



DCS & Labeling Worldwide

**CL Series “e”
Thermal Transfer Printers**



**Operator Manual
for
CL408e, CL412e, CL608e &
CL612e**

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PREFACE

CL SERIES “e” PRINTER OPERATOR’S MANUAL

The CL Series “e” Printer Operator’s Manual contains basic information about the printer such as setup, installation, cleaning and maintenance. It also contains complete instructions on how to use the operator panel to configure the printer. The following is a brief description of each section in this manual.

SECTION 1. PRINTER OVERVIEW

This section contains a discussion of the printer specifications and optional features.

SECTION 2. INSTALLATION

This section contains instructions on how to unpack and set up the printer, AND load the labels and ribbon.

SECTION 3. CONFIGURATION

This section contains instructions on how to use the operator panel to configure the printer.

SECTION 4. CLEANING AND MAINTENANCE

This section contains instructions on how to clean and maintain the printer.

SECTION 5. PROGRAMMING

This section has been replaced by the “e” and PRO Printer Programming Reference, PN 9001096 on the Printer Utilities CD-ROM. It introduces the SATO printer programming language. It contains the commands that are used with the printer to produce labels with bar codes, alphanumeric data and graphics.

SECTION 6. INTERFACE SPECIFICATIONS

This section contains the printer’s interface specifications, which include detailed information on how to properly interface your printer to the host system.

SECTION 7. TROUBLESHOOTING

This section contains troubleshooting procedures to follow in the event you have printer problems.

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SECTION 5. PROGRAMMING

For programming information, see the “e” and PRO Printer Programming Reference, PN 9001096 on the Printer Utilities CD-ROM.

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SECTION 1.

PRINTER OVERVIEW

INTRODUCTION

The SATO CL Series “e” Thermal Transfer Printers are complete, high-performance on-site labeling systems. All printer parameters are user programmable using the front panel controls and the DIP switches. All popular bar codes and 14 human-readable fonts, including a vector font, are resident in memory providing literally thousands of type styles and sizes.

The Operator’s Manual will help you understand the basic operations of the printer such as setup, installation, configuration, cleaning and maintenance.

The major differences in the CL408e and the CL412e printers is the resolution of the head. The CL408e with its 203 dpi head provides an economical labeling solution for most applications. It can print labels up to four inches wide. If a wider label is needed, the CL608e can print labels up to six inches wide at the same resolution. The CL412e provides a higher print resolution, 305 dpi, to give laser-quality printing. It is useful when higher resolution is needed for detailed graphic images. The six inch wide companion printer to the CL412e is the CL612e.

All of the CL Series “e” printers use the same command codes. The only differences are the allowable values representing the print positions on the label. These values are specified in “dots” and will vary depending upon the resolution of the printer and the amount of memory available for imaging the label. The allowable range for each printer is specified in a table for those command codes.

This commonalty makes it very easy to convert labels from one CL printer to another without having to create an entirely different command stream. There are some caveats that must be observed though to compensate for the different resolution print heads. The effect of the different printer resolutions are best illustrated by taking a label designed for a 203 dpi printer and sending the command stream to the its 305 dpi counterpart. The label printed will be an exact two-thirds scale, including the fonts, bar code dimensions and line lengths/widths. The only exception is the PostNet bar code which has only one legal size and the printer resolution is automatically compensated for by the printer. Conversely, a label designed for a 305 dpi printer and sent to its 203 dpi cousin will be one-third larger. It probably will be “truncated” if the label size is larger than the maximum allowable for the printer.

The following general information is presented in this section:

- General Printer Specifications
- Optional Accessories

GENERAL PRINTER SPECIFICATIONS

SPECIFICATION	CL408e	CL412e	CL608e	CL612e
PRINT				
Method	Direct or Thermal Transfer			
Speed (User Selectable)	2 to 6 ips 50 to 150 mm/s		4 to 8 ips 100 to 200 mm/s	
Print Module (Dot Size)	.0049 in. .125 mm	.0033 in. .083 mm	.0049 in. .125 mm	.0033 in. .083 mm
Resolution	203 dpi 8 dpmm	305 dpi 12 dpmm	203 dpi 8 dpmm	305 dpi 12 dpmm
Maximum Print Width	4.1 in. 104 mm		6.0 in. 152 mm	6.5 in. 164mm
Maximum Print Length	49.2 in. 1249 mm	32.8 in. 833 mm	49.2 in. 1249 mm	32.8 in. 833 mm
MEDIA				
Minimum Width	.87 in. (22 mm)		1.96 in. (50 mm)	
Minimum Length	.24 in. (6 mm)		.78 in. (20 mm)	
Maximum Width	5.1 in. (131 mm)		7 in. (178 mm)	
Type	Die Cut Labels, Fan-Fold, Tag Stock or Continuous			
Caliper	.010 in. (.25 mm)			
Roll OD (max)	8.6 in. (218 mm), Face-In Wind			
Core ID (min)	1.5 in. (38 mm)			
Core ID (Recommended)	3 in. (76 mm)			
SENSING				
Transmissive See-thru	Movable			
Reflective Eye-Mark	Movable		Fixed	
Continuous Form	Sensor not used			
RIBBON				
Maximum Width	4.4 in. (111 mm)		6.75 in. (172 mm)	
Length	1475 ft. (450 m)		1345 ft (410 m)	
Thickness	4.5 micron, Face-In Wind			

All specifications subject to change without notice.

SPECIFICATION	CL408e	CL412e	CL608e	CL612e
CONTROLS AND SIGNALS				
On-Line LED	Status = Green ⁽¹⁾		Green	
Power LED	None		Green	
Media Out LED	Status = Red ⁽¹⁾		Red	
Ribbon Out LED	Status = Red ⁽¹⁾		Red	
Error LED	Status = Red ⁽¹⁾		Red	
LCD Panel	2 Line x 16 Character			
On/Off-Line Switch	Front Panel			
Label Feed Switch	Front Panel			
Power On/Off Switch	Rear Panel			
POTENTIOMETER ADJUSTMENTS				
Print Darkness	Front Panel			
Pitch	Front Panel			
Offset	Front Panel			
Display	None		Front Panel	
INTERFACE MODULES				
Parallel	IEEE1284 Parallel			
Serial	RS232C (9600 to 57,600 bps) RS422/485 (9600 to 57,600 bps)			
Serial Protocol	Hardware Flow Control (Ready/Busy) Software Flow Control (X-On/X-Off) Bi-directional Status			
Universal Serial Bus	USB Version 1.1			
Ethernet	10/100BaseT			
Data Transmission	ASCII Format			
PROCESSING				
CPU	32 Bit RISC			
Flash ROM	2 MB			
SDRAM	16 MB			
Receive Buffer	2.95 MB			
Optional Flash ROM	4 MB			
Optional PCMCIA Memory	16 MB Flash or 4 MB SRAM			
(1) Single two color (Red, Green) LED.				

All specifications subject to change without notice.

CHARACTER FONTS

SPECIFICATION	CL408e	CL608e	CL412e	CL612e
MATRIX FONTS				
U Font	(5 dots W x 9 dots H)			
S Font	(8 dots W x 15 dots H)			
M Font	(13 dots W x 20 dots H)			
XU Font	(5 dots W x 9 dots H) Helvetica			
XS Font	(17 dots Wx 17 dots H) Univers Condensed Bold			
XM Font	(24 dots W x 24 dots H) Univers Condensed Bold			
OA Font	(15 dots W x 22 dots H) OCR-A	(22 dots W x 33 dots H) OCR A		
OB Font	20 dots W x 24 dots H) OCR-B	(30 dots W x 36 dots H) OCR B		
AUTO SMOOTHING FONTS				
WB	WB Font (18 dots W x 30 dots H)			
WL	WL Font (28 dot W x 52 dots H)			
XB	XB Font (48 dots W x 48 dots H) Univers Condensed Bold			
XL	XL Font (48 dot W x 48 dots H) Sans Serif			
VECTOR FONT				
	Proportional or Fixed Spacing Font Size 50 x 50 dots to 999 x 999 dots Helvetica, 10 Font Variations			
AGFA® RASTER FONTS				
A Font	CG Times, 2 to 99 pt			
B Font	CG Triumvirate, 2 to 99 pt			
DOWNLOADABLE FONTS				
	Bit Mapped TrueType Fonts with Utility Program			
CHARACTER CONTROL				
	Expansion up to 12X in either the X or Y coordinates Character Pitch control Line Space control Journal Print facility 0°, 90°, 180° and 270° Rotation			

All specifications subject to change without notice.

BAR CODES

SPECIFICATION	CL408e	CL608e	CL412e	CL612e
SYMBOLOLOGIES				
	Bookland (UPC/EAN Supplemental) EAN-8, EAN-13 CODABAR Code 39 Code 93 Code 128 Interleaved 2 of 5 Industrial 2 of 5 Matrix 2 of 5 MSI POSTNET UCC/EAN-128 UPC-A and UPC-E Data Matrix Maxicode PDF417 Micro PDF417 Truncated PDF417 QR Code			
Ratios	1:2, 1:3, 2:5 User definable bar widths			
Bar Height	4 to 600 dots, User programmable			
Rotation	0°, 90°, 180° and 270°			
OTHER FEATURES				
Sequential Numbering	Sequential numbering of both numerics and bar codes			
Custom Characters	RAM storage for special characters			
Graphics	Full dot addressable graphics, SATO Hex/Binary, .BMP or .PCX formats			
Form Overlay	Form overlay for high-speed editing of complex formats.			

All specifications subject to change without notice.

PHYSICAL

SPECIFICATION	CL408e	CL412e	CL608e	CL612e
DIMENSIONS				
Wide	10.7 in. (271 mm)		13.8 in. (352 mm)	
Deep	16.9 in. (430 mm)		16.9 in. (429 mm)	
High	12.6 in. (321 mm)		11.7 in. (298 mm)	
WEIGHT	28.7 lbs (13 Kg)		41.9 lbs (19 Kg)	
POWER REQUIREMENTS				
Voltage	110 V (±10 %) 220V (±10 %) 50/60 Hz (±1%)			
Power Consumption	50W Idle 130W Operating		50W Idle 210W Operating	
ENVIRONMENTAL				
Operating Temperature	41° to 104°F (5° to 40°C)			
Storage Temperature	-0° to 104°F (-20° to 40°C)			
Operating Humidity	15-85 % RH, non-condensing			
Storage Humidity	Max 90% RH, non-condensing			
Electrostatic Discharge	8KV			
REGULATORY APPROVALS				
Safety	UL, CSA			
RFI/EMI	FCC Class A			

All specifications subject to change without notice.

OPTIONAL ACCESSORIES

ACCESSORY	CL408	CL412	CL608	CL612
MEMORY EXPANSION	One slot for PCMCIA Memory Cards (up to 16 MB Flash or 4 MB SRAM) and/or 4MB internal Flash ROM. Can be used for Graphic File storage, print buffer expansion, format storage and downloaded TrueType fonts.			
CALENDAR	An internally mounted Date/Time clock that can be used to date/time stamp labels at the time of printing.			
LABEL CUTTER	Internal attachment allowing labels to be cut at specified intervals. Controlled through programming.			
LABEL DISPENSER	Internal attachment allowing labels to be peeled from backing for immediate (on demand) application. Internal backing take-up.		Internal attachment allowing labels to be peeled from backing for immediate (on demand) application. Backing take-up mounted externally to rear of printer.	
LABEL REWINDER	External option rewinds labels onto a roll after they are printed.			
PARALLEL INTERFACE	IEEE1284 Parallel Interface Module			
SERIAL INTERFACE	High Speed Serial RS232 Interface Module			
UNIVERSAL SERIAL I/F	USB Interface Module			
ETHERNET INTERFACE	10/100BaseT Interface Module			
COAX/TWINAX INTERFACE	Coax/Triax Interface Module. Coax I/F emulates an IBM 3287-2 printer with a standard Type A BNC connector. Twinax I/F emulates IBM 5224, 5225, 5226 or 4214 printers with auto-terminate/cable-thru capabilities.			

All specifications subject to change without notice.

Section 1. Printer Overview

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SECTION 2. INSTALLATION

INTRODUCTION

This section is provided to assist you in taking the CL Series Printer from the shipping container to the application environment. Where the physical differences between the printer models are significant (such as loading paper and ribbons), separate sections for each of the models are used for clarity.

The following information is provided in this section:

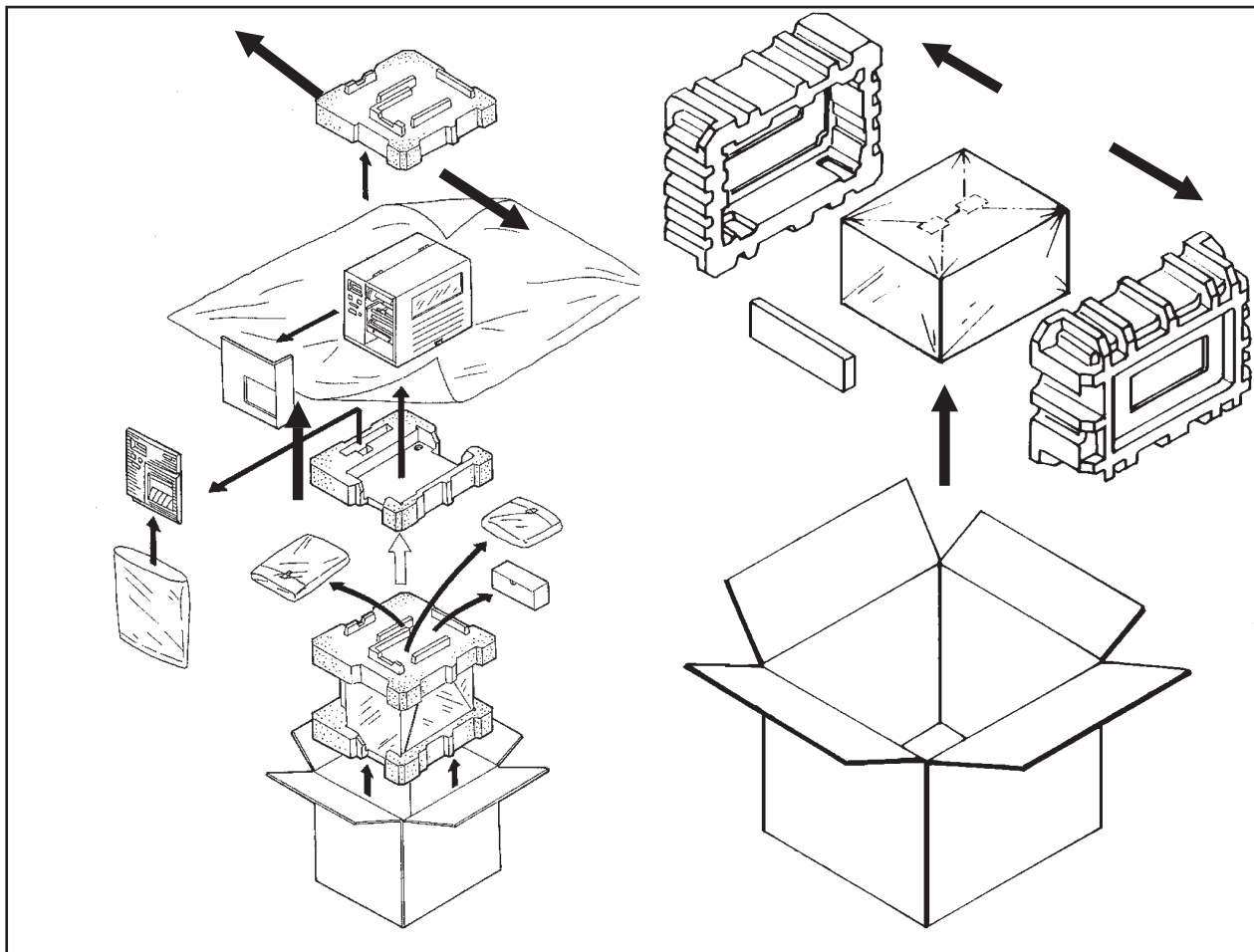
- Unpacking and Parts Identification
- Setting Up the Printer
- Loading Labels or Tags
- Loading the Ribbon
- Operator Panel

UNPACKING AND PARTS IDENTIFICATION

Consider the following when unpacking the printer:

- The box should stay right-side up.
- Lift the printer out of the box carefully.
- Remove the plastic covering from the printer.
- For the CL4XX printers, remove the Front Access Door from its protective bag and attach it to the printer.
- Remove the accessory items from their protective containers.
- If the printer has been stored in a cold environment, allow it to reach room temperature before powering it on.
- Set the printer on a solid, flat surface. Inspect the shipping container and printer for any signs of damage that may have occurred during shipping.

NOTE: The following illustrations are representative only. Your printer may not be packed exactly as shown here, but the unpacking steps are similar.

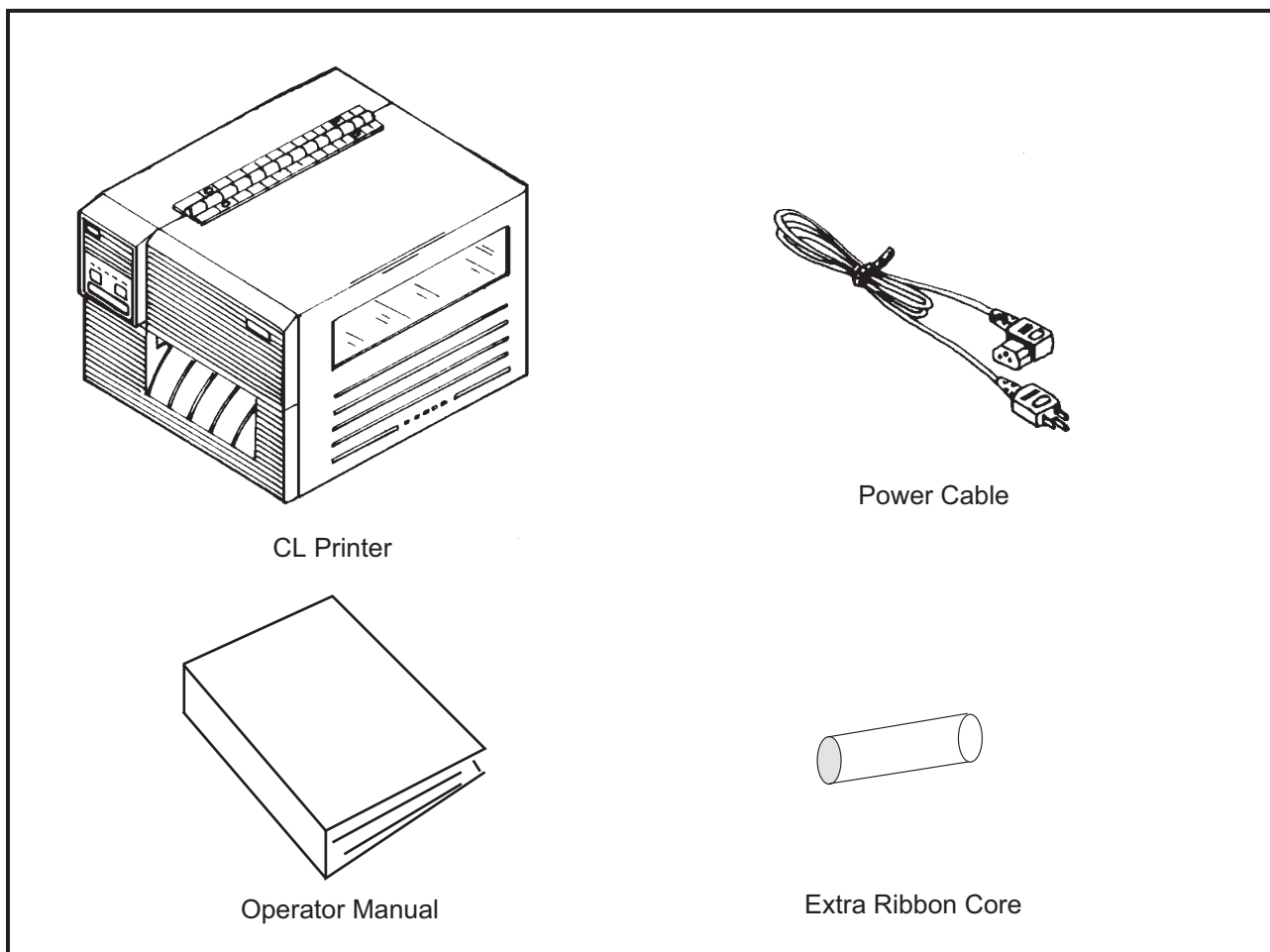


CL4XX Packaging

CL6XX Packaging

Verify that you have the following materials when unpacking:

- Printer
- Power Cord
- Extra Ribbon Core



SETTING UP THE PRINTER

Consider the following when setting up the printer:

- Locate a solid flat surface with adequate room to set the printer. Make sure there is enough room at the top and right-hand (facing the printer) side to provide clearance for the label access door to swing open.
- The location should be near the host computer or terminal. The maximum distance for RS232 cables is 35 feet and six feet for IEEE1284 Parallel cables. Cables can be purchased locally, and their configuration will depend upon the host system being used.
- For information on interfacing the printer to a host system, see *Section 6: Interface Specifications*.

LOADING LABELS OR TAGS

1. Open the **Side Access Door** by swinging it up and to the left. The hinge system automatically dampens the movement to prevent the door from inadvertently falling and possibly causing injury to the operator.
2. Open the **Print Head Assembly** by pushing the **Head Latch** toward the rear of the printer. The **Print Head Assembly** is spring-loaded and will automatically open as soon as the **Head Latch** is disengaged.
3. Push the **Label Supply Guide** to the outside of the printer to give the maximum label width.
4. Release the **Label Roll Support** by pulling outward at the top and swing it down and out of the way.
5. If using roll labels (or tags), load the roll onto the **Label Supply Spindle** so that the printing side of the labels faces upwards as it unwinds from the roll. The labels should be wound face-in. Push the roll all the way to the inside of the printer and push the **Label Supply Guide** snugly against the outside of the label roll.
6. If using fanfold labels (or tags) set them on a flat surface behind the printer. Pass the labels (printing side up) through the slot and under the **Label Supply Spindle**.
7. Open the **Label Hold-Down** by squeezing the green tab and the release tab together. The Label Hold-down is spring loaded and will open automatically when the latch is disengaged. Feed the labels under the **Label Guide**, under the **Label Hold-Down**, through the **Print Head Assembly** and out the front of the printer.
8. Inspect the label routing and verify that the path matches that illustrated in the Label Loading

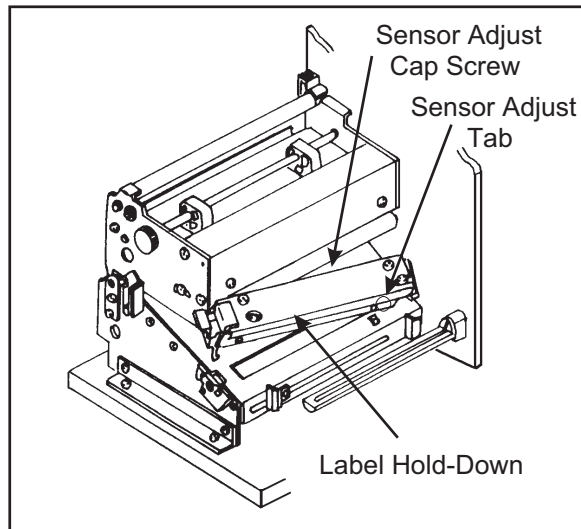
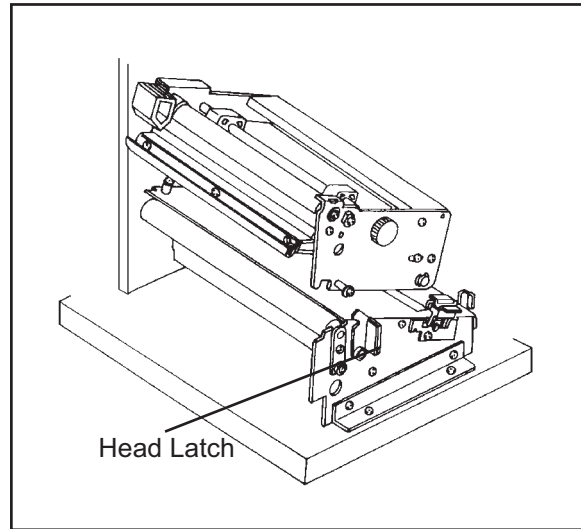


diagram. Set the **Adjustable Label Guide** to keep the labels against the inside of the printer.

