“Se” Applicator Print Engines

Operator and Technical Reference Manual

M-8459Se, M-8460Se, M-8485Se
M-8490Se

PN 9001073 Rev C

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PREFACE

"Se" PRINT ENGINE OPERATOR'S MANUAL

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

SECTION 1. PRINTER OVERVIEW

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

SECTION 2. INSTALLATION

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

SECTION 3. CONFIGURATION

- This section contains information on using the operator panel and switch panels to configure the printer.

SECTION 4. CLEANING AND MAINTENANCE

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

SECTION 5. PROGRAMMING

- This section introduces the SATO Programming Language. It contains the commands that are used with the printer to produce labels with bar codes, alphanumeric data and graphics.

SECTION 6. INTERFACE SPECIFICATIONS

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

SECTION 7. TROUBLESHOOTING

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

APPENDICES

- APPENDIX A: Command Code Quick Reference
- APPENDIX B: Bar Code Specifications
- APPENDIX C: Custom Characters and Graphics
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SECTION 1.
PRINTER OVERVIEW

INTRODUCTION

The SATO “Se” Print Engines are designed to be integrated into high-performance on-site labeling systems. All printer parameters are user programmable using the front panel controls and the DIP switches. All popular bar codes and 14 human-readable fonts, including a vector font, are resident in memory providing literally thousands of type styles and sizes.

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

The following information is presented in this section:

- General Printer Specifications
- Optional Accessories

SPECIFICATIONS

SPECIFICATION	M-8485Se	M-8460Se	M-8490Se	M-8459Se
PRINT				
Method	Direct or Thermal Transfer			Direct Only
Speed (User Selectable)	4 to 12 ips 100 to 300 mm/s	4 to 8 ips 100 to 200 mm/s	4 to 8 ips 100 to 200 mm/s	2 to 5 ips 50 to 125 mm/s
Print Module (Dot Size)	.0049 in. .125 mm		.0033 in. .083 mm	.0049 in. .125 mm
Resolution	203 dpi 8 dpmm		305 dpi 12 dpmm	203 dpi 8 dpmm
Maximum Print Width	5.0 in. 128 mm 1024 dots	6.0 in. 152 mm 1216 dots	4.4 in. 112 mm 1344 dots	4.4 in. 112 mm 896 dots
Maximum Print Length	49.2 in. 1249 mm		32.8 in. 833 mm	49.2 in. 1249 mm
MEDIA				
Minimum Width	1.0 in. (25 mm)	2.0 in. (53 mm)	1.0 in. (25 mm)	1.0 in. (25 mm)
Minimum Length(1)	.25 in. (6 mm)	.25 in. (6 mm)	.25 in. (6 mm)	.25 in. (6 mm)
Maximum Width	5.25 in 134 mm	6.5 in. 165 mm	5.25 in. 134 mm	5.25 in 134 mm
Type	Die Cut Labels, Fan-Fold or Continuous			
Maximum Caliper	.010 in. (.25 mm)			
Max Unwind torque	8.8 lbs (4 Kg) with 5 in. wide labels			
Backing Rewind Tension	400 g or less			
LABEL SENSING				
Transmissive See-Thru	Adjustable			
Reflective Eye-Mark	Fixed			
RIBBON				
Maximum Width	5.25 in. 134 mm	6.5 in. 165 mm	5.25 in. 134 mm	N/A
Minimum Width	1.55 in. 39.5 mm	2.1 in. 53 mm	1.55 in. 39.5 mm	N/A
Length	1968 ft (600 M)			N/A
Thickness	4.5 micron, Face-In Wind			N/A

All specifications subject to change without notice.

(1) Minimum label length at print speeds greater than 6 ips is 1.0 in.

SPECIFICATION	ALL
CONTROLS AND SIGNALS	
On-Line	LED
Power	LED
Label	LED
Ribbon (Not used on M-8459S)	LED
Error	LED
LCD Panel	2 Line x 16 Character
On/Off-Line Switch	Front Panel
Label Feed Switch	Front Panel
Power On/Off Switch	Front Panel
POTENTIOMETER ADJUSTMENTS	
Print Darkness	Inside Panel
Pitch	Inside Panel
Offset	Inside Panel
Display	Front Panel
INTERFACE CONNECTIONS (1)	
Parallel	IEEE1284
Serial Serial Protocol	RS232C (9600 to 57.6 Kbps) RS422/485 (9600 to 57.6 Kbps) Hardware Flow Control (Ready/Busy) Software Flow Control (X-On/X-Off) Bi-directional
Ethernet	10/100BaseT
Universal Serial Bus	USB Ver 1.1
PROCESSING	
CPU	32 Bit RISC
Flash ROM	2 MB
SDRAM	16 MB
Receive Buffer	2.95 MB
Optional Flash ROM	4 MB
Optional PCMCIA Memory	16 MB Flash ROM or 4 MB SRAM

(1) Plug-In Interface Modules

All specifications subject to change without notice.

SPECIFICATION	M-8485Se/M-8459Se/M-8460Se	M-8490Se
MATRIX FONTS		
U Font	(5 dots W x 9 dots H)	
S Font	(8 dots W x 15 dots H)	
M Font	(13 dots W x 20 dots H)	
XU Font	(5 dots W x 9 dots H) Helvetica	
XS Font	(17 dots Wx 17 dots H) Univers Condensed Bold	
XM Font	(24 dots W x 24 dots H) Univers Condensed Bold	
OA Font	(15 dots W x 22 dots H) OCR-A	(22 dots W x 33 dots H) OCR A
OB Font	20 dots W x 24 dots H) OCR-B	(30 dots W x 36 dots H) OCR B
AUTO SMOOTHING FONTS		
WB	WB Font (18 dots W x 30 dots H)	
WL	WL Font (28 dot W x 52 dots H)	
XB	XB Font (48 dots W x 48 dots H) Univers Condensed Bold	
XL	XL Font (48 dot W x 48 dots H) Sans Serif	
VECTOR FONT		
	Proportional or Fixed Spacing Font Size 50 x 50 dots to 999 x 999 dots Helvetica, 10 Font Variations	
AGFA® RASTER FONTS		
A Font	CG Times, 8 to 72 pt	
B Font	CG Triumvirate, 8 to 72 pt	
DOWNLOADABLE FONTS		
	TrueType Fonts with Utility Program	
CHARACTER CONTROL		
	Expansion up to 12X in either the X or Y coordinates Character Pitch control Line Space control Journal Print facility 0°, 90°, 180° and 270° Rotation	

All specifications subject to change without notice.

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

All specifications subject to change without notice.

SPECIFICATION	M-8485Se/M-8459Se/M-8490Se		M-8460Se
DIMENSIONS			
Wide	9.65 in. (245 mm)		
Deep	16.1 in. (408 mm)		17.9 in. 455 mm
High	11.8 in. (300 mm)		
Weight	25.0 lbs (11.34 Kg)		27.5 lbs 12.5 Kg
POWER REQUIREMENTS			
Voltage	115 - 220 V (±10 %) 50/60 Hz (±1%)		
Power Consumption	50W Idle 700W Operating		
ENVIRONMENTAL			
Operating Temperature	41° to 104°F (5° to 40°C)		
Storage Temperature	-0° to 104°F (-20° to 40°C)		
Operating Humidity	15-85 % RH, non-condensing		
Storage Humidity	Max 90% RH, non-condensing		
Electrostatic Discharge	8KV		
REGULATORY APPROVALS			
Safety	UL, CSA, CE, TUV		
RFI/EMI	FCC Class A		
CONFIGURATION			
Left to **Right Hand** Label Feed	Yes		
Right to **Left Hand** Label Feed	Yes	No	Yes

All specifications subject to change without notice.

ACCESSORY	M-8485Se/M-8459Se/M-8490Se	M-8460Se
MEMORY EXPANSION	PCMCIA Memory Cards (up to 16MB Flash or 4 MB SRAM) and 4 MB Flash ROM. Can be used for Graphic File storage, print buffer expansion, format storage and downloaded TrueType fonts.	
FACE-OUT LABEL SENSOR	Top-mounted sensor for reflective Eye-Marks printed on the face of the label.	N/A
COAX/TWINAX INTERFACE	Coax/Twinax Plug-In Interface Module. Coax I/F emulates an IBM3287-2 printer with a standard Type A BNC connector. Twinax I/F emulates IBM 5224, 5225, 5226 or 4212 printers with auto-termination cable-thru capabilities.	
PARALLEL INTERFACE	IEEE1284 Bi-Directional Plug-In Interface Module.	
SERIAL INTERFACE	High Speed RS232C Plug-In Interface Module.	
USB INTERFACE	Universal Serial Bus Plug-In Interface Module.	
ETHERNET INTERFACE	10/100BaseT Plug-In Interface Module.	

All specifications subject to change without notice.

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SECTION 2.
INSTALLATION

INTRODUCTION

This section of the manual has been written to help you install the SATO “Se” print engine modules and to get started as quickly as possible.

It is recommend to read each chapter in this manual before the installation or the use of the print modules.

INSTALLATION

Careful consideration must be given when selecting the location of the printer, especially to environmental considerations. To obtain optimum results from the SATO “S” print module, always try to avoid operation locations influenced by:

- Direct or bright sunlight, as this will make the label sensor less responsive and may cause the label to be sensed incorrectly.
- Locations which have extremes of temperature, as this can create electrical problems on the circuits within the printer.
- The installed location of the printer should ideally be in areas free from dust, humidity and sudden vibrations.

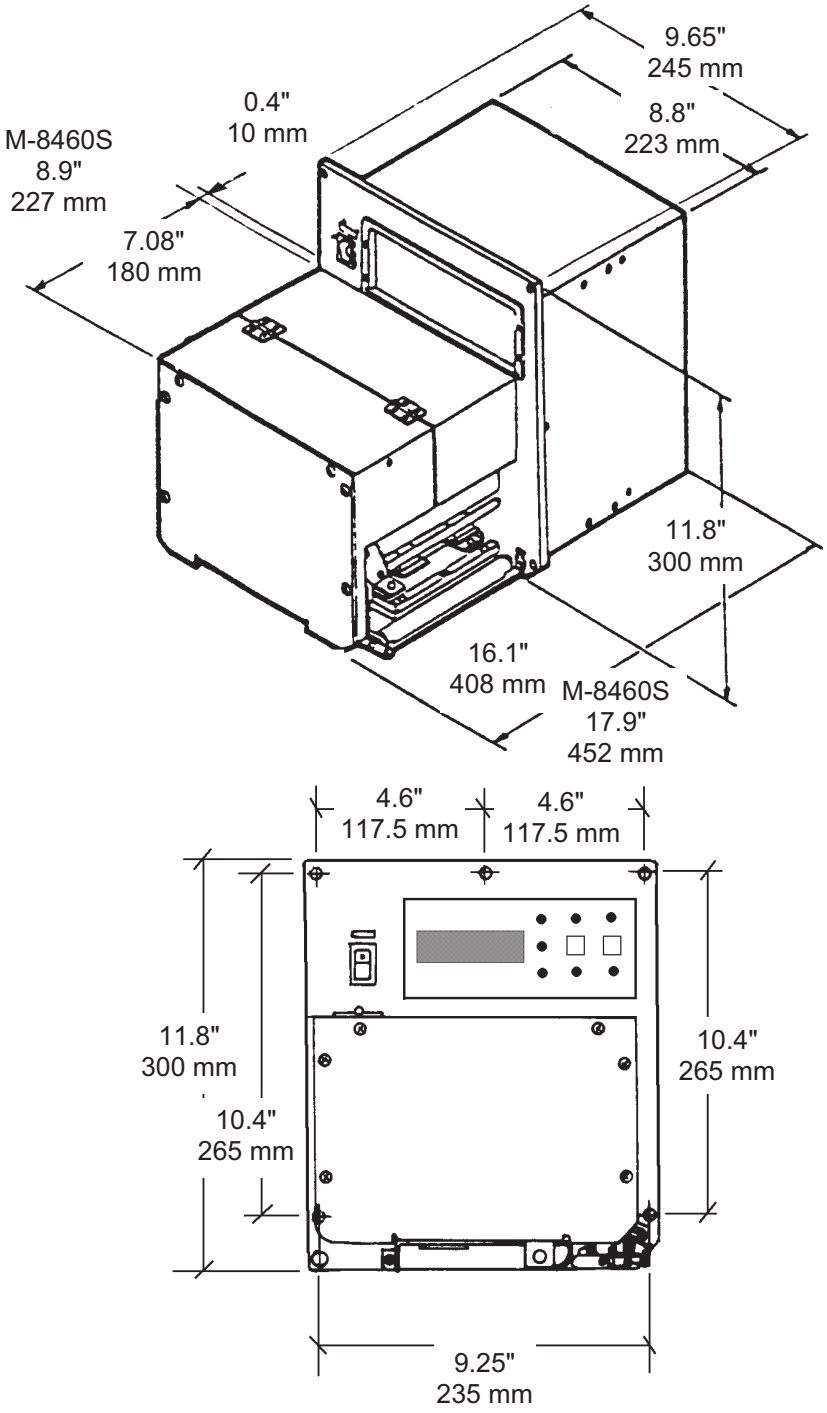
CONSUMABLES

Always use SATO carbon ribbons or equivalent in the thermal transfer models. The use of incorrect materials may cause malfunctions of the printer and void the warranty.

DIMENSIONS

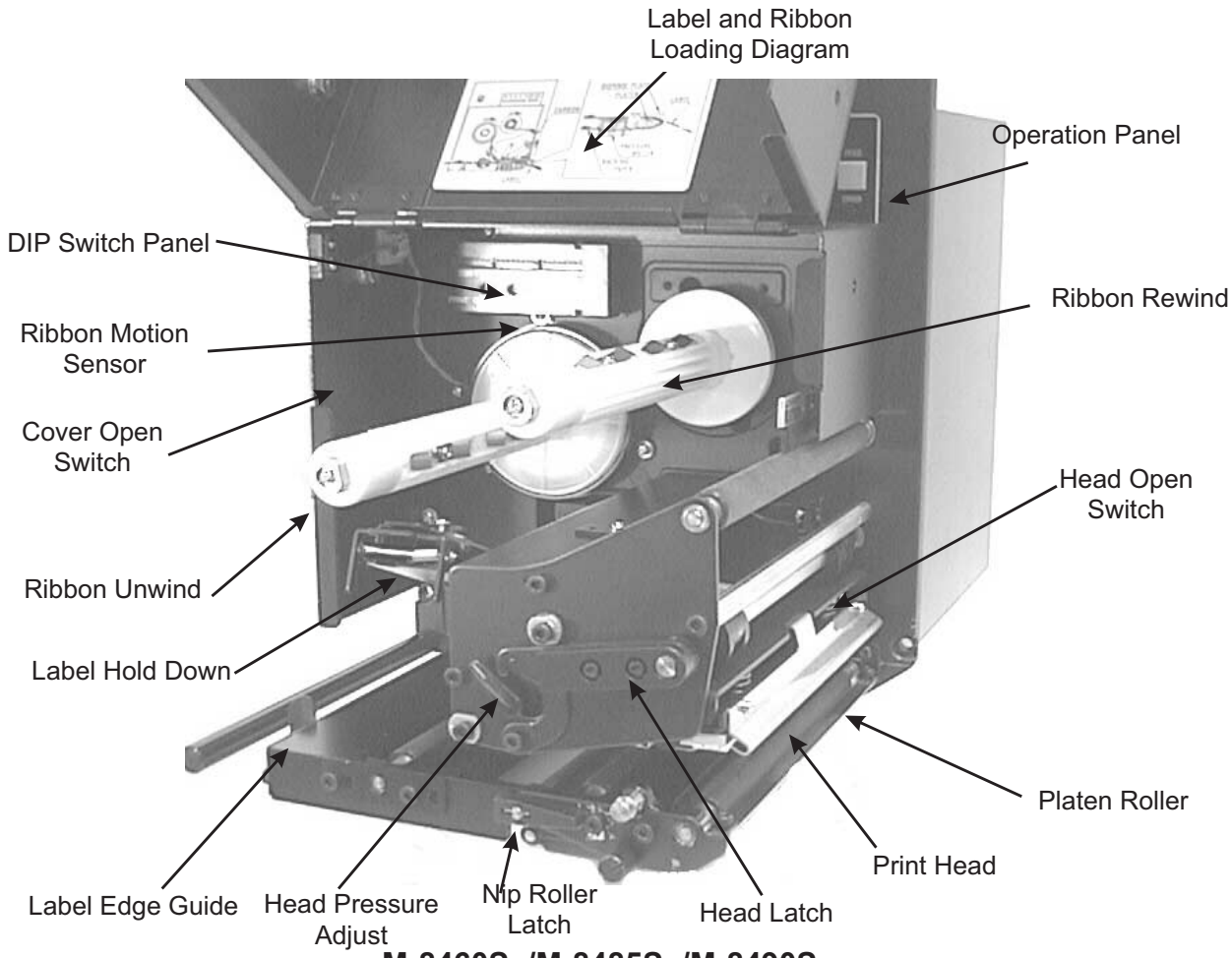
Note: The exact position of components may vary depending on model.

Width:	10.4 inches	265 mm
Depth:	16.06 inches	417 mm
Depth M-8460S Only:	17.8 inches	452 mm
Height:	11.8 inches	300 mm

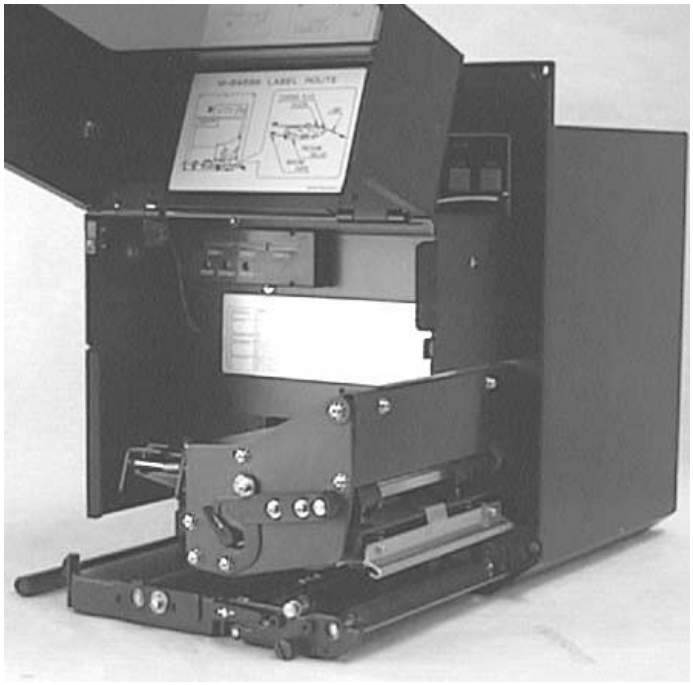


Right Hand Model Shown

COMPONENT NAMES

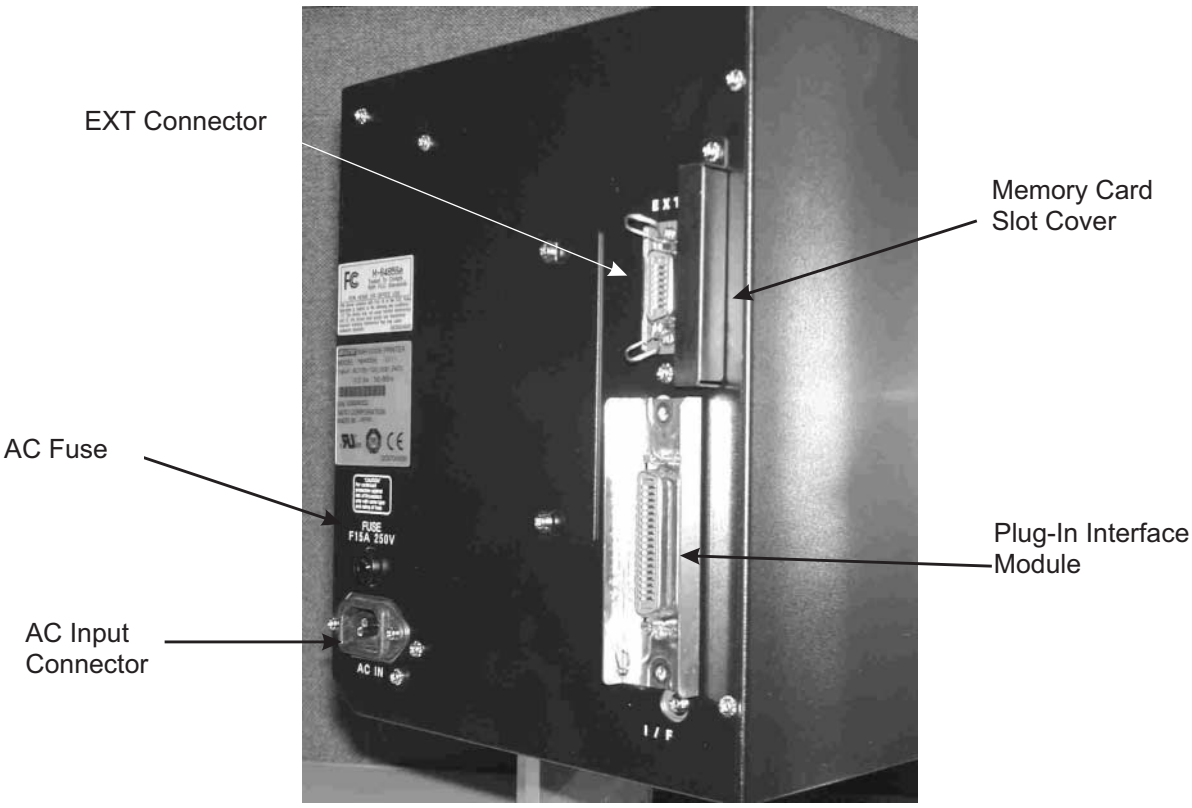


M-8460Se/M-8485Se/M-8490Se



M-8459Se Only

REAR PANEL



Power On/Off Switch	To turn power On or Off
Operation Panel	To set up the various configurations and to display dispensing quantity and the various alarms.
Adjustment Panel	Potentiometers (inside label compartment) to make setup adjustments.
AC Input Connector	To input 115V 50/60 Hz. Use the power cable provided.
AC Fuse	To protect the machine from abnormal power input. Type 15A/250V.
Interface Slot	Slot for installation of Plug-In Interface Module.
EXT Connector	This is an external signal connector for interfacing with the label applicator system.
Memory Card	Connectors for Optional PCMCIA Memory Cards.

SWITCHES AND SENSORS

Cover Open Switch

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

Ribbon Motion Sensor

The sensor will react to the carbon ribbon unwind when approximately 46 feet of ribbon remain. 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.

Note: The M-8459Se Direct Thermal print engine does not use a Ribbon Motion Sensor.

Head Open Switch

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

Label Sensor

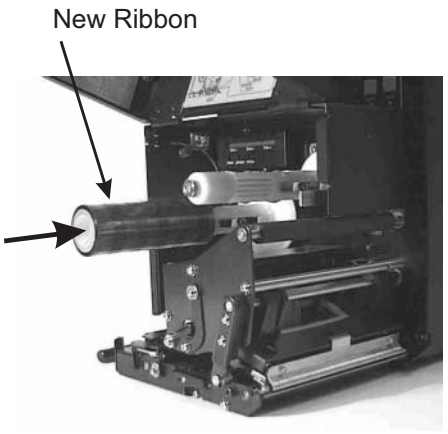
This sensor unit contains two sensors for both label gap and Eye-mark sensing.

MEDIA LOADING

Ribbon Loading (not applicable for the M-8459Se)

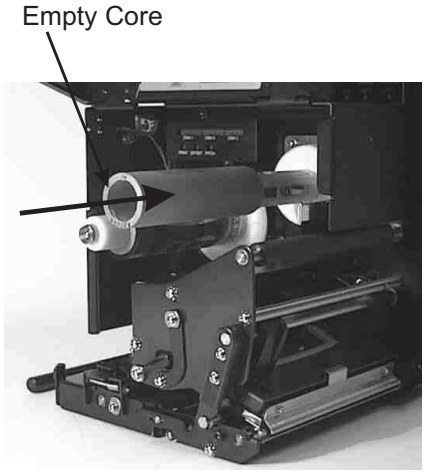
1. Open the print head by rotating the Head Latch until the head releases. It is spring-loaded in the open position.

2. Place a new ribbon roll on the Ribbon Unwind Spindle and push it onto the spindle as far as it will go. Make sure the ribbon wil unwind from the top of the roll. Note that all SATO ribbons are wound face-in (the ink or dull side faces toward the inside of the roll).



3. Place an empty ribbon core on the Ribbon Wind Spindle and push it onto the spindle as far as it will go.

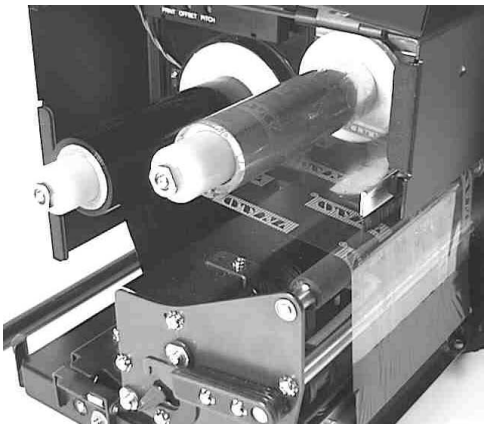
4. Unwind the clear ribbon leader until about 12 inches of leader/ribbon are off the roll.



5. Route the ribbon as shown in the Ribbon Routing Diagram on the inside of the cover.

6. Tape the end of the ribbon leader to the empty core so that it will underneath the core and over the top (see diagram on inside of cover).

7. Manually wind approximately three turns of ribbon on the core.



8. Inspect the ribbon to make sure it is not folded over or excessively wrinkled as it passes over the print head.

9. If labels are already loaded, close and latch the print head.

Loading the Label Stock

1. Open the print head by rotating the Head Latch until the head releases. It is spring-loaded in the open position.

2. Unlatch the Label Hold Down by lifting up on the latch. It is spring-loaded in the open position.

3. Pull the Label Edge Guide all the way out.

4. Remove approximately 18 inches of labels from the backing liner.

5. Route the label liner under the Label Hold Down and under the print head and out the front of the printer.

6. Pull the liner through the printer until the first label is positioned under the Label Hold Down.

7. Push the labels in until they contact the inside edge of the printer, then position the Label Edge Guide until it lightly contacts the outside edge of the label liner.

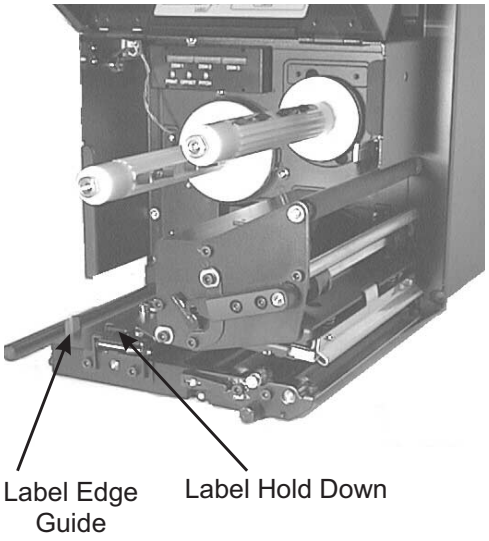
8. Close and latch the Label Hold Down and Print Head.

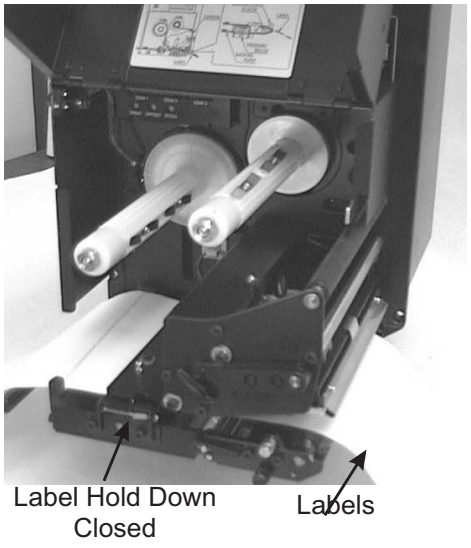
9. Release the Nip Roller Hold Down by rotating the Nip Roller Latch tab clockwise. The Nip Roller Hold Down will swing down.

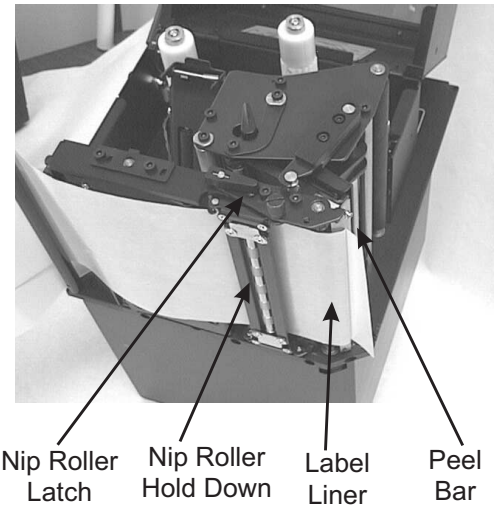
10. Route the liner over the peel bar and back between the Nip Roller Hold Down and the Nip Roller.

11. Pull the liner tight. Close the Nip Roller Hold Down by pushing upward until it latches in place. Make sure the Nip Roller Latch is securely engaged.

Note: Always check that the backing paper is taut between Platen Roller and Nip Roller.



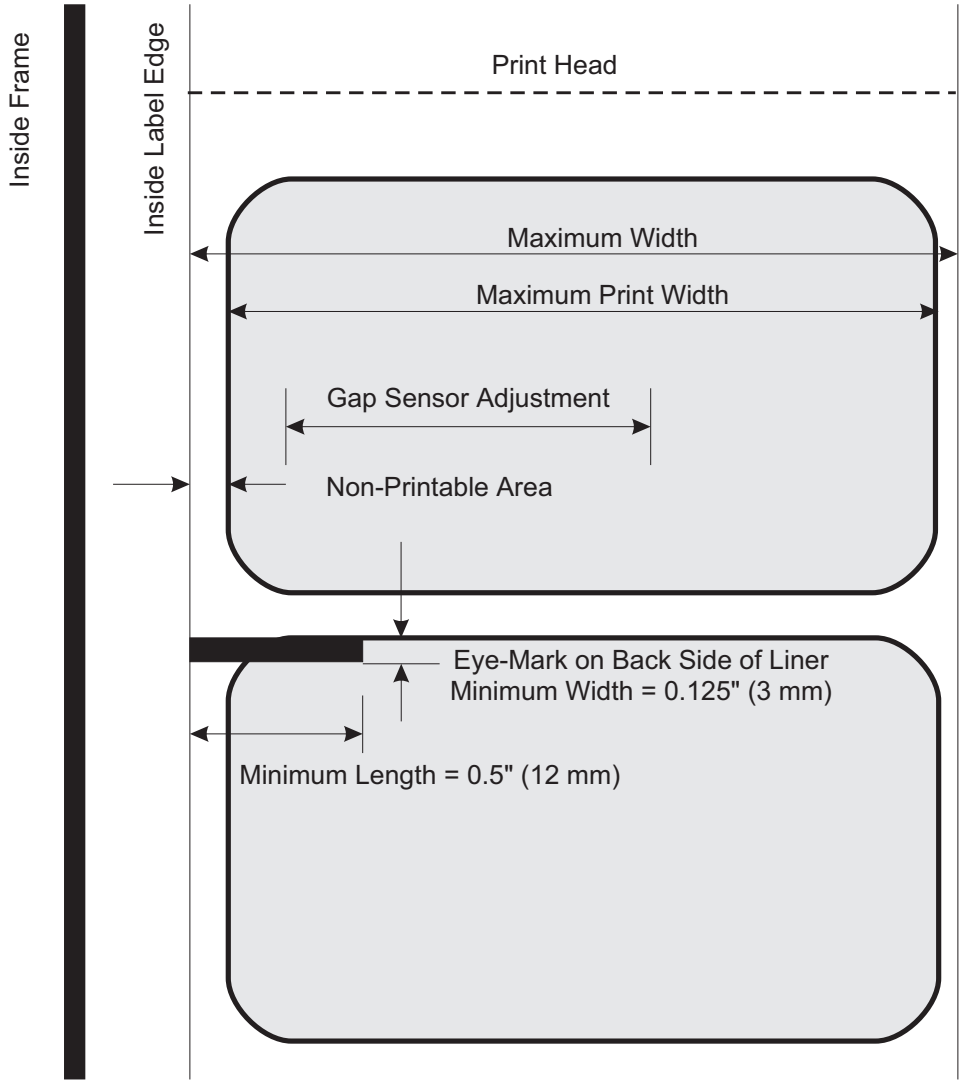




12. Power the printer on and press the Feed key. It should feed labels until the first label is peeled and ready for application.

ADJUSTING THE LABEL SENSOR

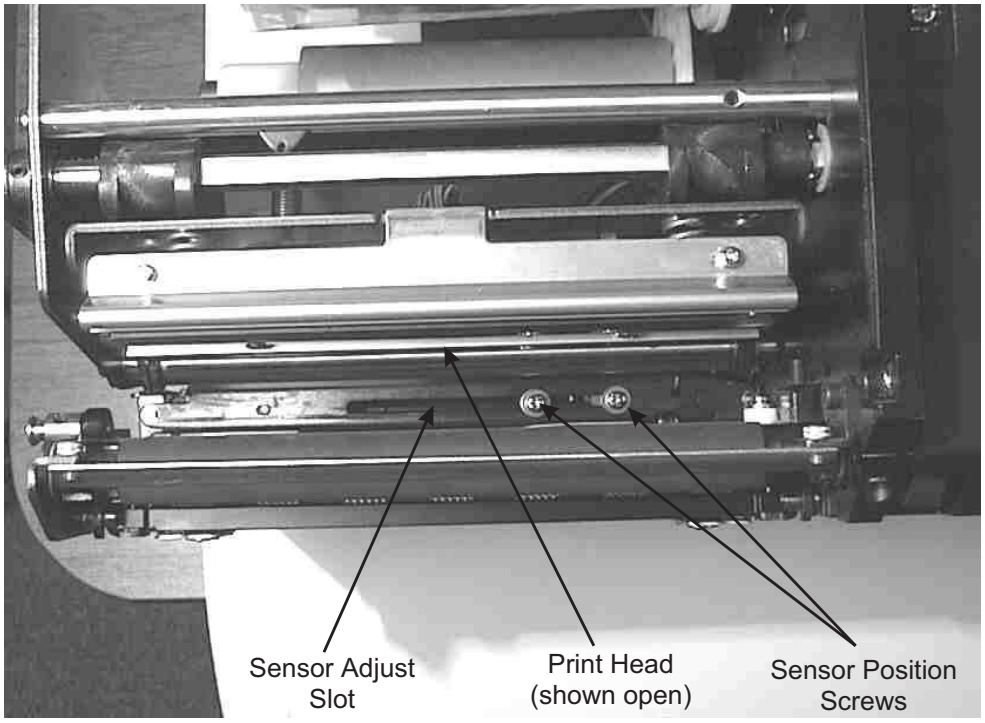
The “Se” printers can position labels using either a label gap (transmissive) or an Eye-Mark (reflective) sensor. The sensor used is selected by DSW2-2. The gap sensor position can be adjusted over a limited range. In addition, the signals from the sensors can be adjusted using the LCD panel to compensate for different liner opacities and/or Eye-Mark reflectance values.



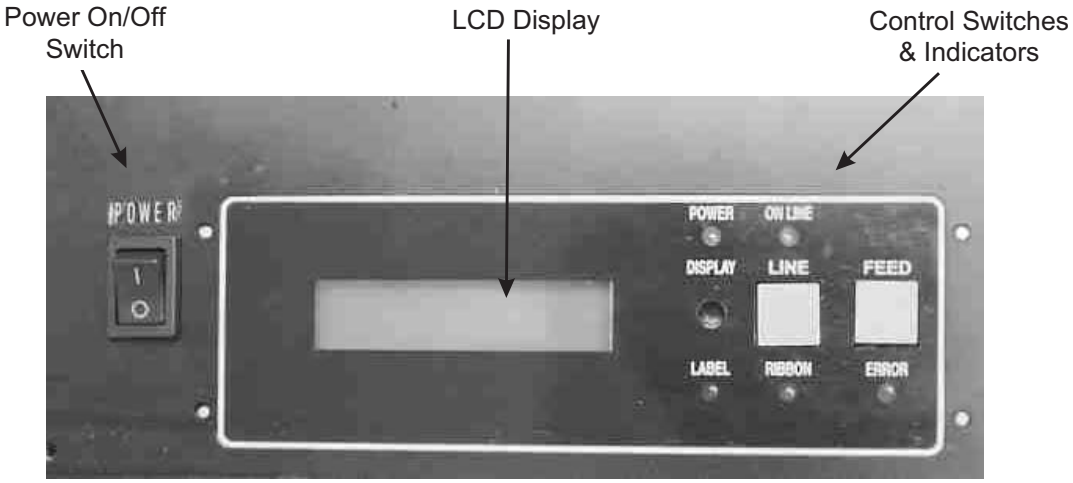
	M-8459Se	M-8460Se	M-8485Se	M-8490Se
Max Label Width (includes liner)	5.27" (134 mm)	6.5“ (165 mm)	5.27" (134 mm)	5.27" (134 mm)
Max Print Width	4.4" (112 mm)	6.0" (152 mm)	5.0" (128 mm)	4.4" (112 mm)
Gap Sensor Adjustment Range	0.5" to 2.67" 14 mm to 68 mm	0.5" to 3.25" 14 mm to 82 mm	0.5" to 2.67" 14 mm to 68 mm	0.5" to 2.67" 14 mm to 68 mm)
Non-Print Area	0.12" (3 mm)	0.12" or 0.25" 3 mm or 6.5 mm	0.12" (3 mm)	0.12" (3 mm)

ADJUSTING SENSOR POSITION

The label gap (transmissive) sensor can be positioned over a limited . The movable sensor assembly is mounted on the Label Hold Down and is held in position by two screws. To adjust the position of the sensor, both screws must be loosened and the sensor moved to the desired position in the slot, and then the screws retightened. Adjustments to compensate for different liner opacity is done with the LCD panel.



OPERATION PANEL

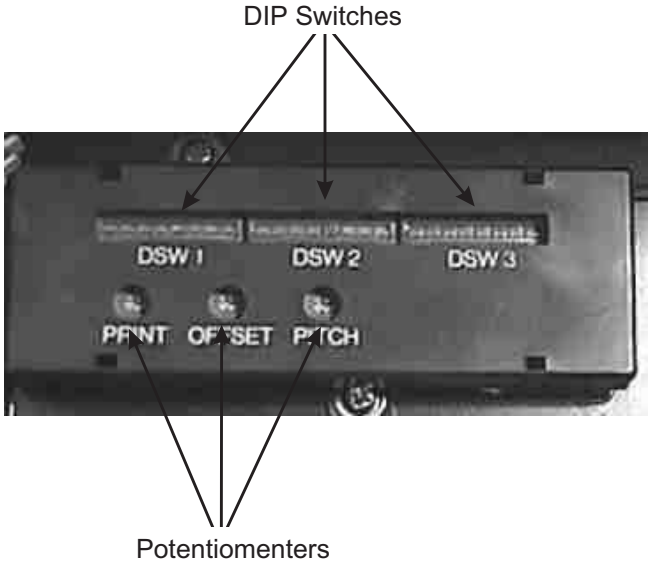


Operation Panel

LCD Display	2 Line x 16 Character display.
LABEL LED	Illuminated when label is out.
RIBBON LED	Illuminated when ribbon is out. Not used on the M-8459Se
ERROR LED	Illuminated when errors have occurred.
ON-LINE LED	Illuminated when printer is On-Line.
LINE Key	Switches the printer On-Line or Off-Line. It can also be used as a Pause function key to stop label during the printing process.
FEED Key	To feed one blank label.
DISPLAY	Potentiometer for adjusting the contrast of the LCD

DIP SWITCH PANEL

The DIP Switch panel is located inside the cover and contains three 8-position DIP switches and three adjustment potentiometers. Adjustment procedures for these are listed in *Section 3: Configuration.*



SECTION 3.
CONFIGURATION

PRINTER DIP SWITCH CONFIGURATION

DIP Switch Panels

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

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

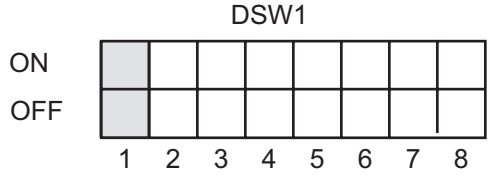
In addition, a third DIP switch is located on the RS232C Serial Adapter card and is used to set the RS232C transmit/receive parameters

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

RS232 Transmit/Receive Setting

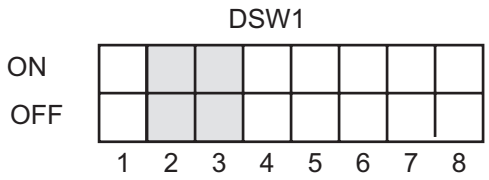
Data Bit Selection (DSW1-1). This switch sets the printer to receive either 7 or 8 bit data bits for each byte transmitted.

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



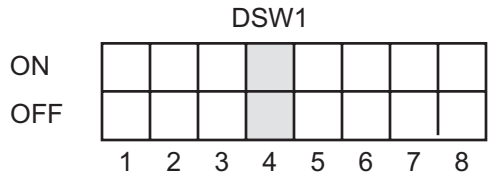
Parity Selection (DSW1-2, DSW1-3). These switches select the type of parity used for error detection.

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



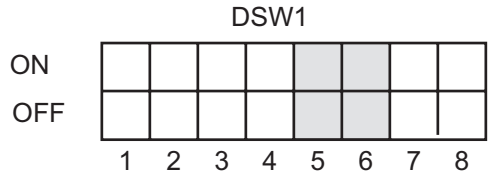
Stop Bit Selection (DSW1-4). Selects the number of stop bits to end each byte transmission.

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



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

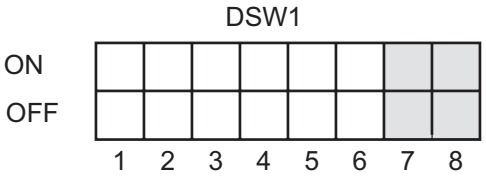
DSW1-5	DSW1-6	SETTING
Off	Off	9600
Off	On	19200
On	Off	38400
On	On	57600



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

(* Will select the Status 2 protocol if DSW2-8 is ON)

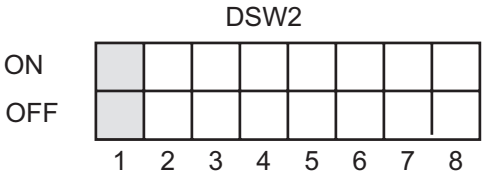
DSW1-7	DSW1-8	SETTING
Off	Off	Rdy/Bsy
Off	On	Xon/Xoff
On	Off	Bi-Com 3
On	On	Bi-Com 4*



Printer Set Up

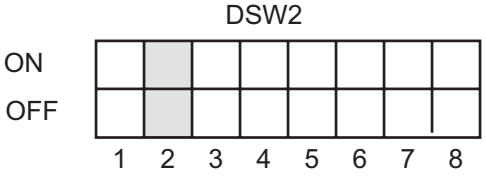
Print Mode Selection (DSW2-1). Selects between direct thermal printing on thermally sensitive paper and thermal transfer printing using a ribbon. *Note: This switch is not used on the M-8459S.*

DSW2-1	SETTING
Off	Therm Xfr
On	Direct Therm



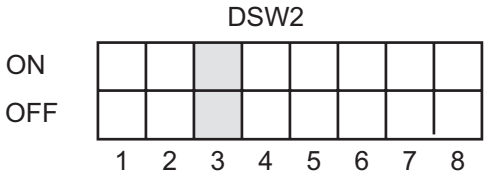
Sensor Type Selection (DSW2-2). Selects between the use of a label gap or a reflective Eye-Mark detector. See page 2-9 for the location of these sensors.

DSW2-2	SETTING
Off	Gap
On	Eye-Mark



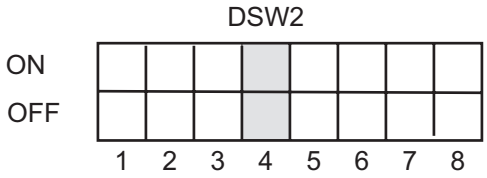
Head Check Selection (DSW2-3). When selected, the printer will check for head elements that are electrically malfunctioning.

DSW2-3	SETTING
Off	Disabled
On	Enabled



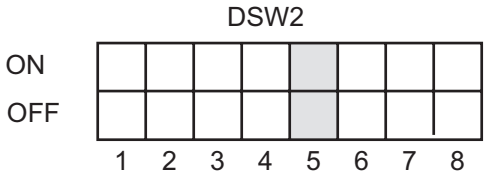
Hex Dump Selection (DSW2-4). Selects Hex Dump mode (see page 3-21).

DSW2-4	SETTING
Off	Disabled
On	Enabled



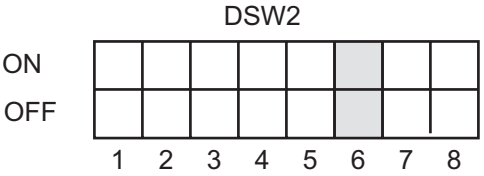
Receive Buffer Selection(DSW2-5). Selects the operating mode of the receive buffer. See *Section 6: Interface Specifications* for more information.

DSW2-5	SETTING
Off	Single Job
On	Multi Job



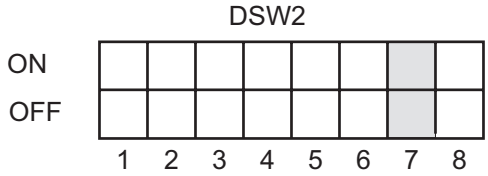
Firmware Download (DSW2-6). Places the printer in the Firmware Download mode for downloading new firmware into flash ROM.

