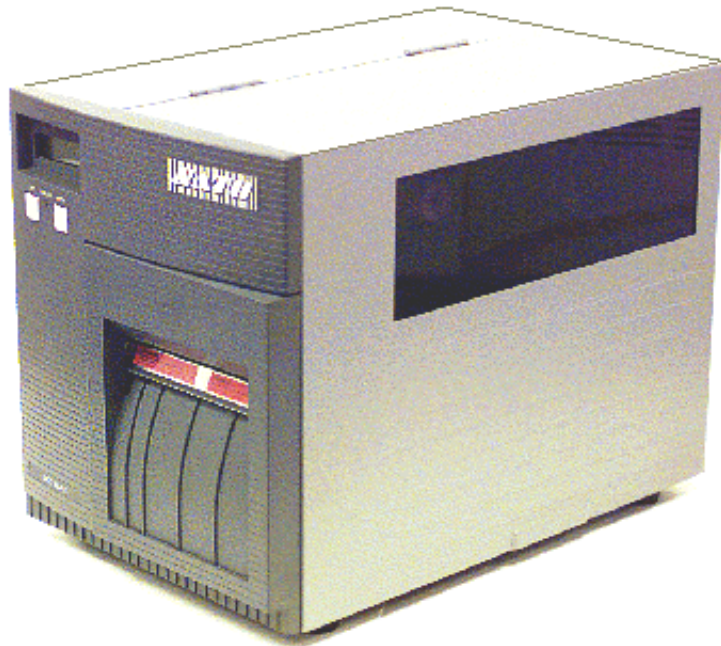




Industrial Bar Code Printers

SATO CL-408/412

Service Manual



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Warning: This equipment complies with the requirements in Part 15 of FCC rules for a Class A computing device. Operation of this equipment in a residential area may cause unacceptable interference to radio and TV reception requiring the operator to take whatever steps are necessary to correct the interference.

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Section 1

Introduction

The SATO CL408/412 Printer Service Manual provides information for installing and maintaining the SATO CL408/412 printer. Step-by-step maintenance instructions are included in this manual with typical problems and solutions. It is recommended that you become familiar with each section in this manual before installing and maintaining the printer. This manual is divided into the following eight sections:

- Section 1 - Introduction
- Section 2 - Printer Configuration
- Section 3 - Specifications
- Section 4 - Troubleshooting
- Section 5 - Printer Configuration
- Section 6 - Mechanical Adjustments
- Section 7 - Replacement Procedures
- Section 8 - Resetting the Printer

1.1 INSTALLATION CONSIDERATIONS

Printer operation can be affected by the printer environment. The location of the printer should be free from dust, humidity, and sudden vibrations. To obtain optimum results from the printer, avoid locations influenced by:

- Direct or bright sunlight since bright light will make the label sensor less responsive and may cause the label to be sensed incorrectly.
- Warm temperatures which can cause electrical problems within the printer. (See Section 3, Specifications).

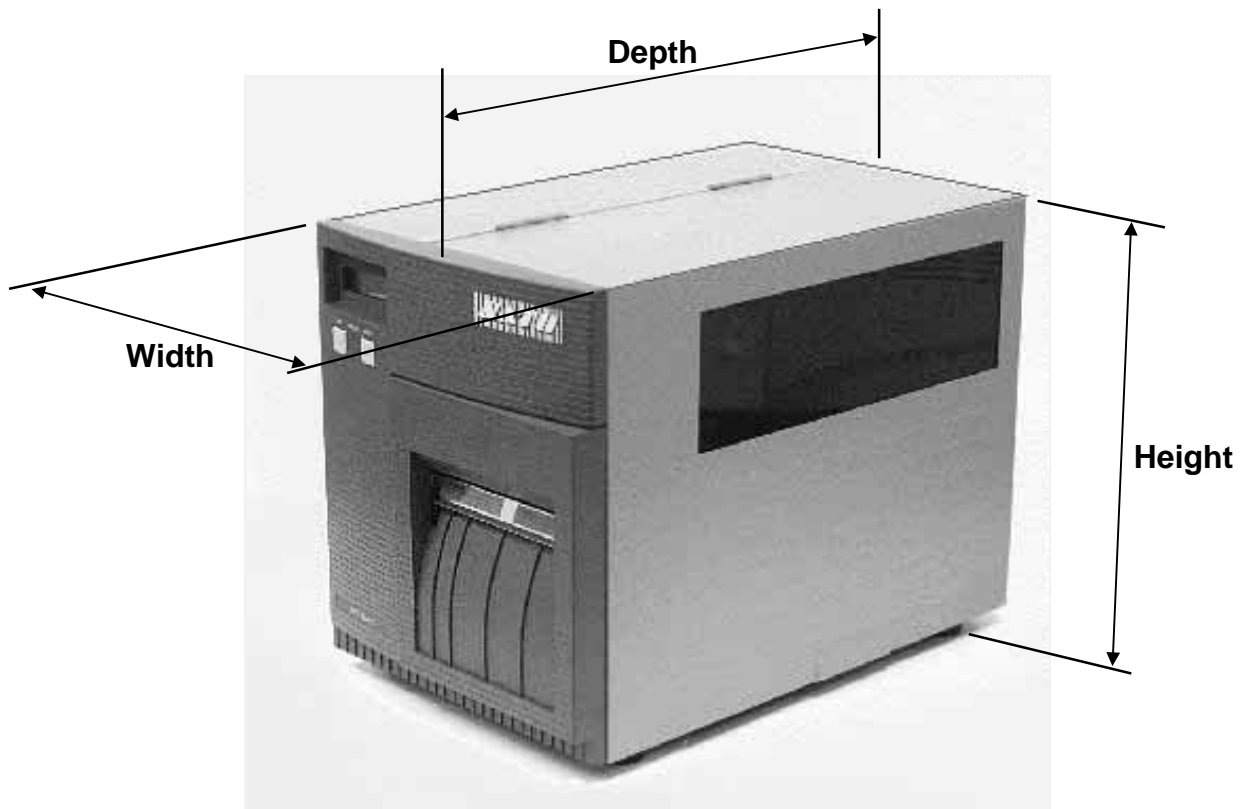
1.2 RIBBON

Use only SATO thermal transfer ribbons which were formulated expressly for use in all SATO printers. Use of other than approved ribbons may result in unsatisfactory print quality and/or damage to the print head and may void your warranty.

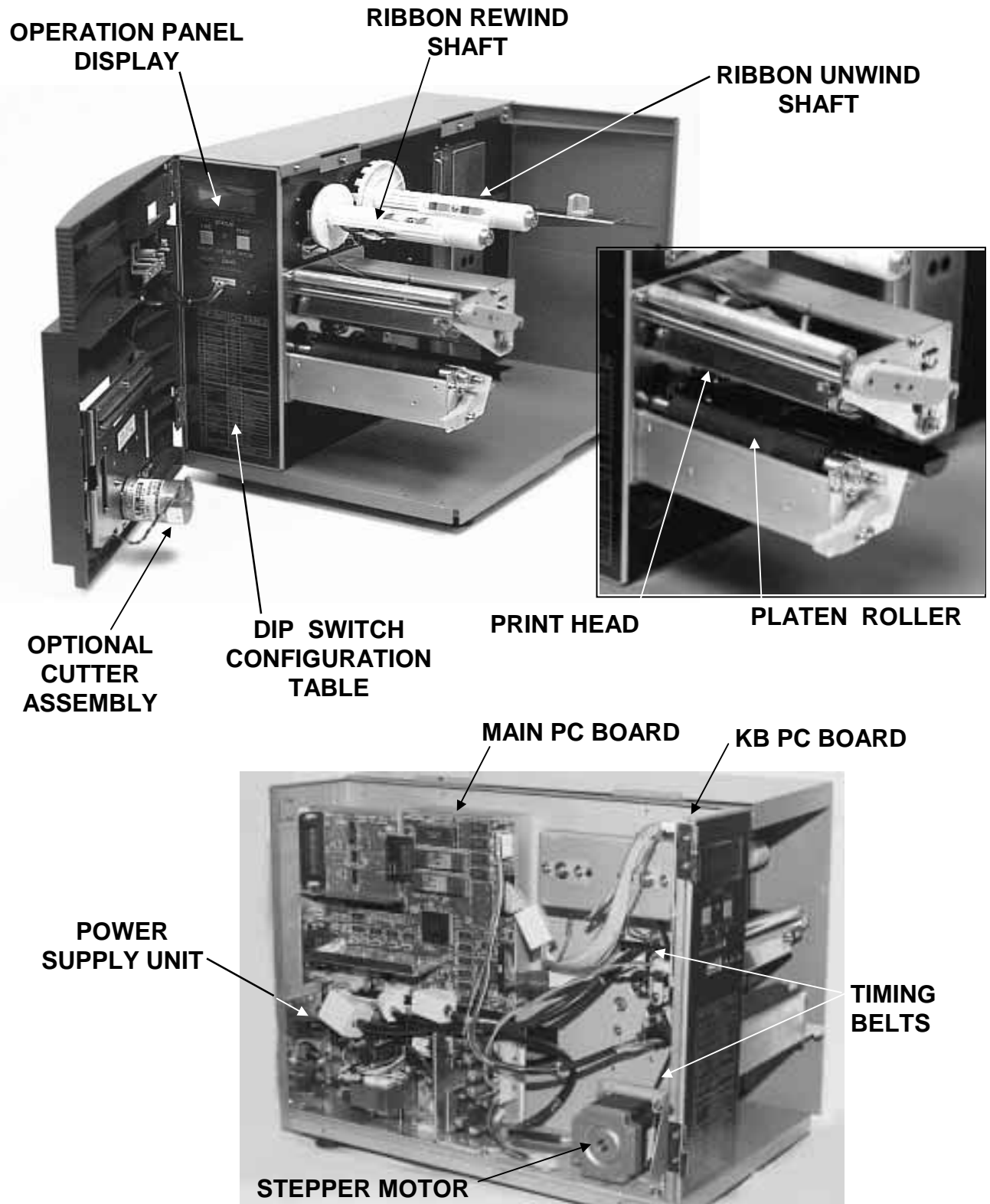
1.3 DIMENSIONS

NOTE: The exact position of components may vary, depending on the model.

Width	11 inches (278 mm)
Depth	17 inches (429.4 mm)
Height	12-3/4 inches (324.9 mm)

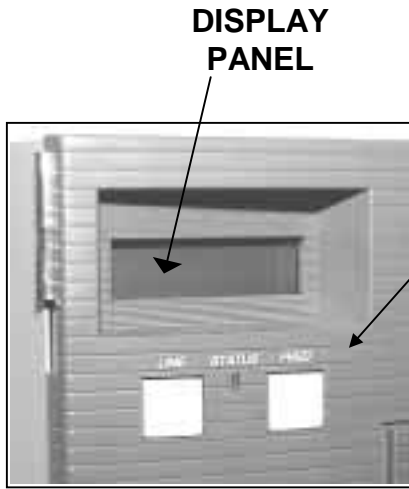


1.4 COMPONENT DESIGNATIONS



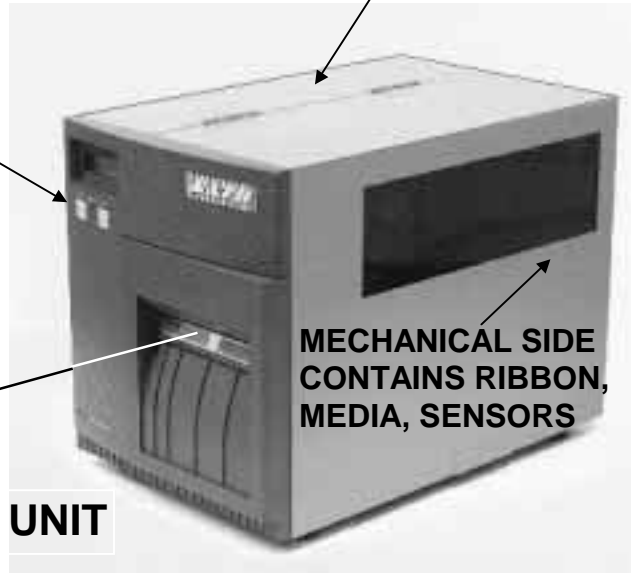
1.5 INTERFACE CONNECTIONS, INPUT AND OUTPUT PANEL

ELECTRONICS SIDE: Contains Main Logic Power Supply, Servo Motors, Main Circuit Board.



DISPLAY PANEL

OPERATION PANEL



MEDIA OUTPUT

MECHANICAL SIDE CONTAINS RIBBON, MEDIA, SENSORS

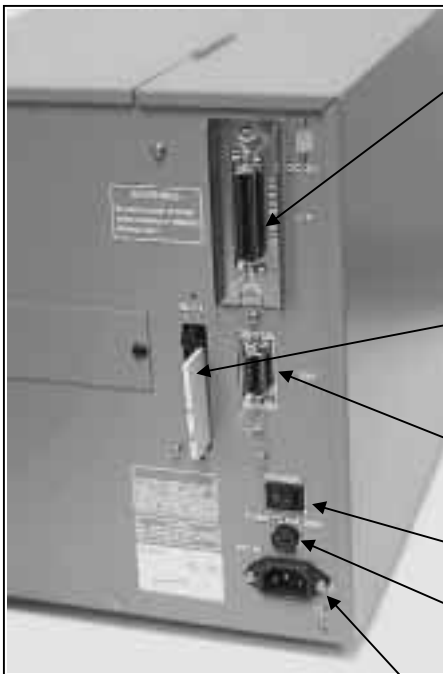
FRONT OF UNIT

Boards are supplied with the following connectors:

CENTRONICS CONNECTOR: For printer using parallel communication connection.

RS232 CONNECTOR: For printer using serial communication connection.

TWINAX/COAX CONNECTOR: For printer operating in a mini/mainframe computer environment.



MEMORY CARD SLOT 1 & 2: Optional connectors for use with PCMCIA Memory Cards.

EXT. CONNECTOR: This is an external signal connector.

POWER ON/OFF SWITCH: To turn power On or Off

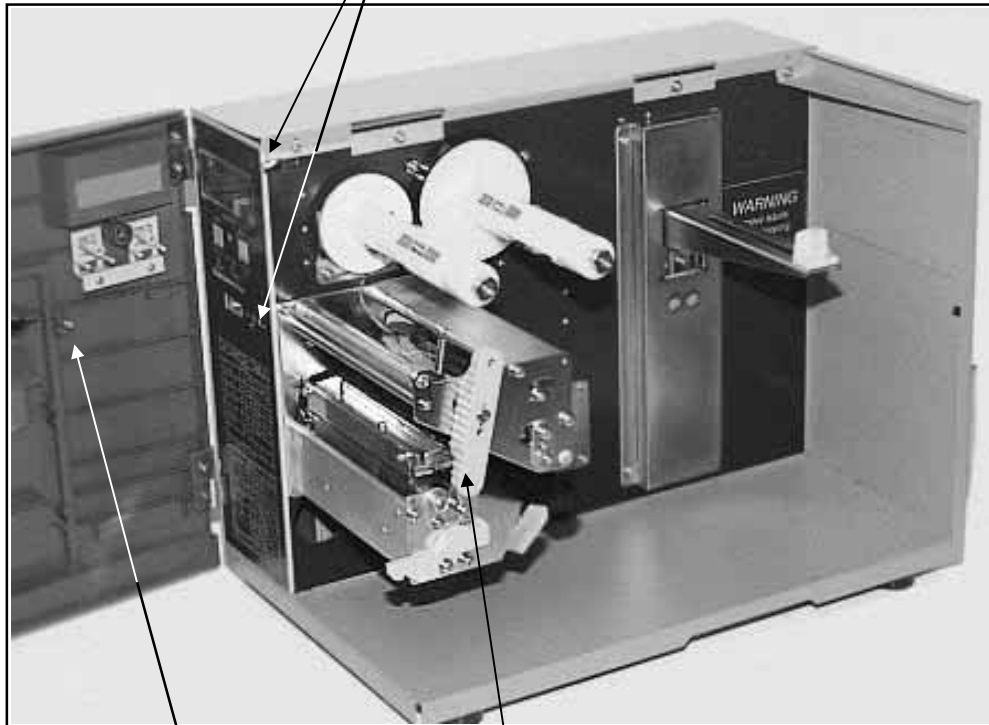
AC FUSE: To protect the machine from abnormal power input. Type 3A/250V

REAR OF UNIT

AC INPUT CONNECTOR: To input 115V 50/60 Hz. Use power cable provided.

1.6 SWITCHES AND SENSORS

COVER OPEN SENSORS: When this sensor is activated, the printer will not operate and **Cover Open** message will be displayed on display panel.



HEAD OPEN LEVER: When the print head is opened, this switch is activated and the printer will stop printing.

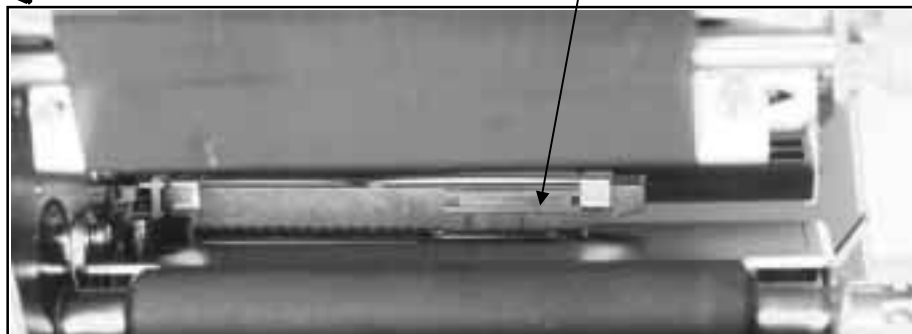
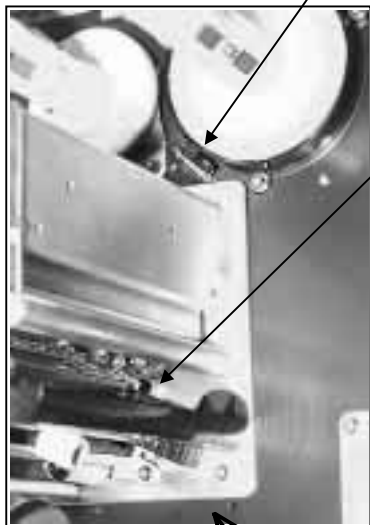
INTERLOCK TAB: The front cover is fitted with a micro switch. When the cover is opened, this switch is activated and the printer will stop printing.

1.6 SWITCHES AND SENSORS (CONT.)

RIBBON SENSOR: The sensor will react to the ribbon unwind when approximately 45 feet of ribbon remains. This sensor is a motion detector that signals the printer when the ribbon supply is turning. This sensor is used for both the ribbon end and ribbon near end sensing.

ERROR SHOWN ON DISPLAY: Ribbon out, not turning.

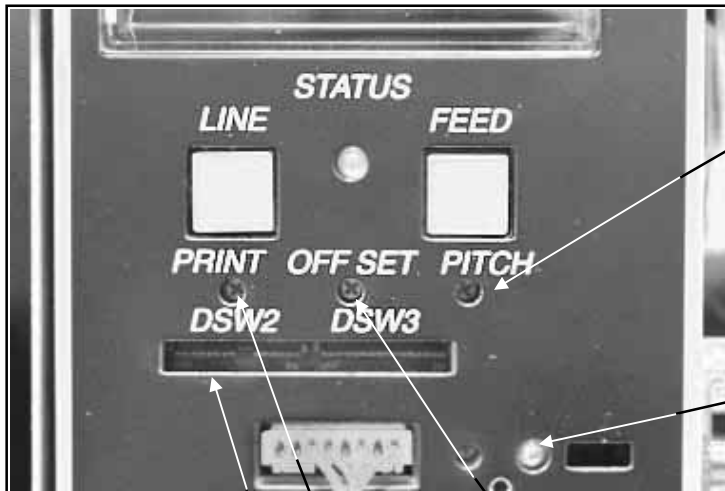
LABEL SENSOR: Both the "T"-mark (reflective) and Gap(transmissive) sensors on the CL408/412 can be adjusted over a limited range. They are both located in the label sensor unit. The assembly can be adjusted by loosening the green sensor adjust knob located underneath the label transport assembly and sliding the label sensor unit to the desired position. The gap sensor can be adjusted from a minimum of 0.67 in (17mm) to a maximum of 2.5 in. (64 mm), and the "T"-mark from a minimum of 0.25 in. (6 mm) to a maximum of 2.1 in. (53 mm) from the fixed position, "inside label guide". Refer to page 2-21 of the CL Series Operator and Technical Reference Manual for more information.



1.6 SWITCHES AND SENSORS (CONT.)

FEED Key: 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.

LINE Key: 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 the printer during the printing process.



PITCH Potentiometer: Adjusts home position of the label (+/- 3.75mm). Affects stop position of label feed, print position, and dispense position. Larger adjustments should be made using the Pitch Offset function. See page 22.

POWER LED: Illuminated when the printer is turned on.

OFFSET Potentiometer: To adjust back/forward feed for dispenser (+/- 3.75mm).

PRINT Potentiometer: To adjust print darkness (fine adjustment).

DSW2 & 3: DIP Switches to set operational parameters of printer.

NOTE: Optional RS232 Communication Card contains DSW1 switches which are configured when supplied with the printer.



2.1 DIP SWITCH SETTINGS

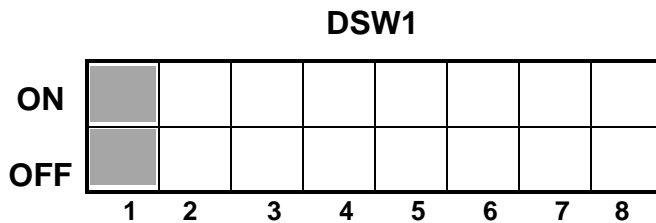
To set the switches, first power the unit Off, then position the DIP switches. After placing the switches in the desired positions, power the printer back on. The switch settings are read by the printer electronics during the power up sequence. They will not become effective until the power is cycled.

RS232 Transmit/Receive Setting

Data Bit Selection (DSW1-1)

This switch sets the printer to receive either 7 or 8 bit data bits for each byte transmitted.

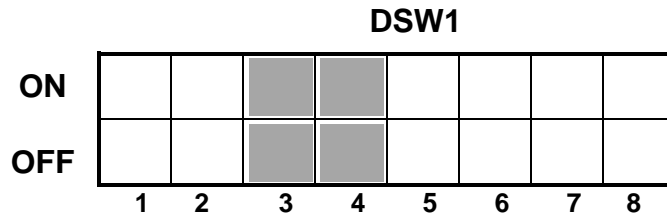
DSW1-1	SETTING
*OFF	8 Data Bits
ON	7 Data Bits



Parity Selection (DS1-2, DS1-3)

These switches select the type of parity used for error detection.

DSW1-2	SETTING	SETTING
*OFF	*OFF	No Parity
OFF	ON	Even
ON	OFF	Odd
ON	ON	Not Used



* *Factory Default*

Stop Bit Selection (DS1-4)

Selects the number of stop bits to end each byte.

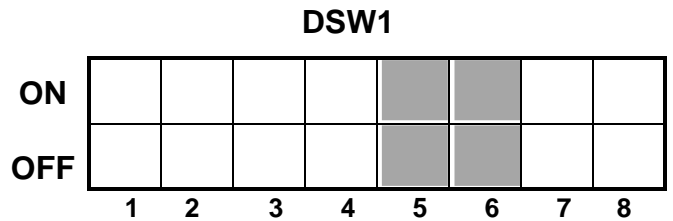
DSW1-4	SETTING
*OFF	1 Stop Bit
ON	2 Stop Bits



Baud Rate Selection (DS1-5, DS1-6)

Selects the data rate(bps) for the RS232 port.