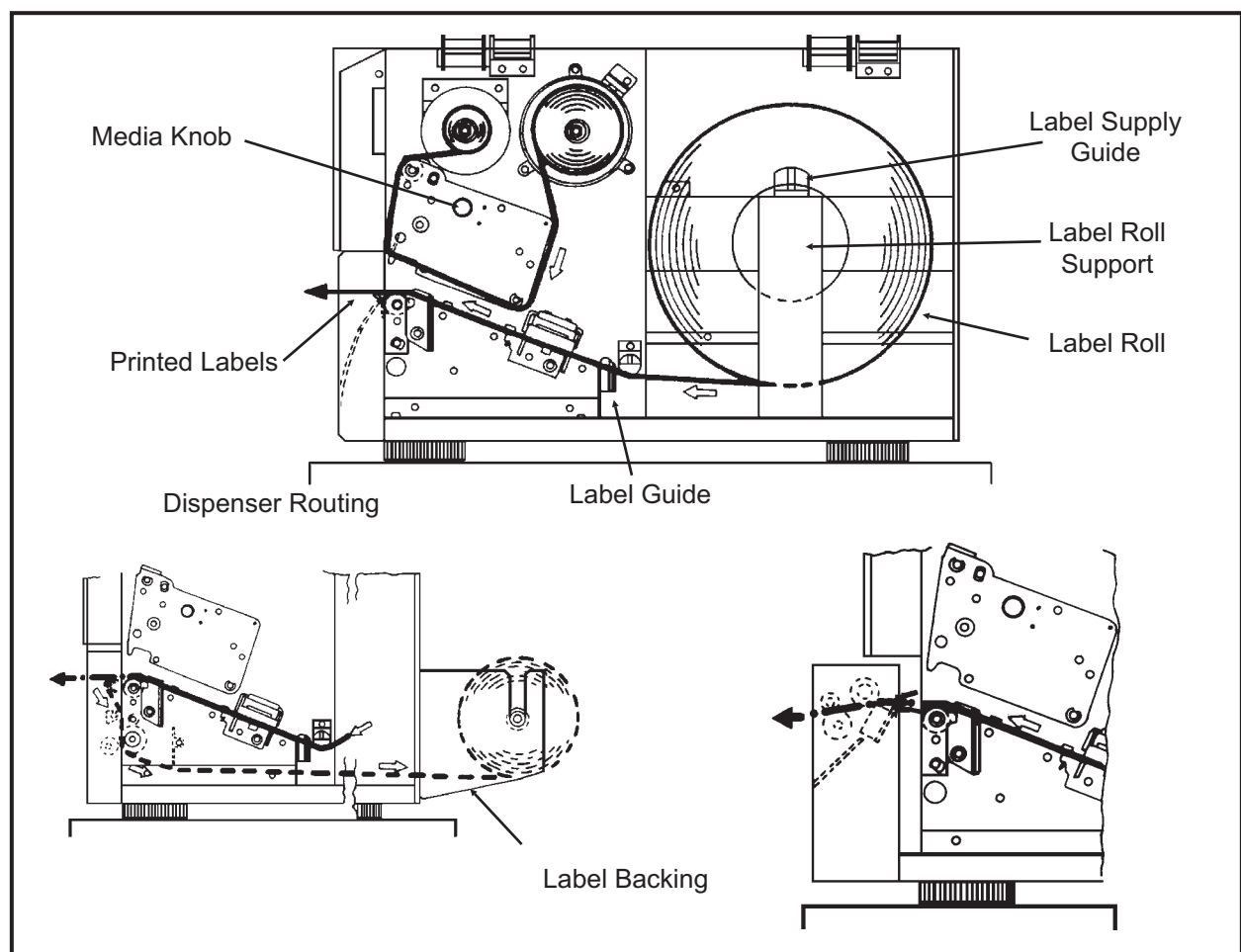
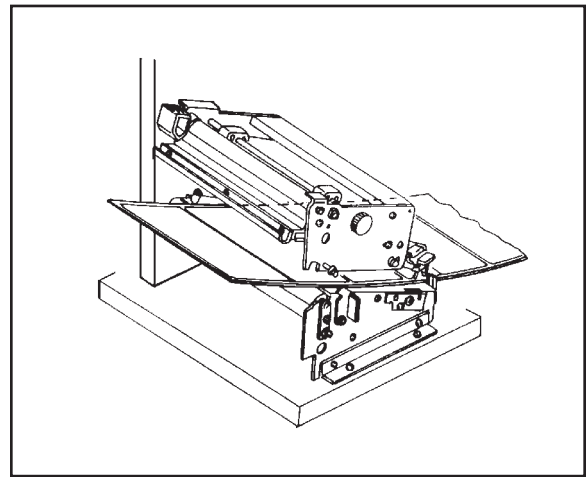
9. Close the **Label Hold-Down** by pushing downward on the green tab until it latches closed.

NOTE: If the Label Dispenser option has been purchased, see Appendix A, for proper label routing instructions.

10. Adjust the **Label Sensor Assembly** to the correct position by loosening the **Sensor Adjust Cap Screw** located on the front side of the **Label Hold-Down** and moving the **Sensor Adjust Tab** to the correct position. After it is correctly positioned, retighten the **Sensor Adjust Cap Screw**.

11. If the ribbon is already loaded, close the **Print Head Assembly** by pushing downward on the green tab until it latches closed.

12. If the ribbon is not loaded, see the following description for loading instructions.



Section 2. Installation

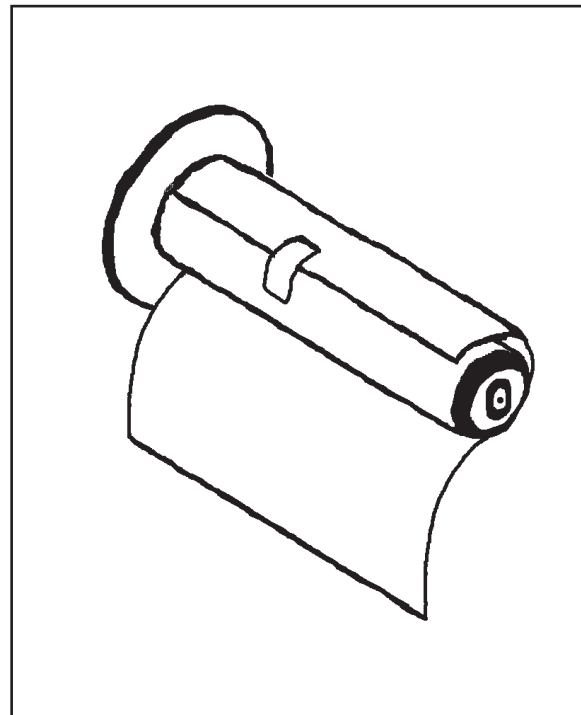
- Adjust the **Media Knob** based on the media you have loaded. For media up to 2.3 inches wide, use the “1” position, for media between 2.3 and 4.6 inches wide, use the “2” position. For media wider than 4.6 inches, use the “3” position. If you use media narrower than 7 inches, using the wrong setting can void the print head warranty due to the excessive pressure.

Caution: Using media narrower than the maximum print width may cause excess head wear due to the label edge.

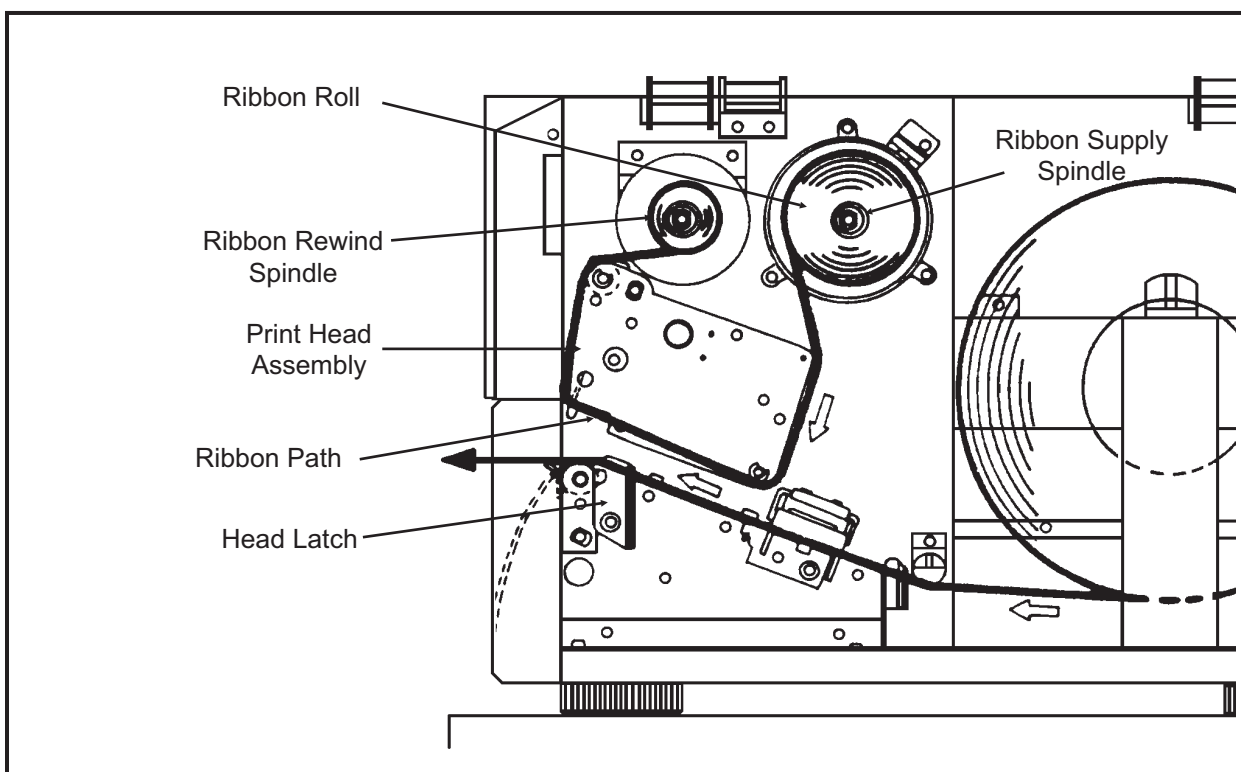
LOADING THE RIBBON

- Open the **Side Access Door** by swinging it up and to the left. The hinge system automatically dampens the movement to prevent the door from inadvertently falling and possibly causing injury to the operator.
- Open the **Print Head Assembly** by pushing the **Head Latch** toward the rear of the printer. The **Print Head Assembly** is spring-loaded and will automatically open as soon as the **Head Latch** is disengaged.
- Locate the **Extra Ribbon Core** supplied with the printer. Place the core on the **Ribbon Rewind Spindle**, pushing it all the way to the inside of the spindle.
Note that the new empty core of each subsequent roll becomes the next rewind core.
- Load the ribbon onto the **Ribbon Supply Spindle**, also pushing it all the way to the inside of the spindle. The dull side of the ribbon should be facing down as it travels through the **Print Head Assembly**.

- Feed the leader portion of the ribbon through the **Print Head Assembly** and up to the **Ribbon Rewind Spindle** following the routing shown in the diagram.
- Load the ribbon behind and over the top of the **Ribbon Rewind Spindle** and tape it to the **Extra Ribbon Core**. Make sure it matches the ribbon path shown in the diagram.
- Manually turn the **Rewind Spindle** to wrap the ribbon onto the core one to two turns to secure it.
- If the labels or tags are already loaded, close the **Print Head Assembly** by pushing downward on the green tab until it latches closed.



NOTE: Run a test print to ensure that the labels and ribbons were loaded correctly. See the “Test Print” section on page 3-22 for instructions on how to run test prints.



CAUTION: If your labels are less than the full width of the print head, the outside edge will eventually wear out a small portion of the print head, resulting in an area that will not print. Special care must be taken if you plan to use multiple widths of labels, since the damaged portion of the print head caused from edge wear on a more narrow label may affect the printing on a wider label. We suggest you plan your print formats carefully to avoid using the area of possible damage on the print head when using a wider label. The small area of damage will have no effect on printing with the undamaged part of the print head.

Damage from a label edge is physical damage and is unavoidable. It is not covered by warranty. It is possible to delay such damage by always ensuring that the ribbon used is wider than the label stock. This will help to protect the print head from label edge damage.

LOADING LABELS, TAGS AND RIBBON

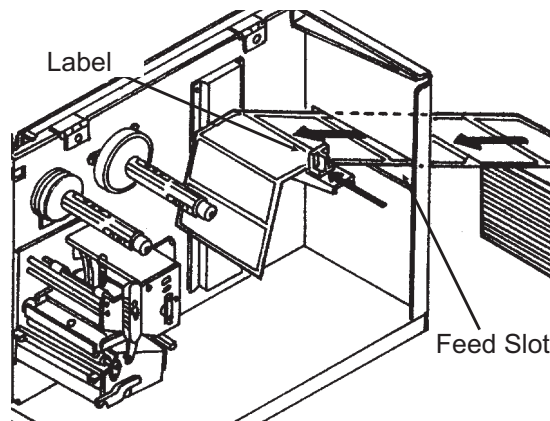
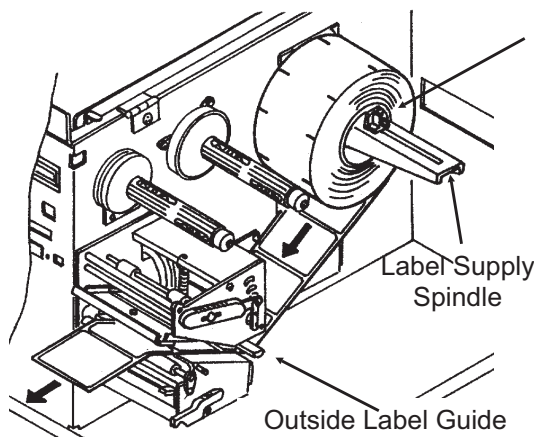
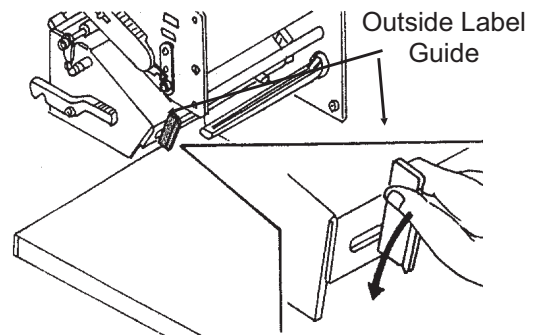
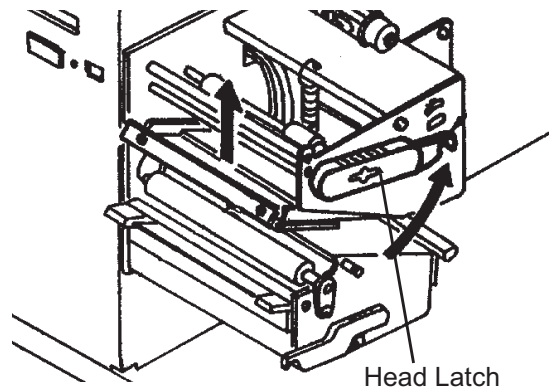
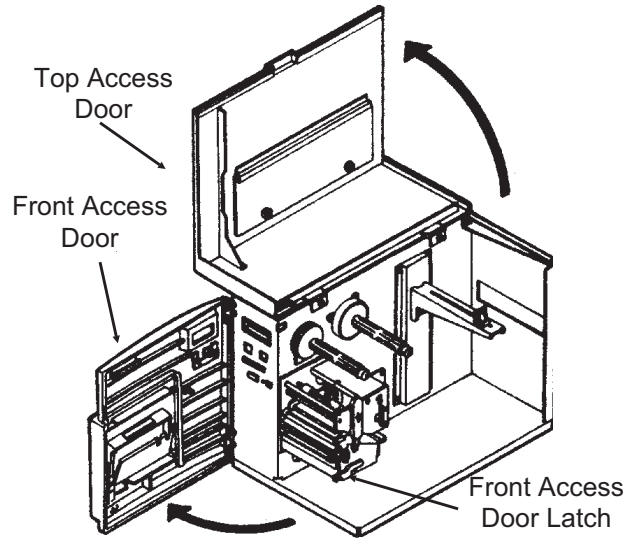
CL408e and CL412e

LOADING LABELS AND TAGS

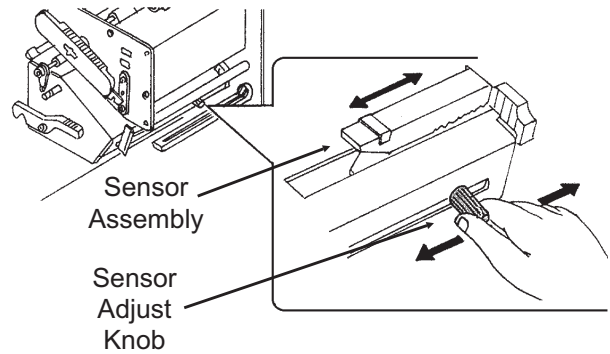
1. Open the **Top Access Door** by swinging it up and to the left. Open the **Front Access Door** by pushing down on the green Front Cover Latch and swinging the door forward and to the left. This gives access to the print mechanism on three sides

Note: The Top Access Door must be open before the Front Access Door can be opened.

2. Open the **Print Head Assembly** by rotating the green **Head Latch** counter clockwise. The head is spring loaded and will automatically raise to the opened position
3. Push the **Label Supply Guide** to the outside of the printer to give the maximum label width.
4. Clear access is provided to the label path by pulling the top of the **Outside Label Guide** down.
5. If using roll labels (or tags), load the roll onto the **Label Supply Spindle** so that the printing side of the labels faces upwards as it unwinds from the roll. Push the roll all the way to the inside of the printer, raise the **Label Supply Guide** and adjust its position until it fits snugly against the outside of the label roll.

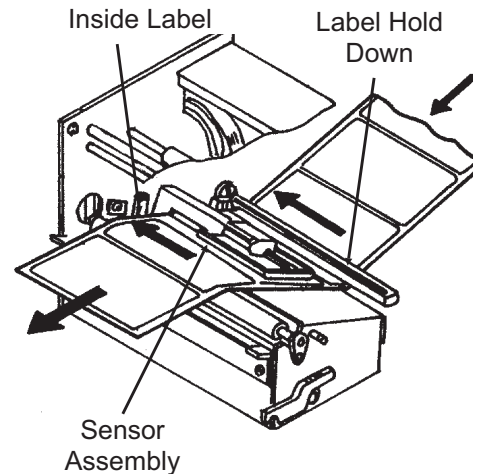


6. If using fanfold labels (or tags) set them on a flat surface behind the printer and remove the cover from the **Feed Slot** on the rear panel. Pass the labels (printing side up) through the slot and over the **Label Supply Spindle**.



7. Route the labels under the **Label Hold-Down**, through the **Label Sensor Assembly**, under the Print Head and out the front of the print mechanism. Push the labels all the way to the inside of the printer until they touch the **Inside Label Guide**.

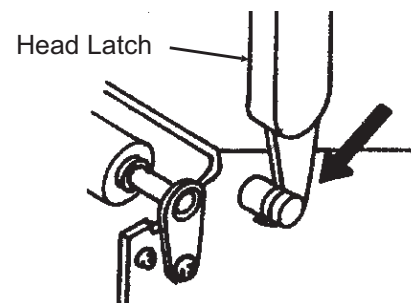
Note: Make sure the labels are routed through the Label Sensor Assembly. If they are not, the printer will react as if there are no labels loaded and will refuse to print.



8. Adjust the **Label Sensor Assembly** loosening the green **Sensor Adjust** knob located on the bottom side of the **Label Transport Assembly** and moving the assembly to the correct position. After it is correctly positioned, retighten the green **Sensor Adjust** knob.

9. Raise the **Outside Label Guide** to the closed position and push the guide inward until it barely contacts the outside edge of the labels.

10. If Ribbon is already loaded in the printer, close the **Print Head** and latch it in the down position.



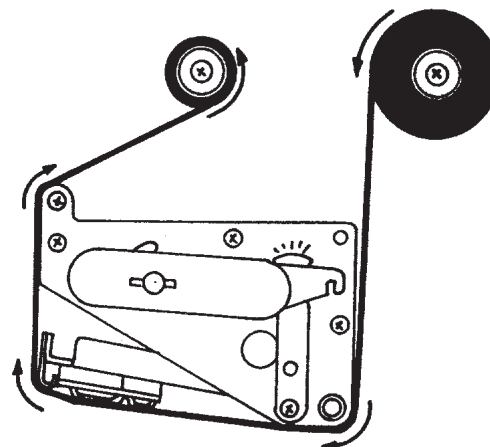
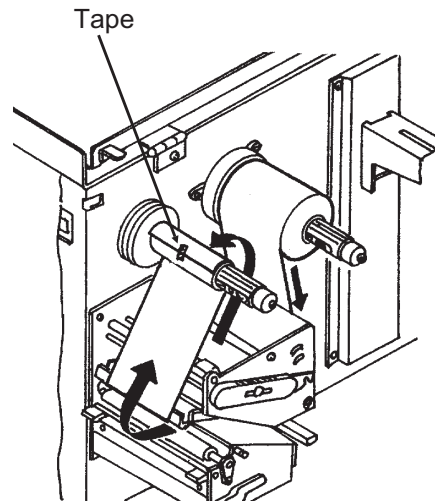
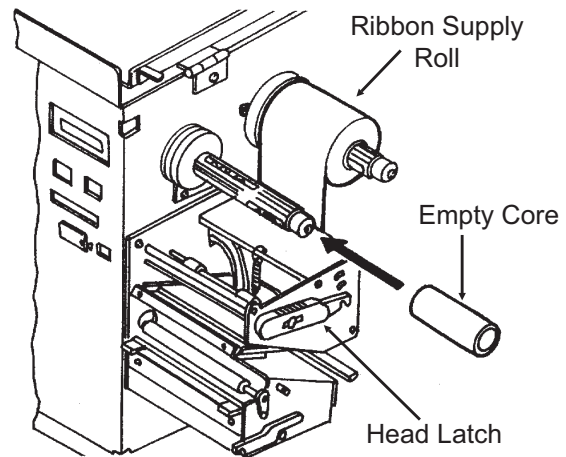
11. Inspect the label routing and verify that the path matches that illustrated in the Label Loading diagram on the inside of the **Top Access Door**.

12. Carefully feed several labels through the opening in the **Front Access Door** and close it. After the **Front Access Door** is closed, the **Top Access Door** may be closed. These covers have interlock switches and the printer will not operate if either is open.

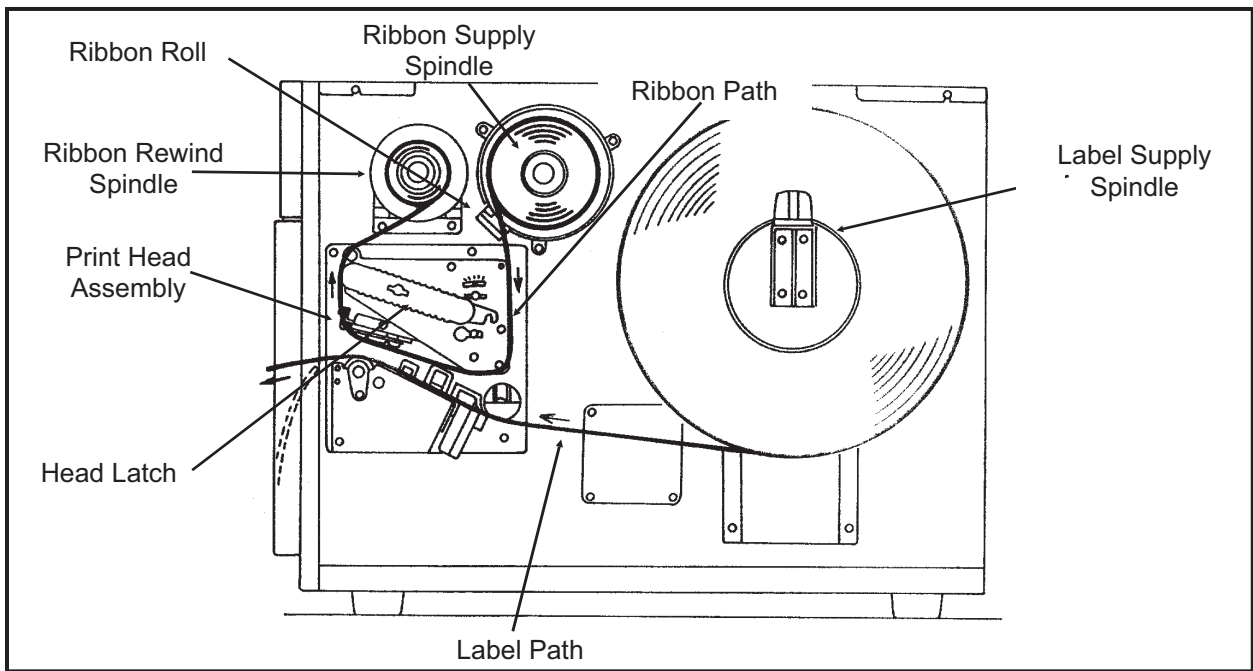
NOTE: If the Label Dispense Option has been purchased, see Appendix A, Optional Accessories for instructions on how to route the label backing. For information on how to enable this option, see Section 3: Printer Configuration.

LOADING THE RIBBON

1. Open the **Top** and **Front Access Doors**.
2. Open the **Print Head Assembly** by rotating the green the **Head Latch** counter clockwise. The print head is spring loaded and will raise to the open position as soon as the latch is released.
3. Locate the **Extra Ribbon Core** supplied with the printer. Place the core on the **Ribbon Rewind Spindle**, pushing it all the way to the inside of the spindle. *Note that the new empty core of each subsequent roll becomes the next rewind core.*
4. Load the ribbon onto the **Ribbon Supply Spindle**, pushing it all the way to the inside of the spindle. The dull side of the ribbon should be facing down as it travels through the **Print Head Assembly**.
5. Feed the leader portion of the ribbon through the **Print Head Assembly** and up to the **Ribbon Rewind Spindle** following the routing shown in the diagram.
6. Load the ribbon behind and over the top of the **Ribbon Rewind Spindle** and tape it to the **Extra Ribbon Core**. Make sure it matches the ribbon path shown in the diagram.
7. Manually turn the **Ribbon Rewind Spindle** to wrap the ribbon onto the core one to two turns to secure it.
8. If the labels or tags are already loaded, close the **Print Head Assembly** by rotating the green **Head Latch** clockwise until it latches closed and close the **Front and Top Access Doors**.



NOTE: Run a test print to ensure that the labels and ribbons were loaded correctly. See the "Test Print" section on page 3-22 for instructions on how to run test prints.



CAUTION: If your labels are less than the full width of the print head, the outside edge will eventually wear out a small portion of the print head, resulting in an area that will not print. Special care must be taken if you plan to use multiple widths of labels, since the damaged portion of the print head caused from edge wear on a more narrow label may affect the printing on a wider label. We suggest you plan your print formats carefully to avoid using the area of possible damage on the print head when using a wider label. The small area of damage will have no effect on printing with the undamaged part of the print head.

Damage from a label edge is physical damage and is unavoidable. It is not covered by warranty. It is possible to delay such damage by always ensuring that the ribbon used is wider than the label stock. This will help to protect the print head from label edge damage.

LABEL SENSOR ADJUSTMENTS

CL608e and CL612e

The Gap (transmissive) sensor on the CL608e and CL612e can be adjusted over a limited range. It is located in the **Label Hold-Down Assembly** and can be adjusted by loosening the **Sensor Adjust Cap Screw** on the front of the **Label Hold-Down** and sliding the **Sensor Adjust Tab** to the desired position. The Gap sensor can be adjusted from a minimum of 1.0 in. (25mm) to a maximum of 3.5 in. (90mm). The Eye Mark sensor is fixed at 0.33 in. (9mm).

