD Displays

The menu options shown in Table 6 display only if you have the ZebraNet PrintServer II installed.

Table 6 • Print Server LCD Displays

LCD	Explanation
IP RESOLUTION	**IP Resolution** Depending on the selection, allows either the user (**permanent**) or the server (**dynamic**) to select the IP address. For more information, see the *PrintServer II™ Installation and User Guide*. • Press the right or left oval to display other choices. **Default:** Dynamic **Selections:** Dynamic, permanent
IP PROTOCOLS	**IP Protocols** If **Dynamic** was chosen in the previous parameter, this selection determines the method(s) by which the PrintServer II receives the IP address from the server. For more information, see the *PrintServer II™ Installation and User Guide*. • Press the right or left oval to display other choices. **Default:** All **Selections:** All, gleaning only, RARP, BOOTP, DHCP, DHCP/BOOTP
IP ADDRESS	**IP Address** This parameter allows you to select the IP address if **Permanent** was chosen in IP RESOLUTION. (If **Dynamic** was chosen, the user cannot select the address.) For more information, see the *PrintServer II™ Installation and User Guide*. **1.** Press the left oval to move to the next digit position. **2.** Press the right oval to increase the value of the digit.
SUBNET MASK	**Subnet Mask** This parameter selects the part of the IP address that is considered to be part of the local network. It can be reached without going through the default gateway. • Press the right or left oval to display other choices. **Default:** Permanent (user must set) **Selections:** Dynamic (user may set, but server can assign), permanent
DEFAULT GATEWAY	**Default Gateway** This parameter allows you to select the IP address that the network traffic is routed through if the destination address is not part of the local network. **1.** Press the left oval to move to the next digit position. **2.** Press the right oval to increase the value of the digit.

Notes •

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5

RFID Guidelines

This chapter provides an overview of how RFID works and the ZPL commands used to create RFID labels.

Contents

Overview

The R110XiIIIplus “smart” label printer-encoders serve as dynamic tools for both printing and encoding RFID labels, tickets, and tags. The printer encodes information on ultra-thin UHF RFID transponders embedded in “smart” labels. It then immediately verifies proper encoding and prints bar codes, graphics, and/or text on the label’s surface. For more information about RFID media, see *RFID “Smart” Labels* on page 16.

Function of an encoded “smart” label depends on factors such as where the label is placed on an item as well as on the contents of the item (such as metals or liquids). Contact the supplier of your RFID transponders for assistance with these types of issues.

Transponder Placement

Communication between the “smart” label and the printer is established when the transponder lines up with the printer’s antenna. The optimal transponder position varies with the transponder size, its configuration, and the type of RFID IC chip used.

Print quality may be affected by printing directly over the transponder. In particular, there is an 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 that you select. For the list of approved transponders and related placement specifications, go to http://www.zebra.com/PA/Printers/product_R110XiIIIPlus.htm.

Important • It is important to use transponders that have been specifically approved for use in this RFID printer. Failure to do so may result in the inability to read or write to the embedded RFID tags. As new transponders become commercially available, Zebra will evaluate them for compatibility with this printer. For the list of approved transponders, go to http://www.zebra.com/PA/Printers/product_R110XiIIIPlus.htm.

ZPL II Commands for RFID

Printing and encoding (writing) of "smart" labels is handled through the use of Zebra Programming Language (ZPL). Each transponder has memory that can be read from through ZPL commands, and most transponders have memory that can be written to. The printer divides the ZPL commands that it receives into two categories: RFID and non-RFID (such as the printing commands for bar codes or human-readable text). The RFID commands are executed first.

ZPL commands also provide for exception handling, such as setting the number of read/write retries before declaring a transponder defective. For example, if an RFID transponder fails to program correctly or cannot be detected, the printer ejects it and prints the word "VOID" across the label. This process continues for the number of RFID tags specified by the `^RS` command using the same data and format.

The following pages provide the ZPL II commands that can be used for RFID applications.

Important • If a parameter is designated as *not applicable*, any value entered for the parameter will be ignored, but the place holder for the field is required.

^HV

Host Verification

Description This command is used to return data from specified fields, along with an optional ASCII header, to the host. It can be used with any field that has been assigned a number with the ^RT command.

Format ^HV#,n,h

The following table identifies the parameters for this format.

Parameters	Details
# = field number specified with another command	The value assigned to this parameter should be the same as the one used in the ^RT command. *Accepted values:* 0 to 9999 *Default value:* 0
n = number of bytes to be returned	*Accepted values:* 1 to 256 *Default value:* 64
h = header	Header (in uppercase ASCII characters) to be returned with the data. *Acceptable values:* 0 to 3072 characters *Default value:* none

^RS

RFID Setup

Important • Use care when using this command in combination with ^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.

Description The ^RS command moves the RFID tag into the effective area for reading or writing or for possible error handling if there is an error.

Format ^RSt,p,v,n,e

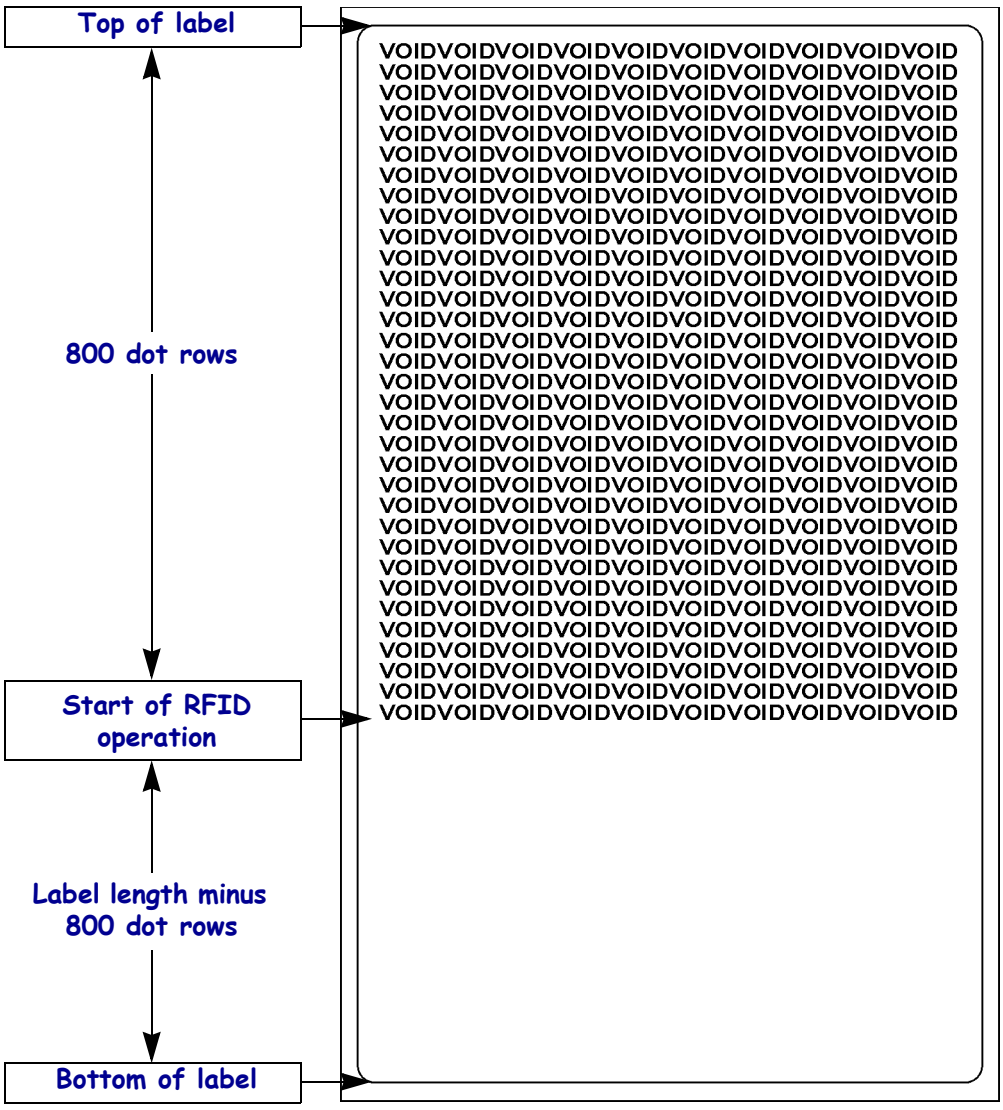
The following table identifies the parameters for this format.

Parameters	Details
t = tag type	*Accepted values:* • 1 = Auto detect (automatically determine the tag type by querying the tag) *Default value:* 1
p = read/write position of the transponder in the vertical (Y axis) in dot rows from the top of the label	Set to 0 (no movement) if the transponder is already in the effective area without moving the media. *Accepted values:* 0 to label length *Default value:* label length minus 8 dot rows
v = length of void printout in vertical (Y axis) dot rows	*Default value:* label length *Accepted values:* 0 to label length
n = number of labels to try in case of read/encode failure	*Default value:* 3 *Accepted values:* 1 to 10 (number of labels)
e = error handling	If an error persists after the specified number of labels are tried, perform this error handling action. *Accepted values:* • N = No action (printer drops the label format causing the error and moves to the next queued label) • P = Place printer in Pause mode (label format stays in the queue until the user cancels) • E = Place printer in Error mode (label format stays in the queue until the user cancels) *Default value:* N **Note •** You can set the printer to send an error message to the host as an unsolicited message for each failure. To enable or disable the unsolicited error message, refer to the ^SX and ^SQ ZPL commands. The parameter for the RFID error in these commands is V.

