“Se” Applicator
Print Engines

M-8459Se, M-8460Se, M-8485Se
M-8490Se
Warning: This equipment complies with the requirements in Part 15 of FCC rules for a Class A computing device. Operation of this equipment in a residential area may cause unacceptable interference to radio and TV reception requiring the operator to take whatever steps are necessary to correct the interference.

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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.
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• APPENDIX A: Command Code Quick Reference
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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

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<tr>
<th>SPECIFICATION</th>
<th>M-8485Se</th>
<th>M-8460Se</th>
<th>M-8490Se</th>
<th>M-8459Se</th>
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<tr>
<td><strong>PRINT</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Method</td>
<td>Direct or Thermal Transfer</td>
<td>Direct Only</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speed (User Selectable)</td>
<td>4 to 12 ips 100 to 300 mm/s</td>
<td>4 to 8 ips 100 to 200 mm/s</td>
<td>4 to 8 ips 100 to 200 mm/s</td>
<td>2 to 5 ips 50 to 125 mm/s</td>
</tr>
<tr>
<td>Print Module (Dot Size)</td>
<td>.0049 in. .125 mm</td>
<td>.0033 in. .083 mm</td>
<td>.0049 in. .125 mm</td>
<td></td>
</tr>
<tr>
<td>Resolution</td>
<td>203 dpi 8 dpmm</td>
<td>305 dpi 12 dpmm</td>
<td>203 dpi 8 dpmm</td>
<td></td>
</tr>
<tr>
<td>Maximum Print Width</td>
<td>5.0 in. 128 mm 1024 dots</td>
<td>6.0 in. 152 mm 1216 dots</td>
<td>4.4 in. 112 mm 1344 dots</td>
<td>4.4 in. 112 mm 896 dots</td>
</tr>
<tr>
<td>Maximum Print Length</td>
<td>49.2 in. 1249 mm</td>
<td>32.8 in. 833 mm</td>
<td>49.2 in. 1249 mm</td>
<td></td>
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<tr>
<td><strong>MEDIA</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum Width</td>
<td>1.0 in. (25 mm)</td>
<td>2.0 in. (53 mm)</td>
<td>1.0 in. (25 mm)</td>
<td>1.0 in. (25 mm)</td>
</tr>
<tr>
<td>Minimum Length (1)</td>
<td>.25 in. (6 mm)</td>
<td>.25 in. (6 mm)</td>
<td>.25 in. (6 mm)</td>
<td>.25 in. (6 mm)</td>
</tr>
<tr>
<td>Maximum Width</td>
<td>5.25 in. 134 mm</td>
<td>6.5 in. 165 mm</td>
<td>5.25 in. 134 mm</td>
<td>5.25 in. 134 mm</td>
</tr>
<tr>
<td>Type</td>
<td>Die Cut Labels, Fan-Fold or Continuous</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Maximum Caliper</td>
<td>.010 in. (.25 mm)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max Unwind torque</td>
<td>8.8 lbs (4 Kg) with 5 in. wide labels</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Backing Rewind Tension</td>
<td>400 g or less</td>
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<td><strong>LABEL SENSING</strong></td>
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<tr>
<td>Transmissive See-Thru</td>
<td>Adjustable</td>
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<tr>
<td>Reflective Eye-Mark</td>
<td>Fixed</td>
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<td></td>
<td></td>
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<tr>
<td><strong>RIBBON</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Maximum Width</td>
<td>5.25 in. 134 mm</td>
<td>6.5 in. 165 mm</td>
<td>5.25 in. 134 mm</td>
<td>N/A</td>
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<tr>
<td>Minimum Width</td>
<td>1.55 in. 39.5 mm</td>
<td>2.1 in. 53 mm</td>
<td>1.55 in. 39.5 mm</td>
<td>N/A</td>
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<tr>
<td>Length</td>
<td>1968 ft (600 M)</td>
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<td></td>
<td>N/A</td>
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<tr>
<td>Thickness</td>
<td>4.5 micron, Face-In Wind</td>
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<td>N/A</td>
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All specifications subject to change without notice.

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

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<td>LED</td>
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<tr>
<td>Power LED</td>
<td>LED</td>
</tr>
<tr>
<td>Label LED</td>
<td>LED</td>
</tr>
<tr>
<td>Ribbon (Not used on M-8459S) LED</td>
<td>LED</td>
</tr>
<tr>
<td>Error LED</td>
<td>LED</td>
</tr>
<tr>
<td>LCD Panel</td>
<td>2 Line x 16 Character</td>
</tr>
<tr>
<td>On/Off-Line Switch</td>
<td>Front Panel</td>
</tr>
<tr>
<td>Label Feed Switch</td>
<td>Front Panel</td>
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<td>Power On/Off Switch</td>
<td>Front Panel</td>
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<td>Inside Panel</td>
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<td>Pitch</td>
<td>Inside Panel</td>
</tr>
<tr>
<td>Offset</td>
<td>Inside Panel</td>
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<td>RS422/485 (9600 to 57.6 Kbps)</td>
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</tr>
<tr>
<td>Ethernet</td>
<td>10/100BaseT</td>
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<td>Universal Serial Bus</td>
<td>USB Ver 1.1</td>
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### PROCESSING

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<td>Flash ROM</td>
<td>2 MB</td>
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<td>SDRAM</td>
<td>16 MB</td>
</tr>
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<td>Receive Buffer</td>
<td>2.95 MB</td>
</tr>
<tr>
<td>Optional Flash ROM</td>
<td>4 MB</td>
</tr>
<tr>
<td>Optional PCMCIA Memory</td>
<td>16 MB Flash ROM or 4 MB SRAM</td>
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(1) Plug-in Interface Modules

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

*All specifications subject to change without notice.*
# Section 1. Printer Overview

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

All specifications subject to change without notice.
## Section 1. Printer Overview

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

All specifications subject to change without notice.
### Section 1. Printer Overview

<table>
<thead>
<tr>
<th>ACCESSORY</th>
<th>M-8485Se/M-8459Se/M-8490Se</th>
<th>M-8460Se</th>
</tr>
</thead>
<tbody>
<tr>
<td>MEMORY EXPANSION</td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>FACE-OUT LABEL SENSOR</td>
<td>Top-mounted sensor for reflective Eye-Marks printed on the face of the label.</td>
<td>N/A</td>
</tr>
<tr>
<td>COAX/TWINAX INTERFACE</td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>PARALLEL INTERFACE</td>
<td>IEEE1284 Bi-Directional Plug-In Interface Module.</td>
<td></td>
</tr>
<tr>
<td>SERIAL INTERFACE</td>
<td>High Speed RS232C Plug-In Interface Module.</td>
<td></td>
</tr>
<tr>
<td>USB INTERFACE</td>
<td>Universal Serial Bus Plug-In Interface Module.</td>
<td></td>
</tr>
<tr>
<td>ETHERNET INTERFACE</td>
<td>10/100BaseT Plug-In Interface Module.</td>
<td></td>
</tr>
</tbody>
</table>

*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

- Operation Panel
- Ribbon Rewind
- Head Open Switch
- Platen Roller
- Print Head
- Head Latch
- Nip Roller Latch
- Head Pressure Adjust
- Label Hold Down
- Label Edge Guide
- Ribbon Unwind
- Cover Open Switch
- Ribbon Motion Sensor
- DIP Switch Panel
- Label and Ribbon Loading Diagram

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

M-8459Se Only
## REAR PANEL

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Power On/Off Switch</strong></td>
<td>To turn power On or Off</td>
</tr>
<tr>
<td><strong>Operation Panel</strong></td>
<td>To set up the various configurations and to display dispensing quantity and the various alarms.</td>
</tr>
<tr>
<td><strong>Adjustment Panel</strong></td>
<td>Potentiometers (inside label compartment) to make setup adjustments.</td>
</tr>
<tr>
<td><strong>AC Input Connector</strong></td>
<td>To input 115V 50/60 Hz. Use the power cable provided.</td>
</tr>
<tr>
<td><strong>AC Fuse</strong></td>
<td>To protect the machine from abnormal power input. Type 15A/250V.</td>
</tr>
<tr>
<td><strong>Interface Slot</strong></td>
<td>Slot for installation of Plug-In Interface Module.</td>
</tr>
<tr>
<td><strong>EXT Connector</strong></td>
<td>This is an external signal connector for interfacing with the label applicator system.</td>
</tr>
<tr>
<td><strong>Memory Card</strong></td>
<td>Connectors for Optional PCMCIA Memory Cards.</td>
</tr>
<tr>
<td>Sensor Type</td>
<td>Description</td>
</tr>
<tr>
<td>---------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Cover Open Switch</td>
<td>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.</td>
</tr>
<tr>
<td>Ribbon Motion Sensor</td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td><em>Note: The M-8459Se Direct Thermal print engine does not use a Ribbon Motion Sensor.</em></td>
</tr>
<tr>
<td>Head Open Switch</td>
<td>When the print head is opened, this switch is activated and the printer will stop printing.</td>
</tr>
<tr>
<td>Label Sensor</td>
<td>This sensor unit contains two sensors for both label gap and Eye-mark sensing.</td>
</tr>
</tbody>
</table>
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 will 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.
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.

### ADJUSTING THE LABEL SENSOR

<table>
<thead>
<tr>
<th></th>
<th>M-8459Se</th>
<th>M-8460Se</th>
<th>M-8485Se</th>
<th>M-8490Se</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max Label Width</td>
<td>5.27” (134 mm)</td>
<td>6.5” (165 mm)</td>
<td>5.27” (134 mm)</td>
<td>5.27” (134 mm)</td>
</tr>
<tr>
<td>(includes liner)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max Print Width</td>
<td>4.4” (112 mm)</td>
<td>6.0” (152 mm)</td>
<td>5.0” (128 mm)</td>
<td>4.4” (112 mm)</td>
</tr>
<tr>
<td>Gap Sensor</td>
<td>0.5” to 2.67”</td>
<td>0.5” to 3.25”</td>
<td>0.5” to 2.67”</td>
<td>0.5” to 2.67”</td>
</tr>
<tr>
<td>Adjustment Range</td>
<td>14 mm to 68 mm</td>
<td>14 mm to 82 mm</td>
<td>14 mm to 68 mm</td>
<td>14 mm to 68 mm</td>
</tr>
<tr>
<td>Non-Print Area</td>
<td>0.12” (3 mm)</td>
<td>0.12” or 0.25”</td>
<td>0.12” (3 mm)</td>
<td>0.12” (3 mm)</td>
</tr>
<tr>
<td></td>
<td>3 mm or 6.5 mm</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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

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
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.
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.

<table>
<thead>
<tr>
<th>DSW1-1 SETTING</th>
<th>DSW1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>8 data bits</td>
</tr>
<tr>
<td>On</td>
<td>7 data bits</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>DSW1-2</th>
<th>DSW1-3</th>
<th>SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>Off</td>
<td>No Parity</td>
</tr>
<tr>
<td>Off</td>
<td>On</td>
<td>Even</td>
</tr>
<tr>
<td>On</td>
<td>Off</td>
<td>Odd</td>
</tr>
<tr>
<td>On</td>
<td>On</td>
<td>Not Used</td>
</tr>
</tbody>
</table>
Stop Bit Selection (DSW1-4). Selects the number of stop bits to end each byte transmission.

<table>
<thead>
<tr>
<th>DSW1-4</th>
<th>SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>1 Stop Bit</td>
</tr>
<tr>
<td>On</td>
<td>2 Stop Bits</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>DSW1-5</th>
<th>DSW1-6</th>
<th>SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>Off</td>
<td>9600</td>
</tr>
<tr>
<td>Off</td>
<td>On</td>
<td>19200</td>
</tr>
<tr>
<td>On</td>
<td>Off</td>
<td>38400</td>
</tr>
<tr>
<td>On</td>
<td>On</td>
<td>57600</td>
</tr>
</tbody>
</table>


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

<table>
<thead>
<tr>
<th>DSW1-7</th>
<th>DSW1-8</th>
<th>SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>Off</td>
<td>Rdy/Bsy</td>
</tr>
<tr>
<td>Off</td>
<td>On</td>
<td>Xon/Xoff</td>
</tr>
<tr>
<td>On</td>
<td>Off</td>
<td>Bi-Com 3</td>
</tr>
<tr>
<td>On</td>
<td>On</td>
<td>Bi-Com 4*</td>
</tr>
</tbody>
</table>

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.*

<table>
<thead>
<tr>
<th>DSW2-1</th>
<th>SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>Therm Xfr</td>
</tr>
<tr>
<td>On</td>
<td>Direct Therm</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>DSW2-2</th>
<th>SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>Gap</td>
</tr>
<tr>
<td>On</td>
<td>Eye-Mark</td>
</tr>
</tbody>
</table>
**Head Check Selection (DSW2-3).** When selected, the printer will check for head elements that are electrically malfunctioning.

<table>
<thead>
<tr>
<th>DSW2-3</th>
<th>SETTING</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>Disabled</td>
<td>ON</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>On</td>
<td>Enabled</td>
<td></td>
<td>ON</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>DSW2-4</th>
<th>SETTING</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>Disabled</td>
<td>ON</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>On</td>
<td>Enabled</td>
<td></td>
<td>ON</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>DSW2-5</th>
<th>SETTING</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>Single Job</td>
<td>ON</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>On</td>
<td>Multi Job</td>
<td></td>
<td>ON</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>DSW2-6</th>
<th>SETTING</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>Disabled</td>
<td>ON</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>On</td>
<td>Enabled</td>
<td></td>
<td>ON</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>DSW2-7</th>
<th>SETTING</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>Standard</td>
<td>ON</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>On</td>
<td>Non-Std</td>
<td></td>
<td>ON</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**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.

<table>
<thead>
<tr>
<th>DSW2-8</th>
<th>SETTING</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>Disabled</td>
<td>ON</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>On</td>
<td>Enabled</td>
<td></td>
<td>ON</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Section 3. Configuration

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

<table>
<thead>
<tr>
<th>DSW3-1</th>
<th>SETTING</th>
<th>DSW3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>Before</td>
<td>ON</td>
</tr>
<tr>
<td>On</td>
<td>After</td>
<td>OFF</td>
</tr>
</tbody>
</table>

**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.

<table>
<thead>
<tr>
<th>DSW3-3</th>
<th>SETTING</th>
<th>DSW3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>Sensor Used</td>
<td>ON</td>
</tr>
<tr>
<td>On</td>
<td>Not Used</td>
<td>OFF</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>DSW3-4</th>
<th>SETTING</th>
<th>DSW3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>Enabled</td>
<td>ON</td>
</tr>
<tr>
<td>On</td>
<td>Disabled</td>
<td>OFF</td>
</tr>
</tbody>
</table>

**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.

<table>
<thead>
<tr>
<th>DSW3-5</th>
<th>SETTING</th>
<th>DSW3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>Enabled</td>
<td>ON</td>
</tr>
<tr>
<td>On</td>
<td>Disabled</td>
<td>OFF</td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>DSW3-6</th>
<th>DSW3-7</th>
<th>SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>Off</td>
<td>Type 4</td>
</tr>
<tr>
<td>Off</td>
<td>On</td>
<td>Type 3</td>
</tr>
<tr>
<td>On</td>
<td>Off</td>
<td>Type 2</td>
</tr>
<tr>
<td>On</td>
<td>On</td>
<td>Type 1</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>DSW3-8</th>
<th>SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>Disabled</td>
</tr>
<tr>
<td>On</td>
<td>Enabled</td>
</tr>
</tbody>
</table>

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:

<table>
<thead>
<tr>
<th></th>
<th>M-8459Se</th>
<th>M-8460Se</th>
<th>M-8485Se</th>
<th>M-8490Se</th>
</tr>
</thead>
<tbody>
<tr>
<td>Print Darkness</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Print Speed</td>
<td>4 in. per sec.</td>
<td>6 in. per sec.</td>
<td>6 in. per sec.</td>
<td>6 in. per sec.</td>
</tr>
<tr>
<td>Print Reference</td>
<td>Vertical = 0000, Horizontal = 0000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zero</td>
<td>Slash</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Auto On Line</td>
<td>Enabled</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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 and then back on.

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

BACKFEED OFFSET

When a label is printed it must be correctly positioned for dispensing and application. The Backfeed adjustment is used to position the label so that it is fully dispensed and ready for application. It may then be necessary to reposition the next label before printing. The Backfeed (repositioning of the label) operation is enabled if DSW3-4 is in the Off position. If Backfeed is enabled, placing DSW3-1 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.*
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.

<table>
<thead>
<tr>
<th>MODE</th>
<th>KEY SEQUENCE</th>
<th>INITIAL DISPLAY</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>POWER</td>
<td>ONLINE QTY:000000</td>
<td>3-10</td>
</tr>
<tr>
<td>Advanced</td>
<td>LINE + POWER</td>
<td>ADVANCED MODE</td>
<td>3-12</td>
</tr>
<tr>
<td>Test Print</td>
<td>FEED + POWER</td>
<td>TEST PRINT MODE CONFIGURATION</td>
<td>3-24</td>
</tr>
<tr>
<td>Default Setting</td>
<td>LINE + FEED + POWER</td>
<td>DEFAULT SETTING YES NO</td>
<td>3-25</td>
</tr>
<tr>
<td>Clear Non-Standard Protocol</td>
<td>DSW2-7 ON + LINE + FEED + POWER</td>
<td>ALT. PROTOCOL</td>
<td>3-25</td>
</tr>
<tr>
<td>Protocol Code Download</td>
<td>DSW2-7 ON + POWER</td>
<td>USER DOWNLOAD</td>
<td>3-26</td>
</tr>
<tr>
<td>Hex Dump</td>
<td>DSW2-4 ON + POWER</td>
<td>ONLINE QTY:000000</td>
<td>3-27</td>
</tr>
</tbody>
</table>
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 message will be changed to OFFLINE whenever the printer is switched offline by pressing the LINE key. As soon a print job is received, the quantity line will indicate the number of labels to be printed. As soon as the label job begins to print, the display will indicate the number of labels in the print job that remains to be printed.

**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.

<table>
<thead>
<tr>
<th>M-8459Se</th>
<th>M-8485Se</th>
<th>M-8460Se</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 ips</td>
<td>4 ips</td>
<td>4 ips</td>
</tr>
<tr>
<td>3 ips</td>
<td>6 ips</td>
<td>6 ips</td>
</tr>
<tr>
<td>4 ips</td>
<td>8 ips</td>
<td>8 ips</td>
</tr>
<tr>
<td>5 ips</td>
<td>10 ips</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>12 ips</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>M-8490Se</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 ips</td>
</tr>
</tbody>
</table>
The label Pitch is the distance from the leading edge (the edge that comes out of the printer first) of a label and the leading edge of the next label. The leading edge position of the label can be adjusted relative to the print head +/- 49mm in increments of 1mm. Once the position is set, it can be fine adjusted +/- 3.75mm using the PITCH potentiometer on the Adjustment Panel.

1. The cursor will initially be positioned over the Pitch Direction setting. Pressing the LINE key will step the setting to the positive (+) or negative (-) selection. A positive selection moves the leading edge of the label forward (away from the print head) while a negative selection moves the leading edge of the label back into the mechanism.

2. Once the correct direction is selected, pressing the FEED key will accept the setting and advance the cursor to the Offset selection.

3. Use the LINE key to step the first digit of the counter to the desired setting. The display will increment one step each time the LINE key is pressed. The reading will advance to a setting of 4 after which it will automatically wrap and start at 0 again.

4. Press the FEED key to accept the setting and advance the cursor to the second digit. Again use the LINE key to step to the desired setting. Once it is correct, pressing the FEED key will step to the next adjustment.

You may wish to print a test label after completing the adjustments to ensure they are correct.
CANCEL PRINT JOB
YES  NO

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

AUTO ONLINE
YES  NO

This setting determines the mode in which the printer powers up. If the YES selection is made, the printer powers up in the ONLINE mode and is ready to print. If NO is selected, the printer powers up in the OFFLINE mode and must be manually placed in the ONLINE 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.
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 back 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 overridden by the Base Reference Point Command.

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

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.
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 day 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 minute 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.

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

1. Use the LINE key to step the underline cursor 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.

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.

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.

CARDCOPYMEMORY
TRUETYPEFONT Y/N

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

1. Use the LINE key to step the cursor to desired setting. If Yes is selected, the printer will enter the Card Copy mode. If No is selected, the display will advance to the Card to Memory SATO Font Copy mode.
2. Confirm your selection by stepping the cursor to the Yes selection. If you select No, the display will return to the previous selection.
3. Press the FEED key to accept the selection. If Yes was selected the copy process will start.
4. Once the copy process is completed, press the FEED key to step the display.
5. If an error is encountered in the copy process, one of the following messages will be displayed on the second line:
   - R/W Error Indicates a Read/Write error occurred
   - No Card Error Indicates no card was recognized
   - Mem Full Error Indicates that there is insufficient memory available.
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.

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

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

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

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

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.

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

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

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

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

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.
Section 3. Configuration

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

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

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

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

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.

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

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

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

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

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.

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.

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

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

<table>
<thead>
<tr>
<th>Error Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>R/W Error</td>
<td>Indicates a Read/Write error occurred</td>
</tr>
<tr>
<td>No Card Error</td>
<td>Indicates no card was recognized</td>
</tr>
<tr>
<td>Mem Full Error</td>
<td>Indicates that there is insufficient memory available.</td>
</tr>
</tbody>
</table>

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.

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.