LABEL SENSOR ADJUSTMENTS

CL408e and CL412e

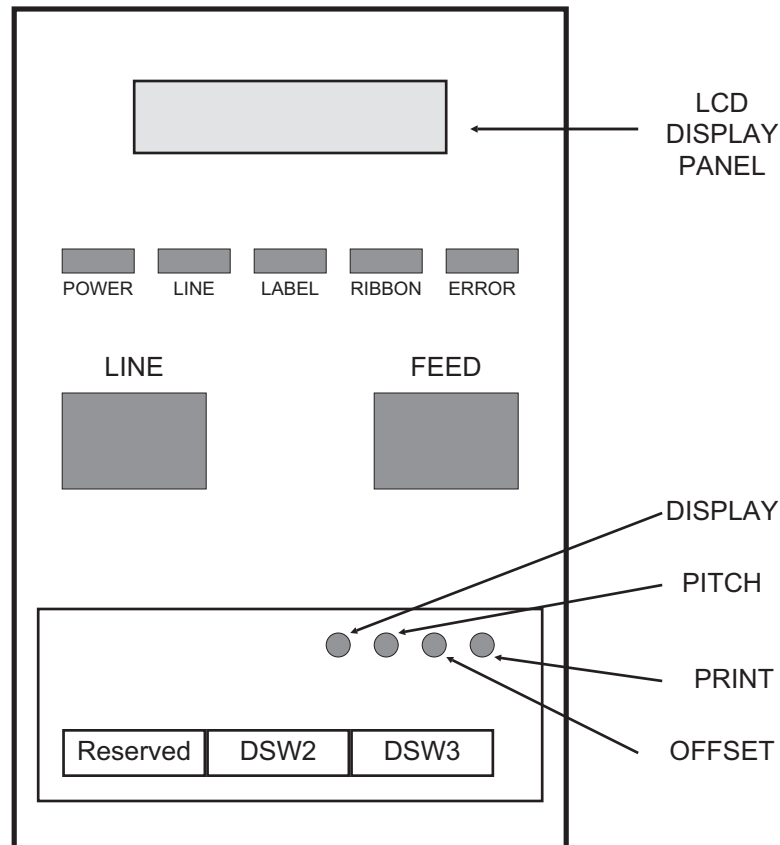
Both the Eye-Mark (reflective) and Gap (transmissive) sensors on the CL408e and CL412e can be adjusted over a limited range. They are both located in the **Label Sensor Unit**. The assembly can be adjusted by loosening the green **Sensor Adjust** knob located underneath the **Label Transport Assembly** and sliding the **Label Sensor Unit** to the desired position. The Gap sensor can be adjusted from a

Section 2. Installation

minimum of 0.67 in. (17mm) to a maximum of 2.5 in. (64 mm), and the Eye-Mark from a minimum of 0.25 in. (6mm) to a maximum of 2.1 in. (53mm).

OPERATOR PANEL

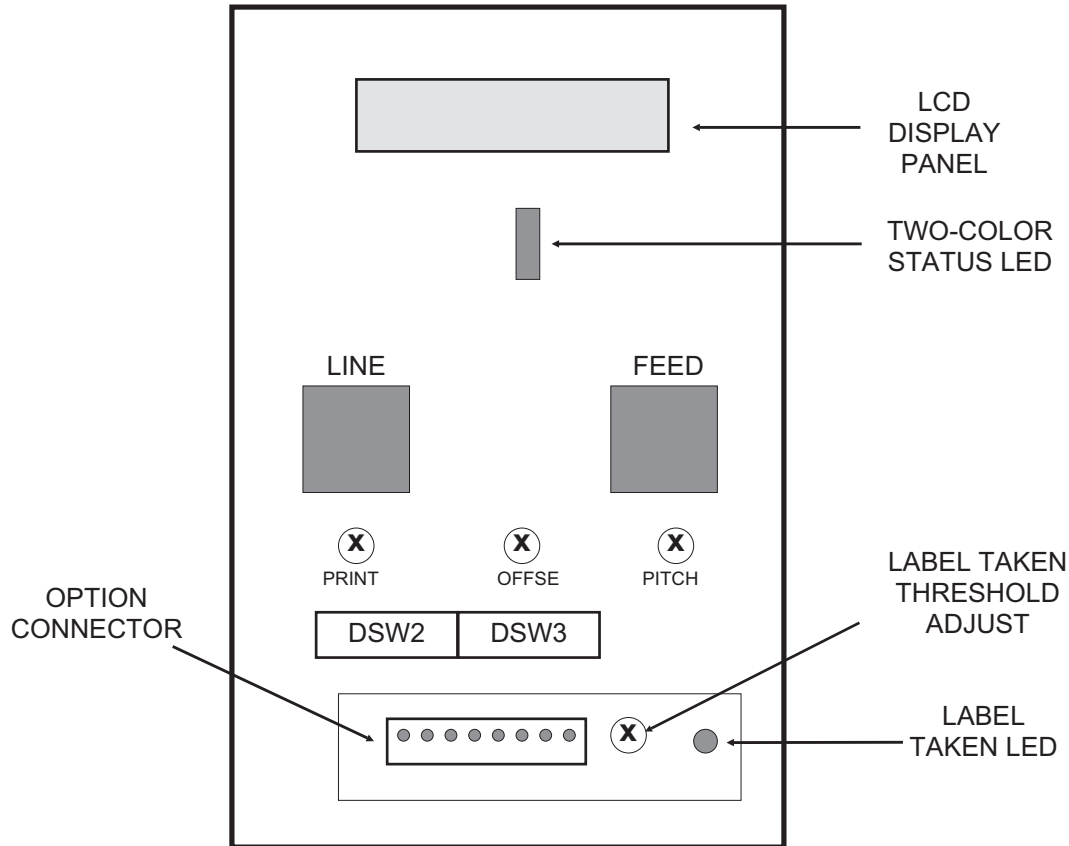
CL608e and CL612e



The **CL608e/CL612e Operator Panel** consists of five LED indicators, two momentary contact switches, three DIP switches, four adjustment potentiometers and one LCD Display. All of these are accessible from the front of the printer. They are used to set the printer operating parameters and to indicate the status of the printer to the operator. After you power on the printer, familiarize yourself with the keys and indicators as it will help you understand the configuration process.

- PRINT:** Potentiometer to adjust print darkness (fine tuning).
- OFFSET:** Potentiometer to adjust amount of back/forward feed for dispenser/cutter/tear-off bar position (+/-3.75 mm)
- PITCH:** Potentiometer to adjust home position of the label (+/- 3.75 mm). Affects stop position of label feed, print position and dispense position.
- DISPLAY:** Potentiometer to adjust the contrast of the LCD.
- POWER:** LED, illuminated when the power is on.

LABEL:	LED, illuminated when label supply is out.
RIBBON:	LED, illuminated when ribbon motion sensor does not detect any ribbon motion.
ERROR:	LED, illuminated when there is a system fault such as an open print head.
ONLINE:	LED, illuminated when printer is ready to receive data. It is turned on and off by toggling the LINE key. This indicator will blink while the printer is receiving data.
LINE:	Momentary switch. Pressing this key toggles the printer between the on-line and off-line mode. When the printer is on-line, it is ready to receive data from the host. This key acts as a pause during a print job by taking the printer off-line. It can also be used as a <i>Pause</i> function key to stop label during the printing process.
FEED:	Momentary switch. Pressing this key feeds one blank label through the printer when it is off-line. When the printer is on-line, another copy of the last label will be printed (can be disabled via the LCD panel).
DSW2-3:	Located behind the Front Access Door. DIP switch array to set operational parameters of the printer. DSW1 is used to set the RS232 parameters and is located on the RS232 interface board.
LCD:	2 Line x 16 Character LCD display. Used for setting operational parameters of the printer.



Note: DSW1 (RS232 Parameter Select) is located on the RS232 Interface Board.

The **CL408e/CL412e Operator Panel** consists of one two-color (red and green) LED indicator, two momentary contact switches, two DIP switches (a third is located on the RS232 interface card), four adjustment potentiometers and one LCD Display. All of these are accessible from the front of the printer, however some are not accessible unless the front cover is open. They are used to set the printer operating parameters and to indicate the status of the printer to the operator. After you power on the printer, familiarize yourself with the keys and indicators as it will help you understand the configuration process.

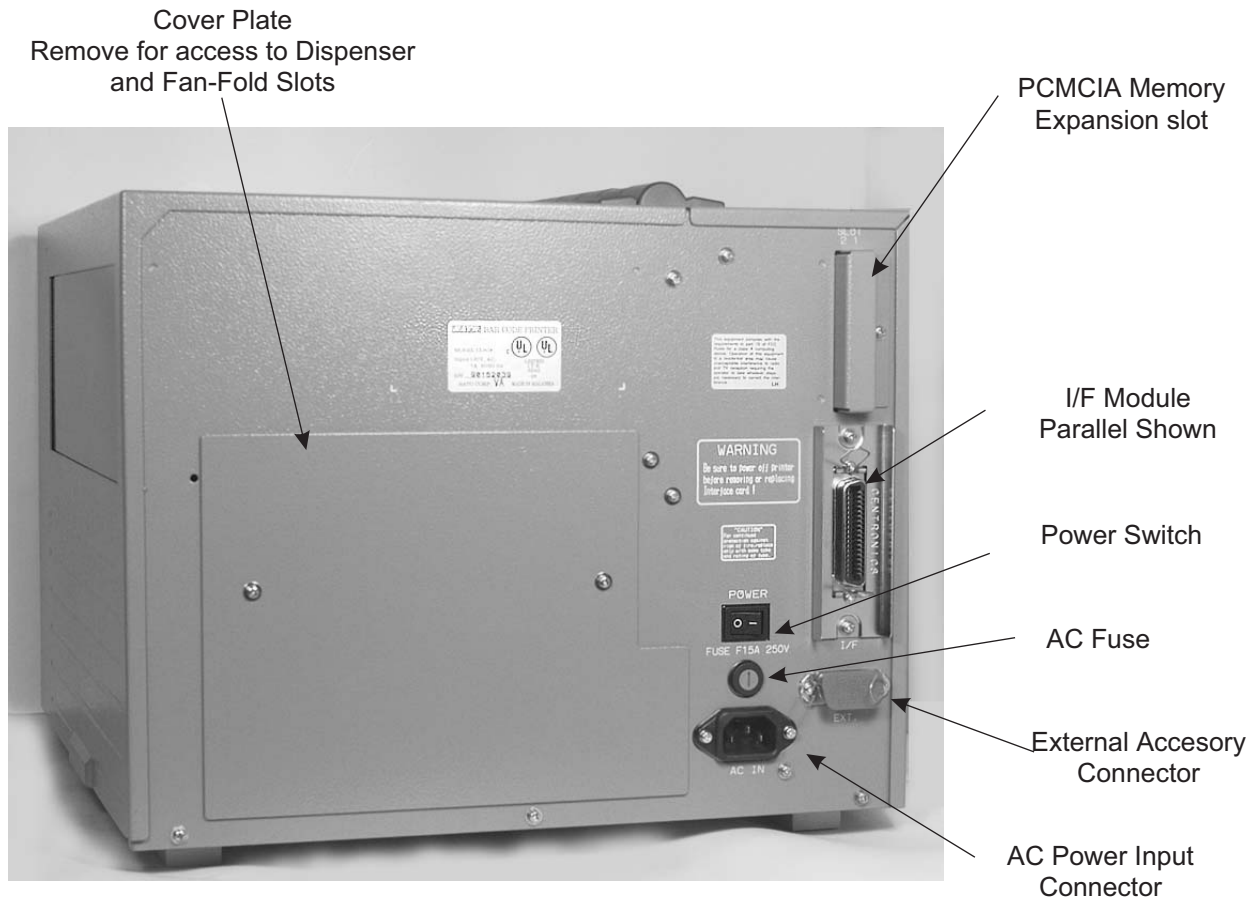
- PRINT:** Located behind the Front Access Door. Potentiometer to adjust print darkness (fine tuning).
- OFFSET:** Located behind the Front Access Door. Potentiometer to adjust amount of back/forward feed for dispenser/cutter/tear-off bar position (+/- 3.75 mm)
- PITCH:** Located behind the Front Access Door. Potentiometer to adjust home position of the label (+/- 3.75 mm). Affects stop position of label feed, print position and dispense position.

STATUS:	Two-color (Red, Green) LED that indicates the following status conditions: Green - Illuminated when printer is ready to receive data. It is turned on and off by toggling the LINE key. Red - Illuminated when there is a system fault such as an open print head.
LINE:	Momentary switch. Pressing this key toggles the printer between the on-line and off-line mode. When the printer is on-line, it is ready to receive data from the host. This key acts as a pause during a print job by taking the printer off-line. It can also be used as a Pause function key to stop label during the printing process.
FEED:	Momentary switch. Pressing this key feeds one blank label through the printer when it is off-line. When the printer is on-line, another copy of the last label will be printed (can be disabled via the LCD panel).
DSW2-3:	Located behind the Front Access Door. DIP switch array to set operational parameters of the printer. DSW1 is used to set the RS232 parameters and is located on the RS232 interface board.
LCD:	2 Line x 16 Character LCD display. Used for setting operational parameters of the printer.
LABEL TAKEN THRESHOLD:	Located behind the Front Access Door. This potentiometer is used to adjust the sensing level of the Label Taken Sensor. Active only when the Label Dispense option is installed.
OPTION CONNECTOR:	Located behind the Front Access Door. This connector is used for the cutter and dispenser optional accessories.
LABEL TAKEN:	Located behind the Front Access Door. This LED is illuminated when a label is not present in the Label Taken Sensor. If it is not illuminated, a label has been detected in the sensor and printing will be inhibited until it is removed. This LED is active only when the Label Dispense option is installed. It is used to adjust the Label Taken Sensor threshold.

REAR PANEL

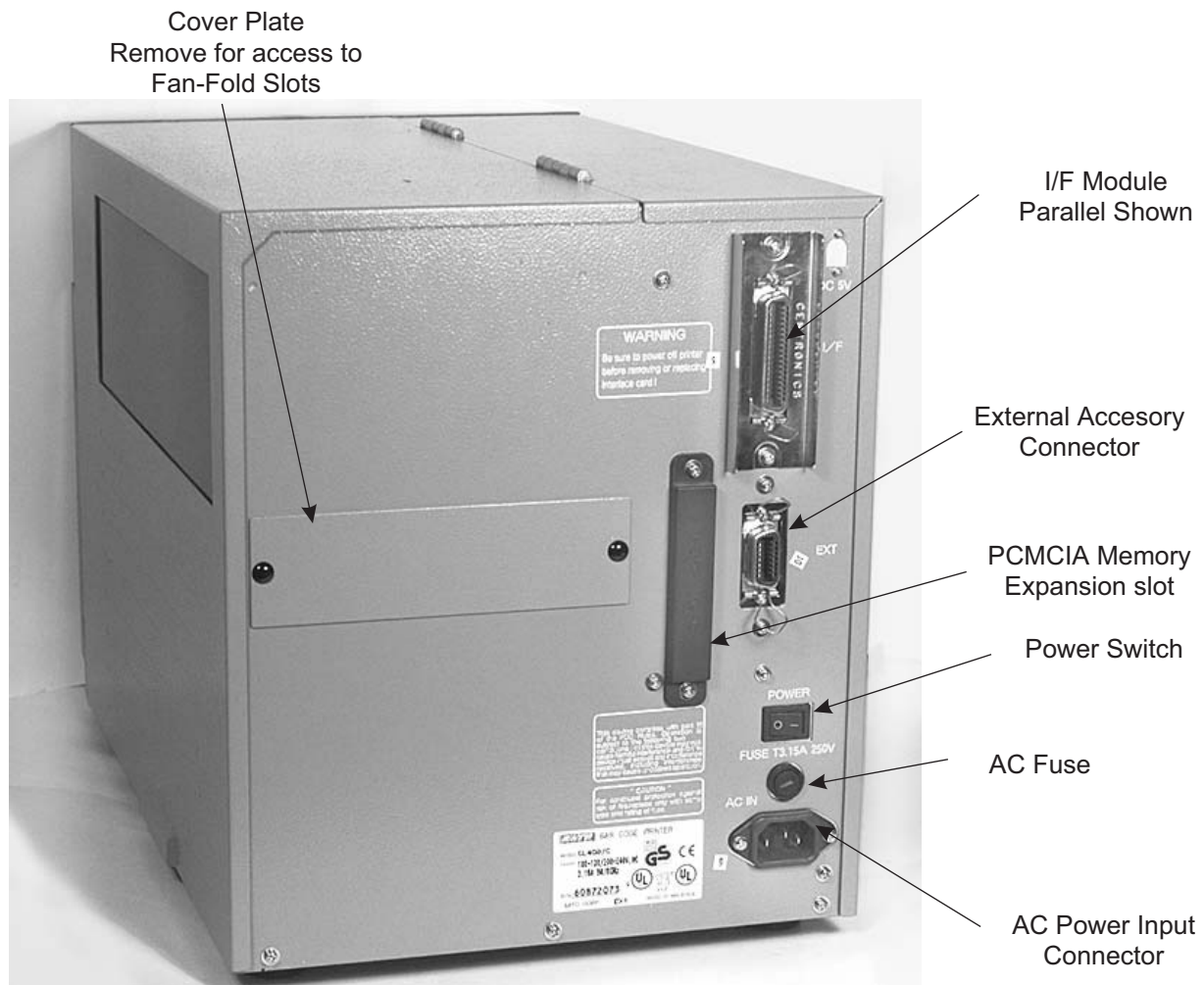
CL608e and CL612e

- Power On/Off Switch:** Turns power On or Off.
- AC Input:** Input 115V 50/60 Hz connector. Use the cable provided.
- AC Fuse:** Input power protection. Type 3A/250V.
- Interface Slot:** Slot to plug in an interface adapter. An adapter must be connected before the printer is operational. The adapter types available are:
 - RS232C Serial I/F Module, DB-25P.
 - IEEE1284 Parallel I/F Module, AMP 57-40360
 - Universal Serial Bus I/F Module
 - Ethernet 10/100BaseT I/F Module
- Memory Card Slot:** Two connectors for optional PCMCIA Memory Cards.
- EXT:** External signal connector, AMP 57-60140.



REAR PANEL**CL408e and CL412e**

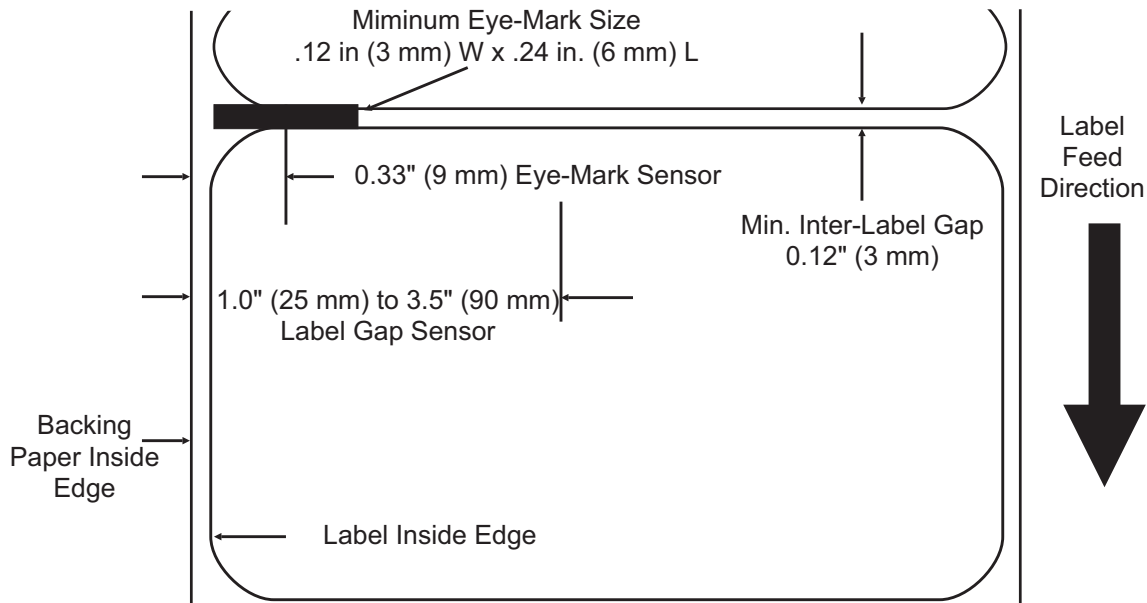
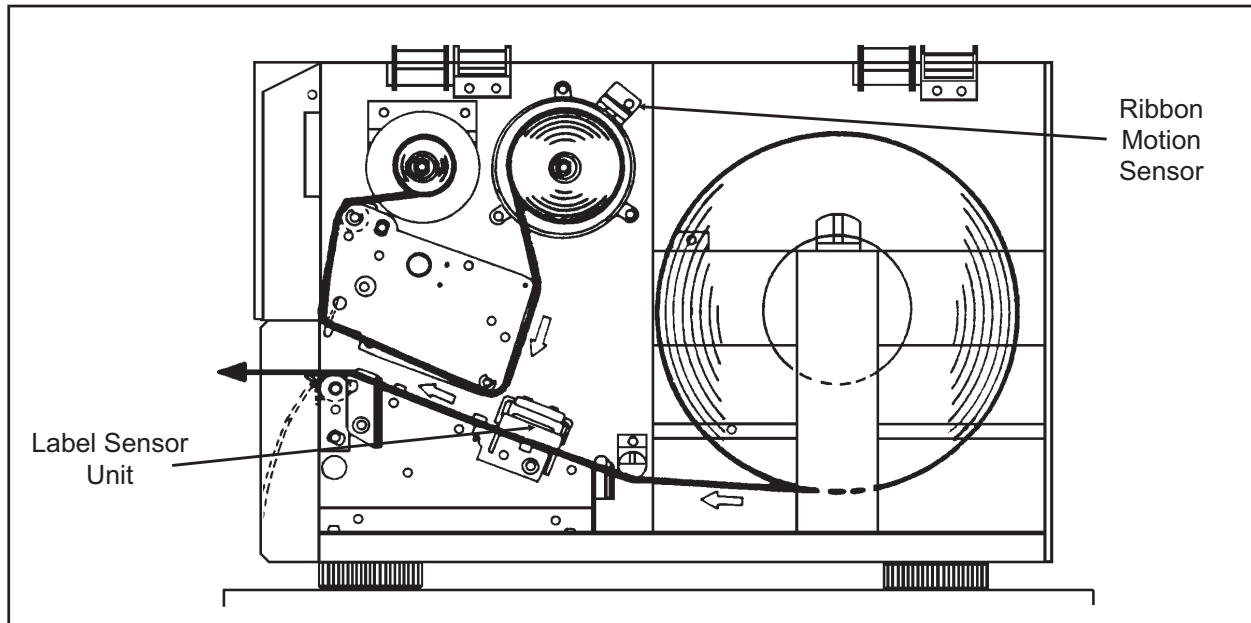
Power:	Switch to turn power On or Off.
AC Input:	Input 115V 50/60 Hz connector. Use the cable provided.
AC Fuse:	Input power protection. Type 3A/250V.
Interface Slot:	Slot to plug in an interface adapter. An adapter must be connected before the printer is operational. The adapter types available are: RS232C Serial I/F Module, DB-25P. IEEE1284 Parallel I/F Module, AMP 57-40360 Universal Serial Bus I/F Module Ethernet 10/100BaseT I/F Module
Memory Card Slot:	Two slots for optional PCMCIA Memory Cards.
EXT:	External signal connector for Accessories, AMP 57-60140.



SWITCHES AND SENSORS

CL608e and CL612e

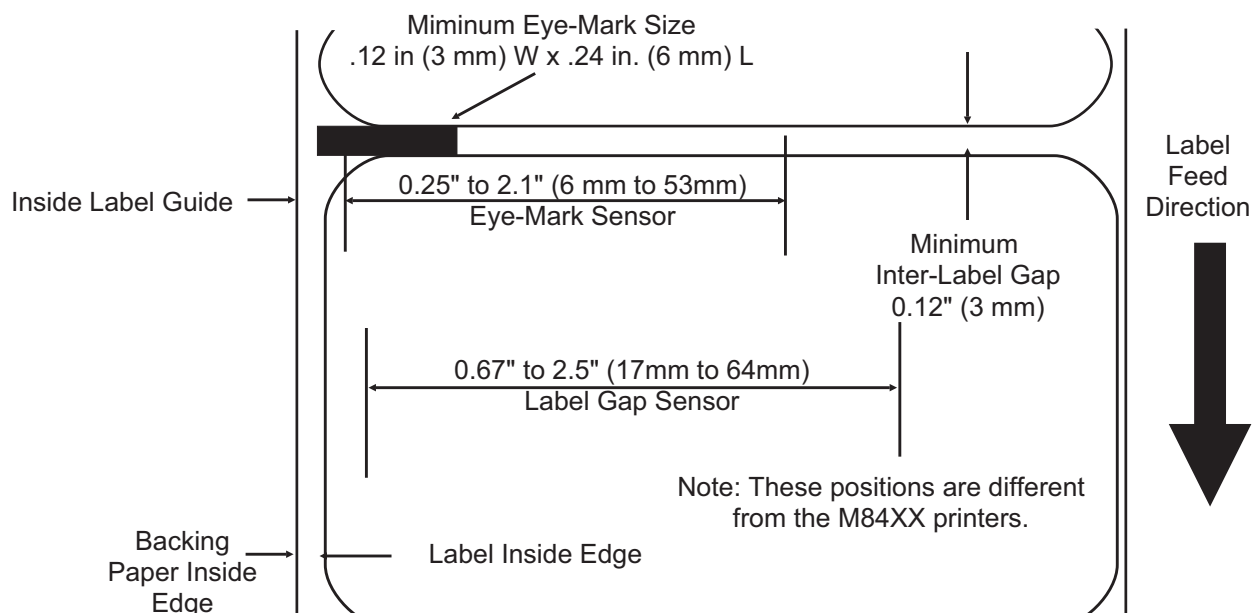
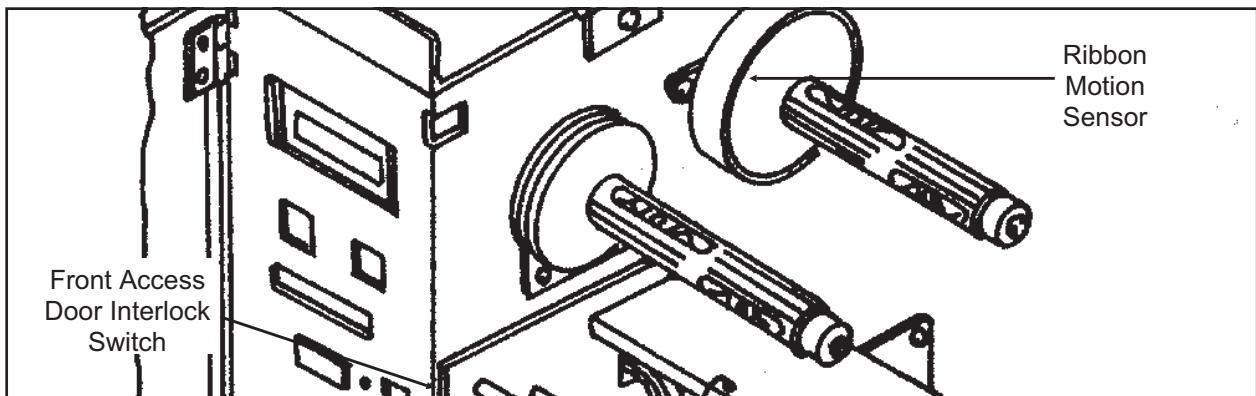
- Ribbon End Sensor:** This sensor is a motion detector that signals the printer when the ribbon supply is turning.
- Head Open Switch:** When the print head is opened, this switch is activated and the printer will stop printing.
- Label Sensor Unit:** This sensor unit contains two types of sensors, one for label gap and one for Eye-Mark sensing.