Example 1 • This example sets the printer to move the media to 800 dots from the top of the media [or label length minus 800 from the bottom (leading edge) of the media] and voids the rest of the media in case of an error. The printer will try to print two labels, then will pause the printer if printing and encoding fail.

```
^XA
^RS,800,,2,P^FS
^XZ
```

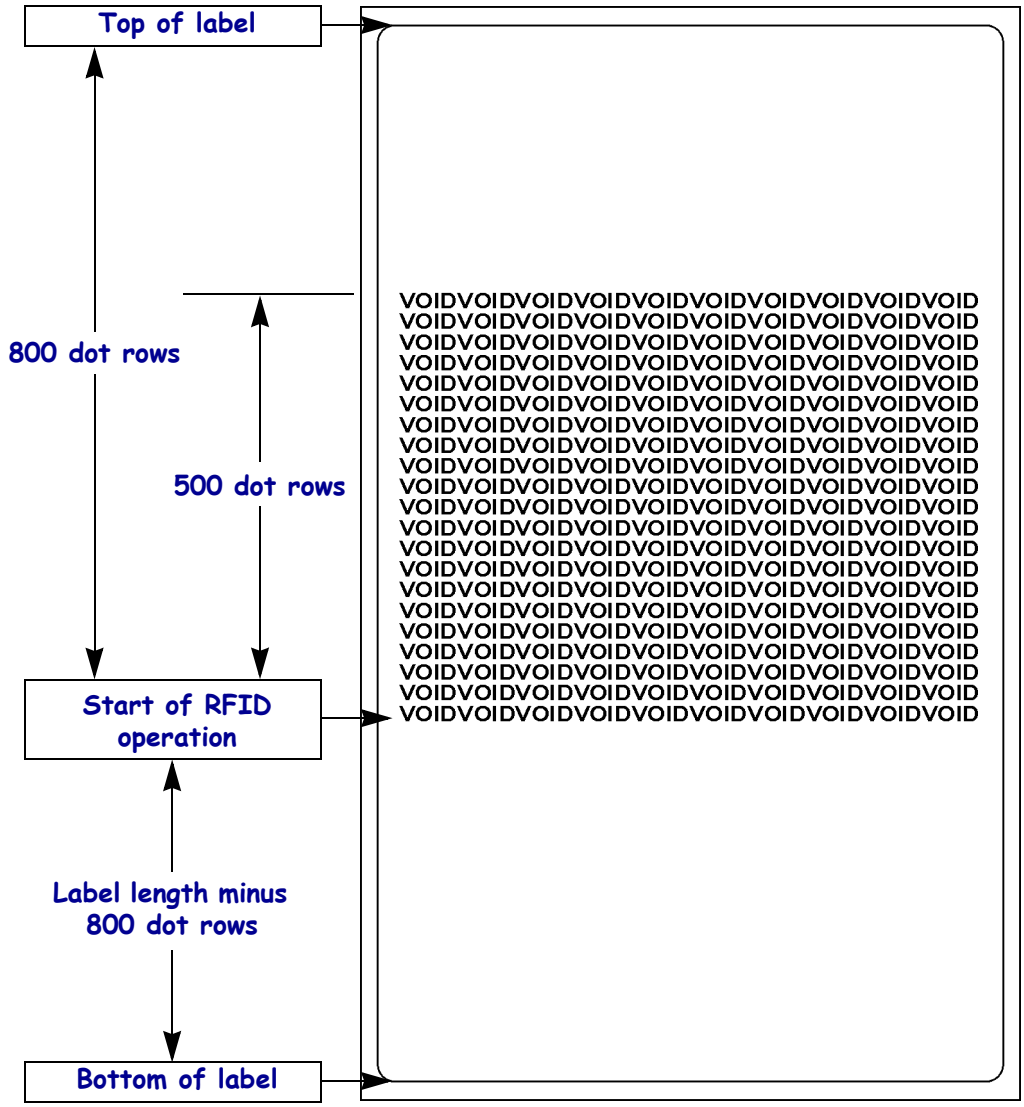
The following illustration shows the resulting voided label. Note where the void starts. The media has been moved 800 dot rows from the top of the label (label length minus 800 dot rows from the bottom (leading edge) of a label) to bring the transponder into the effective area to read/write a tag. If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



Example 2 • This example sets the printer to move the media to 800 dots from the top of the media [or label length - 500 from the bottom (leading edge) of the media] and prints “void” 500 dots in vertical length (Y axis) in case of an error.

```
^XA
^RS,800,500,2,P^FS
^XZ
```

The following illustration 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 entire rest of the media.



^RT

Read Tag

Description The ^RT command tells the printer to read the current RFID tag data. The data can be sent back to the host via the ^HV command.

Format ^RT#,b,n,f,r,m,s

The following table identifies the parameters for this format.

Parameters	Details
# = number to be assigned to the field	*Accepted values:* 0 to 9999 *Default value:* 0
b = starting block number	*Accepted values:* 0 to *n*, where *n* is the maximum number of blocks for the tag. *Default value:* 0
n = number of blocks to read*	*Accepted values:* 1 to *n*, where *n* is the maximum number of blocks minus the starting block number. For example, if the tag has 8 blocks (starting with block 0) and you start with block 6, *n* can be 2. This would give you block 6 and block 7 information. *Default value:* 1
f = format	*Accepted values:* • 0 (ASCII) • 1 (Hexadecimal) *Default value:* 0
r = number of retries	*Accepted values:* 0 to 10 *Default value:* 0
m = motion	*Accepted values:* • 0 (Feed label after writing.) • 1 (No Feed after writing. Other ZPL may cause a feed.) *Default value:* 0
s = special mode	For EPC Class 1 (Alien reader) only. Not applicable for EPC class 0. *Default value:* 0 (Do not read if mismatched checksum.) *Accepted values:* 1 (Read even if mismatched checksum.)

*Not applicable for R110*Xi*III*plus*

Example • This sample reads a tag, prints the data on a label, and sends the string Tag Data:*xxxxxxxx* back to the host. The data read will go into the ^FN1 location of the format. The printer will retry the command five times, if necessary.

```
^XA
^FO20,120^A0N,60^FN1^FS
^RT1,,,,5^FS
^HV1,,Tag Data:^FS
^XZ
```

^WT

Write Tag

Note • Check the amount of data memory available for the tag that you will be using. If more is sent than the memory can hold, the data will be truncated.

Description The ^WT command allows you to program the current RFID tag.

Format ^WTb,r,m,w,f,v

The following table identifies the parameters for this format.

Parameters	Details
b = block number	*Accepted values:* • 0 (ID data/EPC) • 1 (User data) *Default value:* 0
r = number of retries	*Accepted values:* 0 to 10 *Default value:* 0
m = motion	*Accepted values:* • 0 (Feed label after writing.) • 1 (No Feed after writing. Other ZPL may cause a feed.) *Default value:* 0
w = write protect	*Accepted values:* • 0 (Not write protected.) • 1 (Write protect.) *Default value:* 0
f = data format	*Accepted values:* • 0 (ASCII) • 1 (Hexadecimal) *Default value:* 0
v = verify valid data*	*Default value:* y *Accepted values:* • n (Do not verify) • y (Verify valid data [Hex A5A5 in the first two bytes] before writing)

*Not applicable for R110*Xi*III*plus*

Example • This sample encodes data “RFIDRFID” and will try writing up to five times, if necessary.

```
^XA
^WT,5^FDRFIDRFID^FS
^XZ
```

Sample of RFID Programming

ZPL II is Zebra's 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 section is not intended as an introduction to ZPL II. If you are a new ZPL II user, order the *ZPL II Programming Guide* (part number 46530L) or go to http://support.zebra.com to download the guide.

For your programming, do the following:

1. Set up the printer and turn the power On (**I**).
2. Use any word processor or text editor capable of creating ASCII-only files (for example, use Microsoft® Word and save as a .txt file) and type in the label format exactly as shown in the sample label format shown in Table 7.
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 (such as 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
   - *Printer Setup* on page 7
   - *Printer Operation* on page 21
   - *Front Panel Controls* on page 41
   - *Troubleshooting* on page 99

   to make sure that your system is set up correctly.

Table 7 • Sample ZPL Code and Results

Line Number	Type This Label Format	Resulting Printout
1	^XA	ZEBRA 5A65627261000000
2	^RS,0^FS	
3	^WT^FDZebra^FS	
4	^FO100,100^A0n,60^FN0^FS	
5	^FO100,200^A0n,40^FN1^FS	
6	^RT0^FS	
7	^RT1,,,1^FS	
8	^XZ	

Line 1 Indicates start of label format.
Line 2 Indicates no movement for media.
Line 3 Writes the data “Zebra” to the tag.
Line 4 Print field number ‘0’ at location 100,100.^FN0 is replaced by what we read on line 6.
Line 5 Print field number ‘1’ at location 100,200. ^FN1 is replaced by what we read on line 7.
Line 6 Read Tag into field number 0 in ASCII format (default).
Line 7 Read Tag into field number 1 in hexadecimal format.
Line 8 End of label format.

Notes •

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6

Data Ports

This chapter describes the standard communication ports available to connect the printer to your computer or network.

Contents

Parallel Port

When communicating via the parallel port, the values selected must be the same as those used by the host equipment connected to the printer. Port selection for status information is determined by the channel sending the request. The parallel port can be set for bidirectional or unidirectional communication. The default setting is bidirectional.

A standard 36-pin parallel connector (Figure 30) is available on the back of the printer for connection to the data source.

Figure 30 • Parallel Connector

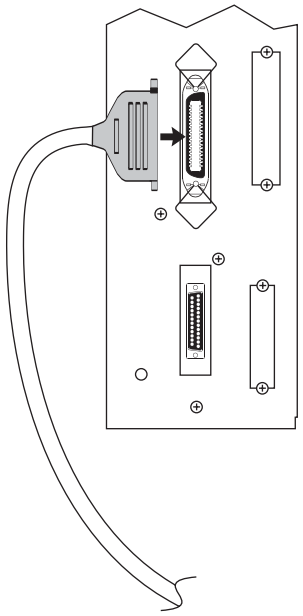


Table 8 shows the pin configuration and function of a standard computer-to-printer parallel cable.

