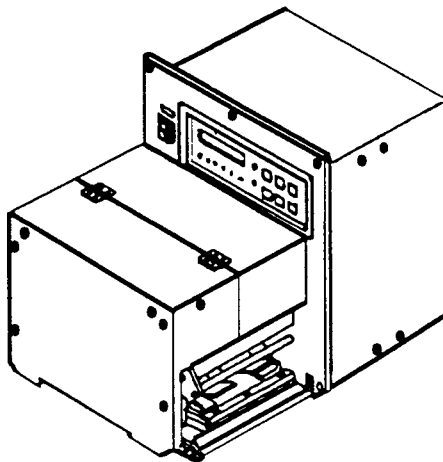




Bar Code Printers For The 90's

M-8400S

Thermal Transfer Printer



Operator's Manual

First Edition

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Sunnyvale, CA 94089**

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M-8400S

Operator's Manual

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SECTION 1

PRINTER OVERVIEW

INTRODUCTION

The SATO M-8400S Thermal Transfer Printer is a high performance OEM printer engine designed for simple integration into automatic label applicator systems. Printer operating parameters are programmable either via input from the Operator Control Panel (OCP) or from the host via the interface (Both serial and parallel interfaces are built-in). All popular bar codes and eight human readable fonts are resident in memory, including a vector font for virtually thousands of typestyles and sizes.

The operating commands for the M-8400S are a super-set of those for the M-8400 table top printer; software written for the table top printer may easily be adapted for use with the "S" model.

This Operator's Manual will provide you with the basic operating instructions for setup, configuration setting, ribbon and label stock loading and periodic cleaning.

GENERAL PRINTER SPECIFICATIONS

Printing Method	Thermal Transfer
Printing Speed	Up to 5 inches (125mm) per second
Bar Code Symbology	UPC-A, UPC-E, EAN-8, EAN-13, CODE 39, I 2/5, CODE 128, CODABAR, MSI, 2/5, CODE 93, UPC Bookland
PCS Value	75% minimum
Bar Code Ratio	1:2, 1:2.5, 1:3, or individually programmable bar widths
Human Readable Fonts	Eight fonts including OCR-A and OCR-B representations and a vector font. American and European character sets, upper and lower case with decenders. Expandable in 12 independent steps horizontally and vertically.
Flexibility	360° rotation of bar codes and text in four 90° steps. RAM Storage for special characters, dot addressable graphics, sequential numbering. Form overlay for high speed editing of complex formats.
Sensing	Adjustable photo-electric sensor. Transmissive sensor for die cut labels & tags. Reflective sensor for use with sense marks (I-Marks). Automatic or manual setting of top of form. Continuous form printing.
Media	Die cut labels, plain paper stock, SATO standard or equivalent.

Tag stock, SATO standard or equivalent with punched feed slot for "see through" sensing.
 Tag caliper: 0.010 in (0.25mm) maximum.

Media Size	Minimum: 1 inch (25mm)W x 0.25 inch (6.35mm)L Maximum: 5 inches (125mm)W x 14 inches (360mm)L
Interface	RS232C Serial, 300-19,200 BPS <ul style="list-style-type: none"> • Hardware (DTR) flow control • Software (X-ON/X-OFF) flow control • Bi-Directional (ENQ/Response) Parallel (Centronics compatible)
Data Transmission	ASCII
Applicator Control Signals	+5V Carbon Near End signal Machine Error Start Print command Print End signal Label Out signal Ribbon Out signal Signal ground
Dimensions	11.8 (300mm)H x 10 (255mm)W x 14.4 (365mm)D
Weight	25lbs (11.34kg)
AC Power	100V-115V (±10%) 220V (±10%) 50/60Hz Idling: 50W Operating: 300W
Environment	Operating: 50–95°F (10–35°C) 15–85% RH, non-condensing Storage: 0–130°F (-20–55°C) 90% RH, non-condensing, maximum
Maximum Print Area	4.1 inches (104mm)W x 14 inches (360mm)L
Print Module	M-8400S /8: 0.005 (0.125mm) square M-8400S /6: 0.0066 (0.167mm) square
Display	LED indicators: POWER, LABEL, RIBBON, ERROR, DATA, ON LINE LCD display: 2-Line printer status and configuration
Approvals	FCC Class A U/L CSA

SECTION 2

SETUP AND CONFIGURATION

INTRODUCTION

This section provides you with instructions for:

- Loading label and tag stock
- Loading ribbon
- Using the Operator Control Panel (OCP)
- Setting printer configuration
 - General Flowchart of the M-8400S
 - User Mode (Mode U)
- Password Protected Modes
 - Interface Mode (Mode I)
 - Setup and Accessory Mode (Mode S)
 - Counter Mode (Mode C)
 - Memory Mode (Mode M)
 - Test Print Mode (Mode T)
 - Watch Mode (Mode W)

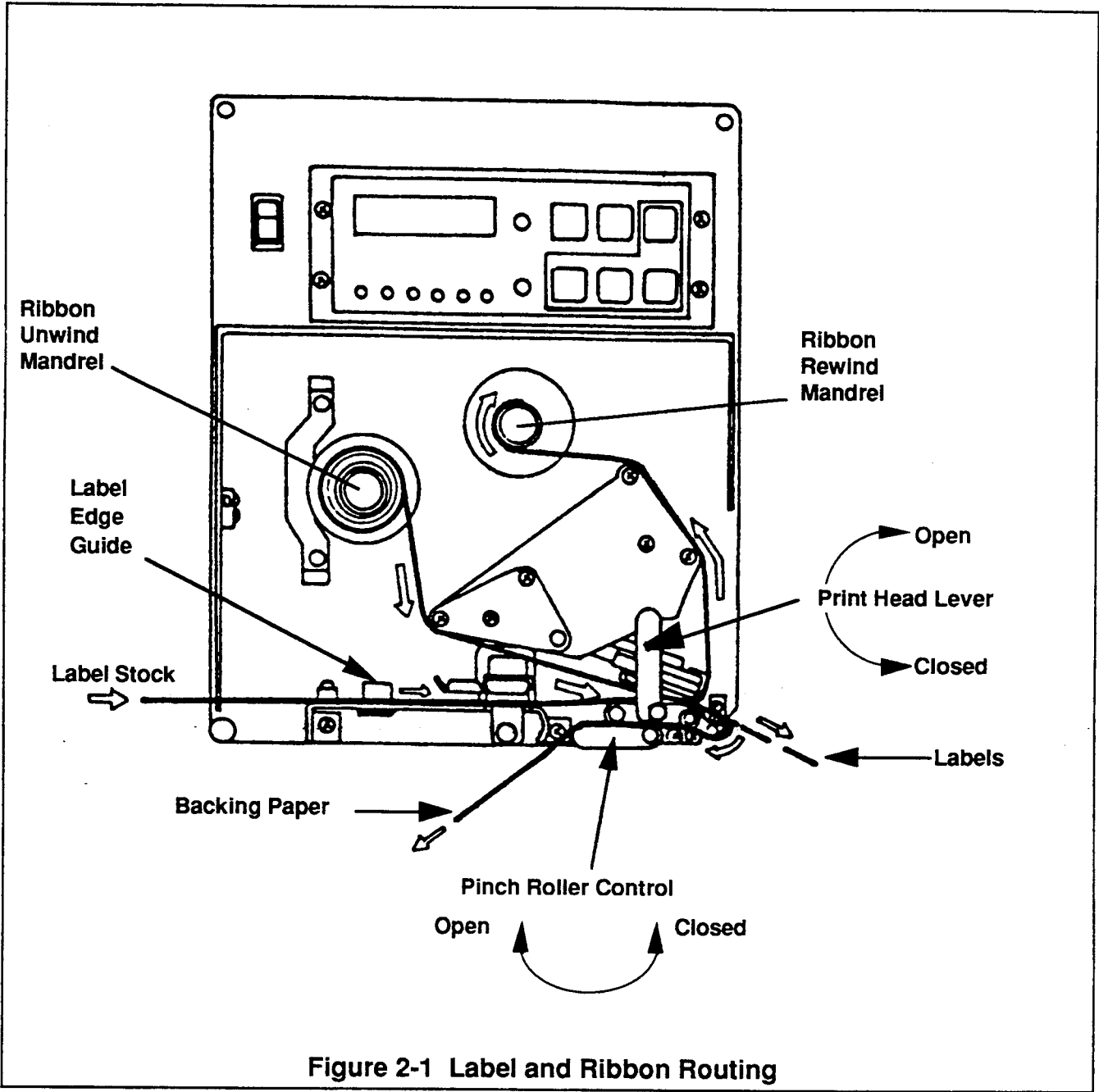
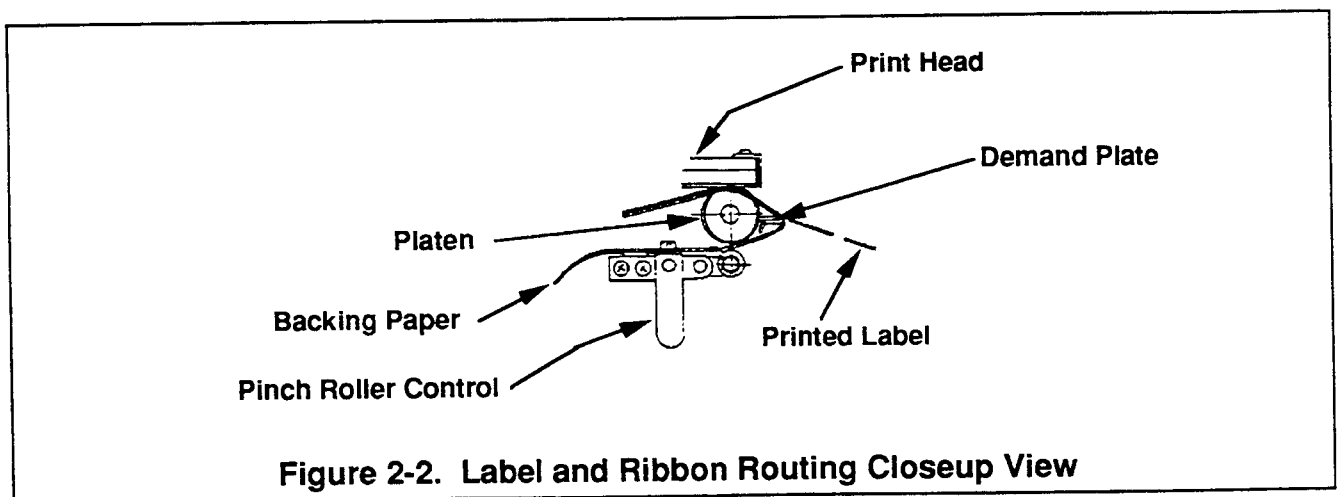


Figure 2-1 Label and Ribbon Routing

LOADING LABEL AND TAG STOCK

- | <u>STEP</u> | <u>ACTION</u> |
|-------------|--|
| 1 | Raise the front cover to the full upright position. |
| 2 | Rotate the Print Head Lever to the open position. (See Figure 2-1.) |
| 3 | Adjust the label edge guide to its widest setting. (See Figure 2-1.) |
| 4 | Manually feed 3 feet of label stock, face up, through the label sensor and between the print head and the platen. Allow label stock to extend beyond the right side of the printer. |
| 5 | Rotate the Print Head Lever to the closed and locked position. |
| 6 | Remove and discard all labels from the backing paper extending to the right of the print head. |
| 7 | Rotate the Pinch Roller Control to the OPEN position. (See Figure 2-1.) |
| 8 | Manually feed the backing paper over the Demand Plate then between the Platen and the Pinch Roller, towards the left, until all slack is removed. (See Figure 2-2.) |
| 9 | Rotate the Pinch Roller Control to the CLOSED position. |
| 10 | Attach the leading edge of the backing paper to the backing paper rewind mandrel following the instructions included with the applicator. Manually rotate the mandrel in the wind direction until all slack is removed from the backing paper. |
| 11 | Adjust the position of the label edge guide to align it with the outside edge of the label stock. |
| 12 | Visually examine the labels to verify that they are loaded as shown in Figure 2-1. |
| 13 | Lower the front cover to the closed position. |

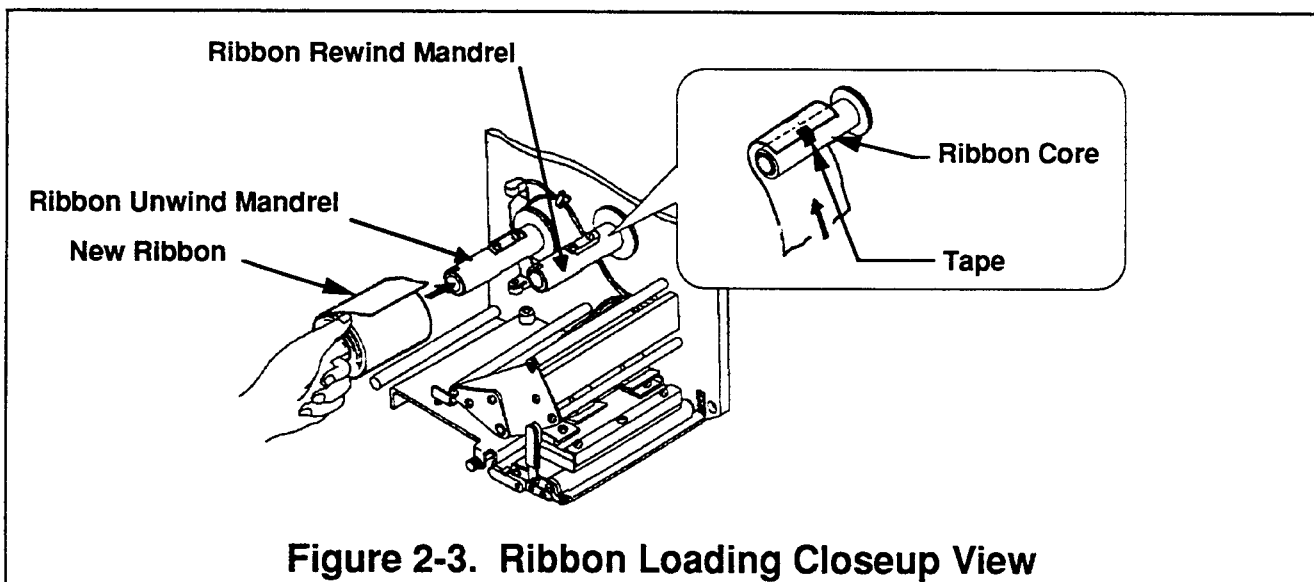
Note: *The printer will not operate unless the front cover is in the fully closed position. FOR YOUR CONTINUED SAFETY DO NOT OVERRIDE THE FRONT COVER INTERLOCK SWITCH.*



LOADING RIBBON

- | STEP | ACTION |
|-------------|---|
| 1 | Raise the front cover to the full upright position. |
| 2 | Rotate the Print Head Lock lever to the open position. |
| 3 | Install an empty ribbon core onto the ribbon rewind mandrel. (Use the core which was included with the printer or one from a previously used ribbon. Always save the empty ribbon core) |
| 4 | Place the new roll of ribbon onto the unwind mandrel with the unwind direction as shown in Figure 2-3. |
- NOTE:** *The dull surface of the ribbon must face the label stock.*
- | | |
|----|--|
| 5 | Carefully thread the leading edge of the ribbon beneath the guide roller, through the ribbon sensor, and between the print head and the platen. |
| 6 | Attach the leading edge of the ribbon squarely to the rewind core using a 1 inch length of common paper or plastic tape. Verify that the rewind direction is as shown in Figure 2-3. |
| 7 | Manually rotate the ribbon rewind mandrel/core in the direction shown in Figure 2-1 to remove all slack in the ribbon and wrap 2-3 turns around the rewind core. |
| 8 | Rotate the Print Head Lock lever to the closed and locked position. |
| 9 | Visually examine the ribbon to verify that it is loaded as shown in Figure 2-1. |
| 10 | Lower the front cover to the closed position. |

Note: *The printer will not operate unless the front cover is in the fully closed position. FOR YOUR CONTINUED SAFETY DO NOT OVERRIDE THE FRONT COVER INTERLOCK SWITCH.*



USING THE OPERATOR CONTROL PANEL (OCP)

The Operator Control Panel (OCP) on the M-8400S consists of a 2-line LCD alpha-numeric display, LED indicator lights, switches, and adjustments. Adjacent to the OCP is the main A-C power switch. These displays, indicators, and switches inform you of the printer's operating conditions and allow you to select the required printer configuration. Review Figure 2-3 below to familiarize yourself with the location of the features of the OCP.

