5

RFID Guidelines

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

Contents

Overview

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

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

Transponder Placement

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

Print quality may be affected by printing directly over the transponder. In particular, there is an area on each label immediately around the location of the IC chip where the printer may print with low quality. Design your printed label around the location of the chip in the type of approved "smart" label that you select. For the list of approved transponders and related placement specifications, go to http://www.rfid.zebra.com/r110.htm.

Important • It is important to use transponders that have been specifically approved for use in this RFID printer. Failure to do so may result in the inability to read or write to the embedded RFID tags. As new transponders become commercially available, Zebra will evaluate them for compatibility with this printer. For the list of approved transponders, go to http://www.rfid.zebra.com/r110.htm.

ZPL II Commands for RFID

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

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

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

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

^HV

Host Verification

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

Format ^HV#,n,h

The following table identifies the parameters for this format.

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

^RS

RFID Setup

! **Important** • Use care when using this command in combination with ^RT (reading tag data). Problems can occur if the data read from the tag is going to be printed on the label. Any data read from the transponder must be positioned to be printed above the read/write position. Failure to do this will prevent read data from being printed on the label.

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

Format ^RSt,p,v,n,e

The following table identifies the parameters for this format.

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

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

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

The following illustration shows the resulting voided label. Note where the void starts. The media has been moved 800 dot rows from the top of the label (label length minus 800 dot rows from the bottom (leading edge) of a label) to bring the transponder into the effective area to read/write a tag. If the printer fails the operation, the rest of the media is voided.
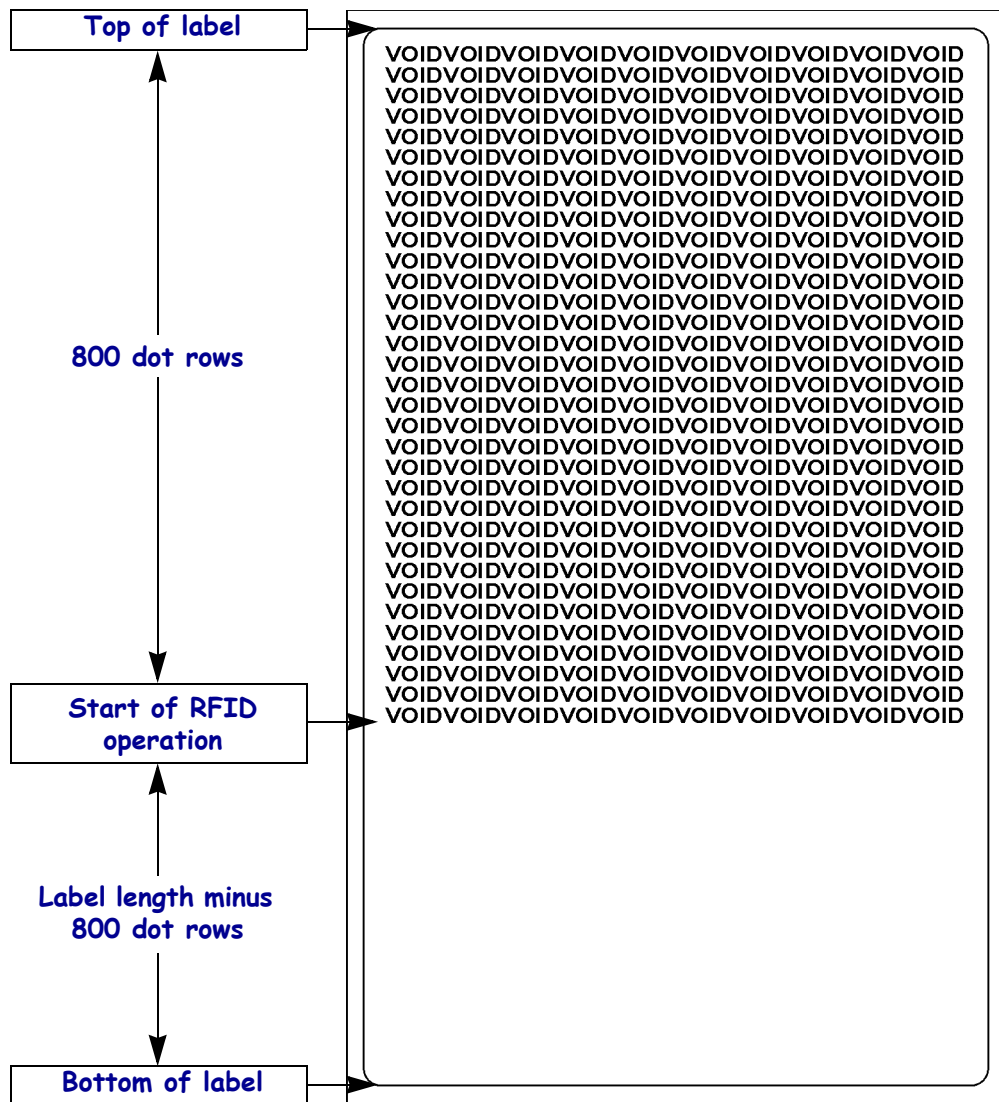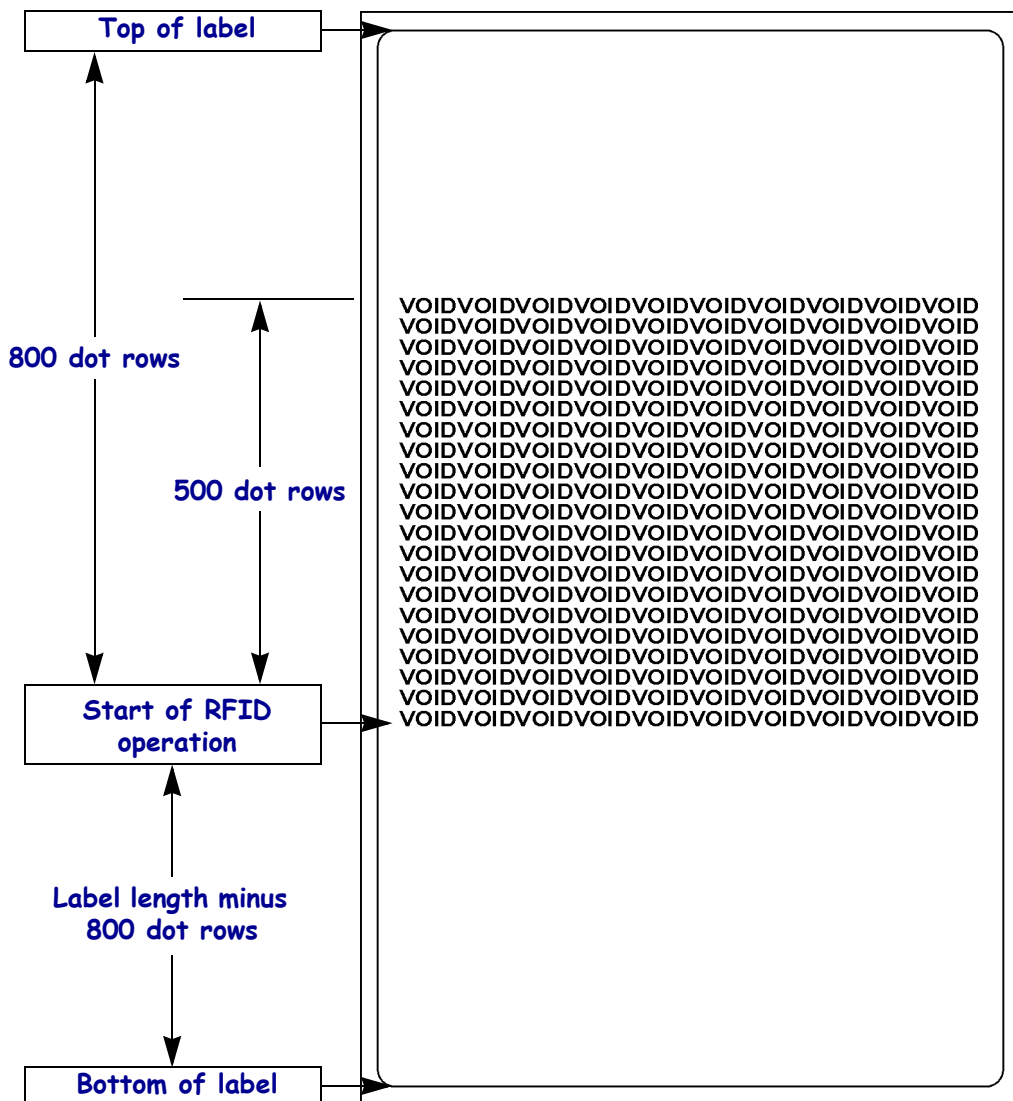
Example 2 • This example sets the printer to move the media to 800 dots from the top of the media [or label length - 500 from the bottom (leading edge) of the media] and prints "void" 500 dots in vertical length (Y axis) in case of an error.