Table 8 • Parallel Cable Pin Configuration

36-Pin Connectors	Description
1	nStrobe/HostClk
2–9	Data Bits 1–8
10	nACK/PtrClk
11	Busy/PtrBusy
12	PError/ACKDataReq
13	Select/Xflag
14	nAutoFd/HostBusy
15	Not used
16, 17	Ground

Table 8 • Parallel Cable Pin Configuration (Continued)

36-Pin Connectors	Description
18	+5 V at 750 mA The maximum current draw may be limited by option configuration.
19–30	Ground
31	ninit
32	nFault/NDataAvail
33, 34	Not used
35	+5 V through a 1.8 KΩ Resistor
36	NSelectin/1284 active

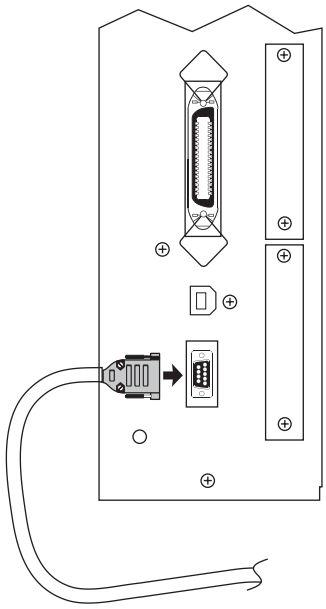
Serial Port

To communicate using the serial data port of the printer, you must choose the number of data and stop bits, parity, and handshaking. Parity applies only to data transmitted by the printer because the parity of received data is ignored.

The values selected must be the same as those used by the host equipment connected to the printer. Default settings are 9600 baud, 8 data bits, 1 stop bit, no parity, and XON/XOFF.

Connect the serial data cable to the female DB-9 connector (Figure 31) on the back panel of the printer.

Figure 31 • Serial Connector



Use a DB-9 to DB-25 interface module for all RS-232 connections through a DB-25 cable. An interface module is required for RS-422/RS-485 interface support (see *RS-422/RS-485 Interconnections* on page 80).

Note • For all RS-232 input and output signals, the printer follows the specifications of the Electronics Industries Association (EIA) RS-232 and the Consultative Committee for International Telegraph and Telephone (CCITT) V.24.

Serial Pin Configuration

Table 9 shows the pin configuration and function of the rear panel serial data connector on the printer.

Table 9 • Serial Connector Pin Configuration

Pin No.	Name	Description
1	—	Not connected
2	RXD	Receive data—data input to printer
3	TXD	Transmit data—data output from printer
4	DTR	Data terminal ready—output from printer
5	SG	Signal ground
6	DSR	Data set ready—input to printer
7	RTS	Request to send—output from printer
8	CTS	Clear to send—input to printer
9	+5 VDC	+5 VDC at 750 mA The maximum current draw may be limited by option configuration.

RS-232 Interface Connections

Note • Adapters are available from Zebra Technologies LLC.

- RS-422/RS-485 adapter, Zebra part number 33114M
- RS-232 DB-9 to DB-25 adapter, Zebra part number 33109M

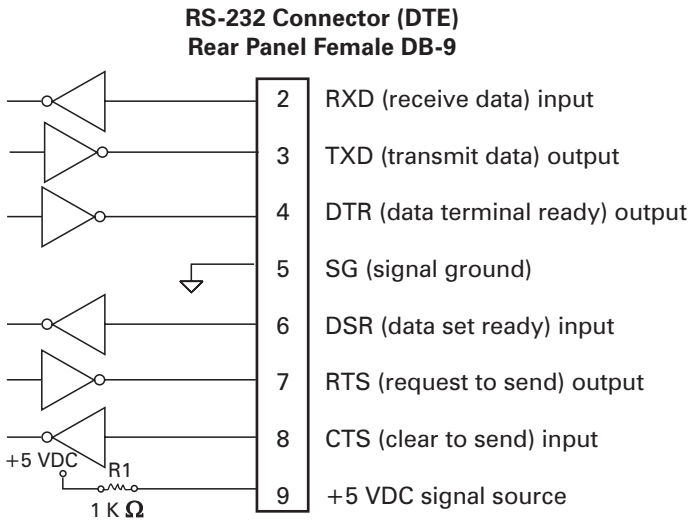
Direct Connection to a Computer

The printer is configured as Data Terminal Equipment (DTE).

Note • Use a **null modem** (crossover) cable to connect the printer to a computer or any other DTE device.

Figure 32 shows the internal connections of the printer's RS-232 connector.

Figure 32 • RS-232 Connections



NOTE: Pin 1 is unused and unterminated.

Pin 9 is also available as a +5 VDC signal source at 750 mA. The maximum current draw may be limited by option configuration.

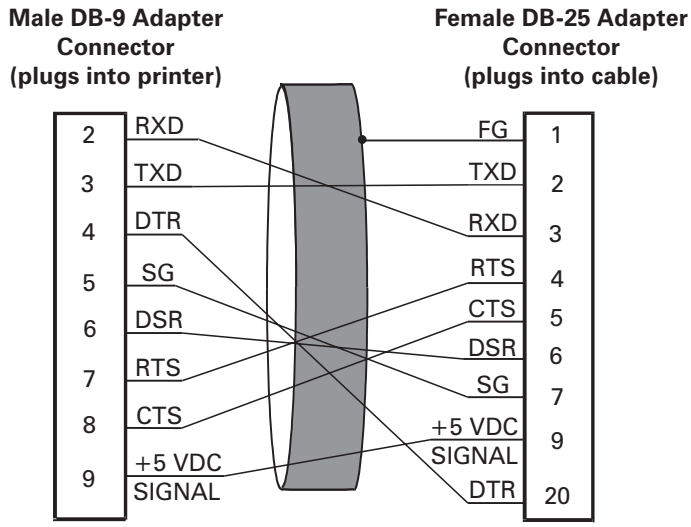
Caution • To enable this capability, a qualified service technician must install a jumper on the printer's main logic board on JP1, pins 2 and 3.

DB-9 to DB-25 Connections

An interface adapter is required (Zebra part number 33109M) to connect the printer's DB-9 interface to a DB-25 connector. A generic DB-25 adapter CAN be used, although the +5 VDC signal source would not be passed through the adapter.

Figure 33 shows the connections required for the DB-9 to DB-25 interface.

Figure 33 • DB-9 to DB-25 Connections



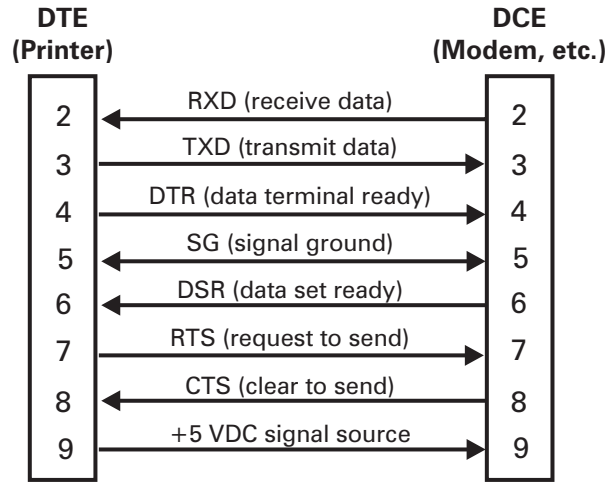
NOTE: Pin 1 of DB-9 connector is unused and unterminated.

Modem Connection

When the printer is connected via its RS-232 interface to Data Communication Equipment (DCE) such as a modem, use a standard RS-232 (straight-through) interface cable.

Figure 34 shows the connections required for this cable.

Figure 34 • RS-232 Connections



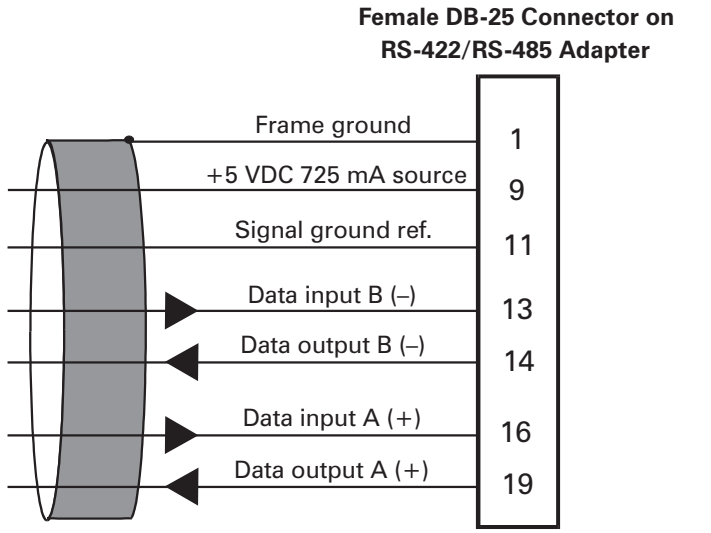
NOTE: Pin 1 is unused and unterminated at the printer.

RS-422/RS-485 Interconnections

Caution • A qualified service technician must install a jumper on the printer's main logic board at JP1, pins 2 and 3, for the RS-422/RS-485 interface adapter to function properly.

An interface adapter (Zebra part number 33114M) is required to connect the printer's RS-232 DB-9 interface to a host computer through an RS-422 or RS-485 interface. A generic DB-25 adapter can be used. Figure 35 shows the cable wiring for interconnecting the DB-9 to the interface adapter's DB-25 female connector.

Figure 35 • DB-9 to DB-25 Connections

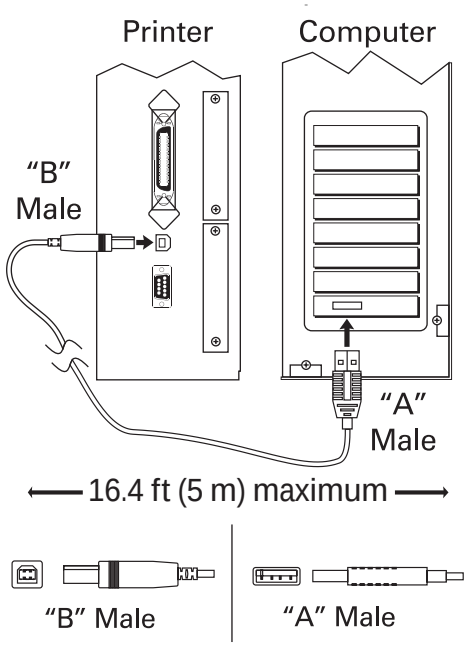


NOTE: Pins 2–8, 10, 12, 15, 17, 18, and 20–25 are unused and unterminated.