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

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

1. Insert a label still attached to the backing into the sensor and close the Label Hold-Down. Record the voltage shown on the top line of the LCD panel. This line should have the message “GAP” on the top line (DIP switch DSW2-2 = OFF). Make sure the label is all the way under the sensor.
2. Strip the label from the backing and insert the backing strip under the sensor and close the Label Lid. Record the voltage shown on the top line of the LCD panel. The voltage ranges measured should be within the following 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 is correct, pressing the FEED key will accept the setting and advance the next display.
EYE - When setting the “eye” threshold, the voltage must be measured with nothing but the label under the sensor and then again with the printed “eye” mark under the sensor. The formula for this is:

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

1. Insert a label into the sensor and close the Label Hold-Down. Make sure the printed “eye” mark is not under the sensor. Record the voltage shown on the top line of the LCD panel. This line should have the message “EYE” on the top line (DIP switch DSW2-2 = ON).

2. Now pull the label forward until the “eye” mark is positioned under the sensor (the voltage reading should be at its highest point). Record the voltage shown on the top line of the LCD panel. The voltage ranges measured should be within the following ranges:

- **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

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

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.
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.

This display 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.
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.

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.

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.

This selection allows the user to specify the dexadecimal code
for the character which is replaced with the Euro Character.
The default is D5.
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.
This selection allows the user to select the character set used by the printer. The selections are English, French, German, Spanish, Italian and Portuguese.

1. Press the LINE key to advance to the desired language setting.

2. When the setting is correct, press the FEED key to accept the setting and step to the next display.

If the printer is placed in the Multi-Item Buffer Mode (DSW2-5 = OFF), the user can choose to ignore CAN (18h) and DLE (10h) 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.

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

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 edge. 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.

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.

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

The Counters Mode is provided to allow the user to access the internal printer counters.
ADVANCED MODE

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

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

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

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

Displays the firmware during the initialization.

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

1. Use LINE key to select either the YES or NO.
2. Once the desired setting is selected, pressing the FEED key will accept the selection and the printer will reset to the original default conditions.

3. When the printer has completed the reset process 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 = 7BH, ETX = 7DH, ESC = 5EH, ENQ = 40H, NULL = 7EH, CAN = 21H and OFFLINE = 5DH.

Displays the firmware during the initialization.

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 \(<\text{ESC}>\)LD command.

<table>
<thead>
<tr>
<th>V 05.00.03.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>INITIALIZING</td>
</tr>
</tbody>
</table>

Displays the firmware during the initialization.

<table>
<thead>
<tr>
<th>USER DOWNLOAD</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRESS THE LINE KEY</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>USER DOWNLOAD</th>
</tr>
</thead>
<tbody>
<tr>
<td>WAITING</td>
</tr>
</tbody>
</table>

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.
Section 3. Configuration

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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 Darkness software command. Once the range has been selected, 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:**

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.

<table>
<thead>
<tr>
<th>CONTROL CHARACTER</th>
<th>STANDARD DSW2-7 OFF</th>
<th>NON-STANDARD DSW2-7 ON</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>STX 02 Hex</td>
<td>7B Hex = {</td>
<td>Start of Data</td>
<td></td>
</tr>
<tr>
<td>ETX 03 Hex</td>
<td>7D Hex = }</td>
<td>End of Data</td>
<td></td>
</tr>
<tr>
<td>ESC 1B Hex</td>
<td>5E Hex = ^</td>
<td>Command code to follow</td>
<td></td>
</tr>
<tr>
<td>ENQ 05 Hex</td>
<td>40 Hex = @</td>
<td>Get printer status</td>
<td></td>
</tr>
<tr>
<td>CAN 18 Hex</td>
<td>21 Hex = !</td>
<td>Cancel print job</td>
<td></td>
</tr>
<tr>
<td>Off-Line 40 Hex</td>
<td>5D Hex = ]</td>
<td>Take printer Off-Line</td>
<td></td>
</tr>
</tbody>
</table>

**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**

```basic
5 REM Parallel Example
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$;"WL1SATO"; 'Sends the data "SATO" to be placed 400 dots horizontally and 100 dots vertically on the label and printed in the "WL" font.
50 LPRINT E$;"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**

```basic
5 REM RS232 Example
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:

\[
\text{Shift Distance} = 3.0" \times 25.4 \text{ mm/in} \times 8 \text{ dpmm} = 610 \text{ dots}
\]

New Base Reference Point = 610 dots

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

\[
<\text{ESC}>A3H0610V0001
\]

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.

\[
\text{Shift Distance} = 3.0" \times 25.4 \text{ mm/in} \times 8 \text{ dpmm} = 610 \text{ dots}
\]

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

\[
\text{<ESC>A}
\]
\[
\text{<ESC>A3H0610V0001}
\]
\[
\text{<ESC>H0050<ESC>V0100<ESC>L0303<ESC>MSATO}
\]
\[
\text{<ESC>H0050<ESC>V0200<ESC>B103100*SATO*}
\]
\[
\text{<ESC>Q1<ESC>Z}
\]

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.

- \(<\text{ESC}>\%\) - 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:

\[
\text{<ESC>A<ESC>%1<ESC>V800<ESC>H200<ESC>L0202<ESC>W81E<ESC>Q1<ESC>Z}
\]
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:

<table>
<thead>
<tr>
<th>COMMAND</th>
<th>DEFAULT</th>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Print Rotation</td>
<td>0°</td>
<td>(1)</td>
</tr>
<tr>
<td>Vertical Reference Point</td>
<td>0</td>
<td>(1)</td>
</tr>
<tr>
<td>Horizontal Reference Point</td>
<td>0</td>
<td>(1)</td>
</tr>
<tr>
<td>Character Pitch</td>
<td>2</td>
<td>(1)</td>
</tr>
<tr>
<td>Base Reference Point</td>
<td>H=1, V=1</td>
<td>(2)</td>
</tr>
<tr>
<td>Character Expansion</td>
<td>1</td>
<td>(1)</td>
</tr>
<tr>
<td>Print Darkness</td>
<td>2</td>
<td>(1)</td>
</tr>
<tr>
<td>Print Darkness (M-8459Se)</td>
<td>3</td>
<td>(1)</td>
</tr>
<tr>
<td>Print Speed</td>
<td>6 ips</td>
<td>(2)</td>
</tr>
<tr>
<td>Print Speed (M-8459Se)</td>
<td>4 ips</td>
<td>(2)</td>
</tr>
</tbody>
</table>

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 come out right to left) version. The M-8459Se is only available in the standard Right-Hand configuration.

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.
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 aaaaabbb 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>Babbccd`
2:5 narrow/wide ratio: `<ESC>BDbbcccd`
1:2 narrow/wide bar ratio: `<ESC>Dabbccd`

- **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

\[\text{ESC}\]A
\[\text{ESC}\]H0025<ESC>V0025<ESC>B103100*CODE 39*
\[\text{ESC}\]H0155<ESC>V0130<ESC>X*CODE 39*
\[\text{ESC}\]H0025<ESC>V0200<ESC>BD20210045676567
\[\text{ESC}\]H0075<ESC>V0310<ESC>XM45676567
\[\text{ESC}\]H0025<ESC>V0375<ESC>BD30215001234567890
\[\text{ESC}\]H0025<ESC>V0600<ESC>BD50210012345
\[\text{ESC}\]H0175<ESC>V0710<ESC>XS12345
\[\text{ESC}\]H0025<ESC>V0775<ESC>BD60210012345
\[\text{ESC}\]H0105<ESC>V0885<ESC>XS12345
\[\text{ESC}\]H0025<ESC>V0950<ESC>BA03100123456
\[\text{ESC}\]H0095<ESC>V1060<ESC>XS12345
\[\text{ESC}\]H0025<ESC>V1125<ESC>B003100081234ABCDE
\[\text{ESC}\]H0080<ESC>V1240<ESC>XS1234ABCDE
\[\text{ESC}\]H0525<ESC>V0025<ESC>B002100A123456B
\[\text{ESC}\]H0565<ESC>V0135<ESC>XS12345
\[\text{ESC}\]H0475<ESC>V0200<ESC>BD303100123456789012
\[\text{ESC}\]H0525<ESC>V0375<ESC>BD4031001234567
\[\text{ESC}\]H0525<ESC>V0550<ESC>DE03100123456
\[\text{ESC}\]H0500<ESC>V0600<ESC>OB0
\[\text{ESC}\]H0533<ESC>V0655<ESC>OB123456
\[\text{ESC}\]H0350<ESC>V0725<ESC>B03031509627721123
\[\text{ESC}\]L0101<ESC>H0320<ESC>V0800<ESC>OB0
\[\text{ESC}\]H0365<ESC>V0878<ESC>OB96277
\[\text{ESC}\]H0505<ESC>V0878<ESC>OB21123
\[\text{ESC}\]H0665<ESC>V0760<ESC>BF0313021826
\[\text{ESC}\]H0680<ESC>V0730<ESC>OB21826
\[\text{ESC}\]H0425<ESC>V1125<ESC>B03031500633895260
\[\text{ESC}\]L0101<ESC>H0395<ESC>V1200<ESC>OB0
\[\text{ESC}\]H0440<ESC>V1278<ESC>OB60338
\[\text{ESC}\]H0580<ESC>V1278<ESC>OB695260
\[\text{ESC}\]H0730<ESC>V1155<ESC>BF0314024
\[\text{ESC}\]H0745<ESC>V1125<ESC>OB24
\[\text{ESC}\]H0325<ESC>V0850<ESC>B003100>GAB>B789>C123456
\[\text{ESC}\]H0435<ESC>V1055<ESC>XSAB789123456
\[\text{ESC}\]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.
Section 5. Programming Reference

UCC-128

Without Incrementing

\(<\text{ESC}>A\text{ESC}>H0100\text{ESC}>V0100\n\text{BI0715010123456700000001}\n\text{ESC}>Q2<\text{ESC}>Z\n
\begin{array}{c}
\text{(00) 0 1234567 00000001 5}
\end{array}

With Incrementing

\(<\text{ESC}>A\text{ESC}>H0100\text{ESC}>V0100\n\text{FO01}\text{ESC}>\text{BI0715010123456700000001}\n\text{ESC}>Q2<\text{ESC}>Z\n
\begin{array}{c}
\text{(00) 0 1234567 00000001 5}
\end{array}

\begin{array}{c}
\text{(00) 0 1234567 00000002 2}
\end{array}
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  \(<\text{ESC}}\text{BW}aabb\)

- **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: \(<\text{ESC}}\text{BW02100}\)

Placement: Immediately follows the \(<\text{ESC}}\text{BT}\) command and precedes data to be encoded.

Default: None

Command Function
This command works together with the \(<\text{ESC}}\text{BT}\) command to specify an expansion factor and the bar code height for the particular symbol being printed.

Input to Printer
\(<\text{ESC}}\text{A}\>
\(<\text{ESC}}\text{H0050}<\text{ESC}}\text{V0050}<\text{ESC}}\text{BT101030103}\>
\(<\text{ESC}}\text{BW04100*1234*}\>
\(<\text{ESC}}\text{Q1}<\text{ESC}}\text{Z}\>

Printer Output

Special Notes
1. This command must be preceded by the Variable Ratio Bar Codes \(<\text{ESC}}\text{BT}\) 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  
\(<\text{ESC}>B\text{Tabbccdddee}\)

- **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: \(<\text{ESC}>B\text{T}101030103\)

Placement: Following print position commands and preceding \(<\text{ESC}>B\text{W}\)

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
\,<\text{ESC}>B\text{T}101030103\n\,<\text{ESC}>A\n\,<\text{ESC}>H0050<\text{ESC}>V0050<\text{ESC}>B\text{T}101030103\n\,<\text{ESC}>B\text{W}03100*1234*\n\,<\text{ESC}>Q1<\text{ESC}>Z\n
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  \texttt{<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: \texttt{<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
\texttt{<ESC>A<ESC>L0202}
\texttt{<ESC>H0025<ESC>V0025<ESC>W0MNORMAL REFERENCE POINT}
\texttt{<ESC>A3H0300V0075}
\texttt{<ESC>H0100<ESC>V0050<ESC>W0MNEW REFERENCE POINT}
\texttt{<ESC>Q1<ESC>Z}

Printer Output

\begin{center}
\textbf{NORMAL REFERENCE POINT}
\end{center}

\begin{center}
\textbf{NEW REFERENCE POINT}
\end{center}
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:

<table>
<thead>
<tr>
<th></th>
<th>M-8459Se</th>
<th>M-8460Se</th>
<th>M-8485Se</th>
<th>M-8490Se</th>
</tr>
</thead>
<tbody>
<tr>
<td>Horizontal</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>aaaa</td>
<td>-896 to 896</td>
<td>-1216 to 1216</td>
<td>-1024 to 1024</td>
<td>-1344 to 1344</td>
</tr>
<tr>
<td>Vertical</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Default bbbb</td>
<td>0001 to 1424</td>
<td>0001 to 1424</td>
<td>0001 to 1424</td>
<td>0001 to 2136</td>
</tr>
<tr>
<td>Expanded bbbb</td>
<td>0001 to 9999</td>
<td>0001 to 9999</td>
<td>0001 to 9999</td>
<td>0001 to 9999</td>
</tr>
</tbody>
</table>
Characters, Custom-Designed

Command Structure

Store Command: \(<\text{ESC}>\text{Tabcc}\)
Recall Command: \(<\text{ESC}>\text{Kab90cc}\)

\(a\) =
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 "I" to "R" in Binary

(data) = Data to describe the character

Example:
\(<\text{ESC}>\text{T1H3F}\)
\(<\text{ESC}>\text{K1H903F}\)
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.

\(<\text{ESC}>\text{A}\)
\(<\text{ESC}>\text{T1H3F0100038007C00FE01FF03FF87FF0F}\)
\(<\text{ESC}>\text{Z}\)
\(<\text{ESC}>\text{A}\)
\(<\text{ESC}>\text{H150}<\text{ESC}>\text{V100}<\text{ESC}>\text{L0505}<\text{ESC}>\text{K1H903F}\)
\(<\text{ESC}>\text{H350}<\text{ESC}>\text{V100}<\text{ESC}>\text{L1010}<\text{ESC}>\text{K1H903F}\)
\(<\text{ESC}>\text{Q1}<\text{ESC}>\text{Z}\)
Section 5. Programming Reference

**Printer Output**

![Printer Output Diagram]

**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>L0305

Placement: Preceding the data to be expanded

Default: <ESC>L0101

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  
SATO

SATO

SATO
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**

```
PROPORTIONAL SPACING

FIXED SPACING
```

**Special Notes**

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

Command Structure  
\(<\text{ESC}>Pa\)  

\(aa\)  =  Number of dots between characters (00-99)  
Example:  \(<\text{ESC}>P03\)  
Placement:  Preceding the text to be printed  
Default:  \(<\text{ESC}>P02\)  

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  
\(<\text{ESC}>A\)  
\(\langle\text{ESC}>H0025\langle\text{ESC}>V0025\langle\text{ESC}>L0202\langle\text{ESC}>XB1\langle\text{ESC}>\text{SATO}\)  
\(<\text{ESC}>H0025\langle\text{ESC}>V0125\langle\text{ESC}>L0202\langle\text{ESC}>P20\langle\text{ESC}>XB1\langle\text{ESC}>\text{SATO}\)  
\(<\text{ESC}>H0025\langle\text{ESC}>V0225\langle\text{ESC}>L0202\langle\text{ESC}>P40\langle\text{ESC}>XB1\langle\text{ESC}>\text{SATO}\)  
\(<\text{ESC}>Q1\langle\text{ESC}>Z\)  

Printer Output  
\(\text{SATO SATO SATO SATO}\)
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

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;ESC&gt;PS</td>
<td>Set to proportional spacing</td>
</tr>
<tr>
<td>&lt;ESC&gt;PR</td>
<td>Reset to fixed spacing</td>
</tr>
</tbody>
</table>

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>\0050<ESC>PS
- <ESC>L0202<ESC>XMPROPORTIONAL SPACING
- <ESC>H0025<ESC>\0130<ESC>PR
- <ESC>L0202<ESC>XMFIXED SPACING
- <ESC>Q1<ESC>Z

Printer Output

PROPORTIONAL SPACING
FIXED SPACING

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  \( <\text{ESC}>*a \)

\( a \) = 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: \( <\text{ESC}>* \)
\( <\text{ESC}>*\& \)

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:
\( <\text{ESC}>A \)
\( <\text{ESC}>* \)
\( <\text{ESC}>Z \)

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>`W DHaaaavbbbbXccccYdddd

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>`W DH0100V0050X0600Y0400

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
SATOSATOSATOSATOSATOSATOSATOSATO
SATOSATOSATOSATOSATOSATOSATOSATO
SATOSATOSATOSATOSATOSATOSATOSATO
/<ESC>H0180/<ESC>V0250/<ESC>`W DH0130V0050X0400Y0200
/<ESC>Q1/<ESC>Z
```

Printer Output:

```
SATOSATOSATOSATOSATOSATOSATO
SATOSATOSATOSATOSATOSATOSATOSATO
SATOSATOSATOSATOSATOSATOSATOSATO
SATOSATOSATOSATOSATOSATOSATOSATO
```

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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:

<table>
<thead>
<tr>
<th></th>
<th>M-8459Se</th>
<th>M-8460Se</th>
<th>M-8485Se</th>
<th>M-8490Se</th>
</tr>
</thead>
<tbody>
<tr>
<td>Horizontal</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>aaaa</td>
<td>0001</td>
<td>0001</td>
<td>0001</td>
<td>0001</td>
</tr>
<tr>
<td>cccc</td>
<td>0896</td>
<td>1216</td>
<td>1024</td>
<td>1344</td>
</tr>
<tr>
<td>Default Vertical</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>bbbb</td>
<td>0001</td>
<td>0001</td>
<td>0001</td>
<td>0001</td>
</tr>
<tr>
<td>dddd</td>
<td>1424</td>
<td>1424</td>
<td>1424</td>
<td>2136</td>
</tr>
<tr>
<td>Expanded Vertical</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>bbbb</td>
<td>0001</td>
<td>0001</td>
<td>0001</td>
<td>0001</td>
</tr>
<tr>
<td>dddd</td>
<td>9999</td>
<td>9999</td>
<td>9999</td>
<td>9999</td>
</tr>
</tbody>
</table>
Fonts U, S, M, OA, OB, XU, XS & XM

Command Structure
Font XU: <ESC>XU
Font XS: <ESC>XS
Font XM: <ESC>XM
Font OA: <ESC>OA
Font U: <ESC>U
Font S: <ESC>S
Font M: <ESC>M
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.

<table>
<thead>
<tr>
<th>NON-PROPORTIONAL</th>
<th>PROPORTIONAL(1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>U 5W x 9H dot matrix</td>
<td>XU 5W x 9H dot matrix</td>
</tr>
<tr>
<td>S 8W x 15H dot matrix</td>
<td>XS 17W x 17H dot matrix</td>
</tr>
<tr>
<td>M 13W x 20H dot matrix</td>
<td>XM 24W x 24H dot matrix</td>
</tr>
<tr>
<td>OA OCR-A font (see note 7 for matrix)</td>
<td></td>
</tr>
<tr>
<td>OB OCR-B font (see note 7 for matrix)</td>
<td></td>
</tr>
</tbody>
</table>

(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

SATO
SATO
SATO
SATO
SATO
SATO
SATO
SATO
SATO
SATO
SATO
SATO
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.

<table>
<thead>
<tr>
<th></th>
<th>M-8459Se/M-8460Se/M-8485Se</th>
<th>M-8490Se</th>
</tr>
</thead>
<tbody>
<tr>
<td>OA Font</td>
<td>15 dots W x 22 dots H</td>
<td>22 dots W x 33 dots H</td>
</tr>
<tr>
<td>OB Font</td>
<td>20 dots W x 24 dots H</td>
<td>30 dots W x 36 dots H</td>
</tr>
</tbody>
</table>
## Font, Raster

### Command Structure

\(<\text{ESC}\)>A<\text{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

![CG Times

CG Triumvirate](image)

### 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”.

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**Font, Vector**

**Command Structure**

Specify Vector Font:  \(<\text{ESC}>\text{a,b,c,d}\)

Data for Vector Font:  \(<\text{ESC}>\text{$=(data)}\)

- \(a\) =
  - 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:  \(<\text{ESC}>\text{A,100,200,0}\text{<ESC>}\text{$=(data)}\text{=123456}\)

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**

\(<\text{ESC}>\text{A}\>
\(<\text{ESC}>\text{H0100<ESC>VD0100<ESC>}$A,100,100,0<ESC>$=\text{SATO AMERICA}\>
\(<\text{ESC}>\text{H0100<ESC>VD200<ESC>$=\text{VECTOR FONT}\>
\(<\text{ESC}>\text{H0100<ESC>VD390<ESC>}$A,200,300,8<ESC>$=\text{SATO}\>
\(<\text{ESC}>\text{Q1<ESC>Z}\>

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 WL:  <ESC>WLa
Font XB:  <ESC>XBa
Font XL:  <ESC>XLa

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

Example:  <ESC>WB123456

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.

\begin{tabular}{|c|c|}
\hline
NON-PROPORTIONAL & PROPORTIONAL(1) \\
\hline
WB & 18W x 30H dot matrix \ \ & XB & 48W x 48H dot matrix \\
WL & 28W x 52H dot matrix \ & XL & 48W x 48H dot matrix \\
\hline
\end{tabular}

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

Input to Printer

\begin{itemize}
\item <ESC>A<ESC>PS
\item <ESC>H0001<ESC>V0100<ESC>WB0SATO
\item <ESC>H0001<ESC>V0185<ESC>WB1SATO
\item <ESC>H0001<ESC>V0270<ESC>WL0SATO
\item <ESC>H0001<ESC>V0355<ESC>WL1SATO
\item <ESC>H0300<ESC>V0100<ESC>XB0SATO
\item <ESC>H0300<ESC>V0185<ESC>XB1SATO
\item <ESC>H0300<ESC>V0270<ESC>XL0SATO
\item <ESC>H0300<ESC>V0355<ESC>XL1SATO
\item <ESC>Q1<ESC>Z
\end{itemize}

Printer Output

\begin{center}
\begin{tikzpicture}
\node at (0,0) {SATO};
\node at (0,-1) {SATO};
\node at (0,-2) {SATO};
\node at (0,-3) {SATO};
\end{tikzpicture}
\end{center}
**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**  
&lt;ESC&gt;A(space)&lt;ESC&gt;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**  
&lt;ESC&gt;A(space)  
&lt;ESC&gt;Z

**Printer Output**  
Blank label or tag
Form Overlay, Recall

Command Structure

\(<\text{ESC}>/\)

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

\(<\text{ESC}>A\>
\(<\text{ESC}>\text{H0100}<\text{ESC}>\text{V0125}\>
\(<\text{ESC}>\text{STHIS IS THE STORED IMAGE WITH A BARCODE}\>
\(<\text{ESC}>\text{H0100}<\text{ESC}>\text{V0165}<\text{ESC}>\text{B103100*12345}\>
\(<\text{ESC}>\&<\text{ESC}>Z\>

\(<\text{ESC}>A<\text{ESC}>\text{H0100}<\text{ESC}>\text{V0050}\>
\(<\text{ESC}>\text{STHIS IS RECALLING AND ADDING TO THE STORED IMAGE}<\text{ESC}>/\>
\(<\text{ESC}>\text{Q1}<\text{ESC}>Z\>

Printer Output