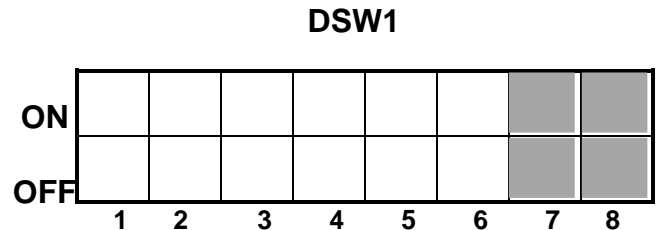
DSW1-5	DSW1-6	SETTING
*OFF	*OFF	9600
OFF	ON	19200
ON	OFF	4800
ON	ON	2400



Communication Protocol Selection (DS1-7, DS1-8)

Selects the flow control and status reporting.

DSW1-7	DSW1-8	SETTING
*OFF	*OFF	Rdy/Bsy
OFF	ON	Xon/XOff
ON	OFF	Bi-Com
ON	ON	Not Used

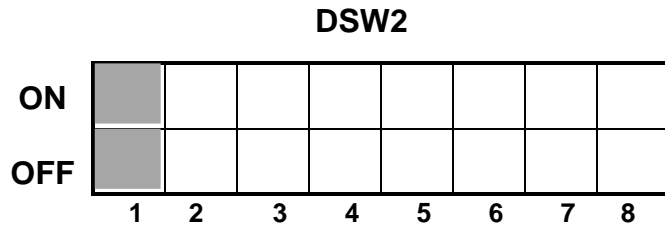


** Factory Default*

Print Mode Selection (DS2-1)

Selects between direct thermal printing on thermally sensitive paper and thermal transfer printing using a ribbon.

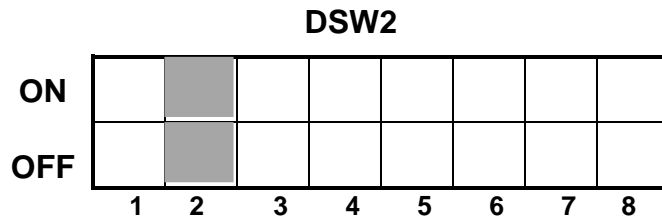
DSW2-1	SETTING
*OFF	Therm Xfr
ON	Direct Therm



Sensor Type Selection (DS2-2)

Selects type of sensing.

DSW2-2	SETTING
*OFF	Gap
ON	"I" Mark



Head Check Selection (DS2-3)

When selected, the printer will check for head elements that are electrically malfunctioned.

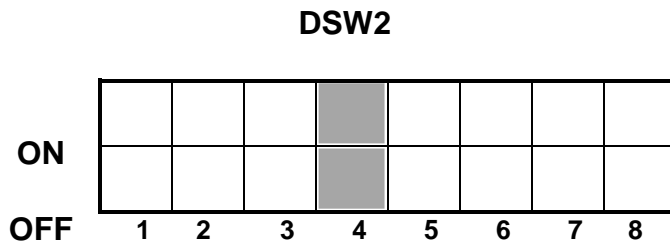
DSW2-4	SETTING
*OFF	Disabled
ON	Enabled



Hex Dump Selection (DS2-4)

Selects Hex Dump mode.

DSW2-3	SETTING
*OFF	Disabled
ON	Enabled



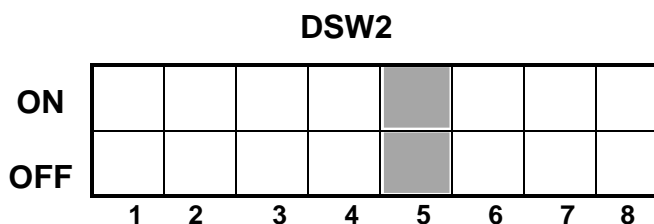
***Factory Default**

Receive Buffer Selection (DS2-5)

Selects the operating mode of the receive buffer.

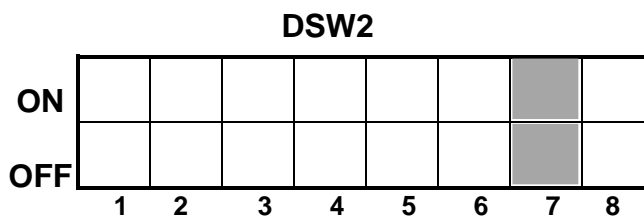
Note: The Centronics interface operates only in the multi job buffer mode regardless of the switch setting.

DSW2-5	SETTING
OFF	Single Job
ON	Multi Job-

**Protocol Control Code Selection (DS2-6 & DS2-7)**

Selects the command codes used for protocol control.

DSW2-6-	DSW2-7	SETTING
Reserved	*OFF	Standard
Reserved	ON	Non - Std.

**SELECTING PROTOCOL CONTROL CODES**

Protocol control codes are the special control characters that prepare the printer to receive instructions. For example, the <ESC> character tells the printer that a command code will follow and the <ENQ> character asks for the printer status.

There are two pre-defined sets of Protocol Control codes to choose from. Each set is made up of six special characters. The Standard Protocol Control codes are non-printable characters, and the Non-Standard Protocol Control codes are printable characters. The Non-Standard set may be useful on host computers using protocol converters or in an application where non-printable ASCII characters cannot be sent from the host. This manual uses the Standard Protocol Control codes for all of the examples. Alternately, the user may define and download a set of custom Protocol Control Codes.

*** Factory Default**

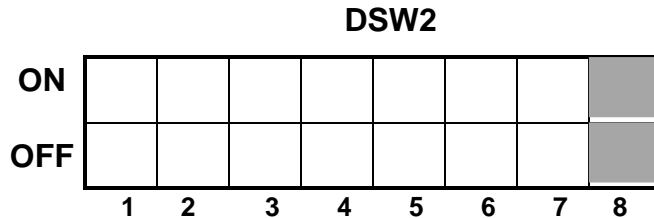
SELECTING PROTOCOL CONTROL CODES (CONT.)

CONTROL CHARACTER	STANDARD DSW2-7 OFF	NON-STANDARD DSW2-7 ON	DESCRIPTION
STX	02 Hex	7B Hex = {	Start of Data
ETX	03 Hex	7D Hex = }	End of Data
ESC	1B Hex	5E Hex = ^	Command code to follow
Null	00 Hex	7E Hex = ~	Cutter command
ENQ	05 Hex	40 Hex = @	Get printer status, Bi-Com mode
Can	18 Hex	21 Hex = !	Cancel print job, Bi Com mode
Off-Line	40 Hex	5D Hex =]	Take printer Off-Line

M-8400 Compatibility (DS2-8)

Software command compatibility with earlier model SATO M-8400 printers.

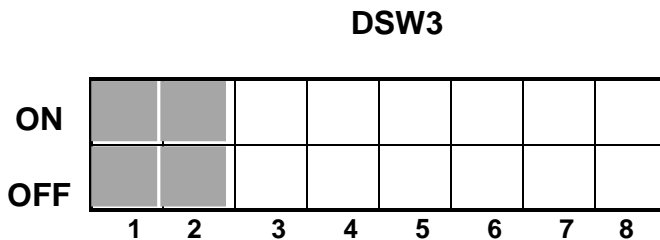
DSW2-8	SETTING
*OFF	OFF
ON	M-8400 Compatibility



Mode Selection (DS3-1 and DS3-2)

Selects the operating mode of the printer. Batch/Continuous disables the label sensors.

DSW3-1	DSW3-2	SETTING
OFF	OFF	Batch/Continuous
OFF	ON	Tear Off
ON	OFF	Cutter
ON	ON	Dispenser

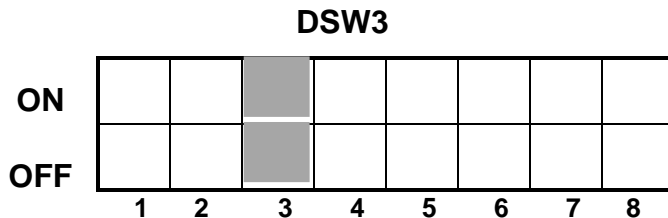


***Factory Default**

Label Sensor Selection (DS3-3)

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.

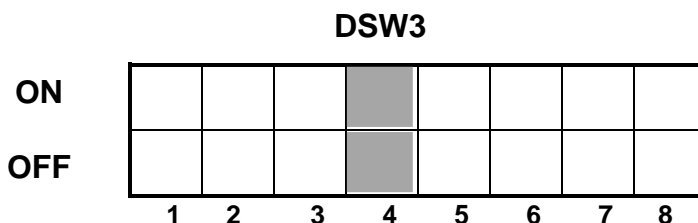
DSW3-3	SETTING
*OFF	Sensor Used
ON	Enables Continuous Operation



Back Feed Selection (DS3-4)

When Back-Feed is enabled, the printer will position the label for dispensing/cutting and retract it to the correct print position before printing the next label.

DSW3-4	SETTING
*OFF	Enabled
ON	Disabled

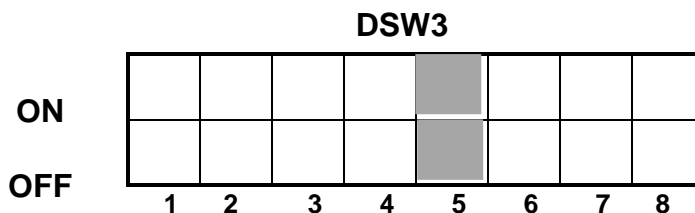


External Signal Interface

The EXT connector on the CL printer rear panel 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.

Print Start Signal Selection (DS3-5)

DSW3-5	SETTING
*OFF	Disabled
ON	Enabled



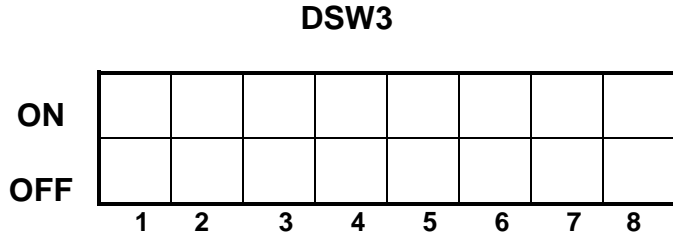
** Factory Default*

External Signal Interface (Cont.)

Refer to Page 18

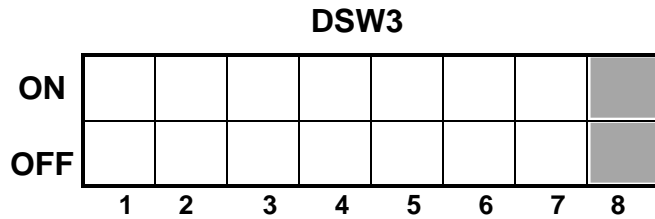
DSW3-6	DSW3-7	SETTING
*Off	Off	Type 4
Off	On	Type 3
On	Off	Type 2
On	On	Type 1

(Output on Pin 6)



Repeat Print via External Signal (DSW3-8)

DSW3-8	SETTING
*OFF	Disabled
ON	Enabled



Note: The DIP Switch functions listed incorporate the latest firmware revisions at the time of printing.

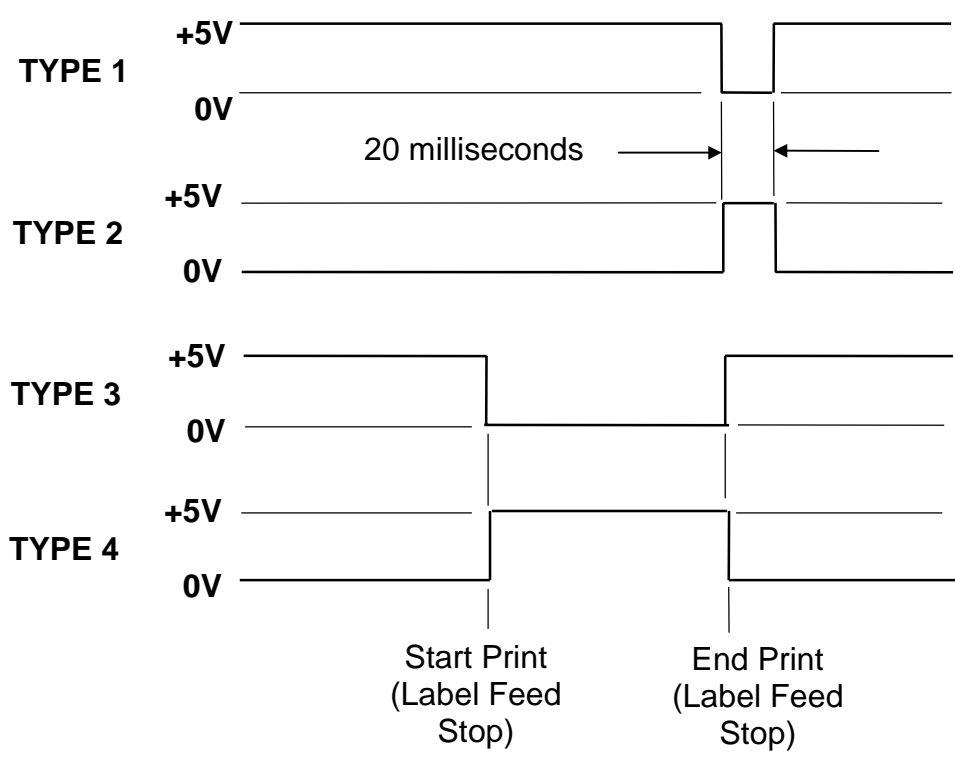
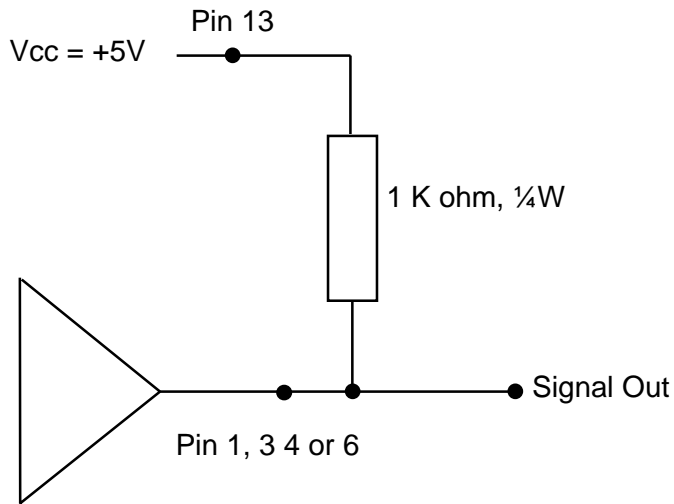
*** Factory Default, is reserved for future use, and should remain in the OFF position**

PIN Assignments

PIN	DIRECTION	SIGNAL DESCRIPTION
1	To Host	Label Out - This pin goes low (0V) when a label out error exists.
2	Reference	Signal Ground
3	To Host	Ribbon Out - This pin goes low when the ribbon is out.
4	To Host	Error - This pin goes low when the printer detects an error condition such as head open or receiving buffer full.
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 ON 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.
7	To Printer	Print Repeat - The printer repeatedly prints the current label in the print buffer immediately after receiving this signal. DSW3-8 must be ON.
10	To Host	+12V - Used to power accessory items.
12	To Host	+24V - Used to power accessory items.
13	To Host	Vcc - +5V
14	Reference	Frame Ground

NOTE: The signals on pins 1, 3 4 and 6 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 1K ohm, ¼ W 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.

External Output Signal Types



2.2 DEFAULT SETTINGS

Switch Selections

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

Communications:	8 data bits, no parity, 1 Stop bit, 9600 Baud
Protocol:	Ready/Busy
Sensor:	Gap Sensor
Receive Buffer:	Single Job
Mode:	Batch/continuous
Pitch:	Sensor Used
Back feed:	Disabled
External Signals:	Disabled

Software Default Settings

The CL408/412 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 RAM 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. This will result in the following default configuration:








Print Darkness:	“3”
Print Speed:	4 inches per second
Print Reference:	Vertical = 0001, Horizontal = 0001
Zero:	Slash
Auto On Line	Enabled

Once the default operation is completed, a “SATO DEFAULT COMPLETED” message will be displayed on the LCD panel. The printer should be powered off while this message is being displayed. This saves the default settings in the EEPROM where they will be automatically loaded the next time the printer is powered on.



2.3 PRINTER ADJUSTMENTS

The LCD Panel on the Cl408/412 printer is used in conjunction with the **LINE** and **FEED** switches by the operator to manually enter printer configuration settings. Many of the 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 operation 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.

POWER ON				
Normal/User Mode	POWER	Refer to Page 21		
Print Test Labels	POWER+FEED	Refer to Page 33		
Advanced Mode Settings and Adjustments	POWER+LINE	Refer to Page 24		
Load SATO Default Settings	POWER+FEED + LINE	Refer to Page 19		
Download User Defined Protocol Codes	POWER+LINE + DSW2-7 =ON	Refer to Page 13		
Reset to SATO Default Protocol Codes	POWER +LINE + FEED +DSW2-7 =ON	Refer to Page 13		
		POWER, then DSW2-4 =ON		
Print Hex Dump Label				Print Buffer Hex Dump Label Refer to Page 12
Print Hex Dump Label	POWER + DSW2-4 =ON			Receive Buffer Hex Dump Label Refer to Page 12

Normal Mode

When the printer is powered on, the readout should display the following message.



The LCD Panel will display the **Online** status on the top line of the display and the bottom line will contain the label quantity (QTY) status. The **ONLINE** message will be changed to OFF Line whenever the printer is switched **offline** by depressing the **LINE** key. As soon as a print job is received, the **QTY** message 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 remaining in the print job that remain to be printed.

User Mode

To enter the USER mode, perform the following steps:

STEP

PROCEDURE

1. The printer is first taken offline by pressing the **LINE** key once. The display will change to:



2. When the display changes to **OFFLINE**, press the **FEED** and **LINE** keys simultaneously for more than one second. The printer now displays the first USER mode adjustment (**Print Darkness**).

Print Darkness Setting

There are five **Darkness** (or heat range) settings on the CL408/412, (1, 2, 3, 4, and 5). The higher numbers represent darker settings. The current setting is indicated by an underline under one of the range settings.

To change the setting perform the following steps:

STEP

PROCEDURE

1. Use the LINE key to step the underlined cursor to the desired setting.



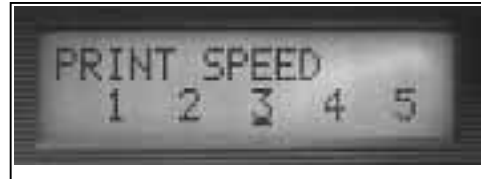
2. Once the correct setting is underlined, press the **FEED** key to accept the setting and advance to the next adjustment.

Note: This setting can be overridden by software.

Print Speed Adjustment

There are five SPEED settings on the CL408/412, (2 ips, 3 ips, 4 ips, 5 ips and 6 ips). The setting is listed on the bottom line of the display. The current setting is indicated by an underline under one of the speed settings.

To change the setting perform the following steps:



STEP

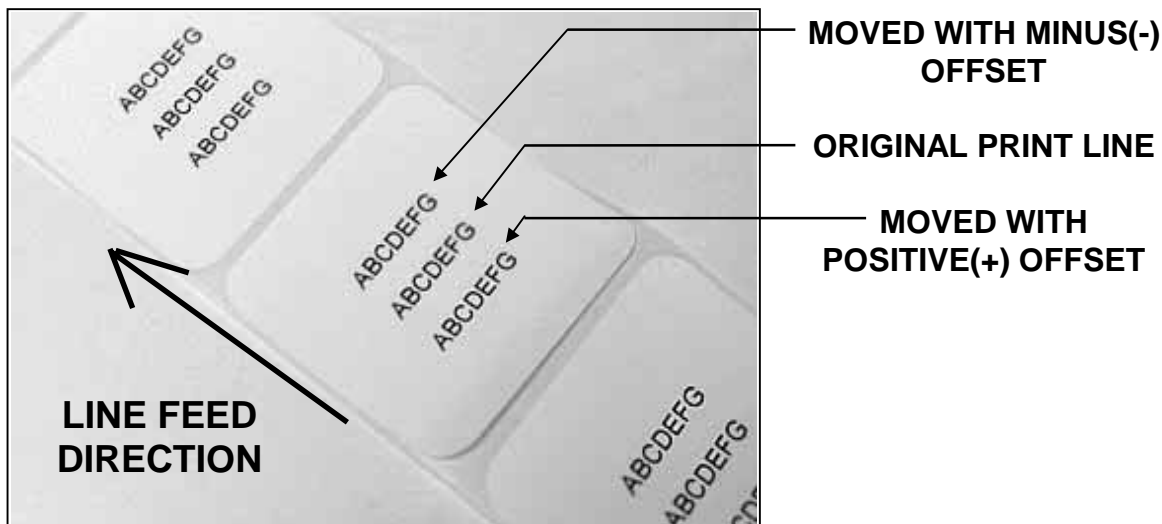
PROCEDURE

1. Use the **LINE** key to step the underlined cursor to the desired setting.
2. Once the correct setting is underlined, press the **FEED** key to accept the setting and advance to the next adjustment.

Note: This setting can be overridden by software.

Pitch Offset and Direction



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 +/- 49 mm in increments of 1 mm using the following procedure. Once the position is set, it can be adjusted +/- 3.75 mm using the PITCH potentiometer on the adjustment panel.



Pitch Offset and Direction

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.

To change the setting perform the following steps:

- | STEP | PROCEDURE |
|-------------|--|
| 1. | Use the LINE key to step the underlined cursor to either the positive (+) or the negative (-) selection. A positive selection increases the label pitch while a negative selection decreases the label pitch. |
| |  |
| 2. | Once the correct setting is underlined, press the FEED key to accept the setting and advance to the Pitch Offset adjustment. |
| |  |
| 3. | Use the LINE key to step the counter to the desired position. The display will increment one step for each time the LINE key is pressed. If the LINE key is held mode. The reading will advance to a setting of 49 mm after which it will automatically wrap and start of "00" again. The pitch direction set in the previous step will be displayed in front of the Offset setting. |
| 4. | Once the setting is correct, press the FEED key to accept the setting and advance to the Cancel Print job display. |
| 5. | You may wish to check your settings by printing a test label after you have completed the adjustments to ensure that they are correct. See page 33 for instructions on how to print a test label. |

Cancel Print Job

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

To cancel the print perform the following steps:

STEP

PROCEDURE

1. Use the **LINE** key to step the underlined cursor to either **YES** or **NO**.



2. Once the correct setting is underlined, press the **FEED** key to accept the setting and terminate the user mode of operation and return you to the normal mode **OFFLINE** display.

If you wish to change any of the settings, you must enter the user mode again by simultaneously pressing **FEED** and **LINE** keys for more than one second.

Advanced Mode Settings and Adjustments

Advanced mode is provided to make adjustments that require only occasional adjustments. 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.

To enter advanced mode, the printer is powered on while pressing the **LINE** key. The printer will “beep” one time and display the first configuration selection on the LCD panel.

From the advanced mode display, the Advanced settings are accessed in sequence by pressing the **FEED** key.

Zero Slash Setting

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 U, S, M, WB, WL, XU, XS, XM, XB, XL and vector fonts will have a slash through the center of the zero character.