USB 2.0 Port

A USB 2.0 port (which is USB 1.1 and 1.0 compatible) is available to connect your printer to the host equipment. The industry-standard USB cable has an A-male connector on one end and a B-male connector on the other end as shown in Figure 36.

Figure 36 • USB Connectors



Note • Use a USB 2.0-certified compliant cable no longer than 16.4 ft (5 m) long. A cable that meets these requirements is available from Zebra (part number 33011).

Notes • _____

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7

Memory Cards

This chapter describes the optional cards that can be used with the printer and gives instructions for installation.

Contents

PCMCIA Memory Card

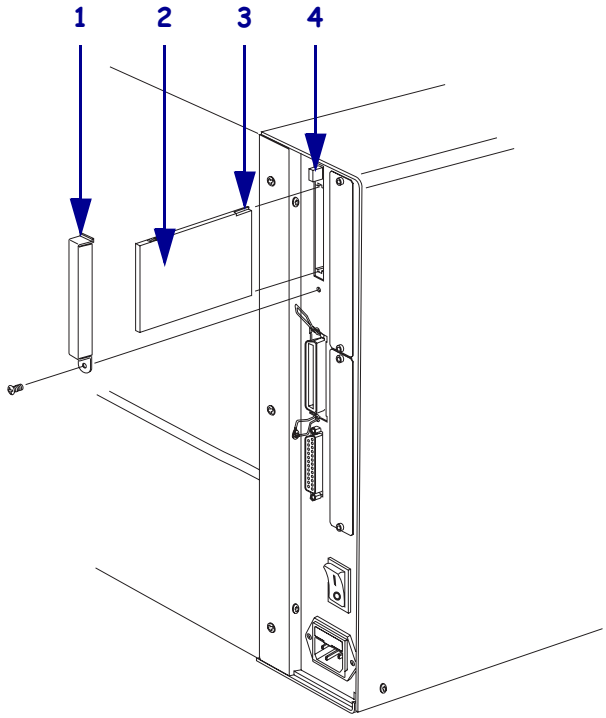
A Type 1- or Type II-compliant PCMCIA memory card holds extra memory or font options for the printer. The card is hot-swappable (it can be installed while the printer is on).

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

To install the PCMCIA card, complete these steps:

1. Remove the PCMCIA card shield from the rear of the printer (Figure 37).

Figure 37 • PCMCIA Card Installation



1	PCMCIA card shield
2	PCMCIA card
3	Notch
4	Card-eject button

2. Insert the PCMCIA card, with the notch **up**, into the card slot as shown. Insert it far enough to make the eject button pop out.

3. Reinstall the PCMCIA card shield over the PCMCIA card and card slot.

Note • The PCMCIA card may take a few minutes to initialize. The PAUSE light flashes while the card initializes. If the card is already initialized, the PAUSE light flashes only once or twice after the card is installed.

The printer is ready to operate with the additional memory or font option. To be sure that the card has successfully initialized, print a configuration label as instructed in *Print a Printer Configuration Label* on page 31 and review it to see whether the new memory card information is listed.

CompactFlash Card

A CompactFlash card is a nonvolatile memory card that stores data even when the power to the printer is turned off. A Type I-compliant CompactFlash card holds extra memory or optional fonts for your printer.

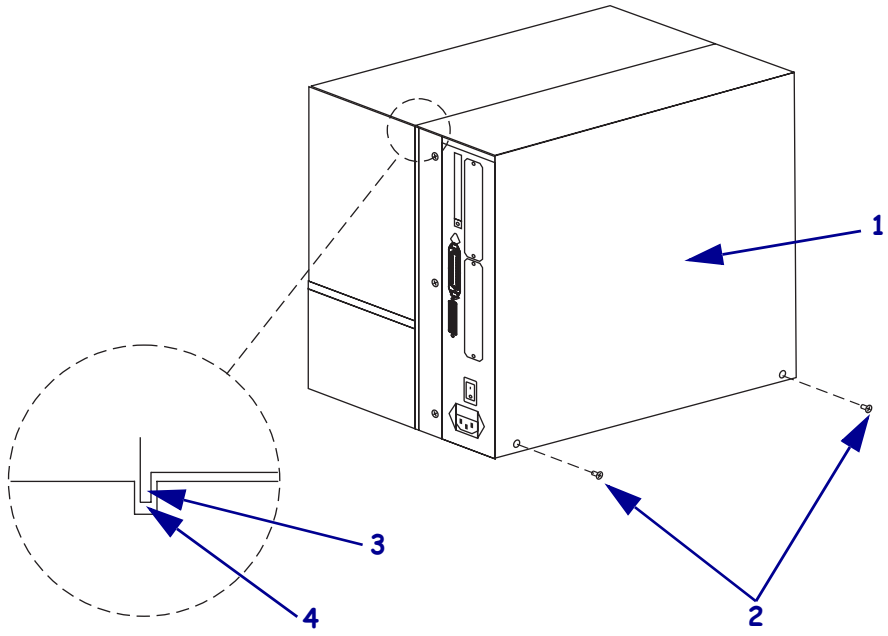
Caution • This procedure should only be performed by qualified service technicians.

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

To install a CompactFlash card, complete these steps:

1. Turn the AC power Off (**O**).
2. Disconnect the AC power cord from the printer.
3. Remove the two screws near the bottom of the electronics cover (Figure 38).

Figure 38 • Printer Exterior



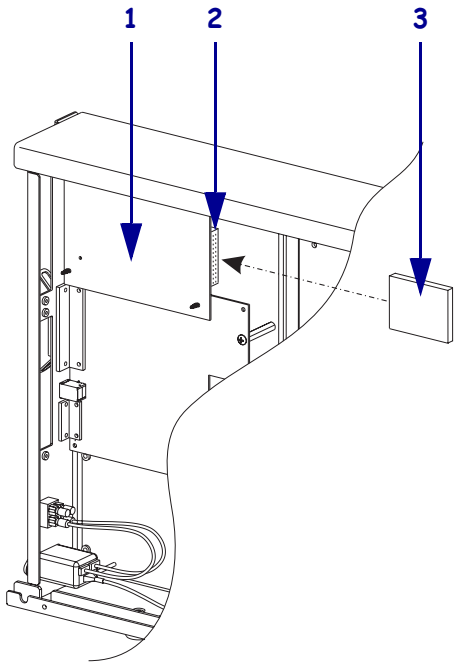
1	Electronics cover
2	Screws
3	Channel
4	Lip of cover

4. Lift the electronics cover at the rear top corner. Pull the corner forward and up, then lift the cover up and away from the printer.

5. Insert the CompactFlash card into the card slot on the upper portion of the option board. Insert the card with the back (unlabeled) side of the card facing out. The card can be inserted only one way and should snap into place.

   Figure 39 shows where to insert the CompactFlash card.

Figure 39 • Compact Flash Card Insertion



1	Option board
2	Card slot
3	Compact flash card

6. Reinstall the electronics cover by lowering the cover so the lip of the cover goes into the channel on the top of the printer.
7. Secure the cover by reinstalling the two screws near the bottom of the cover.
8. Reconnect the printer AC power cord.
9. Press and hold CANCEL while turning the printer On (**I**).

   The printer prints a configuration label.
10. Check for the presence of additional memory or optional fonts by looking at the information on the configuration label.

Note • The CompactFlash card may take a few minutes to initialize. If the process is not successfully completed within 10 minutes, contact Technical Support at http://www.zebra.com/SS/service_support.htm for assistance.

Notes •

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8 Routine Maintenance

Cleaning your printer regularly maintains print quality and may extend the life of the printer. This section provides routine cleaning and maintenance procedures.

Contents

Cleaning Schedule

The recommended cleaning schedule is shown in Table 10. See the following pages for specific procedures.

Caution • Use only the cleaning agents indicated. Zebra is not responsible for damage caused by any other fluids being used on this printer.

Table 10 • Recommended Printer Cleaning Schedule

Area	Method	Interval
Printhead	Solvent*†	Perform these procedures at the following times: • When CLEAN HEAD NOW appears. • **Direct Thermal Print Mode:** After every roll of labels or 500 ft (150 m) of fanfold labels. • **Thermal Transfer Print Mode:** After every roll (1500 ft or 450 m) of ribbon.
Platen roller	Solvent*	
Transmissive (media) sensor	Air blow	
Media path	Solvent*	
Ribbon sensor	Air blow	
Label-available sensors	Air blow	Monthly
Tear-off bar	Solvent*	
Snap plate	Solvent*	As needed

* Use Zebra's Preventative Maintenance kit, part number 47362, or a solution of 90% isopropyl alcohol and 10% deionized water.

Clean Exterior

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

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

Clean Interior

After every four rolls of media, inspect the inside of the printer. Use a soft bristle brush or a vacuum cleaner to remove any dirt and lint from the interior of the printer.

Printhead and Platen Roller

After every roll of ribbon, clean the printhead. Clean the printhead more often if you see inconsistent print quality, such as voids in the bar code or graphics.

Clean after every roll (1500 feet or 450 m) of thermal transfer ribbon or after every roll (500 feet or 150 m) of direct thermal labels or when CLEAN HEAD NOW appears on the LCD.

Note • You do not need to turn off the printer before cleaning the printhead. If power is turned off, all label formats and images, as well as any temporarily saved parameter settings stored in the printer's internal memory, are lost. When power is turned back on, these items must be reloaded.

If print quality does not improve after you perform this procedure, clean the printhead with *Save-a-Printhead* cleaning film. This specially coated material removes contamination buildup without damaging the printhead. Call your authorized Zebra reseller or distributor for more information.

