Zebra® R4Mplus™
Industrial/Commercial Printer

User Guide

Customer Order # 21067L

Manufacturer Part # 21067L Rev. 1

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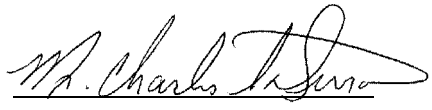


Zebra

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Zebra Technologies Corporation

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Vernon Hills, IL 60061


Zebra

Preface

The Preface discusses the topics and illustrates standards that are used throughout this guide.

Contents

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You can contact Zebra Technologies Corporation, USA at any of the following:

Visit us at: www.zebra.com

Our Mailing Address:
Zebra Technologies Corporation
333 Corporate Woods Parkway
Vernon Hills, Illinois 60061.3109 U.S.A
Telephone: +1 847.634.6700
Facsimile: +1 847.913.8766

Zebra Technologies Europe Limited
Zebra House
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High Wycombe
Buckinghamshire HP13 6EQ, UK
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US Phone Number: +1 847.913.2259

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

About this Document

The User Guide contains the following chapters:

Table 1 • User Guide Contents

Title	Content Description
Introduction	This chapter shows the operational controls and location of major components needed in the loading of media and ribbon.
Printer Setup	The chapter provides the tasks that you must complete and the issues that you must consider before you load and configure your printer.
Printer Operation	This chapter provides instructions for loading media and ribbon.
Configuration	This chapter discusses detailed configuration settings and instructs you how to view or change parameters through the front panel.
RFID Guidelines	This chapter provides an overview of how RFID works, the transponders supported by this printer, and the ZPL commands used to create RFID labels.
Routine Care and Adjustments	This chapter discusses printer cleaning and minor adjustments.
Troubleshooting	This chapter discusses typical problems and their probable solutions.
Data Connections	This appendix provides details about the serial port and parallel port data connections.
Specifications	This appendix contains specifications for the R4Mplus printer.

Document Conventions

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

About this Chapter: This section lists and describes each main section of the chapter, including the initial page number of that section. These sections primarily serve as hyperlink components for the Adobe Acrobat `.pdf` version of this guide.

Alternate Color: (on-line only) Cross-references contain hot links to other sections in this guide. If you are viewing this guide on-line in `.pdf` format, you can click the cross-reference (royal blue text) to jump directly to its location.

Command Line Examples: All command line examples appear in `Courier` 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.

Caution, Important, Note, and Example: These types of paragraphs are defined in the following examples:

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

Caution • Advises you that failure to take or avoid a specified action could result in loss of data or hardware damage.

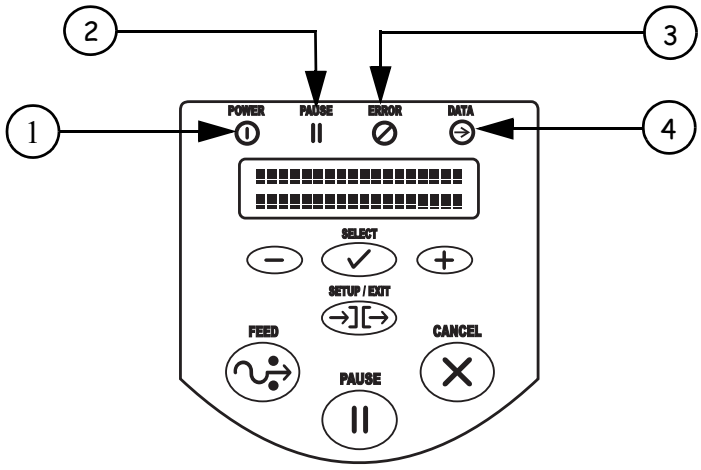
Important • Provides information that is essential to the completion of a task.

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.

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 illustration. See Figure 1.

Figure 1 • Example of an Illustration with Callouts



1	Power LED
2	Pause LED
3	Error LED
4	Data LED

Related Documents

In addition to this user guide, the following documents might be helpful references:

- The *ZPL II Programming Guide Volume I and Volume II* (Zebra part number 45540L) details how to create the perfect label format for your application. The guide explains how the optional ZBI™ extends the power of ZPL II by allowing custom programs to be written that operate within the printer, directly interfacing with bar code scanners, keyboard display devices, etc. The guide also contains information about the enhanced operating system features of your printer. There are three ways to obtain this guide: on the accessory CD-ROM (supplied with the printer), on our web site (www.zebra.com), or by ordering printed manuals from your distributor.
- The *PrintServer II User and Reference Guide* (Zebra part number 45537L) explains how you can quickly set up your printer on an IP network and experience ZebraLink, our revolutionary real-time connectivity and control solution for Zebra printers (optional ZebraNet PrintServer II required).
- The *Z4Mplus and Z6Mplus Maintenance Manual* (Zebra part number 13358L) contains the information you need to maintain your printer.

Note • This maintenance manual applies to the R4Mplus, but the RFID components are not included.

CHAPTER 1

Introduction

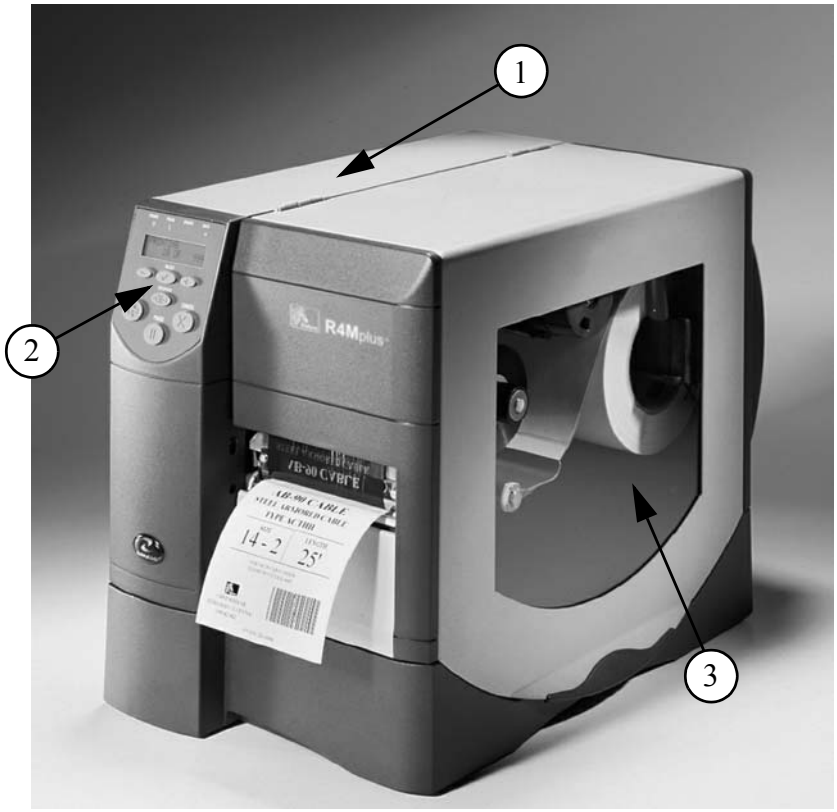
This chapter shows the operational controls and location of major components needed in the loading of media and ribbon.

Contents

External View

Figure 1 shows the outside of the printer.

Figure 1 • External View

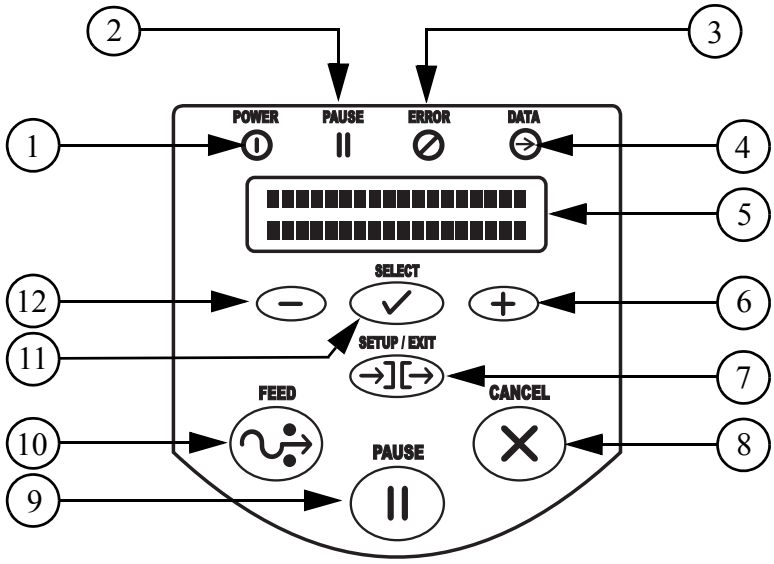


1	Electronics cover
2	Front panel
3	Media door

Front Panel

The front panel keys and lights are shown in Figure 2.

Figure 2 • Front Panel Controls and LEDs



1	Power LED
2	Pause LED
3	Error LED
4	Data LED
5	LCD
6	PLUS (+) Key
7	SETUP/EXIT Key
8	CANCEL Key
9	PAUSE Key
10	FEED Key
11	SELECT Key
12	MINUS (–) Key

LCD Display Settings

Table 1 shows the front panel LCD display settings that you may wish to adjust and what they mean. Refer to *Basic Configuration* on page 46 for more detailed information.

Table 1 • Front Panel LCD Display Settings

LCD Display	Meaning/Available Settings
PRINTER READY	Ready to print labels or to configure the printer. All printer self-tests have been performed successfully.
DARKNESS	The larger the number, the darker the print. The range is 0 to 30, with a default setting of 10.
PRINT SPEED	The print speed is given in inches per second. The larger the number, the faster the label prints.
TEAR OFF	Establishes the position of the media over the tear-off bar after printing.
PRINT MODE	Tear-Off (default setting), Peel-Off, Cutter, Rewind. For more details, see Table 2.
MEDIA TYPE	Non-continuous (default setting), Continuous
SENSOR TYPE	Web (default setting), Mark
SENSOR SELECT	Auto Select (default setting), Transmissive
PRINT METHOD	Thermal transfer (default setting using a ribbon), Direct thermal (no ribbon)

Print Modes

You can view the current print mode on the LCD on the front panel of the printer. Refer to *Configuration and Calibration LCD Displays* on page 49 for more detailed information. Print modes should match the media and printer options chosen. Print mode choices are listed in Table 2.

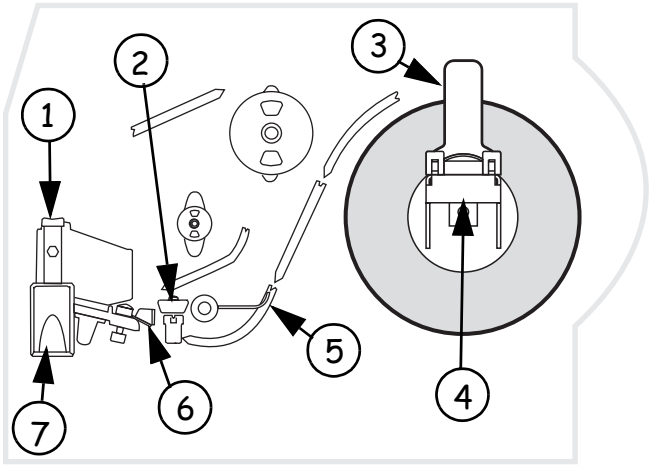
Table 2• Print Mode Options

Mode	Printer Option	Action
Tear-Off Mode (Default setting)	Use for most applications.	Each label or strip of labels can be torn off after printing.
Peel-Off Mode	Use only if printer has the peel option.	Liner material is peeled away from the label as it is printed. After the printed label is removed the next label prints.
Cutter Mode	Use only if printer has a cutter option.	Printer automatically cuts the label after it is printed.
Rewind Mode	Use only if printer has the rewind option.	The media and/or liner are rewound onto a core as they are printed.

Printer Media Compartment

Figure 3 shows a simplified view of your printer. Depending on installed options, your printer may look slightly different.

Figure 3 • Media Compartment



1	Printhead Assembly
2	Transmissive Sensor
3	Label Supply Guide
4	Label Supply Hanger
5	Dancer
6	Label Guide
7	Printhead Open Lever

CHAPTER 2

Printer Setup

The 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 19.

- ❑ **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 13.
- ❑ **Select Media** Do you have the correct media for your application? If you are unsure, see *Types of Media* on page 15.
- ❑ **Select Ribbon** Do you need to use ribbon, and is the appropriate ribbon available, if needed? If you are unsure, see *Ribbon* on page 18.

Unpack and Inspect the Printer

- Check all exterior surfaces.
- Raise the media access door and inspect the media compartment.
- Save the carton and all packing material in case the printer needs to be shipped. Contact your authorized Zebra reseller for instructions.
- 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, see *Connect the Printer to a Power Source* on page 11.

Caution • For personnel and equipment safety, always use a three-prong plug with an earth-ground connection to the AC power source.

Report Damage

If you discover shipping damage:

- Immediately notify the shipping company and file a damage report.

Important • Zebra Technologies Corporation is not responsible for any damage incurred during the shipment of the equipment and will not repair this damage under warranty

- Keep the carton and all packing material for inspection.
- Notify your local Zebra reseller.

Storage

If you are not placing the printer into operation immediately, repackage it using the original packing materials. The printer may be stored under the following conditions:

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

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 110.

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 13.

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.

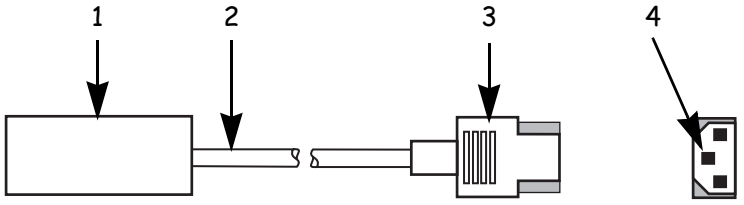
Power Cord Specifications

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

Your power cord must meed these standards:

- The overall length must be less than 9.8 ft. (3.0 m).
- It must be rated for at least 5A, 250 VAC.
- The chassis ground (earth) **must** be connected to ensure safety and reduce electromagnetic interference. The ground connection is handled by the third wire (earth) in the power cord as shown in Figure 4.

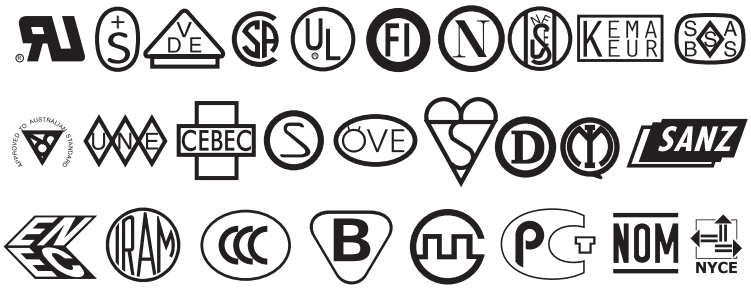
Figure 4 • Power Cord Specifications



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 IEC 320 connector must bear the certification mark of at least one of the known international safety organizations shown in Figure 5.

Figure 5 • 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 RS-232 DB-9 serial data port and the IEEE 1284 compliant bidirectional parallel port. For further information, see *Data Connections* on page 103.

Optional interfaces:

- Socket Card for PCMCIA cards. For further information on PCMCIA cards, see *Install Memory Card* on page 42.

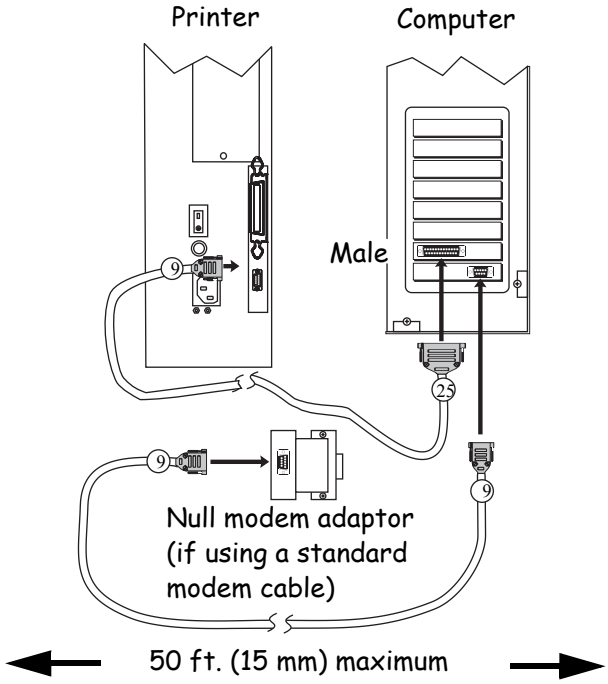
Optional Print Servers:

- ZebraNet external PrintServer II (PSII)
- PSII internal PrintServer (factory installed only)
  Enables the printer to be connected to 10Base-T Ethernet networks.

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

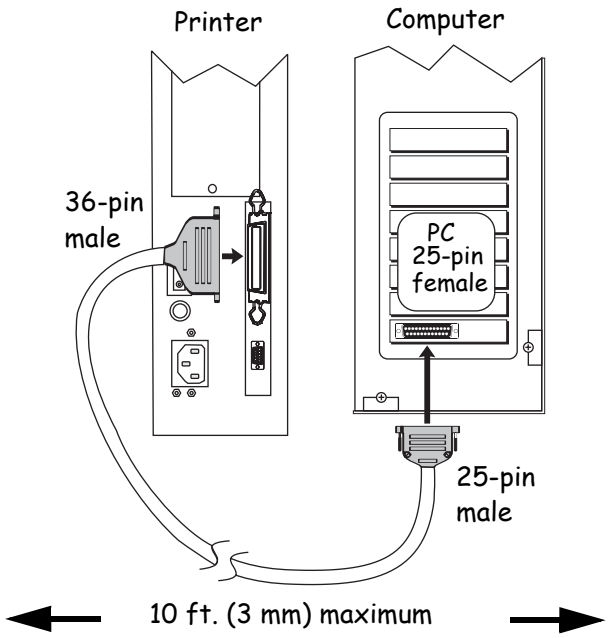
Serial Port Communicating using a serial data port (see Figure 6) requires choosing the baud rate, number of data bits, stop bits, parity, and handshake (default settings are 9600 baud, 8 data bits, 1 stop bit, no parity, and XON/XOFF). Parity only applies to data transmitted by the printer since the parity of received data is ignored. See *Serial Data Port* on page 104 to configure the communication parameters. The values selected must be the same as those used by the host equipment connected to the printer.

Figure 6 • Communicating Using a Serial Data Port



Parallel Port Communicating using the parallel port (see Figure 7) does not require special settings. The serial settings do not affect the parallel port. Refer to *Parallel Data Port* on page 108 for further information.

