

SRRF Communications

Both the printer and the device it communicates with must follow either the Bluetooth standard or Zebra's proprietary SRRF protocol. The communications protocol is determined by the specific QuickLink module installed in the printer.

Printers equipped for short range radio frequency communications (SRRF) allow wireless communication with their host terminals from any direction. Reliable transmission distances will vary but usually exceed 1m. (39") under worst conditions. SRRF printers can be identified by reading the printer's model number label on the front of the unit, which will show the radio module's identification number and/or its operating frequency. QL 320 printers equipped with a Bluetooth wireless module will have the Bluetooth logo on the model number label.

Zebra SRRF Network Overview

Zebra's short range RF network operates as a collection of linked pairs of terminals and printers. There is no base station or centralized control; control of the network is distributed across the entire network.

Before SRRF operation can begin, the QL 320 must be "linked" to a terminal with a compatible short-range radio. Linking means that addresses are exchanged between the terminal and the printer. Once linked, the terminal and the printer become a "linked pair" and communicate exclusively with each other. The terminal and the printer can be turned on and off without affecting the link; it remains valid until another link is deliberately created. Thus it is not necessary to perform a link every time that the equipment is used. So long as the linked pair is kept together, they remain linked indefinitely. If the linked pair is not stored together, then the terminal and printer selected should be linked prior to use.

Multiple linked pairs can be operated in close quarters and each terminal will only communicate with its linked printer. Each SRRF radio module has a unique device address (terminal or printer), based on the device serial number.

Linking From the Terminal to the Printer

The linking operation can be activated from either the terminal or the printer. If the terminal has a scanner available, then the bar-coded serial number on the back of every printer can be scanned and used to establish the printer's unique address. Once the printer's address is established, the terminal can then initiate a link to that printer. If no scanner is available the user can manually enter

the serial number of the printer; however, this method is not recommended. The terminal can only capture the desired printer using this type of link.

The terminal must be programmed to guide the user through scanning the printer serial number bar-code, then execute an algorithm which converts the serial number into an address. Zebra can provide C source code to licensed OEM customers that handles the conversion from serial number to address.

Linking From the Printer to the Terminal

When no scanner is available, and/or no additional software is to be written for the terminal, then the linking operation can be initiated solely by the printer.

In this procedure the printer broadcasts a message seeking an available terminal. If a terminal “hears” the broadcast and is available, it will respond by linking to the printer.

To insure a secure link, the user must perform the link operation far enough away from other operating terminals so that the printer does not inadvertently capture some other user’s terminal. Any other terminal that hears the broadcast message from the printer may try to link to it, therefore you should insure that only one terminal is within broadcast range. Feedback is available from the printer as to the outcome of the link operation.

Bluetooth™ Networking Overview



Exposure to Radio Frequency Radiation

The radiated output power of this internal wireless radio is far below the FCC radio frequency exposure limits. Nevertheless, this Bluetooth radio must be used in such a manner that the antenna is 2.5 cm or further from the human body.

The radio and antenna are mounted internally in this printer in such a way that, when the printer is used in a standard configuration (belt clip, soft case, shoulder strap), the 2.5 cm distance from the users body will be met. Do not use the printer in an unauthorized manner.

The internal wireless radio operates within guidelines found in radio frequency safety standards and recommendations. The level of energy emitted is far less than the electromagnetic energy emitted by wireless devices such as mobile phones.

“Bluetooth” is a worldwide standard for the exchange of data between two devices via radio frequencies. Bluetooth radios are relatively low powered to help prevent interference with other devices running at similar radio frequencies. This limits the range of a Bluetooth device to about 10 meters (about 32 feet).

In order to exchange data, two Bluetooth enabled devices must establish a connection. Bluetooth software is always running in the background, ready to respond to connection requests. One device (known as the *master* or the *client*) must request a connection with another. The second device (the *slave* or the *server*) then accepts or rejects the connection. A Bluetooth enabled QL 320 will normally act as a slave, but in theory any Bluetooth device can be either a master or a slave. This miniature network is sometimes referred to as a “piconet” and can consist of several Bluetooth enabled devices.

Each Bluetooth QL 320 has a unique Bluetooth Device Address (BDA) loaded into its Quick Link module when manufactured.