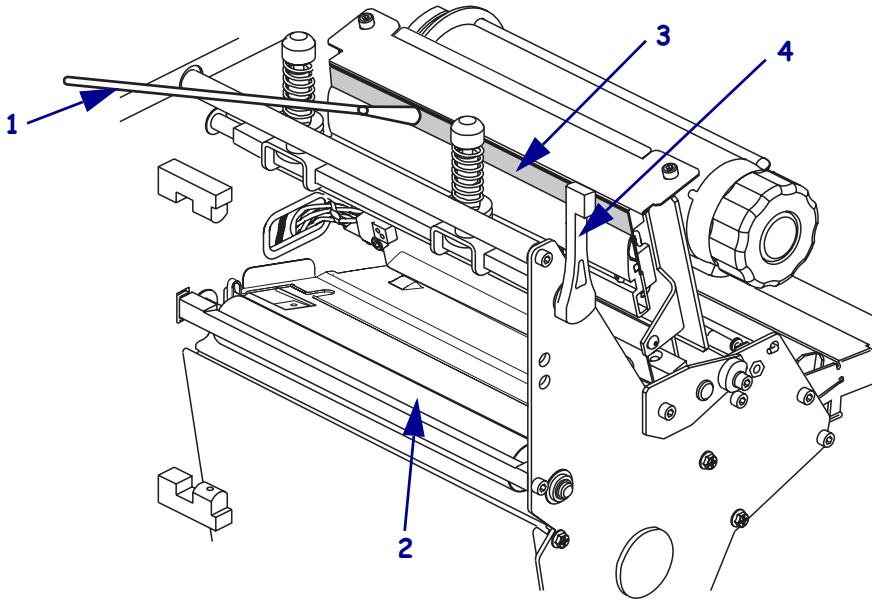
Caution • The printhead is hot and can cause severe burns. Allow the printhead to cool.

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

To clean the printhead and platen roller, complete these steps:

1. Open the printhead.
2. Remove the media and ribbon (if loaded).
3. Use Zebra's Preventative Maintenance kit, part number 47362, or a solution of 90% isopropyl alcohol and 10% deionized water on an applicator to wipe along the print elements from end to end, as shown in Figure 40. (The print elements are on the brown strip on the printhead.) Allow a few seconds for the solvent to evaporate.

Figure 40 • Cleaning the Printhead



1	Applicator
2	Platen roller
3	Printhead print elements
4	Printhead lever

4. Rotate the platen roller and clean thoroughly with solvent and an applicator.
5. Brush or vacuum any accumulated paper lint and dust away from the rollers.
6. Reload the media and the ribbon (if required).
7. Close the printhead.

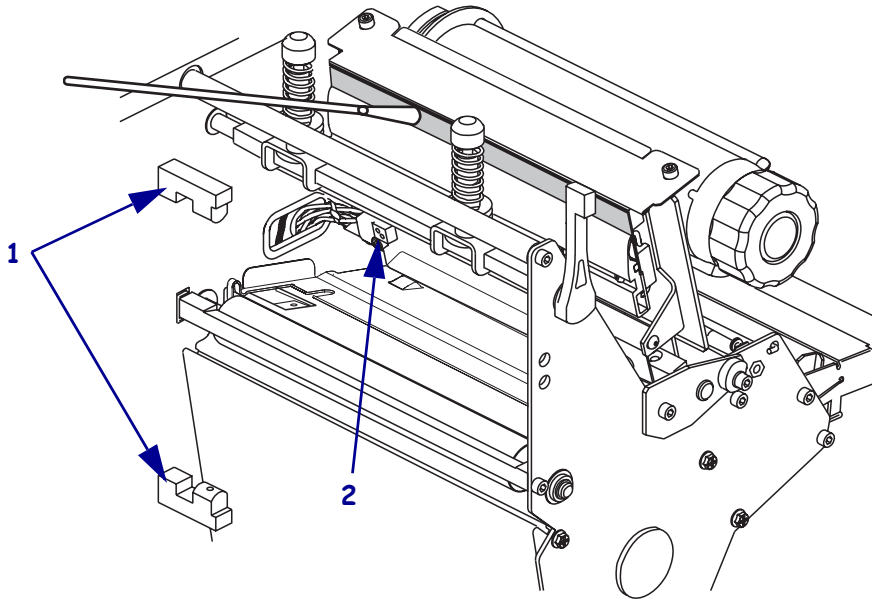
Sensors

Brush or vacuum any accumulated paper lint and dust off the sensors whenever the sensors are blocked. At minimum, clean the sensors according to the recommendations in *Cleaning Schedule* on page 90.

Ribbon and Label-Available Sensor Locations

The ribbon sensor and optional label-available sensor are shown in Figure 41.

Figure 41 • Sensor Locations

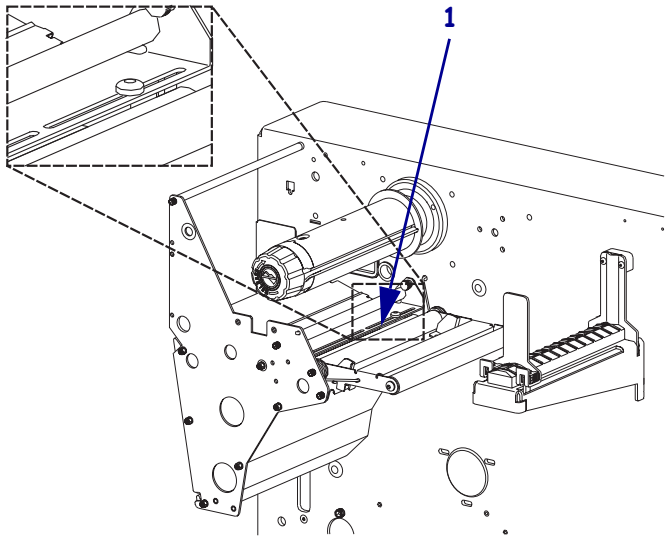


1	Label-available sensors
2	Ribbon sensor

Transmissive (Media) Sensor Locations

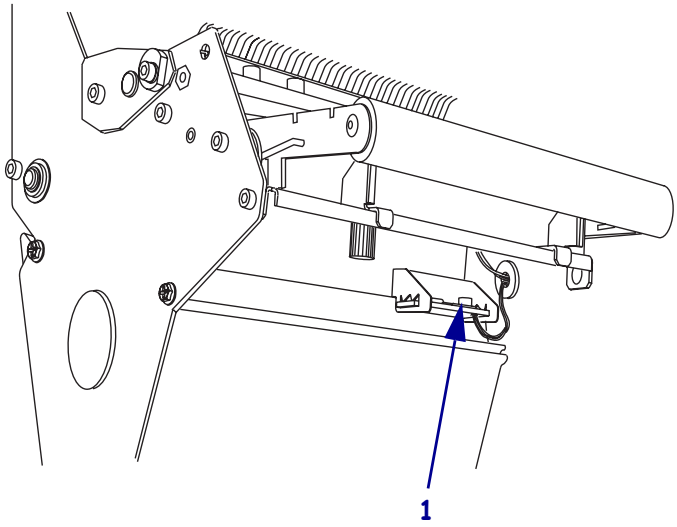
The locations of the upper and lower transmissive (media) sensors are shown in Figure 42 and Figure 43.

Figure 42 • Upper Media Sensor



1	Upper media sensor

Figure 43 • Lower Media Sensor

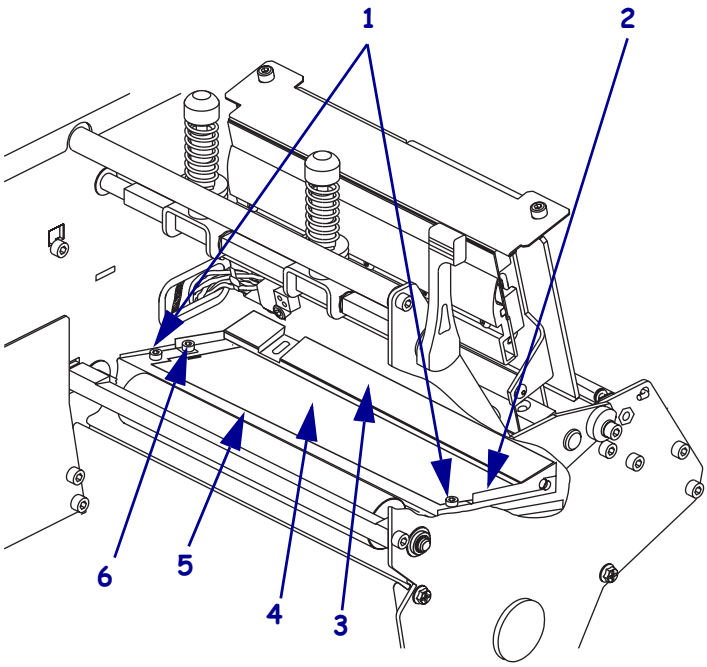


1	Lower media sensor

Snap Plate

Clean the snap plate when label adhesive or a label is stuck to the underside. Figure 44 shows the location of the snap plate.

Figure 44 • Snap Plate



1	Antenna support screws
2	Location of right-side snap plate screw (screw not shown)
3	Snap plate
4	Antenna support
5	Antenna support frame
6	Left-side snap plate screw

To clean the snap plate, complete these steps:

1. Remove the two screws that secure the snap plate to the antenna support frame.

Important • Do not remove the antenna support screws.

2. Remove the snap plate from the printer.
3. Clean the snap plate with cleaning solvent and a soft cloth.
4. To reinstall the snap plate, slide it back into place until the screw holes on the snap plate line up with the screw holes in the antenna support frame.
5. Reinstall the two snap plate screws to secure the snap plate to the antenna support frame.

Replace Fuse

The R110*Xi*III*Plus* fuse must be replaced only by an authorized service technician.

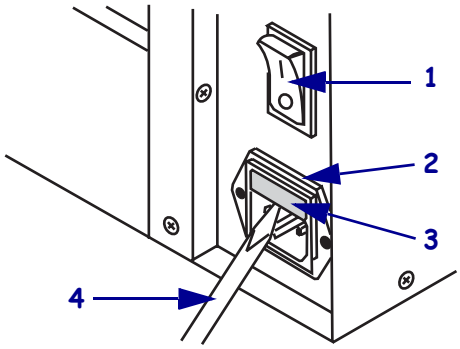
Caution • Turn the AC power switch Off (**O**) and remove the power cord before performing this procedure.