DSW2-6	SETTING
Off	Disabled
On	Enabled



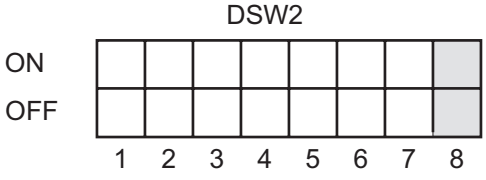
Protocol Code Selection (DSW2-7). Selects the command codes used for protocol control. Refer to page E-1 for more information.

DSW2-7	SETTING
Off	Standard
On	Non-Std



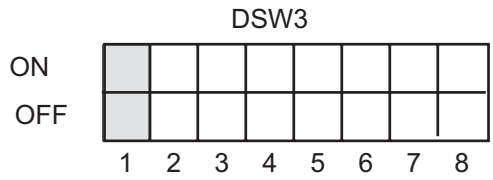
M8400S Emulation Mode (DSW2-8). For emulating earlier series software commands. Should be used only if problems are encountered when using existing software. This switch will also affect the settings selected by DSW1-7 and DSW1-8.

DSW2-8	SETTING
Off	Disabled
On	Enabled



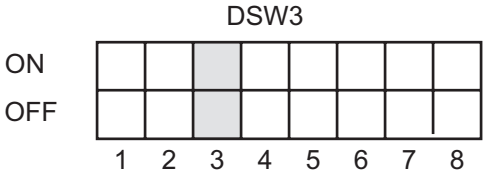
Backfeed Sequence (DSW3-1). Backfeed is used to correctly position the label for application and then retract the next label to the proper print position. This operation can be performed immediately after a label is printed and used, or immediately prior to the printing of the next label.

DSW3-1	SETTING
Off	Before
On	After



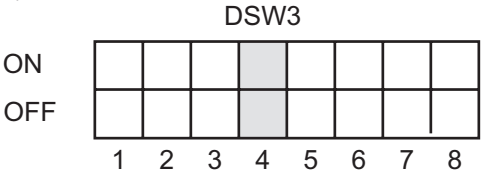
Label Sensor Selection (DSW3-3). Enables or disables the Label Sensor. If the Sensor is enabled, it will detect the edge of the label and position it automatically. If it is disabled, the positioning must be under software control using Line Feed commands.

DSW3-3	SETTING
Off	Sensor Used
On	Not Used



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

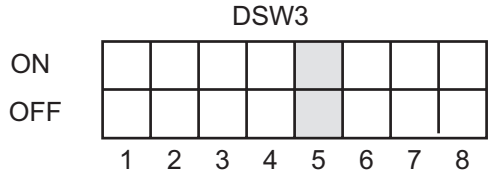
DSW3-4	SETTING
Off	Enabled
On	Disabled



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

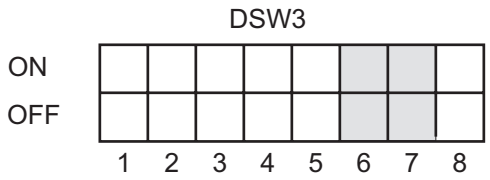
EXT Print Start Signal Selection (DSW3-5). Allows an external device to initiate a label print for synchronization with the applicator. See Section 6: Interface Specifications for a description of the signal level and requirements When DSW3-5 is On, the unit is in the Continuous print mode, Backfeed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

DSW3-5	SETTING
Off	Enabled
On	Disabled



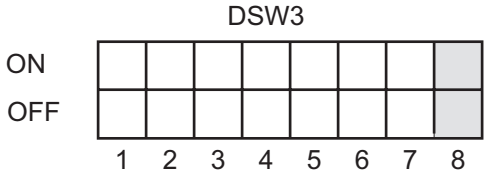
External Signal Type Selection (DSW3-6, DSW3-7). Both the polarity and signal type (level or pulse) of the external print synchronizing signal can be selected. See page 6-19 for a definition of signal types.

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



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

DSW3-8	SETTING
Off	Disabled
On	Enabled



Reserved for Future Use (DSW3-2)

DEFAULT SETTINGS

SWITCH SELECTIONS

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

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

SOFTWARE DEFAULT SETTINGS

The printer stores the software settings upon receipt and uses them until they are again changed by receipt of a command containing a new setting. These settings are stored in non-volatile memory and are not affected by powering the printer off. The printer may be reset to use the default software settings by depressing the **LINE** and **FEED** keys simultaneously while powering the printer on. This will result in the following default configuration:

	M-8459Se	M-8460Se	M-8485Se	M-8490Se
Print Darkness	3	2	2	2
Print Speed	4 in. per sec.	6 in. per sec.	6 in. per sec.	6 in. per sec.
Print Reference	Vertical = 0000, Horizontal = 0000			
Zero	Slash			
Auto On Line	Enabled			

Once the default operation is completed, a DEFAULT COMPLETED message will be displayed on the LCD panel. The printer should be powered off while this message is being displayed (or after the beep is heard. This saves the default settings in the non-volatile memory where they will be automatically loaded the next time the printer is powered on.

POTENTIOMETER ADJUSTMENTS

PITCH

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

1. While depressing the **FEED** key on the front panel, power the printer on.

2. When you hear one beep from the printer, release the **FEED** key and the printer will display on the LCD panel a message asking what type of Test Label you want to print.

3. Use the **LINE** key to step to the Configuration selection and press the **FEED** key to accept the selection.

4. Use the **LINE** key to select the Test Label Size. After the size is selected, press the **FEED** key to accept the selection and the printer will begin to print test labels continuously.

5. Adjust the **PITCH** potentiometer on the front panel until the first print position is at the desired location on the label. If the potentiometer does not have enough range, then you will have to change the pitch setting using the front panel display.

6. Press the **FEED** key to stop the printer.

7. To exit the Test Label mode, power the printer off andthen back on.

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

BACKFEED OFFSET

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

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

1. Turn the printer on.

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

3. Press the **FEED** key to feed out a blank label.

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

DISPLAY

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

PRINT

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

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

LCD PANEL PRINTER CONFIGURATION

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

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

MODE	KEY SEQUENCE	INITIAL DISPLAY	PAGE
Normal	POWER	**ONLINE QTY:000000**	3-10
Advanced	LINE + POWER	**ADVANCED MODE**	3-12
Test Print	FEED + POWER	**TEST PRINT MODE CONFIGURATION**	3-24
Default Setting	LINE + FEED + POWER	**DEFAULT SETTING YES NO**	3-25
Clear Non-Standard Protocol	DSW2-7 ON + LINE + FEED + POWER	**ALT. PROTOCOL**	3-25
Protocol Code Download	DSW2-7 ON + POWER	**USER DOWNLOAD**	3-26
Hex Dump	DSW2-4 ON + POWER	**ONLINE QTY:000000**	3-27

NORMAL MODE

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

V 05.00.03.00 **INITIALIZING**	Displays the firmware during the initialization.
ONLINE **QTY:000000**	The LCD will display the ONLINE status on the top line and the bottom line will contain the label quantity (QTY) status. The messsge will be changed to OFFLINE whenever the printer is switched offline by pressing the LINE key. As soon a print job is received, the quantily line will indicate the number of labels to be printed. As soon as the label job begins to print, the display will indicate the number of labels in the print job that remains to be printed.
OFFLINE **000000**	Press the LINE key once. When the display changes to OFFLINE, press the FEED and LINE keys simultaneously for more than one second.
PRINT DARKNESS **1(L) 2(M) 3(H)**	The LCD now displays the Print Darkness selections. The current setting is indicated by a cursor over one of the range settings. There are 3 possible selections (except for the M-8459Se which has 5 possible selections). The lowest setting represents the lightest print and the highest setting the darkest print. 1. Press the LINE key to step the cursor to the desired setting. 2. Once the correct setting is underlined, press the FEED key to accept the selection and step the display to the next adjustment.
PRINT SPEED **4 6 8 10 12**	The print speed selections are dependent upon the printer model. The current setting is indicated by the underline cursor. 1. Use the LINE key to step the cursor to the desired setting. 2. Once the correct setting is selected, press the FEED key to accept the selection and step the display to the next adjustment.

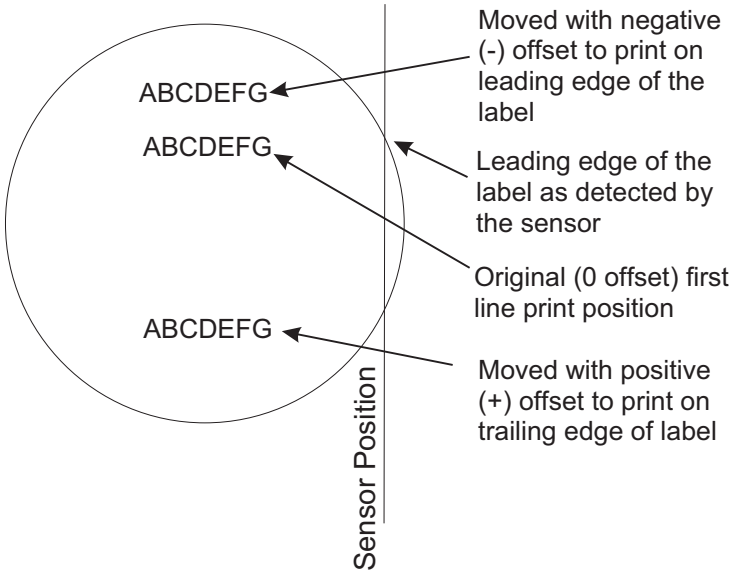
M-8459Se	M-8485Se	M-8460Se M-8490Se
2 ips	4 ips	4 ips
3 ips	6 ips	6 ips
4 ips	8 ips	8 ips
5 ips	10 ips	
	12 ips	

PITCH OFFSET
± 00mm

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

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

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



CANCEL PRINT JOB **YES NO**

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

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

CANCEL PRINT JOB **COMPLETED**

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

ADVANCED MODE

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

V 05.00.03.00 **INITIALIZING**

Displays the firmware during the initialization.

ADVANCED MODE

The Advance Mode is entered by pressing the LINE key while simultaneously turning power on. The printer will emit one long beep after which the LINE key is released.

ZERO SLASH **YES NO**

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

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

AUTO ONLINE **YES NO**

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

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

PRINT OFFSET
V:+0000 H:+0000

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

1. Use the LINE key to step the counter to the desired setting. The display will increment one step for each time the LINE key is pressed. If the LINE key is held pressed for more than two seconds, it will automatically go into the fast scroll mode. The reading will advance to the maximum setting of 800 after which it will automatically wrap and start at "000" again. The range

2. Once the setting is correct, pressing the FEED key will accept the setting and advance to the next display.

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

HEAD DOT DENSITY
100 150 300

This selection only appears on the M-8490Se when the Emulation Mode is enabled (DSW2-8 = On). It allows the user to select the print density.

1. Use the LINE key to step the underline cursor to the desired selection.
2. Once the underline cursor is under the desired selection, pressing the FEED key will accept the setting and advance the display

SET CALENDAR
YES NO

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

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

CALENDAR
00/00/00 00:00

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

IGNORE CR/LF
YES NO

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

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

CHARACTER PITCH
PROP FIXED

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

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

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

CARD MODE

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

V 05.00.03.00 INITIALIZING	Displays the firmware during the initialization.
ADVANCED MODE	The Card Mode is entered from the Advanced Mode display by pressing the LINE key once.
CARD MODE	The Card Mode display indicates that the printer is in the Card Mode. To advance to the first selection, press the FEED key.
MEM SELECT (CC1) CARD MEMORY	This selection determines which type of optional expanded memory will be addressed as “CC1" in the command streams.The CARD selection specifies the optional PCMCIA card as CC1 and the optional Expanded Flash ROM as CC2. The Memory selection specifies the optional Expanded Flash ROM as CC1 and the optional PCMCIA card as CC2. 1. Step the cursor to the desired selection using the LINE key. 2. Once the cursor is positioned over the desired selection, press the FEED key to accept the selection and advance the display.
CARD->MEMORYCOPY TRUETYPEFONT Y/N	This selection allows you to copy TrueType fonts from the PCMCIA Memory card installed in the Memory Card slot on the rear of the printer to the optional Flash ROM. 1. Use the LINE key to step the cursor to desired setting. If Yes is selected, the printer will enter the Card Copy mode. If No is selected, the display will advance to the Card to Memory SATO Font Copy mode.
COPY START YES NO	2. Confirm your selection by stepping the cursor to the Yes selection. If you select No, the display will return to the previous selection.
TRUETYPEFONTCOPY COPYING	3. Press the FEED key to accept the selection. If Yes was selected the copy process will start.
TRUETYPE FONTCOPY COMPLETED	4. Once the copy process is completed, press the FEED key to step the display.
CARD COPY/FORMAT XXXXXXX ERROR	5. If an error is encountered in the copy process, one of the following messages will be displayed on the second line: R/W Error — Indicates a Read/Write error occured No Card Error — Indicates no card was recognized Mem Full Error — Indicates that there is insufficient memory available.

CARD->MEMORYCOPY
SATOFONT Y/N

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

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

COPY START
YES NO

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

SATO FONT COPY
COPYING

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

SATO FONT COPY
COMPLETED

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

CARD COPY/FORMAT
XXXXXXX ERROR

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

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

CARD->MEMORYCOPY
ALL Y/N

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

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

COPY START
YES NO

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

CARD->MEMORY
COPYING

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

CARD-.MEMORY
COMPLETED

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

CARD COPY/FORMAT
XXXXXXX ERROR

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

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

MEMORY->CARDCOPY
ALL <0MB> Y/N

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

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

COPY START **YES NO**	2. Confirm your selection by stepping the cursor to the Yes selection. If you select No, the display will return to the previous selection.
MEMORY->CARDCOPY **COPYING**	3. Press the FEED key to accept the selection. If Yes was selected the copy process will start
MEMORY->CARDCOPY **COMPLETED**	4. Once the copy process is completed, press the FEED key to step the display.
CARD COPY/FORMAT **XXXXXXX ERROR**	5. If an error is encountered in the copy process, one of the following messages will be displayed on the second line: R/W Error — Indicates a Read/Write error occured No Card Error — Indicates no card was recognized Mem Full Error — Indicates that there is insufficient memory available.
CARD->MEMORYCOPY **PROGRAM Y/N**	This selection allows the user to copy printer firmware from the PCMCIA Memory Card to the printer. 1. Use the LINE key to step the cursor to desired setting. If Yes is selected, the printer will enter the Card Copy mode. If No is selected, the display will advance to the mode display.
COPY START **YES NO**	2. Confirm your selection by stepping the cursor to the Yes selection. If you select No, the display will return to the previous selection.
CARD->MEMORY **COPY COPYING**	3. Press the FEED key to accept the selection. If Yes was selected the copy process will start
CARD->MEMORYCOPY **COMPLETED**	4. Once the copy process is completed, press the FEED key to step the display.
CARD COPY/FORMAT **XXXXXXX ERROR**	5. If an error is encountered in the copy process, one of the following messages will be displayed on the second line: R/W Error — Indicates a Read/Write error occured No Card Error — Indicates no card was recognized Mem Full Error — Indicates that there is insufficient memory available.
MEMORY->CARDCOPY **PROGRAM Y/N**	This selection allows the user to copy the current firmware installed in the printer to a PCMCIA Memory Card. 1. Use the LINE key to step the cursor to desired setting. If Yes is selected, the printer will enter the Card Copy mode. If No is selected, the display will advance to the mode display.
COPY START **YES NO**	2. Press the FEED key to accept the selection. If Yes was selected the copy process will start. If you select No, the display will return to the previous selection.
MEMORY->CARDCOPY **COMPLETED**	3. Once the copy process is completed, press the FEED key to step the display.

CARD COPY/FORMAT **XXXXXXX ERROR**	4. If an error is encountered in the copy process, one of the following messages will be displayed on the second line: R/W Error — Indicates a Read/Write error occured No Card Error — Indicates no card was recognized Mem Full Error — Indicates that there is insufficient memory available.
CARD FORMAT **YES NO**	Before a PCMCIA card can be used, it must be formatted. Note: Formatting a card destroys all data currently stored on the card. 1. Use the LINE key to step the cursor to desired setting. If Yes is selected, the printer will enter the Card Format mode. If No is selected, the display will advance to the mode display.
MEMORY FORMAT **YES NO**	Before the internal Expanded Memory can be used, it must be formatted. *Note: Formatting the Memory will destroy any stored data.* 1. Use the LINE key to step the cursor to desired setting. If Yes is selected, the printer will enter the Memory Format mode. If No is selected, the display will advance to the mode display.
CARD MODE	To exit the Card Mode, power the printer off and then back on.

SERVICE MODE

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

V 05.00.03.00 **INITIALIZING**	Displays the firmware during the initialization.
ADVANCED MODE	The Service Mode is entered from the Advanced Mode display by pressing the LINE key once.
SERVICE MODE	The Service Mode display indicates that the printer is in the Card Mode. To advance to the first selection, press the FEED key.

GAP	**[X.XXV]**
INPUT	**[X.XV]**

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

GAP	**[X.XXV]**
INPUT	**[X.XV]**

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

(High Voltage Level + Low Voltage Level) x 0.5 = Start Value

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

   Backing with label = 2.0V to 3.5V
   Backing without label = Less than 1.0V

   If the measured values are outside this range, you may have trouble in finding a value that will work properly under all conditions. If this is the case, a higher quality label may be needed to get adequate performance.
3. Calculate the starting point voltage using the formula.
4. Use the LINE key to step the counter to the desired setting. The display will increment one step for each time the LINE key is pressed. If the LINE key is held pressed for more than two seconds, it will automatically go into the fast scroll mode. The reading will advance to a setting of 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 and the head is closed.
5. Once the setting iscorrect, pressing the FEED key will accept the setting and advance the next display.

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

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

(High Voltage Level + Low Voltage Level) x 0.5 = Start Value

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

   Eye-Mark = 2.5V to 3.5V
   Label Only = Less than 1.0V

   If the measured values are outside this range, you may have trouble in finding a value that will work properly under all conditions. If this is the case, a higher quality label may be needed to get adequate performance.
3. Calculate the starting point voltage using the formula.
4. Use the LINE key to step the counter to the desired setting. The display will increment one step for each time the LINE key is pressed. If the LINE key is held pressed for more than two seconds, it will automatically go into the fast scroll mode. The reading will advance to a setting of 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, pressing the FEED key will accept the setting and advance to the Online Feed display.

AUTO ONLINE FEED
YES NO

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

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

FEED ON ERROR
YES NO

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

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

REPRINT W/FEED YES NO

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

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

FORWARD/BACKFEED DISTANCE DEFAULT

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

1. Use the LINE key to select either the Default or the Manual selection. If Default is selected, the display steps to the next display.

FORWARD/BACKFEED DISTANCE XXXmm

2. If Manual setting is selected, use the LINE key to advance the distance to the desired setting. Each time the LINE key is pressed, the Distance will advance 1 mm. The maximum distance is 255 mm.
3. Once the desired distance is set, press the FEED key to accept the setting and step to the next display.

EXT PIN 9 SELECT MODE1 MODE2

This selection allows the user to select the conditions that cause the signal on Pin 9 of the EXT connector to be true. If Mode1 is selected, pin 9 will be true when the printer is ready to print, i.e. it is Online and has a print job loaded (a quantity of labels to be printed on the display). If Mode 2 is selected, pin 9 will be true if the printer is Online.

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

WEB ACCELERATION FAST NORMAL

This selection allows the printer to use either a Normal or Fast web acceleration. Large, heavy, label rolls should use the Normal selection while smaller, lighter rolls can use the Fast selection.

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

EURO CODE D5

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

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

SELECT LANGUAGE **ENGLISH**	This selection allows the user to select the character set used by the printer. The selections are English, French, German, Spanish, Italian and Portuguese. 1. Press the LINE key to advance to the desired languarge setting. 2. When the setting is correct, press the FEED key to accept the setting and step to the next display.
IGNORE CAN/DLE **YES NO**	If the printer is placed in the Multi-Item Buffer Mode (DSW2-5 = OFF), the user can chose to ignore CAN (18_H) and DLE (10_H) commands used in bi-directional communications (see *Section 6: Interface Specifications*). If the Single Item Buffer Mode is chosen (DSW2-5 = ON), this display will be skipped.
PRIORITY SETTING **COMMAND LCD**	This selection allows the user to assign a priority for Print Darkenss, Print Speed and Print Offset setting methods. If LCD is selected, the setting established via the LCD display/menu system will be used for an incoming label job, regardless of any different command settings. If Command is selected, any commands in the label job will take precedence and be used for printing the job. 1. Use the LINE key to step to the desired priority. 2. Once the desired setting is selected, press the FEED key to accept the setting and step to the next display.
LABEL RE-DETECT **ENABLE DISABLE**	This selection allows the user to disable the feeding of a blank label upon power up. If Enable is selected, the printer will automatically feed a label until it detects a label enge. This will correctly position the next printed label under the print head. If Disable is selected, the printer will not try to detect the next label and the operator is responsible for ensuring that the label is correctly positioned before printing. 1. Use the LINE key to step to the desired setting. 2. Once the desired setting is selected, press the FEED key to accept the setting and step to the next display.
IEEE1284 **ACK SIGNAL 00.5**	If the printer is placed in the Single Item Buffer Mode (DSW2-5 = ON), this selection allows the user to set the width of the IEEE1284 ACK pulse. In the Multi-Item Buffer Mode, this display will be skipped.The range is 0.5 µsec to 10 µsec. 1. Use the LINE key to step the display to the desired setting. The setting will advance in increments of 0.1 µsec each time the LINE key is pressed until the setting reaches 10.0 µsec when it will wrap around to the 0.5 µsec setting. 2. Once the desired setting is selected, press the FEED key to accept the setting and step to the next display.
SERVICE MODE	The Service mode is exited by powering the printer off and then back on.

COUNTERS MODE

The Counters Mode is provided to allow the user to access the internal printer cousters.

ADVANCED MODE

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

COUNTERS MODE

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

COUNTERS **HD DSP CUT LIFE**

The counters are identified in the display as:

HD:Head Counter (should be reset when print head is replaced)
DSP: Dispense Counter (not used on “Se” printers)
CUT: Cutter Counter (not used on “Se” printers)
LIFE: Life Counter (cannot be reset)

1. Use the LINE key to step the cursor to the desired counter, the Head (HD) counter or the LIFE counter. The default position is the Head Counter. Use the LINE key to advance the cursor to the desired selection.

HEAD COUNTER **0.5M**

2. Once the correct setting is selected, pressing the FEED key will display the current value (in meters) stored in the counter. The maximum number of digits displayed is 8.
3. Pressing the FEED key again will advance the counter to the Clear mode. All counters with the exception of the LIFE counter may be cleared.

HEAD COUNT CLEAR **YES NO**

4. Use the LINE key to select the desired setting. If you only wanted to read the counter value, select NO. If you want to read the counter and reset it to 0.0, place the cursor over the YES. Once the desired setting is selected, pressing the FEED key will advance the return you to the Counters Mode display.

COUNTERS MODE

5. To exit the Counters Mode, turn power to the printer off and then back on.

TEST PRINT MODE

The Test Print Mode offers 4 different status labels for troubleshooting. If DSW3-5 is in the OFF position, the Test Print cycle must be initiated with a Print Start signal on the EXT connector.

V 05.00.03.00
INITIALIZING

Displays the firmware during the initialization.

TEST PRINT MODE
CONFIGURATION

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

1. Use the LINE key to step the cursor to type of test label you wish to print. The choices are:
   CONFIGURATION
   BARCODE
   HEADCHECK
   MEMORY
   FACTORY

TEST PRINT SIZE
10 CM

Note: This screen will not be displayed for the Memory Test Label.

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

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

PRESS FEED KEY TO
STOP PRINTING

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

DEFAULT SETTING MODE

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

V 05.00.03.00 **INITIALIZING**	Displays the firmware during the initialization.
DEFAULT SETTING **YES NO**	You enter the Default Setting Mode by pressing the LINE and FEED keys while simultaneously powering the printer on. The printer will emit one long beep after which the FEED and LINE keys should be released. 1. Use LINE key to select either the YES or NO. 2. Once the desired setting is selected, pressing the FEED key will accept the selection and the printer will reset to the original default conditions.
DEFAULT SETTING **COMPLETED**	3. When the printer has completed the reset process it will beep 3 times and the Default Setting Completed display will appear. At this time the printer is in the default configuration. 4. To exit the Default Setting Mode, power the printer off and then back on.

CLEAR NON-STANDARD PROTOCOL

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

V 05.00.03.00 **INITIALIZING**	Displays the firmware during the initialization.
ALT.PROTOCOL **DEFAULT COMPLETE**	To Clear Non-Standard protocol codes, DSW2-7 is placed in the On position and the printer powered on while simultaneously pressing the LINE and FEED keys. 1. The printer will emit one long beep at which time the LINE and FEED keys should be released. 2. When the keys are released, the printer will replace the Alternate protocol codes with the default values. 3. After the default setting is complete, the printer will emit two short beeps indicating the process is complete. 4. To exit the mode, power the printer off and then back on.

DOWNLOAD USER DEFINED PROTOCOL CODES

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

V 05.00.03.00 INITIALIZING	Displays the firmware during the initialization.
USER DOWNLOAD PRESS THE LINE KEY	To enter the User Download mode, DSW2-7 is placed in the on position and the printer is powered on while simultaneously pressing the LINE key. The printer will emit one long beep after which the LINE key is released. 1. Set DSW2-7 Off to replace the Standard protocol codes or On to replace the Alternate set of protocol codes.
USER DOWNLOAD WAITING	2. Press the LINE key. The printer is now waiting for the data to be sent. 3. Transmit the download data command stream to the printer. 4. After the data has been received, the printer will beep and print a status label. If it does not beep and print a status label, the printer did not accept the data. 5. If the printer did not beep and print a status label, turn the printer off and check your data stream for errors and start the download process over. 6. If the custom codes are correct, press the FEED key to accept them and terminate the download process. If they are incorrect, turn the printer off without pressing the FEED key and begin the process again.

HEX DUMP MODE

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

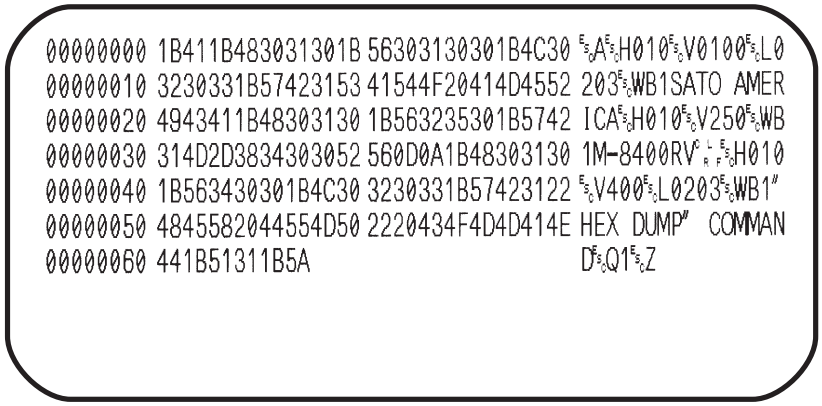
V 05.00.03.00 **INITIALIZING**

Displays the firmware during the initialization.

ONLINE **QTY:000000**

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

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



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SECTION 4.
CLEANING AND MAINTENANCE

INTRODUCTION

The following information is presented in this section:

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

ADJUSTING THE PRINT QUALITY

One of the nice features of the SATO “Se” printers are their high print quality. They are equipped with two different methods of adjusting the quality of the print: print darkness and speed. When adjusting for optimum print quality, a bar code verifier system should be used. The human eye is a poor judge of the relative widths of the bars in a symbol, a characteristic that is extremely important for good bar code quality.

Print (Darkness)

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

The Print Darkness can be set using the front panel LCD panel or by downloading the setting using the Print Darkeness software command. Once the range has beenselected, the **PRINT** Potentiometer on the front panel can be used to make finer adjustments.

The primary adjustment for Print Darkness is the **PRINT** potentiometer on the internal DIP Switch panel. It provides a continuous range of adjustment, allowing you to make precise changes. Use a small cross-point screwdriver, turning clockwise for darker print and counterclockwise for lighter print.

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

Print Speed

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

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

CLEANING THE PRINT HEAD, PLATEN AND ROLLERS

Supplies needed: SATO SA070 Cleaning Kit

Cleaning the Print Head

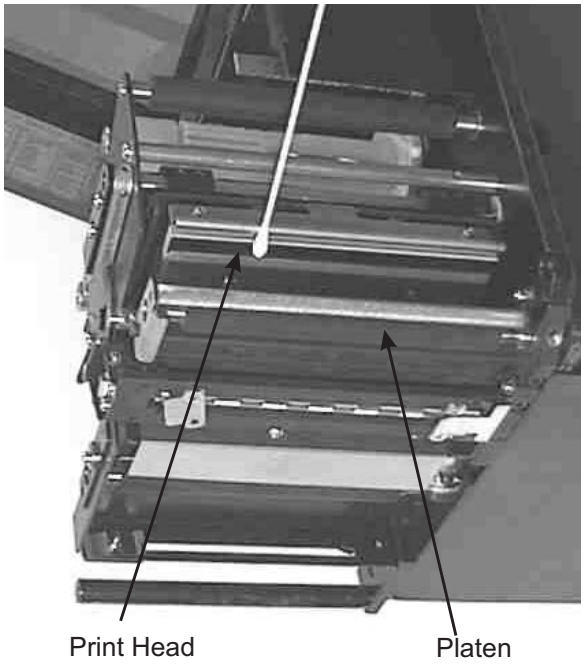
1. Turn the printer off.
2. Open the **Label Access** door.
3. Open the **Print Head Assembly** by pushing the **Head Latch** toward the rear of the printer. The **Print Head Assembly** is spring-loaded and will automatically open as soon as the **Head Latch** is disengaged.
4. Apply SATO Thermal Print Head Cleaner to a cotton swab.

5. The **Print Head** faces downward along the front edge of the assembly. Pass the end of the dampened swab along the entire width of the **Print Head** (you may need to move the ribbon out of the way to do this).

5. Check for any black coloring or adhesive on the swab after cleaning.

6. Repeat if necessary until the swab is clean after it is passed over the head.

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



Cleaning the Platen and Rollers

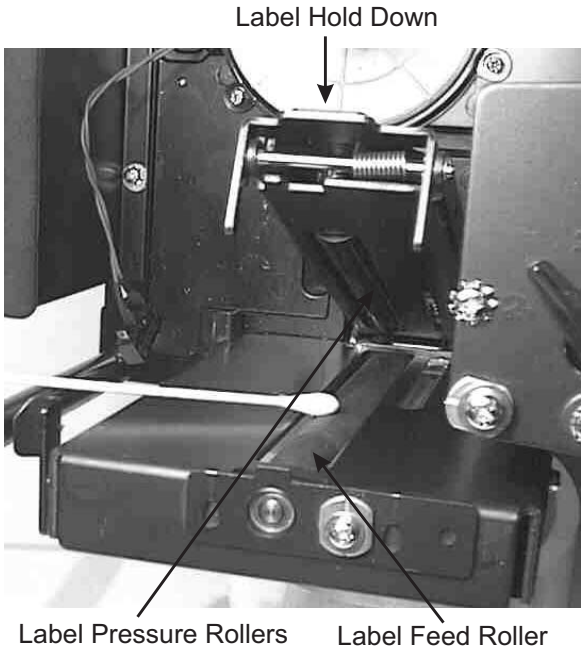
1. Turn the printer off.

2. Open the label access door.

3. Open the **Print Head Assembly** by pushing the **Head Latch** toward the rear of the printer. The **Print Head Assembly** is spring-loaded and will automatically open as soon as the **Head Latch** is disengaged.

4. Apply SATO Thermal Print Head Cleaner to one of the cotton swabs.

5. The **Platen** is the rubber roller directly below the **Print Head**. It should be cleaned of any ribbon or label residue.



6. The **Label Feed Roller** is located underneath the **Label Hold-Down**. It should be cleaned of any label residue or foreign material. Clean the **Label Pressure Rollers** on the underside of the **Label Hold-Down.**

7. There is one metal **Ribbon Guide Roller** used in guiding the ribbon through the printer. It should be cleaned of any residue or foreign material.

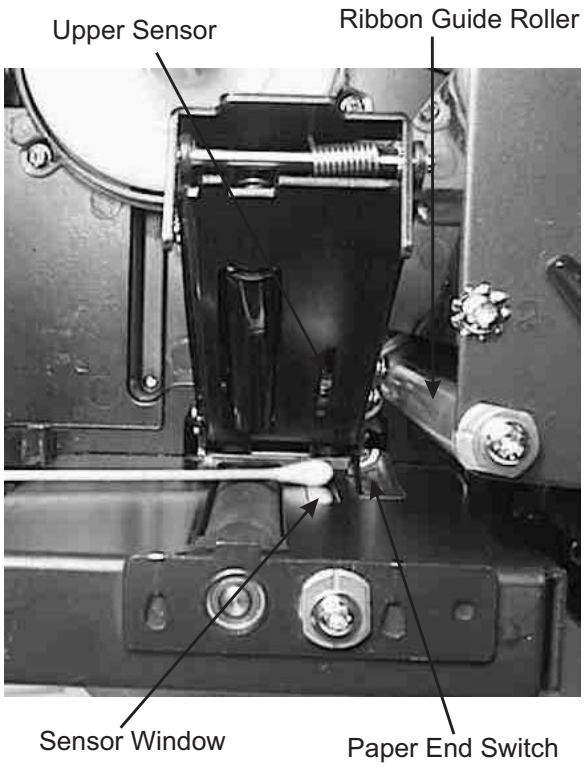
8. Repeat if necessary. The platen and rollers should be cleaned whenever foreign matter such as dust or adhesive is present.

CLEANING THE SENSORS AND PAPER END SWITCH

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

Supplies Needed: SATO SA070 Cleaning Kit

1. Turn the printer off.
2. Open the label access door.
3. Open the **Label Hold-Down** by disengaging the latch. The **Label Hold-Down** is spring loaded and will stay in the up position. The **Upper Sensor** will be visible on the underside of the **Label Hold-Down** when it is raised. It is adjustable over a range of 0.5" (14 mm) to 2.67" (68mm) from the inside edge of the label. The **Sensor Window** is positioned directly below the **Upper Sensor**.
4. Apply SATO Thermal Print Head Cleaner to one of the cotton swabs.
5. Use the cotton swab to clean any foreign matter from the exposed surface of the sensors.
6. Check the roller on the **Paper End Switch** for residue and clean if necessary.

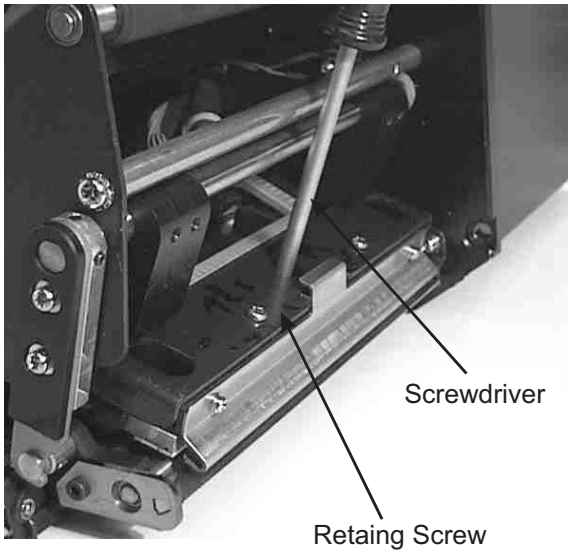


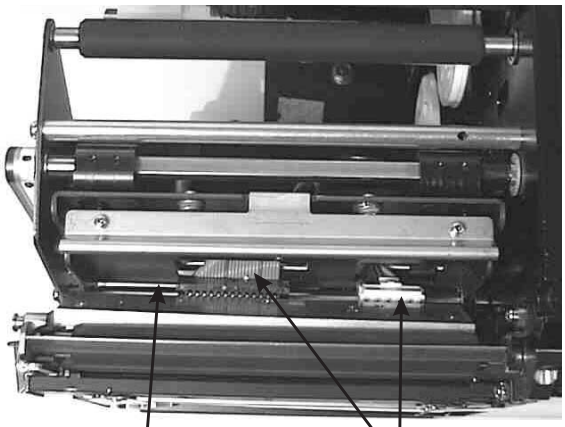
REPLACING THE PRINT HEAD

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

Supplies needed: Flat Blade Screwdriver (Note: Some units may require a No. 2 Phillips screwdriver)

1. Turn the printer off and remove the power cable.
2. Open the **Label Access** door.
3. View the **Print Head Assembly** from the front of the printer. Locate the center mounting screw on the top of the assembly. (*Do not take out the two outside alinment screws!*)It is accessible through the center hole in the **Top Assembly Plate**. Remove this screw and set it aside.
4. Open the **Print Head Assembly** by pushing the **Head Latch** toward the rear of the printer. The **Print Head Assembly** is spring-loaded and will automatically open as soon as the **Head Latch** is disengaged.
5. Remove the ribbon from the **Rewind Spindle** if necessary.
6. The **Print Head** should now be loosened from the top of the assembly by grasping either side and carefully pulling it down and forward.
7. Disconnect the signal and power cables from the print head connectors and set the **Print Head** aside.
8. Carefully attach the new print head to the connectors, using caution to make sure the connector keys are correctly positioned.





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

9. Locate the mounting screw in the top plate assembly and align it with the tapped hole in the new print head.

10. Re-secure the print head by tightening the screw.

REPLACING THE FUSE

Supplies needed: 250V 15A Fuse

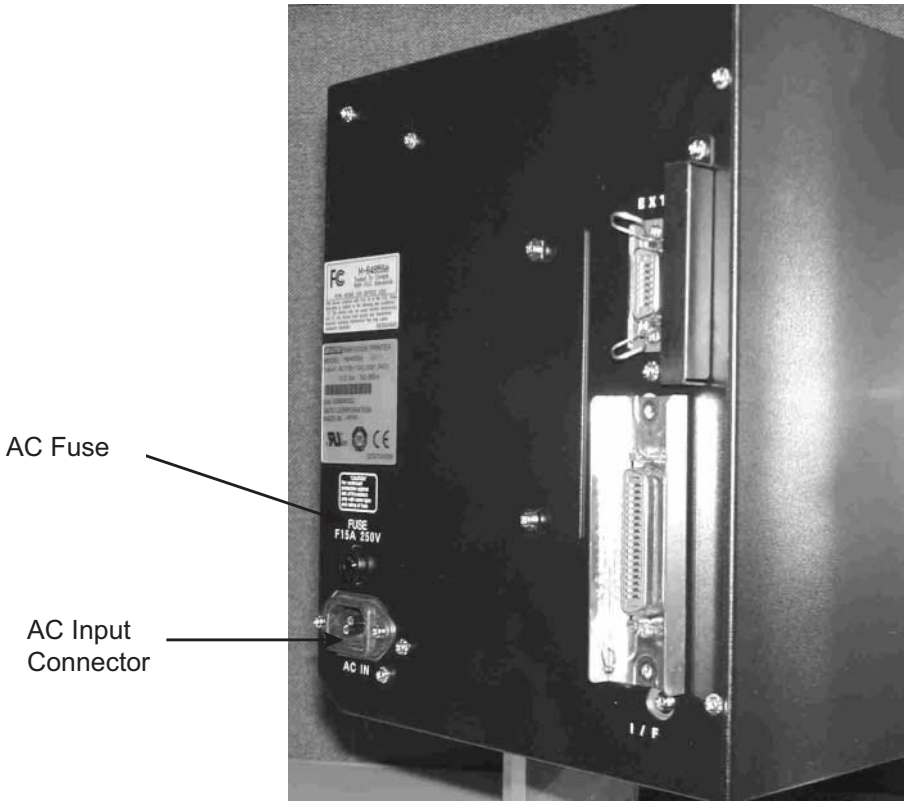
1. Turn the printer power off and remove the power cable.

2. On the back of the printer, locate the **Fuse Cap** directly above the AC connector.

3. Unscrew the cap and remove the defective fuse.

4. Replace with a new 250V 15A fuse.

5. Screw the fuse cap back onto the printer and replace the power cable.



SECTION 5. PROGRAMMING REFERENCE

INTRODUCTION

This section presents the commands that are used with the SATO “Se” printers to produce labels with logos, bar codes and alphanumeric data.

The following information is presented in this section:

- The SATO Programming Language
- Selecting Protocol Control Codes
- Using Basic
- The Print Area
- Command Codes

THE SATO PROGRAMMING LANGUAGE

A programming language for a printer is a familiar concept to most programmers. It is a group of commands that are designed to use the internal intelligence of the printer. The commands, which are referred to as SATO Command Codes, contain non-printable ASCII characters (such as **<STX>**, **<ETX>**, **<ESC>**) and printable characters. These commands must be assembled into an organized block of code to be sent as one data stream to the printer, which in turn interprets the command codes and generates the desired label output. The programmer is free to use any programming language available to send the desired data to the printer.

The command codes used are based upon “Escape” (1B hexadecimal) sequences. Typically there are four types of command sequences:

<ESC>{Command}

These commands generally tell the printer to perform a specific action, like “clear the memory.”

<ESC>{Command} {Data}

Commands with this format tell the printer to perform a specific action which is dependent upon the following data, like “print X labels”, where the value for X is contained in the data.

<ESC>{Command} {Parameter}

These commands set the operational parameters of the printer, like “set the print speed to 3.”

<ESC> {Command} {Parameter} {Data}

Some commands can contain both Parameter and Data elements, such as “print a Code 39 symbol containing the data.”

SELECTING PROTOCOL CONTROL CODES

Protocol 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 different sets of Protocol Control codes to choose from on the printer. 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.

The Protocol Control codes are selected by a DIP switch DSW2-7 on the front panel. See *Section 3: Printer Configuration*.

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
ENQ	05 Hex	40 Hex = @	Get printer status
CAN	18 Hex	21 Hex = !	Cancel print job
Off-Line	40 Hex	5D Hex =]	Take printer Off-Line

USING BASIC

It may be useful to test your printer using a BASIC program on a PC. You may also write your actual production programs in BASIC. Whatever the reason, if you will be working in BASIC, some of the following hints may help you get started:

1. Set the WIDTH of the output device to 255 characters to avoid automatically sending **<CR>** and **<LF>** characters after every line. The command string should be continuous and uninterrupted by **<CR>** and/or **<LF>** commands. The examples given in this manual are printed on separate lines because they will not fit on one line and do not contain any **<CR>** and/or **<LF>** characters. If these characters are needed, they are explicitly noted by the inclusion of **<CR>** and **<LF>** notations.

2. If you are using the printer’s RS232C interface, it is necessary to set the COM port on the PC such that the CTS and DSR signals will be ignored. Send your OPEN “COM” statement in the following way:

OPEN “COM1:9600,E,8,1,CS,DS” AS #1

This sets the RS232C communication parameters of the host PC’s COM1 port for 9600 baud, Even parity, 8 Data bits, 1 Stop bit and directing the port to ignore the **CTS** and **DSR** control signals.

3. You may want to minimize keystrokes and program size by assigning the **<ESC>** character to a string variable since this character is used quite often.

The following two examples in BASIC show a typical example using these hints. Both of these examples use the Standard Protocol codes.

Printing with the Parallel Port

5 REM Parallel Example	Identifies the program as a parallel port print label. The “REM” prevents this data from being sent to the printer and displays it only on the screen.
10 E$=CHR$(27)	Sets the “E$” string as an <ESC> character
20 WIDTH “LPT1:”,255	Sets the width of the output to 255 characters
30 LPRINT E$;"A";	Sends an “<ESC>A” command code to the LPT1 parallel port
40 LPRINT E$;"H400",E$;"V100";E$;"WL1SATO";	Sends the data “SATO” to be to be placed 400 dots horizontally and 100 dots vertically on the label and printed in the “WL” font.
50 LPRINT E$;"Q1";	Instructs the printer to print one label.
60 LPRINT E$; “Z”;	Tells the printer that the last command has been sent. The printer can now create and print the job.

Printing with the RS232C Port

5 REM RS232 Example	Identifies the program as a RS232C port print label. The “REM” prevents this data from being sent to the printer and displays it only on the screen.
10 E$=CHR$(27)	Sets the “E$” string as an <ESC> character.
20 OPEN “COM1:9600,N,8,1,CS,DS” AS #1	Opens the COM1 port for output and sets the parameters as 9600 baud, No parity, 8 Data bits, 1 Stop bit and instructs the port to ignore the CTS and DSR control signals.
30 PRINT #1,CHR$ (2);	Sends an <STX> (ASCII Code a decimal “2”) to the printer instructing it to prepare to receive a message.
50 PRINT #1,E$;"A";	Sends an “<ESC>A” command code to Print Port #1 opened by statement 20 above.

60 PRINT #1, E$;"H400",E$;"V100";E$;"WL1SATO";	Sends the data “SATO” to be to be placed 400 dots horizontally and 100 dots vertically on the label and printed in the “WL” autosmoothed font.
70 PRINT #1, E$;"Q1";	Instructs the printer to print a quantity of one label.
80 PRINT #1, E$; “Z”;	Tells the printer that the last command has been sent. The printer can now create and print the job.
90 PRINT #1,CHR$ (3);	Sends an <ETX> (ASCII Code decimal “3”) to the printer telling it that this is the end of the message.