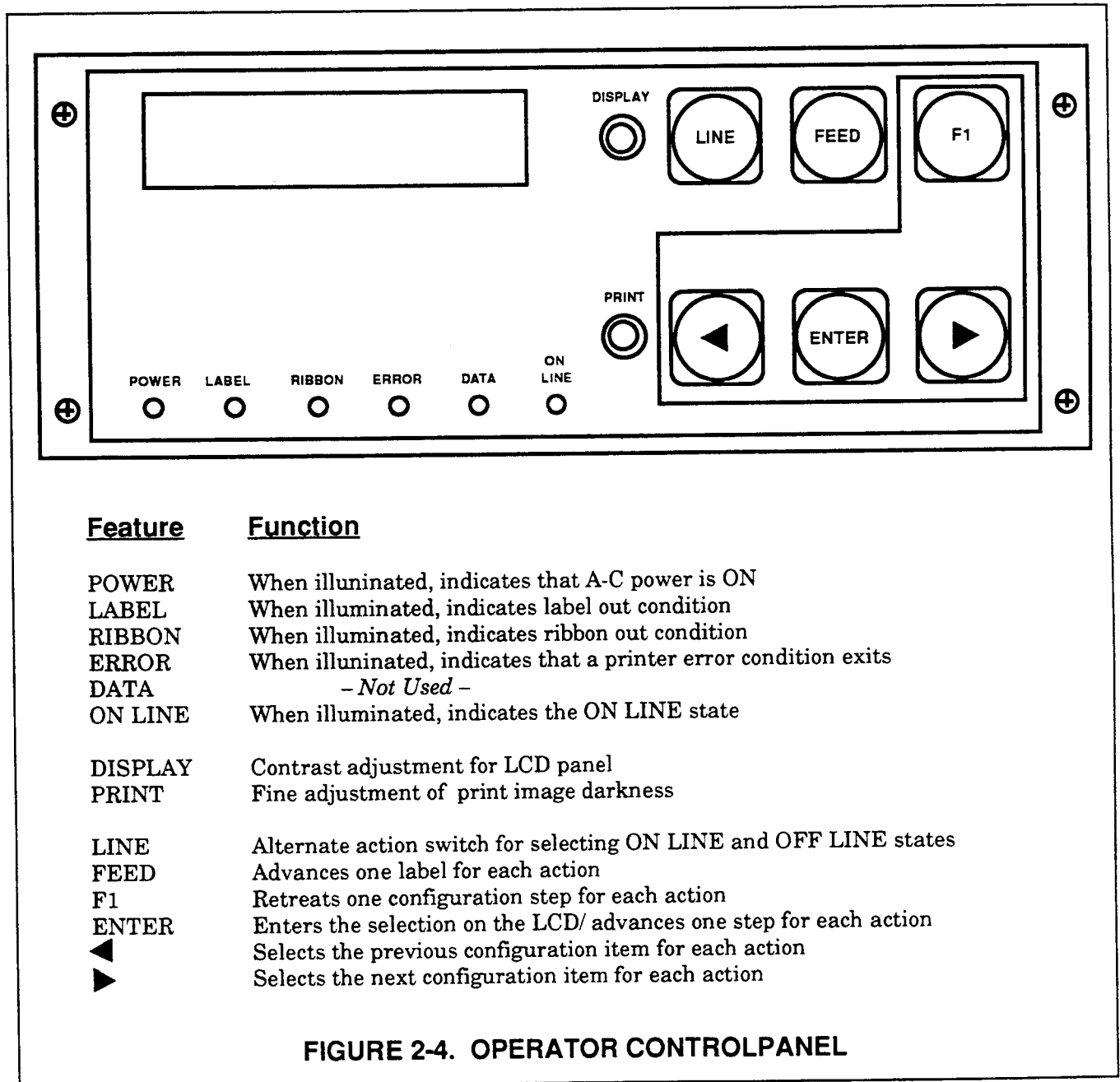


FIGURE 2-4. OPERATOR CONTROL PANEL

SELECTING PRINTER CONFIGURATION

The controls, indicators, and alpha-numeric display on the Operator Control Panel are used to configure the printer, customizing it meet your printing requirements. For example, using the controls and display you can specify which interface type to use.

All operational selections are grouped together under specific modes which are listed the following chart. For instance, Mode U (User Mode) contains only those selections that pertain to the user, whereas Mode S (Setup Mode) contains selections that may be used to configure the printer to your requirements.

Modes I, S, C, M, T, and W cannot be accessed without first entering a password and are, therefore, considered password-protected modes. Instructions for establishing a password are located in the description of Mode S.

Refer to Figure 2-3 for the location and function of each feature within the OCP.

M-8400S Mode Selection Chart

Password Protected Modes						
Mode U	Mode I	Mode S	Mode C	Mode M	Mode T	Mode W
(User)	(Interface)	(Setup)	(Counter)	(Memory)	(Test Print)	(Watch)
Print Darkness	I/F Type	Sensor	Head Counter	Copy Mem Card	Receive Buffer	Year
Print Speed	Receive Buffer Size	Pitch Detect Method	Lifetime Counter	Set Card Type	Format Numbers	Month
Pitch Offset	Proto-Codes	Print Method	User Counter	Clear Mem Card	Stored Graphics	Day
		Carbon Saving			Custom Designs	Hour
		Dispenser			Head Pattern	Minute
		Pitch Offset			Built-In Fonts	
		VH Offset			Vector Fonts	
		Head Check			Printer Settings	
		Loopback Test			Bar Codes	
		SATO Defaults				
		User Defaults				
		External Signals				
		Backfeed				
		Password				

MAIN OCP FLOWCHART

The chart below illustrates the flow of input by the operator for the Operator Control Panel (OCP). Detailed flowcharts for each mode appear on the following pages.

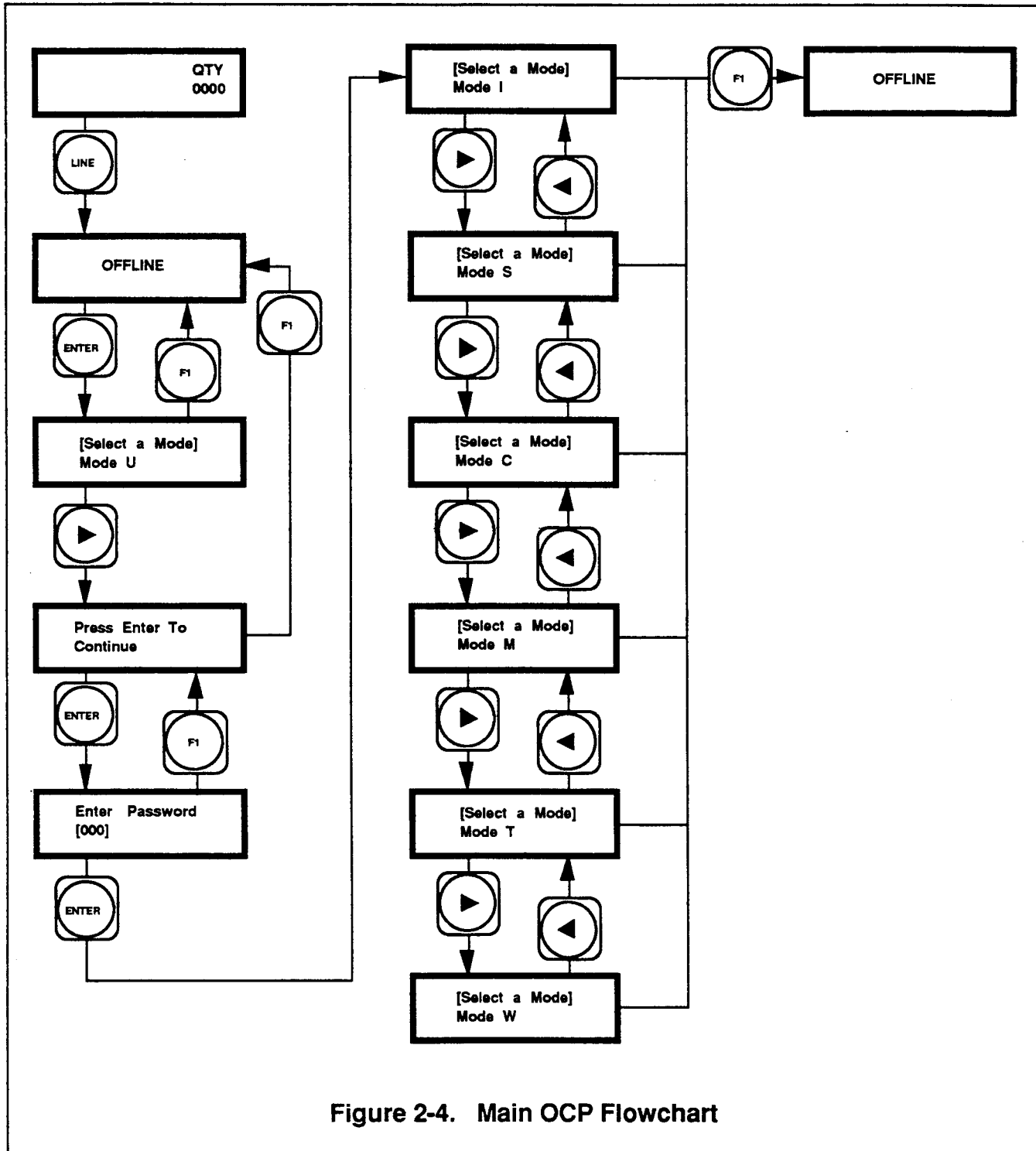
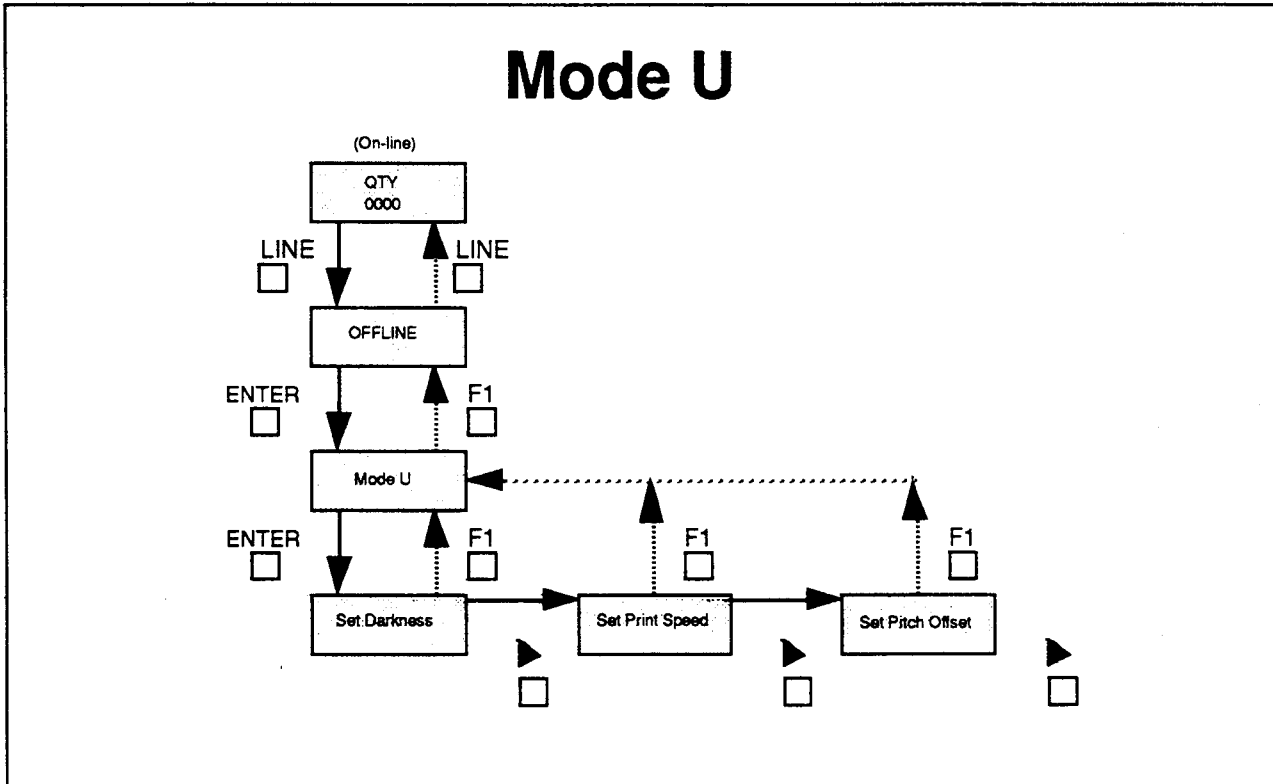


Figure 2-4. Main OCP Flowchart

USER MODE

The following chart shows the general flow of the configuration for Mode U. Each shaded box represents the status of the operator panel's LCD display. The symbols between the boxes represent the operator keys that, if pressed, will take you forward or backward through the mode's available selections.



The ENTER key, arrow keys, and F1 key are used throughout this manual to proceed downward, horizontally, or upward through the options and values. Basically, the keys are used as follows:

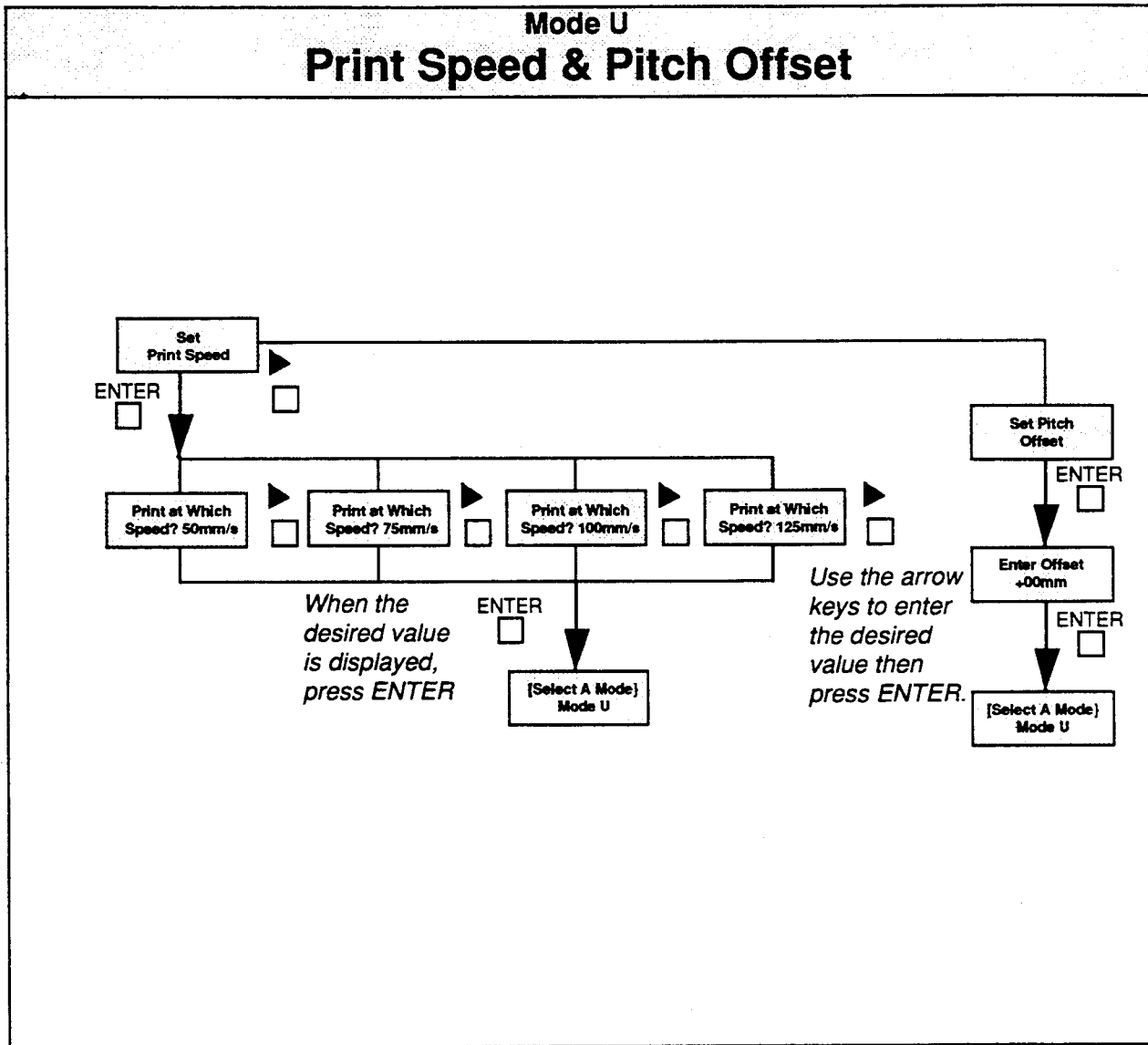
- ENTER
[]

Used to select an option from the display and move down to the next menu level. Also used to set a value into the printer configuration.
- ◀ [] [] ▶

Used to proceed horizontally (left or right) through a series of values, remaining on the same level until the desired value is displayed.
- F1
[]

Used to proceed upwardward (i.e., backward) to a previous level.

Mode U Print Darkness		
<pre> graph TD A[Set Darkness] --> B[Print at Which Darkness? 1] B --> C[Print at Which Darkness? 2] C --> D[Print at Which Darkness? 3] D --> E[Print at Which Darkness? 4] E --> F[Print at Which Darkness? 5] B -- ENTER --> G[When the desired value is displayed, press ENTER] C -- ENTER --> G D -- ENTER --> G E -- ENTER --> G F -- ENTER --> G </pre>		
Option	Definition/Purpose	Values/Settings
Print Darkness	To set the darkness of the print on the label. <i>This option should provide adequate flexibility. If the darkenss needs further adjustment you may use the adjustment on the operator panel.</i>	5 Darkest 4 3* 2 1 Lightest * SATO factory default



Option	Definition/Purpose	Values/Settings
Print Speed	To set the speed at which the labels are printed.	50 mm/s 75 mm/s 100 mm/s* 125 mm/s
Pitch Offset	To adjust the position of the leading edge of the label forward/backward from the normal stop position under the print head. A positive value moves the leading edge forward, lowering the starting print position. A negative value moves the leading edge backward, raising the starting print position.	+00 mm* (-50 mm to +50 mm) (If the scale is set to dots from within Mode S, then the range is -400 dots to +400 dots.)