The printer uses a metric-style fuse (5 × 20 mm IEC) rated at F5A, 250 V. The AC power entry module comes with two approved fuses in the fuse holder: one is in-circuit, and the second is provided as a spare. The end caps of the fuse must bear the certification mark of a known international safety organization.

To replace a faulty fuse, complete these steps:

1. Use a small-blade screwdriver or similar tool to remove the fuse holder.
   The fuse holder is part of the AC power entry module at the rear of the printer (Figure 45).

Figure 45 • AC Power Entry Module

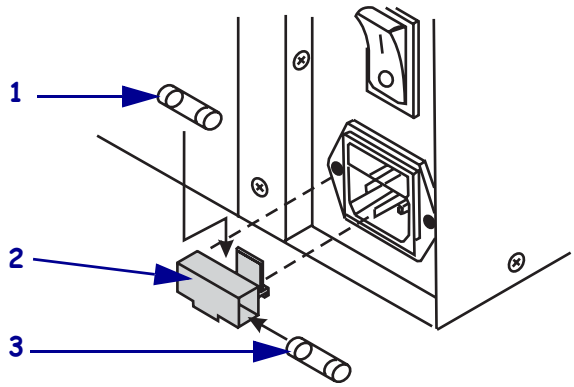


1	Power switch
2	Fuse holder
3	AC power entry module
4	Small-blade screwdriver

2. Remove the faulty fuse and install a new fuse in the in-circuit position (Figure 46).

Important • If you use the spare fuse, be sure to order a replacement fuse from your authorized Zebra distributor. The spare fuse should be the exact type and rating as the original in-circuit fuse.

Figure 46 • Fuse Locations



1	In-circuit fuse
2	Fuse holder
3	Spare fuse

3. Snap the fuse holder back into the AC power entry module.
4. Reconnect the power cord, and turn the printer On (**I**).

Note • If the printer does not power on, an internal component failure may have occurred, and the printer requires servicing by an authorized service technician.

Notes •

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9 Troubleshooting

This chapter provides you with information about LCD, print quality, communications, and other errors that you might need to troubleshoot.

Contents

Troubleshooting

If an error condition exists with the printer, review this checklist:

- ❑ Is there an error message on the LCD? If yes, see *LCD Error Messages* on page 101 for more information.
- ❑ Is the CHECK RIBBON light on when ribbon is loaded properly, or are non-continuous labels being treated as continuous labels? If yes, see *Media and Ribbon Sensor Calibration* on page 34.
- ❑ Are you experiencing problems with print quality? If yes, see *Print Quality Problems* on page 104.
- ❑ Are you experiencing communications problems? If yes, see *Communications Problems* on page 106.

If the labels are not printing or advancing correctly, review this checklist:

- ❑ Are you using the correct type of labels? Review the types of label in *Types of Media* on page 14.
- ❑ Review the label- and ribbon-loading illustrations, starting with *Load the Printer* on page 22.
- ❑ Check the position of the media sensor and move if necessary, as shown in *Adjust and Calibrate Sensors* on page 34.
- ❑ Does the printhead need to be adjusted? See *Adjust Printhead Pressure and Toggle Position* on page 38 for more information.
- ❑ Do the sensors need to be calibrated? See *Media and Ribbon Sensor Calibration* on page 34 for more information.

If none of the above suggestions correct the problem, review this checklist:

- ❑ Perform one or more of the self-tests given in *Printer Diagnostics* on page 108. Use the results to help identify the problem.
- ❑ If you are still having problems, see *Support* on page xviii for customer support information.

LCD Error Messages

The LCD displays messages when there is an error. See Table 11 for LCD errors, the possible causes, and the recommended solutions.

Table 11 • LCD Error Messages

LCD	Possible Cause	Recommended Solution
RIBBON OUT	Thermal Transfer Mode—Ribbon is not loaded or is loaded incorrectly.	Load the ribbon correctly, following directions in *Load Ribbon* on page 26.
	Thermal Transfer Mode—Ribbon is loaded but the ribbon sensor is not sensing the ribbon.	Adjust the media and ribbon sensors. See *Media and Ribbon Sensor Calibration* on page 34.
	Direct Thermal Mode—Ribbon is loaded.	Make sure that ribbon is not loaded and that the printer is in Direct Thermal Print Mode. See *Selecting Print Method* on page 45.
	Direct Thermal Mode—Settings are incorrect.	Make sure the printer driver and software settings are compatible with Direct Thermal Print Mode.
PAPER OUT	Labels are not loaded or are loaded incorrectly.	Load the labels correctly. See *Load the Printer* on page 22.
	Media Sensor is not adjusted correctly.	Check the position of the media sensors, and adjust if necessary. See *Media and Ribbon Sensor Calibration* on page 34.
	Printer is set for non-continuous labels but continuous labels are loaded.	• Make sure the labels and the Media Type settings match. See *Setting Media Type* on page 45. • Make sure the printer driver or software settings match the label and Media Type settings. • Calibrate the printer. For more information, see *Calibrate the Printer* on page 33.
	The MAX LENGTH setting is set to a value that is shorter than the actual length of the label.	Change the MAX LENGTH setting to a value that is at least 1 in. (25 mm) longer than the labels.
HEAD OPEN	The printhead is not fully closed.	Close the printhead.
HEAD ELEMENT BAD	One or more of the printhead elements failed the printhead element test.	• If the failed elements affect your printing application, replace the printhead. • To override this error, disable the head test count feature on the front panel by defaulting the value to **0000**.

Table 11 • LCD Error Messages (Continued)

LCD	Possible Cause	Recommended Solution
RIBBON IN	Ribbon is loaded, but the printer is set for Direct Thermal mode.	• To operate in Direct Thermal mode, remove the ribbon. • To operate in Thermal Transfer mode, leave the ribbon loaded and change the print method to Thermal Transfer. See *Selecting Print Method* on page 45. • Ensure that the printer driver and/or software settings are correctly set (if applicable).
HEAD TOO HOT	The printhead is over temperature.	Printing automatically resumes when the printhead elements cool to an acceptable operating temperature.  **Caution** • The printhead is hot and can cause severe burns. Allow the printhead to cool.  **Electrostatic Discharge Caution** • Observe proper electrostatic safety precautions when handling any static-sensitive components such as circuit boards and printheads.
CLEAN HEAD NOW	The printhead requires cleaning.	Clean the printhead according to the instructions in *Printhead and Platen Roller* on page 91.  **Caution** • The printhead is hot and can cause severe burns. Allow the printhead to cool.  **Electrostatic Discharge Caution** • Observe proper electrostatic safety precautions when handling any static-sensitive components such as circuit boards and printheads. If the message does not go away after the printhead is cleaned, open the printhead and then close it.

Table 11 • LCD Error Messages (Continued)

LCD	Possible Cause	Recommended Solution
HEAD COLD		**Caution** • An improperly connected printhead data or power cable can cause this error message. The printhead can still be hot enough to cause severe burns. Allow the printhead to cool.
	The printhead is under temperature.	Continue printing while the printhead reaches the correct operating temperature. If the error remains, the environment may be too cold for proper printing. Relocate the printer to a warmer area.
	Printhead data cable is not properly connected.	**Caution** • You must turn off the printer before performing this procedure. Failure to do so can damage the printhead. **1.** Turn off (**O**) the printer. **2.** Disconnect and reconnect the data cable to the printhead. **3.** Ensure that the cable connector is fully inserted into the printhead connector. **4.** Turn on (**I**) the printer.  **Electrostatic Discharge Caution** • Observe proper electrostatic safety precautions when handling any static-sensitive components such as circuit boards and printheads.
OUT OF MEMORY	There is not enough memory to perform the function shown on the second line of the error message.	Turn the printer off then back on to clear memory, and try to print again. If the error recurs, there is insufficient memory for the label length, downloaded fonts or graphics, and images.
		Ensure that the device, such as Flash memory or PCMCIA card, is installed and not write-protected or full. See *Memory Cards* on page 83.  **Electrostatic Discharge Caution** • Observe proper electrostatic safety precautions when handling any static-sensitive components such as circuit boards and printheads.
		Ensure that the data is not directed to a device that is not installed or available.

Print Quality Problems

Table 12 identifies problems with print quality, the possible causes, and the recommended solutions.

Table 12 • Print Quality Problems

Problem	Possible Cause	Recommended Solution
General print quality issues	You are using an incorrect combination of labels and ribbon for your application.	Consult your authorized Zebra reseller or distributor for information and advice.
	The printer is set at the incorrect print speed.	For optimal print quality, set the print speed to the lowest possible setting for your application via ZPL II, the driver, or the software. See *Adjusting Print Speed* on page 44.
	The printer is set at an incorrect darkness level.	For optimal print quality, set the darkness to the lowest possible setting for your application via the front panel, the driver, or the software. See *Adjusting Print Darkness* on page 44.
	The printhead is dirty.	Clean the printhead according to the instructions in *Printhead and Platen Roller* on page 91.  **Caution •** The printhead is hot and can cause severe burns. Allow the printhead to cool.  **Electrostatic Discharge Caution •** Observe proper electrostatic safety precautions when handling any static-sensitive components such as circuit boards and printheads.
There is light printing (or no printing) on the left or right side of the label or the printed image is not sharp.	The toggle pressure needs to be adjusted.	Follow the instructions in *Adjust Printhead Pressure and Toggle Position* on page 38.  **Electrostatic Discharge Caution •** Observe proper electrostatic safety precautions when handling any static-sensitive components such as circuit boards and printheads.
Gray lines on blank labels with no consistent pattern	The printhead is dirty.	Clean the printhead according to the instructions in *Printhead and Platen Roller* on page 91.  **Caution •** The printhead is hot and can cause severe burns. Allow the printhead to cool.  **Electrostatic Discharge Caution •** Observe proper electrostatic safety precautions when handling any static-sensitive components such as circuit boards and printheads.