THE PRINT AREA

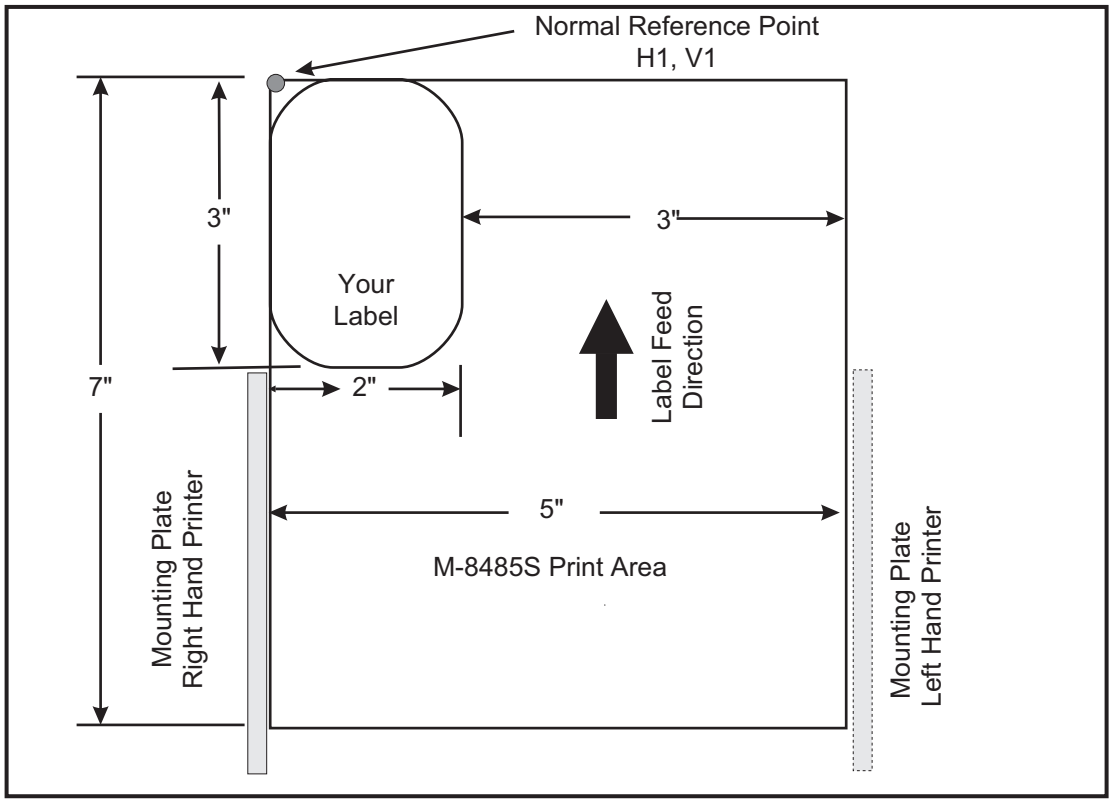
The maximum print area depends upon the printer model. The default for all printers is 7 inches long. If the pitch area is expanded with the <ESC>EX0 Expanded Print Length command, the maximum length can be extended to 49.2 inches for the all printers except the M-8490Se which is 32.8 inches. The length is limited by the available digits (9999) in the Vertical position commands. Many of your label applications will not require labels this large, therefore, it is important to understand how to work with labels that do not use the entire print area. The goal is to help you avoid printing where no label exists, which may lead to print head damage, not to mention the frustration when you cannot see the printed output.

The following diagram illustrates the print area for a standard (Right-Hand) M-8485Se and a sample 2 inch wide by 3 inch long label placed within this area. As can be seen, your label will be oriented against the inside right edge of the printer as viewed from the front (label exit) of the printer. If you are using an M-8485Se Left-Hand printer, the reference point is on the outside edge of the label away from the mounting plate. The normal reference point is located at the H1, V1 position of the print area in the normal print orientation (no rotation).

The base reference point is always on the right edge of the print head as you face the front (label exit) of the printer. If you are using a label that is narrower than the maximum print width, you may have to adjust the base reference point of the Left-Hand printer to correctly position the print area. If you are using a Left-Hand M-8485Se and need to adjust the position of the label there are three methods available to make sure your printed output will appear correctly on your label. They are as follows:

1. **Media Size Command.** Use the <ESC>A1 Media Size Command. This command specifies the width and length of the label. The printer will automatically calculate the correct offsets for printing labels of that size. However, if you specify a label size with this command, the labels loaded should match the size specified to correctly position the label.

2. **Base Reference Point Command**. Send the <ESC>A3 Base Reference Point command as part of your data to the printer to set a new base reference point for your label.



Calculate the distance (in dots) that corresponds to the amount you wish to shift the label print area. If you wanted to move the print area over to the left (as viewed from the front or label exit end of the printer) 3.0 inches:

Shift Distance = 3.0" x 25.4 mm/in x 8 dpmm = 610 dots

New Base Reference Point = 610 dots

Issue the Base Reference Point command after the Start command in your data stream.

<ESC>A3H**0610**V0001

This resets the reference point for all the following data.

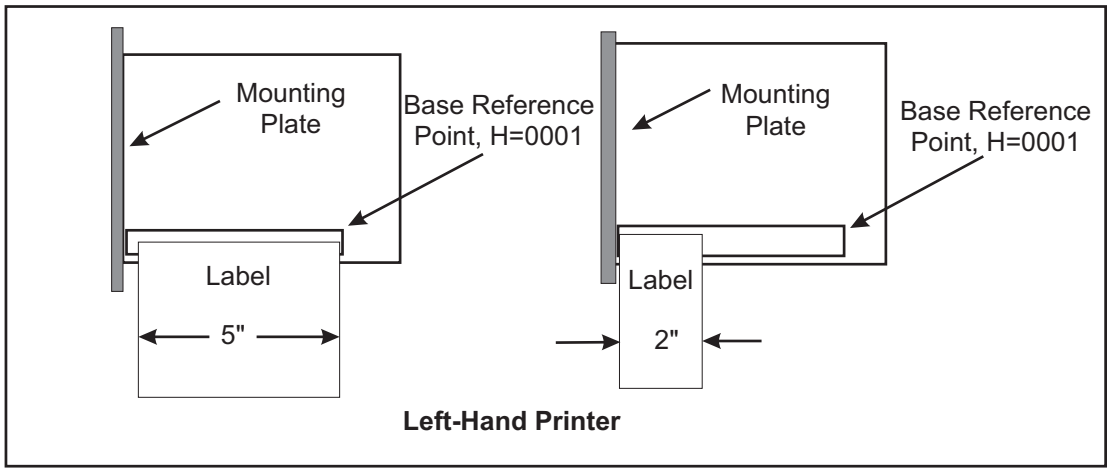
Note: After the reference point is moved, you can no longer print on the 610 dot "margin" unless the reference point is reset.

3. **Adjust the <ESC>H Horizontal Position.** Use the normal base reference point from the print area and use the horizontal position for each field to properly locate it on the label.

   Calculate the distance (in dots) from the normal base reference point to the closest edge of the label.

   Shift Distance = 3.0" x 25.4 mm/in x 8 dpmm = 610 dots

   Each **<ESC>H** command would have the value "610" added to it to correctly position each field.



Left-Hand Printer

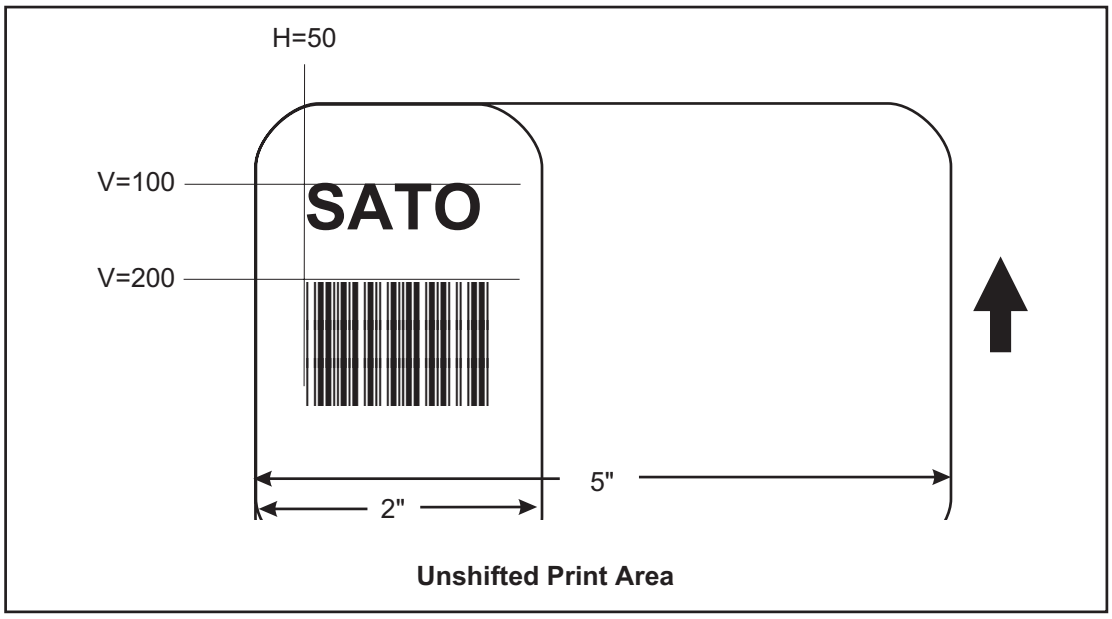
The Command Code subsection contains a sample label output for each command code. These samples reflect how the printed information would appear on a five inch wide label (see illustration). If you want to test any of the sample label outputs and are using labels less than five inches in width, you will have to adjust the positioning accordingly so that the printer does not try to print where there is no label.

You must be careful not to print off the label surface as the label provides a heat sink for the print head elements. Doing so will cause irreparable damage to the head. This damage is not covered under the print head warranty.

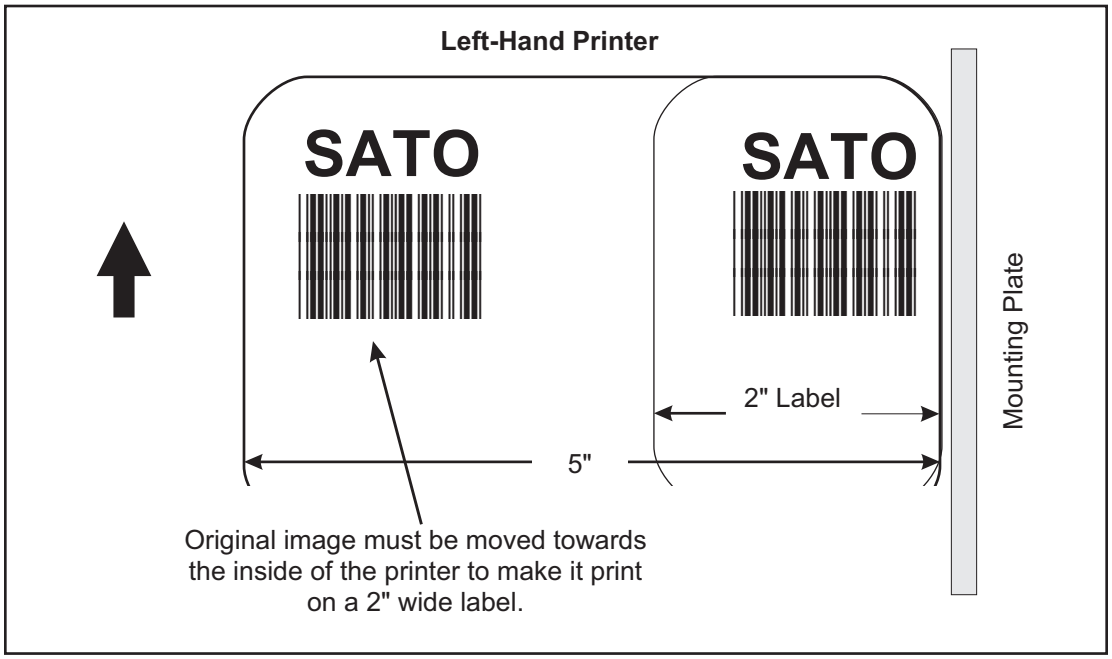
For example, the following illustrates a sample data stream and the resulting label assuming a five inch wide label on a left-hand model printer:

```
<ESC>A
<ESC>H0050<ESC>V0100<ESC>L0303<ESC>MSATO
<ESC>H0050<ESC>V0200<ESC>B103100*SATO*
<ESC>Q1<ESC>Z
```

If you are using a two inch wide label, the entire image may not appear on your label. By adding the following Base Reference Point command to the second line of the data



Unshifted Print Area



stream, the base reference point will be changed, causing the image to be shifted over toward the inside of the printer where it can be printed on the narrower label.

```
<ESC>A
<ESC>A3H0610V0001
<ESC>H0050<ESC>V0100<ESC>L0303<ESC>MSATO
<ESC>H0050<ESC>V0200<ESC>B103100*SATO*
<ESC>Q1<ESC>Z
```

The image reference point is set at the right edge (edge closest to the printer side plate) of the label so that it can be printed on a 2 inch wide label.

Note: The printers will not "wrap" images that extend beyond the print area. If any part of a character or image extends beyond the print area, it will disappear.

For more information, see the Base Reference Point command description.

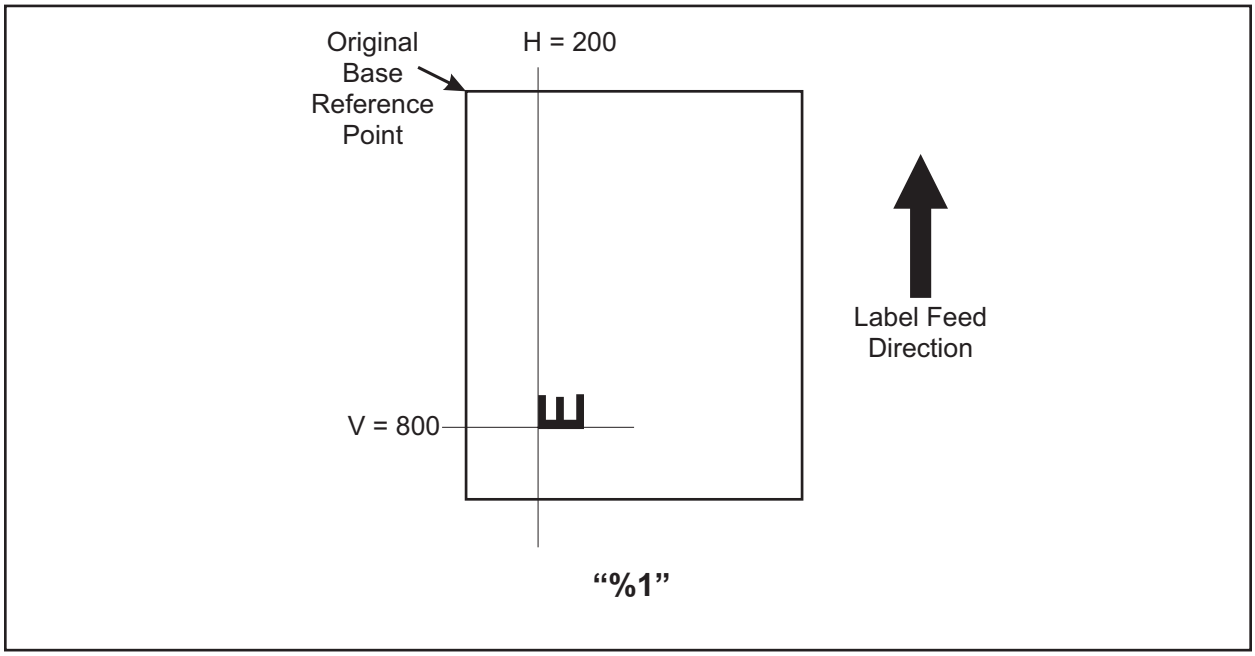
ROTATED FIELDS

The printers can rotate each print field in 90° increments using the Rotate command.

- **<ESC>%** - The field rotates, but the base reference point for the field remains the same.

The following data stream will rotate the print field but will not change the base reference point of the field:

```
<ESC>A<ESC>%1<ESC>V800<ESC>H200<ESC>L0202<ESC>WB1E<ESC>Q1<ESC>Z
```



COMMAND DEFAULT SETTINGS

There are some types of commands that must have a value specified before a label can be printed. If the data stream does not contain these commands, a "default" value is assumed. The commands and the corresponding default values are:

COMMAND	DEFAULT	NOTE
Print Rotation	0°	(1)
Vertical Reference Point	0	(1)
Horizontal Reference Point	0	(1)
Character Pitch	2	(1)
Base Reference Point	H=1, V=1	(2)
Character Expansion	1	(1)
Print Darkness	2	(1)
Print Darkness (M-8459Se)	3	(1)
Print Speed	6 ips	(2)
Print Speed (M-8459Se)	4 ips	(2)

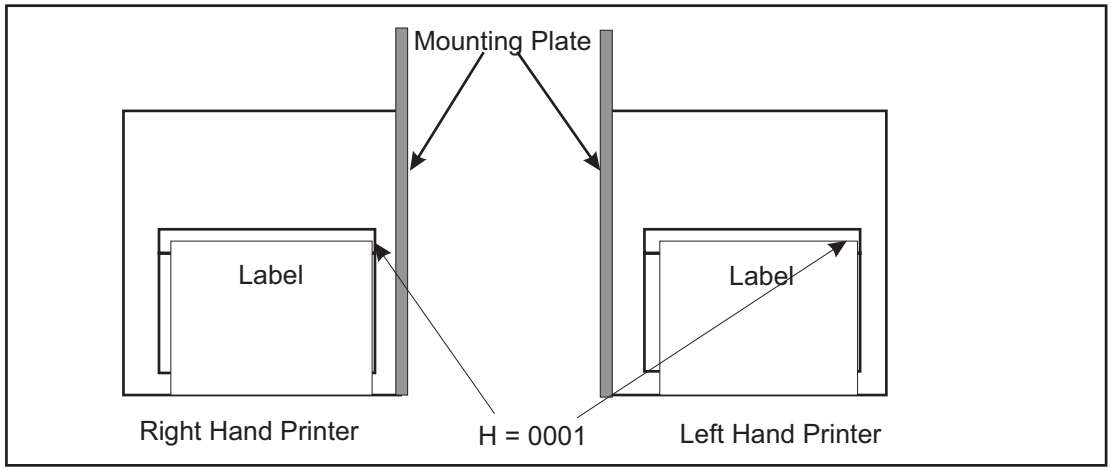
NOTES:

(1) The settings for these commands will revert to the default value when the printer receives an **<ESC>Z** or an **<ESC>***.

(2) These values transmitted with these commands will remain in effect until a new command is received.

OPPOSITE HAND MODELS

The standard “Se” print engine is referred to as a “right-hand” printer (i.e., when facing the Control Panel, the label comes out from left to right). The M-8485Se, M-8460Se and M-8490Se are also available in a “left-hand” (i.e., the labels comes out right to left) version. The M-8459Se is only available in the standard Right-Hand configuation.



The only difference in the print area is the horizontal base reference point for the label. With the standard “Se” printer, the reference point is the first print position nearest the inside frame. With the “left-hand” version, the reference point is the first print position away from the frame. The same command stream sent to both printers should print an identical label except the image may be shifted because of the relative positioning of the label under the print head.

COMMAND CODE PAGE REFERENCE

This section contains all the printer Command Codes. The commands must be sent to the printer in an organized fashion in order for the label(s) to print.

The purpose of this section is to:

1. Explain the different commands and provide examples of their usage.

2. To provide a detailed reference for programming.

Each command begins on a separate page with its own heading. A uniform layout is used to help you find key information about each command. For each Command Code in this section, there will be a sample data input stream to the printer and the expected print output. By studying the examples, you can learn how to use the particular command within a whole block of printer code. Pay particular attention to the "Special Notes" with each command to learn other important information.

The subject commands are highlighted in bold letters in the Reference Sheets. There are two parts of most, but not all, commands. The first is the command character which immediately follows the **<ESC>** code. It is always an upper case alpha or a special character (such as an "&" or a "%"). It is never a lower case alpha character. If the command requires additional variable information, it is represented by a group of lower case alpha characters immediately following the command character. For example, if an **aaaabb** is listed following the basic command, the printer will look for six characters immediately following the command. The first four would represent the value of **aaaa** and the next two the value of **bb**.

The maximum number of characters defined in a parameter is represented by the number of characters shown in the command structure. For example, a command followed by an **aaaa** can have up to four characters. In general, commands with only one parameter following the command can be entered without the leading zeroes. In the above example, you could enter either "809" or "0809". However, certain commands require the exact number of matching characters. A command with two parameters listed following the command code, such as **aaaabbbb** require the exact number of digits to be entered. If the value of **aaaa** is "800" and the value of **bbbb** is "300", then the parameters must be entered as "08000300". It is recommended that you make it a practice to always enter leading zeros to prevent any mistakes.

NOTE: These examples assume the use of the Standard Protocol Command Codes, with a Right-Hand version of the M-8485Se printer with a parallel interface and a five inch wide label which is the maximum width that will fit in the printer. If the same command stream is sent to an M-8490Se, the image will be reduced by 33%.

An alphabetical listing of the commands is contained in *Appendix A: Command Code Quick Reference.*

Bar Codes

Command Structure

1:3 narrow/wide bar ratio: <ESC>**Babbcccd**
2:5 narrow/wide ratio: <ESC>**BDabbcccd**
1:2 narrow/wide bar ratio: <ESC>**Dabbcccd**

a = Bar Code Symbol
- 0 Codabar
- 1 Code 39
- 2 Interleaved 2 of 5 (I 2/5)
- 3 UPC-A / EAN-13
- 4 EAN-8
- 5 Industrial 2 of 5
- 6 Matrix 2 of 5
- 7 reserved
- 8 reserved
- 9 reserved
- A MSI
- B reserved
- C Code 93
- D reserved
- E UPC-E
- F Bookland
- G Code 128
- I UCC 128

bb = Number of dots (01-12) for narrow bar and narrow space

ccc = Bar height in dots (001-600)

d = UCC 128 only. Not used for other bar code types
- 0 No human readable text
- 1 Human readable at top
- 2 Human readable at bottom

Example: <ESC>**BD103200**

Placement: Immediately preceding data to be encoded

Default: None

Command Function

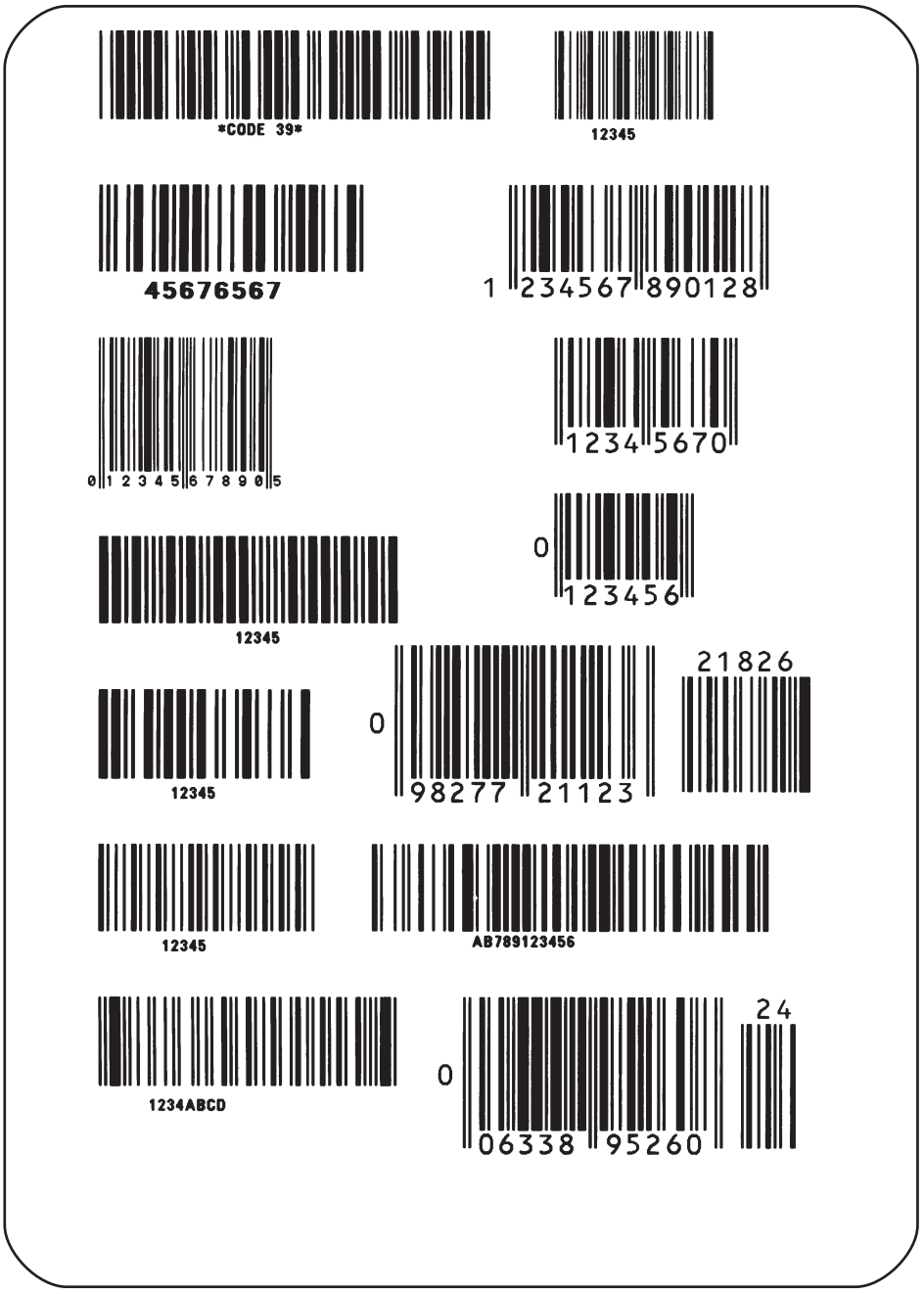
To print bar code images on a label. With this command, there are 14 standard bar code symbologies available to be printed and three two dimensional symbols (see Two Dimensional bar code symbols). Each of the bar codes are unique, and it is important to know the differences. See *Appendix B* for specific information on using each individual bar code symbol.

Input to Printer

<ESC>A
<ESC>H0025<ESC>V0025<ESC>B103100*CODE 39*
<ESC>H0155<ESC>V0130<ESC>XS*CODE 39*
<ESC>H0025<ESC>V0200<ESC>BD20210045676567
<ESC>H0075<ESC>V0310<ESC>XM45676567
<ESC>H0025<ESC>V0375<ESC>BD30215001234567890
<ESC>H0025<ESC>V0600<ESC>BD50210012345
<ESC>H0175<ESC>V0710<ESC>XS12345
<ESC>H0025<ESC>V0775<ESC>BD60210012345
<ESC>H0105<ESC>V0885<ESC>XS12345
<ESC>H0025<ESC>V0950<ESC>BA03100123455
<ESC>H0095<ESC>V1060<ESC>XS12345
<ESC>H0025<ESC>V1125<ESC>BC03100081234ABCD
<ESC>H0080<ESC>V1240<ESC>XS1234ABCD
<ESC>H0525<ESC>V0025<ESC>B002100A12345B
<ESC>H0565<ESC>V0135<ESC>XS12345
<ESC>H0475<ESC>V0200<ESC>BD303100123456789012
<ESC>H0525<ESC>V0375<ESC>BD4031001234567
<ESC>H0525<ESC>V0550<ESC>DE03100123456
<ESC>H0500<ESC>V0600<ESC>OB0
<ESC>H0533<ESC>V0655<ESC>OB123456
<ESC>H0350<ESC>V0725<ESC>D30315009827721123
<ESC>L0101<ESC>H0320<ESC>V0800<ESC>OB0
<ESC>H0365<ESC>V0878<ESC>OB98277
<ESC>H0505<ESC>V0878<ESC>OB21123
<ESC>H0665<ESC>V0760<ESC>BF0313021826
<ESC>H0680<ESC>V0730<ESC>OB21826
<ESC>H0425<ESC>V1125<ESC>D30315000633895260
<ESC>L0101<ESC>H0395<ESC>V1200<ESC>OB0
<ESC>H0440<ESC>V1278<ESC>OB06338
<ESC>H0580<ESC>V1278<ESC>OB95260
<ESC>H0730<ESC>V1155<ESC>BF0314024
<ESC>H0745<ESC>V1125<ESC>OB24
<ESC>H0325<ESC>V0950<ESC>BG03100>GAB>B789>C123456
<ESC>H0435<ESC>V1055<ESC>XSAB789123456
<ESC>Q1<ESC>Z

Note: Carriage Returns and Line Feeds have been added to the command listing for clarity and should not be included in the actual data stream.

Printer Output

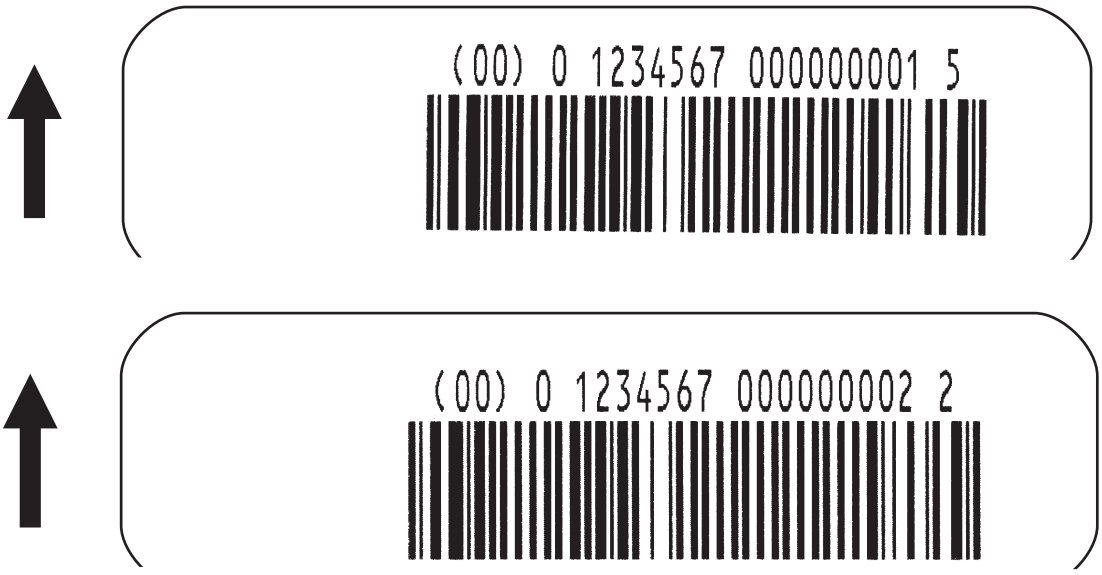


UCC-128 Without Incrementing

<ESC>A<ESC>H0100<ESC>V0100
<ESC>**BI071501012345670000000001**
<ESC>Q2<ESC>Z

With Incrementing

<ESC>A<ESC>H0100<ESC>V0100
<ESC>**>F001+001**<ESC>**>BI071501012345670000000001**
<ESC>Q2<ESC>Z



Special Notes

1. UPC and EAN bar codes are not affected by the different types of narrow to wide ratios. Instead, the <ESC>D command adds descender bars to these codes where needed to meet UPC specifications. The <ESC>BD command puts decender bars and human readable text below the symbol.

2. The Code 128, UCC 128, MSI, and Code 93 bar codes are not affected by the narrow to wide ratios.

3. The Codabar, Code 39, Industrial 2 of 5, and Matrix 2 of 5 bar codes are affected by the Character Pitch command. This command must be placed before the Bar Code command.

4. See *Appendix B* for more specific instructions and detailed information regarding individual bar code symbols.

5. Because of their unique characteristics, two-dimensional (2D) symbols are covered separately.

6. For UCC128, the FNC1 code is automatically inserted and the Mod 10 and Mod 103 check digits are automatically calculated. For the MSI bar code, the check digit is not automatically calculated.

7. The <ESC>D and <ESC>BD commands are not valid for the MSI, Code 128, Code 93, UPC-E, Bookland, UCC128 and Postnet symbologies.

Bar Codes, Expansion

Command Structure <ESC>**BWaabbb**

aa = Expansion factor by which the width of all bars and spaces will be increased (01-12)

bbb = Bar height by dot (004-600 dots)

Example: <ESC>**BW02100**

Placement: Immediately follows the <ESC>BT command and precedes data to be encoded.

Default: None

Command Function This command works together with the <ESC>BT command to specify an expansion factor and the bar code height for the particular symbol being printed.

Input to Printer

```
<ESC>A
<ESC>H0050<ESC>V0050<ESC>BT101030103
<ESC>BW04100*1234*
<ESC>Q1<ESC>Z
```

Printer Output

Special Notes

1. This command must be preceded by the Variable Ratio Bar Codes <ESC>BT command.

2. The following bar codes will be affected by the Character Pitch command: Codabar, Code 39, Interleaved 2 of 5, Matrix 2 of 5.

Bar Codes, Variable Ratio

Command Structure <ESC>**BTabbccddee**

a = Bar Code Symbol:
- 0 Codabar
- 1 Code 39
- 2 Interleaved 2 of 5
- 5 Industrial 2 of 5
- 6 Matrix 2 of 5

bb = Narrow space in dots (01-99)
cc = Wide space in dots (01-99)
dd = Narrow bar in dots (01-99)
ee = Wide bar in dots (01-99)

Example: <ESC>**BT**101030103

Placement: Following print position commands and preceding <ESC>BW

Default: Current setting

Command Function To print a bar code with a ratio other than those specified through the standard bar code commands (B,BD, and D). This is done through individual control of each of the bar code elements (bars, spaces) as shown above. Remember that this command only applies to the five bar code types shown.

Input to Printer

```
<ESC>A
<ESC>H0050<ESC>V0050<ESC>BT101030103
<ESC>BW03100*1234*
<ESC>Q1<ESC>Z
```

Printer Output

Special Notes

1. This command must be immediately followed by the <ESC>BW Bar Code Expansion command.

2. You may use only one variable ratio bar code per label.

3. If the data specified in this command is incorrect, the command is ignored and the ratio used will be based on the previous setting.

4. See *Appendix B* for more specific instructions and details regarding individual bar code symbols.

Base Reference Point

Command Structure <ESC>**A3H-aaaa-Vbbbb**

- = This character is optional. When present, it specifies that The horizontal offset is in the negative direction. If it is left out the offset direction is positive.

aaaa = Horizontal Print Offset (see Note 7 for field range)

bbbb = Vertical Print Offset (see Note 7 for field range)

Example: <ESC>**A3H100V0050**

Placement: Preceding all images that are based on the new base reference point

Default: Current V and H offset setting in the printer configuration

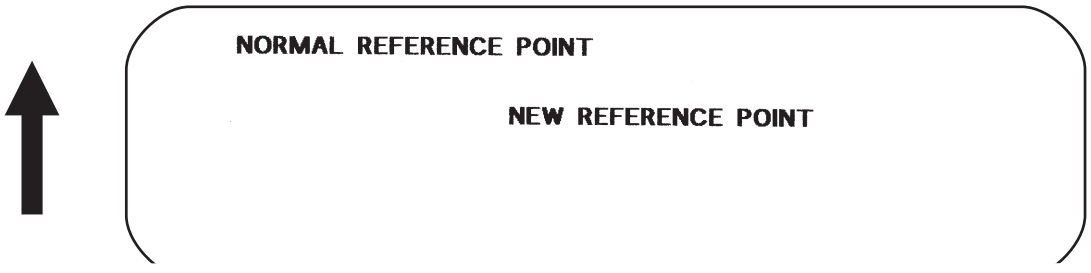
Command Function To establish a new base reference point for the current label. The base reference point is the top left corner or “origin” from where all print position commands are based.

This command may be very helpful when using labels less than four inches wide to place images on the printable label surface. It may also be used to move images past preprinted fields on a label.

Input to Printer

```
<ESC>A<ESC>L0202
<ESC>H0025<ESC>V0025<ESC>WB0MNORMAL REFERENCE POINT
<ESC>A3H0300V0075
<ESC>H0100<ESC>V0050<ESC>WB0MNEW REFERENCE POINT
<ESC>Q1<ESC>Z
```

Printer Output



Special Notes

1. Use of this command will set the Vertical/Horizontal Offset setting of the printer configuration until a new Base Reference Point command is issued or the setting is changed from the operator panel. See *Section 3: Printer Configuration.*

2. This command may be used more than once in a print job.

3. An alternative to using this command is to make changes to your current Horizontal and Vertical Print Position commands.

   Example:
   Let's say the current base reference point is H=1, V=1 and you wish to move all the fields on your label downward vertically by 150 dots. You could either (1) add the Base Reference Point command or (2) change all the vertical position commands by an additional 150 dots.

4. For a more detailed example of the Base Reference Point command, see "Print Area" in this section.

5. The "Se" print engines can print as close as 2 mm to the inside edge of the label.

6. The "Se" print engines will not "wrap" (i.e. if any part of a character or image extends beyond the last print dot position, it will disappear and not be visible on any part of the label).

7. The allowable field ranges for this command are:

	M-8459Se	**M-8460Se**	**M-8485Se**	**M-8490Se**
Horizontal **aaaa**	-896 to 896	-1216 to 1216	-1024 to 1024	-1344 to 1344
Vertical Default **bbbb**	0001 to 1424	0001 to 1424	0001 to 1424	0001 to 2136
Expanded **bbbb**	0001 to 9999	0001 to 9999	0001 to 9999	0001 to 9999

Characters, Custom-Designed

Command Structure

Store Command: <ESC>**Tabcc**
Recall Command: <ESC>**Kab90cc**

a = 1 16x16 matrix
2 24x24 matrix

b = Specifies the character encoding method for the data stream
H Hexadecimal characters
B Binary characters

cc = Memory location to store/recall the character. Valid memory locations are 21 to 52 (counting in Hex) or "!" to "R" in Binary

(data) = Data to describe the character

Example: <ESC>**T1H3F**
<ESC>**K1H903F**
See Appendix C for a more detailed explanation

Placement: The Store command is typically sent in its own data stream to the printer, between the Start/Stop commands. The Recall command is sent in a secondary data stream
to print the character,and follows any necessary position or size commands.

Default: None

Command Function

To allow for the creation, storage, and printing of custom characters, such as special fonts or logos. Up to 50 individual characters may be stored in the custom character volatile memory.

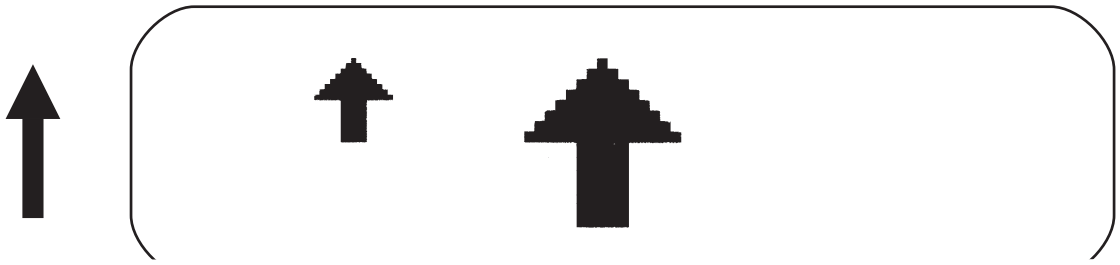
Printer Input

See Appendix C for a detailed explanation.

<ESC>A
<ESC>**T1H3F**0100038007C00FE01FF03FF87FFCFFFE
07C007C007C007C007C007C007C007C0
<ESC>Z

<ESC>A
<ESC>H150<ESC>V100<ESC>L0505<ESC>**K1H903F**
<ESC>H350<ESC>V100<ESC>L1010<E SC>**K1H903F**
<ESC>Q1<ESC>Z

Printer Output



Special Notes

1. When printing the custom character using the Recall command, the character is affected by the following commands:

   Character Expansion
   Character Pitch
   Line Feed
   Rotate, Fixed Base Reference Point

2. The characters are stored in volatile memory and must be reloaded if the printer power is lost.

3. Do not use ASCII <CR> or <LF> characters (carriage return or line feed) as line delimiters within the graphic data or the actual image will not be printed as specified.

Character Expansion

Command Structure **<ESC>Laabb**

aa = Multiple to expand horizontally (01-12)
bb = Multiple to expand vertically (01-12)

Example: <ESC>**L**0305

Placement: Preceding the data to be expanded

Default: <ESC>**L**0101

Command Function To expand characters independently in both the horizontal and vertical directions. The command allows you to enlarge the base size of each font (except the vector font) up to 12 times in either direction. Expanded characters are typically used for added emphasis or for long distance readability.

Input to Printer

<ESC>A<ESC>H0100<ESC>V0100<ESC>XMSATO
<ESC>H0100<ESC>V0200<ESC>**L0402**<ESC>XMSATO
<ESC>H0100<ESC>V0300<ESC>**L0204**<ESC>XMSATO
<ESC>Q1<ESC>Z

Printer Output

Special Notes

1. This command will expand the following fonts:

   Fonts U, S, M, XU, XS, XM, OA & OB and fonts WB, WL, XB and XL.

2. This command will also affect the following commands:
   Character Pitch
   Characters, Custom-Designed

3. The Character Expansion value is in effect for the current print job until a new expansion command is specified.

4. The Line and Box command, if used within the data stream, may return all subsequent text to the default expansion of 1 x 1. Therefore, either send the Character Expansion command before all printed data, or send Line and Box commands last, preceding the <ESC>Q Quantity command.

Character, Fixed Spacing

Command Structure <ESC>**PR**

Example: See Above

Placement: Preceding the data

Default: The default is Proportional Spacing.

Command Function To reset proportional spacing and place the printer back to fixed spacing.

Printer Input

```
<ESC>A
<ESC>H0100<ESC>V0050<ESC>PS
<ESC>L0404<ESC>XMPROPORTIONAL SPACING
<ESC>H0100<ESC>V0180<ESC>PR
<ESC>L0404<ESC>XMFIXED SPACING
<ESC>Q1<ESC>Z
```

Printer Output

Special Notes

1. This command only works with the proportionally spaced fonts XU, XM, XS, XL and XB.

Character Pitch

Command Structure <ESC>**Paa**

aa = Number of dots between characters (00-99)

Example: <ESC>P03

Placement: Preceding the text to be printed

Default: <ESC>**P02**

Command Function To designate the amount of spacing (in dots) between characters. This command provides a means of altering character spacing for label constraints or to enhance readability.

Input to Printer

```
<ESC>A
<ESC>H0025<ESC>V0025<ESC>L0202<ESC>XB1SATO
<ESC>H0025<ESC>V0125<ESC>L0202<ESC>P20<ESC>XB1SATO
<ESC>H0025<ESC>V0225<ESC>L0202<ESC>P40<ESC>XB1SATO
<ESC>Q1<ESC>Z
```

Printer Output

Special Notes

1. This command is affected by the <ESC>L Character Expansion command. The character pitch is actually the product of the current horizontal expansion multiple and the designated pitch value.

   Example:
   <ESC>L0304
   <ESC>P03
   Pitch = (03) x (03) = 9 dots

2. To avoid confusion, you may want to include the <ESC>L Character Expansion command and this command together in your program.

3. This command affects fonts U, S, M, XU, XS, XM, OA & OB, WB, WL, XB and XL, and the vector font.

4. Character Pitch will always revert to the default value unless it is specified before each new font command in the data stream.

5. This command also affects Codabar, Code 39 and Industrial 2 of 5 bar codes.

Character, Proportional Spacing

Command Structure

<ESC>**PS** Set to proportional spacing
<ESC>**PR** Reset to fixed spacing

Example: See above

Placement: Preceding the data to be proportional spaced

Default: <ESC>PS

Command Function

To specify the printing of proportional or fixed spacing for proportionally spaced fonts.

Printer Input

```
<ESC>A
<ESC>H0025<ESC>V0050<ESC>PS
<ESC>L0202<ESC>XMPROPORTIONAL SPACING
<ESC>H0025<ESC>V0130<ESC>PR
<ESC>L0202<ESC>XMFIXED SPACING
<ESC>Q1<ESC>Z
```

Printer Output

Special Notes

1. Once this command is sent in the data stream, it is in effect until the end of the print job unless a reset command is sent.

Clear Print Job(s) & Memory

Command Structure <ESC>***a**

a = If the “a” parameter is not included with this command and the printer is in the multi-buffer mode, this command clears all print jobs in the printer memory, including the current print job.

a = If “a” is included with this command, it specifies the internal memory section to be cleared
- T To clear the custom character memory
- & To clear the form overlay memory
- X To clear all internal memory

Example: <ESC>*
<ESC>***&**

Placement: This command should be sent to the printer as an independent data stream.

Default: None

Command Function To clear individual memory or buffer areas of the printer.

Input to Printer:
```
<ESC>A
<ESC>*
<ESC>Z
```

Printer Output: There is no printer output as a result of this command. The current print job in the buffer will be terminated and all other print jobs in the buffer cleared.

Special Note

1. See Expanded Memory Functions for variations of this command used to clear data from the optional Expanded Memory.
2. It is not necessary to clear the printer’s memory between each print job.
3. The primary purpose of this command is to clear all print jobs in the multi-buffer mode. The “a” parameter can be used in either the multi-buffer or single job mode to clear specific parts of the memory.
4. When the “a” parameter is used, the section of memory specified will not be cleared until the label is printed.

Continuous Forms Printing

Command Structure None

The printer locates the end of an adhesive label by sensing the backing between labels or through the use of an eye-mark (black rectangle on the reverse side of the backing). It locates the end of a tag from a notch, eye-mark, or a hole between tags. Both sensors should be disabled when printing continuous forms by placing the Label Sensor Selection switch (DSW3-3) in the ON position. See *Section 3: Printer Configuration* for instructions on configuring the printer using the front panel DIP switch array.

If you will be using continuous labels or tags, the printer must be told to stop feeding in another manner. The length is determined by the position of the last printed image on the label or tag. The printer will stop feeding when this last field is finished printing. The length may be increased with printed spaces (20 hexadecimal) if necessary. There is no command code to control label length.

Copy Image Area

Command Structure <ESC>**WDHaaaaVbbbbXccccYdddd**

aaaa = Horizontal position of the top left corner of the area

bbbb = Vertical position of the top left corner of the area

cccc = Horizontal length of the image area to be copied

dddd = Vertical length of the image area to be copied

Example: <ESC>**WDH0100V0050X0600Y0400**

Placement: Anywhere within the data stream, after specifying the location of the duplicate image.