To access this setting, perform the following steps:

- | STEP | PROCEDURE |
|-------------|--|
| 1. | Use the LINE key to step the underlined cursor to either YES or NO . |
| 2. | Once the correct setting is underlined, press the FEED key to accept the setting and advance the display to the Auto Online display. |

Auto Online Setting

This setting determines the mode in which the printer powers up. If the **YES** selection is made, the printer powers up in the **ON LINE** 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.



To access this setting perform the following steps:

- | STEP | PROCEDURE |
|-------------|--|
| 1. | Use the LINE key to step the underlined cursor to either YES or NO . |
| 2. | Once the correct setting is underlined, press the FEED key to accept the setting and advance the display to the Vertical Offset display. |

Vertical Offset Setting

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. It is always a positive setting since making it negative would move it up and off the printable label. 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 Offset distance is dots. The maximum values that can be set for the different model printers are.



	CL408	CL412
Vertical Offset	0 to 1428	0 to 2136

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

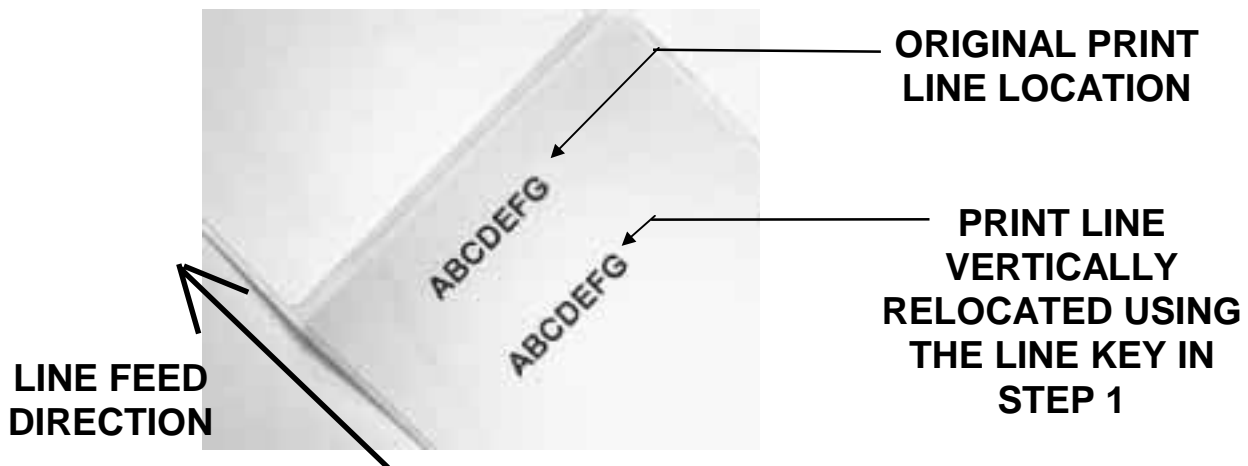
To access this setting perform the following steps:

STEP

PROCEDURE

1. Use the **LINE** key to step to the desired setting. The display will increment one step each time the **LINE** key is pressed. If the **LINE** key is held down for more than two seconds, it will automatically go into the fast scroll mode. The reading will advance to the maximum setting, (the maximum vertical offset) after which it will automatically wrap and start at "0000" again.
2. Once the setting is correct, press the **FEED** key to accept the setting and advance the display to the **Horizontal Direction** display.

Note: The printers will not "wrap" images that extend beyond the print area. Any part of the image that extends beyond the print area will be truncated.



Horizontal Offset and Direction

Horizontal Offset is the 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 positive setting and 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. Its effect is identical to the <ESC> A3 Base Reference point command. Since the printer can only print in discrete steps equal to the size of the print dot, the units of measure for the Horizontal Offset distance is dots.



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

To access this setting perform the following steps:

STEP

PROCEDURE

1. Use the **LINE** key to step the underline to either the positive (+) or negative (-) selection. A positive selection increases (moves) the horizontal reference point for the label to the right edge of the label, towards the outside, while a negative selection moves the horizontal reference point for the label to the left, towards the inside of the printer.
2. Once the setting is underlined, press the **FEED** key to accept the setting and advance the display to the **Horizontal Offset** adjustment.
3. Use the **LINE** key to step the counter to the desired setting. The display will increment one step each time the **LINE** key is pressed. If the **LINE** key is held down for more than two seconds, it will automatically go into the fast scroll mode. The reading will advance to the maximum setting, (the maximum horizontal offset) after which it will automatically wrap and start at "0000" again. The horizontal direction set in the previous will be displayed in front of the **Offset** setting.

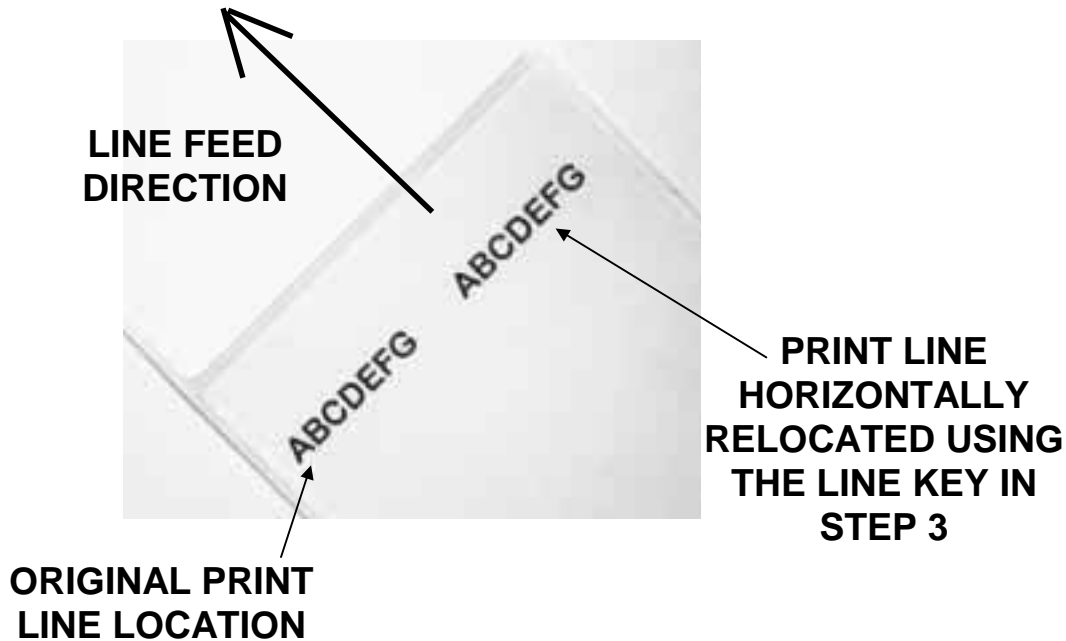


	CL408	CL412
Horizontal Offset	+/-832	+/-1248

Note: The printers will not "Wrap" images that extend beyond the print area. Any part of the image that extends beyond the print area will be truncated.

4. Once the setting is correct, press the **FEED** key to accept the setting and advance to the Sensor Threshold display.

Horizontal Offset and Direction (Cont.)



Sensor Threshold Level

The CL 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 “I” 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 “I” mark 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.



Sensor Threshold Level (Cont.)

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:

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

To access this setting perform the following steps:

STEP

PROCEDURE

1. Insert a label still attached to the backing into the sensor. 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 ranges:

Backing with Label	Label Backing Only
2.0V to 3.5V	Less than 1.0V

If the measured values are outside this range, you may have trouble 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 down for more than two seconds, it will automatically go into the fast scroll mode. The reading will advance to a setting of 4.9 (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 between the two measured voltages each time the printer is powered on with labels loaded.
5. Once the setting is correct, press the **FEED** key to accept the setting and advance to the **Calendar Set** display.
6. Repeat this procedure using values slightly higher or lower until the optimum performance is obtained. If you cannot find a setting between the high and low readings that gives adequate performance, then the label stock has too much variation in its opacity and a better quality stock should be used.

Sensor Threshold Level (Cont.)

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

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

To access this setting perform the following steps:

STEP

PROCEDURE

1. Insert a label into the sensor. Make sure the printed “I” is not under the sensor. Record the voltage shown on the top line of the LCD panel. This line should have the message “I” on the top line (DIP switch DSW2-2 =ON).
2. Now pull the label forward until the “I” 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	Eye Mark
Less than 1.0V	2.5V to 3.5V

If the measured values are outside this range, you may have trouble 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 down for more than two seconds, it will automatically go into the fast scroll mode. The reading will advance to a setting of 4.9 (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, press the **FEED** key to accept the setting and advance to the **Calendar Set** display.
6. Repeat this procedure using values slightly higher or lower until the optimum performance is obtained. If you cannot find a that will give you adequate performance, then the label stock or printed “I” mark has too much variation in its reflectance and a better quality stock should be used.

Calendar Set

If the Calendar Option is installed in the printer, the date and time can be set manually using the LCD display or via the <ESC>WT Calendar Set command. The last setting, set either manually or 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 access this setting perform the following steps:

- | STEP | PROCEDURE |
|------|---|
| 1. | Year: The first display shown will have the two digit year selection underlined. Press the LINE key to scroll through the dates. 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, press the FEED key to advance the underline cursor to the two digit Month position. Press the LINE key to scroll through the numbers corresponding to the month. 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 , press the FEED key to advance the underline cursor to the two digit Day position. Press the LINE key to scroll through the numbers corresponding to the month date. 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, press the FEED key to advance the underline cursor to the tow digit Hour position. Press the LINE key to scroll through the numbers corresponding to the hour (using a 24 hour clock). 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, press the FEED key to advance the underline cursor to the two digit minute position. Press the LINE key to scroll through the numbers corresponding to the minute. 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 calendar, press the FEED key to accept the setting and advance to the Clear Head Counter display. |

Reset Counters

REFER TO SECTION 8 FOR FACTORY RESETS.

The Counter Clear display is used to reset the internal printer counters to zero. This allows the user to keep track of the number of centimeters of label material that has passed through the printer, how many labels have been dispensed or how many labels have been cut.



The Counters are identified in the display as:

NON:	None(default)
HEAD:	Head Counter
DSP:	Dispense Counter
CUT:	Cutter Counter

To access this setting perform the following steps:

STEP	PROCEDURE
1.	Use the LINE key to step the underline cursor to either the counter to be reset, the Head counter, Dispenser (DSP) counter or the CUT (Cutter) counter. The default position reset None (NON) of the counters. Use the LINE key to advance the underline cursor to the desired selection.
2.	Once the correct setting is underlined, press the FEED key to clear the selected counter and advance the display to the EXIT MODE display.

Exit Mode

This allows you to exit the Advanced Mode or to recycle through the selections again.



To access this setting perform the following steps:

STEP	PROCEDURE
1.	Use the LINE key to step the underline cursor to either the YES or NO selection. The default position is NO .
2.	Once the correct setting is underlined, press the FEED key to advance the display to the OFF LINE mode if YES was underlined or back to the Zero Slash display if NO was selected.

2.4 PRINTING TEST LABELS

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 User Test Print Mode, power the printer on while pressing the **FEED** key. The printer will “beep”. Release the **FEED** key and the printer to display the following message on the LCD panel.

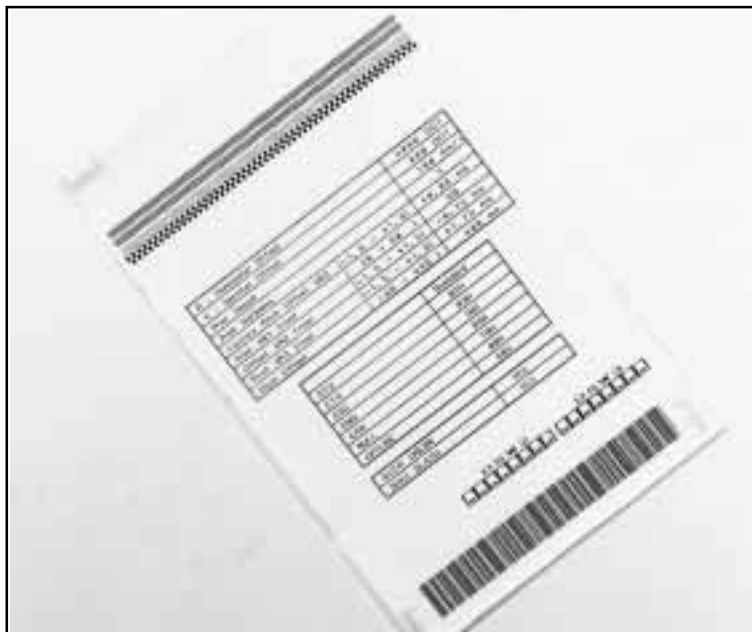


Print Size

To access this setting perform the following steps:

STEP	PROCEDURE
1	Use the LINE key to step the underline cursor to either the Large or Small selection.

If **Large** is underlined, a label will be printed for a maximum width label (6.5"). Press the **FEED** key to print the label which will contain a head check pattern and current printer setting information. The default position is **Large**.



If **SMALL** is underlined, the Print Size message will be displayed. You must enter the size of the label. The minimum label size that can be selected is 4 cm (1.6") and the maximum size is 10 cm (3.9").

Press the **LINE** key to increment the setting by 1 cm each time the key is pressed. Once the maximum size is reached, the display will wrap around and start incrementing at 04 cm again. Once the correct label width is selected, press the **FEED** key to initiate the print. The **SMALL** label only contains a head check pattern.



2. If you wish to pause the printer after it starts to print a test label, press the **LINE** key to place it **Off Line**. Press the **LINE** key again to place the printer back **On Line** and to resume the test label printing. To stop the test label print, pause the printer and then turn power off without placing it **On Line**.

Section

3

Specifications

The major difference in the CL408 and the CL412 printers is the resolution of the head. The CL408 with its 203 dpi head provides an economical labeling solution for most applications. The CL412 provides a higher print resolution, 305 dpi, to give laser quality printing. It is useful when higher resolution is needed for detailed graphic images.

3.1 PRINT

SPECIFICATION	CL408	CL412
PRINT		
Method	Direct or Thermal Transfer	
Speed (User Selectable)	2 to 6 ips 50 to 150 mm/s	
Print Module (Dot Size)	.0049 in. .125 mm	.0033 in. .083 mm
Resolution	203 dpi 8 dpmm	305 dpi. 12 dpmm
Maximum Print Width	4.1 in. 104 mm	
Maximum Print Length (Expanded Print Length)	14 in. 356 mm	
Maximum Print Length with 2MB Memory Card	49.2 in. 1249 mm	32.8 in. 833 mm

3.2 MEDIA, SENSING AND RIBBON

SPECIFICATION	CL408	CL412
MEDIA		
Minimum Width	.87 in. (22 mm)	
Minimum Length	.24 in. (6 mm)	
Maximum Width	5.1 in. (131 mm)	
Type	Die Cut Labels, Fan Fold, Tag Stock or Continuous	
Caliper (thickness)	Maximum .010 in. (.25 mm) including backing paper	
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		
See-Thru for labels or tags	Movable	
Reflective "I"- Mark	Movable	
Continuous Form	Sensor not used	
RIBBON		
Maximum Width	4.4 in. (111 mm)	
Length	1475 ft. (450 m)	
Thickness	4.5 micron, Face-In Wind	

3.3 PRINTER CONTROLS AND SIGNALS, ADJUSTMENTS AND INTERFACE CONNECTIONS

SPECIFICATION	CL408	CL412
CONTROLS AND SIGNALS		
On-Line LED	Status =Green	
Power LED	None	
Media Out LED	Status =Red	
Ribbon Out LED	Status =Red	
Error LED	Status =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	
INTERFACE CONNECTIONS		
Parallel	Centronics Compatible	
Serial	RS232C (2400 to 19.2K bps) or RS422/485 (2400 to 19.2K bps) available	
Serial Protocol	Hardware Flow Control (Ready/Busy) Software Flow Control (X-On/X-Off) Bi-directional (ENQ/Response)	
Data Transmission	ASCII Format	

3.4 PROCESSING

SPECIFICATION	CL408	CL412
PROCESSING		
CPU	32 BIT RISC	
ROM	1 Mbyte (2 x 4 M bit)	
DRAM	2 MByte	
Programmable	8 Kbyte EEPROM	

3.5 CHARACTER FONTS

SPECIFICATION	CL408	CL412
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 W x 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	
OB Font	(20 dots W x 24 dots H) OCR-B	
AUTO SMOOTHING FONTS		
WB	WB Font (18 dots W x 30 dots H)	
WL	WL Font (28 dots W x 52 dots H)	
XB	XB Font (48 dots W x 48 dots H) Univers Condensed Bold	
XL	XL Font (48 dots W x 48 dots H) Sans Serif	

3.5 CHARACTER FONTS

SPECIFICATION	CL408	CL412
VECTOR FONT		
	Proportional or Fixed Spacing Font Size 50 x 50 dots to 999 x 999 dots Helvetica, 10 Font Variations	
DOWNLOADABLE FONTS		
	True Type Fonts with Optional Memory Card	
CHARACTER CONTROL		
	Expansion up to 12 x in either the X or Y coordinates Character Pitch control Line Space control Journal Print facility 0 ⁰ , 90 ⁰ , 180 ⁰ and 270 ⁰ Rotation	

3.6 BAR CODES AND OTHER FEATURES

SYMBOLOGIES	
	Bookland (UPC/EAN Supplemental) EAN-8, EAN-13 CADABAR 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
Ratios	1:2, 1:3, 2:5 User definable bar widths
Bar Height	4 to 600 dots, User programmable
Rotation	0 ⁰ , 90 ⁰ , 180 ⁰ and 270 ⁰

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 or .PCX formats
Form Overlay	Form overlay for high-speed editing of complex formats

3.7 PHYSICAL

SPECIFICATION	CL408	CL412
DIMENSIONS		
Wide	10.7 in. (271 mm)	
Deep	16.9 in. (430 mm)	
High	12.6 in. (321 mm)	
Weight	28.7 lbs (13 Kg)	
POWER REQUIREMENTS		
Voltage	100 - 115 V (+/- 10 %) 220 V (+/- 10 %) 50/60 Hz (+/- 1%)	
Power Consumption	50W Idle 130W Operating	
ENVIRONMENTAL		
Operating Temperature	41 ⁰ to 104 ⁰ F (5 ⁰ to 40 ⁰ C)	
Storage Temperature	-0 ⁰ to 104 ⁰ F (-20 ⁰ to 40 ⁰ C)	
Operating Humidity	15-85 % RH, non-condensing	
Storage Humidity	Max 90% RH, non-condensing	
Electrostatic Discharge	8KV	

3.8 OPTIONAL ACCESSORIES

REGULATORY APPROVALS		
Safety	UL, CSA	
RFI/EMI	FCC Class A	
ACCESSORY	CL408	CL412
Memory Expansion	Two slots for PCMCIA Memory Cards (up to 2MB each) that can be used for Graphic File storage, print buffer expansion, format storage and downloaded True Type fonts.	
Real Time Clock & 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 internals. Controlled through programming.	
Label Dispenser	Internal attachment allowing labels to be peeled from backing for immediate (on demand) application. Internal backing take-up.	
Label Rewinder	External option rewinds labels onto a roll after they are printed.	
Centronics/Parallel Interface	Parallel I/F card must be installed.	
Serial Interface	Serial I/F card must be installed.	
Coax/Twinax Interface	Coax/Triax I/F card must be installed in the interface slot. 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 printer with auto-terminate/cable-thru capabilities.	

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Troubleshooting

The design of the SATO CL-412 printer is based upon proven technology and reliable components. When a problem occurs, the solution can be easily traced using the troubleshooting tables in this section. This table list symptoms, probable causes, and suggested corrective actions. Many of the suggested corrective actions include references to a section or paragraph found elsewhere in this manual where more complete descriptions and procedures may be found.

Both print quality and general operational problems are listed in the troubleshooting table.

4.1 TROUBLESHOOTING TABLES

The troubleshooting table below includes the following general symptom descriptions:

- Image Voids
- Ribbon Wrinkle
- Light Images
- Smearing
- No Ribbon Movement
- No Label Movement
- No printed Image
- Display Problem
- POWER LED not on
- ERROR LED on
- LABEL LED on
- RIBBON LED on
- ON LINE LED not on
- No Label Drive

Print Quality Problems

Symptom	Probable Cause	Suggested Corrective Action	
Image Voids	Poor quality labels	Use thermal transfer compatible stock	
	Poor quality ribbons	Use genuine SATO ribbons	
	Ribbon not matched to label stock	Check with media suppliers	
	Damaged electronics	Replace circuit board (7.3)	
	Damaged Platen	Replace Platen	
Ribbon Wrinkle	Poor Head Alignment	Adjust head balance (6.4) Adjust ribbon roller Adjust head alignment	
	Poor Ribbon Tension	Adjust ribbon tension	
	Worn Platen	Replace platen (7.10)	
	Foreign material on head or platen	Clean head and platen	
	Foreign materials on labels	Use high quality label stock	
	Damaged print head	Replace print head (7.2)	
	Light Images	Poor quality labels	Use thermal transfer compatible stock
		Poor quality ribbons	Use genuine SATO ribbons
Low print head energy/darkness		Adjust darkness control (See Operator Manual)	
Low print head pressure		Use correct head pressure position	
Ribbon not matched to label stock		Use Premier II ribbon with a "1C" thermal transfer ribbon stock or equivalent for optimum results	
Low ribbon drive torque No ribbon movement		Adjust ribbon drive clutch (6.1)	
Foreign material on head		Clean head and platen	
Poor head alignment		Align Print Head (6.3)	
Excessive print speed		Reduce print speed setting	
Symptom	Probable Cause	Suggested Corrective Action	

Smearing	Poor quality labels	Use Premier II ribbon with a “1C” thermal transfer ribbon stock or equivalent for optimum results
	Poor quality ribbons	Use genuine SATO ribbons
	Foreign material on head/platen	Clean head and platen
	Foreign material on labels	Use high quality label stock
	Excessive print head energy	Adjust darkness control
	Excessive print speed	Adjust print speed
	Excessive head pressure	Use correct head pressure position
No Ribbon Movement	Incorrect ribbon core size	Use genuine SATO ribbons
	Loose drive clutch	Adjust clutch tension (6.1)
	Loose platen drive belt	Adjust/replace belt (7.9)
	No + 24 volt output	Test power supply and replace if required (5.1, 7.4)
	Loose service screws on rewind pulley	Tighten service screws
	Damaged electronics	Replace circuit board (7.3)
No Label Movement	Loose/broken platen drive belt	Adjust/replace belt (7.9)
	Incorrect label pitch sensor selected	Select correct label sensor type (DSW2-2)
	No +24 volt output	Replace fuse on main PCB (7.1) Test power supply and replace if required (5.1)
	Loose set screw on platen pulley/stepper motor	Tighten set screws
No Printed Image	Print head not connected	Verify print head connector fully seated at head and main PCB (7.2)
	Ribbon upside down	Use genuine SATO ribbons
	No + 24 volt output	Test power supply and replace if required (5.1)