CL608 and CL612 Label Sensor Positioning

SWITCHES AND SENSORS**CL408e and CL412e**

Ribbon End Sensor:	This sensor is a motion detector that signals the printer when the ribbon supply is turning.
Head Open Switch:	When the print head is opened, this switch is activated and the printer will stop printing.
Label Sensor Unit:	This sensor unit contains two types of sensors, one for label gap and one for Eye-Mark sensing. The sensors are adjustable over a limited range.
Front Access Door Interlock:	This switch prevents printer operation when the Front Access Door is open. The Top Access Door must be open before the Front Access Door can be opened or closed.

**CL408 and CL412 Label Sensor Positioning**

Section 2. Installation

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SECTION 3. CONFIGURATION

PRINTER DIP SWITCH CONFIGURATION

DIP Switch Panels

There are two DIP switches (DSW2 and DSW3) located inside the cover. These switches can be used to set:

- Thermal transfer or direct thermal mode
- Label sensor enable/disable
- Head check mode
- Hex dump mode
- Single Job or Multi-Job Receive buffer
- Operation mode

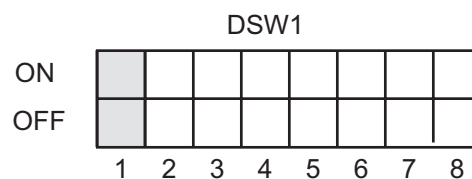
In addition, a third DIP switch is located on the RS232 Serial Adapter module and is used to set the RS232C transmit/receive parameters

Each switch is an eight section toggle switch. The ON position is always to the top. To set the switches, first power the unit Off, then position the DIP switches. Finally, after placing the switches in the desired positions, power the printer back on. The switch settings are read by the printer electronics during the power up sequence. They will not become effective until the power is cycled.

RS232 Transmit/Receive Setting (located on RS232 I/F Module)

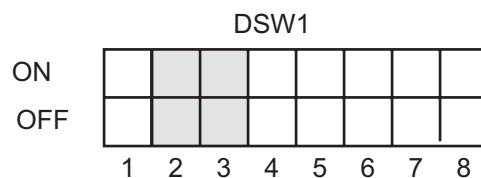
Data Bit Selection (DSW1-1). This switch sets the printer to receive either 7 or 8 bit data bits for each byte transmitted.

DSW1-1	SETTING
Off	8 data bits
On	7 data bits



Parity Selection (DSW1-2, DSW1-3). These switches select the type of parity used for error detection.

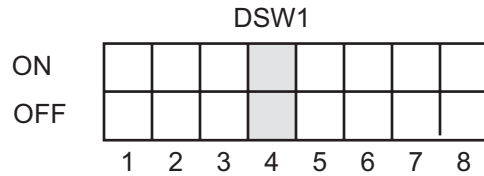
DSW1-2	DSW1-3	SETTING
Off	Off	No Parity
Off	On	Even
On	Off	Odd
On	On	Not Used



Section 3. Configuration

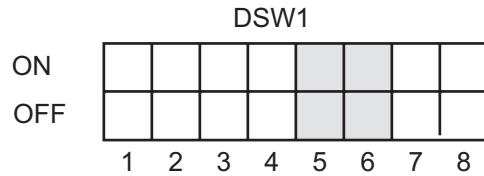
Stop Bit Selection (DSW1-4). Selects the number of stop bits to end each byte transmission.

DSW1-4	SETTING
Off	1 Stop Bit
On	2 Stop Bits



Baud Rate Selection (DSW1-5, DSW1-6). Selects the data rate (bps) for the RS232 port.

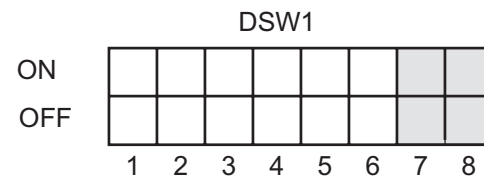
DSW1-5	DSW1-6	SETTING
Off	Off	9600
Off	On	19200
On	Off	38400
On	On	57600



Protocol Selection (DSW1-7, DSW1-8). Selects the flow control and status reporting protocols. See *Section 6: Interface Specifications* for more information.

(* Will select protocol for M-8400 if DSW2-8 is ON)

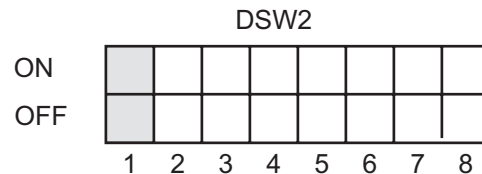
DSW1-7	DSW1-8	SETTING
Off	Off	Rdy/Bsy
Off	On	Xon/Xoff
On	Off	Bi-Com 3
On	On	Bi-Com 4*



Printer Set Up

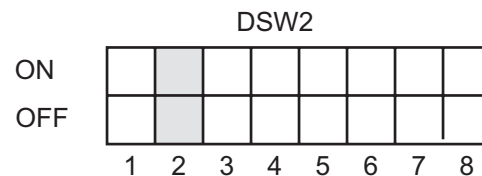
Print Mode Selection (DSW2-1). Selects between direct thermal printing on thermally sensitive paper and thermal transfer printing using a ribbon.

DSW2-1	SETTING
Off	Therm Xfr
On	Direct Therm



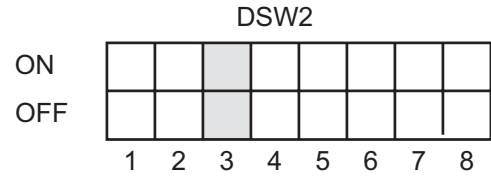
Sensor Type Selection (DSW2-2). Selects between the use of a label gap or a reflective Eye-Mark detector.

DSW2-2	SETTING
Off	Gap
On	Eye-Mark



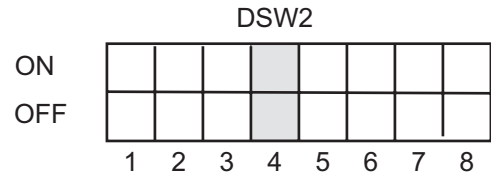
Head Check Selection (DSW2-3). When selected, the printer will check for head elements that are electrically malfunctioning.

DSW2-3	SETTING
Off	Disabled
On	Enabled



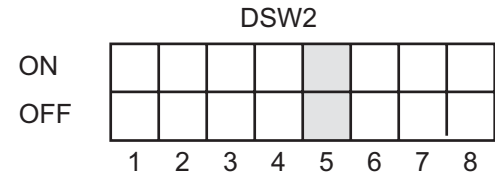
Hex Dump Selection (DSW2-4). Selects Hex Dump mode.

DSW2-4	SETTING
Off	Disabled
On	Enabled



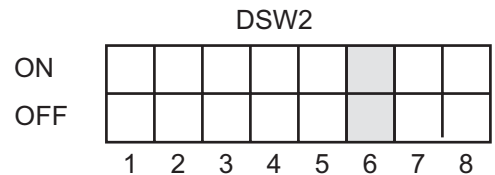
Receive Buffer Selection (DSW2-5). Selects the operating mode of the receive buffer. See Section 6: Interface Specifications for more information.

DSW2-5	SETTING
Off	Single Job
On	Multi Job



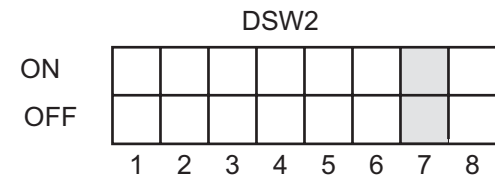
Firmware Download (DSW2-6). Places the printer in the Firmware Download mode for downloading new firmware into flash ROM.

DSW2-6	SETTING
Off	Disabled
On	Enabled



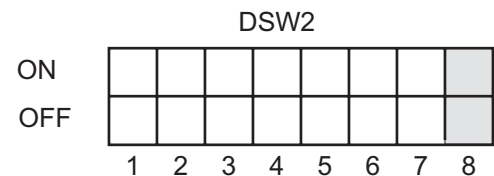
Protocol Code Selection (DSW2-7). Selects the command codes used for protocol control. Refer to Appendix E for more information.

DSW2-7	SETTING
Off	Standard
On	Non-Std



M8400 Emulation Mode (DSW2-8). For emulating earlier series software commands. Should be used only if problems are encountered when using existing software. This switch will also affect the settings selected by DSW1-7 and DSW1-8.

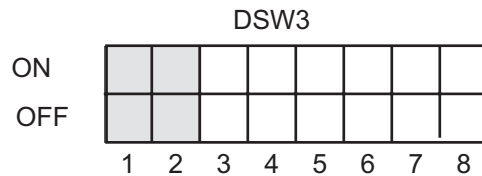
DSW2-8	SETTING
Off	Disabled
On	Enabled



Section 3. Configuration

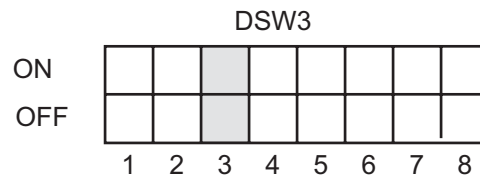
Backfeed Sequence (DSW3-1). Backfeed is used to correctly position the label for application and then retract the next label to the proper print position. This operation can be performed immediately after a label is printed and used, or immediately prior to the printing of the next label.

DSW3-1	DSW3-2	SETTING
Off	Off	Continuous
Off	On	Tear-Off
On	Off	Cutter
On	On	Dispenser



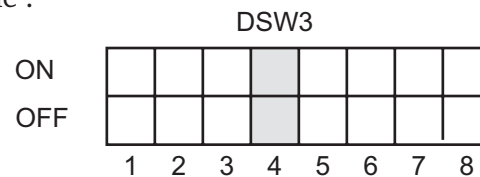
Label Sensor Selection (DSW3-3). Enables or disables the Label Sensor. If the Sensor is enabled, it will detect the edge of the label and position it automatically. If it is disabled, the positioning must be under software control using Line Feed commands.

DSW3-3	SETTING
Off	Sensor Used
On	Not Used



Back-Feed Selection (DSW3-4). When Back-Feed is enabled, the printer will position the last printed label for dispensing and retract it before printing the next label. The amount of backfeed offset is adjustable .

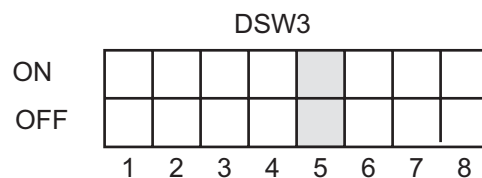
DSW3-4	SETTING
Off	Enabled
On	Disabled



External Signal Interface. See *Section 6: Interface Specifications* for information on the External Signals.

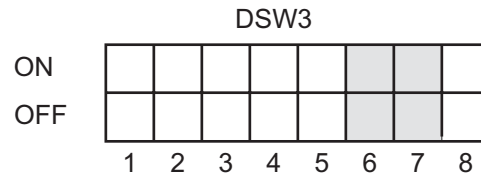
EXT Print Start Signal Selection (DSW3-5). Allows an external device to initiate a label print for synchronization with the applicator. See *Section 6: Interface Specifications* for a description of the signal level and requirements. When DSW3-5 is On, the unit is in the Continuous print mode, Backfeed is disabled and External Signals are ignored.

DSW3-5	SETTING
Off	Enabled
On	Disabled



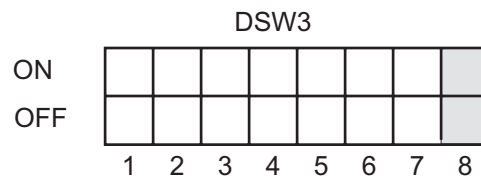
External Signal Type Selection (DSW3-6, DSW3-7). Both the polarity and signal type (level or pulse) of the external print synchronizing signal can be selected. See *Section 6: Interface Specifications* for a definition of signal types.

DSW3-6	DSW3-7	SETTING
Off	Off	Type 4
Off	On	Type 3
On	Off	Type 2
On	On	Type 1



Repeat Print via External Signal (DSW3-8). Allows the applicator to reprint the last label of the print job. See *Section 6: Interface Specifications* for a description of the signal requirements.

DSW3-8	SETTING
Off	Disabled
On	Enabled



Reserved for Future Use (DSW3-2)

DEFAULT SETTINGS

SWITCH SELECTIONS

All switches are placed in the Off default position for shipping. This will result in the following operating configuration:

Communications:	8 data bits, no parity, 1 Stop bit, 9600 Baud ⁽¹⁾
Protocol:	Ready/Busy
Sensor:	Gap Sensor
Receive Buffer:	Multi Job
Mode:	Batch/continuous
Label Sensor:	Sensor Used
Backfeed:	Enabled
External Signals:	Enabled

(1) Only if RS232 I/F Module is installed.

SOFTWARE DEFAULT SETTINGS

The printer stores the software settings upon receipt and uses them until they are again changed by receipt of a command containing a new setting. These settings are stored in non-volatile memory and are not affected by powering the printer off. The printer may be reset to use the default software settings by depressing the LINE and FEED keys simultaneously while powering the printer on. You will be asked to confirm that you want the printer default settings by selecting either YES or NO by using the LINE key to step the cursor to the desired setting. If you select YES and press the FEED key, the following default configuration will be stored:

	CL408e	CL412e	CL608e	CL612e
Print Darkness	3		2	
Print Speed	4 in. per sec.		6 in. per sec.	
Print Reference	Vertical = 0000, Horizontal = 0000			
Zero	Slash			
Auto On Line	Enabled			

Once the default operation is completed, a DEFAULT COMPLETED message will be displayed on the LCD panel or a single beep will be heard if the printer does not have an LCD panel. The printer should be powered off while this message is being displayed (or after the beep is heard. This saves the default settings in the non-volatile memory where they will be automatically loaded the next time the printer is powered on.

POTENTIOMETER ADJUSTMENTS

PITCH

After the pitch has been set with the LCD Control Panel, it is sometimes desirable to make minor adjustments. This can be done using the **PITCH** potentiometer on the front panel. This potentiometer is set at the factory so that it has a range of +/- 3.75 mm. The midpoint setting should have no effect on the pitch. Turning the potentiometer all the way clockwise should move the print position 3.75 mm up towards the top edge of the label. Turning it all the way counterclockwise should move the print position down 3.75 mm.

1. While depressing the **FEED** key on the front panel, power the printer on.
2. When you hear one beep from the printer, release the **FEED** key and the printer will display on the LCD panel a message asking what type of Test Label you want to print.
3. Use the **LINE** key to step to the Configuration selection and press the **FEED** key to accept the selection.
4. Use the **LINE** key to select the Test Label Size. After the size is selected, press the **FEED** key to accept the selection and the printer will begin to print test labels continuously.
4. Adjust the **PITCH** potentiometer on the front panel until the first print position is at the desired location on the label. If the potentiometer does not have enough range, then you will have to change the pitch setting using the front panel display.
5. Press the **FEED** key to stop the printer.
6. To exit the Test Label mode, power the printer off and then back on.

Adjusting the **PITCH** potentiometer will affect the stop position of the label.

BACKFEED OFFSET

When a label is printed it must be correctly positioned for dispensing and application. The Backfeed adjustment is used to position the label so that it is fully dispensed and ready for application. It may then be necessary to reposition the next label before printing. The Backfeed (repositioning of the label) operation is enabled if DSW3-4 is in the Off position. If Backfeed is enabled, placing DSW3-1 in the Off position will cause the backfeed operation to be performed immediately before each label is printed. If DSW3-1 is in the On position, the backfeed operation is performed as soon as the dispensed label has been printed and taken from the printer.

The amount of backfeed is controlled by the **OFFSET** potentiometer on the DIP Switch Panel inside the cover. When turned all the way counterclockwise, the amount of backfeed is +3.75 mm, and -3.75 mm when turned all the way clockwise.

1. Turn the printer on.
2. Press the **LINE** key to place the printer in the Off Line status.

Section 3. Configuration

3. Press the **FEED** key to feed out a blank label.
4. Adjust the position using the **OFFSET** potentiometer on the front control panel and feed another label by depressing the **FEED** key. Repeat this procedure until the label is fully released from the liner.

DISPLAY

This potentiometer is used to adjust the contrast of the LCD display for optimum viewing under various lighting conditions.

PRINT

The PRINT potentiometer is used to adjust the amount of heat (i.e., power) applied to the head for printing. It provides a continuous range of adjustment. Maximum print darkness is obtained by turning the potentiometer all the way clockwise and a maximum counterclockwise setting will give the lightest print.

NOTE: The PRINT potentiometer adjustment will affect the darkness in all of the command code speed and darkness ranges.

LCD PANEL PRINTER CONFIGURATION

The LCD Panel is used by the operator in conjunction with the LINE and FEED switches to manually enter printer configuration settings. Many of these settings can also be controlled via software commands and in the case of conflict between software and control panel settings, the printer will always use the last valid setting. If you load a label job that includes software settings and then enter a new setting via the LCD panel, the manually set values will be used by the printer. If you set the values manually and then download a job with software settings, the software settings will be used.

There are nine modes of operation. To enter the desired mode, the KEY SEQUENCE combination listed in the table below must be performed. The initial LCD display message is shown for each mode.

MODE	KEY SEQUENCE	INITIAL DISPLAY	PAGE
Normal	POWER	ONLINE QTY:000000	3-10
Advanced	LINE + POWER	ADVANCED MODE	3-12
Test Print	FEED + POWER	TEST PRINT MODE CONFIGURATION	3-22
Default Setting	LINE + FEED + POWER	DEFAULT SETTING YES NO	3-23
Clear Non-Standard Protocol	DSW2-7 ON + LINE + FEED + POWER	ALT. PROTOCOL	3-24
Protocol Code Download	DSW2-7 ON + POWER	USER DOWNLOAD	3-24
Hex Dump	DSW2-4 ON + POWER	ONLINE QTY:000000	3-25

NORMAL MODE

The printer initially powers on in the ONLINE mode. The user can access the User Settings using the following procedures.

<p>ONLINE QTY:000000</p>

The LCD will display the ONLINE status on the top line and the bottom line will contain the label quantity (QTY) status. The message will be changed to OFFLINE whenever the printer is switched offline by pressing the LINE key. As soon a print job is received, the quantity line will indicate the number of labels to be printed. As soon as the label job begins to print, the display will indicate the number of labels in the print job that remains to be printed.

<p>OFFLINE 000000</p>

Press the LINE key once. When the display changes to OFFLINE, press the FEED and LINE keys simultaneously for more than one second.

<p>PRINT DARKNESS 1 2 3 4 5</p>
--

The LCD now displays the Print Darkness selections. The current setting is indicated by a cursor over one of the range settings.

1. Press the LINE key to step the cursor to the desired setting.
2. Once the correct setting is highlighted, press the FEED key to accept the selection and step the display to the next adjustment.

<p>PRINT SPEED 4 6 8</p>

The print speed selections are dependent upon the printer model. The current setting is indicated by the underline cursor.

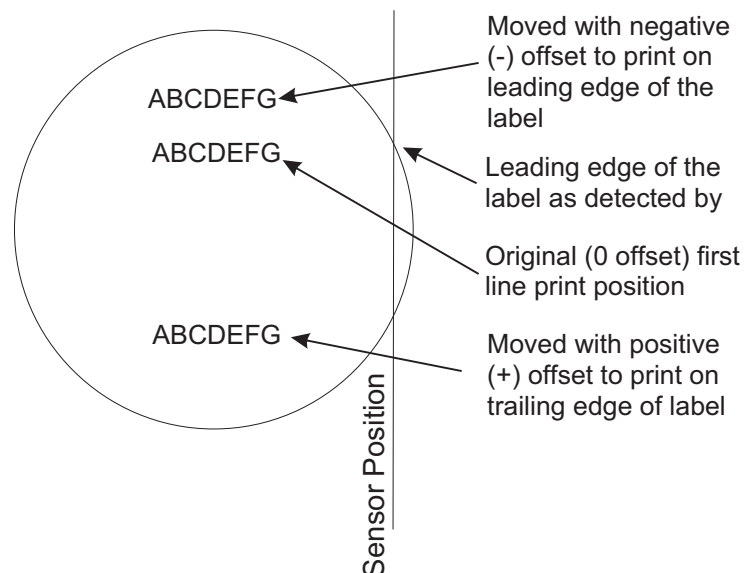
1. Use the LINE key to step the cursor to the desired setting.
2. Once the correct setting is highlighted, press the FEED key to accept the selection and step the display to the next adjustment.

CL408e/CL412e	CL608e/CL612e
2 ips	4 ips
3 ips	6 ips
4 ips	8 ips
5 ips	
6 ips	

PITCH OFFSET ± 00mm

The label Pitch is the distance from the leading edge (the edge that comes out of the printer first) of a label and the leading edge of the next label. The leading edge position of the label can be adjusted relative to the print head +/- 49mm in increments of 1mm. Once the position is set, it can be fine adjusted +/- 3.75mm using the PITCH potentiometer on the Adjustment Panel.

1. The cursor will initially be positioned over the Pitch Direction setting. Pressing the LINE key will step the setting to the positive (+) or negative (-) selection. A positive selection moves the leading edge of the label forward (away from the print head) while a negative selection moves the leading edge of the label back into the mechanism.
2. Once the correct direction is selected, pressing the FEED key will accept the setting and advance the cursor to the Offset selection.
3. Use the LINE key to step the first digit of the counter to the desired setting. The display will increment one step each time the LINE key is pressed. The reading will advance to a setting of 4 after which it will automatically wrap and start at 0 again.
4. Press the FEED key to accept the setting and advance the cursor to the second digit. Again use the LINE key to step to the desired setting. Once it is correct, pressing the FEED key will step to the next adjustment. You may wish to print a test label after completing the adjustments to ensure they are correct.



**CANCEL PRINT JOB
YES NO**

If the printer has a print job(s) in memory, selecting YES will cause the job(s) to be cleared. The default selection is NO. Be sure you want to cancel the print job(s) before selecting yes as the job(s) cannot be recovered and will have to be retransmitted tyo the printer.

1. Use the LINE key to step the cursor to either the YES or NO selection.
2. Once the correct setting is highlighted, pressing the FEED key will accept the setting.

**CANCEL PRINT JOB
COMPLETED**

3. After the print job(s) have been cleared from memory, the printer will display a COMPLETED message for 3 seconds and then return to the initial ONLINE Normal Mode.
4. If you wish to change any of the settings, you must enter the User Settings mode again by taking the printer OFFLINE and pressing the LINE and FEED keys.

ADVANCED MODE

An Advanced Mode is provided to make adjustments that require only occasional changes. Since they affect the basic operation of the printer, the procedure for entering this mode is designed to prevent someone from accidentally changing the settings.

ADVANCED MODE

The Advance Mode is entered by pressing the LINE key while simultaneously turning power on. The printer will emit one long beep after which the LINE key is released. Pressing the FEED key will step the display to the first selection.

**ZERO SLASH
YES NO**

This setting determines if a zero is printed with a slash or without a slash. This setting can also be controlled via software commands. When YES is selected, the printer internal fonts will have a slash through the center of the zero character.

1. Use the LINE key to step the cusor to either the YES or NO selection.
2. Once the correct setting is highlighted, pressing the FEED key will accept the setting and advance the display to the Auto Online display.

**AUTO ONLINE
YES NO**

This setting determines the mode in which the printer powers up. If the YES selection is made, the printer powers up in the ONLINE mode and is ready to print. If NO is selected, the printer powers up in the OFF LINE mode and must be manually placed in the ON LINE mode by pressing the LINE key before it is ready to print.

1. Use the LINE key to step the cursor to either the YES or NO selection.
2. Once the correct setting is highlighted, pressing the **FEED** key will accept the setting and advance the display to the Print Offset display.

PRINT OFFSET	
V:+000	H:+000

Vertical Offset is the distance down from the leading edge (the edge of the label that comes out of the printer first) to the first vertical print position. A positive setting moves the first print position down the length of the label while making it negative moves it up the length of the label. Horizontal Offset is distance that the label image is shifted either to the right or left on the label. The image is shifted to the left (towards the inside edge of the label for a right-hand printer) for a positive setting and it is shifted to the right (towards the outside edge of the label) for a negative setting. This setting changes the base reference point for all subsequent label jobs. It's effect is identical to the <ESC>A3 Base Reference point command. Since the printer moves the label in discrete steps equal to the size of the print dot, the units of measure for Vertical and Horizontal Offset distance is dots. The maximum values that can be set for each is +/-800.

