

# S400 & S600 Maintenance Manual





# *S*400/*S*600

**STRIPE SERIES PRINTER** 

Maintenance Manual
Revision 1
Registration Form
ZEBRA TECHNOLOGIES CORPORATION
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# NOTES

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#### DESCRIPTION

The Zebra Stripe<sup>®</sup> S400 and S600 Thermal Printers are versatile label and ticket printers designed to print high quality bar codes, various sizes and styles of alphanumeric characters, and graphics in either the thermal transfer or direct thermal mode. The Zebra Stripe printers have the flexibility to meet a wide variety of applications. Zebra Programming Language II (ZPL II<sup>®</sup>) allows the programmer to format the printed material. ZPL II is transparent to protocol converters and allows the Zebra Stripe printers to be easily integrated with most systems and host mainframes.

#### **PRINTER OPERATING MODES**

- **Tear-Off Mode**. When the media is in the rest (idle) position, the webbing between labels is over the Tear-Off/Peel-Off Plate. To print a label, the printer first backfeeds the media until the start of the label is directly under the printhead then prints the entire label. The operator then tears off the label, and a new label may be printed.
- **Peel-Off Mode**. When the media is in the rest (idle) position, the start of the label to be printed is slightly in front of the printhead. To print a label, the printer first backfeeds the media until the start of the label is directly under the printhead and then prints the entire label.
- In this mode, once the label is printed, the media passes over the Tear-Off/Peel-Off Plate at a sharp angle. The backing material is peeled away from the label and winds around the Backing Rewind Spindle. The media feeds forward until most of the label hangs loose from the backing. The Label Available Sensor detects this label and pauses printing until the operator removes the label, then the next label prints.
- The Backing Rewind Spindle will hold one half of the backing from a standard size media roll. The Rewind Spindle Full Sensor detects when the spindle is full and then pauses.
- **Cutter Mode**. When the media is in the rest (idle) position, the start of the label to be printed is directly under the printhead. The printer prints the entire label and automatically cuts the label after it is printed. The Cutter Catch Tray catches the completed labels.
- The Cutter automatically cycles through one cutting motion when the printer's power is turned ON. When printing labels, the Cutter activation is determined by a command sent to the printer by the host computer from either ZPL II or from a different software driver.
- External Rewind Mode. Some applications call for the media to be rewound onto a core as the labels are printed. The Stripe printer *does not* have an internal Media Rewind capability. The Backing Rewind Spindle *is not* designed to rewind label stock. An external rewinder is required for this application. *An external rewinder is not available from Zebra Technologies*.
- When the media is in the rest (idle) position, the start of the label to be printed is directly under the printhead. After the label is printed, the media feeds forward until the start of the next label is under the printhead. The media never backfeeds in this mode. When the printer completes a batch of labels, printing will stop. The speed and tension of the rewind operation is strictly a function of the external rewind unit.

#### ZEBRA S400/S600 MAINTENANCE MANUAL

## **S**PECIFICATIONS

#### Agency Approvals

- UL 1950 3<sup>rd</sup> Edition
- CISPR22-B
- CSA22.2 No950-95
- EN50082-1:1997 EN60950
- Meets FCC class B and CAN.DOC class A rules

### Bar Codes

The following barcodes are available

- Check digit calculation where applicable
- Codabar (Supports ratios of 2:1 and 3:1)
- Codablock
- Code 11
- Code 39 (Supports ratios of 2:1 and 3:1)
- Code 49
- Code 93
- Code 128 (Supports serialization in all subsets B and C and UCC Case C Codes)
- Datamatrix
- EAN-8, EAN-13, EAN EXTENSIONS
- Industrial 2 of 5
- Micro PDF417
- Electrical Requirements
- Auto select 110 VAC ±20% or 230 VAC ±15%, 48-62 Hz
- 3 Amps @ 110 VAC, 1.5 Amps @ 230 VAC

## Environmental Ranges for Operation and Storage

- Operating Temperature  $+40^{\circ}$  F (5° C) to  $+105^{\circ}$  F (40° C)
- Storage:  $-40^{\circ}$  F ( $-40^{\circ}$  C) to  $+140^{\circ}$  F ( $+60^{\circ}$  C)
- Relative Humidity (Operating): 20% to 85% non-condensing
- Relative Humidity (Storage): 5% to 85% non-condensing

- Interleaved 2 of 5 (Supports ratios of 2:1 and 3:1 and supports Modulus 10 Check Digit)
- LOGMARS
- MaxiCode
- MSI
- PDF 417
- Plessey
- POSTNET
- QR
- Standard 2 of 5
- Ultracode
- UPC-A, UPC-E, UPC EXTENSIONS

#### Fonts

**Standard Printer Fonts** 

203 dots/inch (8 dots/mm) Printhead					
Fonts	Dot matrix (h x w) (defaults)	Туре*	Minimum character size (h x w)	Maximum Character/inches	
А	9 x 5	U-L-D	0.044" x 0.030"	33.3	
В	11 x 7	U	0.054" x 0.044"	22.7	
C,D	18 x 10	U-L-D	J-L-D 0.089" x 0.059" 16.9		
Е	28 x 15	OCR-B	0.138" x 0.098"	10.2	
F	26 x 13	U-L-D	J-L-D 0.128" x 0.079" 12.7		
G	30 x 40	U-L-D	U-L-D 0.295" x 0.236" 4.2		
Н	21 x 13	OCR-A	OCR-A 0.103" x 0.093" 10.8		
GS	24 x 24	SYMBOL	SYMBOL         0.118" x 0.118"         8.5		
Ø	Ø 15 x 12 SCALEABLE (SMOOTH) FONT			-	
* Type U= Upper Case; L = Lower Case; D = Descenders					

#### **Table 1-1 Standard Printer Fonts**

#### **Bit-Mapped Fonts**

- Zebra standard A, B, D, E, F, G, E, H and GS.
- Standard magnification up to 10 times vertical and horizontal independent.

#### **Scaleable Fonts**

• One smooth font - CG Triumvirate<sup>™</sup> Bold Condensed, with the ability to expand using the standard Zebra expansion routines, expanding on a dot-by-dot basis, height and width independent, while maintaining smooth edges, to a maximum of 1500 x 1500 dots.

#### **International Characters**

• IBM Code Page 850 - International Characters Set available in fonts A, B, D, E, F, G and  $\emptyset$  through software control.

#### **Optional Fonts**

- **Factory/Field Installed Scaleable**: Futura, CG Triumvirate, CG Palacio, Univers, GC Triumvirate Condensed, Century Schoolbook, Cyrillic, East European, Turkish, Greek.
- **Factory/Field Installed Bit-Mapped**: Futura Bold, CG Triumvirate Bold, CG Palacio Bold, CG Times Bold, Univers Bold, CG Triumvirate Bold Condensed.

#### ZEBRA S400/S600 MAINTENANCE MANUAL

#### **Media Considerations**

	<i>S</i> 400	<i>S</i> 600
Minimum media width	0.75" (19 mm)	
Maximum media width	4.5" (114 mm)	
Maximum media width (cutter installed)	4.0" (102 mm)	
Minimum media length (Tear-Off)	0.63" (16 mm)	
Minimum media length (Peel-Off)	1.0" (25 mm)	
Minimum media length (Cutter)	1.5" (38 mm)	
Maximum media length	36" (914 mm)	39" (990 mm)
Total thickness (includes liner)	0.0023" (0.058 mm) to 0.012" (0.305 mm)	
Core size	3.0" (76 mm)	
Maximum roll diameter	8" (203 mm)	
Minimum Inter-label gap	0.08" (2 mm)	0.118" (3 mm) preferred
Maximum Inter-label gap	0.16 (4 mm)	
Ticket/tag notch size (W x L)	0.08" (2mm) x 0.48 (12 mm)	

#### Media Handling

- Tear-Off Mode: Labels produced in strips.
- Peel-Off Mode\*: Labels dispensed and peeled from the liner.
- Cutter Mode\*: Labels are printed and individually cut.
- Rewind Mode\*: Labels are externally rewound (requires optional media rewinder not available from Zebra Technologies Corporation).
- \* These are options and are not found on all printers.

#### **SECTION I**

#### Memory

#### **Table 1-3 Memory Specifications**

	<i>S</i> 400	<i>S</i> 600
Flash ROM (firmware)	1 MB	1 MB
Standard DRAM	1 MB	2 MB
Available Standard Flash Memory	0	1 MB
Memory Upgrades (Options)	4 MB & 8 MB Flash Modules	4 MB & 8 MB Flash Modules

#### Microprocessor

• 32 Bit RISC

#### Options

- 1 MB flash expansion (S400 only)\*
- 4 MB Flash expansion
- 8 MB Flash expansion
- Peel-Off mode with backing-only rewind feature\*
- Cutter with label catch tray\*
- Scalable and bitmap smooth fonts available for text
- Ethernet

\* Factory installed (contact your authorized Zebra distributor for information).

#### **Physical Dimensions**

#### **Table 1-4 Printer Physical Dimensions**

S400 & S600		
Height	13"	330 mm
Width	8.25"	210 mm
Depth	17"	432 mm
Weight (without options)	17 lbs	7.71 kg

#### ZEBRA S400/S600 MAINTENANCE MANUAL

#### **Printing Considerations**

	<i>S</i> 400	<i>S</i> 600
Resolution	203 dots per inch (8 dots per mm)	
Dot Size	0.005" (0.127 mm)	
Minimum print width	0.75" (19 mm)	
Maximum print width	4.09" (104 mm)	
Minimum print length	.005" (0.125 mm) (1 dot row)	
Maximum print length	36" (914 mm)	39" (990 mm)
Bar code modulus ("X") dimension	5.0 mil to 55.0 mil	

<b>Table 1-5 Printing</b>	<b>Specifications</b>
---------------------------	-----------------------

#### **Printing Method**

- Direct Thermal Printing (requires use of direct thermal media). A substrate, typically paper, is coated with a chemical that changes to a dark color upon exposure to heat over a period of time to form an image.
- Thermal Transfer Printing. The printhead is in contact with a ribbon which releases ink above • a certain threshold temperature.

#### **Print Speeds**

	<i>S</i> 400	<i>S</i> 600	
Programmable constant printing speeds	2.4" (61 mm)	2.4" (61 mm)	5" (127 mm)
	3" (76 mm)	3" (76 mm)	6" (152 mm)
	4" (102 mm)	4" (102 mm)	

#### **Ribbon Considerations**

S400 & S600		
Dibbon Width	Minimum	1.57" (40 mm)
	Maximum	4.5" (114 mm)
Standard Length	2:1 media to ribbon roll ratio	984' (300 m)
	3:1 media to ribbon roll ratio	1400' (427 m)
Como Sizo	Inner diameter	1.0" (25 mm)
Cole Size	Outer diameter	3.2" (81 mm)

#### **Table 1-7 Ribbon Specifications**

#### Zebra Programming Language (ZPL II)

ASCII data commands provide the following features:

- Downloadable graphics, scalable and bitmap fonts and formats (with data compression)
- Bit image data transfer and printing, including mixing of text and graphics
- Format inversion
- Mirror image printing
- Four-position field rotation (0, 90, 180, 270 degrees)
- Slew command

- Programmable quantity with print pause Communicates in printable ASCII characters
- Controlled via mainframe, mini, PC, or other data-entry device
- Serialized fields In-spec OCR-A and OCR-B
- (RAM and Memory Card)

#### **Communication Interfaces**

- Serial Port
  - ✓ RS-232
  - ✓ DB-9
  - ✓ Baud Rate (110, 300, 600, 1200, 2400, 4800, 9600, 14400, 19200, 28800, 38400, 57600)
  - ✓ Parity (disabled, even, odd)
  - ✓ Stop Bits (7 or 8 data bits)
  - ✓ Handshake (XON/XOFF or DTR/DSR)
  - $\checkmark \quad \text{Error Detection (on or off)}$
  - ✓ A null modem (crossover cable must be used to connect to a host 9-pin connector (see Figure 1-2).
  - ✓ A null modem cable must be used to connect to a host 25-pin connector (see Figure 1-2).
- Parallel Port
  - ✓ 36-pin Centronics
  - ✓ Bi-directional port
  - $\checkmark$  Parallel operation can be enabled or disabled in the firmware.
  - ✓ 8-bit Parallel Data Interface supporting IEEE 1284 bi-directional "nibble mode."
- Ethernet
  - ✓ Thinnet and 10BaseT connectivity are available through an external connection to the parallel port.
  - ✓ IPX, LAT, NetBIOS/Net BEUI, TCP/IP protocols are supported with a data burst rate of 150KB. HP bitronics mode is supported to provide bi-directional high speed. SNMP compatible and supports MIB I, MIB II and Parallel MIB as well as MPSPON: (Novell NetWare) PC console configuration utility IPX.

#### **COMMUNICATION SPECIFICATIONS**

#### **Serial Data Communication Interface Overview**

The S400 and S600 printers have a single Data Terminal Equipment (DTE) port that supports RS-232 serial data communications. The RS-232 interface has a 9-pin DB-9S connector located at the rear of the printer.

For all RS-232 data and control input and output signals, the S400 and S600 printers follow both the Electronic Industries Association's (EIA) RS-232 and the Consultative Committee for International Telephony and Telegraphy (CCITT) V.24 specifications.

#### **Standard Serial Communication Connector**

The DTE Port is a DB-9P connector located at the rear of the printer (see Figure 1-1). It provides connection to a host via RS-232 signaling. The pinouts and signal descriptions for the DTE Port are found in Table 1-8.



**Figure 1-1 Communication Cable Connections** 

#### ZEBRA S400/S600 MAINTENANCE MANUAL

#### **RS-232** Interconnection

The printer is configured as Data Terminal Equipment (DTE). Figure 1-2 illustrates the connections required to interconnect the printer with the 9 pin or 25 pin serial port connector on a PC.







Figure 1-2 RS-232 Connections

#### Table 1-8 DB9P Pinout

Pin	Description
1	Not used.
2	RXD (RS-232 Receive Data): This is the Serial Data Input to the printer from the host.
3	TXD (RS-232 Transmit Data): This lead is the Serial Data Output from the printer. It is on this lead that printer status or XON-XOFF information is relayed to the host.
4	DTR (RS-232 Data Terminal Ready): This lead is a Control Output from the printer to the host. When the DTR control line from the printer is Active (positive voltage), the host is allowed to send data to the printer. When DTR is inactive (negative voltage), the host may not send data to the printer. This condition occurs when the printer is configured for DTR/DSR Hardware Handshaking and the communication buffer is within 256 characters of its capacity.
5	Signal Ground for RS-232: Not tied to frame ground. This lead serves as the voltage reference between the interfaced devices.
6	DSR (RS-232 Data Set Ready): This is a Control Input to the printer from the host. The printer monitors this lead to determine if the host is ready to receive Data/Status from the printer.
7	RTS (RS-232 Request To Send): This is a Control Output from the printer to the host. RTS is Active (positive voltage) when the printer is powered on. An Active RTS indicates that the printer is ready to receive data.
8	Not used.
9	+5V Fused Output, 1 Amp Max.

#### **Serial Communication Signal Levels**

#### **RS-232** Transmit and Receive Data

RS-232 Data Signals are defined as either MARK or SPACE while Control Signals are either ON (Active-Positive Voltage) or OFF (Inactive-Negative Voltage). Although the permitted voltage levels can range from 3 VDC to 25 VDC, both positive and negative, the levels for the *S*400 and *S*600 printers are shown in Figure 1-3:

• MARK or OFF = -7 to -10 VDC



Figure 1-3 RS-232 Signal/ASCII Code Data

#### **Centronics® Parallel Data Port**

The *S*400 and *S*600 printers also have a standard 36-pin Centronics® Parallel Connector available at the rear of the printer, for connection to a parallel data source, instead of the previously mentioned Serial Data Port. In this data communication method, the bits of data that make up each character are sent all at one time over several wires in the cable, one bit per wire.

#### **Parallel Port Interconnections**

Table 1-9 shows the pin configuration and function of a standard PC-to-printer Centronics Parallel cable.

#### **Parallel Data Signal Levels**

Parallel Data Signals are defined as either HIGH or LOW, while Control Signals are either Active or Inactive. The distinction is due to the fact that some Control Signals are active HIGH while others are active LOW. The Voltage Levels that represent these conditions are:

Data Signal	Voltage Level
HIGH	+5 VDC
LOW	0 VDC

36-Pin Connector	Description
1	<b>STROBE</b> – The High to Low transition of this Input signal will latch the data at the eight DATA inputs into the printer.
2-9	<b>DATA BITS</b> 0 through 7 – Parallel Data Inputs to the printer. They have TTL input characteristics where a HIGH (+5 V) Level corresponds to a Logic 1 and a LOW (O V) Level is a Logic 0.
10	<b>ACKNOWLEDGE</b> – This Output of the printer is an active LOW pulse indicating that the printer has received the previous character as is ready to accept another data character.
11	BUSY – This printer Output is active HIGH whenever it cannot accept data.
12	<b>ERROR</b> – This Output signal is active HIGH whenever the printer is out of paper or ribbon.
13	<b>SELECT</b> – The function of this Output signal is determined by a Printer Configuration Option. In the default condition, SELECT is active HIGH whenever the parallel port is powered up and enabled.
14	AUTOFEED – This Input is unused by the printer.
15, 33 and 34	Not Used
16, 19 – 30	<b>SIGNAL GROUNDS</b> are the logic grounds and returns for all input and output signals.
17	Chassis Ground (For Cable Shield connection).
18	+5V Fused Output, 1 Amp Max.
31	<b>INITIALIZE</b> ( <b>Reset</b> ) – This Input is unused by the printer.
32	<b>FAULT</b> – This Output from the printer is active LOW whenever any of the following error conditions are present: Head Open, Head Too Hot, Paper Out, Ribbon Out and Rewind Full (if Optional Rewind is used.)
35	+5V Resistive.
36	<b>SEL IN</b> – This connection is connected but not used by the printer.