* SATO factory default

Detailed Mode U Configuration Instructions

The following pages illustrate the sequence and steps for making all selections within Mode U.

Panel Displays:	Press Key:	Comments
Qty 0000	LINE <input type="checkbox"/>	Printer is on-line. Pressing LINE takes the printer off-line, which allow you to begin configuring.
Offline	ENTER <input type="checkbox"/>	When in the off-line state, pressing ENTER advances to the User Mode (Mode U). To return to the on-line state, press LINE.
[Select A Mode] Mode U	ENTER <input type="checkbox"/> or <input type="checkbox"/> <input type="checkbox"/>	Press ENTER to progress to Mode U. <i>Alternately, use the arrow keys to move to additional password protected modes.</i>
< Mode U Options > Set Darkness	ENTER <input type="checkbox"/>	This option is a primary adjustment for the darkness of print. Press ENTER to display darkness values. <i>Alternately, use the arrow keys to move to additional Mode U options.</i>
Print at Which Darkness? 3	ENTER <input type="checkbox"/> or <input type="checkbox"/> <input type="checkbox"/>	Use the arrow keys to move through darkness values 1 to 5. (5 is the darkest, 1 is the lightest, factory default is 3.) Press the ENTER key when the desired darkness value is displayed. Pressing ENTER will also advance to the next Mode U option.
< Mode U Options > Set Print Speed	ENTER <input type="checkbox"/> or <input type="checkbox"/> <input type="checkbox"/>	This option allows selection of print speed. Press ENTER to display print speed values. <i>Alternately, use the arrow keys to move to additional Mode U options.</i>

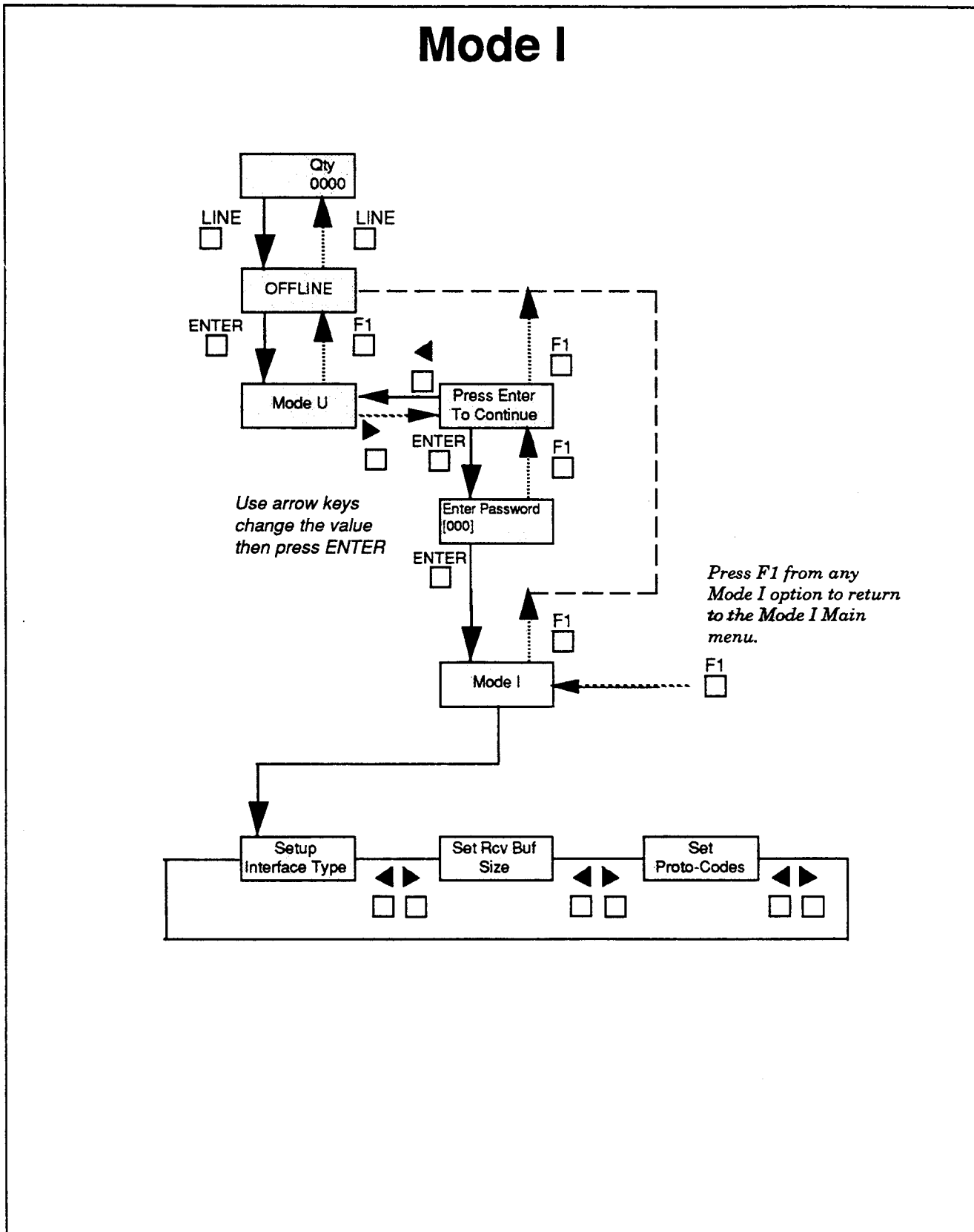
Panel Displays:	Press Key:	Comments
<p>Print at Which Speed? 100mm/s</p>	<p>ENTER <input type="checkbox"/> or <input type="checkbox"/> <input type="checkbox"/></p>	<p>Use the arrow keys to move through print speed values 50, 75, 100, and 125 mm/s.</p> <p>Press ENTER when the desired speed is displayed. Pressing ENTER will also advance to the next Mode U option.</p>
<p>< Mode U Options > Set Pitch Offset</p>	<p>ENTER <input type="checkbox"/> or <input type="checkbox"/> <input type="checkbox"/></p>	<p>Use this option to adjust the position of the leading edge of the label relative to the print head. Press ENTER to display pitch offset values.</p> <p><i>Alternately, use the arrow keys to move to additional Mode U options.</i></p>
<p>Enter Offset +00mm</p>	<p>ENTER <input type="checkbox"/> or <input type="checkbox"/> <input type="checkbox"/></p>	<p>Use the right arrow key to display positive (+) offset values and the left arrow key to display negative (-) offset values.</p> <p>Press the ENTER key when the desired offset value is displayed. Pressing ENTER will also advance to the next Mode U options.</p>
<p>(Select a Mode) Mode U</p>	<p>F1 <input type="checkbox"/></p>	<p>Press F1 to return to the OFFLINE state.</p> <p><i>Alternately, pressing F1 from any Mode U option selection will return to:</i> [Select a Mode] Mode U.</p>
<p>Offline</p>	<p>LINE <input type="checkbox"/></p>	<p>Press LINE key to return to the ONLINE state.</p>
<p>Qty 0000</p>		<p>The printer is now ready to print. You have completed Mode U configuration selections.</p>

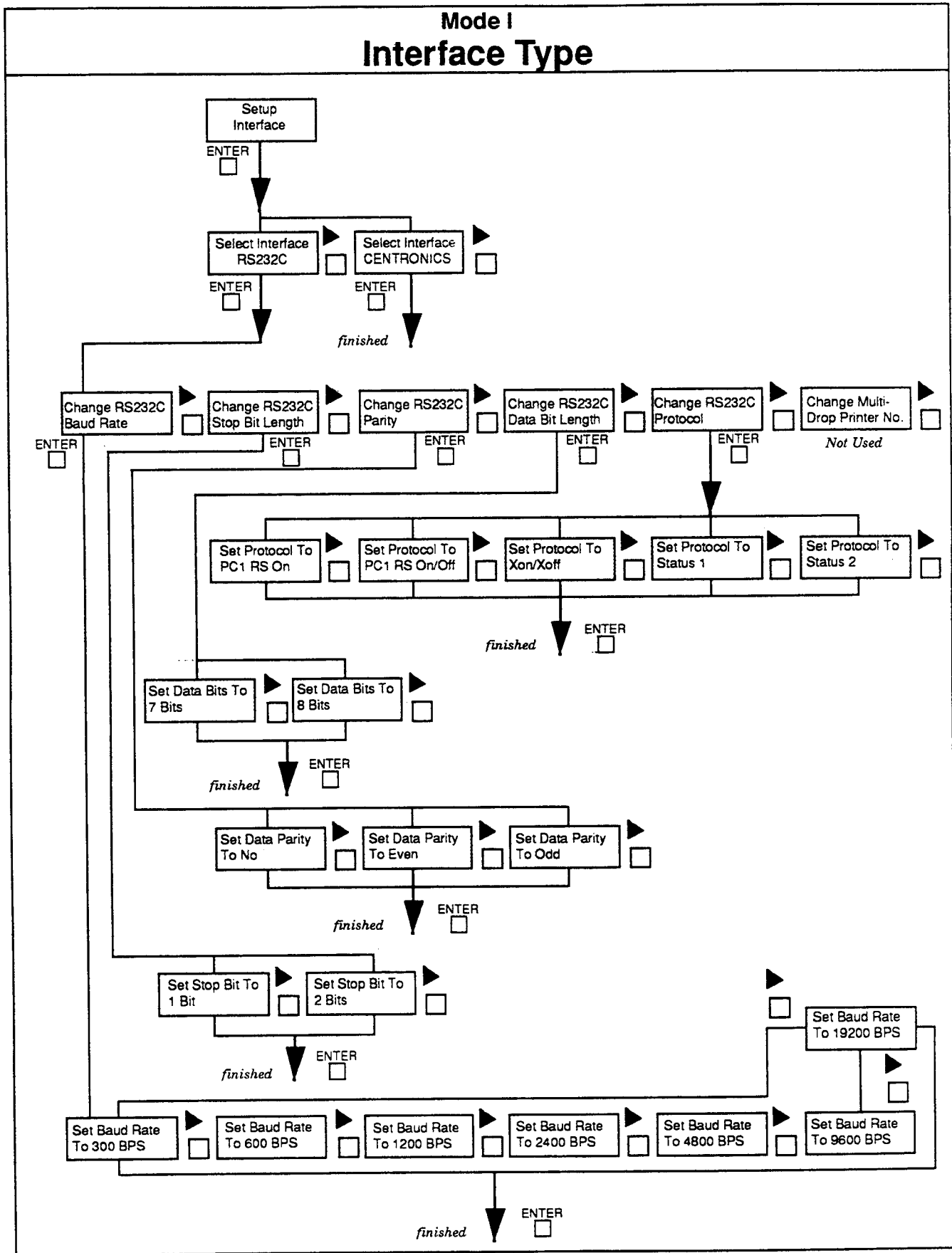
PASSWORD PROTECTED CONFIGURATION MODES

Detailed Instructions for Accessing Modes I, S, C, M, T, and W

The chart below illustrates the process for accessing the first level of the password protected protected modes I, S, C, M, T, and W. For further instructions on the selection and use of the options within each mode refer to the following charts and diagrams.

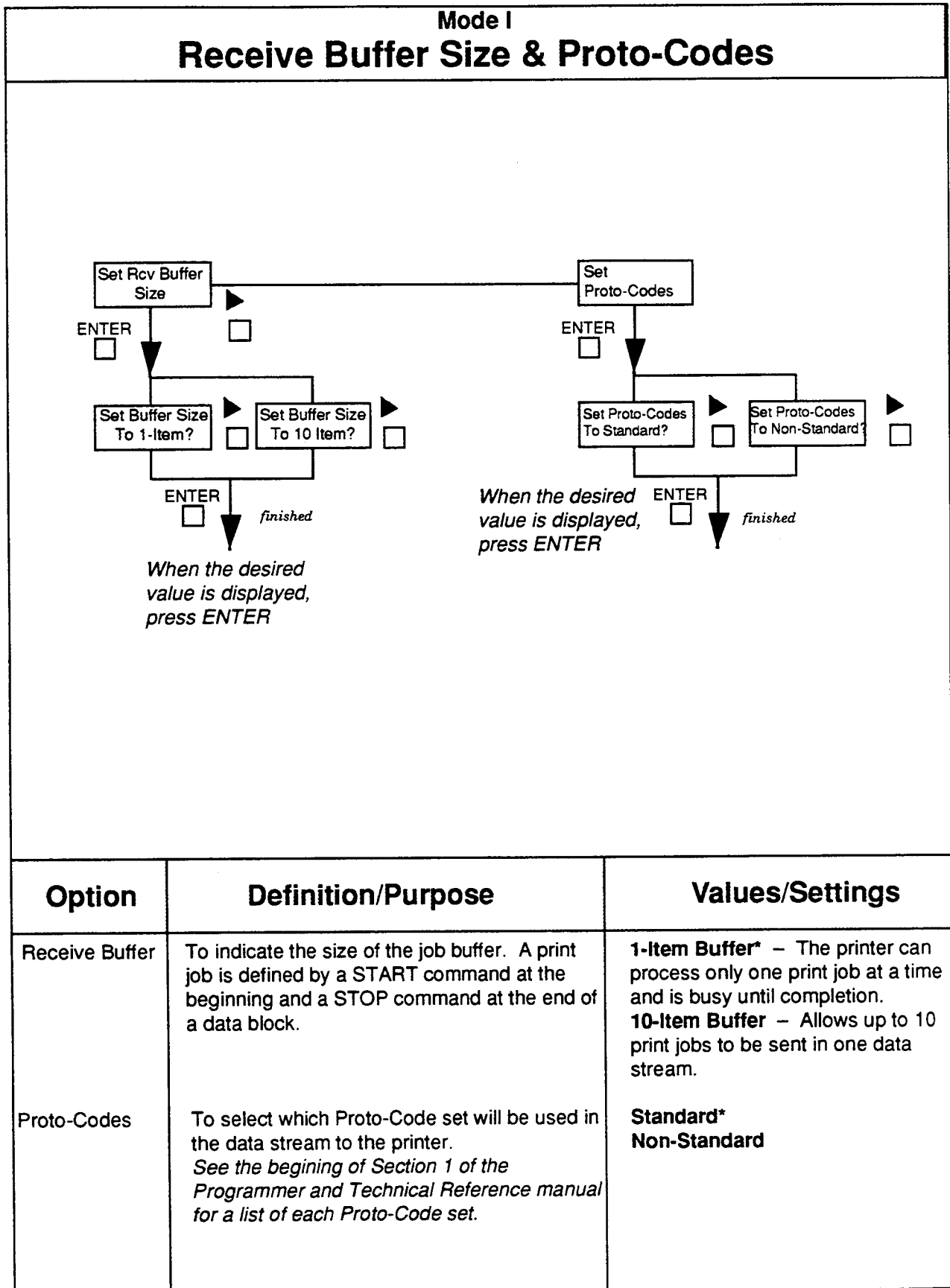
Panel Displays:	Press Key:	Comments
Qty 0000	LINE <input type="checkbox"/>	Printer is on-line. Pressing LINE key takes the printer off-line, which allows you to proceed with configuration selections.
Offline	ENTER <input type="checkbox"/>	When in the off-line state, pressing ENTER advances to the User Mode (Mode U). To return to the on-line state, press LINE.
[Select A Mode] Mode U	◀ ▶ <input type="checkbox"/> <input type="checkbox"/>	Press right arrow key to advance past Mode U.
Press Enter to Continue	ENTER <input type="checkbox"/>	Press ENTER to progress into the Password Protected Configuration Modes.
Enter Password 000	ENTER <input type="checkbox"/> or ◀ ▶ <input type="checkbox"/> <input type="checkbox"/>	Use the arrow keys to move through numbers 000 – 999 to display the password. (SATO factory default password is 000. Set custom password in Mode S.) Press the ENTER key when the desired password is displayed. Pressing ENTER will also advance to Mode I. Each additional pressing of the ENTER key will advance to the next Password Protected Mode (S, C, M, T, and W)
< Select a Mode > Mode I	ENTER <input type="checkbox"/> or ◀ ▶ <input type="checkbox"/> <input type="checkbox"/>	Press either arrow key to advance through all Password Protected Mode selections. Press ENTER when the desired mode is displayed.