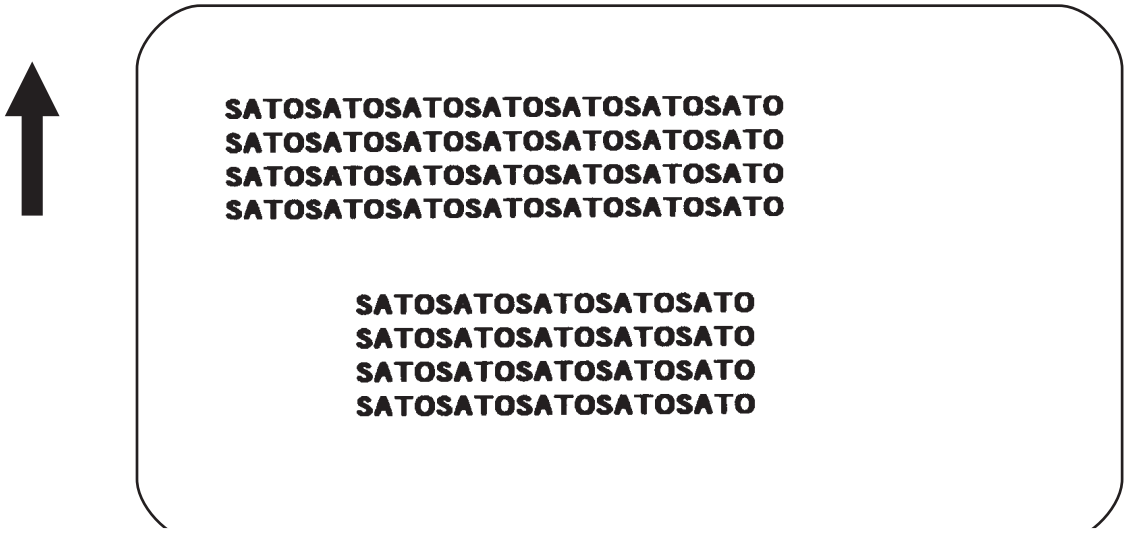
Default: None

Command Function To copy an image from one location to another on the same label. This may be useful for duplicating individual fields or entire sections of the label with only one command.

Input to Printer

<ESC>A
<ESC>H0050<ESC>V0050<ESC>E010<ESC>XM
SATOSATOSATOSATOSATOSATOSATO
SATOSATOSATOSATOSATOSATOSATO
SATOSATOSATOSATOSATOSATOSATO
SATOSATOSATOSATOSATOSATOSATO
<ESC>H0180<ESC>V0250<ESC>**>WDH0130V0050X0400Y0200**
<ESC>Q1<ESC>Z

Printer Output



Special Notes

1. Use the Print Position commands (V and H) to locate the new area for the duplicate image.

2. Position of the new target area must not be inside the original image.

3. If you use the Rotate command, V, H, X and Y axis will be reversed.

4. If the reference area of the target image exceeds the print area, it will not be printed.

5. The allowable ranges for these fields are as follows:

	M-8459Se	**M-8460Se**	**M-8485Se**	**M-8490Se**
Horizontal **aaaa** **cccc**	0001 to 0896	0001 to 1216	0001 to 1024	0001 to 1344
Default Vertical **bbbb** **dddd**	0001 to 1424	0001 to 1424	0001 to 1424	0001 to 2136
Expanded Vertical **bbbb** **dddd**	0001 to 9999	0001 to 9999	0001 to 9999	0001 to 9999

Fonts U, S, M, OA, OB, XU, XS & XM

Command Structure

Font XU:	<ESC>**XU**	Font U:	<ESC>**U**
Font XS:	<ESC>**XS**	Font S:	<ESC>**S**
Font XM:	<ESC>**XM**	Font M:	<ESC>**M**
Font OA:	<ESC>**OA**	Font OB:	<ESC>**OB**

Example: See above

Placement: Preceding the data to be printed

Default: None

Command Function

To print text images on a label. These are eight of the built-in fonts available on the printer. All matrices include descenders.

	NON-PROPORTIONAL		PROPORTIONAL(1)
U	5W x 9H dot matrix	XU	5W x 9H dot matrix
S	8W x 15H dot matrix	XS	17W x 17H dot matrix
M	13W x 20H dot matrix	XM	24W x 24H dot matrix
OA	OCR-A font (see note 7 for matrix)		
OB	OCR-B font (see note 7 for matrix)		

(1) These fonts will be printed with proportional spacing only if preceded by an <ESC>PS command.

Input to Printer

```
<ESC>A<ESC>PS
<ESC>H0001<ESC>V0100<ESC>L0202<ESC>XUSATO
<ESC>H0001<ESC>V0175<ESC>L0202<ESC>XSSATO
<ESC>H0001<ESC>V0250<ESC>L0202<ESC>XMSATO
<ESC>H0001<ESC>V0325<ESC>L0101<ESC>OASATO
<ESC>H0001<ESC>V0400<ESC>L0101<ESC>OBSATO
<ESC>H0300<ESC>V0100<ESC>L0202<ESC>USATO
<ESC>H0300<ESC>V0175<ESC>L0202<ESC>SSATO
<ESC>H0300<ESC>V0250<ESC>L0202<ESC>MSATO
<ESC>Q1<ESC>Z
```

Printer Output

Special Notes

1. Characters may be enlarged through the use of the Character Expansion command.

2. Character spacing may be altered through the use of the Character Pitch command. The default is 2 dots between characters. It is recommended to use a spacing of 5 dots for OCR-A and 1 dot for OCR-B.

3. You may also create custom characters or fonts. See the <ESC>T Custom-Designed Characters command.

4. A font must be defined for each field to be printed. There is no default font.

5. Fonts U, S, M, OA and OB are identical to fonts U, S, M, OA and OB on the SATO M-8400S printer. (Note: These fonts, except the OA and OB fonts which are fixed in size, will be 33% smaller on an M-8490Se)

6. The proportionally spaced fonts XU, XS, XM, XL and XA can be printed with fixed spacing using the <ESC>PS Proportional Space command.

7. The matrices for the OA and OB fonts are scaled so that they will remain a constant size according to the OCR-A and OCR-B specifications when printed on different resolution printers.

	M-8459Se/M-8460Se/M-8485Se	**M-8490Se**
OA Font	15 dots W x 22 dots H	22 dots W x 33 dots H
OB Font	20 dots W x 24 dots H	30 dots W x 36 dots H

Font, Raster

Command Structure <ESC>A<ESC>**RDabb,ccc,ddd,nn. . .n**

a = A CG Times font style
B CG Triumvirate font style.
bb = Always 00
ccc = Horizontal size (16 - 999 dots or P08 - P72)
ddd = Vertical size (16 - 999 dots or P08 - P72)
nn..n = Data to be printed.

Example: <ESC>RFA00,014,018ABCD

Placement: Within normal command stream

Default: None

Command Function To print point size characters created using font definitions.

Input to Printer

<ESC>A
<ESC>V0100<ESC>H0100
<ESC>**RDA00,P28,P28,CG Times**
<ESC>V0200<ESC>H0100
<ESC>**RDB00,075,075,CG Triumvirate**
<ESC>Q1<ESC>Z

Printer Output

Special Notes

1. The “cccc” Horizontal Size and “dddd” Horizontal Size parameters can be entered either in dots or points, but both parameters must use the same value types. If point size is used, the point size is preceded by a “P”.

Font, Vector

Command Structure

Specify Vector Font: <ESC>**$a,b,c,d**

Data for Vector Font: <ESC>**$=(data)**

a = A Helvetica Bold (proportional spacing)
B Helvetica Bold (fixed spacing)
b = Font width (50-999)
c = Font height (50-999 dots)
d = Font variation (0-9) as follows:
0 Standard
1 Standard open (outlined)
2 Gray (mesh) pattern 1
3 Gray (mesh) pattern 2
4 Gray (mesh) pattern 3
5 Standard open, shadow 1
6 Standard open, shadow 2
7 Standard mirror image
8 Italic
9 Italic open, shadow

Example: <ESC>**$A,100,200,0<ESC>$=123456**

Placement: Immediately preceding data to be printed.

Default: None

Command Function

To specify printing of the unique SATO vector font. The vector font allows large characters to be printed with smooth, round edges. Each character is made of a number of vectors (or lines), and will require slightly more printer compiling time.

Input to Printer

<ESC>A
<ESC>H0100<ESC>V0100<ESC>**$A,100,100,0**<ESC>$=SATO AMERICA
<ESC>H0100<ESC>V0200<ESC>**$=**VECTOR FONT
<ESC>H0100<ESC>V0350<ESC>**$A**,200,300,8<ESC>$=SATO
<ESC>Q1<ESC>Z

Printer Output

Special Notes

1. The Pitch command can be used with Vector fonts.
2. If the font size designation is out of the specified range, a default value of 50 is used.
4. The font width and height values include asenders, desenders and other space.
5. A font must be defined for each field to be printed. There is no default font.

Fonts WB, WL, XB & XL

Command Structure

Font WB: <ESC>**WBa** Font XB: <ESC>**XBa**
Font WL: <ESC>**WLa** Font XL: <ESC>**XLa**

a = 0 Disables auto-smoothing of font
1 Enables auto-smoothing of font (see notes below)

Example: <ESC>**WB1123456**

Placement: Preceding the data to be printed

Default: None

Command Function

To print text images on a label. These are the four auto-smoothing fonts available on the printer.

	NON-PROPORTIONAL		PROPORTIONAL(1)
WB	18W x 30H dot matrix	XB	48W x 48H dot matrix
WL	28W x 52H dot matrix	XL	48W x 48H dot matrix

(1) These fonts will be printed with proportional spacing only if preceded by an <ESC>PS command.

Input to Printer

<ESC>A<ESC>PS
<ESC>H0001<ESC>V0100<ESC>**WB0SATO**
<ESC>H0001<ESC>V0185<ESC>**WB1SATO**
<ESC>H0001<ESC>V0270<ESC>**WL0SATO**
<ESC>H0001<ESC>V0355<ESC>**WL1SATO**
<ESC>H0300<ESC>V0100<ESC>**XB0SATO**
<ESC>H0300<ESC>V0185<ESC>**XB1SATO**
<ESC>H0300<ESC>V0270<ESC>**XL0SATO**
<ESC>H0300<ESC>V0355<ESC>**XL1SATO**
<ESC>Q1<ESC>Z

Printer Output

Special Notes

1. Auto-smoothing (when enabled) is only effective if the character expansion rate is at least (3) times in each direction.

2. Characters may be enlarged through the use of the <ESC>L Character Expansion command.

3. Character spacing may be altered through the use of the <ESC>A Character Pitch command.

4. A font must be defined for each field to be printed. There is no default font.

5. The proportionally spaced fonts XU, XS, XM, XL and XB can be printed with fixed spacing using the <ESC>PS Proportional Space command.

Form Feed

Command Structure <ESC>A**(space)**<ESC>Z

Example: See above

Placement: Separate data stream sent to printer

Default: None

Command Function To feed a blank tag or label, which is the equivalent of a “form feed”

Input to Printer

```
<ESC>A(space)
<ESC>Z
```

Printer Output Blank label or tag

Form Overlay, Recall

Command Structure <ESC>/

Example: See above

Placement: Must be preceded by all other data and placed just before the Print Quantity command (<ESC>Q)

Default: None

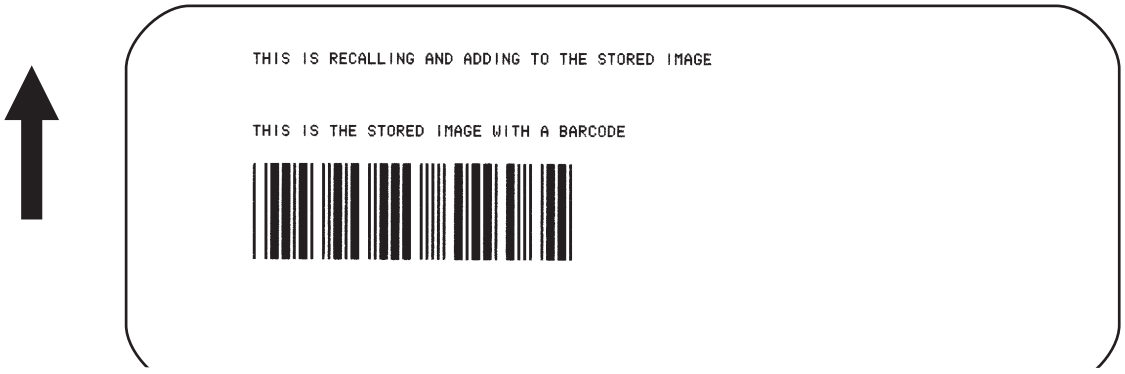
Command Function To recall the label image from the form overlay memory for printing. This command recalls a stored image from the overlay memory. Additional or different data can be printed with the recalled image.

Input to Printer

```
<ESC>A
<ESC>H01000<ESC>V0125
<ESC>STHIS IS THE STORED IMAGE WITH A BARCODE
<ESC>H0100<ESC>V0165<ESC>B103100*12345*
<ESC>&<ESC>Z


<ESC>A<ESC>H0100<ESC>V0050
<ESC>STHIS IS RECALLING AND ADDING TO THE STORED IMAGE<ESC>/
<ESC>Q1<ESC>Z
```

Printer Output



Special Notes

1. The overlay is stored using the <ESC>& Form Overlay Store command.
2. If the this command is used with the <ESC>EX0 Expanded Print Length command the Form Overlay length cannot exceed 9999 dots.

Form Overlay, Store

Command Structure

<ESC>**&**

Example: See above

Placement: Must be preceded by all other data and placed just before the Stop command (<ESC>Z)

Default: None

Command Function

To store a label image in the volatile form overlay memory. Only one label image may be stored in this memory area at a time.

Input to Printer

```
<ESC>A
<ESC>H0100<ESC>V0125
<ESC>STHIS IS THE STORED IMAGE WITH A BARCODE
<ESC>H0100<ESC>V0165<ESC>B103100*12345*
<ESC>&
<ESC>Z
```

Printer Output

There is no output from this command. It stores the label image in the overlay buffer.

Special Notes

1. Remember that this storage is volatile. Therefore, if the printer loses power, the overlay must be sent again.

2. The overlay is recalled using the <ESC>/ Form Overlay Recall command.

3. Form overlays do not have to be recompiled each time they are called to be printed and therefore may result in much faster print output.

Graphics, Custom

Command Structure <ESC>**Gabbbccc(data)**

a = Specifies format of data stream to follow
B Binary format
H Hexadecimal format

bbb = Number of horizontal 8 x 8 blocks
(see note 7 for allowable range)

ccc = Number of vertical 8 x 8 blocks
(see note 7 for allowable range)

(data)= Hex data to describe the graphic image

Example: <ESC>GH006006
See Appendix C for a detailed example

Placement: May be placed anywhere within the data stream after the necessary position commands.

Default: None

Command Function To create and print custom graphics (logos, pictures, etc.) on a label. The graphic image may be printed along with other printed data to enhance label appearance or eliminate the need for preprinted label stock. Using a dot-addressable matrix, design the graphic image in 8 dot by 8 dot blocks, then send it in a binary format to the printer.

Printer Input

<ESC>A
<ESC>H0100<ESC>V0100<ESC>**GH006006**
FFFFFFFFFFFFFFFFFFFFFFFFC00000000003
C00000000003C000FFFFFFF3C00080000013
C00080000013C0009FFFFF13C00080000013
C00080000013C0009FFFFF13C00080000013
C00080000013C000FFFFFFF3C00000000003
C00000000003C00000000003C00000000003
C00000000003C00000000003C00003C00003
C00007E00003C0000FF00003C0000FF00003
C0000FF00003C0000FF00003C00007E00003
C00003C00003C00003C00003C00003C00003
C00003C00003C00003C00003C00003C00003
C00003C00003C00003C00003C00003C00003
C00003C00003C00001800003C00000000003
C00000000003FFFFFFFFFFFFFFFFFFFFFFFF
<ESC>H0300<ESC>V0100<ESC>XSPLEASE PLACE YOUR DISK
<ESC>H0300<ESC>V0150<ESC>XSIN A SAFE PLACE
<ESC>Q1<ESC>Z

See Appendix C for a details on the data format.

Printer Output

Special Notes

1. Do not use ASCII <CR> or <LF> characters (carriage return or line feed) as line delimiters within the graphic data or the actual image will not be printed as specified.

2. A custom graphic cannot be enlarged by the <ESC>L Character Expansion command.

3. A custom graphic is not affected by either of the Rotation commands. Therefore, always design and locate your graphic image to print in the appropriate orientation.

4. To store graphic images in optional Expanded Memory, see the Expanded Memory Functions section.

6. The binary format reduces the transmission time by 50%.

7. The maximum allowable settings are:

	M-8459Se	**M-8460Se**	**M-8485Se**	**M-8490Se**
Hor Blocks **bbb**	001 to 112	001 to 152	001 to 128	001 to 168
Vertical Blocks Default **ccc**	001 to 178	001 to 178	001 to 178	001 to 267
Expanded **ccc**	001 to 999	001 to 999	001 to 999	001 to 999

8. Use the <ESC>E0 Expanded Print Length command to get the maximum label length.

Graphics, BMP

Command Structure <ESC>**GMaaaaa,**(data)

aaaaa = Number of bytes to be downloaded

Example: <ESC>**GM32000**, ... data...

Placement: Anywhere within the job data stream

Default: None

Command Function To allow the creation and printing of graphic images using a BMP file format.

Printer Input See Appendix Appendix C for a detailed example

<ESC>A
<ESC>V0100<ESC>H0100<ESC>**GM03800,(...Data...)**
<ESC>Q1
<ESC>Z

Printer Output

Special Notes

1. The maximum number of bytes that can be downloaded is 32K (compressed). The number specified by this command includes the BMP header information. The maximum size of the uncompressed BMP file is 64K. If the uncompressed file exceeds 64K, the graphic will not print.

2. Only black and white BMP files can be downloaded.

3. The file size specified by this command is the DOS file size in bytes.

Graphics, PCX

Command Structure <ESC>**GPaaaaa,**(data)

aaaaa = Number of bytes to be downloaded

Example: <ESC>**GP32000**, ... data...

Placement: Anywhere within the job data stream

Default: None

Command Function To allow the creation and printing of graphic images using a PCX file format.

Printer Input See Appendix Appendix C for a detailed example

<ESC>A
<ESC>V0150<ESC>H0100<ESC>**GP03800,(...Data...)**
<ESC>Q1
<ESC>Z

Printer Output

Special Notes

1. The maximum number of bytes that can be downloaded is 32K (compressed). The number specified by this command includes the PCX header information. The maximum size of the uncompressed PCX file is 64K. If the uncompressed file exceeds 64K, the graphic will not print.

2. Only black and white PCX files can be downloaded.

3. The file size specified by this command is the DOS file size in bytes.

Job ID Store

Command Structure

<ESC>**IDaa**

aa = Job ID assigned (01 to 99)

Example: <ESC>**ID09**

Placement: Immediately following the <ESC>A in the job data stream.

Default: None

Command Function

To add an identification number to a job. The status of the job can then be determined using the ENQ command in the Bi-Com status mode (See *Section 6: Interface Specifications* for more information).

Printer Input

<ESC>A
<ESC>**ID02**
. . . Job . . .
<ESC>Z

Printer Output

There is no printer output as a result of this command.

Special Notes

1. Works only in Bi-Communications modes. The Job ID number must be stored before Bi-Com status mode can be used.

2. If more than one ID number is sent in a single job, i.e.

   <ESC>A
   <ESC>ID01
   . . . . . .
   <ESC>ID02
   . . . . . .

   the last number transmitted will be used.

Job Name

Command Structure

<ESC>**WKnnn. . . n**

nn..n = Job Name assigned, up to 16 ASCII characters

Example: <ESC>**WKSATO**

Placement: Immediately following the <ESC>A in the job data stream.

Default: None

Command Function

This command is to identify a particular job using a descriptive name

Printer Input

<ESC>A
<ESC>**WKSATO**
. . . Job . . .
<ESC>Z

Printer Output

There is no printer output as a result of this command. The information is returned to the host upon receipt of a Bi-Com status request.

Special Notes

1. Works only in Bi-Com 4 mode. The Job Name must be stored before Bi-Com status mode can be used.

2. If more than one Job Name is sent in a single job, i.e.

   <ESC>A
   <ESC>WKSATO
   . . . . . .
   <ESC>WKSATO AMERICA
   . . . . . .

   the last name transmitted will be used.

Journal Print

Command Structure <ESC>**J**

Example: See above

Placement: Immediately following <ESC>A

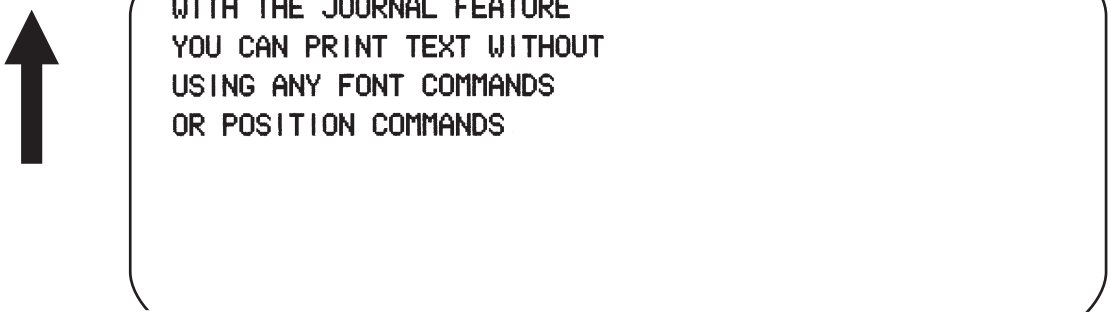
Default: None

Command Function To print text in a line by line format on a label. By specifying this command, you automatically select Font XS with a Character Expansion of 2x2. You also establish a base reference point of H2,V2. The character pitch is 2 dots and the line gap is 16 dots. Simply issue an ASCII <CR> at the end of each text line.

Input to Printer

```
<ESC>A
<ESC>J WITH THE JOURNAL FEATURE
YOU CAN PRINT TEXT WITHOUT
 USING ANY FONT COMMANDS
OR POSITION COMMANDS
<ESC>Q1<ESC>Z
```

Printer Output



Special Notes

1. Journal mode assumes a maximum label width . Otherwise, you may print where there is no label and damage your print head.
2. It is effective only for the current print job.

Lines and Boxes

Command Structure

Line: <ESC>**FWaabcccc**

aa = Width of horizontal line in dots (01-99)

b = Line orientation
H Horizontal line
V Vertical Line

cccc = Length of line in dots (see Note 2 for max length)

Box: <ESC>**FWaabbVccccHdddd**

aa = Width of horizontal side in dots (01-99)

bb = Width of vertical side in dots (01-99)

cccc = Length of vertical side in dots (see Note 2 for max length)

dddd = Length of horizontal side in dots (see Note 2 for max length)

Example: <ESC>**FW02H0200**

Placement: Following the necessary positioning commands

Default: None

Command Function

To print horizontal lines, vertical lines, and boxes as images on the label.

Input to Printer

<ESC>A
<ESC>H0100<ESC>V0100<ESC>**FW20H0200**
<ESC>H0320<ESC>V0100<ESC**>FW20V0200**
<ESC>H0350<ESC>V0100<ESC>**FW1010H0200V0200**
<ESC>Q1<ESC>Z

Printer Output

Special Notes

1. It is recommended that all lines and boxes be specified in the normal print direction.

2. The maximum allowable lengths are as follows.

LINE/BOX LENGTH	M-8459Se	M-8460Se	M-8485eS	M-8490Se
Horizontal **cccc**	0001 to 896	0001 to 1216	0001 to 1024	0001 to 1344
Vertical Default **cccc**	0001 to 1424	0001 to 1424	0001 to 1424	0001 to 2136
Expanded **cccc**	0001 to 9999	0001 to 9999	0001 to 9999	0001 to 9999

3. Use the <ESC>E0 Expanded Print Length command for maximum label length.

Line Feed

Command Structure <ESC>**Eaaa**

aaa = Number of dots (001-999) between the bottom of the characters on one line to the top of the characters on the next line

Example: <ESC>**E010**

Placement: Preceding the text that will use the line feed function

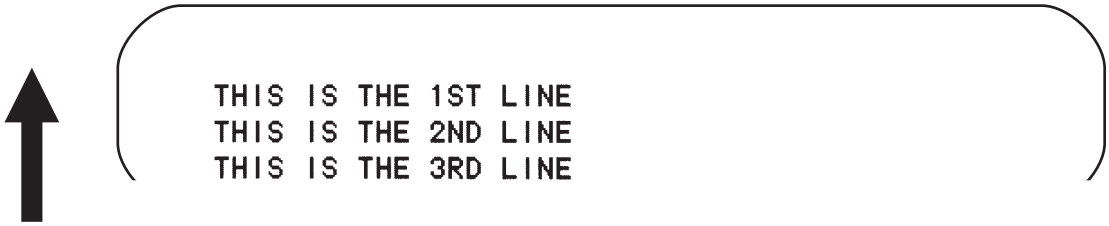
Default: None

Command Function To print multiple lines of the same character size without specifying a new print position for each line. With the Line Feed command, specify the number of dots you want between each line. Then, send an ASCII <CR> at the end of each line of text. The printer automatically identifies the size of the last character, moves down the number of dots specified, and begins printing the next line.

Input to Printer

```
<ESC>A
<ESC>E010<ESC>H0050<ESC>V0050<ESC>L0202<ESC>S
THIS IS THE 1ST LINE<>CR>
THIS IS THE 2ND LINE>CR>
THIS IS THE 3RD LINE>CR>
<ESC>Q1<ESC>Z
```

Printer Output



Special Notes

1. It is effective only for the current data stream.
2. When printing lines or boxes in the same data stream with the Line Feed command, the Lines and Boxes command should be specified last, preceding <ESC>Q Quantity command.
3. This command is invalid only if the value specified is zero.
4. Following this command with a <CR> character will allow you to print with auto line feed. The print position will be determined from the value specified and the H value set in the printer. If you specify several H values after this command, the print position will be determined by the H value last specified. You must redefine the font to be used after each H command.

Media Size

Command Structure <ESC>**A1aaaabbbb**

aaaa = Label Width in dots (0 to Hmax)
bbbb = Label Length in dots (0 to Vmax)

Example: <ESC>**A108323200**

Placement: Separate data stream to the printer.

Default: <ESC>**A108322136**

Command Function To set the size of the media.

Input to Printer

<ESC>A
<ESC>**A108321424**
<ESC>Z

Printer Output There is no printer output resulting from this command. It is used to automatically adjust the offset values for the size of label being used. The sample command stream specifies a label 832 dots wide by 1424 dots long.

Special Notes

1. The Base Reference point is always the on the right (looking at the front of the printer) side of the print head. This command adjusts the Base Reference Point to correspond with the right edge of the loaded media.

2. If the label size is changed, then this command must be respecified to center the print image on the label.

3. All eight variables (“aaaa” and “bbbb”) must be included in this command.

Maximum	M-8459Se	M-8460Se	M-8485eS	M-8490Se
Hmax **aaaa**	896	1216	1024	1344
Vmax Default **bbbb**	1424	1424	1424	2136
Expanded **bbbb**	9999	9999	9999	9999

Mirror Image

Command Structure <ESC>**RM**

Example: <ESC>A103000832<ESC>**RM**

Placement: After label data

Default: None

Command Function To allow mirror image printing of data, such as on transparent labels to be applied to a glass or other transparent surface.

Input to Printer

Label #1
<ESC>A
<ESC>A1<ESC>H0100<ESC>V0050<ESC>XL0ABCDEF
<ESC>**RM**
<ESC>Q1<ESC>Z

Printer Output

Special Notes

1. The <ESC>A1 Media defines the area to be mirrored.
2. This command can be used with the <ESC>% Rotate Fixed Base Reference Point command. Please note that the reference point rotation is dependent upon the location of the <ESC>% command in the data stream
3. This command should not be specified more than once in any single job.
4. This command cannot be used with commands requiring re-editing of the print area, such as Sequential Numbering, Real time clock or Copy Image Area.

5. Any data outside the area defined by the <ESC>A1 Media Size command is not mirrored the command is treated as a command error. Any print job containing the <ESC>RM comand and without any print data will be treated as a command error.

Off-Line/Pause

Command Structure <ESC>**@,nn . . . n**

nn...n = Optional message to be displayed on the LCD. Maximum of 32 characters.

Example: See above

Placement: Anywhere in the print job between the <ESC>A and <ESC>Z

Default: None

Command Function To specify the printer to come to an off-line state. When used within a print job, the printer goes off-line after finishing the print job.

Input to Printer

<ESC>A
<ESC>**@, LOAD BLUE LABELS AND PLACE PRINTER ON-LINE**
...Job...
<ESC>Z

Printer Output There is no printer output for this command. The printer is placed in the Off-Line mode as soon as the current print job is finished.

Special Notes

1. You must press the LINE key on the front panel to return the printer to an On-Line status (see *Section 2: Operator Panel* of this manual).

2. Remember, when using this command, that the print job specifies <ESC>Q10, all ten labels will print before the printer goes off-line.

Postnet

Command Structure <ESC>**BPn...n**

n...n = 5 digits (Postnet-32 format)
6 digits (Postnet-37 format)
9 digits (Postnet-52 format)
11 digits (Postnet-62, Delivery Point format)

Example: <ESC>**BP123456789**

Placement: Immediately preceding the data to be encoded

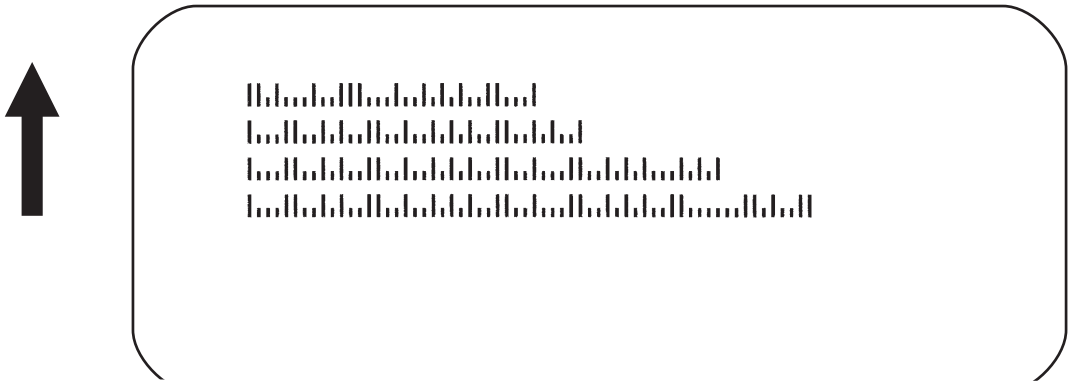
Default: None

Command Function To print Postnet bar codes

Printer Input

```
<ESC>A
<ESC>H0100<ESC>V0120<ESC>BP94089
<ESC>H0100<ESC>V0160<ESC>BP123456
<ESC>H0100<ESC>V0200<ESC>BP123456789
<ESC>H0100<ESC>V0240<ESC>BP12345678901
<ESC>Q1<ESC>Z
```

Printer Output



Special Notes

1. If the number of data digits does not match those listed, the command is ignored.
2. Only numeric data will be accepted.

Print Darkness

Command Structure <ESC>**#Ea**

a = Print Darkness Value
(see note 2 for allowable range)

Example: <ESC>**#E2**

Placement: Must be placed immediately after <ESC>A and immediately before <ESC>Z in its own separate data stream

Default: 2

Command Function To specify a new print darkness settings. This command allows software control of the darkness setting for unique media and ribbon combinations.

Input to Printer

```
<ESC>A
<ESC>#E2
<ESC>Z
```

Printer Output There is no printer output for this command.

Special Notes

1. This becomes the new setting in the printer configuration for all subsequent print jobs, unless changed. The setting is stored in non-volatile memory and is not affected by cycling power.

2. The allowable ranges for heat settings are:

Heat Range	M-8459Se	M-8460Se	M-8485Se	M-8490Se
a	1 2 3 4 5	1 2 3	1 2 3	1 2 3

3 The lighest setting is the smallest value and the darkest setting is the largest value.

Print Length, Expanded

Command Structure

<ESC>**EX0**	Sets the print length to maximum
<ESC>**AR**	Resets the maximum print length to 7" (178 mm)
Example:	See above
Placement:	Must follow the Start Code command and be in it's own separate data stream.
Default:	<ESC>AR (7")

Command Function To increase the maximum print length (in feed direction) for a label.

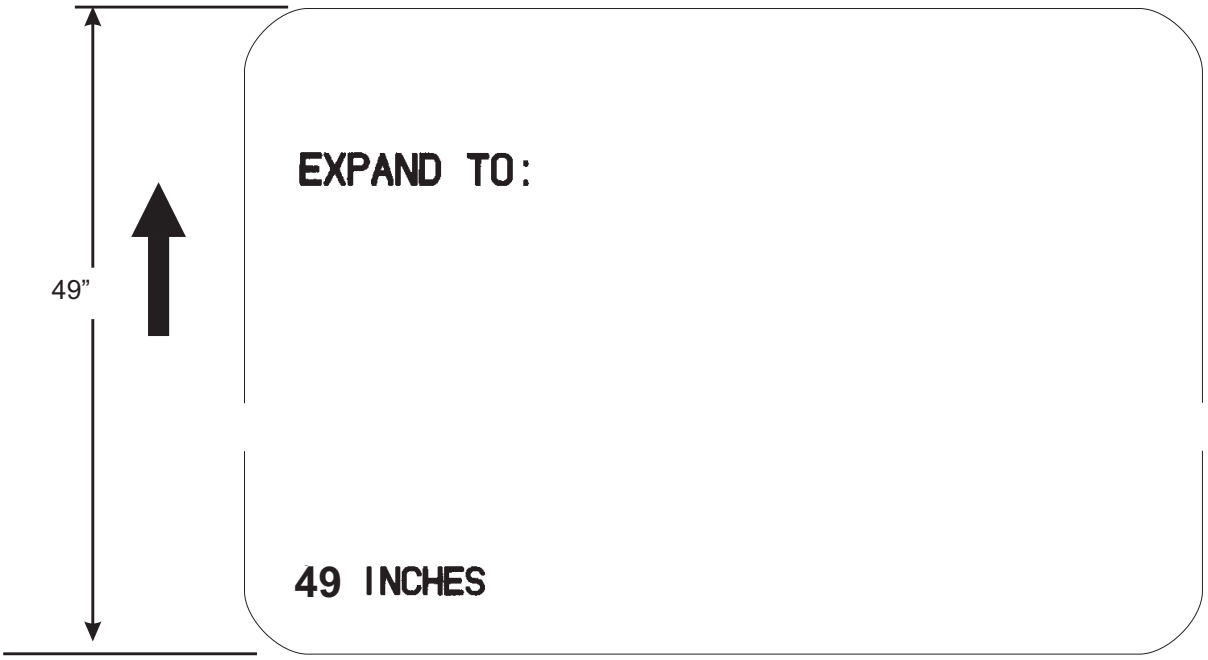
Input to Printer

```
<ESC>A
<ESC>EX0
<ESC>Z

<ESC>A
<ESC>H0050<ESC>V0100<ESC>WB1EXPAND TO:
<ESC>H0050<ESC>V2700<ESC>WB149 INCHES
<ESC>Q1<ESC>Z

<ESC>A
<ESC>AR
<ESC>Z
```

Printer Output



Special Notes

1. EX0 is effective until AR is sent to reset the printer to its standard print length, or until the printer is repowered.

2. It may be included in an independent data stream to specify the size of the maximum print area:

LENGTH	M-8459S	M-8460S	M-8485S	M-8490S
<ESC>A **<ESC>EX0** **<ESC>Z**	49.2" 1249 mm 2848 dots	49.2" 1249 mm 2848 dots	49.2" 1249 mm 2848 dots	32.8" 833 mm 4272 dots
<ESC>A **<ESC>AR** <ESC>Z	7" 178 mm 1424 dots	7" 178 mm 1424 dots	7" 178 mm 1424 dots	7" 178 mm 2136 dots

3. When this command is used with the <ESC>& Store Form Overlay command the Form length cannot exceed the maximum specified.

7. If a job contains elements out of the memory range, it is ignored.

8. If the Forms Overlay command <ESC>& is used with Expanded Memory to expand the print area, the Form Overlay length is still limited to the maximum..

Print Position

Command Structure

Horizontal Position: <ESC>**Haaaa**

Vertical Position: <ESC>**Vbbbb**

aaaa = Number of dots horizontally from the base reference point (1 to maximum) See Note 2.

bbbb = Number of dots vertically from the base reference point (1 to maximum) See Note 2.

Example: <ESC>**H0020**<ESC>**V0150**

Placement: Preceding any printed field description of lines/boxes, fonts, bar codes or graphics.

Default: <ESC>H0001
<ESC>V0001

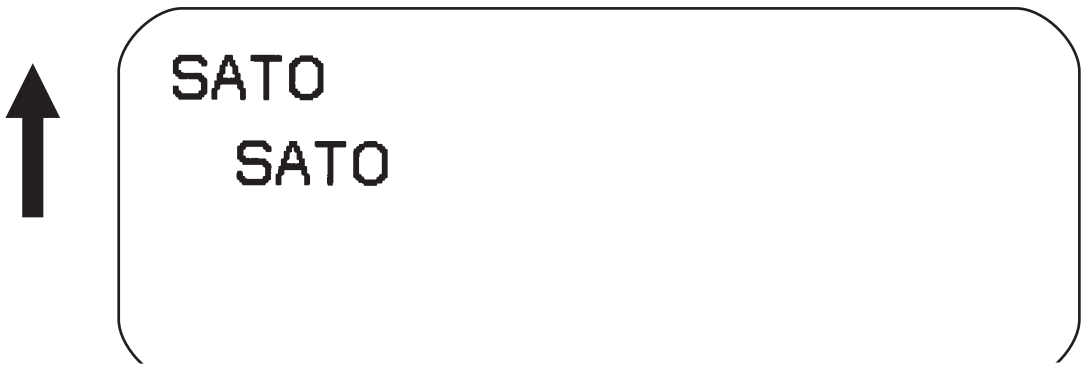
Command Function

The Horizontal and Vertical commands specify the top left corner of a field or label, using the current base reference point as an origin. They also establish a reference point for subsequent fields until the next horizontal and/or vertical print position command is issued.

Input to Printer

<ESC>A
<ESC**>H0025<ESC>V0050**<ESC>L0303<ESC>MSATO
<ESC>**H0100<ESC>V0150**<ESC>MSATO
<ESC>Q2<ESC>Z

Printer Output



Special Notes

1. To expand the print length to the maximum limit, the <ESC>EX0 Expanded Print Length command must be used.

	M-8459Se	M-8460Se	M-8485Se	M-8490Se
Maximum Print Width **aaaa**	896 4.4 in. 112 mm	1216 6.0 in. 152 mm	1024 5.0 in. 127 mm	1344 dots 4.4 in. 112 mm
Default Print Length **bbbb**	1424 dots 7.0 in. 178 mm	1424 dots 7.0 in. 178 mm	1424 dots 7.0 in. 178 mm	2136 dots 7.0" 178mm
Expanded with <ESC>EX0 **bbbb**	9999 dots (1) 49.2 in. 1249 mm	9999 dots (1) 49.2 in. 1249 mm	9999 dots (1) 49.2 in. 1249 mm	9999 dots(1) 32.8 in. 833 mm

(1) Limited by the number of digits in the command field.

2. If any part of an image is placed past the maximum number of dots, that part of the image will be lost.

3. If any part of an image is placed past maximum allowable dots across the label, that part of the image will be lost.

4. If you attempt to print where there is no paper, you may damage the print head.

5. For these commands, the leading zeroes do not have to be entered. The command V1 is equivalent to V0001.

Print Quantity

Command Structure <ESC>**Qaaaaaa**

aaaaaa = Total number of labels to print (1-999999)

Example: <ESC>Q500

Placement: Just preceding <ESC>Z, unless <ESC>~ exists, then preceding that. This command must be present in every print job.

Default: None

Command Function To specify the total number of labels to print for a given print job.

Input to Printer

```
<ESC>A
<ESC>H0100<ESC>V0100<ESC>WB1M-8485S
<ESC>Q3
<ESC>Z
```

Printer Output Three labels containing the data “M-8485S” wll be printed.

Special Notes

1. To pause during a print job, you must press the LINE key on the Operator Panel.
2. To cancel a print job, you must turn off the printer, or you may send the <CAN> code if using the Bi-Com mode. Multi-Buffer jobs can be cleared with the <ESC>* Clear Print Job(s) and Memory command.
3. When used with the <ESC>F Sequential Numbering command, the Print Quantity value should be equal to the total number of labels to be printed.
4. If you do not specify a Print Quantity, the printer will not print a label.
5. For this command, leading zeroes do not have to be entered. The command Q1 is equivalent to Q000001.

Print Speed

Command Structure

<ESC>**CSa**

a = Designates the speed selection (see note 2)

Example: <ESC>**CS6**

Placement: Must be placed immediately after <ESC>A and immediately before <ESC>Z in a separate data stream

Default: As previously set in the printer configuration

Command Function

To specify a unique print speed through software for a particular label. This allows flexibility in finding the best performance and quality for the particular label format, media, and ribbon. All subsequent labels will print at this speed unless the speed is changed with this command or through the Operator Panel.

Input to Printer

```
<ESC>A
<ESC>CS6
<ESC>Z
```

Printer Output

There is no printer output for this command. It sets the print speed of the printer.

Special Notes

1. This becomes the new setting for all subsequent print jobs, unless changed. The setting is stored in non-volatile memory and is not affected by cycling the power. The allowable speed ranges are:

Print Speed a	M-8459Se	M-8460Se	M-8485Se	M-8490Se
2	2 ips 50 mm/sec			
3	3 ips 75 mm/sec			
4	4 ips 100 mm/sec	4 ips 100 mm/sec	4 ips 100 mm/sec	4 ips 100 mm/sec
5	5 ips 125 mm/sec			
6		6 ips 150 mm/sec	6 ips 150 mm/sec	6 ips 150 mm/sec
8		8 ips 200 mm/sec	8 ips 200 mm/sec	8 ips 200 mm/sec
10		10 ips 250 mm/sec	10 ips 250 mm/sec	
12			12 ips 300 mm/sec	

Repeat Label

Command Structure <ESC>**C**

Example: See above

Placement: Must be placed immediately after <ESC>A and immediately before <ESC>Z in a separate data stream

Default: None

Command Function To print duplicate of the last label printed

Input to Printer

```
<ESC>A
<ESC>C
<ESC>Z
```

Printer Output A duplicate of the previous label will be printed.

Special Notes

1. This command will have no effect if the power to the printer was cycled off and back on since printing the previous label.

Replace Data (Partial Edit)

Command Structure <ESC>**0** (<ESC>zero)

Example: See above

Placement: Must follow <ESC>A and precede all other print data

Default: None

Command Function To replace a specified area of the previous label with new data. This command will cause the previous label to print along with any changes specified within the current data stream.

Input to Printer

```
<ESC>A
<ESC>H0025<ESC>V0020<ESC>WB0Company Name
<ESC>H0025<ESC>V0085<ESC>WB1SATO
<ESC>H0025<ESC>V0150<ESC>WL0SATO
<ESC>H0025<ESC>V0215<ESC>WL1SATO
<ESC>Q1<ESC>Z

<ESC>A
<ESC>0<ESC>H0025<ESC>V0020<ESC>WB0SATO
<ESC>Q1<ESC>Z
```

Printer Output

Special Notes

1. Specify the exact same parameters for the image to be replaced as were specified in the original data stream, including rotation, expansion, pitch, etc. This will ensure that the new data will exactly replace the old image. If the replacement data contains fewer characters than the old data, then the characters not replaced will still be printed.

2. This command will not function if the power has been cycled off and back on since the last label was printed.

3. Proportional Pitch text cannot be used with this command.

Reverse Image

Command Structure <ESC>**(aaaa,bbbb**

a = Horizontal length in dots of reverse image area
b = Vertical height in dots of reverse image area.
See Note 6 for field ranges

Example: <ESC>**(100,50**

Placement: This command must be preceded by all other data and be placed just before <ESC>Q

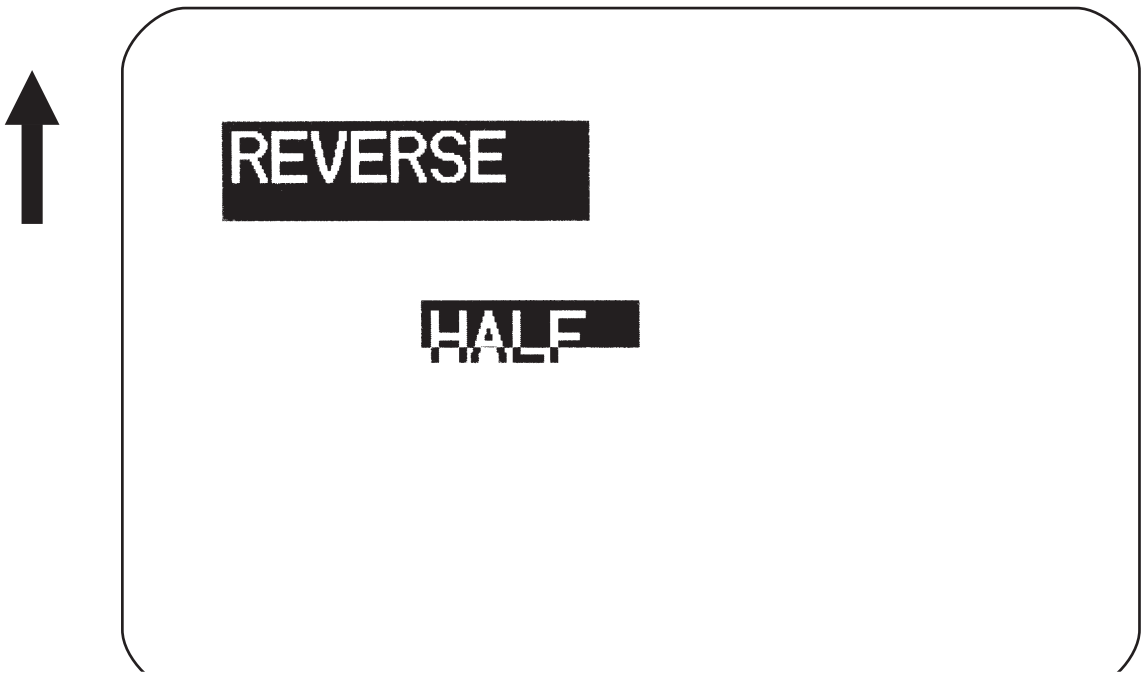
Default: None

Command Function To reverse an image area from black to white and vice versa. Use the Print Position commands (<ESC>H and <ESC>V) to locate the top left corner of the reverse image area.