#### **Table 1-9 Centronics Parallel Cable Pinout**

SECTION I

#### **ELECTRONICS SYSTEM BLOCK DIAGRAM**



**Figure 1-4 Electronic Block Diagram** 

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# **OPERATIONS OVERVIEW**

This section contains information and adjustments for an individual to become acquainted with, adjust, test and operate the printer. This information is also found in the User's Guide

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#### **OPERATOR CONTROLS**

#### **Refer to Figure 2-1**

#### **POWER Status Indicator (green):**

Controlled by Figure 2-2).	the Power ON/OFF Switch located on the left side of the near the AC Power (see
ON	Indicates that primary power is applied to the printer.
OFF	Indicates the printer has been turned off or is not receiving power.

#### **PRINTHEAD Status Indicator (yellow):**

ON	Indicates that a printhead over temperature condition exists. Printing stops until the printhead cools down and then printing resumes automatically.	
	Indicates that a printhead under temperature condition exists. Printing continues.	
OFF	Normal condition.	
FLASHING	Indicates that the printhead is open.	

#### **PAPER/RIBBON Status Indicator (yellow):**

ON	Indicates that the media is out.
OFF	Normal condition. Media and ribbon (if used) are properly loaded.
FLASHING	Direct Thermal Mode – Ribbon is in printer.
	Thermal Transfer Mode – Ribbon is out.
	Peel-Off Mode – Backing rewind spindle full.

#### **PAUSE Status Indicator (yellow):**

ON	Indicates that the printer has stopped all printing operations.
OFF	Normal condition.

#### **DATA Status Indicator (green):**

ON	Indicates that the data processing or printing is taking place, but no data is being received.
OFF	Indicates that no data is being received or processed.
SINGLE FLASH	Indicates that the CANCEL Key was pressed and a format was successfully deleted from the print queue.
FLASHING	Indicates that data is being received.
SLOW FLASHING	Indicates that the printer sent a "stop transmitting" command to the host computer.

#### **DARKEN Status Indicator (yellow):**

ON	Indicates the printer is in the Configuration Mode. See "Adjusting the Printer Darkness" and "Top of the Label Position Adjustment" in this section for more information.
OFF	Normal condition.

#### **POSITION Status Indicator (yellow):**

ON	Indicates the printer is in the Configuration Mode. See "Tear-Off Position Adjustment" in this section for more information.
OFF	Normal condition.

#### **CALIBRATE Status Indicator (yellow):**

ON	Indicates the printer is in the Configuration Mode. See ''Top of the Label Position Adjustment'' in this section for more information.
OFF	Normal condition.

#### PAUSE Key:

Allows the operator to interrupt the printing of a batch of labels.

- If the printer is currently printing and the PAUSE Key is pressed, printing will stop after the label being printed is completed.
- If the printer is not currently printing, no printing can occur.

#### FEED (▲) Key:

Forces the printer to feed one blank label.

- If the printer is currently printing and the FEED Key is pressed, a blank label will feed after the current batch of labels is completed.
- If the printer is not currently printing, a blank label feeds immediately.

#### CANCEL (♥) Key:

When in the PAUSE mode, this key will cancel print jobs.

- If there are no print jobs in queue, pressing the CANCEL Key will cancel the next print job to be sent to the printer.
- If there is a print job in the queue, pressing the CANCEL Key once will cancel the current print job.
- If there are print jobs in the queue, pressing and holding the CANCEL Key for several seconds will cancel all print jobs in the printer's memory.

#### **MODE Key:**

The MODE Key puts the printer in the Configuration Mode and activates the automatic Media Calibration procedure.

#### **Power ON/OFF Switch**

Located on the left side of the printer, near the AC Power Cord is the Power ON/OFF Switch (see Figure 2-2). The Power ON/OFF 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 as it begins operation. Turning the printer power ON while holding down certain front panel keys will launch additional Printer Self Tests immediately following the Power On Self Test. These tests are described later in this section.

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 back ON may re-establish proper printer operation.







Figure 2-2 Power ON/OFF Switch Location

#### ACCESSING THE PRINTER

To access the printer for the loading and unloading of media and ribbon, and for operator adjustments, do the following:

- 1. Lift on the Main Door and swing it up and to the left until it rests on top of the right side cover (see Figure 2-3).
- 2. Grab the tab on top of the Front Door and carefully pull down until it rests on the desktop.



**Figure 2-3 Accessing the Printer**
### ZEBRA S400/S600 MAINTENANCE MANUAL

### **SECTION II**

### LOADING THE MEDIA

Note: A Media Calibration must be performed when media and ribbon (if used) are first installed in the printer, or when a different type of media or ribbon is installed.

Note: Media widths and thickness vary between applications. To maintain print quality from one application to another, refer to the Print Quality Adjustments section in this manual.

### **Tear-Off Mode Media Loading**

- 1. Move the Head Open Lever counterclockwise to the OPEN position and raise the Printhead.
- 2. Slide the Media Guide and the Media Supply Guide as far out from the printer frame as possible.
- 3. **Roll Media** Place the media roll on the Media Supply Hanger and thread the media through the Printhead Assembly as shown in Figure 2-4.

**Fanfold Media** – Feed fanfold media through either the bottom or rear access slot of the printer as shown in Figure 2-5.

4. Adjust the Media Supply Guide and Media Guide against the outer edge of the media.

### Note: These guides must not cause pressure or excessive drag on the media.

- 5. CLOSE the Head Open Lever.
- 6. Perform the Media Sensor position adjustment.

### **Cutter Mode Media Loading**

- 1. Move the Head Open Lever counterclockwise to the OPEN position and raise the Printhead.
- 2. Slide the Media Guide and the Media Supply Guide as far out from the printer frame as possible.
- 3. Place the media roll on the Media Supply Hanger and thread the media through the Printhead Assembly as shown in Figure 2-6.

### Note: The end of the media must be positioned on top of the platen roller.

4. Adjust the Media Supply Guide and Media Guide against the outer edge of the media.

### Note: These guides must not cause pressure or excessive drag on the media.

- 5. With the end of the media positioned directly on top of the platen roller, CLOSE the Head Open Lever. The printer will automatically feed out and cut one label when the printer power is turned on.
- 6. Perform the Media Sensor position adjustment.

SECTION II



Figure 2-5 Fanfold Media Loading



Figure 2-7 Peel-Off Mode Media Loading

### Peel-Off Mode Media Loading

- 1. Move the Head Open Lever counterclockwise to the OPEN position and raise the Printhead.
- 2. Slide the Media Guide and the Media Supply Guide as far out from the printer frame as possible.
- 3. Remove the Hold Down Hook.
- 4. Place the media roll on the Media Supply Hanger and thread the media through the Printhead Assembly as shown in Figure 2-7.
- 5. From the front of the printer, pull the media through the Printhead Assembly until approximately 24" of media extends out from the printer. Remove the labels from the backing of the 24" of media.
- 6. Thread the backing behind the Lower Label Available Sensor, through the slot under the Rewind Power Roller and below the Lower Guide Rod to the Backing Rewind Spindle.
- 7. Wind the backing material around the Backing Rewind Spindle three or four times in a counter-clockwise direction. Insure the edge of the backing material is against the round plate at the far end of the spindle.
- 8. 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. Rotate the Backing Rewind Spindle counter-clockwise to remove any slack in the backing material.
- 9. Adjust the Media Supply Guide inward until it is just touching the outer side of the Media Supply Roll. Lock the guide in place with the locking screw.
- 10. 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.
- 11. Adjust the Media Guide until it just touches the outer edge of the media and backing without causing the material to buckle.
- 12. CLOSE the Head Open Lever
- 13. Perform the Media Sensor position adjustment.

### **Removing the Label Backing Material**

When the amount of backing material wound on the Backing Rewind Spindle reaches full capacity, the Backing Rewind Spindle Full Sensor activates, the Paper/Ribbon LED flashes, and the printing pauses.

Use the following steps to remove the backing material.

### Note: You do not need to turn the printer OFF 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 material through the mechanism and attach it to the Backing Rewind Spindle as described in the Peel-Off Mode Media Loading procedures.
- 4. 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.

### Adjusting the Media Sensor

When the printer is powered ON, it performs a self-test and configures its operating characteristics. Some of these characteristics are determined by the position of the Media Sensor (see Figure 2-8).

The Media Sensor Assembly consists of two sections. The media passes between a stationary light source and a movable light sensor. The light source is positioned below the media, while the light sensor is above the media.

### Media Sensor Adjustment for Non-Continuous Media

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

- 1. Move the Head Open Lever counterclockwise to the OPEN position and raise the Printhead.
- 2. Look through the side of the print mechanism and locate the Media Sensor Adjustment Lever (see Figure 2-8).
- 3. Reposition the sensor until the top of the adjustment lever is in line with the notch in the media.
- 4. CLOSE the Head Open Lever.

### Media Sensor Adjustment for Continuous Media

Continuous media does not contain label start/end indicators. You must tell the printer, through the software, the length of each label. If you are using ZPL or ZPL II, include a Label Length (^LL) instruction in each label format you sent to the printer. Refer to your ZPL II Programming Guide or instruction provided with the software driver you are using.

### Note: When continuous media is used, position the Media Sensor anywhere over the media so that an "Out-of-Media" condition will still be sensed.



Figure 2-8 Media Sensor Adjustment

### **RIBBON LOADING**

Note: Do not load ribbon if the printer is to be used in the direct thermal mode.



### CAUTION:

DO NOT USE RIBBON THAT IS NARROWER THAN THE MEDIA. PREMATURE PRINTHEAD FAILURE MAY RESULT DUE TO EXCESSIVE ABRASION CAUSED BY THERMAL TRANSFER MEDIA.

### **Adjusting the Ribbon Supply Spindle**

The *S*400/*S*600 comes with a Dual-Tension Ribbon Supply Spindle to provide the appropriate amount of tension on the ribbon.

### **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 Spindle End-Cap until it clicks into place (see Figure 2-9).

### **Low-Tension Position**

The low-tension position is used in limited applications with ribbons wider than 2.4" (60 mm) to provide lower back-tension. The low-tension position is only recommended when the normal tension hampers the ribbon movement. To place the spindle in the low-tension position, firmly push the Spindle End-Cap until it clicks into place (see Figure 2-9).



Figure 2-9 Dual Tension Ribbon Supply Spindle Adjustment

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### Loading the Ribbon

Note: For Direct Thermal Print Method, <u>ribbon is not used</u> and should not be loaded in the printer when performing the Media Calibration.

Note: Use 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.

To load ribbon, see Figure 2-10 and follow the procedures below.

1. Adjust the Ribbon Supply Spindle position for normal or low tension (see procedure on previous page).

Note: Step 2 can be skipped if the ribbon width is 2.4" (60 mm) or less.

- 2. Align the blades on the two sections of the spindle as shown in Figure 2-9.
- 3. Place the ribbon roll on the ribbon supply spindle so that the ribbon unwinds toward the front of the printer from under the roll. Make sure that the core is pushed up against the stop and that the ribbon is aligned squarely with its core.
- 4. Open the printhead assembly by moving the Head Open Lever counterclockwise to the OPEN position.
- 5. Thread the ribbon as shown in Figure 2-10. Use caution not to crease or wrinkle the ribbon. Wind the ribbon onto the Ribbon Take-up Spindle for several turns in a clockwise direction.
- 6. Close the printhead assembly by moving the Head Open Lever clockwise to the CLOSED position.

### **Removing Used Ribbon**

To remove used ribbon, follow the steps below.

- 1. Cut the ribbon between the Upper Ribbon Guide Roller and the Ribbon Take-Up Spindle (see Figure 2-10).
- 2. Press the Ribbon Release Button and slide the ribbon off of the Ribbon Take-Up Spindle.



Figure 2-10 Ribbon Loading Diagram

### **SECTION II**

### **DATA CABLE INSTALLATION**

- 1. Turn the printer off by the power switch.
- 2. Determine whether you are using a parallel data cable or serial data cable.
- 3. Follow your computer manufacturer's instructions for installing data cables to the computer. The computer manufacturer may require you to power down the computer before making any cable connections.
- 4. Connect the printer data cable from the computer to the proper printer port on the rear of the printer (see Figure 2-11).



**Figure 2-11 Data Cable Connections** 

### **POWER ON SELF-TEST**

A Power On Self-Test 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 LEDs will turn ON and OFF to insure proper operation. Once completed, only the POWER LED is on. If other LEDs are on, refer to Section III Troubleshooting.

### Additional Printer Self-Tests

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

Each self-test is enabled by holding in a specific front panel key while turning the Power Switch ON. The key should be depressed until the Front Panel LEDs turn ON. When the Power On Self-Test is complete, the selected printer self-test will automatically start.

### Notes:

- When performing self-tests, except for the Mode Key Self-Test, disconnect the printer data cable from the printer.
- Use full width media when performing the self-tests. Labels less than full width will lose printing on the right side. Printing may run on to the next label when using short labels.
- When canceling a self-test before its actual completion, always turn the printer Power Switch OFF and back ON.
- When performing the self-tests in the Peel-Off Mode, the operator must remove the labels as they become available.
- When the Cutter Option is installed and enabled, the labels printed during the self-test should be automatically cut as they are printed.

### **Printer Self-Test/Reset Default Quick Reference Chart**

Table 2-1 lists the self-tests and default resets that can be accessed by holding a front panel key or keys and turning the printer power on. The "X" in the four columns on the right indicates which key or keys are pressed.

The  $\checkmark$  indicates whether the self-test is one that can be performed by the operator (user) and/or maintenance personnel. These tests produce sample labels and provide specific information that helps the operator/maintenance personnel determine the operating conditions for the printer. Self-tests without the  $\checkmark$  require special tools or knowledge and are for repair and maintenance of the printer and only should be performed by maintenance personnel.

Detailed information on the operator self-tests immediately follows this chart. Detailed information on maintenance personnel only self-tests are found in Section IV Preventive and Corrective Maintenance Procedures along with extended diagnostics.

*Note:* The printer data cable must be removed from the printer (except for the MODE key test) prior to running the self-tests.

Operator	Description		FEED Key	CANCEL Key	MODE Key
1	<b>CANCEL Key Self-Test</b> – Produces a printer configuration label printout			Х	
1	<b>PAUSE Key Self-Test</b> – Produces test printouts for adjustments (15 or 50 labels @ 2 or 6 ips)	Х			
1	<b>FEED Key Self-Test</b> – Produces test printouts to determine the best darkness setting		Х		
1	<b>MODE Key Self-Test</b> – Produces a communications diagnostic mode printout				Х
1	<b>Factory Default Reset</b> – Resets printer configuration to factory default values	Х	Х		
1	<b>Communication Parameter Default Reset</b> – Resets printer communication parameters to 9600 baud, 8 bit work length, not parity and 1 stop bit.	Х	Х		Х
1	Manual Calibration – The printer determines the media type, label length, media and ribbon sensor settings, and printing method.	Х	Х	Х	
	<b>PAUSE and CANCEL Key Self Test</b> – Serialized test printouts to verify proper printer operation (500 maximum)	Х		Х	
	<b>Ribbon Parameter Calibration</b> – Sets ribbon parameters to factory default values. <i>Note: This test is only performed when</i> <i>sensor assemblies are replaced or when a</i> <i>Manual Calibration fails. A Manual</i> <i>Calibration procedure must be performed</i> <i>after the Ribbon Parameter Calibration.</i>		Х	Х	Х
	<b>FEED and CANCEL Key Self Test</b> – Pre-programmed label test formats for major overhauls		Х	Х	

Table 2-1 Self-Test and Calibration	Quick Reference	Chart
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### **IMPORTANT:**



USE FULL WIDTH MEDIA WHEN PERFORMING THE SELF-TESTS. LABELS LESS THAN FULL WIDTH WILL LOSE PRINTING ON THE RIGHT SIDE. PRINTING MAY RUN ON TO THE NEXT LABEL WHEN USING SHORT LABELS.

### **CANCEL Key Self-Test**

This self-test prints a listing of the printer's current configuration parameters that are currently stored in Configuration (EEPROM) Memory (see Figure 2-12).

The configuration may be changed either temporarily (for specific label formats or ribbon and label stock), or permanently (by saving the new parameters in memory.) Saving new parameters occurs whenever a Printer Configuration procedure is performed.

To start the CANCEL Key Self-Test, press the CANCEL key while turning the printer power on. The printer will first run through a Power On Self-Test and then print the configuration label.

FIRMWARE IN THIS PRINTER IS COPYRIGHTED

Figure 2-12 CANCEL Key Self Test Printout (Configuration Label)

### **PAUSE Key Self-Test**

This self-test can be used to provide the test labels (see Figure 2-13) required when making adjustments to the printer's mechanical assemblies. These test labels can also be used during the Configuration Mode Adjustments.

To start the PAUSE Key Self-Test, press the PAUSE key while turning the printer power on.

This self-test consists of four individual test features:

- 1. The initial self-test prints 15 labels at 2 inches per second (ips) (speed A) and then automatically pauses the printer. Each time the PAUSE key is pressed, an additional 15 labels will print, up to a maximum of 9999 labels.
- 2. While the printer is paused, pressing the CANCEL key once alters the self-test. Now each time the PAUSE key is pressed the printer prints 15 labels at speed 6 ips (speed D) up to a maximum of 9999 labels.
- 3. While the printer is paused, pressing the CANCEL key a second time alters the self-test again. Now each time the PAUSE key is pressed the printer prints 50 labels at speed 2 ips up to a maximum of 9999 labels.
- 4. While the printer is paused, pressing the CANCEL key a third time alters the self-test again. Now each time the PAUSE key is pressed the printer prints 50 labels at speed 6 ips up to a maximum of 9999 labels.

### FEED Key Self-Test

The results of this self-test will be used to determine the best Darkness Setting for a specific media/ribbon combination.

The FEED Key Self-Test prints a series of labels (Figure 2-14) at various plus or minus Darkness settings relative to the current darkness setting. The operator inspects these printouts and determines which printout has the best darkness setting. The value next to "Relative Darkness:" on the printout is added to (+) or subtracted from (-) the current Darkness value.

To start the FEED Key Self-Test, press the FEED key while turning the printer power on.

The following procedure sets the darkness of the printing on the label. To maximize the life of the printhead, use the lowest setting that provides the necessary print quality.