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

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

```
Top of label


                                        VOIDVOIDVOIDVOIDVOIDVOIDVOIDVOIDVOIDVOID
                                        VOIDVOIDVOIDVOIDVOIDVOIDVOIDVOIDVOIDVOID
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  800 dot rows                          VOIDVOIDVOIDVOIDVOIDVOIDVOIDVOIDVOIDVOID
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      500 dot rows                      VOIDVOIDVOIDVOIDVOIDVOIDVOIDVOIDVOIDVOID
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                                        VOIDVOIDVOIDVOIDVOIDVOIDVOIDVOIDVOIDVOID
   Start of RFID                        VOIDVOIDVOIDVOIDVOIDVOIDVOIDVOIDVOIDVOID
    operation


 Label length minus
   800 dot rows


  Bottom of label
```

^RT

Read Tag

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

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

The following table identifies the parameters for this format.

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

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

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

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

^WT

Write Tag

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

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

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

The following table identifies the parameters for this format.

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

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

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

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

Sample of RFID Programming

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

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

For your programming, do the following:

1. Set up the printer and turn the power On (**I**).

2. Use any word processor or text editor capable of creating ASCII-only files (for example, use Microsoft® Word and save as a .txt file) and type in the label format exactly as shown in the sample label format shown in Table 7.

3. Save the file in a directory for future use. Use the ".zpl" extension.

4. Copy the file to the printer.

   From the DOS command window, use the "COPY" command to send a file to the Zebra printer. For example, if your file name is **format1.zpl** then type,
   ```
   COPY FORMAT 1.ZPL XXXX
   ```
   where XXXX is the port to which your Zebra printer is connected (such as LPT1).

5. Compare your results with those shown. If your printout does not look like the one shown, confirm that the file you created is identical to the format shown, then repeat the printing procedure. If nothing prints, refer to

   - *Printer Setup* on page 7
   - *Printer Operation* on page 21
   - *Front Panel Controls* on page 41
   - *Troubleshooting* on page 99

   to make sure that your system is set up correctly.

Table 7 • Sample ZPL Code and Results

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

Line 1 Indicates start of label format.

Line 2 Indicates no movement for media.

Line 3 Writes the data "Zebra" to the tag.

Line 4 Print field number '0' at location 100,100.^FN0 is replaced by what we read on line 6.

Line 5 Print field number '1' at location 100,200. ^FN1 is replaced by what we read on line 7.

Line 6 Read Tag into field number 0 in ASCII format (default).

Line 7 Read Tag into field number 1 in hexadecimal format.