Table 12 • Print Quality Problems (Continued)

Problem	Possible Cause	Recommended Solution
Light, consistent vertical lines running through the labels	The printhead or platen roller is dirty.	Clean the printhead and platen roller as instructed in *Printhead and Platen Roller* on page 91.  **Caution** • The printhead is hot and can cause severe burns. Allow the printhead to cool.  **Electrostatic Discharge Caution** • Observe proper electrostatic safety precautions when handling any static-sensitive components such as circuit boards and printheads.
Intermittent creases on the left and right edges of the labels	There is too much toggle pressure on the printhead.	Reduce the toggle pressure. See *Adjust Printhead Pressure and Toggle Position* on page 38.  **Electrostatic Discharge Caution** • Observe proper electrostatic safety precautions when handling any static-sensitive components such as circuit boards and printheads.
Wrinkled Ribbon	The ribbon is not loaded correctly.	Load the ribbon correctly. See *Load Ribbon* on page 26.
	The darkness setting is incorrect.	Set the darkness to the lowest possible setting for good print quality. See *Adjusting Print Darkness* on page 44.
	Incorrect printhead pressure or balance.	Set the pressure to the minimum required for good print quality. See *Adjust Printhead Pressure and Toggle Position* on page 38.  **Electrostatic Discharge Caution** • Observe proper electrostatic safety precautions when handling any static-sensitive components such as circuit boards and printheads.
	The labels are not feeding correctly. They are shifting from side to side.	Make sure that the media guide and media supply guide touch the edge of the media.
		Adjust the ribbon strip plate.

Communications Problems

Table 13 identifies problems with communications, the possible causes, and the recommended solutions.

Table 13 • Communications Problems

Problem	Possible Cause	Recommended Solution
A label format was sent to the printer but was not recognized. The DATA light does not flash.	The communication parameters are incorrect.	Check the printer driver or software communications settings (if applicable).
		If you are using serial communication, check the serial port setting in the front panel menu. See *Setting Serial Communications* on page 50.
		Make sure you are using the correct communication cable. See *Data Cable Requirements* on page 13 for the requirements.
		Using the front panel controls, check the protocol setting. It should be set to NONE. See *Setting Protocol* on page 51.
		If a driver is used, check the driver communication settings for your connection.
A label format was sent to the printer. Several labels print, then the printer skips, misplaces, misses, or distorts the image on the label.	The host is set to EPP parallel communications.	Change the settings on the computer host to standard parallel communications. See *Setting Parallel Communications* on page 50.
	The serial communication settings are incorrect.	Ensure that the flow control settings match.
		Check the communication cable length. See *Data Cable Requirements* on page 13 for requirements.
		Check the printer driver or software communications settings (if applicable).
A label format was sent to the printer but was not recognized. The DATA light flashes but no printing occurs.	The prefix and delimiter characters set in the printer do not match the ones in the label format.	Verify the prefix and delimiter characters. See *Format Prefix Character* on page 53 and *Delimiter Character* on page 53 for the requirements.
	Incorrect data is being sent to the printer.	Ensure that ZPL is being used.
		Check the communication settings on the computer. Ensure that they match the printer settings.

Table 13 • Communications Problems (Continued)

Problem	Possible Cause	Recommended Solution
The printer fails to calibrate or detect the top of the label.	The printer was not calibrated for the label being used.	Perform the calibration procedure in *CANCEL Self Test* on page 109.
	The printer is configured for continuous media.	Set the media type to non-continuous media. See *Setting Media Type* on page 45.
	The driver or software configuration is not set correctly.	Driver or software settings produce ZPL commands that can overwrite the printer configuration. Check the driver or software media-related setting.

Printer Diagnostics

Self tests give information about the condition of the printer. The most commonly used are the Power-On and the CANCEL self tests.

Caution • Be sure that the print width is set to match the label width you are using before running any self tests. If the labels are not wide enough, the test may print on the platen roller and damage it.

Power-On Self Test

The Power-On Self Test (POST) is performed automatically each time the printer is turned on. During either test sequence, the front panel LEDs light up and the LCD monitors the progress of the POST. If the printer fails any of these tests, FAILED shows on the LCD. If this occurs, notify an authorized Zebra reseller.

Additional Printer Self Tests

These self tests produce sample printouts and provide specific information that help determine the operating conditions for the printer.

Each self test is enabled by pressing a specific front panel key or combination of keys while turning the power On (**I**)**.** Keep the key(s) depressed until the DATA light turns off. When the POST is complete, the selected self test starts automatically.

Note • When performing a self test, do not send a label format to the printer. For remote hosts, disconnect all data interface cables from the printer. For printers in Peel-Off Mode, remove the labels as they come out of the printer.

CANCEL Self Test

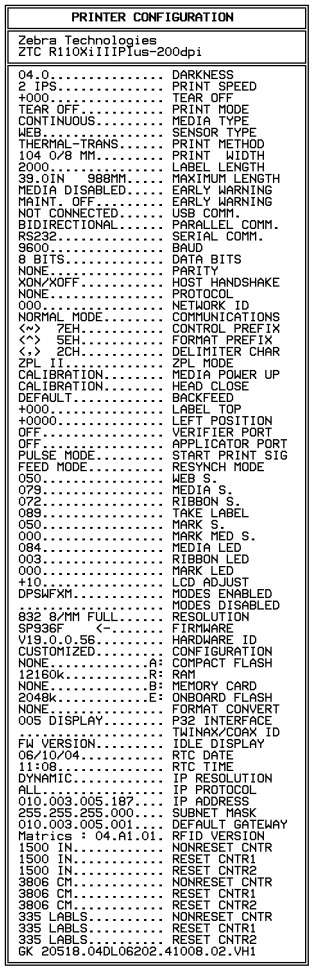
The CANCEL self test prints a configuration label, which tells you the current settings for the printer.

To perform the CANCEL Self Test, complete these steps:

1. Turn Off (**O**) the printer.
2. Press and hold CANCEL while turning the power On (**I**). Hold CANCEL until the DATA light turns off.

   A printer configuration label prints (Figure 47).

Figure 47 • Printer Configuration Label



```
PRINTER CONFIGURATION

Zebra Technologies
ZTC R110XiIIIPlus-200dpi

04.0............... DARKNESS
2 IPS.............. PRINT SPEED
+000............... TEAR OFF
TEAR OFF........... PRINT MODE
CONTINUOUS......... MEDIA TYPE
WEB................ SENSOR TYPE
THERMAL-TRANS...... PRINT METHOD
104 0/8 MM......... PRINT  WIDTH
2000............... LABEL LENGTH
39.0IN   988MM..... MAXIMUM LENGTH
MEDIA DISABLED..... EARLY WARNING
MAINT. OFF......... EARLY WARNING
NOT CONNECTED...... USB COMM.
BIDIRECTIONAL...... PARALLEL COMM.
RS232.............. SERIAL COMM.
9600............... BAUD
8 BITS............. DATA BITS
NONE............... PARITY
XON/XOFF........... HOST HANDSHAKE
NONE............... PROTOCOL
000................ NETWORK ID
NORMAL MODE........ COMMUNICATIONS
<~>  7EH........... CONTROL PREFIX
<^>  5EH........... FORMAT PREFIX
<,>  2CH........... DELIMITER CHAR
ZPL II............. ZPL MODE
CALIBRATION........ MEDIA POWER UP
CALIBRATION........ HEAD CLOSE
DEFAULT............ BACKFEED
+000............... LABEL TOP
+0000.............. LEFT POSITION
OFF................ VERIFIER PORT
OFF................ APPLICATOR PORT
PULSE MODE......... START PRINT SIG
FEED MODE.......... RESYNCH MODE
050................ WEB S.
079................ MEDIA S.
072................ RIBBON S.
089................ TAKE LABEL
050................ MARK S.
000................ MARK MED S.
084................ MEDIA LED
003................ RIBBON LED
000................ MARK LED
+10................ LCD ADJUST
DPSWFXM............ MODES ENABLED
.................. MODES DISABLED
832 8/MM FULL...... RESOLUTION
SP936F    <-....... FIRMWARE
V19.0.0.56......... HARDWARE ID
CUSTOMIZED......... CONFIGURATION
NONE............A: COMPACT FLASH
12160k..........R: RAM
NONE............B: MEMORY CARD
2048k...........E: ONBOARD FLASH
NONE............... FORMAT CONVERT
005 DISPLAY........ P32 INTERFACE
.................. TWINAX/COAX ID
FW VERSION......... IDLE DISPLAY
06/10/04........... RTC DATE
11:08.............. RTC TIME
DYNAMIC............ IP RESOLUTION
ALL................ IP PROTOCOL
010.003.005.187.... IP ADDRESS
255.255.255.000.... SUBNET MASK
010.003.005.001.... DEFAULT GATEWAY
Matrics : 04.A1.01. RFID VERSION
1500 IN............ NONRESET CNTR
1500 IN............ RESET CNTR1
1500 IN............ RESET CNTR2
3806 CM............ NONRESET CNTR
3806 CM............ RESET CNTR1
3806 CM............ RESET CNTR2
335 LABLS.......... NONRESET CNTR
335 LABLS.......... RESET CNTR1
335 LABLS.......... RESET CNTR2
GK 20518.04DL06202.41008.02.VH1
```

The printer configuration can be changed by performing a calibration procedure. See *Calibrate the Printer* on page 33 for more information.

PAUSE Self Test

This self test can be used to provide the test labels required when making adjustments to the printer's mechanical assemblies. See the sample printout below.

To perform a PAUSE self test, complete these steps:

1. Turn Off (**O**) the printer.
2. Press and hold PAUSE while turning the power On (**I**). Hold PAUSE until the DATA light turns off.
   - The initial self test prints 15 labels at 2.4 in. (61 mm) per second, then automatically pauses the printer. When PAUSE is pressed, an additional 15 labels print. Figure 48 shows a sample of the labels.