1. Use the LINE key to step the first digit of the counter to the desired setting. The display will increment one step each timethe LINE key is pressed.
2. Press the FEED key to accept the setting and advance the cursor to the second digit. Again use the LINE key to step to the desired setting. Once it is correct, pressing the FEED key will step to the next adjustment.
3. Once the setting is correct, pressing the FEED key will accept the setting and advance to the next display.

You may wish to print a test label after completing the adjustments to ensure they are correct.

Note: This setting can be overridden by the Base Reference Point Command.

SET CALENDAR	
YES	NO

The Calendar Option is ia standard feature in all Se printers allowing the date and time to be set manually using the LCD Display or via the <ESC>WT Calendar Set command. The last setting, set either manually via software command, received by the printer will be the value used. The format of the display is YY/MM/DD hh:mm (Year/Month/Day/hours:minutes).The date format is fixed and cannot be changed.

To enable the Calendar feature (if installed), press the LINE key until the cursor is over the the YES. If the Calendar feature is to be disabled, press the LINE key until the cursor is over the NO. When the desired setting is selected, press the FEED key.

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CALENDAR 00/00/00 00:00

1. Year - The first display shown will have the two digit year selection underlined. You can scroll through the dates by pressing the LINE key. The year number will increase by one each time the LINE key is pressed until it reaches its maximum legal value (i.e., "99" for the year digits) at which point it will wrap around to the "00" setting.
2. Month - After you have set the correct year, pressing the FEED key will advance the cursor to the two digit Month position. You can scroll through the numbers corresponding to the month by pressing the LINE key. The month number will increase by one each time the LINE key is pressed until it reaches a value of "12" at which point it will wrap around to the "01" setting.
3. Day - After you have set the correct month, pressing the FEED key will advance the cursor to the two digit Day position. You can scroll through the numbers corresponding to the month date by pressing the LINE key. The date number will increase by one each time the LINE key is pressed until it reaches a value of "31" at which point it will wrap around to the "01" setting.
4. Hour - After you have set the correct date, pressing the FEED key will advance the cursor to the two digit Hour position. You can scroll through the numbers corresponding to the hour (using a 24 hour clock) by pressing the LINE key. The hour number will increase by one each time the LINE key is pressed until it reaches a value of "24" at which point it will wrap around to the "01" setting.
5. Minute- After you have set the correct hour, pressing the FEED key will advance the cursor to the two digit Minute position. You can scroll through the numbers corresponding to the hour by pressing the LINE key. The minute number will increase by one each time the line key is pressed until it reaches a value of "60" at which point it will wrap around to the "01" setting.
6. After you have set the minutes, pressing the FEED key will accept the setting and advance to the Ignore CR/LF selection.

IGNORE CR/LF YES NO

This selection tells the printer to strip out all carriage return/line feed pairs (CRLF) from the data stream, including graphics and 2D bar codes. It is used primarily to maintain compatibility with earlier models of SATO printers.

1. Use the LINE key to step the cursor to either the YES or NO selection.
2. Once the correct setting is highlighted, pressing the FEED key will accept the setting and advance the display to the Character Pitch display.

CHARACTER PITCH FIXED PROP
--

This selection allows you to set the default character pitch to either fixed character spacing or proportional character spacing.

1. Use the LINE key to step the cursor to the desired setting.
2. Once the correct setting is highlighted, pressing the FEED key will accept the setting and the display will return to the Advanced Mode display.

Note: This command can be overridden by the <ESC>PR or <ESC>PS Character Pitch Commands.

ADVANCED MODE

To exit the Advanced mode, power the printer off and then back on.

CARD MODE

The Card Mode allows the operator to manage the Expanded Memory (PCMCIA Card or Internal Expanded Flash ROM).

ADVANCED MODE

The Card Mode is entered from the Advanced Mode display by pressing the LINE key once.

CARD MODE

The Card Mode display indicates that the printer is in the Card Mode. To advance to the first selection, press the FEED key.

MEM SELECT (CC1) CARD MEMORY

This selection determines which type of optional expanded memory will be addressed as "CC1" in the command streams. The CARD selection specifies the optional PCMCIA card as CC1 and the optional Expanded Flash ROM as CC2. The Memory selection specifies the optional Expanded Flash ROM as CC1 and the optional PCMCIA card as CC2.

1. Step the cursor to the desired selection using the LINE key.
2. Once the cursor is positioned over the desired selection, press the FEED key to accept the selection and advance the display.

CARD->MEMORYCOPY TRUETYPEFONT Y/N

This selection allows you to copy TrueType fonts from the PCMCIA Memory card installed in the Memory Card slot on the rear of the printer to the optional Flash ROM.

1. Use the LINE key to step the cursor to desired setting. If Yes is selected, the printer will enter the Card Copy mode. If No is selected, the display will advance to the Card to Memory SATO Font Copy mode.
2. Confirm your selection by stepping the cursor to the Yes selection. If you select No, the display will return to the previous selection.
3. Press the FEED key to accept the selection. If Yes was selected the copy process will start.
4. Once the copy process is completed, press the FEED key to step the display.

COPY START YES NO

TRUETYPEFONTCOPY COPYING

TRUETYPE FONTCOPY COMPLETED
--

**CARD COPY/FORMAT
XXXXXXX ERROR**

5. If an error is encountered in the copy process, one of the following messages will be displayed on the second line:

R/W Error	Indicates a Read/Write error occurred
No Card Error	Indicates no card was recognized
Mem Full Error	Indicates that there is insufficient memory available.

**CARD->MEMORYCOPY
SATOFONT Y/N**

This selection allows you to copy SATO fonts from the PCMCIA Memory card installed in the Memory Card slot on the rear of the printer to the optional Flash ROM.

1. Use the LINE key to step the cursor to desired setting. If Yes is selected, the printer will enter the Card Copy mode. If No is selected, the display will advance to the Card to Memory Copy All mode.

**COPY START
YES NO**

2. Confirm your selection by stepping the cursor to the Yes selection. If you select No, the display will return to the previous selection.

**SATO FONT COPY
COPYING**

3. Press the FEED key to accept the selection. If Yes was selected the copy process will start

**SATO FONT COPY
COMPLETED**

4. Once the copy process is completed, press the FEED key to step the display.

**CARD COPY/FORMAT
XXXXXXX ERROR**

5. If an error is encountered in the copy process, one of the following messages will be displayed on the second line:

R/W Error	Indicates a Read/Write error occurred
No Card Error	Indicates no card was recognized
Mem Full Error	Indicates that there is insufficient memory available.

**CARD->MEMORYCOPY
ALL Y/N**

This selection allows you to copy the entire contents from the PCMCIA Memory card installed in the Memory Card slot on the rear of the printer to the optional internal Expanded Memory.

1. Use the LINE key to step the cursor to desired setting. If Yes is selected, the printer will enter the Card Copy mode. If No is selected, the display will advance to the Card to Memory Copy All mode.

**COPY START
YES NO**

2. Confirm your selection by stepping the cursor to the Yes selection. If you select No, the display will return to the previous selection.

**CARD->MEMORY
COPYING**

3. Press the FEED key to accept the selection. If Yes was selected the copy process will start

**CARD-.MEMORY
COMPLETED**

4. Once the copy process is completed, press the FEED key to step the display.

**CARD COPY/FORMAT
XXXXXXX ERROR**

5. If an error is encountered in the copy process, one of the following messages will be displayed on the second line:

R/W Error	Indicates a Read/Write error occurred
No Card Error	Indicates no card was recognized
Mem Full Error	Indicates that there is insufficient memory available.

MEMORY->CARDCOPY
ALL <XMB> Y/N

This selection allows you to copy the entire contents of the optional Expanded Memory to the PCMCIA Memory card installed in the Memory Card slot on the rear of the printer.

COPY START
YES NO

MEMORY->CARD
COPY
COPYING

MEMORY->CARD
COPY
COMPLETED

CARD COPY/FORMAT
XXXXXXX ERROR

1. Use the LINE key to step the cursor to desired setting. If Yes is selected, the printer will enter the Card Copy mode. If No is selected, the display will advance to the Card to Memory Copy All mode.

2. Confirm your selection by stepping the underline cursor to the Yes selection. If you select No, the display will return to the previous selection.

3. Press the FEED key to accept the selection. If Yes was selected the copy process will start

4. Once the copy process is completed, press the FEED key to step the display.

5. If an error is encountered in the copy process, one of the following messages will be displayed on the second line:

R/W Error	Indicates a Read/Write error occurred
No Card Error	Indicates no card was recognized
Mem Full Error	Indicates that there is insufficient memory available.

CARD->MEMORYCOPY
PROGRAM Y/N

This selection allows the user to copy printer firmware from the PCMCIA Memory Card to the printer.

COPY START
YES NO

CARD->MEMORY
COPY
COPYING

CARD->MEMORYCOPY
COMPLETED

CARD COPY/FORMAT
XXXXXXX ERROR

1. Use the LINE key to step the cursor to desired setting. If Yes is selected, the printer will enter the Card Copy mode. If No is selected, the display will advance to the mode display.

2. Confirm your selection by stepping the underline cursor to the Yes selection. If you select No, the display will return to the previous selection.

3. Press the FEED key to accept the selection. If Yes was selected the copy process will start

4. Once the copy process is completed, press the FEED key to step the display.

5. If an error is encountered in the copy process, one of the following messages will be displayed on the second line:

R/W Error	Indicates a Read/Write error occurred
No Card Error	Indicates no card was recognized
Mem Full Error	Indicates that there is insufficient memory available.

MEMORY->CARDCOPY
PROGRAM Y/N

This selection allows the user to copy the current firmware installed in the printer to a PCMCIA Memory Card.

1. Use the LINE key to step the cursor to desired setting. If Yes is selected, the printer will enter the Card Copy mode. If No is selected, the display will advance to the mode display.

Section 3. Configuration

COPY START
YES NO

2. Press the FEED key to accept the selection. If Yes was selected the copy process will start. If you select No, the display will return to the previous selection.

MEMORY->CARD COPY
COMPLETED

3. Once the copy process is completed, press the FEED key to step the display.

CARD COPY/FORMAT
XXXXXX ERROR

4. If an error is encountered in the copy process, one of the following messages will be displayed on the second line:
R/W Error Indicates a Read/Write error occurred
No Card Error Indicates no card was recognized
Mem Full Error Indicates that there is insufficient memory available.

CARD FORMAT
YES NO

Before a PCMCIA card can be used, it must be formatted.
Note: Formatting a card destroys all data currently stored on the card.

1. Use the LINE key to step the cursor to desired setting. If Yes is selected, the printer will enter the Card Format mode. If No is selected, the display will advance to the mode display.

MEMORY FORMAT
YES NO

Before the internal Expanded Memory can be used, it must be formatted.

Note: Formatting the Memory will destroy any stored data.

1. Use the LINE key to step the cursor to desired setting. If Yes is selected, the printer will enter the Memory Format mode. If No is selected, the display will advance to the mode display.

CARD MODE

To exit the Card Mode, power the printer off and then back on.

SERVICE MODE

The Service Mode allows the operator to set up the basic operation parameters of the printer.

ADVANCED MODE

The Service Mode is entered from the Advanced Mode display by pressing the LINE key twice.

SERVICE MODE

The Service Mode display indicates that the printer is in the Service Mode. To advance to the first selection, press the FEED key.

GAP	[X.XV]
INPUT	[X.XV]

The “e” Series printers determine the location of the leading edge of the label by measuring the difference between light levels when it sees either a label edge or a black “EYE” mark. This adjustment allows you to manually set the threshold voltage level, between the maximum and minimum light levels. DIP switch DSW2-2 selects the sensor type. If DSW2-2 is in the OFF position, the setting will be for a See-Thru (or Gap) sensor and the LCD will display “GAP” on the top line along with the current setting. If DSW2-2 is in the ON position, the LCD will display “EYE” on the top line with its current setting. If the value entered for the bottom line setting is “0.0V”, then the printer will automatically calculate the setting when the first label is fed after the printer is powered on or the head is closed. There are some instances where the automatically calculated value must be adjusted to ensure reliable label feeding, such as when the backing opacity or the reflectance of the EYE mark varies significantly within a roll of labels or between label rolls. In these instances the value should be set using the following procedures.

GAP	[X.XV]
INPUT	[X.XV]

GAP - When setting the “gap” threshold, the voltage shown on the top line of the display must be measured with nothing but the backing in the sensor and then again with a label still attached to the backing. The formula to be used for setting the threshold is:

$$(\text{High Voltage Level} + \text{Low Voltage Level}) \times 0.5 = \text{Start Value}$$

1. Insert a label still attached to the backing into the sensor and close the Label Hold-Down. Record the voltage shown on the top line of the LCD panel. This line should have the message “GAP” on the top line (DIP switch DSW2-2 = OFF). Make sure the label is all the way under the sensor.
2. Strip the label from the backing and insert the backing strip under the sensor and close the Label Lid. Record the voltage shown on the top line of the LCD panel. The voltage ranges measured should be within the following range

Backing without label = 0.5V or less

Backing with label = 1.0V \geq the low value

If the measured values are outside this range, you may have trouble in finding a value that will work properly under all conditions. If this is the case, a higher quality label may be needed to get adequate performance.

3. Calculate the starting point voltage using the formula.
4. Use the LINE key to step the counter to the desired setting. The display will increment one step for each time the LINE key is pressed. If the LINE key is held pressed for more than two seconds, it will automatically go into the fast scroll mode. The reading will advance to a setting of 3.3 (the maximum voltage) after which it will automatically wrap and start at “0.0” again. If a value of “0.0” is set, the printer will automatically set the level each time the printer is powered on with labels loaded or the head is closed.
5. Once the setting is correct, pressing the FEED key will accept the setting and advance to the Online Feed display.

Section 3. Configuration

EYE	[X.XV]
INPUT	[X.XV]

EYE - When setting the “eye” threshold, the voltage must be measured with nothing but the label under the sensor and then again with the printed “eye” mark under the sensor. The formula for this is:

$(\text{High Voltage Level} + \text{Low Voltage Level}) \times 0.5 = \text{Start Value}$

1. Insert a label into the sensor and close the Label Hold-Down. Make sure the printed “eye” mark is *not* under the sensor. Record the voltage shown on the top line of the LCD panel. This line should have the message “EYE” on the top line (DIP switch DSW2-2 = ON).
2. Now pull the label forward until the “eye” mark is positioned under the sensor (the voltage reading should be at its highest point). Record the voltage shown on the top line of the LCD panel. The voltage ranges measured should be within the following ranges:

Label Only = 0.3 to 0.7V

Eye-Mark \geq 1.2V above low value

If the measured values are outside this range, you may have trouble in finding a value that will work properly under all conditions. If this is the case, a higher quality label may be needed to get adequate performance.

3. Calculate the starting point voltage using the formula.
4. Use the LINE key to step the counter to the desired setting. The display will increment one step for each time the LINE key is pressed. If the LINE key is held pressed for more than two seconds, it will automatically go into the fast scroll mode. The reading will advance to a setting of 3.3 (the maximum voltage) after which it will automatically wrap and start at “0.0” again. If a value of “0.0” is set, the printer will automatically set the level each time the printer is powered on with labels loaded or the head is closed.
5. Once the setting is correct, pressing the FEED key will accept the setting and advance to the Online Feed display.

ONLINE FEED
YES NO

This selection specifies whether or not the printer will automatically feed a blank label when it is placed in the Online mode.

1. Use the LINE key to step the cursor to desired setting. If Yes is selected, the printer will feed a blank label anytime it enters the Online mode. If No is selected, the display will advance to the mode display.

FEED ON ERROR
YES NO

This selection specifies whether or not the printer will feed a blank label automatically when an error condition is cleared..

1. Use the LINE key to step the cursor to desired setting. If Yes is selected, the printer will feed a blank label anytime an error condition is cleared. If No is selected, the display will advance to the mode display.

REPRINT W/FEED	
YES	NO

This selection specifies whether or not the printer will print the last printed label stored in memory when the FEED key is pressed in the Normal Online mode.

1. Use the LINE key to step the cursor to desired setting. If Yes is selected, the printer will reprint the last label when the FEED key is pressed when the printer is Online. If the printer is Offline, pressing the FEED key will feed a blank label. If No is selected, the display will advance to the mode display.

FORWARD/BACKFEED	
DISTANCE	DEFAULT

This display will only appear when Backfeed is enabled (DSW3-4 = OFF). The maximum backfeed distance is 255 mm.

1. Use the LINE key to select either the Default or the Distance selection. If Default is selected, the display steps to the Web acceleration selection.

FORWARD/BACKFEED	
DISTANCE	XXXmm

2. If Manual setting is selected, use the LINE key to advance the distance to the desired setting. Each time the LINE key is pressed, the Distance will advance 1 mm. The maximum distance is 255 mm.

3. Once the desired distance is set, press the FEED key to accept the setting and step to the next display.

EURO CODE	
D5	

This selection allows the user to specify the dhexadecimal code for the character which is replaced with the Euro Character. The default is D5_H.

1. The cursor should be positioned over the first digit selection. Use the LINE key to step to the desired setting.
2. Press the FEED key to advance the cursor to the second digit of the desired hexadecimal code.
3. Press the LINE key to step to the desired setting.
4. When the setting is correct, press the FEED key to accept the setting and step to the next display.

SELECT LANGUAGE	
ENGLISH	

This selection allows the user to select the character set used by the printer. The selections are English, French, German, Spanish, Italian and Portuguese.

1. Press the LINE key to advance to the desired language setting.
2. When the setting is correct, press the FEED key to accept the setting and step to the next display.

PRIORITY SETTING	
LCD	COMMAND

This selection allows the user to assign a priority for Print Darkness, Print Speed and Print Offset.

1. Use the LINE key to step to the desired priority. If LCD is selected, the setting established via the LCD display/menu system will be used for an incoming label job, regardless of any different command settings. If Command is selected, any commands in the label job will take precedence and be used for printing the job and the LCD Display will reflect the new setting.
2. Once the desired setting is selected, press the FEED key to accept the setting and step to the next display.

Section 3. Configuration

SERVICE MODE

The Service mode is exited by powering the printer off and then back on.

COUNTER MODE

The Counter Mode is provided to allow the user to access the internal printer counters.

ADVANCED MODE

The Counter Mode is accessed from the Advanced Mode. Press the LINE key to step to the Counter Mode.

COUNTER MODE

Pressing the FEED key will advance the display to the counter selections.

SELECT COUNTER HD DSP CUT LIFE

The counters are identified in the display as:

HD: Head Counter (should be reset when print head is replaced)

DSP: Dispense Counter

CUT: Cutter Counter

LIFE: Life Counter (cannot be reset)

1. Use the LINE key to step the cursor to the desired counter, the Head (HD) counter or the LIFE counter. The default position is the Head Counter. Use the LINE key to advance the cursor to the desired selection.
2. Pressing the FEED key again will advance the counter to the Clear mode. All counters with the exception of the LIFE counter may be cleared.
3. Once the correct setting is highlighted, pressing the FEED key will display the current value (in meters) stored in the counter.
4. Use the LINE key to select the desired setting. If you only wanted to read the counter value, select NO. If you want to read the counter and reset it to 0.0, place the cursor over the YES. Once the desired setting is selected, pressing the FEED key will advance the return you to the Counters Mode display.
5. To exit the Counters Mode, turn power to the printer off and then back on.

HEAD COUNTER XXXXX M

HD CNTR CLEAR YES NO

COUNTERS MODE

TEST PRINT MODE

The Test Print Mode offers four different printer status labels for troubleshooting. If DSW3-5 is OFF, the Test Print cycle must be initiated with a Print Start command.

<p>TEST PRINT MODE CONFIGURATION</p>

This option allows you to print a test label. It is recommended that you print a test label after you have changed any of the settings in the Advanced Mode. The test label allows you to verify that you indeed did make the desired changes. To enter the Test Print Mode, power the printer on while pressing the **FEED** key. The printer will beep. Release the **FEED** key and the printer will display the Test Print Mode message on the LCD panel:

1. Use the **LINE** key to step the cursor to type of test label you wish to print. The choices are:
 - Configuration
 - Bar Code
 - Head Pattern
 - Memory

<p>TEST PRINT SIZE 10 CM</p>

Once you have selected the type of test label to be printed, use the FEED key to accept the selection and the display advances to the Test Print Size display. This display allows you to select the label width.

1. Use the LINE key to select the label width. Each time the LINE key is pressed, the label size advances 1 cm until it reaches a maximum width of 10 cm, at which point it will wrap to the smallest size of 4 cm.

<p>PRESS FEED KEY TO STOP PRINTING</p>

2. Pressing the LINE key accepts the selection.
3. Press the FEED key to start printing test labels continuously.
4. Press the FEED key to stop the printer.
5. To exit the Test Print Mode, power the printer off and then back on.

DEFAULT SETTING MODE

Occasionally it is desirable to reset all printer configuration settings to their original default conditions. This allows the operator to start reconfiguration of the printer starting from a know set of conditions.

<p>DEFAULT SETTING YES NO</p>

You enter the Default Setting Mode by pressing the LINE and FEED keys while simultaneously powering the printer on. The printer will emit one long beep after which the FEED and LINE keys should be released.

1. Use LINE key to select either the YES or NO.
2. Once the desired setting is selected, pressing the FEED key will accept the selection and the printer will reset to the original default conditions.
3. When the printer has completed the reset process, the Default Setting Completed display will appear. At this time the printer is in the default configuration.
4. To exit the Default Setting Mode, power the printer off and then back on.

<p>DEFAULT SETTING COMPLETED</p>

CLEAR NON-STANDARD PROTOCOL

The standard protocol codes used by the printer can be modified to accommodate the requirements of different host systems. However, if the printer is to be used with a system that does not use the custom protocol codes, they can be cleared and the default protocol codes reactivated. The default values are: STX = 7B_H, ETX = 7D_H, ESC = 5E_H, ENQ = 40_H, NULL = 7E_H, CAN = 21_H and OFFLINE = 5D_H.

**ALT.PROTOCOL
DEFAULT COMPLETE**

To Clear Non-Standard protocol codes, DSW2-7 is placed in the on position and the printer powered on while simultaneously pressing the LINE and FEED keys.

1. The printer will emit one long beep at which time the LINE and FEED keys should be released.
2. When the keys are released, the printer will replace the Alternate protocol codes with the default values.
3. After the default setting is complete, the printer will emit two short beeps indicating the process is complete.
4. To exit the mode, power the printer off and then back on.

DOWNLOAD USER DEFINED PROTOCOL CODES

The user can define a set of custom protocol codes and download them to the printer using the <ESC>LD command.

**USER DOWNLOAD
PRESS THE LINE KEY**

To enter the User Download mode, DSW2-7 is placed in the on position and the printer is powered on while simultaneously pressing the LINE key. The printer will emit one long beep after which the LINE key is released.

1. Set DSW2-7 off to replace the Standard protocol codes or on to replace the Alternate set of protocol codes.

**USER DOWNLOAD
WAITING**

1. Press the LINE key. The printer is now waiting for the data to be sent.
2. Transmit the download data command stream to the printer.
3. After the data has been received, the printer will beep and print a status label. If it does not beep and print a status label, the printer did not accept the data.
4. If the printer did not beep and print a status label, turn the printer off and check your data stream for errors and start the download process over.
5. If the custom codes are correct, press the FEED key to accept them and terminate the download process. If they are incorrect, turn the printer off without pressing the FEED key and begin the process again.

HEX DUMP MODE

In addition to the Test Print Labels, the printer can print the contents of the receive buffer in a hexadecimal format to allow the data stream to be examined for errors and troubleshooting.

ONLINE
QTY:000000

The Hex Dump Mode is entered by placing DSW2-4 in the on position and powering the printer on.

1. The printer is now ready to receive data.
2. Send the data stream to the printer.
3. The received data will be printed in a hexadecimal format
4. To return the printer to normal operation, place DSW2-4 in the off position and power the printer off and then back on.

```

00000000 1B411B4830303530 1B56303230301B42 5A5H00505V02005B
00000010 443130343130302A 434C3430382A1B48 D104100*CL 408*5H
00000020 303035301B563030 35301B4254303031 00505V00505BT001
00000030 3033303130331B42 5730333130303132 0301035BW0310012
00000040 333435360D0A1B51 311B5A0D0A      3456 5Q15Z5

```

Section 3. Configuration

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SECTION 4.

CLEANING AND MAINTENANCE

INTRODUCTION

This section provides information on user maintenance for the CL Series “e” printers. Because they come in two versions that differ mechanically, it is divided into two basic sections, one covering the procedures for the CL6XXe and the other the procedures for the CL4XXe. Each section contains the following information.

- Adjusting the Print Quality
- Cleaning the Print Head, Platen and Rollers
- Replacing the Print Head
- Replacing the Fuse

PROCEDURES

ALL MODELS

ADJUSTING THE PRINT QUALITY

The CL Series “e” printers are equipped with two different methods of adjusting the quality of the print; print darkness and speed. When adjusting the printer for optimum print quality, a bar code verifier system should be used. The human eye is a poor judge of the relative widths of the bars in a symbol, a characteristic that is extremely important for good bar code quality.

Darkness (Print)

This adjustment allows the user to control (within a specified range) the amount of power that is used to activate the individual print head heat elements. It is important to find a proper print darkness level based on your particular label and ribbon combination. The printed images should not be too light nor should the ink from the ribbon “bleed.” The edges of each image should be crisp and well defined.

The Print Darkness range can be set using the front panel LCD panel or by downloading the setting using the Print Darkness software command. The darkness ranges for the printer are displayed on the LCD panel. The lightest print is represented by the smaller value and the darkest print by the highest value. Once the range has been selected, the **PRINT** Potentiometer on the front panel can be used to make finer adjustments.

Print

The fine adjustment for Print Darkness is the **PRINT** potentiometer on the operator panel. It provides a continuous range of adjustment, allowing you to make precise changes. Use a small cross-point screwdriver, turning clockwise for darker print and counterclockwise for lighter print. See *Section 3: Configuration* for instructions on performing potentiometer adjustments

*NOTE: The **PRINT** potentiometer adjustment will affect the darkness in all of the command code speed ranges, i.e. if the **PRINT** potentiometer is adjusted for lighter print, the darkness will be lighter in all speed ranges selected by the command code.*

Print Speed

The other method of controlling print quality is by controlling the speed at which the label is printed. This adjustment is made only on an individual label basis using either the Print Speed command code or the LCD display panel. For more details on this command, see *Section 5: Programming*. Changing the print speed allows the user to control the amount of time allowed for print element cooling before the media is stepped to the next print position. It is especially critical when printing “ladder” bar codes (bar codes printed with the bars parallel to the print line). When printing a “ladder” bar code, it is important to allow the head to cool sufficiently before stepping to the next position. If it does not have sufficient time to cool, the bar will be “smeared” on the trailing edge.