Section 4 Troubleshooting

Symptom	Probable Cause	Suggested Corrective Action
No Printed Image	Damaged print head	Replace print head (7.2)
	Damaged electronics	Replace circuit board (7.3)
Back light but no words on display or no display.	Most common failure of printer is DOA situation. The most likely cause is the ribbon cable has fallen out or not seated fully into connector.	Verify that the cable and connector are properly seated.
POWER LED not on	AC power cable not connected	Verify that the cable is connected to the printer and the AC outlet
	Main Power Fuse defective	Replace fuse (7.1)
	Defective power supply	Test power supply and replace if defective (5.1, 7.4)
ERROR LED on	Head not locked	Close and latch head release
LABEL LED on	Label supply roll empty	Replenish label supply
	Label stock not routed through sensor	Reload labels
	Label sensor not positioned correctly	Adjust sensor position
	Label sensor blocked	Clean label sensor
	Incorrect label sense threshold setting	Adjust label sense threshold (5.2, 5.3)
	Platen drive malfunction	See Section 6, Mechanical Adjustments
RIBBON LED on	Ribbon supply roll empty	Replenish ribbon supply
	Ribbon sensor out of alignment	Realign ribbon sensor (7.5)
	Ribbon sensor blocked	Clean ribbon sensor
	No cardboard core on ribbon rewind	Use cardboard core on ribbon rewind

Symptom	Probable Cause	Suggested Corrective Action
ON LINE LED not on	LABEL, RIBBON, ERROR LED (s) on	Clear error condition
	Illegal printer memory state	Cycle POWER switch off and back on
No Label Drive	Timing Belt bad/loose	Replace/tighten timing belts (7.9)

4.2 HEAD PATTERN EXAMPLES



FIG. 4-1 **FACTORY DEFAULT**

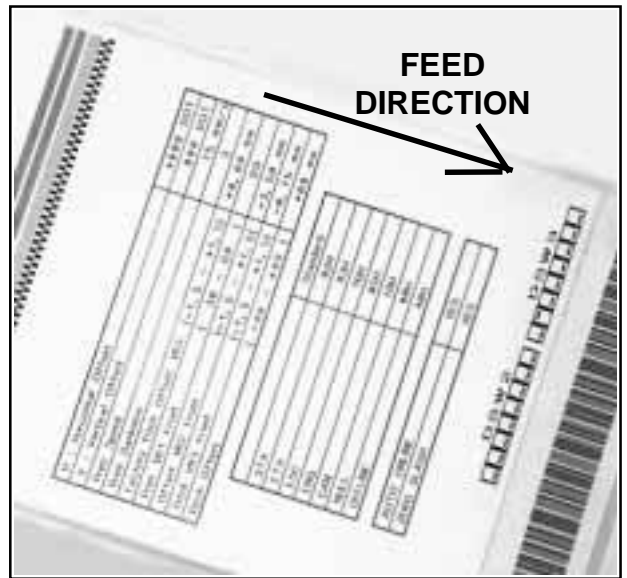
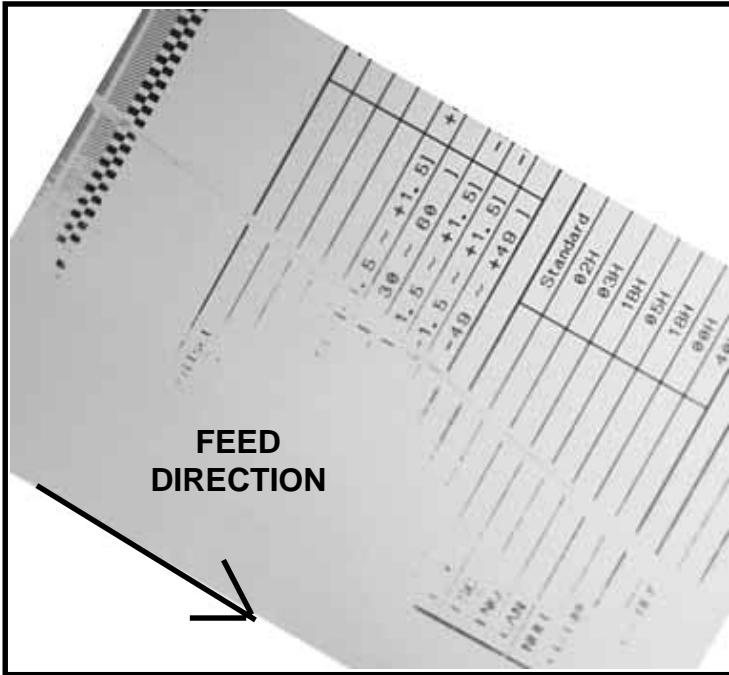


FIG. 4-2

GOOD ADJUSTMENT,
CLEAR, DARK,
EVEN TEXT

4.2 HEAD PATTERN EXAMPLES



DISPLAY:
IRREGULAR UNEVEN
TEXT, ECCENTRIC NUT
TURNED TOO FAR
COUNTER CLOCKWISE

CAUSE:
POOR HEAD ALIGNMENT,
BALANCE OUT OF
ADJUSTMENT

FIG. 4-3

DISPLAY:
IRREGULAR UNEVEN
TEXT, ECCENTRIC NUT
TURNED TOO FAR
CLOCKWISE

CAUSE:
POOR HEAD ALIGNMENT,
BALANCE OUT OF
ADJUSTMENT

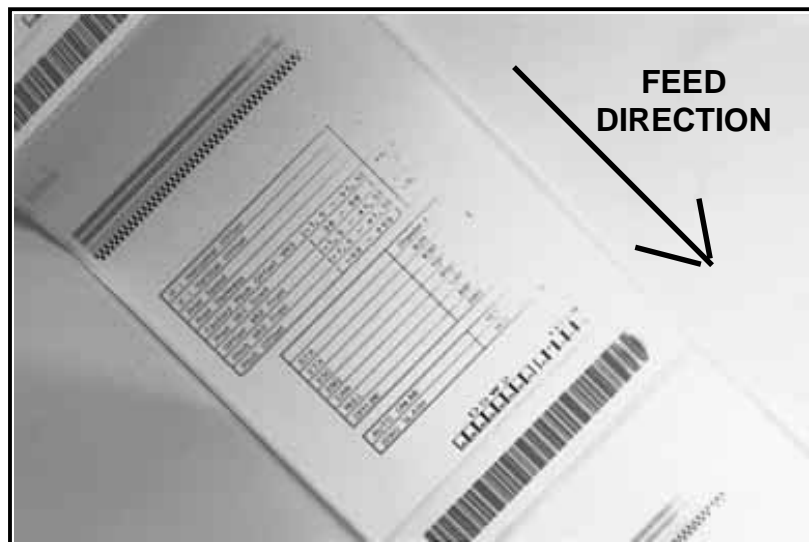


FIG. 4-5

4.2 HEAD PATTERN EXAMPLES

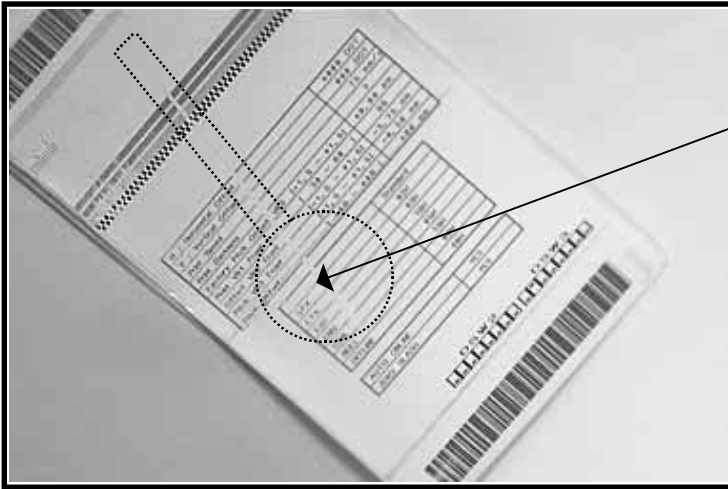


FIG. 4-6

DISPLAY:
RIBBON WRINKLE,
DIAGONAL VOIDS (WHITE
STREAKS) THAT “WALK”
ACROSS LABEL

CAUSE:
POOR HEAD ALIGNMENT,
POOR RIBBON TENSION,
WORN PLATEN,
FOREIGN MATERIAL,
DAMAGED PRINT HEAD

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Section

5

Electrical Checks and Adjustments

This chapter describes how to check CL408/412 voltage levels and adjust threshold sensor voltages.

The CL408/412 power supply converts 125 VAC into regulated DC voltages. The printer uses: +5VDC and -24VCD. These DC voltages are not adjustable, however you can measure these DC voltages at test points. If a voltage is out of specification, the power supply must be replaced. Section 5.1 contains procedures for measuring DC voltage levels. Power supply removal and replacement procedures are located in section 7.4.

You can adjust threshold voltage levels for label sensors. These adjustments are made to allow for variations in the characteristics of the labels used with the printer. If you cannot calibrate the label sensor voltage level within the specified voltage range, you should reposition the label sensor by following the adjustment procedures included in this section. After completing the label sensor adjustment procedures, perform the label sensor voltage level adjustment procedure.

You can check or adjust:

- Power supply
- Label sensor

5.1 POWER SUPPLY CHECKS

- | | |
|---------------------|---|
| Required Equipment: | <ul style="list-style-type: none"> • Number 2 Phillips Screwdriver • DC Voltmeter |
|---------------------|---|

To check voltage levels, first check the Main BCB fuses (7.1), and replace if necessary, then perform the following steps:

- | STEP | PROCEDURE |
|-------------|--|
| 1. | Raise the RH cover. Remove (2) screws holding the LH cover to the printer base and loosen (2) inside screws. Refer to FIG. 5-1 . |
| 2. | Connect the printer AC power cord to a grounded AC outlet. Power the printer off before attaching the leads to the meter. |
| 3. | On the main circuit board attach the DC voltmeter negative lead to the test point labeled CH1 (Ground) on the main circuit board. Attach the DC voltmeter positive lead to the corresponding voltage test point and place the power switch in the ON position. Refer to table below and Fig. 5-2, 5-3 . |

Voltage	Test Points	Voltage Range
+ 5VDC	CH1 & CH3	+4.8 to +5.2VDC
+24VDC	CH1 & CH4	+23.5 to +24.5

NOTE: The power supply voltages are not adjustable. All voltages must read within +/- 10% of the nominal value for correct operation of the printer.

4. After performing tests, replace and secure the LH cover to the printer base with (2) screws previously removed. Tighten (2) inside screws. Refer to **FIG. 5-1**.

5.1 POWER SUPPLY CHECKS



FIG. 5-1

MAIN CIRCUIT BOARD

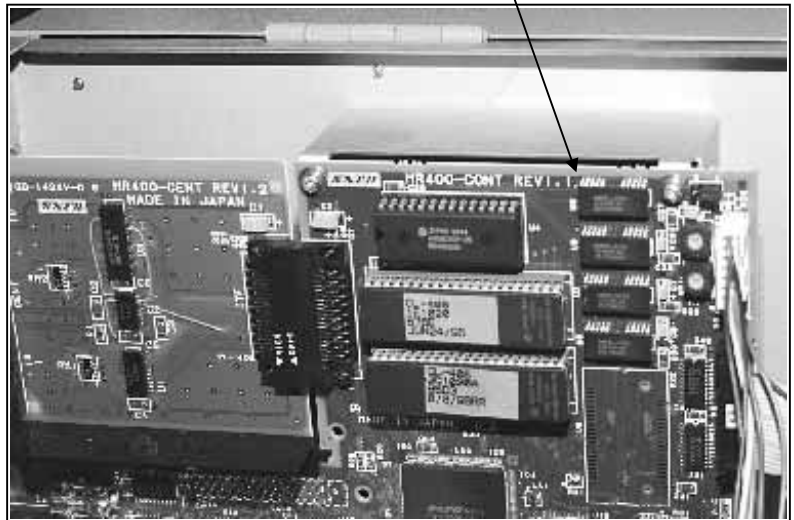
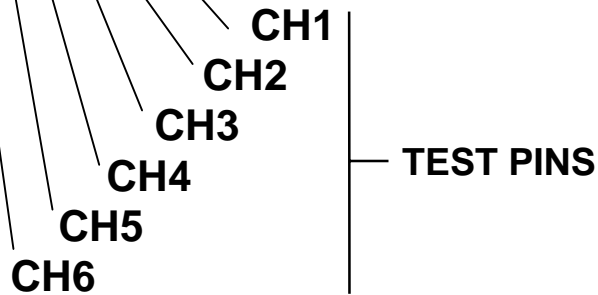


FIG. 5-2



FIG. 5-3

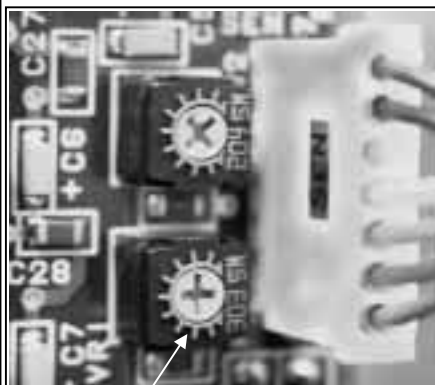


5.2 REFLECTIVE LABEL PITCH SENSOR ADJUSTMENT

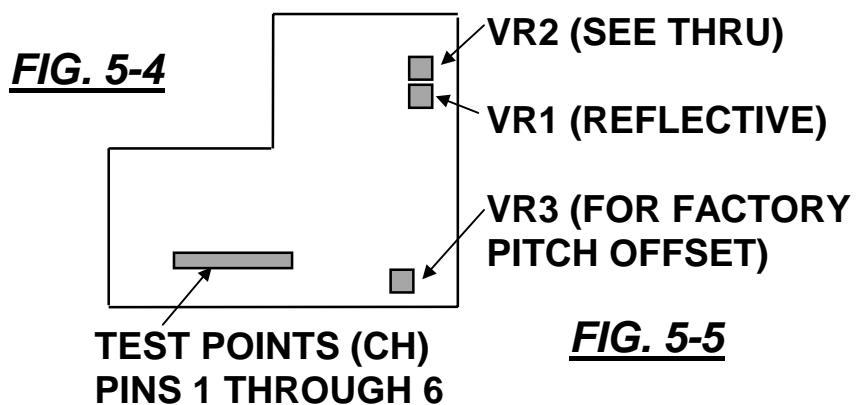
- | | |
|---------------------|--|
| Required Equipment: | <ul style="list-style-type: none"> • Number 2 Phillips Screwdriver • DC Voltmeter • Small flathead screwdriver (for potentiometer adjustment) |
|---------------------|--|

To adjust the Reflective Label Pitch Sensor voltage, perform the following steps:

- | STEP | PROCEDURE |
|------|---|
| 1. | Connect the printer AC power cord to a grounded AC outlet. Place the power switch in the ON (1) position. |
| 2. | Load a roll of label stock with I-marks into the printer. Leave the head lock lever in the open position. |
| 3. | On the main circuit board, turn VR1 Clockwise until it will no longer turn. |
| 4. | Attach the DC voltmeter negative lead to pin 1 of the test point labeled CH (Ground) on the main circuit board. Attach the DC voltmeter positive lead to pin 5 of the CH test point of the main circuit board. |
| 5. | Position a label in the sensor's field of view. If the voltage reading is not between +0.5 to +0.8VDC, adjust VR1 to +0.8VDC. |
| 6. | Position the non-reflective "I" Mark printed on the reverse side of the label backing in the sensor's field of view. If the difference between the Step 5 voltage reading and this voltage reading is not equal to or greater than 2VDC, your label material may not be compatible with this printer. Consult your SATO dealer. |



VR1 (PIN 1-5)
ROTATE CLOCKWISE



TEST POINTS (CH)
PINS 1 THROUGH 6

FIG. 5-5

MAIN CIRCUIT BOARD
(SCHEMATIC, NOT TO SCALE)

5.3 SEE THRU LABEL PITCH SENSOR ADJUSTMENT

- | | |
|---------------------|--|
| Required Equipment: | <ul style="list-style-type: none"> • Number 2 Phillips Screwdriver • DC Voltmeter • Small flathead screwdriver (for potentiometer adjustment) |
|---------------------|--|

NOTE: It is important to use pressure sensitive label stock that is rated for use with thermal transfer printers using see through (transmissive) sensing.

To adjust the Reflective Label Pitch Sensor voltage, perform the following steps:

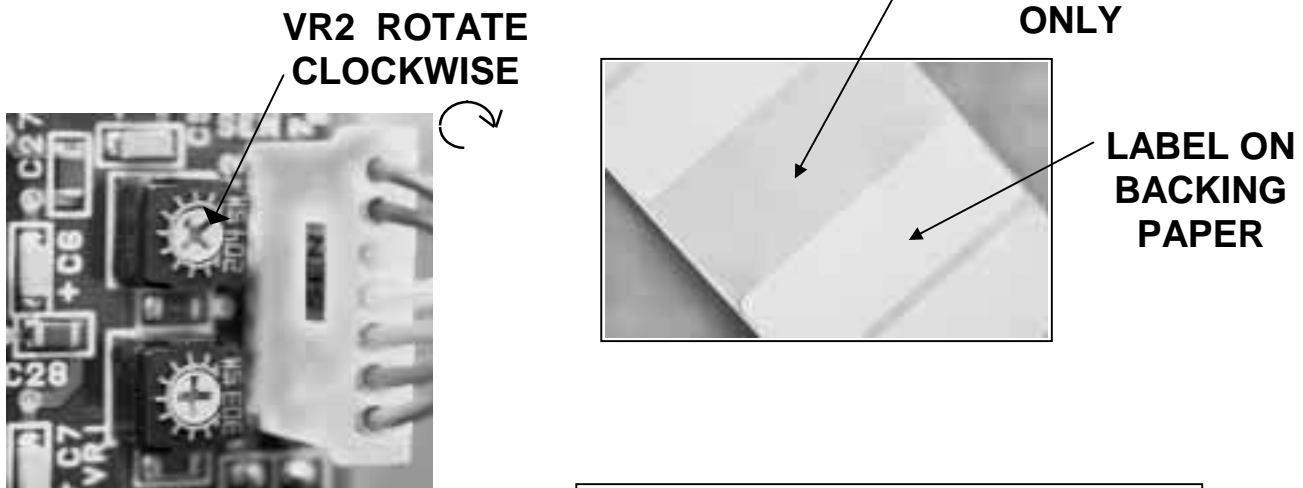
STEP	PROCEDURE
1.	Connect the printer AC power cord to a grounded AC outlet. Place the power switch in the ON (1) position.
2.	Remove and discard a label from the backing paper of label stock you will be using.
3.	On the main circuit board, turn VR2 clockwise until it will no longer turn.
4.	Attach the DC voltmeter negative (-) test lead to pin #1 (ground) of the test point pin array CH located on the main circuit board.
5.	Attach the DC voltmeter positive (+) test lead to pin #2 of the test point pin array CH located on the main circuit board.
6.	Position the label backing paper (area with the label removed) so that it is directly under the label sensor. The voltage indicated on your voltmeter must be equal to or less than 0.5 Volts DC. If the voltage is not within this specification, you must adjust VR2 counter clockwise to meet the 0.5 volt or less specification. (If you are unable to adjust to these settings, the label stock you are using may not be manufactured using proper specifications for see-through sensing on SATO printers. Contact your label supplier or SATO Technical Support for assistance.)

5.3 SEE THRU LABEL PITCH SENSOR ADJUSTMENT (CONT.)

STEP

PROCEDURE

7. Position a strip of the label material (label attached to the backing paper) so it is directly under the label sensor. Observe the voltage reading on your DC voltmeter. For the labels to feed properly the difference between this voltage and the voltage reading obtained in step 6, must be equal to or greater than 2 volts. If the voltage difference is less than 2 volts, it may indicate that the label stock (face stock) you are using is too transparent for proper operation on the printer. Contact your label supplier or SATO Technical Support for assistance.



NOTE: SEE PAGE 4 FOR THE LOCATIONS OF VR1, VR2, VR3 AND TEST POINTS ON THE CIRCUIT BOARD.

Mechanical Adjustments

The SATO CL-408/CL-412 printers contain adjustable mechanical sub-assemblies. This means that during your regular maintenance, your service technicians are able to make adjustments to reset the printer to factory specifications thereby ensuring optimum performance of your printer.

The main mechanical sub-assemblies are:

- Ribbon Unwind/Rewind Assembly
- Ribbon Guide Roller Assembly
- Print Head Assembly
- Drive Belt Assembly

In this section you will find procedures for:

- Ribbon Unwind and Rewind Clutch Adjustment
- Ribbon Guide Plate Adjustment
- Print Head Position Alignment
- Print Head Balance Adjustment
- Print Head Alignment Adjustment
- Timing Belt Tension Adjustment
- Tear Plate Adjustment

6.1 RIBBON CLUTCH ADJUSTMENTS

Excessive ribbon unwind and rewind tension will result in variable ribbon motion and could be the cause of print quality problems.

Follow the procedures 6.1.1 and 6.1.2 to verify that the ribbon unwind and rewind tensions are within specification or if adjustment of either clutch is necessary.

Required Equipment: FOR 6.1.1 & 6.1.2	<ul style="list-style-type: none"> • 1 Kg Tension Gauge • Ribbon Core, empty • String • 12 mm Wrench • #2 Phillips Screw Driver
---	--

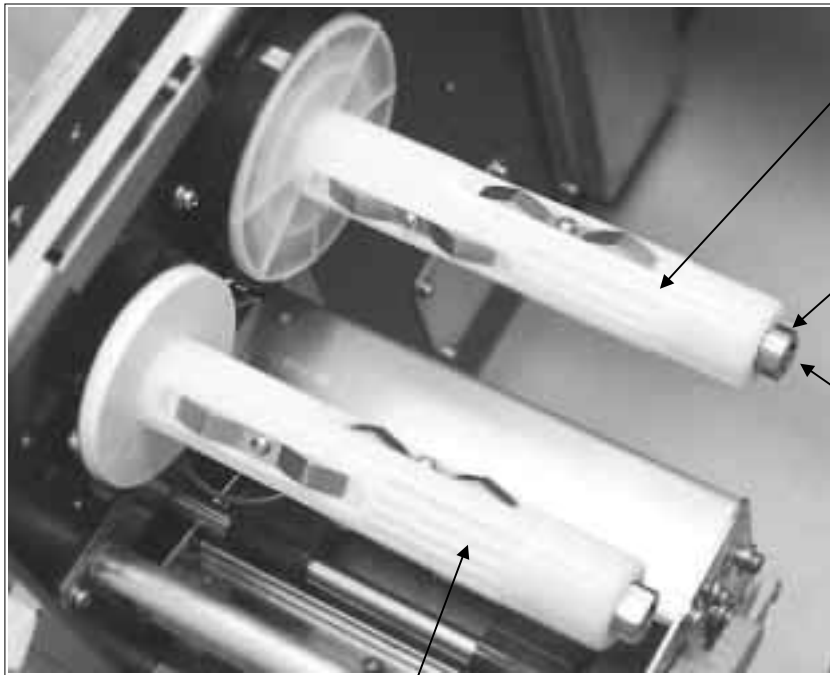
6.1.1 RIBBON UNWIND CLUTCH ADJUSTMENT

To adjust the Ribbon Unwind Clutch, perform the following steps and refer to the illustrations:

STEP	PROCEDURE
1.	Remove the ribbon if installed.
2.	Place an empty ribbon core on the ribbon unwind spindle. Attach the free end of the string to the tension gauge. Refer to Fig. 6-1 .
3.	Wind the string tightly around the ribbon core in a single layer and in a clockwise direction. Attach the free end of the string to the tension gauge.
4.	Gradually lift the tension gauge, pulling the string to unwind it from the core. Once the spindle begins to move, the gauge should indicate 600 to 800 grams of tension. Excessive or insufficient tension must be corrected by adjusting the ribbon unwind clutch. Refer to Fig. 6-1, 6-2 .