```
THIS IS RECALLING AND ADDING TO THE STORED IMAGE

THIS IS THE STORED IMAGE WITH A BARCODE
```

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>\0125
<ESC>STHIS IS THE STORED IMAGE WITH A BARCODE
<ESC>H0100<ESC>\0165<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

\(<\text{ESC}>\text{Gabbccc}(\text{data})\)

- **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: \(<\text{ESC}>\text{GH006006}\)

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

\(<\text{ESC}>\text{A}\)
\(<\text{ESC}>\text{H0100}<\text{ESC}>\text{V0100}<\text{ESC}>\text{GH006006}\)
\(\text{FFFFFFF}000000003\text{C000FFFF}3\text{C0008000013}\)
\(\text{C0008000013}009\text{FFFF}13\text{C0008000013}\)
\(\text{C0008000013}009\text{FFFF}13\text{C0008000013}\)
\(\text{C0008000013}000\text{FFFF}3\text{C0000000003}\)
\(\text{C0000000003}00000000003\text{C0000000003}\)
\(\text{C0000000003}00000000003\text{C0000000003}\)
\(\text{C0000000003}00000000003\text{C0000000003}\)
\(\text{C0000000003}00000000003\text{C0000000003}\)
\(\text{C0000000003}00000000003\text{C0000000003}\)
\(\text{C0000000003}00000000003\text{C0000000003}\)
\(\text{C0000000003}00000000003\text{C0000000003}\)
\(\text{C0000000003}00000000003\text{C0000000003}\)
\(\text{C0000000003}00000000003\text{C0000000003}\)
\(\text{C0000000003}00000000003\text{C0000000003}\)
\(\text{C0000000003}00000000003\text{C0000000003}\)
\(\text{C0000000003}00000000003\text{C0000000003}\)
\(\text{C0000000003}00000000003\text{C0000000003}\)
\(\text{C0000000003}00000000003\text{C0000000003}\)
\(\text{C0000000003}00000000003\text{C0000000003}\)
\(\text{C0000000003}00000000003\text{C0000000003}\)
\(\text{C0000000003}00000000003\text{C0000000003}\)
\(\text{C0000000003}00000000003\text{C0000000003}\)
\(\text{C0000000003}00000000003\text{C0000000003}\)
\(\text{C0000000003}00000000003\text{C0000000003}\)
\(\text{C0000000003}00000000003\text{C0000000003}\)
\(\text{C0000000003}00000000003\text{C0000000003}\)
\(\text{C0000000003}00000000003\text{C0000000003}\)
\(\text{C0000000003}00000000003\text{C0000000003}\)

\(<\text{ESC}>\text{H0300}<\text{ESC}>\text{V0100}<\text{ESC}>\text{X}\) PLEAS\(\text{E}\)E PLAC\(\text{E}\)E YO\(\text{U}\)R DISK
\(<\text{ESC}>\text{H0300}<\text{ESC}>\text{V0150}<\text{ESC}>\text{XS IN A SAFE PLAC}E\)
\(<\text{ESC}>\text{Q1}<\text{ESC}>\text{Z}\)

See Appendix C for a details on the data format.
Printer Output

PLEASE PLACE YOUR DISK
IN A SAFE PLACE

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.

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

6. The maximum allowable settings are:

<table>
<thead>
<tr>
<th></th>
<th>M-8459Se</th>
<th>M-8460Se</th>
<th>M-8485Se</th>
<th>M-8490Se</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hor Blocks</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>bbb</td>
<td>001 to 112</td>
<td>001 to 152</td>
<td>001 to 128</td>
<td>001 to 168</td>
</tr>
<tr>
<td>Vertical Blocks</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Default ccc</td>
<td>001 to 178</td>
<td>001 to 178</td>
<td>001 to 178</td>
<td>001 to 267</td>
</tr>
<tr>
<td>Expanded ccc</td>
<td>001 to 999</td>
<td>001 to 999</td>
<td>001 to 999</td>
<td>001 to 999</td>
</tr>
</tbody>
</table>

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 C for a detailed example

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

**Printer Output**

![Graphic Image]

**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

\texttt{<ESC>WKnnn...n}

\texttt{nn...n} = Job Name assigned, up to 16 ASCII characters

Example: \texttt{<ESC>WKSATO}

Placement: Immediately following the \texttt{<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

\texttt{<ESC>A}
\texttt{<ESC>WKSATO}
\ldots \texttt{Job} \ldots
\texttt{<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.
\texttt{<ESC>A}
\texttt{<ESC>WKSATO}
\ldots \ldots
\texttt{<ESC>WKSATO AMERICA}
\ldots \ldots

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  
WITH THE JOURNAL FEATURE
YOU CAN PRINT TEXT WITHOUT
USING ANY FONT COMMANDS
OR POSITION COMMANDS

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
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.

<table>
<thead>
<tr>
<th>LINE/BOX LENGTH</th>
<th>M-8459Se</th>
<th>M-8460Se</th>
<th>M-8485eS</th>
<th>M-8490Se</th>
</tr>
</thead>
<tbody>
<tr>
<td>Horizontal</td>
<td>0001 to 896</td>
<td>0001 to 1216</td>
<td>0001 to 1024</td>
<td>0001 to 1344</td>
</tr>
<tr>
<td>Vertical Default</td>
<td>0001 to 1424</td>
<td>0001 to 1424</td>
<td>0001 to 1424</td>
<td>0001 to 2136</td>
</tr>
<tr>
<td>Expanded</td>
<td>0001 to 9999</td>
<td>0001 to 9999</td>
<td>0001 to 9999</td>
<td>0001 to 9999</td>
</tr>
</tbody>
</table>

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

Command Structure  

\[<\text{ESC}>Eaaa\]

\[aaa = \] 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: \[<\text{ESC}>E010\]

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 \(<\text{CR}>\) 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

\[<\text{ESC}>A\]
\[<\text{ESC}>E010<\text{ESC}>H0050<\text{ESC}>V0050<\text{ESC}>L0202<\text{ESC}>S\]
\[\text{THIS IS THE 1ST LINE}<\text{CR}>\]
\[\text{THIS IS THE 2ND LINE}<\text{CR}>\]
\[\text{THIS IS THE 3RD LINE}<\text{CR}>\]
\[<\text{ESC}>Q1<\text{ESC}>Z\]

Printer Output

\[\text{THIS IS THE 1ST LINE}\]
\[\text{THIS IS THE 2ND LINE}\]
\[\text{THIS IS THE 3RD LINE}\]

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 \(<\text{ESC}>Q\) Quantity command.

3. This command is invalid only if the value specified is zero.

4. Following this command with a \(<\text{CR}>\) 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  
\(<\text{ESC}>\text{A1aaaabbb}\)

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

Example:  \(<\text{ESC}>\text{A108323200}\)

Placement: Separate data stream to the printer.

Default:  \(<\text{ESC}>\text{A108322136}\)

Command Function  
To set the size of the media.

Input to Printer  
\(<\text{ESC}>\text{A}\>
\(<\text{ESC}>\text{A108321424}\>
\(<\text{ESC}>\text{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.

<table>
<thead>
<tr>
<th>Maximum</th>
<th>M-8459Se</th>
<th>M-8460Se</th>
<th>M-8485eS</th>
<th>M-8490Se</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hmax aaaa</td>
<td>896</td>
<td>1216</td>
<td>1024</td>
<td>1344</td>
</tr>
<tr>
<td>Vmax Default bbbb</td>
<td>1424</td>
<td>1424</td>
<td>1424</td>
<td>2136</td>
</tr>
<tr>
<td>Expanded bbbb</td>
<td>9999</td>
<td>9999</td>
<td>9999</td>
<td>9999</td>
</tr>
</tbody>
</table>
Mirror Image

Command Structure  
\(<\text{ESC}>\text{RM}\)

Example:  \(<\text{ESC}>\text{A103000832}<\text{ESC}>\text{RM}\)

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
\(<\text{ESC}>\text{A}\>
\(<\text{ESC}>\text{A1}<\text{ESC}>\text{H0100}<\text{ESC}>\text{V0050}<\text{ESC}>\text{XLOABCDEF}<\text{ESC}>\text{RM}<\text{ESC}>\text{Q1}<\text{ESC}>\text{Z}\>

Printer Output

Special Notes

1. The \(<\text{ESC}>\text{A1}\) Media defines the area to be mirrored.

2. This command can be used with the \(<\text{ESC}>\%\) Rotate Fixed Base Reference Point command. Please note that the reference point rotation is dependent upon the location of the \(<\text{ESC}>\%\) 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` command 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  
\(<\text{ESC}>\text{BPn...n}\)

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

Example:  \(<\text{ESC}>\text{BP123456789}\)

Placement:  Immediately preceding the data to be encoded

Default:  None

Command Function  
To print Postnet bar codes

Printer Input  
\(<\text{ESC}>A\)  
\(<\text{ESC}>\text{H0100<ESC>\text{V0120<ESC>BP94089}}\)  
\(<\text{ESC}>\text{H0100<ESC>\text{V0160<ESC>BP123456}}\)  
\(<\text{ESC}>\text{H0100<ESC>\text{V0200<ESC>BP123456789}}\)  
\(<\text{ESC}>\text{H0100<ESC>\text{V0240<ESC>BP12345678901}}\)  
\(<\text{ESC}>Q1<\text{ESC>}}\)

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:

<table>
<thead>
<tr>
<th>Heat Range</th>
<th>M-8459Se</th>
<th>M-8460Se</th>
<th>M-8485Se</th>
<th>M-8490Se</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. The highest 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 its 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>AR**
- **<ESC>EX0**
- **<ESC>Z**

Printer Output

![Diagram showing EXPAND TO: 49 INCHES]

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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:

<table>
<thead>
<tr>
<th>LENGTH</th>
<th>M-8459S</th>
<th>M-8460S</th>
<th>M-8485S</th>
<th>M-8490S</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;ESC&gt;A</td>
<td>49.2&quot;</td>
<td>49.2&quot;</td>
<td>49.2&quot;</td>
<td>32.8&quot;</td>
</tr>
<tr>
<td>&lt;ESC&gt;EX0</td>
<td>1249 mm</td>
<td>1249 mm</td>
<td>1249 mm</td>
<td>833 mm</td>
</tr>
<tr>
<td>&lt;ESC&gt;Z</td>
<td>2848 dots</td>
<td>2848 dots</td>
<td>2848 dots</td>
<td>4272 dots</td>
</tr>
<tr>
<td>&lt;ESC&gt;A</td>
<td>7&quot;</td>
<td>7&quot;</td>
<td>7&quot;</td>
<td>7&quot;</td>
</tr>
<tr>
<td>&lt;ESC&gt;AR</td>
<td>178 mm</td>
<td>178 mm</td>
<td>178 mm</td>
<td>178 mm</td>
</tr>
<tr>
<td>&lt;ESC&gt;Z</td>
<td>1424 dots</td>
<td>1424 dots</td>
<td>1424 dots</td>
<td>2136 dots</td>
</tr>
</tbody>
</table>

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:  \(<\text{ESC}>H\text{aaaa}\)

Vertical Position:  \(<\text{ESC}>V\text{bbbb}\)

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:  \(<\text{ESC}>H0020<\text{ESC}>V0150\)

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

Default:  \(<\text{ESC}>H0001\>
<\text{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

\(<\text{ESC}>A\>
<\text{ESC}>H0025<\text{ESC}>V0050<\text{ESC}>L0303<\text{ESC}>MSAT0\>
<\text{ESC}>H0100<\text{ESC}>V0150<\text{ESC}>MSAT0\>
<\text{ESC}>Q2<\text{ESC}>Z\>

Printer Output

SATO

SATO
Special Notes

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

<table>
<thead>
<tr>
<th></th>
<th>M-8459Se</th>
<th>M-8460Se</th>
<th>M-8485Se</th>
<th>M-8490Se</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Print Width</td>
<td>896</td>
<td>1216</td>
<td>1024</td>
<td>1344 dots</td>
</tr>
<tr>
<td></td>
<td>4.4 in.</td>
<td>6.0 in.</td>
<td>5.0 in.</td>
<td>4.4 in.</td>
</tr>
<tr>
<td></td>
<td>112 mm</td>
<td>152 mm</td>
<td>127 mm</td>
<td>112 mm</td>
</tr>
<tr>
<td>Default Print Length</td>
<td>1424 dots</td>
<td>1424 dots</td>
<td>1424 dots</td>
<td>2136 dots</td>
</tr>
<tr>
<td></td>
<td>7.0 in.</td>
<td>7.0 in.</td>
<td>7.0 in.</td>
<td>7.0&quot;</td>
</tr>
<tr>
<td></td>
<td>178 mm</td>
<td>178 mm</td>
<td>178 mm</td>
<td>178 mm</td>
</tr>
<tr>
<td>Expanded with &lt;ESC&gt;EX0</td>
<td>9999 dots (1)</td>
<td>9999 dots (1)</td>
<td>9999 dots (1)</td>
<td>9999 dots (1)</td>
</tr>
<tr>
<td></td>
<td>49.2 in.</td>
<td>49.2 in.</td>
<td>49.2 in.</td>
<td>32.8 in.</td>
</tr>
<tr>
<td></td>
<td>1249 mm</td>
<td>1249 mm</td>
<td>1249 mm</td>
<td>833 mm</td>
</tr>
</tbody>
</table>

(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” will 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:

<table>
<thead>
<tr>
<th>Print Speed a</th>
<th>M-8459Se</th>
<th>M-8460Se</th>
<th>M-8485Se</th>
<th>M-8490Se</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>2 ips 50 mm/sec</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>3 ips 75 mm/sec</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>4 ips 100 mm/sec</td>
<td>4 ips 100 mm/sec</td>
<td>4 ips 100 mm/sec</td>
<td>4 ips 100 mm/sec</td>
</tr>
<tr>
<td>5</td>
<td>5 ips 125 mm/sec</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>6 ips 150 mm/sec</td>
<td>6 ips 150 mm/sec</td>
<td>6 ips 150 mm/sec</td>
</tr>
<tr>
<td>8</td>
<td>8 ips 200 mm/sec</td>
<td>8 ips 200 mm/sec</td>
<td>8 ips 200 mm/sec</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>10 ips 250 mm/sec</td>
<td>10 ips 250 mm/sec</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
<td></td>
<td>12 ips 300 mm/sec</td>
<td></td>
</tr>
</tbody>
</table>
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

Company Name
SATOSATO

SATO

SATO

SATO

SATO

SATO
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  \(<\text{ESC}\>a,\text{bbb}\>

\[a = \text{Horizontal length in dots of reverse image area}\]
\[b = \text{Vertical height in dots of reverse image area.}\]

See Note 6 for field ranges

Example:  \(<\text{ESC}\>(100,50\>

Placement:  This command must be preceded by all other data and be placed just before \(<\text{ESC}\>Q\>

Default:  None

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

Input to Printer

\(<\text{ESC}\>A\>
\(<\text{ESC}\>0050<\text{ESC}\>00120<\text{ESC}\>00220<\text{ESC}\>WA1\text{REVERSE}\>
\(<\text{ESC}\>0050<\text{ESC}\>00300<\text{ESC}\>00220<\text{ESC}\>WA1\text{HALF}\>
\(<\text{ESC}\>0040<\text{ESC}\>00110<\text{ESC}\>(370,100\>
\(<\text{ESC}\>00240<\text{ESC}\>00290<\text{ESC}\>(220,47\>
\(<\text{ESC}\>Q1<\text{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:

<table>
<thead>
<tr>
<th></th>
<th>M-8459Se</th>
<th>M-8460Se</th>
<th>M-8485Se</th>
<th>M-8490Se</th>
</tr>
</thead>
<tbody>
<tr>
<td>Horizontal</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>aaaa</td>
<td>001 to 896</td>
<td>0001 to 1216</td>
<td>0001 to 1024</td>
<td>0001 to 1344</td>
</tr>
<tr>
<td>Vertical</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Default bbbb</td>
<td>0001 to 1424</td>
<td>0001 to 1424</td>
<td>0001 to 1424</td>
<td>0001 to 2136</td>
</tr>
<tr>
<td>Expanded bbbb</td>
<td>0001 to 9999</td>
<td>0001 to 9999</td>
<td>0001 to 9999</td>
<td>0001 to 9999</td>
</tr>
</tbody>
</table>
Rotate, Fixed Base Reference Point

Command Structure  
\(<\text{ESC}>\%a\)

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

Example:  
\(<\text{ESC}>\%3\)

Placement: Preceding any printed data to be rotated

Default:  
\(<\text{ESC}>\%0\)

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 \(<\text{ESC}>\%\) 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  
\(<\text{ESC}>A\)  
\(\langle\text{ESC}\rangle%0\langle\text{ESC}\rangle L202\langle\text{ESC}\rangle H0200\langle\text{ESC}\rangle V0100\langle\text{ESC}\rangle M\text{NORMAL DIRECTION}\)  
\(<\text{ESC}>%1\langle\text{ESC}\rangle H0200\langle\text{ESC}\rangle V0300\langle\text{ESC}\rangle M\text{ONE}\)  
\(<\text{ESC}>%2\langle\text{ESC}\rangle H0200\langle\text{ESC}\rangle V0400\langle\text{ESC}\rangle M\text{TWO}\)  
\(<\text{ESC}>%3\langle\text{ESC}\rangle H0200\langle\text{ESC}\rangle V0500\langle\text{ESC}\rangle M\text{THREE}\)  
\(<\text{ESC}>Q1\langle\text{ESC}\rangle Z\)

Printer Output  

\[\begin{array}{c}
\text{NORMAL DIRECTION} \\
\text{ONE} \\
\text{TWO} \\
\text{THREE}
\end{array}\]
**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  

\(<\text{ESC}>\text{Faaaabccc,dd,ee,g}\)

- **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:  

\(<\text{ESC}>\text{F001-001,04,03}\)

Decrementing

00432T321

Free from Decrementing

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

- \(<\text{ESC}>A<\text{ESC}>\text{H0100<ESC}>\text{V0100<ESC>MSERIAL NUMBER:}\)
- \(<\text{ESC}>\text{H0100<ESC}>\text{V0200<ESC>}\text{F001+005}\)
- \(<\text{ESC}>\text{L0202<ESC>\text{M1000}}\)
- \(<\text{ESC}>\text{Q2<ESC>\text{Z}}\)
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>X01001
   <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>WB1SAT0
<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

\(<\text{ESC}> WP\text{abb}\)

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

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

Example: \(<\text{ESC}> WP\text{M03}\)

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

\(<\text{ESC}> A\>
\(<\text{ESC}> H0100<\text{ESC}> V100<\text{ESC}> \text{XB1Current Date:}\>
\(<\text{ESC}> \text{WAMM/DD/YY}\>
\(<\text{ESC}> WP\text{M06}\>
\(<\text{ESC}> H0100<\text{ESC}> V0200<\text{ESC}> \text{XB1Expiration Date:}\>
\(<\text{ESC}> \text{WAMM/DD/YY}\>
\(<\text{ESC}> Q1<\text{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  \(<\text{ESC}>WA(\text{elements})\)

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

Example:  \(<\text{ESC}>WAMM/DD/YY hh:mm\)

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  
\(<\text{ESC}>A\)
\(<\text{ESC}>H0100<\text{ESC}>V0100<\text{ESC}>XB1\) The current date is:
\(<\text{ESC}>XB1<\text{ESC}>WAMM/DD/YY\)
\(<\text{ESC}>H0100<\text{ESC}>V0200<\text{ESC}>XB1\) The current time is:
\(<\text{ESC}>XB1<\text{ESC}>WAhh:mm\)
\(<\text{ESC}>Q1<\text{ESC}>Z\)

Printer Output

\(\text{The current date is: 01/01/95}\)

\(\text{The current time is: 00:00}\)

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

\[\text{<ESC}\text{BJR}aabbccddeeffffgg\ldots g\]
\[\text{<ESC}\text{BJT}aa,bb,cc,dd,ee,ffff,gg\ldots g\]

\begin{align*}
a & = \text{Font ID (0 thru 9)} \\
aa & = \text{Font ID (00 thru 99)} \\
bb & = \text{Horizontal Expansion (01 thru 12)} \\
cc & = \text{Vertical Expansion (01 thru 12)} \\
dd & = \text{Character Pitch (01 thru 99)} \\
d & = \text{Reserved, always 00} \\
ffff & = \text{Number of characters to be printed using the font} \\
\ldots & = \text{Data to be printed}
\end{align*}

Example:  \[\text{<ESC}\text{BJR10202010000004SATO}\]

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

\[\text{<ESC}\text{A}<\text{ESC}\text{V0100}<\text{ESC}\text{H0100}<\text{ESC}\text{CC1}<\text{ESC}\text{BJT01,02,02,01,00,0004,SATO}<\text{ESC}\text{Q1}<\text{ESC}\text{Z}\]

Printer Output

\[\text{SATO}\]

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>BJDccccddddddee...e
End Download    <ESC>BJ)

aa..a = 40 byte font description
bb..b = 10 byte date information
cccc= 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 Memory Function
Format/Field Recall

Command Structure

\[ \text{<ESC}>YR,aa \text{<ESC>}/D,bb,cc...c \]

- \( aa \) = 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:

\[ \text{<ESC}>YR,01\text{<ESC>}/D,01,99 \]

Placement: Immediately after \(<\text{ESC}>CC\) 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

- \(<\text{ESC}>A\)
- \(<\text{ESC}>CC1\)
- \(<\text{ESC}>YR,02<\text{ESC>}/D,01,TWO\ FIELDS\ OF<\text{ESC>}/D,02,VARIABLE\ DATA\)
- \(<\text{ESC}>Q1<\text{ESC}>Z\)

Printer Output

