Stripe®

For the Zebra *S*400™ and *S*600™ Printers

User's Guide

Customer Order # 11996L
Manufacturer Part # 11996LB Rev. 1

Zebra®

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

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

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Stripe® Series
*S*400 and *S*600

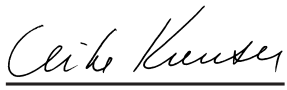
manufactured by:

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

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

for Home, Office, Commercial, and Industrial use

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



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Introduction

Congratulations! You have just purchased a high-quality thermal label printer manufactured by the industry leader in quality, service, and value. For over 25 years, Zebra Technologies Corporation has provided customers with the highest caliber of products and support.

This user's guide provides all the information you need to operate the printer on a daily basis.

- ZPL II® is Zebra Technologies Corporation's Zebra Programming Language II label design language. ZPL II lets you create a wide variety of labels from the simple to the very complex, including text, bar codes, and graphics. To create and print label formats, refer to the *ZPL II Programming Guide* (part #46469L). If one was not ordered with your printer, simply call your distributor or Zebra Technologies Corporation.
- In addition, label preparation software is available. Contact your distributor or Zebra Technologies Corporation for further information. Or, visit our web site at **www.zebra.com** for a free demo copy.
- The *S*400/*S*600 Maintenance Manual (part #44895L) contains all the information you need to maintain your printer. To order, contact your distributor or Zebra Technologies Corporation.

Unpacking

Save the carton and all packing materials in case reshipping is required.

- Inspect the printer for possible shipping damage.
- Check all exterior surfaces for damage.
- Raise the media access cover (refer to Figure 4 on page 5) and inspect the media compartment for damage.

Reporting Damage

If you discover shipping damage:

- Immediately notify the shipping company and file a report with them. *Zebra Technologies Corporation is not responsible for any damage incurred during shipment of the printer and will not cover the repair of this damage under its warranty policy.*
- Keep the carton and all packing material for inspection.
- Notify your authorized Zebra distributor.

Storage and Reshipping

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

To ship the printer, carefully pack it in a suitable container to avoid damage during transit. Whenever possible, use the original container from the factory. A shipping container can be purchased from Zebra Technologies Corporation, if the original one has been lost or destroyed.

If you use a different container, package the printer carefully to avoid damage.

CAUTION: When packaging the printer in a rigid container, use shock mounts or shock-absorbing packing material. A rigid container allows shock on the outside to be transmitted undamped to the printer which may cause damage. Also, before packing, remove all ribbon and media from the supply and take-up spindles to prevent damage to the printer.

Site Requirements

CAUTION: To ensure that the printer has proper ventilation and cooling, do not place any padding or cushioning material under the unit as this restricts air flow.

This printer may be installed on any solid, level surface of sufficient size and strength to accommodate the physical dimensions and weight of the unit. The area enclosure in which the printer operates must meet the environmental conditions specified. Electrical power must be available and in close proximity to the printer.

Since this printer was designed and is fabricated as an industrial-type unit, it functions satisfactorily in areas such as warehouses, factory floors, and office environments that conform to specified environmental and electrical conditions.

Introduction to Printers

The first thing you want to do is identify your printer. This makes certain tasks — such as media loading — much easier to do!

Figure 1 shows a printer that is set up for Tear-Off mode. Tear-Off allows you to tear away each label (or a strip of labels) after it is printed.

To load the media for Tear-Off mode, see page 9.

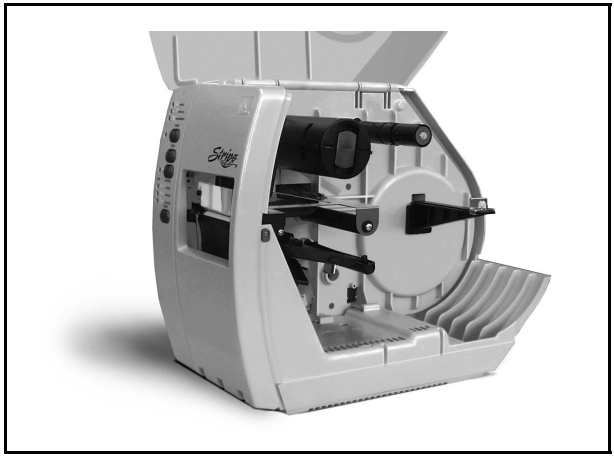


Figure 1. Tear-Off Mode

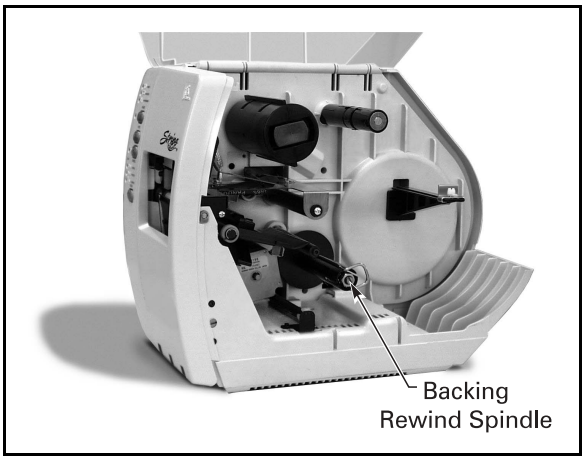


Figure 2. Peel-Off Mode

In Figure 2, the printer is shown in Peel-Off mode. In Peel-Off, backing material is peeled away from the label as it is printed. After this label is removed from the printer, the next one is printed.

To load media in Peel-Off mode, see page 11.

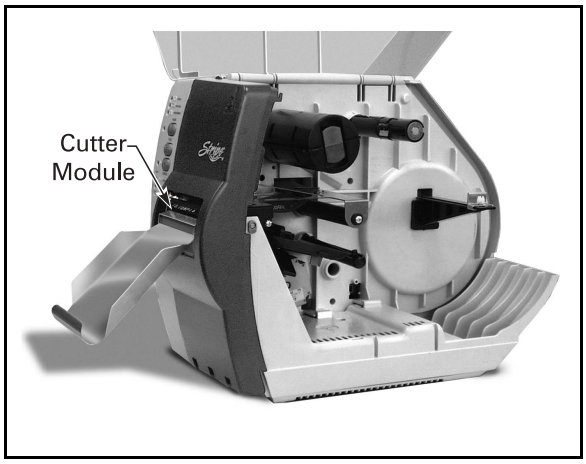
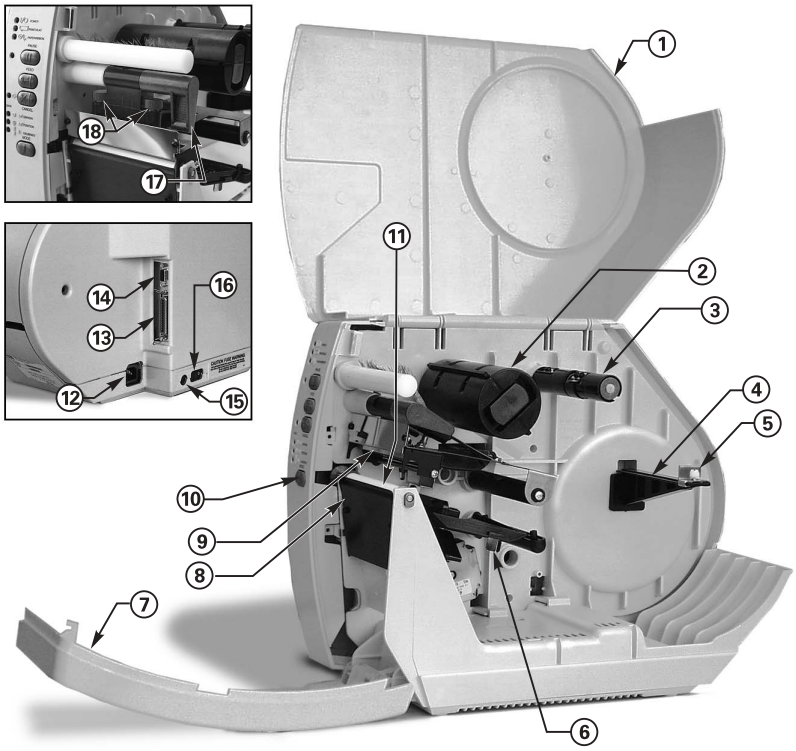


Figure 3. Cutter Mode

Figure 3 shows a printer that is equipped for Cutter mode. When in cutter mode, the printer automatically cuts the label after it is printed. Then, the cutter catch tray "catches" the label.

To load the media in Cutter mode, see page 14.



1 Media Access Cover
2 Ribbon Take-up Spindle
3 Ribbon Supply Spindle
4 Media Supply Hanger
5 Media Supply Guide
6 Media Guide
7 Front Cover
8 Tear Plate
9 Printhead
10 Control Panel
11 Platen Roller
12 AC Power Cable Connection
13 Parallel Interface
14 Serial Interface
15 Fuse
16 Power On/Off Switch
17 Head Open Lever
18 Pressure Toggles

Figure 4. Printer Components

AC Power Cable

The AC power cable has a three-prong female connector on one end (see Figure 5). This connector must be plugged into the mating connector on the left side of the printer. See Figure 6.

The connector at the other end of the AC power cable is one of the following:

- US Standard 110 VAC three-prong plug
- Great Britain Standard 230 VAC three-prong plug
- European Standard 230 VAC three-prong plug
- Australian Standard 230 VAC three-prong plug

WARNING: For personnel and equipment safety, always use a three-prong plug with an earth ground connection.

Ensure that the AC power on/off switch is in the “off” position before connecting the AC power cable to a nearby electrical outlet.

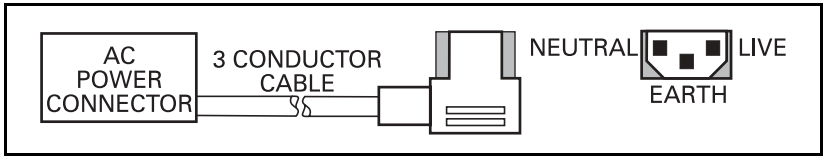


Figure 5. AC Power Connection

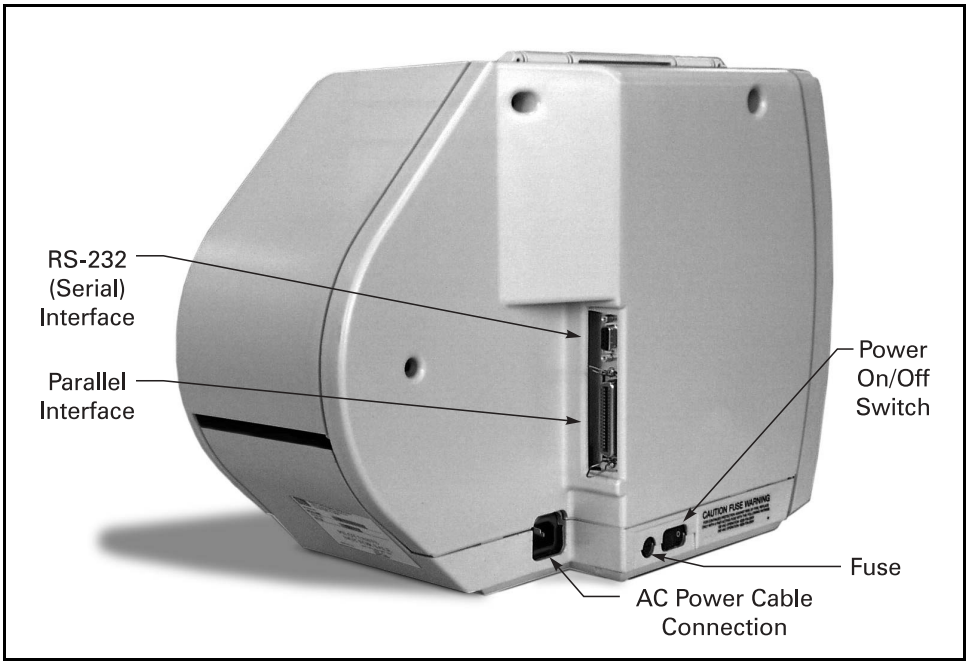


Figure 6. AC Mating Connector

Loading the Media

Media widths and thicknesses vary between applications. To maintain print quality from one application to another, see "Print Quality Adjustments" beginning on page 38.

NOTE: Zebra recommends using media that is outside wound (i.e., you can see the labels on the outside of the roll).

Tear-Off Mode

1. Refer to Figure 7. Move the head open lever (a) counterclockwise to the open position to raise the printhead (b).
2. Slide the media guide (c) and the media supply guide (d) as far out from the printer frame as possible.

If you are loading roll media in Tear-Off mode, follow steps 3-5. For loading fanfold media in Tear-Off mode, skip to step 6.

