

# CX200

## Desktop Printer



# Programming Guide

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# CX200 PROGRAMMING GUIDE

## INTRODUCTION

---

This section presents the commands that are used with the SATO CX 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
- Printer Configuration
- 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.

The Protocol Control Code set is made up of six special characters. The Standard Protocol Control codes are non-printable characters. They can be changed to printable characters using the Protocol Control code download command. This 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 must be downloaded from the host using the **<ESC>LD** command (see Page 90). Once they are downloaded, the printer will not respond to standard protocol codes. The current protocol codes active in a printer can be determined by printing a Test Label (see CX200 User’s Guide, Page 9).

CONTROL CHARACTER	HEX VALUE	DESCRIPTION
STX	02	Start of Data
ETX	03	End of Data
ESC	1B	Command code to follow
ENQ	05	Not Used on CX200
CAN	18	Not Used on CX200
Off-Line	40	Take printer Off-Line

## USING BASIC

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

1. Set the WIDTH of the output device to 255 characters to avoid automatically sending **<CR>** and **<LF>** characters after every line. The command string should be continuous and uninterrupted by **<CR>** and/or **<LF>** commands. The examples given in this manual are printed on separate lines because they will not fit on one line and do not contain any **<CR>** and/or **<LF>** characters. If these characters are needed, they are explicitly noted by the inclusion of **<CR>** and **<LF>** notations.
2. If you are using the printer’s RS232 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 RS232 communication parameters of the host PC's COM1 port for 9600 baud, Even parity, 8 Data bits, 1 Stop bit and directing the port to ignore the **CTS** and **DSR** control signals.

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

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

#### Printing with the Parallel Port

5	REM Parallel Example	Identifies the program as a parallel port print label. The "REM" prevents this data from being sent to the printer and displays it only on the screen.
10	E\$=CHR\$(27)	Sets the "E\$" string as an <ESC> character
20	WIDTH "LPT1:",255	Sets the width of the output to 255 characters
30	LPRINT E\$;"A";	Sends an "<ESC>A" command code to the LPT1 parallel port
40	LPRINT E\$;"H400";E\$;"V100";E\$;"WL1SATO";	Sends the data "SATO" to be 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 RS232 Port

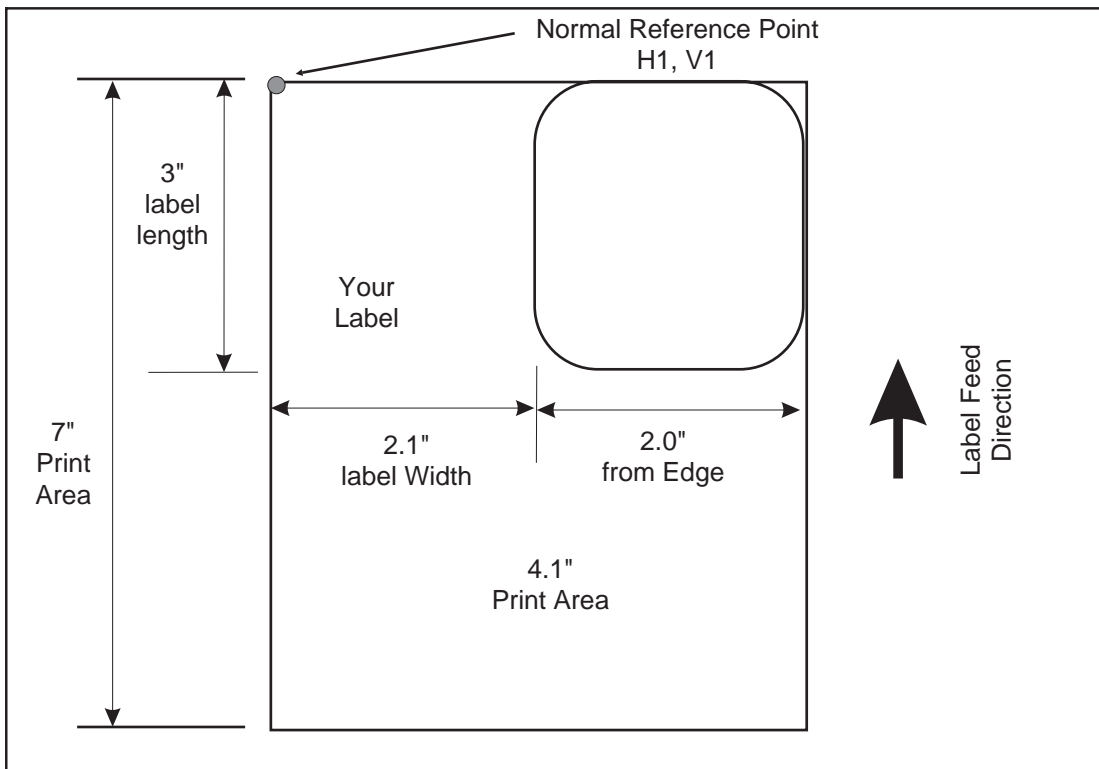
5	REM RS232 Example	Identifies the program as a RS232 port print label. The "REM" prevents this data from being sent to the printer and displays it only on the screen.
10	E\$=CHR\$(27)	Sets the "E\$" string as an <ESC> character.
20	OPEN "COM1:9600,N,8,1,CS,DS" AS #1	Opens the COM1 port for output and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