- 1. Press the MODE key. The PAUSE and DARKEN LEDs turn on.
- 2. If the value on the FEED Key Self-Test Printout is a positive value, press the FEED (▲) key the number of times indicated on the printout. Example: If the best label has "Relative Darkness: 3", press the FEED Key three times.
- 3. If the value on the FEED Key Self-Test Printout is a negative value, press the CANCEL (▼) key the number of times indicated on the printout. Example: If the best label has "Relative Darkness: -2", press the CANCEL Key two times.
- 4. Press the MODE key three times. The MODE LEDs will flash on and off to indicate that the settings have been saved to memory.
- 5. Press the PAUSE key to exit the PAUSE mode and turn off the PAUSE LED.



Figure 2-13 PAUSE Key Self-Test Printout



Figure 2-14 FEED Key Self-Test Printout

### **MODE Key Self-Test**

### Note: The printer data cable must be connected to the host computer during this 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. Refer to Figure 2-15 for sample printout.

To start the MODE Key Self-Test, press the MODE key while turning the printer power on.

### FEED and PAUSE Key Factory Default Reset

If it is ever necessary to return the printer configuration to factory default values, press the FEED key and PAUSE Key at the same time while turning the power on. The default values will remain active until the printer power is turned off. To save the default values in memory, press the MODE key four times. The Darken, Position, and Calibrate LEDs will cycle on and then off indicating the values have been saved. Table 2-2 lists the factory default values.

## FEED, PAUSE and MODE Key Reset (Communication Parameter Default)

To reset the communication parameters only, press the FEED, PAUSE and MODE keys while turning the printer power on. The communication parameters are reset to 9600 baud, 8 bit work length, not parity and 1 stop bit.

To make these settings permanent, press the MODE key four times. The DARKEN, POSITION and CALIBRATE LEDs will flash indicating the changes have been saved. To return to printing mode, turn the printer off and then on once more.



### Figure 2-15 MODE Key Self-Test Printout

Parameter	Default Value
Backfeed	Default
Baud	9600
Calibration	Auto
Darkness	10
Data Bits	8 bits/character
Error Detection	On
Handshake	XON/XOFF
Head Close	Calibration
Label Top	00
Left Position	000
Media Type	Non-Continuous Web Sensing
Parallel Port	Enabled
Parity	None
Print Method	Thermal Transfer
Print Mode	Tear-Off
Print Width	103 mm
ZPL Control Prefix	7E
ZPL Delimiter Char	2C
ZPL Format Prefix	5E
ZPL Mode	ZPL II

#### **Table 2-2 Factory Default Values**

### **CALIBRATION**

### **Auto Calibration**

The Auto Calibration occurs whenever the printer is turned on or when the printhead is opened and closed (with the printer turned on). 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 will not auto calibrate, refer to the Manual Calibration procedure.

- 1. Load the media and ribbon (if used).
- 2. Turn on the printer power.
- 3. Several blank labels will feed, completing the auto calibration procedure.

### **Manual Calibration**

### **IMPORTANT:**



### PERFORM THE MANUAL CALIBRATION PROCEDURE WHEN USING PRE-PRINTED MEDIA, THE PRINTER IS IN MANUAL CALIBRATION MODE, OR WHEN THE PRINTER WILL NOT AUTO CALIBRATE.

During this procedure, the printer determines the media type, label length, media and ribbon sensor settings, and printing method. 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. If ribbon is not sensed, the direct thermal print method is configured.

The results of the 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.

Notes: 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 when changing media (a label will print that shows the sensor profile).

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. Turn printer power off.
- 2. Place the Head Open Lever in the OPEN position.
- 3. Remove the ribbon (if used).
- 4. Remove approximately six labels from the media roll, enough so that only the backing material is treaded under the media sensor when media is loaded.
- 5. Reload the media.
- 6. Press and hold down the PAUSE, FEED, and CANCEL buttons.

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- 7. Turn the power switch ON.
- 8. After the CALIBRATE LED goes out, release the PAUSE, FEED, and CANCEL buttons.
- 9. When the PRINTHEAD LED flashes, reload the ribbon.
- 10. Make sure the Media Sensor is properly positioned.
- 11. Close the printhead.
- 12. A media and ribbon sensor profile will print.

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

### **Ribbon Parameter Calibration**

### Note: Perform this procedure only if the Manual Calibration fails or if Sensor Assemblies are replaced. A Manual Calibration must be performed after the Ribbon Parameter Calibration.

To set the ribbon parameter to factory default values:

- 1. Turn off the printer.
- 2. Open the printhead and remove the ribbon.
- 3. Press the FEED, CANCEL and MODE keys while turning the printer power on.
- 4. After the PRINTHEAD LED flashes, load the ribbon.
- 5. Close the printhead.

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

6. After the Data LED flashes once, save the calibration by pressing the MODE Key four times.

### **CONFIGURATION MODE**

The Configuration Mode allows you to fine-tune the internal printer configuration settings for your application. In this mode, you can change the following parameters:

- Printer darkness.
- Rest position of the media with respect to the "web" or "interlabel gap."
- Position of printing relative to the top of the label.
- Media and Ribbon Sensor values.
- Label length.
- Printing method.
- Media type (continuous or non-continuous).

You can get a printout of the printer configuration by performing the CANCEL Key Self-Test.

To set the printer configuration to factory defaults, refer to the FEED Key and PAUSE Key Self-Test.

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The ZPL II Programming Guide contains information on instructions that may be sent to the printer to disable the MODE key and set specific label format values for each of these parameters. If you are not using ZPL II, refer to the instructions provided with the software you are using to determine if the software allows you to change these parameters.

### **Print Darkness**

Due to differences in types of media, ribbon and the wear on thermal printhead elements, it may be necessary to adjust the Print Darkness Setting to achieve proper printing.

### **Printing and Examining a Configuration Label**

First, it is a good idea to print out a configuration label to see where the darkness is set at this time. Also, once the ideal parameters for a particular media/ribbon combination have been determined, a Configuration Label can be printed and saved for future reference. To get a Configuration Label, a CANCEL Key Self-Test is run.

To start the CANCEL Key Self-Test, press the CANCEL key while turning the printer power on. The printer will first run through a Power On Self-Test and then print the Configuration Label (see Figure 2-16).

The first item on the Configuration Label is the DARKNESS setting. It is displayed as a number between 0 and 30. The sample shown in Figure 2-16 lists a DARKNESS setting of 20. Factory default for this value is 10.

If you already know the DARKNESS setting (actual number) for a particular combination of media and ribbon, you may skip down to the Adjusting The Printer Darkness procedure.



### **IMPORTANT:**

USE FULL WIDTH MEDIA WHEN PERFORMING THE SELF-TESTS. LABELS LESS THAN FULL WIDTH WILL LOSE PRINTING ON THE RIGHT SIDE. PRINTING MAY RUN ON TO THE NEXT LABEL WHEN USING SHORT LABELS.

### **Testing Print Darkness (FEED Key Self-Test Method)**

The FEED Key Self-Test prints a series of labels (Figure 2-17) at various plus or minus Darkness settings relative to the current darkness setting and at various print speeds. The operator inspects these printouts and determines which printout has the best darkness setting. The value next to "Relative Darkness:" on the printout is added to (+) or subtracted from (-) the current Darkness value. If the label with the best appearance has a value of "ØØ" no adjustments are necessary.

To start the FEED Key Self-Test, press the FEED key while turning the printer power on. The printer will first run through a Power On Self-Test and then start printing the FEED Key Self-Test Labels. Examine these labels and proceed to the Adjusting The Printer Darkness procedure.

Figure 2-16 CANCEL Key Self Test Printout (Configuration Label)



Figure 2-17 FEED Key Self-Test Printout

### **Testing Print Darkness (PAUSE Key Self-Test Method)**

Another method of testing print darkness, with a test label that contains a large amount of printing, is done by performing the PAUSE Key Self-Test. First, you must determine how you want to proceed with the adjustments.

- 1. You can run the PAUSE Key Self-Test procedures (listed below) without knowing your DARKNESS setting start point. Essentially, you would run the test, examine the labels, and then perform the Adjusting The Printer Darkness procedure by using your best guess as to how far to increase or decrease the DARKNESS setting to the optimal setting.
- 2. You can manually set the DARKNESS setting to the factory default value (or any other start point you wish), then run the PAUSE Key Self-Test, and then perform the Adjusting The Printer Darkness procedure.

### To manually set the DARKNESS setting, you need do the following procedure:

- 1. Press the MODE key. The PAUSE and DARKEN LEDs turn on.
- Press and release the CANCEL (♥) key to decrease the DARKNESS setting, each time waiting for the DARKEN LED to flash once before pressing again. Continue to press the CANCEL (♥) key in this fashion until the DARKEN LED does not flash. This means you are at setting "0."
- Press and release the FEED (▲) key to increase the DARKNESS setting, each time waiting for the DARKEN LED to flash once before pressing again. Continue to press the FEED (▲) key in this fashion until you count up to 10 (factory default) or to whatever number you desired to set the start point).
- 4. Press the MODE key three times. The MODE LEDs will flash on and off to indicate that the settings have been saved permanently into memory.
- 5. Press the PAUSE key to resume printing. You are now ready to start the PAUSE Key Self-Test.

### To start the PAUSE Key Self-Test, press the PAUSE key while turning the printer power on.

This self-test consists of four individual test features:

- 1. The initial self-test prints 15 labels at 2 inches per second (ips) (speed A) and then automatically pauses the printer. Each time the PAUSE key is pressed, an additional 15 labels will print, up to a maximum of 9999 labels.
- 2. While the printer is paused, pressing the CANCEL key once alters the self-test. Now each time the PAUSE key is pressed the printer prints 15 labels at speed 6 ips (speed D) up to a maximum of 9999 labels.
- 3. While the printer is paused, pressing the CANCEL key a second time alters the self-test again. Now each time the PAUSE key is pressed the printer prints 50 labels at speed 2 ips up to a maximum of 9999 labels.

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4. While the printer is paused, pressing the CANCEL key a third time alters the self-test again. Now each time the PAUSE key is pressed the printer prints 50 labels at speed 6 ips up to a maximum of 9999 labels.

To conserve labels, you would want to check the sample labels in tests 1 and/or 2 of the PAUSE Key Self-Test. If you are not satisfied with the print darkness quality, proceed to Adjusting The Printer Darkness and adjust accordingly.

Afterwards, you would run test 1 and/or 2 of the PAUSE Key Self-Test again and repeat the procedures if desired print darkness is still not achieved.

### **Adjusting The Printer Darkness**

### **CAUTION:**



### SET THE PRINT DARKNESS TO THE LOWEST SETTING POSSIBLE FOR THE DESIRED PRINT QUALITY. DARKNESS SET TOO HIGH MAY CAUSE INK SMEARING, RIBBON WRINKLE AND/OR BURNING THROUGH OF THE RIBBON.

The following procedure sets the darkness of the printing on the label.

### Note: It is not necessary to turn the printer power off to adjust this parameter

- 1. Press the MODE key. The PAUSE and DARKEN LEDs turn on.
- 2. Press the FEED ( $\blacktriangle$ ) key to increase or the CANCEL ( $\blacktriangledown$ ) key to decrease the darkness setting.

**Example 1**: Your Configuration Label (see Figure 2-16) lists a DARKNESS setting of 20. You know your Media/Ribbon combination should be 15. You would press the CANCEL  $(\mathbf{\nabla})$  key five times (20 - 15 = 5).

**Example 2**: After running the FEED Key Self-Test, you have determined that the label that looks the best (see sample in Figure 2-17) has a Relative Darkness of  $\emptyset$ 3. You would press the FEED ( $\blacktriangle$ ) key three times.

**Example 3**: After manually resetting the DARKNESS setting to the factory default of 10, you run the PAUSE Key Self-Test and determine the labels are too light. You would make your best estimate and press the FEED ( $\blacktriangle$ ) key your estimated number of times

- 3. Press the MODE key three times. The MODE LEDs will flash on and off to indicate that the settings have been saved permanently into memory.
- 4. Press the PAUSE key to exit the PAUSE mode and turn off the PAUSE LED.

### **Tear-Off Position Adjustment**

This procedure sets the end-of-label position relative to the Tear-Off Plate or Cutter. The media stopping position is adjustable in increments of four dot rows at a time. The possible adjustment range is +/-80 dot rows or a distance of 0.392" (10 mm) up or down from center. Make this adjustment if the label is not being torn or cut at the correct position.

- 1. Press the MODE key twice. The PAUSE and POSITION LEDs turn on.
- 2. To adjust the label position, press the FEED ( $\blacktriangle$ ) key to move the label forward (out of the printer) or the CANCEL ( $\bigtriangledown$ ) key to move the label back (into the printer).
- 3. Press the MODE key twice. The MODE LEDs will flash on and off to indicate that the settings have been saved to memory.
- 4. Press the PAUSE key to exit the PAUSE mode and turn off the PAUSE LED.



Figure 2-18 Tear-Off Position Adjustment

### **Top of the Label Position Adjustment**

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

- 1. Press the MODE key twice briefly and then press and hold it for approximately five seconds (until the PAUSE, DARKEN, and CALIBRATE LEDs turn on).
- 2. Press the FEED (▲) key to move the printing closer to the top edge or the CANCEL (▼) key to move away from the top edge. Each press of either of these keys equals eight dot rows, or approximately .0394".
- 3. Press the MODE key twice. The MODE LEDs will flash on and off to indicate that the settings have been saved to memory.
- 4. Press the PAUSE key to exit the PAUSE mode and turn off the PAUSE LED.

### Example:

In Figure 2-19, the Configuration Label printed on the right was first printed. It was decided to move the print closer to the top edge (in the " - " direction) approximately 15/32".

Notice that the LABEL TOP line (of the Configuration Label on the right) has a value of +012.

Take 15/32" and divided by .0394" and it equals 11.89 (round to 12). Pushing the CANCEL ( $\mathbf{\nabla}$ ) key 12 times (and completing the adjustment procedures) will give us the Configuration Label shown on the left when you print a new Configuration Label).

Now notice that the printed Configuration Label on the left has a LABEL TOP line value of -084 and that the printing is closer to the top of the label (approximately 15/32" from its original position).

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Figure 2-19 Adjusting the Print of the Top of the Label

### **ROUTINE ADJUSTMENTS**

### **Printhead Pressure Adjustment**

If the printing is too light on one side of the label, or if media with a different thickness is used, the printhead pressure may need to be adjusted in order to provide the best print quality. Refer to Figure 2-20 and perform the following procedure:

- 1. Begin by printing sample labels. This can be done by performing a PAUSE Key Self-Test.
- 2. After printing a few labels, press the PAUSE Key and check the print quality.
- 3. If necessary, increase or decrease the toggle pressure using the knurled adjustment nuts at the top of the Toggle Shafts.

**Example 1**: If printing is acceptable on the left side, but too light on the right side, increase the toggle pressure by turning the right Toggle Pressure Adjust clockwise.

**Example 2**: If printing is acceptable on the right side, but too dark on the left side, decrease the toggle pressure by turning the left Toggle Pressure Adjust counter-clockwise.

- 4. Press the PAUSE Key to continue printing and check for proper print quality.
- 5. Repeat steps 2 through 4 as needed.

Note: Using the lowest pressure that produces the desired print quality can extend Printhead life. Do not increase overall head pressure to increase darkness unless the continued increase of the Darkness Setting does not provide satisfactory results.

Note: When using narrow media, adjust the Toggle Pressure Adjust that is away from the side frame to zero or minimum required for acceptable print. This will reduce the wear on those areas of the Printhead and the Platen where ribbon and media are not present.



**Figure 2-20 Printhead Pressure Adjustment** 

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### **Backing Rewind Power Roller Adjustment**

# Note: The Rewind Power Roller is only present on printers with the Peel-Off Option. This roller is pre-set 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 insure 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 Media Loading Procedures. Insure 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 outer Media Guides against the outside edge of the media, but no so tight as to bind the material.

When the Rewind 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 the right as printing occurs. This can cause print registration problems on the labels.

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

### Adjusting the Rewind Power Roller

- 1. Locate the Power Roller Adjustment screw (see Figure 2-21).
- 2. Using a screwdriver (or a coin) turn the Power Roller Adjustment screw **counter-clockwise** to **increase** the tension on the right side of the Rewind Power Roller. Turning the Power Roller Adjustment screw **clockwise decreases** the tension on the right side of the Rewind Power Roller.

### Note: The adjustment changes the position of the right end of the Rewind Power Roller only. The left end remains stationary.

3. Use the FEED Key Self-Test to print several labels to insure 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.

**Example:** Figure 2-21 illustrates an improperly adjusted Rewind Power Roller. On the left side, the backing material is not contacting the Rewind Power Roller. This is because the backing has more tension on the right edge than on the left.

By turning the Power Roller Adjustment screw clockwise, the tension in the right side will decrease. The screw should be adjusted until the tension is equal on the left and right sides of the Rewind Power Roller and the label backing material tracking is maintained.



Figure 2-21 Backing Rewind Power Roller

### TROUBLESHOOTING

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### **TROUBLESHOOTING CHARTS**

Consult the following charts when troubleshooting the printer. Also consult the "Sample Labels" section for other print quality issues and possible solutions.

Table	Subject		
3-1	LED quick reference chart (refer to Table 3-2 for symptoms and actions).		
3-2	Problems and conditions with LED indications (refer to Table 3-1).		
3-3	Possible print or print quality related problems. Also use with "Sample Labels" section.		
3-4	Wrinkled ribbon related problems.		
3-5	Jammed or stuck label related problems.		
3-6	Printer setting or parameter related problems.		
3-7	Printer cutter related problems (cutter is an option).		

### **LED Quick Reference Chart**

Table 3-1 is a quick reference troubleshooting chart based on the status of the LEDs after the Power On Self-Test has been completed (or attempts to complete) or during operation of the printer. Using the legend at the bottom of the table, match the LED condition of the printer to the chart. The rightmost column refers to possible solutions found in Table 3-2.