3. Place the media roll on the media supply hanger (e), and thread the media through the printhead assembly as shown.

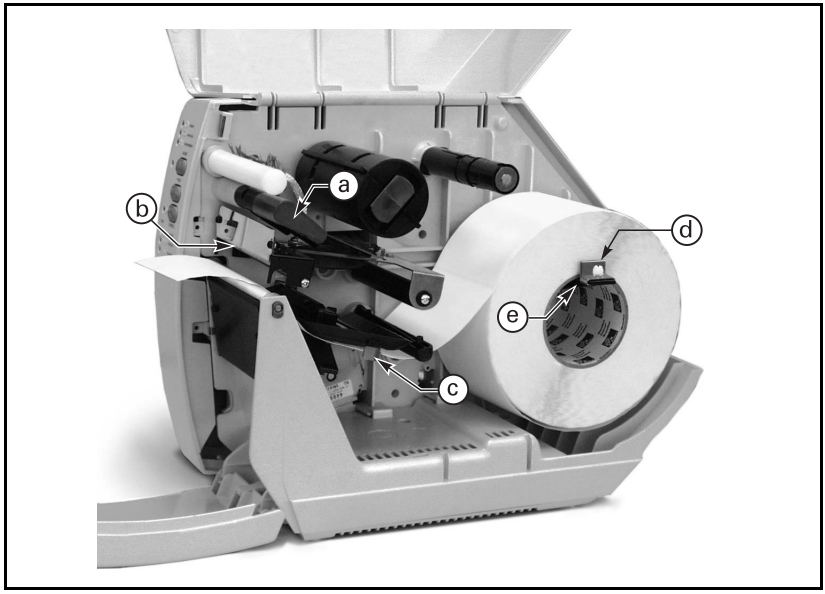


Figure 7. Loading — Tear-Off Mode

4. Adjust the media supply guide and the media guide against the outer edge of the media. *These guides must not cause pressure or excessive drag on the media.*

5. Close the head open lever, and see "Adjusting the Media Sensor" on page 18 to adjust the media sensor position.

For loading fanfold media:

6. Refer to Figure 8. Make sure the fanfold media feeds through either the bottom (f) or rear (g) access slot.

NOTE: When utilizing the bottom access slot, be sure to thread media over the media supply hanger.

7. Thread the media through the printhead as shown in Figure 8.

8. Adjust the media supply guide and the media guide against the outer edge of the media. *These guides must not cause pressure or excessive drag on the media.*

9. Close the head open lever, and see "Adjusting the Media Sensor" on page 18 to adjust the media sensor position.

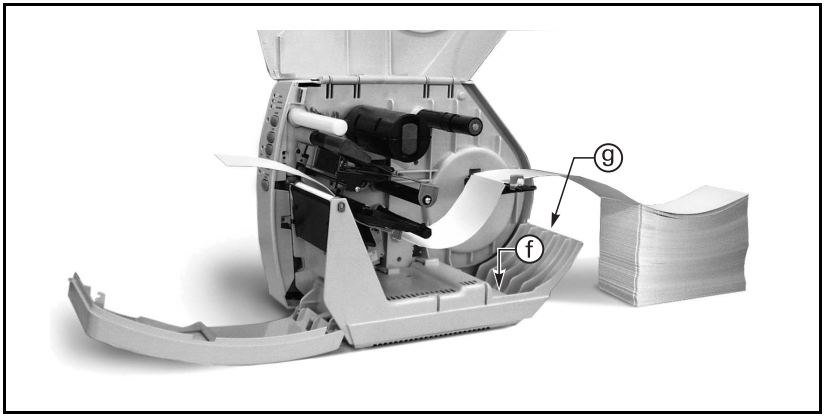


Figure 8. Loading — Fanfold Media

Peel-Off Mode

(Peel-Off mode is optional).

Refer to Figure 9 and follow the procedure below.

1. Slide the media supply guide (a), media guide (b), and the outer edge guides on both the platen guide rod (c) and the lower guide rod (d) as far out from the printer frame as possible.
2. Open the head open lever (e) to raise the printhead (f).
3. Remove the hold down hook (g).
4. Thread the media through the printhead as shown in Figure 9.
5. From the front of the printer, pull the media through the printhead until approximately 24" of media extends out from the printer. Remove the labels from the backing of the 24" of media that extends from the front of the printer.
6. Align the inside edge of the media with the edge guide mark (h) near the left side of the tear-off/peel-off plate, then close the head open lever. (See Figure 25 on page 52 for a detailed illustration.)
7. Thread the label backing behind the lower label available sensor (i), through the slot under the rewind power roller (j), and below the lower guide rod (k) to the backing rewind spindle (l). Then, wind the backing material around the backing rewind spindle three or four times in a counterclockwise direction. To ensure proper winding, press the edge of the backing material against the round plate at the far end of the spindle.
8. To hold the media against the spindle, place the hold down hook over the backing and insert both ends into the small slots in the round plate at the far end of the spindle. Again, rotate the backing rewind spindle counterclockwise to remove any slack in the backing material.

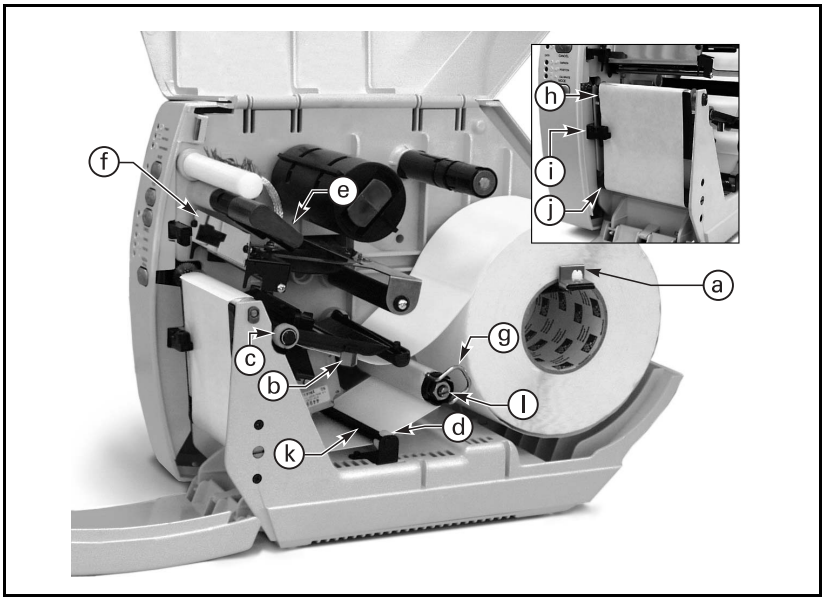


Figure 9. Loading — Peel-Off Mode

9. Adjust all of the guides:

   - Push the media supply guide inward until it is just touching the outer side of the media supply roll, then lock the guide in place with its locking screw. *The guide must not cause pressure or excessive drag on the media supply roll.*
   - Adjust the outer edge guides on both the lower guide rod and the platen guide rod until they just touch the outer edge of the media and backing without causing the material to buckle.
   - Adjust the media guide until it just touches the outer edge of the media without causing the material to buckle.

10. See "Adjusting the Media Sensor" on page 18 to adjust the media sensor.

NOTE: In the Peel-Off mode, proper media tracking is critical. Refer to "Backing Rewind Power Roller Adjustment" on page 42 to make sure that the media tracks properly through the printer.

(Peel-Off option required).

When the amount of backing wound on the backing rewind spindle reaches full capacity, the backing rewind spindle full sensor activates, the PAPER/RIBBON light flashes, and printing pauses.

To remove the backing material, follow these steps (you don't need to power off the printer for this procedure):

1. Unwind about 24" of backing from the backing rewind spindle and cut it off at the spindle.
2. Pull out the hold down hook and slide the backing material off of the spindle and discard.
3. Feed the new starting edge of the backing through the mechanism and attach it to the backing rewind spindle as described in the loading procedure.

NOTE: While holding the media in position against the tear-off/ peel-off plate, open and close the printhead without disturbing the media position. The printer is now ready to print more labels.

Cutter Mode

(Cutter mode is optional).

To ensure proper media loading, follow the directions for the Tear-Off mode with the exception that the end of the media must be positioned on top of the platen roller. See Figure 10.

With the end of the media positioned directly on top of the platen roller (a), close the head open lever. The printer automatically calibrates, feeds out, and cuts the label when the printer is powered on or the printhead is opened and closed.

NOTE: The cutter only cuts if the printer is in cutter mode. Refer to the *ZPL II Programming Guide* or the label preparation software user's guide for instructions.

NOTE: The cutter cycles once at power up or resets (even when NOT in cutter mode).

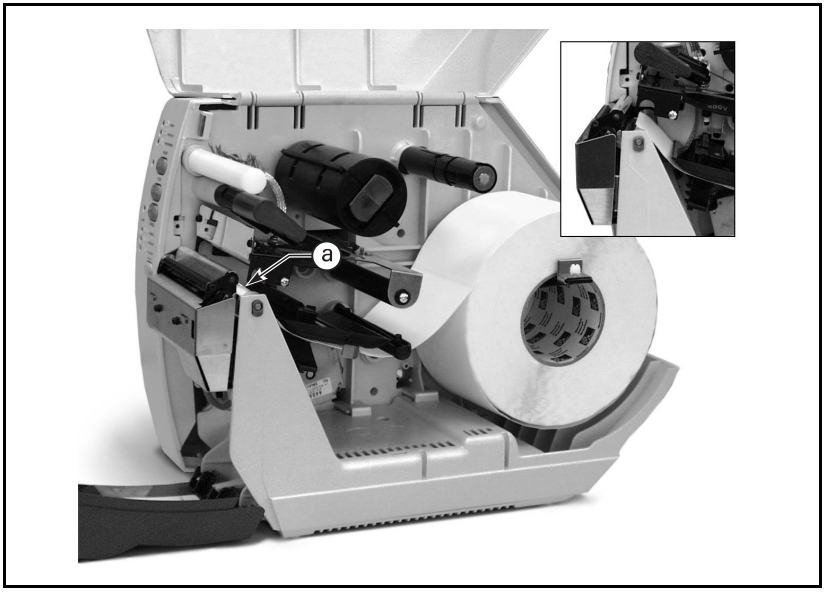


Figure 10. Loading — Cutter Mode

Loading the Ribbon

Before you load the ribbon, make sure the ribbon supply spindle is adjusted properly.

Ribbon Supply Spindle: Normal Position

In the normal position, the "dual-tension" ribbon supply spindle provides the desired amount of ribbon back tension for different ribbon widths.

To place the spindle in the normal position, firmly pull the spindle end cap (a) until it clicks into place, as shown in Figure 11.

Ribbon Supply Spindle: Low-Tension Position

Low-tension position is used in limited applications to provide lower ribbon back tension. Low-tension position is only recommended when normal tension hampers the ribbon movement (for example, you will see scuffing or image breakup on the label).

To put the spindle in the low-tension position, firmly push the spindle end cap (a) until it clicks into place, as shown in Figure 11.

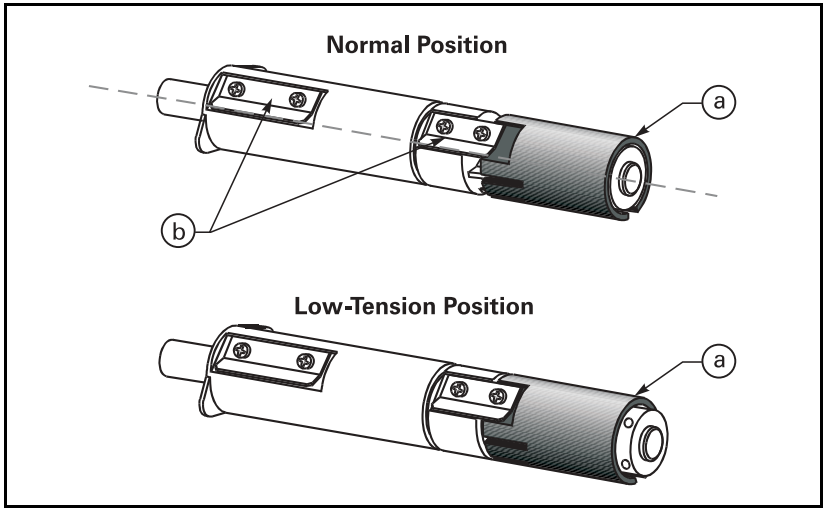


Figure 11. Ribbon Supply Spindle Positions

Ribbon Loading Instructions

NOTE: Zebra recommends the use of ribbon that is wider than the media. The smooth backing of the ribbon protects the printhead from wear and premature failure due to excessive abrasion. (For the direct thermal print method, ribbon is not used and should not be loaded in the printer.)

NOTE: Zebra recommends the use of ribbon that is outside wound (i.e., the ink side is on the outside of the roll).

To load ribbon, see Figure 12 and follow the procedure below.

1. Adjust the ribbon supply spindle position for normal or low tension.
2. Align the blades (b) on the two sections of the spindle as shown in Figure 11. (You do not need to do this if your ribbon width is 2.4" [60 mm] or less.)
3. Place the ribbon roll on the ribbon supply spindle (a). Make sure the roll is pushed in to the stop at the end of the spindle.
4. Open the printhead by moving the head open lever (b) counterclockwise to the open position.
5. Thread the ribbon as shown. Wind the ribbon onto the ribbon takeup spindle (c) for several turns in a clockwise direction until wrinkles and creases disappear.
6. Close the printhead by moving the lever clockwise to the closed position.

Ribbon Removal

Refer to Figure 12.