Figure 7 • Communicating Using a Parallel Port



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. Zebra printers comply with FCC Rules and Regulations, Part 15 for Class B equipment using fully shielded data cables. Use of unshielded cables may increase radiation above the Class B limits.

To minimize electrical noise pickup in the cable:

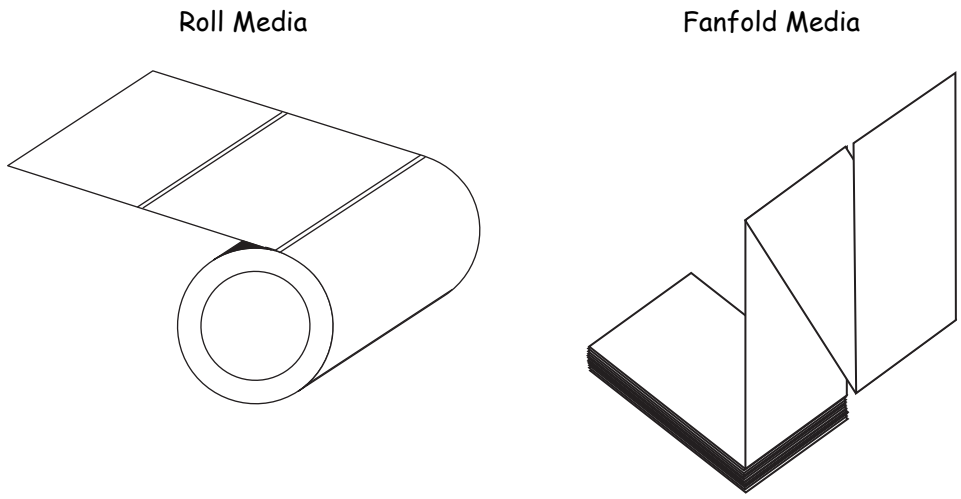
- Keep data cables as short as possible.
- Do not bundle the data cables tightly with the power cords.
- Do not tie the data cables to power wire conduits.

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

Types of Media

Your printer is capable of using various types of media. These include continuous roll and fanfold media (Figure 8) 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 8 • Roll and Fanfold 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.

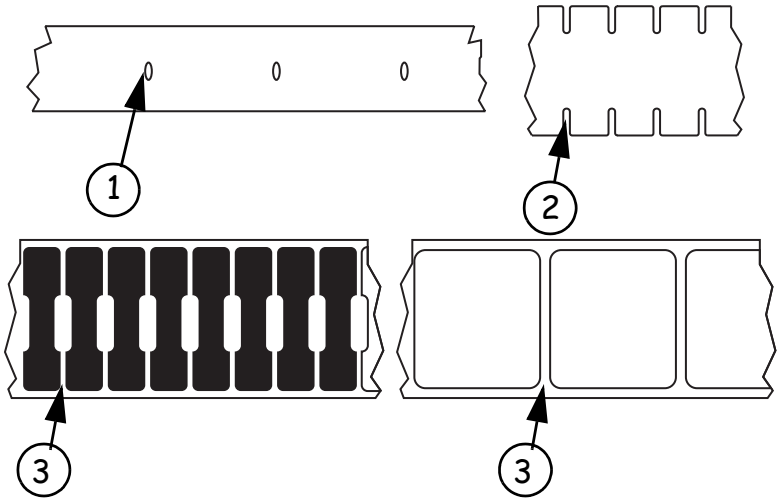
Note • Because print quality is affected by media and ribbon, printing speeds, and printer operating modes, it is very important to run tests for your applications.

Non-Continuous Web Media

Non-continuous web media refers to individual labels that are separated by a gap, notch, or hole (Figure 9). When you look at the media, you can tell where one label ends and the next one begins.

Important • Printhead life may be reduced by abrasion from exposed paper fibers when using perforated media.

Figure 9 • Non-Continuous Web Media



1	Hole
2	Notch
3	Label Gap

Continuous Media

Continuous media (Figure 10) 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 10 • Continuous Media

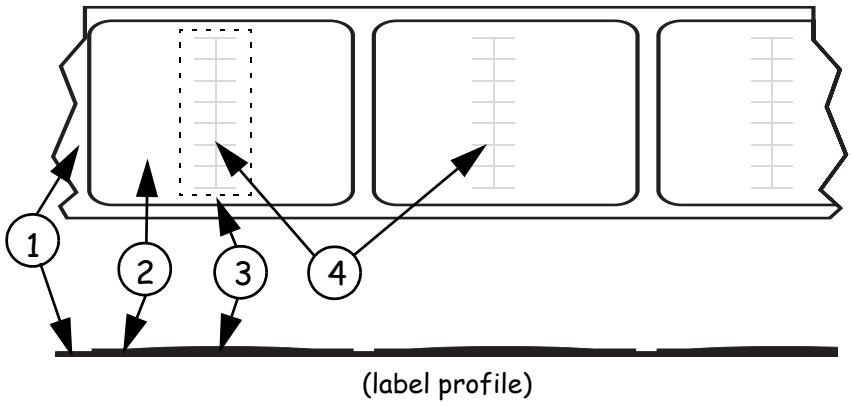
RFID “Smart” Labels

“Smart” labels are usually made from two components: media and an embedded RFID transponder (Figure 11). 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 71.

Figure 11 • 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 carrying wax or wax resin that is transferred to the media during the thermal transfer process. The media determines whether you need to use ribbon and determines the minimum width of the ribbon. Consider the following:

- **Thermal transfer** — ribbon needed.

  The ribbon 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.

  Caution • The ribbon must be as wide 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.

- **Direct thermal transfer** — no ribbon needed.

  When printing in direct thermal mode, ribbon is not used and should not be loaded in the printer.

CHAPTER 3

Printer Operation

This chapter provides instructions for loading media and ribbon.

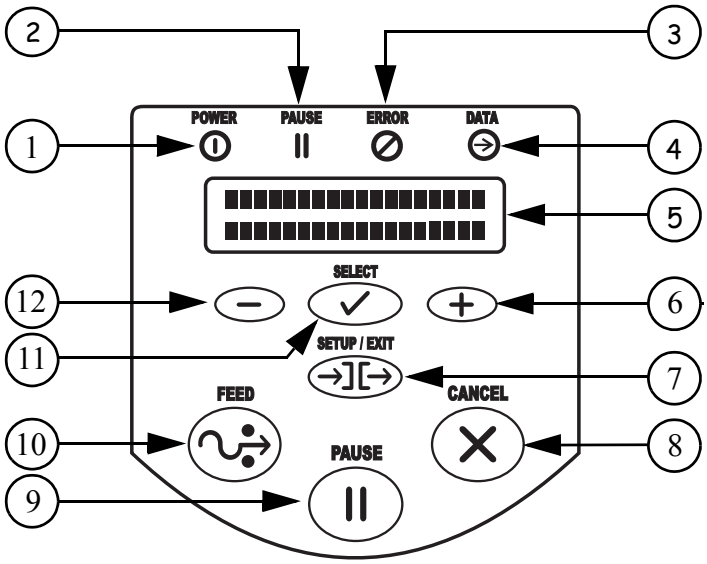
Contents

Front Panel

The front panel display shows the printer's operating status and allows you to change settings as needed to work with your media and label formats.

The front panel keys and lights are shown in Figure 12. Descriptions for each are located in Table 4 and Table 5.

Figure 12 • Front Panel



1	Power LED
2	Pause LED
3	Error LED
4	Data LED
5	LCD
6	PLUS (+) Key
7	SETUP/EXIT Key
8	CANCEL Key
9	PAUSE Key
10	FEED Key
11	SELECT Key
12	MINUS (–) Key

Front Panel Keys

Table 4 • Front Panel Keys

Key	Function
FEED	Forces the printer to feed one blank label each time the key is pressed. Printer not printing: one blank label immediately feeds. Printing: one blank label feeds after the current batch of labels is complete.
PAUSE	Starts and stops the printing process. Printer not printing: no printing occurs. (Press **PAUSE** again to resume printing.) Printing: printing stops after the current label is complete.
CANCEL	Cancels print jobs when in the pause mode. Printer not printing: the next stored label format does not print. Printing: current label completes printing and the next label format is cancelled. Press and hold for several seconds to cancel all print jobs in memory.
SETUP/EXIT	Enters and exits the configuration mode.
SELECT	Toggles the function of **PLUS** (+) and **MINUS** (–) between the Scroll and Change Modes. Press once to use **PLUS** (+) and **MINUS** (–) to change the values of the selection. Press again to use **PLUS** (+) and **MINUS** (–) to scroll through the menu items.
PLUS (+) (scroll mode)	Scrolls to the next selection.
PLUS (+) (change mode)	Increases the value. Answers yes. Prints a label (when applicable).
MINUS (–) (scroll mode)	Scrolls to the previous selection.
MINUS (–) (change mode)	Decreases the value. Selects the digit you wish to change. Answers no.

Front Panel Lights

Table 5 • Front Panel Lights

Light	Status	Indication
POWER	Off	The printer is off or no power is applied.
	On	The printer is on.
PAUSE	Off	Normal printer operation.
	On	The printer has stopped all printing operations.
	Flashing	Peel-Off Mode, the Pause light flashes when the label is available, and when initializing FLASH or PCMCIA memory.
ERROR	Off	Normal printer operation (no errors).
	Slow flashing	RIBBON IN warning, HEAD UNDER TEMP warning, or HEAD OVER TEMP error.
	Fast flashing	HEAD OPEN error.
	On	PAPER OUT or RIBBON OUT errors.
DATA	Off	Normal printer operation (no data being received or processed).
	One flash	**CANCEL** is pressed and a format is successfully cancelled.
	Slow flashing	The printer is unable to accept more data from the host.
	Fast flashing	The printer is receiving data.
	On	A partial format has been received and no subsequent data activity.

Load Roll Media

Tear-Off Mode

Tear-Off Mode is the default mode. The printer is set to this mode in the factory.

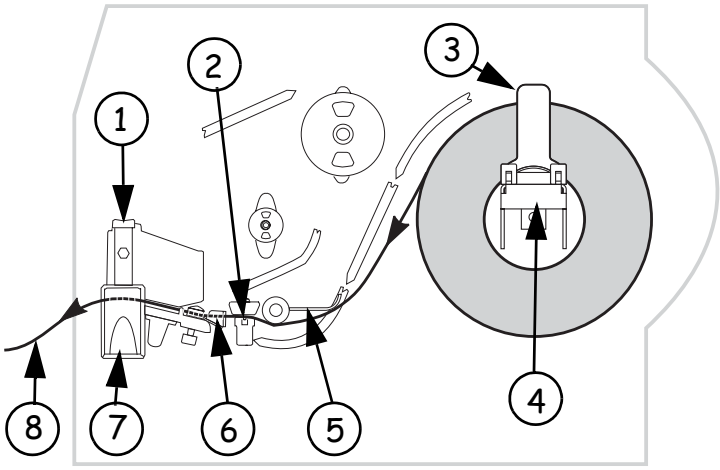
To load media in Tear-Off Mode, complete these steps:

1. Press the printhead open lever. The printhead assembly springs up.

Caution • Ensure that the printhead is fully open and engaged in the upright position. If you fail to latch the printhead, it could fall on your hand during the procedure.

2. Flip down the media supply guide.
3. Slide out the media guide as far from the printer frame as possible.
4. Place the roll of media on the media supply hanger and orient the media properly.
5. Flip up the media supply guide.
6. Slide in the media supply guide until it touches, but does not restrict, the edge of the roll.
7. Feed the media under the dancer, through the slot in the transmissive sensor, under the ribbon sensor, and out the front of the printer.
8. Ensure the media is against the back of the transmissive sensor. Slide in the media guide until it touches, but does not restrict, the edge of the label.
9. Close the printhead assembly.
10. The printer is paused (the Pause light is on), press **PAUSE** to enable printing.

Figure 13 • Tear-Off Mode



1	Printhead Assembly
2	Transmissive Sensor
3	Label Supply Guide
4	Label Supply Hanger
5	Dancer
6	Label Guide
7	Printhead Open Lever
8	Printed Label

Peel-Off Mode

This setting works only with the Peel-Off Option installed on the printer. Figure 14 shows the printer with the Peel-Off Option.

To load media in Peel-Off Mode, complete these steps:

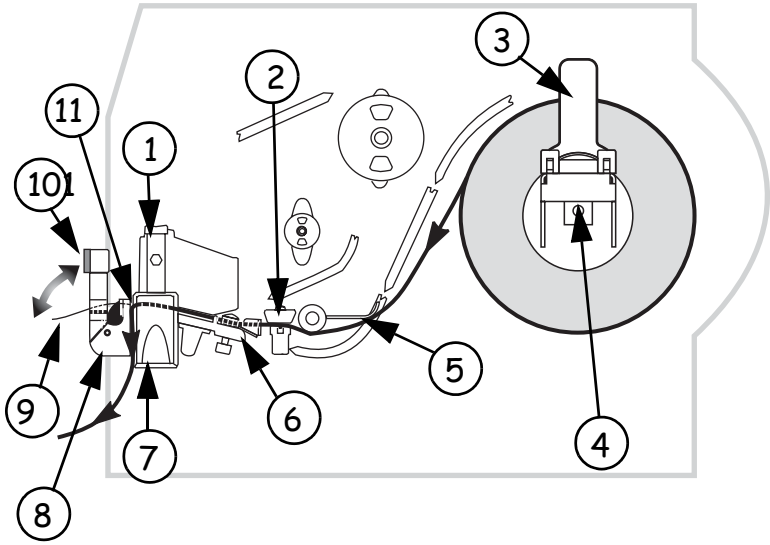
1. Press the printhead open lever. The printhead assembly springs up.

   Caution • Ensure that the printhead is fully open and engaged in the upright position. If you fail to latch the printhead, it could fall on your hand during the procedure.

2. Flip down the media supply guide.
3. Slide the media guide as far from the printer main frame as possible.
4. Place a roll of media onto the media supply hanger as shown.
5. Flip up the media supply guide.
6. Slide in the media supply guide until it just touches, but does not restrict, the edge of the media.
7. Feed the media under the dancer, through the slot in the transmissive sensor, under the ribbon sensor, and through the Peel Assembly.
8. Pull approximately 12 in. (30 mm) of media through the front of the printer.
9. Ensure the media is against the rear of the transmissive sensor. Slide in the media guide until it just touches, but does not restrict, the edge of the media.
10. Pull down the peel lever to open the peel assembly.
11. Feed the liner over the tear-off/peel-off bar and behind the peel assembly.
12. Close the printhead assembly.
13. Close the peel assembly using the peel lever.
14. The printer is paused (the Pause light is on), press **PAUSE** to enable printing.

    Peeling starts automatically. Press **FEED** to test.

Figure 14 • Peel-Off Mode



1	Printhead Assembly
2	Transmissive Sensor
3	Media Supply Guide
4	Media Supply Hanger
5	Dancer
6	Media Guide
7	Printhead Open Lever
8	Peel Assembly
9	Label
10	Peel Lever
11	Tear-Off/Peel/Off Bar

Liner Take-Up Mode

The Liner Take-up option must be installed to use this mode. The option is shown in Figure 16.

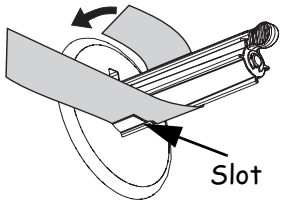
To load media in Liner Take-Up Mode, complete these steps:

1. Press the printhead open lever. The printhead assembly springs up.

   Caution • Ensure that the printhead is fully open and engaged in the upright position. If you fail to latch the printhead, it could fall on your hand during the procedure.

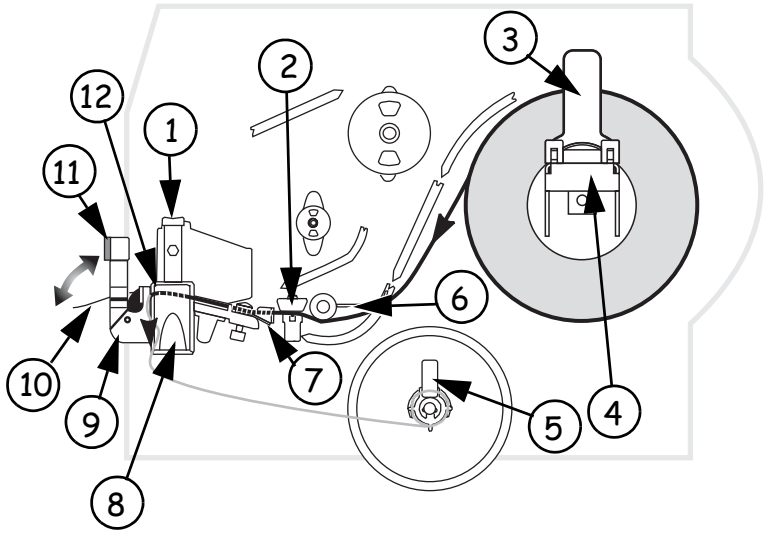
2. Flip down the media supply guide.
3. Slide the media guide as far from the maim frame as possible.
4. Place a roll of media onto the media supply hanger as shown.
5. Flip up the media supply guide.
6. Slide in the media supply guide until it just touches, but does not restrict, the edge of the media.
7. Feed the media under the dancer, through the slot in the transmissive sensor, and under the ribbon sensor.
8. Pull approximately 18 in. (500 mm) of media through the front of the printer.
9. Remove the labels from the exposed media until only liner remains.
10. Ensure the media is against the back of the transmissive sensor. Slide in the media guide until it just touches, but does not restrict, the edge of the media.
11. Pull down the peel lever to open the peel assembly.
12. Feed the media over the tear-off/peel-off bar and behind the peel assembly.
13. Close the printhead assembly.
14. Close the peel assembly.
15. Slide the liner into the slot (see Figure 15) in the spindle of the liner take-up. Ensure that the liner is resting against the back plate of the spindle assembly.

Figure 15 • Liner Take-Up Spindle



16. Turn the spindle assembly counterclockwise a few times to snug the liner.
17. If the printer is paused (the pause light is on), press **PAUSE** to enable printing. Peeling starts automatically. Press **FEED** to test.

Figure 16 • Liner Take-Up Mode

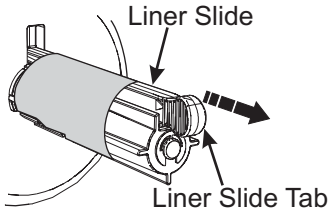


1	Printhead Assembly
2	Transmissive Sensor
3	Label Supply Guide
4	Label Supply Hanger
5	Liner Take-Up
6	Dancer
7	Label Guide
8	Printhead Open Lever
9	Peel Assembly
10	Label
11	Peel Lever
12	Tear-Off/Peel/Off Bar

Liner Removal

1. Pull the liner slide toward you (see inset) until it stops (about a third of the way down the liner take-up spindle).

Figure 17 • Removing Liner from Liner Take-Up Spindle



2. Slide the liner from the take-up spindle.

Note • The liner slide moves back in place once the liner is removed.