Power	Printhead	Paper/ Ribbon	Pause	Data	Darken	Position	Calibrate	Refer to: Table 3-2 Item #
•	•		•	•	•	•	•	1
*	*	*	*	**	\$ <del>2</del>	<b>\</b>	*	2
*	•	•	•	•	•	•	•	3
*	*	*	*	*	\$ <del>2</del>	*	•	4
*	*	*	*	**	245	•	•	5
*	*	*	*	*	•	•	•	6
*	*	*	*	•	•	•	•	7
*	*	*	•	•	•	•	•	8
<b>‡</b>	•	*	*	•	•	•	•	9
袋	•	F	*	•	•	•	•	10
*	F	•	*	•	•	•	•	11
*	*	•	*	•	•	•	•	12
<b>‡</b>	•	•	*	•	•	•	•	13
*	*		•	•	•	•	•	14
<b>‡</b>	•	•	F	•	•	•	•	15
袋	•	•	•	SF		•	•	16
<b>‡</b>	•	•	•	F	•	•	•	17
ф	•		•	SLF	•	•	•	18
ф	•	•	AF	AF	•	•	•	19
• = LED Off			$\mathbf{AF} = \mathbf{Al}$	ternate F	lashing	SF = Sing	le Flash	
举= LED On			F = Flas	hing		SLF = Slo	ow Flashing	

 Table 3-1 LED Quick Reference Chart

### **Troubleshooting Chart (Problems with LED Indications)**

Table 3-2 lists a number of problems or conditions that may be encountered with the printer. These condition or problems generally have LED indications as listed in Table 3-1.

#	SYMPTOM	DIAGNOSIS	ACTION
	No LEDs turn on.	No AC power applied to the printer	Insure AC power cable is connected to a working voltage source.
1		Faulty AC power fuse.	Replace fuse.
		No voltage from the internal Power Supply.	Replace Power Supply.
	All LEDs turn on and stay	An improper configuration was set.	Reload factory defaults and then set correct parameters.
2	on and printer locks up while running Power On Self-Test.	Main Logic Board faulty or loose interconnecting	Insure cables are properly connected.
		cables	Replace the Main Logic Board.
3	POWER LED on and all other LEDs OFF. No printer operation possible.	Printer misconfigured for Peel-Off Mode and Peel-	If Peel-Off Option is installed, check Take Label Sensor.
		Off Option not installed	If Peel-Off Option is not installed, check printer configuration and insure Peel-Off mode is not selected.
		Main Logic Board faulty or loose interconnecting	Insure cables are properly connected.
		cables	Replace the Main Logic Board.
4	CALIBRATE LED turns OFF after 5 seconds but all	Boot Block CRC error.	Download new Boot Block and Firmware.
	other LEDs stay on.		Replace the Main Logic Board.
5	CALIBRATE and POSITION LEDs OFF but all other LEDs on.	Dynamic RAM failed.	Replace the Main Logic Board.
6	CALIBRATE, POSITION and DARKEN LEDs OFF but all other LEDs on.	Firmware decompression error.	Download and install firmware.

### Table 3-2 Troubleshooting Chart (Problems with LED Indications)

#	SYMPTOM	DIAGNOSIS	ACTION
7	CALIBRATE, POSITION, DARKEN and DATA LEDs OFF but all other LEDs on.	Firmware error.	Download and install firmware.
8	CALIBRATE, POSITION, DARKEN, DATA and PAUSE LEDs OFF but all other LEDs on.	Firmware error.	Download and install firmware.
		Media incorrectly or not loaded.	Load media correctly, then turn the printer off and on.
	Printer stops, PAUSE and	Cutter error.	Clear jam, then open and close the printhead.
9	PAPER/RIBBON LED	Calibration error.	Re-calibrate printer.
	both on.	Misadjusted media sensor.	Check position and sensitivity media sensor.
		Pre-printed media is being used.	Re-calibrate the printer.
10	Printer stops, PAUSE LED on and PAPER/RIBBON LED flashing.	Ribbon incorrectly or not loaded.	Reload the ribbon correctly, then turn the printer off and on.
		Backing rewind spindle is full.	Remove label backing from the spindle.
		Ribbon not calibrated.	Recalibrate the ribbon.
		Malfunctioning ribbon sensor.	Replace ribbon sensor.
	Printer stops, PAUSE LED on and PRINTHEAD LED flashes.	Printhead is not fully closed.	Close Printhead completely.
11		Printhead Open Sensor not detecting Flag or Flag not in proper position.	Check Head Open Sensor and Flag for proper operation.
12	Printer stops, PAUSE LED	Printhead element is overheated.	Printer resumes printing when the printhead element cools.
12	and PRINTHEAD LED on.	Power Supply over temperature.	Printer resumes printing when the Power Supply cools.

### Table 3-2 Troubleshooting Chart (Problems with LED Indications) (continued)

#	SYMPTOM	DIAGNOSIS	ACTION
		The PAUSE button was accidentally or intentionally pushed.	Push the PAUSE button to resume operation.
13	Printer stops and PAUSE LED on.	<ul> <li>Not enough memory to perform one of the functions listed below:</li> <li>1. Download Graphics.</li> <li>2. Creating Bitmap (not enough memory for length of label).</li> <li>3. Building Format (label too complex).</li> <li>You may do any of the following:</li> </ul>	<ol> <li>You may do the following:</li> <li>Check for proper Communication Configuration.</li> <li>With PAUSE on, use the ~HM ZPL II command to display the amount of memory free.</li> <li>With PAUSE on, press CANCEL to skip that label format and continue to the next one.</li> <li>Cycle Power OFF and back on to clear printer memory and start again.</li> </ol>
14	PRINTHEAD LED on but printing continues.	Printhead is under temperature.	Check print quality. Printhead will heat up by printing or moving the printer to a warmer area.
15	PAUSE LED flashing	Waiting for user to remove peel label.	Remove label.
16	DATA LED single flashed.	CANCEL button was pressed and a format was deleted	No action required.
17	DATA LED is flashing.	Printer is receiving data.	Printing resumes when data is received.
18	DATA LED is slow flashing.	Printer sent a "stop transmitting" to the host computer.	No action required.
19	PAUSE and DATA LED alternately flashing, but all other LEDs are on.	Firmware error.	Download and install firmware.

### Table 3-2 Troubleshooting Chart (Problems with LED Indications) (continued)

### **Troubleshooting Chart (Print or Print Quality Related Problems)**

SYMPTOM	DIAGNOSIS	ACTION
	Printhead dirty.	Clean the printhead.
Dots missing in printed	Print quality problems.	Check print quality
area of label.	Printhead element going bad.	Replace Printhead.
	Possible media sensor	Adjust media sensor.
Loss of printing	problem.	Replace media sensor
registration on labels.	Printer set for non- continuous media, but continuous media loaded.	Set printer for correct media.
Loss of printing registration on labels (for Peel-Off mode).	Improperly adjusted media edge guides or power roller.	Check edge guides and power roller. Adjust as necessary.
Verticle drift in top-of- form registration.	Incorrect media loading or Media Sensor adjustments.	Reload media or adjust sensors as necessary.
Light vertical lines	Dirty Printhead or Ribbon Rollers.	Clean Printhead and Ribbon Rollers.
running through all labels	Defective Printhead elements.	Replace Printhead.
Light printing or no printing on the left or right side of the label.	Printhead pressure needs balancing.	Perform printhead balance adjustments.
Short printed lines at 45 degrees to label edge on left or right side of label.	Too much Printhead pressure	Reduce Toggle Pressure.
Truncated print, no print or FEED Key operates	Media or ribbon improperly loaded.	Re-load media and/or ribbon.
incorrectly while using non-continuous media.	Incorrect Media Sensor position or sensitivity	Adjust Media Sensor.

Table 3-3 Troubleshooting Chart (Print or Print Quality Related Problems)

SYMPTOM	DIAGNOSIS	ACTION
Fine gray lines on blank labels at angles	Wrinkled ribbon.	See Wrinkled Ribbon symptom chart
Mis-registration and 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 or sensitivity	Adjust Media Sensor.
	Auto-calibrate failed.	Perform a manual calibration.
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.	Adjust the Dual-Tension Ribbon Supply Spindle to provide low tension by pushing in the Spindle End Cap.
Poor print quality.	Darkness too low.	Increase Print Darkness.
	Incorrect Media and Ribbon combination.	Replace Media or Ribbon.
	Printhead adjustments incorrect.	Perform required adjustments.
Mis-registration/Skips labels.	Misadjusted Media Sensors.	Perform Media Sensor adjustments. Also try recalibrating.
	Improper ZPL format.	Correct ZPL format.
Printer prints across web or in wrong position.	Loss of registration indicating a Media Sensor problem.	Adjust Media Sensor position.
	Printer set for continuous media, but non-continuous media is loaded	Set printer for correct type of media.
	Peel-Off Mode:	Reposition and adjust as necessary.
	Improperly adjusted Media Edge Guides or Power Roller.	
Long tracks of missing print on several labels.	Wrinkled ribbon.	See Wrinkled Ribbon symptom chart on the next page.
	Print element damaged.	Replace printhead.

### Table 3-3 Troubleshooting Chart (Print or Print Quality Related Problems) (continued)
#### **Troubleshooting Chart (Wrinkled Ribbon)**

SYMPTOM	DIAGNOSIS	ACTION	
	Ribbon fed through printer incorrectly	Load ribbon correctly.	
	Incorrect Darkness setting.	Set the Darkness to the lowest setting possible for good print quality.	
	Incorrect Printhead pressure or balance.	Set the pressure to the minimum needed.	
	Media not feeding properly. Media walking side to side.	Make sure the media is running parallel to the main frame with balance adjustment.	
Wrinkled ribbon.	Incorrect Dual-Tension Spindle setting	Pull Spindle End Cap out when using wide media to obtain normal (higher) tension.	
	Strip Plate needs adjusting.	Perform adjustments.	
	Ribbon Supply Spindle tension needs adjusting.	Perform adjustments.	
	Printhead needs realigning with Platen Roller.	Perform adjustments.	
	Ribbon Take-up Spindle tension needs adjusting.	Perform adjustments.	

#### Table 3-4 Troubleshooting Chart (Wrinkled Ribbon)

#### **Troubleshooting Chart (Jammed or Stuck Labels)**

#### Table 3-5 Troubleshooting Chart (Jammed or Stuck Labels)

SYMPTOM	DIAGNOSIS	ACTION
In Peel-Off Mode, skewed or stuck labels.	Adhesive material from the back of the labels causing medial movement problems.	Perform maintenance and cleaning of the printer.
	Media and backing not properly aligned in printer.	Reload media. Adjust the Power Roller if necessary.
Label jam in rear area of the printhead.	Upper Media Plate needs cleaning.	Remove jam and clean Upper Media Plate.

#### **Troubleshooting Chart (Settings or Parameter Related)**

SYMPTOM	DIAGNOSIS	ACTION
Changes in parameter	Parameters are set or saved incorrectly	Reload the factory defaults, calibrate the printer and then cycle the power off and on.
settings did not take effect.	If problem continues there may be a problem on the Main Logic Board.	Replace the Main Logic Board.
ZPL was sent to printer, but not recognized. DATA	Communications parameters are incorrect.	Print a 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.
LED remains OFF.	Prefix and Delimiter characters set in printer do	Set the characters in the printer to match ZPL format.
	not match the ones used in ZPL.	If problem continues, check the ZPL format for changed <b>^CC</b> , <b>^CT</b> and <b>^CD</b> .
	Printhead open.	Close the printhead.
Printer will not successfully perform an auto calibration	Pre-printed media is being used.	Perform a manual calibration.
	Media is out.	Load media and check media sensor.

#### Table 3-6 Troubleshooting Chart (Settings or Parameter Related)

#### **Troubleshooting Chart (Cutter Related)**

SYMPTOM	DIAGNOSIS	ACTION	
In Cutter Mode, skewed or stuck labels.	Cutter is dirty.	Clean Cutter Module.	
The Cutter is not cutting	Cutter is dirty.	Clean Cutter.	
labels cleanly.	Cutter blades are dull.	Replace the Cutter Module.	
The Cutter is jamming up	Cutter is dirty	Clean Cutter.	
with the labels or labels ar ebing cut more than once.	Label length is too short.	Increase label length.	
Labels are not being cut at	Cutter Option not available	The Cutter Option is installed at the factory. Non-Cutter units are not retrofittable.	
an.	Cutter Option not installed/ enabled.	Check Cutter configuration.	

#### Table 3-7 Troubleshooting Chart (Cutter Related)

#### SAMPLE LABELS

The following pages contain samples of labels to be used with the preceding troubleshooting charts. These labels illustrate conditions that could be seen if mechanical adjustments are necessary. Zebra type 3P Media Stock and type 5319 Ribbon were used to obtain these labels. Any other Label and Ribbon stock combinations may produce sample labels with similar but not necessarily the same indications.



#### Acceptable Label:

Darkness properly set.

Printhead positioned correctly.

Toggles Balanced (equal pressure on left and right sides).



#### Unacceptable Label:

Darkness set too high.

Printhead positioned correctly.

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#### **Unacceptable Label:**

Darkness set too low.

Printhead positioned correctly

Toggles Balanced (equal pressure on left and right sides).

#### **Unacceptable Label:**

Darkness set very low.

Printhead positioned correctly

Toggles Balanced (equal pressure on left and right sides).

#### **Unacceptable Label:**

Darkness set properly.

Printhead too far forward.

- "Scratch Flowers" on black area (foggy appearance).
- Printhead needs to be moved rearward.
- Walk out wrinkle with Feed Button and readjust.







#### **Unacceptable Label:**

Darkness set properly.

Printhead too far forward.

- "Scratch Flowers" on black area (washed out appearance).
- Printhead needs to be moved rearward.
- Walk out wrinkle with Feed Button and readjust.

Toggles Balanced (equal pressure on left and right sides).

#### **Unacceptable Label:**

Darkness set properly.

Printhead too far back.

- Breakup on trailing edges of bars (opposite the direction of movement).
- Black is splotchy.
- Printhead needs to come forward on both sides.

Toggles Balanced (equal pressure on left and right sides).

#### **Unacceptable Label:**

Darkness set properly.

Printhead way too far back.

- Breakup on trailing edges of bars (opposite the direction of movement).
- Black is splotchy.
- Printhead needs to come forward on both sides.

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#### **Unacceptable Label:**

Darkness set properly.

Printhead position.

- Correct on right side.
- Way too far back on left side.

Noisy printing.

- Breakup on trailing edges of horizontal bars.
- Splotchy on left side

Toggles Balanced (equal pressure on left and right sides).



#### **Unacceptable Label:**

Darkness set properly. Printhead position.

- Correct on left side.
- Way too far back on right side.

Noisy printing.

- Breakup on trailing edges of horizontal bars.
- Splotchy on right side





#### **Unacceptable Label:**

Darkness set properly.

Printhead position.

- Correct on right side.
- Way too far forward on left side.

Noisy printing.

- Breakup on trailing edges of horizontal bars.
- Splotchy on left side

Toggles Balanced (equal pressure on left and right sides).

#### Unacceptable Label:

Darkness set properly.

Printhead position.

- Correct on left side.
- Way too far forward on right side.

Noisy printing.

- Breakup on trailing edges of horizontal bars.
- Splotchy on right side

#### **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.	
	Checks for proper media loading.	If the printer runs out of media,	
Media Sensor	If non-continuous media is used, sets label length for individual labels.	turn on.	
Ribbon Sensor	Monitors the presence of ribbon.	If the printer runs out of ribbor the PAPER/RIBBON LED flashes.	
Label Available Sensor (Peel-Off option only)	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, the printing resumes.	
Backing Rewind Spindle Full Sensor (Peel-Off option only)	Senses when the Backing Rewind Spindle is full of used backing material.	When the spindle is full, the PAPER/RIBBON LED flashes.	

#### **FACTORY ASSISTANCE**

Should any problem be encountered which cannot be corrected with the aid of this manual, and you have Internet access, you should check out ZIP Support<sup>™</sup>. If you cannot solve your problem via ZIP Support<sup>™</sup> or do not have Internet access, contact your Distributor or Zebra Technologies Corporation's Technical Support Department to minimize or avoid printer downtime.

#### **ZIP SUPPORT**TM

- Questions can be identified, diagnosed, and resolved all in one brief, easy, on-line session.
- ZIP Support<sup>TM</sup> is updated regularly by Zebra corporate product experts, guaranteeing the most comprehensive, timely product information available.
- High-speed, accurate, intuitive database utilizes text and graphics.
- Available any time, all time zones, 24 hours a day, 365 days a year

You can access ZIP Support<sup>™</sup> on the Internet at <u>http://support.zebra.com</u>

#### **TECHNICAL SUPPORT**

 Zebra Technologies Corporation, USA
 Zebra Technologies Europe Limited, UK

 Phone: +1 847.793.6810
 Phone: +44 (0) 1494 536644

 Fax: +1 847.913.2578
 Fax: +44 (0) 1494 450103

#### **REPAIR SERVICE DEPARTMENT**

For in factory service and repair.					
Zebra Technologies Corporation, USA		Zebra Technologies Europe Limited, UK			
Phone:	+1 847.913.2259	Phone: +44 (0) 1494 472872			
Fax:	+1 847.913.1797				

#### **RETURNING EQUIPMENT**

A Return Materials Authorization (RMA) number is required for all equipment being returned. Contact Zebra Technologies Corporation's Technical Support Department to obtain an RMA number. Equipment returned for service without prior authorization may be refused.

Whenever possible, the original shipping container should be used. Should it become necessary to ship your printer, carefully pack the printer in a suitable container to avoid damage during transit. A note describing the failure must be enclosed with the unit. Replacement shipping containers can be ordered by contacting Zebra Technologies Corporation's Repair Service Department.

If other containers are used, packaging material similar to the original factory packaging should be used. Remove all media from the printer. Enclose the unit in a protective, dust-proof bag and insure that the unit floats in an outer carton of shock absorbing material.