When it's time to change the ribbon, cut the ribbon where it is stretched between the upper ribbon guide arm and the takeup spindle. To remove ribbon from the takeup spindle, press the release button (d) and slide the ribbon off the spindle.

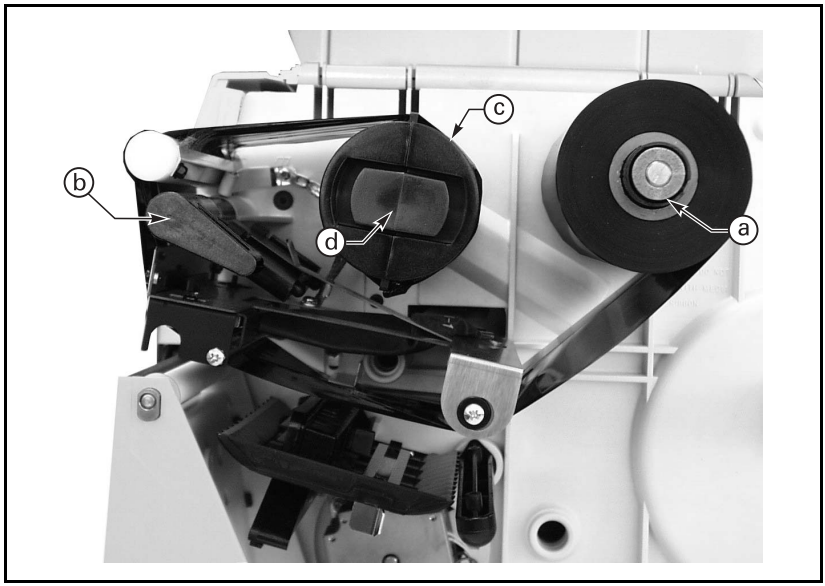


Figure 12. Ribbon Removal

Adjusting the Media Sensor

This adjustment aligns the position of the light sensor with the notch or edge of the label, so the printer can determine the correct label size.

See Figure 13. With the printhead open, look through the side of the print mechanism and locate the media sensor adjustment lever (a). Reposition the sensor until the top of the adjustment lever is in line with the notch or web in the media or the edge of the label. Close the printhead by moving the head open lever to the closed position.

When continuous media (no notch or opening to sense) is used, position the media sensor anywhere over the media so that an "out-of-media" condition is sensed.

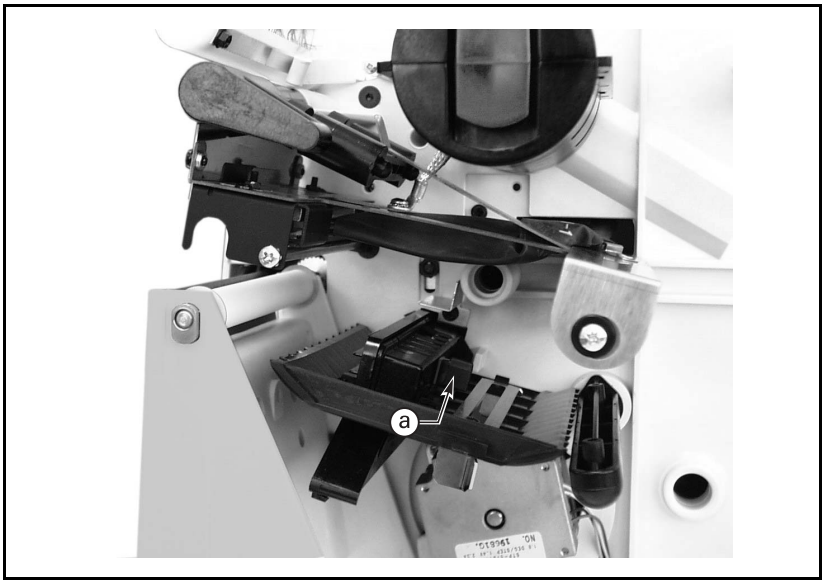


Figure 13. Media Sensor Adjustment

Non-Continuous Media

This type of media has some type of physical characteristic (web, notch, perforation, etc.) that indicates the start/end of each label.

The media sensor must be properly positioned to sense these indicators as described above. Then, turn on the printer. If the printer does not auto calibrate, press the MODE button three times, and then the FEED button once, to manually calibrate (a label prints showing the sensor profile).

Continuous Media

Since continuous media does not contain label start/end indicators, you must tell the printer via software how long each label is. If you are using ZPL or ZPL II, include a Label Length (**^LL**) instruction in each label format you send to the printer (refer to your *ZPL II Programming Guide*). If you are using other software to operate your printer, refer to the instructions provided with that software.

Auto Calibration

This procedure occurs whenever the printer is turned on or the printhead is opened and closed. During this procedure, the printer automatically determines the media type, label length, media and ribbon sensor settings, and printing method (direct thermal or thermal transfer). This procedure is set at the factory but may be changed via ZPL II command.

NOTE: If the printer fails to auto calibrate when you are using pre-printed labels or pre-printed label backing, or if the printer does not auto calibrate, see "Manual Calibration" on page 53.

1. Load the media and ribbon (if used).
2. Turn on the printer power.
3. Two or three blank labels feed, completing auto calibration.

Operator Controls

Front Panel Buttons

Refer to Figure 14.

PAUSE Button

- Starts and stops the printing process.
- The first time the button is pressed, any partially printed label is completed; then, the printing process is stopped.
- If the printer is idle when the button is pressed, no new print requests are printed until PAUSE is pressed again.

FEED Button (also referred to as the UP button)

- Forces the printer to feed one blank label.
- If the button is pressed when the printer is idle or paused, a blank label immediately feeds.
- When the button is pressed while the printer is printing, one blank label feeds *after* the completion of the current batch of labels.
- Once the blank label has been fed, pressing the button again feeds a second label.
- When in the configuration mode, functions as the UP button.

CANCEL Button (also referred to as the DOWN button)

- This button only functions when the printer is paused.
- If the button is pressed, the label format that is currently printing is canceled.
- If pressed when no label format is printing, then the next format to be printed is canceled.
- Press for at least three seconds to cancel all label formats the printer has received and return the printer to an idle state.
- When in the configuration mode, functions as the DOWN button.

MODE Button

- Puts the printer into the configuration mode.
- Used to change print darkness and media position, and to calibrate the printer.

Front Panel LEDs

Refer to Figure 14.

The front panel LEDs give you a quick indication of the printer's current status. During normal operation, the POWER LED is on and all other LEDs are off. For all other conditions, please refer to "Troubleshooting" beginning on page 45.

Now, you're ready to turn on the printer!

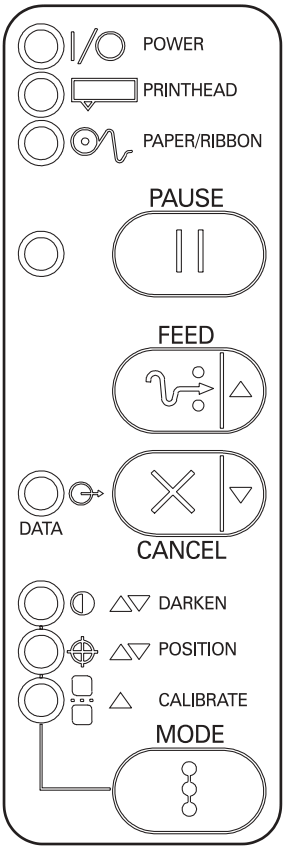


Figure 14. Front Panel

AC Power On/Off Switch

This switch is located on the left side of the printer near the AC power cord and fuse (see Figure 6 on page 8). The AC power switch should be turned off before connecting or disconnecting any cables.

Turning the switch on activates the printer and causes it to perform a Power-On Self Test, which can take up to 30 seconds, as it begins operation. Turning the printer power on while holding down certain front panel keys activates additional printer self tests following the Power-On Self Test. See page 56.

External influences, such as lightning storms or unwanted noise on the power or data cables, may cause erratic printer behavior. Turning the AC power off and then back on may re-establish proper printer operation. Otherwise, see “Troubleshooting” beginning on page 45.

Printing a Test Label

Before you connect the printer to your computer, make sure that the printer is in proper working order. You can do this by printing a configuration label (see “CANCEL Key Self Test” on page 57.) If you can’t get this label to print, refer to “Troubleshooting” beginning on page 45.

To make print quality adjustments, see “Print Quality Adjustments” beginning on page 38.

Connecting the Printer and Computer

This printer comes with both a nine-pin Electronics Industries Association (EIA) RS-232 serial data interface and an IEEE 1284 bi-directional parallel data interface. In either case, you must supply the required interface cable for your application.

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

RS-232 Interface Requirements

Refer to Figure 6 on page 8.

The required cable must have a 9-pin "D" type (DB-9P) connector (male) on one end, which is plugged into the mating (DB-9S) connector (female) located inside the access opening on the left side of the printer.

The other end of the signal interface cable connects to a serial port at the host computer. This cable is one of two types — standard or null modem — depending on the specific interface requirements.

For pinout information, as well as information on how to interconnect to either a DTE (data terminal equipment) or DCE (data communication equipment) device, refer to the "Appendix" on page 67.

Parallel Interface Requirements

Refer to Figure 6 on page 8.

An IEEE 1284 compatible bi-directional parallel data cable is required when this communication method is selected. The required cable must have a standard 36-pin parallel connector on one end, which is plugged into the mating connector located inside the access opening on the left side of the printer. The parallel interface cable is connected using bail clips instead of screws.

The other end of the parallel interface cable connects to the printer connector at the host computer.

For pinout information, see “Parallel Interface Technical Information” on page 69.

Serial and Parallel Cabling Requirements

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

To minimize electrical noise pickup in the cable:

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

Communicating with the Printer

Via the Parallel Port

- Set the parallel connection on the host computer. For instructions, refer to your computer’s user’s guide.

Via the Serial Port

- Set the host computer to the factory defaults of the printer: 9600 baud, 8 bit word length, no parity, 1 stop bit, and XON/XOFF. For instructions, refer to your computer’s user’s guide.

NOTE: If you can’t reset the host computer communications settings, then you must establish a temporary parallel connection to send down the Set Communications (**^SC**) command that changes the printer’s settings to match the host settings.

Defaulting the Printer: To reset *only* the communications parameters on the printer to the factory defaults (9600 baud, 8 bit word length, no parity, 1 stop bit, and XON/XOFF), press and hold the PAUSE, FEED, and MODE buttons while turning on the printer, then release the buttons when the CALIBRATE LED goes out. All of the LEDs turn on, while the DARKEN, POSITION, and CALIBRATE LEDs flash. Press and hold the MODE button until all of the lights go out, then release the MODE button. The factory defaults have now been reset. Next, set the communications parameters on your computer to match this.

NOTE: To save the default settings, press the MODE button four times. Otherwise, the previous settings are restored the next time the printer is turned on.

Autobaud: To automatically detect the communications parameters, press and hold the PAUSE, FEED, and MODE buttons while turning on the printer, then release the buttons when the CALIBRATE LED goes out. All of the LEDs turn on, while DARKEN, POSITION, and CALIBRATE LEDs flash. Send a label format using the host computer settings. If the printer accepts the host parameters, all of the LEDs turn off (except for the POWER LED) and the printer restarts with the host communication settings. If the printer *does not* accept the host communications parameters, the printer does not restart and the LEDs flash on and off. If this should happen, turn the printer off and then on, and try again.

NOTE: Label formats sent to the printer at this time only help the printer determine the host settings. No label prints until settings are recognized.

NOTE: In order for autobaud to work, your label *must* start with either a **^XA** or **~XA** ZPL II command. If all the LEDs are on, send another label format.

NOTE: Save the new communication settings by pressing MODE four times.

NOTE: Autobaud only works for 9600 baud and higher.

^SC: Use the Set Communications (**^SC**) command to change the communications settings on the printer. With the host computer set at the same communications settings as the printer, send the **^SC** command to change the printer to the desired settings. Then, change the host computer settings to match the printer settings.

Setting Up the Software

In order to create labels, you must decide whether to use ZPL II or commercial label preparation software. To use ZPL II, refer to the *ZPL II Programming Guide*. If you choose to use a label preparation software, follow the installation instructions included in the package.

Routine Care and Adjustments

Cleaning

CAUTION: Use only the cleaning agents indicated below. Zebra Technologies Corporation will not be responsible for any other products being used on this printer. No lubricants are needed.

Table 1 provides a brief cleaning schedule. Specific cleaning procedures are provided on the following pages. Cleaning swabs saturated with 70% isopropyl alcohol are available from your distributor as a preventive maintenance kit.

Refer to Figure 15 for cleaning locations.

Table 1. Cleaning Schedule

Area		Method	Interval
Printhead (a)		Alcohol	After every roll of media (or 500 feet of fanfold media) when printing in the direct thermal mode. After every roll of ribbon when printing in the thermal transfer mode.
Platen roller (b)		Alcohol	
Media sensor (c)		Air blow	
Media path (d)		Alcohol	
Ribbon path (e)		Air blow	
Upper guide rod (f) (Peel-Off)		Alcohol	
Platen guide rod (g) (Peel-Off)		Alcohol	
Rewind power roller (h) (Peel-Off)		Alcohol	
Lower guide rod (i) (Peel-Off)		Alcohol	
Cutter Assembly (j) (if used)	Cutting continuous, pressure-sensitive media	Citrus based adhesive remover	After every roll of media or more often, depending upon your application and the media.
	Cutting tagstock or label backing material only	Alcohol and air blow	After every 2 or 3 rolls of media.
Tear-Off/Peel-Off plate (k)		Alcohol	Once a month.
Label available sensor (l)		Air blow	Once every six months.