Rewind/Peel Mode

The Rewind option must be installed to use this mode. The option is shown in Figure 18.

To load media in Rewind/Peel Mode, complete these steps:

1. Press the printhead open lever. The printhead assembly springs up.

   Caution • Ensure that the printhead is fully open and engaged in the upright position. If you fail to latch the printhead, it could fall on your hand during the procedure.

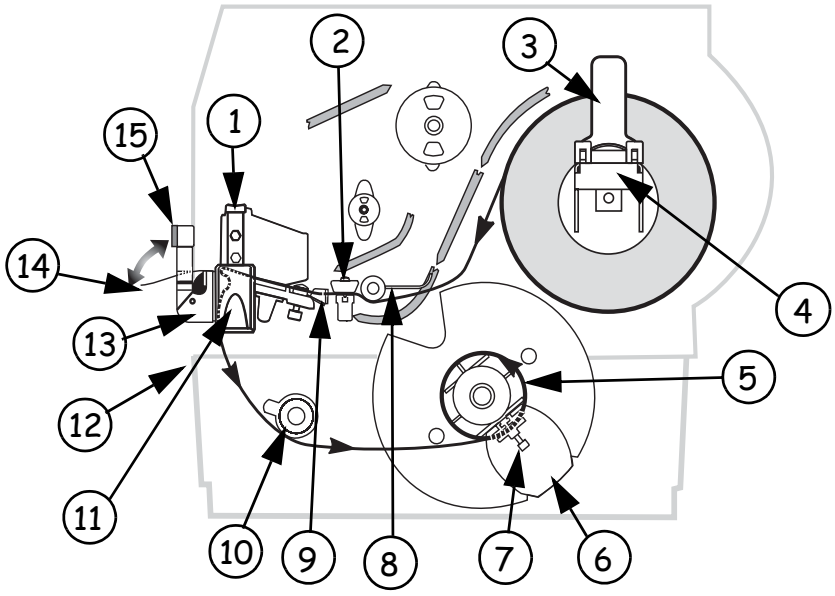
2. Flip down the media supply guide.
3. Slide the media guide as far from the main frame as possible.
4. Place the roll of labels on the media supply hanger as shown.
5. Flip up the media supply guide.
6. Slide in the media supply guide until it just touches, but does not restrict, the edge of the media.
7. Feed the labels under the dancer, through the slot in the transmissive sensor, and under the ribbon sensor.
8. Pull approximately 36 in. (900 mm) of label through the front of the printer.
9. Remove the labels from the first 18 in. (450 mm) of media.
10. Ensure the media is against the back of the transmissive sensor. Slide in the media guide until it touches, but does not restrict, the edge of the media.
11. Pull down the peel lever to open the peel assembly.
12. Feed the media over the tear-off/peel-off bar, and through the slot in the peel assembly.
13. Loosen the thumbscrew and slide out the rewind media guide to the end of the take-up spindle.
14. Slide an empty core onto the take-up spindle; wrap the liner around the core and turn the take-up spindle counterclockwise to wind up the excess liner.

    Note • The liner must be attached to the take-up spindle for the printer to operate properly. Ensure the edge of the liner is flush against the backplate of the take-up spindle.

15. Slide the rewind media guide against the liner and tighten the thumbscrew.
16. Close the printhead assembly.
17. Close the peel assembly using the peel lever.
18. If the printer is paused (the Pause light is on), press **PAUSE** to enable printing.

    Peeling starts automatically. Press **FEED** to test.

Figure 18 • Rewind/Peel Mode



1	Printhead Assembly
2	Transmissive Sensor
3	Label Supply Guide
4	Label Supply Hanger
5	Rewind Spindle
6	Rewind Label Guide
7	Thumbscrew
8	Dancer
9	Label Guide
10	Media Alignment Spindle
11	Printhead Open Lever
12	Peel Assembly
13	Label
14	Rewind Base Assembly
15	Peel Lever

Liner Removal

To remove liner from the rewind spindle, complete these steps:

1. Cut the liner between the media alignment spindle and the rewind spindle.
2. Rotate the take-up spindle counterclockwise until the rewind media guide is in the 12 o'clock position.
3. Loosen the thumbscrew and slide the rewind media guide to the end of the take-up spindle.
4. Slide the core with the liner from the take-up spindle.

Rewind Mode

The Rewind option must be installed to use this mode. The option is shown in Figure 19.

To load media in Rewind Mode, complete these steps:

1. Press the printhead open lever. The printhead assembly springs up.

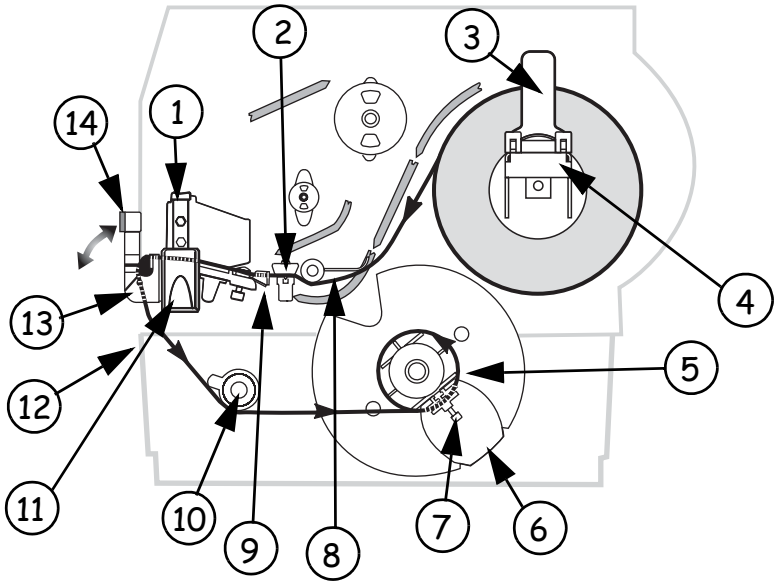
Caution • Ensure that the printhead is fully open and engaged in the upright position. If you fail to latch the printhead, it could fall on your hand during the procedure.

2. Flip down the media supply guide.
3. Slide the media guide as far from the main frame as possible.
4. Place a roll of media on the media supply hanger as shown.
5. Flip up the media supply guide.
6. Slide in the media supply guide until it just touches, but does not restrict, the edge of the media.
7. Feed the media under the dancer, through the slot in the transmissive sensor, and under the ribbon sensor.
8. Pull approximately 36 in. (900 mm) of media through the front of the printer.
9. Remove the labels from the first 18 in. (450 mm) of media.
10. Ensure the media is against the back of the transmissive sensor. Slide in the media guide until it just touches, but does not restrict, the edge of the media.
11. Feed the media over the peel assembly and through the rewind base assembly.
12. Loosen the thumbscrew and slide out the rewind media guide to the end of the take-up spindle.
13. Slide an empty core onto the take-up spindle; wrap the media around the core and turn the take-up spindle counterclockwise to wind up the excess material.

Note • The liner must be attached to the take-up spindle for the printer to operate properly. Ensure the edge of the liner is flush against the backplate of the take-up spindle.

14. Slide the rewind media guide against the media, and tighten the thumbscrew.
15. Close the printhead assembly.
16. The printer is paused (the Pause light is on), press **PAUSE** to enable printing.

Figure 19 • Rewind Mode



1	Printhead Assembly
2	Transmissive Sensor
3	Label Supply Guide
4	Label Supply Hanger
5	Rewind Spindle
6	Rewind Label Guide
7	Thumbscrew
8	Dancer
9	Label Guide
10	Media Alignment Spindle
11	Printhead Open Lever
12	Rewind Base Assembly
13	Peel Assembly
14	Peel Lever

Media Removal

To remove printed media from the rewind spindle, complete these steps:

1. Cut the media between the media alignment spindle and the rewind spindle.
2. Rotate the take-up spindle counterclockwise until the rewind media guide is in the 12 o'clock position.
3. Loosen the thumbscrew and slide out the rewind media guide to the end of the take-up spindle.
4. Slide the core with the roll of media from the take-up spindle.

Adjust Media Alignment for Rewind Option

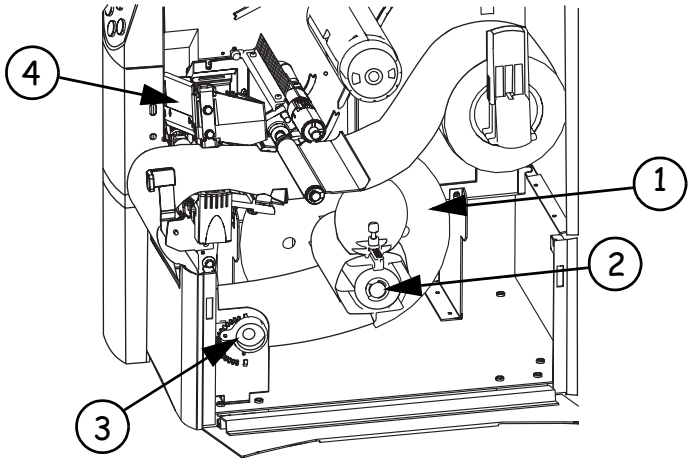
The instructions below apply only if the printer has a Rewind option. The liner should be installed flush against the backplate of the rewind spindle to prevent the media/backing from winding too loosely. See Figure 20.

Do the adjustments in the order given. Do only what is needed to solve the problem.

To adjust the Media Alignment for Rewind Mode, complete these steps:

1. Turn the adjustment dial clockwise to move the media toward the mainframe.
2. Turn the dial counter clockwise to move the media away from the mainframe.

Figure 20 • Rewind Option Adjustment Dial



1	Rewind Spindle Backplate
2	Rewind Spindle
3	Adjustment Dial
4	Printhead Assembly

Load Fanfold Media

Fanfold media feeds through either the bottom or rear access slot. See Figure 21.

To load fanfold media, complete these steps:

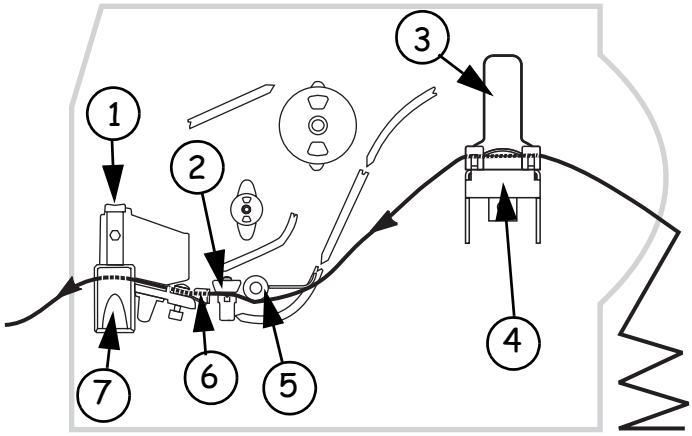
1. Press the printhead open lever. The printhead assembly springs up.

   Caution • Ensure that the printhead is fully open and engaged in the upright position. If you fail to latch the printhead, it could fall on your hand during the procedure.

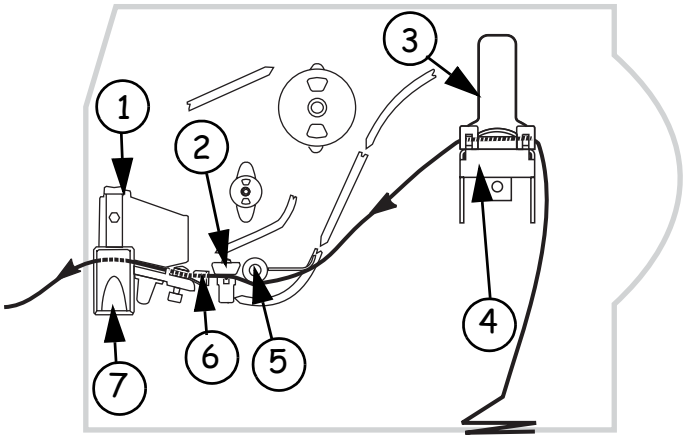
2. Flip down the media supply guide.
3. Slide the media guide as far from the main frame as possible.
4. Pass the fanfold media over the media supply hanger.
5. Flip up the media supply guide. Slide in the media supply guide until it just touches, but does not restrict, the edge of the media.
6. Thread the media under the dancer, through the slot in the transmissive sensor, under the ribbon sensor, and out the front of the printer.
7. Ensure the media is against the back of the transmissive sensor. Then, slide in the media guide until it just touches, but does not restrict, the edge of the media.
8. Close the printhead assembly.
9. Press **PAUSE**.

Figure 21 • Loading Fanfold Media

Rear Feed



Bottom Feed



1	Printhead Assembly
2	Transmissive Sensor
3	Label Supply Guide
4	Label Supply Hanger
5	Dancer
6	Label Guide
7	Printhead Open Lever

Load the Ribbon

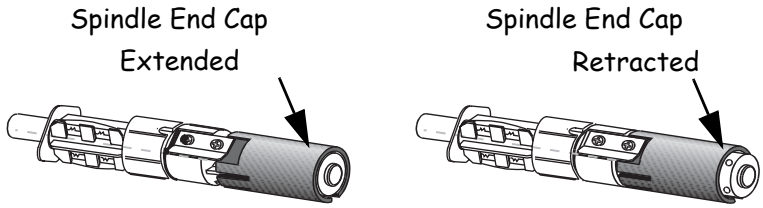
The ribbon supply spindle in your printer is a dual-tension variety. Most applications require the spindle to be in the normal position. The low tension position is recommended only when a wide ribbon is used or normal tension hampers the ribbon movement.

Note • Always use ribbon that is wider than the media. The smooth liner of the ribbon protects the printhead from wear. For direct thermal printing, do **not** load ribbon in the printer.

To load ribbon, complete these steps:

1. Set the spindle for normal or low tension.
   - To place the spindle in the **normal position**, firmly pull out the spindle end cap until it extends and clicks in place, as shown in Figure 22.
   - To place the spindle in the **low tension position**, firmly push in the end cap until it retracts and clicks in place, as shown in Figure 22.

Figure 22 • Ribbon Spindle Normal and Low Tension



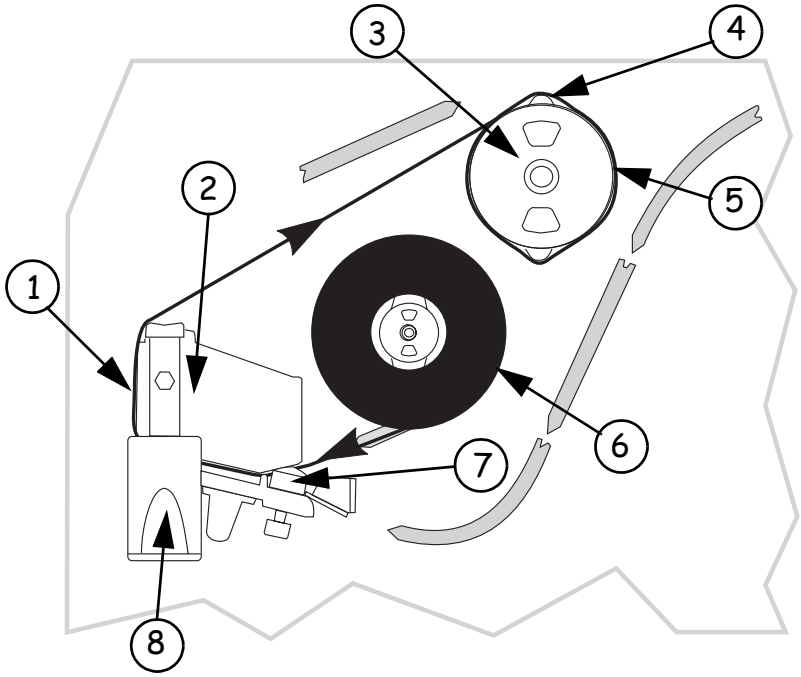
2. See Figure 23. Press the printhead open lever.

   The printhead assembly springs up.

   Caution • Ensure that the printhead is fully open and engaged in the upright position. If you fail to latch the printhead, it could fall on your hand during the procedure.

3. Orient the ribbon as shown. Push the ribbon roll completely onto the ribbon supply spindle.
4. Pull the end of the ribbon over the ribbon sensor, under the printhead assembly, and out the front of the printer.
5. Hold the ribbon snug and free of wrinkles and in line with the guide mark near the left edge of the strip plate. Close the printhead assembly.
6. Wind the ribbon clockwise onto the ribbon take-up spindle.

Figure 23 • Ribbon Path



1	Strip Plate
2	Printhead Assembly
3	Release Knob
4	Tension Blades
5	Ribbon Take-Up Spindle
6	Ribbon Supply Spindle
7	Ribbon Sensor
8	Printhead Open Lever

Remove the Ribbon

To remove used ribbon, complete these steps:

1. If the ribbon has not run out, break it between the strip plate and the ribbon take-up spindle.

   Caution • Do not cut the ribbon on the ribbon take-up spindle. This may damage the spindle.

2. While turning the ribbon take-up spindle release knob counterclockwise, squeeze the ribbon against the ribbon take-up spindle tension blades.
3. When the tension blades collapse into the ribbon take-up spindle, hold the release knob and rotate the spent ribbon toward the rear of the printer. Then, slide the ribbon off the ribbon take-up spindle.

Calibrate the Printer

Auto Calibration

The R4Mplus automatically calibrates on power up. During auto calibration, the printer determines the label length and sensor settings.

Auto calibration occurs when the printer is turned on and each time the printer recovers from an error condition. To clear an error, open and close the printhead assembly and then press **PAUSE**. The printer begins auto calibration when all errors have been cleared.

The results of the auto calibration are stored in the printer's memory and are retained even if printer power is removed. These parameters remain in effect until the next calibration is performed.

Note • If the front panel setting for MEDIA POWER UP or HEAD CLOSE are set to LENGTH, NO MOTION, or FEED, the printer starts printing without auto calibrating.

Manual Calibration

Perform a media and ribbon sensor calibration to reset the sensitivity of the sensors so the media and ribbon are detected more accurately. If you change the type of ribbon or media, your printer may operate better if this calibration is performed.

For instructions, refer to *Media and Ribbon Sensor Calibration (Manual Calibration) on page 56*.

Print a Configuration Label

Print a configuration label to test the printer setup. Do this when the printer is first installed, or when the printer cannot properly detect the top of the label.

To print a configuration label, complete these steps:

1. Turn the printer Off (**O**).
2. Press and hold **CANCEL** while turning the printer On (**I**). See Figure 2, *Front Panel Controls and LEDs, on page 3*.
3. Release **CANCEL** after the DATA light turns off (approximately five seconds).