Line 8 End of label format.

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6

Data Ports

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

Contents

Parallel Port

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

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

Figure 30 • Parallel Connector
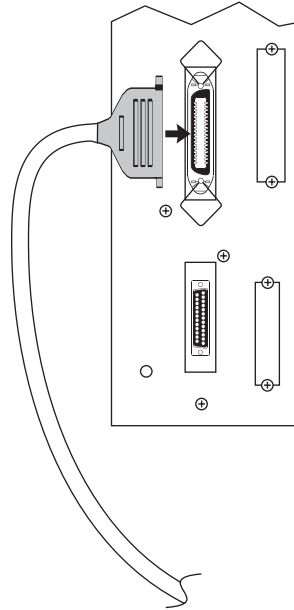
Table 8 shows the pin configuration and function of a standard computer-to-printer parallel cable.

Table 8 • Parallel Cable Pin Configuration

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

Table 8 • Parallel Cable Pin Configuration (Continued)

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

Serial Port

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

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

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

Figure 31 • Serial Connector
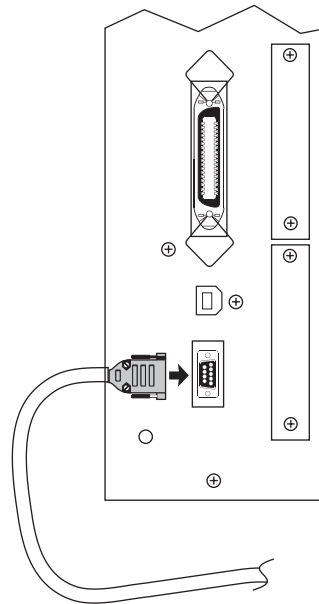
Use a DB-9 to DB-25 interface module for all RS-232 connections through a DB-25 cable. An interface module is required for RS-422/RS-485 interface support (see *RS-422/RS-485 Interconnections* on page 80).

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

Serial Pin Configuration

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

Table 9 • Serial Connector Pin Configuration

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

RS-232 Interface Connections

Note • Adapters are available from Zebra Technologies LLC.

• RS-422/RS-485 adapter, Zebra part number 33114M

• RS-232 DB-9 to DB-25 adapter, Zebra part number 33109M

Direct Connection to a Computer

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

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

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

Figure 32 • RS-232 Connections

RS-232 Connector (DTE)
Rear Panel Female DB-9

Pin	Signal
2	RXD (receive data) input
3	TXD (transmit data) output
4	DTR (data terminal ready) output
5	SG (signal ground)
6	DSR (data set ready) input
7	RTS (request to send) output
8	CTS (clear to send) input
9	+5 VDC signal source

+5 VDC R1 1 K Ω
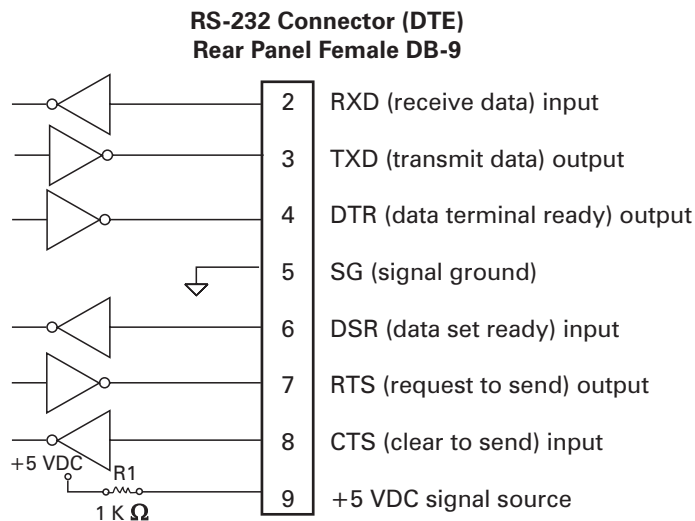
NOTE: Pin 1 is unused and unterminated.

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

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

DB-9 to DB-25 Connections

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

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

Figure 33 • DB-9 to DB-25 Connections
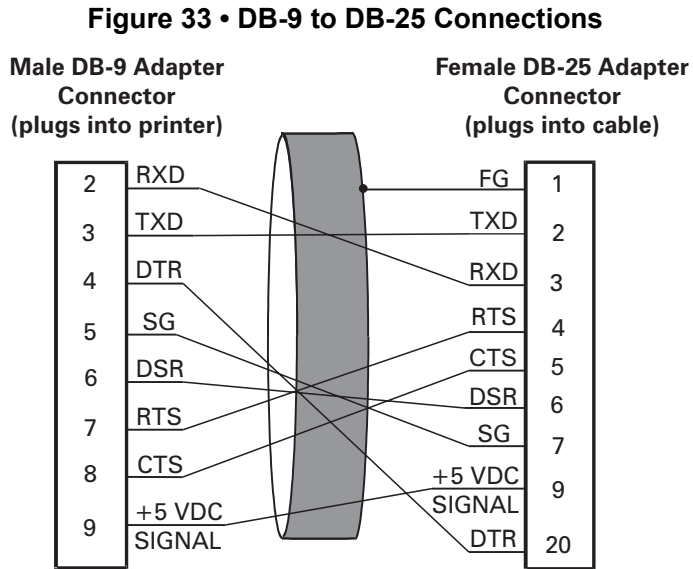
NOTE: Pin 1 of DB-9 connector is unused and unterminated.

Modem Connection

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

Figure 34 shows the connections required for this cable.