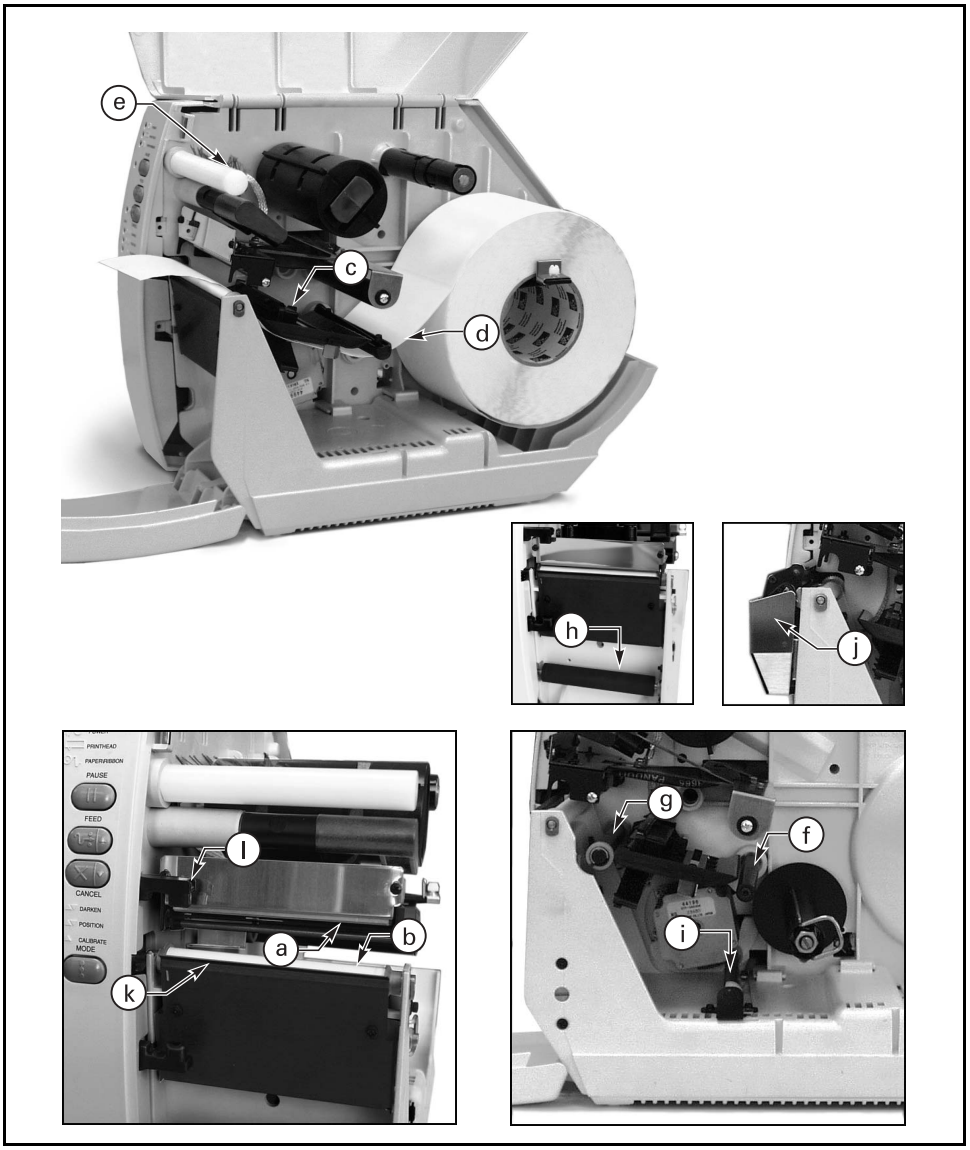


Figure 15. Cleaning Locations

Cleaning 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 solution or desktop cleaner may be used sparingly.

Cleaning the Interior

Remove any accumulated dirt and lint from the interior of the printer using a soft bristle brush and/or vacuum cleaner. Inspect this area after every roll of media.

Cleaning the Printhead and Platen Roller

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

NOTE: It is not necessary to turn the printer off 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 DRAM memory, are lost. When power is turned back on, it is necessary to reload these items.

To clean the printhead, refer to Figure 16 and follow these steps:

1. Open the media access cover and the front cover (see Figure 4 on page 5).
2. Open the printhead (a) by moving the head open lever (b) to the open position.
3. Remove the media and ribbon (if present).
4. With a swab, wipe the print elements (c) from end to end (the print elements are the grayish/black strip just behind the chrome strip.) Allow a few seconds for the solvent to evaporate.
5. Rotate the platen roller (d) and clean thoroughly with alcohol.
6. Brush/vacuum any accumulated paper lint and dust away from the rollers and media sensors.
7. Reload ribbon and/or media, close and latch the printhead, close the front cover and the media access cover, and continue printing.

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 distributor for more information.

Figure 16. Printhead and Platen Roller Cleaning

Cleaning the Cutter Module

(For printers equipped with the optional Cutter).

The cutter module requires periodic cleaning to remove paper dust and gummed label residue. The procedure on the following pages should be performed by the operator according to the cleaning schedule outlined in Table 1. However, depending on your application and media type, you may need to clean the cutter more or less frequently.

NOTE: In the figures shown, media and ribbon have been removed for clarity. It is not necessary to remove media or ribbon before performing the maintenance procedures described.

IMPORTANT: Do NOT exchange cutter modules between different printers. The cutter module adjustments are optimized during installation to work with a particular printer and may not perform correctly if the module is placed on a different printer.

Removing the Cutter Module from the Printer

1. Turn off the printer's AC power.
2. See Figure 17. Remove the label catch tray (a) by lifting it up and away from the front of the cutter module (b).

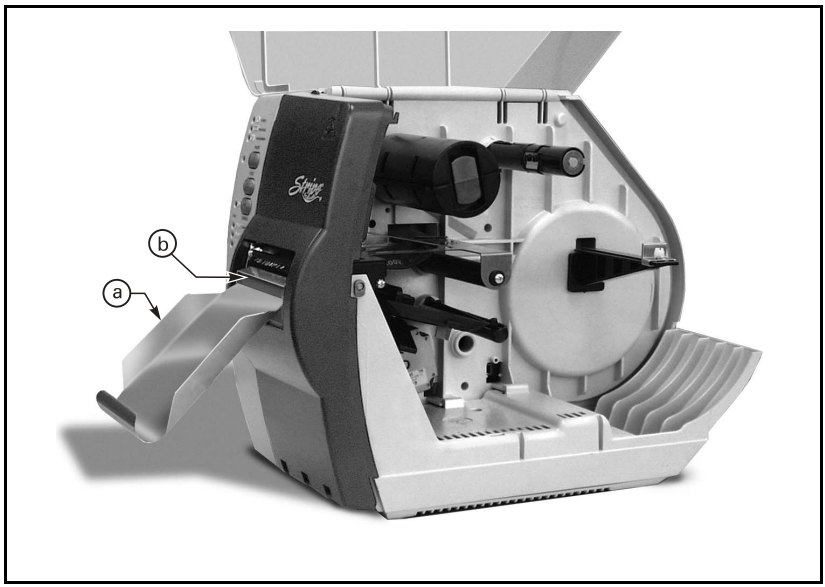


Figure 17. Label Catch Tray Removal

3. Raise the printer's media access cover and lower the printer's front cover.
4. See Figure 18. Gently pull straight down on the cutter cable connector (a) to remove it from the mating socket on the cutter module.

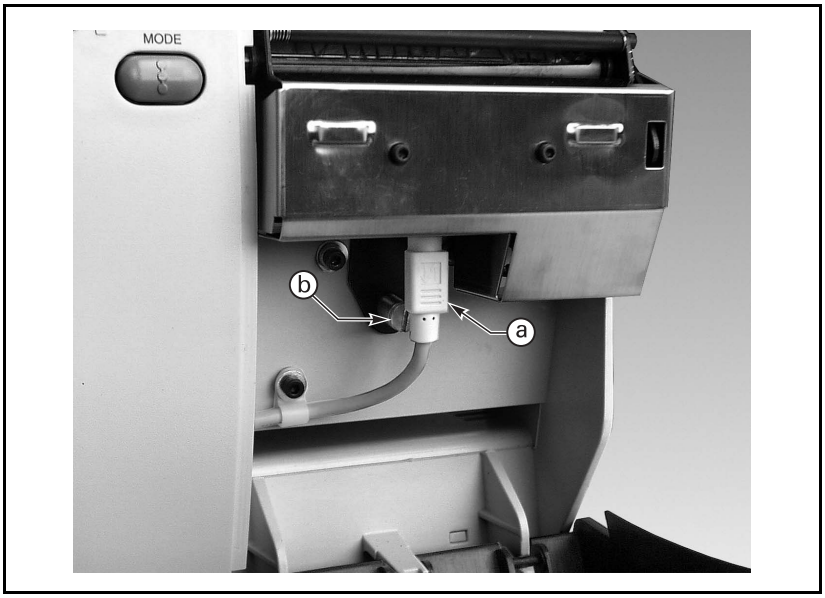


Figure 18. Cutter Cable Connector Removal

5. Turn the cutter mounting screw (b) with a screwdriver or by hand in a counterclockwise direction until it is loose.

6. See Figure 19. Hold the cutter module as shown. Apply gentle upward pressure to the left and right ends while raising the cutter module up and away from the mounting posts (a). If necessary, rock the module side to side to loosen it.

Figure 19. Cutter Module Removal

Disassembling the Cutter Module

1. See Figure 20. Hold the cutter module as illustrated. Put your thumbs on the two wire spring loops (a) and your index fingers on the top of the rear cutter blade guard (b). It may help to lay the cutter module on a table or other surface throughout this process.

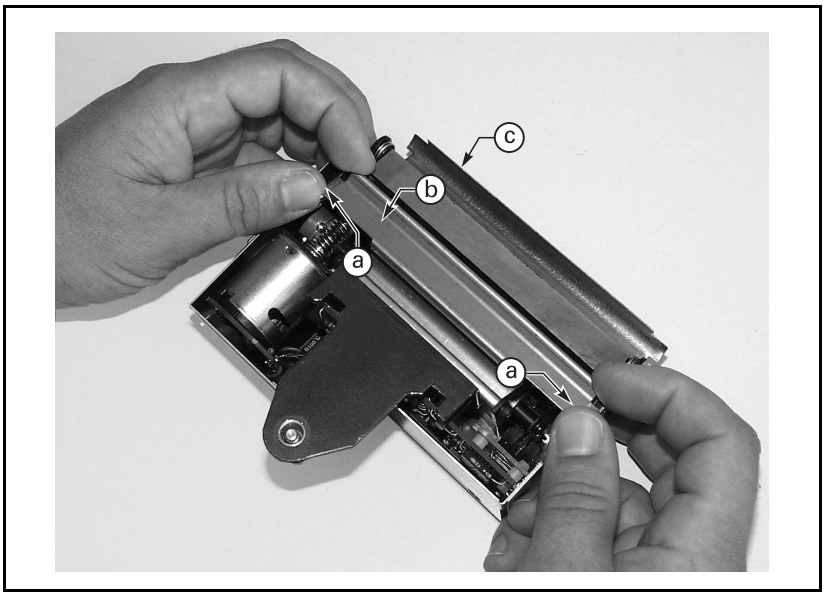


Figure 20. Cutter Module Disassembly

2. To remove the rear cutter blade guard, first press down simultaneously on the two wire spring loops. While pressing down on the loops, press the rear cutter blade guard back toward you and over the top of the loops. (You're trying to tuck the loops underneath the blade guard in this process.)

3. Continue pressing the rear cutter blade guard toward you and allow the back edge of the guard to pop up as the guard comes free from its holders. You may now remove the rear cutter blade guard by lifting it off of the module.

NOTE: The wire springs may flip up out of position during this process. Springs are repositioned during reassembly.

4. Observe the ends of the rear cutter blade guard and note the small metal pins protruding toward the inside. During the reassembly procedure, these pins are mounted into the corresponding mounting slots in the cutter side panels.

5. To provide complete access to the area to be cleaned, raise the upper cutter blade guard (c) as shown in Figure 20.

Cleaning the Cutter Module

1. Remove any label material that has adhered to the cutter parts and use a small brush to remove any paper dust from the cutter module.

2. If you use pressure-sensitive media, use a lint-free cloth soaked in an adhesive remover to remove all gum and label residue from the cutting blades and guards. If you use tag stock, use alcohol to remove any dirt.

Reassembling the Cutter Module

1. See Figure 21. Position the two wire springs (a) down against the lower cutter blade.

2. Place the rear cutter blade guard (b) over the wire springs, perpendicular to its final position. Place your thumbs on the top (flat) part of the guard.