   A configuration label prints showing the printer's currently stored parameters (similar to the label shown in Figure 24).
4. Did the configuration label print correctly?
   - If **yes**, go to *Configuration on page 43*.
   - If the configuration label did not print or if the labels are aligned improperly, review the following items in the order shown. Do only as many steps as needed to solve the printing problem.
     - Review *Types of Media on page 15* to make sure that you have the correct type of media for your application.
     - Review *Ribbon on page 18*. If you are using direct thermal media, you do not need to use ribbon. If you are using thermal media, ribbon is required for printing.
     - Review *Load Roll Media on page 23* or *Load Fanfold Media on page 34*.
     - Configure the printer according to the directions given in *Basic Configuration on page 46*.

Figure 24 • Sample Configuration Label

PRINTER CONFIGURATION

Zebra Technologies
ZTC R4MPlus-200 dpi

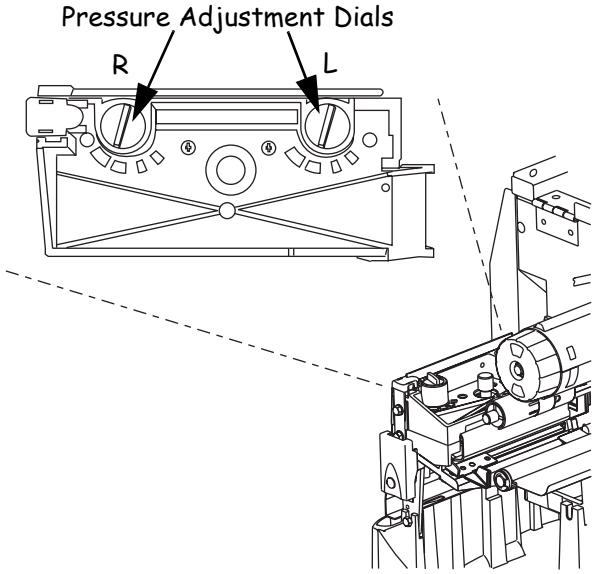
+27.....	DARKNESS
2 IPS.....	PRINT SPEED
+000.....	TEAR OFF
TEAR OFF.....	PRINT MODE
NON-CONTINUOUS.....	MEDIA TYPE
THERMAL-TRANS.....	PRINT METHOD
104 0/8 MM.....	PRINT WIDTH
1242.....	LABEL LENGTH
39.0IN 988MM.....	MAXIMUM LENGTH
BIDIRECTIONAL.....	PARALLEL COMM.
RS232.....	SERIAL COMM.
115200.....	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
NO MOTION.....	MEDIA POWER UP
NO MOTION.....	HEAD CLOSE
DEFAULT.....	BACKFEED
+000.....	LABEL TOP
+0000.....	LEFT POSITION
039.....	WEB S.
079.....	MEDIA S.
068.....	RIBBON S.
029.....	TAKE LABEL
035.....	MEDIA LED
104.....	RIBBON LED
+10.....	LCD ADJUST
DPSWFXM.....	MODES ENABLED
.....	MODES DISABLED
832 8/MM FULL.....	RESOLUTION
SP920C <-.....	FIRMWARE
V23.0.0.54.....	HARDWARE ID
CUSTOMIZED.....	CONFIGURATION
3584k.....R:	RAM
0512k.....E:	ONBOARD FLASH
NONE.....	FORMAT CONVERT
000 DISPLAY.....	P30 INTERFACE
NONE.....	OPTION
FW VERSION.....	IDLE DISPLAY
15/27/00.....	RTC DATE
00:00.....	RTC TIME
NONE.....	ZEBRA NET II
Alien : 00.00.88...	RFID VERSION
ePC Class 1.....	RFID TAG TYPE
GL12472.03JDR060127.79000.1.VH1.....	

FIRMWARE IN THIS PRINTER IS COPYRIGHTED

Adjust Printhead Pressure

See Figure 25. This adjustment may be necessary if printing is too light on one side or if thick media is used.

Figure 25 • Printhead Pressure Adjustment Dials



The pressure adjustment dials for the R4Mplus each have four possible settings designated by blocks of increasing size embossed on the print mechanism. The smallest block (fully counterclockwise) is considered position 1 and the largest block (fully clockwise) is considered position 4.

Set Printhead Pressure

Depending on which printer you have, use Table 6 to select the initial dial settings for your media.

Some media types require higher pressure to print well. For these media, increase both dials one position. If the media tends to shift to the left while printing, increase the right dial setting one position or decrease the left dial setting one position. If the media tends to shift to the right while printing, increase the left dial setting one position or decrease the right dial setting one position.

Table 6 • R4Mplus Printhead Pressure

Media Width	Left Dial	Right Dial
1 in. (25.4 mm)	3	1
2 in. (51 mm)	4	1
3 in. (76 mm)	3	2
3.5 in. and up (89 mm and up)	3	3

Install Memory Card

The printer can use Type I or Type II compliant PCMCIA memory cards.

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

Note • The PCMCIA card is hot-swappable. It can be installed while the printer is On (**I**).

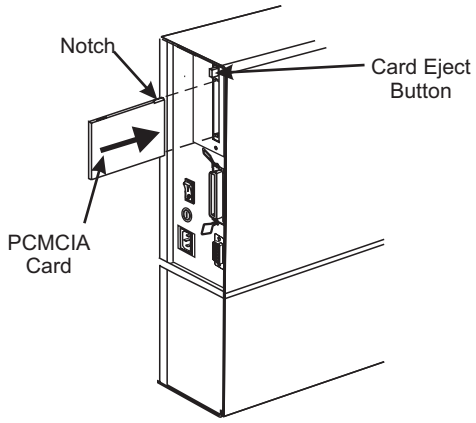
To install the PCMCIA memory card, complete these steps:

1. Remove the PCMCIA card shield from the rear of the printer.
2. Insert the PCMCIA card, with the notch UP, into the card slot as shown (see Figure 26). Insert the card far enough to cause the eject button to pop out.
3. Reinstall the PCMCIA card shield over the PCMCIA card and card slot.

   The printer is now ready to operate with the additional memory or font option.

Note • Initialization of the PCMCIA card may take a few minutes; the Pause LED flashes while the card initializes. If the card is already initialized, the Pause LED flashes only once or twice. To verify that the card has successfully initialized, print a configuration label and review it to see if the new memory card information is listed.

Figure 26 • Installing the PCMCIA Card



CHAPTER 4

Configuration

This chapter discusses detailed configuration settings and instructs you how to view or change parameters through the front panel.

Contents

Overview

After you have installed the media and ribbon and the Power-On Self Test (POST) is complete (see *Power-On Self Test* on page 95 for more information), the front panel displays PRINTER READY. Use the front panel display and the four keys directly below it to set printer parameters for your application.

Note • Printers operating on an IP network can be quickly configured using ZebraNet View (optional ZebraNet PrintServer II required). For more information, see the *PrintServer II User and Reference Guide*.

Enter Configuration Mode

To enter configuration mode, complete these steps:

1. From the front panel, press **SETUP/EXIT**:
2. Press **PLUS** (+) or **MINUS** (–) to scroll to the setting you wish to change.
3. Press **SELECT** to toggle the functionality of **PLUS** (+) and **MINUS** (–) keys.
4. Press **PLUS** (+) or **MINUS** (–) to increase or decrease the value, answer yes or no, print a label, or select the digit you wish to change.
5. Press **SELECT** again to use **PLUS** (+) and **MINUS** (–) to scroll to the desired menu item.

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

Exit Configuration Mode

You can leave configuration mode at any time.

To exit configuration mode, complete these steps:

1. From the front panel, press **SETUP/EXIT**.

   The SAVE CHANGES display appears. Press **PLUS** (+) or **MINUS** (–) to display other choices.

   - PERMANENT — Permanently saves the changes. Values are stored in the printer even when power is turned off. This is the default selection.
   - 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 for darkness and tear-off settings (if they were changed).
   - LOAD DEFAULTS — Loads factory defaults.
   - LOAD LAST SAVE — Loads values from the last permanent save.
2. Press **SELECT** to select the displayed choice.
3. Press **SETUP/EXIT** to save your choice.

Change Password-Protected Parameters

Certain parameters are password-protected by factory default. If you press **SELECT** when a password-protected parameter is displayed on the front panel, the printer prompts you for a password. If you do not know the password, press **SETUP/EXIT** to leave the prompt. You will not be allowed to modify the parameter without entering the password.

The default password is **1234**. You can change the password using the ^KP (Define Password) ZPL II command.

Password-Protect All Parameters You have the option of making all parameters password protected. Refer to *PASSWORD LEVEL** on page 67 for details.

Disable Password You can disable the password protection feature to no longer prompt you for a password by setting the password to ØØØØ 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 that is one to four digits in length, except Ø.

To enter a password, complete these steps:

1. From the front panel, enter a four-digit password at the ENTER PASSWORD prompt. **MINUS** (–) changes the selected digit position. **PLUS** (+) increases value of the selected digit.
2. After entering the password, press **SELECT**.

   The parameter that you selected is displayed, and the value may be modified if the password was entered correctly.

Note • After you enter the password correctly, you do not have to enter it again until you leave and reenter the configuration mode.

Basic Configuration

If your labels are not printing correctly, the configuration may need to be changed because the printer defaults may not reflect the options that you need. Media, ribbon, darkness, print mode, media type, sensor type, and print method all affect the way the printer is configured. This section covers how to change these basic configuration options for your printer through the printer's front panel. Review Figure 2 on page 3 to familiarize yourself with the front panel controls.

Refer to *Configuration and Calibration LCD Displays* on page 49 for more detailed information on all of the configuration options available on your printer.

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

To perform basic a configuration, complete these steps:

1. Enter the configuration mode by pressing **SETUP/EXIT**.

   DARKNESS displays.

Adjust Darkness

2. Is the printed image too dark or too light? Or does the ribbon stick to the media?
   - If **no**, press **PLUS** (+) to move to the next option: PRINT SPEED. Continue with *Adjust Image Crispness and Print Speed*.
   - If **yes**, complete the following steps:

     2.1. Press **SELECT**.

     2.2. If the labels moved forward, but the print is light or there is no print, press **PLUS** (+) to increase the darkness. If the print is too dark, or the ribbon sticks to the media, press **MINUS** (–) to decrease the darkness.

     2.3. Press **SELECT** to accept the change.

     2.4. Press **PLUS** (+) to move to the next option.

     PRINT SPEED displays. Continue with *Adjust Image Crispness and Print Speed*.

Adjust Image Crispness and Print Speed

3. Is the printed image crisp?
   - If **yes**, press **PLUS** (+) to move to the next option: TEAR-OFF. Continue with *Adjust Tear-Off Position*.
   - If the print is dark enough but the image is not crisp, slow down the print speed by completing the following steps. Print speed is given in inches per second (ips).

     3.1. Press **SELECT**.

     3.2. Press **PLUS** (+) to increase the speed or **MINUS** (–) to decrease the speed.

     3.3. Press **SELECT** to accept the changes.

     3.4. Press **PLUS** (+) to move to the next option.

     TEAR OFF displays. Continue with *Adjust Tear-Off Position*.

Adjust Tear-Off Position

The Tear-Off position defines the position of the label on the tear-off bar. When working with non-continuous labels, the inter-label gap should be on the tear bar. This setting does not apply to continuous media.

4. Are you using continuous media?
   - If **yes**, press **PLUS** (+) to move to the next option: PRINT MODE. Continue with *Select Print Mode*.
   - If **no**, continue with Step 5.
5. Does the inter-label gap line up on the tear bar?
   - If **yes**, press **PLUS** (+) to move to the next option: PRINT MODE. Continue with *Select Print Mode*.
   - If **no**, complete the following steps:
     5.1. Press **SELECT**.
     5.2. Press **PLUS** (+) to move the label forward or **MINUS** (–) to move the label backward. Repeat this until the label lines up correctly.
     5.3. Press **SELECT** to accept the changes.
     5.4. Press **PLUS** (+) to move to the next option.
     PRINT MODE displays. Continue with *Select Print Mode*.

Select Print Mode

When the wrong Print Mode is selected, the top of the label is not found by the printer. Examples of common problems include when the gaps between noncontinuous labels do not line up on the tear bar or when continuous media is not being cut at the right interval.

6. Do the labels line up or cut correctly?

   If **yes**, press **PLUS** (+) to move to the next option: MEDIA TYPE. Continue with *Select Media Type*.

   If **no**, review the media and the printer options, then complete the following steps:
   6.1. Press **SELECT**.
   6.2. Press **PLUS** (+) or **MINUS** (–) to scroll through the setting options. Stop at the setting that matches your printer options (Tear-Off, Peel-Off, or Rewind).
   6.3. Press **SELECT** to accept the change.
   6.4. Press **PLUS** (+) to move to the next option.
   MEDIA TYPE displays. Continue with *Select Media Type*.

Select Media Type

For examples of non-continuous and continuous media, see *Types of Media* on page 15.

7. Does the media type on the display match the type of media that you are using?

- If **yes**, press **PLUS** (+) to move to the next option: PRINT METHOD. Continue with *Select Print Method*.
- If your label media does not match the Media Type, complete the following steps:

  7.1. Press **SELECT**.

  7.2. Press **PLUS** (+) or **MINUS** (–) to scroll through the setting options. Stop at the setting that matches your printer options (Continuous or Noncontinuous).

  7.3. Press **SELECT** to accept the change.

  7.4. Press **PLUS** (+) to move to the next option.

  PRINT METHOD displays. Continue with *Select Print Method*.

Select Print Method

The two choices for print method are: thermal and direct. You can find out if a label is thermal or direct thermal by scratching it with your fingernail. If your nail leaves a black mark, the media is direct thermal. If it does not leave a mark, the media is thermal.

- Use Thermal Transfer if you are using ribbon with your label material.
- Use Direct Thermal if you are not using ribbon. Direct thermal label media has ink embedded in the label material that is brought out by the heat of the printhead.

8. Does the Print Method setting match your media type?

- If **yes**, continue with *Save Changes and Exit*.
- If **no**, complete the following steps:

  8.1. Press **SELECT**.

  8.2. Press **PLUS** (+) or **MINUS** (–) to scroll through the setting options. Stop at the setting that matches your printer options (Thermal Transfer or Direct Thermal).

  8.3. Press **SELECT** to accept the change.

Save Changes and Exit

9. Press **SETUP/EXIT** to leave the front panel menu.

SAVE CHANGES PERMANENT displays. For other save options, see *Exit Configuration Mode* on page 44.

10. Press **SETUP/EXIT** again.

SAVING PERMANENT displays. One or more labels may feed out, depending on your settings. The LCD displays PRINTER READY.

Configuration and Calibration LCD Displays

Table 7 covers all of the configuration options for your printer. Parameters are shown in the order in which they are displayed when you press **PLUS** (+) after entering the setup mode. Throughout this process, press **PLUS** (+) to continue to the next parameter, or press **MINUS** (–) to return to the previous parameter in the cycle. Refer to *Basic Configuration* on page 46 for information on changing just the basic print settings.

Table 7 • Printer Parameters and Other LCD Displays (Sheet 1 of 20)

Parameter/LCD Display	Action/Explanation
DARKNESS	**Adjusting Print Darkness** Set the darkness to the lowest setting that provides good print quality. Darkness set too high may cause ink to smear or the printer may burn through the ribbon. Darkness settings are dependent upon a variety of factors, including ribbon type, media, and the condition of the printhead. You may adjust the darkness for consistent high-quality printing. Darkness settings may also be changed by the driver or software settings. You may want to adjust the darkness while performing the *Feed Self Test* on page 98. Because the darkness setting takes effect immediately, you can see the results on labels that are currently printing during the test. **Default:** +10 **Range:** 0 to +30 **1.** Press **SELECT** to select the parameter. **2.** Press **PLUS** (+) to increase darkness if printing is too light or if there are voids in printed areas. **3.** Press **MINUS** (–) to decrease darkness if printing is too dark or if there is spreading or bleeding of printed areas. **4.** Press **SELECT** to accept any changes and deselect the parameter.
PRINT SPEED	**Adjusting Print Speed** Speed is measured in inches per second (ips). **Default:** 2 ips **1.** Press **SELECT** to select the parameter. **2.** Press **PLUS** (+) to increase print speed. **3.** Press **MINUS** (–) to decrease print speed. **4.** Press **SELECT** to accept any changes and deselect the parameter.

Table 7 • Printer Parameters and Other LCD Displays (Sheet 2 of 20)

Parameter/LCD Display	Action/Explanation
TEAR OFF	**Adjusting the Tear-Off Position** This parameter establishes the position of the media over the tear-off/peel-off bar after printing. The label and liner can be torn off or cut between labels. **Default:** +0 **Range:** –120 to +120 **1.** Press **SELECT** to select the parameter. **2.** Press **PLUS** (+) to increase the value. Each press adjusts the tear-off position by four dot rows. **3.** Press **MINUS** (–) to decrease the value. **4.** Press **SELECT** to accept any changes and deselect the parameter.
PRINT MODE	**Selecting Print Mode** Print mode settings tell the printer the method of media delivery that you wish to use. Be sure to select a print mode that your hardware configuration supports as some selections displayed are for optional printer features. **Default:** Tear-off **Selections:** Tear-off, cutter, peel-off, rewind **1.** Press **SELECT** to select the parameter. **2.** Press **PLUS** (+) or **MINUS** (–) to display other choices. **3.** Press **SELECT** to accept any changes and deselect the parameter.
MEDIA TYPE	**Setting Media Type** This parameter tells the printer the type of media you are using. Selecting continuous media requires that you include a label length instruction in your label format (`^LLxxxx` if you are using ZPL or ZPL II). When non-continuous media is selected, the printer feeds media to calculate label length (the distance between two detections of the inter-label gap, webbing, or alignment notch or hole). **Default:** Non-Continuous **Selections:** Non-continuous, Continuous **1.** Press **SELECT** to select the parameter. **2.** Press **PLUS** (+) or **MINUS** (–) to display other choices. **3.** Press **SELECT** to accept any changes and deselect the parameter.