Figure 34 • RS-232 Connections
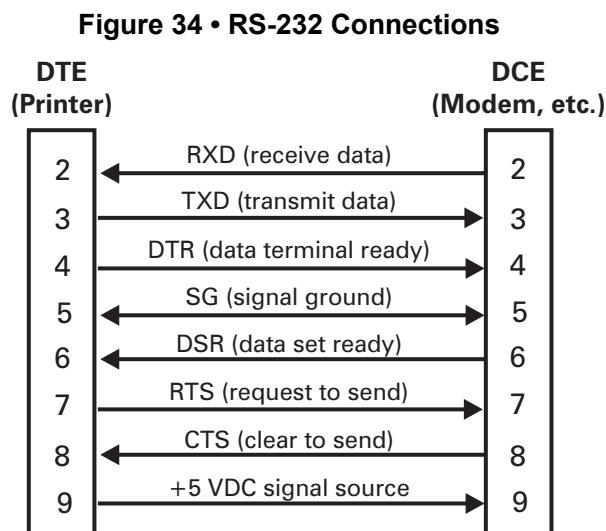
NOTE: Pin 1 is unused and unterminated at the printer.

RS-422/RS-485 Interconnections

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

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

Figure 35 • DB-9 to DB-25 Connections

Female DB-25 Connector on
RS-422/RS-485 Adapter

Frame ground	1
+5 VDC 725 mA source	9
Signal ground ref.	11
Data input B (–)	13
Data output B (–)	14
Data input A (+)	16
Data output A (+)	19
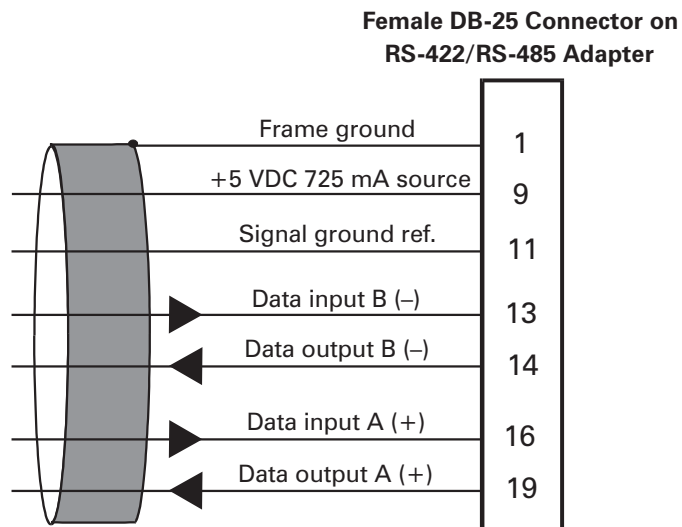
NOTE: Pins 2–8, 10, 12, 15, 17, 18, and 20–25 are unused and unterminated.

USB 2.0 Port

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

Figure 36 • USB Connectors
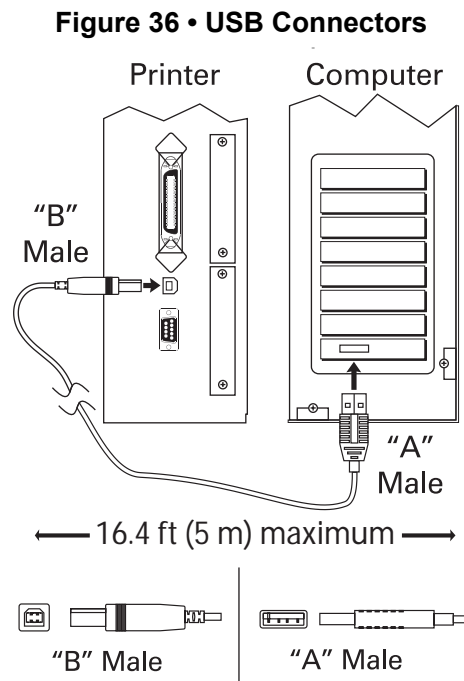
Note • Use a USB 2.0-certified compliant cable no longer than 16.4 ft (5 m) long. A cable that meets these requirements is available from Zebra (part number 33011).

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7

Memory Cards

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

Contents

PCMCIA Memory Card

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

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

To install the PCMCIA card, complete these steps:

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

Figure 37 • PCMCIA Card Installation
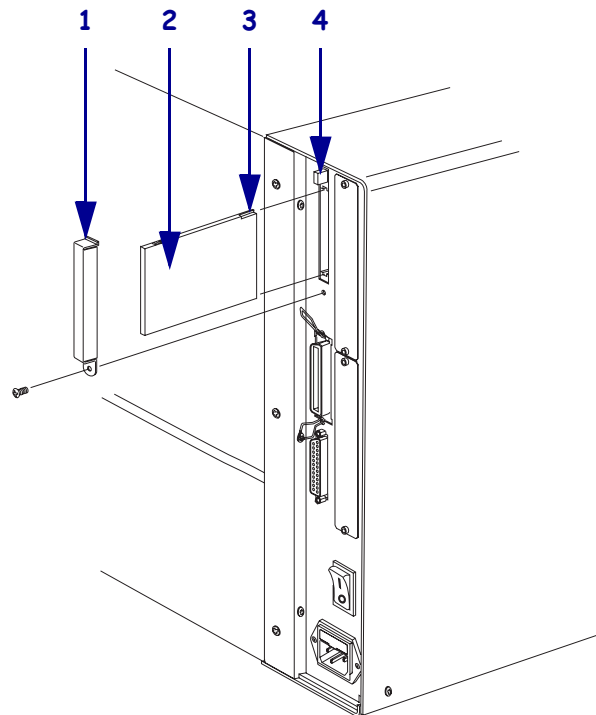
1	PCMCIA card shield
2	PCMCIA card
3	Notch
4	Card-eject button

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

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

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

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

CompactFlash Card

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

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

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

To install a CompactFlash card, complete these steps:

1. Turn the AC power Off (**O**).

2. Disconnect the AC power cord from the printer.

3. Remove the two screws near the bottom of the electronics cover (Figure 38).

Figure 38 • Printer Exterior
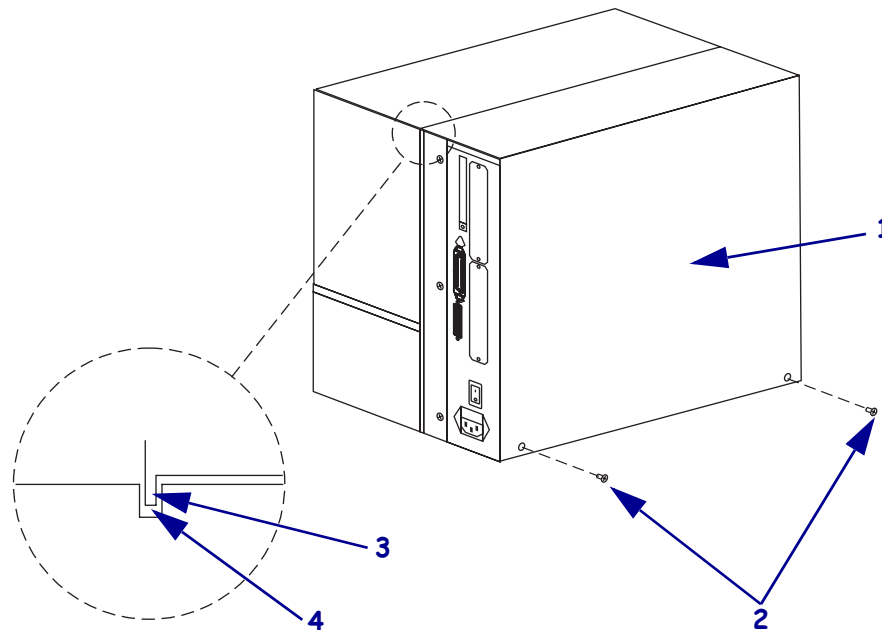
1	Electronics cover
2	Screws
3	Channel
4	Lip of cover

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

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

Figure 39 shows where to insert the CompactFlash card.

Figure 39 • Compact Flash Card Insertion
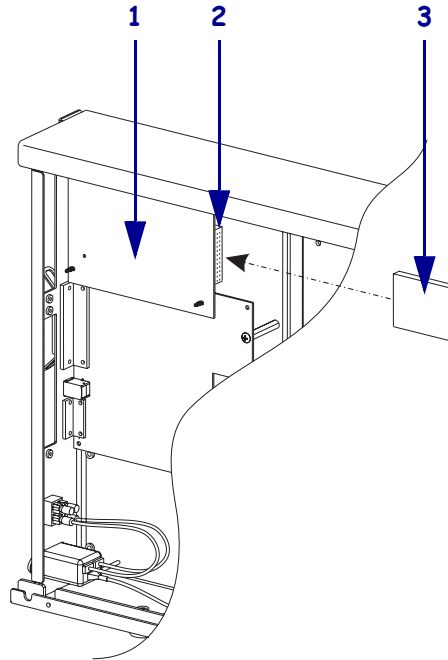
1	Option board
2	Card slot
3	Compact flash card

6. Reinstall the electronics cover by lowering the cover so the lip of the cover goes into the channel on the top of the printer.

7. Secure the cover by reinstalling the two screws near the bottom of the cover.

8. Reconnect the printer AC power cord.

9. Press and hold CANCEL while turning the printer On (**I**).

The printer prints a configuration label.

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

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

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8

Routine Maintenance

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

Contents

Cleaning Schedule

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

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

Table 10 • Recommended Printer Cleaning Schedule

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

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

Clean Exterior

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

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

Clean Interior

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

Printhead and Platen Roller

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

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

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

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

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

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

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

1. Open the printhead.

2. Remove the media and ribbon (if loaded).

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

Figure 40 • Cleaning the Printhead
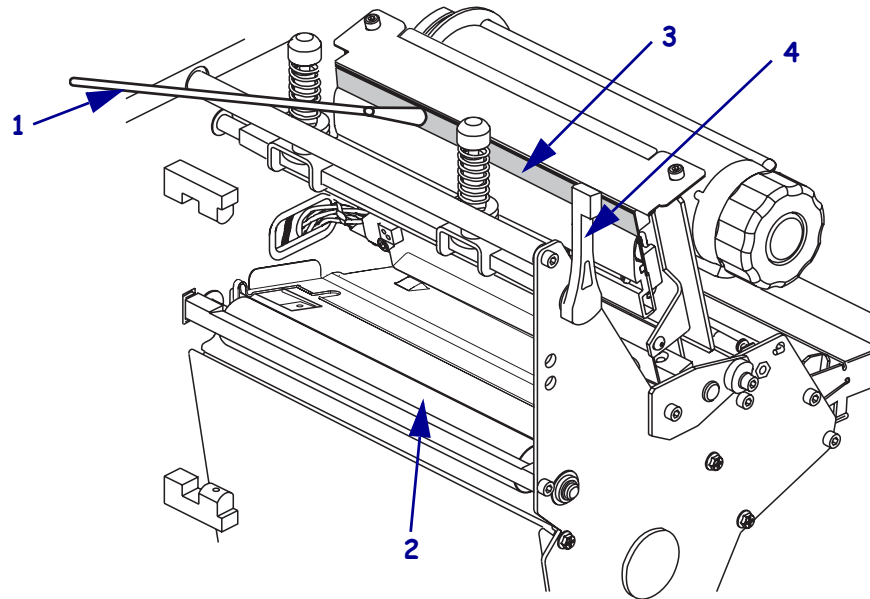
1	Applicator
2	Platen roller
3	Printhead print elements
4	Printhead lever