NOTE: Ensure that the ends of the rear cutter blade guard are positioned on the outside of the cutter side panels.

3. Press the rear cutter blade guard down and forward, rotating the guard as you proceed, to lock the mounting pins (c) into position in the cutter side panel mounting slots (d). Slide the guard forward until the two wire spring loops pop up on the back side of the guard.

NOTE: Ensure that the wire springs remain positioned under the rear cutter blade guard when assembly is completed.

4. Lower the upper cutter blade guard back to its normal position. When reassembled, the back of the cutter module should look like the one shown in Figure 22.

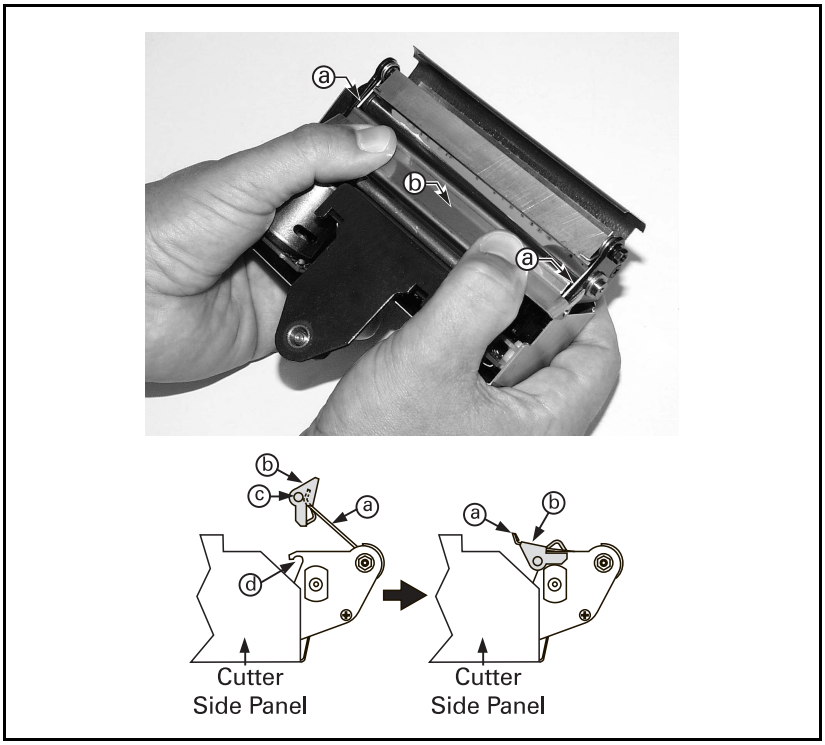


Figure 21. Cutter Module Reassembly

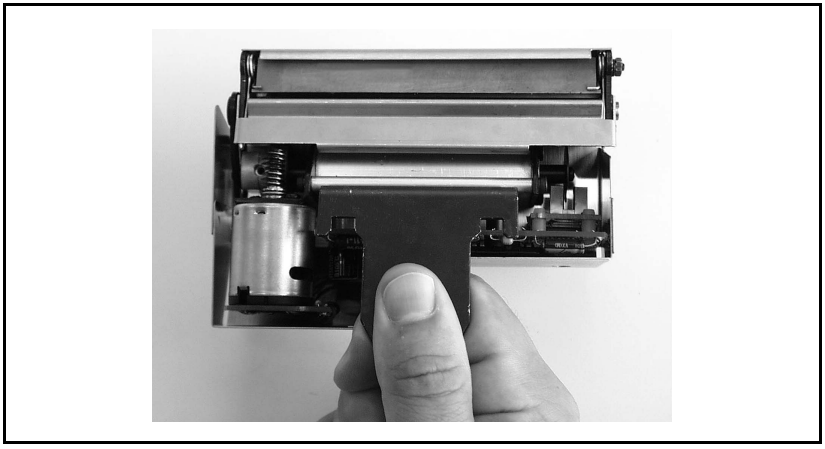


Figure 22. Cutter Module Reassembly — Rear View

Reinstalling the Cutter Module

1. See Figure 19. Position the cutter module above the cutter mounting posts (a). Press down on the cutter module until the mounting slots (b) engage the mounting posts on the printer.
2. See Figure 18. Tighten the mounting screw (b) in a clockwise direction to hold the cutter module in position.
3. See Figure 18. Position the cutter cable connector (a) so the flat side of the connector faces away from the printer, then insert it up into the mating connector on the cutter module.
4. Replace the cutter catch tray onto the two mounting posts located on the front of the cutter module.

Testing the Cutter Operation

1. If necessary, reload ribbon and label stock into the printer, then close the printer's front cover and media access cover.

   NOTE: When loading media, make sure the end of the label is positioned on top of the platen roller, then close the printhead open lever.

2. When the printer is turned on, the cutter module cycles through one cutting operation and is then ready to print labels.
3. **OPTIONAL:** Hold in the PAUSE button while turning on the printer's AC power. When the Power-On Self Test begins (all LEDs on), release the PAUSE button. When the Power-On Self Test ends, the printer automatically prints test labels that the cutter module automatically cuts.

Lubrication

CAUTION: **No lubricating agents of any kind are required on this printer.** Some commercially available lubricants will damage the finish if used.

AC Power Fuse Replacement

A user-replaceable AC power fuse (see Figure 6) is located just to the left of the power on/off switch. For use with both voltage ranges, the replacement fuse is a 5 x 20 fast blow style rated at 5 Amp/250 VAC.

1. Before replacing the fuse, turn the AC power switch off and unplug the AC power cable.
2. To replace the fuse, insert the tip of a flathead screwdriver into the slot in the end of the fuse holder end cap.
3. Press in slightly on the end cap and turn the screwdriver slightly counterclockwise. This disengages the end cap from the fuse holder and permits the removal of the fuse.
4. To install a new fuse, remove the old fuse and insert the new fuse into the fuse holder.
5. 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.
6. Plug in the AC power cable and turn the AC power switch on.

Mechanical Adjustments

This printer has been designed so that minimal operator adjustments are required.

Print Quality Adjustments

When changing from one media/ribbon combination to another, only slight changes in print darkness or toggle pressure may be required. For these situations, refer to “Toggle Pressure Adjustment” on page 40.

Checking the Initial Print Quality

1. Open the media access cover and front cover on the printer (see Figure 4 on page 5).
2. Load the recommended media and ribbon for your application and adjust the media sensor position.
3. Send a label format to the printer or activate the PAUSE Key Self Test (see page 58), print a few labels, and press the PAUSE button to stop printing.
4. Observe the print quality of the test labels. If it is satisfactory, exit the PAUSE Key Self Test by pressing and holding the CANCEL button until the DATA LED goes off. Otherwise, continue to "Adjusting the Print Darkness (Burn Temperature)" below.

Adjusting the Print Darkness (Burn Temperature)

1. Press the MODE button once (DARKEN and PAUSE LEDs turn on) to permit darkness adjustment.
2. Press the PAUSE button to begin printing test labels.
3. While observing the print darkness, repeatedly press the UP (FEED) button to make the printing darker, or the DOWN (CANCEL) button to make the printing lighter, until the desired darkness is achieved.
4. Briefly press the MODE button three times. The MODE LEDs flash on and off to indicate that the settings have been saved in memory.
5. Press the PAUSE button to stop printing.

NOTE: To confirm the change, turn off the printer. Then, turn on the printer while holding the CANCEL button.

If you are still experiencing poor print quality, perform the toggle pressure adjustment procedure on the next page. Otherwise, exit the PAUSE Key Self Test by pressing and holding the CANCEL button until the DATA LED goes off.

Toggle Pressure Adjustment

The toggle assembly presses the printhead against the ribbon (if used), the media, and the platen.

The pressure applied by the toggle assembly may need to be increased or reduced when different thicknesses or widths of media are used in the printer.

NOTE: Before increasing toggle pressure to achieve darker print darkness, perform the print quality adjustments.

Refer to Figure 23. Turn the two knurled toggle pressure adjust knobs (a) on top of the toggle assembly to adjust the pressure. Turning clockwise increases the pressure, and turning counterclockwise decreases the pressure.

Always use the lowest toggle pressure necessary to provide the desired print darkness on the label.

NOTE: When using media narrower than 4.5" wide (full media width), reduce the pressure on the right hand toggle until print quality is affected, then increase pressure just to the point where good print quality is achieved. This reduces the wear on those areas of the printhead and the platen where ribbon and media are not present. (For very narrow media, zero pressure from the right toggle may be required.)

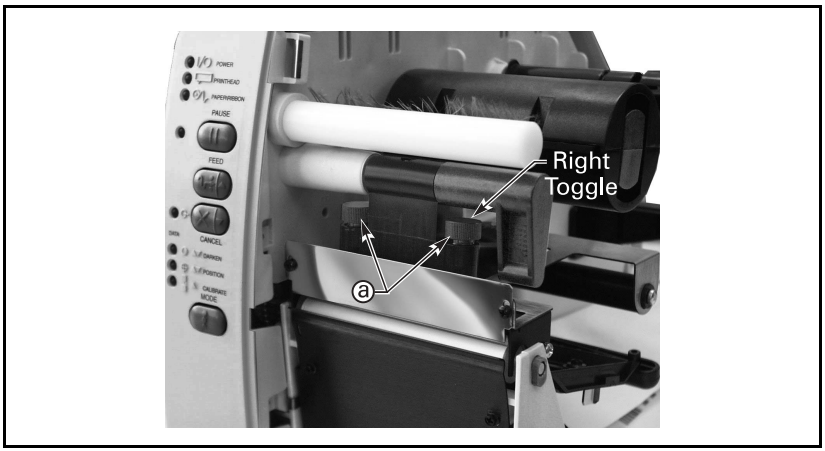


Figure 23. Toggle Pressure Adjustment

Media Rest Position Adjustment

This procedure sets the end-of-label position relative to the Tear-Off plate or cutter. Adjust this if your label is not being torn or cut at the correct point.

1. Briefly press the MODE button twice. The PAUSE and POSITION LEDs turn on.
2. Press UP (FEED) or DOWN (CANCEL) to adjust the current setting.
3. Briefly press the MODE button twice. The MODE LEDs flash on and off to indicate that the settings have been saved in memory.
4. Press PAUSE to exit the pause mode. The PAUSE LED turns off.

Top of the Label Position Adjustment

This procedure positions the printing on the label relative to the top edge of the label. Adjust this if your printing is too close or too far away from the top or bottom edge of the label.

1. Briefly press the MODE button twice, then press and hold it for about five seconds until the lights change. The PAUSE, DARKEN, and CALIBRATE LEDs turn on.
2. Press UP (FEED) or DOWN (CANCEL) to adjust the current setting.
3. Briefly press the MODE button twice. The MODE LEDs flash on and off to indicate that the settings have been saved in memory.
4. Press PAUSE to exit the pause mode. The PAUSE LED turns off.

Media Sensor Position Adjustment

Please see “Adjusting the Media Sensor” on page 18 to adjust the media sensor position.

Ribbon Supply Spindle Adjustment

Please see page 15 for the ribbon supply spindle adjustment procedure.

(Peel-Off option required).

NOTE: This roller is only present on printers with the Peel-Off option. Zebra presets this roller during manufacture for proper operation with most applications. Only adjust this roller when necessary.

In the Peel-Off mode, proper media tracking is critical. The rewind power roller automatically turns along with the movement of media to ensure continuous rewind of the label backing material. When adjusting this roller, the operating position may vary due to the type, width, and thickness of the backing material.

Before performing this adjustment, review the loading procedure for "Peel-Off Mode" on page 11. Ensure minimal sideways movement during the printing process by positioning the left edge of the label backing even with the edge guide mark on the tear-off/peel-off plate. Position the media guides against the outside (right) edge of the media, but not so tight as to bind the material.

When the power roller is properly adjusted, the backing material should have even tension across its entire width and be wrapped snugly around all guides and rollers. If the tension is not even, the media/backing material may slide (walk) to the left or to the right as printing occurs. This can cause print registration problems on the labels.

Figure 24 illustrates an improperly adjusted backing rewind power roller (a). On the left side, the backing material (b) is not contacting the power roller. The backing has more tension on the right edge (c) than on the left edge (d).

Use a coin or screwdriver to turn the power roller adjustment (e). The adjustment mechanism changes the position of the right end of the roller, while the left end is stationary. The right end moves up and down for tension balance.

Turning this adjustment in a counterclockwise direction causes the right end of the power roller to move down and increases the tension on the right side of the backing material. (Turning the adjustment in a clockwise direction moves the right end of the power roller up and decreases the tension on the right side.)

Balancing the tension increases the reliability of the printer to provide properly printed labels by preventing the label backing from walking.

Use the FEED Key Self Test (see page 59) or your own label format to print several labels to ensure tracking is maintained and tension on both edges of the backing material remains consistent. Remember to remove each label as it is automatically peeled away from the backing.