Input to Printer

```
<ESC>A
<ESC>H0050<ESC>V0120<ESC>L0202<ESC>WB1REVERSE
<ESC>H0250<ESC>V0300<ES C>L0202<ESC>WB1HALF
<ESC>H0040<ESC>V0110<ESC>(370,100
<ESC>H0240<ESC>V0290<ESC>(220,47
<ESC>Q1<ESC>Z
```

Printer Output



Special Notes

1. A reverse image area is affected by the rotate commands. Therefore, always assume the printer is in the normal print orientation when designing and sending the Reverse Image command.

2. If using reverse images with the form overlay, place this command before the Form Overlay command in the data stream.

3. If the height and width to be reversed contain other than alphanumeric data, the area is not printed.

4. If the values specified exceed the maximum ranges, the reverse image is not created.

5. The maximum allowable settings are as follows:

	M-8459Se	**M-8460Se**	**M-8485Se**	**M-8490Se**
Horizontal **aaaa**	001 to 896	0001 to 1216	0001 to 1024	0001 to 1344
Vertical Default **bbbb**	0001 to 1424	0001 to 1424	0001 to 1424	0001 to 2136
Expanded **bbbb**	0001 to 9999	0001 to 9999	0001 to 9999	0001 to 9999

Rotate, Fixed Base Reference Point

Command Structure <ESC>**%a**

a = 0 Sets print to normal direction
1 Sets print to 90°CCW
2 Sets print to 180° rotated (upside down)
3 Sets print to 270° CCW

Example: <ESC>**%3**

Placement: Preceding any printed data to be rotated

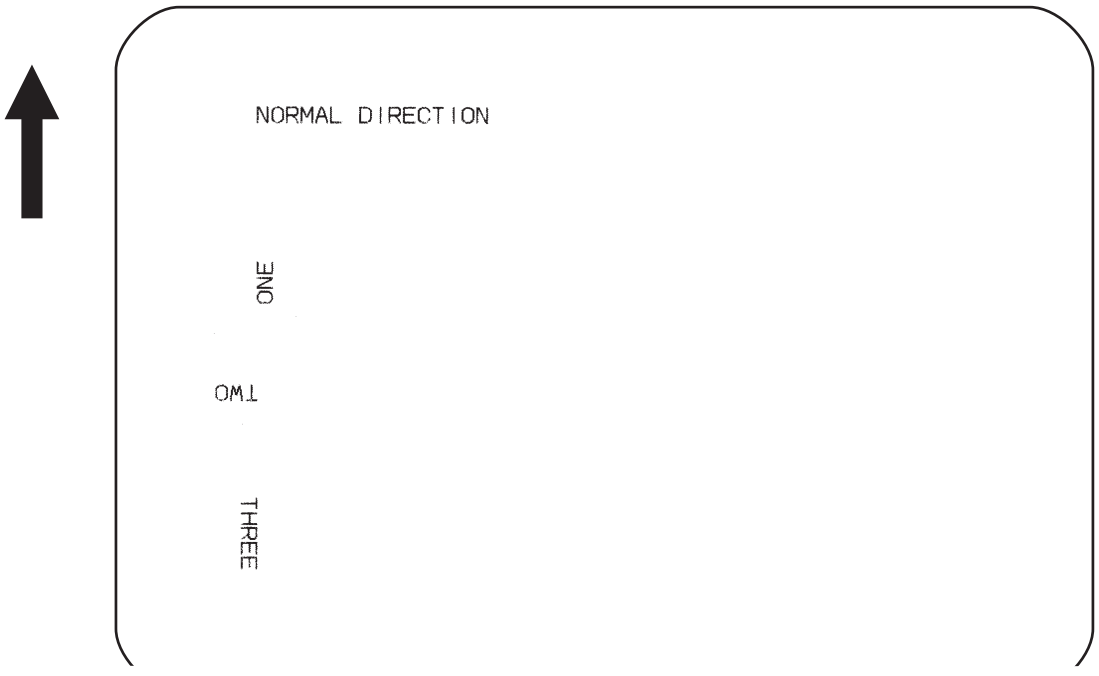
Default: <ESC>%0

Command Function To rotate the print direction in 90° increments without changing the location of the base reference point. The diagram below illustrates the use of the <ESC>% Rotate command. Note that the entire print area is shown, but your label will probably not be as large as the entire area.

Input to Printer

```
<ESC>A
<ESC>%0<ESC>L202<ESC>H0200<ESC>V0100<ESC>MNORMAL DIRECTION
<ESC>%1<ESC>H0200<ESC>V0300<ESC>MONE
<ESC>%2<ESC>H0200<ESC>V0400<ESC>MTWO
<ESC>%3<ESC H0200<ESC>V0500<ESC>MTHREE
<ESC>Q1<ESC>Z
```

Printer Output



Special Notes

1. The specified values are valid until another Rotate (<ESC>%) command is received.

2. Receipt of a Stop Print (<ESC>Z) command will reset the setting to the default value.

Sequential Numbering

Command Structure <ESC>**Faaaabcccc,dd,ee,g**

aaaa = Number of times to repeat the same data (0001-9999)

b = Plus or minus symbol (+ for increments; - for decrements)

cccc = Value of step for sequence (0001-9999)

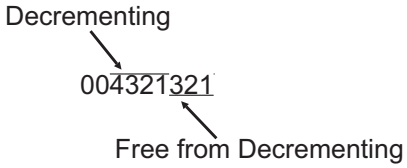
,dd = Number of digits for sequential numbering (01-99). The first

incrementing character position starts after the positions exempted from sequential numbering as specified in ee. If these digits are left out, the default is 8.

,ee = Number of digits free from sequential numbering (00-99) starting with the right most position. If these digits are left out, the default is 0.

,g = Count base
1 Decimal Count
2 Hexadecimal Base

Example: <ESC>**F001-001,04,03**



In this example, the right most (least significant) three digits would not decrement and the next four would decrement.

Placement: Preceding the starting value to be incremented or decremented.

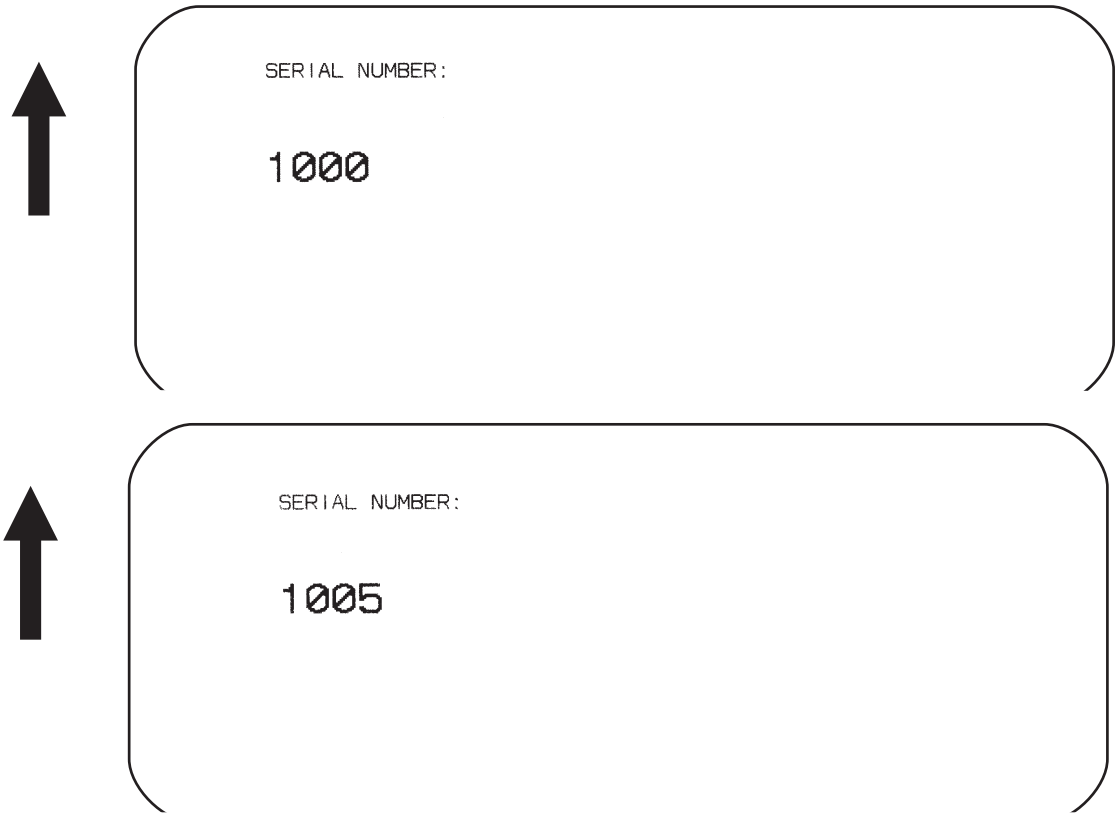
Default: None

Command Function To allow the ability to print sequential fields (text, bar codes) where all incrementing is done within the printer. Up to eight different sequential fields can be specified per label. Sequencing is effective for up to 99-digit numeric data within each field.

Input to Printer

```
<ESC>A<ESC>H0100<ESC>V0100<ESC>MSERIAL NUMBER:
<ESC>H0100<ESC>V0200<ESC>F001+005
<ESC>L0202<ESC>M1000
<ESC>Q2<ESC>Z
```

Printer Output



Special Notes

1. The value specified for Print Quantity should be equal to the number of different sequential values desired multiplied by the number of repeats specified.

Example:
To print 2 sets each of the numbers 1001-1025 on separate labels, we need 50 total labels. The commands would be as follows:

<ESC>A
<ESC>H0100<ESC>V0100<ESC>**F002+001**<ESC>XM1001
<ESC>Q50
<ESC>Z

2. It is necessary to specify the print position for each sequential field on a label.

3. Up to eight different sequential fields can be specified per label.

4. This command ignores alpha characters in the sequential number field.

5. This command can not be used with the following commands:
   Copy Image
   Reverse Image
   Line Feed

Start/Stop Label

Command Structure

Start Command: <ESC>**A**
Stop Command: <ESC>**Z**

Example: See above

Placement: <ESC>A must precede data
<ESC>Z must follow data

Default: None

Command Function

For all print jobs, the Start command must precede the data, and the Stop command must follow. The print job will not run properly if these are not in place.

Input to Printer

<ESC>**A**
<ESC>H0001<ESC>V0100<ESC>WB1SATO
<ESC>H0130<ESC>V0200<ESC>B103150*M-8485S*
<ESC>H0170<ESC>V0360<ESC>L0202<ESC>S*M-8485S*
<ESC>Q1<ESC>**Z**

Printer Output

There is no output for these commands they are not accompanied by other label printing commands. However, these commands must precede and follow each print job sent to the printer.

CALENDAR COMMANDS

The following commands in this section are used to control the Calendar Functions.

Calendar Increment

Command Structure <ESC>**WPabbb**

a = Y Years
M Months
D Days
h Hours
W Week Number

bbb = Numeric data: Years (0-9), Months (01-99), Days (001-999), Hours (000-999), Week (00-99)

Example: <ESC>**WPM03**

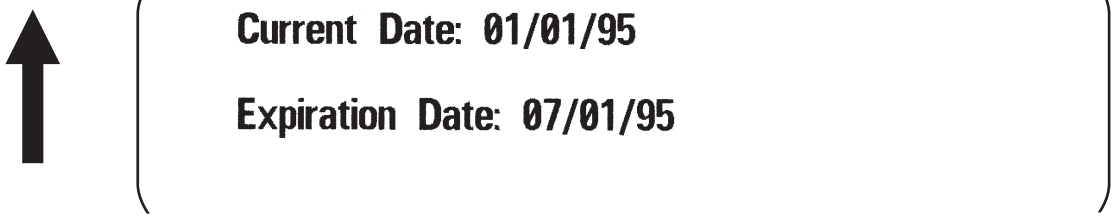
Placement: Anywhere within the data stream

Default: None

Command Function To add a value to the printer's current date and/or time, which may then be printed on the label. This command does not change the printer's internal clock setting.

Input to Printer

```
<ESC>A
<ESC>H0100<ESC>V100<ESC>XB1Current Date:
<ESC>WAMM/DD/YY
<ESC>WPM06
<ESC>H0100<ESC>V0200<ESC>XB1Expiration Date:
<ESC>WAMM/DD/YY
<ESC>Q1<ESC>Z
```



Printer Output

Special Notes:

1. Once the year increments past "99" it will wrap back to "00".
2. This command can only be used once per data stream.
2. The printer's internal clock may be set through the Calendar Set command.

4. If a print quantity of more than one label per job is used, the same time and date will be on each label of the entire print job.

5. Calendar Increment Example:
   1998 January 15 (ww=03) plus 48 weeks = week 51

6. The Week Calendar specification follows ISO8601. Days of the week are numbered 1 thru 7, beginning with Monday. The first week of the year is the week containing the first Thursday. If January 1st falls on Friday, it belongs to the last week of the previous year. If December 31st falls on a Wednesday, it belongs to the first week of the following year. If Calendar Increment calculation extends over the year, the result belongs to the week number of the following year.

Calendar Print

Command Structure <ESC>**WA(elements)**

(elements) =

YYYY	4 digit Year (1981-2080)
YY	2 digit Year (00-91)
MM	Month (01-12)
DD	Day (01-31)
HH	12 Hour Clock (00-11)
hh	24 Hour Clock (00-23)
mm	Minute (00-59)
ss	Seconds (00-59)
TT	AM or PM
JJJ	Julian Date (001-366)
WW	Week (00-53)
ww	Week (01-54)

Example: <ESC>**WAMM/DD/YY hh:mm**

Placement: Anywhere within the data stream

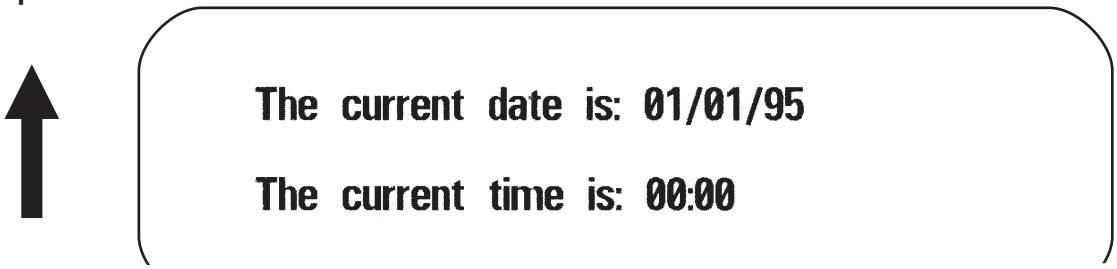
Default: None

Command Function To specify the printing of a date and/or time field from the printer's internal clock. This may be used to date/time stamp your labels.

Input to Printer

```
<ESC>A
<ESC>H0100<ESC>V0100<ESC>XB1The current date is:
<ESC>XB1<ESC>WAMM/DD/YY
<ESC>H0100<ESC>V0200<ESC>XB1The current time is:
<ESC>XB1<ESC>WAhh:mm
<ESC>Q1<ESC>Z
```

Printer Output



Special Notes

1. The date and time elements may be placed in any order for printing.
2. Use a slash (/) to separate date elements and a colon (:) to separate time elements.

3. The font for the date/time elements must be specified before this command.

4. The printer's internal clock may be set through the Calendar Set command.

5. This command can be used up to six times per job.

6. The Copy (<ESC>WD), Mirror Image (<ESC>RM) or Reverse Image (<ESC>/)commands cannot be used with this command.

7. Up to 16 characters can be used with this command.

8. Century ranges are:

   For Year = YY, any year equal to or greater than 80 and less than or equal to 99, then the century equals 19

   For Year specified as YYYY=1999, and printed as <ESC>WAYY, will be equal to 99.

9. The Julian date is the accumulated day from January 1st to the current date. The first day of the year is January 1st (001) and the last day of the year is December 31st (365 or 366 for leap years).

10. The TT command should not be specified for printing in numeric only bar codes.

Calendar Set

Command Structure <ESC>**WTaabbccddee**

aa = Year (00-99)
bb = Month (01-12)
cc = Day (01-31)
dd = Hour (00-23)
ee = Minute (00-59)

Example: <ESC>**WT9101311200**

Placement: This command must be sent in an independent data stream.

Default: None

Command Function To set the time and date of the printer's internal clock.

Input to Printer:

<ESC>A
<ESC>**WT9312251300**
<ESC>Z

Printer Output There is no printer output for this command. It sets the current date to December 25, 1993 and the current time to 1:00 PM in the printer.

Special Notes None

EXPANDED MEMORY OPTION COMMANDS

These commands require the optional Expanded Memory.

Note: Before Expanded Memory can be used for the first time, it must be initialized using the <ESC>BJF command. If it is not initialized, the printer will not recognize the memory and respond as if no expanded memory was installed.

Expanded Memory Function
Clear Expanded Memory

Command Structure <ESC>*a,bbb

a = Memory card section to be cleared
- G To clear SATO graphic files from memory card
- P To clear PCX graphic files
- F To clear formats from the memory card
- O To clear TrueType fonts
- R To clear BMP graphic files

bbb = Memory Card storage area to be cleared
001 to 999 for Graphics, PCX or Formats
000 to 099 for TrueType fonts

Example: <ESC>***G,01**

Placement: This command should be sent to the printer immediately following the <ESC>CC Memory Area Select command.

Default: None

Command Function To clear individual memory areas in the Expanded Memory.

Input to Printer
```
<ESC>A
<ESC>CC1<ESC>*O,09
<ESC>Z
```

Printer Output There is no printer output as a result of this command.

Special Notes

1. To clear everything in the Expanded Memory, use the <ESC>BJF Expanded Memory Initialize command.
2. This command is ignored if there is no data to be cleared.
3. This command is ignored if Expanded Memory is not installed in the printer.

Expanded Memory Function Fonts, TrueType Recall

Command Structure

<ESC>**BJRabbccddeeffffgg...g**
<ESC>**BJTaa,bb,cc,dd,ee,ffff,gg...g**

a	=	Font ID (0 thru 9)
aa	=	Font ID (00 thru 99)
bb	=	Horizontal Expansion (01 thru 12)
cc	=	Vertical Expansion (01 thru 12)
dd	=	Character Pitch (01 thru 99)
ee	=	Reserved, always 00
f f f f	=	Number of characters to be printed using the font
gg..g	=	Data to be printed

Example: **<ESC>BJR1020201000004SATO**

Placement: Immediately following the <ESC>CC Slot Select command.

Default: None

Command Function

This command recalls previously stored bit mapped TrueType fonts from Expanded Memory.

Printer Input

<ESC>A
<ESC>V0100<ESC>H0100<ESC>CC1<ESC>**BJT01,02,02,01,00,0004,SATO**
<ESC>Q1<ESC>Z

Printer Output

Special Notes

1. TrueType fonts are stored in a fixed size bit mapped format by this command.

Expanded Memory Function Fonts, TrueType Store

Command Structure

Begin Download <ESC>**BJ(aa...abb..b**
Download <ESC>**BJDcccccddddee...e**
End Download <ESC>**BJ)**

aa..a = 40 byte font description
bb..b = 10 byte date information
ccccc= Memory offset (hexadecimal)
dddd = Number of data bytes to be stored (0001-2000)
ee...e= Font data to be downloaded

Example: <ESC>**BJ({50 byte header}**
<ESC>**BJD{5 byte hex memory offset}{data}**
<ESC>**BJ)**

Placement: Immediately following the <ESC>CC Slot Select command.

Default: None

Command Function

This command allows bit mapped TrueType fonts to be stored in a Expanded Memory.

Printer Input

The download data stream is very complex and it is recommended that the TrueType Download utility program be used instead of manually creating the required command and data stream.

Printer Output

There is no printer output as a result of this command. See <ESC>BJR TrueType Font Recall command.

Special Notes

1. This command requires the Expanded Memory option. See your SATO representative for details.

2. The SATO TrueType Download utility program can be used to automate the download process from a computer running Windows 3.1 or above. A copy of this utility program is included as a part of the Expanded Memory Option.

Expanded MemoryFunction Format/Field Recall

Command Structure <ESC>**YR,aa** <ESC>**/D,bb,cc...c**

aa = Format number to be recalled (01-99)
bb = Field number to be recalled (01-99)
cc...c = Data to be placed in recalled field.

Example: <ESC>**YR,01**<ESC>**/D,01,99**

Placement: Immediately after <ESC>CC Memory Area Select command

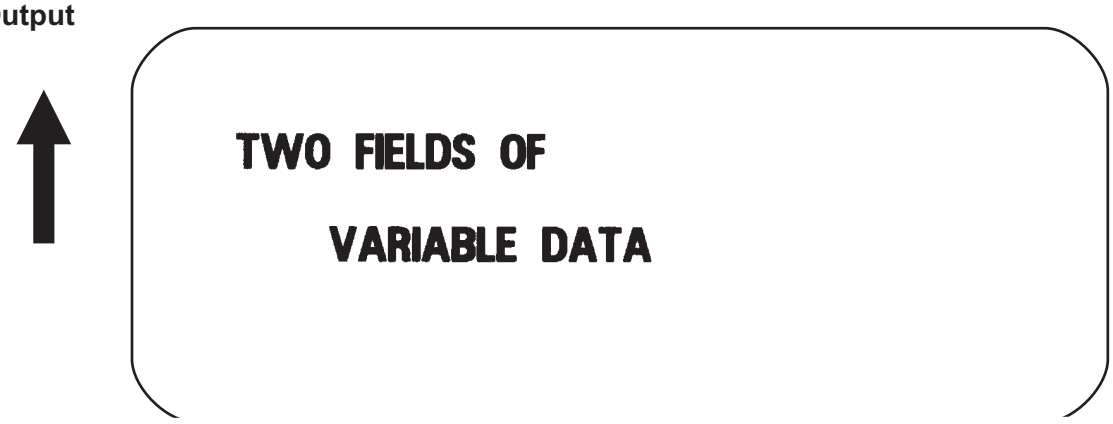
Default: None

Command Function To recall a field from a stored format and place new data in the field.

Printer Input

```
<ESC>A
<ESC>CC1
<ESC>YR,02<ESC>/D,01,TWO FIELDS OF<ESC>/D,02,VARIABLE DATA
<ESC>Q1<ESC>Z
```

Printer Output



Special Notes

1. This command requires the Expanded Memory option. See your SATO representative for details.

2. Only one format can be recalled at a time. However, multiple fields may be recalled from the same format.

3. The number of data characters contained in the “cc...c” field cannot exceed the value designated in the <ESC>/N Field Store command. If it does, the data will be truncated to fit the field length defined in the Field Store Command.

Expanded Memory Function Format/Field Store

Command Structure

<ESC>**YS,aa**<ESC>**/N,bb,cc{.....}**

aa = Format number to be stored (01-99)
bb = Field number to be stored (01-99)
cc = Length of field to be stored (01-99)
{.....} = Command stream describing the field to be stored.

Example: <ESC>**YS,01**<ESC>**/N,01,05**

Placement: Immediately after <ESC>CC Memory Area Select command.

Default: None

Command Function

To store a format field description in the memory card.

Printer Input

<ESC>A
<ESC>CC1
<ESC>**YS,02**<ESC>**/N,01,13**<ESC>V0100<ESC>H0100<ESC>XB1
<ESC>**/N,02,13**<ESC>V0200<ESC>H0200<ESC>XB1
<ESC>Z

Printer Output

There is no printer output as a result of this command. See <ESC>YR Format/Field Recall command.

Special Notes

1. This command requires the Expanded Memory option. See your SATO representative for details.

2. Each job should be sent individually. If more than one job is sent in a data stream, only the first one will be accepted and the remainder ignored.

3. The following commands cannot be stored in a format:

<ESC>CS	Print Speed	<ESC>C	Repeat Label
<ESC>NULL	Cut Label	<ESC>Q	Print Quantity
<ESC>/D	Recall Field	<ESC>EX	Expanded Label Storage
<ESC>T	Custom Characters	<ESC>&	Store Form Overlay
<ESC>@	Off Line	<ESC>#E	Print Darkness
<ESC>BJ	TrueType Fonts	<ESC>ID	Store Job ID
<ESC>G	Store Custom Graphics	<ESC>*	Clear Memory & Buffer
<ESC>BT	Variable Ratio Bar Codes	<ESC>PI	Store PCX Graphics
<ESC>0	Partial Edit		

Expanded Memory Function
Form Overlay Recall

Command Structure

<ESC>**&R,aa**

aa = Storage Number (01 to 99)

Example: <ESC>**&R,01**

Placement: Following The <ESC>CC Memory Area Select Command

Command Function

To recall the label image from stored in the Expanded Memory.

Input to the Printer

<ESC>A
<ESC>CC1
<ESC>**&R,01**
<ESC>Q1<ESC>Z

Printer Output

To be added

Special Notes

1. The Expanded Memory option is required for this command. See your SATO representative for details.
2. The <ESC>CC Memory Area Select Command must be sent prior to this command.
3. Several label images stored under different Storage Numbers can be printed with this command.
4. The Storage number must be specified.
5. A Read/Write error will occur if an unused Storage number is specified by this command.
6. The label image reference point will be V=1 H=1 if the window area has not been specified.
7. The label image can be moved by using the <ESC>V and <ESC>H commands when it is stored along with a window size. If it exceeds the printable area by being moved, the label image will be truncated.

Expanded Memory Function Form Overlay Store

Command Structure <ESC>**&S,aa,bbbb,cccc**

aa = Store Number (01 to 99)
bbbb = Horizontal size of window (50 to H max)
cccc = Vertical size of window (50 to V max)

Example: <ESC>**&S,01**

Placement: Following the <ESC>CC Memory Area select Command

Default: None

Command Function To store a label image in Expanded Memory

Printer Input

```
<ESC>A
<ESC>CC1
<ESC>&S,01
<ESC>Z
```

Printer Output There is no printer output as a result of this command.

Special Notes

1. The <ESC>CC Memory AreaSelect command must be sent before this command.

2. The label image must be divided from other label images by the <ESC>A and <ESC>Z bounding commands.

3. The parameters of “bbbb” and “cccc” may be omitted. By specifying them, the label image can be moved by using the <ESC>V and <ESC>H position commands when recalling the label image. If the repositioned label image exceeds beyond the printable area, the image will be truncated. If an <ESC>A1 Media Size Command has been sent to the printer, the maximum size form that can be stored is the size of label defined by the command.

4. A label image cannot be stored in a location that already contains data.

5. Graphics, PCX and BMP files can be stored with this command.

6. As many as 99 Form Overlays can be stored, however their combined storage area cannot exceed the available memory.

7. The forms stored by this command are cleared by the <ESC>*R command.

Expanded Memory Function
BMP Graphics Recall

Command Structure <ESC>**GCaaa**

aaa = Storage Number (001 to 999)

Example: <ESC>GC001

Placement: After the CC Memory Area Select command.

Default: None

Command Function To recall a previously stored BMP file stored in Expanded Memory

Printer Input

<ESC>A
<ESC>CC1<ESC>V100<ESC>H100
<ESC>**GC001**
<ESC>Q1<ESC>Z

Printer Output

Special Notes

1. The <ESC>CC Memory Area Select command must be sent before this command.
2. The printed image can be expanded or rotated.

Expanded Memory Function
BMP Graphics Store

Command Structure

<ESC>**GTaaa,bbbbb,nn...n**

aaa = Storage area number (001 thru 999)
bbbbb= Size of BMP file in bytes
nn..n + Data

Example: <ESC>**GT001**

Placement: This command must be placed within its own data stream specifying the placement of the graphic.

Default: None

Command Function

To store for printing a graphic file in a BMP format in the optional Expanded Memory.

Printer Input

<ESC>A
<ESC>CC1<ESC>**GT001, 12345, nn...n**
<ESC>Q1<ESC>Z

Printer Output

There is no printer output as a result of this command.

Special Notes

1. This command requires the Expanded Memory Option. See your SATO representative for details.
2. Data must be sent in binary format.
3. The Memory Area Select Command <ESC>CCa must be sent before this command.
4. The first 62 bytes of the stored file is used for the header and the remainder is the BMP image data.
5. The graphic will not be printed correctly if the specified size does not match the actual graphic size.
6. Only black and white non-compressed BMP files can be stored. Color BMP files will cause an error.
7. If you try to store an image in a memory area that already contains data, an error will occur.

Expanded Memory Function Graphics, Custom Recall

Command Structure **<ESC>GRaaa**

aaa = Graphics storage number (001-999)

Example: <ESC>**GR111**

Placement: The Recall command is sent in a secondary data stream to print the graphic, and follows any necessary position or size commands.

Default: None

Command Function Use the Recall command any time you want to print a graphic image on a label along with other printed data.

Printer Input

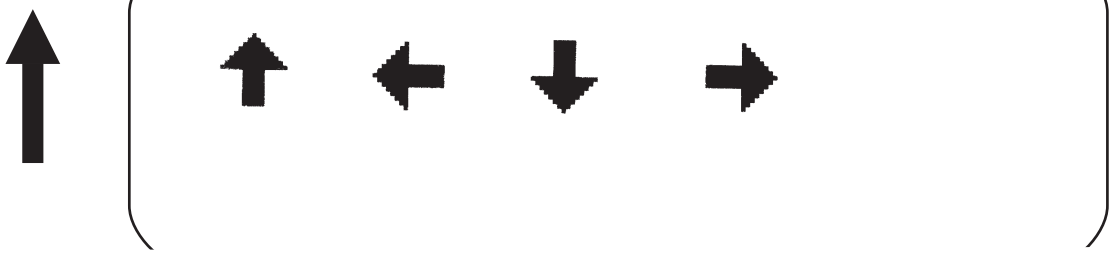
Non Rotated Graphic
<ESC>A<ESC>CC1
<ESC>V0100<ESC>H0080<ESC>L0505
<ESC>**GR001**
<ESC>Q1<ESC>Z

Graphic Rotated 90°
<ESC>A<ESC>CC1<ESC>%1
<ESC>V0180<ESC>H0250<ESC>L0505
<ESC>**GR001**
<ESC>Q1<ESC>Z

Graphic Rotated 180°
<ESC>A<ESC>CC1<ESC>%2
<ESC>V0180<ESC>H0500<ESC>L0505
<ESC>**GR001**
<ESC>Q1<ESC>Z

Graphic Rotated 270°
<ESC>A<ESC>CC1<ESC>%3
<ESC>V0100<ESC>H0700<ESC>L0505
<ESC>**GR001**
<ESC>Q1<ESC>Z

Printer Output



Special Notes

1. The graphic image to be stored cannot be rotated before it is stored. It can be rotated when it is recalled.
2. Graphic images cannot be stored as part of a label format.
3. See the <ESC>GI Custom Graphic Store command.

Expanded Memory Function Graphics, Custom Store

Command Structure

<ESC>**Glabbbcccddd{data}**

a = Specifies character format of the data
H Hex data
B Binary data
bbb = Number of horizontal 8 x 8 blocks (see Note 7 for range)
ccc = Number of vertical 8 x 8 blocks (see Note 7 for range)
ddd = Graphics storage number (001-099)
{data}= Hex or binary data to describe the graphic image

Example: See Appendix C for detailed information on creating Hex and Binary graphic files.

Placement: Immediately following the <ESC>CC Memory Area Select command.

Default: None

Command Function

To provide similar functionality to the <ESC>G Custom Graphic command, but allows for the graphic image to be stored in Expanded Memory. Use the Store command to send the graphic data to the printer, which is held in the optional Expanded Memory, even if printer power is lost.

Printer Input

<ESC>A
<ESC>CC1<ESC>**GIH002002001**
0100038007C00FE01FF03FF87FFCFFFE07C007
C007C007C007C007C007C007C0
<ESC>Z

Note: See Appendix C for detailed explanation on how to format a graphics data stream.

Printer Output

There is no printer output as a result of this command. See <ESC>GR Recall Custom Graphics command.

Special Notes

1. You must have the optional Expanded Memory to use this command. Call your SATO representative for details.

2. The maximum storage capacity is 999 graphics, up to the capacity of the memory card used.

3. If a data transmission error occurs, the printer will beep and the “ERROR” LED will come on. You must then retransmit the image.

4. Each graphic to be stored must be sent in its own data stream.

Example of correct data stream:

<ESC>A
<ESC>**GIHaaabbb001(DATA)**
<ESC>Z
<ESC>A
<ESC>**GIHaaabbb002(DATA)**
<ESC>Z

Example of incorrect data stream:

<ESC>A
<ESC>**GIHaaabbb001(DATA)**
<ESC>**GIHaaabbb002(DATA)**
<ESC>Z

5. Do not use ASCII <CR> or <LF> characters (carriage return or line feed) as line delimiters within the graphic data or the actual image will not be printed as specified.

6. The graphics storage number (ddd) must be specified with this command.

	M-8459Se	**M-8460Se**	**M-8485Se**	**M-8490Se**
Hor Blocks **bbb**	001 to 112	001 to 152	001 to 128	001 to 168
Vertical Blocks Default **ccc**	001 to 178	001 to 178	001 to 178	001 to 267
Expanded **ccc**	001 to 999	001 to 999	001 to 999	001 to 999

Expanded Memory Function Graphics, PCX Recall

Command Structure

<ESC>**PY**aaa

aa = Storage area number (001 thru 999)

Example: <ESC>**PY001**

Placement: This command must be placed within its own data stream specifying the placement of the graphic.

Default: None

Command Function

To recall for printing a graphic file previously stored in a PCX format in the Memory Card.

Printer Input

Normal Rotation
<ESC>A<ESC>CC1
<ESC>V0100<ESC>H0050<ESC>**PY001**
<ESC>Q1<ESC>Z

Rotate Base Reference Point
<ESC>A<ESC>CC1<ESC>%1
<ESC>V0330<ESC>H0160<ESC>**PY001**
<ESC>Q1<ESC>Z

2nd Rotation, Base Reference Point
<ESC>A<ESC>CC1<ESC>%2
<ESC>V0330<ESC>H0600<ESC>**PY001**
<ESC>Q1<ESC>Z

3rd Rotation, Base Reference Point
<ESC>A<ESC>CC1<ESC>%3
<ESC>V0100<ESC>H0800<ESC>**PY001**
<ESC>Q1<ESC>Z

Printer Output

Special Notes:

1. This command requires Expanded Memory option. See your SATO representative for details.
2. See the <ESC>PI Store PCX Graphics command.

Expanded Memory Function Graphics, PCX Store

Command Structure **<ESC>PI**aaa,bbbbb,{data}

aaa = Storage area number (001 thru 999)
bbbbb = Size of PCX file in bytes
{data} = Data

Example: <ESC>**PI001,32000,{data}**

Placement: This command must be placed within its own data stream

Default: None

Command Function To store for later printing a PCX graphic file in the Expanded Memory.

Printer Input BASIC Program to Download a PCX file to Expanded Memory Area #1, Storage Area #1

```
OPEN “C:\WIZARD\GRAPHICS\LION.PCX” FOR INPUT AS #2
DA$ = INPUT$(3800,#2)
C$ = CHR$(27)
WIDTH “LPT1:”,255
LPRINT C$;"A";C$;"CC1";
LPRINT C$; “PI001,03800,”;DA$
LPRINT C$;"Z";
CLOSE #2
```

Printer Output There is no printer output as a result of this command. See <ESC>PY PCX Graphics Recall command.

Special Notes:

1. This command requires Expanded Memory option. See your SATO representative for details.
2. Graphics cannot be stored as part of a format.
3. Only black and white PCX files can be stored.
4. The file size specified by this command is the DOS file size in bytes.

Expanded Memory Function Initialize

Command Structure

<ESC>**BJFaaaaaaaa**

aaaaaaa = Eight character alphanumeric user ID

Example: <ESC>BJFsatocard

Placement: Immediately following the <ESC>CC Memory Area Select command.

Default: None

Command Function

This clears all of the data from Expanded Memory in the specified memory area and prepares the area to accept data.

Input to Printer

```
<ESC>A
<ESC>CC2<ESC>BJFsatocard
<ESC>Z
```

Printer Output

There is no printer output as a result of this command.

Special Notes

1. You must have the optional Expanded Memory to use this command. Call your local SATO representative for information.

2. All Expanded Memory must be initialized before it can be used for the first time.

3. Care should be exercised when using this command as it destroys any data previously written to the card. It will clear all data from the card and assign the new ID (“satocard” in the above example).

Expanded Memory Function
Memory Area Select

Command Structure

<ESC>**CCa**

a = Memory Area
- 1 Memory Area 1
- 2 Memory Area 2

Example: <ESC>**CC1**

Placement: Immediately following the <ESC>A Start Code.

Default: Last selected Memory Area.

Command Function

Selects the Memory Area to be used for following Expanded Memory commands.

Printer Input

<ESC>A
<ESC>**CC1**
{commands}
<ESC>Z

Printer Output

There is no printer output as a result of this command.

Special Notes

1. This command requires the Expanded Memory option. See your SATO representative for more information.

2. The Memory Areas specified by this command may be reversed using the LCD menu/configuration panel.

3. Unless otherwise modified via the LCD menu/configuration panel (see *Section 3:Card Mode*), CC1 selects the PCMCIA Expanded Memory and CC2 selects the internal Expanded Memory.

Expanded Memory Function Status

Command Structure <ESC>**BJS**

Example: **<ESC>BJS**

Placement: After the <ESC>CC Memory Area Select command.

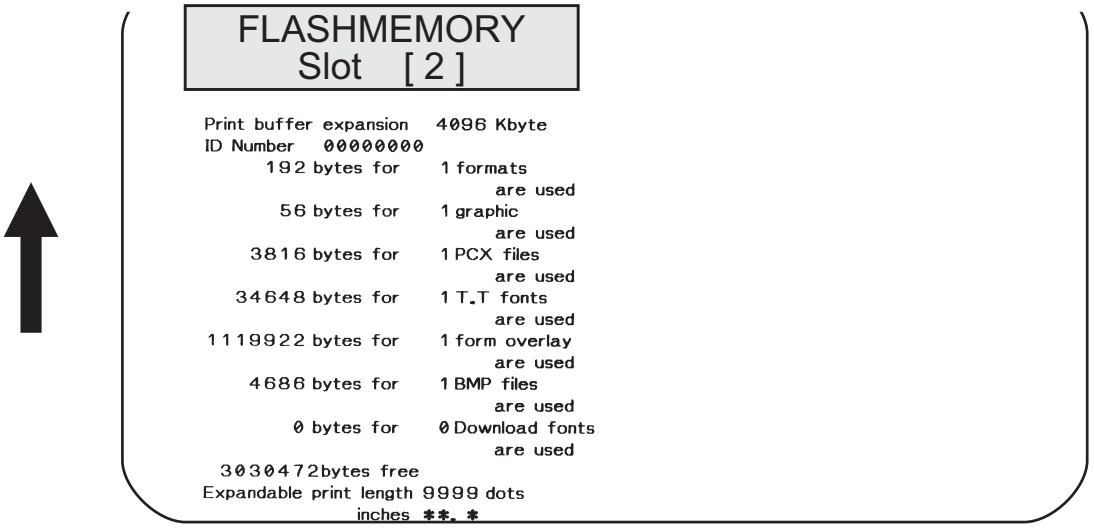
Default: None

Command Function Casues the printer to print the card status.

Printer Input

<ESC>A
<ESC>CC1<ESC>**BJS**
<ESC>Z

Printer Output



Special Notes

1. This command requires the Expanded Memory option. See your SATO representative for more information

2. The following information is provided on the status label:
   Line 1: Memory size in Kbytes
   Line 2: The ID number assigned with the <ESC>BJF command
   Line 3: Number of formats stored and bytes used
   Line 4: Number of graphics stored and bytes used
   Line 5: Number of PCX files and bytes used
   Line 6: Number of bit-mapped TT fonts stored and bytes used
   Line 7: Number of BMP files stored and bytes used
   Line 7: Remaining free memory
   Line 8: Max expandable print length

TWO-DIMENSIONAL SYMBOLS

The following commands are used to create the two-dimensional symbologies supported by the printers.

Two-Dimensional Bar Codes
Data Matrix, Data Format

Command Structure

<ESC>**BXaabbccddeeefffghh**

aa = Format ID. 01-06 or 11-16. The values 07 and 17 will not be accepted by the printer.
bb = Error correction level. 00 ,05, 08, 10, 14 or 20 or 200. All other values will be processed as a 00.
cc = Horizontal cell size. 03 - 12 dots/cell.
dd = Vertical cell size. 03 - 12 dots/cell.
eee = Number of cells in one line. Must use 000 to optimize.
fff = Number of cell lines. Must use 000 to optimize.
g = Mirror Image
  0 = Normal Print
  1 = Reverse Print
hh = Guide Cell Thickness. 01-15. 01 indicates normal type.

Example: <ESC>**BX03080505000000001**

Placement: Immediately preceding data to be encoded

Default: None

Command Function

To designate the format for a Data Matrix two-dimensional bar code image on a label.

Printer Input

<ESC>A
<ESC>%0<ESC>V0100<ESC>H0100<ESC>**BX05051010000000001**
<ESC>DCDATA MATRIX DATA MATRIX
<ESC>Q1<ESC>Z

Printer Output

There is no printer output as a result of this command. See the <ESC>DC Print Data command for printer output.

Special Notes

1. If any of the parameters entered are outside the valid range, a symbol will not be printed when the <ESC>DC Print Data command is sent to the printer.

2. The number of cells per line (eee) and the number of cell lines (fff) should be specified as all zeroes, allowing the printer to automatically calculate the optimum configuration for the symbol.

3. The Reference Point for the Data Matrix symbol is the upper-left corner.

4. The Format ID specified for “aa” is defined by the following table. The printer only supports the Format ID’s defined in the table.

ECC Level (bb)	Format ID (aa)					
	01	**02**	**03**	**04**	**05**	**06**
00 (ECC000)	500	452	394	413	310	271
05 (ECC050)	457	333	291	305	228	200
08 (ECC080)	402	293	256	268	201	176
10 (ECC100)	300	218	190	200	150	131
14 (ECC140)	144	105	91	96	72	83
20 (ECC200)		Numeric			3116	
		Alphanumeric			2336	
		ISO 8-bit (01_H - FF_H)			1556	

5. The character set or each Format ID is:

ID NUMBER	CHARACTER SET	ENCODING SCHEME
16 Bit CRC		
01	Numeric, Space	Base 11
02	Upper Case Alpha, Space	Base 27
03	Upper Case Alpha, Space,Comma, Period, Slash, Minus	Base 41
04	Upper Case Alphanumeric, Space	Base 37
05	ASCII 7-bit, Full Keyboard (20_H -$7F_H$)	ASCII
06	ISO 8-bit, International (20_H -FF_H)	8-Bit

Two-Dimensional Bar Codes
Data Matrix, Print Data

Command Structure

<ESC>**DCxx...x**

xx...x = Data to be encoded

Example: <ESC>**DC00006000**

Placement: Immediately following the <ESC>BC Data Format designation command or the <ESC>FX Sequential Numbering command.

Default: None

Command Function

To print a Data Matrix two-dimensional bar code image on a label.

Printer Input

```
<ESC>A
<ESC>%0<ESC>V0100<ESC>H0100<ESC>BX05051010000000001
<ESC>DCDATA MATRIX DATA MATRIX
<ESC>Q1<ESC>Z
```

Printer Output

Special Notes

1. If an <ESC>BX Data Format designation command contains any parameters out of the valid range, no symbol will be printed when this command is sent.

Two-Dimensional Bar Codes
Data Matrix, Sequential Numbering

Command Structure <ESC>**FXaaabcccdddeee**

aaa = Number of duplicate labels to be printed (001 -999)
b = Increment or Decrement
+ = Increment
- = Decrement
ccc = Increment/Decrement Steps (001 - 999)
ddd = Sequential numbering start position (001 - 999) Referenced to left side.
eee = Incremented data length measured from start position (001 - 999)

Placement: Immediately following the <ESC>BX Data Format designation command and preceding the <ESC>DC Print Data Command.

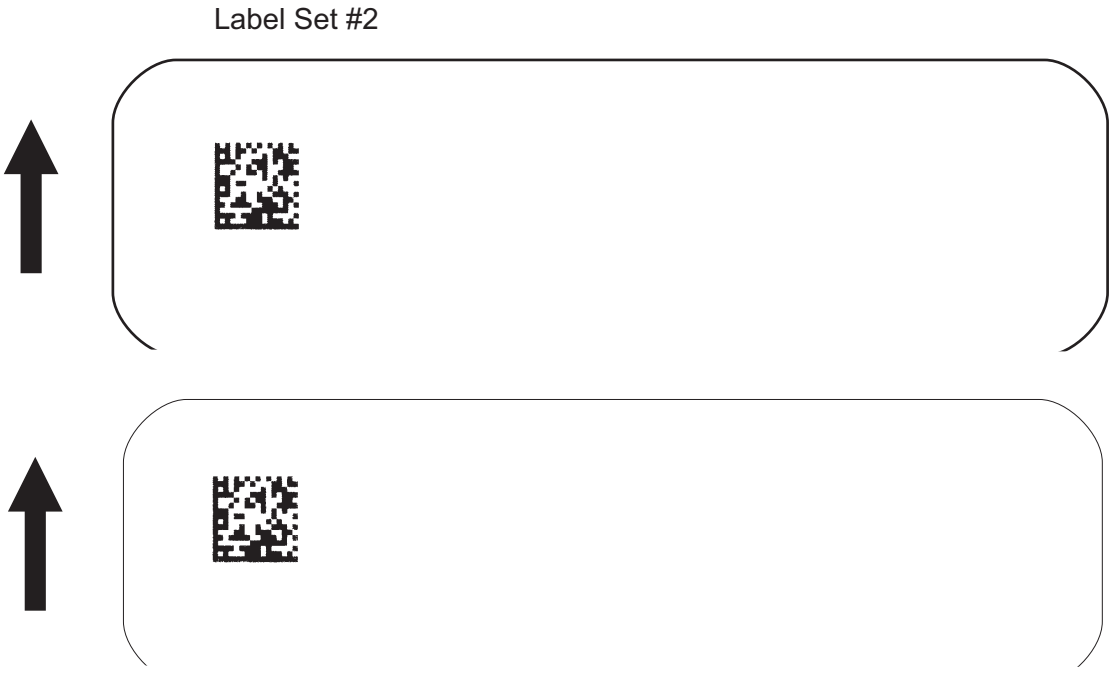
Default: None

Command Function To print sequential numbered Data Matrix symbols.