Table 7 • Printer Parameters and Other LCD Displays (Sheet 3 of 20)

Parameter/LCD Display	Action/Explanation
PRINT METHOD	**Selecting Print Method** The print method parameter tells the printer the method of printing you wish to use: direct thermal (no ribbon) or thermal transfer (using thermal transfer media and ribbon). Selecting direct thermal when using thermal transfer media and ribbon creates a warning condition, but printing continues. **Default:** Thermal transfer **Selections:** Thermal transfer, direct thermal **1.** Press **SELECT** to select the parameter. **2.** Press **PLUS** (+) for the next value. **3.** Press **MINUS** (–) for the previous value. **4.** Press **SELECT** to accept any changes and deselect the parameter.
PRINT WIDTH	**Setting Print Width** Print width determines the printable area across the width of the label. **Default, Range:** The default and range of acceptable values may vary depending on what printer you have. See *Printing Specifications* on page 111 for further information about the ranges available for your model. **1.** Press **SELECT** to select the parameter. **2.** Press **PLUS** (+) to increase the value of the selected digit. **3.** Press **MINUS** (–) to move to the next digit. **4.** To change the unit of measurement, press **MINUS** (–) until the unit of measurement is active, then press **PLUS** (+) to toggle to a different unit of measure (inches, mm, or dots). **5.** Press **SELECT** to accept any changes and deselect the parameter.
MAXIMUM LENGTH	**Setting Maximum Length** Always set the value to at least 1 in. (25.4 mm) longer than the longest label to be used in the printer. **Default:** 39 in. (991 mm) for non-continuous material **1.** Press **SELECT** to select the parameter. **2.** Press **PLUS** (+) to increase the value **3.** Press **MINUS** (–) to decrease the value. **4.** Press **SELECT** to accept any changes and deselect the parameter.

Table 7 • Printer Parameters and Other LCD Displays (Sheet 4 of 20)

Parameter/LCD Display	Action/Explanation
LIST FONTS	**List Fonts** This selection is used to print a label that lists all of the fonts currently available in the printer, including standard printer fonts plus any optional fonts. Fonts may be stored in RAM, FLASH memory, font EPROMs, or font cards. **1.** Press **SELECT** to select the parameter. **2.** Press **PLUS** (+) to print a label listing all of the available fonts. **3.** Press **SELECT** to deselect the parameter.
LIST BAR CODES	**List Bar Codes** This selection is used to print a label that lists all of the bar codes currently available in the printer. **1.** Press **SELECT** to select the parameter. **2.** Press **PLUS** (+) to print a label listing all of the available bar codes. **3.** Press **SELECT** to deselect the parameter.
LIST IMAGES	**List Images** This selection is used to print a label that lists all of the images currently stored in the printer's RAM, FLASH memory, optional EPROM, or optional memory card. **1.** Press **SELECT** to select the parameter. **2.** Press **PLUS** (+) to print a label listing all of the available images. **3.** Press **SELECT** to deselect the parameter.
LIST FORMATS	**List Formats** This selection is used to print a label that lists all of the formats currently stored in the printer's RAM, FLASH memory, optional EPROM, or optional memory card. **1.** Press **SELECT** to select the parameter. **2.** Press **PLUS** (+) to print a label listing all of the available formats. **3.** Press **SELECT** to deselect the parameter.
LIST SETUP	**List Setup** This selection is used to print a label that lists the current printer configuration information. (Same label as *Cancel Self Test* on page 96.) **1.** Press **SELECT** to select the parameter. **2.** Press **PLUS** (+) to print a label listing the current printer configuration. **3.** Press **SELECT** to deselect the parameter.

Table 7 • Printer Parameters and Other LCD Displays (Sheet 5 of 20)

Parameter/LCD Display	Action/Explanation
LIST ALL	**List All** This selection is used to print a label that lists the five previous selections, as described. **1.** Press **SELECT** to select the parameter. **2.** Press **PLUS** (+) to print a label listing all of the available fonts, bar codes, images, formats, and the current printer configuration. **3.** Press **SELECT** to deselect the parameter.
FORMAT CARD A B	**Initialize Memory Card** **Caution •** Perform this operation only when it is necessary to erase all previously stored information from the optional memory card. Press **PLUS** (+) to bypass this function. **1.** Press **SELECT** to select the parameter. If your printer is set to require a password, you are prompted to enter the password. **2.** Enter the password, then press **SELECT**. **3.** Press the **PLUS** (+) to select B memory (PCMCIA card) or press **MINUS** (–) to select the A memory (internal compact flash). The front panel LCD asks ARE YOU SURE?. **4.** Press **MINUS** (–) to select No and cancel the request. The INITIALIZE CARD prompt is displayed. or Press **PLUS** (+) to select YES and begin initialization. FORMATTING CARD displays. Depending on the amount of memory in the memory card, initialization may take up to three minutes to complete. When formatting is complete, FORMAT CARD displays. **5.** Press **SELECT** to continue with the next prompt.

Table 7 • Printer Parameters and Other LCD Displays (Sheet 6 of 20)

Parameter/LCD Display	Action/Explanation
INIT FLASH MEM	**Initialize Flash Memory** **Caution •** Perform this operation only when it is necessary to erase all previously stored information from the FLASH memory. Press **PLUS** (+) to bypass this function. **1.** Press **SELECT** to select the parameter. If your printer is set to require a password, you are prompted to enter the password. **2.** Enter the password, then press **SELECT**. **3.** Press **PLUS** (+) to select YES. The display asks INITIALIZE FLASH?. **4.** Press **PLUS** (+) to select YES. The front panel LCD asks ARE YOU SURE?. **5.** Press **MINUS** (–) to select NO and cancel the request. The INITIALIZE FLASH prompt is displayed. or Press **PLUS** (+) to select YES and begin initialization. Depending on the amount of free FLASH memory, initialization may take up to one minute to complete. **6.** Press **SETUP/EXIT** followed by **SELECT**. If initialization is still in process, the front panel display flashes back and forth between the phrases CHECKING E: MEMORY and PRINTER IDLE. When initialization is complete, the printer automatically exits the configuration mode and the front panel displays PRINTER READY. **7.** Press **SELECT** to continue with the next prompt.

Table 7 • Printer Parameters and Other LCD Displays (Sheet 7 of 20)

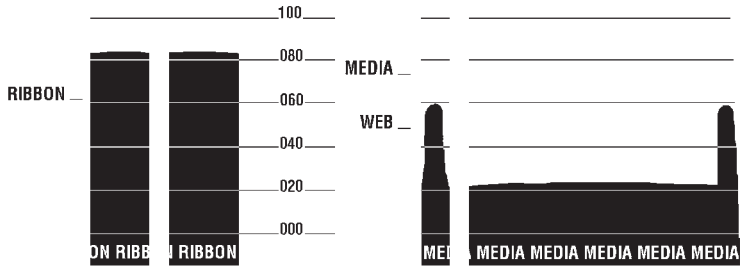
Parameter/LCD Display	Action/Explanation
SENSOR PROFILE	**Sensor Profile** The media sensor profile may be used to troubleshoot registration problems that may be caused when the media sensor detects preprinted areas on the media or experiences difficulty in determining web location. If the sensitivity of the media and/or ribbon sensors MUST be adjusted, use the manual calibration procedure. **Figure 27 • Media Sensor Profile**  1. Press **SELECT** to select the parameter. 2. Press **PLUS** (+) to print a media sensor profile. 3. Press **SELECT** to deselect the parameter.

Table 7 • Printer Parameters and Other LCD Displays (Sheet 8 of 20)

Parameter/LCD Display	Action/Explanation
MEDIA AND RIBBON	**Media and Ribbon Sensor Calibration (Manual Calibration)**

Performing the manual calibration procedure resets the sensitivity of the sensors to detect the media and ribbon you are using more accurately. With the sensors at their new sensitivity, the printer then performs the manual calibration. Changing the type of ribbon and/or media may require resetting the sensitivity of the media and ribbon sensors.

1. Press **SELECT** to display CALIBRATE.
2. Press **PLUS** (+) to start the calibration procedure.

   LOAD BACKiNG is displayed.
3. Open the printhead.
4. Remove approximately 8 in. (200 mm) of labels from the media roll, enough so that only the liner material is threaded between the media sensors when the media is loaded.
5. Press **PLUS** (+) to continue. To cancel the operation, press **MINUS** (–).

   REMOVE RiBBON is displayed.
6. Remove the ribbon (sliding it as far to the right as possible has the same effect as removing it).
7. Close the printhead.
8. Press **PLUS** (+) to continue. To cancel the operation, press **MINUS** (–).

   CALIBRATING PLEASE WAIT is displayed.

   The printer automatically adjusts the scale (gain) of the signals it receives from the media and ribbon sensors based on the specific media and ribbon combination you are using. On the sensor profile, this corresponds to moving the graph up or down to optimize the readings for your application.

   RELOAD ALL is displayed.
9. Open the printhead and pull the media forward until a label is positioned under the media sensor.
10. Move the ribbon back to its proper position.
11. Close the printhead.

    MEDIA AND RIBBON is displayed.

    Now that the scale has changed, the printer performs another calibration. During this process, the printer checks the readings for the media and ribbon based on the new scale that you established, determines the label length, and determines whether you are in Direct Thermal or Thermal Transfer Print Mode. The process is now complete. To see the new readings, print a sensor profile. See *Sensor Profile* on page 55.
12. Press **SELECT** to deselect the parameter.

Table 7 • Printer Parameters and Other LCD Displays (Sheet 9 of 20)

Parameter/LCD Display	Action/Explanation
Setting Communication Parameters (next nine parameters) Communication parameters must be set correctly for the printer to communicate with the host computer. These parameters make sure that the printer and host computer are speaking the same language. All communication parameters are password protected.	
PARALLEL COMM	**Setting Parallel Communications** **Note •** Unidirectional will not support ZebraNet two-way communications. **Default:** Bidirectional **Selections:** Bidirectional, Unidirectional **1.** Press **SELECT** to select the parameter. **2.** Press **PLUS** (+) or **MINUS** (–) to display other choices. **3.** Press **SELECT** to accept any changes and deselect the parameter.
SERIAL COMM	**Setting Serial Communications** Select the communications port that matches the one being used by the host computer. **Default:** RS-232 **Selections:** RS-232, RS-422/485, RS-485 multidrop **1.** Press **SELECT** to select the parameter. **2.** Press **PLUS** (+) or **MINUS** (–) to display other choices. **3.** Press **SELECT** to accept any changes and deselect the parameter.
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. **Default:** 9600 **Selections:** 110, 300, 600, 1200, 2400, 4800, 9600, 14400, 19200, 28800, 38400, 57600, 115200 **1.** Press **SELECT** to select the parameter. **2.** Press **PLUS** (+) or **MINUS** (–) to display other choices. **3.** Press **SELECT** to accept any changes and deselect the parameter.

Table 7 • Printer Parameters and Other LCD Displays (Sheet 10 of 20)

Parameter/LCD Display	Action/Explanation
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 •** Must be set to 8 data bits to use Code Page 850. **Default:** 7-bits **Selections:** 7-bits, 8-bits **1.** Press **SELECT** to select the parameter. **2.** Press **PLUS** (+) or **MINUS** (–) to display other choices. **3.** Press **SELECT** to accept any changes and deselect the parameter.
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. **Default:** None **Selections:** None, even, odd **1.** Press **SELECT** to select the parameter. **2.** Press **PLUS** (+) or **MINUS** (–) to display other choices. **3.** Press **SELECT** to accept any changes and deselect the parameter.
HOST HANDSHAKE	**Setting Host Handshake** The handshake protocol of the printer must match the handshake protocol of the host computer for communications to take place. Select the handshake protocol that matches the one being used by the host computer. **Default:** XON/XOFF **Selections:** XON/XOFF, DTR/DSR, RTS/CTS **1.** Press **SELECT** to select the parameter. **2.** Press **PLUS** (+) or **MINUS** (–) to display other choices. **3.** Press **SELECT** to accept any changes and deselect the parameter.

Table 7 • Printer Parameters and Other LCD Displays (Sheet 11 of 20)

Parameter/LCD Display	Action/Explanation
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 Volume I*. **Default:** None **Selections:** None, Zebra, ACK_NACK Zebra is the same as ACK_NACK except that with Zebra the response messages are sequenced. If Zebra is selected, the printer must use DTR/DSR host handshake protocol. **1.** Press **SELECT** to select the parameter. **2.** Press **PLUS** (+) or **MINUS** (–) to display other choices. **3.** Press **SELECT** to accept any changes and deselect the parameter.
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 a network, you must select a network ID number. This does not affect TCP/IP or IPX networks. **Default:** 000 **Range:** 000 to 999 **1.** Press **SELECT** to select the parameter. **2.** Press **PLUS** (+) to increase the value of the selected digit. **3.** Press **MINUS** (–) to move to the next digit. **4.** Press **SELECT** to accept any changes and deselect the parameter.

Table 7 • Printer Parameters and Other LCD Displays (Sheet 12 of 20)

Parameter/LCD Display	Action/Explanation
COMMUNICATIONS	**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 hex characters. The printer prints all characters received, including control codes, such as CR (carriage return). A sample printout is shown in Figure 35 on page 99. **Default:** Normal mode **Selections:** Normal mode, diagnostics 1. Press **SELECT** to select the parameter. 2. Press **PLUS** (+) or **MINUS** (–) to display other choices. 3. Press **SELECT** to accept any changes and deselect the parameter. **Notes on diagnostic printouts** • FE indicates a framing error • OE indicates an overrun error • PE indicates a parity error • NE indicates noise For any errors, check that your communication parameters are correct. Set the print width equal to or less than the label width used for the test. See *PRINT WIDTH* on page 51 for more information.

Table 7 • Printer Parameters and Other LCD Displays (Sheet 13 of 20)

Parameter/LCD Display	Action/Explanation
Selecting Prefix and Delimiter Characters (next three parameters) Prefix and delimiter characters are 2-digit hex values used within the ZPL/ZPL II formats sent to the printer. The printer uses the last prefix and delimiter characters sent to it, whether from a ZPL II instruction or from the front panel. **Do not** use the same hex value for the control, format, and delimiter characters. The printer needs to see different characters to function properly.	
CONTROL PREFIX	**Control Prefix Character** The printer looks for this 2-digit hex character to indicate the start of a ZPL/ZPL II control instruction. **Default:** 7E (tilde - displayed as a black square) **Range:** 00 to FF **1.** Press **SELECT** to select the parameter. **2.** Press **PLUS** (+) to increase the value of the selected digit. **3.** Press **MINUS** (–) to move to the next digit. **4.** Press **SELECT** to accept any changes and deselect the parameter.
FORMAT PREFIX	**Format Prefix Character** The printer looks for this 2-digit hex character to indicate the start of a ZPL/ZPL II format instruction. **Default:** 5E (caret) **Range:** 00 to FF **1.** Press **SELECT** to select the parameter. **2.** Press **PLUS** (+) to increase the value of the selected digit. **3.** Press **MINUS** (–) to move to the next digit. **4.** Press **SELECT** to accept any changes and deselect the parameter.
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. **Default:** 2C (comma) **Range:** 00 to FF **1.** Press **SELECT** to select the parameter. **2.** Press **PLUS** (+) to increase the value of the selected digit. **3.** Press **MINUS** (–) to move to the next digit. **4.** Press **SELECT** to accept any changes and deselect the parameter.

Table 7 • Printer Parameters and Other LCD Displays (Sheet 14 of 20)

Parameter/LCD Display	Action/Explanation
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 Volume II* for more information on the differences between ZPL and ZPL II. **Default:** ZPL II **Selections:** ZPL II, ZPL 1. Press **SELECT** to select the parameter. 2. Press **PLUS** (+) or **MINUS** (–) to display other choices. 3. Press **SELECT** to accept any changes and deselect the parameter.
MEDIA POWER UP	**Media Power Up** Establishes the action of the media when the printer is turned on. **Default:** Calibration **Selections:** • **Calibration:** Recalibrates the media and ribbon sensors. • **Length:** Determines the length of the label. • **No Motion:** Media does not move. • **Feed:** Feeds the label to the first web. 1. Press **SELECT** to select the parameter. 2. Press **PLUS** (+) or **MINUS** (–) to display other choices. 3. Press **SELECT** to accept any changes and deselect the parameter.
HEAD CLOSE	**Head Close** Determines the action of the media after the printhead has been opened and then closed. **Default:** Calibration **Selections:** • **Calibration:** Recalibrates the media and ribbon sensors. • **Length:** Determines the length of the label. • **No Motion:** Media does not move. • **Feed:** Feeds the label to the first web. 1. Press **SELECT** to select the parameter. 2. Press **PLUS** (+) or **MINUS** (–) to display other choices. 3. Press **SELECT** to accept any changes and deselect the parameter.

Table 7 • Printer Parameters and Other LCD Displays (Sheet 15 of 20)

Parameter/LCD Display	Action/Explanation
BACKFEED	**Backfeed Sequence** This parameter establishes when and how much label backfeed occurs after a label is removed or cut in the peel-off or cutter 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 Volume I*). The difference between the value entered and 100% establishes how much backfeed occurs before the next label is printed. For example, a value of 40 means that 40% of the backfeed takes place after the label is removed or cut. The remaining 60% takes place before the next label is printed. A value of "before" means that all backfeed takes place before the next label is printed. **Default:** Default (90%) **Selections:** Default, after, before, 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, off 1. Press **SELECT** to select the parameter. 2. Press **PLUS** (+) or **MINUS** (–) to display other choices. 3. Press **SELECT** to accept any changes and deselect the parameter.
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). **Default:** +0 **Range:** –120 to +120 dot rows 1. Press **SELECT** to select the parameter. 2. Press **PLUS** (+) to increase the value. The displayed value represents dots. 3. Press **MINUS** (–) to decrease the value. 4. Press **SELECT** to accept any changes and deselect the parameter.

Table 7 • Printer Parameters and Other LCD Displays (Sheet 16 of 20)

Parameter/LCD Display	Action/Explanation
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. **Default:** 0000 **Range:** –9999 to +9999 **1.** Press **SELECT** to select the parameter. **2.** Press **MINUS** (–) to move to the next position. **3.** Press **PLUS** (+) to change between +/– or to increase the value of the digit. The displayed value represents dots. For a negative value, enter the value before changing to the minus sign. **4.** Press **SELECT** to accept any changes and deselect the parameter.
WEB S. MEDIA S. RIBBON S. TAKE LABEL S. MEDIA LED RIBBON 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 **PLUS** (+) repeatedly to skip these parameters.
LCD ADJUST	**LCD Display Adjustment** This parameter allows you to adjust the brightness of your display if your display is difficult to read. **Range:** 00 to 19 **1.** Press **SELECT** to select the parameter. **2.** Press **MINUS** (–) to decrease the value (reduce brightness). **3.** Press **PLUS** (+) to increase the value (increase brightness). **4.** Press **SELECT** to accept any changes and deselect the parameter.