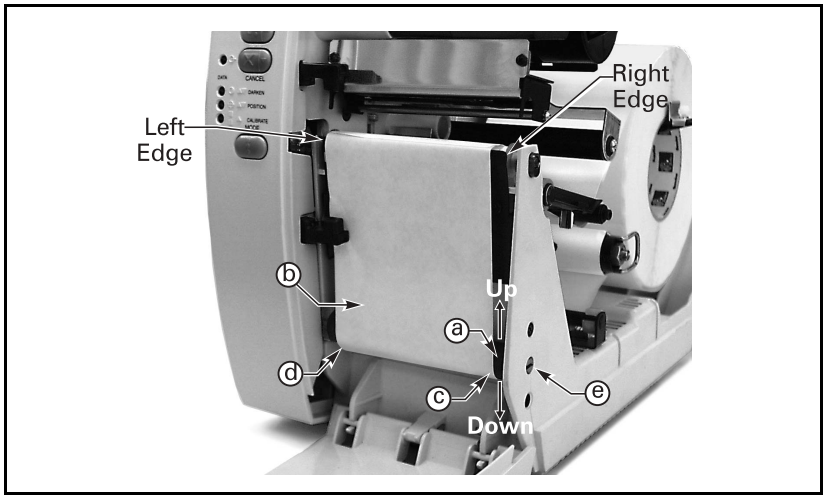


Figure 24. Improper Backing Rewind Power Roller Adjustment

Troubleshooting

If the printer operates in an abnormal fashion, consult the troubleshooting table below. The printer diagnostics following the troubleshooting table may also help you to determine the problem.

The troubleshooting of some problems may be beyond the abilities of the operator. In these cases, call a service technician to perform additional troubleshooting and repair procedures.

Troubleshooting Tables

Symptom	Diagnosis	Action
No LEDs turn on.	No AC power applied to the printer.	Ensure the AC power cable is connected to a working voltage source.
	Faulty AC power fuse.	Replace the fuse.
	No voltage available from the internal power supply.	Call a service technician.
Printer locks up with all LEDs on when running the Power-On Self Test.	Hardware failure.	Call a service technician.
CALIBRATE LED off but all other LEDs on.	Boot-block CRC error.	Call a service technician.
CALIBRATE and POSITION LEDs off but all other LEDs on.	DRAM error.	Call a service technician.
CALIBRATE, POSITION, and DARKEN LEDs off but all other LEDs on.	Firmware decompression error.	Call a service technician for instructions on how to download and install firmware.
CALIBRATE, POSITION, DARKEN, and DATA LEDs off but all other LEDs on.	Firmware error.	
CALIBRATE, POSITION, DARKEN, DATA, and PAUSE LEDs off but all other LEDs on.	Firmware error.	

Symptom	Diagnosis	Action
Printer stops, PAUSE LED and PAPER/RIBBON LED both on.	Media incorrectly or not loaded.	Load media correctly, then turn the printer off and on. See page 8.
	Cutter error.	Clear jam, then open and close the printhead.
	Calibration error.	Re-calibrate printer.
	Misadjusted media sensor.	Check position and sensitivity of media sensor. See page 18.
	Are you using pre-printed media?	Calibrate the printer. See page 19.
Printer stops, PAUSE LED on and PAPER/RIBBON LED flashing.	Ribbon incorrectly or not loaded.	Load ribbon correctly, then turn the printer off and on. See page 15.
	Backing rewind spindle is full.	Remove label backing from the spindle. See page 13.
	Malfunctioning ribbon sensor.	Call a service technician.
	Ribbon not calibrated.	Calibrate the ribbon. See “Resetting Ribbon Parameters” on page 55.
Printer stops, PAUSE LED on and PRINTHEAD LED flashing.	Printhead is not fully closed.	Close printhead completely, then turn the printer off and on.
	Printhead open sensor not detecting its position flag.	Call a service technician.
Printer stops, PAUSE LED and PRINTHEAD LED both on.	Printhead element is overheated.	Printer resumes printing when the printhead element cools.
	Power supply over temperature.	Printer resumes printing when the power supply cools.
Printer does not successfully perform an auto calibration.	Printhead open.	Close the printhead.
	You’re using pre-printed labels.	Perform a manual calibration. See “Manual Calibration” on page 53.
	Media is out.	Load media. Ensure that the media sensor is properly positioned.
Printer does not perform a manual calibration.	Media is out of specification.	Ensure that the media sensor is properly positioned. Or, perform a manual calibration. See “Manual Calibration” on page 53.
	Hardware failure.	Call a service technician.
Printing continues, PRINTHEAD LED on.	Printhead is under temperature.	Continue printing.
PAUSE LED flashing.	Waiting for user to peel label.	Remove label.

Symptom	Diagnosis	Action
DATA LED is single flashing.	CANCEL button was pressed and a format was deleted.	No action required.
PAUSE LED and DATA LED alternately flashing, but all other LEDs on.	Firmware error.	Call a service technician for instructions on how to download and install firmware.
DATA LED is flashing.	Printer is receiving data.	Printing resumes when data is received.
DATA LED is slow flashing.	Printer sent a “stop transmitting” to the host computer.	No action required.
Dots missing in printed area of label.	Dirty printhead.	Clean the printhead. See page 29.
	Printhead element going bad. Print quality problems.	Call a service technician.
	Print width set incorrectly.	Default the printer. See “Resetting Factory Defaults” on page 54.
Loss of printing registration on labels.	Possible media sensor problem.	Adjust media sensor position (see page 18) and call a service technician if necessary.
	Printer set for non-continuous media, but continuous media loaded.	Set printer for correct media. See “Non-Continuous Media” and “Continuous Media” on page 19.
For Peel-Off mode:	Improperly adjusted media edge guides or power roller.	See “Adjusting the Media Sensor” on page 18 and “Backing Rewind Power Roller Adjustment” on page 42 for proper positioning and adjustments.
Excessive vertical drift in top-of-form registration.	Incorrect media loading or media sensor adjustments.	See “Loading the Media” on page 8 or “Adjusting the Media Sensor” on page 18.
Light vertical lines approximately 0.006 wide running through all labels.	Dirty head or ribbon rollers.	See “Cleaning the Printhead and Platen Roller” on page 29.
	Defective printhead elements.	Call a service technician.
Light printing or no printing on the left or right side of the label.	Printhead needs balancing.	Adjust balance. See “Toggle Pressure Adjustment” on page 40.
Short printed lines at 45° to label edge on left or right side of label.	Too much printhead pressure.	Reduce the pressure. See “Toggle Pressure Adjustment” on page 40.

Symptom	Diagnosis	Action
Truncated print, no print, or FEED button operates incorrectly while using non-continuous media.	Media or ribbon improperly loaded.	See “Loading the Media” on page 8 and “Loading the Ribbon” on page 15.
	Incorrect media sensor position or sensitivity.	See “Adjusting the Media Sensor” on page 18.
		See “Auto Calibration” on page 19.
Fine gray lines on blank labels at angles.	Wrinkled ribbon.	See “Wrinkled Ribbon” in this table.
Long tracks of missing print on several labels.	Wrinkled ribbon.	See “Wrinkled Ribbon” in this table.
	Print element damaged.	Call a service technician.
Wrinkled Ribbon	Ribbon fed through machine incorrectly.	See “Loading the Ribbon” on page 15.
	Incorrect darkness setting.	Set to the lowest value needed for good print quality.
	Incorrect printhead pressure.	See “Toggle Pressure Adjustment” on page 40.
	Incorrect dual-tension spindle setting.	Pull spindle end cap out when using wide media to obtain normal (higher) tension. See “Loading the Ribbon” on page 15.
	Media not feeding properly; it is walking from side to side.	Make sure the media is snug by adjusting the media guides.
	Continuing symptoms.	Call a service technician.
In Peel-Off mode, skewed or stuck labels.	Glue material from back of labels causing media movement problems.	Refer to “Routine Care and Adjustments” beginning on page 27 and perform maintenance and cleaning of the printer.
	Media and backing not properly aligned in printer.	Reload media and adjust the power roller, if needed. See “Loading the Media” on page 8 and “Backing Rewind Power Roller Adjustment” on page 42.
Image is not positioned correctly and/ or misprint of 1 to 3 labels.	Media was pulled when motor was not moving.	Open and close the printhead, so it calibrates to find the label length.
	Incorrect media sensor position.	See “Adjusting the Media Sensor” on page 18.
	Media or ribbon improperly loaded.	See “Loading the Media” on page 8 and “Loading the Ribbon” on page 15.
	Auto calibrate failed.	Perform a manual calibration. See “Manual Calibration” on page 53.

Symptom	Diagnosis	Action
Changes in parameter settings did not take effect.	Parameters are set or saved incorrectly.	Reload the factory defaults (see “PAUSE Key Self Test” on page 58 and “FEED Key Self Test” on page 59), calibrate the printer, then cycle the power on/off switch.
	If problem continues, there may be a problem on the main logic board.	Call a service technician.
When using wide ribbon (over 2.4"), the image gets lighter or smears near the end of the roll of ribbon. Ribbon appears to slow down or stop.	Too much back-tension on the ribbon.	See “Loading the Ribbon” on page 15 to adjust the ribbon supply spindle to provide low tension.
ZPL was sent to printer, but not recognized. The DATA LED remains off.	Communications parameters are set incorrectly.	Print configuration label and verify that the host computer and printer settings match. If they do, perform the MODE Key Self Test and check for format or overrun errors. If they do not, see “Communicating with the Printer” on page 24.
	Prefix and delimiter characters set in printer configuration do not match the ones sent in the ZPL label formats.	Set the characters in the printer to match the ZPL format. Check configuration printout for correct characters. If problem continues, check the ZPL format for changed **^CC**, **^CT**, and **^CD** instructions.

Symptom	Diagnosis	Action
In cutter mode, skewed, stuck, improperly cut or partially cut labels.	Cutter is dirty.	See “Cleaning the Cutter Module” on page 30.
	Cutter blades are dull.	Call a service technician.
The cutter is jamming up with labels, or labels are being cut more than once.	Cutter is dirty.	See “Cleaning the Cutter Module” on page 30.
	Label length is too short.	Increase label length.
Labels are not being cut at all.	Cutter option not enabled.	See “Reinstalling the Cutter Module” on page 37.
	Connecting cable not connected to cutter module.	With printer power off, plug cable into cutter module.
Printing stops, PAPER/RIBBON, PAUSE, and CANCEL LEDs on.	Out of media.	Load media.
For printers with the cutter option installed.	Media jammed in cutter.	Remove media, clean cutter module if necessary.
	Cutter module is dirty.	Clean cutter module. See page 35.
	End of the media not positioned correctly on top of platen.	Reposition media so that the end is on top of the platen. See page 18.
	If error condition persists after attempting each of the above solutions, call a service technician.	

Printer Status Sensors

The printer contains several status sensors. These sensors alert the operator to various conditions by either stopping the printing or turning on an LED.

Sensor	What it Monitors	How it Works
Printhead sensor	Checks the open/closed status of the printhead lever.	If the printhead is open, the PRINTHEAD LED flashes.
Media sensor (See page 18 to adjust this sensor.)	Checks for proper media loading.	If you run out of paper, the PAPER/RIBBON LED turns on.
	If non-continuous media is used, sets label length for individual labels.	
Ribbon sensor	Monitors the presence of ribbon.	If you run out of ribbon, the PAPER/ RIBBON LED flashes.
Label available sensor (Peel-Off option required. See Figure 25.)	In Peel-Off mode, it checks to see if a label is available.	Once a label prints, it passes between the two parts of this sensor and causes the printer to pause. When the label is removed, printing resumes.
Backing rewind spindle full sensor (Peel-Off option required. See Figure 26.)	Senses when the backing rewind spindle is full of used backing material.	When the spindle is full, the PAPER/RIBBON LED flashes.

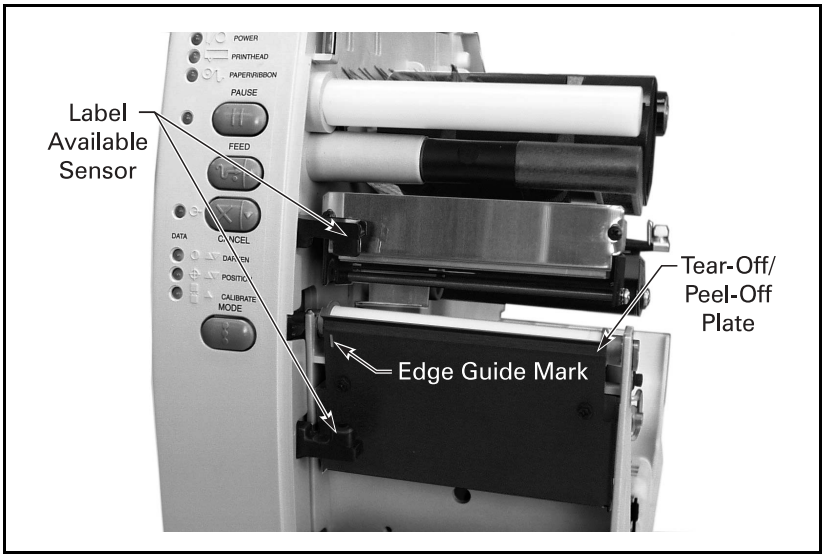


Figure 25. Label Available Sensor

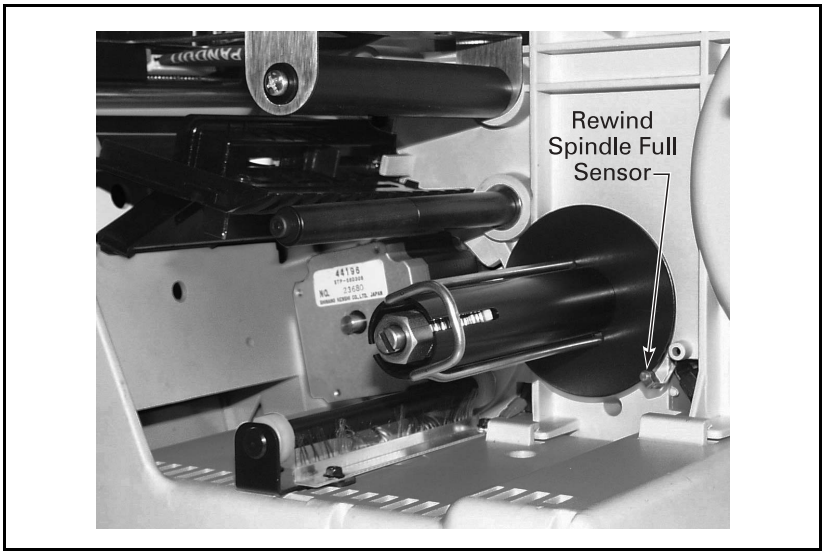


Figure 26. Backing Rewind Spindle Full Sensor

Manual Calibration

Perform a manual calibration if you are using pre-printed media, if the printer is in manual calibration mode, *or* if the printer does not auto calibrate.