A Typical Bluetooth Connection Sequence

In this simplified sequence “Joe’s Terminal” is a Bluetooth ready hand held terminal running an application that needs access to a printer.

1. Joe’s Terminal performs a search of its “piconet” (a Device In-

quiry) and determines that there are four Bluetooth devices in the vicinity.

2. Joe's Terminal queries each of the four nearby devices to determine which services they provide (a Service Discovery). The Bluetooth enabled QL 320 "Sandy's Printer" offers the printing service.

3. Joe's Terminal sends a print connection request to Sandy's Printer.

4. Sandy's Printer evaluates the request and determines that Joe's Terminal is permitted to use the print service, *but only if the correct password is submitted.*

5. Sandy's Printer queries Joe's Terminal for the password (Authentication).

6. Joe's Terminal returns the correct password and the print connection is established.

7. After Joe's Terminal is finished printing it disconnects with Sandy's Printer. (Some Bluetooth services disconnect automatically, others must be closed manually.)

There are several layers of security in the Bluetooth system, so this sequence may not be a completely accurate representation of how your printer may function in a Bluetooth environment. For the most part, communications using the Bluetooth protocol are initiated and processed without any operator intervention, much like the IrDA system described previously.

Wireless Local Area Network (WLAN)



WARNING: Use of the QL 320 will result in exposure to Radio Frequency radiation. To conform to FCC RF exposure requirements the printer must be used only in the intended orientation and in the intended manner.

Printers equipped for Wireless Local Area Network (WLAN) communications using the industry standard 802.11 or 802.11b protocols are known as QL 320N Printers. These printers allow wireless communication as a node within a local area network, and its wireless capabilities allow communications from any point within the LAN's perimeter. Methods of establishing communications to the QL 320 will vary with each LAN application.

QL 320N printers can be identified the model number on the front of the unit.

The QL 320N is designed for use with either a shoulder strap and a specially designed soft case, or with a belt clip. The printer should be oriented on the operator's hip so that printed material is transported *away* from the operator.

When the QL 320N is used as designed, either the printer's soft case or the belt clip will allow use of the printer in the manner mandated by the FCC.

Setting Up the Software

The QL 320 uses Zebra's CPL Programming language which was designed for mobile printing applications. CPL is fully described in the Mobile Printing Systems Programming Manual, which is available in Portable Document Format (.pdf) on-line at Zebra's website

You can also use Label Vista™, Zebra's Windows™ based label creation program which uses a graphical interface to create and edit labels in the CPL language. Label Vista is available either on-line at Zebra's website, or on a CD (part number AC15065-1).

The QL 320 with its optional memory upgrade can support an interpreter for ZPL II®, the programming language used by Zebra desktop printers. To use ZPL II, refer to the ZPL II Programming Guide. If you choose to use a third party label preparation system, follow the installation instructions included in the package.

Adjustable Shoulder Strap

Refer to Figure 14, below.

Snap each end of the shoulder strap into the “D” rings in the top of the printer. Slide the buckle away from or towards the printer until you achieve the desired length.