Table 7 • Printer Parameters and Other LCD Displays (Sheet 17 of 20)

Parameter/LCD Display	Action/Explanation
FORMAT CONVERT	**Format Convert** The Format Convert setting is used when upgrading from a printer of lower resolution to a printer of higher resolution and the user does not wish to modify their formats. **Example:** If your original formats were written for a 150 dpi printer and your new printer is 300 dpi, you would choose150-300. **Default:** None **Selections:** None, 150–300, 150–600, 200–600, 300–600 **1.** Press **SELECT** to select the parameter. **2.** Press **PLUS** (+) or **MINUS** (–) to display other choices. **3.** Press **SELECT** to accept any changes and deselect the parameter.
IDLE DISPLAY	**Idle Display** If RTC is installed, this parameter selects the LCD options for the real-time clock. **Default:** FW Version **Selections:** FW Version, MM/DD/YY 24HR, MM/DD/YY 12HR, DD/MM/YY 24HR, DD/MM/YY 12HR **1.** Press **SELECT** to select the parameter. **2.** Press **PLUS** (+) or **MINUS** (–) to display other choices. **3.** Press **SELECT** to accept any changes and deselect the parameter.
RTC DATE	**RTC Date** If RTC is installed, this parameter allows changing of the date. **1.** Press **SELECT** to select the parameter. **2.** Press **PLUS** (+) to increase the value of the selected digit. **3.** Press **MINUS** (–) to move to the next digit. **4.** Press **SELECT** to accept any changes and deselect the parameter.
RTC TIME	**RTC Time** If RTC is installed, this parameter allows changing of time. **1.** Press **SELECT** to select the parameter. **2.** Press **PLUS** (+) to increase the value of the selected digit. **3.** Press **MINUS** (–) to move to the next digit. **4.** Press **SELECT** to accept any changes and deselect the parameter.

Table 7 • Printer Parameters and Other LCD Displays (Sheet 18 of 20)

Parameter/LCD Display	Action/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 *ZebraNet Networking: PrintServer II Installation and Users Guide*. **Default:** Dynamic **Selections:** Dynamic, permanent 1. Press **SELECT** to select the parameter. 2. Press **PLUS** (+) or **MINUS** (–) to display other choices. 3. Press **SELECT** to accept any changes and deselect the parameter.
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 *ZebraNet Networking: PrintServer II Installation and Users Guide*. **Default:** All **Selections:** All, gleaning only, RARP, BOOTP, DHCP, DHCP/BOOTP 1. Press **SELECT** to select the parameter. 2. Press **PLUS** (+) or **MINUS** (–) to display other choices. 3. Press **SELECT** to accept any changes and deselect the parameter.
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 *ZebraNet Networking: PrintServer II Installation and Users Guide*. 1. Press **SELECT** to select the parameter. 2. Press **PLUS** (+) to increase the value of the selected digit. 3. Press **MINUS** (–) to move to the next digit. 4. Press **SELECT** to accept any changes and deselect the parameter.
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. **Default:** Permanent (user *must* set) **Selections:** Dynamic (user *may* set, but server can assign), permanent 1. Press **SELECT** to select the parameter. 2. Press **PLUS** (+) or **MINUS** (–) to display other choices. 3. Press **SELECT** to accept any changes and deselect the parameter.

Table 7 • Printer Parameters and Other LCD Displays (Sheet 19 of 20)

Parameter/LCD Display	Action/Explanation
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 **SELECT** to select the parameter. **2.** Press **PLUS** (+) to increase the value of the selected digit. **3.** Press **MINUS** (–) to move to the next digit. **4.** Press **SELECT** to accept any changes and deselect the parameter.
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 ERR STATUS	**RFID Error Status** If an error condition exists, a message may be displayed here.
PASSWORD LEVEL*	**Password Level** This parameter allows you to select whether certain Zebra-selected menu items (selected items) or all menu items (all items) are password protected. **Default:** Selected items **Selections:** Selected items, all items **1.** Press **SELECT** to select the parameter. **2.** Press **PLUS** (+) or **MINUS** (–) to display other choices. **3.** Press **SELECT** to accept any changes and deselect the parameter.

Table 7 • Printer Parameters and Other LCD Displays (Sheet 20 of 20)

Parameter/LCD Display	Action/Explanation
LANGUAGE	**Selecting the Display Language** This parameter allows you to change the language used on the front panel display. **Default:** English **Selections:** English, Spanish, French, German, Italian, Norwegian, Portuguese, Swedish, Danish, Spanish 2, Dutch, Finnish, Japanese **1.** Press **SELECT** to select the parameter. **2.** Press **PLUS** (+) or **MINUS** (–) to display other choices. **3.** Press **SELECT** to accept any changes and deselect the parameter.

* ZebraNet PrintServer II External or Internal option required

CHAPTER 5

RFID Guidelines

This chapter provides an overview of how RFID works, the transponders supported by this printer, and the ZPL commands used to create RFID labels.

Contents

Overview

The R4Mplus “smart” label printer-encoder serves as a dynamic tool 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 17.

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 reader 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.rfid.zebra.com/r4m.htm.

Important • It is important to use transponders that have been specifically approved for use in the R4Mplus 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.rfid.zebra.com/r4m.htm.

ZPL II Commands for RFID

Printing and encoding (writing) of "smart" labels is handled through the use of Zebra Programming Language (ZPL). The printer segments the ZPL RFID and non-RFID related commands that it receives. The printer executes the RFID commands first, followed by the others (such as the printing commands for bar codes or human-readable text). Each transponder has memory that can be written to and read from through ZPL commands.

The ZPL commands also provide for exception handling, such as setting the number of read/write retries before declaring the transponder defective. If an RFID tag is declared defective (fails to program correctly or cannot be detected) the printer ejects it and prints the word "void" across the entire label. This process will continue for the number of RFID tags specified in the `^RS` command using the same data and format, assuming that the problems persist. After the last tag is ejected, the printer removes the customer format from the print queue and proceeds with the next format (if one exists in the buffer).

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

^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

Table 8 identifies the parameters for this format.

Table 8 • ^WT Parameters

Parameters	Details
b = block number*	*Default value:* 0 *Other values:* 1 to *n*, where *n* is the maximum number of blocks for the tag.
r = number of retries	*Default value:* 0 *Other values:* 1 to 10, number of retries
m = motion	*Default value:* 0 (Feed label after writing.) *Other values:* 1 (No Feed after writing. Other ZPL may cause a feed.)
w = write protect	*Default value:* 0 (Not write protected.) *Other values:* 1 (Write protect.)
f = data format	*Default value:* 0 ASCII *Other values:* 1 Hexadecimal
v = verify valid data	*Default value:* y (Verify valid data [Hex A5A5 in the first two bytes] before writing) *Other values:* n (Do not verify)
*** Not applicable for R4Mplus.**	

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

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

^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

Table 9 identifies the parameters for this format.

Table 9 • ^RT Parameters

Parameters	Details
# = number to be assigned to the field	*Default value:* 0 *Other values:* 1 to 9999
b = starting block number*	*Default value:* 0 *Other values:* 1 to *n*, where *n* is the maximum number of blocks for the tag.
n = number of blocks to read*	*Default value:* 1 *Other values:* 2 to *n*, where *n* is 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.
f = format	*Default value:* 0 ASCII *Other values:* 1 Hexadecimal
r = number of retries	*Default value:* 0 *Other values:* 1 to 10, number of retries
m = motion	*Default value:* 0 (Feed label after writing.) *Other values:* 1 (No Feed after writing. Other ZPL may cause a feed.)
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.) *Other values:* 1 (Read even if mismatched checksum.)
*** Not applicable for R4Mplus.**	

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. It will retry the command five times, if necessary.

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

^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

Table 10 identifies the parameters for this format.

Table 10 • ^HV Parameters

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 or ^RI command. *Default value:* 0 *Other values:* 1 to 9999
n = number of bytes to be returned	*Default value:* 64 *Other values:* 1 to 256
h = header	Header (in uppercase ASCII characters) to be returned with the data. *Default value:* none *Acceptable values:* 1 to 3072 characters

^RS

RFID Setup

Note • Use care when using this command in combination with ^RT (reading tag data) or ^RI (reading the tag's unique ID number). 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 is used to set up for RFID operation. Specifically, it moves the 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

Table 11 identifies the parameters for this format.

Table 11 • ^RS Parameters

Parameters	Details
t = tag type*	*Default value:* 1 = Auto detect (automatically determine the tag type by querying the tag) *Other values:* 2 = Tag it (Texas Instruments Tagit tags) 3 = Icode (Phillips Icode tags) 4 = Pico tag (Inside Technology's) 5 = ISO15693 tag 6 = ePC tag
p = read/write position of the transponder in the vertical (Y axis) in dot rows from the top of the label	*Default value:* label length minus 8 dot rows *Other values:* 0 to label length Set to 0 (no movement) if the transponder is already in the effective area without moving the media.
v = length of void printout in vertical (Y axis) dot rows	*Default value:* label length *Other values:* 0 to label length
n = number of labels to try in case of read/encode failure	*Default value:* 3 *Other values:* 1 to 10 (number of labels)
*** Not applicable for R4Mplus.**	

Table 11 • ^RS Parameters (Continued)

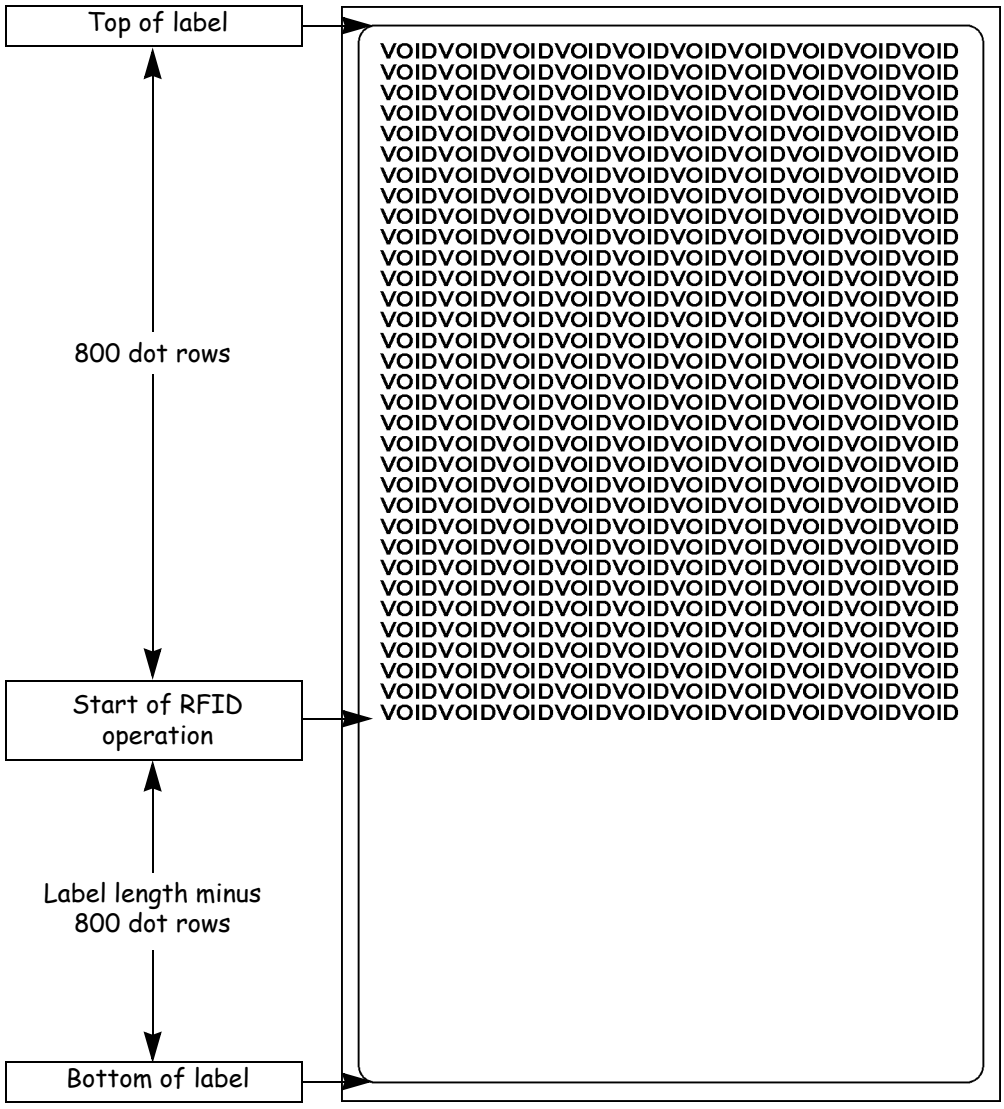
Parameters	Details
e = error handling	Send an error message to the host as an unsolicited message for each failure and set the printer in error mode. **Note •** To enable or disable the unsolicited error message, refer to the ^SX and ^SQ commands. The parameter for the RFID error in these commands is V. *Default value:* N (no action) *Other values:* P = Place printer in Pause E = Place printer in Error
*** Not applicable for R4Mplus.**	