During this procedure, the media type, label length, media and ribbon sensor settings, and printing method are determined. Media type is determined by sensing either continuous or non-continuous media as blank labels move through the printer. If non-continuous media is sensed, label length is also calibrated. If ribbon is sensed, the thermal transfer print method is configured; otherwise, the direct thermal print method is configured.

The results of this 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: This procedure should only be done once to put the printer into manual calibration. After that, press the MODE button three times and the FEED button once if you change media (a label prints that shows the sensor profile).

NOTE: If the printer is in the Peel-Off mode, the operator must "catch" the labels as they are peeled away from the backing during this procedure.

1. Place the head open lever in the open position.
2. Remove the ribbon.
3. Remove approximately 6" of labels from the media roll, enough so that only the backing material is threaded under the media sensor when the media is loaded.
4. Reload the media.
5. Press and hold down the PAUSE, FEED, and CANCEL buttons.
6. Turn on the power switch.
7. After the CALIBRATE LED goes out, release the PAUSE, FEED, and CANCEL buttons.

8. When the PRINTHEAD LED flashes, reload the ribbon.
9. Make sure the media sensor is properly positioned.
10. Close the printhead.
11. A media and ribbon sensor profile prints.

NOTE: To return to Auto Calibration, press and hold the PAUSE, CANCEL, and MODE buttons when you turn on the printer.

Resetting Printer Parameters

Resetting Factory Defaults

If it is ever necessary to reset all of the factory default values, press and hold the FEED and PAUSE buttons while turning on the power. Permanently save these values in memory by pressing the MODE button four times; the DARKEN, POSITION, and CALIBRATE LEDs flash, indicating the changes have been saved. To return to printing mode, turn off and then turn on the printer.

Resetting Communications Parameters

Pressing and holding the FEED, PAUSE, and MODE buttons while turning on the power resets only the communications parameters to 9600 baud, 8 bit word length, no parity, and 1 stop bit. Permanently save these values in memory by pressing the MODE button four times; the DARKEN, POSITION, and CALIBRATE LEDs flash, indicating the changes have been saved.

Resetting Ribbon Parameters

If it is ever necessary to reset the ribbon parameters to the factory default values, follow this procedure:

1. Turn off the printer.
2. Open the printhead and remove the ribbon.
3. Turn on the printer while pressing and holding the FEED, CANCEL, and MODE buttons.
4. After the PRINTHEAD LED flashes, reload the ribbon.
5. Close the printhead.

NOTE: A label automatically prints, showing the ribbon sensor profile.

6. To save, press the MODE button four times.

Printer Diagnostics

Power-On Self Test

A Power-On Self Test (POST) is performed automatically each time the printer is turned on. This test checks for proper initialization of various electronic circuits and establishes starting parameters as those stored in the printer's memory. During this test sequence, the front panel lights turn on and off to ensure proper operation.

At the end of this self test, only the POWER LED remains lit. If other LEDs are also lit, refer to "Troubleshooting Tables" beginning on page 45.

Additional Printer Self Tests

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

Each self test is enabled by holding in a specific front panel button while turning the power switch on. Keep the button depressed until the CALIBRATE LED goes out. When the Power-On Self Test is complete, the selected printer self test automatically starts. To return to printing mode, turn off and then turn on the printer.

NOTE: When performing self tests, disconnect all communications interface cables from the printer.

NOTE: When canceling a self test before its actual completion, always turn the printer power switch off and then back on.

NOTE: When performing these self tests while in the Peel-Off mode, the operator must remove the labels as they become available.

NOTE: When the cutter option is installed and enabled, the labels printed in these self tests should be automatically cut as they are printed.

CANCEL Key Self Test

This self test prints the printer's configuration parameters (for example, printing darkness, label length, and media type) that are currently stored in configuration (Flash) memory. See Figure 27.

1. Press the CANCEL button while turning on the printer.
2. Release the button when the CALIBRATE LED turns off.
3. To return to printing mode, turn off and then turn on the printer.

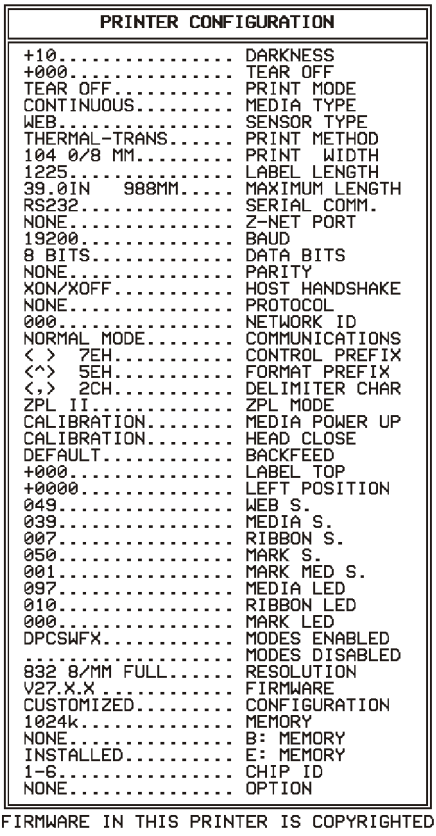


Figure 27. Configuration Label

PAUSE Key Self Test

This self test can be used to provide the test labels required when making adjustments to the printer's mechanical assemblies. See Figure 28.

1. Press the PAUSE button while turning on the printer.
2. Release the button when the front panel LEDs turn on.
3. To return to printing mode, turn off and then turn on the printer.

NOTE: This self test consists of four individual test features:

- The initial self test prints 15 labels at 2.4"/second then automatically pauses the printer. Each time the PAUSE button is pressed, an additional 15 labels will print, up to 9999 labels.
- While the printer is paused, pressing the CANCEL button once alters the self test. Now each time the PAUSE button is pressed, the printer prints 15 labels at maximum speed, up to 9999 labels.
- While the printer is paused, pressing the CANCEL button a second time alters the self test again. Now each time the PAUSE button is pressed, the printer prints 50 labels at 2.4"/second, up to 9999 labels.
- While the printer is paused, pressing the CANCEL button alters the self test a third time. Now each time the PAUSE button is pressed, the printer prints 50 labels at maximum speed, up to 9999 labels.

Figure 28. PAUSE Test Label

FEED Key Self Test

The results of this self test are used to determine the best darkness setting for a specific media/ribbon combination. Refer to Figure 29.

1. Press the FEED button while turning on the printer.
2. Release the button when the front panel LEDs turn on.
3. To return to printing mode, turn off and then turn on the printer.

To adjust print darkness, see "Print Quality Adjustments" on page 38.

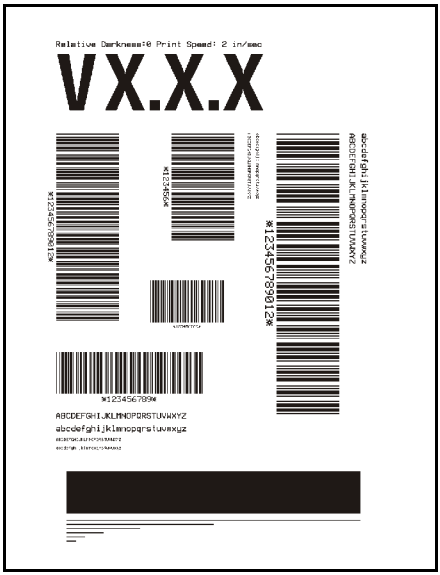


Figure 29. FEED Test Label

NOTE: The FEED Key Self Test labels print at various plus or minus darkness settings relative to the current darkness setting. Inspect these printouts and determine which printout has the best darkness setting.

NOTE: The value on that printout is added to (plus) or subtracted from (minus) the current darkness value. (For example, relative darkness is "5," so add that to the number on the current configuration label [see the next note] for the new darkness setting.)

NOTE: Increments to the actual darkness value can be programmed into the label formats sent to the printer. To see the actual value of the current darkness setting, perform a CANCEL Key Self Test; the value prints on the configuration printout.

MODE Key Self Test

This self test places the printer in a communications diagnostics mode. In this mode, the printer prints the ASCII characters and their corresponding hexadecimal values for any data received from the host computer. See Figure 30.

1. Press the MODE button while turning on the printer.
2. Release the button when the front panel LEDs turn on.
3. To return to printing mode, turn off and then turn on the printer.

NOTE: Turn off the power to exit this self test.

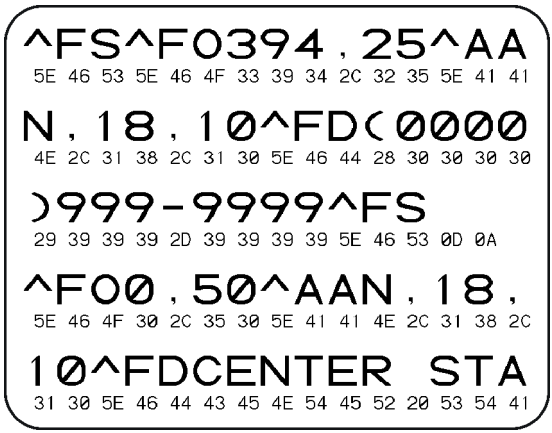


Figure 30. MODE Test Label

Specifications

NOTE: Printer specifications are subject to change without notice. In addition, your printer may not have all of the options described in these specifications.

General Specifications

Height		13"	330 mm
Width		8.25"	210 mm
Depth		17"	432 mm
Weight (option-dependent)		17 lbs.	7.71 kg
Electrical		Auto range 110 VAC +/–20% or 230 VAC +/–15%, 47-63 Hz	
		3 Amps @ 110 VAC, 1.5 Amps @ 230 VAC	
Agency approvals		UL 1950 3rd Edition; CSA22.2 No950-95; CISPR22-B; EN50082-1; EN60950. Meets FCC Class B and Canadian DOC Class A Rules	
Temperature	Operating	40 to 105º F	5 to 40º C
	Storage	–40 to 140º F	–40 to 60º C
Relative humidity	Operating	20% to 85%, non-condensing	
	Storage	5% to 85%, non-condensing	
Communications Interface		DB-9S-type RS-232 serial data interface; 110-57, 600 baud; parity, bits/char. and XON/XOFF or DTR handshake protocols — all software selectable	
		Bi-directional parallel data interface	

Printing Specifications

Printing Specifications		*S*400 Printer	*S*600 Printer
Resolution		203 dots per inch (8 dots per mm)	
Dot size (square)		0.005" (0.127 mm)	
Maximum print width		4.09" (104 mm)	
Print Length	Minimum	0.005" (0.127 mm)	
	Maximum	36" (914 mm)	39" (991 mm)
Bar code modulus ("X") dimension		5 mil to 55 mil	
Programmable constant printing speeds		2" (51 mm) 3" (76 mm) 4" (102 mm)	2" (51 mm)
			3" (76 mm)
			4" (102 mm)
			5" (127 mm)
			6" (152 mm)
DRAM Memory		1MB	2MB
Flash Memory (E:)		n/a	1MB

Ribbon Specifications

Ribbon width *(Zebra recommends using ribbon at least as wide as the media to protect the printhead from wear)*.		Minimum	1.57"	40 mm
		Maximum	4.5"	114 mm
Standard lengths	2:1 media to ribbon roll ratio		984'	300 m
	3:1 media to ribbon roll ratio		1476'	450 m
Ribbon core inside diameter			1.0"	25 mm
Maximum ribbon roll diameter			3.2"	81 mm

Media Specifications

Total media width	Minimum		0.75"	19 mm
	Maximum		4.5"	114 mm
	Maximum (cutter installed)		4.0"	102 mm
Label length	Minimum	Tear-Off	0.63"	16 mm
		Peel-Off	1.00"	25 mm
		Cutter	1.50"	38 mm
	Maximum		See “Printing Specifications”	
Total thickness (includes liner)	Minimum		0.0023"	0.058 mm
	Maximum (printhead position may need to be adjusted above 0.01")		0.012"	0.305 mm
Core size			3.0"	76 mm
Maximum roll diameter			8.0"	203 mm
Inter-label gap	Minimum		0.08" (0.118" preferred)	2 mm (3 mm preferred)
	Maximum		0.16"	4 mm
Ticket/tag notch size (W x L)			0.08" x 0.48"	2 mm x 12 mm

Media Handling

- **Tear-Off** mode: Produced in strips.
- **Peel-Off** mode: Dispensed and peeled away from the liner.
- **Cutter** mode: Printed and individually cut.