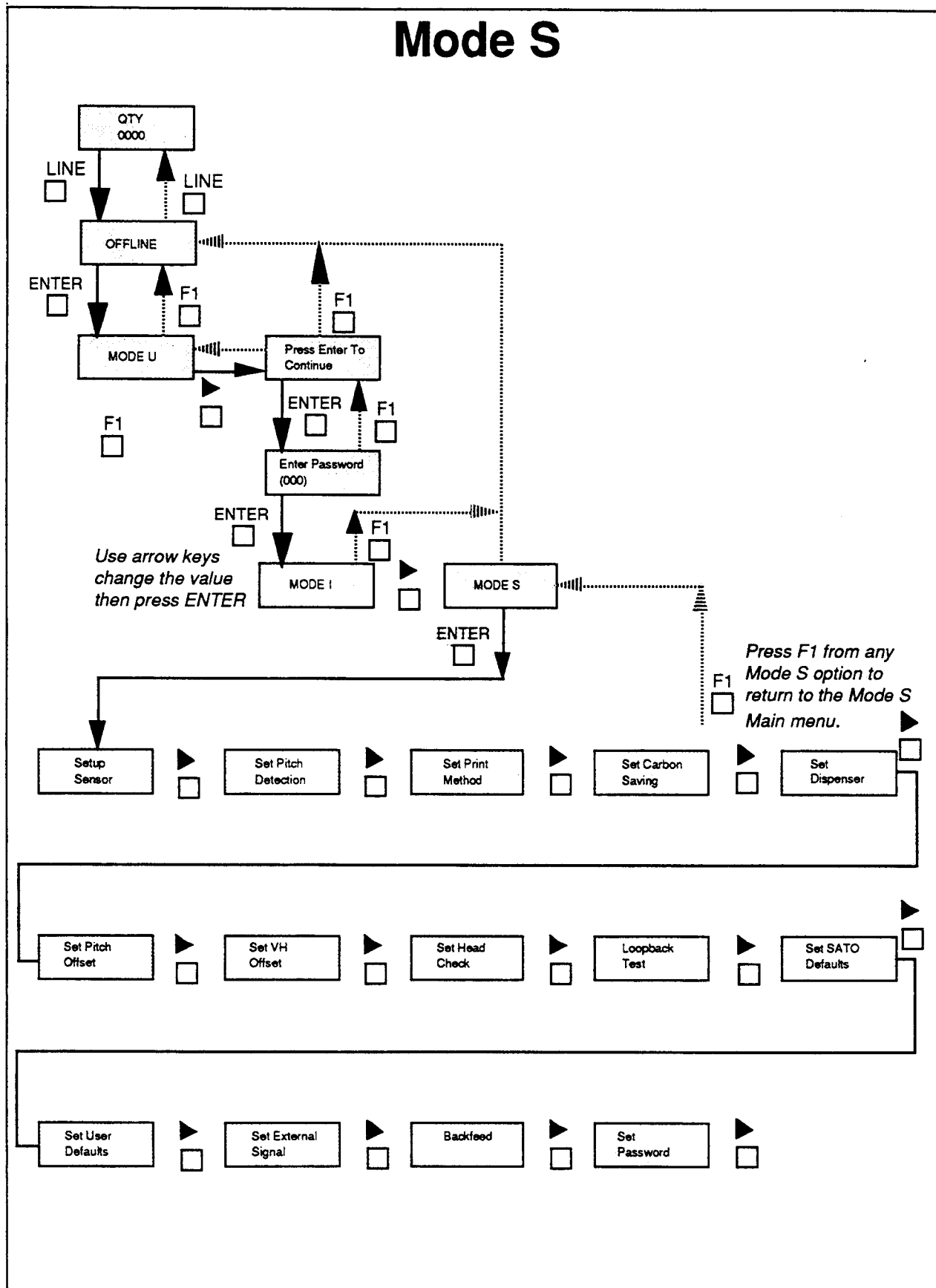
Mode I Interface Type										
Option	Definition/Purpose	Values/Settings								
Interface	<p>To indicate which interface will be used to communicate with your host computer</p> <p>If RS232C is selected, you must set the following values:</p> <ul style="list-style-type: none"> • Baud Rate • Stop Bit • Parity • Data Bit • Protocol • Multi-Drop Printer 	Centronics Parallel RS232C*								
		If RS232C:								
		<p>Baud Rate Values:</p> <table style="margin-left: 20px;"> <tr> <td>300 Bps</td> <td>4800 Bps</td> </tr> <tr> <td>600 Bps</td> <td>9600 Bps*</td> </tr> <tr> <td>1200 Bps</td> <td>19200 Bps</td> </tr> <tr> <td>2400 Bps</td> <td></td> </tr> </table>	300 Bps	4800 Bps	600 Bps	9600 Bps*	1200 Bps	19200 Bps	2400 Bps	
		300 Bps	4800 Bps							
		600 Bps	9600 Bps*							
		1200 Bps	19200 Bps							
		2400 Bps								
		<p>Stop Bit Values:</p> <p>1 Bit*</p> <p>2 Bits</p>								
<p>Parity Values:</p> <p>No*</p> <p>Even</p> <p>Odd</p>										
<p>Data Bit Values:</p> <p>7 Bits</p> <p>8 Bits*</p>										
<p>Protocol Values:</p> <p>PC1 RS On*</p> <p>PC1 RS On/Off</p> <p>Xon/Xoff</p> <p>Status 1 – Reserved</p> <p>Status 2 – Bi-Directional</p> <p>Note: See Programmer and Technical Reference Manual, Section 2 – Interface Specifications for more details on RS232 protocols</p>										
<p>Multi-Drop Printer Values:</p> <p>Reserved for future use.</p>										

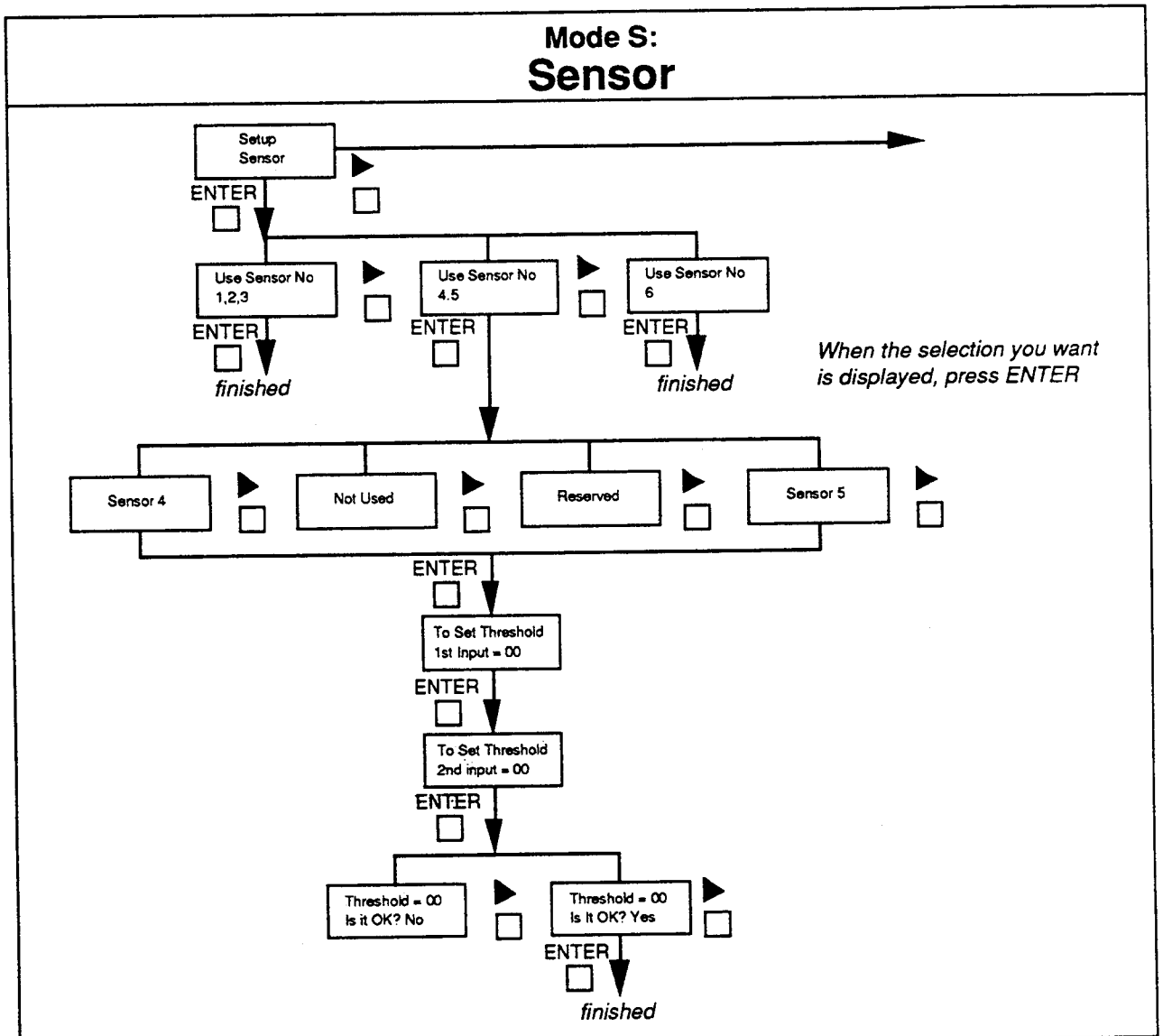
* SATO Factory Default



* SATO factory default

Setup and Accessory Mode



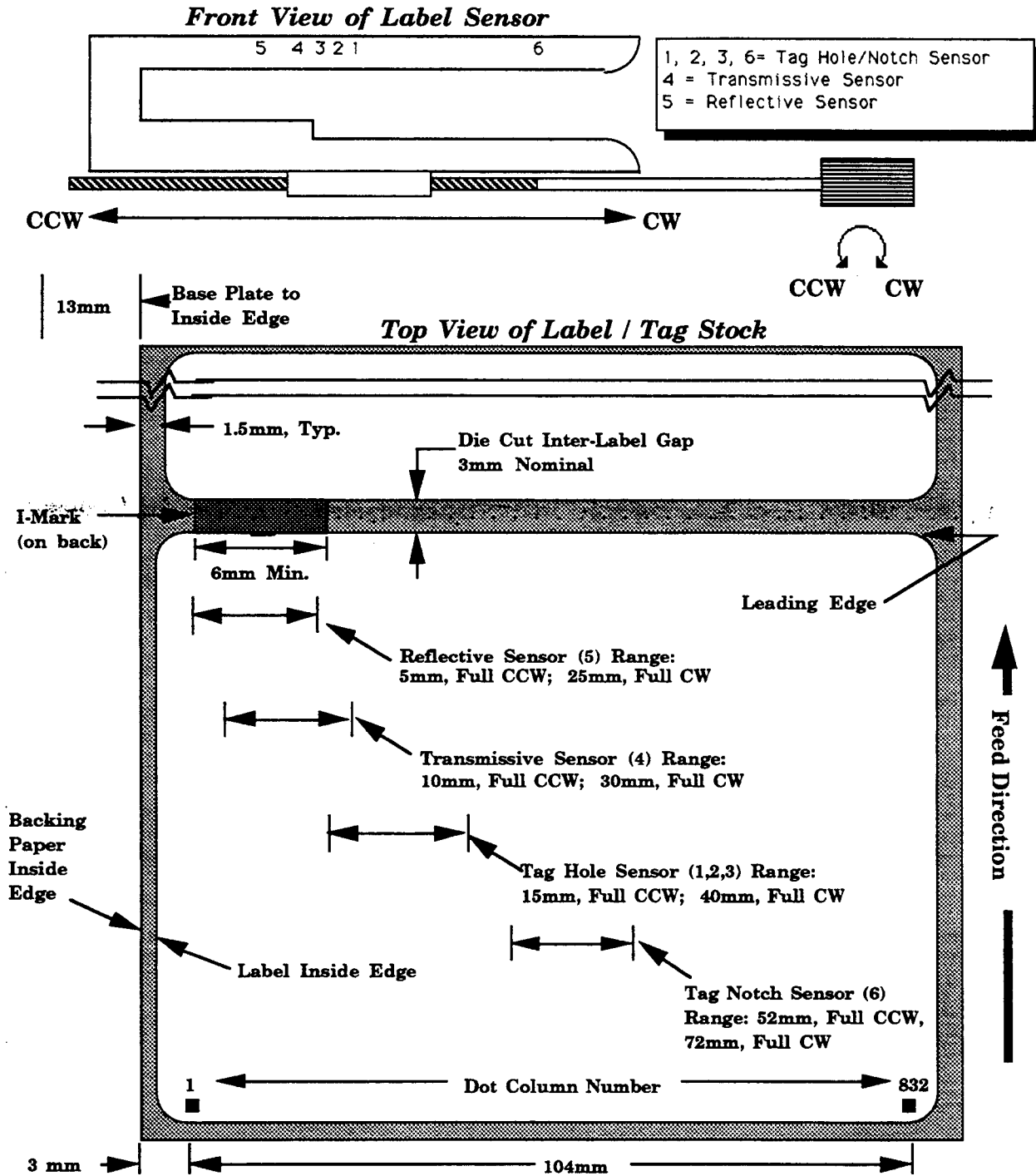


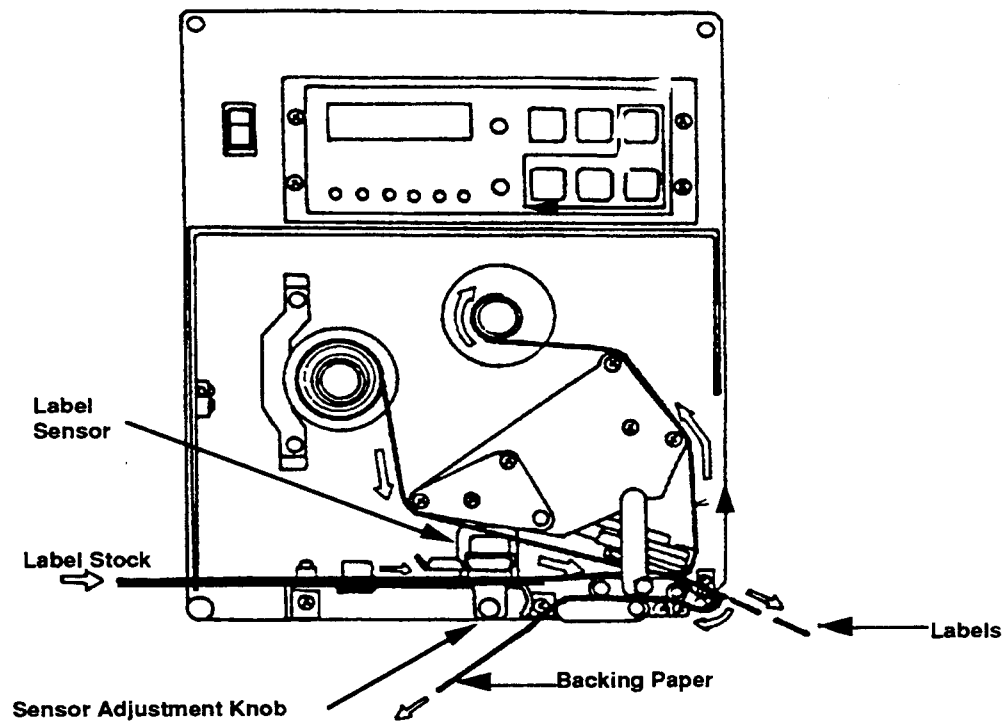
Option	Definition/Purpose	Values/Settings
Sensor	There are 6 label sensors in the M-8400S. Each sensor detects the leading edge of the label to properly align the position the printed image.	1,2,3 (Tag Hole/Notch) 4.5* (See Through & Reflective) 6 (Center Hole)
Use Sensor 1, 2, 3, 6	No calibration required	N/A
Use Sensor 4	Calibration required to distinguish between the the label and the gap. For use with die cut stock. Threshold must be 2.2 volts or greater.	1st input = 00 V 2nd input = 00 V Threshold = 00 V
Use Sensor 5*	Calibration required to distinguish between the the backing paper and the I-Mark. For use with but-cut stock. Threshold must be 2.2 volts or greater.	1st input = 00 V 2nd input = 00 V Threshold = 00 V

* SATO Factory Default

Label Sensor Adjustment

The position of the label sensor is adjustable to match the position of the feed slots (notches) or I-Marks on your labels and tags. Rotate the knob identified below to adjust the position of the sensor. Use the data shown when designing labels and tags to ensure correct placement of the leading edge indicator.





Location of Label Sensor and Adjustment Knob.

If Sensor 4 (See-Thru) or Sensor 5 (Reflective) is chosen during the use of the Sensor option in Mode S, setting of the threshold values will be required to complete the configuration setup.

The printer calculates a threshold voltage based on the amount of light (resulting voltage generated) passing through the label and the amount passing through the inter-label gap or reflected back from the label and I-Mark. When detected, this threshold voltage indicates the leading edge of the next label.

You must manually position the label and then the inter-label gap in the sensor's field of vision and record (ENTER) the resulting voltage reading. Use the instructions in the following chart and the illustration above to complete this procedure.

To Set Threshold
1st Input = 3.0V

- When the message shown on the left is displayed on the printer,
1. Open the print head assembly by rotating the lever to the "head open" position.
 2. Manually adjust the position of the label in the sensor until the highest Threshold voltage level is displayed. (This should result in a voltage of approximately 3.0V.)
 3. Press <ENTER>.

To Set Threshold
2nd Input = 0.2V

- When the message shown on the left is displayed on the printer,
1. Manually adjust the position the inter-label gap in the sensor until the lowest Threshold voltage level is displayed. (This should result in a voltage of 1.0v or less.)
 2. Press <ENTER>.