The Print Speed can be set using the LCD panel or with the Print Speed command code. The software command will override the any setting entered using the LCD panel.

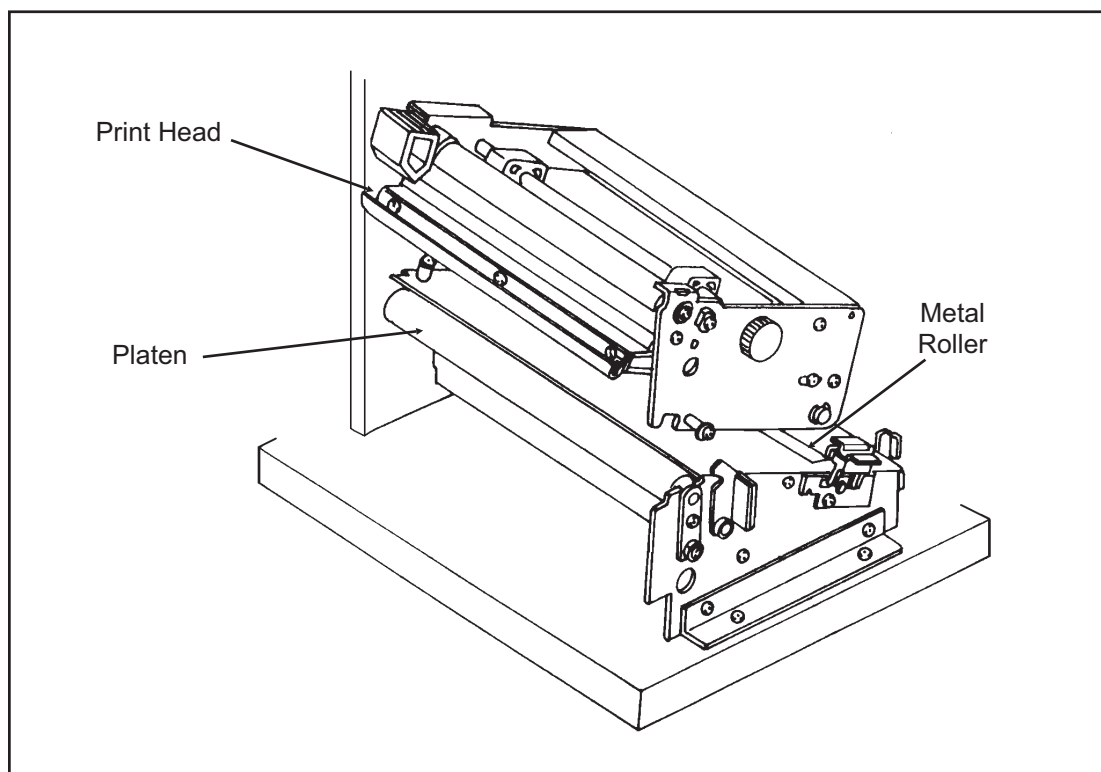
CLEANING THE PRINT HEAD, PLATEN AND ROLLERS **CL608e and CL612e**

Supplies needed:

SATO SA070 Cleaning Kit

Cleaning the Print Head

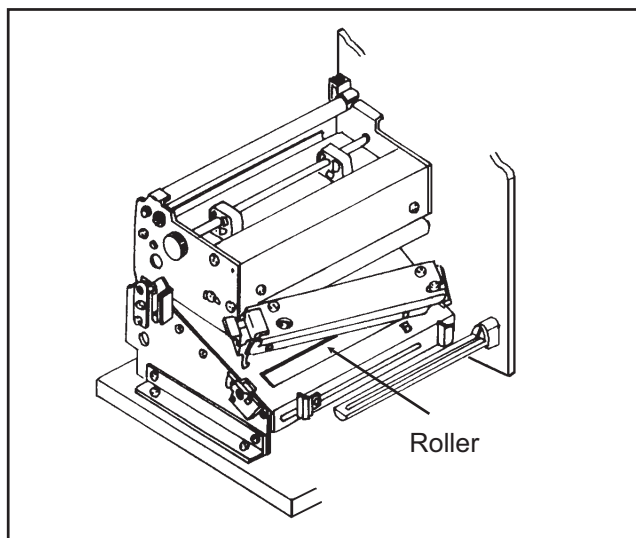
1. Turn the printer off and remove the power cable.
2. Open the **Label Access** door.
3. Open the **Print Head Assembly** by pushing the **Head Latch** toward the rear of the printer. The **Print Head Assembly** is spring-loaded and will automatically open as soon as the **Head Latch** is disengaged. Remove the ribbon.
4. Apply SATO Thermal Print Head Cleaner to a cotton swab.
5. The **Print Head** faces downward along the front edge of the assembly. Pass the end of the dampened swab along the entire width of the **Print Head** (you may need to move the ribbon out of the way to do this).
5. Check for any black coloring or adhesive on the swab after cleaning.
6. Repeat if necessary until the swab is clean after it is passed over the head.



7. The head should be cleaned at least every time the ribbon is changed and more often in harsh environments.

Cleaning the Platen and Rollers

1. Turn the printer off and remove the power cord.
2. Open the **Label Access Door**.
3. Open the **Print Head Assembly** by pushing the **Head Latch** toward the rear of the printer. The **Print Head Assembly** is spring-loaded and will automatically open as soon as the **Head Latch** is disengaged. Remove the labels.
4. Apply SATO Thermal Print Head Cleaner to one of the cotton swabs.
5. The **Platen** is the rubber roller directly below the **Print Head**. It should be cleaned of any ribbon or label residue.
6. The **Label Load Roller** is located underneath the **Label Hold-Down**. It should be cleaned of any label residue or foreign material.



7. There is one metal roller used in guiding the labels through the printer. It should be cleaned of any residue or foreign material.
8. Repeat if necessary. The platen and rollers should be cleaned whenever foreign matter such as dust or adhesive is present.

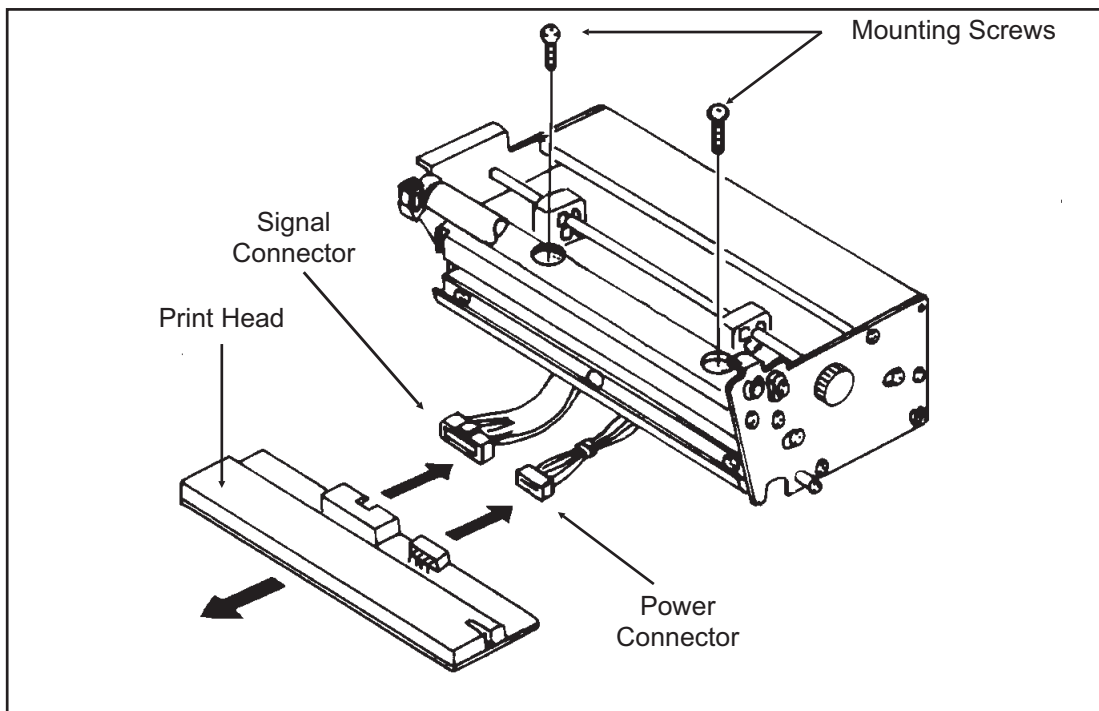
REPLACING THE PRINT HEAD

CL608e and CL612e

The print head on the CL6XXe printers is a user-replaceable item. If it becomes damaged for any reason, it can be easily removed and replaced. Contact your local SATO representative for information on obtaining a new print head.

Supplies needed: No. 2 Phillips screwdriver (a magnetic tip is helpful)

1. Turn the printer off and remove the power cable.
2. Open the **Label Access** door.
3. Open the **Print Head Assembly** by pushing the **Head Latch** toward the rear of the printer. The **Print Head Assembly** is spring-loaded and will automatically open as soon as the **Head Latch** is disengaged.
4. Remove the ribbon from the **Ribbon Rewind Spindle** if necessary.
5. View the **Print Head Assembly** from the front of the printer. Locate the two mounting screws on the top of the assembly. They are accessible through the two holes in the **Top Assembly Plate**. Unscrew these two screws and set them aside.
6. The **Print Head** should now be loosened from the top of the assembly by grasping either side and carefully pulling it forward.



7. Disconnect the signal and power cables from the print head connectors and set the **Print Head** aside.
8. Carefully attach the new print head to the connectors, using caution to make sure the connector keys are correctly positioned.

NOTE: Be careful not to scratch the printing surface of the print head while installing it. Scratching the surface will cause permanent and irreparable damage and is not covered by the warranty!

9. Locate the two mounting screws in the top plate assembly and align them with the tapped holes in the new print head.
10. Re-secure the print head by tightening the screws.

CLEANING THE SENSORS

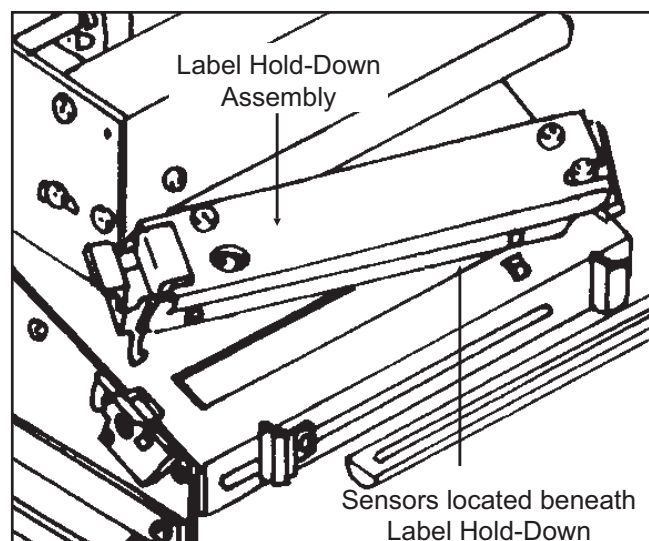
CL608e and CL612e

There are two sensors that are used to control the positioning of the label. One is a transmissive see-thru sensor that detects the edge of the label by looking through the backing paper which is translucent and detecting the presence of the opaque label. The other is a reflective sensor that detects the light reflected from the bottom of the label liner. When a printed black Eye-Mark passes through the beam, the light is no longer reflected back to the sensor detector, indicating to the printer that it should use this position as the start of a new label. When dust, dirt or other foreign matter interferes with the light path of either of these sensors, the results is erratic label positioning. These sensors should be cleaned regularly, at least every two rolls of labels.

Supplies Needed:

SATO SA070 Cleaning Kit

1. Turn the printer off and remove the power cable.
2. Open the **Label Access Door**.
3. Open the **Label Hold-Down** by disengaging the latch. The **Label Hold-Down** is spring loaded and will stay in the up position. Two rectangular holes will be visible underneath the **Label Hold-Down** when it is raised. These are located approximately 1 and 2 inches in from the printer side plate.
4. Apply SATO Thermal Print Head Cleaner to one of the cotton swabs.



Section 4: Cleaning and Maintenance

5. Use the cotton swab to clean any foreign matter from the exposed surface of the sensors.

REPLACING THE FUSE

CL608e and CL612e

Supplies needed:

250V 3A Fuse

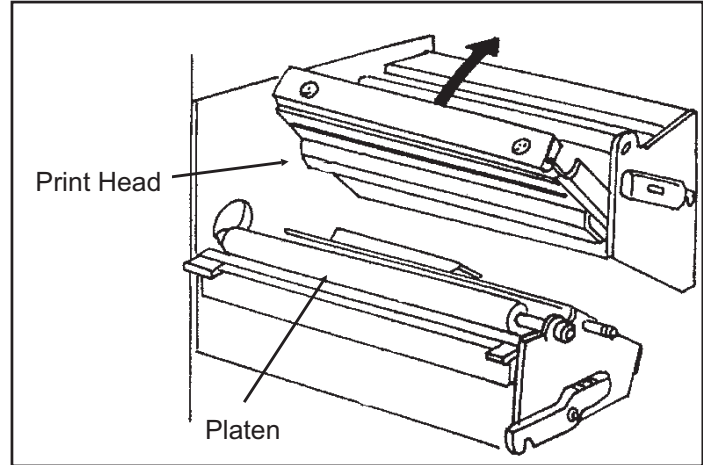
1. Turn the printer power off and remove the power cable.
2. On the back of the printer, locate the **Fuse Cap** directly above the AC connector.
3. Unscrew the cap and remove the defective fuse.
4. Replace with a new 250V 3A fuse.
5. Screw the cap back onto the printer and replace the power cord.

CLEANING THE PRINT HEAD AND PLATEN**CL408e and CL412e****Supplies needed:**

SATO SA070 Cleaning Kit

Cleaning the Print Head

1. Turn the printer off and remove the power cable and open the **Top Access Door**.
2. Open the **Print Head Assembly** by rotating the green **Head Latch** counter-clockwise. The **Print Head Assembly** is spring-loaded and will automatically open as soon as the **Head Latch** is disengaged. Remove the ribbon.



3. Apply SATO Thermal Print Head Cleaner to a cotton swab.
4. The **Print Head** faces downward along the front edge of the assembly. Pass the end of the dampened swab along the entire width of the **Print Head** (you may need to move the ribbon out of the way to do this).
5. Check for any black coloring or adhesive on the swab after cleaning.
6. Repeat if necessary until the swab is clean after it is passed over the head.
7. The head should be cleaned at least every time the ribbon is changed and more often in harsh environments.

Cleaning the Platen

1. Turn the printer off and remove the power cord.
2. Open the **Print Head Assembly** by rotating the green **Head Latch** counter-clockwise. The **Print Head Assembly** is spring-loaded and will automatically open as soon as the **Head Latch** is disengaged. Remove the labels.
3. Apply SATO Thermal Print Head Cleaner to one of the cotton swabs.
4. The **Platen** is the rubber roller directly below the **Print Head**. It should be cleaned of any ribbon or label residue.
5. Repeat if necessary. The platen and rollers should be cleaned whenever foreign matter such as dust or adhesive is present.

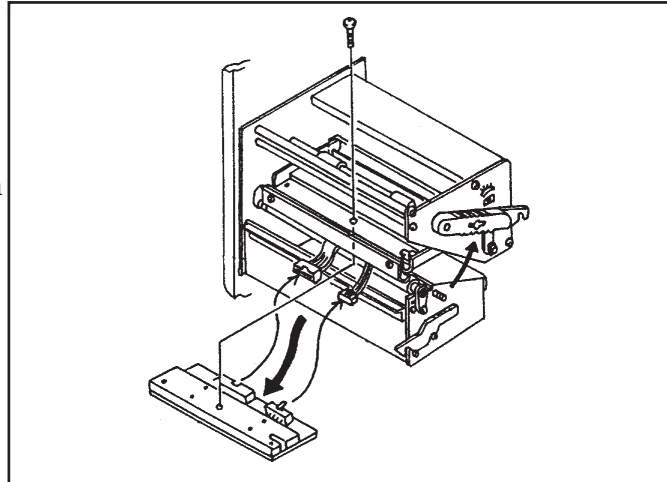
REPLACING THE PRINT HEAD**CL408e and CL412e**

The print head on the CL4XXe printers is a user-replaceable item. If it becomes damaged for any reason, it can be easily removed and replaced. Contact your local SATO representative for information on obtaining a new print head.

Supplies needed:

No. 2 Phillips screwdriver (a magnetic tip is helpful)

1. Turn the printer off and remove the power cable and open the **Top Access Door**.
2. Open the **Print Head Assembly** by rotating the green **Head Latch** counter-clockwise. The **Print Head Assembly** is spring-loaded and will automatically open as soon as the **Head Latch** is disengaged.
3. Remove the ribbon from the **Ribbon Rewind Spindle** if necessary.



4. View the **Print Head Assembly** from the front of the printer. Locate the single mounting screw on the top of the assembly. It is accessible through the hole in the **Top Assembly Plate**. Unscrew the screw and set it aside.
5. The **Print Head** should now be loosened from the top of the assembly by grasping either side and carefully pulling it forward.
6. Disconnect the signal and power cables from the print head connectors and set the **Print Head** aside.
7. Carefully attach the new print head to the connectors, using caution to make sure the connector keys are correctly positioned.

NOTE: Be careful not to scratch the printing surface of the print head while installing it. Scratching the surface will cause permanent and irreparable damage and is not covered by the warranty!

8. Locate the mounting screw in the top plate assembly and align it with the tapped hole in the new print head.
10. Re-secure the print head by tightening the screw.

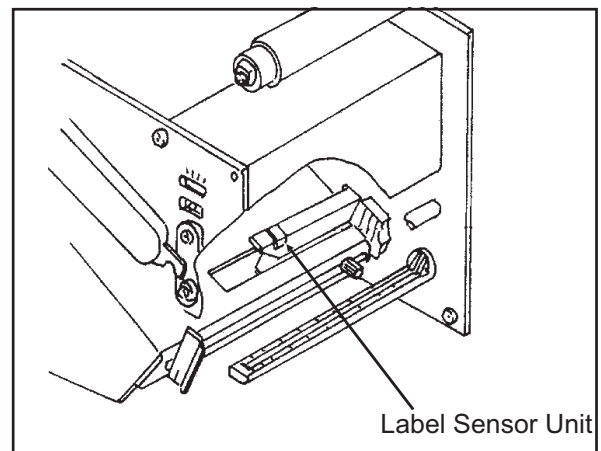
CLEANING THE SENSORS**CL408e and CL412e**

There are two sensors that are used to control the positioning of the label. One is a transmissive see-thru sensor that detects the edge of the label by looking through the backing paper which is translucent and detecting the presence of the opaque label. The other is a reflective sensor that detects the light reflected from the bottom of the label liner. When a printed black Eye-Mark passes through the beam, the light is no longer reflected back to the sensor detector, indicating to the printer that it should use this position as the start of a new label. When dust, dirt or other foreign matter interferes with the light path of either of these sensors, the results is erratic label positioning. These sensors should be cleaned regularly, at least every two rolls of labels.

Supplies Needed:

SATO SA070 Cleaning Kit

1. Turn the printer off and remove the power cable.
2. Open the label **Top Access Door**.
3. Open the **Print Head Assembly** by rotating the green **Head Latch** counter-clockwise. The **Print Head Assembly** is spring-loaded and will automatically open as soon as the **Head Latch** is disengaged.
4. Apply SATO Thermal Print Head Cleaner to one of the cotton swabs.
5. Insert the cotton swab between the top and bottom pieces of the **Sensor Unit** and move back and forth to clean any foreign matter from the exposed surface of the sensors.

**REPLACING THE FUSE****CL408e and CL412e****Supplies needed:**

250V 3A Fuse

1. Turn the printer power off and remove the power cable..
2. On the back of the printer, locate the **Fuse Cap** directly above the AC connector.
3. Unscrew the cap and remove the defective fuse.
4. Replace with a new 250V 3A fuse.
5. Screw the cap back onto the printer and replace the power cord.

Section 4: Cleaning and Maintenance

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SECTION 5. PROGRAMMING REFERENCE

Information on programming the Cle Series printers can be found in the *“e” and PRO Printer Programming Reference*, PN 9001096 found on the Printer Utilities CD-ROM.

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SECTION 6.

INTERFACE SPECIFICATIONS

INTRODUCTION

The CL Series “e” printers utilize a Plug-In Interface Module for maximum printer configuration flexibility. This section presents the interface specifications for the CL Series “e” Series printers. These specifications include detailed information on how to properly interface your printer with your host system.

The following information is presented in this section:

- Interface Types
- Using the Receive Buffer
- IEEE1284 Parallel Interface
- Universal Serial Bus (USB) Interface
- Local Area Network (LAN) Interface
- RS232C Serial Interface
 - General Specifications
 - Electrical Specifications
 - Pin Assignments
 - Ready/Busy Flow Control
 - X-On/X-Off Flow Control
 - Bi-Directional Communications Protocol

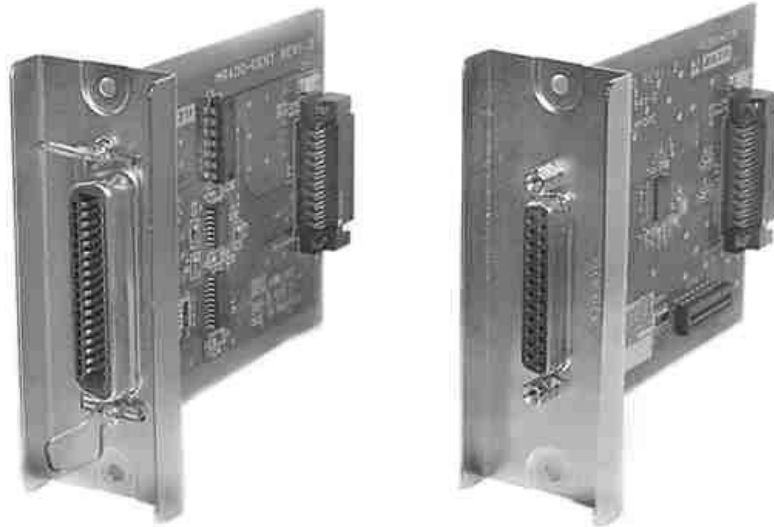
INTERFACE TYPES

The parallel interface for the CL Series “e” printers is a high speed, bi-directional interface that conforms to the IEEE1284 specification (ECP mode on some computers). The interface is also compatible with the older Centronics parallel interface standard. If it does not detect the correct IEEE1284 signals in the interface connection, it will automatically operate in the standard Centronics mode which is much slower. To use the IEEE1284 parallel interface to its fullest capability requires that the host also have an IEEE1284 compatible interface and that the two be connected with a cable that meets the IEEE1284 specification. If either of these two are not present, the data rate is severely compromised.

In order to provide flexibility in communicating with a variety of host computer systems all “e” printers use a Plug-In Interface Module. The IEEE1284 Interface module is shipped with the printer unless another interface type is specified at the time of the order. The other interfaces available are a high speed (to 57.6K bps) serial interface, an Ethernet interface or an optional Universal Serial Bus (USB) interface.

The Parallel interface will probably be the most useful in communicating with IBM PCs and compatibles. The RS232C Serial interface allows connectivity to a number of other hosts. The USB interface allows the printer to be connected to a computer that supports peripherals attached to a USB bus. Up to 127 peripherals can be connected to a single USB port.

WARNING: Never connect or disconnect interface cables (or use a switch box) with power applied to either the host or the printer. This may cause damage to the interface circuitry in the printer/host and is not covered by warranty.



THE RECEIVE BUFFER

The CL Series “e” printers have the ability to receive a data stream from the host in one of two ways. The receive buffer may be configured to accept one print job at a time or multiple print jobs. The single job print buffer is generally used by software programs that wish to maintain control of the job print queue so that it can move a high priority job in front of ones of lesser importance. The multiple job buffer, on the other hand prints all jobs in the order they are received by the printer, and the order of printing cannot be changed.

Single Job Buffer

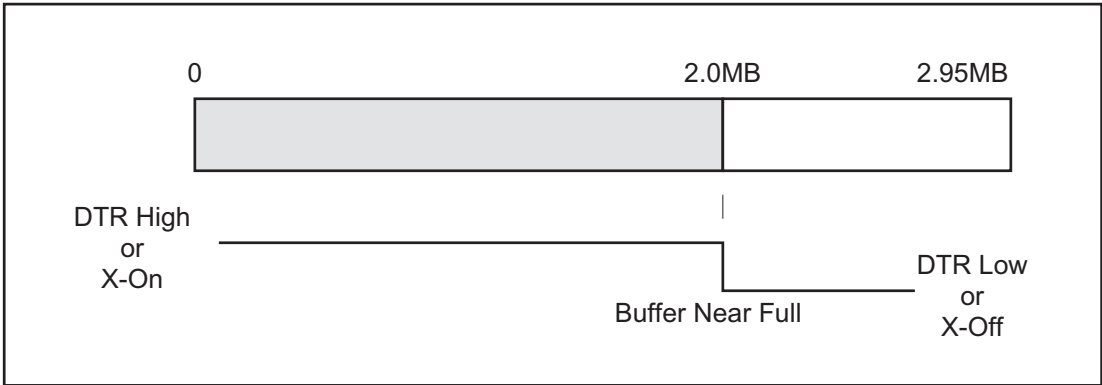
The printer receives and prints one job at a time. Each job must not exceed 2.95MB.