Printer Input

```
<ESC>A
<ESC>V0100<ESC>H0100
<ESC>BX03081010000000001
<ESC>FX002+001005003<ESC>DC000060000
<ESC>Q4<E SC>Z
```

Printer Output Label Set #1



Special Notes

1. The maximum number of <ESC>FX Sequential Numbering commands that can be used in one job is eight.

2. In the example above four total labels will be printed (<ESC>FX002+005003<ESC>DC00006000), the sequential numbering will start at position 5 and the three digits “600” will be incremented in steps of 1. A total of two sets of labels will be printed, the first set of two labels with the value “00006000” and the next two label set with the value “00006010”.

	Label Set #1		Label Set #2
1st Label	00006000	3rd Label	00006010
2nd Label	00006000	4th Label	00006010

3. The <ESC>Q Label Quantity command must be set for the total number of labels to be printed. In the above example, the value for the <ESC>Q command should be 2 sets x 2 labels/set = 4. If, in the above example, it was set to a value of “1”, only the first label would be printed.

Two-Dimensional Bar Codes
Maxicode

Command Structure <ESC>**BVa,b,c,ddddddddd,eee,fff,gggg.....<ESC>**

a = Position of Maxicode symbol within the set, when used in a structured append format 1~8.
b = Total number of Maxicode symbols in the set, when used in a structured format 1~8.
c = 2 For Mode 2 Structured Carrier Message for Domestic U.S. UPS shipments
3 For Mode 3 Structured Carrier Message for International UPS shipments
4 Standard symbol
5 Not currently supported
6 Reader programming
ddd..dd 9 digit numeric Postal Code
eee = 3 digit numeric Country Code
fff = 3 digit numeric Service Class
gg..g = Data, terminated by <ESC>

Example: <ESC>**BV1,2,3,123456789,222,333,MESSAGE<ESC>**

Placement: Immediately preceding data to be encoded

Default: None

Command Function To print a Maxicode two-dimensional bar code image on a label. See Appendix B for specific information on using each individual bar code symbol.

Command Function To print a UPS Maxicode symbol.

<ESC>A<ESC>V0100<ESC>H0100
<ESC>**BV1,1,2,123456789,840,001,[)<RS>01<GS>961Z01547089<GS>UPSN<GS>056872<GS>349<GS>99999999<GS>001/005<GS>029<GS>N<GS><GS>LENEXA<GS>KS<RS><EOT>**
<ESC>Q001<ESC>Z

Printer Output

Special Notes

1. <RS> represents Hex 1E, <GS> represents Hex 1D, <EOT> represents Hex 04, <ESC> represents Hex 1B and <SP> represents Hex 20.

Two-Dimensional Bar Codes
PDF417

Command Structure <ESC>**BK**aabbcddeeffffnn...n,g

aa = Minimum module dimension (01-09 dots). Will not print if values of 01, 02 or greater than 10 are specified.
bb = Minimum module pitch dimension (01-24 dots). Will not print if values of 01, 02, 03 or greater than 25 are specified.
c = Security (error detection) Level (1-8).
dd = Code words per line (01-30). If 00 is specified for both dd and ee, the printer automatically optimizes the number of rows per symbol.
ee = Rows per symbol (00 or 03-40). If 00 is specified for both dd and ee, the printer automatically optimizes the number of rows per symbol.
ffff = Number of characters to be encoded (0001-2700).
nn...n = Data to be printed.
g = PDF417 type. If not specified, standard PDF417
T Truncated PDF417
M Micro PDF417

Example: <ESC>BK0304400000021

Placement: Immediately preceding data to be encoded

Default: None

Command Function To print a PDF417 two-dimensional bar code image on a label.

Printer Input

<ESC>A
<ESC>V0100<ESC>H0100<ESC>**BK0607400000021PDF417 PDF417 PDF417**
<ESC>Q1<ESC>Z

Printer Output

Special Notes

1. When the code words per line and the number of rows per symbol (“dd” and“ee”) are set to all zeroes, the printer will calculate the optimum configuration.

2. If the product of the values entered for “dd” and “ee” are not equal to or less than the value of “fff” (i.e.,“ffff” is greater that “dd” x “ee”), an error will occur and the symbol will not be printed. It is recommended that these values each be set to “000” and the printer be allowed to automatically calculate the optimum values.

3. The values for “dd” and “ee” need to be made larger if the security level is increased.

4. The maximum data length is 2700 characters, but may be less depending upon:
   - the minimum module dimension (“aa”)
   - the security level specified by “c”.
   - the number of data characters

5. The Reference Point of the PDF417 symbol is the upper-left corner.

6. The <ESC>F Sequential Numbering command cannot be used with this command.

7. The <ESC>E Line Feed command cannot be used with this command.

8. The values 00_H thru $1F_H$ can be specified as print data.

9. This command can be stored in a format.

10. The print height of the symbol will vary depending upon the data specified; numeric only, alpha only or alphanumeric.

11. For module dimensions less than “4”, symbol quality may be degraded.

QR Code

Command Structure

<ESC>**2D3m,a,bb,c,d (,ee,f f,gg)**
<ESC>**DSk,nn.....n**
<ESC>**DNIIII,xx.....x**

m = Model
0 Model 2
1 Model 1
2 Micro QR Code

a = Error Correction Level
L 7%
M 15%
Q 25%
H 30%

bb = Cell Size (01 to 32 dots/cell)

d = Connection Mode
0 Normal
1 Connection (parameters ee, ff and gg will be used if the file is split into several blocks as independent symbols)

ee = Total Connection Number (01 - 16)

f f = Connection number of each symbol encoded as an independent symbol (01 - 16)

gg = Connection Mode Parity Data (00_H - FF_H)

k = Input Data Type
1 Numeric
2 Alphanumeric
3 Kanji (shift JIS Code)

nn...n = Data

xx...x = Data Size. Used in Automatic or Manual mode with binary data (0001 - 2953 bytes)

Special Notes

1. Contact SATO Technical Support for specific usage information.
2. Parameters “c”, “d”, “ee”, “f f” and “gg” are not used for Micro QR Code.
3. Parameter “xx...x” is limited to 0001 to 0486 bytes for Model 1 and Micro QR Code.
4. The data command should be used according to the input mode or data type.
5. In Automatic Mode, the data for 80_H to $9F_H$ or $E0_H$ to FF_H will be interpreted as Kanji, not binary data

6. In Manual Mode, The multiple data fields for numeric, alphanumeric, Kanji and binary can be specified in a job. In this case, the data fields for <ESC>2D30 and each data field must follow the data field. Also, the maximum data size should be less than 7000 bytes and the maximum block number for the data field is 200.

7. If the parameters are not correctly specified, the symbol will not be printed.

CONFIGURATION COMMANDS

These commands are used to change to operating configuration of the printer.

Custom Protocol Command Codes Download

Command Structure <ESC>**LD,a,b,c,d,e,f,g,h,i,jj**

a = Replacement character for STX
b = Replacement character for ETX
c = Replacement character for ESC
d = Replacement character for ENQ
e = Replacement character for CAN
f = Replacement character for NULL
g = Replacement character for OFFLINE
h = Auto-Online. Printer powers up in the On Line mode.
0 = Yes
1 = No
i = Zero Slash. Places a slash through the “0” character.
0 = Yes
1 = No
jj = Hexadecimal code for Eurocharacter

Example: **<ESC>LD,{,},%,#,&,*,~,0,0,D5**

Placement in: Immediately following the <ESC>A Start command and an independent data stream.

Default: Standard Protocol command Codes

Command Function Allows the user to defines custom Protocol Command codes.

Printer Input

<ESC>A
<ESC>**LD,{,},%,#,&,*,~,0,0,D5**
<ESC>Z

Printer Output A Protocol Command code status label will be printed as a result of the a successful download of a custom set of Protocol Command codes.

STX = 7B ETX = 7D ESC = 25
ENQ = 23 CAN = 26 NULL = 2A
OFFLINE = 7E
AUTO ONLINE = YES
ZERO SLASH = YES

Press the “FEED” key to activate the User Default or power the printer off to ignore them.

Special Notes

1. Commas must be used to separate the parameters. If a parameter is omitted between two commas, the default Non-Standard Protocol Command codes for that parameter will be used. See Appendix E.

2. This command must be sent as an independent data stream immediately following the <ESC>A Start code and immediately preceding the <ESC>Z Stop code. No other commands can be included in the data stream.

3. If more or less than nine commas are included in the command, the entire command sequence will be ignored. The command must contain exactly nine commas.

4. If two characters are specified for a parameter, it will be interpreted as a hex value. For example:

Command Parameter	Resulting Command Code
2B	+
+	+

   If a combination of characters are outside the hexadecimal range, the entire command sequence will be ignored.

5. Downloading Auto Online and Zero Slash settings will overwrite the values selected using the LCD panel. If these settings are changed using the LCD panel, they will overwrite any previously downloaded settings.

6.

Printer Setting

Command Structure <ESC>**PCaa,a,b,c,d,e,f,g,h,i,j,k,l,m,n,o,p,q,r,s,t,u,v,w,x,y,z**
<ESC>**PCaa,bb**

aa =Setting to be changed (01 to 26). Only relevant setting can be changed.

SETTING (ASCII)	COMMAND PARAMETER	ASCII VALUE	DESCRIPTION
01	a	0	Reserved
02	b	0	Reserved
03	c	0	Print Speed, 2 ips (50 mm/s)
03		1	Print Speed, 3 ips (75 mm/s)
03		2	Print Speed, 4 ips (100 mm/s)
03		3	Print Speed, 5 ips (125 mm/s)
03		4	Print Speed, 6 ips (150 mm/s)
03		5	Print Speed, 8 ips (200 mm/s)
03		6	Print Speed, 10 ips (250 mm/s)
03		7	Print Speed, 12 ips (300 mm/s)
04	d	0	Reserved
05	e	0	Not Used
05		1	Not Used
05		2	Not Used
06	f	0	Dispense Mode, Backfeed after print
06		1	Dispense Mode, Backfeed before print
07	g	0	Reserved
08	h	A	Print Darkness Range A
08		B	Print Darkness Range B
08		C	Print Darkness Range C
08		D	Print Darkness Range D
08		E	Print Darkness Range E
08		F	Print Darkness Range F
09	i	1	Print Darkness Level 1
09		2	Print Darkness Level 2
09		3	Print Darkness Level 3

SETTING (ASCII)	COMMAND PARAMETER	ASCII VALUE	DESCRIPTION
09		4	Print Darkness Level 4
09		5	Print Darkness Level 5
10	j	0	Reflective (Eye-Mark) Sensor
10		1	Transmissive (Gap) Sensor
10		2	Sensors Disabled
11	k	0	Zero Slash disabled
11		1	Zero Slash enabled
12	l	0	Reserved
13	m	0	Paper Type, Labels
13		1	Paper Type, Fan-Fold
14	n	0	Autofeed disabled
14		1	Autofeed enabled
15	o	0	Pitch Fixed
15		1	Pitch Proportional
16	p	0000 to 9999	Vertical Label Size (0 to Vmax dots)
17	q	000 to Hmax	Horizontal Label Size (0 to Hmax dots)
18	r	000 to 792 -001 to -792	Vertical Offset (0 to 792 dots) Vertical Offset (-1 to -792 dots)
19	s	000 to 792 -001 to -792	Horizontal Offset (0 to 792 dots) Horizontal Offset (-1 to -792 dots)
20	t	00 to 99	Pitch Offset (0 to 99 dots)
21	u	00 to 99 -01 to -99	Tear Off Offset (0 to 99 dots) Tear Off Offset (-1 to -99 dots)
22	v	0	Not Used
23	w	00 to 99 -01 to -99	DispenseOffset (0 to 99 dots) Dispense Offset (-1 to -99 dots)
24	x	0	Reserved
25	y	0 to 64	Gap Size (0 to 64 dots)
26	z	0	Buzzer Enabled
26		1	Buzzer Disabled

Placement: Separate data stream sent to printer

Default: None

Command Function To set the printer default configuration into EEPROM

Input to Printer

```
<ESC>A
<ESC>PC26,0
<ESC>Z
```

Printer Output There is no printer output as a result of this command. This command example enables the buzzer.

Special Notes

1. All command setting values must be in ASCII format.

2. These settings are stored in EEPROM and will remain valid until receipt of another <ESC>PC command.

3. All positions in this command must be separated by a comma. If the parameter. To change multiple settings, the correct number of commas must be placed in the command, i.e. to change the label gap sensor to reflective (eye-mark), the command would be:

   <ESC>PC, , , , , , , , ,0, , , , , , , , , , , , , , , , , , .

4. If only one setting is to be changed, the “aa” parameter must be an “F”.

Pitch Offset

Command Structure <ESC>**POabcc**

a		3	Continuous
b	=	+	Positive Offset
		-	Negative Offset
cc	=		00 to 99, Offset value in dots

Example: See above

Placement: Separate data stream sent to printer

Default: Default value set by <ESC>PG command

Command Function To set the pitch offset used for a job.

Input to Printer

<ESC>A
<ESC>**PO3+20**
<ESC>Z

Printer Output Blank label

Special Notes

1. When power is cycled, the value set by this command is lost and replaced by the default value stored in the EEPROM.

2. To change the value stored in the EEPROM, use the <ESC>PC Printer Setting command or use the Printer Setting Utility program contained on the CDROM shipped with the printer.

Print Mode

Command Structure <ESC>**PMa**

a = 0 Continuous
1 Tear-Off
2 Reserved
3 Reserved
4 Reserved
5 Reserved
6 Reserved
7 Dispense, Backfeed after print
8 Dispense, Backfeed before print

Example: See above

Placement: Separate data stream sent to printer

Default: Default value set by <ESC>PC command

Command Function To set the print mode for a job.

Input to Printer
<ESC>A
<ESC>**PM1**
<ESC>Z

Printer Output There is no printer output as a result of this command.

Special Notes

1. When power is cycled, the value set by this command is lost and replaced by the default value stored in the EEPROM.

2. To change the value stored in the EEPROM, use the <ESC>PC Printer Setting command or use the Printer Setting Utility program contained on the CDROM shipped with the printer.

3. The Print Mode can also be set using DSW3-1, 3-2 and 3-4. The setting priority is determined by the Priority Setting in the LCD Panel Service Mode.

Print Type

Command Structure <ESC>**PHa**

a = 0 Thermal Transfer printing
1 Direct Thermal Printing

Example: See above

Placement: Separate data stream sent to printer

Default: Default value set by <ESC>PC command.

Command Function To set the printing method used for a job

Input to Printer

<ESC>A
<ESC>**PH1**
<ESC>Z

Printer Output There is no printer output as a result of this command.

Special Notes

1. When power is cycled, the value set by this command is lost and replaced by the default value stored in the EEPROM.

2. To change the value stored in the EEPROM, use the <ESC>PC Printer Setting command or use the Printer Setting Utility program contained on the CDROM shipped with the printer.

3. The Print Type can also be set using DSW2-1. The setting priority is determined by the Priority Setting in the LCD Panel Service Mode.

Sensor Type

Command Structure <ESC>**IGa**

a = 0 Reflective (Eye Mark) sensor
1 See-thru (transmissive) sensor
2 Sensor not used

Example: See above

Placement: Separate data stream sent to printer

Default: Default value set by <ESC>PC command

Command Function To select the label sensing method for a job.

Input to Printer

```
<ESC>A
<ESC>IG1
<ESC>Z
```

Printer Output There is no printer output as a result of this command

Special Notes

1. When power is cycled, the value set by this command is lost and replaced by the default value stored in the EEPROM.
2. To change the value stored in the EEPROM, use the c Printer Setting command or use the Printer Setting Utility program contained on the CD-ROM shipped with the printer.
3. The Sensor Type can also be set using DSW3-2 and DSW3-3.. The setting priority is determined by the Priority Setting in the LCD Panel Service Mode.

Serial Interface Parameters

Command Structure <ESC>**I2abcde**

a	=	0	Baud rate, 9600 bps
		1	Baud Rate, 19200 bps
		2	Baud Rate, 38400 bps
		3	Baud Rate, 57600 bps
b	=	0	8 Data bits
		1	7 Data Bits
c	=	0	No Parity
		1	Odd Parity
		2	Even Parity
d	=	0	1 Stop Bit
		1	2 Stop Bits
e	=	0	Single Item Buffer
		1	Multi Item Buffer
		2	X-On/X-Off Flow Control
		3	Bi-Com 4
		4	Bi-Com 3

Example: See above

Placement: Separate data stream sent to printer

Default: Default value set by <ESC>PC command

Command Function To set the operating parameters of the RS232 Inferface for a job.

Input to Printer

```
<ESC>
<ESC>I230011
<ESC>Z
```

Printer Output There is no printer output as a result of this command.

Special Notes

1. The setting are stored in the EEPROM by this command and they will remain in effect until a new <ESC>I2 command is received. Cycling power will have no effect on these settings.

2. To change the value stored in the EEPROM, use the <ESC>PC Printer Setting command or use the Printer Setting Utility program contained on the CDROM shipped with the printer.

3. All command parameters must be present in the data stream sent to the printer.

4. Selecting X-On/X-Off, Bi-Com3 or Bi-Com4 will automatically place the printer in the Multi Buffer mode.

SECTION 6.
INTERFACE SPECIFICATIONS

INTRODUCTION

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

The following information is presented in this section:

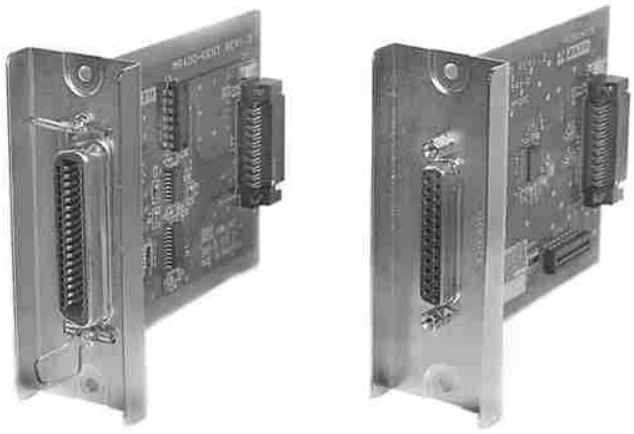
- Interface Types
- Using the Receive Buffer
- IEEE1284 Parallel Interface
- Universal Serial Bus (USB) Interface
- Local Area Network (LAN) Interface
- RS232C Serial Interface
  - General Specifications
  - Electrical Specifications
  - Pin Assignments
  - Ready/Busy Flow Control
  - X-On/X-Off Flow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

INTERFACE TYPES

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

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

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



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

THE RECEIVE BUFFER

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

Single Job Buffer

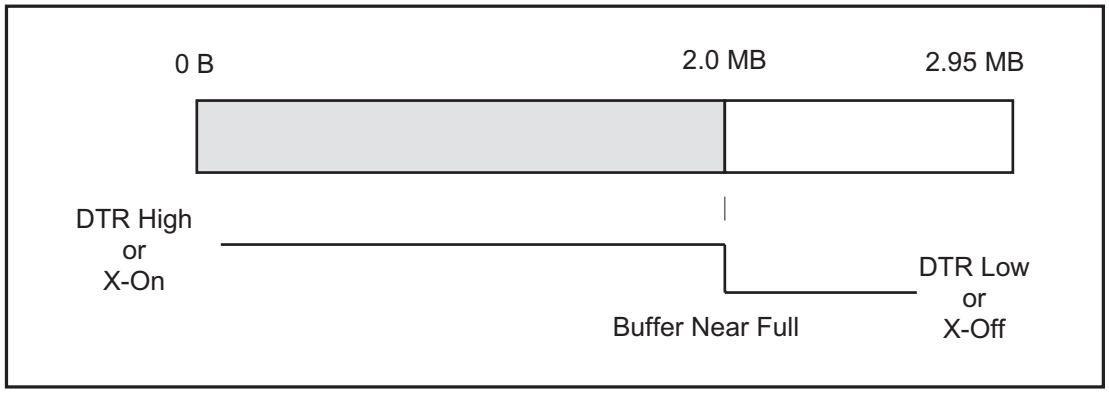
The printer receives and prints one job at a time. Each job must not exceed 2.95 MB.

Multi Job Buffer

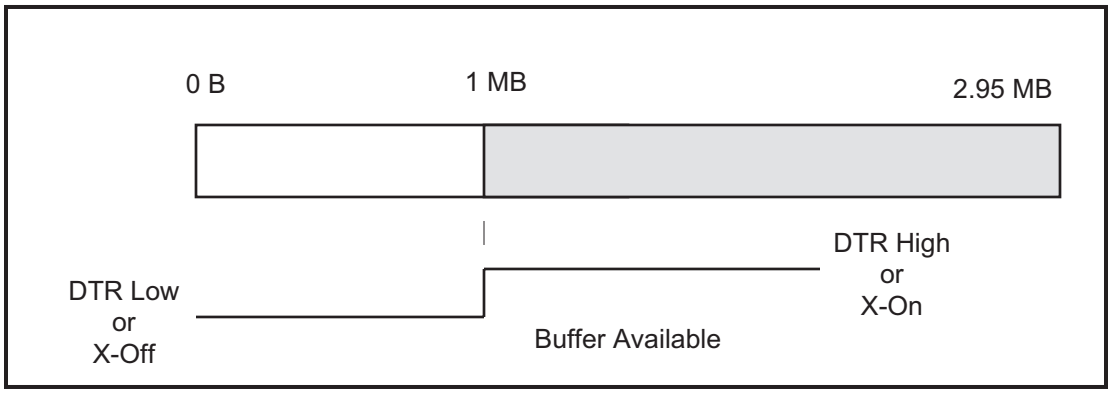
The printer is able to continuously receive print jobs, compiling and printing other jobs at the same time. It acts much like a "print buffer" to maximize the performance of the host and the printer.

When using the RS232C Serial interface, the Multi Job Buffer uses either the **Ready/Busy** with **DTR** (pin 20) or **X-On/X-Off** flow control protocols. See these sections for more details. With an empty receiving buffer, the status of **DTR** is "high" (or an **X-On** status if using **X-On/X-Off**), meaning the printer is ready to receive data. When the receive buffer is holding 2.0 MB of data (1 MB from being full), **DTR**

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



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



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

IEEE1284 PARALLEL INTERFACE

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

ELECTRICAL SPECIFICATIONS

Printer Connector AMP 57-40360 (DDK) or equivalent

Cable Connector AMP 57-30360 (DDK) or equivalent

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

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

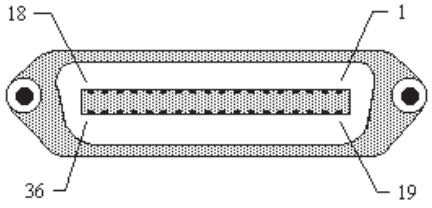
DATA STREAMS

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

IEEE1284 Parallel Interface Pin Assignments

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

(1) Signals required for IEEE1284 mode.



RS232C SERIAL INTERFACE

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

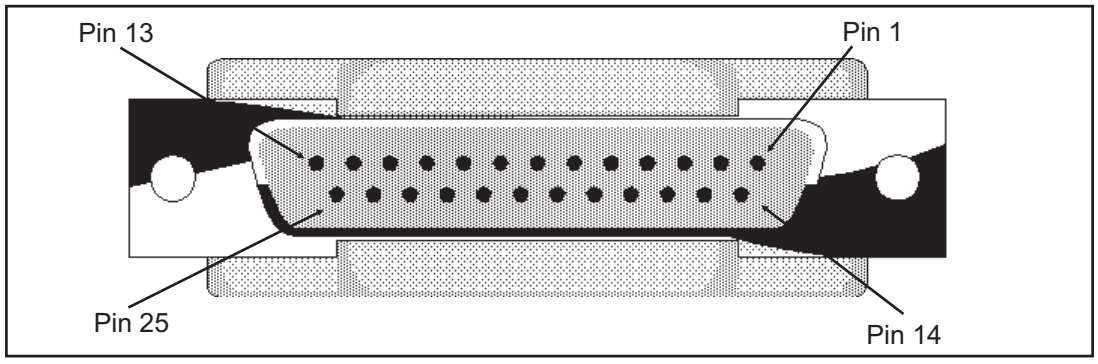
GENERAL SPECIFICATIONS

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

ELECTRICAL SPECIFICATIONS

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

Pin Assignments



RS232C Interface Signals

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

Cable Requirements

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

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

READY/BUSY FLOW CONTROL

Ready/Busy is the hardware flow control method for the serial interface on the Se printers. By raising/lowering the voltage level on Pin 20 of the RS232C port, the printer notifies the host when it is ready to receive data. Pin 4 (**RTS**) and pin 20

(**DTR**) are the important signals on the printer for this method of flow control. The host must be capable of supporting this flow control method for it to function properly.

X-On/X-Off FLOW CONTROL

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

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

Data Streams

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

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

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

NOTE: All charactersare in ASCII.

UNIVERSAL SERIAL BUS (USB) INTERFACE

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

LOCAL AREA NETWORK (LAN) OPTIONAL INTERFACE

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

BI-DIRECTIONAL COMMUNICATIONS

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

ENQUIRE/ACK/NAK

In the Bi-Com 4 mode, the host transmits an **ENQ** (05 hexadecimal) to the printer and the printer will respond with its status within five milliseconds. If printing, it will respond upon finishing the current label, then resume printing. In order for this protocol to work properly with an RS232C Interface, pin 6 (**DTR**) and pin 5 (**CTS**) must be held high by the host. One way to ensure these pins are always in the correct state is to tie pin 20 (**DTR**) to pin 6 (**DSR**) and pin 4 (**RTS**) to pin 5 (**CTS**) at the printer end of the cable.

Enquire (ENQ)

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

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

- **ID** - This is a two byte number identifying the current print job ID. The print job ID is defined using the **<ESC>ID** Job ID command transmitted with the print job (see Job ID Store in the command listing for more information on how to use this command). The range is from 00 to 99.
- **Status** - A single byte defining the current status of the printer (see the Status Byte Definition table).
- **Label Remaining** - Six bytes defining the number of labels remaining in the current print job. The range is from 000000 to 999999 labels.
- **Job Name** - 16 bytes of ASCII characters identifying the name assigned to the job by the <ESC>WK Job Name command. If the Job Name is less than 16 characters, the field will be padded with leading zeroes.

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

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

Cancel (CAN)

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

Print Job

Upon receipt of a valid print job **(<ESC>A . . . <ESC>Z)**, an **ACK** (06 hexadecimal) will be returned by the printer if there are no errors and a **NAK** (16 hexadecimal) if a printer error exists (this protocol only works with the RS232C interface).

Print Stop (DLE)

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

Print Start (DC1)

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

(1) To provide compatibility with older SATO printers, the RS232C interface can be configured to use an earlier Bi-Com 3 ENQ/ACK/NAK protocol selected via DSW2-8 and DSW1-7/8 (on the RS232C Interface module).The earlier protocol did not have provisions for the Job Name and did not respond to the DLE or DCI commands. Also, there are additional Response Codes in the Status Byte Definition. It is recommended that you use the current protocol rather than the earlier version unless it is necessary for compatibility with existing software.

Status Byte Definition, Bi-Com Protocol

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

(1) Not supported by legacy Bi-Com protocols

STATUS RESPONSE

The second method of determining printer status is to interrograte the printer with specific commands. The response from these commands will provide specific information about the printer status depending upon the command. This allows the controlling application to determine the status of a printer when it is located in a remote location.

Printer Status (SOH + MG)

Upon Receipt of an **SOH** (hexadecimal 01) followed immediately by an ASCII **MG** causes the printer to return a 30 byte Printer Status Word bounded by an **STX-ETX** pair that reports the current operating status of the printer.

BYTE NUMBER	HEX VALUE	DESCRIPTION
1	00 01	Thermal Transfer Print Type Direct Thermal Print Type
2	00 01	203 dpi Resolution 305 dpi Resoution
3	00 01 02 03 04 05 06 07 08 09	2 ips Print Speed 3 ips Print Speed 4 ips Print Speed 5 ips Print Speed 6 ips Print Speed 7 ips Print Speed 8 ips Print Speed 9 ips Print Speed 10 ips Print Speed 12 ips Print Speed
4	00 01 02 03 04	Not Supported Not Supported Not Supported Label Dispense Print mode Reserved
5	00 01 02	Not Supported Not Supported Not Supported
6	00 01	Dispense at head position Dispense at dispense position
7	00	Reserved
8	41 42 43	Not Supported Not Supported Not Supported C

BYTE NUMBER	HEX VALUE	DESCRIPTION
9	00 01 02 03 04	Print Density Level 1 Print Density Level 2 Print Density Level 3 Print Density Level 4 Print Density Level 5
10	00 01 02	Reflective (Eye-Mark) Sensor Gap (See-Thru) Sensor No Sensor
11	00 01	Zero Slash Disabled Zero Slash Enabled
12	00	Reserved
13	00 01	Not Supported Not Supported
14	00 01	Online Feed Disabled Online Feed Enabled
15	00 01	Fixed Pitch Proportional Pitch
16-17	00 to C80 00 to 12C0	Not Supported
18-19	00 to 340 00 to 4E0	Not Supported
20-21	00 to 3E7 FFFF to FC19	Vertical Base Reference Point Offset in dots (0 to 792) Vertical Base Reference Point Offset in dots (-1 to -792)
22-23	00 to 320 00 to FCE0	Horizontal Base Reference Point Offset in dots (0 to 800) Horizontal Base Reference Point Offset in dots (-1 to -800)
24	00 to 63 FF to 9D	Not Supported
25	00 to 63 FF to 9D	Not Supported
26	00 to 63 FF to 9D	Not Supported
27	00 to 63 FF to 9D	Dispense Offset in dots (0 to 99) Dispense Offset in dots (-1 to -99)
28	00 01	Compatibility Mode Enabled Compatibility Mode Disabled
29	08 to 40	Not Supported
30	00 01	Buzzer Enabled Buzzer Disabled

Counter Status (SOH + ME)

Upon Receipt of an **SOH** (hexadecimal 01) followed immediately by an ASCII **ME** causes the printer to return a 28 byte Head Counter Status Word bounded by an **STX-ETX** pair that reports the current status of the printer life counters.

BYTE NUMBER	VALUE	DESCRIPTION
1-8	Hex	Current Life Counter in dots
9-12	Hex	1st (Current) Head Counter in dots
13-16	Hex	2nd (Previous) Head Counter in dots
17-20	Hex	3rd Head Counter in dots
21-24	Hex	Not Supported
25-28	Hex	Not Supported

Sensor Status (SOH + SG)

Upon Receipt of an **SOH** (hexadecimal 01) followed immediately by an ASCII **SG** causes the printer to return a 4 byte Sensor Status Word bounded by an **STX-ETX** pair that reports the values of the printer counters.

BYTE NUMBER	VALUE	DESCRIPTION
1	Hex	Reflective Sensor Level
2	Hex	Transmissive Sensor Level
3	00_H 01_H	Out of Paper Paper Present
4	00_H 01_H	Head Open Head Closed

Head Status (SOH + HC)

Upon Receipt of an **SOH** (hexadecimal 01) followed immediately by an ASCII **HC** causes the printer to return a 1 byte Head Fault Status Word bounded by an **STX-ETX** pair that reports the current operating status of the print head. Before the printer will respond to this command, it must be in the Head Check Mode (DSW2-3 = On).

BYTE NUMBER	HEX VALUE	DESCRIPTION
1	00 01	Print Head OK Electrical Fault in Print Head

System Version Information (SOH + SB)

Upon Receipt of an **SOH** (hexadecimal 01) followed immediately by a ASCII **SB** causes the printer to return a 50 byte Printer Status Word bounded by an **STX-ETX** pair that reports the system version of the printer.

BYTE NUMBER	VALUE	DESCRIPTION
1-50	ASCII	Firmware Version Information

Memory Status (SOH + EB)

Upon Receipt of an **SOH** (hexadecimal 01) followed immediately by an ASCII **EB** causes the printer to return a 24 byte Memory Status Word bounded by an **STX-ETX** pair that reports the current user memory allocation.

BYTE NUMBER	VALUE	DESCRIPTION
1-4	Hex	Free Font Memory
5-8	Hex	Total Font Memory
9-12	Hex	Free Form Overlay Memory
13-16	Hex	Total Form Overlay Memory
17-20	Hex	Free Graphic Memory
21-24	Hex	Total Graphic Memory

Form Overlay Status (SOH + FO)

Upon Receipt of an **SOH** (hexadecimal 01) followed immediately by an ASCII **FO** causes the printer to return a 18 byte Form Overlay Status Word bounded by an **STX-ETX** pair that reports the Forms downloaded into the printer.

BYTE NUMBER	VALUE	DESCRIPTION
1-2	01 to 99	Form Registration Number (ASCII value)
3-18	ASCII	Form Name

Font Configuration (SOH + FG)

Upon Receipt of an **SOH** (hexadecimal 01) followed immediately by an ASCII **FG** causes the printer to return a 102 byte Font/Graphics Status Word bounded by an **STX-ETX** pair that reports information on the stored font or graphic.

Note: The printer must be in the Font/Graphic Download (See Section 3: Configuration) mode before a response will be received.

BYTE NUMBER	VALUE	DESCRIPTION
1-2	ASCII	Font ID Number
3-4	00_H 01_H	Font Graphic
5-36	ASCII	Font Name
37-48	ASCII	Font Style
49-52	ASCII	Font Point Size
53-54	Hex	Character Width in dots
54-60	Hex	Character Height in dots
57-60	Hex	Font Size
58-64	Hex	Font Registration Number
65-68	Hex	Font Data Top Address
69-72	Hex	Total Size
73-74	Hex	Vertical/Horizontal Writing Flag
75	Hex	Character Pitch, Fixed/Variable
76	Hex	Family Attribute
77	Hex	Character Set
78	Hex	Italic Attribute
79-80	Hex	Weight Attribute
81-82	Hex	Spread
83-84	Hex	Assent in dots
85-86	Hex	Registration Start Code
86-87	Hex	Registration End Code
88-95	Hex	Reserved
96-98	Hex	Code
99-100	Hex	Horizontal Valid Size
101-102	Hex	Left Gap Size

Interface Status (SOH + IG)

Upon Receipt of an **SOH** (hexadecimal 01) followed immediately by an ASCII **IG** causes the printer to return a 1 byte Interface Status Word bounded by an **STX-ETX** pair that reports the type of interface connection currently set in the printer.

BYTE NUMBER	VALUE	DESCRIPTION
1	0 1 2 3	IEEE 1284 Parallel Serial RS232 Local Area Network Universal Serial Bus

Serial Interface Settings (SOH + H2)

Upon Receipt of an **SOH** (hexadecimal 01) followed immediately by an ASCII **H2** causes the printer to return a 5 byte Serial IF Status Word bounded by an **STX-ETX** pair that reports the current operating parameters of the Serial RS232 Interface.

BYTE NUMBER	VALUE	DESCRIPTION
1	0 1 2 3	9600 BPS 19200 BPS 38400 BPS 57600 BPS
2	0 1 3	No Parity Odd Parity Even Parity
3	0 1	1 Stop Bit 2 Stop Bits
4	0 1 2 3 4	Single Item Buffer with Ready/Busy Flow Control Multi-Item Buffer with Ready/Busy Flow Control X-ON/X-OFF Flow Control Status 4 Bi-Comm Status 3 Bi-Comm

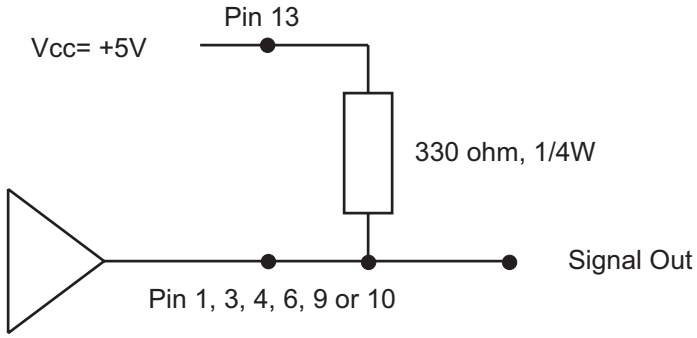
EXT CONNECTOR

The EXT connector on the rear panel of the “Se” printers is intended for use with the external printer accessories such as label rewinders or applicators. The 14-pin Centronics type connector provides a choice of four different output signals along with various error conditions. A DB-9 to 14-pin Centronics adapter cable is provided for legacy applications.

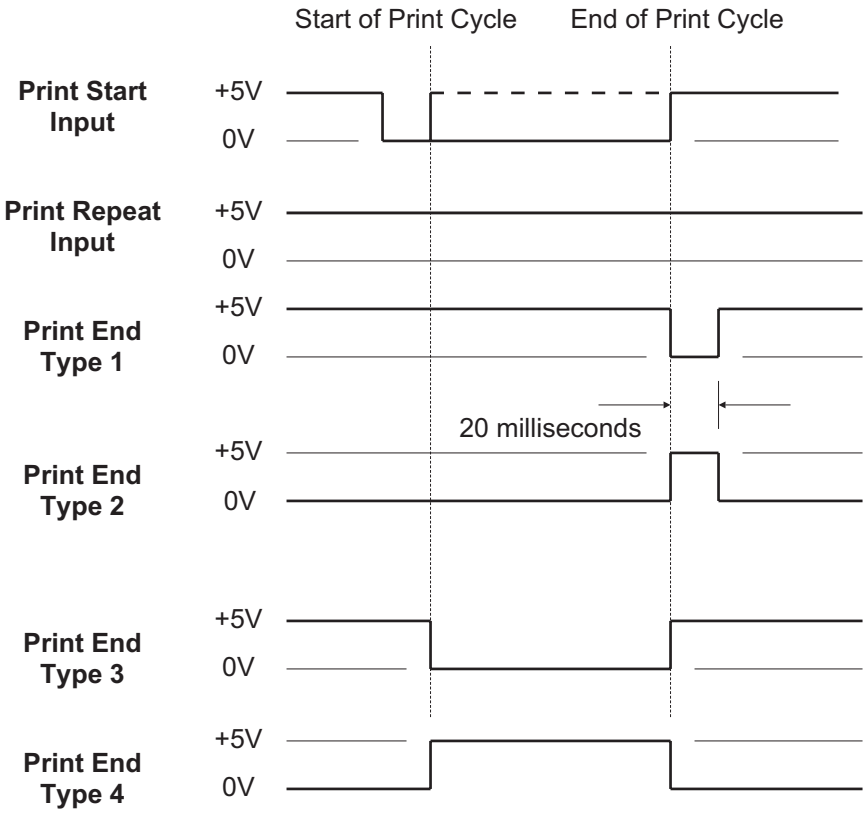
Pin Assignments

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

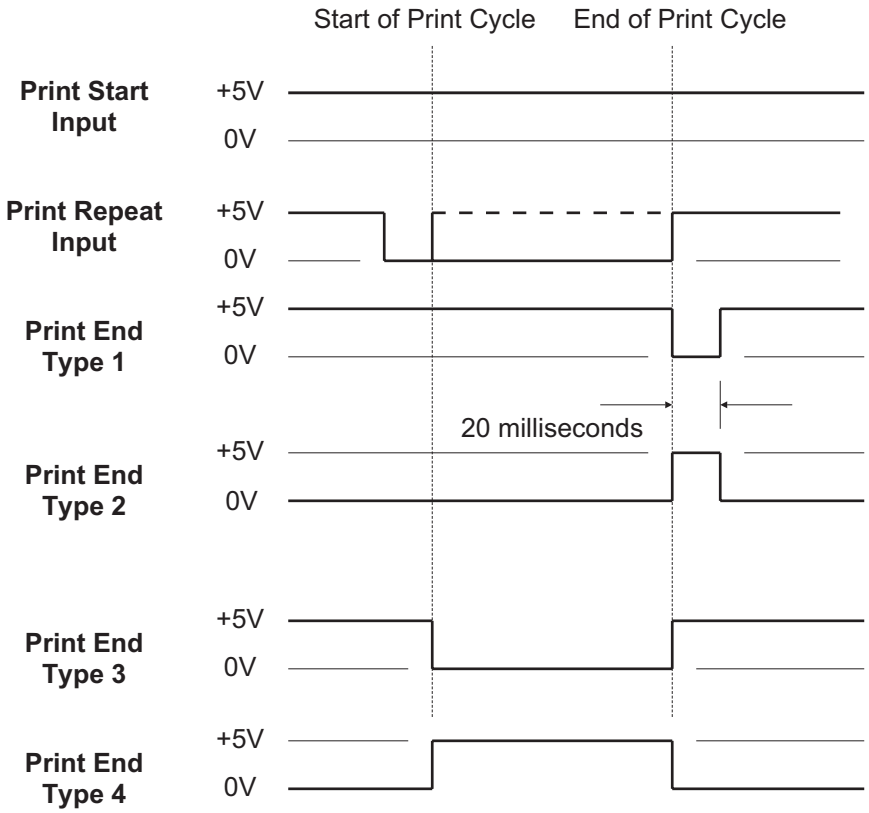
NOTE: The signals on pins 1, 3, 4, 6, 9 and 10 each have an open collector output. These pins normally measure +.07V maximum when a true condition exists. If a false condition occurs, the voltage will drop to 0V. To achieve a signal level of +5V, you must add a 330 ohm, 1/4W pull-up resistor between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



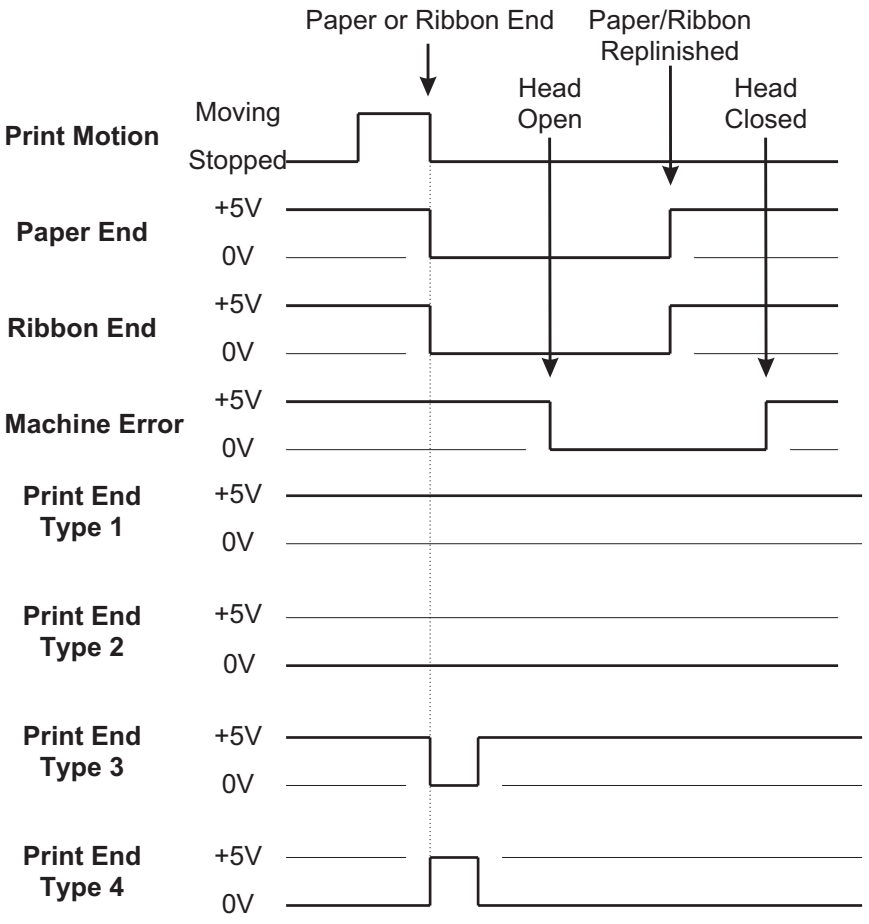
STANDARD OPERATION



REPEAT PRINT



ERROR SIGNALS



SECTION 7.
TROUBLESHOOTING

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

- Initial Checklist
- IEEE1284 Parallel Interface
- RS232C Serial Interface
- Universal Serial Bus Interface
- LAN Ethernet Interface

INITIAL CHECKLIST

1. Is the printer powered up and ON-LINE?

2. Is the ERROR light on the front panel off? Is this light is on, it may mean the Print Head Assembly or the Label Hold-Down is not closed and latched in position.

3. Are the LABEL and RIBBON lights on the front panel off? If these lights are on, the labels or ribbons may be incorrectly loaded.

USING THE IEEE1284 PARALLEL INTERFACE

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

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

2. Does the Parallel interface cable used meet IEEE1284 specifications? If it does not and you are connected to an IEEE1284 or ECP parallel port on the computer, the printer may not be able to communicate correctly.

3. Is there more than one parallel interface port on your PC (LPT1, LPT2, etc.)? If so, make sure you are sending data out the correct port.

4. Is the IEEE1284 Interface Module installed in the printer? Older versions of the Parallel Interface module will not work correctly in the "Se" printers.

5. When you send the print job to the printer, and it does not respond, do you get an error message on your PC that says “Device Fault” or something similar?