Example • 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
```

Figure 28 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.

Figure 28 • Sample Voided Label 1

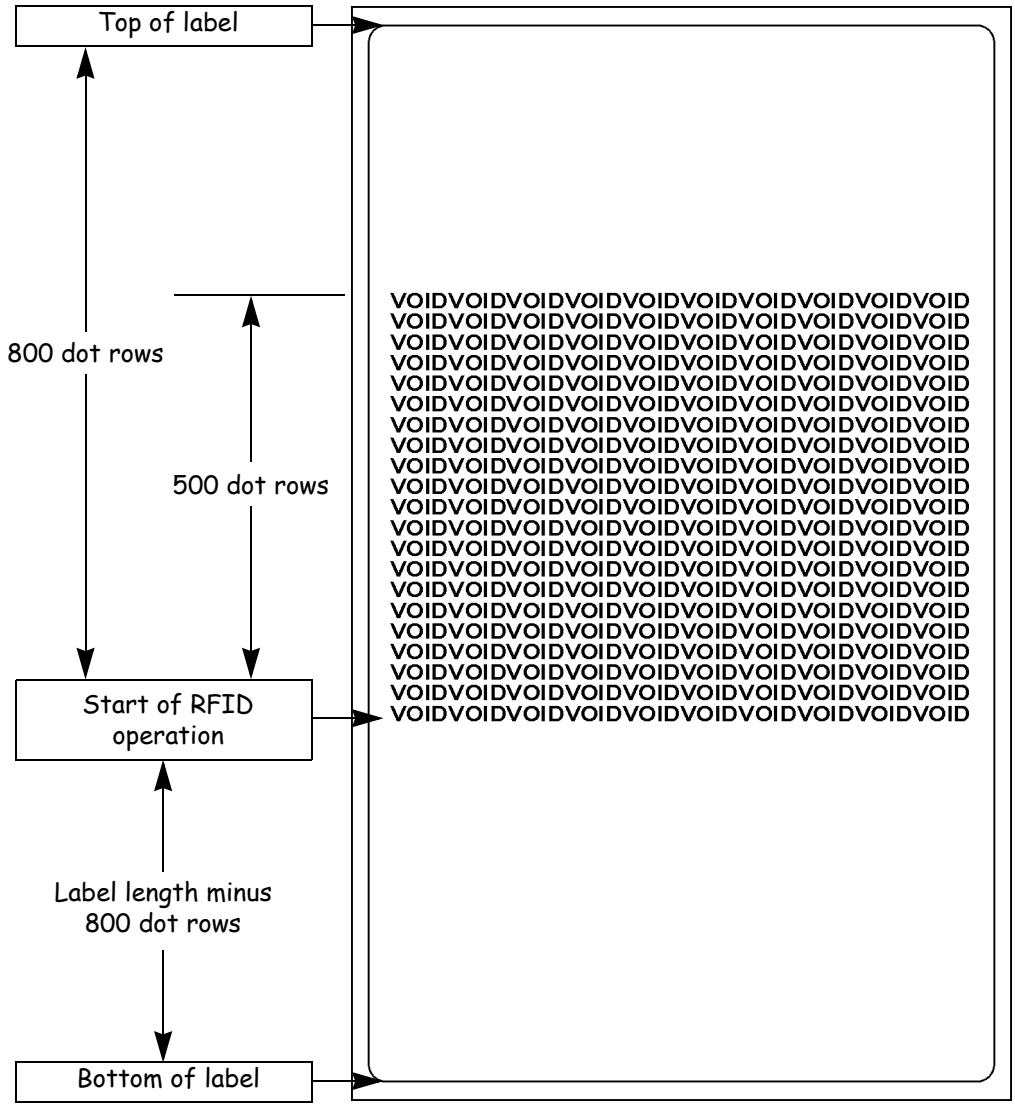


Example • This example sets the printer to move the media to 800 dots from the top of the media [or label length - 500 from the bottom (leading edge) of the media] and prints “void” 500 dots in vertical length (Y axis) in case of an error.

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

Figure 29 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 as in Figure 28.

Figure 29 • Sample Voided Label 2



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.
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 that follows.
3. Save the file in a directory for future use. Use the ".zpl" extension.
4. Copy the file to the printer.

   From the DOS command window, use the "COPY" command to send a file to the Zebra printer. For example, if your file name is **format1.zpl** then type, `COPY FORMAT 1.ZPL XXXX`, where `XXXX` is the port to which your Zebra printer is connected (for example, `LPT1`).
5. Compare your results with those shown. If your printout does not look like the one shown, confirm that the file you created is identical to the format shown, then repeat the printing procedure. If nothing prints, refer to
   - *Printer Setup* on page 7
   - *Printer Operation* on page 19
   - *Configuration* on page 43
   - *Troubleshooting* on page 89

   to make sure that your system is set up correctly.

Table 12 • 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 5.
Line 5 Print field number ‘1’ at location 100,200. ^FN1 is replaced by what we read on line 6.
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.

CHAPTER 6

Routine Care and Adjustments

This chapter discusses printer cleaning and minor adjustments.

Contents

Cleaning Procedures

Specific cleaning procedures are provided on the following pages. Table 13 shows a recommended cleaning schedule.

Table 13 • Recommended Cleaning Schedule

Area	Method	Interval
Printhead	Solvent*	**Direct Thermal Mode:** After every roll of media (or 500 feet of fanfold media). **Thermal Transfer Mode:** After every roll of ribbon or three rolls of media. These intervals are intended as guidelines only. You may have to clean more often, depending upon your application and media.
Platen roller	Solvent*	
Media sensors	Air blow	
Ribbon sensor	Air blow	
Media path	Solvent*	
Ribbon path	Solvent*	
Pinch roller. (Optional peel-off option required. Refer to *Clean the Peel-Off Assembly* on page 86.)	Solvent*	
Tear-off/peel-off bar	Solvent*	Once a month.
Take label sensor	Air blow	Once every six months.

* Zebra recommends using the Preventive Maintenance Kit, Part Number 47362 or a solution of 90% Isopropyl and 10% deionized water)

Note • Zebra Technologies Corporation will not be responsible for damage caused by the use of cleaning fluids on the R4Mplus printer.

Clean the Exterior

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

Clean the Interior

Remove any accumulated dirt and lint from the interior of the printer using a soft bristle brush or vacuum cleaner.

Clean the Printhead and Platen Roller

You can minimize printhead wear and maintain print quality with regular preventive measures.

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

- Clean your printhead frequently and use well-lubricated thermal transfer ribbons with packagings optimized to reduce friction.
- Minimize printhead pressure and burn temperature settings by optimizing the balance between the two.
- Ensure that the thermal transfer ribbon is as wide or wider than the label media to prevent exposing the elements to the more abrasive label material.

For best results, perform the following cleaning procedure after changing every roll of ribbon. Inconsistent print quality, such as voids in the bar code or graphics, may indicate a dirty printhead.

Note • The printer can remain on while you are cleaning the printhead. In this way all label formats, images, and all temporary parameter settings stored in the printer's internal memory are saved. In addition, keep the peel engaged while cleaning the platen roller (media must be unloaded to do this) to reduce the risk of bending the tear-off/peel-off bar.

To clean the printhead and platen roller, refer to Figure 30 and complete these steps:

1. Open the printhead assembly.

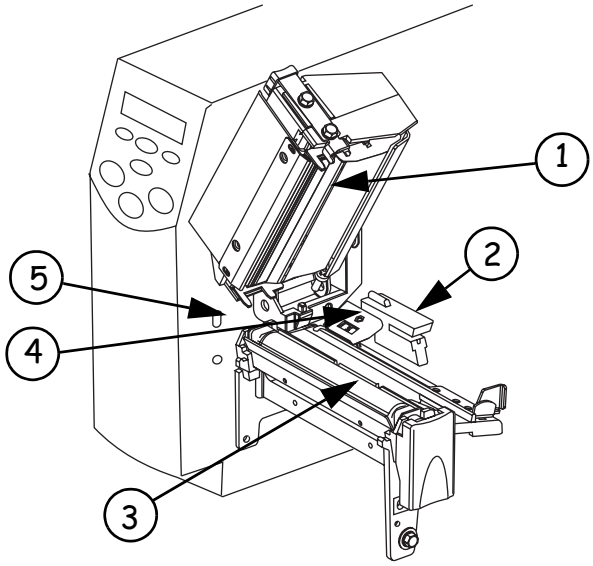
   

   Caution • Ensure that the printhead is fully open and engaged in the up position. If the printhead is not latched in the up position, it could fall on your hand during the procedure.

2. Remove the media and ribbon.
3. Use the Preventive Maintenance Kit (Zebra part number 47362) or a solution of 90% Isopropyl alcohol and 10% deionized water and swab. Wipe along the print elements from end to end. The print elements are on the brown strip just behind the chrome strip on the printhead. Allow the solvent to evaporate.
4. Manually rotate the platen roller and clean thoroughly with solvent and a pad.
5. Brush or vacuum any accumulated paper lint and dust away from the media and ribbon paths.
6. Reload media or ribbon, and close the printhead assembly.

Note • If print quality has not improved after performing this procedure, try cleaning the printhead with *Save-A-Printhead* cleaning film. This specially coated material removes contamination buildup without damaging the printhead. Call your authorized Zebra reseller for more information.

Figure 30 • Cleaning the Printhead and Platen Roller



1	Printhead Assembly
2	Transmissive Sensor
3	Platen Roller
4	Ribbon Sensor
5	Take-Label Sensor

Clean the Sensors

Brush or vacuum any accumulated paper lint and dust away from the printer sensors. Refer to Figure 30. The transmissive sensor and ribbon sensor should be cleaned on a regular basis to ensure proper operation of the printer. For printers with the peel-off, liner take-up, and/or rewind option(s) installed, clean the take label sensor as well.

Clean the Rewind Option

The Rewind option is required. Refer to Figure 31 and perform the following procedure if adhesive buildup begins to affect peel performance.

To clean the Rewind option, complete these steps:

1. Open the printhead assembly.

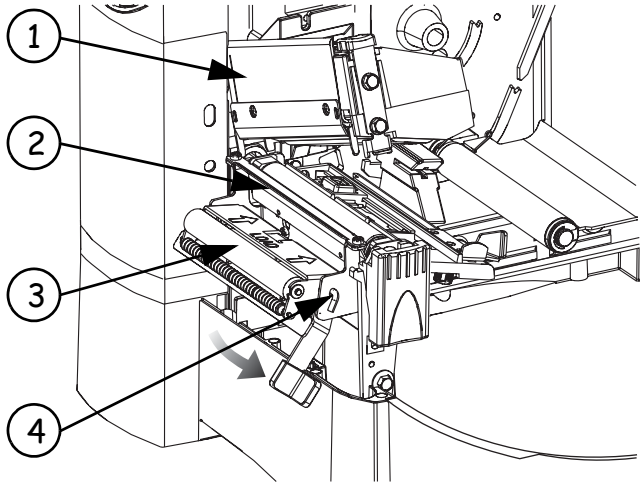
Caution • Ensure that the printhead is fully open and engaged in the up position. If the printhead is not latched in the up position, it could fall on your hand during the procedure.

2. Close the peel assembly to prevent bending the tear-off/peel-off bar during cleaning.
3. Use the Preventive Maintenance Kit (Zebra part number 47362) or a solution of 90% Isopropyl alcohol and 10% deionized water and swab to remove excess adhesive from the tear-off/peel-off bar. Allow the solvent to evaporate.

Note • Apply minimum force when cleaning the tear-off/peel-off bar. Excessive force can cause the tear-off/peel-off bar to bend, which can have a negative effect on peel performance.

4. Open the peel assembly by pivoting the module toward you.
5. Manually rotate the pinch roller and clean thoroughly with solvent and a swab. Allow the solvent to evaporate.
6. Close the peel assembly.
7. Close the printhead assembly.

Figure 31 • Cleaning the Rewind Option



1	Printhead Assembly
2	Tear-Off/Peel-Off Bar
3	Pinch Roller
4	Peel Assembly

Clean the Peel-Off Assembly

The Peel-Off option is required.

Refer to Figure 31 and perform the following procedure if adhesive buildup begins to affect peel-off performance.

1. Open the printhead assembly.

Caution • Ensure that the printhead is fully open and engaged in the up position. If the printhead is not latched in the up position, it could fall on your hand during the procedure.

2. Close the peel assembly to prevent bending the tear-off/peel-off bar during cleaning.
3. Use the Preventive Maintenance Kit (Zebra part number 47362) or a solution of 90% Isopropyl alcohol and 10% deionized water and swab to remove excess adhesive from the tear-off/peel-off bar. Allow the solvent to evaporate.
4. Open the peel assembly by pivoting the module toward you.

Note • Apply minimum force when cleaning the tear-off/peel-off bar. Excessive force can cause the tear-off/peel-off bar to bend, which could have a negative effect on peel performance.

5. Manually rotate the pinch roller and clean thoroughly with solvent and a swab.
6. Close the peel assembly.

Note • When cleaning the tear-off/peel-off bar or the pinch roller, remove excess solvent with a pad to ensure the solvent has dried before printing.

7. Close the printhead assembly.

Lubrication

No lubrication is needed for this printer.

Caution • Some commercially available lubricants will damage the finish and the mechanical parts if used.

Fuse Replacement

A user-replaceable AC power fuse is located just below the AC power switch at the rear of the printer. The replacement fuse is a 5 × 20 mm fast blow style rated at 5 Amp/250 VAC.

Caution • Before replacing the fuse, turn off the AC power switch and unplug the AC power cord.

To replace the fuse, complete these steps:

1. To replace the fuse, insert the tip of a flat blade screwdriver into the slot in the end of the fuse holder end cap.
2. Press in slightly on the end cap and turn the screwdriver slightly counter clockwise. This disengages the end cap from the fuse holder and permits removal of the fuse.
3. To install a new fuse, remove the old fuse and insert the new fuse into the fuse holder.
4. Push the end cap in slightly, then insert the tip of a flat blade screwdriver into the slot in the end cap and turn clockwise to engage it.


Zebra

CHAPTER 7

Troubleshooting

This chapter discusses typical problems and their probable solutions.

Content

LCD Error Conditions and Warnings

The LCD displays error condition messages and warnings if the printer detects a problem. The messages, along with their causes and solutions, are listed in Table 14.

Table 14 • Error Conditions and Warnings

Error	Potential Problem	Recommended Solution
RIBBON OUT	In thermal transfer mode, the ribbon is not loaded *or* loaded incorrectly.	Load the ribbon correctly. See *Load the Ribbon* on page 36.
	In thermal transfer mode, the ribbon sensor is not sensing correctly loaded ribbon.	Perform the media and ribbon sensor calibration (see *Media and Ribbon Sensor Calibration (Manual Calibration)* on page 56).
RIBBON IN	In direct thermal mode, when ribbon is not used:	Put the printer in direct thermal mode via the front panel and remove ribbon.
		Ensure that the printer driver or software settings are correctly set.
PAPER OUT	The media is not loaded *or* loaded incorrectly.	Reload the media. See *Load Roll Media* on page 23.
	The printer is set for non-continuous media, but continuous media is loaded.	Either load the correct media or set the printer for the correct media type via the front panel.
		Ensure that the printer driver or software settings are correctly set.
		Calibrate the printer (see *Media and Ribbon Sensor Calibration (Manual Calibration)* on page 56).
	The incorrect media sensor is being used.	Via the front panel, locate the SENSOR SELECT menu item (page 53) and manually select the correct sensing method.

Table 14 • Error Conditions and Warnings (Continued)

Error	Potential Problem	Recommended Solution
HEAD OPEN	The printhead is not fully closed.	Close the printhead.
	The ribbon is loaded incorrectly; it is covering the head open sensor.	Correctly align the ribbon with the guide mark on the strip plate before closing the printhead assembly.
	Print method is incorrectly set.	Via the front panel, locate the PRINT METHOD menu item (page 51) and select thermal transfer mode.
		Ensure that the printer driver and/or software settings are correctly set.
	The ribbon is loaded.	Remove the ribbon and set the printer to direct thermal mode. See *PRINT MODE* on page 50.
		Ensure that the printer driver and/or software settings are correctly set.
HEAD OVER TEMP	 **Caution •** The printhead is hot and can cause severe burns. Allow the printhead to cool.	
	The printhead is over temperature.	Allow the printer to cool. Printing automatically resumes when the printhead elements cool to an acceptable operating temperature.
HEAD UNDER TEMP	 **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.
		The environment may be too cold for proper printing. Relocate the printer to a warmer area.
OUT OF MEMORY*	*There is not enough memory to perform the function shown on the second line of the error message.	Insufficient DRAM for the label length, downloaded fonts/graphics, and images.
		Ensure that the device, such as FLASH memory or PCMCIA card, is installed and not write protected or full.
		Ensure that the data is not directed to a device that is not installed or available.

Print Quality Problems

Table 15 • Print Quality Problems and Solutions

Issue	Potential Problem	Recommended Solution
General print quality issues	You are using an incorrect media and ribbon combination for your application.	Consult your authorized reseller/ distributor for information and advice.
	The printer is set at an excessive print speed to achieve optimal quality.	For optimal print quality, set the print speed to a lower setting via ZPL II, the driver, software, or front panel.
	The printer is set at an excessive darkness level to achieve optimal quality.	For optimal print quality, set the darkness level to a lower setting via the front panel, the driver, or the software.
	The printhead is dirty.	Clean the printhead according to the instructions in *Clean the Printhead and Platen Roller* on page 83.
	There is light printing (or no printing) on the left or right side of the label *or* the printed image is not sharp.	The pressure adjustment dials need to be adjusted. Follow the printhead pressure adjustment instructions on *Set Printhead Pressure* on page 41.
Gray lines on blank labels with no consistent pattern	The printhead is dirty.	Clean the printhead according to the instructions in *Clean the Printhead and Platen Roller* on page 83.
Light, consistent vertical lines running through all labels	The printhead or platen roller is dirty.	Clean the printhead, platen roller, or both according to the instructions in *Clean the Printhead and Platen Roller* on page 83.
Intermittent creases on the left and right edges of the label	There is too much pressure on the printhead.	Reduce the printhead pressure. See *Set Printhead Pressure* on page 41.
Wrinkled ribbon	The ribbon is not loaded correctly.	Load the ribbon correctly. See *Load the Ribbon* on page 36.
	The darkness setting is incorrect.	Set the darkness to the lowest possible setting for good print quality. See *DARKNESS* on page 49.
	Incorrect printhead pressure or balance.	Set the pressure to the minimum required for good print quality. See *Set Printhead Pressure* on page 41.
	The media is not feeding correctly. It is walking from side to side.	Make sure that the media guide and media supply guide touch the edge of the media.

Calibration Problems

Table 16 • Calibration Problems and Solutions

Problem	Recommended Solution
Loss of printing registration on labels. Excessive vertical drift in top-of-form registration.	Ensure that the media guides are properly positioned.
	Set the printer for the correct media type. See *MEDIA TYPE* on page 50.
	Via the front panel, locate the SENSOR SELECT menu item (*SENSOR SELECT* on page 53) and manually select the correct sensing method.
	Reload the media.
	Clean the platen roller according to the instructions in *Clean the Printhead and Platen Roller* on page 83.
Auto Calibrate failed.	Perform a manual calibration (see *Media and Ribbon Sensor Calibration (Manual Calibration)* on page 56).
	Reload the media.

Communication Problems

Table 17 • Communication Problems and Solutions

Issue	Potential Problem	Recommended Solution
The printer does not respond to label requests. The Data light does not flash.	The communication parameters are incorrect.	Check the printer driver or software communications settings.
		Confirm that you are using the correct communication cable. See *Cable Requirements* on page 14.
		Using the front panel, check the protocol setting. It should be set to the default none. See *PROTOCOL* on page 59.
		Ensure that the correct driver is being used.
Several labels print, then the printer skips, misplaces, misses, or distorts the image on the label after a label is sent to the printer.	The host is set to EPP parallel communications.	Change the settings on the computer host to standard parallel communications.
	The serial communication settings are incorrect.	Standard RS-232 cables are appropriate for lengths under 50 ft. (15.2 m); RS-422 and RS-485 cables allow serial transmission up to 4000 ft.(1.2 km). Check cable length and shielding, and confirm the appropriate RS-232, RS-422, or RS-485 setting is being used.
		Check the printer driver or software communications settings.
A label format was sent to the printer but 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 *Selecting Prefix and Delimiter Characters (next three parameters)* on page 61.
	Incorrect data is being sent to the printer.	Check the communication settings on the computer. Ensure they match the printer settings.

Printer Diagnostics