To adjust the clutch, loosen the set screw and move the adjust nut CW for more tension and CCW for less tension. Tighten the set screw and repeat Steps 3 and 4 until the correct tension is achieved.

6.1 RIBBON CLUTCH ADJUSTMENTS



RIBBON UNWIND SPINDLE

ADJUST NUT

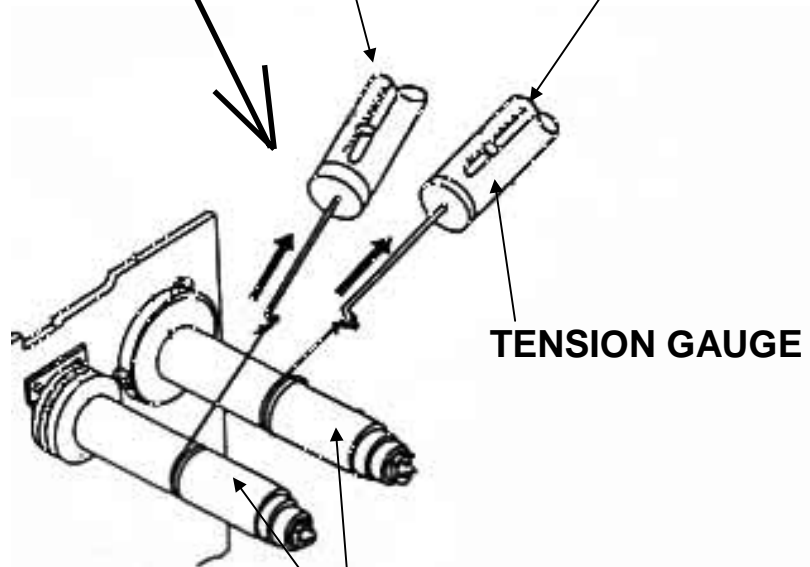
SET SCREW - IS INSIDE ADJUST NUT

FIG. 6-1

RIBBON REWIND SPINDLE

500-700g

600-800g



TENSION GAUGE

FIG. 6-2

EMPTY RIBBON CORES

6.1.2 RIBBON REWIND CLUTCH ADJUSTMENT

To adjust the Ribbon Wind Clutch, perform the following steps and refer to the illustrations on previous page:

STEP	PROCEDURE
1.	Connect the power cable to the printer and AC outlet. Place the printer's power switch to the ON (1) position.
2.	Place an empty ribbon core on the ribbon wind spindle. Attach the free end of the string to the tension gauge. Refer to Fig. 6-1 .
3.	Wind the string tightly around the ribbon core in a single layer and in a clockwise direction. Attach the free end of the string to the tension gauge.
4.	Gradually lift the tension gauge, pulling the string to unwind it from the core. Once the spindle begins to move, the gauge should indicate 500 to 700 grams of tension. Excessive or insufficient tension must be corrected by adjusting the ribbon unwind clutch. Refer to Fig. 6-1, 6-2 .

To adjust the clutch, loosen the set screw and move the adjust nut to get the correct tension. Tighten the set screw and repeat Steps 3 and 4 until the correct tension is achieved.

6.2 RIBBON GUIDE PLATE ADJUSTMENT

Required Equipment: #2 Phillips Screw Driver

If the ribbon is not smooth across the guide plate (ribbon wrinkle) and adjustment is required, perform the following steps:

1. Check for even ribbon tension by watching the ribbon movement under the guide plate as it moves upward toward the ribbon rewind spindle. If it appears uneven, proceed to Step 2. Refer to **Fig. 6-3**.
2. Reposition the ribbon plate by loosening the retaining screws. Refer to illustration. Refer to **Fig. 6-4**.

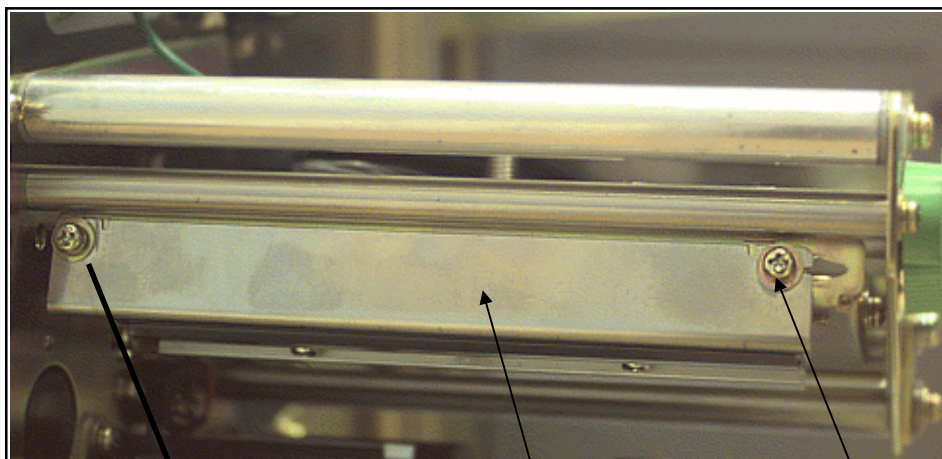


FIG. 6-3

GUIDE PLATE

**RETAINING
SCREWS**



FIG. 6-4

6.3 PRINT HEAD POSITION ALIGNMENT

(MINOR ADJUSTMENT)

- Required Equipment:
- Flat Head Screwdriver
 - #2 Phillips Screwdriver

To adjust the print head alignment and make print quality consistent across label, perform the following steps:

1. Loosen the center and right screw on the ribbon adjustment plate. Realign the right side of print head by prying adjust plate forward or backward with a flat blade screwdriver. Adjusting head balance should be corrected at this time.
2. Use a flat head screwdriver to nudge the plate into position. Refer to illustrations and note the adjustment marks. Tighten the screws.

NOTE: Use head pattern as a guide to even print position. Refer to Section 4.2.

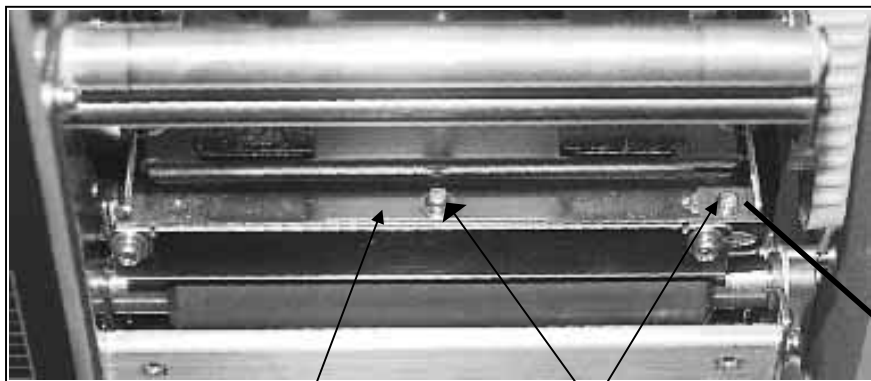


FIG. 6-5

SCREWS

**RIBBON
ADJUSTMENT PLATE**

**ADJUSTMENT
MARKS**

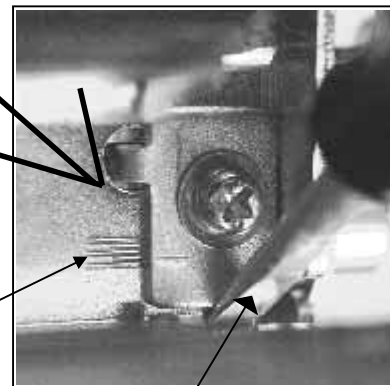


FIG. 6-6

**FLAT BLADE
SCREWDRIVER**

**REFER TO SECTION 4.2 FOR
HEAD PATTERN EXAMPLES**

6.4 PRINT HEAD BALANCE ADJUSTMENT

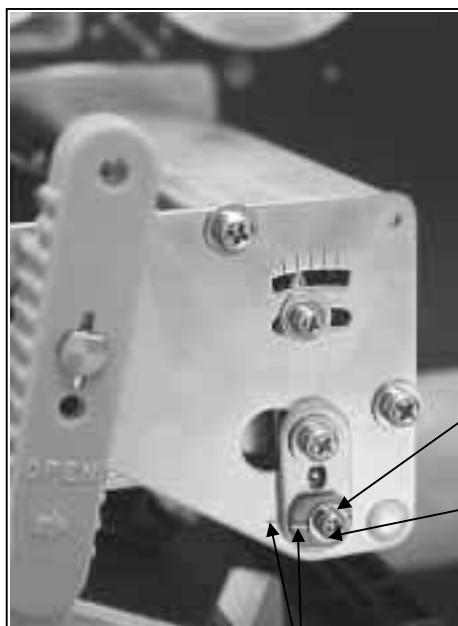
- | | |
|---------------------|---|
| Required Equipment: | <ul style="list-style-type: none"> • 10mm Open End Wrench • #2 Phillips Screwdriver |
|---------------------|---|

To optimize print quality, perform the following steps to adjust the Print Head Balance, using head pattern as a guide:

1. Load the ribbon and label stock into the printer.
2. Hold eccentric nut along flats with 10mm box wrench and loosen holding screw. Refer to **Fig. 6-7**.
3. Adjust eccentric nut by rotating CW or CCW.

Rotating CW increases print density on left side of label. CCW decreases print density on the right side of label. Note indexing marks on plate. Allowable range is between 7-11 o'clock. Refer to **Fig. 6-7**.

4. Tighten screw to secure eccentric nut in place.
5. Loosen and adjust screw along slot to move indexing pointer for maximum print quality.



**LOOSEN SCREW
1/4 TURN**

**USE 10MM BOX WRENCH TO
ADJUST ECCENTRIC NUT CW
OR CCW AND TIGHTEN SCREW**

FIG. 6-7

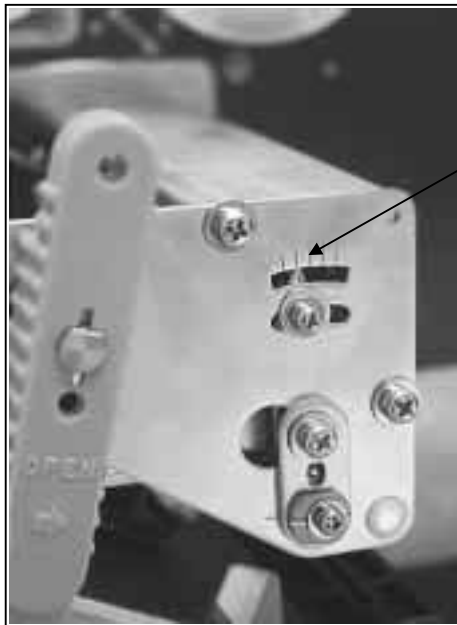
INDEXING MARKS

6.5 PRINT HEAD ALIGNMENT ADJUSTMENT (MAJOR ADJUSTMENT)

Required Equipment: • #2 Phillips Screwdriver

To further optimize print quality, especially when using thick label stock, additional adjustments are possible. Perform the following steps using head pattern as a guide:

1. Load the ribbon and label stock into the printer.
2. Loosen and adjust screw along slot to move indexing pointer for maximum print quality. Refer to **Fig. 6-8**.



**INDEXING POINTER
SHIFTS HEAD
BACKWARD/FORWARD**

FIG. 6-8

6.6 TIMING BELT TENSION ADJUSTMENT

- Required Equipment:
- 500 Tension Gauge
 - #2 Phillips Screwdriver

To adjust the Timing Belt Tension, perform the following steps:

1. Press in the center of each timing belt with the tension gauge and note the tension reading when the belt is moved 1 to 2mm.
2. If the tension reading of each belt is not within range of 500g, adjust the position of the pulley by loosening the (4) stepper motor mounting screws and moving motor to achieve the required range. After adjusting motor, tighten but do not over tighten screws. Belts should have some movement. Refer to **Fig. 6-9**.

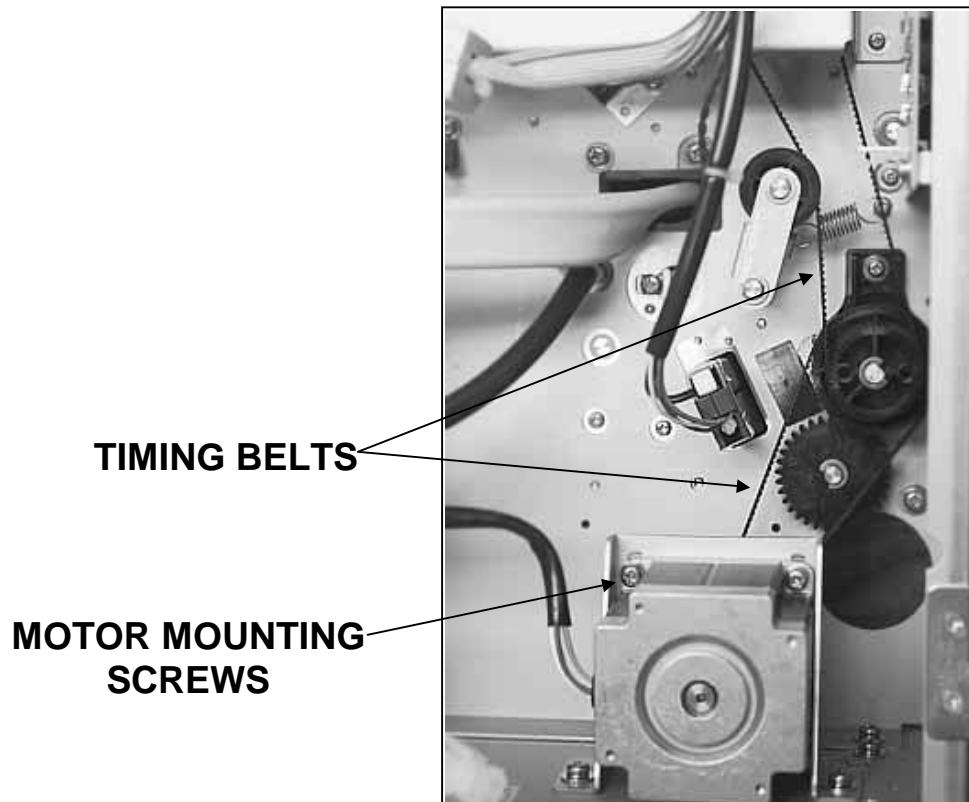


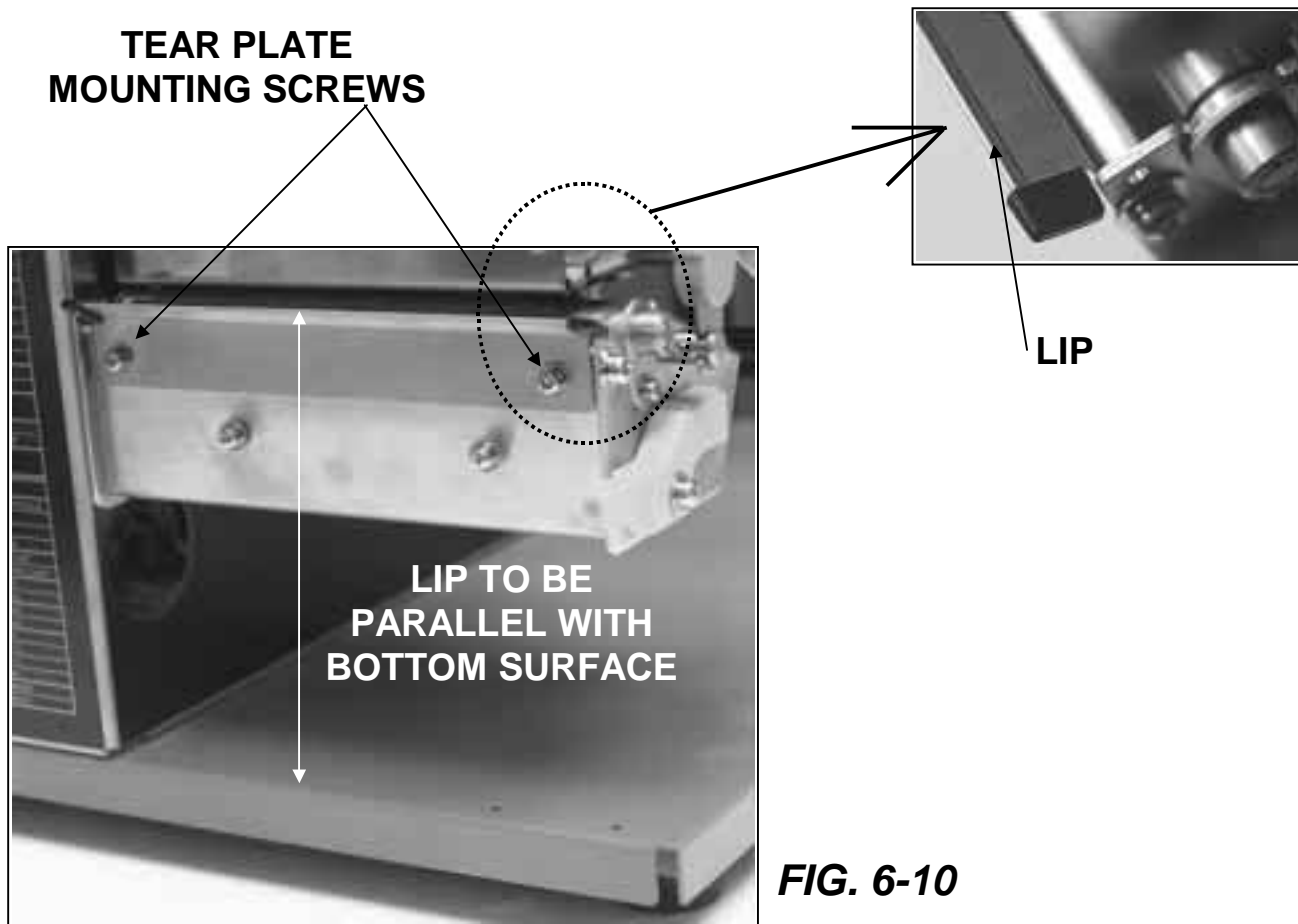
FIG. 6-9

6.7 TEAR PLATE ADJUSTMENT

Required Equipment: #2 Phillips Screwdriver

To adjust the Tear Plate perform the following steps:

1. Loosen the Tear Plate mounting screws and position plate so that the lip is parallel to the bottom of the printer assembly. Refer to **Fig. 6-10**.
2. Tighten the mounting screws.



Replacement Procedures

The SATO CL-408/CL-412 printers contain replaceable components and sub-assemblies. This chapter contains step-by-step instructions for removing and replacing the following components and sub-assemblies.

- Fuses
- Print Head
- Main Circuit Board
- Power Supply
- Label Sensor
- Ribbon Motion Sensor
- Ribbon Clutch Washers
- Timing Belts
- Platen
- Display Panel
- Stepper Motor

7.1 REPLACING FUSES

Fuse replacement is described in the following section.

- 7.1.1 Removing and Replacing the Main Power Fuse
- 7.1.2 Removing and Replacing the +5V Fuse
- 7.1.2 Removing and Replacing the +24VCD External Fuse

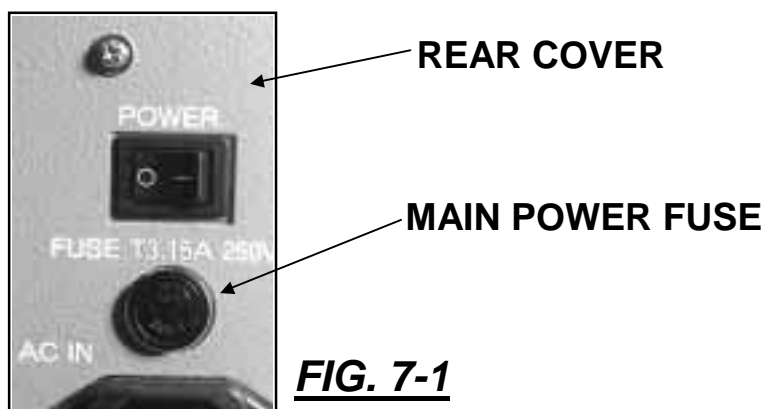
NOTE: Before replacing a fuse, determine the cause of the overload condition.

7.1.1 REMOVING AND REPLACING THE MAIN POWER FUSE

Required Equipment: T3.15 Amp, 250 V Fuse

To remove and replace the Main Power Fuse perform the following steps:

STEP	PROCEDURE
1.	Switch the printer OFF (position 0) and disconnect the AC Power Cord.
2.	Unscrew the fuse cover from the rear of the printer. Remove and replace the main power with one of equal rating (T3.15 Amp, 250 V). Do not use a fuse with a higher rating. Refer to FIG.7-1 .
3.	Return the printer to service by reconnecting the AC Power Cord.

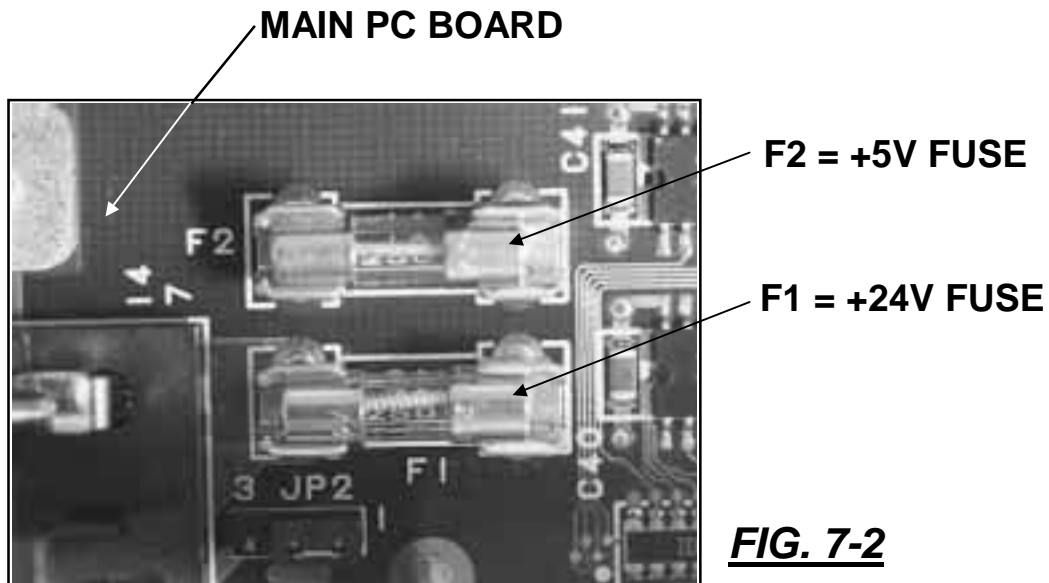


7.1.2 REMOVING AND REPLACING THE +5V Or +24V FUSE(s)

- | | |
|---------------------|---|
| Required Equipment: | <ul style="list-style-type: none">• 1 Amp, 250 V Fuse (+5V)
or• 3 Amp, 250 V Fuse (+24V)• #2 Phillips Screwdriver |
|---------------------|---|

To remove and replace the Main Power Fuse perform the following steps:

- | STEP | PROCEDURE |
|------|---|
| 1. | Switch the printer OFF (position 0) and disconnect the AC Power Cord. |
| 2. | Remove (2) screws securing the LH Cover. Lift the cover to gain access to the Main PCB. |
| 3. | Refer to FIG. 7-2 and locate the +5V Fuse (F2) or +24V Fuse (F1). |
| 4. | Remove and replace the Fuse(s) with one of equal rating. Do not use a fuse with a higher rating. |
| 5. | Replace the cover and secure with screws removed in Step 2. |
| 6. | Return the printer to service by reconnecting the AC Power Cord. |



7.2 REPLACING THE PRINT HEAD

The CL-408/CL-412 print head can be easily replaced. No critical adjustments are required because the print head is a subassembly mounted on a permanent, factory adjusted mechanism.