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

   a. Both ends of the cable are securely inserted into their respective connectors.

   b. The printer is ONLINE.

   c. The cable is not defective. There are other things that can cause this error
   message on your computer, but at this stage, a defective cable may be one of the reasons.

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

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

   <ESC>A—DATA—<ESC>Z

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

   c. Verify the following:

- You have not typed a “0” (zero) for an “O” (letter) or vice-versa.
- You have not missed any <ESC> characters where they’re needed.
- Make sure all printer command codes are capital letters.

7. If you’ve checked all of the above and the printer still isn’t printing, you may want to try a Buffer Hex Dump to determine what (if anything) the printer is receiving from your computer. See Printing Hex Dump Labels in *Section 3: Configuration*.

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

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

characters. See the beginning of *Section 5: Programming Reference* for details on writing a program in BASIC.

If you're not programming in BASIC, check to see if you have an equivalent statement in the language you're using to suppress extra carriage returns and line feeds from your data being sent out to the printer. We want the data stream to be one complete line going to the printer.

USING THE RS232C SERIAL INTERFACE

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

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

2. Is the cable defective? At the very least, you should be using a "Null Modem Cable," which crosses pins in a specific manner. This should enable your printer to print. But we recommend that you eventually use a cable built to specifications as described in Section 6: Interface Specifications.

3. Is the RS232 Interface Module installed in the printer? The "Se" printers require the new Hi Speed Serial Interface (PN WCL40451)to take advantage of the faster data transmission speeds. The older Serial Interface Modules will work, but at a reduced capability.

4. Check for obvious errors in the data stream. Is the data properly framed with the <ESC>A and <ESC>Z commands? See *Section 5: Programming Reference* if necessary.

5. If after sending your job to the printer, it only "beeps" and displays an error message on the LCD display, you may have a configuration problem. There may be some inconsistencies with the Baud Rate, Parity, Data Bits, or Stop Bits in relation to your host computer. If you are confused as to what the printer's current RS232 settings are, print a Configuration Test label(see Section 3). It will list all of the current printer configuration settings.

6. If you still are unable to get printer output, try the Hex Dump as described in Step 5 under the Parallel Interface troubleshooting. In this case, the printer monitors the RS232C interface for incoming data.

7. From the Hex Dump, if you are seeing extra $0D_H$ $0A_H$ (CR and LF) characters, and are using BASIC, refer to the beginning of the Command Code section. It provides hints for writing a SATO program in BASIC.

USING THE UNIVERSAL SERIAL BUS (USB) INTERFACE

If nothing prints when doing a test print you will need to verify that the device drivers have been successfully installed by doing the following:

1. Click on Start, then Settings and then Control Panel.
2. Within the new Window you should have an Icon listed as System. Double Click on this.
3. Click on the Device Manager tab.
4. Make sure that the View Device by type is checked. Scroll down until you get to SATO-USB device.
5. Verify that it does not have any errors next to it. If it shows an error, remove the device and then reinstall it.
6. Reboot the PC and the Printer.
7. Consult the Windows 98 Troubleshooting guide or contact technical support for further assistance.

USING THE LAN ETHERNET INTERFACE

Printer Does Not Come Up Ready

If you cannot print to the print server after you install it, check the following:

1. Make sure that the printer is powered on, that all cables are securely plugged in, and that the printer is on-line.
2. If possible, connect a terminal to the serial port. If you see the boot prompt, the print server firmware has not been loaded properly. If reloading does not fix the problem, try setting switch 1 to ON (factory defaults) and powering the print server off and then on again; if the problem persists, the product may be defective.

Installation Problems (Printer Comes up Ready but You Cannot Print)

If the printer starts up OK but you cannot print, the problem could one of the following:

- There is a problem with the interface between the print server and the printer
- There is a problem with the network connection or cabling.
- There is a queue setup problem, a print server setup problem, or other protocol-related problem.

Checking the Interface between the Print Server and the Printer

First make sure that the cable between the print server and the printer is securely plugged in at both sides. Then:

1. Wait about two minutes after the printer is powered on and then run a printer self-test (see *Secton 3:Configuration* for information on how to run the self-test).

- If the self-test does not print, then there is possibly a hardware problem. Double check the connections.
- In some rare instances, disabling NBUF with the command SET PORT P1 NBUF DISABLED will solve port compatibility issues.

Checking the Network Connection and Cabling

If the self-test page prints but you cannot print documents, first check the network connection and cabling.

1. If you are connecting to a 10baseT network, verify that the OK LED is on. If the appropriate LEDs are not on, there is probably a bad 10BaseT or 100BaseTX cable or the hub port is bad. If possible, try a different cable and hub port, or try connecting a different device (such as a PC) to the cable.

2. If you are using a repeater or hub, make sure that SQE (heartbeat) is turned off at the hub (this is the default setting for most hubs). Also, if you have a hub or multiport repeater, verify that the hub or repeater port is good by trying the print server on a different port.

3. If you have a bridge or router located between the print server and the host computer, make sure that the device is set up to allow the print server to send and receive data from the host. For example, a bridge can be set up to only allow certain types of Ethernet addresses to pass through (a process known as filtering); therefore, such a bridge must be configured to allow print server addresses. Likewise, a router can be set up to pass only certain protocols, so be sure that the desired protocol can be passed through to the print server. In the case of routers, also make sure that the protocol is routable (LAT, NetBEUI, and DLC/LLC are not routable).

4. Make sure that you are not trying to perform an illegal operation, such as attempting to print a label larger than the printer can handle.

5. Check the individual protocol troubleshooting sections in provided with the Ethernet Interface Module for additional causes of intermittent printer problems.

Intermittent Problems

If the print server and the printer start up OK, but you intermittently have problems printing, check the following:

1. Excessive NetWare polling can be a big cause of intermittent problems. Make sure that you have only enabled the NetWare file servers that you need for printing (do a SHOW NETWARE command from the print server console to see the enabled file servers). If you have V3.21 or earlier firmware, make sure that NetWare polling is disabled by using the console command SET NETWARE RANGE 0. If you are not using NetWare, you can disable NetWare entirely with the command SET NETWARE DISABLED.

2. Check the individual protocol troubleshooting sections provided with the Ethernet Plug-In Interface Module for additional causes of intermittent printer problems.

ERROR SIGNALS

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

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

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APPENDIX A.
COMMAND CODE QUICK REFERENCE

INSTRUCTION	DESCRIPTION	PAGE
A	**Start Code**. Begins all print jobs.	5-74
A1aaaabbbb	**Media Size.** Specifies the label size. aaaa = Label length in dots (0 to Vmax) bbbb = Label width in dots (0 to Hmax)	5-53
A(space)Z	**Form Feed**. Feeds a blank tag or label.	5-40
AR	**Normal Print Length**. This command resets the printer to the Standard print length (7 inches).	5-59
A3H-aaaa -Vbbbb	**Base Reference Point**. Establishes a new base reference point position in dots for the current label. Units of measurement are dots. - = Optional character. If included, will shift reference point in negative direction.	5-19

	M-8459Se	M-8460Se	M-8485Se	M-8490Se
aaaa = Horizontal Print Offset	+/- 896	+/- 1216	+/- 1024	+/- 1344
bbbb = Vertical Print Offset	0001 to 1424	0001 to 1424	0001 to 1424	0001 to 2136

Babbcccd	Bar Codes. Prints a 1:3 ratio bar code.		5-11
	a=	0	Codabar
		1	Code 39
		2	Interleaved 2 of 5 (I 2/5)
		3	UPC-A/EAN-13
		4	EAN-8
		5	Industrial 2 of 5
		6	Matrix 2 of 5
		7	reserved
		8	reserved
		9	reserved
		A	MSI
		B	reserved
		C	Code 93
		D	reserved
		E	UPC-E
		F	Bookland
		G	Code 128
		I	UCC 128
	bb = Number of dots (01-12) for narrow bar and narrow space		
	ccc = Bar height in dots (001-600)		
	d = UCC 128 only		
		0	No human readable text
		1	Human readable at top
		2	Human readable at bottom

INSTRUCTION	DESCRIPTION	PAGE
BDabbcccd	**Bar Codes**. Prints a 2:5 ratio bar code, except for UPC, EAN, Code 93, Code 128 and UCC128 symbols, which are fixed width bar codes. For values a, bb, ccc and d see instructions for Babbcccd. For UPC/EAN bar codes, this command puts descender bars and humand readable text below the symbol.	5-16
BKaabbcdd eeefffnn...n	**PDF417**. Prints PDF417 2-D symbols. aa = Minimum module dimension (03-09 dots). Will not print for values of 01, 02 or ≥ 10. bb = Minimum module pitch dimension (04-240 dots). Will not print for values of 01, 02, 03 or greater than 25. c = Security level (1-8). dd = Code words per line (01-30). If 00 is specified for dd *and* ee, printer will automatically optimize settings. ee = Rows/symbol (00 or 03). If 00 is specified for dd *and* ee, printer will automatically optimize settings. fff = Number of characters to be encoded (0001-2700) g = Not specified, standard PDF417 M Micro PDF417 T Truncated PDF417 nn...n = Data to be printed.	5-108
BPn...n	**Postnet**. Prints Postnet bar codes. n...n = 5 digit ZIP (Postnet-32 format) 6 digits (Postnet-37 format) 9 digit ZIP+4 (Postnet -52 format) 11 digit ZIP+4+DPC (Postnet-62, Delivery Point format).	5-57
BTabbccddee	**Bar Codes**. Variable Ratio. provides the ability to print a bar code with a ratio other than those specified through the standard bar code commands (B, BD, and D). a = Bar code option: 0 Codabar 1 Code 39 2 Interleaved 2 of 5 5 Industrial 2 of 5 6 Matrix 2 of 5 bb = Narrow space in dots (01-99) cc = Wide space in dots (01-99) dd = Narrow bar in dots (01-99) ee = Wide bar in dots (01-99)	5-17
BVa,b,c, ddddddddd, eee,f f f,gg..g	**Maxicode**. Prints 2-D Maxicode symbols per AIM I.S.S. specification. a = Position of symbol within the set b = Total number of symbols in the set c = Mode dd..d = 9 digit numeric Postal Code eee = 3 digit numeric Country Code f f f = 3 digit numeric Service Class gg..g = Data, terminated by <ESC>	5-106

INSTRUCTION	DESCRIPTION	PAGE
BWaabbb	**Bar Codes**. Expansion. Works together with the BT command to specify an expansion factor and the bar code height for the particular symbol being printed. aa = Expansion factor by which the width of all bars and spaces is increased (01-12) bbb = Bar height by dot (004-600 dots)	5-16
BXaabbccdd eeefffghh	**Data Matrix**. Data Format. Specifies the format of the Data Matrix 2-D symbology. aa = Format ID (01-16, The values 07 and 17 will not be accepted) bb = Error correction level (00, 05, 08,10,14, 20 or 200. All other values processed as 00. cc = Horizontal cell size (03-12 dots/cell) dd = Vertical cell size (03-12 dots per cell) eee = Cells per line. Must use 000 for optimized symbol. fff = Cell lines. Must use 000 to optimize. g = Mirror image 0 Normal Print 1 Reverse Print hh = Guide cell thickness (01-15) 01 indicates normal type.	5-100
C	**Repeat Label**. Prints a duplicate of the last label printed.	5-65
CSa	**Print Speed Selection**. Specifies a unique print speed in in./sec. through software for a particular label.	5-64

	M-8459Se	M-8460Se	M-8485Se	M-8490Se
a = Speed Setting	2 = 2 ips 3 = 3 ips 4 = 4 ips 5 = 5 ips	4 = 4 ips 6 = 6 ips 8 = 8 ips	4 = 4 ips 6 = 6 ips 8 = 8 ips 10 = 10 ips 12 = 12 ips	4 = 4 ips 6 = 6 ips 8 = 8 ips

Dabbcccd	**Bar Codes**. Prints 1:2 ratio bar code. For UPC and EAN bar codes, this will add descender bars. For values a, bb, ccc and d see instructions for Babbcccd.	5-11
DCxx...x	**Data Matrix**. Print Data. Prints data using Data Matrix format specified in BX Data Format command. xx...x = Data to be printed. Cannot exceed 500 characters.	5-103
Eaaa	**Line Feed**. Provides the ability to print multiple lines of the same character size without specifying a new print position for each line. aaa = Number of dots (1-999) between the bottom of the characters on one line to the top of the characters on the next line.	5-52
EX0	**Expanded Print Length**. Expands the print length to 9999 dots.	5-59
Faaaabcccc ddee	**Sequential Numbering**. Allows the printing of sequencing fields (text, bar codes) where all incrementing is done within the printer. aaaa = Number of times to repeat the same data (0001-9999) b = Plus or minus symbol (+ for increments; - for decrements) cccc = Value of step for sequence (001-9999) dd = No. of digits for sequential numbering (01-99, default = 8) ee = No. of digits free from sequential numbering (01-99, default=0)	5-72

INSTRUCTION	DESCRIPTION	PAGE

FWaaHbbbb

Horizontal Line. Prints a horizontal line. Units of measurement are dots. 5-50

	M-8459Se	M-8460Se	M-8485Se	M-8490Se
aa = Width of Hor Line	01 to 99			
bbbb = Length of Hor Line	0001 to 0896	0001 to 1216	0001 to 1024	0001 to 1344

FWaabbVccc Hdddd

Box. Prints a box. For values aa, bbbb, cc, and dddd, see instructions for horizontal and vertical lines. Units of measurement are dots. 5-50

	M-8459Se	M-8460Se	M-8485Se	M-8490Se
aa = Width of Hor Side	01 to 99			
bb = Width of Vert Side	01 to 99			
cccc = Length of Vert Side Expanded	0001 to 1424 0001 to 9999			0001 to 2136 0001 to 9999
dddd = Length of Hor Side	0001 to 0896	0001 to 1216	0001 to 1024	0001 to 1344

FWccVddd

Vertical Line. Prints a vertical line. Units of measurement are dots. 5-50

	M-8459Se	M-8460Se	M-8485Se	M-8490Se
cc = Width of Vert Line	01 to 99			
dddd = Length of Vert Line Expanded	0001 to 1424 0001 to 9999			0001 to 2136 0001 to 9999

FXaaabccc dddeee

Data Matrix. Sequential Numbering. Prints sequential numbered Data Matrix 2-D symbols. 5-104

- aaa = Number of duplicate labels (001-999)
- b = Increment or decrement
  - \+ Increment
  - \- Decrement
- ccc = Increment/decrement steps (001-999)
- ddd = Sequential numbering start position (001-999). Referenced to left side.
- eee = Incremented data length (001-999). Measured from start position.

INSTRUCTION	DESCRIPTION	PAGE
Gabbbccc(data)	**Custom Graphics**. Allows the creation and printing of graphic images using a dot-addressable matrix. a = Specifies format of data stream to follow B Binary H Hexadecimal bbb = Number of horizontal 8 x 8 blocks (see page 5-XX for range) ccc = Number of vertical 8 x 8 blocks (see page 5-XX for range) data = Data to describe the graphic image	5-43
GMaaaaa	**BMP File**. Downloads BMP file to the internal graphics image memory. aaaaa = No. of bytes to be downloaded (max DOS file size is 32K	5-45
GPaaaaa	**PCX File**. Downloads PCX file to the internal graphics image memory. aaaaa = No. of bytes to be downloaded (max DOS file size is 32K)	5-46
Haaaa	**Horizontal Position**. Specifies a field's horizontal location across the width of the label from the current base reference point. The units of measurement are dots.	5-61

	M-8459Se	M-8460Se	M-8485Se	M-8490Se
aaaa = New Horizontal Position	0001 to 0896	0001 to 1216	0001 to 1024	0001 to 1344

IDaa	**Store Job ID**. Stores the Job ID number. aa = Job ID number assigned (01-99)	5-47
J	**Journal Print**. Provides the ability to print text line by line. Fixed spacing between lines and characters.	5-49
Kab90cc	**Recall Custom Designed Characters**. Recalls for printing a custom character stored by the Tabcc(data) command. a = 1 16 x 16 matrix 2 24 x 24 matrix b = Indicates the format that data stream was stored in B Binary H Hexadecimal bb = Memory location where the character was stored. Valid locations are 21 to 52 or "!" to "R" in hex values.	5-19
Laabb	**Character Expansion**. Expands characters in both directions. aa = Multiple to expand horizontally (01-12) bb = Multiple to expand vertically (01-12)	5-21
M	**Font type**. Specifies the 13W x 20H dot matrix font (including descenders).	5-33
OA	**Font type**. Specifies the OCR-A font with dot matrix.	5-33

	M-8459Se	M-8460Se	M-8485Se	M-8490Se
OA Font Matrix	15W x 22H			22W x 33H

OB	**Font type**. Specifies the OCR-B font dot matrix.	5-33

INSTRUCTION	DESCRIPTION	PAGE

	M-8459Se	M-8460Se	M-8485Se	M-8490Se
OB Font Matrix	20 W x 24H			30W x 36H

Paa	**Character Pitch**. Designates the number of dots between characters. aa = Number of dots between characters (01-99)	5-26
PR	**Fixed Font Spacing**. Returns the printer to fixed character spacing mode.	5-25
PS	**Proportional Font Spacing**. Places the printer in the proportional character spacing mode. Will not work with U Font.	5-28
Qaaaaaa	**Print Quantity**. Specifies the total number of labels to print. aaaaaa = Total number of labels to print for the job (000001-999999)	5-63
RDabb,ccc, ddd,nn...n	**Font Type.** Specifies the internal AGFA raster fonts. a = A Specifies CG Times font B Specifies CG Triumvirate font bb = Always 00 ccc = Horizontal Size (16 to 999 dots or P08 to P72 point size) ddd = Vertical Size (16 to 999 dots or P08 to P72 point size) nn..n = Data to be printed	5-35
RMaaaa,bbbb	**Mirror Image.** Prints mirror image of data. Must be preceded by an A1 Media Size Command. Must be preceded by an <ESC>A1 Media Size command.	5-54
S	**Font type**. Specifies the 8W x 15H dot matrix font (including descenders).	5-33
Tabcc(data)	**Store Custom Designed Characters**. To create and store custom characters or images in the printer's volatile memory. See Kab90cc to recall the character for printing. a = 1 16 x 16 matrix 2 24 x 24 matrix b = Specifies data stream format to follow B Binary H Hexadecimal cc = Memory location to store the character. Valid locations are 21 to 52 or "!" to "R" in hex values. (data)= Data to describe the character.	5-21
U	**Font type**. Specifies a 5W x 9L dot matrix font (including descenders).	5-33
Vbbbb	**Vertical Position**. Specifies a field's vertical location down the length of the label from the current base reference point. Units of measurement are dots.	5-61

	M-8459Se	M-8460Se	M-8485Se	M-8490Se
bbbb = Vert Position Expanded	0001 to 1424 0001 to 9999			0001 to 2136 0001 to 9999

WBa	**Font type**. Specifies the 18W x 30L dot matrix font (including descenders). a = 0 Disables auto-smoothing of font 1 Enables auto-smoothing if expansion is greater than 3	5-38

INSTRUCTION	DESCRIPTION	PAGE
WDHaaaaVbbbb XccccYdddd	**Copy Image Area**. To copy an image to another location of the label. aaaa = Horizontal position of the top left corner of image area bbbb = Vertical position of the top left corner of image area cccc = Horizontal length of image area dddd = Vertical length of image area	5-31
WKnn...n	**Job Name.** Stores the job name. nn..n = Job name, up to 16 ASCII characters	5-48
WLa	**Font type**. Specifies the 28W x 52L dot matrix font (including decenders). a = 0 Disables auto-smoothing of font 1 Enables auto-smoothing if expansion is greater than 3	5-38
XM	**Font type**. Specifies the 24W x 24H dot matrix font (including descenders).	5-33
XS	**Font type**. Specifies the 17W x 17H dot matrix font (including descenders).	5-33
XU	**Font type**. Specifies the 5W x 9L dot matrix font (including descenders).	5-33
XWa	**Font type**. Specifies the 48W x 48L dot matrix font (including descenders). a = 0 Disables auto-smoothing of font 1 Enables auto-smoothing if expansion is greater than 3	5-38
XBa	**Font type**. Specifies the 48W x 48L dot matrix font (including descenders). a = 0 Disables auto-smoothing of font 1 Enables auto-smoothing if expansion is greater than 3	5-38
Z	**Stop Code**. Ends all print jobs.	5-74
%a	**Rotate.** Fixed Base Reference Point. Rotates printing in 90° increments without changing the base reference point. a = 0 Sets print to normal direction 1 Sets print to 90° CCW 2 Sets print to 180° rotated (upside down) 3 Sets print to 270° CCW (90° CW)	5-70
$a,b,c,d	**Vector font**. Specifies printing of the unique SATO vector font. a = A Helvetica Bold (proportional spacing) B Helvetica Bold (fixed spacing) b = Font width (50-999 dots*) c = Font height (50-999 dots*) d = Font variation (0-9) as follows: 0 Standard 1 Standard open (outlined) 2 Gray (mesh) pattern 1 3 Gray (mesh) pattern 2 4 Gray (mesh) pattern 3 5 Standard, shadow 1 6 Standard, shadow 2 7 Standard mirror image 8 Italic 9 Italic open (outlined)	5-36

INSTRUCTION	DESCRIPTION	PAGE

$=(data) — **Data** for Vector font. — 5-36

#Ea — **Print Darkness**. Specifies a new print darkness setting. The lightest setting is “1”. There are three darkenss levels (five for the M-8459Se) that can be specified. — 5-58

	M-8459Se	M-8460Se	M-8485Se	M-8490Se
a = Print Darkness	1, 2, 3, 4, or 5	1, 2 or 3	1, 2 or 3	1, 2 or 3

(aaaa,bbbb — **Reverse Image.** Reverse image from black to white and vice versa. Units of measure are dots. — 5-68

	M-8459S	M-8460S	M-8485S	M-8490S
aaaa = Hor Length	0001 to 0896	0001 to 1216	0001 to 1024	0001 to 1344
bbbb = Vert Length	0001 to 1424			0001 to 2136
Expanded	0001 to 9999			0001 to 9999

& — **Store Form Overlay**. Stores a specified label image in the printer’s volatile form overlay memory. — 5-42

/ — **Recall Form Overlay.** Recalls the label image from the printer’s formoverlay memory for printing. — 5-41

0 (zero) — **Replace Data (Partial Edit)**. Provides the ability to replace a specified area of the previous label with new data. — 5-66

*a — **Clear Print Job(s) and Memory.** Clears individual memory and buffers. — 5-29

- a = When not included in command, clears print jobs in Multi-Buffer mode.
- a = If included in command, specifies memory section to be cleared
  - T Custom character memory, printer
  - & Form overlay memory, printer
  - X Clears all memory all memory and buffers

@,nnnn — **Off-Line**. Signals the printer to go off-line after the completion of a print job. — 5-56

- nnnn = Optional message to be displayed on the LCD panel. Maximum of 32 characters.

2D3m,a,bb,cd,ee,ff,gg — **QR Code.** Prints QR Code symbols. See command description for parameter definition and usage. — 5-110

INSTRUCTION	DESCRIPTION	PAGE

CALENDAR COMMANDS

WA(elements)	**Calendar Print**. Prints the date and/or time field (up to 16 characters) from the printer's internal clock. Use slash to separate date elements and colon to separate time elements. elements = YY 2 digit Year (00-91) YYYY 4 digit Year (1981-2080) MM Month (01-12) DD Day (01-31) HH 12 Hour Clock (00-11) hh 24 Hour Clock (00-23) mm Minutes (00-59) ss Seconds (00-59) TT AM or PM JJJ Julian Date (000-366) WW Week (00-53) ww Week (01-54)	5-78
WPabbb	**Calendar Increment**. To add a value to the printer's current date and/or time. Does not change the printer's internal time setting. a = Y Years M Months D Days h Hours bbb = Numeric data, Week (00-99), Years (1-9), Months (01-99), Days (001-999), Hours (001-999).	5-76
WTaabbccddee	**Calendar Set.** To set the time and date of the printer's internal clock. aa = Year (00-99) bb = Month (01-12) cc = Day (01-31) dd = Hour (00-23) ee = Minute (00-59)	5-80

EXPANDED MEMORY OPTION COMMANDS

BJ(aa..abb..b	**Start TrueType Font Storage**. Prepares the Expanded Memory to accept TrueType font data. aa...a = 40 byte font description bb...b = 10 byte date field	5-84
BJDcccccdddd ee...e	**Download Bit Mapped TrueType Font Data**. Downloads the bit mapped TrueType font data to the memory area specified. ccccc = Memory Offset (hexadecimal) dddd = Data size in bytes (max = 2000) ee...e = Font data to be downloaded	5-84
BJ)	**End TrueType Font Storage**.Ends the bit mapped TrueType font storage process	5-84
BJFaaaaaaaa	**Initialize Expanded Memory**. Initializes the Memory Area and formats it for use. Should be preceded by the Memory Area Select command for the memory area to be initialized. aaaaaaaa = 8 character alphanumeric password	5-97

INSTRUCTION	DESCRIPTION	PAGE
BJRabbccdd eeeeff..f	**TrueType Font Recall**. Recalls a previously stored bit mapped TrueType font for use. a = Font ID (1-9 bb = Horizontal Expansion (01-12) cc = Vertical Expansion (01-12) dd = Character pitch (01-99) eeee = Number of characters ff...f = Data to be printed using font	5-83
BJS	**Expanded Memory Status.** Reports the status of the currently active Memory Card to the host by printing a status label.	5-99
BJTaa,bb,cc, dd,ee,fff,gg..g	**TrueType Font Recall.** Recalls a previously stored bit mapped TrueType font for use. aa = Font ID (01-99 bb = Horizontal Expansion (01-12) cc = Vertical Expansion (01-12) dd = Reserved, always 00 ee = Character pitch (01-99) f f f f = Number of characters gg...g = Data to be printed using font	5-83
CCa	**Memory Area Select**. Selects the Memory area for all following Expanded Memory commands. a = 1 Memory Area 1 b = 2 Memory Area 2	5-98
GCaaa	**Recall BMP Graphic**. Recalls BMP graphic files stored in Expanded Memory.	5-90
GIabbbcccddd ee...e	**Store Custom Graphics**. Stores a graphic image in the memory card to be called later for printing on a label. a = Specifies format of data stream to follow B Binary H Hexadecimal bbb = Number of horizontal 8 x 8 blocks ccc = Number of vertical 8 x 8 blocks ddd = Graphics storage number (001-999) ee...e = Data to describe the graphic image	5-93
GRccc	**Recall Custom Graphics**. Recalls for printing the graphic image stored by the GI command. ccc = Storage number (001-999)	5-92
GTaaa,bbbbb, nn. . . n	**Store BMP Graphics**. Stores BMP files in Expanded Memory. aaa = Storage area number (001 to 999) bbbbb= Size of BMP file in bytes nn...n = Data	5-91
PIaaa,bbbbb, cc...c	**Store PCX Graphics File**. Stores a PCX graphic file. aaa = Storage number (001-999) bbbbb= Number of bytes in the file to be stored.	5-96
PYaaa	**Recall PCX Graphics File**. Recalls a PCX graphics file. aaa = The storage number assigned to the file (001-999)	5-95
YR,aaa /D,bb,cc...c	**Recall Format/Field**. To recall a field from a format previously stored in the memory card. aaa = Number of format to be recalled (001 to 999) bb = Number of field to be recalled (01-99) cc...c = Data to be placed in field.	5-85

INSTRUCTION	DESCRIPTION	PAGE
YS,aaa /Nbb,cc	**Store Format/Field**. To store a field in a format in the memory card. aaa = Format number (001 -999) bb = Field number (01-99) cc = Number of characters in the field	5-86
&R,aa	**Recall Form Overlay**. Recalls a label image previously stored in Expanded Memory. aa = Storage number (00 to 99).	5-87
&S,aa,bbbb,cccc	**Store Form Overslay**. Storesa label image in Expanded Memory. aa = Storage number (00 to 99) bbbb = Horizontal size of window to be stored (50 to Hmax) cccc = Vertical size of window to be stored (50 to Vmax)	5- 88
*a,bbb	**Clear Expanded Memory**. Clears individual memory and buffer areas. a = Memory section to be cleared G SATO graphic files (001-999) P PCX graphic file (001-999) F Stored formats (001-999) O TrueType fonts, memory card (001-009) R BMP graphic file (001-999) bbb = Storage number	5-82

INSTRUCTION	DESCRIPTION	PAGE

CONFIGURATION COMMANDS

I2abcde	**Serial Interface.** Sets the operating parameters for the Serial RS232C interface. Sets the default printer configuration in Flash ROM. See Serial Interface Parameters command in the Configuration Commands of *Section 5: Programming Reference* of this manual for details.	5-124
IGa	**Sensor Type**. Selects the sensor type. a = 0 Reflective (Eye-Mark) sensor. 1 Transmissive (See-Thru) sensor 2 Sensor not used	5-123
LD,a,b,c,d,e, f,g,i, j j	**Download Protocol Command Codes**. Downloads a user defined set of Alternate Protocol Command Codes. See *Appendix E* for details on the proper usage of this command.	5-113
PCaa,bb PCF,a,.....z	**Printer Setting**. Sets the default printer configuration in Flash ROM. See Printer Setting command in the Configuration Commands of *Section 5: Programming Reference* of this manual for details.	5-117
PHa	**Print Type.** Selects the thermal printing method. a = 0 Thermal transfer printing 1 Direct thermal printing	5-122
PMa	**Print Mode.** Selects desired backfeed operation. a = 0 No backfeed, continuous operation 1 Tear-Off 2 Cut, backfeed after print 3 Cut, backfeed before print 4 Cut, no backfeed 7 Dispense, backfeed after print 8 Dispense, backfeed before print	5-121
POabcc	**Pitch Offset.** Sets the pitch type, direction and offset to be used a = 0 Cutter 1 Dispense 2 Tear-Off 3 Continuous b = + Positive offset - Negative offset cc = 00 to 99, offset value in dots.	5-113

LEGACY COMMANDS

These commands are provided for legacy applications that use command streams created for older SATO printers. It is not recommended that these commands be used for new applications.

AX	**Expanded Print Length**. This command sets the printer to the Expanded print length (14 inches). <ESC>EX0 is the recommended replacement.
N	**Rotate, Moving Base Reference Point**. Sets the original base reference point and returns printing to normal orientation. <ESC>% is the recommended replacement.
R	**Rotate, Moving Base Reference Point**. Rotates the printing of all subsequent images by 90 degrees counterclockwise each time it is used. Also moves the base reference point. <ESC>% is the recommended replacement.

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APPENDIX B.
BAR CODE SPECIFICATIONS

BAR CODE SYMBOLOGIES

This section contains detailed information on the printing of bar codes on the “Se” Series printers. Information on printing the following bar code symbologies is provided:

- Codbar
- Code 39
- Interleaved 2 of 5
- UPC-A/EAN-13
- EAN-8
- Industrial 2 of 5
- Matrix 2 of 5
- Code 128
- MSI
- Code 93
- UPC-E
- UPC Supplements(Bookland)
- UCC-128
- Postnet
- Data Matrix
- Maxicode
- PDF417

Codabar

Command Structure

1:3 ratio <ESC>**B0bbcccd (data) d**
2:5 ratio <ESC>**BD0bbcccd (data) d**
1:2 ratio <ESC>**D0bbcccd (data) d**

bb = Width of narrow element in dots (01-12)
ccc = Bar height in dots (001-600)
d = Required Start and Stop character (A, B, C, or D)
(data)= Bar code data (alphanumeric)

Character Set

0-9, -,$,:,/,+
A, B, C, D (Start/Stop characters)

Density Table

Printer Model	Narrow/ Wide Ratio	Value of "bb"	"X" Dimension (mils)	Density (char/inch)
M-8490Se	1:3	01	3.3	25.0
	1:3	02	6.7	12.6
	2:5	01	6.7	13.6
	1:2	02	3.3	15.1
M-8459Se M-8460Se M-8485Se	1:3	01	5.0	16.9
	1:3	02	10.0	8.5
	2:5	01	10.0	9.2
	1:2	02	5.0	10.2

Example

<ESC>H0400<ESC>V0025<ESC>**B002100A12345B**
<ESC>H0440<ESC>V0135<ESC>XS12345

Notes

You must add the appropriate (A, B, C or D) Start and Stop characters to the data string. The printer does not automatically add them when printing.

Code 39

Command Structure

1:3 ratio: <ESC>**BIbbccc* (data) ***
2:5 ratio: <ESC>**BD1bbccc* (data) ***
1:2 ratio: <ESC>**D1bbccc* (data) ***

bb = Width of narrow element in dots (01-12)
ccc = Bar height in dots (001-600)
* = Required Start and Stop character (asterisk)
(data)= Bar code data (alphanumeric)

Character Set

0-9, A-Z, Space, $, %, +, -, .,/
* (Start/Stop character)

Density Table

Printer Model	Narrow/ Wide Ratio	Value of "bb"	"X" Dimension (mils)	Density (char/inch)
M-8490Se	1:3	01	3.3	18.8
	1:3	02	6.7	9.5
	2:5	01	3.3	10.3
	1:2	01	6.7	23.1
	1:2	02	3.3	11.5
M-8459Se M-8460Se M-8485Se	1:3	01	5.0	12.7
	1:3	02	10.0	6.4
	2:5	01	10.0	7.0
	1:2	01	5.0	15.6
	1:2	02	10.0	7.8

Example

<ESC>H0100<ESC>V0025<ESC>**B103100*CODE 39***
<ESC>H0230<ESC>V0130<ESC>XS*CODE 39*

Notes

You must add the "*" Start/Stop characters to the data stream. The printer does not add them automatically.

Interleaved Two of Five (I 2/5)

Command Structure

1:3 ratio: <ESC>**B2bbccc (data)**
2:5 ratio: <ESC>**BD2bbccc (data)**
1:2 ratio: <ESC>**D2bbccc (data)**

bb = Width of narrow element in dots (01-12)
ccc = Bar height in dots (001-600)
(data)= Bar code data (numeric); must be an even number of digits or else the printer will add a leading zero; start and stop code are provided by the printer

Character Set

0-9 (numeric only)

Density Table

Printer Model	Narrow/ Wide Ratio	Value of "bb"	"X" Dimension (mils)	Density (char/inch)
M-8490Se	1:3	01	3.3	33.4
	1:3	02	6.7	16.7
	2:5	01	3.3	18.8
	1:2	01	6.7	21.4
	1:2	02	3.3	14.3
M-8459Se M-8460Se M-8485Se	1:3	01	5.0	22.6
	1:3	02	10.0	11.3
	2:5	01	10.0	12.7
	1:2	01	5.0	14.5
	1:2	02	10.0	9.7

Example

<ESC>H0100<ESC>V0100<ESC>**B20310045676567**
<ESC>H0140<ESC>V0210<ESC>XM4567 6567

Notes

To add horizontal guard bars to the top and bottom of the bar code, use the Line and Box command.

UPC-A/EAN-13

Command Structure

<ESC>**B3bbccc (data)**
<ESC>**D3bbccc (data)**
<ESC>**BD3bbccc (data)**

bb = Width of narrow element in dots (01-03)
ccc = Bar height in dots (001-600)
(data)= Bar code data (numeric); must be exactly 13 digits. For UPC-A, the first digit must be a zero and the last 11 digits are the actual UPC-A data followed by a check digit.

To select UPC-A, 11 digits of data is sent. The printer adds a “0” and automatically generates the check digit. If 12 digits of data are sent, the printer assumes an EAN-13 symbol and automatically generates the check digit. The last digit of the bar code data is a modulo 10 check digit. If 13 digits of data are sent to the printer, the check digit is not created and must be supplied by the programmer. It must be the last character in the 13 digit string and can be determined by using the calculations outlined below.

Character Set

0-9 (numeric only)

Density Table

Printer Model	Value of “bb”	Narrow Bar Width (mils)	Magnification Factor
M-8490Se	02	6.7	Below Minimum
	03	10.0	75%
	04	13.3	100%
M-8459Se M-8460Se M-8485Se	02	10.0	75%
	03	15.0	112%
	04	20.0	150%

Notes

D3 provides guide bars that extend longer than the rest of the bar code. BD3 provides guide bars and the human readable text below the symbol.

Example

<ESC>H0100<ESC>V0375<ESC>**BD30215001234567890**

Calculating the Mod 10 Check Digit

If you wish to encode the UPC-A data “01234567890”, follow these steps to find the correct check digit.

ODD	0		2		4		6		8		0	
EVEN		1		3		5		7		9		CD

1. First add all the numbers in the ODD positions.
   i.e., 0+2+4+6+8+0 = 20

2. Multiply the result of Step 1 by 3.
   i.e., 20 x 3 = 60

3. Add up all the numbers in the EVEN positions.
   i.e., 1+3+5+7+9 = 25

4. Add the result of Step 2 to that of Step 3.
   i.e., 60 + 25 = 85

5. Subtract the result of Step 4 from the next highest increment of 10.
   i.e., 90 - 85 = 5

6. The correct Modulo 10 check digit for the 11 digit string “01234567890” is 5.

EAN-8

Command Structure

<ESC>**B4bbccc (data)**
<ESC>**D4bbccc (data)**

bb = Width of narrow element in dots (01-03)
ccc = Bar height in dots (001-600)
(data)= Bar code data (numeric); must be exactly 8 digits.

Character Set

0-9 (numeric only)

Density Table

Printer Model	Value of "bb"	Narrow Bar Width (mils)	Magnification Factor
M-8490Se	02	6.7	Below Minimum
	03	10.0	75%
	04	13.3	100%
M-8459Se M-8460Se M-8485Se	02	10.0	75%
	03	15.0	112%
	04	20.0	150%

Notes

1. D4 provides guide bars that extend longer than the rest of the bar code and the human readable text below the symbol.
2. The check digit is automatically calculated for EAN-8.

Example

<ESC>H0400<ESC>V0375<ESC>**BD4031001234567**

Industrial Two of Five

Command Structure

1:3 ratio: **B5bbccc (data)**
2:5 ratio: **BD5bbccc (data)**
1:2 ratio: **D5bbccc (data)**

bb = Width of narrow element in dots (01-12)
ccc = Bar height in dots (001-600)
(data)= Bar code data (numeric); must be an even number of digits or else the printer will add a leading zero

Character Set

0-9 (numeric only)

Notes

To add horizontal guard bars to the top and bottom of the bar code, use the Line and Box command.

Example

<ESC>H0100<ESC>V0600<ESC>**BD50310012345**
<ESC>H0300<ESC>V0710<ESC>XS12345

Matrix Two of Five

Command Structure

1:3 ratio: <ESC>**B6bbccc (data)**
2:5 ratio: <ESC>**BD6bbccc (data)**
1:2 ratio: <ESC>**D6bbccc (data)**

bb = Width of narrow element in dots (01-12)
ccc = bar height in dots (001-600)
(data)= Bar code data (numeric only); must be an even number of digits or else the printer will add a leading zero.

Character Set

0-9 (numeric only)

Notes

To add horizontal guard bars to the top and bottom of the bar code, use the Line and Box command.

Example

<ESC>H0100<ESC>V0775<ESC>**BD60310012345**
<ESC>H0230<ESC>V0885<ESC>XS12345

Code 128

Command Structure <ESC>**BGbbcccdd (data)**

bb = Width of narrow element in dots (01-12)
ccc = Bar height in dots (001-600)
dd = Start code to specify initial subset of bar code data
>G Subset A Start code
>H Subset B Start code
>I Subset C Start code
(data)= Includes bar code data and subset Shift codes; Shift codes are used to change the subset type within the bar code data. Shift codes:
>E Subset A Shift code
>D Subset B Shift code
>C Subset C Shift code

Character Set See Code 128 Character Table on Page B-18

Density Table

Printer Model	Value of "bb"	"X" Dimension (mils)	Density (char/inch)	
			Subsets A, B	Subset C
M-8490Se	01	3.3	27.3	54.7
	02	6.7	13.6	27.2
	03	10	9.1	18.3
M-8459Se M-8460Se M-8485Se	01	5.0	18.2	36.5
	01	10.0	9.1	18.3
	03	15.0	13.8	12.2

Example The following will start in Subset A for the characters "AB", shift to Subset B for "789", then shift to Subset C for "123456".

<ESC>H0200<ESC>V0550<ESC>**BG03100>GAB>B789>C123456**
<ESC>H0310<ESC>V655<ESC>XSAB789123456

MSI

Command Structure

1:3 ratio: <ESC>**BAbbccc (data) d**
2:5 ratio <ESC>**BDAbbccc (data) d**
1:2 ratio <ESC>**DAbbccc (data) d**

bb = Width of narrow element in dots (01-12)
ccc = Bar height in dots (001-600)
(data)= Bar code data (numeric); maximum of 15 digits
d = Required check digit

Character Set

0-9 (numeric only)

Example

<ESC>H0100<ESC>V0950<ESC>**BA03100123455**
<ESC>H0170<ESC>V1060<ESC>XS12345

Code 93

Command Structure 1:3 ratio: <ESC>**BCbbcccdd (data)**

bb = Width of narrow element in dots (01-12)
ccc = Bar height in dots (001-600)
dd = Length of data (number of digits, 00-99)
(data)= Bar code data (alphanumeric); length must match value of parameter “dd”; check digit is supplied by printer

Character Set 0-9, A-Z, -, ., Space, $, /, +, %

Density Table

Printer Model	Nar-row/Wide Ratio	Value of “bb”	“X” Dimension (mils)	Density (char/inch)
M-8490Se	1:3	01	3.3	33.3
	1:3	02	6.7	16.7
	1:3	03	10	11.1
M-8459Se M-8460Se M-8485Se	1:3	01	5.0	22.5
	1:3	02	10.0	11.3
	1:3	03	15	7.5

Example

<ESC>H0100<ESC>V1125<ESC>**BC03100081234ABCD**
<ESC>H0155<ESC>V1240<ESC>XS1 234ABCD

UPC-E

Command Structure

<ESC>**BEbbccc (data)**
<ESC>**DEbbccc (data)**

bb = Width of narrow element in dots (01-03)
ccc = Bar height in dots (001-600)
(data)= Bar code data (numeric); must be exactly 6 digits

Character Set

0-9 (numeric only)

Density Table

Printer Model	Value of "bb"	Narrow Bar Width (mils)	Magnification Factor
M-8490Se	02	6.7	Below Minimum
	03	10.0	75%
	04	13.3	100%
M-8459Se M-8460Se M-8485Se	02	10.0	75%
	03	15.0	112%
	04	20.0	150%

Notes

Command **DE** provides guide bars that extend longer than the rest of the bar code.

Example

<ESC>H0400<ESC>V0550<ESC>**DE03100123456**
<ESC>H0375<ESC>V0600<ESC>OB0
<ESC>H0408<ESC>V0655<ESC>OB123456

Bookland (UPC/EAN Supplements)

Command Structure <ESC>**BFbbccc (data)**

bb = Width of narrow element in dots (01-03)
ccc = Bar height in dots (001-600)
(data)= Bar code data (numeric); must be exactly 2 or 5 digits

Character Set 0-9 (numeric only)

Density Table

Printer Model	Value of "bb"	Narrow Bar Width (mils)	Magnification Factor
M-8490Se	02	6.7	Below Minimum
	03	10.0	75%
	04	13.3	100%
M-8459Se M-8460Se M-8485Se	02	10.0	75%
	03	15.0	112%
	04	20.0	150%

Example

<ESC>H0325<ESC>V0725<ESC>D30315009827721123
<ESC>L0101<ESC>H0295<ESC>V0800<ESC>OB0
<ESC>H0340<ESC>V0878<ESC>OB98277
<ESC>H 0480<ESC>V0878<ESC>OB21123
<ESC>H640<ESC>V0760<ESC>**BF0313021826**
<ESC>H655<ESC>V0730<ESC>OB21826

UCC-128

Command Structure <ESC>**Blbbcccd (data)**

bb = Width of the narrow elements in dots (01 to 12)
ccc = Bar height in dots (001 to 600)
d = Placement of human readable text
0 None
1 Text at top of bar code
2 Text at bottom of bar code
(data)= 17 digits made up of the following:
1st digit = Container type
digits 2-8, Shipper identification
digits 9-17, Container Sequential number
(not automatically sequenced by the printer)

Character Set See Code 128 Character Table on Page B-18

Density Table See Code 128, Page B-10

Notes

1. The Start, Function, Stop and Extension codes will be created by the printer and added automatically.

2. The internal Modulo 10 check character will be automatically created and added by the printer. The overall Code 128 symbol check character will be automatically created by the printer and added.

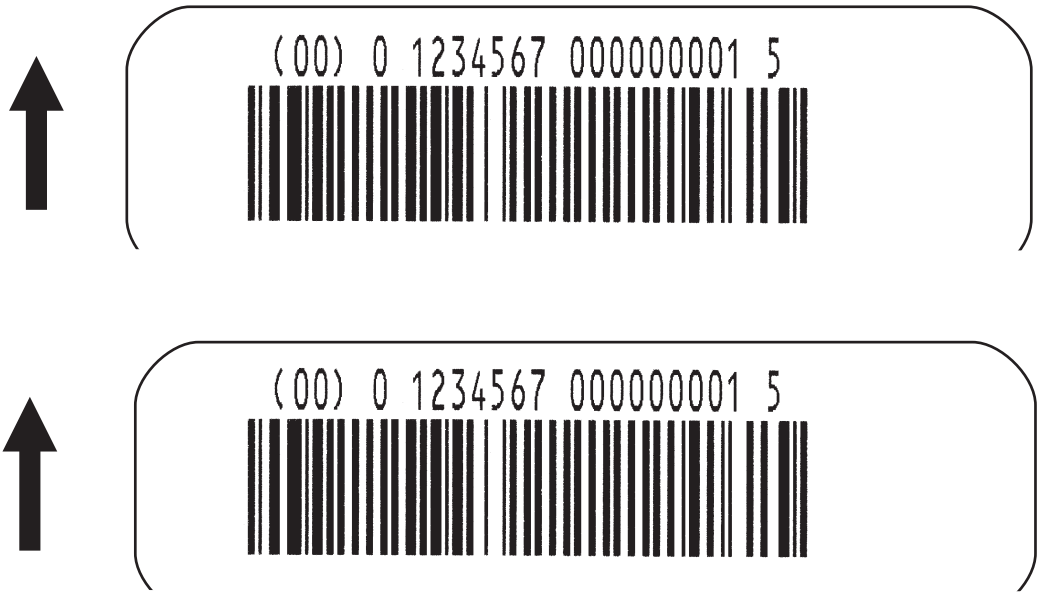
3. The automatically created human readable text will be created according to the following rules:

   - The spacing between the bar code and the text is fixed at 10 dots (.050 inches).
   - If the width of the human readable text is wider than the bar code, it will start at the same position as the bar code and extend past the right of the bar code.
   - If the width of the human readable text is less than the bar code, it will be centered on the bar code.
   - The automatically generated HRI font is OCR-B.
   - If any part of the human readable text extends outside the printable area, none of it will be printed. Care should be exercised when placing the bar code to allow for any automatically created human readable text.