4. Rotate the platen roller and clean thoroughly with solvent and an applicator.

5. Brush or vacuum any accumulated paper lint and dust away from the rollers.

6. Reload the media and the ribbon (if required).

7. Close the printhead.

Sensors

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

Ribbon and Label-Available Sensor Locations

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

Figure 41 • Sensor Locations
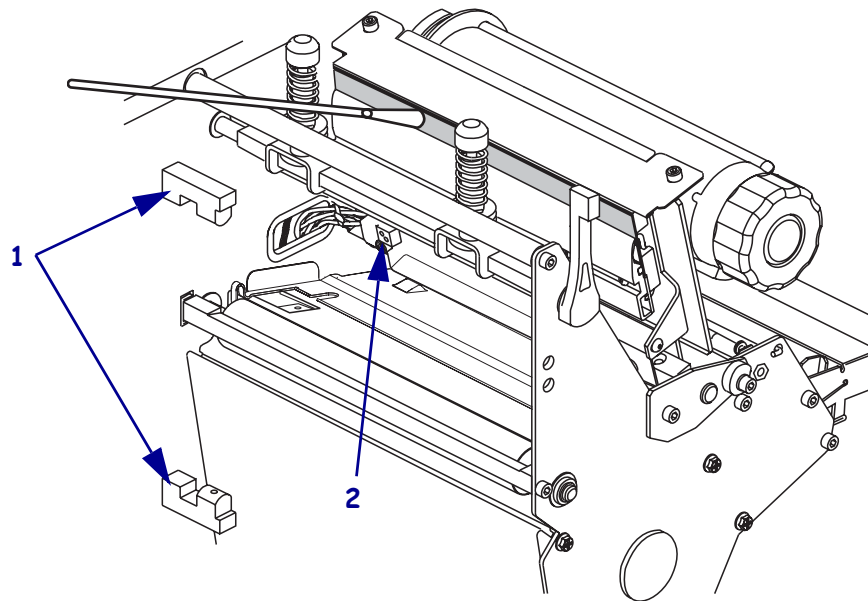
1	Label-available sensors
2	Ribbon sensor

Transmissive (Media) Sensor Locations

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

Figure 42 • Upper Media Sensor
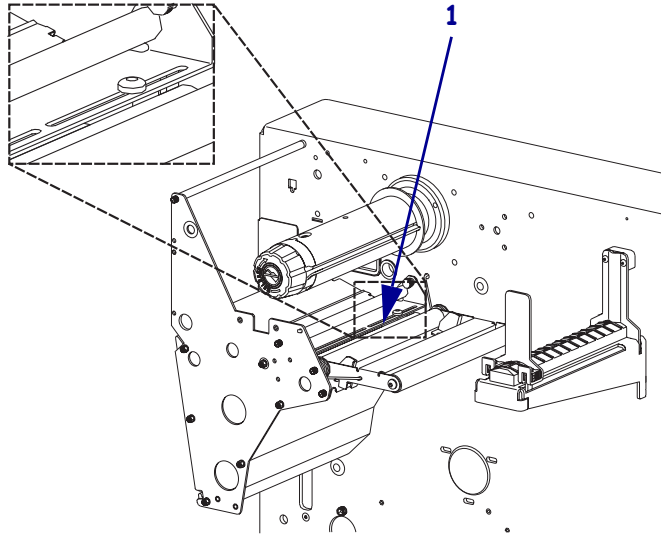
1	Upper media sensor

Figure 43 • Lower Media Sensor
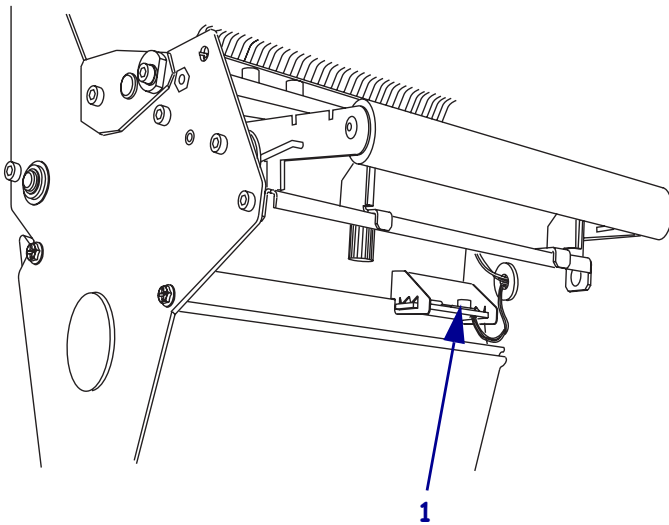
1	Lower media sensor

Snap Plate

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

Figure 44 • Snap Plate
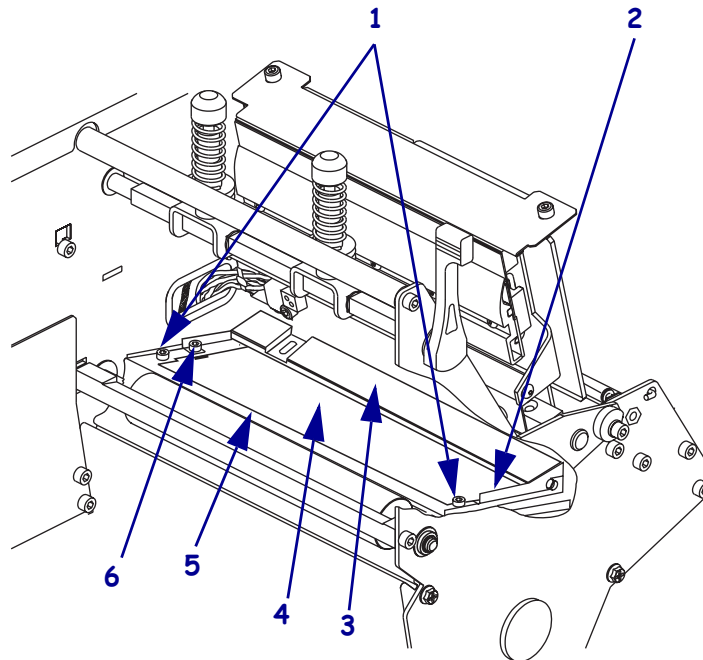
1	Antenna support screws
2	Location of right-side snap plate screw (screw not shown)
3	Snap plate
4	Antenna support
5	Antenna support frame
6	Left-side snap plate screw

To clean the snap plate, complete these steps:

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

Important • Do not remove the antenna support screws.