Multi Job Buffer

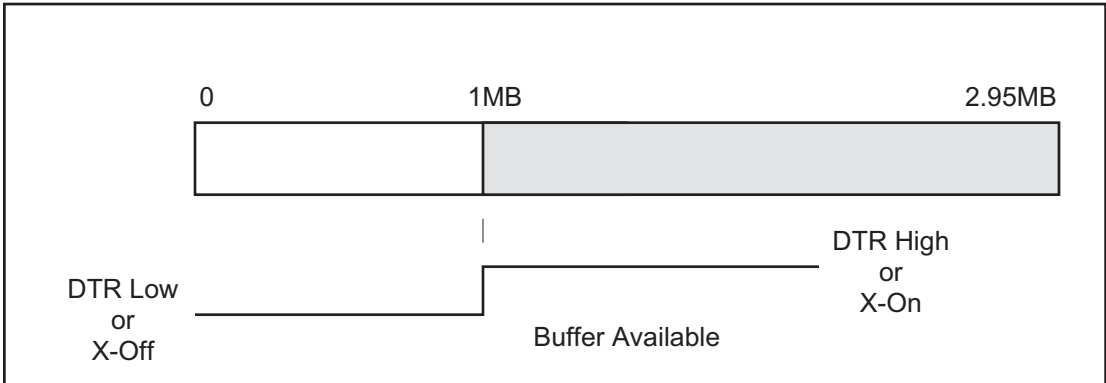
The printer is able to continuously receive print jobs, compiling and printing other jobs at the same time. It acts much like a “print buffer” to maximize the performance of the host and the printer.

When using the RS232 Serial interface, the Multi Job Buffer uses either the **Ready/Busy** with **DTR** (pin 20) or **X-On/X-Off** flow control protocols. See these sections for more details. With an empty receiving buffer, the status of **DTR** is “high” (or an **X-On** status if using **X-On/X-Off**), meaning the printer is ready to receive data. When the receive buffer is holding 2.0MB of data (1MB from being full), **DTR**

will go “low” (or an **X-Off** is sent) indicating the printer can no longer receive data. This condition is called “Buffer Near Full.”



The receiving buffer will not be able to receive more data again until a “Buffer Available” condition occurs. This takes place when the receiving buffer has emptied so that only 1MB bytes of data are being held (2.0MB bytes from being full). At this time, **DTR** will go “high” or an **X-On** is sent to tell the host that it can again receive data.



All printer error conditions (i.e., label out, ribbon out) will cause the printer to go busy (**DTR** “low” or **X-Off**) until the problem is corrected and the printer is placed on-line. The printer will also be busy if taken off-line from the front panel.

IEEE1284 PARALLEL INTERFACE

The parallel interface for the CL Series “e” printers is a Plug-In Interface Module that can be installed by the user. It conforms to the IEEE1284 specification. It will automatically detect the IEEE1284 signals and operate in the high speed mode. If it does not detect the IEEE1284 signals, it will operate in the standard Centronics mode, which is significantly slower. *For this reason, an interface cable and host interface conforming to the IEEE1284 specification must be present to fully utilize the speed capabilities.* This interface also operates bi-directionally and can report the status of the printer back to the host.

ELECTRICAL SPECIFICATIONS

- Printer Connector** AMP 57-40360 (DDK) or equivalent
- Cable Connector** AMP 57-30360 (DDK) or equivalent

Section 6. Interface Specifications

Cable IEEE1284 Parallel, 10 ft. (3 m) or less

Signal Level High = +2.4V to +5.0V
Low = 0V to -0.4V

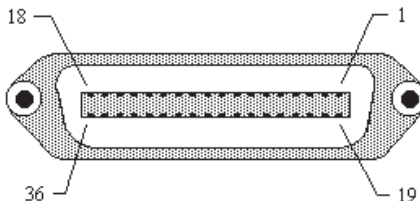
DATA STREAMS

<ESC>A . . Job#1 . . <ESC>Z<ESC>A . . Job#n . . <ESC>Z

IEEE1284 Parallel Interface Pin Assignments

PIN	SIGNAL	DIRECTION	PIN	SIGNAL	DIRECTION
1	$\overline{\text{STROBE}}$	To Printer	19	STROBE Return	Reference
2	DATA 1	To Printer	20	DATA 1 Return	Reference
3	DATA 2	To Printer	21	DATA 2 Return	Reference
4	DATA 3	To Printer	22	DATA 3 Return	Reference
5	DATA 4	To Printer	23	DATA 4 Return	Reference
6	DATA 5	To Printer	24	DATA 5 Return	Reference
7	DATA 6	To Printer	25	DATA 6 Return	Reference
8	DATA 7	To Printer	26	DATA 7 Return	Reference
9	DATA 8	To Printer	27	DATA 8 Return	Reference
10	$\overline{\text{ACK}}$	To Host	28	ACK Return	Reference
11	BUSY	To Host	29	BUSY Return	Reference
12	PTR ERROR	To Host	30	PE Return	Reference
13	SELECT	To Host	31	$\overline{\text{INIT}}$	From Host
14	$\overline{\text{AUTOFD}}$ ⁽¹⁾	To Host	32	$\overline{\text{FAULT}}$	To Host
15	Not Used		33	Not Used	
16	Logic Gnd		34	Not Used	
17	FG	Frame Ground	35	Not Used	
18	+5V (Z=24K ohm)	To Host	36	$\overline{\text{SELECTIN}}$ ⁽¹⁾	From Host

(1) Signals required for IEEE1284 mode.



OPTIONAL RS232C SERIAL INTERFACE

The High Speed Serial Interface is a Plug-In Interface Module that can be installed in the printer by the user.

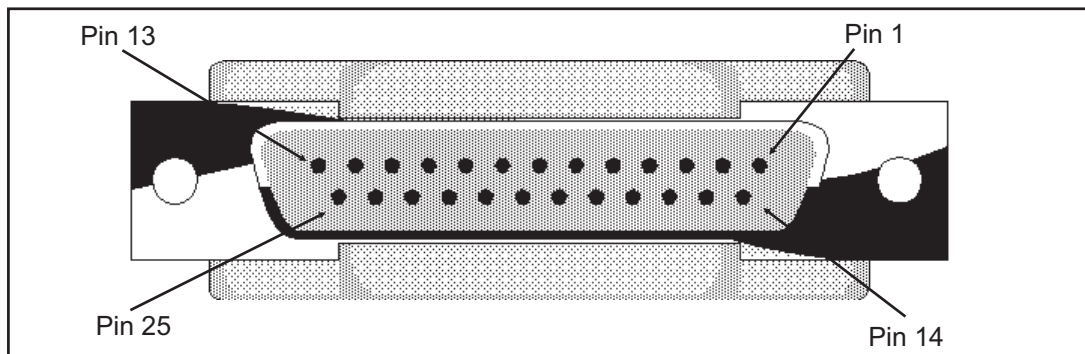
GENERAL SPECIFICATIONS

Asynchronous ASCII	Half-duplex communication Ready/Busy Hardware Flow Control Pin 20, DTR Control Pin 4, RTS Error Condition X-On/X-Off Software Flow Control Bi-Directional Communication
Data Transmission Rate	9600, 19200, 38400, 57600 bps
Character Format	1 Start Bit (fixed) 7 or 8 data bits (selectable) Odd, Even or No Parity (selectable) 1 or 2 Stop bits (selectable)

ELECTRICAL SPECIFICATIONS

Connector	DB-25S (Female)
Cable	DB-25P (Male), 50 ft. maximum length. For cable configuration, refer to Cable Requirements appropriate to the RS232C protocol chosen.
Signal Levels	High = +5V to +12V Low = -5V to -12V

PIN ASSIGNMENTS



RS232C Interface Signals

PIN	DIRECTION	SIGNAL DEFINITION
1	Reference	FG (Frame Ground)
2	To Host	TD (Transmit Data) - Data from the printer to the host computer. Sends X-On/X-Off characters or status data (Bi-Directional protocols).
3	To Printer	RD (Receive Data) - Data to the printer from the host computer.
4	To Host	RTS (Request to Send) - Used with Ready/Busy flow control to indicate an error condition. RTS is high and remains high unless the print head is open (in this case, RTS would return to the high state after the print head is closed and the printer is placed back on-line) or an error condition occurs during printing (e.g., ribbon out, label out).
5	To Printer	CTS (Clear to Send) - When this line is high, the printer assumes that data is ready to be transmitted. The printer will not receive data when this line is low. If this line is not being used, it should be tied high (to pin 4).
6	To Printer	DSR (Data Set Ready) - When this line is high, the printer will be ready to receive data. This line must be high before data is transmitted. If this line is not being used, it should be tied high (to pin 20).
7	Reference	SG (Signal Ground)
20	To Host	DTR (Data Terminal Ready) - This signal applies to Ready/Busy flow control. The printer is ready to receive data when this pin is high. It goes low when the printer is off-line, either manually or due to an error condition, and while printing in the Single Job Buffer mode. It will also go low when the data in the buffer reaches the Buffer Near Full level.

Cable Requirements

DB9	DB25	HOST	INTERCONNECTION	PRINTER
1	1	FG	←—————→	1 FG (Frame Ground)
2	3	RD	←—————	2. TD (Transmit Data)
3	2	TD	—————→	3 RD (Receive Data)
8	5	CTS	←—————	4 RTS (Request to Send)
7	4	RTS	—————→	5 CTS (Clear to Send)
4	20	DTR	—————→	6 DSR (Data Set Ready)
6	6	DSR*	←—————	20 DTR (Data Terminal Ready)
5	7	SG	←—————→	7 SG (Signal Ground)

* This connection at the host side of the interface would depend upon the pin that is being used as the Ready/Busy signal by the driving software. Typically, on a PC, it would be either CTS (pin 5) or DSR (pin 6) on a DB-25 connector.

READY/BUSY FLOW CONTROL

Ready/Busy is the hardware flow control method for the serial interface on the Se printers. By raising/lowering the voltage level on Pin 20 of the RS232 port, the printer notifies the host when it is ready to receive data. Pin 4 (**RTS**) and pin 20 (**DTR**) are the important signals on the printer for this method of flow control. The

host must be capable of supporting this flow control method for it to function properly.

X-On/X-Off FLOW CONTROL

X-On/X-Off flow control is used whenever hardware (Ready/Busy) flow control is not available or desirable. Instead of a voltage going high/low at pin 20, control characters representing “Printer Ready” (**X-On** = 11 hexadecimal) or “Printer Busy” (**X-Off** = 13 hexadecimal) are transmitted by the printer on pin 2 (Transmit Data) to the host. In order for this method of flow control to function correctly, the host must be capable of supporting it. **X-On/X-Off** operates in a manner similar to the function of pin 20 (**DTR**) as previously explained. When the printer is first powered on it sends an **X-Off** when the “Buffer Near Full” level is reached and a **X-On** when the data level of the buffer drops below the “Buffer Available” mark. When the printer is taken off-line manually, it transmits an **X-Off** indicating it cannot accept data. When it is placed back on line manually, it sends an **X-On**, indicating it is again available for receipt of data. If an error occurs during printing (paper out, ribbon out), the printer sends an **X-Off** as soon as an error condition is detected. When the error is cleared and the printer is placed back on-line, it transmits an **X-On** indicating it is again ready to accept data.

Upon power up if no error conditions are present, the printer will continually send **X-On** characters at five millisecond intervals until it receives a transmission from the host.

Data Streams

The data streams for **X-On/X-Off** and **Ready/Busy** flow control are constructed in the same way as they are for Ready/Busy flow control.

<ESC>A . . Job#1 . . <ESC>Z<ESC>A . . Job#n . . <ESC>Z

Example: <ESC>A . . Job#1 . . <ESC>Z

NOTE: All characters are in ASCII.

UNIVERSAL SERIAL BUS (USB) OPTIONAL INTERFACE

The Universal Serial Bus (USB) interface is a Plug-In Interface Module that can be installed by the user. It requires a driver (shipped with each printer that has the interface installed) that must be loaded on your PC and the PC must be configured to support USB peripherals using Windows 98. Details for loading the USB driver are contained in the USB Interface Manual that is shipped with each printer with a USB Optional interface installed. Up to 127 devices may be connected to a USB port.

LOCAL AREA NETWORK (LAN) OPTIONAL INTERFACE

A Local Area Network (LAN) interface is a Plug-In Interface Module that can be installed by the user. It requires a driver shipped with each printer that has the interface installed. The driver that must be loaded on your PC and the PC must be configured to support the TCP/IP network protocol using a 10/100BaseT LAN connection. Details for loading the LAN driver are contained in the LAN Interface Manual that is shipped with each printer with a LAN Optional interface installed.

BI-DIRECTIONAL COMMUNICATIONS

This is a two-way communications protocol between the host computer and the printer, thus enabling the host to check printer status. When Bi-Com 4 communications is selected, there is no busy signal from the printer. The host must request the complete status from the printer, including ready/busy. The host may request status in two different ways.

ENQUIRE/ACK/NAK

In the Bi-Com 4 mode, the host transmits an **ENQ** (05 hexadecimal) to the printer and the printer will respond with its status within five milliseconds. If printing, it will respond upon finishing the current label, then resume printing. In order for this protocol to work properly with an RS232 Optional Interface, pin 6 (**DTR**) and pin 5 (**CTS**) must be held high by the host. One way to ensure these pins are always in the correct state is to tie pin 20 (**DTR**) to pin 6 (**DSR**) and pin 4 (**RTS**) to pin 5 (**CTS**) at the printer end of the cable.

Enquire (ENQ)

Upon receipt of an **ENQ** command, the printer responds with 25 bytes of status information bounded by an **STX/ETX** pair. The Bi-Com protocol works only in the Multi Job Buffer mode. The status information is defined as follows:

<STX>{ 2 Byte ID}{1 Status Byte}{6 Byte Label Remaining}{16 Byte Job Name}<ETX>

ID - This is a two byte number identifying the current print job ID. The print job ID is defined using the **<ESC>ID** Job ID command transmitted with the print job (see Job ID Store in the command listing for more information on how to use this command). The range is from 00 to 99.

Status - A single byte defining the current status of the printer (see the Status Byte Definition table).

Label Remaining - Six bytes defining the number of labels remaining in the current print job. The range is from 000000 to 999999 labels.

Job Name - 16 bytes of ASCII characters identifying the name assigned to the job by the **<ESC>WK** Job Name command. If the Job Name is less than 16 characters, the field will be padded with leading zeroes.

If an **ENQ** is received after the print job specified in the ID bytes has been completed, or there is no data in the buffer, the printer will respond with two "space" characters

(20 hexadecimal) for the ID number, six “zero” characters (30 hexadecimal) in the Remaining Labels bytes and the 16 byte Job Name.

Cancel (CAN)

If a **CAN** (18 hexadecimal) command is received, it will stop the print job and clear all data from the receive and print buffers. A delay of five milliseconds or more is required before any new data can be downloaded. The **CAN** command is effective immediately upon receipt, even if the printer is off-line or in an error condition. The printer will return an **ACK** (06 hexadecimal) if there is no printer error condition and a **NAK** (15 hexadecimal) if an error condition exists.

Print Job

Upon receipt of a valid print job (**<ESC>A . . . <ESC>Z**), an **ACK** (06 hexadecimal) will be returned by the printer if there are no errors and a **NAK** (16 hexadecimal) if a printer error exists.

Print Stop (DLE)

If a **DLE** (10 hexadecimal) is received by the printer, the print process is stopped and an **ACK** (06 hexadecimal) is returned if there are no errors and a **NAK** (16 hexadecimal) if a printer error exists.

Print Start (DC1)

If the printer has been stopped by receipt of a **DLE** (10 hexadecimal) command, it can be restarted by sending a **DC1** (hexadecimal 11) command. Upon receipt of this command an **ACK** (06 hexadecimal) is returned if there are no errors and a **NAK** (16 hexadecimal) if a printer error exists.

(1) To provide compatibility with older SATO printers, the RS232 interface can be configured to use an earlier Bi-Com 3 ENQ/ACK/NAK protocol selected via DSW2-8 and DSW1-7/8 (on the RS232 Interface module). The earlier protocol did not have provisions for the Job Name and did not respond to the DLE or DC1 commands. Also, there are additional Response Codes in the Status Byte Definition. It is recommended that you use the current protocol rather than the earlier version unless it is necessary for compatibility with existing software.

Status Byte Definition, Bi-Com Protocol

ASCII	HEX	DEFINITION
OFF-LINE		
0	30	No Errors
1	31	Ribbon Near End
2	32	Buffer Near Full
3	33	Ribbon Near End and Buffer Near Full
4 ⁽¹⁾	34	Print Stop (no error)
ON-LINE, WAITING FOR DATA		
A	41	No Errors
B	42	Ribbon Near End
C	43	Buffer Near Full
D	44	Ribbon Near End and Buffer Near Full
E ⁽¹⁾	45	Print Stop (without error)
ON-LINE, PRINTING		
G	47	No Errors
H	48	Ribbon Near End
I	49	Buffer Near Full
J	4A	Ribbon Near End and Buffer Near Full
K ⁽¹⁾	4B	Print Stop (without error)
ON-LINE, WAITING TO DISPENSE A LABEL		
M	4D	No Errors
N	4E	Ribbon Near End
O	4F	Buffer Near Full
P	50	Ribbon Near End and Buffer Near Full
Q ⁽¹⁾	51	Print Stop (without error)
ON-LINE, COMPILING PRINT JOB		
S	53	No Errors
T	54	Ribbon Near End
U	55	Buffer Near Full
V ⁽¹⁾	56	Ribbon Near End and Buffer Near Full
W ⁽¹⁾	56	Print Stop (without error)
OFF-LINE, ERROR CONDITION		
b	62	Head Open
c	63	Paper End
d	64	Ribbon End
e	65	Media Error
f	66	Sensor Error
g	67	Head Error
j	6A	Cutter Error
k	6B	Other Error Condition

(1) Not supported by legacy Bi-Com protocols

STATUS RESPONSE

The second method of determining printer status is to interrogate the printer with specific commands. The response from these commands will provide specific information about the printer status depending upon the command. This allows the controlling application to determine the status of a printer when it is located in a remote location. Details on the Status Response mode are found in the *“e” and PRO Printer Programming Reference*, PN 9001096, found on the Printer Utilities CD-ROM.

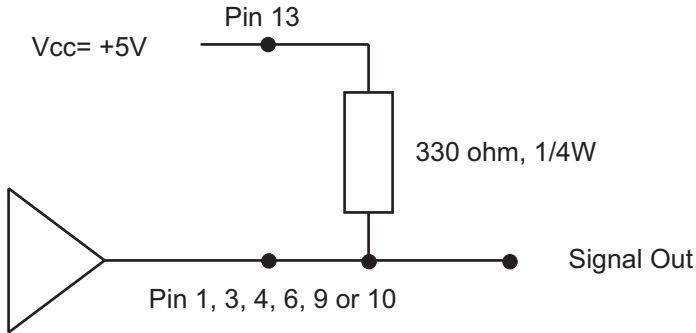
EXT CONNECTOR

The EXT connector on the rear panel of the CL Series “e” printers is intended for use with the external printer accessories such as label rewinders or applicators. The 14-pin Centronics type connector provides a choice of four different output signals along with various error conditions.

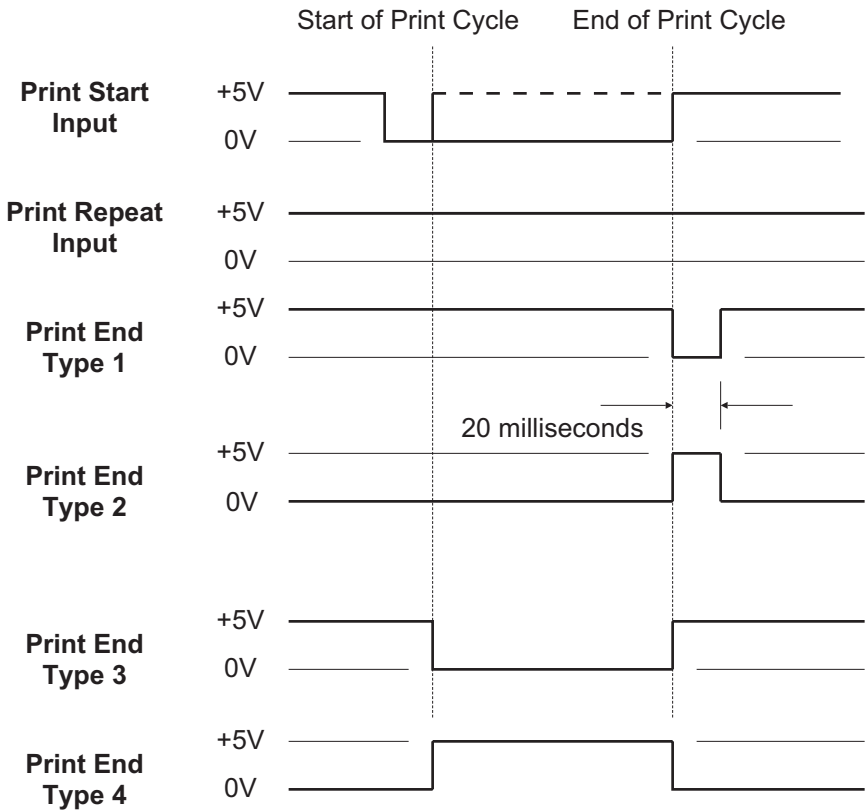
Pin Assignments

PIN	DIRECTION	SIGNAL DESCRIPTION
13	To Host	Vcc - +5V
10	To Host	Ribbon Near End - This pin goes high when the amount of ribbon on the unwind shaft is approximately 46 feet (14 m). The output will be low when the ribbon is completely out.
4	To Host	Error - This pin goes low when the printer detects an error condition such as head open or receiving buffer full.
7	To Printer	Reprint - A duplicate of the last label in a print job will be reprinted when this signal is received.
5	To Printer	Print Start - The printer will print one label when this pin is pulled to ground. This signal must be enabled by placing switch DSW3-5 on the Control Panel in the OFF position.
6	To Host	End Print - It is used to drive an applicator or other external device requiring synchronization with the print cycle. You may choose between four types of output signals using control panel DSW3-6 and DSW3-7 selections. See timing charts on next page.
1	To Host	Label Out - This pin goes low (0V) when a label out error exists.
3	To Host	Ribbon Out - This pin goes low (0V) when the ribbon is out.
2	Reference	Signal Ground
8	To Printer	Reserved
9	To Host	Off Line - This pin goes low (0V) when the printer is Off Line.
11		Reserved
12	To Host	+24V +/- 10% @2A - Power for external devices.
14		Frame Ground

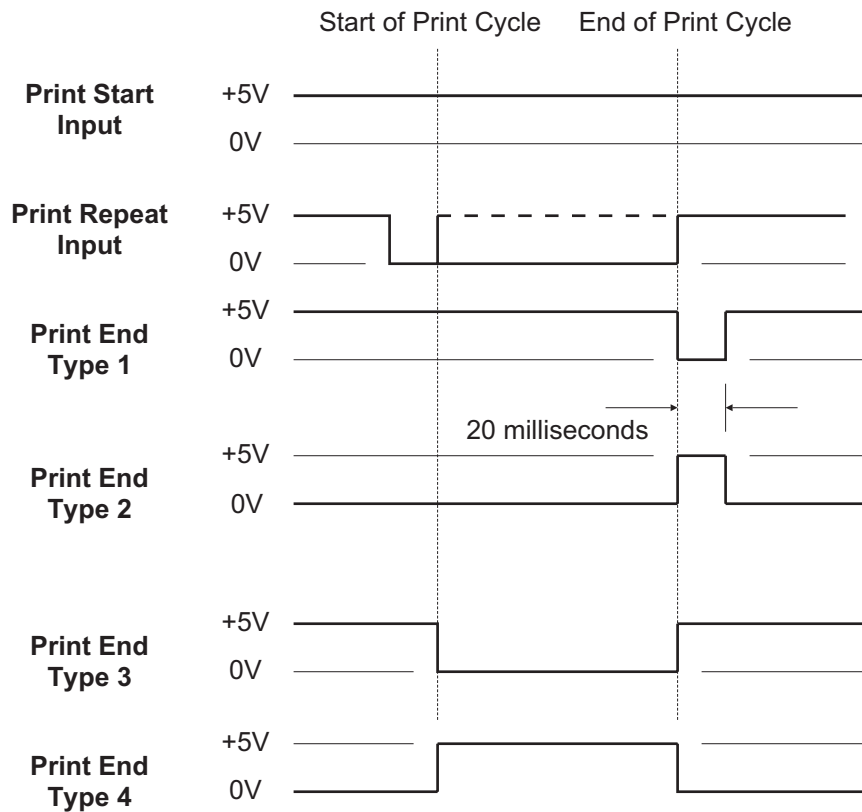
NOTE: The signals on pins 1, 3, 4, 6, 9 and 10 each have an open collector output. These pins normally measure +.07V maximum when a true condition exists. If a false condition occurs, the voltage will drop to 0V. To achieve a signal level of +5V, you must add a 330 ohm, 1/4W pull-up resistor between the open collector output pin and Vcc (pin 13) as illustrated. This will provide a signal level of +5V for a true condition and 0V when a false condition exists. The maximum voltage that can be applied to these pins is +50V and the maximum current they can sink is 500 milliamps.