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## **EQUIPMENT SAFETY TIPS** After reviewing each procedure, place a check in the box. The AC power plug and IEC 320 connectors on all Zebra Printers must bear the certification mark of at least one international safety organization listed below. EMA Unless indicated otherwise, turn the power OFF before performing any maintenance procedures to the printer. To prevent damage to the spindles, on S400<sup>TM</sup> and S600<sup>TM</sup> printers, **do not** lubricate the spindle assemblies. To prolong printhead life, when reinstalling the Printhead, secure the grounding strap to the Printhead mounting screw. Zebra printers comply with international regulations governing radiated emissions when using fully shielded data cables. Data cables must be fully shielded and fitted with metal or metalized connector shells. Required Shielded data cables and connectors prevent radiation and reception of electrical noise. Use of unshielded data cables may increase radiated emissions above the regulated limits.

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#### **EQUIPMENT SAFETY TIPS (CONTINUED)**



- □ To insure optimum printhead life, observe proper electrostatic safety precautions (i.e.; ESD Wrist Straps) when removing, handling and replacing the Printhead.
- □ Zebra recommends using solvent containing 70% isopropyl alcohol, 30% distilled water for cleaning of;
  - Printheads
  - Platen Rollers
  - Peel-Off Roller
  - Media Path
  - Peel/Tear Bar
  - Spindles
- □ Ribbons used in the printers must be as wide as or wider than the media. If the ribbon is narrower than the media, areas of the printhead will be unprotected and subject to premature wear.
- □ To insure the printer has proper ventilation and cooling, do not place any padding or cushioning material under the unit because this restricts air flow.
- □ Install Zebra printers on a 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 will operate must meet the environmental conditions specified in the Maintenance Manual or Users Guide . Electrical power must be available and in close proximity to the printer.

Personal Safety Tips		
	Do not wear any jewelry (rings, watches, etc.) and loose clothing when servicing the printers.	
	<ul> <li>Opening and closing of covers.</li> </ul>	
	Printhead     Description description	
	<ul><li>Rewind Spindle</li><li>Platen Roller</li></ul>	
	Wear protective eye wear when removing E-Rings, C-Clips and springs.	
	For personal and equipment safety use a three-prong plug with a ground (earth) connection.	

#### **PREVENTIVE MAINTENANCE SCHEDULE**

#### Cleaning - General



#### **CAUTION:**

## USE ONLY THE CLEANING AGENTS DESCRIBED IN THE FOLLOWING PROCEDURES. DAMAGE MAY OCCUR IF THE INCORRECT CLEANING AGENTS ARE USED ON THIS PRINTER.

**Exterior** – The exterior surfaces of the printer may be cleaned as required by using a lint free cloth. Do not use solvents or harsh cleaning agents. If the unit is excessively dirty, a mild detergent solution or desktop cleaner may be used sparingly.

**Interior** – As required, remove any dirt/lint accumulated in the interior of the printer using a soft bristle brush, dry compressed air and/or vacuum cleaner. It is a good practice to inspect these areas with every roll of media.

**Media and Ribbon Paths** – Clean with a solution of 70% isopropyl alcohol and 30% distilled water. No other cleaning fluids or sprays should be used.

Table 4-1 lists a recommended cleaning schedule showing the area, method and interval for cleaning the printer. Actual schedule should be adjusted based on volume of labels printed and the environmental conditions where the printer is located.

#### **Cleaning - Printhead and Platen Roller**

Inconsistent print quality such as voids in the bar codes or graphics may indicate a dirty printhead. For optimum performance, the printhead should be cleaned regularly with a swab soaked in 70% isopropyl alcohol and 30% distilled water. This cleaning procedure is the best thing you can do to maintain consistent, high quality printing.

It is recommended to perform the cleaning procedure when installing a new roll of ribbon, or when installing a new roll of direct thermal media, or after having printed 500 feet of continuous or fanfold media.

It is not necessary to turn the printer power off prior to cleaning. If the power is turned off, all label formats, images and parameter settings stored in RAM will be lost. Permanent parameter settings stored in the Flash memory will be retained. When power is turned back on, it may be necessary to reload some information items into the printer's memory.

AREA	METHOD	INTERVAL	
Printhead	Clean with a solution of 70% isopropyl alcohol and 30% distilled water.		
Platen Roller	Clean with a solution of 70% isopropyl alcohol and 30% distilled water.		
Media Sensor	Air blow.	After every roll of	
Media Path	Clean with a solution of 70% isopropyl alcohol and 30% distilled water.	media (or 500 feet of fanfold media) when	
Ribbon Path	Air blow.	mode.	
Rewind Power Roller (Peel- Off)	Clean with a solution of 70% isopropyl alcohol and 30% distilled water.	After every roll of ribbon when printing	
Upper Guide Rod (Peel-Off)	Clean with a solution of 70% isopropyl alcohol and 30% distilled water.	in thermal transfer mode.	
Platen Guide Rod (Peel-Off)	Clean with a solution of 70% isopropyl alcohol and 30% distilled water.		
Lower Guide Rod (Peel-Off)	Clean with a solution of 70% isopropyl alcohol and 30% distilled water.		
Cutter Assembly – If using continuous pressure-sensitive media.	Citrus based adhesive remover.	After every roll of media or more often depending on application and media.	
Cutter Assembly – If using tagstock or label backing material only.	Clean with a solution of 70% isopropyl alcohol and 30% distilled water. Air blow.	After every 2 or 3 rolls of media.	
Tear-Off/Peel-Off Plate	Clean with a solution of 70% isopropyl alcohol and 30% distilled water.	Once a month.	
Exterior	Mild detergent or desktop cleaner	As needed.	
Interior	Air blow/brush/vacuum.	As needed.	
Label Available Sensor	Air blow.	6 months/500 rolls	
Belts	Visual inspection for wear.	6 months/500 rolls	

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#### **Printhead and Platen Roller Cleaning Procedure**

- 1. Open the Main Door and Front Door (see Figure 4-1). Open the Printhead by turning the Locking Lever counter-clockwise.
- 2. Remove the media and ribbon if present.
- 3. Use a cleaning swab to wipe the print elements from end to end. Allow a few seconds for the solution to evaporate (see Figure 4-2).
- 4. Rotate the Platen Roller and clean thoroughly with a cleaning swab.
- 5. Brush or vacuum any accumulated paper, lint and dust away from all of the rollers and the Media and Ribbon Sensors.
- 6. Reload the ribbon and/or media. Close and latch the Printhead. Close the Main and Front Doors and restore power (if previously turned off).
- 7. Run the PAUSE Key Self-Test to check print quality.



Figure 4-1 Main Door and Front Door

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**Figure 4-2 Printhead Cleaning** 

#### **Cleaning the Cutter Module**

The Cutter Module is an option available on the *S*400/*S*600 that requires periodic cleaning to remove paper dust and gummed label residue. The following procedure should be performed, as scheduled in Table 4-1, by the operator. However, depending on the application and media type, it may be necessary to clean the cutter more or less often.

*Note:* In Figures shown, media and ribbon have been removed for clarity. It is not necessary to remove the media or ribbon prior to performing the maintenance procedures described.

#### CAUTION:



#### 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 PLACED ON A DIFFERENT PRINTER.

- 1. Remove the Cutter Module from the printer
  - a. Turn the printer's AC power OFF.
  - b. Remove the Cutter Catch Tray by lifting it up and away from the front of the Cutter Module (see Figure 4-3).
  - c. Raise the Main Door and lower the Front Door (see Figure 4-1).
  - d. Gently pull straight down on the Cutter Cable Connector to remove it from the Cutter Module (see Figure 4-4).
  - e. Turn the Cutter Mounting Screw in a counter-clockwise direction until it is loose.
  - f. Hold the Cutter Module as shown in Figure 4-5. Apply gentle upward pressure to the left and right ends while raising the Cutter Module up and away from the Mounting Posts. If necessary, rock the Cutter Module side-to-side to loosen it.

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**Figure 4-3 Cutter Catch Tray Location** 



Figure 4-4 Cutter Connector and Mounting Screw



**Figure 4-5 Cutter Module Removal** 

- 2. Disassemble the Cutter Module.
  - a. Hold the Cutter Module as shown in Figure 4-6. Put your thumbs on the two Wire Spring Loops and your index fingers on the top of the Rear Cutter Blade Guard. It may help to lay the Cutter Module on a table or other surface throughout this process.
  - b. To remove the Rear Cutter Blade Guard, first press down simultaneously on the two Wire Spring Loops. While still pressing down on the Wire Spring Loops, press the Rear Cutter Guard back toward you and over the top of the loops. You are trying to tuck the Wire Spring Loops underneath the Cutter Blade Guard in this process.
  - c. Continue pressing the Rear Cutter Guard toward you and allow the back edge of the guard to pop up as it comes free from its holders. You may now remove the Rear Cutter Guard by lifting it off of the module. *Note: The Wire Springs may flip up out of position during this process. They will be repositioned during reassembly.*
  - d. 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 will be mounted into the corresponding mounting slots in the Cutter Side Panels.
  - e. To provide complete access to the area to be cleaned, raise the Upper Cutter Blade Guard as shown in Figure 4-6.



Figure 4-6 Cutter Module Disassembly

- 3. Clean the Cutter Module.
  - a. 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.
  - b. If pressure sensitive media has been used, use a lint-free cloth soaked in an adhesive remover to clean all gum and label residue from the Cutting Blades and Guards.

If tag stock was used, use 70% isopropyl alcohol to remove any dirt.

- 4. Reassemble the Cutter Module.
  - a. Position the two Wire Springs down against the Lower Cutter Blade (see Figure 4-7).
  - b. Place the Rear Cutter Blade Guard over the Wire Springs, perpendicular to its final position. Place your thumbs on the top (flat) part of the guard. *Note: Insure that the ends of the Rear Cutter Blade Guard are positioned on the outside of the Cutter Side Panels*.
  - c. Refer to Figure 4-8. Press the Rear Cutter Blade Guard down and forward, rotating the guard as you proceed, to lock the mounting pins into position in the Cutter Side Panel mounting slots. Slide the guard forward until the two Wire Spring Loops pop up on the backside of the guard. *Note: Insure that the Wire Springs remain positioned under the Rear Cutter Blade Guard when assembly is completed*.
  - d. Lower the Upper Cutter Blade Guard back to its normal position. When reassembled, the back of the Cutter Module should look like Figure 4-9.



Figure 4-7 Cutter Module Reassembly

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Figure 4-8 Side View of Cutter Module Reassembly



Figure 4-9 Reassembled Cutter Module

- 5. Reinstall the Cutter Module.
  - a. Refer to Figure 4-10. Position the Cutter Module above the Cutter Mounting Posts. Press down on the Cutter Module until the Mounting Slots engage the Mounting Posts on the printer.
  - b. Refer to Figure 4-4. Tighten the Mounting Screws in a clockwise direction to hold the Cutter Module in position.
  - c. Position the Cutter Cable Connector so the flat side of the connector faces away from the printer. Insert the connector up into the mating connector on the Cutter Module.
  - d. Replace the Cutter Catch Tray on to the two mounting slots located on the front of the Cutter Module.
- 6. Test the cutter operation.
  - a. If necessary, reload ribbon and media into the printer. Close the printer's Front Door and Main Door. *Note: When loading media, make sure the end of the label is positioned on top of the Platen Roller, then close the Printhead Latch*.
  - b. When the printer is turned on, the Cutter Module will cycle through one cutting operation and be ready to print labels.
  - c. Further tests may be performed by running a PAUSE Key Self-Test.



**Figure 4-10 Cutter Module Reinstallation** 

#### LUBRICATION



#### **CAUTION:**

NO LUBRICATING AGENTS OF ANY KIND SHOULD BE USED ON THIS PRINTER! IF USED, SOME COMMERCIALLY AVAILABLE LUBRICANTS WILL DAMAGE THE FINISH AND THE MECHANICAL PARTS.

#### DIAGNOSTICS

#### Printer Self-Test/Reset Default Quick Reference Chart

Table 4-2 lists the self-tests and default resets that can be accessed by holding a front panel key or keys and turning the printer power on. The "X" in the four columns on the right indicates which key or keys are pressed.

The  $\checkmark$  indicates whether the self-test is one that can be performed by the operator (user) and/or maintenance personnel. These tests produce sample labels and provide specific information that helps the operator/maintenance personnel determine the operating conditions for the printer. Self-tests without the  $\checkmark$  require special tools or knowledge and are for repair and maintenance of the printer and only should be performed by maintenance personnel.

Detailed information on the operator self-tests are found in Section II Operations Overview. Detailed information on maintenance personnel only self-tests immediately follows.

## *Note:* The printer data cable must be removed from the printer (except for the MODE key test) prior to running the self-tests.

#### PAUSE and CANCEL Key Self-Test

This self-test can be used to verify proper printer operation after parts have been replaced or adjusted. When activated, the printer prints a maximum of 500 Head Test labels (see Figure 4-11). Each label backfeeds prior to printing and feeds forward to the rest position after printing. A serialized number prints on each label.

To start the PAUSE and FEED Key Self-Test, press the PAUSE and FEED key while turning the printer power on.

Press the PAUSE Key or turn the printer power off to stop printing.

#### FEED and CANCEL Key Self-Test

This self-test is normally performed during the manufacturing process or after a major overhaul of the mechanical assemblies has been performed. This test prints seven pre-programmed formats at 6 ips and 2 ips. The printer automatically pauses after each format. Table 4-3 shows the sequence of formats. Refer to Figures 4-12 through 4-18 for sample label formats.

Operator	Description	PAUSE Key	FEED Key	CANCEL Key	MODE Key
1	<b>CANCEL Key Self-Test</b> – Produces a printer configuration label printout			Х	
1	<b>PAUSE Key Self-Test</b> – Produces test printouts for adjustments (15 or 50 labels @ 2 or 6 ips)	Х			
1	<b>FEED Key Self-Test</b> – Produces test printouts to determine the best darkness setting		Х		
1	<b>MODE Key Self-Test</b> – Produces a communications diagnostic mode printout				Х
1	<b>Factory Default Reset</b> – Resets printer configuration to factory default values	Х	Х		
1	<b>Communication Parameter Default Reset</b> – Resets printer communication parameters to 9600 baud, 8 bit work length, not parity and 1 stop bit.	Х	Х		Х
1	Manual Calibration – The printer determines the media type, label length, media and ribbon sensor settings, and printing method.	Х	Х	Х	
	<b>PAUSE and CANCEL Key Self Test</b> – Serialized test printouts to verify proper printer operation (500 maximum)	Х		Х	
	<b>Ribbon Parameter Calibration</b> – Sets ribbon parameters to factory default values. <i>Note: This test is only performed when</i> <i>sensor assemblies are replaced or when a</i> <i>Manual Calibration fails. A Manual</i> <i>Calibration procedure must be performed</i> <i>after the Ribbon Parameter Calibration.</i>		Х	Х	Х
	<b>FEED and CANCEL Key Self Test</b> – Pre-programmed label test formats for major overhauls		Х	Х	

Table 4-2 Self-Test and Calibration	Quick Reference	Chart
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#### ZEBRA *S*400/*S*600 MAINTENANCE MANUAL

Format	# Of Labels	Speed	Test Function	Figure
1	20	6 ips (Speed D)	Left Ribbon Wrinkle Test	4-12
2	20	6 ips (Speed D)	Right Ribbon Wrinkle Test	4-13
3	20	6 ips (Speed D)	Bar Code Wrinkle Test (Code – 39)	4-14
4	10	6 ips (Speed D)	Useable Area Test	4-15
5	10	6 ips (Speed D)	Head Temperature Test	4-16
6	10	6 ips (Speed D)	Upper Smear Test	4-17
7	10	6 ips (Speed D)	Lower Smear Test	4-18
8	20	2 ips (Speed A)	Left Ribbon Wrinkle Test	4-12
9	20	2 ips (Speed A)	Right Ribbon Wrinkle Test	4-13
10	20	2 ips (Speed A)	Bar Code Wrinkle Test (Code – 39)	4-14
11	10	2 ips (Speed A)	Useable Area Test	4-15
12	10	2 ips (Speed A)	Head Temperature Test	4-16
13	10	2 ips (Speed A)	Upper Smear Test	4-17
14	10	2 ips (Speed A)	Lower Smear Test	4-18

#### Table 4-3 Sequence of Formats







Figure 4-12 Test, Formats 1 and 8



Figure 4-13 Test, Formats 2 and 9



Figure 4-14 Test, Formats 3 and 10



Figure 4-15 Test, Formats 4 and 11



Figure 4-16 Test, Formats 5 and 12



Figure 4-17 Test, Formats 6 and 13



Figure 4-18 Test, Formats 7 and 14

#### **EXTENDED PRINTER DIAGNOSTICS**

Additional diagnostic tests are available for printhead assembly adjustments. These diagnostic tests are only accessible when the Printer Data Cable is disconnected from the printer and a Loopback Connector is attached in its place.

The Serial Loopback Connector is a 9 pin "D" Type (DB9P – Male) with the following pins tied together:

• Pins 2 and 3. • Pins 4 and 6.

The Parallel Loopback Connector is a standard 36-pin parallel connector mounted to a small printed circuit board. This connector is available from Zebra Technologies as part # 44680.

For each of these diagnostic tests, the printer will transmit the Test Label Format out of the Printer Data Connector to the Loopback Connector. The Loopback Connector passes the test label format to the printer as Receive Data and the test label is printed.

#### **PAUSE Key Loopback Test**

This test demonstrates the media movement capabilities of the printer and provides a test label to view while making print quality adjustments.

With the Loopback Connector in place, press the PAUSE Key while turning the power switch ON. After the Power On Self-Test, the printer will print 500 Head Test labels. Each label will backfeed prior to printing and feed to the rest position after printing. A serialized number will print on each label. Press the PAUSE key to stop and restart the printing operation. The labels will look the one in Figure 4-11.

#### **FEED Key Loopback Test**

This test demonstrates the media movement capabilities of the printer and provides a test label to view while making print quality adjustments.

With the Loopback Connector in place, press the FEED Key while turning the power switch ON. After the Power On Self-Test, the printer will begin printing the same series of label formats as shown in Table 4-3. The printer will PAUSE at the end of each printed format. Press the PAUSE Key to begin printing the next format. Sample labels are shown in Figures 4-12 through 4-18.