Options

• 8 MB flash expansion	• *Cutter with label catch tray
• *Peel-Off mode with backing-only rewind feature	• Ethernet
• Scalable and bitmap smooth fonts available for text	

* Factory installed.
Contact your authorized Zebra distributor for information.

Zebra Programming Language (ZPL II)

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

Bar Codes

1D		2D
• Codabar (supports ratios of 2:1 to 3:1)	• Interleaved 2 of 5 (supports ratios of 2:1 to 3:1, Modulus 10 Check Digit)	• Codablock
• Code 11	• LOGMARS	• Code 49
• Code 128 (supports serialization in all subsets and UCC Case Codes)	• MSI	• Data Matrix
• Code 39 (supports ratios of 2:1 to 3:1)	• Plessey	• MaxiCode
• Code 93	• POSTNET	• MicroPDF417
• EAN 8	• Standard 2 of 5	• PDF 417
• EAN 13	• UPC-A	• QRcode
• EAN extensions	• UPC-E	
• Industrial 2 of 5	• UPC extensions	

Standard Printer Fonts

- Zebra fonts A, B, C, D, E, F, G, H, GS, 0, P, Q, R, S, T, U, V
- CG Triumvirate Bold Condensed™ scalable smooth font
- IBM Code Page 850 International characters

Optional Printer Fonts

There are many optional character fonts that can be purchased for your printer in addition to those that are standard in the unit. From time to time, additions may be made to the list of available fonts. Contact Zebra Technologies Corporation or an authorized Zebra distributor for further information.

Fonts can be installed in Flash, and additional Flash (up to 8 MB), is available. Once installed, this font can be used in addition to the standard fonts available in the printer. Refer to your *ZPL II Programming Guide* or, if using another software package to drive your printer, to the instructions accompanying that package.

RS-232 Connector Technical Information

RS-232 Connector Pinouts	
Pin. No.	**Description**
1	Not used
2	RXD (receive data) input to the printer
3	TXD (transmit data) output from the printer
4	DTR (data terminal ready) output from the printer — controls when the host may send data
5	Chassis ground
6	DSR (data set ready) input to the printer
7	RTS (request to send) output from the printer — always in the ACTIVE condition when the printer is turned on
8	Not used
9	5 V Fused

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.

Interconnecting to DTE Devices

The printer is configured as data terminal equipment (DTE). To connect the printer to other DTE devices (such as the serial port of a personal computer), use an RS-232 null modem (crossover) cable. Figure 31 shows the required cable connections.

Interconnecting to DCE Devices

When the printer is connected via its RS-232 interface to data communication equipment (DCE) such as a modem, a STANDARD RS-232 (straight-through) interface cable must be used. Figure 32 shows the connections required for this cable.

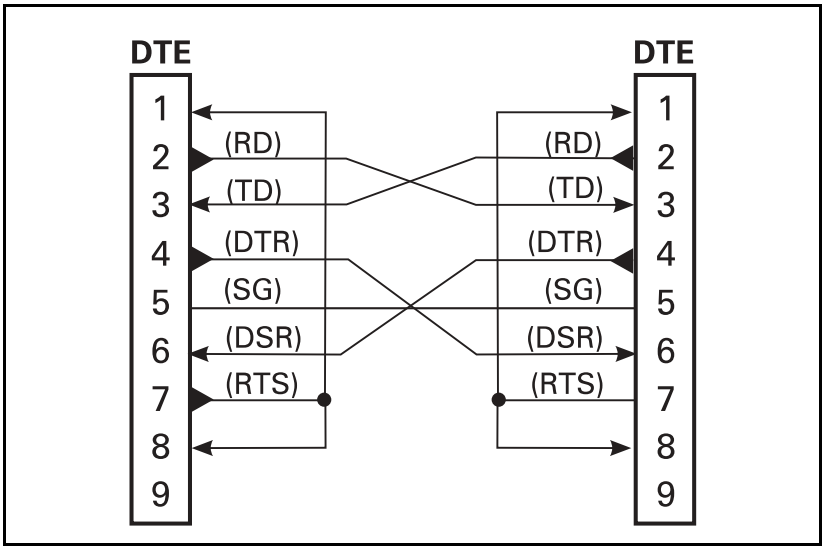


Figure 31. DTE Cable Connections

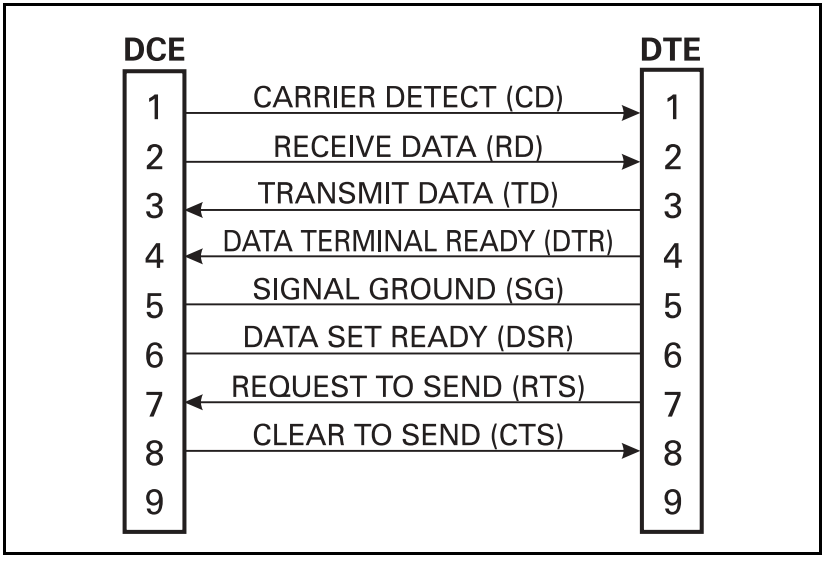


Figure 32. DCE Cable Connections

Parallel Interface Technical Information

Parallel Connector Pinouts	
Pin No.	**Description**
1	nStrobe/Host Clk
2-9	Data Bits 1-8
10	nACK/PtrClk
11	Busy/Per Busy
12	PError/ACK Data Req.
13	Select/Xflag
14	nauto Fd/Host Busy
15	Not Used
16-17	Ground
18	+5V @ 1A Fused
19-30	Ground
31	nInit
32	nFault/nData Avail.
33-34	Not Used
35	+5V through 2.2KΩ Resistor
36	NSelectIn/1284 active

Glossary

Alphanumeric — Indicating letters, numerals, and characters such as punctuation marks.

Backfeed — Backfeed is when the printer pulls the media and ribbon (if used) backward into the printer so that the beginning of the label is properly positioned behind the printhead. Backfeed occurs when you're operating the printer in Tear-Off, Peel-Off, or Cutter mode.

Bar code — A code by which alphanumeric characters can be represented by a series of adjacent stripes of different widths. Many different code schemes exist, such as the universal product code (UPC) or Code 39.

Calibration (of a printer) — A process in which the printer determines some basic information needed to print accurately with a particular media/ribbon combination. To do this, the printer feeds some media and ribbon (if used) through the printer and senses whether to use the direct thermal or thermal transfer print method, whether continuous or non-continuous media is used, and (if non-continuous media) the length of individual labels/tags.

Character set — The set of all letters, numerals, punctuation marks, and other characters that can be expressed by a particular barcode.

Check digit — A character added to a barcode symbol that indicates to the scanner that it has read the symbol correctly.

Continuous media — Label or tagstock that has no web (space between labels), notch, or gap to separate each label/tag, but rather the media is one long piece of material.

Core diameter — The inside diameter of the cardboard core at the center of a roll of media/ribbon.

Cutter — A device that can cut each label/tag immediately after it is printed.

Diagnostics — Information about what printer functions are not working. This information is used for troubleshooting problems.

Direct thermal printing — Printing in which direct thermal media is used. No ribbon is used; instead, the media is coated with a substance that reacts to heat to produce an image.

Fanfold media — Media that comes folded in a rectangular stack, rather than on a roll.

Font — A complete set of alphanumeric characters in one style of type. Example: Times, Helvetica.

Ips "inches-per-second" — The speed at which the label or tag is printed. Zebra offers printers that can print from 2 ips to 12 ips.

Label — An adhesive-backed piece of paper, plastic, or other material on which information is printed.

Label available sensor — For printers equipped with the Peel-Off option, this sensor detects a printed label waiting to be taken or "picked" by the operator. While it detects this label, the printer does not print additional labels. Once the label has been taken, printing resumes. Also called "take-label sensor."

Label backing (label liner) — The material on which labels are affixed during manufacture and that is discarded or recycled by the end-users. Label backing (or liner) has a non-stick surface that allows the label to be easily removed by the end-user and placed in the desired location.

Media — Material onto which data is printed by the printer. Types of media include: tagstock, continuous, fanfold, roll, etc.

Media sensor — This sensor is located behind the printhead to detect the presence of media and, for non-continuous media, the position of the web, hole, or notch that separates each label.

Media supply spindle — The rotating arm that supports media rolls and provides consistent media feed to the printhead.

Non-volatile memory — Electronic memory that retains data even when power is removed.

Print speed — The speed at which printing occurs. For thermal transfer printers, this speed is expressed in terms of ips (inches per second).

Printhead wear — The degradation of the surface of the printhead and/or the print elements over time. Heat and abrasion can cause printhead wear. Therefore, to maximize the life of your printhead, use the lowest print darkness setting (sometimes called "burn temperature" or "head temperature") and the lowest printhead/toggle pressure necessary. Also, use ribbon that is as wide as or wider than the media to protect the printhead from the rougher media.

Registration — Alignment of printing with respect to the top of a label/tag.

Ribbon — A band of inked material that is pressed by the printhead against the media to transfer an image onto the media, which in turn is pressed against the platen. A ribbon consists of a base film coated with wax or resin "ink." Zebra ribbons also have a back coating that protects the printhead from damage. The ribbon transfers ink onto the media when heated by the printhead.

Ribbon wrinkle — A wrinkling of the ribbon caused by improper alignment of the strip plate and/or printhead pressure. This wrinkle can be seen just above the strip plate. Ribbon wrinkle can cause voids in the print and/or the spent ribbon to rewind unevenly. This is a condition that should be corrected by performing adjustment procedures.

Roll media — Media that comes supplied rolled up on a core (usually cardboard). Contrast this with fanfold media, which comes folded in a rectangular stack.

Supplies — Supplies is a general term for ribbon and media.

Tag — A type of media having no adhesive backing but featuring a hole or notch by which the tag can be hung on something. Usually tags are made of cardboard or other durable material.

Take label sensor — See "label available sensor."

Thermal direct printing — See "direct thermal printing."

Thermal transfer printing — A printing method in which the printhead heats an ink- or resin-coated ribbon against the media, causing the ink/resin to transfer onto the media. By selectively heating the ribbon, you can form an image on the media. See also "ribbon."

Void — A space where printing should have occurred but, due to some error condition, it did not. A void can cause a bar code symbol to be read incorrectly or to not be read at all.

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Warranty Information

Effective November 1, 2001

All Zebra products are sold with warranties. Here is some general information:

Printer Products

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

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

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

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

Printhead	Warranty Period
Barcode label printer printheads	6 months
Card printer printheads	12 months

To qualify for this warranty, the printhead must be returned to the factory or to an authorized service center. Customers are not required to purchase Zebra supplies (media and/or ribbons) for warranty qualification. However, if it is determined that the use of other manufacturer supplies has caused any defect in the printhead for which a warranty claim is made, the user is responsible for Zebra's labor and material charges required to repair the defect. The warranty becomes void if the printhead is physically worn or damaged; also if it is determined that failure to follow the preventive maintenance schedule listed in the User's Guide has caused defect in the thermal printhead for which a warranty claim is made.

Software. Software is warranted to be free of defects in material and workmanship for 30 days from the date of purchase. In the event of notification within the warranty period of defects, Zebra will replace the defective diskette or documentation.

Batteries. Mobile printer batteries are warranted to be free of defects in material and workmanship for 90 days from date of purchase. In the event of notification within the warranty period, Zebra will replace the defective battery provided there has not been damage resulting from user abuse.

Parts. All parts, maintenance kits, options kits, and accessories are warranted to be free of defects in material and workmanship for 90 days (except where otherwise noted) from date of purchase. This warranty becomes void if the item is modified, improperly installed or used, or damaged by accident or neglect.

Supplies Products

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

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

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