```
TWO FIELDS OF
VARIABLE DATA
```

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 \(<\text{ESC>}/N\) 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

\(<\text{ESC}>\text{YS},aa<\text{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: \(<\text{ESC}>\text{YS,01}<\text{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>Cu Null Cut Label
- <ESC>/D Recall Field
- <ESC>T Custom Characters
- <ESC>@ Off Line
- <ESC>Bj TrueType Fonts
- <ESC>G Store Custom Graphics
- <ESC>BT Variable Ratio Bar Codes
- <ESC>0 Partial Edit
- <ESC>C Repeat Label
- <ESC>Q Print Quantity
- <ESC>EX Expanded Label Storage
- <ESC>& Store Form Overlay
- <ESC>#E Print Darkness
- <ESC>ID Store Job ID
- <ESC>* Clear Memory & Buffer
- <ESC>PI Store PCX Graphics

---

Section 5. Programming Reference
# Expanded Memory Function

## Form Overlay Recall

<table>
<thead>
<tr>
<th>Command Structure</th>
<th>&lt;ESC&gt;&amp;R,aa</th>
</tr>
</thead>
<tbody>
<tr>
<td>aa</td>
<td>Storage Number (01 to 99)</td>
</tr>
<tr>
<td>Example:</td>
<td>&lt;ESC&gt;&amp;R,01</td>
</tr>
<tr>
<td>Placement:</td>
<td>Following The &lt;ESC&gt;CC Memory Area Select Command</td>
</tr>
</tbody>
</table>

### 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 Area Select 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>GTaa,bbbbb,nn...n

aaa = Storage area number (001 thru 999)
bbbb = 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  

\(<\text{ESC}>\text{GR}aaa\)

\(aaa = \) Graphics storage number (001-999)

Example: \(<\text{ESC}>\text{GR}111\)

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
\(<\text{ESC}>A<\text{ESC}>\text{CC}1\)  
\(<\text{ESC}>\text{V}0100<\text{ESC}>\text{H}0080<\text{ESC}>\text{L}0505\)  
\(<\text{ESC}>\text{GR}001\)  
\(<\text{ESC}>\text{Q}1<\text{ESC}>\text{Z}\)

Graphic Rotated 90°
\(<\text{ESC}>A<\text{ESC}>\text{CC}1<\text{ESC}>\%1\)  
\(<\text{ESC}>\text{V}0180<\text{ESC}>\text{H}0250<\text{ESC}>\text{L}0505\)  
\(<\text{ESC}>\text{GR}001\)  
\(<\text{ESC}>\text{Q}1<\text{ESC}>\text{Z}\)

Graphic Rotated 180°
\(<\text{ESC}>A<\text{ESC}>\text{CC}1<\text{ESC}>\%2\)  
\(<\text{ESC}>\text{V}0180<\text{ESC}>\text{H}0500<\text{ESC}>\text{L}0505\)  
\(<\text{ESC}>\text{GR}001\)  
\(<\text{ESC}>\text{Q}1<\text{ESC}>\text{Z}\)

Graphic Rotated 270°
\(<\text{ESC}>A<\text{ESC}>\text{CC}1<\text{ESC}>\%3\)  
\(<\text{ESC}>\text{V}0100<\text{ESC}>\text{H}0700<\text{ESC}>\text{L}0505\)  
\(<\text{ESC}>\text{GR}001\)  
\(<\text{ESC}>\text{Q}1<\text{ESC}>\text{Z}\)

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 \(<\text{ESC}>\text{GI} \) Custom Graphic Store command.
Expanded Memory Function
Graphics, Custom Store

Command Structure

\(<\text{ESC}>\text{Gl}a\text{b}b\text{b}c\text{c}d\text{d}dd\{\text{data}\}\)  

\(a\) = Specifies character format of the data  
\(H\) Hex data  
\(B\) Binary data  

\(\text{bbb}\) = Number of horizontal 8 x 8 blocks (see Note 7 for range)  

\(\text{ccc}\) = Number of vertical 8 x 8 blocks (see Note 7 for range)  

\(\text{ddd}\) = Graphics storage number (001-099)  

\(\{\text{data}\}\) = 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 \(<\text{ESC}>\text{CC}\) Memory Area Select command.  

Default: None  

Command Function

to provide similar functionality to the \(<\text{ESC}>\text{G}\) 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  

\(<\text{ESC}>\text{A}\)  
\(<\text{ESC}>\text{CC1}<\text{ESC}>\text{GIH002002001}\)  
\(0100038007C00E01FF03FF87FFCFFFE07C007\)  
\(C007C007C007C007C007C007\)  
\(<\text{ESC}>\text{Z}\)  

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 \(<\text{ESC}>\text{GR}\) 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:
\(<\text{ESC}>A\)
\(<\text{ESC}>\text{GIHaaabb001}(\text{DATA})\>
\(<\text{ESC}>Z\>
\(<\text{ESC}>A\>
\(<\text{ESC}>\text{GIHaaabb002}(\text{DATA})\>
\(<\text{ESC}>Z\>

Example of incorrect data stream:
\(<\text{ESC}>A\>
\(<\text{ESC}>\text{GIHaaabb001}(\text{DATA})\>
\(<\text{ESC}>\text{GIHaaabb002}(\text{DATA})\>
\(<\text{ESC}>Z\>

5. Do not use ASCII \(<\text{CR}> or \(<\text{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.

<table>
<thead>
<tr>
<th></th>
<th>M-8459Se</th>
<th>M-8460Se</th>
<th>M-8485Se</th>
<th>M-8490Se</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hor Blocks bbb</td>
<td>001 to 112</td>
<td>001 to 152</td>
<td>001 to 128</td>
<td>001 to 168</td>
</tr>
<tr>
<td>Vertical Blocks</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Default ccc</td>
<td>001 to 178</td>
<td>001 to 178</td>
<td>001 to 178</td>
<td>001 to 267</td>
</tr>
<tr>
<td>Expanded ccc</td>
<td>001 to 999</td>
<td>001 to 999</td>
<td>001 to 999</td>
<td>001 to 999</td>
</tr>
</tbody>
</table>
Expanded Memory Function
Graphics, PCX Recall

Command Structure

<ESC>PYaaa

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>P\text{aaa,bbbb,\{data\}}

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

Example:

<ESC>P\text{I001,32000,\{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

\begin{verbatim}
OPEN "C:\WIZARD\GRAPHCIS\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
\end{verbatim}

Printer Output
There is no printer output as a result of this command. See <ESC>\text{P}Y 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>BJFaaaaaaaaa

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

Causes 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>BX0505101000000001
<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.
5. The character set or each Format ID is:

<table>
<thead>
<tr>
<th>ID NUMBER</th>
<th>CHARACTER SET</th>
<th>ENCODING SCHEME</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Numeric, Space</td>
<td>Base 11</td>
</tr>
<tr>
<td>02</td>
<td>Upper Case Alpha, Space</td>
<td>Base 27</td>
</tr>
<tr>
<td>03</td>
<td>Upper Case Alpha, Space, Comma, Period, Slash, Minus</td>
<td>Base 41</td>
</tr>
<tr>
<td>04</td>
<td>Upper Case Alphanumeric, Space</td>
<td>Base 37</td>
</tr>
<tr>
<td>05</td>
<td>ASCII 7-bit, Full Keyboard (20H - 7FH)</td>
<td>ASCII</td>
</tr>
<tr>
<td>06</td>
<td>ISO 8-bit, International (20H - FFH)</td>
<td>8-Bit</td>
</tr>
</tbody>
</table>
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>bx05051010000000000001  
<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>FXaabcdddeee

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>BX030810100000001
<ESC>FX002+001005003<ESC>DC000060000
<ESC>Q4<ESC>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”.

<table>
<thead>
<tr>
<th>Label Set #1</th>
<th>Label Set #2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Label</td>
<td>3rd Label</td>
</tr>
<tr>
<td>00006000</td>
<td>00006010</td>
</tr>
<tr>
<td>2nd Label</td>
<td>4th Label</td>
</tr>
<tr>
<td>00006000</td>
<td>00006010</td>
</tr>
</tbody>
</table>

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  

\(<\text{ESC}>BV_a,b,c,ddddddddddd,eee,fff,ggg\ldots<\text{ESC}>\)

- **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 \(<\text{ESC}>\)

Example: \(<\text{ESC}>BV1,2,3,123456789,222,333,MESSAGE<\text{ESC}>\)

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.

Printer Output

\(<\text{ESC}>A<\text{ESC}>V0100<\text{ESC}>H0100\)

\(<\text{ESC}>BV1,1,2,123456789,840,001,]0<RS>01<GS>961Z01547089<GS>UPSN\)

\(<GS>056872<GS>349<GS>99999999<GS>001/005<GS>029<GS>N<GS>\)

\(<GS>\text{LENEAXA}<GS>\text{KS}<RS><EOT>\)

\(<\text{ESC}>Q001<\text{ESC}>Z\)
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

\(<\text{ESC}\)BKaaabcddeeffffnn...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: \(<\text{ESC}\)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

\(<\text{ESC}\>A\\n<\text{ESC}\>V0100<\text{ESC}\>h0100<\text{ESC}\>BK060740000021PDF417 PDF417 PDF417\\n<\text{ESC}\>Q1<\text{ESC}\>z\)

Printer Output

![PDF417 Barcode Image]
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 than “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 00H thru 1FH 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

\[
\text{<ESC>}2\text{D}3m,a,bb,c,d \ (ee,f f,gg)
\]

\[
\text{<ESC>}DSk,nn........n
\]

\[
\text{<ESC>}DNIII,xx........x
\]

\[
\begin{align*}
m & = \text{Model} \\
0 & \text{Model 2} \\
1 & \text{Model 1} \\
2 & \text{Micro QR Code} \\
a & = \text{Error Correction Level} \\
L & 7\% \\
M & 15\% \\
Q & 25\% \\
H & 30\% \\
bb & = \text{Cell Size (01 to 32 dots/cell)} \\
d & = \text{Connection Mode} \\
0 & \text{Normal} \\
1 & \text{Connection (parameters ee, ff and gg will be used if the file is split into several blocks as independent symbols)} \\
ee & = \text{Total Connection Number (01 - 16)} \\
f f & = \text{Connection number of each symbol encoded as an independent symbol (01 - 16)} \\
gg & = \text{Connection Mode Parity Data (00H - FFH)} \\
k & = \text{Input Data Type} \\
1 & \text{Numeric} \\
2 & \text{Alphanumeric} \\
3 & \text{Kanji (shift JIS Code)} \\
nn..n & = \text{Data} \\
xx..x & = \text{Data Size. Used in Automatic or Manual mode with binary data (0001 - 2953 bytes)}
\end{align*}
\]

### 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 80H to 9FH or E0H to FFH 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  \(<\text{ESC}>LD,a,b,c,d,e,f,g,h,i,jj<\/text>\)

- **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: \(<\text{ESC}>LD,{,},%,#,&,*,~,0,0,D5<\/text>\)

Placement: Immediately following the \(<\text{ESC}>A<\/text>\) Start command and in an independent data stream.

Default: Standard Protocol command Codes

Command Function
Allows the user to define custom Protocol Command codes.

Printer Input
- \(<\text{ESC}>A<\/text>\)
- \(<\text{ESC}>LD,{,},%,#,&,*,~,0,0,D5<\/text>\)
- \(<\text{ESC}>Z<\/text>\)

Printer Output
A Protocol Command code status label will be printed as a result of the successful download of a custom set of Protocol Command codes.

<table>
<thead>
<tr>
<th>Character</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>STX</td>
<td>7B</td>
</tr>
<tr>
<td>ETX</td>
<td>7D</td>
</tr>
<tr>
<td>ESC</td>
<td>25</td>
</tr>
<tr>
<td>ENQ</td>
<td>23</td>
</tr>
<tr>
<td>CAN</td>
<td>26</td>
</tr>
<tr>
<td>NULL</td>
<td>2A</td>
</tr>
<tr>
<td>OFFLINE</td>
<td>7E</td>
</tr>
<tr>
<td>AUTO ONLINE</td>
<td>YES</td>
</tr>
<tr>
<td>ZERO SLASH</td>
<td>YES</td>
</tr>
</tbody>
</table>

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:

<table>
<thead>
<tr>
<th>Command Parameter</th>
<th>Resulting Command Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>2B</td>
<td>+</td>
</tr>
<tr>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

   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.

<table>
<thead>
<tr>
<th>SETTING (ASCII)</th>
<th>COMMAND PARAMETER</th>
<th>ASCII VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>a</td>
<td>0</td>
<td>Reserved</td>
</tr>
<tr>
<td>02</td>
<td>b</td>
<td>0</td>
<td>Reserved</td>
</tr>
<tr>
<td>03</td>
<td>c</td>
<td>0</td>
<td>Print Speed, 2 ips (50 mm/s)</td>
</tr>
<tr>
<td>03</td>
<td></td>
<td>1</td>
<td>Print Speed, 3 ips (75 mm/s)</td>
</tr>
<tr>
<td>03</td>
<td></td>
<td>2</td>
<td>Print Speed, 4 ips (100 mm/s)</td>
</tr>
<tr>
<td>03</td>
<td></td>
<td>3</td>
<td>Print Speed, 5 ips (125 mm/s)</td>
</tr>
<tr>
<td>03</td>
<td></td>
<td>4</td>
<td>Print Speed, 6 ips (150 mm/s)</td>
</tr>
<tr>
<td>03</td>
<td></td>
<td>5</td>
<td>Print Speed, 8 ips (200 mm/s)</td>
</tr>
<tr>
<td>03</td>
<td></td>
<td>6</td>
<td>Print Speed, 10 ips (250 mm/s)</td>
</tr>
<tr>
<td>03</td>
<td></td>
<td>7</td>
<td>Print Speed, 12 ips (300 mm/s)</td>
</tr>
<tr>
<td>04</td>
<td>d</td>
<td>0</td>
<td>Reserved</td>
</tr>
<tr>
<td>05</td>
<td>e</td>
<td>0</td>
<td>Not Used</td>
</tr>
<tr>
<td>05</td>
<td></td>
<td>1</td>
<td>Not Used</td>
</tr>
<tr>
<td>05</td>
<td></td>
<td>2</td>
<td>Not Used</td>
</tr>
<tr>
<td>06</td>
<td>f</td>
<td>0</td>
<td>Dispense Mode, Backfeed after print</td>
</tr>
<tr>
<td>06</td>
<td></td>
<td>1</td>
<td>Dispense Mode, Backfeed before print</td>
</tr>
<tr>
<td>07</td>
<td>g</td>
<td>0</td>
<td>Reserved</td>
</tr>
<tr>
<td>08</td>
<td>h</td>
<td>A</td>
<td>Print Darkness Range A</td>
</tr>
<tr>
<td>08</td>
<td></td>
<td>B</td>
<td>Print Darkness Range B</td>
</tr>
<tr>
<td>08</td>
<td></td>
<td>C</td>
<td>Print Darkness Range C</td>
</tr>
<tr>
<td>08</td>
<td></td>
<td>D</td>
<td>Print Darkness Range D</td>
</tr>
<tr>
<td>08</td>
<td></td>
<td>E</td>
<td>Print Darkness Range E</td>
</tr>
<tr>
<td>08</td>
<td></td>
<td>F</td>
<td>Print Darkness Range F</td>
</tr>
<tr>
<td>09</td>
<td>i</td>
<td>1</td>
<td>Print Darkness Level 1</td>
</tr>
<tr>
<td>09</td>
<td></td>
<td>2</td>
<td>Print Darkness Level 2</td>
</tr>
<tr>
<td>09</td>
<td></td>
<td>3</td>
<td>Print Darkness Level 3</td>
</tr>
</tbody>
</table>
### Setting (ASCII) Command Parameter ASCII Value Description

<table>
<thead>
<tr>
<th>Setting (ASCII)</th>
<th>Command Parameter</th>
<th>ASCII Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>09</td>
<td>4</td>
<td>4</td>
<td>Print Darkness Level 4</td>
</tr>
<tr>
<td>09</td>
<td>5</td>
<td>5</td>
<td>Print Darkness Level 5</td>
</tr>
<tr>
<td>10</td>
<td>j</td>
<td>0</td>
<td>Reflective (Eye-Mark) Sensor</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>1</td>
<td>Transmissive (Gap) Sensor</td>
</tr>
<tr>
<td>10</td>
<td>2</td>
<td>2</td>
<td>Sensors Disabled</td>
</tr>
<tr>
<td>11</td>
<td>k</td>
<td>0</td>
<td>Zero Slash disabled</td>
</tr>
<tr>
<td>11</td>
<td>1</td>
<td>1</td>
<td>Zero Slash enabled</td>
</tr>
<tr>
<td>12</td>
<td>l</td>
<td>0</td>
<td>Reserved</td>
</tr>
<tr>
<td>13</td>
<td>m</td>
<td>0</td>
<td>Paper Type, Labels</td>
</tr>
<tr>
<td>13</td>
<td>1</td>
<td>1</td>
<td>Paper Type, Fan-Fold</td>
</tr>
<tr>
<td>14</td>
<td>n</td>
<td>0</td>
<td>Autofeed disabled</td>
</tr>
<tr>
<td>14</td>
<td>1</td>
<td>1</td>
<td>Autofeed enabled</td>
</tr>
<tr>
<td>15</td>
<td>o</td>
<td>0</td>
<td>Pitch Fixed</td>
</tr>
<tr>
<td>15</td>
<td>1</td>
<td>1</td>
<td>Pitch Proportional</td>
</tr>
<tr>
<td>16</td>
<td>p</td>
<td>0000 to 9999</td>
<td>Vertical Label Size (0 to Vmax dots)</td>
</tr>
<tr>
<td>17</td>
<td>q</td>
<td>000 to Hmax</td>
<td>Horizontal Label Size (0 to Hmax dots)</td>
</tr>
<tr>
<td>18</td>
<td>r</td>
<td>000 to 792</td>
<td>Vertical Offset (0 to 792 dots)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-001 to -792</td>
<td>Vertical Offset (-1 to -792 dots)</td>
</tr>
<tr>
<td>19</td>
<td>s</td>
<td>000 to 792</td>
<td>Horizontal Offset (0 to 792 dots)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-001 to -792</td>
<td>Horizontal Offset (-1 to -792 dots)</td>
</tr>
<tr>
<td>20</td>
<td>t</td>
<td>00 to 99</td>
<td>Pitch Offset (0 to 99 dots)</td>
</tr>
<tr>
<td>21</td>
<td>u</td>
<td>00 to 99</td>
<td>Tear Off Offset (0 to 99 dots)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-01 to -99</td>
<td>Tear Off Offset (-1 to -99 dots)</td>
</tr>
<tr>
<td>22</td>
<td>v</td>
<td>0</td>
<td>Not Used</td>
</tr>
<tr>
<td>23</td>
<td>w</td>
<td>00 to 99</td>
<td>Dispense Offset (0 to 99 dots)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-01 to -99</td>
<td>Dispense Offset (-1 to -99 dots)</td>
</tr>
<tr>
<td>24</td>
<td>x</td>
<td>0</td>
<td>Reserved</td>
</tr>
<tr>
<td>25</td>
<td>y</td>
<td>0 to 64</td>
<td>Gap Size (0 to 64 dots)</td>
</tr>
<tr>
<td>26</td>
<td>z</td>
<td>0</td>
<td>Buzzer Enabled</td>
</tr>
<tr>
<td>26</td>
<td>1</td>
<td>1</td>
<td>Buzzer Disabled</td>
</tr>
</tbody>
</table>

**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  
\(<\text{ESC}>\text{PMa}\)

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 \(<\text{ESC}>\text{PC}\) command

Command Function  
To set the print mode for a job.

Input to Printer  
\(<\text{ESC}>\text{A}\)  
\(<\text{ESC}>\text{PM1}\)  
\(<\text{ESC}>\text{Z}\)

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 \(<\text{ESC}>\text{PC}\) 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  \(<\text{ESC}>\text{PH}a\)

\(a = 0\)  Thermal Transfer printing

\(1\)  Direct Thermal Printing

Example:  See above

Placement:  Separate data stream sent to printer

Default:  Default value set by \(<\text{ESC}>\text{PC}\) command.

Command Function  To set the printing method used for a job

Input to Printer  \(<\text{ESC}>A\)

\(<\text{ESC}>\text{PH}1\)

\(<\text{ESC}>Z\)

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 \(<\text{ESC}>\text{PC}\) 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  \(<\text{ESC}>I2abcde\)

- \(a = 0\)  Baud rate, 9600 bps
- \(a = 1\)  Baud Rate, 19200 bps
- \(a = 2\)  Baud Rate, 38400 bps
- \(a = 3\)  Baud Rate, 57600 bps

- \(b = 0\)  8 Data bits
- \(b = 1\)  7 Data Bits

- \(c = 0\)  No Parity
- \(c = 1\)  Odd Parity
- \(c = 2\)  Even Parity

- \(d = 0\)  1 Stop Bit
- \(d = 1\)  2 Stop Bits

- \(e = 0\)  Single Item Buffer
- \(e = 1\)  Multi Item Buffer
- \(e = 2\)  X-On/X-Off Flow Control
- \(e = 3\)  Bi-Com 4
- \(e = 4\)  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 Interface for a job.

Input to Printer  
- \(<\text{ESC}>\)
- \(<\text{ESC}>I230011\)
- \(<\text{ESC}>Z\)

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

Special Notes  
1. The settings 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**

<table>
<thead>
<tr>
<th>Component</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Printer Connector</td>
<td>AMP 57-40360 (DDK) or equivalent</td>
</tr>
<tr>
<td>Cable Connector</td>
<td>AMP 57-30360 (DDK) or equivalent</td>
</tr>
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</table>
IEEE1284 Parallel Interface Pin Assignments

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

(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
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.

\[<\text{ESC}>A \ldots \text{Job#1} \ldots <\text{ESC}>Z<\text{ESC}>A \ldots \text{Job#n} \ldots <\text{ESC}>Z\]

Example: \[<\text{ESC}>A \ldots \text{Job#1} \ldots <\text{ESC}>Z\]

NOTE: All characters are 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 DC1 commands. Also, there are additional Response Codes in the Status Byte Definition. It is recommended that you use the current protocol rather than the earlier version unless it is necessary for compatibility with existing software.
### Status Byte Definition, Bi-Com Protocol

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

\(^{(1)}\) Not supported by legacy Bi-Com protocols
STATUS RESPONSE

The second method of determining printer status is to interrogate the printer with specific commands. The response from these commands will provide specific information about the printer status depending upon the command. This allows the controlling application to determine the status of a printer when it is located in a remote location.

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.

<table>
<thead>
<tr>
<th>BYTE NUMBER</th>
<th>HEX VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>00</td>
<td>Thermal Transfer Print Type</td>
</tr>
<tr>
<td></td>
<td>01</td>
<td>Direct Thermal Print Type</td>
</tr>
<tr>
<td>2</td>
<td>00</td>
<td>203 dpi Resolution</td>
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<tr>
<td></td>
<td>01</td>
<td>305 dpi Resolution</td>
</tr>
<tr>
<td>3</td>
<td>00</td>
<td>2 ips Print Speed</td>
</tr>
<tr>
<td></td>
<td>01</td>
<td>3 ips Print Speed</td>
</tr>
<tr>
<td></td>
<td>02</td>
<td>4 ips Print Speed</td>
</tr>
<tr>
<td></td>
<td>03</td>
<td>5 ips Print Speed</td>
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<td>12 ips Print Speed</td>
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<tr>
<td></td>
<td>01</td>
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<tr>
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<td>Not Supported</td>
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<td>03</td>
<td>Label Dispense Print mode</td>
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<tr>
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<td>04</td>
<td>Reserved</td>
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<td>00</td>
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<tr>
<td></td>
<td>01</td>
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<td></td>
<td>02</td>
<td>Not Supported</td>
</tr>
<tr>
<td>6</td>
<td>00</td>
<td>Dispense at head position</td>
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<tr>
<td></td>
<td>01</td>
<td>Dispense at dispense position</td>
</tr>
<tr>
<td>7</td>
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<td>Reserved</td>
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<tr>
<td>8</td>
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SATO “Se” Print Engines       PN 9001073 Rev C       Page 6-11
<table>
<thead>
<tr>
<th>BYTE NUMBER</th>
<th>HEX VALUE</th>
<th>DESCRIPTION</th>
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<tbody>
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<td>9</td>
<td>00</td>
<td>Print Density Level 1</td>
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<td>01</td>
<td>Print Density Level 2</td>
</tr>
<tr>
<td></td>
<td>02</td>
<td>Print Density Level 3</td>
</tr>
<tr>
<td></td>
<td>03</td>
<td>Print Density Level 4</td>
</tr>
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<td></td>
<td>04</td>
<td>Print Density Level 5</td>
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<td>10</td>
<td>00</td>
<td>Reflective (Eye-Mark) Sensor</td>
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<tr>
<td></td>
<td>01</td>
<td>Gap (See-Thru) Sensor</td>
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<tr>
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<td>02</td>
<td>No Sensor</td>
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<tr>
<td>11</td>
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<td>01</td>
<td>Zero Slash Enabled</td>
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<tr>
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<td>Reserved</td>
</tr>
<tr>
<td>13</td>
<td>00</td>
<td>Not Supported</td>
</tr>
<tr>