The PAUSE Key can be used to stop and restart the printing operation. When the printer is paused, The CANCEL Key can be used to move to the next label format.

#### **MECHANICAL ADJUSTMENTS**

#### **Printhead Position Adjustment**

- 1. Make sure the printer is loaded with full width media and ribbon, and has had a media calibration performed with this combination of media and ribbon.
- 2. Turn printer power off.
- 3. Remove the Cutter Module (if present).
- 4. Loosen, but do not remove, the two Printhead Position Locking Screws two full turns (see Figure 4-19). Re-tighten these screws finger-tight to remove the looseness.
- 5. Perform a PAUSE Key Self-Test by holding the PAUSE key while turning the printer on.
- 6. When the printer completes its Power On Self-Test, it will begin the PAUSE Key Self-Test. Once the PAUSE Key Self-Test begins, let several labels print and then push the PAUSE key.
- 7. Examine the labels and compare to the labels found in Section III, Sample Labels (page 3-11).
- 8. Using a flat blade screwdriver, adjust the Position Adjustment Slots (Figure 4-19) to change the printhead position (forward and rearward) and adjust for parallelism.

## Note: The desired result is that the darkest printing is observed evenly across the label and the lines printed on the test labels are parallel to the top of the label.

- 9. Press the PAUSE key, let several more labels print, and then press the PAUSE key again.
- 10. Examine this set of labels and make any additional adjustments (if necessary).
- 11. Repeat steps 9 and 10 until consistent print quality and parallelism is achieved.
- 12. Tighten the two Printhead Position Locking Screws.
- 13. Press the PAUSE key, let several more labels print and then press the PAUSE key again.
- 14. Examine this set of labels to make sure the print quality and parallelism is still good. If the adjustment "slipped" when you tightened the Printhead Position Locking Screws, loosen the Printhead Position Locking Screws. Repeat steps 8-12 until the print quality and parallelism is good and the Printhead Position Locking Screws are tight.

# Note: If after making the above adjustments the print quality is even, but not dark enough, perform the Adjusting The Darkness procedure until optimum darkness is achieved. If optimum darkness still cannot be achieved, it may be necessary to perform the Printhead Pressure Adjustment.

### To extend the life of the Printhead, use the lowest **Toggle Pressure** that produces the desire print quality.
#### ZEBRA S400/S600 MAINTENANCE MANUAL

- 15. If labels are printing properly, press the PAUSE key to stop printing.
- 16. Press the MODE key three times. The MODE LEDs flash and the settings will be permanently saved into memory.
- 17. To exit the PAUSE Key Self-Test, the printer must be turned off.



Figure 4-19 Printhead Position Adjustment (Top View)

#### Label Available Sensor Adjustment

The Label Sensor functions only when the printer is set to Peel-Off mode. This mode requires that the Peel-Off option be in stalled in the printer. This sensor is not installed on printers without the Peel-Off option.

Figure 4-20 shows the location of the Label Available Sensor. When the sensing beam is interrupted, the printer will be prevented from printing or feeding (when in Peel-Off mode only). It may, however, accept additional label formats if the buffer is not full. When the label is removed, the next label prints automatically.

There is no sensitivity adjustment of the Label Available Sensor. Sensors are attached and aligned at the factory when the Peel-Off option is installed. If a problem is encountered, check the alignment of the sensor components. They should point directly at one another. Also verify that the format sent contains the Peel-Off Mode command.



Figure 4-20 Label Available Sensor Location

#### **Strip Plate Adjustment**

The Ribbon Strip Plate position can be adjusted to provide proper tracking and separation of the ribbon from the media after printing. If the ribbon does not track properly, or if ribbon wrinkle problems are experienced, refer to Figure 4-21 and adjust the strip plate by following this procedure.

- 1. Begin printing labels. This can be done by performing a PAUSE Key Self-Test.
- 2. Loosen the Phillips head screws holding the Strip Plate to the front of the Printhead Assembly.
- 3. Position the Strip Plate so the ribbon tracks properly, does not wrinkle and stays flat and smooth when fed to the Upper Ribbon Guide when the FEED key is pressed.

# Note: If the Strip Plate is too high, the result will be a noisy operation and possible wrinkle, especially on the backfeed. Smudging or print quality problems will result if the Strip Plate is positioned too low.

- 4. Tighten the Strip Plate adjustment screws.
- 5. Perform another PAUSE Key Self-Test checking for ribbon wrinkle and proper ribbon tracking. Readjust Strip Plate if required.
- 6. If ribbon wrinkle and/or tracking problems persist, check the torque settings of the Ribbon Take-Up Spindle as detailed in this section and adjust the tension if required.



Figure 4-21 Strip Plate Adjustment

#### **Backing Rewind Spindle Adjustment**

Refer to Figure 4-22 and follow the procedures below to adjust the Backing Rewind Spindle tension.

- 1. Turn the printer off and remove all media and ribbon.
- 2. Tape the end of the 30" long Mylar Tape (Zebra part # 01776) to the Rewind Spindle.
- 3. Wrap the Mylar Strip around the Rewind Spindle in a clockwise direction.
- 4. Connect a 1000 gram spring scale to the Mylar Strip.
- 5. Pull the spring scale to create the tension measurement.
- 6. The rotation of the Rewind Spindle, created by pulling on the spring scale, should be smooth and similar to the pace of a sweep second hand on a clock. Make sure there is no platen movement when measuring the Rewind Spindle tension.
- 7. When the Rewind Spindle is moving smoothly with even pull, read the tension setting on the spring scale. The correct tension should be 700 grams (+100/-50)
- 8. If the tension is incorrect, use a pair of utility pliers and hold the locking nut stationary while rotating the Rewind Spindle until there is easy access to the 1.5 mm Hex locking screws.
- 9. Use a 1.5 mm Hex driver and loosen the locking nut Hex screws.
- 10. Using the utility pliers, turn the Hex nut clockwise to increase and counter-clockwise to decrease tension.
- 11. After achieving the correct tension, tighten the 1.5 mm Hex locking screws.
- 12. Reload the media and ribbon and test the printer's backing rewind function.



Figure 4-22 Backing rewind Spindle Adjustment

#### **ELECTRICAL ADJUSTMENTS**

#### **Printhead Voltage Adjustment**



#### **CAUTION:**

#### THE PRINTHEAD VOLTAGE ADJUSTMENT IS CRITICAL TO THE LIFE OF THE PRINTHEAD. <u>DO NOT</u> USE THIS ADJUSTMENT IN AN ATTEMPT TO INCREASE THE PRINTING DARKNESS.

When a Printhead or Power Supply Board is replaced, the Printhead Voltage must be adjusted for the proper value. This adjustment provides the voltage applied to the print elements during the printing process.

1. Calculate the proper Printhead Voltage using the formula or values found in Table 4-4 for the *S*400 or Table 4-5 for the *S*600.

## *Note:* The S400 printhead resistance value can be read from the Fork Bracket label RXXXX (where XXXX is the value in ohms).

#### The S600 printhead resistance value can be read from the label on the printhead (R=XXX ohms).

- 2. Remove the Rear Cover (see Figure 4-27).
- 3. Attach a voltmeter between F2 and ground on the Main Logic Board (see Figure 4-30).
- 4. Turn the printer on and let it complete the Power On Self-Test.
- 5. Locate RV2 on the Power Supply Board (see Figure 4-23) and adjust until the voltmeter reads the value determined in step 1.

<b>Printhead Voltage Formula:</b> $V = 0.78 + \sqrt{(0.49 \times \text{Resistance})}$					
Resistance Ω	Voltage VDC	Resistance Ω	Voltage VDC		
935 to 945	22.2	1092 to 1110	24.0		
946 to 963	22.4	1111 to 1129	24.2		
964 to 981	22.6	1130 to 1148	24.4		
982 to 999	22.8	1149 to 1168	24.6		
1000 to 1017	23.0	1169 to 1187	24.8		
1018 to 1035	23.2	1188 to 1207	25.0		
1036 to 1053	23.4	1208 to 1227	25.2		
1054 to 1072	23.6	1228 to 1247	25.4		
1073 to 1091	23.8	1248 to 1265	25.6		

 Table 4-4 Printhead Voltage Values (S400 Only)

Table 4-5 Printhead Voltage Values (S600 Only)

<b>Printhead Voltage Formula:</b> $V = 0.78 + \sqrt{(0.673 \times \text{Resistance})}$					
Resistance Ω	Voltage VDC	Resistance Ω	Voltage VDC		
680 to 688	22.2	795 to 808	24.0		
689 to 701	22.4	809 to 822	24.2		
702 to 714	22.6	823 to 836	24.4		
715 to 727	22.8	837 to 850	24.6		
727 to740	23.0	851 to 864	24.8		
741 to 754	23.2	865 to 879	25.0		
755 to 767	23.4	880 to 893	25.2		
768 to 781	23.6	894 to 908	25.4		
782 to 794	23.8	909 to 920	25.6		



Figure 4-23 Printhead Voltage Adjustment Potentiometer Location

#### Cutter Voltage Adjustment

#### WARNING:



USE CAUTION AROUND CUTTER BLADES. KEEP FINGERS AWAY FROM BLADES.

The voltage applied to the printhead is the same voltage applied to the Cutter Module. The specific voltage applied to the cutter motor is controlled by the Home Position Potentiometer.

There are three cases in which you must adjust the Cutter Module's Home Position Potentiometer:

- Before placing a new Cutter Module into service.
- If a new Printhead is installed on the printer.
- If a Cutter Module is installed on a different printer than it was previously adjusted for.
- 1. Turn the printer power off. Load media and ribbon if not already installed.
- 2. Attach the new Cutter Module to the Cutter Cable Connector on the printer and lay it on the table or on the inside of the printer's open Front Door.

#### Note: Do not mount the Cutter Module on the printer at this time.

3. Perform a PAUSE test (hold the PAUSE key while turning the printer on).

## Note: Do not allow the printed labels to pass through the Cutter Module. Let them accumulate on the table or floor.

- 4. While the labels are printing, observe where the Sensor Disc on the Cutter Module stops after completing a cut cycle (see Figure 4-24). It can be viewed between the Outer Cover and the Side Plate. The desired stopping position of the Sensor Disc is when the Embossed Line on the Sensor Disc is aligned with the edge of the Side Plate.
- 5. Adjust the Home Position Potentiometer (Figure 4-25) with the Potentiometer Adjustment Tool (Zebra part # 01428) until the Embossed Line on the Sensor Disc is in alignment with the Side Plate Edge.
- 6. Turn the printer power off and install the Cutter Module.



Figure 4-24 Properly Adjusted Cutter Sensor



**Figure 4-25 Home Position Potentiometer** 

#### **CORRECTIVE MAINTENANCE**

#### **Tools Required**

7/32 Open End Wrench	Screwdriver, Phillips No. 2
Metric Allen Wrench Set	Spring Scale, 2200 Gram and 1000 Gram
Screwdriver, ¼" Flat Blade	.010 Shim or Feeler Gauge
Screwdriver, Phillips No. 1	.020 Shim or Feeler Gauge

#### **Test Equipment Required**

Anti-Static Mat and Anti-Static Wrist Strap (used when removing Electronic Circuit Boards or updating Firmware).

**Digital Voltmeter** 

#### **Removing the Main Door**

- 1. Lift on the Main Door and swing it up and to the left until it rests on top of the right side cover (see Figure 4-26).
- 2. Using both hands, slide the Main Door towards the rear of the printer. Lift the end of the Main Door nearest the front of the printer, pivoting it to the rear of the printer and off the printer Main Frame.

#### **Removing the Front Door**

- 1. Open (or remove) the Main Door.
- 2. Grab the tab on top of the Front Door and carefully pull down until it rests on the desktop.
- 3. Notice that the Front Door hinges in three places on the base of the printer (see Figure 4-26).
- 4. Grab the Front Door, near the left and right hinge.
- 5. Pull the left side of the Front door away from the printer base while pivoting on the right side (or vice-versa).

#### **Removing the Rear Cover**

- 1. Remove the three cover screws attaching the Rear Cover to the printer Main Frame (see Figure 4-27).
- 2. Lift the Rear Cover straight up approximately <sup>1</sup>/<sub>2</sub>" and then slide off towards rear of the printer.



Figure 4-27 Door and Cover Disassembly

#### **Tear-Off Plate Removal**

- 1. Open (or remove) the Main Door.
- 2. Grab the tab on top of the Front Door and carefully pull down until it rests on the desktop.
- 3. Remove the two 5mm Hex screws from the Tear-Off Plate (see Figure 4-28).
- 4. Push up on the bottom of the Tear-Off Plate and pull the plate out.
- 5. Reverse the procedure to replace the Tear-Off Plate.



Figure 4-28 Tear-Off Plate

#### **Control Panel Assembly Removal**



#### **CAUTION:**

## OBSERVE PROPER ELECTROSTATIC SAFETY PRECAUTIONS WHEN REMOVING, HANDLING AND REPLACING PRINTED CIRCUIT BOARDS.

- 1. Turn printer off and remove the power cord.
- 2. Remove the Front Door.
- 3. Remove the Rear Cover.
- 4. Remove the 5mm Hex screw that attaches the Control Panel Assembly to the Main Frame (see Figure 4-29).
- 5. Remove the 5mm Hex screw that attaches the ribbon cable strain relief to the Main Frame.
- 6. Detach the Control Panel Ribbon Cable from the Main Logic Board (J12) (Figure 4-30).
- 7. Grasp the Control Panel Assembly by its sides and carefully lift it out of the printer base guide slots.

#### **Control Panel Circuit Board Replacement**

- 1. Turn printer off and remove the power cord.
- 2. Remove the Control Panel Assembly.
- 3. Detach the Control Panel Board from the Control Panel Cover, by removing the two 5mm Hex mounting screws (see Figure 4-29).
- 4. Carefully align the replacement board over the mounting holes on the Control Panel Cover and reinstall the two 5mm Hex screws.
- 5. Remount the Control Panel Assembly in the base guide slots and secure into the Main Frame by reinstalling the 5mm Hex screw.
- 6. Reattach the Control Panel Ribbon Cable to the Main Logic Board (J12) (Figure 4-30).
- 7. Reattach the ribbon cable strain relief to the Main Frame.
- 8. Remount the Rear Cover and Front Door

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Figure 4-29 Control Panel Assembly

#### **Main Logic Board Removal**



#### **CAUTION:**

#### OBSERVE PROPER ELECTROSTATIC SAFETY PRECAUTIONS WHEN REMOVING, HANDLING AND REPLACING PRINTED CIRCUIT BOARDS.

- 1. Turn printer off and remove the power cord.
- 2. Remove the printer data cable (if connected).
- 3. Remove the Rear Cover.
- 4. Note the positions of all ribbon cable connectors and wire harness connectors. Remove all connectors to the Main Logic Board (see Figure 4-30).
- 5. Remove the three 5mm Hex screws securing the Main Logic Board to the printer Main Frame.
- 6. Carefully grasping both sides of the Main Logic Board, pull the board straight up from the Power Supply connector and out of the unit. A gentle rocking motion of the Main Logic Board may be necessary to release it from the Power Supply Board.

#### Main Logic Board Installation

- 1. Carefully align connector J8 at the bottom of the Main Logic Board (see Figure 4-30) with the mating Power Supply Board connector (J2).
- 2. Push the Main Logic Board straight down until connector J8 has seated completely onto the Power Supply Board.
- 3. Reinstall the three mounting screws, making sure the mounting screw in the upper right hand side of the Main Logic Board goes through the braided ground strap first.
- 4. Reconnect all ribbon cables and wire harness cables.
- 5. Replace the Rear Cover.

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J1	Serial Port	J10	Full Roll Switch Assembly
J2	Parallel Port	J11	Media/Ribbon Sensor Assembly
J3	Ribbon Take-Up Motor Assembly	J12	Control Panel Assembly
J4	Printhead Assembly (S600)	J13	Not Used
J5	Printhead Assembly (S400)	J14	Option Connector (on back of board)
J6	Not Used	RV1	Spindle Tension Adjustment
J7	Cutter Assembly	F1	5 MF 2A/250V
J8	Power Supply Assembly	F2	E 5A/125V
J9	Label Available Sensor Assembly	F3	E 250mA/125V

Figure 4-30 Main Logic Board

#### **Print Mech Assembly Removal**

- 1. Turn printer off and remove the power cord.
- 2. Remove the printer data cable (if connected).
- 3. Remove the Media and Ribbon.
- 4. Remove the Main Door, Front Door and Rear Cover.
- 5. Remove the Main Logic Board.
- 6. Locate the Printhead cable (see Figure 4-30, J4 or J5). Remove the Ferrite Assembly from around the Printhead cable by sliding the clips off of the Ferrites (see Figure 4-31)
- 7. Rotate the Head Open Lever counter-clockwise to remove the pressure on the Printhead.
- 8. Locate the Braided Ground Straps, on the Print Mech Assembly, leading to the Main Frame and to the Riot Bar on the electronics side of the printer. Remove the screws securing the Braided Ground Strap to the Main Frame (see Figure 4-32).
- 9. Remove the single screw with two washers on the electronics side of the printer securing the Print Mech Assembly to the Main Frame and Riot Bar (see Figure 4-33).
- 10. Carefully slide the Printhead Cable through the cut-out in the Main Frame and remove the Printhead Assembly.
- 11. Reverse the procedures to reinstall the Print Mech Assembly.
- 12. Test the unit and perform a Printhead Position Adjustment if necessary.



Figure 4-31 Printhead Cable Ferrite Assembly

#### Printhead Assembly Removal

- 1. Turn printer off and remove the power cord.
- 2. Remove the printer data cable (if connected).
- 3. Remove the Main Door, Front Door and Rear Cover.
- 4. Remove the two Phillips head screws holding the Strip Plate to the front of the Printhead Assembly (see Figure 4-21).
- 5. Rotate the Head Open Lever counter-clockwise to remove the pressure on the Printhead.
- 6. Using a 7/32 open-end wrench, remove the two M3 nuts holding the Printhead Assembly to the Print Mechanism Assembly (see Figure 4-34).