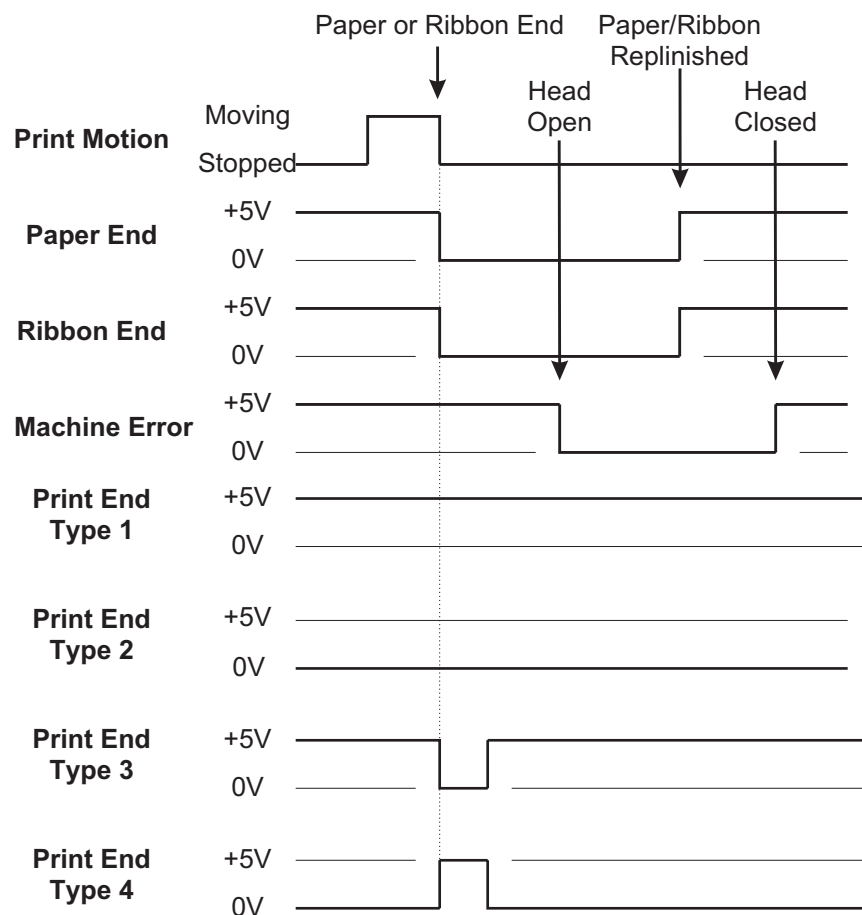
STANDARD OPERATION



REPEAT PRINT



ERROR SIGNALS



SECTION 7.

TROUBLESHOOTING

This section has been devised to help you if you are unable to produce output on the CL Series “e” printers. Use this section to make sure the basics have been checked before deciding you are unable to proceed any further. The section is divided into three parts:

- Initial Checklist
- IEEE1284 Parallel Interface
- RS232C Serial Interface

INITIAL CHECKLIST

1. Is the printer powered up and ON-LINE?
2. Is the ERROR light on the front panel off? Is this light is on, it may mean the Print Head Assembly or the Label Hold-Down is not closed and latched in position..
3. Are the LABEL and RIBBON lights on the front panel off? If these lights are on, the labels or ribbons may be incorrectly loaded.

USING THE IEEE1284 PARALLEL INTERFACE

1. Is the IEEE1284 printer cable connected securely to your parallel port (DB-25S Female) on the PC and to the Parallel Interface connector on the printer?

WARNING: Never connect or disconnect interface cables (or use a switch box) with power applied to either the printer or the host. This may cause damage to the interface circuitry and is not covered by warranty.

2. Does the Parallel interface cable used meet IEEE1284 specifications? If it does not and you are connected to an IEEE1284 or ECP parallel port on the computer, the printer may not be able to communicate correctly.
3. Is there more than one parallel interface port on your PC (LPT1, LPT2, etc.)? If so, make sure you are sending data out the correct port.
4. Is the IEEE1284 Interface Module installed in the printer? Older versions of the Parallel Interface module will not work correctly in the “e” printers.
5. When you send the print job to the printer, and it does not respond, do you get an error message on your PC that says “Device Fault” or something similar?

Section 7. Troubleshooting

This may mean that the computer doesn't know the printer is there. Verify that:

- a. Both ends of the cable are securely inserted into their respective connectors.
- b. The printer is ONLINE.
- c. The cable is not defective. There are other things that can cause this error message on your computer, but at this stage, a defective cable may be one of the reasons.

5. When you send the print job to the printer and it does not respond, and there is no error message on the PC:

- a. Check your data stream for some of the basics. Is your job framed as follows?

```
<ESC>A—DATA—<ESC>Z
```

- b. Verify that you've included all required parameters in the data stream.

- c. Verify the following:

- You have not typed a "0" (zero) for an "O" (letter) or vice-versa.
 - You have not missed any <ESC> characters where they're needed.
 - Make sure all printer command codes are capital letters.
6. If you've checked all of the above and the printer still isn't printing, you may want to try a Buffer Hex Dump to determine what (if anything) the printer is receiving from your computer. See Printing Hex Dump Labels in Section 3.

The Parallel port is now listening for incoming data. Send your print job. The printer will now print (only once) a Hexadecimal (Hex) Dump of everything it received from the host computer. Each 2-digit hexadecimal character represents a character the printer received. It may be tedious, but now you can analyze and troubleshoot the data stream.

7. While checking the Hex Dump printout, if you notice 0D_H 0A_H (Carriage Return and Line Feed) characters throughout. The command string should be continuous and no CR or LF characters are allowed between the Start Command (<ESC>A) and the Stop Command (<ESC>Z). If you are using BASIC, it may be adding these characters automatically as the line wraps. Adding a "width" statement to your program can help to suppress these extra 0D_H 0A_H characters by expanding the line length up to 255 characters. See the "e" and PRO Printer Programming Reference, PN 9001096, for details on writing a program in BASIC.

If you're not programming in BASIC, check to see if you have an equivalent statement in the language you're using to suppress extra

carriage returns and line feeds from your data being sent out to the printer. We want the data stream to be one complete line going to the printer.

USING THE RS232C SERIAL INTERFACE

1. Is the RS232C Serial cable connected securely to your serial port on the PC (DB- 25S or DB-9S Male) and to the RS232C connector on the printer?

WARNING: Never connect or disconnect interface cables (or use a switch box) with power applied to either the printer or the host. This may cause damage to the interface circuitry and is not covered by warranty.

2. Is the cable defective? At the very least, you should be using a “Null Modem Cable,” which crosses pins in a specific manner. This should enable your printer to print. But we recommend that you eventually use a cable built to specifications as described in Section 6: Interface Specifications.
3. Is the RS232 Interface Module installed in the printer?
4. Check for obvious errors in the data stream. Is the data properly framed with the <ESC>A and <ESC>Z commands? See Section 5 if necessary.
5. If after sending your job to the printer, it only “beeps” and displays an error message on the LCD display, you may have a configuration problem. There may be some inconsistencies with the Baud Rate, Parity, Data Bits, or Stop Bits in relation to your host computer. If you are confused as to what the printer’s current RS232 settings are, print a Configuration Test label(see Section 3). It will list all of the current printer configuration settings.
6. If you still are unable to get printer output, try the Hex Dump as described in Step 5 under the Parallel Interface troubleshooting. In this case, the printer monitors the RS232C interface for incoming data.
7. From the Hex Dump, if you are seeing extra 0D_H 0A_H (CR and LF) characters, and are using BASIC, refer to the beginning of the Command Code section. It provides hints for writing a SATO program in BASIC.

ERROR SIGNALS

The LCD Display, Front Panel LED Indicators and Buzzer provide a visual/audio indication of the type of error encountered.

LED	LCD MESSAGE	AUDIBLE BEEP	ERROR CONDITION	TO CLEAR
Error On	Machine Error	1 Long	Machine Error	Cycle power on/off
Error On	EEPROM Error	1 Long	EEPROM Read/Write	Cycle power on/off
Error On	Head Error	1 Long	Head	Cycle power on/off
Error On	Sensor Error	3 Short	Sensor	Cycle power on/off
Error Blinks	Card R/W Error	1 Long	Memory Card Read/Write	Cycle power on/off
Error Blinks	Card Low Battery	1 Long	Memory Card Battery Low	Cycle power on/off
Error Blinks	Head Open	3 Short	Head Open	Close head lever
Error Blinks	Cutter Error	3 Short	Cutter	Cycle Power On/Off
Error On Line Blinks	PARITY ERROR	3 Short	RS232 Parity Error	Cycle power on/off
Error On Line Blinks	Overrun Error	3 Short	RS232 Overrun Error	Cycle power on/off
Error On Line Blinks	Framing Error	3 Short	RS232 Framing Error	Cycle power on/off
Error On Line Blinks	Buffer Over	3 Short	Buffer Overflow	Cycle power on/off
Error Blinks Label On	Paper End	3 Short	Label End	Open/close Head Lever Open/close Label Hold-down
Error Blinks Ribbon On	Ribbon End	3 Short	Ribbon End	Open/close Head Lever Open/close Label Hold-down
Error Blinks Label Blinks	Media Error	3 Short	Media Error	Open/close Head Lever
Ribbon Blinks		None	Ribbon Near End	Replace ribbon with full roll
Line Blinks		None	Buffer Near Full	Slow down transmission rate

APPENDIX A.

OPTIONAL ACCESSORIES

INTRODUCTION

This section contains instructions for using the following CL Series “e” optional features:

- Label Rewinder
- Label Cutter
- Label Dispenser
- PCMCIA Memory Expansion
- Internal Flash ROM Memory Expansion
- Calendar
- Interface Cards

LABEL REWINDER

ALL MODELS

The rewinder is an external unit that allows for labels and tags to be rewound in rolls up to 8.5 inches in diameter. It derives its power directly from the printer’s EXT connector using a built-in cable. The rewinder provides the ability to rewind tags/labels from the printer and subsequently be unwound for later use with applicators.

Installation

1. Position the **Rewinder** at the front of the printer and align it with the label slot. (The **Rewind Wheel/Spindle** should be positioned away from the printer.)
2. Connect the built-in cable from the **Rewinder** to the EXT connector at the rear of the printer.
3. On the **Rewinder**, remove the metal clamp from the **Rewind Spindle**.
4. Feed the lead end of the label stock under the first spindle and onto the **Rewind Spindle**. Feed the stock around the spindle once, then replace the metal clamp over the label stock. Wind another revolution to ensure the labels are secure on the spindle.
5. Select the REWIND option on the rewinder, then set the power switch to ON. (The printer must be powered ON for the rewinder to function.)

Removing and Unwinding the Roll

As labels are printed, tension from the rewinder should keep the label stock taut as it wraps itself on the spindle.

To remove the roll from the spindle, first set the power switch to OFF. Remove the metal clamp, then remove the rewound roll of labels.

To unwind for using with an applicator, first set the power switch OFF. Attach the lead edge of the labels from the rewind spindle to the applicator entry point. Select the WIND option on the rewinder, and when ready to begin, set the power switch to ON.

LABEL CUTTER

ALL MODELS

The label cutter consists of an internal mechanism that will cut labels or tags as they exit from the printer. The cutter can be used to print labels of various lengths using continuous form label/tag stock or to easily separate labels when there is no perforation at the label gap.

Operator Setup

The following steps should be taken to set up the label cutter.

1. Install the label cutter, following the instructions provided with the unit. The installation time is approximately 20 minutes.
2. Power the printer ON.
3. The printer must be configured to use the **Label Cutter** option. Switches DSW3-1 and DSW3-2 on the front panel are used to configure the printer. To enable the cutter, **DSW3-1** should be in the **ON** position and **DSW3-2** should be in the **OFF** position.
4. Open the **Print Head Assembly** and feed the edge of the labels/tags into the cutter assembly and out between the label cutters.

NOTE: Although the cutting blade is fairly well protected, be careful as you feed labels into the cutter area. You may want to have the printer powered OFF at this point.

5. Close the **Print Head Assembly** and place the printer on-line.
6. The **Label Cutter** is ready for use.
7. Adjust the cut position using the backfeed adjustment procedures outlined in *Section 3: Configuration*.

General Operation

The data stream to be sent to the printer may need to be altered to add the Cutter Command. If this command is not used, the cutter will default to cut after every label assuming it has been enabled in the printer configuration. For more details, see the *“e” and PRO Printer Programming Reference*. As the labels are printed, they will be cut based on the the data supplied using the cutter command.

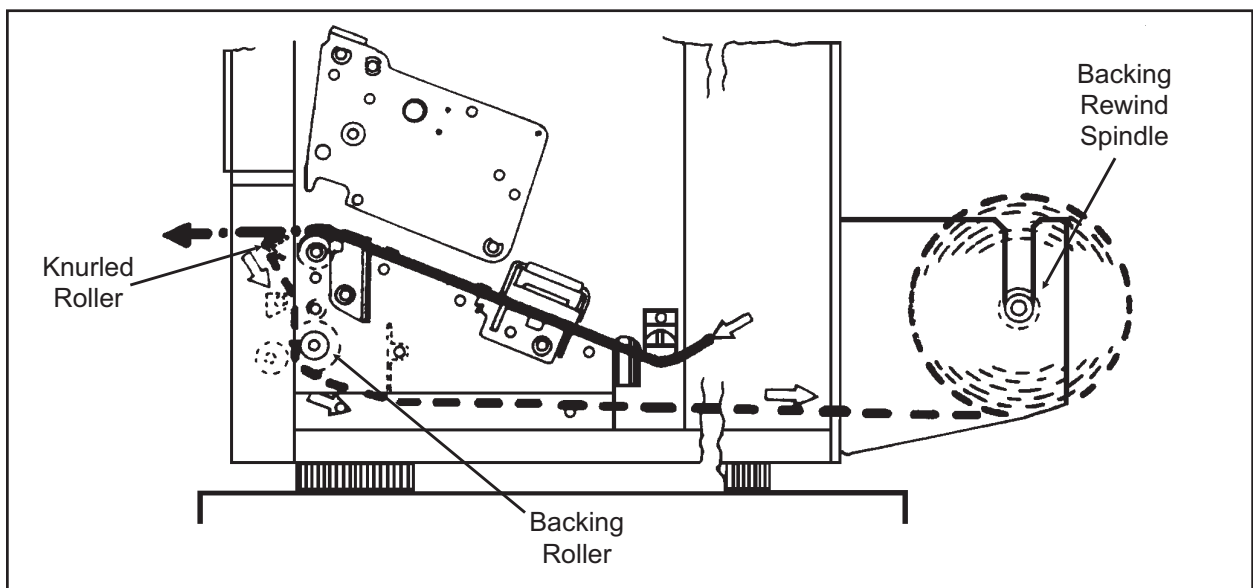
LABEL DISPENSE OPTION**CL608e and CL612e**

The CL608e and CL612e **Label Dispense Option** is an external mechanism that provides the ability to print labels in the “demand” mode. It is attached to rear of the printer with two screws and is connected to the internal drive mechanism of the printer. When the label dispenser is installed and configured for operation, the printer dispenses one label at a time, peeling the backing from the label, which allows for immediate application to the product by the operator.

Operator Setup

The following steps should be taken to set up the **Label Dispense Option**.

1. Install the option using the instructions provided with the unit. The installation time is approximately 30 minutes.
2. Power the printer ON.
3. The printer must be configured to used the label dispenser option. Switches DSW3-1 and DSW3-2 on the front panel are used to configure the printer. To enable the dispenser, both **DSW3-1** and **DSW3-2** should be in the **ON** position.
4. Remove enough labels from the backing paper to provide 24 to 30 inches of backing free from labels.
5. Open the **Print Head** assembly and feed the backing paper through the print area in the normal manner.
6. At the label exit area, feed the backing paper down and behind the **Knurled Roller**, then back down and around the **Backing Roller**.
7. Feed the backing paper out the slot in the bottom rear of the printer and attach to the **Backing Rewind Spindle**.



Label Dispenser Routing, CL608e/CL612e

8. Close the **Print Head** and place the printer on-line.
9. The **Label Dispense Option** is ready for use.

LABEL DISPENSE OPTION

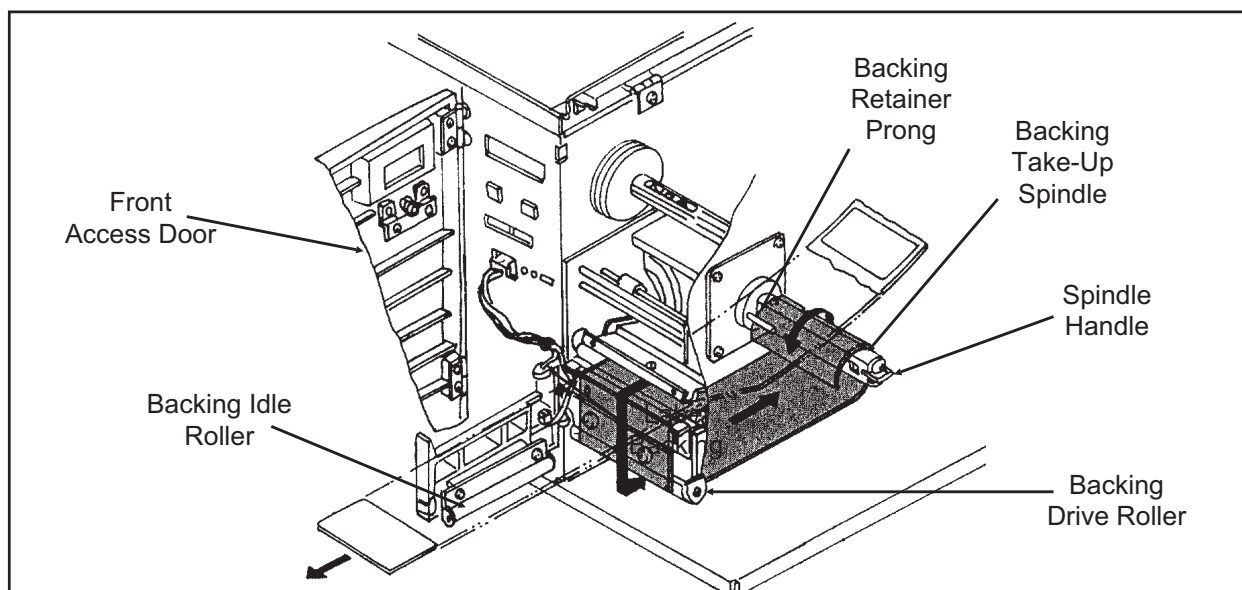
CL408e and CL412e

The CL408e and CL412e have an internally mounted **Label Dispense Option** which rewinds the label backing as the labels are stripped. When the **Label Dispense Option** is installed and configured for operation, the printer dispenses one label at a time, peeling the backing from the label, which allows for immediate application to the product by the operator.

Operator Setup

The following steps should be taken to set up the **Label Dispense Option**.

1. Install the **Label Dispense Option** using the instructions provided with the unit. The installation time is approximately 30 minutes.
2. Power the printer OFF.
3. The printer must be configured to used the **Label Dispense Option**. Switches DSW3-1 and DSW3-2 on the front panel are used to configure the printer. To enable the dispenser, both **DSW3-1** and **DSW3-2** should be in the **ON** position.
4. Remove enough labels from the backing paper to provide 24 to 30 inches of backing free of labels.
5. Open the **Top Access Door** and the **Front Access Door**.
6. The **Backing Idle Roller** is held closed by the green **Front Access Door Latch** (the Front Access Door is held in the closed position by a magnetic latch when the **Label Dispense Option** is installed). Push down on the rear of the

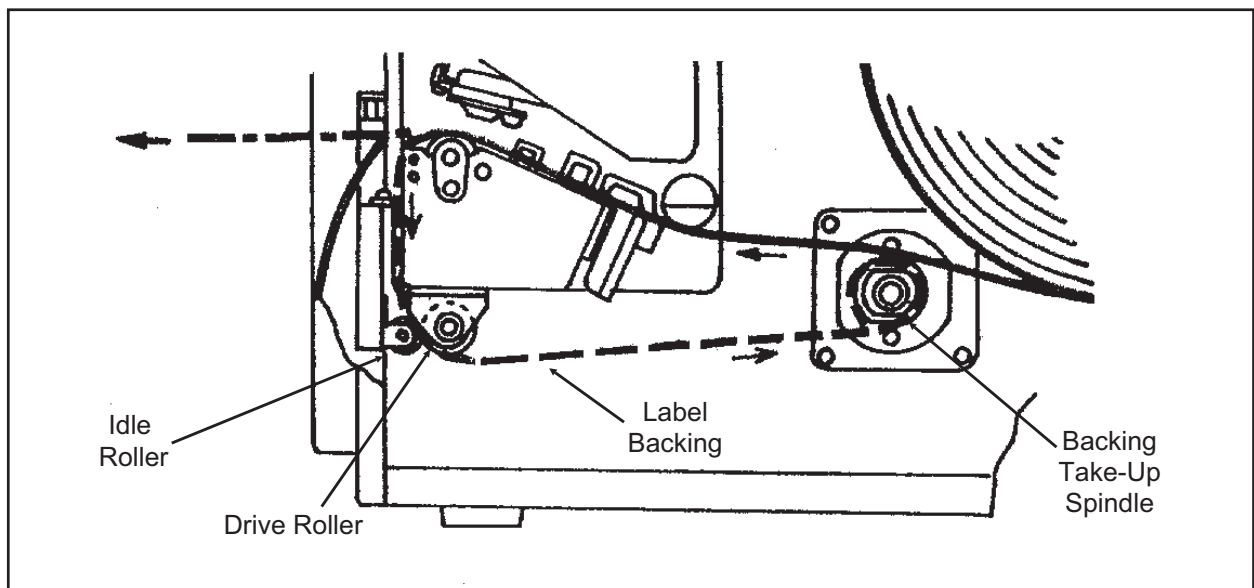


Label Backing Path, CL408e/CL412e

- Front Access Door** latch until it releases and swing the **Backing Idle Roller** out of the way.
7. Open the **Print Head** and feed the backing paper through the print area in the normal manner.
 8. Route the label backing down the front of the print mechanism and around the **Backing Drive Roller**.
 9. Wrap the backing under and around the **Backing Take-Up Spindle**, routing it under the two retainer prongs.
 10. Manually turn the **Backing Take-Up Spindle** counter-clockwise to take up all the slack in the backing.
 11. Swing the **Backing Idle Roller** back into position until the **Front Access Door Latch** engages.
 12. Close the **Front Access Door** until the magnetic latch engages.
 13. Close the **Print Head**.
 14. Close the **Top Access Cover**.
 15. To remove the backing from the **Backing Retainer Spindle**, pull outward on the green **Spindle Handle**. This will slide the rolled-up backing out from under the two retainer prongs, allowing the label backing to be easily removed and discarded.

General Operation

Send your data stream in the normal manner to the printer. Labels should print one at a time, even if your print quantity command requests more than one label. As the labels are printed and presented for the operator to remove, the backing paper will be



Label Dispenser Routing, CL408e/CL412e

rewound on the spindle. The next label will only print after removing the current label from the label exit path.

Note: The label dispenser will function only if it has been enabled using the front panel switches (DSW3-1 and DSW3-2 in the ON positions).

The **Label Taken Sensor** is adjusted at the factory for the optimal setting for most label material. However, the use of labels with a substantially different opacity may require that the threshold be adjusted. To adjust the threshold of the sensor, use the following procedure:

1. Turn the **Label Taken Threshold Potentiometer** (located to the right of where the **Label Dispense Option** connector is plugged into the front panel, all the way clockwise. Turn the **Power Switch** to the ON position while simultaneously pressing the **FEED** key. When the printer “beeps,” release the **FEED** key.
2. Make sure there is no label in the **Label Taken Sensor**. Turn the potentiometer counter-clockwise until the LED illuminates.
3. Place a label in the **Label Taken Sensor** and check to see if the LED turns off. If it does not, turn the potentiometer clockwise until it goes off and repeat steps (b) through (c).
4. Press the **FEED** key and the printer will print a test label. Press the **FEED** key again to stop the printing and turn the printer OFF.

PCMCIA MEMORY CARDS**ALL MODELS****Description**

The Memory Card Option provides the connectors and interface board for one PCMCIA memory card slot. The PCMCIA memory is selected for use via the <ESC>CC Memory Area Select command. It can be used to store fonts, graphic images and forms.

Type	SRAM or Flash
Applicable Specifications	PCMCIA Version 2.1 (JEIDA Version 4.1)
Size	Up to 4MB SRAM or 16MB Flash
Connector Pins	68
Battery	Approximately two years (manufacturer dependent)
Write Protect	Yes
Low Battery Detect	Yes

Installation

Instructions for installing the Memory Card Option are included with the installation kit.

Error Handling

Memory Card error conditions are indicated to the operator using a combination of the ERROR LED on the front panel, the LCD display and the audible indicator.

ERROR DESCRIPTION	INDICATION	REMEDY
Low Battery - Low battery condition is detected when printer is powered on.	ERROR LED: Blinking Audible Beep: 1 long Display: Card Low Battery Depress LINE key to print Card Status.	Replace Memory Card battery. Note that all data will be lost when the battery is removed.
Card R/W Error 1. No card is inserted. 2. Card is write protected. 3. Invalid store/recall number. 4. Card has not been initialized.	ERROR LED: On Audible Beep: 1 long Display: Card R/W Error Printer must be powered off to reset.	1. Insert card into selected slot. 2. Remove write protect tab. 3. Correct program 4. Initialize card with BJJ command
Warning 1. Duplicate number. 2. Data not in print area. 3. Data overflows card memory.	Audible Beep: 1 short Display: None Printer will ignore invalid commands.	1. Correct program. 2. Correct program. 3. Use card with more capacity.

INTERNAL FLASH ROM MEMORY EXPANSION

ALL MODELS

Description

A factory installed option allows the internal FLASH ROM to be expanded from 2MB to 6 MB by adding an additional 4MB. It can be used to store fonts, graphic images and form overlays. The Expanded Memory is selected using the <ESC>CC Memory Area Select command. This option requires the installation of an Expanded Memory pcb and is a factory-only installed option.

CALENDAR

ALL MODELS

The **Calendar Option** allows the date and time to be maintained in the local printer rather than using the system clock. It consists of an integrated circuit module containing the clock components and battery and plugs into a socket on the main PCB assembly. A qualified technician should perform the upgrade as it requires modifications to the main PCB assembly. Please call SATO Technical Support if you need to add this option to an existing printer in the field.

PLUG-IN INTERFACE MODULES

ALL MODELS

The CL Series “e” printers have user changable Plug-In Interface Modules. The **Interface Module** is accessible from the **Rear Panel** and is retained by two screws. Use the following procedure to replace an interface module.

1. Turn power off both the printer and the host and remove the power and interface cables.

WARNING: Never connect or disconnect interface cables (or use a switch box) with power applied to either the host or the printer. This may cause damage to the interface circuitry and is not covered by warranty.

2. Remove the two **Interface Module Retaining Screws**.
3. Grasp the **Interface Module** and pull it out of the connector.
4. Place the new **Interface Module** in the slot and press inward firmly until it is properly seated.
5. Replace the two **Interface Card Retaining Screws**.
6. If the new **Interface Module** is for a serial interface, set DSW1 for the proper operation.
7. Connect the interface cable to the connector.

Appendix A: Optional Features

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