<td></td>
<td>01</td>
<td>Not Supported</td>
</tr>
<tr>
<td>14</td>
<td>00</td>
<td>Online Feed Disabled</td>
</tr>
<tr>
<td></td>
<td>01</td>
<td>Online Feed Enabled</td>
</tr>
<tr>
<td>15</td>
<td>00</td>
<td>Fixed Pitch</td>
</tr>
<tr>
<td></td>
<td>01</td>
<td>Proportional Pitch</td>
</tr>
<tr>
<td>16-17</td>
<td>00 to C80</td>
<td>Not Supported</td>
</tr>
<tr>
<td></td>
<td>00 to 12C0</td>
<td></td>
</tr>
<tr>
<td>18-19</td>
<td>00 to 340</td>
<td>Not Supported</td>
</tr>
<tr>
<td></td>
<td>00 to 4E0</td>
<td></td>
</tr>
<tr>
<td>20-21</td>
<td>00 to 3E7</td>
<td>Vertical Base Reference Point Offset in dots (0 to 792)</td>
</tr>
<tr>
<td></td>
<td>FFFF to FC19</td>
<td></td>
</tr>
<tr>
<td>22-23</td>
<td>00 to 320</td>
<td>Horizontal Base Reference Point Offset in dots (0 to 800)</td>
</tr>
<tr>
<td></td>
<td>00 to FCE0</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>00 to 63</td>
<td>Not Supported</td>
</tr>
<tr>
<td></td>
<td>FF to 9D</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>00 to 63</td>
<td>Not Supported</td>
</tr>
<tr>
<td></td>
<td>FF to 9D</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>00 to 63</td>
<td>Not Supported</td>
</tr>
<tr>
<td></td>
<td>FF to 9D</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>00 to 63</td>
<td>Dispense Offset in dots (0 to 99)</td>
</tr>
<tr>
<td></td>
<td>FF to 9D</td>
<td>Dispense Offset in dots (-1 to -99)</td>
</tr>
<tr>
<td>28</td>
<td>00</td>
<td>Compatibility Mode Enabled</td>
</tr>
<tr>
<td></td>
<td>01</td>
<td>Compatibility Mode Disabled</td>
</tr>
<tr>
<td>29</td>
<td>08 to 40</td>
<td>Not Supported</td>
</tr>
<tr>
<td>30</td>
<td>00</td>
<td>Buzzer Enabled</td>
</tr>
<tr>
<td></td>
<td>01</td>
<td>Buzzer Disabled</td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>BYTE NUMBER</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-8</td>
<td>Hex</td>
<td>Current Life Counter in dots</td>
</tr>
<tr>
<td>9-12</td>
<td>Hex</td>
<td>1st (Current) Head Counter in dots</td>
</tr>
<tr>
<td>13-16</td>
<td>Hex</td>
<td>2nd (Previous) Head Counter in dots</td>
</tr>
<tr>
<td>17-20</td>
<td>Hex</td>
<td>3rd Head Counter in dots</td>
</tr>
<tr>
<td>21-24</td>
<td>Hex</td>
<td>Not Supported</td>
</tr>
<tr>
<td>25-28</td>
<td>Hex</td>
<td>Not Supported</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>BYTE NUMBER</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hex</td>
<td>Reflective Sensor Level</td>
</tr>
<tr>
<td>2</td>
<td>Hex</td>
<td>Transmissive Sensor Level</td>
</tr>
<tr>
<td>3</td>
<td>00H</td>
<td>Out of Paper</td>
</tr>
<tr>
<td>4</td>
<td>01H</td>
<td>Paper Present</td>
</tr>
<tr>
<td></td>
<td>00H</td>
<td>Head Open</td>
</tr>
<tr>
<td></td>
<td>01H</td>
<td>Head Closed</td>
</tr>
</tbody>
</table>
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).

<table>
<thead>
<tr>
<th>BYTE NUMBER</th>
<th>HEX VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>00</td>
<td>Print Head OK</td>
</tr>
<tr>
<td></td>
<td>01</td>
<td>Electrical Fault in Print Head</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>BYTE NUMBER</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-50</td>
<td>ASCII</td>
<td>Firmware Version Information</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>BYTE NUMBER</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-4</td>
<td>Hex</td>
<td>Free Font Memory</td>
</tr>
<tr>
<td>5-8</td>
<td>Hex</td>
<td>Total Font Memory</td>
</tr>
<tr>
<td>9-12</td>
<td>Hex</td>
<td>Free Form Overlay Memory</td>
</tr>
<tr>
<td>13-16</td>
<td>Hex</td>
<td>Total Form Overlay Memory</td>
</tr>
<tr>
<td>17-20</td>
<td>Hex</td>
<td>Free Graphic Memory</td>
</tr>
<tr>
<td>21-24</td>
<td>Hex</td>
<td>Total Graphic Memory</td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>BYTE NUMBER</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2</td>
<td>01 to 99</td>
<td>Form Registration Number (ASCII value)</td>
</tr>
<tr>
<td>3-18</td>
<td>ASCII</td>
<td>Form Name</td>
</tr>
</tbody>
</table>
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.*

<table>
<thead>
<tr>
<th>BYTE NUMBER</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2</td>
<td>ASCII</td>
<td>Font ID Number</td>
</tr>
<tr>
<td>3-4</td>
<td>00H</td>
<td>Font Graphic</td>
</tr>
<tr>
<td></td>
<td>01H</td>
<td></td>
</tr>
<tr>
<td>5-36</td>
<td>ASCII</td>
<td>Font Name</td>
</tr>
<tr>
<td>37-48</td>
<td>ASCII</td>
<td>Font Style</td>
</tr>
<tr>
<td>49-52</td>
<td>ASCII</td>
<td>Font Point Size</td>
</tr>
<tr>
<td>53-54</td>
<td>Hex</td>
<td>Character Width in dots</td>
</tr>
<tr>
<td>54-60</td>
<td>Hex</td>
<td>Character Height in dots</td>
</tr>
<tr>
<td>57-60</td>
<td>Hex</td>
<td>Font Size</td>
</tr>
<tr>
<td>58-64</td>
<td>Hex</td>
<td>Font Registration Number</td>
</tr>
<tr>
<td>65-68</td>
<td>Hex</td>
<td>Font Data Top Address</td>
</tr>
<tr>
<td>69-72</td>
<td>Hex</td>
<td>Total Size</td>
</tr>
<tr>
<td>73-74</td>
<td>Hex</td>
<td>Vertical/Horizontal Writing Flag</td>
</tr>
<tr>
<td>75</td>
<td>Hex</td>
<td>Character Pitch, Fixed/Variable</td>
</tr>
<tr>
<td>76</td>
<td>Hex</td>
<td>Family Attribute</td>
</tr>
<tr>
<td>77</td>
<td>Hex</td>
<td>Character Set</td>
</tr>
<tr>
<td>78</td>
<td>Hex</td>
<td>Italic Attribute</td>
</tr>
<tr>
<td>79-80</td>
<td>Hex</td>
<td>Weight Attribute</td>
</tr>
<tr>
<td>81-82</td>
<td>Hex</td>
<td>Spread</td>
</tr>
<tr>
<td>83-84</td>
<td>Hex</td>
<td>Assent in dots</td>
</tr>
<tr>
<td>85-86</td>
<td>Hex</td>
<td>Registration Start Code</td>
</tr>
<tr>
<td>86-87</td>
<td>Hex</td>
<td>Registration End Code</td>
</tr>
<tr>
<td>88-95</td>
<td>Hex</td>
<td>Reserved</td>
</tr>
<tr>
<td>96-98</td>
<td>Hex</td>
<td>Code</td>
</tr>
<tr>
<td>99-100</td>
<td>Hex</td>
<td>Horizontal Valid Size</td>
</tr>
<tr>
<td>101-102</td>
<td>Hex</td>
<td>Left Gap Size</td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>BYTE NUMBER</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>IEEE 1284 Parallel</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Serial RS232</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Local Area Network</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Universal Serial Bus</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>BYTE NUMBER</th>
<th>VALUE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>9600 BPS</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>19200 BPS</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>38400 BPS</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>57600 BPS</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>No Parity</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Odd Parity</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Even Parity</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>1 Stop Bit</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2 Stop Bits</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
<td>Single Item Buffer with Ready/Busy Flow Control</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Multi-Item Buffer with Ready/Busy Flow Control</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>X-ON/X-OFF Flow Control</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Status 4 Bi-Comm</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Status 3 Bi-Comm</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>PIN</th>
<th>DIRECTION</th>
<th>SIGNAL DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>To Host</td>
<td>Vcc - +5V</td>
</tr>
<tr>
<td>10</td>
<td>To Host</td>
<td>Ribbon Near End - This pin goes high when the amount of ribbon on the unwind shaft is approximately 46 feet (14 m). The output will be low when the ribbon is completely out.</td>
</tr>
<tr>
<td>4</td>
<td>To Host</td>
<td>Error - This pin goes low when the printer detects an error condition such as head open or receiving buffer full.</td>
</tr>
<tr>
<td>7</td>
<td>To Printer</td>
<td>Reprint - A duplicate of the last label in a print job will be reprinted when this signal is received.</td>
</tr>
<tr>
<td>5</td>
<td>To Printer</td>
<td>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.</td>
</tr>
<tr>
<td>6</td>
<td>To Host</td>
<td>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.</td>
</tr>
<tr>
<td>1</td>
<td>To Host</td>
<td>Label Out - This pin goes low (0V) when a label out error exists.</td>
</tr>
<tr>
<td>3</td>
<td>To Host</td>
<td>Ribbon Out - This pin goes low (0V) when the ribbon is out.</td>
</tr>
<tr>
<td>2</td>
<td>Reference</td>
<td>Signal Ground</td>
</tr>
<tr>
<td>8</td>
<td>To Printer</td>
<td>Reserved</td>
</tr>
<tr>
<td>9</td>
<td>To Host</td>
<td>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</td>
</tr>
<tr>
<td>11</td>
<td>Reserved</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>To Host</td>
<td>+24V +/- 10% @2A - Power for external devices.</td>
</tr>
<tr>
<td>14</td>
<td>Frame Ground</td>
<td></td>
</tr>
</tbody>
</table>

*NOTE: The signals on pins 1, 3, 4, 6, 9 and 10 each have an open collector output. These pins normally measure +0.7V 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

<table>
<thead>
<tr>
<th></th>
<th>Start of Print Cycle</th>
<th>End of Print Cycle</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Print Start Input</strong></td>
<td>+5V</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0V</td>
<td></td>
</tr>
<tr>
<td><strong>Print Repeat Input</strong></td>
<td>+5V</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0V</td>
<td></td>
</tr>
<tr>
<td><strong>Print End Type 1</strong></td>
<td>+5V</td>
<td>20 milliseconds</td>
</tr>
<tr>
<td></td>
<td>0V</td>
<td></td>
</tr>
<tr>
<td><strong>Print End Type 2</strong></td>
<td>+5V</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0V</td>
<td></td>
</tr>
<tr>
<td><strong>Print End Type 3</strong></td>
<td>+5V</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0V</td>
<td></td>
</tr>
<tr>
<td><strong>Print End Type 4</strong></td>
<td>+5V</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0V</td>
<td></td>
</tr>
</tbody>
</table>

Vcc = +5V

Pin 13

330 ohm, 1/4W

Pin 1, 3, 4, 6, 9 or 10

Signal Out
Section 6. Interface Specifications

REPEAT PRINT

<table>
<thead>
<tr>
<th>Event</th>
<th>Start of Print Cycle</th>
<th>End of Print Cycle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Print Start Input</td>
<td>+5V</td>
<td>0V</td>
</tr>
<tr>
<td>Print Repeat Input</td>
<td>+5V</td>
<td>0V</td>
</tr>
<tr>
<td>Print End Type 1</td>
<td>+5V</td>
<td>0V</td>
</tr>
<tr>
<td>Print End Type 2</td>
<td>+5V</td>
<td>0V</td>
</tr>
<tr>
<td>Print End Type 3</td>
<td>+5V</td>
<td>0V</td>
</tr>
<tr>
<td>Print End Type 4</td>
<td>+5V</td>
<td>0V</td>
</tr>
</tbody>
</table>

ERROR SIGNALS

<table>
<thead>
<tr>
<th>Event</th>
<th>Paper or Ribbon End</th>
<th>Paper/Ribbon Replinished</th>
</tr>
</thead>
<tbody>
<tr>
<td>Print Motion</td>
<td>Moving</td>
<td>Head Open</td>
</tr>
<tr>
<td></td>
<td>Stopped</td>
<td>Head Closed</td>
</tr>
<tr>
<td>Paper End</td>
<td>+5V</td>
<td>0V</td>
</tr>
<tr>
<td>Ribbon End</td>
<td>+5V</td>
<td>0V</td>
</tr>
<tr>
<td>Machine Error</td>
<td>+5V</td>
<td>0V</td>
</tr>
<tr>
<td>Print End Type 1</td>
<td>+5V</td>
<td>0V</td>
</tr>
<tr>
<td>Print End Type 2</td>
<td>+5V</td>
<td>0V</td>
</tr>
<tr>
<td>Print End Type 3</td>
<td>+5V</td>
<td>0V</td>
</tr>
<tr>
<td>Print End Type 4</td>
<td>+5V</td>
<td>0V</td>
</tr>
</tbody>
</table>
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 0AH (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 0AH 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 0AH_ (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 Section 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.

<table>
<thead>
<tr>
<th>LED On/Off</th>
<th>LCD MESSAGE</th>
<th>AUDIBLE BEEP</th>
<th>ERROR CONDITION</th>
<th>TO CLEAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Error On</td>
<td>Machine Error</td>
<td>1 Long</td>
<td>Machine Error</td>
<td>Cycle power on/off</td>
</tr>
<tr>
<td>Error On</td>
<td>EEPROM Error</td>
<td>1 Long</td>
<td>EEPROM Read/Write</td>
<td>Cycle power on/off</td>
</tr>
<tr>
<td>Error On</td>
<td>Head Error</td>
<td>1 Long</td>
<td>Head</td>
<td>Cycle power on/off</td>
</tr>
<tr>
<td>Error On</td>
<td>Sensor Error</td>
<td>3 Short</td>
<td>Sensor</td>
<td>Cycle power on/off</td>
</tr>
<tr>
<td>Error Blinks</td>
<td>Card R/W Error</td>
<td>1 Long</td>
<td>Memory Card Read/Write</td>
<td>Cycle power on/off</td>
</tr>
<tr>
<td>Error Blinks</td>
<td>Card Low Battery</td>
<td>1 Long</td>
<td>Memory Card Battery Low</td>
<td>Cycle power on/off</td>
</tr>
<tr>
<td>Error Blinks</td>
<td>Head Open</td>
<td>3 Short</td>
<td>Head Open</td>
<td>Close head lever</td>
</tr>
<tr>
<td>Error Blinks</td>
<td>Cutter Error</td>
<td>3 Short</td>
<td>Cutter</td>
<td>Cycle Power On/Off</td>
</tr>
<tr>
<td>Error On Line Blinks</td>
<td>Parity Error</td>
<td>3 Short</td>
<td>RS232 Parity Error</td>
<td>Cycle power on/off</td>
</tr>
<tr>
<td>Error On Line Blinks</td>
<td>Overrun Error</td>
<td>3 Short</td>
<td>RS232 Overrun Error</td>
<td>Cycle power on/off</td>
</tr>
<tr>
<td>Error On Line Blinks</td>
<td>Framing Error</td>
<td>3 Short</td>
<td>RS232 Framing Error</td>
<td>Cycle power on/off</td>
</tr>
<tr>
<td>Error On Line Blinks</td>
<td>Buffer Over</td>
<td>3 Short</td>
<td>Buffer Overflow</td>
<td>Cycle power on/off</td>
</tr>
<tr>
<td>Error Blinks Label On</td>
<td>Paper End</td>
<td>3 Short</td>
<td>Label End</td>
<td>Open/close Head Lever</td>
</tr>
<tr>
<td>Error Blinks Ribbon On</td>
<td>Ribbon End</td>
<td>3 Short</td>
<td>Ribbon End</td>
<td>Open/close Head Lever</td>
</tr>
<tr>
<td>Error Blinks Label Blinks</td>
<td>Media Error</td>
<td>3 Short</td>
<td>Media Error</td>
<td>Open/close Head Lever</td>
</tr>
<tr>
<td>Ribbon Blinks</td>
<td>None</td>
<td>None</td>
<td>Ribbon Near End</td>
<td>Replace ribbon with full roll</td>
</tr>
<tr>
<td>Line Blinks</td>
<td>None</td>
<td>None</td>
<td>Buffer Near Full</td>
<td>Slow down transmission rate</td>
</tr>
</tbody>
</table>
Section 7. Troubleshooting

This page left intentionally blank.
### APPENDIX A.
**COMMAND CODE QUICK REFERENCE**

<table>
<thead>
<tr>
<th>INSTRUCTION</th>
<th>DESCRIPTION</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Start Code. Begins all print jobs.</td>
<td>5-74</td>
</tr>
<tr>
<td>A1aaaabbbb</td>
<td>Media Size. Specifies the label size.</td>
<td>5-53</td>
</tr>
<tr>
<td></td>
<td>aaaa = Label length in dots (0 to Vmax)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>bbbb = Label width in dots (0 to Hmax)</td>
<td></td>
</tr>
<tr>
<td>A(space)Z</td>
<td>Form Feed. Feeds a blank tag or label.</td>
<td>5-40</td>
</tr>
<tr>
<td>AR</td>
<td>Normal Print Length. This command resets the printer to the Standard print length (7 inches).</td>
<td>5-59</td>
</tr>
<tr>
<td>A3H-aaaa-Vbbb</td>
<td>Base Reference Point. Establishes a new base reference point position in dots for the current label. Units of measurement are dots.</td>
<td>5-19</td>
</tr>
<tr>
<td></td>
<td>- = Optional character. If included, will shift reference point in negative direction.</td>
<td></td>
</tr>
<tr>
<td>Babbcccd</td>
<td>Bar Codes. Prints a 1:3 ratio bar code.</td>
<td>5-11</td>
</tr>
<tr>
<td></td>
<td>a= 0 Codabar</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 Code 39</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 Interleaved 2 of 5 (I 2/5)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 UPC-A/EAN-13</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 EAN-8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5 Industrial 2 of 5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6 Matrix 2 of 5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7 reserved</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8 reserved</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9 reserved</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A MSI</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B reserved</td>
<td></td>
</tr>
<tr>
<td></td>
<td>C Code 93</td>
<td></td>
</tr>
<tr>
<td></td>
<td>D reserved</td>
<td></td>
</tr>
<tr>
<td></td>
<td>E UPC-E</td>
<td></td>
</tr>
<tr>
<td></td>
<td>F Bookland</td>
<td></td>
</tr>
<tr>
<td></td>
<td>G Code 128</td>
<td></td>
</tr>
<tr>
<td></td>
<td>I UCC 128</td>
<td></td>
</tr>
<tr>
<td></td>
<td>bb = Number of dots (01-12) for narrow bar and narrow space</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ccc = Bar height in dots (001-600)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>d = UCC 128 only</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Instruction</th>
<th>M-8459Se</th>
<th>M-8460Se</th>
<th>M-8485Se</th>
<th>M-8490Se</th>
</tr>
</thead>
<tbody>
<tr>
<td>aaaa = Horizontal Print Offset</td>
<td>+/- 896</td>
<td>+/- 1216</td>
<td>+/- 1024</td>
<td>+/- 1344</td>
</tr>
<tr>
<td>bbbb = Vertical Print Offset</td>
<td>0001 to 1424</td>
<td>0001 to 1424</td>
<td>0001 to 1424</td>
<td>0001 to 2136</td>
</tr>
</tbody>
</table>

Page A-1 PN 9001073 Rev C SATO “Se” Print Engines
### INSTRUCTION | DESCRIPTION | PAGE
--- | --- | ---
BDabbcdd | **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 human readable text below the symbol. | 5-16

BKaabcdd | **PDF417.** Prints PDF417 2-D symbols. | 5-108

en...n | 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. | 5-57

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

BTabbcddddee | **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)
c = 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, dddddddddd, eee,f f,g,gg..g | **Maxicode.** Prints 2-D Maxicode symbols per AIM I.S.S. specification. | 5-106

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
ff f = 3 digit numeric Service Class
gg..g = Data, terminated by <ESC> | 5-106
Appendix A: Command Quick Reference

<table>
<thead>
<tr>
<th>INSTRUCTION</th>
<th>DESCRIPTION</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>BWaabbbaabb</td>
<td><strong>Bar Codes.</strong> Expansion. Works together with the BT command to specify an expansion factor and the bar code height for the particular symbol being printed.</td>
<td>5-16</td>
</tr>
<tr>
<td>BXaabcddcccdeeffffff</td>
<td><strong>Data Matrix.</strong> Data Format. Specifies the format of the Data Matrix 2-D symbology.</td>
<td>5-100</td>
</tr>
<tr>
<td>C</td>
<td><strong>Repeat Label.</strong> Prints a duplicate of the last label printed.</td>
<td>5-65</td>
</tr>
<tr>
<td>CSa</td>
<td><strong>Print Speed Selection.</strong> Specifies a unique print speed in in./sec. through software for a particular label.</td>
<td>5-64</td>
</tr>
<tr>
<td>Dabbcccd</td>
<td><strong>Bar Codes.</strong> 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.</td>
<td>5-11</td>
</tr>
<tr>
<td>DCxx...x</td>
<td><strong>Data Matrix.</strong> Print Data. Prints data using Data Matrix format specified in BX Data Format command.</td>
<td>5-103</td>
</tr>
<tr>
<td>Eaaa</td>
<td><strong>Line Feed.</strong> Provides the ability to print multiple lines of the same character size without specifying a new print position for each line.</td>
<td>5-52</td>
</tr>
<tr>
<td>EX0</td>
<td><strong>Expanded Print Length.</strong> Expands the print length to 9999 dots.</td>
<td>5-59</td>
</tr>
<tr>
<td>Faaaaaabccccddee</td>
<td><strong>Sequential Numbering.</strong> Allows the printing of sequencing fields (text, bar codes) where all incrementing is done within the printer.</td>
<td>5-72</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>M-8459Se</th>
<th>M-8460Se</th>
<th>M-8485Se</th>
<th>M-8490Se</th>
</tr>
</thead>
<tbody>
<tr>
<td>a = Speed Setting</td>
<td>2 = 2 ips</td>
<td>4 = 4 ips</td>
<td>4 = 4 ips</td>
<td>4 = 4 ips</td>
</tr>
<tr>
<td></td>
<td>3 = 3 ips</td>
<td>6 = 6 ips</td>
<td>6 = 6 ips</td>
<td>6 = 6 ips</td>
</tr>
<tr>
<td></td>
<td>4 = 4 ips</td>
<td>8 = 8 ips</td>
<td>8 = 8 ips</td>
<td>8 = 8 ips</td>
</tr>
<tr>
<td></td>
<td>5 = 5 ips</td>
<td>10 = 10 ips</td>
<td>10 = 10 ips</td>
<td>12 = 12 ips</td>
</tr>
</tbody>
</table>
## Horizontal Line
Prints a horizontal line. Units of measurement are dots.

<table>
<thead>
<tr>
<th>INSTRUCTION</th>
<th>DESCRIPTION</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>FWaaHbbbb</td>
<td>Horizontal Line</td>
<td>5-50</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>aa = Width of Hor Line</th>
<th>M-8459Se</th>
<th>M-8460Se</th>
<th>M-8485Se</th>
<th>M-8490Se</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>01 to 99</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>bbbb = Length of Hor Line</th>
<th>M-8459Se</th>
<th>M-8460Se</th>
<th>M-8485Se</th>
<th>M-8490Se</th>
</tr>
</thead>
<tbody>
<tr>
<td>0001 to 0896</td>
<td></td>
<td>0001 to 1216</td>
<td>0001 to 1024</td>
<td>0001 to 1344</td>
</tr>
</tbody>
</table>

## Box
Prints a box. For values aa, bbbb, cc, and dddd, see instructions for horizontal and vertical lines. Units of measurement are dots.

<table>
<thead>
<tr>
<th>INSTRUCTION</th>
<th>DESCRIPTION</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>FWaabbVccc</td>
<td>Box</td>
<td>5-50</td>
</tr>
<tr>
<td>Hdddd</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>aa = Width of Hor Side</th>
<th>M-8459Se</th>
<th>M-8460Se</th>
<th>M-8485Se</th>
<th>M-8490Se</th>
</tr>
</thead>
<tbody>
<tr>
<td>01 to 99</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>bb = Width of Vert Side</th>
<th>M-8459Se</th>
<th>M-8460Se</th>
<th>M-8485Se</th>
<th>M-8490Se</th>
</tr>
</thead>
<tbody>
<tr>
<td>01 to 99</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>cccc = Length of Vert Side</th>
<th>M-8459Se</th>
<th>M-8460Se</th>
<th>M-8485Se</th>
<th>M-8490Se</th>
</tr>
</thead>
<tbody>
<tr>
<td>0001 to 1424</td>
<td>0001 to 9999</td>
<td>0001 to 2136</td>
<td>0001 to 9999</td>
<td></td>
</tr>
</tbody>
</table>

| Expanded              |          |          |          |          |

<table>
<thead>
<tr>
<th>dddd = Length of Hor Side</th>
<th>M-8459Se</th>
<th>M-8460Se</th>