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 printer On (**I**). Press the key(s) until the DATA light turns off (approximately five seconds). When the Power-On Self Test is complete, the selected self test starts automatically.

Note • When performing self tests, avoid sending a label format to the printer. In the case of a remote host, disconnect all data interface cables from the printer.

- When cancelling a self test prior to its actual completion, always turn the printer Off (**O**) and then back On (**I**) to reset the printer.
- When performing these self tests while in the Peel-Off Mode, you must remove the labels as they become available.
- If your media is not wide enough or long enough, unexpected or undesired results may occur. Ensure that your print width is set correctly for the media you are using before you run any self tests, otherwise the test may print on the platen roller. See *PRINT WIDTH* on page 51 for information on setting the print width.

Power-On Self Test

A Power-On Self Test (POST) is performed automatically each time the printer is turned on. During this test sequence, the front panel lights and liquid crystal display (LCD) monitor the progress of the POST. If the printer fails any of these tests, the word FAILED is display. If this occurs, notify an authorized Zebra reseller.

Cancel Self Test

This self test prints a listing of the configuration parameters currently stored in the printer's memory. See Figure 32. Depending on the options ordered, your label may look different.

Figure 32 • Sample Configuration Label

The configuration shown on the label may be changed either temporarily (for specific label formats or ribbon and label stock) or permanently (by saving the new parameters in memory). See *Basic Configuration* on page 46 for further information about the configuration procedure.

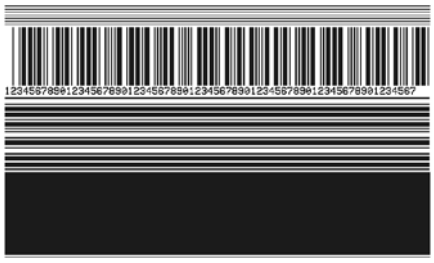
To perform the Cancel Self Test, complete these steps:

1. Turn the printer Off (**O**).
2. Press and hold **CANCEL** while turning the printer On (**I**).
3. Release **CANCEL** after the DATA light turns off (approximately five seconds).

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 in Figure 33.

Figure 33 • Pause Test Label



To perform the Pause Self Test, complete these steps:

1. Turn the printer Off (**O**).
2. Press and hold **PAUSE** while turning the printer On (**I**).
3. Release **PAUSE** after the DATA light turns off (approximately five seconds).
   - The initial self test prints 15 labels at 2 in. (51 mm) per second, then automatically pauses the printer. When **PAUSE** is pressed, an additional 15 labels print.
   - Pressing **CANCEL** while the printer is paused alters the self test. When **PAUSE** is pressed, the printer prints 15 labels at 6 in. (152 mm) per second.
   - Pressing **CANCEL** again while the printer is paused alters the self test again. When **PAUSE** is pressed, the printer prints 50 labels at 2 in. (51 mm) per second.
   - Pressing **CANCEL** again while the printer is paused alters the self test a third time. When **PAUSE** is pressed, the printer prints 50 labels at 6 in. (152 mm) per second.
   - Pressing **CANCEL** again while the printer is paused alters the self test a fourth time. When **PAUSE** is pressed, the printer prints 15 labels at the printer's maximum speed.
   - To exit this self test at any time, press and hold **CANCEL**.

Feed Self Test

See Figure 34.

Figure 34 • Feed Self Test Label

To perform the Feed Self Test, complete these steps:

1. Turn the printer Off (**O**).
2. Press and hold **FEED** while turning the printer On (**I**).
3. Release **FEED** after the DATA light turns off (approximately five seconds).

The Feed Self Test prints out at various darkness settings above and below that of the darkness value shown on the configuration label. Examine these labels and determine which one has the best darkness setting for your application. This value can be entered into the printer by setting the darkness during the configuration procedure. See *Basic Configuration* on page 46 for more information.

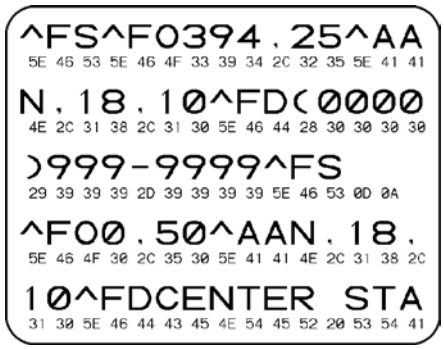
The value printed on that label is added to (plus) or subtracted from (minus) the darkness value specified on the configuration label. The resulting numeric value (0 to 30) is the best darkness value for that specific media and ribbon combination.

Communications Diagnostics Test

This test is controlled from the front panel display. A typical printout from this test is shown in Figure 35. Turn the printer Off (**O**) to exit this self test.

Note • This label is inverted when printed (prints upside down).

Figure 35 • Communications Diagnostics Test Printout



RFID Test

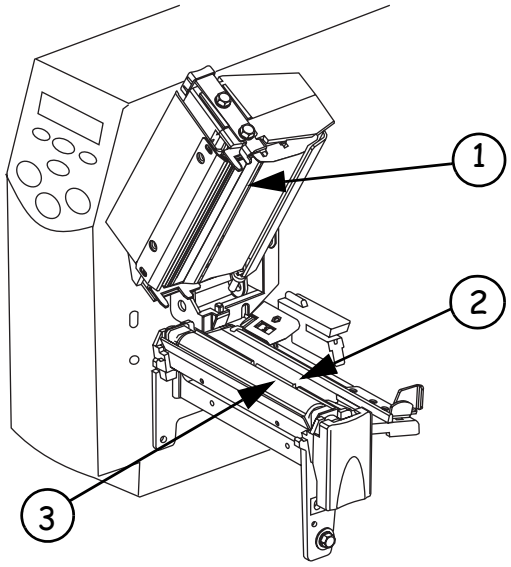
The RFID test is controlled from the front panel display (see *RFID Test* on page 67). If the printer fails the test, the front panel displays an error message.

You have the option of running the RFID test in two ways: quick or slow. 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 and displays the tests on the LCD as it runs through them.

To perform the RFID Test, complete these steps:

1. See Figure 36. Place an RFID label in the printer so the embedded transponder is over the open area behind the platen roller (no movement occurs with the test).

Figure 36 • Label Placement for RFID Test



1	Printhead Assembly
2	Open Area
3	Platen Roller

2. From the front panel, press **SETUP/EXIT**.
3. Press **PLUS** (+) or **MINUS** (–) until you reach RFID TEST.
4. Press **SELECT** to select the parameter.
5. Press **MINUS** (–) to select QUICK.
   OR
   Press **PLUS** (+) to select SLOW.
   - For the quick test, the results are PASSED and FAILED. Press **PLUS** (+) to continue.
   - For the slow test, a pass result returns you to the RFID Test menu item. A failed result returns the message WRITE ERROR. Press **PLUS** (+) to continue.
6. Press **SELECT** to deselect the parameter.

Loading Factory Defaults

Use care when loading defaults. You will need to reload all settings that you changed manually.

To load the factory defaults, complete these steps:

1. Press **SETUP/EXIT** two times.
2. Use **PLUS** (+) or **MINUS** (–) to scroll through the SAVE CHANGES choices.
3. When LOAD DEFAULTS displays, press **SETUP/EXIT**.


Zebra

APPENDIX A

Data Connections

This appendix provides details about the serial port and parallel port data connections.

Content

Serial Data Port

Hardware Control Signal Descriptions

For all RS-232 input and output signals, the R4Mplus printer follows both the Electronics Industries Association (EIA) RS-232 and the Consultative Committee for International Telegraph and Telephone (CCITT) V.24 standard signal level specifications.

When DTR/DSR handshaking is selected, the Data Terminal Ready (DTR) control signal output from the printer controls when the host computer may send data. DTR ACTIVE (positive voltage) permits the host to send data. When the printer places DTR in the INACTIVE (negative voltage) state, the host must not send data.

Note • When XON/XOFF handshaking is selected, data flow is controlled by the ASCII Control Codes DC1 (XON) and DC3 (XOFF). The DTR Control lead has no effect.

Request to send (RTS) is a control signal from the printer that is connected to the clear to send (CTS) input at the host computer. RTS is always active (positive voltage) when the printer is on.

RS-232 Serial Data Port

The connection for this standard interface is made through the female DB-9 connector on the rear panel. A DB-9 to DB-25 interface module is required for all RS-232 connections through a DB-25 cable (see page 106 for details).

For all RS-232 input and output signals, the printer follows both the Electronics Industries Association's (EIA) RS-232 specifications and the Consultative Committee for International Telegraph and Telephone (CCITT) V.24 standard signal level specifications.

Table 18 shows the pin configuration and function of the rear panel serial data connector on the printer.

Table 18 • Serial Data Connector Pin Configuration

Pin Number	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

Table 18 • Serial Data Connector Pin Configuration (Continued)

Pin Number	Name	Description
7	RTS	Request to send—output from printer
8	CTS	Clear to send—input to printer
*9	+5 V DC	+5 VDC

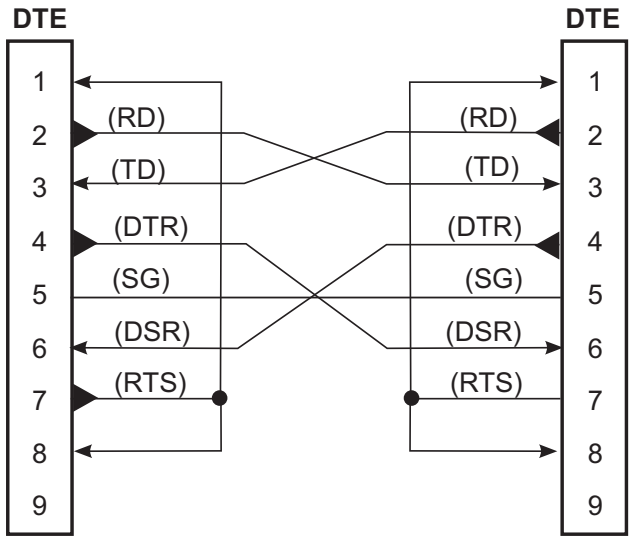
* This pin is also available as a +5 VDC power source at 750 mA. To enable this capability, a jumper on the computer's main logic board needs to be installed on JP1, pins 2 and 3.

Note • An interface module is required for RS-422/RS-485 interface support (refer to page 107).

RS-232 Interface Connections

The printer is configured as Data Terminal Equipment (DTE). Figure 37 shows the internal connections of the printer's RS-232 connector.

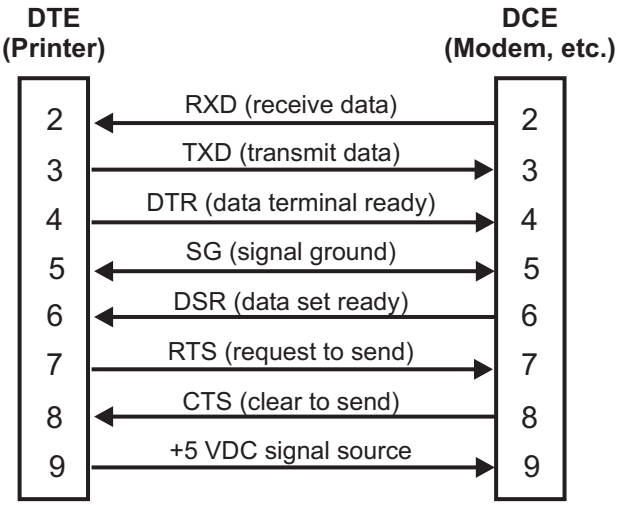
Figure 37 • RS-232 Internal Connections



Note • You must use a a null modem (crossover) cable to connect the printer to a computer or any other DTE devices.

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 38 illustrates the connections required for this cable.

Figure 38 • RS-232 to DCE Internal Connections



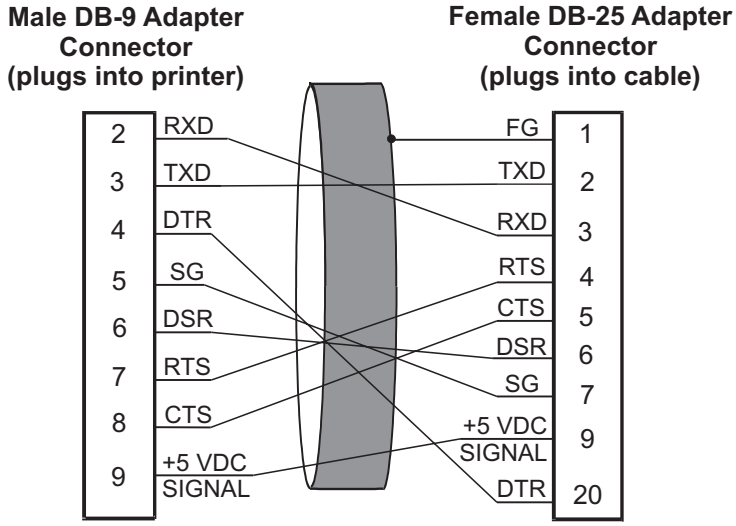
NOTE • Pin 1 is unused and unterminated at the printer.

RS-232 Interconnections Using a DB-25 Cable

To connect the printer's RS-232 DB-9 interface to a DB-25 connector, an interface adapter is required (Zebra part number 33138). A generic DB-25 adapter may also be used, however, the +5 VDC signal source would not be passed through. Figure 39 shows the connections required for the DB-9 to DB-25 interface.

Note • You must use a a null modem (crossover) cable to connect the printer to a computer or any other DTE devices.

Figure 39 • DB-9 to DB-25 Internal Connections



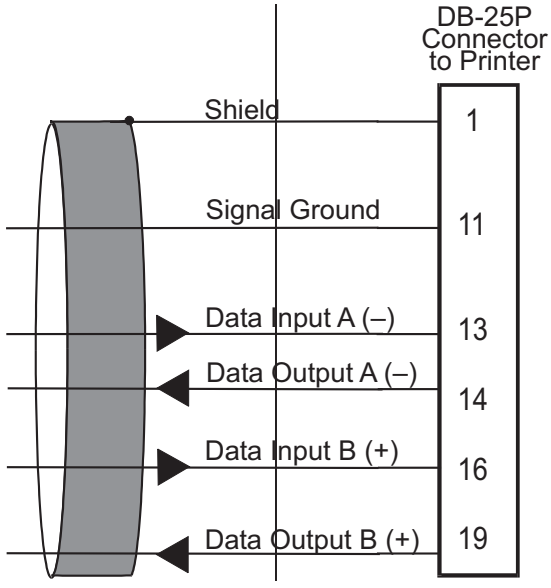
Note • Pin 1 of DB-9 connector is unused and unterminated.

RS-422/RS-485 Interconnections

Note • A jumper on the computer's main logic board needs to be installed on JP1, Pins 2 and 3, for the RS-422/RS-485 interface adapter to function properly.

To connect the printer's RS-232 DB-9 interface to a host computer through an RS-422 or an RS-485 interface, an interface adapter is required (Zebra part number 33130). Figure 40 shows the required cable wiring for interconnecting to the interface adapter's DB-25 female connector.

Figure 40 • RS-422 and RS-485 Adapter Internal Connections



Parallel Data Port

The 8-bit parallel data interface supports IEEE 1284 bidirectional parallel communications in nibble mode. The parallel interface provides a means of communication that is typically faster than the previously mentioned serial interface methods. In this method, the bits of data that make up a character are sent all at one time over several wires in the cable, one bit per wire.

Parallel Cabling Requirements

An IEEE-1284 compatible bi-directional parallel data cable is required when this communication method is used. The required cable must have a standard 36-pin parallel connector on one end that is plugged into the mating connector located at the rear of the printer. The other end of the cable connects to the printer connector at the host computer. Port selection for status information is determined each time the printer is turned on.

Parallel Port Interconnections

Table 19 shows the pin configuration and function of a standard computer-to-printer parallel cable.

Table 19 • Parallel Cable Pin Configuration

36-Pin Connectors	Description
1	nStrobe/HostClk
2 to 9	Data Bits 1 to 8
10	nACK/PtrClk
11	Busy/PtrBusy
12	PError/ACKDataReq
13	Select/Xflag
14	nAutoFd/HostBusy
15	Not used
16 and 17	Ground
18	+5V @ 750 mA The maximum current draw may be limited by option configuration.
19 to 30	Ground
31	nInit
32	nFault/NDataAvail
33 and 34	Not used
35	+5V through a 1.8KΩ Resistor
36	NSelectin/1284 active

APPENDIX B

Specifications

This appendix contains specifications for the R4Mplus printer.

Contents

General Specifications

Table 20 • R4Mplus General Specifications

General Specifications		R4Mplus	
Height		13.3 in.	338 mm
Width		10.9 in.	277 mm
Depth		18.7 in.	475 mm
Weight (without options)		32.4 lbs.	14.7 kg
Electrical		90-265 VAC, 48-62 Hz, 5 Amps (fused)	
Agency Approvals		UL 1950, CSA 22.2 No. 950-95. Complies with FCC Class B limits for digital devices.	
Temperature	Operating	40° to 104°F	5° to 40°C
	Storage	–40° to 140°F	–40° to 60°C
Relative Humidity	Operating	20% to 85%, non-condensing	
	Storage	5% to 85%, non-condensing	
Communication Interface		RS-232/CCITT V.24 serial data interface; 110 to115000 baud, parity, bits/character, 7 or 8 data bit, and XON-XOFF, RTS/CTS or DTR/DSR handshake protocol required. 750mA at 5 V from pin 9. 8-bit parallel data interface; supports IEEE 1284 bidirectional parallel, ECP and nibble mode compliant. Error detection CRC protocol.	

Printing Specifications

Table 21 • R4Mplus Printing Specifications

Printing Specifications			
Print resolution		203 dots/inch	8 dots/mm
		300 dots/inch	12 dots/mm
Dot size (width x length)	203 dpi	0.00492 in. x 0.00492 in.	0.125 mm x 0.125 mm
	300 dpi	0.0033 in. x 0.0039 in.	0.084 mm x 0.099 mm
Maximum print width	203 dpi	4.09 in.	104 mm
	300 dpi	4.1 in.	106 mm
Minimum print length		1 dot row	
Maximum print length	203 dots/inch	105 in.	2667 mm
	300 dots/inch	45 in.	1143 mm
Bar code modulus (X) dimension	203 dots/inch	5 mil to 50 mil	
	300 dots/inch	3.3 mil to 33 mil	
Programmable constant print speeds	203 dots/inch	Per second: 7 in. 8 in. 9 in. 10 in.	Per second: 178 mm 203 mm 229 mm 254 mm
	300 dots/inch	Per second: 2 in. 3 in. 4 in. 5 in. 6 in.	Per second: 51 mm 76 mm 102 mm 127 mm 152 mm
Thin film printhead with energy control			

Media Specifications

Table 22 • R4Mplus Media Specifications

Media Specifications				
Label length	Minimum	Tear-off	0.5 in.	13 mm
		Peel-off	1 in.	25.4 mm
		Rewind	0.5 in.	13 mm
		“Smart” labels	Minimum label length for RFID “smart” labels varies for each transponder type. For the list of approved transponders and related placement specifications, go to http://www.rfid.zebra.com/r4m.htm.	
	Maximum		39 in.	991 mm
Label width	Minimum	Tear/Peel/Rewind	1 in.	25.4 mm
		“Smart” labels	Minimum label width for RFID “smart” labels varies for each transponder type. For the list of approved transponders and related placement specifications, go to http://www.rfid.zebra.com/r4m.htm.	
	Maximum	Tear	4.5 in.	114 mm
		Peel/Rewind	4.25 in.	108 mm
Total thickness (includes liner, if any)		Minimum	0.0023 in.	0.058 mm
		Maximum	0.010 in.	0.25 mm
Core size			3 in.	76 mm
Maximum roll diameter			8 in.	203 mm
Inter-label gap		Minimum	0.079 in.	2 mm
		Preferred	0.118 in.	3 mm
		Maximum	0.157 in.	4 mm
Ticket/tag notch size (width x length)			0.236 in. × 0.12 in.	6 mm × 3 mm
Hole diameter			0.125 in.	3 mm

Table 22 • R4Mplus Media Specifications (Continued)

Media Specifications			
Notch or hole position (Centered from inner media edge)	Minimum	0.15 in.	3.8 mm
	Maximum	2.25 in.	57 mm
Density, in Optical Density Units (UDO)		> 1.0 ODU	
Maximum media density		$\leq$ 0.5 ODU	
Transmissive Sensor	Fixed	7/16 in. (11 mm) from inside edge	

Ribbon Specifications

Table 23 • R4Mplus Ribbon Specifications

Ribbon Specifications			
Ribbon must be wound with the coated side out			
Ribbon width (Zebra recommends using ribbon at least as wide as the media to protect the printhead from wear.)	Minimum	>1 in.	25.4 mm
	Maximum	4.3 in.	109 mm
Standard lengths	2:1 media to ribbon roll ratio	984 ft.	300 m
	3:1 media to ribbon roll ratio	1476 ft.	450 m
Ribbon core inside diameter		1 in.	25.4 mm

Printer Options

- Peel-off
- Liner take-up
- PCMCIA card socket (supports Zebra Rapid Flash and ATA formats)
- Linear Memory Card (Zebra Rapid Flash) 8MB and 32MB
- Compact Flash
  32MB, 64MB, 128MB, and 256MB
- 300 dpi printhead
- Rewind
- Adjustable transmissive sensor
- External PrintServer
- Internal PrintServer

Zebra Programming Language (ZPL II) Features

- Downloadable graphics (with data compression)
- Bit image data transfer and printing, mixed text/graphics
- Format inversion
- Mirror image printing
- Four-position field rotation
  (0°, 90°, 180°, 270°)
- Slew command
- Programmable quantity with print pause
- Communicates in printable ASCII characters
- Controlled via mainframe, mini, PC, portable data terminal
- In-Spec OCR-A and OCR-B
- UPC/EAN
  (nominal 100% magnification 6 dots/mm printheads only)
- Serialized fields

Supported Bar Codes

Table 24 • Supported Bar Codes

R4Mplus Bar Code Features	
Code 11	LOGMARS
Code 39 (supports ratios of 2:1 to 3:1)	Plessey
Code 49 (2-dimensional bar code)	EAN-8, EAN-13, EAN EXTENSIONS
Code 93	UPC-A, UPC-E, UPC EXTENSIONS
Code 128 (supports serialization in all subsets and UCC case codes)	MSI
Codabar (supports ratios of 2:1 to 3:1)	PDF-417 (2-dimensional bar code)
Codablock	Micro-PDF-417
Interleaved 2 of 5 (supports ratios of 2:1 to 3:1; modulus 10 check digit)	POSTNET
Industrial 2 of 5	MaxiCode
Standard 2 of 5	Datamatrix
QR Code	Check digit calculation where applicable

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Zebra

Zebra Technologies Corporation
333 Corporate Woods Parkway
Vernon Hills, Illinois 60061.3109 U.S.A.
Telephone: +1 847.634.6700
Facsimile: +1 847.913.8766

Zebra Technologies Europe Limited
Zebra House
The Valley Centre, Gordon Road
High Wycombe
Buckinghamshire HP13 6EQ, UK
Telephone: +44 (0) 1494 472872
Facsimile: +44 (0) 1494 450103

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