## Note: Do not remove, loosen or adjust the two Phillips head screws on top of the Printhead Assembly. They are only used when a Printhead Alignment is necessary.

- 7. Carefully remove the Printhead Cable from the Printhead Assembly (see Figure 4-34).
- 8. Install the replacement Printhead Assembly by reversing step 4 through 7.

Note: When installing the Printhead Cable onto the Printhead Assembly, insure the insulation sleeve is pushed as far forward (towards the Printhead Assembly) as possible.

Note: Do not remove, loosen or adjust the two Phillips head screws on top of the replacement Printhead Assembly. They are only used when a Printhead Alignment is necessary.

- 9. Reconnect the power cord.
- 10. Perform a "Printhead Voltage Adjustment."



#### **CAUTION:**

THE PRINTHEAD VOLTAGE ADJUSTMENT IS CRITICAL TO THE LIFE OF THE PRINTHEAD. <u>DO NOT</u> USE THIS ADJUSTMENT IN AN ATTEMPT TO INCREASE THE PRINTING DARKNESS.

11. Print test labels to determine print quality. Perform a Strip Plate Adjustment only if experiencing ribbon wrinkle or the ribbon is not tracking properly. Perform a Printhead Position Adjustment only if necessary (replacement Printheads are pre-aligned at the factory).



Figure 4-32 Braided Ground Strap Location



Figure 4-33 Print Mechanism Assembly Mounting Screw Location



Figure 4-34 Printhead Assembly Removal/Installation

#### **Ribbon Supply Spindle Disassembly**

#### **Refer to Figure 4-35**

- 1. Turn printer off and remove the power cord.
- 2. Remove the printer data cable (if connected).
- 3. Remove any media and ribbon.
- 4. Ensure the Dual Tension Ribbon Supply Spindle Outer Spindle is in the retracted (pushed in) position to gain access to the Allen Head Set Screws.
- 5. Rotate the Outer Spindle to locate and loosen the two 1.5 mm Allen Head Set Screws holding the Cup and Spring Assembly on the ribbon supply spindle shaft.
- 6. Slide the Cup and Spring Assembly and the Outer Spindle off of the shaft.
- 7. Remove the C-Clip off of the shaft.
- 8. Slide the Spindle Assembly off of the shaft.
- 9. Rotate the Ribbon Supply Spindle Sub-Assembly to locate and loosen the two 1.5 mm Allen Head Set Screws holding the Cup and Spring Assembly on the ribbon supply spindle shaft.
- 10. Slide the Ribbon Supply Spindle Sub-Assembly off of the shaft.
- 11. See "Ribbon Supply Spindle Replacement" for replacement instructions.



Figure 4-35 Dual-Tension Ribbon Supply Disassembly

#### **Ribbon Supply Spindle Replacement**

- 1. Perform the "Ribbon Supply Spindle Disassembly" procedures.
- 2. Use an emery cloth to remove burrs and nicks on the ribbon supply spindle shaft.
- 3. Slide the ribbon supply spindle sub-assembly on the ribbon supply spindle shaft (see Figure 4-36).
- 4. Slide one of the cup and spring assemblies on the ribbon supply spindle shaft.
- 5. Place a .010 shim or feeler gauge between the C-Clip and ribbon supply spindle subassembly (see Figure 4-36).
- 6. While applying a light pressure against the Cup and Spring Assembly, tighten the two Allen Head Set Screws on the Cup and Spring Assembly.

## Note: Rotate the Ribbon Supply Spindle Sub-Assembly in order to get access to the Allen Head Set Screws.



Figure 4-36 Ribbon Supply Spindle Sub-Assembly Installation

- 7. Once the Cup and Spring Assembly is tightened, remove the shim/feeler gauge. The Ribbon Supply Spindle Sub-Assembly should have some "play" on the shaft. When rotated in a counter-clockwise direction, the Ribbon Supply Spindle Sub-Assembly should spin freely until it encounters the spring. When continuing to turn the Ribbon Supply Spindle Sub-Assembly in the counter-clockwise direction, a "snap" would be heard and once again the Ribbon Supply Spindle Sub-Assembly would move freely.
- 8. When rotated in a clockwise direction, the Ribbon Supply Spindle Sub-Assembly should encounter the spring and attempt to spin the Ribbon Supply Spindle Sub-Assembly in the counter-clockwise direction.
- 9. If the results in steps 7 and 8 are not achieved, repeat steps 2 through 8.
- 10. Slide the Spindle Assembly on the shaft (see Figure 4-37).



**Figure 4-37 Spindle Assembly Installation** 

- 11. Replace the C-Clip in the grove found on the shaft (see Figure 4-38).
- 12. Place a .020 shim or feeler gauge between the Spindle Assembly and the Ribbon Supply Spindle Sub-Assembly (see Figure 4-38).
- 13. Slide the Outer Spindle on the shaft.
- 14. Align the large notch on the Outer Spindle with the corresponding protrusion on the Spindle Assembly. The protrusion on the Spindle Assembly is inline with the metal core clip (see Figure 4-39).
- 15. Carefully push the Outer Spindle onto the Spindle Assembly only to the first notch (see Figure 4-39). If it is pushed on too far (see Figure 4-40), simply pull the Outer Spindle away from the Spindle Assembly until it looks like Figure 4-39.
- 16. Slide the Cup and Spring Assembly on the shaft.
- 17. While applying a light pressure against the Cup and Spring Assembly, and with the .020 shim or feeler gauge between the Spindle Assembly and the Ribbon Supply Spindle Sub-Assembly, tighten the two Allen Head Set Screws on the Cup and Spring Assembly.

#### Note: Rotate the Outer Spindle in order to get access to the Allen Head Set Screws.

- 18. Once the Cup and Spring Assembly is tightened, remove the shim/feeler gauge. The Outer Spindle and Spindle Assembly should have some "play" on the shaft. When rotated in a counter-clockwise direction, the Outer Spindle and Spindle Assembly should spin freely until it encounters the spring. When continuing to turn the Outer Spindle and Spindle Assembly in the counter-clockwise direction, a "snap" would be heard and once again the Ribbon Supply Spindle Sub-Assembly would move freely.
- 19. When rotated in a clockwise direction, the Outer Spindle and Spindle Assembly should encounter the spring and attempt to spin the Outer Spindle and Spindle Assembly in the counter-clockwise direction.
- 20. Push in the Outer Spindle until it is flush against the Spindle Assembly (see Figure 4-40). The Outer Spindle and Spindle Assembly should now spin freely clockwise and counterclockwise with no restrictions.
- 21. If the results in steps 18, 19 and 20 are not achieved, repeat steps 10 through 20.
- 22. Replace the printer data cable and power cable.
- 23. Reload media and ribbon and test the printer.

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Figure 4-38 Spindle Assembly Installation



Figure 4-39 Spindle Assembly & Outer Spindle (Expanded)



Figure 4-40 Spindle Assembly & Outer Spindle (Retracted)

#### **Media Sensor Assembly Removal**



#### **CAUTION:**

#### OBSERVE PROPER ELECTROSTATIC SAFETY PRECAUTIONS WHEN REMOVING, HANDLING AND REPLACING PRINTED CIRCUIT BOARDS.

- 1. Turn printer off and remove the power cord and the printer data cable (if connected).
- 2. Remove Media and Ribbon.
- 3. Remove the Main Door and the Rear Cover.
- 4. Disconnect the wiring harness from J11 on the Main Logic Board (see Figure 4-30).
- 5. Carefully slide out the Upper Media Guide Assembly (see Figure 4-41).
- 6. Locate the two mounting screws used to secure the Media Sensor Assembly to the Main Frame.
- 7. Using a long reach magnetic tip Phillips screwdriver, carefully remove the two mounting screws.
- 8. Carefully remove the Media Sensor Assembly from the Main Frame.

#### **Media Sensor Assembly Replacement**

- 1. Remove the wiring harness from W1 on the defective Media Sensor Board and connect to W1 on the replacement Media Sensor Board.
- 2. Carefully install the Media Sensor Assembly on to the Main Frame insuring that the wiring harness attached to W1 on the Media Sensor Board goes through the cutout to the other side of the Main Frame.
- 3. Using a long reach magnetic tip Phillips screwdriver, carefully replace the two mounting screws.
- 4. Connect the wiring harness from the Media Sensor Board to J11 on the Main Logic Board (see Figure 4-30).
- 5. Reinstall the Upper Media Guide Assembly (see Figure 4-41).
- 6. Reinstall the Media and Ribbon.
- 7. Reinstall the Main Door and Rear Cover.
- 8. Reconnect the power cord and printer data cable.
- 9. Turn the printer on and recalibrate the media. Check for proper media and ribbon operation.

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Figure 4-41 Media Sensor Assembly



Figure 4-42 Main Drive Belt Replacement and Adjustment

#### Main Drive Belt Removal, Replacement and Adjustment for Printers Without the Peel-Off Option



#### **CAUTION:**

#### OBSERVE PROPER ELECTROSTATIC SAFETY PRECAUTIONS WHEN REMOVING, HANDLING AND REPLACING PRINTED CIRCUIT BOARDS.

- 1. Turn printer off and remove the power cord and the printer data cable (if connected).
- 2. Remove Media and Ribbon.
- 3. Remove the Main Door and the Rear Cover.
- 4. Remove the Main Logic Board and Media Sensor Assembly.

Note: Scribing a mark into the printer Main Frame indicating the position of the Idler Pulley prior to performing step #5 may help when adjusting the belt tension.

- 5. Refer to Figure 4-42. Loosen the shoulder bolt holding the Idler Pulley in position until the pulley freely moves up and down.
- 6. Remove the old Main Drive Belt and install the new one.
- 7. Hook a 1000 gram spring scale to the belt as shown in Figure 4-42, and carefully pull up on the Idler Pulley to increase belt tension.
- 8. When a scale reading of 500 grams ( $\pm$  100 grams) creates a deflection of <sup>1</sup>/<sub>4</sub> inch, tighten the shoulder bolt.
- 9. Reinstall the Media Sensor Assembly, Main Logic Board, Main Door and Rear Cover.
- 10. Reload Media and Ribbon.
- 11. Reconnect power cord and printer data cable. Turn on printer and test for proper operation.

#### Main Drive Belt/Rewind Spindle Drive Belt Removal, Replacement and Adjustment for Printers Equipped With the Peel-Off Option



#### CAUTION:

#### OBSERVE PROPER ELECTROSTATIC SAFETY PRECAUTIONS WHEN REMOVING, HANDLING AND REPLACING PRINTED CIRCUIT BOARDS.

- 1. Turn printer off and remove the power cord and the printer data cable (if connected).
- 2. Remove Media and Ribbon.
- 3. Remove the Main Door and the Rear Cover.
- 4. Remove the Main Logic Board and Media Sensor Assembly.

## Note: Scribing a mark into the printer Main Frame indicating the position of the Idler Pulley prior to performing step #5 may help when adjusting the belt tension.

- 5. Refer to Figure 4-43. Loosen the shoulder bolt holding the Idler Pulley in position, for the particular belt being replaced, until the pulley freely moves up and down.
- 6. Remove the old Main Drive Belt and/or Rewind Spindle Drive Belt and install the new one.
- 7. Hook a 2200 gram spring scale to the new Main Drive or Rewind Spindle Drive Belt, dependent on which one is being replaced/adjusted, as shown in Figure 4-43 and carefully pull up on the Idler Pulley to increase belt tension.
- 8. **Main Drive Belt Adjustment**. When a scale reading of 1800 grams ( $\pm$  225 grams) creates a deflection of <sup>1</sup>/<sub>4</sub> inch, tighten the shoulder bolt.

**Rewind Spindle Drive Belt Adjustment**. When a scale reading of 2300 grams ( $\pm$  225 grams) creates a deflection of <sup>1</sup>/<sub>4</sub> inch, tighten the shoulder bolt.

- 9. Reinstall the Media Sensor Assembly, Main Logic Board, Main Door and Rear Cover.
- 10. Reload Media and Ribbon.
- 11. Reconnect power cord and printer data cable. Turn on printer and test for proper operation.

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Figure 4-43 Peel-Off Drive Belt Adjustment

#### **Platen Roller Replacement**

- 1. Turn printer off and remove the power cord and the printer data cable (if connected).
- 2. Remove Media and Ribbon.
- 3. Remove the Main Door, Rear Cover and Control Panel Assembly.
- 4. Remove the Main Logic Board and Media Sensor Assembly.

## Note: Scribing a mark into the printer Main Frame indicating the position of the Idler Pulley prior to performing step #5 may help when adjusting the belt tension.

- 5. Refer to Figure 4-44. Loosen the shoulder bolt holding the Idler Pulley in position until the pulley freely moves up and down.
- 6. Remove the Main Drive Belt.
- 7. Remove the screw securing the Platen Roller Ground Chain Assembly to the Main Frame (see Figure 4-44).
- 8. Remove the Tear-Off Plate (see Figure 4-28).
- 9. Remove the Platen Roller by lifting up on the end with the Platen Pulley and pivoting the Platen Bearings out of the slots.
- 10. Remove the Platen Pulley from the Platen Roller.
- 11. Install the Platen Bearings, Nylon Spacer Washers, Ground Chain Assembly and the Platen Pulley on the replacement Platen Roller as shown in Figure 4-45.

## Note: Make sure the Platen Bearings are orientated so that the off center holes are at the top for the S400 and at the bottom for the S600 when installed (see Figure 4-45).

- 12. Reinstall the Platen Roller by sliding the outside Platen Bearing into its cutout and dropping the inside Platen Bearing into its slot.
- 13. Reattach the Ground Chain Assembly to the Main Frame.
- 14. Reinstall the Main Drive Belt.
- 15. Adjust the Main Drive Belt Tension.
- 16. Reinstall the Main Logic Board and Media Sensor Assembly.
- 17. Reinstall the Tear-Off Plate, Control Panel Assembly, Rear Cover and Main Door.
- 18. Reload Media and Ribbon.
- 19. Reconnect power cord and printer data cable. Turn on printer and test for proper operation.



**Figure 4-45 Platen Roller** 

#### **Ribbon Take-Up Motor Replacement**

- 1. Turn printer off and remove the power cord and the printer data cable (if connected).
- 2. Remove Media and Ribbon.
- 3. Remove the Main Door and Rear Cover.
- 4. Remove the Main Logic Board.
- 5. Remove the Main Drive Belt.
- 6. Loosen the two 1.5mm Hex screws and slide the Bevel Gear from the Ribbon Take-Up Spindle Shaft (see Figure 4-46).
- 7. Remove the Ground Chain Assembly from around the Idler Pulley.
- 8. Remove the screw securing the Ground Chain Assembly to the Ribbon Supply Spindle Shaft.
- 9. Remove the two 5mm Hex screws holding the Ribbon Tension Motor Assembly and mounting bracket to the Main Frame.
- 10. Install the replacement Ribbon Tension Motor Assembly by reversing steps 6 through 9.
- 11. Perform a Main Drive Belt tension adjustment.
- 12. Reinstall the Main Logic Board, Rear Cover and Main Door.
- 13. Perform the Ribbon Take-Up Spindle Tension Adjustment.
- 14. Reload Media and Ribbon.
- 15. Reconnect power cord and printer data cable. Turn on printer and test for proper operation



Figure 4-46 Ribbon Take-Up Motor

#### **Stepper Motor Replacement**

- 1. Turn printer off and remove the power cord and the printer data cable (if connected).
- 2. Remove Media and Ribbon.
- 3. Remove the Main Door and Rear Cover.
- 4. Remove the Main Logic Board.
- 5. Remove the Main Drive Belt.
- 6. Remove the screw, underneath the Upper Media Guide Assembly, holding the Stepper Motor to the Main Frame (see Figure 4-47).
- 7. Disconnect the Stepper Motor Cable (J1) from the Power Supply Board (see Figure 4-48).
- 8. Carefully grasping the Stepper Motor, turn it counter-clockwise and remove it from the slots.
- 9. Reverse the procedure, steps 6 through 8, to install the replacement Stepper Motor.
- 10. Replace the Main Drive Belt and adjust the tension.
- 11. Replace the Main Logic Board.
- 12. Replace the Rear Cover and Main Door.
- 13. Reload Media and Ribbon.
- 14. Reconnect power cord and printer data cable. Turn on printer and test for proper operation.



Figure 4-47 Stepper Motor (Media Side)



Figure 4-48 Stepper Motor (Electronics Side)



#### **CAUTION:**

#### OBSERVE PROPER ELECTROSTATIC SAFETY PRECAUTIONS WHEN REMOVING, HANDLING AND REPLACING PRINTED CIRCUIT BOARDS.

#### **Power Supply Board Removal**

- 1. Turn printer off and remove the power cord and the printer data cable (if connected).
- 2. Remove Media and Ribbon.
- 3. Remove the Main Door and Rear Cover.
- 4. Remove the Main Logic Board.
- 5. Disconnect the Stepper Motor Cable from the Power Supply Board (J1) (see Figure 4-48).
- 6. Disconnect the ground wire leading from the Power Supply Board to the Ground Bar (see Figure 4-48).
- 7. Remove the screw in the middle of the media compartment that holds the main base and power supply base together (see Figure 4-49).
- 8. Insert a flat blade screwdriver tip into the slots shown in Figure 4-49.
- 9. Gently pull the screwdriver handle towards the front of the printer until the tabs "pop" out of the cut-out (tabs slide into the base).
- 10. Carefully pry the front of the Power Supply Base downward to remove the assembly.
- 11. Remove the two mounting screws that secure the Power Supply Board to the base (see Figure 4-50).
- 12. Pivot the board off of the front snaps.

#### **Power Supply Board Replacement**

- 1. Press the Power Supply Board onto the three mounting snaps (see Figure 4-50).
- 2. Reinstall the two screws.
- 3. With the printer tilted up on the Front Cover, position the front hooks of the power supply base into the holes.
- 4. Route the ground wire through the opening in the base.
- 5. Engage the rear snaps by pivoting the Power Supply Base Assembly to the printer base.
- 6. Insert the screw in the middle of the media compartment that holds the main base and power supply base together (see Figure 4-50).
- 7. Connect the ground wire to the Riot (ground) Bar (see Figure 4-48).
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- 8. Replace the Main Logic Board.
- 9. Reconnect all ribbon cable connectors and wire harness connectors to the Main Logic Board.
- 10. Reconnect power cord and perform a Printhead Voltage Adjustment procedure.
- 11. Replace the Rear Cover and Main Door.
- 12. Reload Media and Ribbon.
- 13. Reconnect printer data cable. Turn on printer and test for proper operation.