Before you replace the print head, check the head counter values by printing a test pattern. (Refer to Section 8.1).

Required Equipment: #2 Phillips screwdriver

To remove and replace the Print Head perform the following steps:

STEP	PROCEDURE
1.	Switch the printer OFF (position 0) and disconnect the AC Power Cord.
2.	Lift the RH cover and open the front cover to gain access to the print head.
3.	Remove the center screw holding the head bracket to the thermal head. Refer to Fig 7-3 .
4.	Carefully open the print head so that the print head will drop down. Refer to Fig 7-6 .
5.	Carefully disconnect the print head data cable and the print head power cable and remove the print head.
6.	Install the new print head by reconnecting the print head data cable and the print head power cable to the print head. Refer to Fig 7-4, 7.5 .
7.	Position the print head so that the center screw is aligned with the mechanism and the alignment pins are aligned with the head. Refer to Fig 7-7 .
8.	Close the head, replace the center screw and tighten securely.

Before you return the printer to normal service, you should perform the following procedures:

- Head Counter Clear (Refer to Section 8.3).
- Confirm that the head cables are connected and that it does not touch the head opening spring. Also confirm that you can open and close the head without restriction and that the ribbon guide plate adjustment is correct.
- Print test pattern.

7.2 REPLACING THE PRINT HEAD

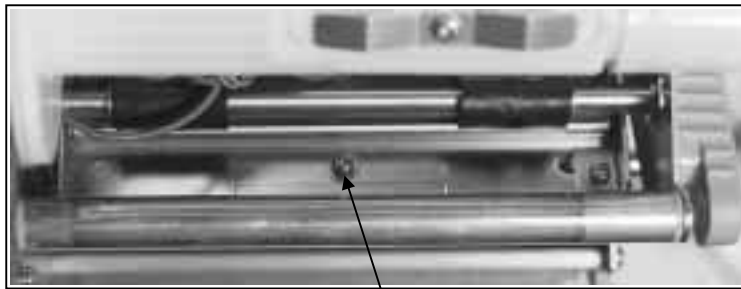


FIG. 7-3

CENTER SCREW

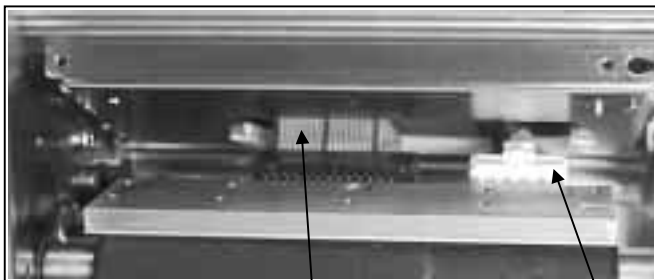
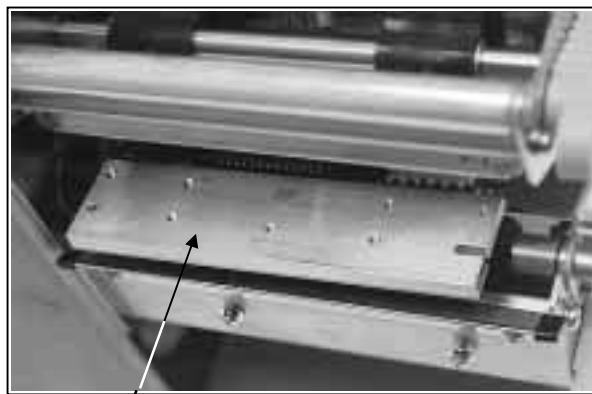


FIG. 7-4, 7.5

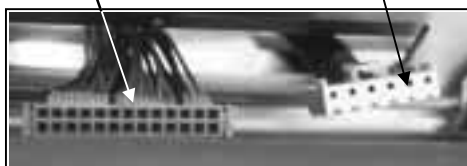
**P.H. DATA
CABLE**

**P. H.POWER
CABLE**

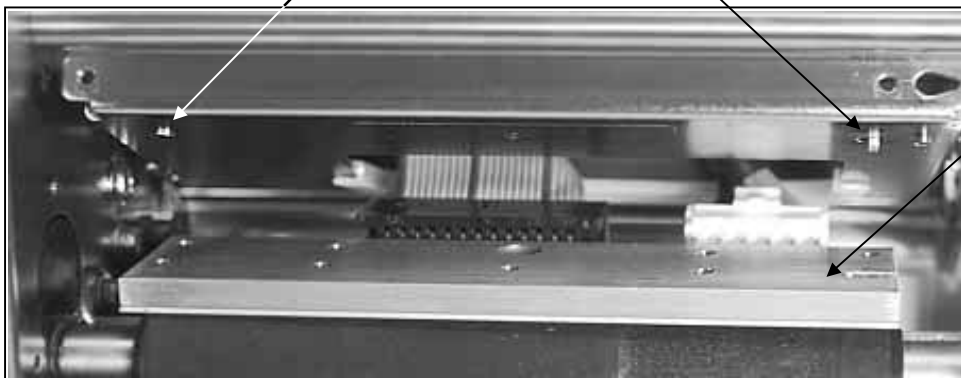


PRINT HEAD

FIG. 7-6



ALIGNMENT PINS



PRINT HEAD

FIG. 7-7

7.3 REPLACING THE MAIN CIRCUIT BOARD

The Main Circuit Board contains the control electronics for the CL-408/412 and is located behind the LH cover of the printer. This board will also include an interface card.

NOTE: Many of the components on these boards are extremely susceptible to damage by static electricity. To avoid damage from static electricity, do not unpack new circuit boards from anti-static bags until instructed to do so.

Required Equipment: #2 Phillips Screw Driver

To remove and replace the Printed Circuit Board (PCB) perform the following steps:

STEP	PROCEDURE
1.	Raise the RH cover. Remove (2) screws holding the LH cover to the printer base and loosen (2) inside screws. Refer to Fig 7-8 .
2.	Switch the printer OFF (position 0).
3.	Remove (2) screws holding the interface card to the rear cover and pull away to detach the card from the PCB board. Refer to Fig 7-9 .
4.	Note cable connections locations, then disconnect all cables from the PCB board. Refer to Fig 7-9 .
5.	Remove (3) screws holding the display panel PCB to the PCB Bracket. Refer to Fig 7-9 .
6.	Remove (2) screws from the outside of the Rear Cover holding the bracket which is part of the PCB board and remove the PCB board from the printer. Refer to Fig 7-10, 7-11 .
7.	Carefully remove the EPROM(s) from the defective PCB and install in the same location(s) on the new PCB. Refer to Fig 7-9 .
8.	Reinstall the PCB and interface card using screws removed in Steps 3 & 5.
9.	Reconnect all cables previously detached.
10.	Replace and secure the LH cover to the printer base with (2) screws previously removed. Tighten (2) inside screws. Refer to <i>Fig 7-8</i> .
11.	Reset printer to factory defaults.

7.3 REPLACING THE MAIN CIRCUIT BOARD

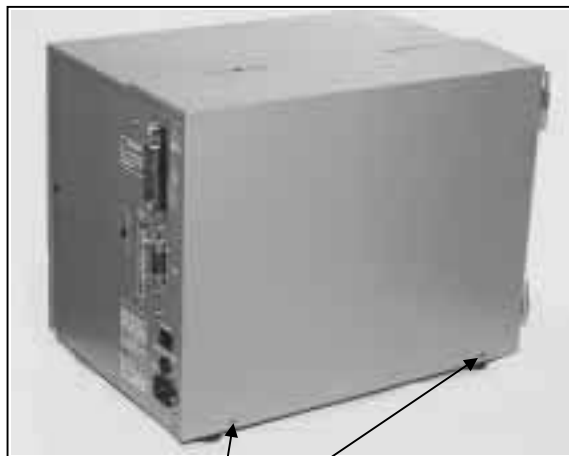
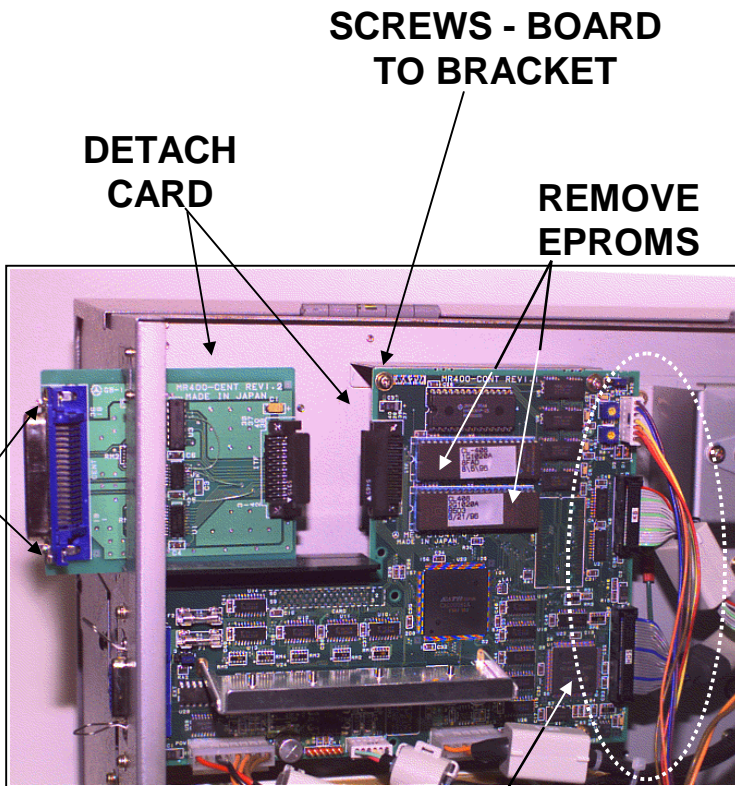


FIG. 7-8
(2) SCREWS

REMOVE (2) SCREWS



LOOSEN (2) SCREWS



DISCONNECT CABLES

FIG. 7-9



REMOVE (2) SCREWS

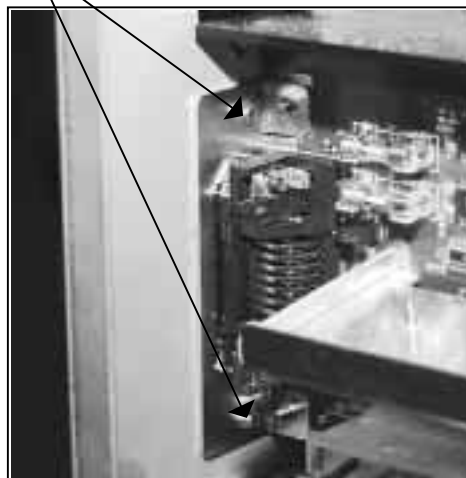


FIG. 7-10, 7-11

7.4 REPLACING THE POWER SUPPLY

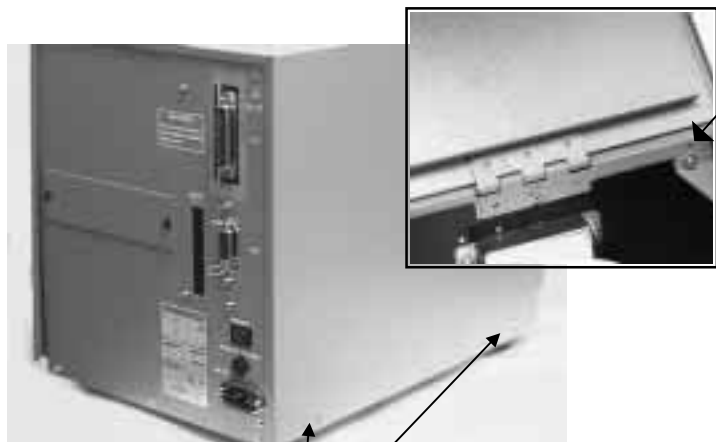
The CL-408/412 Power Supply is attached to the rear cover and the base frame. The Power Supply is a non-repairable component with no service parts and is replaced as a complete assembly.

Required Equipment: #2 Phillips Screw Driver
--

To remove and replace the Power Supply, perform the following steps:

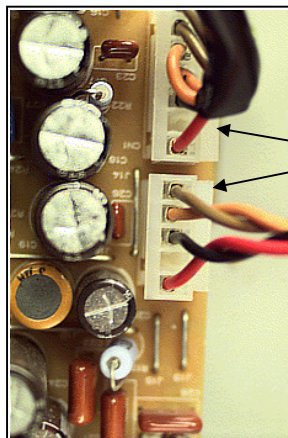
STEP	PROCEDURE
1.	Switch the printer OFF (position 0) and disconnect the AC power cord from the printer.
2.	Raise the RH cover. Remove (2) screws holding the LH cover to the printer base and loosen (2) inside screws. Refer to Fig. 7-12 .
3.	Remove (2) cables from the power supply. Refer to Fig. 7-13 .
4.	Remove (2) screws from the outside holding the power supply bracket to the rear cover and (1) from the inside holding the power supply bracket to the base frame. Refer to Fig. 7-14, 7-15
5.	Remove the power supply unit through the side. Refer to Fig. 7-16 .
6.	Install the new power supply and reinstall all mounting screws and reconnect cables removed in Step 5.
7.	Check the DC power voltages. Refer to 5.1.
8.	Replace and secure the LH cover to the printer base with the (2) screws previously removed. Tighten (2) inside screws.

7.4 REPLACING THE POWER SUPPLY



LOOSEN (2)
SCREWS

(2) SCREWS

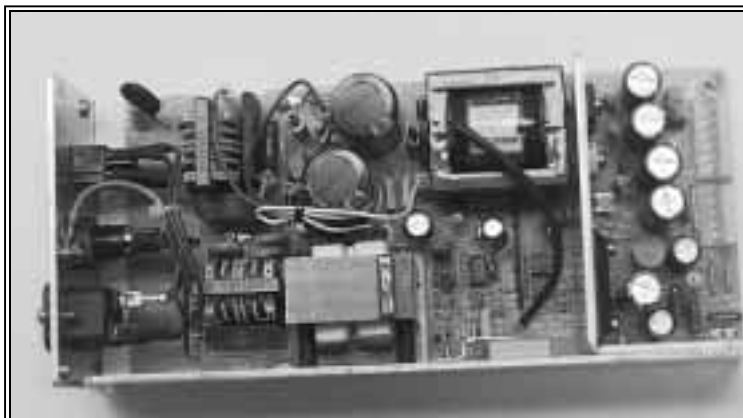
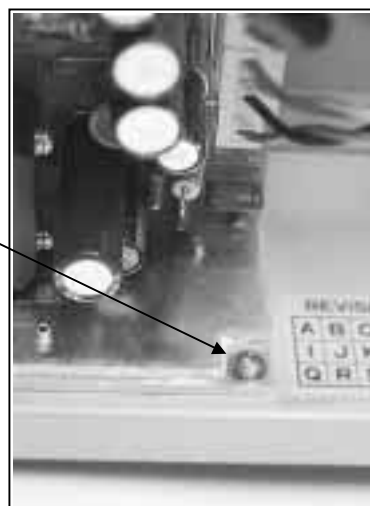


CABLES

FIG. 7-13



(3) SCREWS



POWER UNIT
SHOWN REMOVED

7.5 REPLACING THE LABEL SENSOR ASSEMBLY

The Label Sensor Assembly can be removed from the printer to clear label fragments and for service. No critical alignment is required when replacing the sensors.

- | |
|---|
| Required Equipment: <ul style="list-style-type: none"> • #2 Phillips Screw Driver • Diagonal Cutters • One 3" Tie Wrap |
|---|

To remove and replace the Label Sensor, perform the following steps and refer to the illustrations:

- | STEP | PROCEDURE |
|-------------|---|
| 1. | Switch the printer OFF (position 0) and disconnect the AC power cord from the printer. |
| 2. | Raise the RH cover. |
| 3. | Remove (2) screws holding the LH cover to the printer base and loosen (2) inside screws. Refer to Fig. 7-17 . |
| 4. | Remove (3) screws in front which goes into the side frame and (2) screws in back which attaches the sensor to the center frame. Refer to Fig. 7-18, 7-19 . |
| 5. | Cut the tie wrap that secures the SEN 1 cable assembly and detach the cable connector from the Main PCB. Refer to Fig. 7-20 . |
| 6. | Remove the Sensor unit by guiding the cable through the hole in the center frame and lifting the sensor from platen shaft. Refer to Fig. 7-21 . |
| 7. | Install the new sensor unit and reinstall all mounting screws removed in Step 4.
<i>If the Sensor Module needs replacing, refer to Section 7.6.</i> |
| 8. | Replace tie wrap removed in Step 5. |
| 9. | Upon completion of sensor installation, replace and secure the LH cover to the printer base with (2) screws previously removed. Tighten (2) inside screws. Reconnect the power. |

7.5 REPLACING THE LABEL SENSOR ASSEMBLY

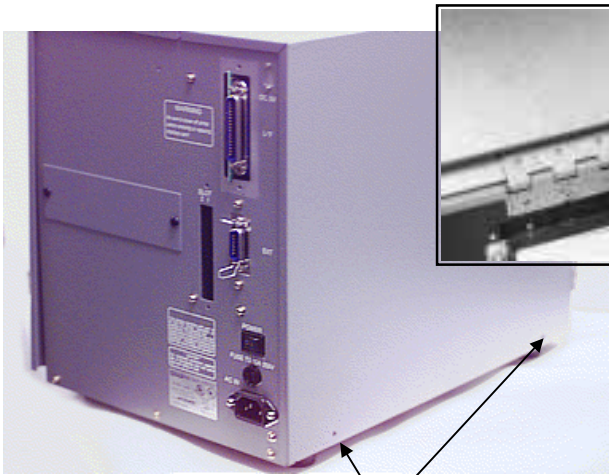


FIG. 7-17

(2) SCREWS



LOOSEN (2)
SCREWS

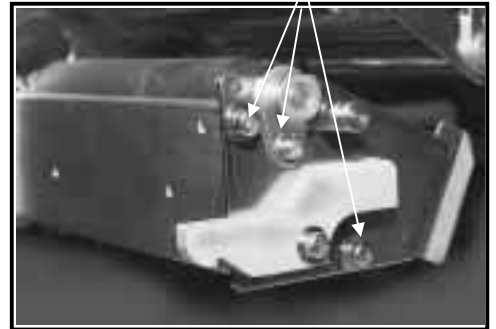


FIG 7-18

(3) SCREWS



FIG 7-19

(2) SCREWS

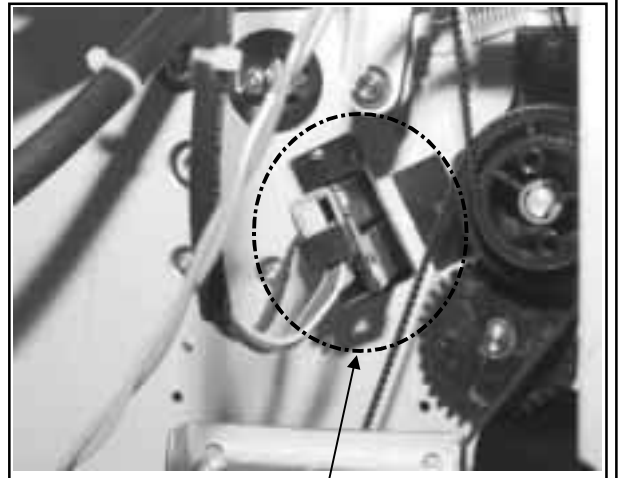


FIG. 7-21

SLIDE CABLE
THROUGH HOLE IN
CENTER FRAME

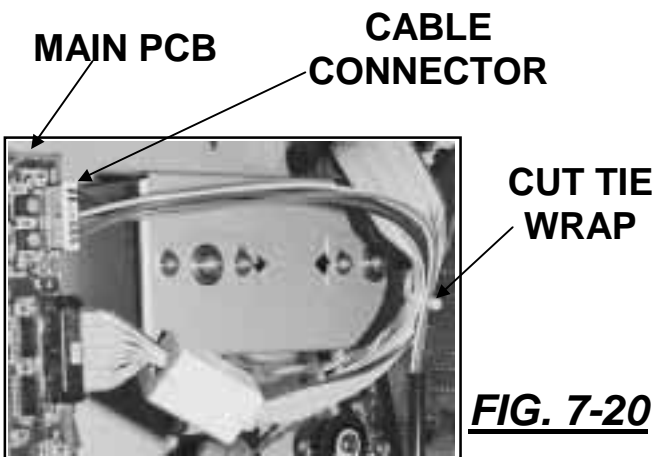


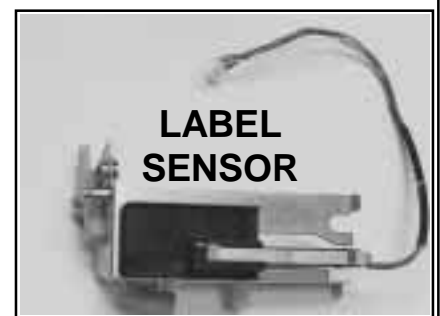
FIG. 7-20

MAIN PCB

CABLE
CONNECTOR

CUT TIE
WRAP

If the Label Sensor Module needs replacing, refer to Section 7.6



LABEL
SENSOR

7.6 REPLACING THE LABEL SENSOR MODULE

After removing the Label Sensor Assembly from the printer, if the sensor module needs to be replaced, perform the following steps

- | STEP | PROCEDURE |
|------|--|
| 1. | Detach the Paper Guide from the Side Frame. Refer to Fig. 7-22, 7-23. |
| 2. | Remove the center screw holding the collar, spring, and washer to the sensor mechanism. Refer to Fig. 7-24, 7-25. |
| 3. | Slide out the defective sensor and replace with a new part. Refer to Fig. 7-21. |
| 4. | Reinstall parts removed in Step 2. |
| 5. | Reattach the unit to the printer using Steps from Section 7.5. |

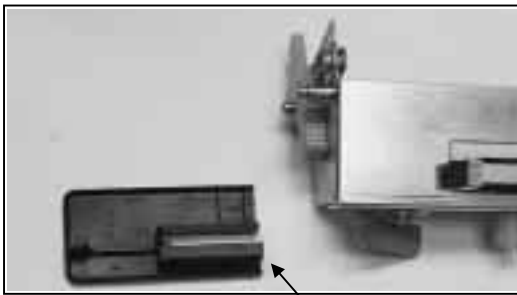


FIG. 7-22 PAPER GUIDE

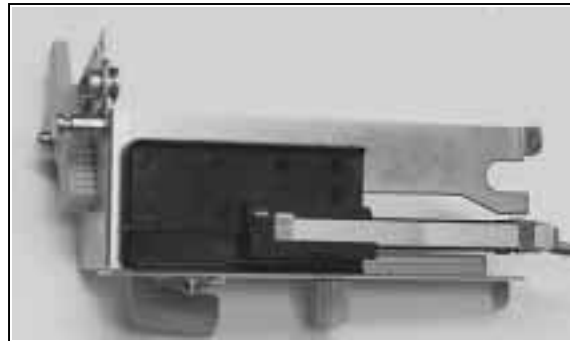


FIG. 7-23

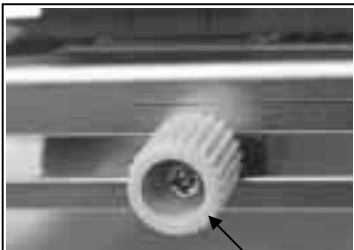
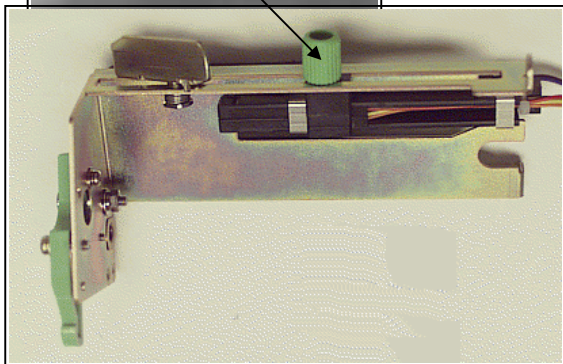


FIG. 7-24, 25



SENSOR MODULE

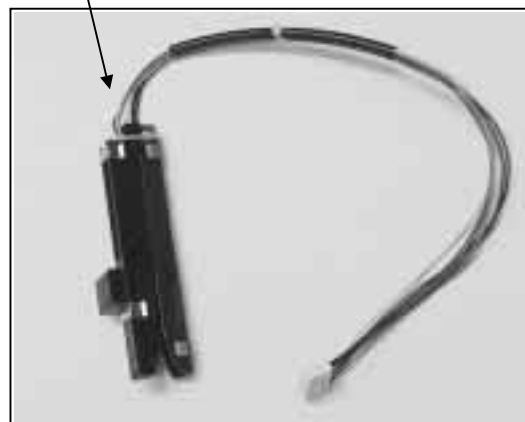


FIG. 7-26

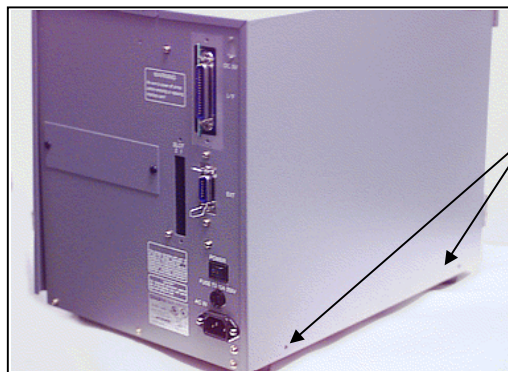
7.7 REPLACING THE RIBBON MOTION SENSOR

The Ribbon Motion Sensor is easily replaced for service.