Threshold = 1.6V
Is it OK? No

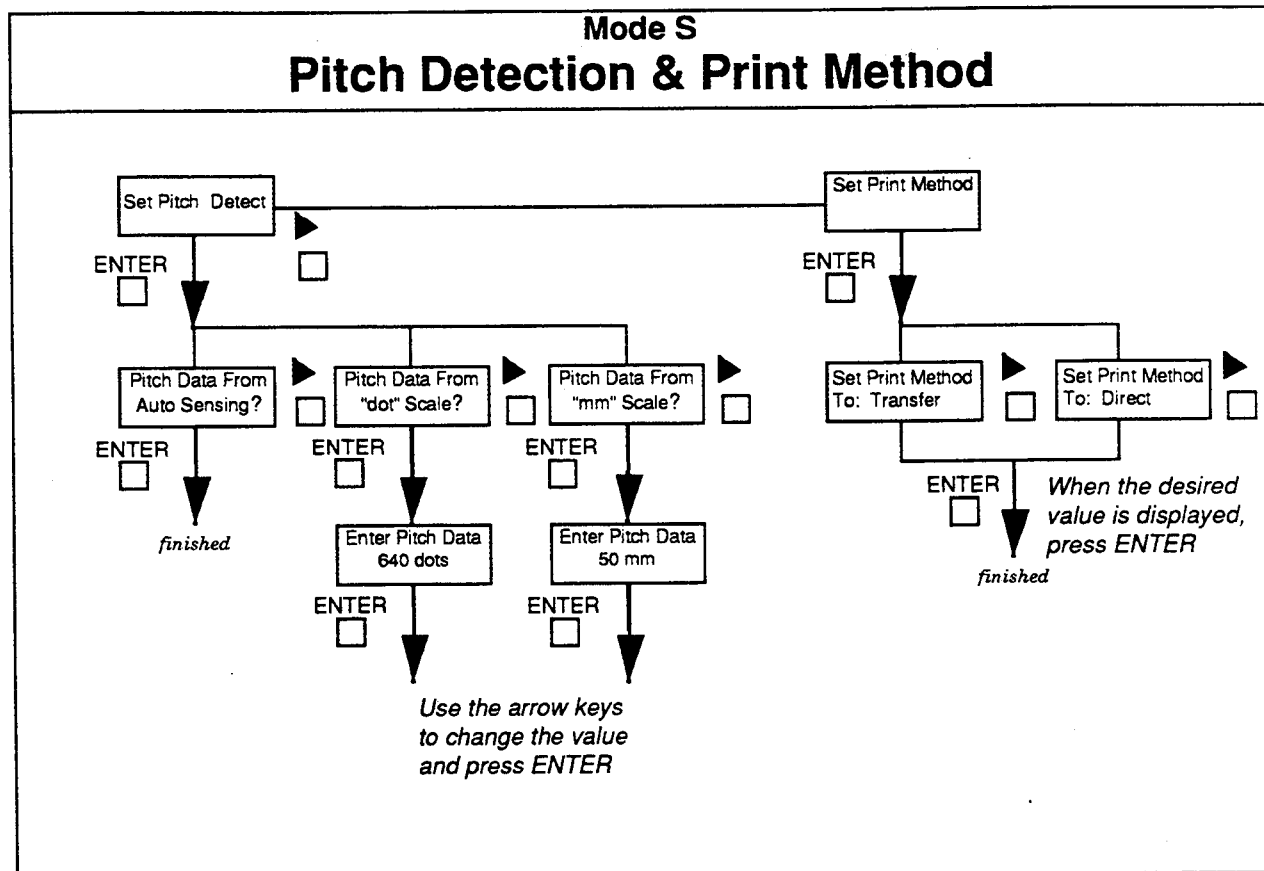
If the threshold value displayed on the printer is 1.5 volts or greater, press either arrow key until the display is "Yes" and then press <ENTER>.

If the threshold value is less than 2.2 volts, press either arrow key until the display is "No", press <ENTER>, and repeat the above steps.

Note:

The threshold value should be 1.5 volts of greater for consistant label feeding/printing.

Failure to achieve this minimum threshold value is usually the result of overly transparent label stock or overly opaque backing material.

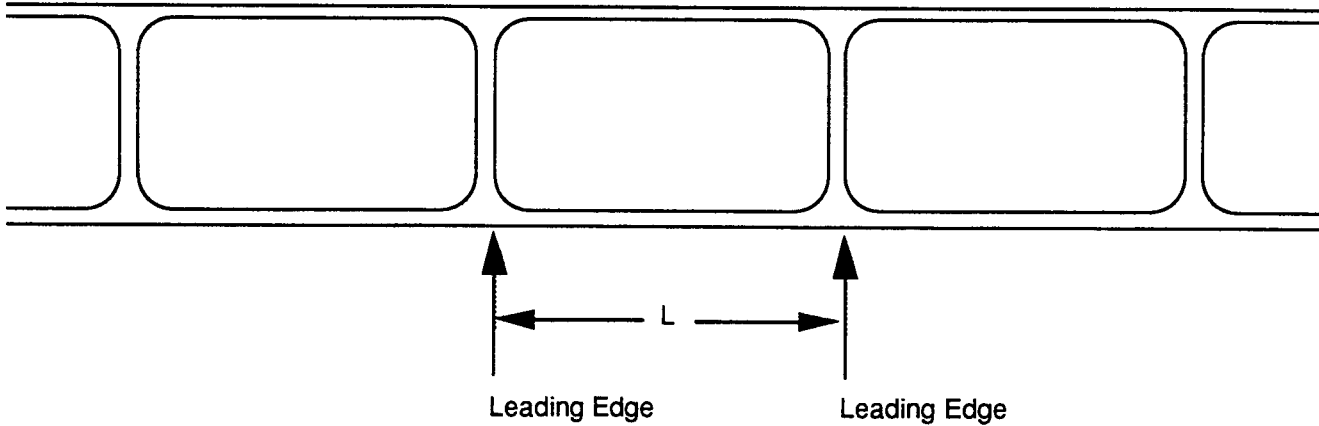


Option	Definition/Purpose	Values/Settings
Pitch Detection	To indicate the method by which the printer will determine the top of form (label leading edge).	<p>Auto Sensing* – The printer automatically determines label length. It will feed 2 or 3 labels each time the printer is powered on or label stock is changed.</p> <p>"dot" Scale – The label length will be determined by a user entered dot value. Value range = 0000 to 2000 dots. 640 is Factory Default value. (See next page.)</p> <p>"mm" Scale – The label length will be determined by a user entered mm value. Value range = 000 to 178 mm. 050 is Factory Default value.</p>
Print Method	To indicate the method by which the labels are printed. Printer makes adjustments in the amount of heat applied based on the method chosen.	<p>Thermal Transfer* – Method of printing using a carbon-based ribbon on standard label stock.</p> <p>Direct Thermal – Method of printing using special heat sensitive label stock. No ribbon is required.</p>

* SATO factory default

Dot Scale

When determining the label length using the dot scale method, begin by measuring from the leading edge of one label to the leading edge of the next label.



If the label length from one leading edge to the next leading edge is 3.15 inches or greater, set the dot scale to 640 dots (479 for the M-8400/6 S printer).

If the label length from one leading edge to the next leading edge is less than 3.15 inches, use the formula below to determine the dot scale value:

Dot Scale Value Formula: $[3.15 - N(L)] \times 203^*$

Where: **N** Number of whole labels (leading edge to leading edge) that will fit into 3.15 inches.

$$N = (3.15 + L) - \text{remainder}$$

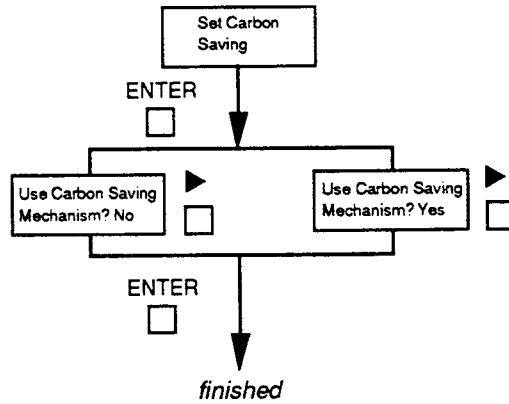
L Label length from leading edge to leading edge (in inches).

Example: Label length = 1.25"

1. Calculate N (The number of whole labels that will fit within 3.15 inches):
 $N = (3.15 + 1.25) - \text{remainder}$
 $N = 2.52 - \text{remainder}$
 $N = 2.52 - 0.52$
 $N = 2$
2. Multiply the number of whole labels by the label length from one leading edge to the next:
 $2 \times 1.25 = 2.5 \text{ inches}$
3. Subtract the total from Step 2 from 3.15 inches
 $3.15 - 2.5 = 0.65$
4. Convert 0.65 inches to dots:
 $0.65 \text{ inches} \times 203 \text{ dpi} = 132 \text{ dots}$
5. Set Dot Scale Value to 132 dots

* For M-8400/6 S use 152 instead of 203

Mode S: Carbon Saving

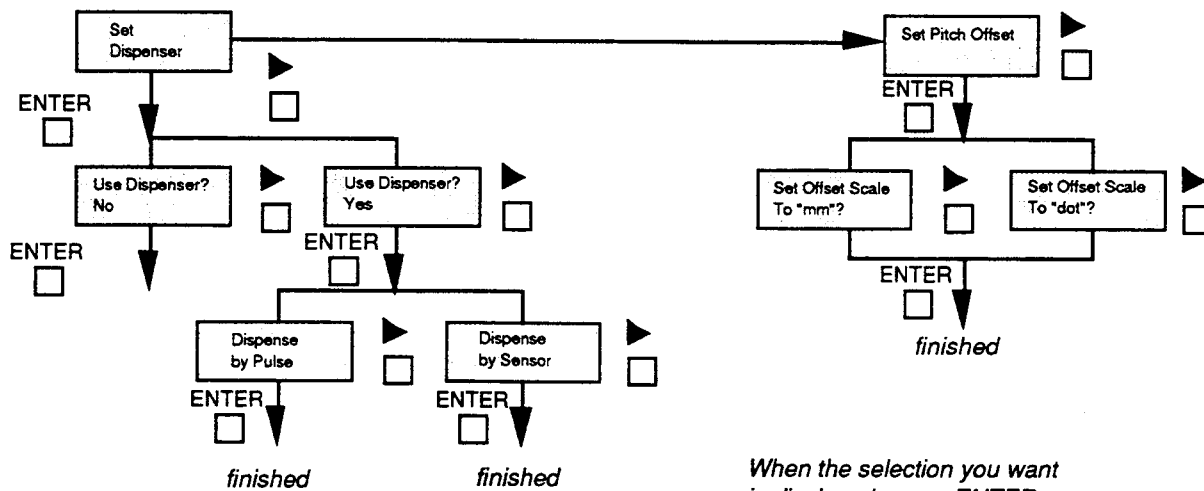


*When the value you want
is displayed, press ENTER*

Option	Definition/Purpose	Values/Settings
Carbon Saving	To indicate the use of the ribbon (carbon) saver option. Note: The M-8400S Ribbon Saver is a factory installed option to the printer. See the Programmer and Technical Reference manual, Appendix E.	No* – Disables use of Ribbon Saver Yes – Enables use of Ribbon Saver

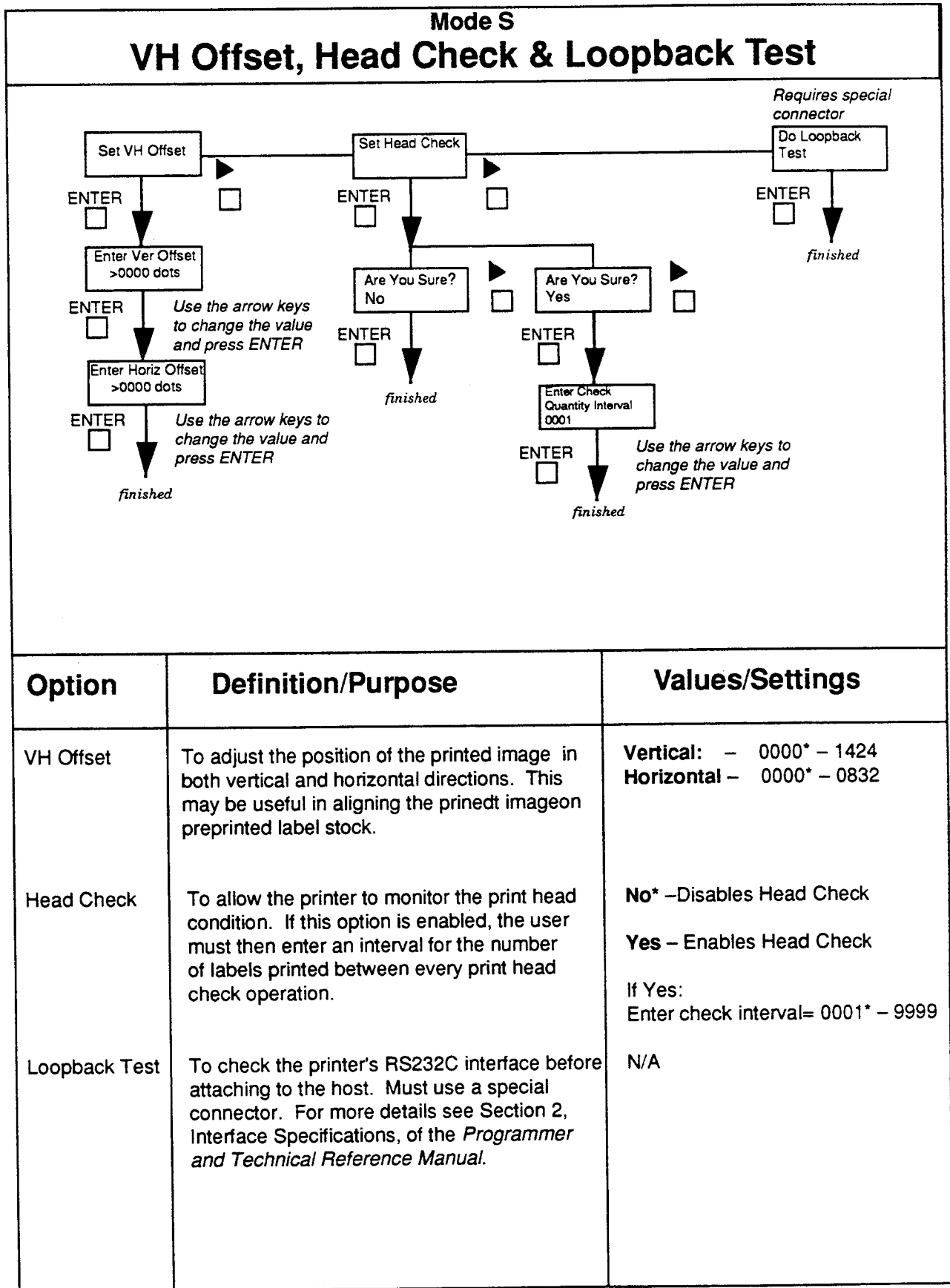
* SATO Factory Default

Mode S: Dispenser & Pitch Offset



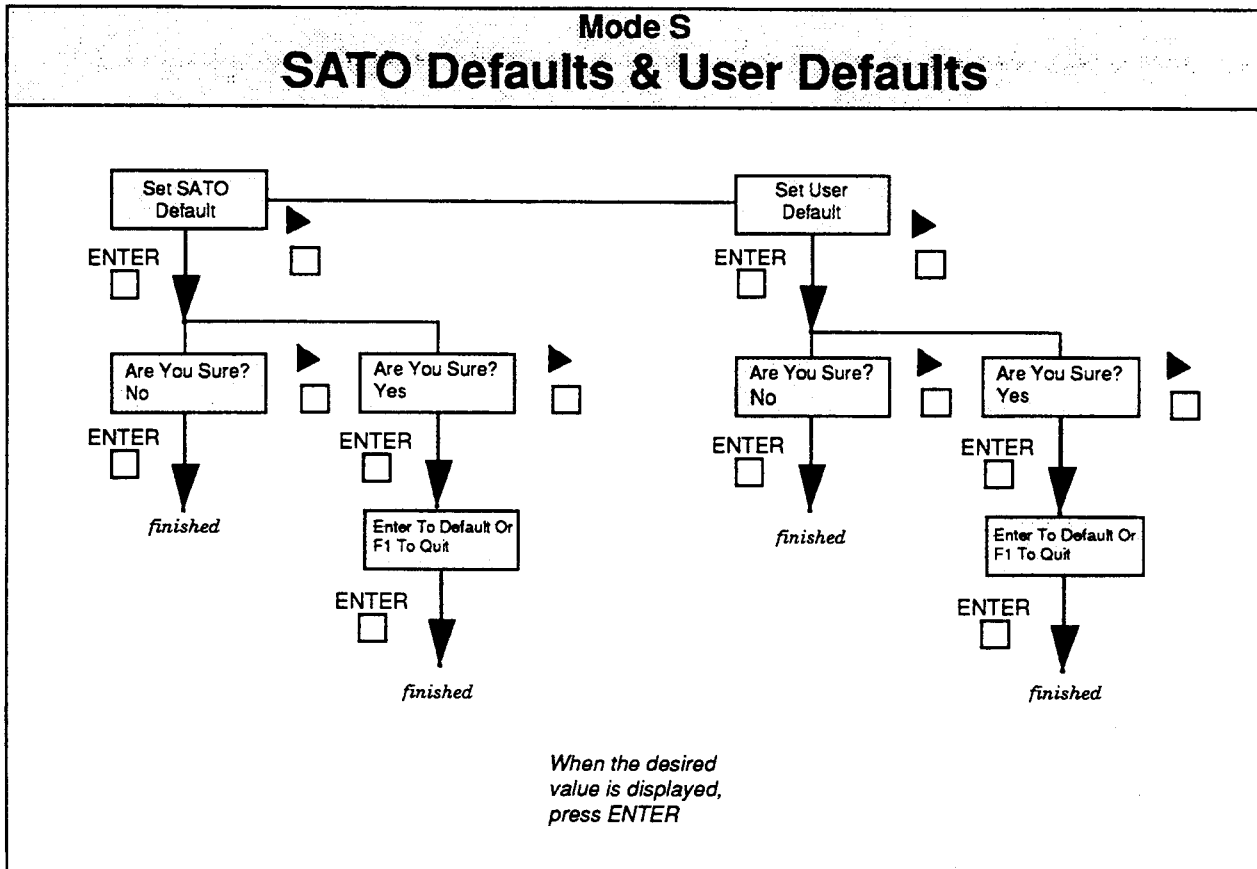
Option	Definition/Purpose	Values/Settings
Dispenser	To select the dispenser feature for use with an applicator system. Must also select Dispense by Pulse . (See below)	No* – Selects continuous printing Yes – Selects Demand printing
Dispense by Pulse	To allow the applicator to control the printing of labels	Prints one label each time Pin 5 of the applicator connector (I F) is switched to 0v (ground).
Dispense by Sensor	To allow continuous printing of labels <i>Note: Not used with applicator systems.</i>	Not applicable to "S" model printers, do not use.