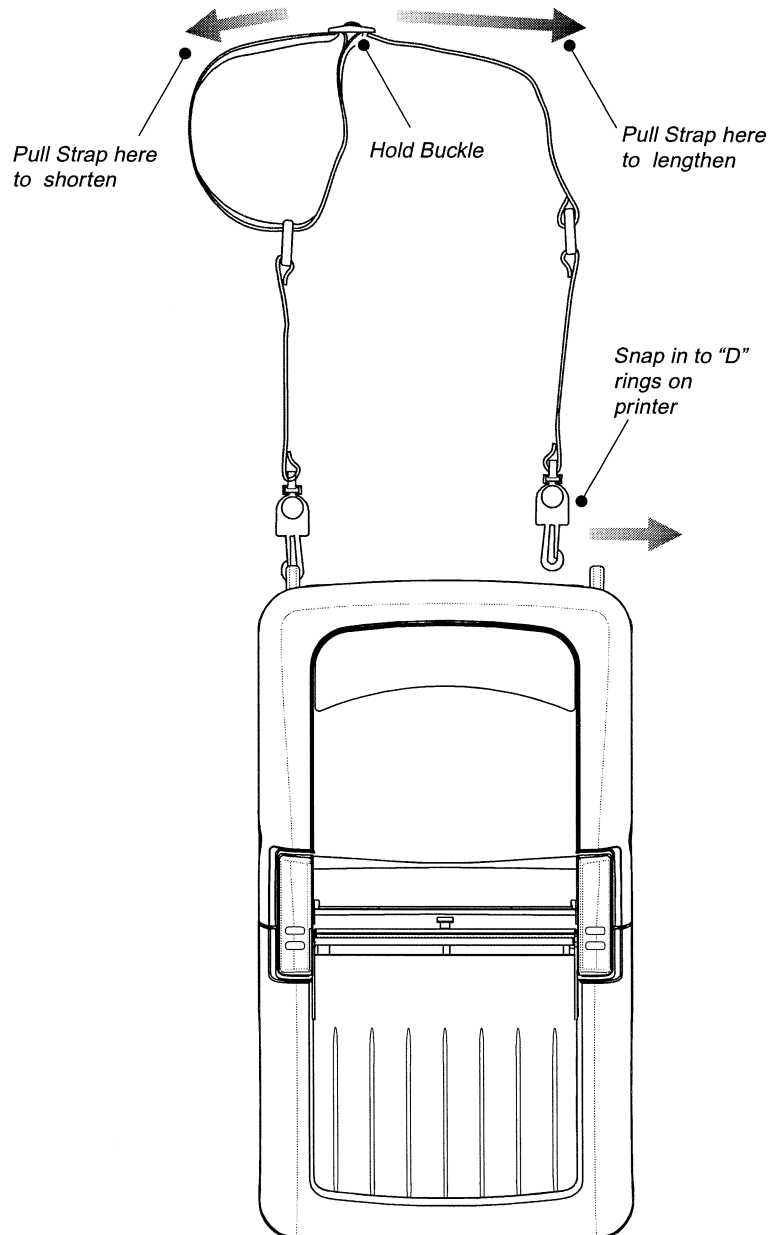


FIGURE 14

Belt Clip

If the QL 320 is equipped with a belt clip, hook the clip over your belt, and ensure that the clip is securely attached to the belt. The belt clip will pivot to allow you to move freely while wearing the printer.