Figure 48 • PAUSE Test Label

   - While the printer is paused, pressing CANCEL alters the self test. When PAUSE is pressed, 15 labels print at 6 in. or 152 mm per second.
   - While the printer is paused, pressing CANCEL again alters the self test a second time. When PAUSE is pressed, 50 labels print at 2.4 in. (61 mm per second).
   - While the printer is paused, pressing CANCEL again alters the self test a third time. When PAUSE is pressed, 50 labels print at 6 in. (152 mm) per second.
   - While the printer is paused, pressing CANCEL again alters the self test a fourth time. When PAUSE is pressed, 15 labels print at the printer's maximum speed.
   - To exit this self test at any time, press and hold CANCEL.

FEED Self Test

This test helps you choose the best darkness setting for your printer.

To perform a FEED self test, complete these steps:

1. Turn Off (**O**) the printer.
2. Press and hold FEED while turning the power On (**I**). Hold FEED until the DATA light turns off.

   The printer prints a series of labels (Figure 49) at various speeds and at darkness settings higher and lower than the darkness value shown on the configuration label.

Figure 49 • FEED Test Label

3. Inspect the labels and determine which one has the best print quality for your application. The darkness value printed on that label is added to (plus) or subtracted from (minus) the darkness value specified on the configuration label. The resulting numeric value (0 to 30) is the best darkness value for that specific label/ribbon combination and print speed.
4. Enter the corresponding darkness and print speed values into the printer through the front panel.

FEED and PAUSE Self Test

Performing this self test temporarily resets the printer configuration to the factory default values. These values are active only until power is turned off unless you save them permanently in memory.

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

1. Turn Off (**O**) the printer.
2. Press and hold FEED and PAUSE while turning the power On (**I**). Hold FEED and PAUSE until the DATA light turns off.

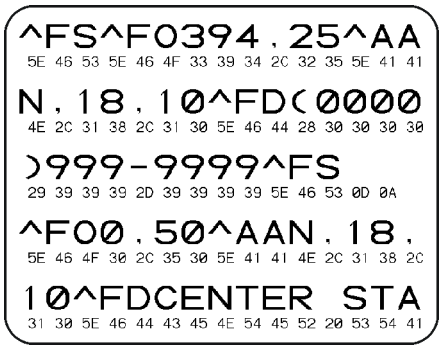
   No labels print at the end of this test.

Communications Diagnostics Test

This test is controlled from the front panel display. See *Setting Communications Mode on page 52*. Figure 50 shows a typical printout from this test. Turn off the power to exit this self test and return to normal operation.

Note • The communications test label prints upside-down.

Figure 50 • Communications Diagnostics Test Label



Additional Printer Diagnostics

Additional diagnostic tests are available for this printer. See the *Maintenance Manual* for information about these additional tests.

A

Specifications

This appendix provides the features of and specifications for the R*Xi*III*Plus* printers.

Contents

Features

This section lists the standard and optional features for the printer.

Standard Features

Note • Printer specifications are subject to change without notice.

- Thermal transfer and direct thermal printing
- DRAM 16 MB
- USB 2.0 Port
- Real-time Clock
- Advanced Counter

Print Modes

Five different print modes can be used, depending on the printer options purchased:

- **Tear-Off Mode:** Labels are produced in strips.
- **Peel-Off Mode:** Labels are dispensed and peeled from the backing as needed.
- **Applicator Mode:** The printer is part of a larger label application system.

Zebra Programming Language (ZPL II®)

ZPL features include:

- Downloadable graphics, scalable and bitmap fonts, and label formats
- Object copying between memory areas
- (RAM, memory card, and internal Flash)
- Code page 850 character set
- Data compression
- Automatic virtual input buffer management
- Format inversion
- Mirror image printing
- Four-position field rotation (0°, 90°, 180°, 270°)
- Slew command
- Controlled via mainframe, mini-computer, PC, portable data terminal
- Programmable quantity with print, pause, and cut control
- Communicates in printable ASCII characters
- Error-checking protocol
- Status message to host upon request
- Serialized fields
- In-spec OCR-A and OCR-B
- UPC/EAN
- User-programmable password

Bar Codes

Types of bar codes include:

- Bar code ratios—2:1, 7:3, 5:2, 3:1
- Codabar (supports ratios of 2:1 up to 3:1)
- CODABLOCK
- Code 11
- Code 39 (supports ratios of 2:1 up to 3:1)
- Code 49 (two-dimensional bar code)
- Code 93
- Code 128 (with subsets A, B, and C and UCC case codes)
- Check digit calculation where applicable
- Data Matrix
- EAN-8, EAN-13, EAN extensions
- ISBT-128
- Industrial 2 of 5
- Interleaved 2 of 5 (supports ratios of 2:1 up to 3:1, Modulus 10 Check Digit)
- LOGMARS
- MaxiCode
- Micro PDF
- MSI
- PDF-417 (2-dimensional bar code)
- PLANET code
- Plessey
- POSTNET
- QR-Code
- RSS code
- Standard 2 of 5
- TLC 39
- UPC-A, UPC-E, UPC extensions
-

Agency Approvals for All Printers

Approvals include:

- Binational UL 60950 3rd edition/CSA CAN/CSA-C22.2 No. 60950-00 3rd edition
- Canadian ICES-003, Class B
- FCC class B

Compliance for All Printers

- Complies with FCC class B and Canadian Doc. class A rules

General Specifications

Dimensions	R110*Xi* III*Plus*
Height	15.5 in (393.7 mm)
Width	10.37 in. (263.5 mm)
Depth	19.5 in. (495.3 mm)
Weight without options	51 lb. (25 kg)

Electrical Specifications

Power	R110*Xi* III*Plus*
General	90 to 264 VAC; 48 to 62 Hz
Power consumption printing PAUSE test at slowest speed	180 W
Printer idle	20 W

Environmental Conditions for Operation and Storage

Environment	Mode	Temperature	Relative Humidity
Operation	Thermal Transfer	41° to 104°F (5° to 40° C)	20 to 85% non-condensing
	Direct Thermal	32° to 104°F (0° to 40° C)	
Storage	Thermal Transfer or Direct Thermal	–40° to 140°F (–40° to 60° C)	5 to 85% non-condensing

Print Specifications by Model

Refer to the key and the table that follows for printer specifications.

Model Specifications Key This table contains the key for print specifications for the table that follows.

■	Non-Continuous printing (gap, notch, or hole between labels).
▄▀	Continuous printing (no gap, notch or hole).
◆	Ladder (rotated) orientation.
✧	Picket fence (nonrotated) orientation.

Print Specifications	R110*Xi*III*Plus* 200 dpi
Printhead resolution	203 dots/inch (8 dots/mm)
Dot size (width×length)	0.0049×0.0049 in. (0.125×0.125 mm)
First dot location (measured from inside media edge)	0.10 ± 0.035 in. (2.5 ± 0.89 mm)
Maximum print width	4.09 in. (104 mm)
Selectable print speeds (inches per second)	2.4, 3 through 10
Maximum Print length	39 in. (991 mm) ■ 150 in. (3810 mm)▄▀
Bar code modulus (X) dimension	4.9 mil to 49 mil◆ 4.9 mil to 49 mil✧
Thin film printhead with Element Energy Equalizer (E^3)®	Yes

Ribbon Specifications

Refer to the table that follows for ribbon specifications.

Note • Match the ribbon to the label width and printhead width that you are using.

- Ribbon must be wound with the coated side out.
- Ribbon should be at least as wide as the labels to protect the printhead from excessive wear.

Ribbon Specifications	R110*Xi*III*Plus* 200 dpi
Printhead resolution	203 dots/inch (8 dots/mm)
Ribbon width—Minimum*	0.79 in. (20 mm)
Ribbon width—Maximum	4.33 in. (110 mm)
Standard length with 2:1 label to ribbon ratio	984 ft (300 m)
Standard length with 3:1 label to ribbon ratio	1476 ft (450 m)
Ribbon core inside diameter	1.0 in. (25.4 mm)
Maximum ribbon roll outside diameter	3.2 in. (81.3 mm)

* For RFID “smart” labels, the minimum ribbon width is determined by the minimum label width for the transponder being used. For the list of approved transponders and related size and placement specifications, go to http://www.zebra.com/PA/Printers/product_R110XiIIIPlus.htm.

Label Specifications

R*Xi*III*Plus* printers need the correct size and type of labels for best performance. Refer to the table that follows for the specifications.

Important • Media registration and minimum label length are affected by label type and width, ribbon type, print speed, and printer mode of operation. Performance improves as these factors are optimized. Zebra recommends qualifying any application with thorough testing.

Label Specifications		
Minimum label length	Tear-off	0.7 in. (18 mm)*
	RFID "smart" labels	**
Total media width (label + backing, if any)	Minimum	0.79 in. (20 mm)*
	Maximum	4.5 in. (114 mm)
	RFID "smart" labels	**
Total thickness (includes backing, if any)	Minimum	0.003 in. (0.076 mm)
	Maximum	0.012 in. (0.305 mm)
Roll media core inside diameter		3 in. (76 mm)
Maximum roll diameter on 3 in. (76 mm) core		8.0 in. (203 mm)
Interlabel gap	Minimum	0.079 in.(2 mm)*
	Preferred	0.118 in. (3 mm)*
	Maximum	0.157 in. (4 mm)*
	RFID "smart" labels	**
Maximum internal fanfold media pack size (label + backing) L × W×H		8.0×4.5×4.5 in. (20×114×114 mm)
Ticket/tag sensing notch L × W		0.12×0.25 in. (3×6 mm)
Ticket/tag sensing hole diameter		0.125 in. (3 mm)
Label registration tolerance (vertical)		± 0.06 in. (± 1.5 mm)
Label registration tolerance (horizontal)		± 0.06 in. (± 1.5 mm)

* Does not apply to RFID "smart" labels.

** This parameter varies for each transponder type. For the list of approved transponders and related placement specifications, go to http://www.zebra.com/PA/Printers/product_R110XiIIIPlus.htm.

Notes •

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