Figure 4-49 Power Supply Assembly Removal

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Figure 4-50 Power Supply Assembly Exploded View

### **AC Power Fuse Replacement**



### **CAUTION:**

### THE REPLACEMENT FUSE MUST HAVE THE RATINGS SPECIFIED BELOW. SERIOUS DAMAGE MAY OCCUR IF A HIGHER RATED FUSE IS INSTALLED.

A user replaceable AC Power Fuse is located just to he left of the Power On/Off Switch (see Figure 4-51). For 120 VAC operation a F5A/250V fuse is used. For 220 VAC operation a F3A/250V is used.

### Note: Do not rely on a visual inspection to determine if a fuse is blown. Always turn the printer off and remove the power cord. Then remove the fuse from the fuse holder (or circuit board) and test with an ohmmeter. A good fuse will give a short (0 ohm) indication.

- 1. Turn printer off and remove the power cord.
- 2. Insert the tip of a flat blade screwdriver into the slot found on the fuse holder cap. Press in on the cap and turn counter-clockwise (to the left). Remove the screwdriver.
- 3. Grab the fuse holder cap with your fingers and remove from the fuse holder.
- 4. Remove the blown fuse from the fuse holder cap and insert the proper fuse.
- 5. Replace the fuse holder cap by placing it into the fuse holder. Insert the tip of a flat blade screwdriver into the slot found on the fuse holder cap. Carefully press in on the cap and turn clockwise (to the right) until the cap will no longer turn. Remove the screwdriver



**Figure 4-51 Fuse Holder Location** 

### **OPTIONS (FIELD INSTALLABLE)**

### **Memory Upgrade Kit Installation Instructions**



### **CAUTION:**

### **OBSERVE PROPER ELECTROSTATIC SAFETY PRECAUTIONS WHEN REMOVING, HANDLING AND REPLACING PRINTED CIRCUIT BOARDS.**

- 1. Turn printer off and remove the power cord.
- 2. Remove the printer data cable (if connected).
- 3. Remove the Rear Cover.

### Note: It is not necessary to remove the Main Door or the Front Door if only installing the Memory Upgrade Kit.

- 4. Note the positions of all ribbon cable connectors and wire harness connectors. Remove all connectors to the Main Logic Board (see Figure 4-30).
- 5. Remove the three 5mm Hex screws securing the Main Logic Board to the printer Main Frame.
- 6. Carefully grasping both sides of the Main Logic Board, pull the board straight up from the Power Supply connector and out of the unit. A gentle rocking motion of the Main Logic Board may be necessary to release it from the Power Supply Board.
- 7. Inspect the back of the Main Logic Board. Remove any contaminants with a cotton swab and isopropyl alcohol on J14 (found at the left edge of the board when looking at the back of the board).
- 8. Lay the Main Logic Board on the anti-static mat face up.
- 9. Remove the three mounting screws from the Memory Board (see Figure 4-52) and put aside for use later.
- 10. With the Memory Board face up (100-pin connector to the left and pins up), carefully slide the Memory Board underneath the Main Logic Board (see Figure 4-53).
- 11. Align the three screw holes in the Main logic Board with the three holes in the connector on the Memory Board.
- 12. Carefully install the three previously removed screws (from the Memory Board), finger tight, through the Main Logic Board and into the Memory Board.
- 13. Carefully align connector J8 at the bottom of the replacement Main Logic Board with the mating connector on the Power Supply Board in the base of the printer.
- 14. Once all three screws have been installed finger tight, tighten the center screw first (with the screwdriver) and then each of the end screws. Do not over torque the screws.

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- 15. Push the Main Logic Board straight down until connector J8 has seated completely onto the Power Supply Board.
- 16. Reinstall the three 5mm Hex screws securing the Main Logic Board to the printer Main Frame.
- 17. Reconnect all ribbon cable connectors and wire harness connectors (see Figure 4-30).



### **IMPORTANT:**

USE FULL WIDTH MEDIA WHEN PERFORMING THE CANCEL KEY SELF-TEST. LABELS LESS THAN FULL WIDTH WILL LOSE PRINTING ON THE RIGHT SIDE. PRINTING MAY RUN ON TO THE NEXT LABEL WHEN USING SHORT LABELS.

- 18. Connect the power cord to the printer.
- 19. Load media and ribbon (if not already done).
- 20. Perform a CANCEL Key Self-Test. To start the CANCEL Key Self-Test, press the CANCEL key while turning the printer power on. The printer will first run through a Power On Self-Test and then print the configuration label.

### Note: This self-test prints a listing of the printer's current configuration parameters that are currently stored in Configuration (EEPROM) Memory (see Figure 4-54).

21. Inspect the label to determine if the Main Logic Board recognizes the amount of memory that was installed (see Figure 4-54). If the label indicates "NOT INITIALIZED", turn the printer off and run the test again (this is normal for the first time power up with the optional memory).

### Note: If the installed memory is still not recognized, turn the printer off, remove the power cord and repeat steps 5 through 7. Remove the Memory Board and re-clean the gold pads on J14 of the Main Logic Board. Repeat steps 9 through 21.

22. Reinstall the Rear Cover, power cord and data cable.

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Figure 4-52 Sample Main Logic Board & Memory Board



**Figure 4-53 Memory Board Installation** 

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Figure 4-54 Sample Before And After Configuration Labels (8 MB Memory Board Installed)

### **MAINTENANCE AND ASSEMBLY DRAWINGS**

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RIBBON AND MEDIA SUPPLY	5-6
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CUTTER OPTION	

### **COVER ASSEMBLIES**

#	Part No.	Description	Qty
1	44114	Screw M4.2 x 1.41 x 8 Hi-Lo Hex	3
2	44185M	Front Door Retention Clip	1
3	44075-1	Rear Cover	1
4	44076-5	Front Door (S400)	1
4	44076-4	Front Door (S600)	1
5	44070-3	Main Door (Standard)	1
5	44070-4	Main Door (Quick Release)	1

#	Part No.	Description	Qty

### **Cover Assemblies**



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### LOGIC BOARD AND CONTROL PANEL

#	Part No.	Description	Qty
1	44114	Screw M4.2 x 1.41 x 8 Hi-Lo Hex	3
2	44506M	(A) Front Panel Assembly	1
		( <b>B</b> ) Front Panel Cover (includes 1	
2	44071 400M	Front Door Retention Clip, 2	1
3	440/1-400101	M4.2 x 1.41 x 8 Hi-Lo Hex screws	1
		and 1 M4 x 10 Hex screw)	
4	44053	Screw M3 x .6 x 10	1
5	44459	Locking Ring	1
6	44860	Screw 10-32 x 1.5 SHCS	1
7	44219	Head Open Sensor Flag	1
8	44485	Screw M3 x 8 x DIN7500C	1
9	44123	Braided Ground Strap	1
10	44784M	(C) Main Logic Board (S400)	1
10	44782M	(C) Main Logic Board (S600)	1
11	44077	Ground Bezel	1
12	44859	Shaft Collar	1
13	01155	#4 Lock Washer	2
14	22416	Hex Stand Off 4-40	2
15	44115	Screw M4 x 10	1

#	Part No.	Description	Qty



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### **RIBBON AND MEDIA SUPPLY**

#	Part No.	Description	Qty
1	10432	Screw, M4 x .7	1
2	30251	Washer .836 x .390 x .048	1
3	44043M	(A) RTU Motor Assy	1
4	44198M	Cable, Motor RTU	1
5	44481	Ground Chain Assy 1-3/8"	1
6	44046-2	Bevel Gear, 60T	1
	44052-400M	Ribbon Take-Up Spindle Assy	1
-		(Tear-Off and Cutter Option only)	
1	44052-402M	Ribbon Take-Up Spindle Assy	1
		(Peel-Off Option only)	
0	44066-1M	( <b>B</b> ) Media Edge Guide & Thumb	1
0		Screw	1
9	44069	Media Bracket	1
10	44084	Washer .70 x .38 x .03	4
11	44100	Set Screw M3 x .5 x 6	1
12	44118	Shaft Collar	1
13	11012 100M	(C) Dual Torque Ribbon Supply	1
	44712-400IVI	Spindle Kit	1
14	44356	Washer .198 x .75 x .085	1

#	Part No.	Description	Qty
15	44114	Screw M4.2 x 1.41 x 8 Hi-Lo Hex	2
16	44278	Chain Assy 1 <sup>3</sup> / <sub>4</sub> "	1
17	44176	Wire Clip	1
18	44466	Ground Cable	1
19	44053	Screw M3 x .6 x 10	1
20	44339	Hex Standoff	1

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### **Ribbon and Media Supply**



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### TOGGLE AND PRINT MECH ASSEMBLY

#	Part No.	Description	Qty
1	44329-400M	(A) Toggle Assy	1
2	44180M	(B) Print Mech Assy (S400)	1
2	44204M	(B) Print Mech Assy (S600)	1
3	77687	Braided Ground Strap	1
4	44482	Screw M3 x 20 DIN7500C	1
5	01448	Screw	1
6	44484	Screw M4.2 x 1.41 x 25	1
7	44339	Hex Standoff	1
8	44459	Locking Ring	1
9	44859	Shaft Collar	1
10	44219	Head Open Sensor Flag	1
11	44485	Screw M3 x 8 x DIN7500C	1
12	44860	Screw 10-32 x 1.5 SHCS	1
13	06262	Nut	1
14	44923	Braided Ground Strap	1

#	Part No.	Description	Qty



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### PRINT MECH AND PRINTHEAD ASSEMBLY

#	Part No.	Description	Qty
1	44999M	(A) Printhead Assy (S400)	1
1	44998M	(A) Printhead Assy (S600)	1
C	44180M	( <b>B</b> ) Print Mech Assy (S400)	1
Z	44204M	(B) Print Mech Assy (S600)	1
2	44527	Printhead Cable Assy (S400)	1
3	44920	Printhead Cable Assy (S600)	1

#	Part No.	Description	Qty

### **Print Mech and Printhead Assembly**



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### MEDIA SENSOR AND RIBBON GUIDE

#	Part No.	Description	Qty
1	44011	Media Guide	1
2	44466	Ground Cable	1
3	44482	Screw, M3 x 20 DIN7500C	1
	44140-400M	Upper Media Guide Plate Assy	1
4		(Tear-Off and Cutter Option only)	
4	44140-402M	Upper Media Guide Plate Assy	1
		(Peel-Off Option only)	
	44135-400M	(A) Media Sensor Assy	1
-		(Standard)	
5	44911M	(A) Media Sensor Assy (Black	1
		Mark)	
6	44114	Screw M4.2 x 1.41 x 8 Hi-Lo Hex	4
7	44189	Anti-Static Brush	1
8	44190M	( <b>B</b> ) Ribbon Guide Assy	1
9	30466	Washer .26 x .63 x .06	1
10	30393-008	Screw 8-32 x .500	1
11	07257	Washer .438 x .188 x .036	1
12	44747	Media/Ribbon Sensor Cable	1
13	44484	Screw M4.2 x 1.41 x 25	1

#	Part No.	Description	Qty
14	44339	Hex Standoff	1
15	44123	Braided Ground Strap	1



### Media Sensor and Ribbon Guide



### **DRIVE SYSTEM**

#	Part No.	Description	Qty
	44023-0M	Stepper Motor (Tear-Off and	1
1		Cutter Option only)	
1	44023-2M	Stepper Motor (Peel-Off Option	1
		Only)	
2	44216	Screw M4.2 x 1.41 x 13	1
3	44177	Tear Plate Ground Strap	1
4	44019	Idler Shaft	1
~	Idler Pulley, 20T (Tear-Off and		1
3	44025	Cutter Option only)	1
(	11250	Washer .198 x .75 x .085	1
0	44330	(Tear-Off and Cutter Option only)	1
7	44055	Hex Nut M5	1
8	44172-2	Ground Chain Assy 1 1/8"	1
	45189-5	Main Drive Belt (S400 and S600 –	1
		Peel-Off Option Only)*	
9	45189-6	Main Drive Belt (S600 – Tear-Off	1
		And Cutter Option only)	
	45189-8	Main Drive Belt 160T (S400 –	1
		Tear-Off and Cutter Option only)	

#	Part No.	Description	Qty
10	44017	Platen Pulley (S400)	1
10	44022	Platen Pulley, 50T (S600)	1
11	44485	Screw M3 x 8 x DIN7500C	1
12	44100	Set Screw M3 x .5 x 6	1

\* See Peel-Off Option (Rear View) for more information

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### PLATEN AND POWER SUPPLY

#	Part No.	Description	Qty
1	44282	Tear Off Plate	1
2	44015	Platen Bearing	2
3	44120	Outboard Guide	1
4	44182	Platen Roller (S400)	1
4	44214	Platen Roller (S600)	1
5	44121	Inboard Guide	1
6	44114	Screw M4.2 x 1.41 x 8 Hi-Lo Hex	2
7	44484	Screw M4.2 x 1.41 x 25	1
8	44004-400M	Cover Assy PSU	1
9	44114	Screw M4.2 x 1.41 x 8 Hi-Lo Hex	
10	44816M	Power Supply Assy 120/240 VAC	1

#	Part No.	Description	Qty

### **Platen and Power Supply**



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### PEEL-OFF OPTION (FRONT VIEW)

#	Part No.	Description	Qty
1	44191	Ground Chain Assy	1
2	44218	Backing Rewind Hook	1
3	44284M	( <b>D</b> ) Media Take-Up Spindle Assy	1
4	44391	Anti-Static Brush	1
5	44398M	(C) Lower Guide Rod Kit	1
6	44383	Ground Cable Assy	1
7	44349M	( <b>B</b> ) Upper Media Rod Kit	1
8	44463M	(A) Platen Guide Rod Kit	1

#	Part No.	Description	Qty



### **Peel-Off Option (Front View)**

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### PEEL-OFF OPTION (REAR VIEW)

#	Part No.	Description	Qty	
1	44216	Screw M4.2 x 1.41 x 13	1	
2	44358M	(C) Media Take-Up Idler Assy	1	
3	4425014	(B) Upper Idler Assy (Peel-Off	1	
5	44339111	Option Only)	1	
4	44368M	( <b>D</b> ) Carrier Idler Assy	1	
5	44536M	(A) Take Label Sensor Assy	1	
6	44665M	Full Roll Switch Assy	1	
7	45189-7	Belt 118T	1	
0	45100 5	Main Drive Belt (Peel-Off Option	1	
ð	45189-5	Only)	1	
9	44341M	(E) Power Roller Assy	1	
10	44264M	(F) Carrier Bearing Assy	1	
11	44282	Tear Plate	1	
12	44275	Power Roller	1	
12	44022 214	Stepper Motor (Peel-Off Option	1	
13	44023-2INI	Only)	1	
14	44172-1	Ground Chain Assy 1 1/8"	1	
15	44383	Ground Cable Assy	1	
16	44191	Ground Chain Assy	1	

#	Part No.	Description	Qty
17	01159	Lock Washer #6	1
18	44387	Screw M3.5 x .6 x 6	1

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### **Peel-Off Option (Rear View)**



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### **CUTTER OPTION**

#	Part No.	Description	Qty
1	44710M	Cutter Maint Kit	1
2	44986	Catch Tray	1
3	44437M	Cutter Mounting Maint Kit	1
4	10432M	Plate Mounting Maint Kit	1
5	10432	Screw, M4 x .7 x 12	1
6	07257	Washer .438 x .188 x .036	1
7	06223	Cable Clamp .188	1
8	44674	Cable 8 Cond DIN (Cutter Cable)	1
9	10461	Nut M4-0.7	1

#	Part No.	Description	Qty

### **Cutter Option**



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### MISCELLANEOUS INFORMATION AND APPENDICES

This section is used to file various documents. Some of which may not have been originally included with the manual. This includes (if applicable):

- Additional information provided that does not fit in any other section
- Option Kit Installation Instructions
- Upgrade Kit Installation Instructions
- Maintenance Kit Installation Instructions
- Notes

### **ASCII CODE CHART**

American Standard Code for	• Information Interchange
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HEX	CHAR	HEX	CHAR	HEX	CHAR
00	NUL	20	Space	40	@
01	SOH	21	!	41	Α
02	STX	22	"	42	В
03	ETX	23	#	43	С
04	EOT	24	\$	44	D
05	ENQ	25	%	45	E
06	ACK	26	&	46	F
07	BEL	27	4	47	G
08	BS	28	(	48	Н
09	HT	29	)	49	Ι
0A	LF	2A	*	4A	J
0B	VT	2B	+	4B	K
0C	FF	2C	,	4C	L
0D	CR	2D	-	4D	М
0E	SO	2E	•	4E	N
0F	SI	2F	/	4F	0
10	DLE	30	0	50	Р
11	DC1	31	1	51	Q
12	DC2	32	2	52	R
13	DC3	33	3	53	S
14	DC4	34	4	54	Т
15	NAK	35	5	55	U
16	SYN	36	6	56	V
17	ETB	37	7	57	W
18	CAN	38	8	58	Х
19	EM	39	9	59	Y
1A	SUB	3A	:	5A	Ζ
1B	ESC	3B	;	5B	[
1C	FS	3C	<	5C	\
1D	GS	3D	=	5D	]
1E	RS	3E	>	5E	^
1F	US	3F	?	5F	
			-		

HEX CHAR 6 60 61 a 62 b 63 с 64 d 65 e f 66 67 g 68 h 69 i 6A j 6B k 6C 1 6D m 6E n 6F 0 70 р 71 q 72 r 73 S 74 t 75 u 76 v 77 W 78 Х 79 у 7A Z 7B { 7C 7D } 7E ~ 7F

Note: Not recommended for use as a command prefix, format prefix or delimiter character

DEL