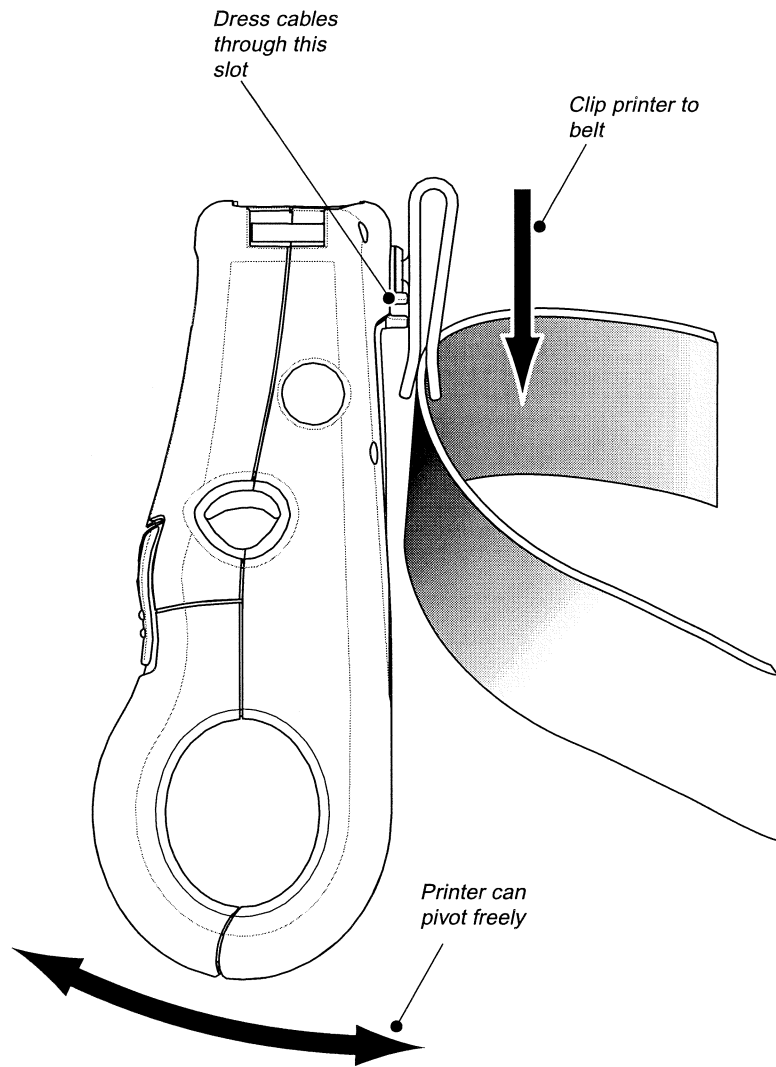


FIGURE 15

Preventive Maintenance



WARNING: *To avoid possible personal injury or damage to the printer, never insert any pointed or sharp objects into the printer.*

Extending Battery Life

- Never expose the battery to direct sunlight or temperatures over 104° F (40° C).
- Always use a Zebra charger designed specifically for Lithium-Ion batteries. Use of any other kind of charger may damage the battery.
- Choose the media that is easiest to “burn.” An authorized Zebra re-seller can help you determine the optimum media for your application.
- If you print the same text or graphic on every label, consider using a pre-printed label.
- Choose the correct print darkness, and print speed for your media.
- Use software handshaking (XON/XOFF) whenever possible.
- Select Tear-Off mode whenever possible (Peel-Off mode uses more power).
- If your printer has the optional LCD display: Use the display backlight only when necessary. Turn it off whenever it is not needed. The LCD backlight consumes a great deal of power.
- Pull the battery out of the printer if the printer won't be used for a day or more and you're not performing a maintenance charge.
- Consider purchasing an extra battery.
- Remember that any rechargeable battery will lose its ability to maintain a charge over time. It can only be recharged a finite number of times before it must be replaced.

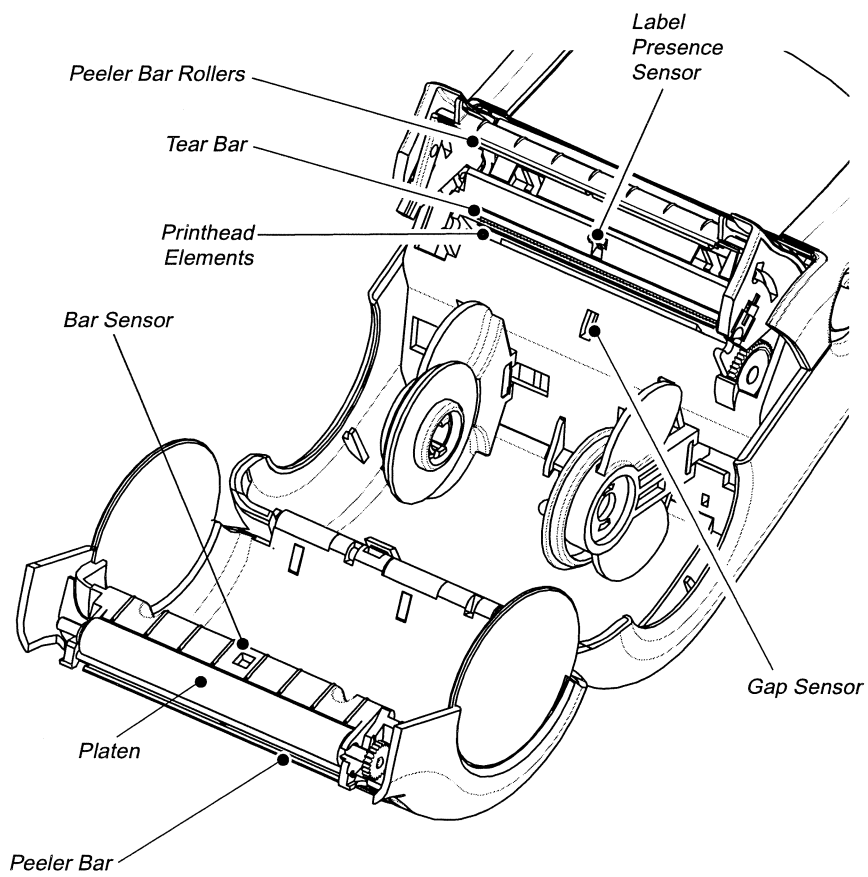


FIGURE 16

Cleaning



CAUTION.- Use only the cleaning agents indicated. Zebra Technologies Corporation will not be responsible for damage caused by any other cleaning materials used on this printer.