* SATO Factory Default



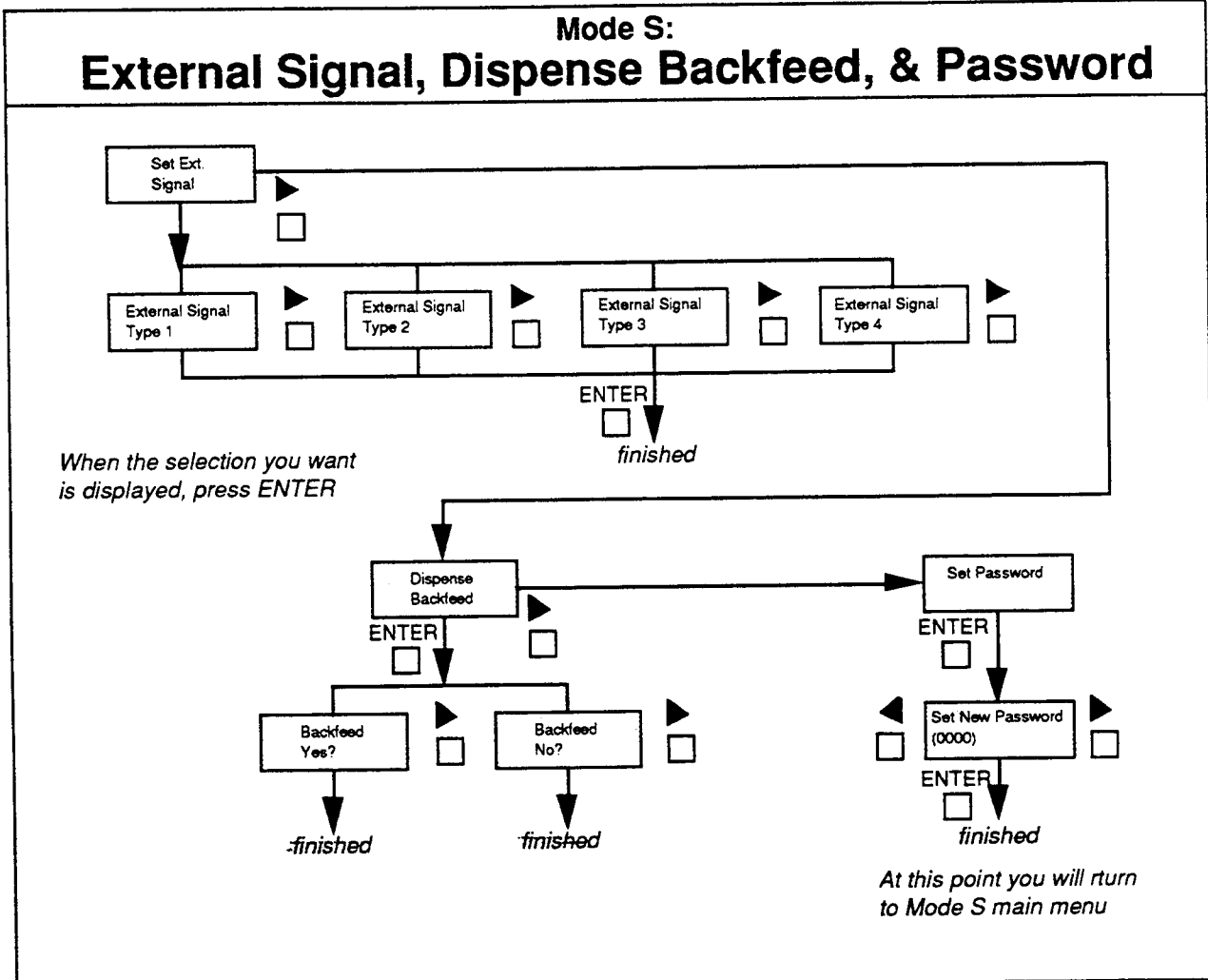
Option	Definition/Purpose	Values/Settings
VH Offset	To adjust the position of the printed image in both vertical and horizontal directions. This may be useful in aligning the printed image on preprinted label stock.	Vertical: – 0000* – 1424 Horizontal – 0000* – 0832
Head Check	To allow the printer to monitor the print head condition. If this option is enabled, the user must then enter an interval for the number of labels printed between every print head check operation.	No* – Disables Head Check Yes – Enables Head Check If Yes: Enter check interval= 0001* – 9999
Loopback Test	To check the printer's RS232C interface before attaching to the host. Must use a special connector. For more details see Section 2, Interface Specifications, of the <i>Programmer and Technical Reference Manual</i> .	N/A





* SATO factory default



Option	Definition/Purpose	Values/Settings
SATO Defaults	To set all current configuration options back to SATO factory defaults. <u>These are different from the user-programmed defaults in the next option.</u> <i>Note: SATO factory defaults are indicated by the asterisks throughout the configuration section.</i>	No* – Does not change current Yes – Resets configuration to factory defaults
User Defaults	To set all current configuration options to user programmed defaults. The User Default configuratin is a storage area on the printer used for holding a printer configuration designed especially for the end user's application. The user defaults can be stored by sending a short program to the printer. (See the Programmer and Technical Reference Manual, Appendix D). The defaults can then be placed into the current configuration by selection this option.	No* – Does not change current configuration Yes – Resets configuration to user default

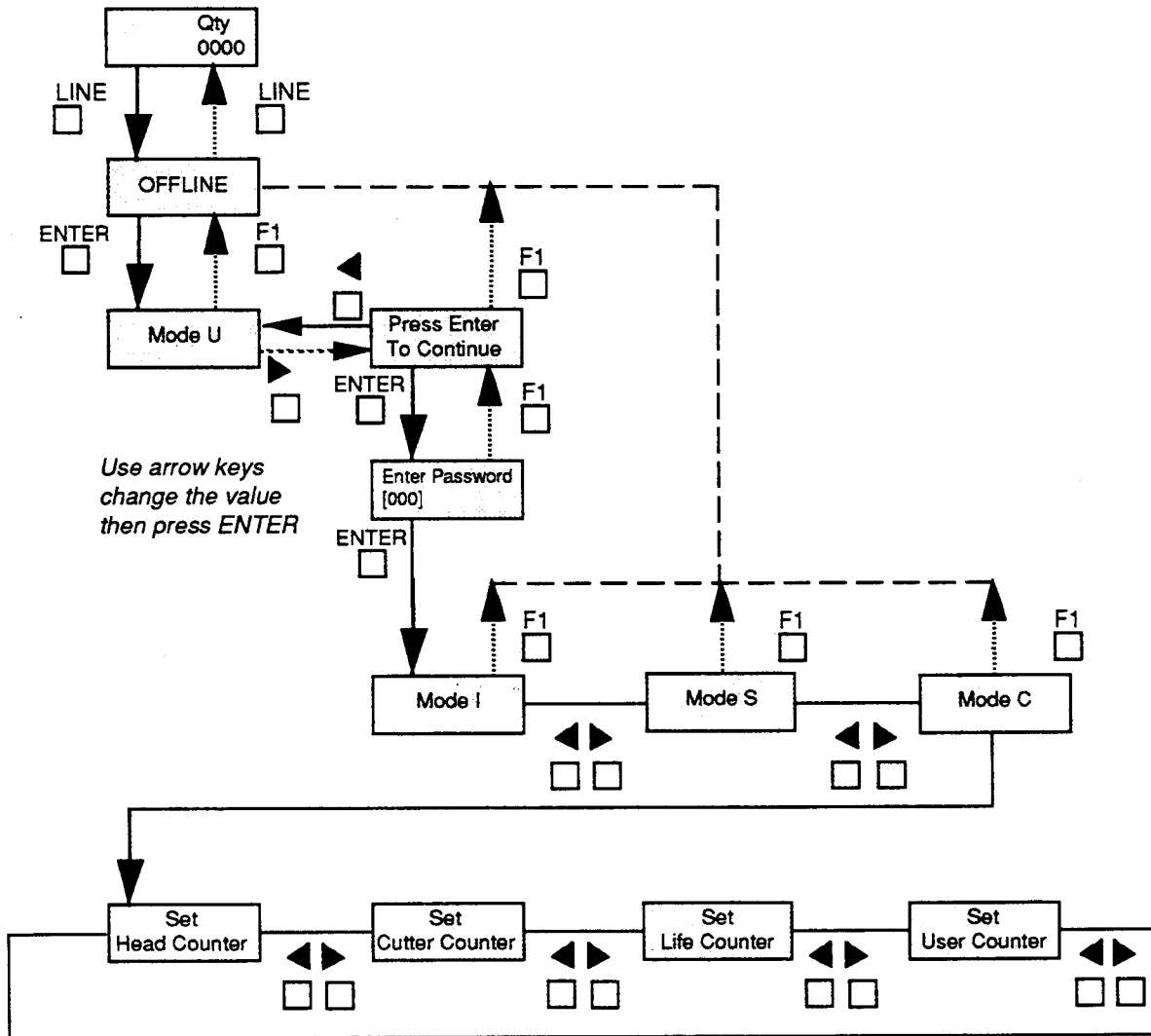
* SATO factory default



Option	Definition/Purpose	Values/Settings
External Signal	To select the particular printer output signal to drive applicators and other devices from the M-8400S via the I F connector, pin 6	Type 1*  5V 0V Type 2  5V 0V Type 3  5V 0V Type 4  5V 0V
Password	To set the current password number that allows access to all Password Protected Configuration Modes.	000* – 999
Backfeed	To allow selection of label backfeed.	Yes No*

* SATO Factory Default

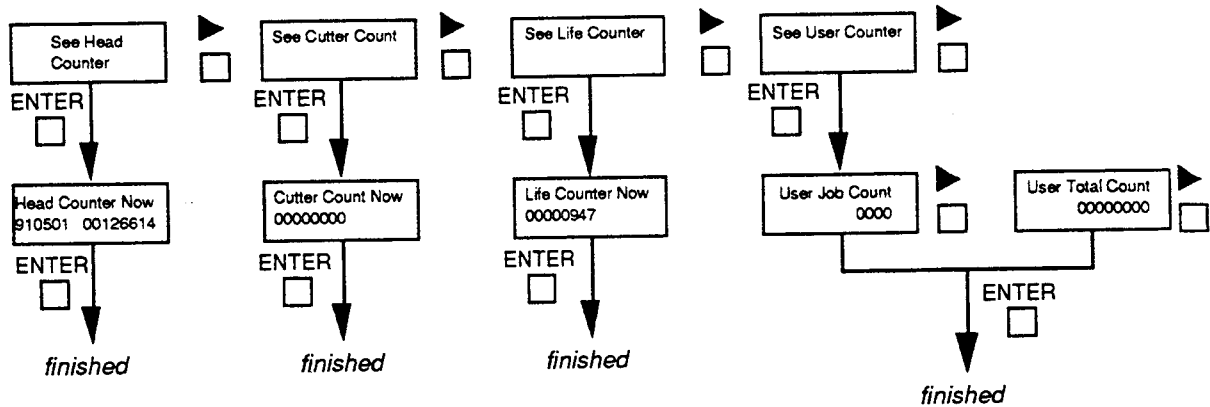
Mode C



Use arrow keys
change the value
then press ENTER

Press F1 from any
Mode I option to return
to the Main menu.

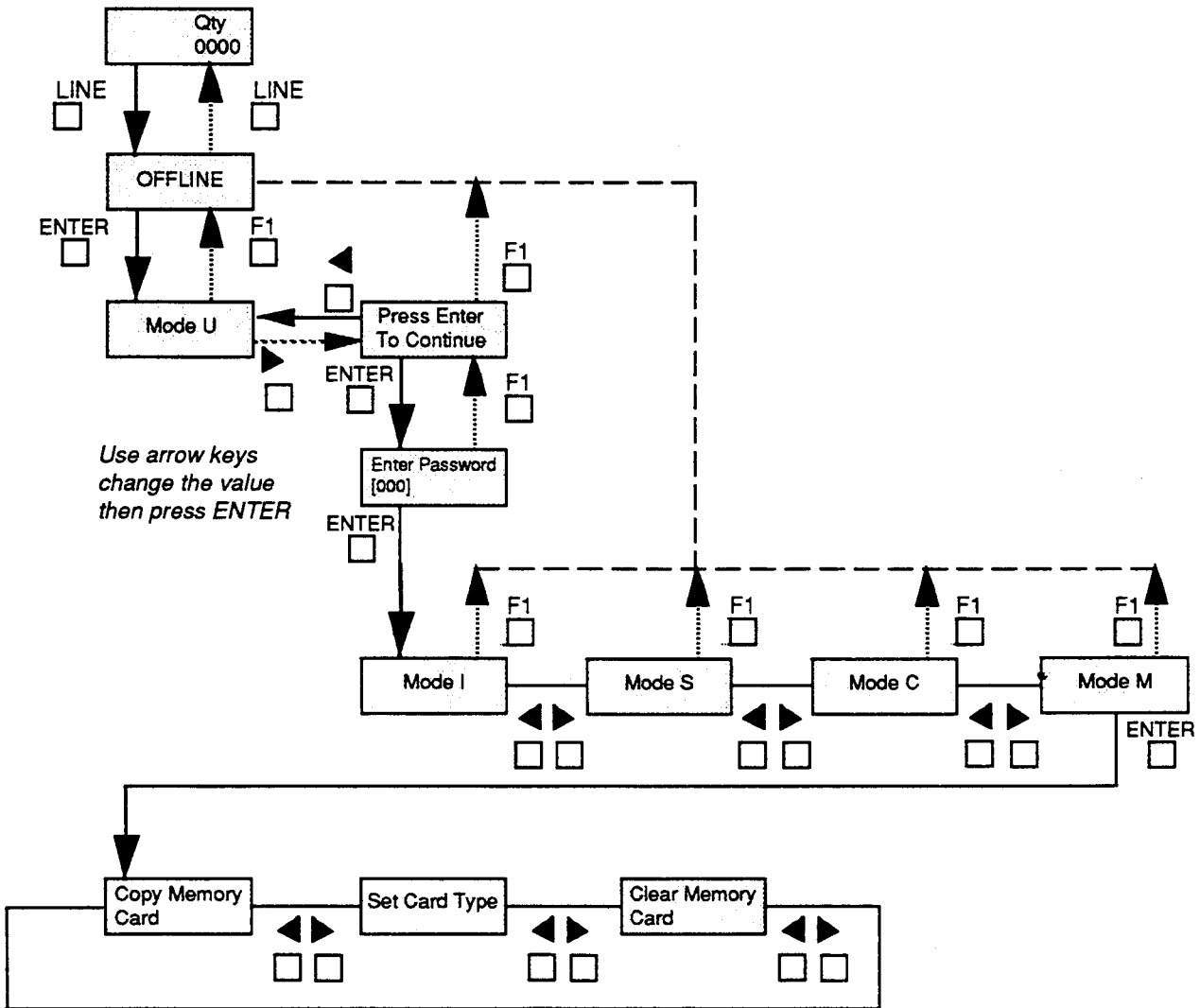
Mode S: Head, Cutter, Lifetime, & User Counters



Pressing ENTER at this point will return you to Mode C main menu

Option	Definition/Purpose	Values/Settings
Head Counter	Displays two values: 1. The install date for the current print head 2. The total length the label stock (mm) that has passed through the print head assembly.	Head Counter Now: 1. 000000 – 991015 (YYMMDD) 2. 00000000 – 99999999
Cutter Counter	Not applicable to the M-8400S	
Lifetime Counter	Displays the total number of label (of all sizes) that have passed through the print head assembly.	Life Counter Now: 0000000 – 99999999
User Counter	The User Count displays the current number of labels waiting to print, and the User Total Count display the number of different print jobs sent to the printer since the last power on.	User Job Count: 0000 – 9999 User Total Count: 00000000 – 99999999