Required Equipment: #2 Phillips Screw Driver

To remove and replace the Ribbon Motion Sensor, perform the following steps and refer to the illustrations:

- | STEP | PROCEDURE |
|-------------|---|
| 1. | Switch the printer OFF (position 0) and disconnect the AC power cord from the printer. |
| 2. | Raise the RH cover. |
| 3. | Remove (2) screws holding the LH cover to the printer base and loosen (2) inside screws. Refer to Fig. 7-27 . |
| 4. | Remove (1) screw which attaches the sensor to the Center Frame. And detach connector from the display panel PCB. Refer to Fig. 7-28, 29 . |
| 5. | Detach connector from the display panel PCB. Refer to Fig. 7-30 . |
| 5. | Remove the sensor unit from the printer. |
| 6. | Replace the sensor unit and secure with screw removed in Step 4. |
| 7. | Attach connector to the display panel PCB. |
| 8. | Upon completion of sensor installation, replace and secure the LH cover to the printer base with (2) screws previously removed. Tighten (2) inside screws. Reconnect the power. |



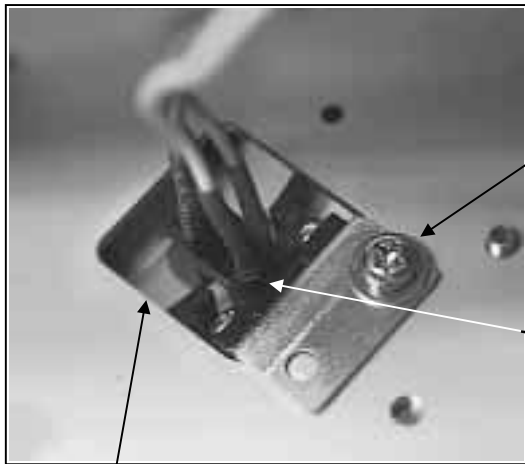
(2) SCREWS



LOOSEN (2)
SCREWS

FIG. 7-27

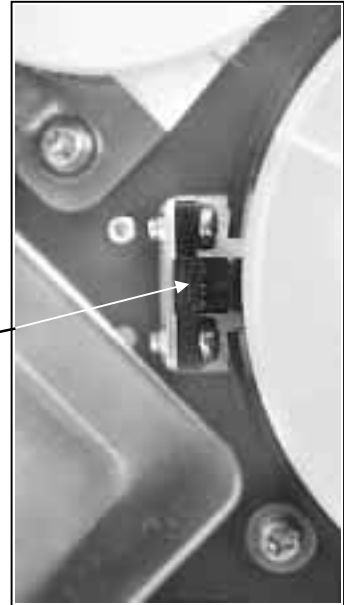
7.7 REPLACING THE RIBBON MOTION SENSOR



SCREW

SENSOR

LH SIDE OF
PRINTER



RH SIDE OF
PRINTER

FIG. 7-28,-29

OPENING FOR
SENSOR

DETACH
CONNECTOR

DISPLAY
PANEL PCB

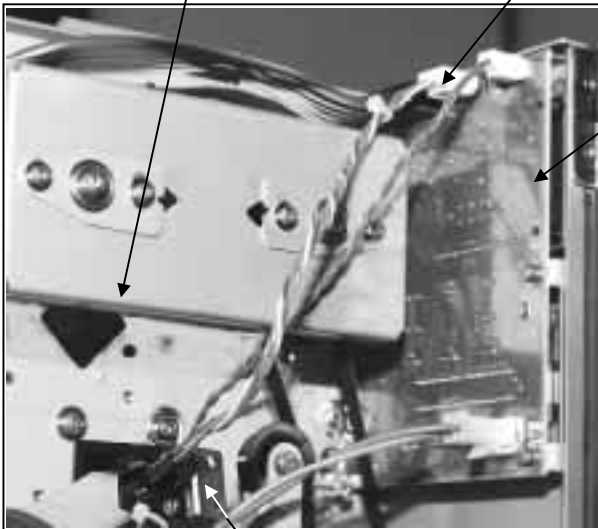


FIG. 7-30

SENSOR UNIT (SHOWN
DETACHED FROM FRAME))

7.8 REPLACING THE RIBBON DRIVE CLUTCH WASHERS

Both the ribbon unwind and the rewind drive spindles incorporate a friction clutch assembly to control tension. The friction washers within these clutch assemblies are replaceable. The procedure is identical for both the off-wind and the on-wind clutch assemblies.

Required Equipment:	#2 Phillips Screw Driver #12mm Open End Wrench
---------------------	---

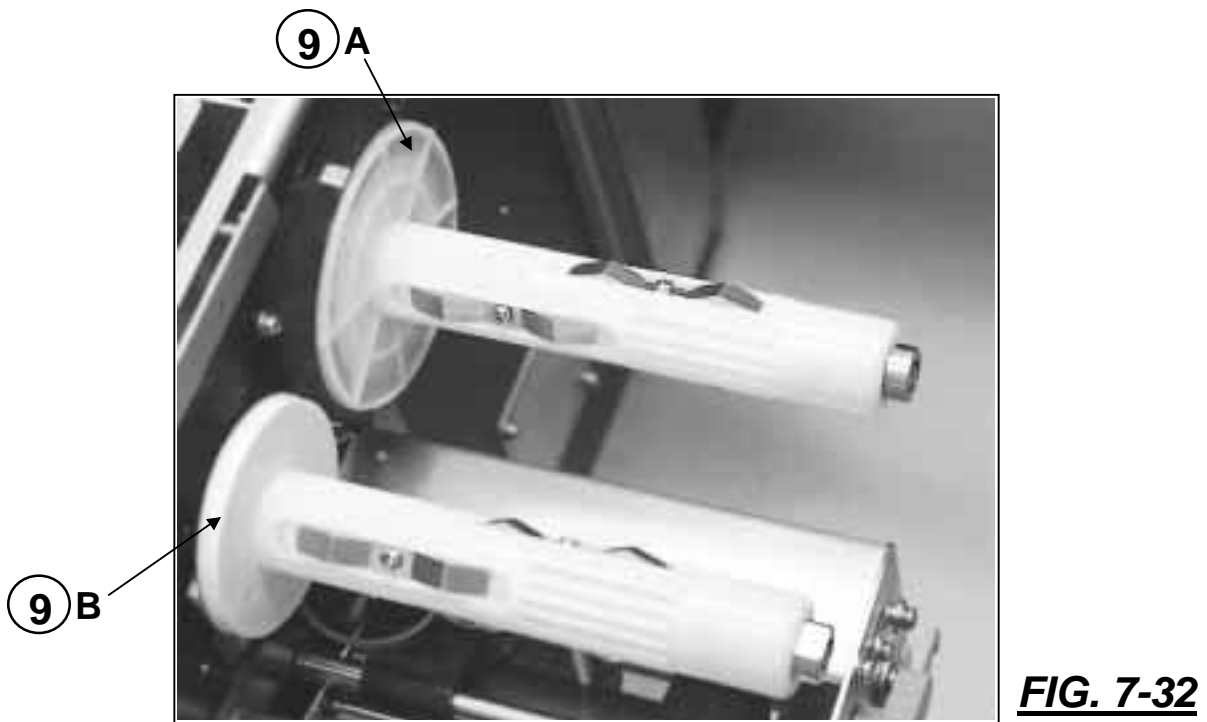
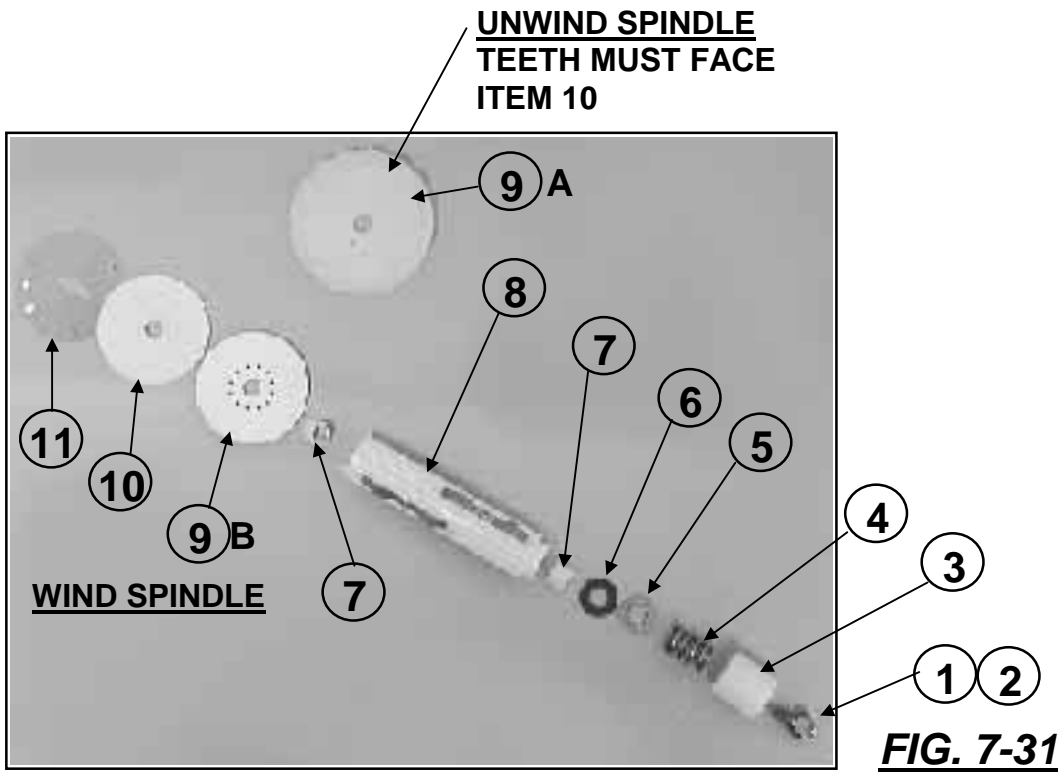
To remove the Ribbon Drive Clutch Washers, perform the following steps:

- | STEP | PROCEDURE |
|-------------|--|
| 1. | Open the RH cover. |
| 2. | Remove the ribbon from the carbon unwind and rewind spools/spindles. |
| 3. | Remove the following parts from two spindle shafts(in order): Refer to Fig.7-31 . |

ITEM NO.	DESCRIPTION	QTY EA ASSY
1.	Screw	(1)
2.	Adjustment Nut	(1)
3.	Stopper Collar	(1)
4.	Spring	(1)
5.	Disc	(1)
6.	Oil- less Dry Metal Washer	(1)
7.	Collar	(2)
8.	Ribbon Boss	(1)
9A & 9B	Disc Plate (Different)	(1)
10.	Friction Washer	(1)
11.	Hold Plate	(1)

NOTE: Disassemble one spindle at a time so that the other can be used for reference.

7.8 REPLACING THE RIBBON DRIVE CLUTCH WASHERS



COMPONENTS SHOWN ASSEMBLED

7.8 REPLACING THE RIBBON DRIVE CLUTCH WASHERS

To replace the parts to each spindle, perform the following steps:
Refer to **Fig.7-31, 7-32.**

STEP	PROCEDURE
1.	To each spindle install Item 11 Plate with teeth facing outward and align the plate with the peg on the Ribbon Shaft Flange.
2.	Install Item 10 Felt Friction Washer onto the Ribbon Shaft and slide it against Item 11 Plate.
3.	Install (1) ea. Item 9A& 9B Wind and Unwind Disc Plates onto Item 8 Ribbon Bosses. Align the hole in the Disc Plates over the pegs on Item 8. The teeth/slots on the unwind disc plate must be facing away from the Ribbon Boss. Install this assembly onto the Ribbon Shaft and slide it against the felt friction washer.
4.	Install Item 6 Oil-less Dry Metal Washer onto the ribbon shaft with the copper side facing inward (the black carbon side will face outward). Align Item 6 Washer with the peg on #8 Ribbon Boss.
5.	Install Item 5 Disc onto the ribbon shaft with the smooth side facing Item 6 Washer, (one side of the disc is smooth and the other side has sharp edges).
6.	Install Item 4 Spring onto the ribbon shaft.
7.	Install Item 3 Stopper Collar onto the ribbon shaft.
8.	Screw the Item 2 Adjustment Nut clockwise into the end of the ribbon shaft.
9.	Replace #1 Screw and tighten.

NOTE: Do not over-tighten the adjustment nut since this screw is used to adjust the clutch tension. Adjust the clutch tension as outlined in Section 6.1.

7.9. REPLACING THE TIMING BELTS

Timing Belt “A” is used to transmit torque from the stepper motor to the platen pulley via a set of toothed pulleys.

Timing Belt “B” is used to transmit torque from the platen pulley to the ribbon roller via another set of toothed pulleys.

Required Equipment: FOR 7.9.1 & 7.9.2	<ul style="list-style-type: none"> • #2 Phillips Screw Driver • Flat head Screw Driver
---	--

7.9.1 REMOVING THE TIMING BELTS TO CARBON REWIND

To remove the timing belts, perform the following steps:

- | STEP | PROCEDURE |
|------|---|
| 1. | Switch the printer OFF (position 0) and disconnect the AC power cord from the printer. |
| 2. | Raise the RH cover. Remove (2) screws holding the LH cover to the printer base and loosen (2) inside screws. Refer to Fig. 7-33 . |
| 3. | Remove tension from Belt “A” by loosening (4) mounting screws attaching the stepper motor to the motor bracket. Move the motor up in the bracket so belt slides from the motor shaft. Remove belt for replacing. Refer to Fig. 7-33 . |
| 4. | Detach the connector from the Main PC board to the display panel PCB. Remove the center screw holding the shaft supporter to the ribbon frame (and connects to the ribbon rewind shaft). Slide Belt “B” from the pulley while pulling the rewind shaft back from the frame. Remove belt for replacing. Refer to Fig. 7-35, 7-36, 7-37 . |
| 5. | Upon completion of replacing belts, replace and secure the LH cover to the printer base with (2) screws previously removed. Tighten (2) inside screws. Reconnect the power. |



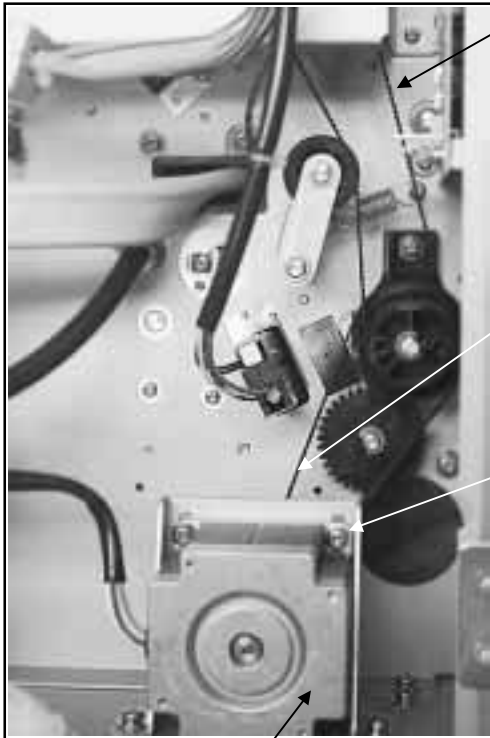
(2) SCREWS

FIG. 7-33



LOOSEN (2)
SCREWS

7.9.1 REPLACING THE TIMING BELTS TO CARBON REWIND



STEPPER MOTOR

FIG. 7-34

BELT "B"

BELT "A"

(4)
MOUNTING
SCREWS



FIG. 7-35

CENTER
SCREW

DETACH CONNECTOR

SLIDE BELT
FROM
PULLEY

RIBBON REWIND
SHAFT

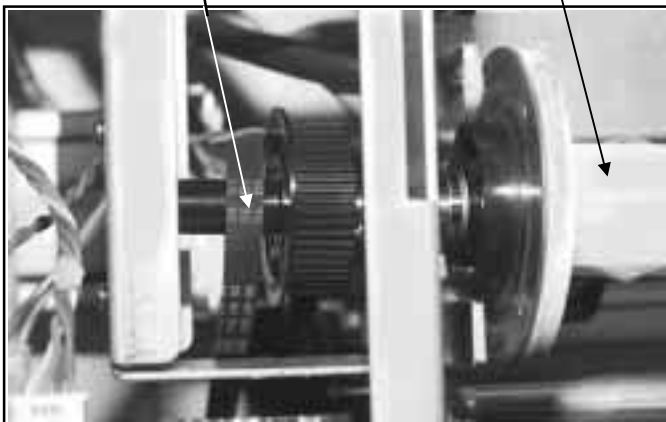


FIG. 7-37



FIG. 7-36

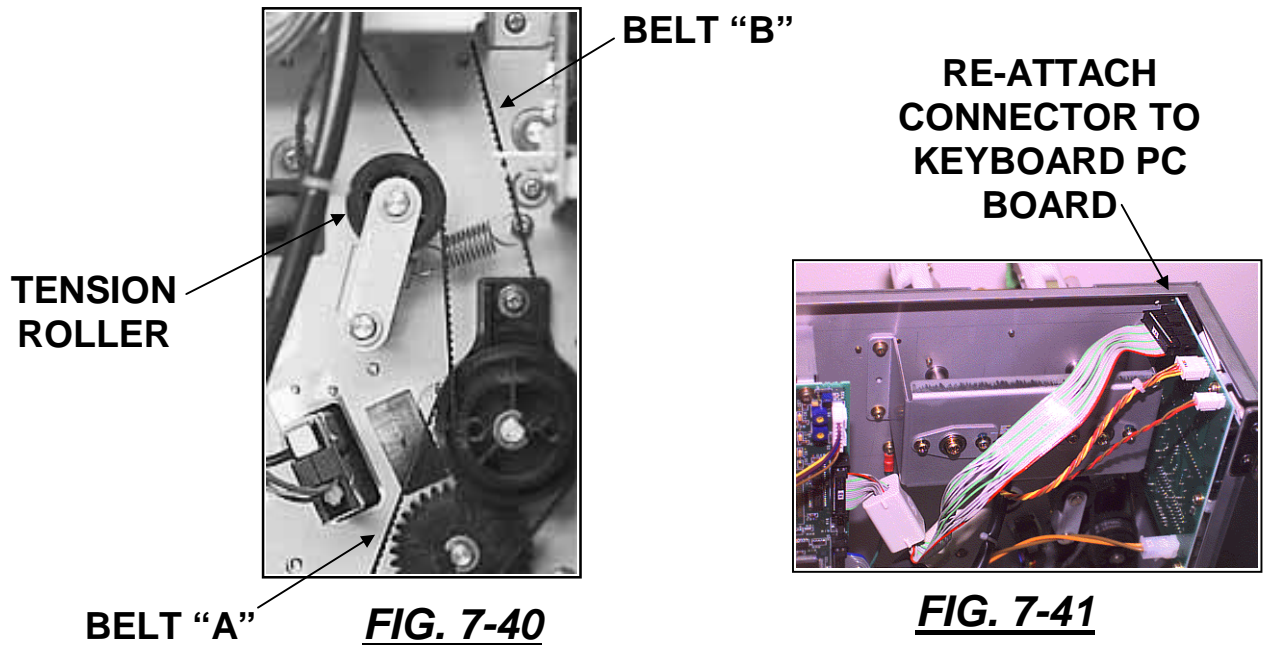
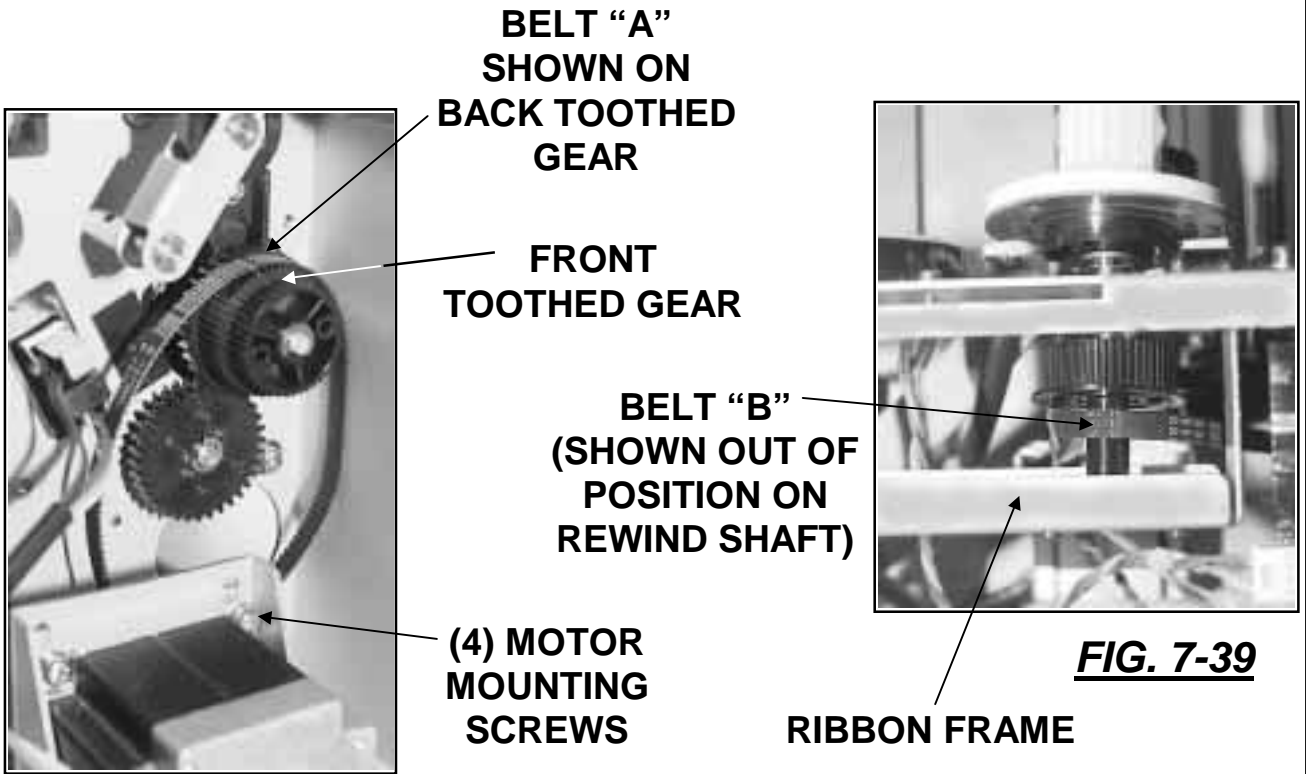
7.9 REPLACING THE TIMING BELTS

7.9.2 REPLACING THE TIMING BELTS TO PLATEN PULLEY

To replace the timing belts, perform the following steps:

STEP	PROCEDURE
1.	Refer to Section 7.9.1 to remove belts. Slide a replacement Belt "A" over the back toothed gear on the platen shaft. Refer to Fig. 7-38 .
2.	Slide the open end of the belt over the motor shaft and position so that the belt is in alignment on the gear and shaft.
3.	Lightly tighten (4) mounting screws attaching the motor to the motor bracket. Refer to Fig. 7-38 .
4.	Slide a replacement Belt "B" over the rewind shaft and tangent to the tension roller. Position the open end to the front toothed gear on the platen shaft. Refer to Fig. 7-39, 7-40 .
5.	Insert the rewind shaft through the ribbon frame and through the adjust plate and bushing. Secure with center screw.
6.	Slide the opposite end of the belt over the front toothed gear on the platen shaft. Position belt so that it is in alignment with the gears.
7.	Re-attach the connector from the main PC board to the Display Panel PCB. Refer to Fig. 7-41 .
8.	Refer to Section 6.5 to adjust timing belts.
9.	Upon completion of replacing belts, replace and secure the LH cover to the printer base with (2) screws previously removed. Tighten (2) inside screws. Reconnect the power.