<th>M-8485Se</th>
<th>M-8490Se</th>
</tr>
</thead>
<tbody>
<tr>
<td>0001 to 0896</td>
<td>0001 to 1216</td>
<td>0001 to 1024</td>
<td>0001 to 1344</td>
<td></td>
</tr>
</tbody>
</table>

## Vertical Line
Prints a vertical line. Units of measurement are dots.

<table>
<thead>
<tr>
<th>INSTRUCTION</th>
<th>DESCRIPTION</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>FWccVddd</td>
<td>Vertical Line</td>
<td>5-50</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>cc = Width of Vert Line</th>
<th>M-8459Se</th>
<th>M-8460Se</th>
<th>M-8485Se</th>
<th>M-8490Se</th>
</tr>
</thead>
<tbody>
<tr>
<td>01 to 99</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>dddd = Length of Vert Line</th>
<th>M-8459Se</th>
<th>M-8460Se</th>
<th>M-8485Se</th>
<th>M-8490Se</th>
</tr>
</thead>
<tbody>
<tr>
<td>0001 to 1424</td>
<td>0001 to 9999</td>
<td>0001 to 2136</td>
<td>0001 to 9999</td>
<td></td>
</tr>
</tbody>
</table>

## Data Matrix
Sequential Numbering. Prints sequential numbered Data Matrix 2-D symbols.

<table>
<thead>
<tr>
<th>INSTRUCTION</th>
<th>DESCRIPTION</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>FXaaabccc</td>
<td>Data Matrix</td>
<td>5-104</td>
</tr>
<tr>
<td>dddeeee</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>aaa = Number of duplicate labels (001-999)</th>
<th>M-8459Se</th>
<th>M-8460Se</th>
<th>M-8485Se</th>
<th>M-8490Se</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>b = Increment or decrement</th>
<th>M-8459Se</th>
<th>M-8460Se</th>
<th>M-8485Se</th>
<th>M-8490Se</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ Increment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Decrement</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ccc = Increment/decrement steps (001-999)</th>
<th>M-8459Se</th>
<th>M-8460Se</th>
<th>M-8485Se</th>
<th>M-8490Se</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ddd = Sequential numbering start position (001-999)</th>
<th>M-8459Se</th>
<th>M-8460Se</th>
<th>M-8485Se</th>
<th>M-8490Se</th>
</tr>
</thead>
<tbody>
<tr>
<td>Referenced to left side.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>eee = Incremented data length (001-999)</th>
<th>M-8459Se</th>
<th>M-8460Se</th>
<th>M-8485Se</th>
<th>M-8490Se</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measured from start position.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Custom Graphics

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

#### BMP File

BMP File. Downloads BMP file to the internal graphics image memory.

- **aaaa** = No. of bytes to be downloaded (max DOS file size is 32K)

#### PCX File

PCX File. Downloads PCX file to the internal graphics image memory.

- **aaaa** = No. of bytes to be downloaded (max DOS file size is 32K)

### Horiztonal Position

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.

<table>
<thead>
<tr>
<th></th>
<th>M-8459Se</th>
<th>M-8460Se</th>
<th>M-8485Se</th>
<th>M-8490Se</th>
</tr>
</thead>
<tbody>
<tr>
<td>aaaa = New Horizontal Position</td>
<td>0001 to 0896</td>
<td>0001 to 1216</td>
<td>0001 to 1024</td>
<td>0001 to 1344</td>
</tr>
</tbody>
</table>

### Store Job ID

Store Job ID. Stores the Job ID number.

- **aa** = Job ID number assigned (01-99)

### Journal Print

Journal Print. Provides the ability to print text line by line. Fixed spacing between lines and characters.

### Recall Custom Designed Characters

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.

### Character Expansion

Character Expansion. Expands characters in both directions.

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

### Font type

Font type. Specifies the 13W x 20H dot matrix font (including descenders).

### Font type

Font type. Specifies the OCR-A font with dot matrix.

<table>
<thead>
<tr>
<th></th>
<th>M-8459Se</th>
<th>M-8460Se</th>
<th>M-8485Se</th>
<th>M-8490Se</th>
</tr>
</thead>
<tbody>
<tr>
<td>OA Font Matrix</td>
<td>15W x 22H</td>
<td>22W x 33H</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Font type

Font type. Specifies the OCR-B font dot matrix.
### Appendix A: Command Quick Reference

<table>
<thead>
<tr>
<th>INSTRUCTION</th>
<th>DESCRIPTION</th>
<th>M-8459Se</th>
<th>M-8460Se</th>
<th>M-8485Se</th>
<th>M-8490Se</th>
</tr>
</thead>
<tbody>
<tr>
<td>OB Font Matrix</td>
<td></td>
<td>20 W x 24H</td>
<td>30W x 36H</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Paa**

**Character Pitch.** Designates the number of dots between characters. 

\[ \text{aa} = \text{Number of dots between characters (01-99)} \]

**PR**

**Fixed Font Spacing.** Returns the printer to fixed character spacing mode.

**PS**

**Proportional Font Spacing.** Places the printer in the proportional character spacing mode. Will not work with U Font.

**Qaaaaaa**

**Print Quantity.** Specifies the total number of labels to print. 

\[ \text{aaaaaa} = \text{Total number of labels to print for the job (000001-999999)} \]

**RDabb,ccc,ddd,nn...n**

**Font Type.** Specifies the internal AGFA raster fonts. 

- **a** = A Specifies CG Times font 
- **b** = 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

**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.

**S**

**Font type.** Specifies the 8W x 15H dot matrix font (including descenders).

**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 
- **b** = 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 “I” to “R” in hex values. 
- **(data)** = Data to describe the character.

**U**

**Font type.** Specifies a 5W x 9L dot matrix font (including descenders).

**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.

**Wba**

**Font type.** Specifies the 18W x 30L dot matrix font (including descenders). 

\[ \text{a} = \begin{cases} 
0 & \text{Disables auto-smoothing of font} \\
1 & \text{Enables auto-smoothing if expansion is greater than 3} 
\end{cases} \]
### Appendix A: Command Quick Reference

<table>
<thead>
<tr>
<th>INSTRUCTION</th>
<th>DESCRIPTION</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>WDHaaaaVbbbb</td>
<td><strong>Copy Image Area.</strong> To copy an image to another location of the label.</td>
<td>5-31</td>
</tr>
</tbody>
</table>
| XccccYddddd | 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 | |
| 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 descenders).  
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 |
Appendix A: Command Quick Reference

<table>
<thead>
<tr>
<th>INSTRUCTION</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>$=(data)</td>
<td>Data for Vector font.</td>
</tr>
<tr>
<td>#Ea</td>
<td><strong>Print Darkness.</strong> Specifies a new print darkness setting. The lightest setting is “1”. There are three darkness levels (five for the M-8459Se) that can be specified.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>a = Print Darkness</th>
<th>M-8459Se</th>
<th>M-8460Se</th>
<th>M-8485Se</th>
<th>M-8490Se</th>
</tr>
</thead>
<tbody>
<tr>
<td>1, 2, 3, 4, or 5</td>
<td>1, 2 or 3</td>
<td>1, 2 or 3</td>
<td>1, 2 or 3</td>
<td>1, 2 or 3</td>
</tr>
</tbody>
</table>

| (aaaa,bbbb)        | **Reverse Image.** Reverse image from black to white and vice versa. Units of measure are dots. | 5-68 |

<table>
<thead>
<tr>
<th>aaaa = Hor Length</th>
<th>M-8459S</th>
<th>M-8460S</th>
<th>M-8485S</th>
<th>M-8490S</th>
</tr>
</thead>
<tbody>
<tr>
<td>0001 to 0896</td>
<td>0001 to 1216</td>
<td>0001 to 1024</td>
<td>0001 to 1344</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>bbbb = Vert Length</th>
<th>M-8459S</th>
<th>M-8460S</th>
<th>M-8485S</th>
<th>M-8490S</th>
</tr>
</thead>
<tbody>
<tr>
<td>0001 to 1424</td>
<td>0001 to 2136</td>
<td>0001 to 9999</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expanded</td>
<td>0001 to 9999</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| &                  | **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 |

<table>
<thead>
<tr>
<th>*a</th>
<th><strong>Clear Print Job(s) and Memory.</strong> Clears individual memory and buffers.</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>When not included in command, clears print jobs in Multi-Buffer mode.</td>
</tr>
<tr>
<td>a</td>
<td>If included in command, specifies memory section to be cleared</td>
</tr>
<tr>
<td>T</td>
<td>Custom character memory, printer</td>
</tr>
<tr>
<td>&amp;</td>
<td>Form overlay memory, printer</td>
</tr>
<tr>
<td>X</td>
<td>Clears all memory all memory and buffers</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>@,nnnn</th>
<th><strong>Off-Line.</strong> Signals the printer to go off-line after the completion of a print job.</th>
</tr>
</thead>
<tbody>
<tr>
<td>nnnn</td>
<td>Optional message to be displayed on the LCD panel. Maximum of 32 characters.</td>
</tr>
</tbody>
</table>

| 2D3m,a,bb,c d,ee,ff,gg | **QR Code.** Prints QR Code symbols. See command description for parameter definition and usage. | 5-110 |
### 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)

- **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 (1-99), Months (01-99), Days (001-999), Hours (001-999).

- **WTaabbccdde** *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)

### 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

- **BJDcccccdedd ee...e** *Download Bit Mapped TrueType Font Data.* Downloads the bit mapped TrueType font data to the memory area specified.

  - cccc = Memory Offset (hexadecimal) 
  - dddd = Data size in bytes (max = 2000) 
  - ee...e = Font data to be downloaded

- **BJ)** *End TrueType Font Storage.* Ends the bit mapped TrueType font storage process

- **BJFaaaaaaa** *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
## 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

## Expanded Memory Status
Reports the status of the currently active Memory Card to the host by printing a status label.

## 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)
- **ffff** = Number of characters
- **gg...g** = Data to be printed using font

## Memory Area Select
Selects the Memory area for all following Expanded Memory commands.

- **a** = 1 Memory Area 1
- **b** = 2 Memory Area 2

## Recall BMP Graphic
Recalls BMP graphic files stored in Expanded Memory.

## 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 8x8 blocks
- **ccc** = Number of vertical 8x8 blocks
- **ddd** = Graphics storage number (001-999)
- **ee...e** = Data to describe the graphic image

## Recall Custom Graphics
Recalls for printing the graphic image stored by the GI command.

- **ccc** = Storage number (001-999)

## Store BMP Graphics
Stores BMP files in Expanded Memory.

- **aaa** = Storage area number (001 to 999)
- **bbbb** = Size of BMP file in bytes
- **nn...n** = Data

## Store PCX Graphics File
Stores a PCX graphic file.

- **aaa** = Storage number (001-999)
- **bbbb** = Number of bytes in the file to be stored.

## Recall PCX Graphics File
Recalls a PCX graphics file.

- **aaa** = The storage number assigned to the file (001-999)

## 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.
<table>
<thead>
<tr>
<th>INSTRUCTION</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>YS,aaa</td>
<td><strong>Store Format/Field.</strong> To store a field in a format in the memory card.</td>
</tr>
</tbody>
</table>
| /Nbb,cc     | aaa = Format number (001 -999)  
|             | bb = Field number (01-99)  
|             | cc = Number of characters in the field |
| &R,aa       | **Recall Form Overlay.** Recalls a label image previously stored in Expanded Memory. |
|             | aa = Storage number (00 to 99). |
| &S,aa,bbbc,cccc | **Store Form Overlay.** Stores a label image in Expanded Memory. |
|             | aa = Storage number (00 to 99)  
|             | bbb = Horizontal size of window to be stored (50 to Hmax)  
|             | cccc = Vertical size of window to be stored (50 to Vmax) |
| *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 |

5-86

5-87

5-88

5-82
### CONFIGURATION COMMANDS

<table>
<thead>
<tr>
<th>INSTRUCTION</th>
<th>DESCRIPTION</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>I2abcdef</td>
<td><strong>Serial Interface.</strong> 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.</td>
<td>5-124</td>
</tr>
<tr>
<td>IGa</td>
<td><strong>Sensor Type.</strong> Selects the sensor type.</td>
<td>5-123</td>
</tr>
<tr>
<td></td>
<td>a = 0 Reflective (Eye-Mark) sensor.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 Transmissive (See-Thru) sensor</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 Sensor not used</td>
<td></td>
</tr>
<tr>
<td>LD,a,b,c,d,e,f,g,i,jj</td>
<td><strong>Download Protocol Command Codes.</strong> Downloads a user defined set of Alternate Protocol Command Codes. See Appendix E for details on the proper usage of this command.</td>
<td>5-113</td>
</tr>
<tr>
<td>PCaa,bb</td>
<td><strong>Printer Setting.</strong> Sets the default printer configuration in Flash ROM.</td>
<td>5-117</td>
</tr>
<tr>
<td>PCF,a.....z</td>
<td>See Printer Setting command in the Configuration Commands of Section 5: Programming Reference of this manual for details.</td>
<td></td>
</tr>
<tr>
<td>PHa</td>
<td><strong>Print Type.</strong> Selects the thermal printing method.</td>
<td>5-122</td>
</tr>
<tr>
<td></td>
<td>a = 0 Thermal transfer printing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 Direct thermal printing</td>
<td></td>
</tr>
<tr>
<td>PMa</td>
<td><strong>Print Mode.</strong> Selects desired backfeed operation.</td>
<td>5-121</td>
</tr>
<tr>
<td></td>
<td>a = 0 No backfeed, continuous operation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 Tear-Off</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 Cut, backfeed after print</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 Cut, backfeed before print</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 Cut, no backfeed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7 Dispense, backfeed after print</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8 Dispense, backfeed before print</td>
<td></td>
</tr>
<tr>
<td>POabcc</td>
<td><strong>Pitch Offset.</strong> Sets the pitch type, direction and offset to be used</td>
<td>5-113</td>
</tr>
<tr>
<td></td>
<td>a = 0 Cutter</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 Dispense</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 Tear-Off</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 Continuous</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b = + Positive offset</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Negative offset</td>
<td></td>
</tr>
<tr>
<td></td>
<td>cc = 00 to 99, offset value in dots.</td>
<td></td>
</tr>
</tbody>
</table>
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.
Appendix A: Command Quick Reference

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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

<table>
<thead>
<tr>
<th>Printer Model</th>
<th>Narrow/ Wide Ratio</th>
<th>Value of “bb”</th>
<th>“X” Dimension (mils)</th>
<th>Density (char/inch)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M-8490Se</td>
<td>1:3</td>
<td>01</td>
<td>3.3</td>
<td>25.0</td>
</tr>
<tr>
<td></td>
<td>1:3</td>
<td>02</td>
<td>6.7</td>
<td>12.6</td>
</tr>
<tr>
<td></td>
<td>2:5</td>
<td>01</td>
<td>6.7</td>
<td>13.6</td>
</tr>
<tr>
<td></td>
<td>1:2</td>
<td>02</td>
<td>3.3</td>
<td>15.1</td>
</tr>
<tr>
<td>M-8459Se</td>
<td>1:3</td>
<td>01</td>
<td>5.0</td>
<td>16.9</td>
</tr>
<tr>
<td>M-8460Se</td>
<td>1:3</td>
<td>02</td>
<td>10.0</td>
<td>8.5</td>
</tr>
<tr>
<td>M-8485Se</td>
<td>2:5</td>
<td>01</td>
<td>10.0</td>
<td>9.2</td>
</tr>
<tr>
<td></td>
<td>1:2</td>
<td>02</td>
<td>5.0</td>
<td>10.2</td>
</tr>
</tbody>
</table>

Example

<ESC>H0400<ESC>V0025<ESC>B002100A12345B  
<ESC>H0440<ESC>V0135<ESC>X$12345

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>B\(bb\)ccc* (data) *
2:5 ratio:  <ESC>B\(D\)bbccc* (data) *
1:2 ratio:  <ESC>D\(bb\)ccc* (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

<table>
<thead>
<tr>
<th>Printer Model</th>
<th>Narrow/ Wide Ratio</th>
<th>Value of “bb”</th>
<th>“X” Dimension (mils)</th>
<th>Density (char/inch)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M-8490Se</td>
<td>1:3</td>
<td>01</td>
<td>3.3</td>
<td>18.8</td>
</tr>
<tr>
<td></td>
<td>1:3</td>
<td>02</td>
<td>6.7</td>
<td>9.5</td>
</tr>
<tr>
<td></td>
<td>2:5</td>
<td>01</td>
<td>3.3</td>
<td>10.3</td>
</tr>
<tr>
<td></td>
<td>1:2</td>
<td>01</td>
<td>6.7</td>
<td>23.1</td>
</tr>
<tr>
<td></td>
<td>1:2</td>
<td>02</td>
<td>3.3</td>
<td>11.5</td>
</tr>
<tr>
<td>M-8459Se</td>
<td>1:3</td>
<td>01</td>
<td>5.0</td>
<td>12.7</td>
</tr>
<tr>
<td>M-8460Se</td>
<td>1:3</td>
<td>02</td>
<td>10.0</td>
<td>6.4</td>
</tr>
<tr>
<td>M-8465Se</td>
<td>2:5</td>
<td>01</td>
<td>10.0</td>
<td>7.0</td>
</tr>
<tr>
<td></td>
<td>1:2</td>
<td>01</td>
<td>5.0</td>
<td>15.6</td>
</tr>
<tr>
<td></td>
<td>1:2</td>
<td>02</td>
<td>10.0</td>
<td>7.8</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Printer Model</th>
<th>Narrow/Wide Ratio</th>
<th>Value of &quot;bb&quot;</th>
<th>&quot;X&quot; Dimension (mils)</th>
<th>Density (char/inch)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M-8490Se</td>
<td>1:3 01</td>
<td>3.3</td>
<td>33.4</td>
<td></td>
</tr>
<tr>
<td>M-8490Se</td>
<td>1:3 02</td>
<td>6.7</td>
<td>16.7</td>
<td></td>
</tr>
<tr>
<td>M-8490Se</td>
<td>2:5 01</td>
<td>3.3</td>
<td>18.8</td>
<td></td>
</tr>
<tr>
<td>M-8490Se</td>
<td>1:2 01</td>
<td>6.7</td>
<td>21.4</td>
<td></td>
</tr>
<tr>
<td>M-8490Se</td>
<td>1:2 02</td>
<td>3.3</td>
<td>14.3</td>
<td></td>
</tr>
<tr>
<td>M-8459Se</td>
<td>1:3 01</td>
<td>5.0</td>
<td>22.6</td>
<td></td>
</tr>
<tr>
<td>M-8459Se</td>
<td>1:3 02</td>
<td>10.0</td>
<td>11.3</td>
<td></td>
</tr>
<tr>
<td>M-8459Se</td>
<td>2:5 01</td>
<td>10.0</td>
<td>12.7</td>
<td></td>
</tr>
<tr>
<td>M-8459Se</td>
<td>1:2 01</td>
<td>5.0</td>
<td>14.5</td>
<td></td>
</tr>
<tr>
<td>M-8459Se</td>
<td>1:2 02</td>
<td>10.0</td>
<td>9.7</td>
<td></td>
</tr>
</tbody>
</table>

Example

<ESC>H0100<ESC>V0100<ESC>B20310045676567
<ESC>H0140<ESC>V0210<ESC>XM45676567

Notes

To add horizontal guard bars to the top and bottom of the bar code, use the Line and Box command.
### 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

<table>
<thead>
<tr>
<th>Printer Model</th>
<th>Value of “bb”</th>
<th>Narrow Bar Width (mils)</th>
<th>Magnification Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>M-8490Se</td>
<td>02</td>
<td>6.7</td>
<td>Below Minimum</td>
</tr>
<tr>
<td></td>
<td>03</td>
<td>10.0</td>
<td>75%</td>
</tr>
<tr>
<td></td>
<td>04</td>
<td>13.3</td>
<td>100%</td>
</tr>
<tr>
<td>M-8459Se</td>
<td>02</td>
<td>10.0</td>
<td>75%</td>
</tr>
<tr>
<td>M-8460Se</td>
<td>03</td>
<td>15.0</td>
<td>112%</td>
</tr>
<tr>
<td>M-8485Se</td>
<td>04</td>
<td>20.0</td>
<td>150%</td>
</tr>
</tbody>
</table>

### 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
If you wish to encode the UPC-A data “01234567890”, follow these steps to find the correct check digit.

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

\(<\text{ESC}B4\text{bb}c\text{ccc}\) (data)
\(<\text{ESC}D4\text{bb}c\text{ccc}\) (data)

\textbf{bb} = Width of narrow element in dots (01-03)
\textbf{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

<table>
<thead>
<tr>
<th>Printer Model</th>
<th>Value of “bb”</th>
<th>Narrow Bar Width (mils)</th>
<th>Magnification Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>M-8490Se</td>
<td>02</td>
<td>6.7</td>
<td>Below Minimum</td>
</tr>
<tr>
<td></td>
<td>03</td>
<td>10.0</td>
<td>75%</td>
</tr>
<tr>
<td></td>
<td>04</td>
<td>13.3</td>
<td>100%</td>
</tr>
<tr>
<td>M-8459Se</td>
<td>02</td>
<td>10.0</td>
<td>75%</td>
</tr>
<tr>
<td>M-8460Se</td>
<td>03</td>
<td>15.0</td>
<td>112%</td>
</tr>
<tr>
<td>M-8485Se</td>
<td>04</td>
<td>20.0</td>
<td>150%</td>
</tr>
</tbody>
</table>

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

\(<\text{ESC}H0400<\text{ESC}V0375<\text{ESC}>BD4031001234567\)
**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**

\(<ESC>H0100<ESC>V0600<ESC>BD50310012345<ESC>H0300<ESC>V0710<ESC>XS12345\)

![Bar Code Example](image)
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
Appendix B: Bar Code Specifications

# Code 128

## Command Structure

\(<\text{ESC}>BG\text{bb}c\text{ccdd} \text{(data)}\)

- \(\text{bb}\) = Width of narrow element in dots (01-12)
- \(\text{ccc}\) = Bar height in dots (001-600)
- \(\text{dd}\) = Start code to specify initial subset of bar code data
  - \(>\text{G}\) Subset A Start code
  - \(>\text{H}\) Subset B Start code
  - \(>\text{I}\) Subset C Start code

\((\text{data})=\) Includes bar code data and subset Shift codes; Shift codes are used to change the subset type within the bar code data. Shift codes:
  - \(>\text{E}\) Subset A Shift code
  - \(>\text{D}\) Subset B Shift code
  - \(>\text{C}\) Subset C Shift code

## Character Set

See Code 128 Character Table on Page B-18

## Density Table

<table>
<thead>
<tr>
<th>Printer Model</th>
<th>Value of “bb”</th>
<th>“X” Dimension (mils)</th>
<th>Density (char/inch)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Subsets A, B</td>
<td>Subset C</td>
</tr>
<tr>
<td>M-8490Se</td>
<td>01</td>
<td>3.3</td>
<td>27.3</td>
</tr>
<tr>
<td></td>
<td>02</td>
<td>6.7</td>
<td>13.6</td>
</tr>
<tr>
<td></td>
<td>03</td>
<td>10</td>
<td>9.1</td>
</tr>
<tr>
<td>M-8459Se</td>
<td>01</td>
<td>5.0</td>
<td>18.2</td>
</tr>
<tr>
<td>M-8460Se</td>
<td>01</td>
<td>10.0</td>
<td>9.1</td>
</tr>
<tr>
<td>M-8485Se</td>
<td>03</td>
<td>15.0</td>
<td>13.8</td>
</tr>
</tbody>
</table>

## 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”.

\(<\text{ESC}>H0200<\text{ESC}>V0550<\text{ESC}>BG03100>GAB>B789>C123456\)

\(<\text{ESC}>H0310<\text{ESC}>V555<\text{ESC}>XS\text{A}789123456\)
Appendix B: Bar Code Specifications

**MSI**

**Command Structure**
- 1:3 ratio: `<ESC>BAbccc (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
```
Appendix B: Bar Code Specifications