Never use any sharp objects on the printer mechanism as it could damage the print head. Use only the cleaning pen supplied with the printer or a cotton swab saturated with alcohol for cleaning the printer.

Area	Method	Interval
Printhead (Figure 16)	Use the supplied cleaning pen or 70% isopropyl alcohol on a cotton swab to clean the print elements from end to end (the print elements are located in the thin gray line on the printhead). <i>If print quality has not improved after performing this procedure, try cleaning the printhead with a Cleaning Pad. This specially prepared material removes contamination buildup without damaging the printhead. Refer to Appendix C for more information.</i>	After every five rolls of media (or more often, if needed) Linerless media requires more frequent cleaning.
Platen Roller (Figure 16)	Rotate the platen roller and clean it thoroughly with the cleaning pen or 70% isopropyl alcohol and a cotton swab. Units with linerless platens: No cleaning is necessary. <i>Do not use alcohol on linerless platens!</i>	
Peel bar (Figure 16)	Clean thoroughly with the cleaning pen or 70% isopropyl alcohol and a cotton swab.	As needed
Tear bar (Figure 16)	Clean thoroughly with the cleaning pen or 70% isopropyl alcohol and a cotton swab.	
Exterior	Water-dampened cloth	
Interior (Figure 16)	Brush/air blow. Insure the Bar Sensor, Gap Sensor and Label Present Sensor windows are free of dust.	

Troubleshooting






Standard Control Panel

If the printer is not functioning properly, refer to the chart below to find the state of the two LEDs on the Control Panel. Then refer to the Troubleshooting topic referenced in the chart to resolve the problem.

Green LED	Yellow LED	Indication	Ref. to Topic
Steady	Off	Normal Operation, and/or RF Link established	n/a
Off	Off	Power Off	1
Fast Blink	Off	No RF Link	6, 11
Slow Blink	Off	Low Battery	3, 6, 7
Steady	Steady	Out of media, or Media Cover not closed	9, 11
Steady	Fast Blink	Normal RF activity	8
Steady	Fast Blink, Beeper Sounds	No application	8

Optional LCD Control Panel

The top of the display shows several icons which indicate various printer functions. Check the indicator status, then refer to the Troubleshooting topic referenced in the chart to resolve the problem.

Status Icon	Condition	Indication	Ref. to Topic
	Steady	RF Link established	n/a
	Off	No RF Link	6
	Flashing	Low Battery	3, 6, 7
	Flashing	Head latch not closed	9, 11
	Flashing	Printer is receiving a file	8
	Flashing	Out of media,	9, 11
Blank Screen	n/a	No application	1,13

Troubleshooting Topics

1. No power

- Check that battery is installed properly
- Recharge or replace battery as necessary.

2. Media does not feed:

- Be sure print head is closed and latched.
- Check spindle holding media for any binding.
- If unit is equipped with label presence sensor:
Insure most recently printed label is removed.
Also insure label sensor is not blocked.

3. Poor or faded print or flashing:

- Clean print head.
- Check battery and recharge or replace as necessary
- Check quality of media.

4. Partial/missing print:

- Check media alignment
- Clean print head.
- Insure printhead is properly closed and latched.

5. Garbled print:

- Check baud rate.

6. No print:

- Check baud rate
- Replace battery
- Check cable to terminal
- Establish RF Link (Wireless units only) or restore LAN associativity (QL 320N models only)
- Invalid label format or command structure — put printer in Communications Diagnostic (Hex Dump) Mode to diagnose problem.

7. Reduced battery life

- Check battery date code — if battery is one to two years old, short life may be due to normal aging.
- Recondition battery.
- Replace battery.

8. Yellow error light or flashing:

- No application or application corrupted: reload program.
- If using wireless communications: flashing indicator is normal while data is being transmitted or received.

continued on next page

9. Yellow error light always on,  or  flashing:

- Check media is loaded and print head is closed and securely latched.