2. Remove the snap plate from the printer.

3. Clean the snap plate with cleaning solvent and a soft cloth.

4. To reinstall the snap plate, slide it back into place until the screw holes on the snap plate line up with the screw holes in the antenna support frame.

5. Reinstall the two snap plate screws to secure the snap plate to the antenna support frame.

Replace Fuse

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

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

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

To replace a faulty fuse, complete these steps:

1. Use a small-blade screwdriver or similar tool to remove the fuse holder.

    The fuse holder is part of the AC power entry module at the rear of the printer (Figure 45).

Figure 45 • AC Power Entry Module
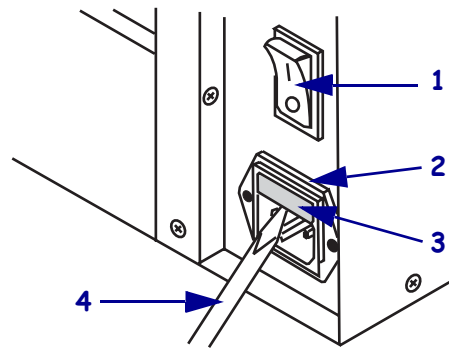
1	Power switch
2	Fuse holder
3	AC power entry module
4	Small-blade screwdriver

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

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

Figure 46 • Fuse Locations
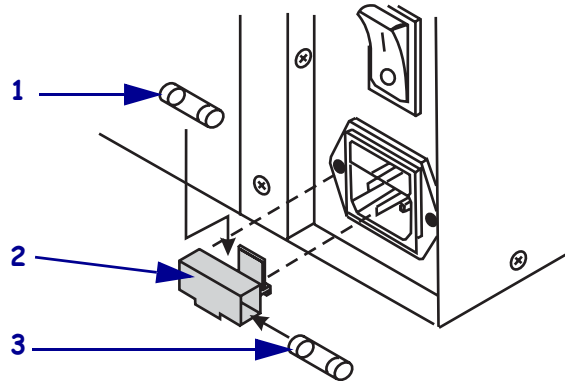
1	In-circuit fuse
2	Fuse holder
3	Spare fuse

3. Snap the fuse holder back into the AC power entry module.

4. Reconnect the power cord, and turn the printer On (**I**).

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

Notes • _____

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Fax: 1.847.821.1795   Attention: TechPubs — CTC

9

Troubleshooting

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

Contents

Troubleshooting

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

❑ Is there an error message on the LCD? If yes, see *LCD Error Messages* on page 101 for more information.

❑ Is the CHECK RIBBON light on when ribbon is loaded properly, or are non-continuous labels being treated as continuous labels? If yes, see *Media and Ribbon Sensor Calibration* on page 34.

❑ Are you experiencing problems with print quality? If yes, see *Print Quality Problems* on page 104.

❑ Are you experiencing communications problems? If yes, see *Communications Problems* on page 106.

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

❑ Are you using the correct type of labels? Review the types of label in *Types of Media* on page 14.

❑ Review the label- and ribbon-loading illustrations, starting with *Load the Printer* on page 22.

❑ Check the position of the media sensor and move if necessary, as shown in *Adjust and Calibrate Sensors* on page 34.

❑ Does the printhead need to be adjusted? See *Adjust Printhead Pressure and Toggle Position* on page 38 for more information.

❑ Do the sensors need to be calibrated? See *Media and Ribbon Sensor Calibration* on page 34 for more information.

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

❑ Perform one or more of the self-tests given in *Printer Diagnostics* on page 108. Use the results to help identify the problem.

❑ If you are still having problems, see *Support* on page xviii for customer support information.

LCD Error Messages

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

Table 11 • LCD Error Messages

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

Table 11 • LCD Error Messages (Continued)

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

Table 11 • LCD Error Messages (Continued)

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

Print Quality Problems

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

Table 12 • Print Quality Problems

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

Table 12 • Print Quality Problems (Continued)

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

Communications Problems

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

Table 13 • Communications Problems

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

Table 13 • Communications Problems (Continued)

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

Printer Diagnostics

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

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

Power-On Self Test

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

Additional Printer Self Tests

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

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

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

CANCEL Self Test

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

To perform the CANCEL Self Test, complete these steps:

1. Turn Off (**O**) the printer.

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

   A printer configuration label prints (Figure 47).