## Code 93

### Command Structure

1:3 ratio:  \(<\text{ESC}>\text{BC}bc\text{c}d\text{dd} \ (\text{data})\)

- **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

<table>
<thead>
<tr>
<th>Printer Model</th>
<th>Narrow/Wide Ratio</th>
<th>Value of “bb”</th>
<th>“X” Dimension (mils)</th>
<th>Density (char/inch)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M-8490Se</td>
<td>1:3</td>
<td>01</td>
<td>3.3</td>
<td>33.3</td>
</tr>
<tr>
<td></td>
<td>1:3</td>
<td>02</td>
<td>6.7</td>
<td>16.7</td>
</tr>
<tr>
<td></td>
<td>1:3</td>
<td>03</td>
<td>10</td>
<td>11.1</td>
</tr>
<tr>
<td>M-8459Se</td>
<td>1:3</td>
<td>01</td>
<td>5.0</td>
<td>22.5</td>
</tr>
<tr>
<td>M-8460Se</td>
<td>1:3</td>
<td>02</td>
<td>10.0</td>
<td>11.3</td>
</tr>
<tr>
<td>M-8485Se</td>
<td>1:3</td>
<td>03</td>
<td>15</td>
<td>7.5</td>
</tr>
</tbody>
</table>

### Example

\(<\text{ESC}>\text{H}0100<\text{ESC}>\text{V}1125<\text{ESC}>\text{BC}03100081234\text{ABCD}\)

\(<\text{ESC}>\text{H}0155<\text{ESC}>\text{V}1240<\text{ESC}>\text{XS}1 \ 234\text{ABCD}\)
UPC-E

Command Structure

\(<\text{ESC}>\text{BE}bbccc\ (\text{data})\)
\(<\text{ESC}>\text{DE}bbccc\ (\text{data})\)

- \(bb\) = Width of narrow element in dots (01-03)
- \(ccc\) = Bar height in dots (001-600)
- \((\text{data})\) = Bar code data (numeric); must be exactly 6 digits

Character Set

0-9 (numeric only)

Density Table

<table>
<thead>
<tr>
<th>Printer Model</th>
<th>Value of “bb”</th>
<th>Narrow Bar Width (mils)</th>
<th>Magnification Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>M-8490Se</td>
<td>02</td>
<td>6.7</td>
<td>Below Minimum</td>
</tr>
<tr>
<td></td>
<td>03</td>
<td>10.0</td>
<td>75%</td>
</tr>
<tr>
<td></td>
<td>04</td>
<td>13.3</td>
<td>100%</td>
</tr>
<tr>
<td>M-8459Se</td>
<td>02</td>
<td>10.0</td>
<td>75%</td>
</tr>
<tr>
<td>M-8460Se</td>
<td>03</td>
<td>15.0</td>
<td>112%</td>
</tr>
<tr>
<td>M-8485Se</td>
<td>04</td>
<td>20.0</td>
<td>150%</td>
</tr>
</tbody>
</table>

Notes

Command \(\text{DE}\) provides guide bars that extend longer than the rest of the bar code.

Example

\(<\text{ESC}>\text{H}0400<\text{ESC}>V0550<\text{ESC}>\text{DE}03100123456\)
\(<\text{ESC}>\text{H}0375<\text{ESC}>V0600<\text{ESC}>\text{OB}0\)
\(<\text{ESC}>\text{H}0408<\text{ESC}>V0655<\text{ESC}>\text{OB}123456\)
Appendix B: Bar Code Specifications

Bookland (UPC/EAN Supplements)

Command Structure: \(<\text{ESC}>\text{BFbbccc (data)}\)

- \(bb\) = Width of narrow element in dots (01-03)
- \(ccc\) = Bar height in dots (001-600)
- \(\text{(data)}\) = Bar code data (numeric); must be exactly 2 or 5 digits

Character Set:

0-9 (numeric only)

Density Table:

<table>
<thead>
<tr>
<th>Printer Model</th>
<th>Value of “bb”</th>
<th>Narrow Bar Width (mils)</th>
<th>Magnification Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>M-8490Se</td>
<td>02</td>
<td>6.7</td>
<td>Below Minimum</td>
</tr>
<tr>
<td></td>
<td>03</td>
<td>10.0</td>
<td>75%</td>
</tr>
<tr>
<td></td>
<td>04</td>
<td>13.3</td>
<td>100%</td>
</tr>
<tr>
<td>M-8459Se</td>
<td>02</td>
<td>10.0</td>
<td>75%</td>
</tr>
<tr>
<td>M-8460Se</td>
<td>03</td>
<td>15.0</td>
<td>112%</td>
</tr>
<tr>
<td>M-8485Se</td>
<td>04</td>
<td>20.0</td>
<td>150%</td>
</tr>
</tbody>
</table>

Example:

\(<\text{ESC}>\text{H0325}<\text{ESC}>\text{VO725}<\text{ESC}>\text{D30315009827721123}\>
\(<\text{ESC}>\text{L0101}<\text{ESC}>\text{H0295}<\text{ESC}>\text{V0800}<\text{ESC}>\text{OB0}\>
\(<\text{ESC}>\text{H0340}<\text{ESC}>\text{V0878}<\text{ESC}>\text{OB98277}\>
\(<\text{ESC}>\text{H0480}<\text{ESC}>\text{V0878}<\text{ESC}>\text{OB21123}\>
\(<\text{ESC}>\text{H0480}<\text{ESC}>\text{V0878}<\text{ESC}>\text{OB21123}\>
\(<\text{ESC}>\text{H0480}<\text{ESC}>\text{V0878}<\text{ESC}>\text{OB21123}\>
\(<\text{ESC}>\text{H0480}<\text{ESC}>\text{V0878}<\text{ESC}>\text{OB21123}\>
\(<\text{ESC}>\text{H640}<\text{ESC}>\text{V0760}<\text{ESC}>\text{BF0313021826}\>
\(<\text{ESC}>\text{H655}<\text{ESC}>\text{V0730}<\text{ESC}>\text{OB21826}\>

Example Code:

\(<\text{ESC}>\text{BF0313021826}\>

Example Image:

![Bar Code Image]

Example Image:

![Bar Code Image]
UCC-128

Command Structure  \textless ESC\textgreater Blbbcccd (data)

\begin{itemize}
  \item bb = Width of the narrow elements in dots (01 to 12)
  \item ccc = Bar height in dots (001 to 600)
  \item d = Placement of human readable text
    \begin{itemize}
      \item 0 None
      \item 1 Text at top of bar code
      \item 2 Text at bottom of bar code
    \end{itemize}
  \item (data) = 17 digits made up of the following:
    \begin{itemize}
      \item 1st digit = Container type
      \item digits 2-8, Shipper identification
      \item digits 9-17, Container Sequential number
    \end{itemize}
\end{itemize}

(data) is 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:

   \begin{itemize}
     \item The spacing between the bar code and the text is fixed at 10 dots (.050 inches).
     \item 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.
     \item If the width of the human readable text is less than the bar code, it will be centered on the bar code.
     \item The automatically generated HRI font is OCR-B.
     \item 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.
   \end{itemize}
Appendix B: Bar Code Specifications

Example

Without incrementing

<ESC>A
<ESC>H0100<ESC>V0100<ESC>Blo415010123456700000001
<ESC>Q2<ESC>Z

With incrementing

<ESC>A
<ESC>H0100<ESC>V0100<ESC>F001+001
<ESC>Blo415010123456700000001
<ESC>Q2<ESC>Z
Appendix B: Bar Code Specifications

Postnet

Command Structure  
<ESC>BP (data)

- data = 5 digits ZIP
- = 6 digits for Postnet 37
- = 9 digits for ZIP+4
- = 11 digits for Delivery 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

[Bar code image]
## Data Matrix

**Command Structure**  
Data Format: `<ESC>`BXaabbccddeeefffghh

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>aa</td>
<td>Format ID. 01-06 or 11-16. The values 07 and 17 will not be accepted by the printer.</td>
</tr>
<tr>
<td>bb</td>
<td>Error correction level. 00, 05, 08, 10, 14, 20 or 200. All other values will be processed as a 00.</td>
</tr>
<tr>
<td>cc</td>
<td>Horizontal cell size. 03 - 12 dots/cell.</td>
</tr>
<tr>
<td>dd</td>
<td>Vertical cell size. 03 - 12 dots/cell.</td>
</tr>
<tr>
<td>eee</td>
<td>Number of cells in one line. Must use 000 to optimize.</td>
</tr>
<tr>
<td>fff</td>
<td>Number of cell lines. Must use 000 to optimize.</td>
</tr>
</tbody>
</table>
| g      | Mirror Image  
0 = Normal Print  
1 = Reverse Print |
| hh     | Guide Cell Thickness. 01-15. 01 indicates normal type. |

**Sequential Numbering**  
Data Format: `<ESC>`FXaaabcccdddeee

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>aaa</td>
<td>Number of duplicate labels to be printed (001 - 999)</td>
</tr>
</tbody>
</table>
| 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**  
Data Format: `<ESC>`DCxxx...x

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>xx...x</td>
<td>Data</td>
</tr>
</tbody>
</table>
Character Set

<table>
<thead>
<tr>
<th>ID NUMBER</th>
<th>CHARACTER SET</th>
<th>ENCODING SCHEME</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Numeric, Space</td>
<td>Base 11</td>
</tr>
<tr>
<td>02</td>
<td>Upper Case Alpha, Space</td>
<td>Base 27</td>
</tr>
<tr>
<td>03</td>
<td>Upper Case Alpha, Space, Comma, Period, Slash, Minus</td>
<td>Base 41</td>
</tr>
<tr>
<td>04</td>
<td>Upper Case Alphanumeric, Space</td>
<td>Base 37</td>
</tr>
<tr>
<td>05</td>
<td>ASCII 7-bit, Full Keyboard (20H - 7FH)</td>
<td>ASCII</td>
</tr>
<tr>
<td>06</td>
<td>ISO 8-bit, International (20H - FFH)</td>
<td>8-Bit</td>
</tr>
</tbody>
</table>

Notes
See AIM USA Technical Specification Data Matrix for information on the structure of this symbology.