7.9.2 REPLACING THE TIMING BELTS TO PLATEN PULLEY



7.10 REPLACING THE PLATEN

Before replacing the platen, you must first remove timing belts “A” & “B” from platen pulleys, but do not need to fully remove each belt from the carbon rewind shaft gear.

Required Equipment: FOR 7.10.1 & 7.10.2	<ul style="list-style-type: none"> • #2 Phillips Screw Driver • Flat head Screw Driver
---	--

REMOVING THE PLATEN

To remove the platen, perform the following steps:

- | STEP | PROCEDURE |
|------|--|
| 1. | Switch the printer OFF (position 0) and disconnect the AC power cord from the printer. |
| 2. | Raise the RH cover. Remove (2) screws holding the LH cover to the printer base and loosen (2) inside screws. Refer to Fig. 7-42 . |
| 3. | Remove the ribbon and labels from the printer. |
| 4. | Loosen the 4 motor mounting screws to release tension on timing belts. Refer to Fig. 7-43 . |
| 5. | Remove the E-snap ring from the end of platen shaft and slide off the toothed gears. Refer to Fig. 7-44 . |
| 6. | Remove the screw holding the clamp and platen components to the side frame. |
| 7. | Tilt the platen up and pull away from the engine frame. Separate the platen and platen components for replacing. Refer to Fig. 7-45 . |



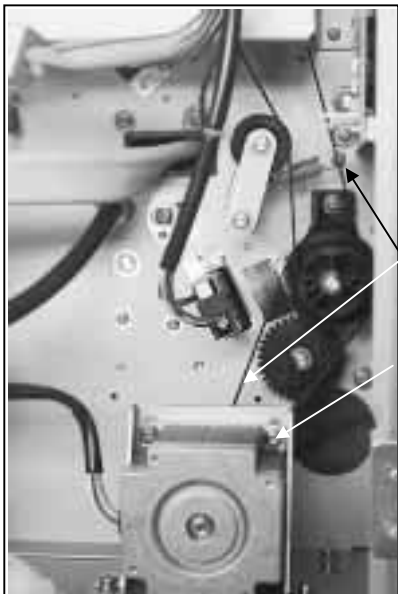
(2) SCREWS



LOOSEN (2)
SCREWS

FIG. 7-42

7.10 REPLACING THE PLATEN



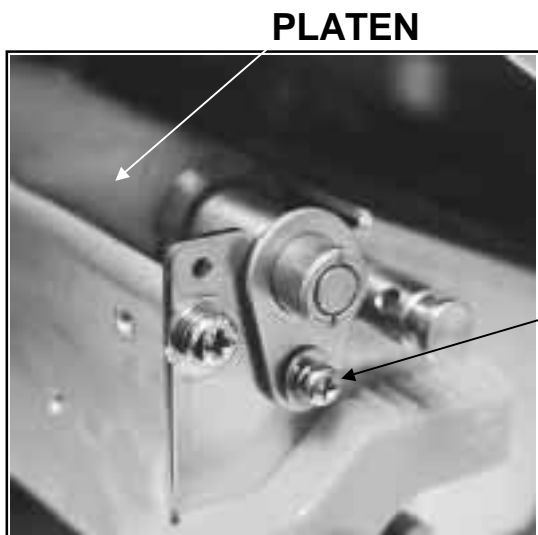
TIMING BELTS
MOTOR MOUNTING SCREWS

FIG. 7-43



REMOVE "E"-SNAP RING

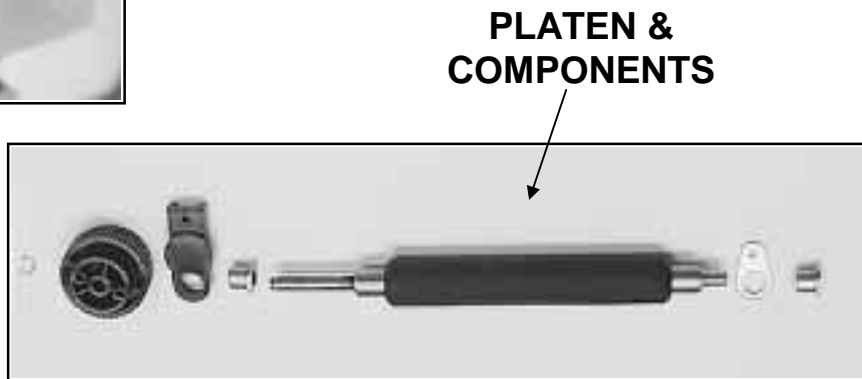
FIG. 7-44



PLATEN

SCREW & CLAMP

FIG. 7-45



PLATEN & COMPONENTS

FIG. 7-46

7.10 REPLACING THE PLATEN

7.10.2 REPLACING THE PLATEN

To replace the platen, perform the following steps:

- | STEP | PROCEDURE |
|------|---|
| 1. | Install the bushing to the new platen. Refer to Fig. 7-47 . |
| 2. | Insert the platen through the frame. Guide the flats on the bushing into the cutout on the side frame. Fig. 7-47 . |
| 3. | Attach the clamp to the side frame with the screw. |
| 4. | Reassemble the toothed gears to the platen and replace the E-snap ring. Fig. 7-48 . |
| 5. | Adjust belts. Refer to Section 6.5 . |
| 6. | Upon completion of adjusting belts, replace and secure the LH cover to the printer base with (2) screws previously removed. Tighten (2) inside screws. Reconnect the power. |

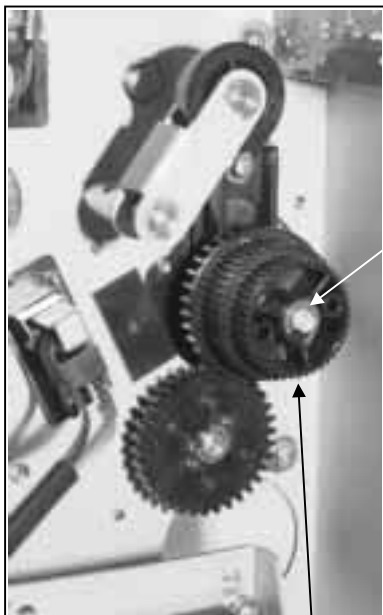


FIG. 7-48

TOOTHED GEARS
ON PLATEN SHAFT

"E" SNAP
RING

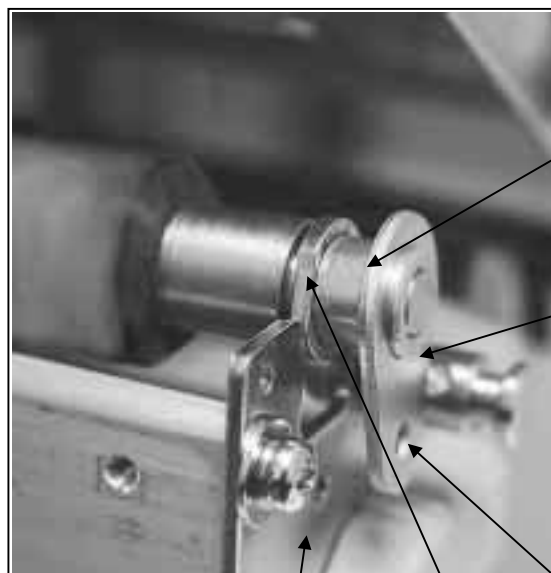


FIG. 7-47

SIDE
FRAME

FLATS

BUSHING

CLAMP

REPLACE
SCREW

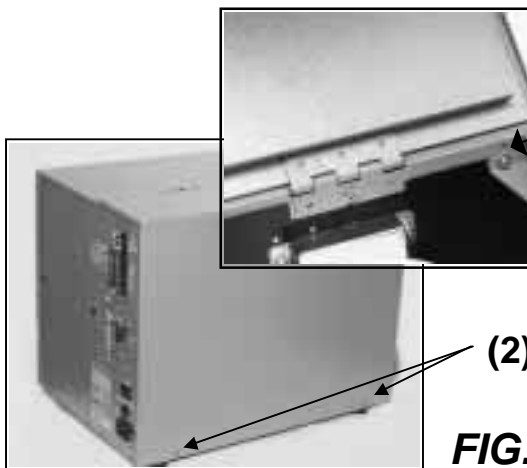
7.11 REPLACING THE DISPLAY PANEL PCB

The display panel PCB is mounted inside the printer.

Required Equipment: #2 Phillips Screw Driver

To remove and replace the Ribbon Motion Sensor, perform the following steps and refer to the illustrations:

- | STEP | PROCEDURE |
|-------------|---|
| 1. | Switch the printer OFF (position 0) and disconnect the AC power cord from the printer. |
| 2. | Raise the RH cover. Remove (2) screws holding the LH cover to the printer base and loosen (2) inside screws. Refer to Fig. 7-49 . |
| 3. | Note cable connection locations, then disconnect cables from the display panel PCB. Refer to Fig. 7-49 . |
| 4. | Remove (3) screws and remove the Display Panel PCB. Refer to Fig. 7-49 . |
| 5. | Replace the display panel PCB and secure with (3) screws. Reconnect all cable connectors. |
| 6. | Upon completion of replacing display panel, replace and secure the LH cover to the printer base with (2) screws previously removed. Tighten (2) inside screws. Reconnect the power. |

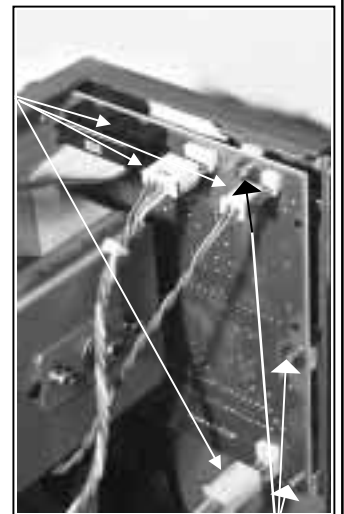


(4) CONNECTORS
 LOOSEN (2)
 SCREWS

(2) SCREWS

FIG. 7-48

FIG. 7-49



(3) SCREWS

7.12 REPLACING THE STEPPER MOTOR

The stepper motor is used to transmit motion to the print mechanism for precise print positioning. The stepper motor transmits torque to the label feed roller, the platen roller, the ribbon feed roller, and the ribbon rewind spindle via a series of toothed pulleys and two timing belts

- | |
|---|
| <p>Required Equipment:</p> <ul style="list-style-type: none"> • #2 Phillips Screw Driver • (1) 3 inch Cable Tie |
|---|

To remove and replace the stepper motor, perform the following steps and refer to the illustrations:

- | STEP | PROCEDURE |
|-------------|---|
| 1. | Switch the printer OFF (position 0) and disconnect the AC power cord from the printer. |
| 2. | Raise the RH cover. Remove (2) screws holding the LH cover to the printer base and loosen (2) inside screws. Refer to Fig. 7-50 . |
| 3. | Remove (4) mounting screws attaching the stepper motor to the motor bracket and disengage belt. Refer to Fig. 7-51 . |
| 4. | Cut the cable tie from the cable tie and disconnect the "STP" cable connector from the main pcb and remove the motor. |
| 5. | Replace the motor and secure with (4) screws to the motor bracket and attach belt to shaft. |
| 6. | Reconnect "STP" cable connector and tie wrap "STP" cable. Refer to Fig. 7-51 . |
| 7. | Adjust timing belt as outlined in Section 6.5 . |
| 8. | Upon completion of adjusting belts, replace and secure the LH cover to the printer base with (2) screws previously removed. Tighten (2) inside screws. Reconnect the power. |

7.12 REPLACING THE STEPPER MOTOR

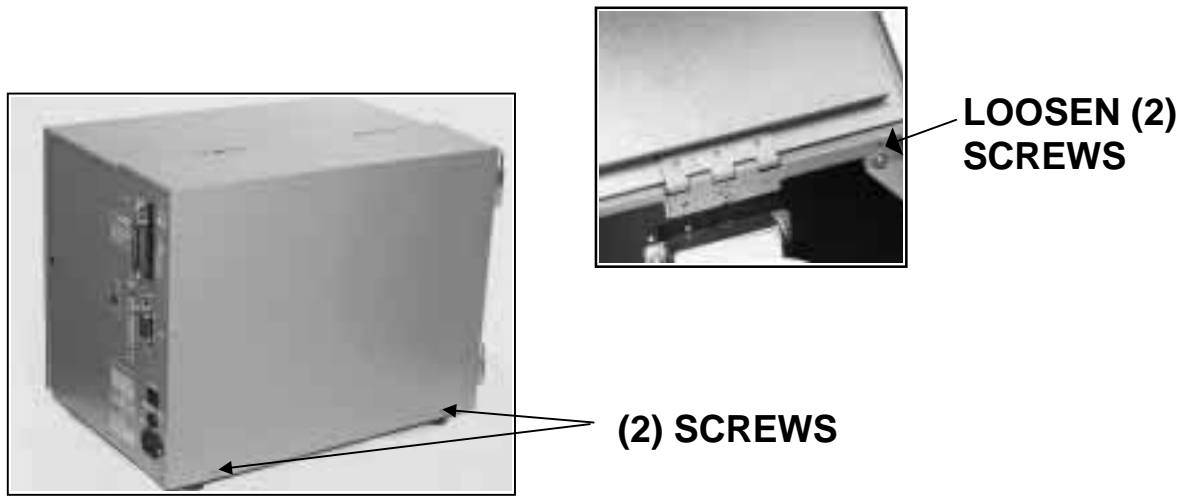


FIG. 7-50

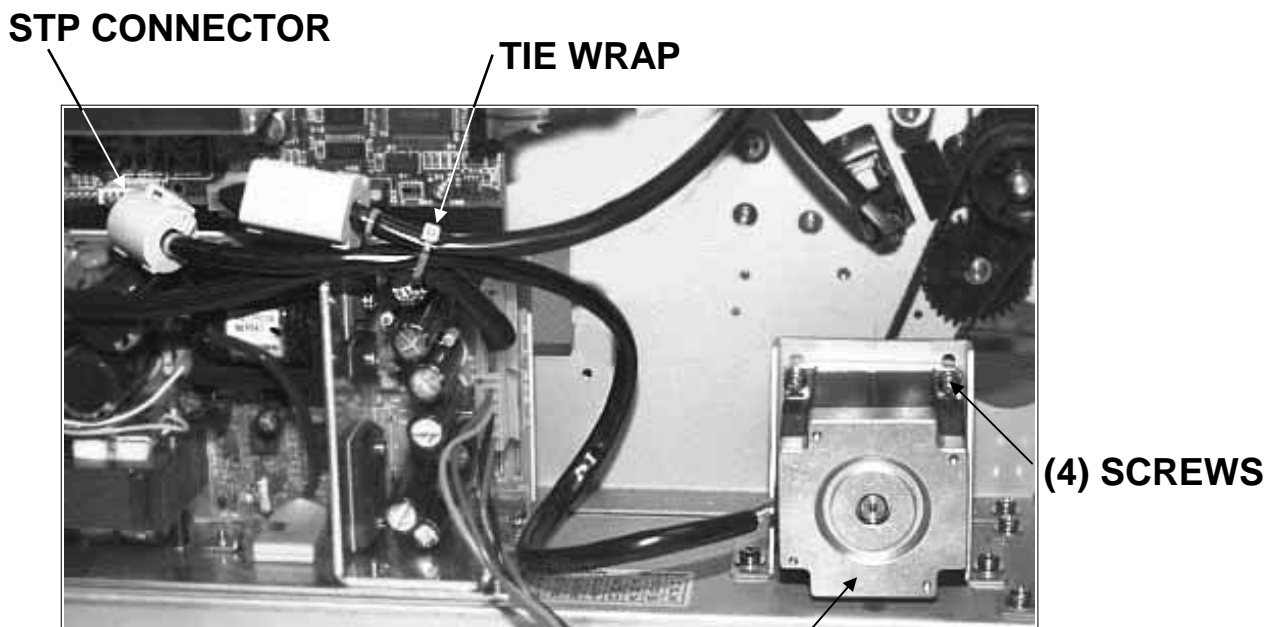


FIG. 7-51

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Section

8

Factory Resets


The Factory Reset Mode allows you to :

- Reset to factory default
- EE Prom Clear all
- Clear counter heads
- Clear cutter counter

8.1 RESETTING THE PRINTER


To reset the printer to the factory settings perform the following steps:

Caution: *Resetting the printer will clear all registers.*


- | STEP | PROCEDURE |
|------|---|
| 1. | Record all current dip switch positions, then place all switches in the off position. |
| 2. | Place the DSW2-5 in the on or up position. |
| 3. | Place the print head in the open position, keeping both the line and feed keys depressed power on the printer. |
| 4. | Upon hearing the audible tone, release the line & feed keys. Place the print head back in the closed position and DSW2-5 in the off or down position. |
| 5. | Verify display: “Factory Mode” . |
| 6. | Press the feed key once. Verify display: Counter clear
Non |
| |  |
| 7. | Press the feed key to initialize reset. After a slight pause, (1) blank will feed out followed by a factory test print. |
| | <p>Warning: <i>This test activates all the heating elements on the print head and therefore should be used for testing purposes only to avoid damaging the print head, especially when performed with labels less than the full width of the print head.</i></p> |
| 8. | Press the feed key to stop printing. |
| 9. | Place the printers power switch to the off position and return all switches to their original positions. |

8.2 EE PROM CLEAR ALL


This setting clears all counters.

- | STEP | PROCEDURE |
|------|---|
| 1. | Record all current dip switch positions, then place all switches in the off position. |
| 2. | Place the DSW2-5 in the on or up position. |
| 3. | Place the print head in the open position, keeping both the line and feed keys depressed power on the printer. |
| 4. | Upon hearing the audible tone, release the line & feed keys. Place the print head back in the closed position and DSW2-5 in the off or down position. |
| 5. | Verify display: “Factory Mode” . |
| 6. | Press the feed key once. Verify display: Counter clear Non |
| 7. | Press the line key once. Verify display: Counter clear All |
| |  |
| 8. | Press the feed key to initialize reset. After a slight pause, (2) blank labels will feed out followed by a factory test print. |
| | <p>Warning: <i>This test activates all the heating elements on the print head and therefore should be used for testing purposes only to avoid damaging the print head, especially when performed with labels less than the full width of the print head.</i></p> |
| 9. | Press feed key to stop printing. Verify that the counters on test print have reset to 0.0 km. |
| 10. | Place the printers power switch to the off position and return all switches to their original positions. |

8.3 CLEAR COUNTER HEADS

- | STEP | PROCEDURE |
|------|---|
| 1. | Record all current dip switch positions, then place all switches in the off position. |
| 2. | Place the DSW2-5 in the on or up position. |
| 3. | Place the print head in the open position, keeping both the line and feed keys depressed power on the printer. |
| 4. | Upon hearing the audible tone, release the line & feed keys. Place the print head back in the closed position and DSW2-5 in the off or down position. |
| 5. | Verify display: “Factory Mode” . |
| 6. | Press the feed key once. Verify display: Counter clear |
| 7. | Press the line key twice. Verify display: Non |
| | Counter clear |
| | Head |
| |  |
| 8. | Press the feed key once. After a slight pause, (1) blank label will feed out followed by a factory test print. |
| | <p>Warning: <i>This test activates all the heating elements on the print head and therefore should be used for testing purposes only to avoid damaging the print head, especially when performed with labels less than the full width of the print head.</i></p> |
| 9. | Place the printers power switch to the off position and return all switches to their original positions. |

8.4 CLEAR CUTTER COUNTER

- | STEP | PROCEDURE |
|------|---|
| 1. | Record all current dip switch positions, then place all switches in the off position. |
| 2. | Place the DSW2-5 in the on or up position. |
| 3. | Place the print head in the open position, keeping both the line and feed keys depressed power on the printer. |
| 4. | Upon hearing the audible tone, release the line & feed keys. Place the print head back in the closed position and DSW2-5 in the off or down position. |
| 5. | Verify display: "Factory Mode" . |
| 6. | Press the feed key once. Verify display: Counter clear
Non |
| 7. | Press the line key three X. Verify display: Counter clear
Cut |
| |  |
| 8. | Press the feed key once. After a slight pause, (1) blank label will feed out followed by a factory test print. |
| | <p>Warning: <i>This test activates all the heating elements on the print head and therefore should be used for testing purposes only to avoid damaging the print head, especially when performed with labels less than the full width of the print head.</i></p> |
| 9. | Verify that cutter counter has been reset to (0). |
| 10. | Place the printers power switch to the off position and return all switches to their original positions. |