10. Skips labels:

- Check media for top of form sense mark or label gap.
- Check that the maximum print field has not been exceeded on label.
- Insure bar/ or gap sensor is not blocked or malfunctioning

11. Communication Error:

- Check media is loaded, head is closed and error light is off.
- Check baud rate.
- Replace cable to terminal.

12. Label Jam:

- Open head release latch and media cover.
- Generously apply alcohol to printer in area of jammed label.

13. Blank LCD Screen (only for units with optional LCD control panel)

- No application loaded or application corrupted: reload program.

Troubleshooting Tests

Printing a Configuration Label

To print out a listing of the printer's current configuration follow these steps:

1. Turn the printer off. Load the media compartment with journal media (media with no black bars printed on the back)
2. Press and hold the Feed Button.
3. Press and release the Power button and keep the Feed button pressed. When printing starts, release the Feed button.


The printer will generate a configuration label as shown on Figures 17 and 17a :

Sample Configuration Label

Print Head Test

Zebra QL 320 V79.23 11/06/01
 CRC: FFFF 00781-12-0001
 #T037425 /18
 Testing Memory...
 Memory tested and OK
 Speed Rate: 19200 BPS
 In-activity Timeout: 120 Secs
 Low battery Shut-down: 180

End of report.

Zebra QL 320 V79.23 11/06/01
Serial Number:

 00781-12-0001

Program:
 Firmware:HTQ37923 /18
 Chksum:5E9F
 Software:HTT37800
 Chksum:7068
 Ver: L4.079.23.0898.819.119.400

Cable Communications:
 19200 BPS, N,4,1
 Handshake:On-Off/Hardware
 DSR: 0

Wireless Communications:

Peripherals:
 MCR: 2.00
 LCD: Not installed
 module: 8x3F
 Other: 0F

Power Management:
 In-activity Timeout: 120 Secs
 Low-battery Timeout: 60 Secs
 Remote(CITR) sw-off: Enabled
 Vol tage: 03(100)
 Resistor: 178
 03

Annotations:

- Print Head Test
- End of First Report
- Unit Serial Number
- Application Number
- Report appears only on units with wireless options installed. Units with no wireless options will print an empty line and resume the report.
- Peripherals installed: In this example the LCD display option is not installed.

FIGURE 17

continued on next page

Sample Configuration Label (continued)