Example

<ESC>V0100<ESC>H0100
<ESC>BX0505101000000001
<ESC>DCDATA MATRIX DATA MATRIX
Maxicode

Command Structure  

\(<\text{ESC}>BVa,b,c,ddddddddee,fff,ggg..\text{ESC}>\)

- \(a\) = 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.
- \(c\) = For Mode 2 Structured Carrier Message for Domestic U.S. UPS shipments
  - 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
- \(d\ldots d\) = 9 digit numeric Postal Code
- \(e\) = 3 digit numeric Country Code
- \(f\) = 3 digit numeric Service Class
- \(g\ldots g\) = Data, terminated by \(<\text{ESC}>\)

<table>
<thead>
<tr>
<th>MODE</th>
<th>POSTAL CODE</th>
<th>COUNTRY CODE</th>
<th>SERVICE CLASS</th>
<th>MESSAGE LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>9 digits max</td>
<td>3 digits max</td>
<td>3 digits max</td>
<td>84 characters</td>
</tr>
<tr>
<td></td>
<td>numeric only</td>
<td>numeric only</td>
<td>numeric only</td>
<td>alphanumeric</td>
</tr>
<tr>
<td>3</td>
<td>6 digits fixed</td>
<td>3 digits max</td>
<td>3 digits max</td>
<td>84 characters</td>
</tr>
<tr>
<td></td>
<td>alphanumeric</td>
<td>numeric only</td>
<td>numeric only</td>
<td>alphanumeric</td>
</tr>
<tr>
<td>4</td>
<td>&quot;000000&quot;</td>
<td>&quot;000&quot;</td>
<td>&quot;000&quot;</td>
<td>91 characters</td>
</tr>
<tr>
<td>6</td>
<td>fixed data</td>
<td>fixed data</td>
<td>fixed data</td>
<td>fixed data</td>
</tr>
</tbody>
</table>

Notes  
See AIM I.S.S specification for information on the structure of this symbology.

Example  

\(<\text{ESC}>A<\text{ESC}>V0100<\text{ESC}>H0100<\text{ESC}>BV1,1,2,123456789,840,001[,]<RS>01<GS>961Z01547089<GS>UPSN<GS>056872<GS>349<GS>99999999<GS>001\{005<GS>029<GS>N<GS><GS>LENEXA<GS>KS<RS><EOT><ESC>Q001<ESC>Z\)
PDF417

Command Structure  \(<\text{ESC}>B\text{F}a\text{abc}d\text{ee}f\text{ff}nnn...n\)

\(aa\)  =  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  \(<\text{ESC}>V0100<\text{ESC}>H0100<\text{ESC}>\text{BK0607400000021PDF417 PDF417 PDF417}\)
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”.

<table>
<thead>
<tr>
<th>VALUE</th>
<th>SUBSET A</th>
<th>SUBSET B</th>
<th>SUBSET C</th>
</tr>
</thead>
<tbody>
<tr>
<td>99</td>
<td>Subset C &gt;C</td>
<td>Subset C &gt;C</td>
<td>99</td>
</tr>
<tr>
<td>100</td>
<td>Subset B &gt;D</td>
<td>FNC4 &gt;D</td>
<td>Subset B &gt;D</td>
</tr>
<tr>
<td>101</td>
<td>FNC4 &gt;E</td>
<td>Subset A &gt;E</td>
<td>Subset A &gt;E</td>
</tr>
<tr>
<td>102</td>
<td>FNC1 &gt;F</td>
<td>FNC1 &gt;F</td>
<td>FNC1 &gt;F</td>
</tr>
</tbody>
</table>

- 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

<table>
<thead>
<tr>
<th>VALUE</th>
<th>SUBSET A</th>
<th>SUBSET B</th>
<th>SUBSET C</th>
<th>VALUE</th>
<th>SUBSET A</th>
<th>SUBSET B</th>
<th>SUBSET C</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>SP</td>
<td>SP</td>
<td>00</td>
<td>36</td>
<td>D</td>
<td>D</td>
<td>36</td>
</tr>
<tr>
<td>1</td>
<td>!</td>
<td>!</td>
<td>01</td>
<td>37</td>
<td>E</td>
<td>E</td>
<td>37</td>
</tr>
<tr>
<td>2</td>
<td>&quot;</td>
<td>&quot;</td>
<td>02</td>
<td>38</td>
<td>F</td>
<td>F</td>
<td>38</td>
</tr>
<tr>
<td>3</td>
<td>#</td>
<td>#</td>
<td>03</td>
<td>39</td>
<td>G</td>
<td>G</td>
<td>39</td>
</tr>
<tr>
<td>4</td>
<td>$</td>
<td>$</td>
<td>04</td>
<td>40</td>
<td>H</td>
<td>H</td>
<td>40</td>
</tr>
<tr>
<td>5</td>
<td>%</td>
<td>%</td>
<td>05</td>
<td>41</td>
<td>I</td>
<td>I</td>
<td>41</td>
</tr>
<tr>
<td>6</td>
<td>&amp;</td>
<td>&amp;</td>
<td>06</td>
<td>42</td>
<td>J</td>
<td>J</td>
<td>42</td>
</tr>
<tr>
<td>7</td>
<td>(</td>
<td>)</td>
<td>07</td>
<td>43</td>
<td>K</td>
<td>K</td>
<td>43</td>
</tr>
<tr>
<td>8</td>
<td>(</td>
<td>)</td>
<td>08</td>
<td>44</td>
<td>L</td>
<td>L</td>
<td>44</td>
</tr>
<tr>
<td>9</td>
<td>)</td>
<td>)</td>
<td>09</td>
<td>45</td>
<td>M</td>
<td>M</td>
<td>45</td>
</tr>
<tr>
<td>10</td>
<td>*</td>
<td>*</td>
<td>10</td>
<td>46</td>
<td>N</td>
<td>N</td>
<td>46</td>
</tr>
<tr>
<td>11</td>
<td>+</td>
<td>+</td>
<td>11</td>
<td>47</td>
<td>O</td>
<td>O</td>
<td>47</td>
</tr>
<tr>
<td>12</td>
<td>,</td>
<td>,</td>
<td>12</td>
<td>48</td>
<td>P</td>
<td>P</td>
<td>48</td>
</tr>
<tr>
<td>13</td>
<td>-</td>
<td>-</td>
<td>13</td>
<td>49</td>
<td>Q</td>
<td>Q</td>
<td>49</td>
</tr>
<tr>
<td>14</td>
<td>.</td>
<td>.</td>
<td>14</td>
<td>50</td>
<td>R</td>
<td>R</td>
<td>50</td>
</tr>
<tr>
<td>15</td>
<td>/</td>
<td>/</td>
<td>15</td>
<td>51</td>
<td>S</td>
<td>S</td>
<td>51</td>
</tr>
<tr>
<td>16</td>
<td>0</td>
<td>0</td>
<td>16</td>
<td>52</td>
<td>T</td>
<td>T</td>
<td>52</td>
</tr>
<tr>
<td>17</td>
<td>1</td>
<td>1</td>
<td>17</td>
<td>53</td>
<td>U</td>
<td>U</td>
<td>53</td>
</tr>
<tr>
<td>18</td>
<td>2</td>
<td>2</td>
<td>18</td>
<td>54</td>
<td>V</td>
<td>V</td>
<td>54</td>
</tr>
<tr>
<td>19</td>
<td>3</td>
<td>3</td>
<td>19</td>
<td>55</td>
<td>W</td>
<td>W</td>
<td>55</td>
</tr>
<tr>
<td>20</td>
<td>4</td>
<td>4</td>
<td>20</td>
<td>56</td>
<td>X</td>
<td>X</td>
<td>56</td>
</tr>
<tr>
<td>21</td>
<td>5</td>
<td>5</td>
<td>21</td>
<td>57</td>
<td>Y</td>
<td>Y</td>
<td>57</td>
</tr>
<tr>
<td>22</td>
<td>6</td>
<td>6</td>
<td>22</td>
<td>58</td>
<td>Z</td>
<td>Z</td>
<td>58</td>
</tr>
<tr>
<td>23</td>
<td>7</td>
<td>7</td>
<td>23</td>
<td>59</td>
<td>[</td>
<td>]</td>
<td>59</td>
</tr>
<tr>
<td>24</td>
<td>8</td>
<td>8</td>
<td>24</td>
<td>60</td>
<td>\</td>
<td>\</td>
<td>60</td>
</tr>
<tr>
<td>25</td>
<td>9</td>
<td>9</td>
<td>25</td>
<td>61</td>
<td>}</td>
<td>}</td>
<td>61</td>
</tr>
<tr>
<td>26</td>
<td>:</td>
<td>:</td>
<td>26</td>
<td>62</td>
<td>^</td>
<td>^</td>
<td>62</td>
</tr>
<tr>
<td>27</td>
<td>;</td>
<td>;</td>
<td>27</td>
<td>63</td>
<td>__</td>
<td>__</td>
<td>63</td>
</tr>
<tr>
<td>28</td>
<td>&lt;</td>
<td>&lt;</td>
<td>28</td>
<td>64</td>
<td>NUL&gt;(space)</td>
<td>`(space)</td>
<td>64</td>
</tr>
<tr>
<td>29</td>
<td>=</td>
<td>=</td>
<td>29</td>
<td>65</td>
<td>SOH    &gt;!</td>
<td>a</td>
<td>or      &gt;!</td>
</tr>
<tr>
<td>30</td>
<td>&gt;J</td>
<td>&gt;J</td>
<td>30</td>
<td>66</td>
<td>STX    &gt;&quot;</td>
<td>b</td>
<td>or      &gt;&quot;</td>
</tr>
<tr>
<td>31</td>
<td>?</td>
<td>?</td>
<td>31</td>
<td>67</td>
<td>ETX    &gt;#</td>
<td>c</td>
<td>or      &gt;#</td>
</tr>
<tr>
<td>32</td>
<td>@</td>
<td>@</td>
<td>32</td>
<td>68</td>
<td>EOT    &gt;$</td>
<td>d</td>
<td>or      &gt;$</td>
</tr>
<tr>
<td>33</td>
<td>A</td>
<td>A</td>
<td>33</td>
<td>69</td>
<td>ENQ    &gt;%</td>
<td>e</td>
<td>or      &gt;%</td>
</tr>
<tr>
<td>34</td>
<td>B</td>
<td>B</td>
<td>34</td>
<td>70</td>
<td>ACK    &gt;&amp;</td>
<td>f</td>
<td>or      &gt;&amp;</td>
</tr>
<tr>
<td>35</td>
<td>C</td>
<td>C</td>
<td>35</td>
<td>71</td>
<td>BEL    &gt;'</td>
<td>g</td>
<td>or      &gt;'</td>
</tr>
</tbody>
</table>
## Appendix B: Bar Code Specifications

### Code 128 Character Table (cont’d)

<table>
<thead>
<tr>
<th>VALUE</th>
<th>SUBSET A</th>
<th>SUBSET B</th>
<th>SUBSET C</th>
<th>VALUE</th>
<th>SUBSET A</th>
<th>SUBSET B</th>
<th>SUBSET C</th>
</tr>
</thead>
<tbody>
<tr>
<td>72</td>
<td>BS</td>
<td>&gt;h</td>
<td>&gt;h</td>
<td>72</td>
<td>EM</td>
<td>&gt;g</td>
<td>y</td>
</tr>
<tr>
<td>73</td>
<td>HT</td>
<td>&gt;i</td>
<td>&gt;i</td>
<td>73</td>
<td>SUBB</td>
<td>&gt;z</td>
<td>&gt;z</td>
</tr>
<tr>
<td>74</td>
<td>LF</td>
<td>&gt;j</td>
<td>&gt;j</td>
<td>74</td>
<td>ESC</td>
<td>&gt;l</td>
<td>(</td>
</tr>
<tr>
<td>75</td>
<td>VT</td>
<td>&gt;k</td>
<td>&gt;k</td>
<td>75</td>
<td>FS</td>
<td>&gt;l</td>
<td>(</td>
</tr>
<tr>
<td>76</td>
<td>FF</td>
<td>&gt;l</td>
<td>&gt;l</td>
<td>76</td>
<td>GS</td>
<td>&gt;=</td>
<td>)</td>
</tr>
<tr>
<td>77</td>
<td>CR</td>
<td>&gt;m</td>
<td>&gt;m</td>
<td>77</td>
<td>RS</td>
<td>&gt;&gt;</td>
<td>~</td>
</tr>
<tr>
<td>78</td>
<td>SO</td>
<td>&gt;n</td>
<td>&gt;n</td>
<td>78</td>
<td>US</td>
<td>&gt;?</td>
<td>DEL</td>
</tr>
<tr>
<td>79</td>
<td>SI</td>
<td>&gt;o</td>
<td>&gt;o</td>
<td>79</td>
<td>FNC3</td>
<td>&gt;@</td>
<td>FNC3</td>
</tr>
<tr>
<td>80</td>
<td>DLE</td>
<td>&gt;p</td>
<td>&gt;p</td>
<td>80</td>
<td>FNC2</td>
<td>&gt;A</td>
<td>FNC2</td>
</tr>
<tr>
<td>81</td>
<td>DC1</td>
<td>&gt;q</td>
<td>&gt;q</td>
<td>81</td>
<td>SHIFT</td>
<td>&gt;B</td>
<td>SHIFT</td>
</tr>
<tr>
<td>82</td>
<td>DC2</td>
<td>&gt;r</td>
<td>&gt;r</td>
<td>82</td>
<td>Subset C</td>
<td>&gt;C</td>
<td>Subset C</td>
</tr>
<tr>
<td>83</td>
<td>DC3</td>
<td>&gt;s</td>
<td>&gt;s</td>
<td>83</td>
<td>100</td>
<td>Subset B</td>
<td>&gt;D</td>
</tr>
<tr>
<td>84</td>
<td>DC4</td>
<td>&gt;t</td>
<td>&gt;t</td>
<td>84</td>
<td>101</td>
<td>FNC4</td>
<td>&gt;D</td>
</tr>
<tr>
<td>85</td>
<td>NAK</td>
<td>&gt;u</td>
<td>&gt;u</td>
<td>85</td>
<td>102</td>
<td>FNC1</td>
<td>&gt;F</td>
</tr>
<tr>
<td>86</td>
<td>SYN</td>
<td>&gt;v</td>
<td>&gt;v</td>
<td>86</td>
<td>103</td>
<td>SUBSET A</td>
<td>START CODE</td>
</tr>
<tr>
<td>87</td>
<td>ETB</td>
<td>&gt;w</td>
<td>&gt;w</td>
<td>87</td>
<td>104</td>
<td>SUBSET B</td>
<td>START CODE</td>
</tr>
<tr>
<td>88</td>
<td>CAN</td>
<td>&gt;x</td>
<td>&gt;x</td>
<td>88</td>
<td>105</td>
<td>SUBSET C</td>
<td>START CODE</td>
</tr>
</tbody>
</table>
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

![Grid Example](image-url)
Appendix B: Bar Code Specifications
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

T1H3F

<ESC>

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

K1H903F
K1H903F

<ESC>L0505<ESC>H0150<ESC>V100<ESC>
<ESC>L0505<ESC>H0600<ESC>V100<ESC>

<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

T1B3F

<ESC>

H

C0

H

07

H

C0

H 00H 03H 80H 07H C0H 0FH E0H 1FH F0H 3FH
H C0H 07H C0H 07H C0H 07H C0H 07H C0H

01

H

F8

H

7F

H

FC

H

FF

H

FE

H

07

H

C0

H

07

07

<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 FFH), 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).

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SATO “Se” Print Engines


6. To recall the custom character from memory, send the following code to the printer:

\texttt{\textless ESC\textgreater A}
\texttt{\textless ESC\textgreater L505\textless ESC\textgreater H0150\textless ESC\textgreater V100\textless ESC\textgreater K1B903F}
\texttt{\textless ESC\textgreater L505\textless ESC\textgreater H0600\textless ESC\textgreater V100\textless ESC\textgreater K1B903F}
\texttt{\textless ESC\textgreater L0303\textless ESC\textgreater H0125\textless ESC\textgreater V0250\textless ESC\textgreater XMTHISSIDEUP!}
\texttt{\textless ESC\textgreater Q1}
\texttt{\textless ESC\textgreater 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:
4. Using the hexadecimal data, send the following code to print the graphic image as designed.

\[ \text{<ESC>A<ESC>H0100<ESC>V0100<ESC>GH006006} \]
\[ \text{FFFFFF FFFFFFF FFFFFFF FFFFFFF} \]
\[ \text{C00000 000003 C000FF FFFFFFF C00080 000013} \]
\[ \text{C00080 000013 C0009F FFFFF13 C00080 000013} \]
\[ \text{C00080 000013 C0009F FFFFF13 C00080 000013} \]
\[ \text{C00000 000003 C00000 000003 C00000 000003} \]
\[ \text{C00000 000003 C00000 000003 C00000 000003} \]
\[ \text{C00007 E00003 C0000F F00003 C0000F F00003} \]
\[ \text{C0000F F00003 C0000F F00003 C00007 E00003} \]
\[ \text{C00003 C00003 C00000 000003 C00000 000003} \]
\[ \text{C00000 000003 C00000 000003 C00001 800003} \]
\[ \text{C0003 C00003 C00003 C00003 C00003 C00003} \]
\[ \text{C00003 C00003 C00003 C00003 C00003 C00003} \]
\[ \text{C00003 C00003 C00001 800003 C00000 000003} \]
\[ \text{C00000 000003 FFFFFFF FFFFFFF FFFFFFF} \]
\[ \text{<ESC>Q1<ESC>Z} \]

**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$ (&H00)” which sends the hexadecimal value of “CO” 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 "C:\COM2\9600;N,8,1,CS,DS" FOR OUTPUT AS #1
ES$ = CHR$(27)
PRINT #1,CHR$(2); ES$; "A"; ES$; "V0100"; ES$; "GH006006";
PRINT #1,CHR$(&HFF);CHR$(&HFF);CHR$(&HFF);CHR$(&HFF);CHR$(&HFF);CHR$(&HFF);CHR$(&HFF);CHR$(&HFF);
PRINT #1,CHR$(&HFF);CHR$(&HFF);CHR$(&HFF);CHR$(&HFF);CHR$(&HFF);CHR$(&HFF);CHR$(&HFF);CHR$(&HFF);
PRINT #1,CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);
PRINT #1,CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);
PRINT #1,CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);
PRINT #1,CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);
PRINT #1,CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);
PRINT #1,CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);
PRINT #1,CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);
PRINT #1,CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);
PRINT #1,CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);
PRINT #1,CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);
PRINT #1,CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);
PRINT #1,CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);
PRINT #1,CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);
PRINT #1,CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);
PRINT #1,CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);
PRINT #1,CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);
PRINT #1,CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);
PRINT #1,CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);
PRINT #1,CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);
PRINT #1,CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);
PRINT #1,CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);
PRINT #1,CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);
PRINT #1,CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);
Appendix B: Bar Code Specifications

The printer output for both the hexadecimal and binary format example is:
Appendix C: Custom Characters and Graphics

**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:
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.

<table>
<thead>
<tr>
<th>Type</th>
<th>SRAM or Flash-ROM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicable Specifications</td>
<td>PCMCIA Version 2.1 (JEIDA Version 4.1)</td>
</tr>
<tr>
<td>Size</td>
<td>Up to 4 MB SRAM or 16MB Flash ROM</td>
</tr>
<tr>
<td>Connector Pins</td>
<td>68</td>
</tr>
<tr>
<td>Battery</td>
<td>Two years for SRAM type (approximately)</td>
</tr>
<tr>
<td>Write Protect</td>
<td>Yes</td>
</tr>
<tr>
<td>Low Battery Detect</td>
<td>Yes (SRAM only)</td>
</tr>
</tbody>
</table>

**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.
### 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 changeable Plug-In Interface Modules. The Interface Module is accessible from the Rear Panel and is retained by two screws. Use the following procedure to replace an interface module.

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

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

3. Grasp the **Interface Module** and pull it out of the connector.

4. Place the new **Interface Module** in the slot and press inward firmly until it is properly seated.

5. Replace the two **Interface Card Retaining Screws**.

6. If the new **Interface Module** is for a serial interface, set DSW1 for the proper operation.

7. Connect the interface cable to the connector.
Appendix D: Optional Accessories

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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 occasionally 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.

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>STANDARD SETTING</th>
<th>ALTERNATE SETTING (DEFAULT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>STX</td>
<td>{</td>
</tr>
<tr>
<td>b</td>
<td>ETX</td>
<td>}</td>
</tr>
<tr>
<td>c</td>
<td>ESC</td>
<td>@</td>
</tr>
<tr>
<td>d</td>
<td>ENQ</td>
<td>!</td>
</tr>
<tr>
<td>e</td>
<td>CAN</td>
<td>]</td>
</tr>
<tr>
<td>g</td>
<td>OFFLINE</td>
<td></td>
</tr>
<tr>
<td>h (Auto ONLINE)</td>
<td>No</td>
<td>0 = YES 1 = NO</td>
</tr>
<tr>
<td>i (Zero Slash)</td>
<td>No</td>
<td>0 = YES 1 = NO</td>
</tr>
<tr>
<td>j j (Eurocharacter)</td>
<td>D5</td>
<td>User Defined</td>
</tr>
</tbody>
</table>
Appendix E: Custom Protocol Command Codes

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.
Appendix E: Custom Protocol Command Codes

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.

<table>
<thead>
<tr>
<th>Custom Code Printout Label</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>STX</td>
<td>XX</td>
</tr>
<tr>
<td>ETX</td>
<td>XX</td>
</tr>
<tr>
<td>ESC</td>
<td>XX</td>
</tr>
<tr>
<td>ENQ</td>
<td>XX</td>
</tr>
<tr>
<td>CAN</td>
<td>XX</td>
</tr>
<tr>
<td>NULL</td>
<td>XX</td>
</tr>
<tr>
<td>AUTO ONLINE</td>
<td>YES</td>
</tr>
<tr>
<td>ZERO SLASH</td>
<td>YES</td>
</tr>
</tbody>
</table>
Appendix E: Custom Protocol Command Codes

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