Figure 47 • Printer Configuration Label

```
           PRINTER CONFIGURATION
  ─────────────────────────────────────
  Zebra Technologies
  ZTC R110XiIIIPlus-200dpi
  ─────────────────────────────────────
  04.0.............. DARKNESS
  2 IPS............. PRINT SPEED
  +000.............. TEAR OFF
  TEAR OFF.......... PRINT MODE
  CONTINUOUS........ MEDIA TYPE
  WEB............... SENSOR TYPE
  THERMAL-TRANS..... PRINT METHOD
  104 0/8 MM........ PRINT  WIDTH
  2000.............. LABEL LENGTH
  39.0IN   988MM.... MAXIMUM LENGTH
  MEDIA DISABLED.... EARLY WARNING
  MAINT. OFF........ EARLY WARNING
  NOT CONNECTED..... USB COMM.
  BIDIRECTIONAL..... PARALLEL COMM.
  RS232............. SERIAL COMM.
  9600.............. BAUD
  8 BITS............ DATA BITS
  NONE.............. PARITY
  XON/XOFF.......... HOST HANDSHAKE
  NONE.............. PROTOCOL
  000............... NETWORK ID
  NORMAL MODE....... COMMUNICATIONS
  <~>  7EH.......... CONTROL PREFIX
  <^>  5EH.......... FORMAT PREFIX
  <,>  2CH.......... DELIMITER CHAR
  ZPL II............ ZPL MODE
  CALIBRATION....... MEDIA POWER UP
  CALIBRATION....... HEAD CLOSE
  DEFAULT........... BACKFEED
  +000.............. LABEL TOP
  +0000............. LEFT POSITION
  OFF............... VERIFIER PORT
  OFF............... APPLICATOR PORT
  PULSE MODE........ START PRINT SIG
  FEED MODE......... RESYNCH MODE
  050............... WEB S.
  079............... MEDIA S.
  072............... RIBBON S.
  089............... TAKE LABEL
  050............... MARK S.
  000............... MARK MED S.
  084............... MEDIA LED
  003............... RIBBON LED
  000............... MARK LED
  +10............... LCD ADJUST
  DPSWFXM........... MODES ENABLED
  ................. MODES DISABLED
  832 8/MM FULL..... RESOLUTION
  SP936F    <-...... FIRMWARE
  V19.0.0.56........ HARDWARE ID
  CUSTOMIZED........ CONFIGURATION
  NONE.............A: COMPACT FLASH
  12160k...........R: RAM
  NONE.............B: MEMORY CARD
  2048k............E: ONBOARD FLASH
  NONE.............. FORMAT CONVERT
  005 DISPLAY....... P32 INTERFACE
  ................. TWINAX/COAX ID
  FW VERSION........ IDLE DISPLAY
  06/10/04.......... RTC DATE
  11:08............. RTC TIME
  DYNAMIC........... IP RESOLUTION
  ALL............... IP PROTOCOL
  010.003.005.187... IP ADDRESS
  255.255.255.000... SUBNET MASK
  010.003.005.001... DEFAULT GATEWAY
  Metrics : 04.A1.01. RFID VERSION
  1500 IN........... NONRESET CNTR
  1500 IN........... RESET CNTR1
  1500 IN........... RESET CNTR2
  3806 CM........... NONRESET CNTR
  3806 CM........... RESET CNTR1
  3806 CM........... RESET CNTR2
  335 LABLS......... NONRESET CNTR
  335 LABLS......... RESET CNTR1
  335 LABLS......... RESET CNTR2
  GK 20518.04DL06202.41008.02.VH1
```

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

PAUSE Self Test

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

To perform a PAUSE self test, complete these steps:

1. Turn Off (**O**) the printer.

2. Press and hold PAUSE while turning the power On (**I**). Hold PAUSE until the DATA light turns off.

   - The initial self test prints 15 labels at 2.4 in. (61 mm) per second, then automatically pauses the printer. When PAUSE is pressed, an additional 15 labels print. Figure 48 shows a sample of the labels.

Figure 48 • PAUSE Test Label

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

FEED Self Test

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

To perform a FEED self test, complete these steps:

1. Turn Off (**O**) the printer.

2. Press and hold FEED while turning the power On (**l**). Hold FEED until the DATA light turns off.

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

Figure 49 • FEED Test Label

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

4. Enter the corresponding darkness and print speed values into the printer through the front panel.

FEED and PAUSE Self Test

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

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

1. Turn Off (**O**) the printer.

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

   No labels print at the end of this test.

Communications Diagnostics Test

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

Note • The communications test label prints upside-down.

Figure 50 • Communications Diagnostics Test Label
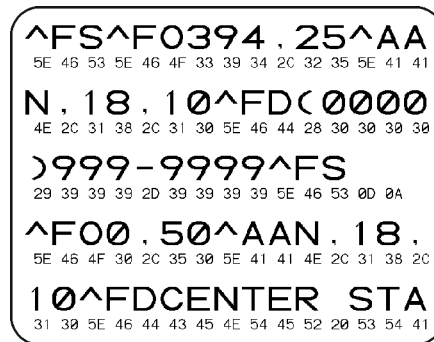
Additional Printer Diagnostics

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

A
Specifications

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

Contents

Features

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

Standard Features

Note • Printer specifications are subject to change without notice.

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

Print Modes

Five different print modes can be used, depending on the printer options purchased:
- **Tear-Off Mode:** Labels are produced in strips.
- **Peel-Off Mode:** Labels are dispensed and peeled from the backing as needed.
- **Applicator Mode:** The printer is part of a larger label application system.

Zebra Programming Language (ZPL II®)

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

- User-programmable password

Bar Codes

Types of bar codes include:

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

Agency Approvals for All Printers

Approvals include:

- Canadian ICES-003, Class B
- FCC class B

Compliance for All Printers

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

General Specifications

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

Electrical Specifications

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

Environmental Conditions for Operation and Storage

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

Print Specifications by Model

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

Model Specifications Key

This table contains the key for print specifications for the table that follows.

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

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

Ribbon Specifications

Refer to the table that follows for ribbon specifications.

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

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

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

* For RFID "smart" labels, the minimum ribbon width is determined by the minimum label width for the transponder being used. For the list of approved transponders and related size and placement specifications, go to http://www.rfid.zebra.com/r110.htm.

Label Specifications

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

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

Specifications

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

* Does not apply to RFID "smart" labels.
** This parameter varies for each transponder type. For the list of approved transponders and related placement specifications, go to http://www.rfid.zebra.com/r110.htm

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