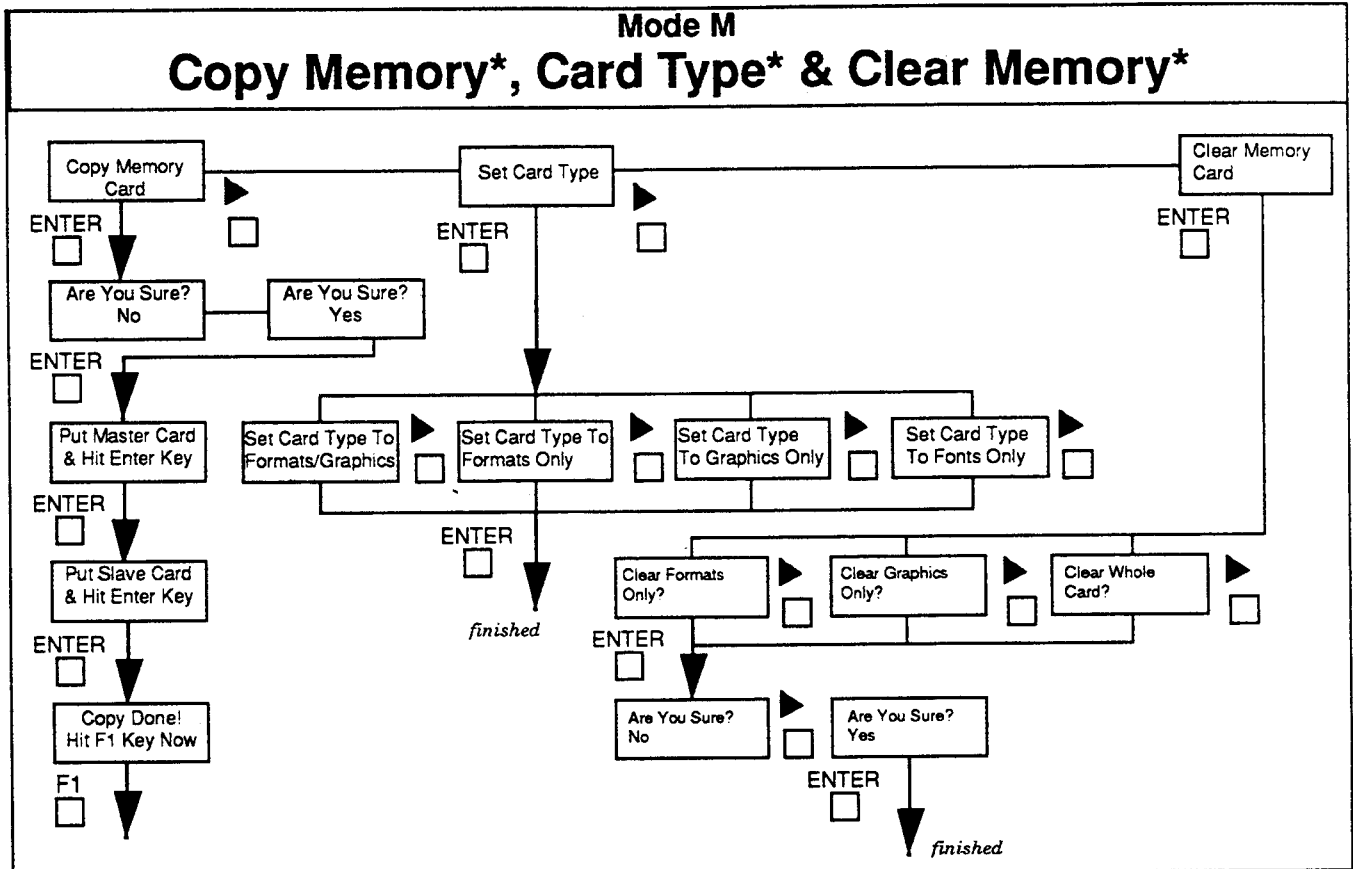
Mode M



Use arrow keys
change the value
then press ENTER

Use arrow keys
change the value
then press ENTER

Press F1 from any
Mode I option to return
to the Main menu.

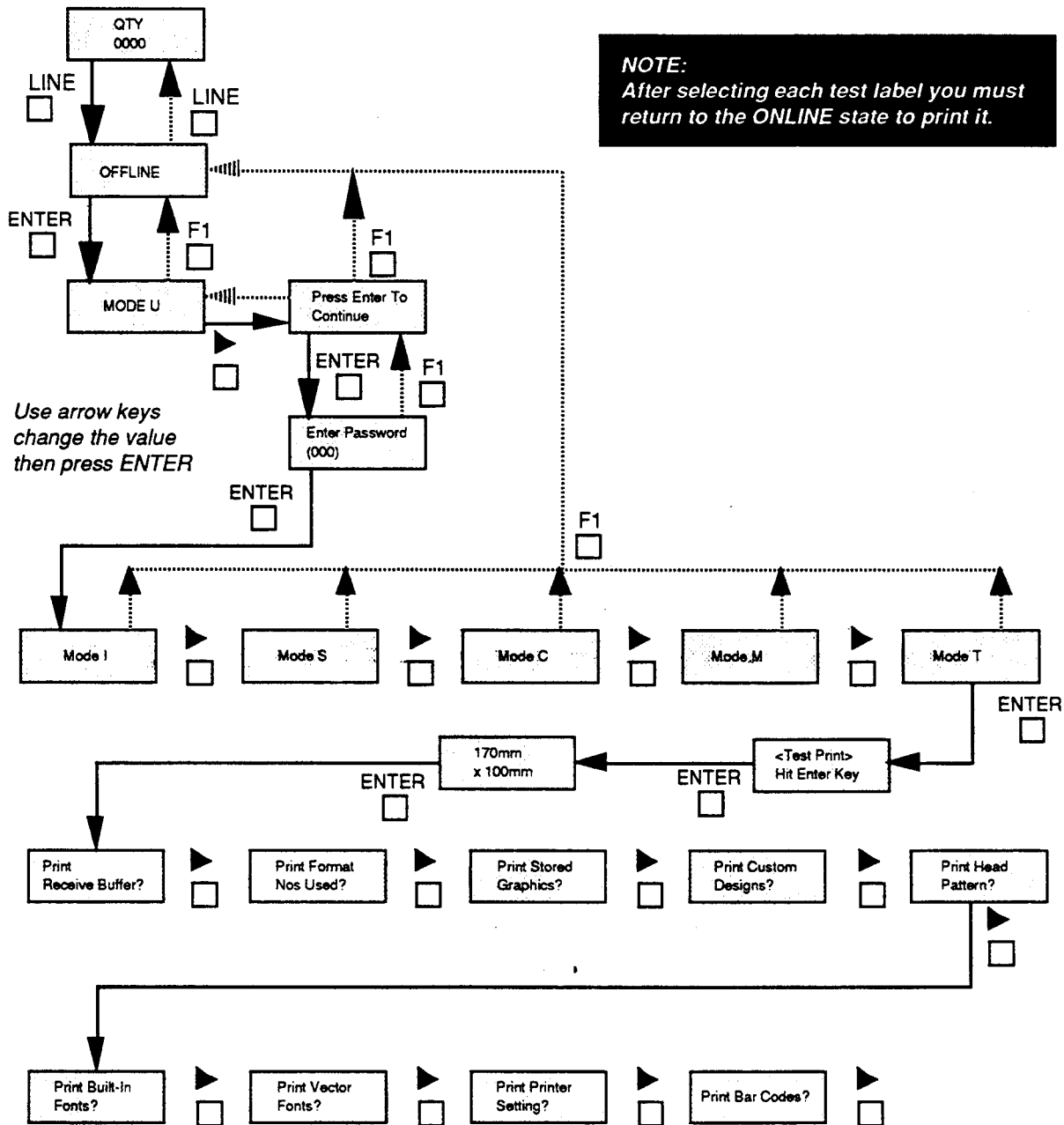
***NotApplicable To "S" Model**

Option	Definition/Purpose	Values/Settings
Copy Memory Card	To allow data to be copied from one memory card to another.	No* – Does not select memory card copy Yes – Selects memory card copy
	<i>Note: The M-8400 S memory card is an optional feature used to provide additional storage for label formats, graphic images, or downloaded fonts.</i>	If yes: Load the master memory card, and press <ENTER>. Then load the blank memory card, and press <ENTER>
Set Card Type	To indicate how the optional memory card will be formatted to properly store and recall	Formats & Graphics – Card used to store label formats and custom graphic images. Formats Only – Stores label formats only Graphics Only – Stores graphic images only Fonts Only – Card used to store downloaded fonts
Clear Memory Card	To allow stored data to be cleared from the optional memory card	Clear Formats Only – Clears label format data Clear Graphics Only – clears custom graphic images Clear Whole Card – Clears all stored data from card

Setup and Accessory Mode

Mode T

NOTE:
After selecting each test label you must return to the *ONLINE* state to print it.



Press F1 from any Mode T option to return to the Mode T Main menu.

Important Notes About Using Mode T

Mode T is operational only when using Standard proto-codes.

The printer must be set to Standard proto-codes (using Mode I) to print the built-in test label formats. If your application currently uses the Non-standard protocol code set, temporarily set the proto-codes to Standard prior to selecting a test label to be printed. Set the proto-codes back to Non-standard upon completion of the printing of the built-in test label formats.

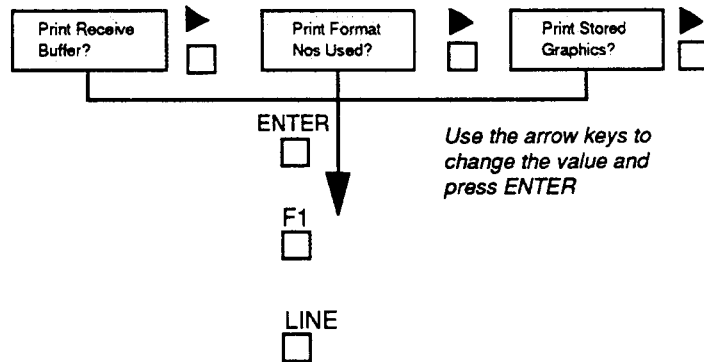
Each built-in test label format within Mode T is automatically printed when the printer is placed in the on-line state.

After selecting a Mode T label format, you must select the on-line state to print the label. Depress the F1 key repeatedly until the LCD displays "OFFLINE." Now press the LINE switch once and your test label will be printed providing no error conditions exist within the printer. After the selected test label has been completed the printer is ready to be returned to normal service. To print an additional test label format you must return to Mode T and make your selection.

All Built-In Test Label Formats Require The Use of 170mm x 100mm (7" x 4") Label Stock.

You must load 170mm long x 100mm wide (7" x 4") label stock and a 4.3" ribbon to print any of the built-in test label formats. The use of smaller size stock and ribbon will cause printing directly on the platen. **THIS IS NOT RECOMMENDED AND MAY CAUSE DAMAGE TO THE PRINT HEAD!** Such damage is not covered by the warranty.

Mode T: Receive Buffer, *Format Numbers, & *Stored Graphics

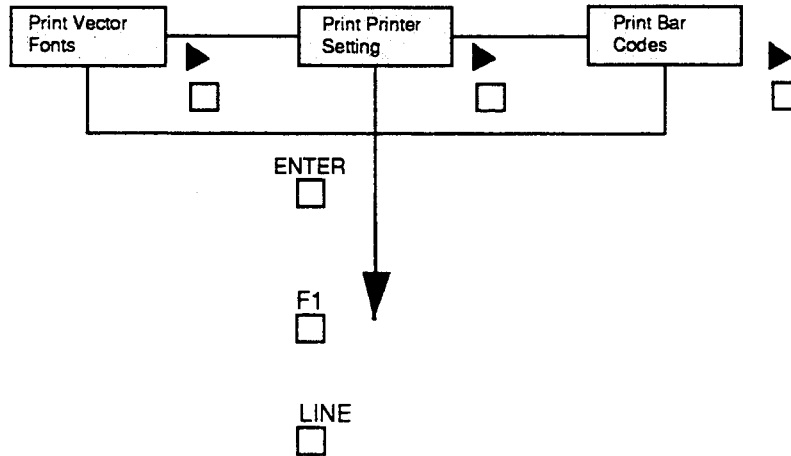


Option	Definition/Purpose	Values/Settings
Print Receive	To print a label which includes a hexadecimal version of the input data received from the host computer.	N/A
Print Format Nos Used	Not applicable to the "S" model.	N/A
Print Stored Graphics	Not applicable to the "S" model.	N/A

* Not applicable to the "S" model.

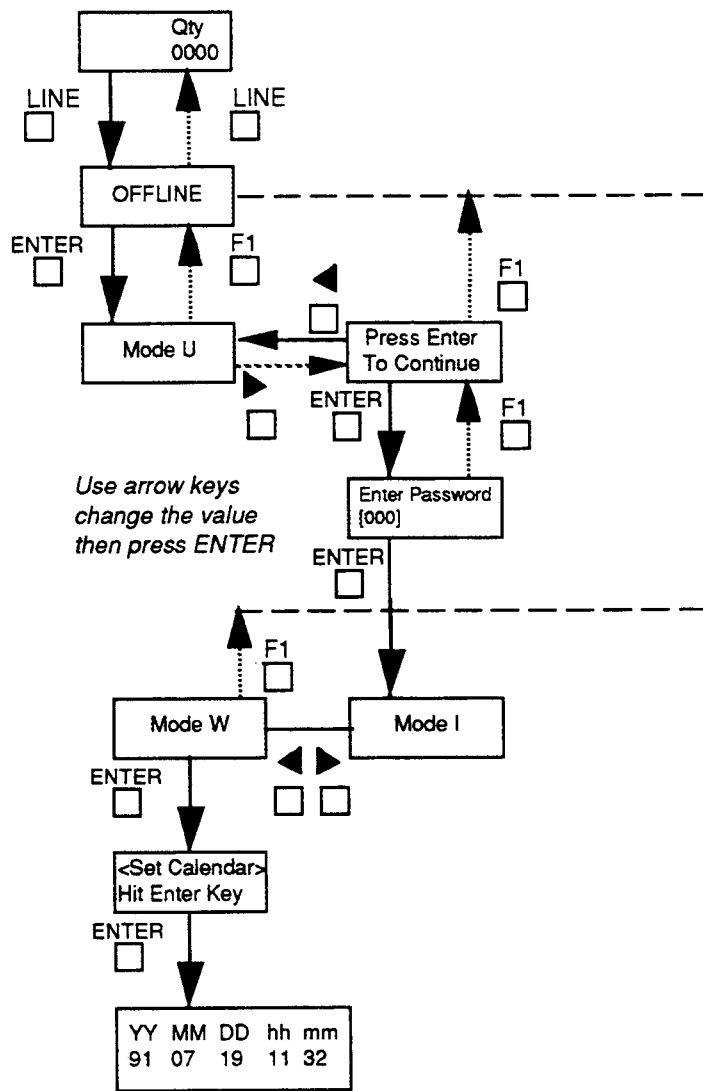
Mode T Custom Designs, Head Pattern, & Built-In Fonts		
<pre> graph TD A[Print Custom Designs] --> B[Print Head Platen] B --> C[Print Built-In Fonts] A -- ENTER --> A1[finished] B -- ENTER --> B1[Enter Print Qty 0000] C -- ENTER --> C1[finished] B1 -- ENTER --> B2[finished] B1 -- F1 --> B3[F1] B1 -- LINE --> B4[LINE] </pre> <p style="text-align: right;"><i>Use the arrow keys to change the value and press ENTER</i></p>		
Option	Definition/Purpose	Values/Settings
Custom Design	To print all custom characters that have been stored in memory.	N/A
Head Pattern	To print a test label using all of the print head elements. Also shows the printer's firmware level and the printer's current data/time	Enter quantity of labels to print from 0001* to 9999
Built-In Fonts	To print a test pattern of the seven built-in fonts (U, S, M, OA, OB, WB, AND WL).	N/A

Mode T Vector Fonts, Printer Setting, & Bar Codes

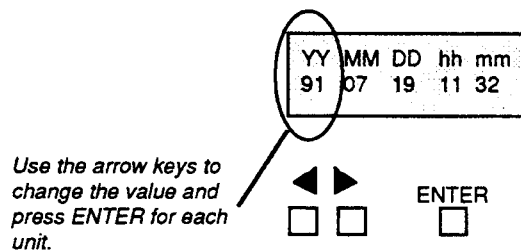


Option	Definition/Purpose	Values/Settings
Vector Fonts	To print a test pattern of the SATO vector font.	N/A
Printer Setting	To print a list of the current printer configuration settings.	N/A
Bar Codes	To print a sample of the bar code capabilities	N/A

Mode W



Mode W
YY MM DD hh mm



Option	Definition/Purpose	Values/Settings
YY	To set the year on the printer's internal clock	00 – 99
MM	To set the month on the printer's internal clock	01 – 12
DD	To set the day on the printer's internal clock	01 – 31
hh	To set the hour on the printer's internal clock	00 – 23
mm	To set the minute on the printer's internal clock	00 – 59

How to Enable Certain Printer Configuration Settings

When changing certain printer settings, it is required that the printer be repowered or label stock fed in order for the new setting to be enabled (i.e., activated). The following chart displays which settings are affected by this requirement.

Mode	Setting	Requirement	
		Repower Printer	Feed A Label
U	Pitch Offset		✓
I	Interface	✓	
	Baud Rate	✓	
	Stop Bits	✓	
	Parity	✓	
	Data Bit Length	✓	
	Protocol	✓	
	Multi-Drop Address	✓	
	Receive Buffer Size	✓	
	Proto-Codes	✓	
S	Sensor		✓
	Pitch Detect		✓
	Print Method		✓
	Ribbon Saver	✓	
	Cutter Mode		✓
	Dispenser		✓
	Pitch Offset (mm, dot)		✓
	VH Offset	✓	
	SATO Default	✓	
	User Default	✓	
	Dispenser Backfeed		✓

SECTION 3

CLEANING AND USER MAINTENANCE

INTRODUCTION

In this section you will find instructions for:

- Adjusting Print Quality (Darkness)
- Cleaning the Print Head, Platen, and Rollers
- Replacing the Print Head
- Replacing the main power fuse

ADJUSTING THE PRINT QUALITY (DARKNESS)

The print quality you will achieve with the M-8400S is a function of 1) proper selection of printing parameters and 2) cleanliness of the printer. In this section you will learn how to optimize performance for each label stock and ribbon type you use by selecting the correct parameters. A subsequent section will detail the cleaning procedures to be followed.