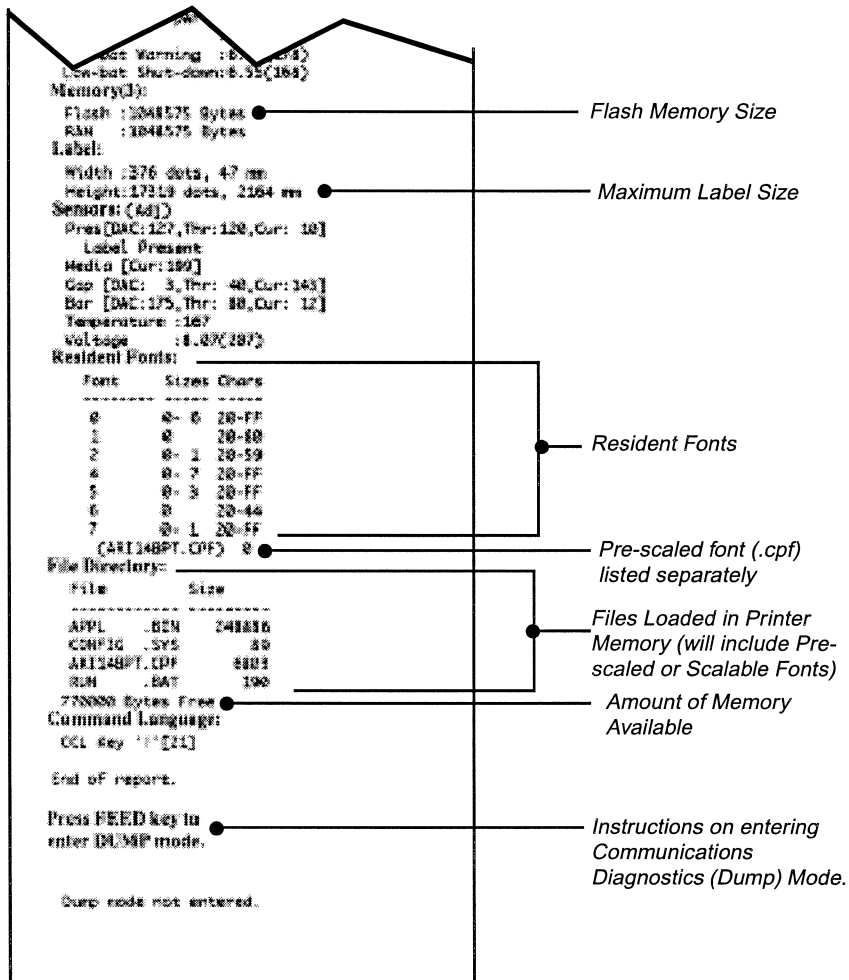


FIGURE 17A

Communications Diagnostics

If there's a problem transferring data between the computer and the printer, try putting the printer in the Communications Diagnostics Mode (also referred to as the "DUMP" mode). The printer will print the ASCII characters and their and their text representation (or the period '.', if not a printable character) for any data received from the host computer

To enter Communications Diagnostics Mode:

1. Print a configuration label as described on pg. 34.
5. At the end of 2nd diagnostics report, the printer will print: "Press FEED key to enter DUMP mode".
6. Press the FEED key. The printer will print: "Entering DUMP mode".

Note: If the FEED key is not pressed within 3 seconds, the printer will print "DUMP mode not entered" and will resume normal operation.

7. At this point, the printer is in DUMP mode and will print the ASCII hex codes of any data sent to it, and their text representation (or "." if not a printable character).

Additionally, a file with a ".dmp" extension containing the ASCII information will be created and stored in the printer's memory. It can be viewed, "cloned" or deleted using the Label Vista application. (Refer the Label Vista documentation for more information.)

To terminate the Communications Diagnostics Mode and return the printer to normal operations:

1. Turn the printer OFF.
2. Wait 5 seconds.
3. Turn the printer ON.

Calling the Help Desk

If the printer fails to print the configuration label, or you encounter problems not covered in the Troubleshooting Guide, contact the Help Desk. Help Desk addresses and phone numbers for your area can be found in Appendix D of this manual. The Help Desk will need the following information:

- Model number/type (e.g. QL 320)
- Unit serial number (Found on the large label on the back of the printer, also found in the configuration label printout))
- Product Configuration Code (PCC) (15 digit number found on the small label on the back of the unit)

Specifications



NOTE.- Printer specifications are subject to change without notice.

Printing Specifications

Print Density	203 dots/inch (8 dots/mm)
Print Width	Up to 2.9" (71.2 mm)
Print Speed	4" per second (101.6 mm per second)
Print Head Life, calculated	1,964,160" (50 Km) nominal
Distance from Print Element to Top of Form	.571" (14.5 mm) 116 dots

Memory/Communications Specifications

Flash Memory	1 MB flash (standard); 2MB flash (optional)
SRAM Memory	1MB SRAM (standard); 2 MB SRAM (optional)
Standard Communications	RS-232 serial port (8 Pin circular DIN connector) Configurable Baud rate (from 9600 to 57.6 Kbps), parity and data bits. Software (X-ON/X-OFF) or hardware (DTR/STR) communication handshake protocols.
Optional Wireless Communications	Infrared wireless link (meets IrDA 1.1 communications specifications) 2,400 to 115,200 Baud rate Bluetooth compatible 2.4 GHz SRRF link Optional SRRF frequencies of 916 MHz and 2.4 GHz per Zebra proprietary wireless protocol. Optional wireless LAN capabilities comply with 802.11 and 802.11b protocols