Example

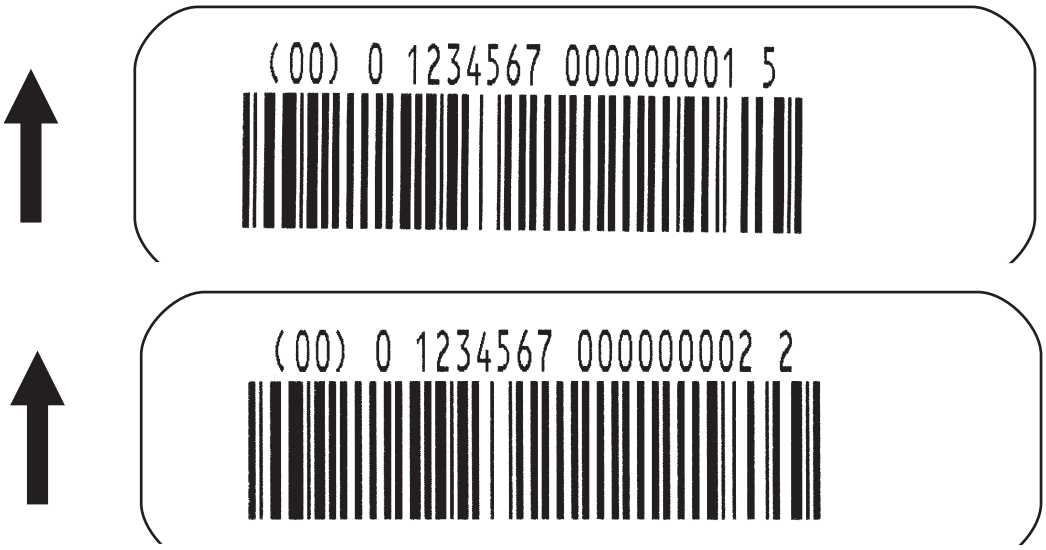
Without incrementing

```
<ESC>A
<ESC>H0100<ESC>V0100<ESC>BI0415010123456700000000 1
<ESC>Q2<ESC>Z
```



With incrementing

```
<ESC>A
<ESC>H0100<ESC>V0100<ESC>F001+001
<ESC>BI0415010123456700000000 1
<ESC>Q2<ESC>Z
```



Postnet

Command Structure <ESC>**BP (data)**

data = 5 digits ZIP
= 6 digits for Postnet 37
= 9 digits for ZIP+4
= 11 digits for Dlelivery Point Bar Code

Character Set 1-9 (numeric only)

Notes

1. Frame bits and check digits added automatically by printer.
2. Bar code width and height are fixed and cannot be changed.
3. If the number of digits sent to the printer as data does not match one of the formats specified above (i.e. 5, 6, 9 or 11), the command is ignored and nothing will be printed.
4. If a "–" is included in the data stream (i.e. 84093-1565), it is ignored.

Example

<ESC>H0100<ESC>V0120<ESC>**BP94089**
<ESC>H0100<ESC>V0160<ESC>**>BP123456**
<ESC>H0100<ESC>V0200<ESC>**BP123456789**
<ESC>H0100<ESC>V0240<ESC>**BP12345678901**

Data Matrix

Command Structure

Data Format <ESC>**BXaabbccddeeefffghh**

aa = Format ID. 01-06 or 11-16. The values 07 and 17 will not be accepted by the printer.
bb = Error correction level. 00 ,05, 08, 10, 14, 20 or 200. All other values will be processed as a 00.
cc = Horizontal cell size. 03 - 12 dots/cell.
dd = Vertical cell size. 03 - 12 dots/cell.
eee = Number of cells in one line. Must use 000 to optimize.
fff = Number of cell lines. Must use 000 to optimize.
g = Mirror Image
  0 = Normal Print
  1 = Reverse Print
hh = Guide Cell Thickness. 01-15. 01 indicates normal type.

Sequential Numbering <ESC>**FXaaabcccdddeee**

aaa = Number of duplicate labels to be printed (001 - 999)
b = Increment or Decrement
  + = Increment
  - = Decrement
ccc = Increment/Decrement Steps (001 - 999)
ddd = Sequential numbering start position (001 - 999) Referenced to left side.
eee = Incremented data length measured from start position (001 - 999)

Print Data <ESC>**DCxxx...x**

xx...x = Data

Character Set

ID NUMBER	CHARACTER SET	ENCODING SCHEME
16 Bit CRC		
01	Numeric, Space	Base 11
02	Upper Case Alpha, Space	Base 27
03	Upper Case Alpha, Space,Comma, Period, Slash, Minus	Base 41
04	Upper Case Alphanumeric, Space	Base 37
05	ASCII 7-bit, Full Keyboard (20_H - $7F_H$)	ASCII
06	ISO 8-bit, International (20_H - FF_H)	8-Bit

Notes

See AIM USA Technical Specification Data Matrix for information on the structure of this symbology.

Example

<ESC>V0100<ESC>H0100
<ESC>BX05051010000000001
<ESC>**DCDATA MATRIX DATA MATRIX**

Maxicode

Command Structure <ESC>**BVa,b,c,ddddddddd,eee,fff,gggg.....<ESC>**

a = Position of Maxicode symbol within the set, when used in a structured append format 1~8.
b = Total number of Maxicode symbols in the set, when used in a structured format 1~8.
c = 2 For Mode 2 Structured Carrier Message for Domestic U.S. UPS shipments
3 For Mode 3 Structured Carrier Message for International UPS shipments
4 Standard symbol
5 Not currently supported
6 Reader programming
ddd..ddd 9 digit numeric Postal Code
eee = 3 digit numeric Country Code
fff = 3 digit numeric Service Class
gg..g = Data, terminated by <ESC>

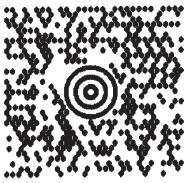
Character Set

MODE	POSTAL CODE	COUNTRY CODE	SERVICE CLASS	MESSAGE LENGTH
2	9 digits max numeric only	3 digits max numeric only	3 digits max numeric only	84 characters alphanumeric
3	6 digits fixed alphanumeric	3 digits max numeric only	3 digits max numeric only	84 characters alphanumeric
4 6	“000000“ fixed data	“000“ fixed data	“000“ fixed data	91 characters alphanumeric

Notes See AIM I.S.S specification for information on the structure of this symbology.

Example

<ESC>A<ESC>V0100<ESC>H0100
<ESC>BV1,1,2,123456789,840,001,[)><RS>01<GS>961Z01547089
<GS>UPSN<GS>056872<GS>349<GS>99999999<GS>001/005
<GS>029<GS>N<GS><GS>LENEXA<GS>KS<RS><EOT>
<ESC>Q001<ESC>Z



PDF417

Command Structure <ESC>**BFaabbcddeeffffnnn...n**

aa = Minimum module dimension (03-09 dots). Will not print if values of 01, 02 or greater than 10 are specified.
bb = Minimum module pitch dimension (04-24 dots). Will not print if values of 01, 02, 03 or greater than 25 are specified.
c = Security (error detection) Level (1-8).
dd = Code words per line (01-30). If 00 is specified for both dd and ee, the printer automatically optimizes the number of rows per symbol.
ee = Rows per symbol (00 or 03-40). If 00 is specified for both dd and ee, the printer automatically optimizes the number of rows per symbol.
ffff = Number of characters to be encoded (0001-2700).
gg = PDF417 Type. If not specified, standard PDF417
= T Truncated PDF417
= M Micro PDF417
nn...n = Data to be printed.

Character Set ASCII 128 character set plus PC437 Extended Character set.

Notes See AIM USA Uniform Symbology Specification PDF417 for information on the structure of this symbology.

Example <ESC>V0100<ESC>H0100<ESC>**BK0607400000021PDF417 PDF417 PDF417**

CODE 128 CHARACTER TABLE

The Code 128 Table lists 105 data values for the three subsets: A, B, and C. Each subset column displays either a single column of data or a double column of data.

- If the subset column displays a single column of data, that is the data to be entered to produce the result.
- If the subset column displays a double column of data, the first column contains the desired output, and the second column contains the actual characters to be entered.

For example, look at value 99 in the table:

If you are currently using Subset A or Subset B, you can change to Subset C by encoding "**>C**".

VALUE	SUBSET A	SUBSET B	SUBSET C
99	Subset C >C	Subset C >C	99
100	Subset B >D	FNC4 >D	Subset B >D
101	FNC4 >E	Subset A >E	Subset A >E
102	FNC1 >F	FNC1 >F	FNC1 >F

- Note: When Subset C is chosen, you must specify an even number of data positions because of the interleaved encodation method.

Code 128 Character Table

VALUE	SUBSET A	SUBSET B	SUBSET C	VALUE	SUBSET A	SUBSET B	SUBSET C
0	SP	SP	00	36	D	D	36
1	!	!	01	37	E	E	37
2	“	”	02	38	F	F	38
3	#	#	03	39	G	G	39
4	$	$	04	40	H	H	40
5	%	%	05	41	I	I	41
6	&	&	06	42	J	J	42
7	‘	‘	07	43	K	K	43
8	(	(	08	44	L	L	44
9	)	)	09	45	M	M	45
10	*	*	10	46	N	N	46
11	+	+	11	47	O	O	47
12	,	,	12	48	P	P	48
13	-	-	13	49	Q	Q	49
14	.	.	14	50	R	R	50
15	/	/	15	51	S	S	51
16	0	0	16	52	T	T	52
17	1	1	17	53	U	U	53
18	2	2	18	54	V	V	54
19	3	3	19	55	W	W	55
20	4	4	20	56	X	X	56
21	5	5	21	57	Y	Y	57
22	6	6	22	58	Z	Z	58
23	7	7	23	59	[	[	59
24	8	8	24	60	\	\	60
25	9	9	25	61	]	]	61
26	:	:	26	62	^	^	62
27	;	;	27	63	__	__	63
28	<	<	28	64	NUL>(space)	‘ >(space)	64
29	=	=	29	65	SOH >!	a or >!	65
30	>J	>J	30	66	STX >"	b or >"	66
31	?	?	31	67	ETX >#	c or >#	67
32	@	@	32	68	EOT >$	d or >$	68
33	A	A	33	69	ENQ >%	e or >%	69
34	B	B	34	70	ACK >&	f or >&	70
35	C	C	35	71	BEL >’	g or >’	71

Code 128 Character Table (cont'd)

VALUE	SUBSET A	SUBSET B	SUBSET C	VALUE	SUBSET A	SUBSET B	SUBSET C
72	BS >(	h >(	72	89	EM >9	y >9	89
73	HT >)	i >)	73	90	SUB >:	z >:	90
74	LF >*	j >*	74	91	ESC >;	{ >;	91
75	VT >+	k >+	75	92	FS ><	| ><	92
76	FF >,	l >,	76	93	GS >=	} >=	93
77	CR >-	m >-	77	94	RS >>	~ >>	94
78	SO >.	n >.	78	95	US >?	DEL >?	95
79	SI >/	o >/	79	96	FNC3 >@	FNC3 >@	96
80	DLE >0	p >0	80	97	FNC2 >A	FNC2 >A	97
81	DC1 >1	q >1	81	98	SHIFT >B	SHIFT >B	98
82	DC2 >2	r >2	82	99	Subset C >C	Subset C >C	99
83	DC3 >3	s >3	83	100	Subset B >D	FNC4 >D	Subset B >D
84	DC4 >4	t >4	84	101	FNC4 >E	Subset A >E	Subset A >E
85	NAK >5	u >5	85	102	FNC1 >F	FNC1 >F	FNC1 >F
86	SYN >6	v >6	86	103	SUBSET A	START CODE >G	
87	ETB >7	w >7	87	104	SUBSET B	START CODE >H	
88	CAN >8	x >8	88	105	SUBSET C	START CODE >I	

APPENDIX C.
CUSTOM CHARACTERS AND GRAPHICS

CUSTOM-DESIGNED CHARACTER EXAMPLE

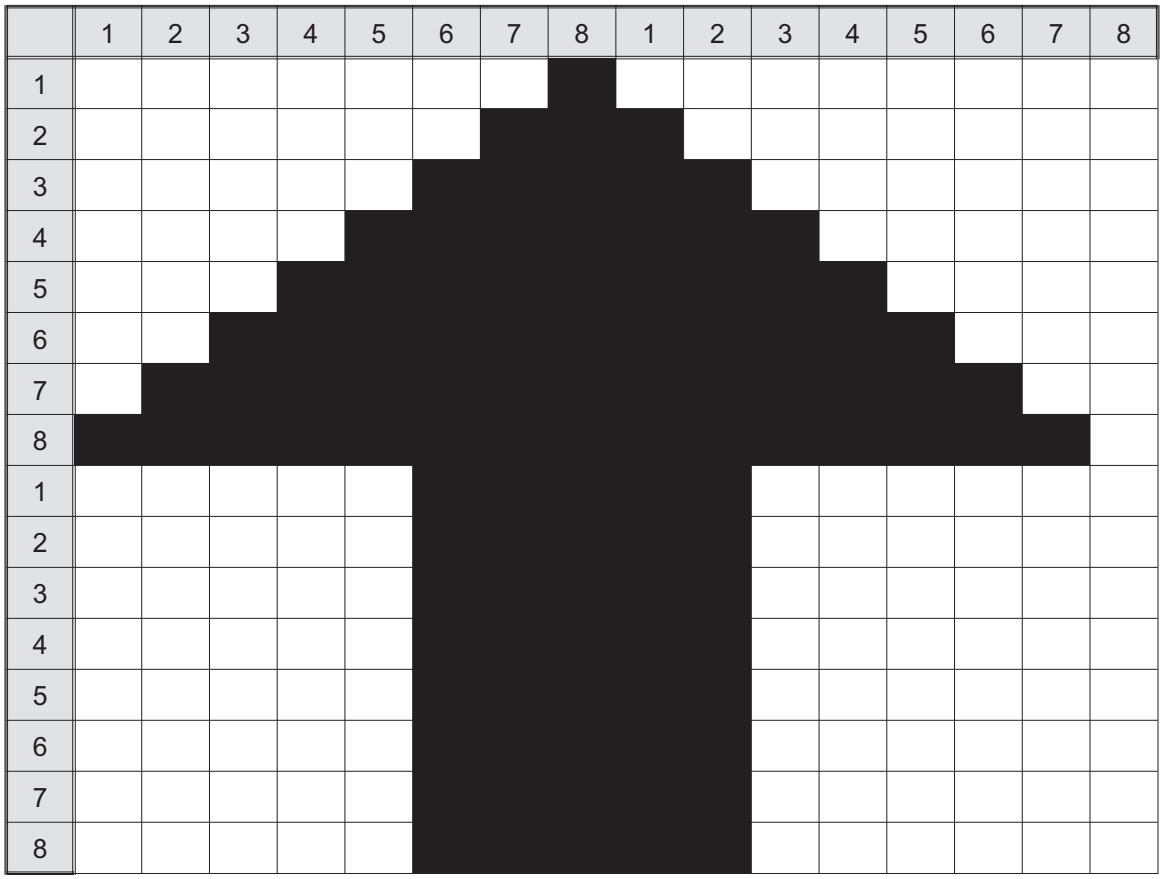
The following example is presented to help understand the use of the Custom Designed Characters command. It demonstrates the design and printing of an “arrow” in a 16 x 16 matrix.

1. Determine which matrix size to use

    - 16 dot x 16 dots
    - 24 dots by 24 dots

2. Lay out a grid and draw the image on the grid.

    - Each square represents one dot
    - Blacken squares for each printed dot



3. Transfer the image into two bit map representations and then into hexadecimal or binary format.

ROW	BIT MAP				HEX	
1	0000	0001	0000	0000	01	00
2	0000	0011	1000	0000	03	80
3	0000	0111	1100	0000	07	C0
4	0000	1111	1110	0000	0F	E0
5	0001	1111	1111	0000	1F	F0
6	0011	1111	1111	1000	3F	F8
7	0111	1111	1111	1100	7F	FC
8	1111	1111	1111	1110	FF	FE
9	0000	0111	1100	0000	07	C0
10	0000	0111	1100	0000	07	C0
11	0000	0111	1100	0000	07	C0
12	0000	0111	1100	0000	07	C0
13	0000	0111	1100	0000	07	C0
14	0000	0111	1100	0000	07	C0
15	0000	0111	1100	0000	07	C0
16	0000	0111	1100	0000	07	C0

4. To store the custom designed character in memory using a hexadecimal data stream, the command would be:

<ESC>A
<ESC>**T1H3F**0100038007C00FE01FF03FF87FFCFFFE07C007C007C007C007C007C007C007C0<ESC>Z

Note: This should be a continuous data string without any CR or LF characters.

5. To recall the custom character from memory, send the following code to the printer. Note that you can print other data as well. Also note how the character size was expanded using the <ESC>L command.

<ESC>A
<ESC>L0505<ESC>H0150<ESC>V100<ESC>**K1H903F**
<ESC>L0505<ESC>H0600<ESC>V100<ESC>**K1H903F**
<ESC>L0303<ESC>H0125<ESC>V0250<ESC>MTHIS SIDE UP !
<ESC>Q1
<ESC>Z

6. To store the custom designed character in memory using a binary data stream, the command would be:

<ESC>A
<ESC>**T1B3F** 01_H 00_H 03_H 80_H 07_H $C0_H$ $0F_H$ $E0_H$ $1F_H$ $F0_H$ $3F_H$ $F8_H$ $7F_H$ FC_H FF_H FE_H 07_H $C0_H$ 07_H $C0_H$ 07_H $C0_H$ 07_H $C0_H$ 07_H $C0_H$ 07_H $C0_H$ 07_H $C0_H$ 07_H $C0_H$
<ESC>Z

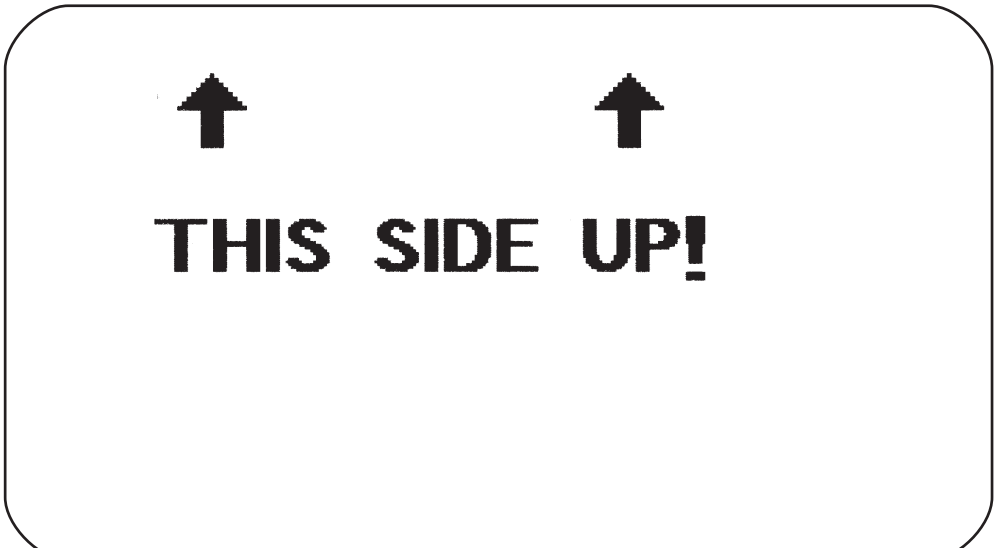
NOTE: Spaces are shown between hexidecimal values in the above example for clarity only and *are not* included in the data string.

Note that the data stream is only half as long as the hexadecimal format. This is because we can send the binary equivalent of "11111111" (represented above in its hexidecimal value of FF_H*), for example, using one eight bit word while it takes two eight bit words to transmit the hexadecimal equivalent "F" and "F". To send binary characters using BASIC, the expression "CHR (&HFF) will send the binary equivalent of FF (i.e., 11111111).*

6. To recall the custom character from memory, send the following code to the printer:

```
<ESC>A
<ESC>L505<ESC>H0150<ESC>V100<ESC>K1B903F
<ESC>L505<ESC>H0600<ESC>V100<ESC>K1B903F
<ESC>L0303<ESC>H0125<ESC>V0250<ESC>XMTHIS SIDE UP !
<ESC>Q1
<ESC>Z
```

The printer output for both the hexadecimal and binary format examples is:



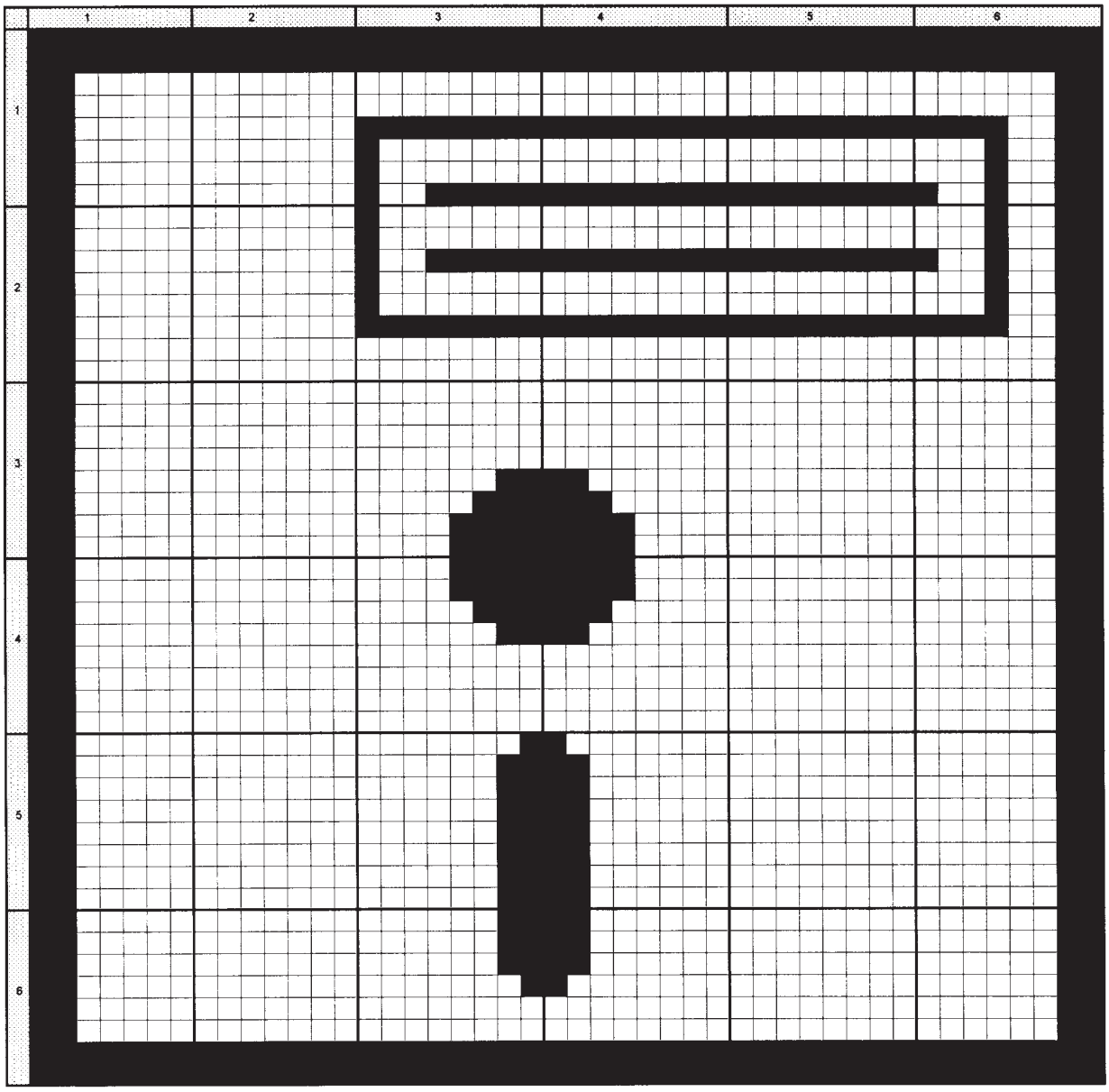
CUSTOM GRAPHICS EXAMPLE

The following example is presented to help you understand the use of the Custom Graphics command. It demonstrates the design and printing of a “diskette” in a 48 x 48 matrix.

1. Determine the matrix size for the graphic. It must be in 8 dot by 8 dot blocks. The example here has six blocks horizontally and six blocks vertically (48 x 48).

2. Lay out a grid and draw the image on the grid.

    - Each square represents one dot
    - Blacken squares for each printed dot



3. Transfer the image into a bit map representation and then into hexadecimal format:

BIT MAP						HEXADECIMAL FORMAT					
1	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**	**4**	**5**	**6**
11111111	11111111	11111111	11111111	11111111	11111111FF	FF	FF	FF	FF	FF	FF
11111111	11111111	11111111	11111111	11111111	11111111FF	FF	FF	FF	FF	FF	FF
11000000	00000000	00000000	00000000	00000000	00000011C0	00	00	00	00	03	03
11000000	00000000	00000000	00000000	00000000	00000011C0	00	00	00	00	03	03
11000000	00000000	11111111	11111111	11111111	11110011C0	00	FF	FF	FF	03	03
11000000	00000000	10000000	00000000	00000000	00010011C0	00	80	00	00	13	13
11000000	00000000	10000000	00000000	00000000	00010011C0	00	80	00	00	13	13
11000000	00000000	10011111	11111111	11111111	00010011C0	00	9F	FF	FF	13	13
11000000	00000000	10000000	00000000	00000000	00010011C0	00	80	00	00	13	13
11000000	00000000	10000000	00000000	00000000	00010011C0	00	80	00	00	03	03
11000000	00000000	10011111	11111111	11111111	00010011C0	00	9F	FF	FF	13	13
11000000	00000000	10000000	00000000	00000000	00010011C0	00	80	00	00	13	13
11000000	00000000	10000000	00000000	00000000	00010011C0	00	80	00	00	13	13
11000000	00000000	11111111	11111111	11111111	11110011C0	00	FF	FF	FF	F3	F3
11000000	00000000	00000000	00000000	00000000	00000011C0	00	00	00	00	03	03
11000000	00000000	00000000	00000000	00000000	00000011C0	00	00	00	00	03	03
11000000	00000000	00000000	00000000	00000000	00000011C0	00	00	00	00	13	13
11000000	00000000	00000000	00000000	00000000	00000011C0	00	00	00	00	13	13
11000000	00000000	00000000	00000000	00000000	00000011C0	00	00	00	00	13	13
11000000	00000000	00000000	00000000	00000000	00000011C0	00	00	00	00	13	13
11000000	00000000	00000011	11000000	00000000	00000011C0	00	03	C0	00	03	03
11000000	00000000	00000111	11100000	00000000	00000011C0	00	07	E0	00	03	03
11000000	00000000	00001111	11110000	00000000	00000011C0	00	0F	F0	00	03	03
11000000	00000000	00001111	11110000	00000000	00000011C0	00	0F	F0	00	03	03
11000000	00000000	00001111	11110000	00000000	00000011C0	00	0F	F0	00	03	03
11000000	00000000	00001111	11110000	00000000	00000011C0	00	0F	F0	00	03	03
11000000	00000000	00000111	11100000	00000000	00000011C0	00	07	E0	00	03	03
11000000	00000000	00000011	11000000	00000000	00000011C0	00	03	C0	00	03	03
11000000	00000000	00000000	00000000	00000000	00000011C0	00	00	00	00	03	03
11000000	00000000	00000000	00000000	00000000	00000011C0	00	00	00	00	03	03
11000000	00000000	00000000	00000000	00000000	00000011C0	00	00	00	00	03	03
11000000	00000000	00000000	00000000	00000000	00000011C0	00	00	00	00	03	03
11000000	00000000	00000001	10000000	00000000	00000011C0	00	01	80	00	03	03
11000000	00000000	00000011	11000000	00000000	00000011C0	00	03	C0	00	03	03
11000000	00000000	00000011	11000000	00000000	00000011C0	00	03	C0	00	03	03
11000000	00000000	00000011	11000000	00000000	00000011C0	00	03	C0	00	03	03
11000000	00000000	00000011	11000000	00000000	00000011C0	00	03	C0	00	03	03
11000000	00000000	00000011	11000000	00000000	00000011C0	00	03	C0	00	03	03
11000000	00000000	00000011	11000000	00000000	00000011C0	00	03	C0	00	03	03
11000000	00000000	00000011	11000000	00000000	00000011C0	00	03	C0	00	03	03
11000000	00000000	00000011	11000000	00000000	00000011C0	00	03	C0	00	03	03
11000000	00000000	00000011	11000000	00000000	00000011C0	00	03	C0	00	03	03
11000000	00000000	00000011	11000000	00000000	00000011C0	00	03	C0	00	03	03
11000000	00000000	00000001	10000000	00000000	00000011C0	00	01	80	00	03	03
11000000	00000000	00000000	00000000	00000000	00000011C0	00	03	C0	00	03	03
11000000	00000000	00000000	00000000	00000000	00000011C0	00	03	C0	00	03	03
11111111	11111111	11111111	11111111	11111111	11111111FF	FF	FF	FF	FF	FF	FF
11111111	11111111	11111111	11111111	11111111	11111111FF	FF	FF	FF	FF	FF	FF

4. Using the hexadecimal data, send the following code to print the graphic image as designed.

<ESC>A<ESC>H0100<ESC>V0100<ESC>**GH006006**
FFFFFF FFFFFF FFFFFF FFFFFF C00000 000003
C00000 000003 C000FF FFFFF3 C00080 000013
C00080 000013 C0009F FFFF13 C00080 000013
C00080 000013 C0009F FFFF13 C00080 000013
C00080 000013 C000FF FFFFF3 C00000 000003
C00000 000003 C00000 000003 C00000 000003
C00000 000003 C00000 000003 C00003 C00003
C00007 E00003 C0000F F00003 C0000F F00003
C0000F F00003 C0000F F00003 C00007 E00003
C00003 C00003 C00000 000003 C00000 000003
C00000 000003 C00000 000003 C00001 800003
C00003 C00003 C00003 C00003 C00003 C00003
C00003 C00003 C00003 C00003 C00003 C00003
C00003 C00003 C00003 C00003 C00003 C00003
C00003 C00003 C00001 800003 C00000 000003
C00000 000003 FFFFFF FFFFFF FFFFFF FFFFFF
<ESC>Q1<ESC>Z

Note: Spaces shown in the hexadecimal listing above are for emphasis only. Spaces must not be encoded within the graphic portion of the data stream to the printer. Also, CR and LF characters to separate the lines must not be encoded in the data stream.

5. To send the data in binary format, the software must convert the data into binary format before transmitting it to the printer. Using the BASIC programming language for example, this is done by notation “CHR$ (&HC0)” which sends the hexidecimal value of “C0” as binary data (11000000). The BASIC program listing for sending this graphic to the printer (using the RS232 port) in binary format is:

```
CLS
OPEN “COM2:9600,N,8,1,CS,DS” FOR OUTPUT AS #1
E$ = CHR$(27)
PRINT #1,CHR$(2); E$; “A”; E$; “V0100"; E$; ”H0100"; E$; “GB006006";
PRINT #1,CHR$(&HFF);CHR$(&HFF);CHR$(&HFF);CHR$(&HFF);CHR$(&HFF);
PRINT #1,CHR$(&HFF);CHR$(&HFF);CHR$(&HFF);CHR$(&HFF);CHR$(&HFF);
PRINT #1,CHR$(&HFF);CHR$(&HFF);CHR$(&HC0);CHR$(&H00);CHR$(&H00);
PRINT #1,CHR$(&H00);CHR$(&H00);CHR$(&H03);CHR$(&HC0);CHR$(&H00);
PRINT #1,CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H03);CHR$(&HC0);
PRINT #1,CHR$(&H00);CHR$(&HFF);CHR$(&HFF);CHR$(&HFF);CHR$(&HF3);
PRINT #1,CHR$(&HC0);CHR$(&H00);CHR$(&H80);CHR$(&H00);CHR$(&H00);
PRINT #1,CHR$(&H13);CHR$(&HC0);CHR$(&H00);CHR$(&H80);CHR$(&H00);
PRINT #1,CHR$(&H00);CHR$(&H13);CHR$(&HC0);CHR$(&H00);CHR$(&H9F);
PRINT #1,CHR$(&HFF);CHR$(&HFF);CHR$(&H13);CHR$(&HC0);CHR$(&H00);
PRINT #1,CHR$(&H80);CHR$(&H00);CHR$(&H00);CHR$(&H13);CHR$(&HC0);
PRINT #1,CHR$(&H00);CHR$(&H80);CHR$(&H00);CHR$(&H00);CHR$(&H13);
PRINT #1,CHR$(&HC0);CHR$(&H00);CHR$(&H9F);CHR$(&HFF);CHR$(&HFF);
PRINT #1,CHR$(&H13);CHR$(&HC0);CHR$(&H00);CHR$(&H80);CHR$(&H00);
PRINT #1,CHR$(&H00);CHR$(&H13);CHR$(&HC0);CHR$(&H00);CHR$(&H80);
PRINT #1,CHR$(&H00);CHR$(&H00);CHR$(&H13);CHR$(&HC0);CHR$(&H00);
PRI NT #1,CHR$(&HFF);CHR$(&HFF);CHR$(&HFF);CHR$(&HF3);CHR$(&HC0);
PRINT #1,CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H03);
PRINT #1,CHR$(&HC0);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);
PRINT #1,CHR$(&H03);CHR$(&HC0);CHR$(&H00);CHR$(&H00);CHR$(&H00);
PRINT #1,CHR$(&H00);CHR$(&H03);CHR$(&HC0);CHR$(&H00);CHR$(&H00);
PRINT #1,CHR$(&H00);CHR$(&H00);CHR$(&H03);CHR$(&HC0);CHR$(&H00);
PRINT #1,CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H03);CHR$(&HC0);
PRINT #1,CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H03);
PRINT #1,CHR$(&HC0);CHR$(&H00);CHR$(&H03);CHR$(&HC0);CHR$(&H00);
PRINT #1,CHR$(&H03);CHR$(&HC0);CHR$(&H00);CHR$(&H07);CHR$(&H00);
```

```
PRINT #1,CHR$(&H00);CHR$(&H03);CHR$(&HC0);CHR$(&H00);CHR$(&H0F);
PRINT #1,CHR$(&HF0);CHR$(&H00);CHR$(&H03);CHR$(&HC0);CHR$(&H00);
PRINT #1,CHR$(&H0F);CHR$(&HF0);CHR$(&H00);CHR$(&H03);CHR$(&HC0);
PRINT #1,CHR$(&H00);CHR$(&H0F);CHR$(&HF0);CHR$(&H00);CHR$(&H03);
PRINT #1,CHR$(&HC0);CHR$(&H00);CHR$(&H0F);CHR$(&HF0);CHR$(&H00);
PRINT #1,CHR$(&H03);CHR$(&HC0);CHR$(&H00);CHR$(&H07);CHR$(&HE0);
PRINT #1,CHR$(&H00);CHR$(&H03);CHR$(&HC0);CHR$(&H00);CHR$(&H03);
PRINT #1,CHR$(&HC0);CHR$(&H00);CHR$(&H03);CHR$(&HC0);CHR$(&H00);
PRINT #1,CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H03);CHR$(&HC0);
PRINT #1,CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H03);
PRINT #1,CHR$(&HC0);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);
PRINT #1,CHR$(&H03);CHR$(&HC0);CHR$(&H00);CHR$(&H00);CHR$(&H00);
PRINT #1,CHR$(&H00);CHR$(&H03);CHR$(&HC0);CHR$(&H00);CHR$(&H01);
PRINT #1,CHR$(&H80);CHR$(&H00);CHR$(&H03);CHR$(&HC0);CHR$(&H00);
PRINT #1,CHR$(&H03);CHR$(&HC0);CHR$(&H00);CHR$(&H03);CHR$(&HC0);
PRINT #1,CHR$(&H00);CHR$(&H03);CHR$(&HC0);CHR$(&H00);CHR$(&H03);
PRINT #1,CHR$(&HC0);CHR$(&H00);CHR$(&H03);CHR$(&HC0);CHR$(&H00);
PRINT #1,CHR$(&H03);CHR$(&HC0);CHR$(&H00);CHR$(&H03);CHR$(&HC0);
PRINT #1,CHR$(&H00);CHR$(&H03);CHR$(&HC0);CHR$(&H00);CHR$(&H03);
PRINT #1,CHR$(&HC0);CHR$(&H00);CHR$(&H03);CHR$(&HC0);CHR$(&H00);
PRINT #1,CHR$(&H03);CHR$(&HC0);CHR$(&H00);CHR$(&H03);CHR$(&HC0);
PRINT #1,CHR$(&H00);CHR$(&H03);CHR$(&HC0);CHR$(&H00);CHR$(&H03);
PRINT #1,CHR$(&HC0);CHR$(&H00);CHR$(&H03);CHR$(&HC0);CHR$(&H00);
PRINT #1,CHR$(&H03);CHR$(&HC0);CHR$(&H00);CHR$(&H03);CHR$(&HC0);
PRINT #1,CHR$(&H00);CHR$(&H03);CHR$(&HC0);CHR$(&H00);CHR$(&H03);
PRINT #1,CHR$(&HC0);CHR$(&H00);CHR$(&H03);CHR$(&HC0);CHR$(&H00);
PRINT #1,CHR$(&H01);CHR$(&H80);CHR$(&H00);CHR$(&H03);CHR$(&HC0);
PRI NT #1,CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H03);
PRINT #1,CHR$(&HC0);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);
PRINT #1,CHR$(&H03);CHR$(&HFF);CHR$(&HFF);CHR$(&HFF);CHR$(&HFF);
PRINT #1,CHR$(&HFF);CHR$(&HFF);CHR$(&HFF);CHR$(&HFF);CHR$(&HFF);
PRINT #1,CHR$(&HFF);CHR$(&HFF);CHR$(&HFF);
PRINT #1,E$; “Q1"; E$; ”Z"; CHR$(3)
CLOSE #1
```

The printer output for both the hexadecimal and binary format example is:

PCX GRAPHICS EXAMPLE

A graphics file in a PCX format may also be transmitted to the printer. The file must not be larger than 32K bytes (DOS file size reported in a DIR listing). For example, the WIZ.PCX image shown below has a file size of 15076 bytes.

The uncompressed size (PCX is a compressed file) of the file must not be greater than 64K bytes. Generally this is not a problem unless the graphic image is surrounded by large amount of white space which the PCX algorithm can compress very efficiently. If this is the case, the file should be recaptured to eliminate the surrounding white space as much as possible.

The following basic program will send and print this file:

```
OPEN "WIZ.PCX" FOR INPUT AS #2
DA$ = INPUT$(15706, #2)
C$ = CHR$(27)
WIDTH "LPT1:", 255
LPRINT C$; "A";
LPRINT C$; "V150"; C$; "H100"; C$; "GP15706,"; DA$
LPRINT C$; "Q1"; C$; "Z";
CLOSE #2
```

The printer output for this program is:

APPENDIX D.
OPTIONAL ACCESSORIES

This section contains instructions for using the following features:

- PCMCIA Memory Cards
- Memory Option
- Top Mounted Reflective Sensor

PCMCIA MEMORY CARDS

Description

The Memory Card Option provides the connectors and interface board for one PCMCIA memory cards slots. The printer memory can be expanded up to 16MB.

Type	SRAM or Flash-ROM
Applicable Specifications	PCMCIA Version 2.1 (JEIDA Version 4.1)
Size	Up to 4 MB SRAM or 16MB Flash ROM
Connector Pins	68
Battery	Two years for SRAM type (approximately)
Write Protect	Yes
Low Battery Detect	Yes (SRAM only)

Installation

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

Error Handling

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

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

EXPANDED FLASH ROM MEMORY OPTION

Adds an additional 4 MB of Flash ROM to the printer, extending the onboard Flash ROM to 6MB total. The Expanded Flash ROM Memory Option requires the installation of an upgraded Memory Module in the printer which replaces the standard Memory Module.

Installation

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

TOP MOUNTED REFLECTIVE SENSOR

If there is a requirement for printing a registration mark on the top of a label instead of on the bottom side, a Top Mounted Reflective Sensor Assembly can be installed. This option is not available on the M-8460Se and the Left-Hand versions of the M-8485Se, M-8459Se and M-8490Se.

PLUG-IN INTERFACE MODULES

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

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

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

2. Remove the two **Interface Module Retaining Screws**.

3. Grasp the **Interface Module** and pull it out of the connector.

4. Place the new **Interface Module** in the slot and press inward firmly until it is properly seated.

5. Replace the two **Interface Card Retaining Screws**.

6. If the new **Interface Module** is for a serial interface, set DSW1 for the proper operation.

7. Connect the interface cable to the connector.

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APPENDIX E.
CUSTOM PROTOCOL COMMAND CODES

DESCRIPTION

This section contains information on creating custom Protocol Command Codes for operating the “Se” printers. The Protocol Command codes are used to tell the printer that a specific type of information is being transmitted to it. As an example, the Standard Protocol Command Code specifies the use of an <ESC>character to tell the printer that the following character(s) will represent a specific command. Sometimes the host computer is unable to generate the character or it uses the <ESC> character to control another function. In this case, an Alternate Protocol Command Code set can be selected for use by placing DIP switch 2-7 in the ON position. When the Alternate set is selected, the <ESC> character is not used and is instead replaced with a “carrot” (^) character. A command stream would then start with an “^” instead of an “<ESC>”. These two sets of Protocol Command Codes are adequate for the majority of all applications, but ocassionally situations occur where conflicts exist when using the Alternate set. In these cases, the user can define and download a custom set of Protocol Command Codes that are stored in non-voltile memory in the printer. After these are downloaded, they replace the Alternate Command Code set when DIP switch DS2-7 is in the ON position. When DIP switch DS2-7 is in the OFF position, the Standard Protocol Command Codes are used.

DOWNLOAD COMMAND STRUCTURE

The command for downloading a new set of Protocol Command Codes takes the form of “<ESC>LD,a,b,c,d,e,f,g,h,i,j j”. The parameters specified for “a” through “i” can be transmitted in either ASCII characters or hex notation, allowing a complete 128 character (except for the “,”) set to be used for selecting the custom code.

PARAMETER	STANDARD SETTING	ALTERNATE SETTING (DEFAULT)
a	STX	{
b	ETX	}
c	ESC	
d	ENQ	@
e	CAN	!
g	OFFLINE	]
h (Auto ONLINE)	No	0 = YES 1 = NO
i (Zero Slash)	No	0 = YES 1 = NO
j j (Eurocharacter)	D5	User Defined

RESET

If the custom Protocol Command codes are incorrect or if the printer does not respond to commands using the custom set, the Alternate Protocol Control Codes can be restored by the following procedure:

1. Turn the printer off.

2. Place DIP switch **DS2-7** in the **ON** position.

3. Turn power on while simultaneously pressing the **FEED** and **LINE** switches.

4. When the message "ALT PROTOCOL DEFAULT COMPLETED" appears on the display, turn the printer off.

5. When the printer is powered up again, the Alternate Protocol Command Code set will be active. All previous custom settings will be lost.

DOWNLOAD PROCEDURE

The procedure for downloading a custom Protocol Command Code set is:

1. Reset the printer to the default settings using the Reset procedure.

2. Place DIP switch **DS2-7** in the **ON** position.

3. Turn the POWER switch ON while simultaneously pressing the **LINE** switch. This places the printer in the USER DOWNLOAD mode.

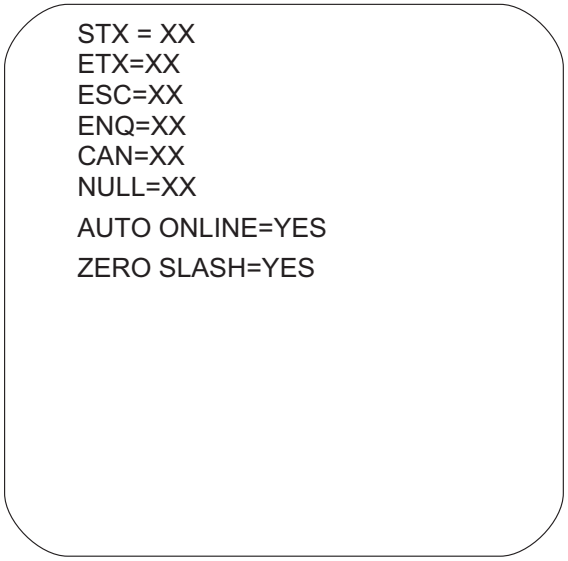
4. Set DIP switch **DS2-7** in the position to accept the Protocol Control codes to be used for downloading (i.e. DS2-7 = OFF for Standard codes and DS2-7 ON to use the Alternate set).

5. Press the **LINE** key to place the printer in the ON-LINE mode. The LINE LED should be on and the printer is ready to receive the download command data stream.

6. After the command has been sent, the unit will beep and print a status label. If it does not beep and print the label, the printer did not accept the data.

7. If the printer does not beep and print a setting label, turn the printer off, check your download command stream for errors and start the download process over at step 1.

8. If the custom codes are correct, press the FEED key to accept them and terminate the download process. If they are incorrect, turn the unit off without pressing the FEED key and begin the download process again at step 1.



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