It is assumed that the label stock and ribbons loaded in the printer meet or exceed the minimum SATO recommendations. If you are unsure of their compatibility, check with your supplier; be sure to provide him with the exact model designation of the printer (M-8400S /6, M-8400S /8) and a description of the application.

Optimum print quality is evidenced by even print density and clear crisp edges on bar code symbols, alpha-numeric characters, and graphic elements. It is also evidenced by consistently high "first read rates" with your bar code scanner.

The first factor affecting print quality is print darkness. With the M-8400S you may set the print darkness via input through the OCP in Mode U. Print darkness may also be controlled from the host system by imbedding the appropriate command in the data sent to the printer.

NOTE: *Print darkness commands received from the host system will always override those selected via the OCP.*

To select the print darkness via input from the OCP, select Mode U and proceed to the Print Darkness menu following the information in the preceding section of this *Operator's Manual* (Section 2). Using the ► and ◀ keys, select the desired numerical value for print darkness. The value 1 is the lightest selection; 5 is the darkest selection. If you have interrupted a print job to adjust print darkness, the printer's input buffer will contain the data used for printing the previous label. Pressing the ENTER switch at this time will cause the M-8400S to print one additional label using this data. Use this feature after each new selection of darkness to examine the effect it has on your label. Under most circumstances one of these selections will produce the required print quality. If the required print quality cannot be achieved simply by selecting the darkness value, a change of print speed may also be required.

Details for incorporating the print darkness command into the data from the host are located in the *M-8400S Programmer and Technical Reference Manual*.

For additional, fine adjustment of the print quality use the PRINT as outlined below:

Using a 1/8" standard screwdriver, rotate the control identified as PRINT control clockwise for darker print and counterclockwise for lighter print. (This control is much like the volume control on a radio; its full rotational range is 270°. Do not force it to rotate beyond the stops.) The setting of this control will interact with the print darkness selection made above, the darkness command in the data and print speed.

If you are unable to achieve the required print quality by following these guidelines consult with your service department. No additional user adjustments are available. Mechanical adjustments of the printer should be carried out only by trained service personnel using the recommended procedures and tools.

CLEANING THE PRINT HEAD

With time and use, label adhesive, ribbon residue, and paper dust will build up on the active surface of the print head. If allowed to accumulate it will eventually reduce the print quality to the point at which voids will appear in the printed image. It will also drastically reduce print head life.

Completion of this procedure is recommended whenever the ribbon is replaced.

Use of chemicals and materials other than those in the SATO Print Head Cleaning Kit (P/N SA070) to clean the print head may result in damage to the print head and void your warranty. The active surface of the print head is actually a very thin glass material. Under no circumstances should a hard, sharp object be used to scrape foreign matter from the print head surface or from any other surface in the printer. If the glass surface of the print head is damaged it cannot be repaired; the print head must be replaced.

STEP	ACTION
1	Set the printer's main power switch to the OFF (0) position.
2	Raise the front cover to the full upright position.
3	Rotate the Print Head Lock lever to the open position.
4	If a ribbon is loaded, remove it from the label path. It is not necessary to completely remove the ribbon from the printer.
5	Remove the label stock from the area of the print head.
6	Moisten a cotton swab with SATO THERMAL PRINTHEAD & PLATEN CLEANER and remove all label adhesive, ribbon residue, and paper which may have accumulated on the print head. You may be required to scrub with the swab to remove stubborn deposits. Repeat as necessary until all foreign material is removed.

- 7 Dry the print head with a Clean Wipe from the cleaning kit.
- 8 Reposition/load the ribbon.
- 9 Reposition the label stock.
- 10 Rotate the Print Head Lock lever to the closed and locked position.
- 11 Lower the front cover to the closed position.
- 12 Set the printer's main power switch to the ON (1) position.

CLEANING THE PLATEN, DEMAND PLATE, AND ROLLERS

The same label adhesive, ribbon residue, and paper dust which collected on the active surface of the print head may also build up on the platen and rollers in the M-8400S. If allowed to accumulate, it will reduce the print quality and cause label feed problems.

Completion of this procedure is recommended whenever the ribbon is replaced.

Use of chemicals and materials other than those in the SATO Print Head Cleaning Kit (P/N SA070) to clean the platen and rollers may result in damage and void your warranty. Under no circumstances should a hard, sharp object be used to scrape foreign matter from the platen or from any other surface in the printer. If the surface of the platen is damaged it cannot be repaired; it must be replaced.

- | <u>STEP</u> | <u>ACTION</u> |
|--------------------|---|
| 1 | Set the printer's main power switch to the OFF (0) position. |
| 2 | Raise the front cover to the full upright position. |
| 3 | Rotate the Print Head Lock lever to the full open position. |
| 4 | Remove both ribbon and label stock from the printer. |
| 5 | Moisten a cotton swab with SATO PRINTHEAD & PLATEN CLEANER and remove all adhesive, ribbon residue, and paper dust from the platen, demand plate, and rollers within the M-8400S. You may be required to scrub with the swab to remove stubborn deposits. Manually rotate the ribbon wind shaft to access the complete surfaces of the platen and rollers. Repeat as necessary until all surfaces are clean and free of deposits. |
| 6 | Dry the platen, demand plate, and rollers with a Clean Wipe from the kit. |
| 7 | Reload ribbon and label stock. |
| 8 | Rotate the Print Head Lock lever to the closed and locked position. |
| 9 | Lower the front cover to the closed position. |
| 10 | Return the printer's main power switch to the ON (1) position. |

REPLACING THE PRINT HEAD

While the print head in the M-8400S has a very long life, it is a consummable item and requires replacement periodically. Removal and replacement is a simple operation easily accomplished in minutes by the operator. Replacement print heads are available from your applicator system vendor. In high duty cycle applications you may consider keeping a new print head on hand to minimize disruption to production when the present head requires replacement.

The only tool required to successfully remove and replace the print head is a No. 2 Phillips screwdriver. The task will go much easier if the screwdriver has a magnetized tip to hold the screws.

STEP ACTION

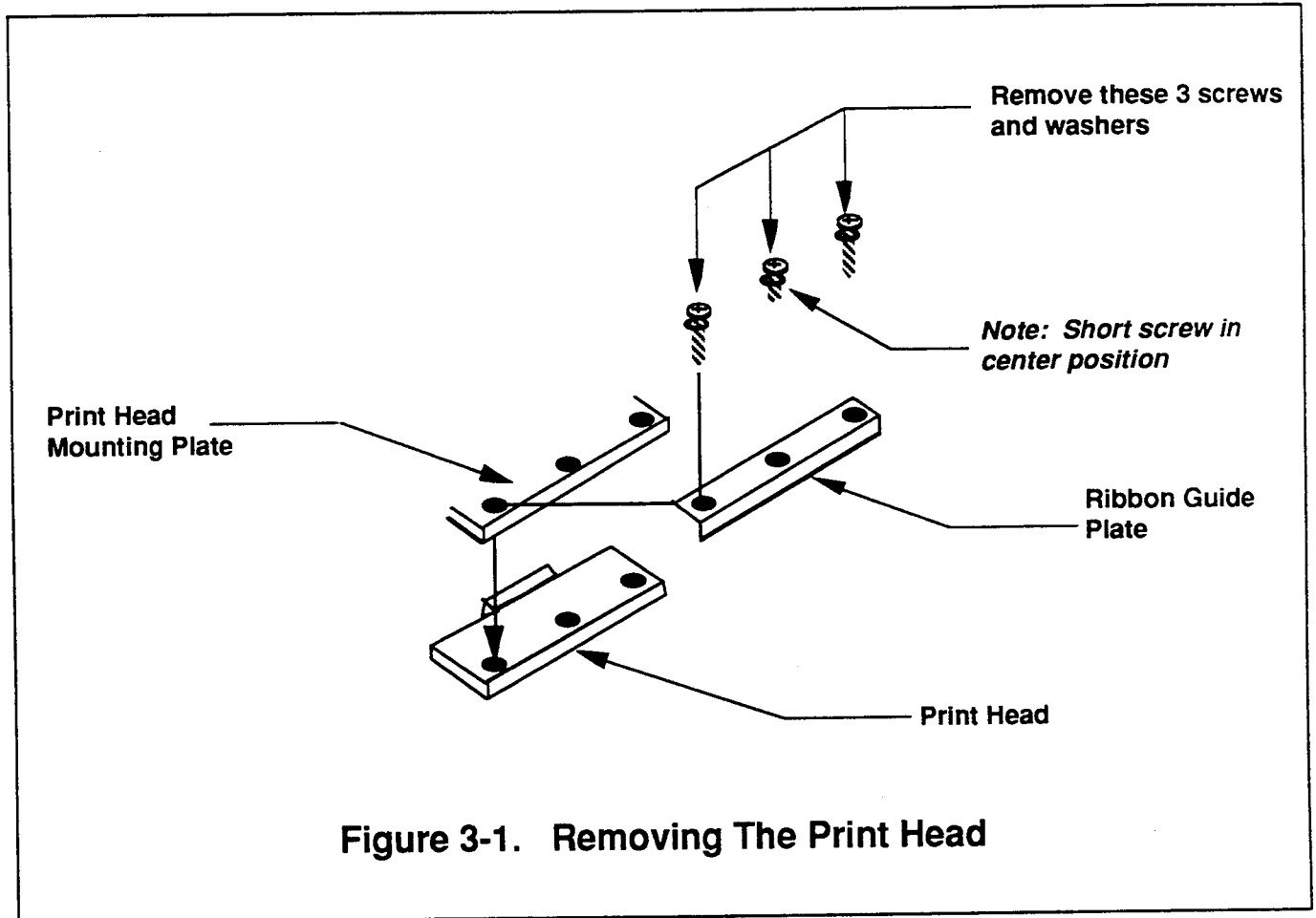
- 1 Set the printer's main power switch to the OFF (0) position.
- 2 Raise the front cover to the full upright position.
- 3 Remove ribbon and label stock from the print area.
- 4 Rotate the Print Head Lever to the CLOSED position.
- 5 Carefully remove and retain the three (3) screws and washers shown in Figure 3-1.

NOTE: ***DO NOT LOOSEN OR REMOVE THE TWO (2) LARGER SCREWS LOCATED BEHIND THE THREE SHOWN IN FIGURE 3-1. REMOVAL/LOOSENING OF THESE SCREWS WILL REQUIRE A TRAINED SERVICE TECHNICIAN TO RESTORE PROPER OPERATION.***

- 6 Remove and retain the Ribbon Guide Plate.
- 7 Rotate the Print Head Lever to the OPEN position.
- 8 Carefully unplug the print head from the connector.
- 9 Replace the print head by first plugging it into the connector.

Caution: ***Be very careful not to scratch the printing surface of the print head during installation. Scratches on the surface are permanent, irreparable and cause print voids.. Such damage is not covered by the warranty.***

- 10 Hold the Print Head aligned with the Print Head Mounting Plate and rotate the Print Head Lever to the CLOSED position.
- 11 Replace the Ribbon Guide Plate.
- 12 Replace the three screws removed in step 5 above. Tighten securely.
- 13 Reload ribbon and label stock.
- 14 Reset the printer's main power switch to the ON (1) position.



REPLACING THE MAIN POWER FUSE

The circuitry within the M-8400S is protected from a current overload by a fast blow fuse. Should the printer fail to operate, the condition of this fuse should be checked; if it is open the cause of the overload condition must be determined and corrected prior to replacing the fuse. **NEVER** replace the fuse with one of a greater amperage rating – the specified rating has been selected to prevent damage and/or injury.

STEP	ACTION
1	Set the printer's main power switch to the OFF (0) position.
2	Disconnect the A-C power cable from the rear of the printer.
3	Locate the fuse holder assembly in Figure 3-2.
4	Gently press down on the fuse holder cover while pulling away from the printer. No tools are required.

- 5 Extend the fuse holder to the full open position.
- 6 Remove the main power fuse.
- 7 Replace the main power fuse with one having the exact same rating. (A spare fuse is included with the printer and can be found in the cover of the fuse holder.)
- 8 Gently press the fuse holder assembly into the printer until it "clicks" into place.
- 9 Reconnect the A-C power cable removed in step 2 above.
- 10 Set the printer's main power switch to the ON (1) position. Providing the cause of the overload condition has been corrected, full operation of the printer should resume. If full operation does not return consult your service department. No additional user service procedures are available.

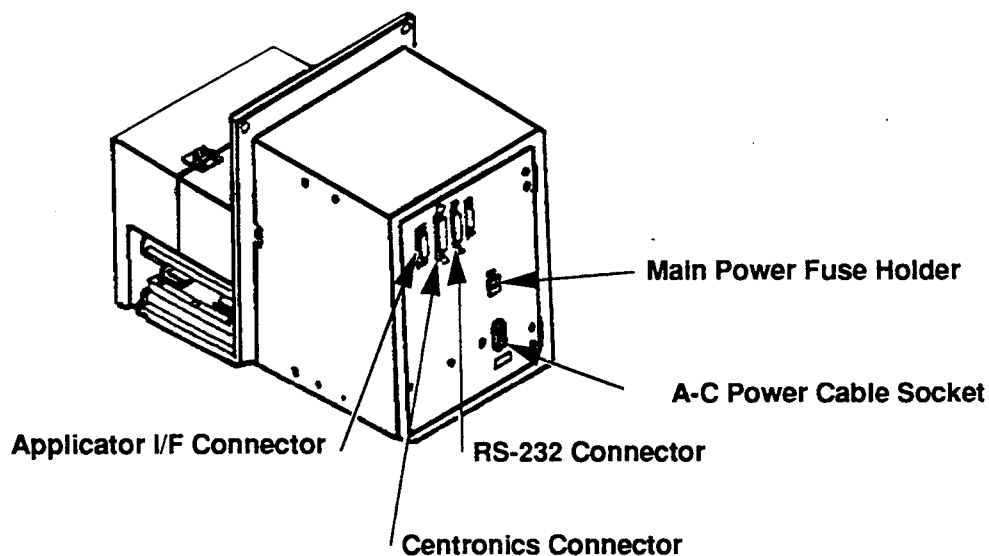
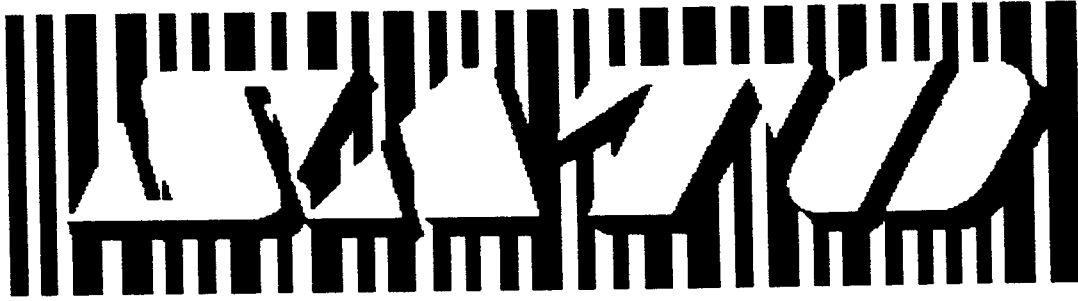
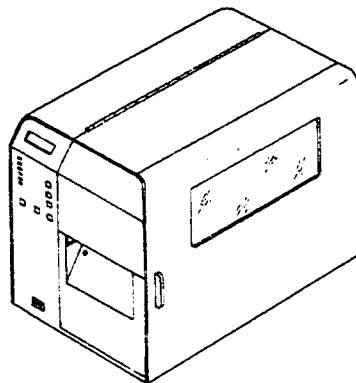


Figure 3-2. Rear View of M-8400S



M-8400

*Thermal Transfer / Direct Thermal
Electronic Printer*



**Programmer and
Technical Reference Manual**

Second Edition

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SATO America, Inc.
Sunnyvale, CA 94089**

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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PREFACE

M-8400 OPERATOR'S MANUAL

The M-8400 Operator's Manual contains basic information about the printer such as setup, installation, cleaning, and maintenance. It also contains complete instructions on how to use the operator panel to configure the printer. The following is a brief description of each section in this manual:

SECTION 1: OVERVIEW

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

SECTION 2: INSTALLATION AND CONFIGURATION

This section contains instructions on how to unpack and set up the printer, load the labels and ribbon, and use the operator panel to configure the printer.

SECTION 3: CLEANING AND MAINTENANCE

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

INDEX

M-8400 PROGRAMMER AND TECHNICAL REFERENCE MANUAL

The M-8400 Programmer and Technical Reference Manual contains technical information about the printer's programming language and interface. The following is a brief description of each section in this manual:

SECTION 1: M-8400 PROGRAMMING

This section introduces the SATO M-8400 printer programming language. It contains the commands that are used with the printer to produce labels with bar codes, alphanumeric data, and other graphics.

SECTION 2: INTERFACE SPECIFICATIONS

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

SECTION 3: TROUBLESHOOTING

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

APPENDIXES

Appendixes A through F contain the following information:

- Command codes quick reference chart
- Detailed bar code specifications
- Examples of custom-designed characters and custom graphics
- Instructions for setting the user default configuration
- Instructions for using the M-8400 optional features
- Character Tables

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Programmer and Technical Reference Manual

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