Label Specifications

Label/Tag Width	1.5" to 3.1" (38.1 mm to 78.4 mm)
Max. Label/Tag Length	16" (406.4 mm) with standard memory
Inter-label Gap.	.08" to .16" (.12" preferred) 2 mm to 4 mm (3 mm preferred)
Label/Tag Thickness	.0025" to .0065" (.064 mm to .165 mm)
Label Roll Size: Max. Diameter	2.625" (66.7 mm) O.D.
Inner Core Diameter	.75" (19 mm) std, 1.38" (35.05 mm) optional Use Zebra-brand direct thermal media that is outside wound. Media may be reflective (black mark) sensing or transmissive (gap) sensing, die-cut, continuous or linerless. For die-cut labels, use only full auto dies.
Media Requirements	The reflective media black marks should extend past the centerline of the roll. Minimum Black Mark Dimensions: Mark width: 0.5" (12.7mm) perpendicular to the edge of the media, centered within the width of the roll. Mark length: 0.094" (2.4 mm) parallel to the edge of the media.

Font/Bar Code Specifications

Fonts Available	Five resident scalable and rotatable fonts available from 12-48 pt. Downloadable pre-scaled fonts via Label Vista™ software Optional international character sets
1D Bar Codes Available	Codabar UCC/EAN 128 Code 39 Code 93 EAN 8/JAN 8, 2 and 5 digit extensions EAN 13/JAN 13, 2 and 5 digit extensions Interleaved 2 of 5 MSI/Plessey FIM/POSTNET UPC-A, 2 and 5 digit extensions UPC E, 2 and 5 digit extensions
2D Bar Codes Available	MaxiCode PDF 417
Rotation Angles	0°, 90°, 180°, and 270°

Physical/Environmental/Electrical Specifications

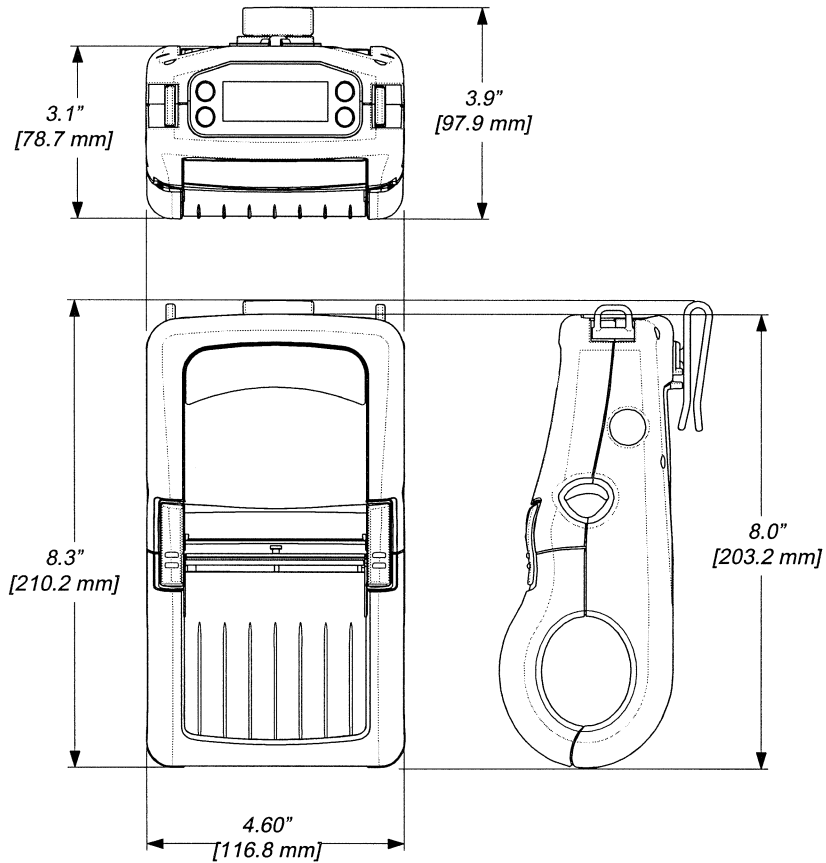


FIGURE 18 OVERALL DIMENSIONS

Weight w/ battery excluding media.	1.65 lbs. (.75 kg.)
Temperature Operating Storage	5° to 122° F (-15° to 50° C) -13° to 158° F (-25° to 70° C) Range
Relative Humidity Operation Storage	10% to 80% (non-condensing) 10% to 90% (non-condensing)
Electrical	Battery: 7.4V Lithium-Ion Charger: External battery charger, 120-230 VAC depending on model selected.