- 50 PRINT #1, E\$;"H400";E\$;"V100";E\$;"WLOSATO"; Sends the data "SATO" to be placed 400 dots horizontally and 100 dots vertically on the label and printed in the "WL" font.
- 60 PRINT #1, E\$;"Q1"; Instructs the printer to print a quantity of one label.
- 70 PRINT #1, E\$; "Z"; Tells the printer that the last command has been sent. The printer can now create and print the job.
- 80 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 is 7 inches long in the standard mode and 14 inches long if the length is expanded with the Expanded Print Length command. Most of your label applications will fit into this area, 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 diagram below illustrates the print area for 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 left edge of the printer as viewed from the front (label exit) of the printer. The normal reference point is located at the H1, V1 position of the print area in the normal print orientation (no rotation).





The base refernece 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. There are two methods available as follows:

1. Send the 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) from the normal base reference point to the closest edge of the label. If you wanted to move the print area over to the left (as viewed from the front or label exit end of the printer) 2.1 inches:

$$\text{Label Width} = 2.0" \times 25.4 \text{ mm/in} \times 8 \text{ dpmm} = 406 \text{ dots}$$

The new base reference point then becomes:

$$\begin{aligned} \text{New Base Reference Point} &= \text{max print width} - \text{label width} \\ &= 832 \text{ dots} - 406 \text{ dots} = 426 \end{aligned}$$

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

`<ESC>A3H0426V0001`

This resets the reference point for all the following data.

*Note: After the reference point is moved, you can no longer print on the 426 dot "margin" unless the reference point is reset.*

2. 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.

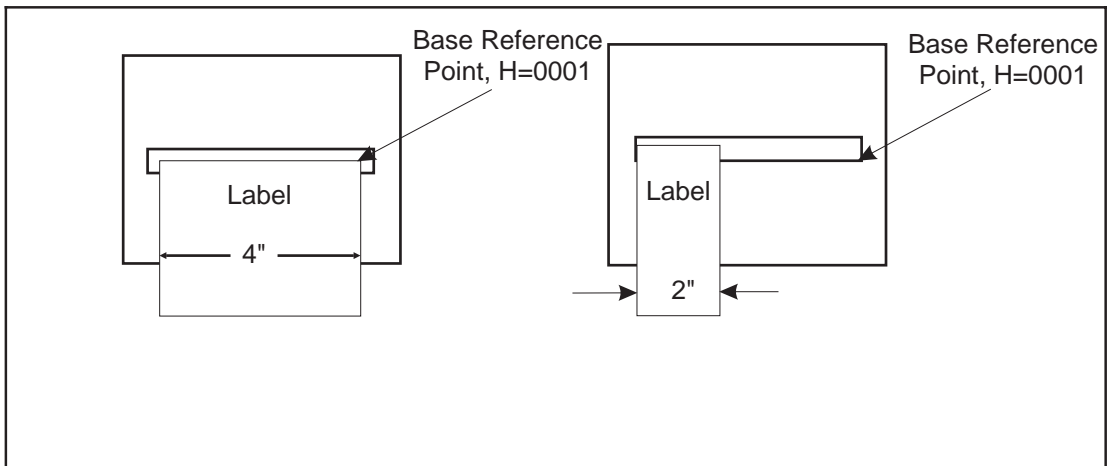
Calculate the distance (in dots) from the normal base reference point to the closest edge of the label.

$$\begin{aligned} \text{Shift Distance} &= 2.1" \times 25.4 \text{ mm/in} \times 8 \text{ dpmm} = 426 \text{ dots} \\ \text{New Base Reference Point} &= 832 \text{ dots} - 426 \text{ dots} = 406 \end{aligned}$$

Each `<ESC>H` command would have the value "406" added to it to correctly position each field.

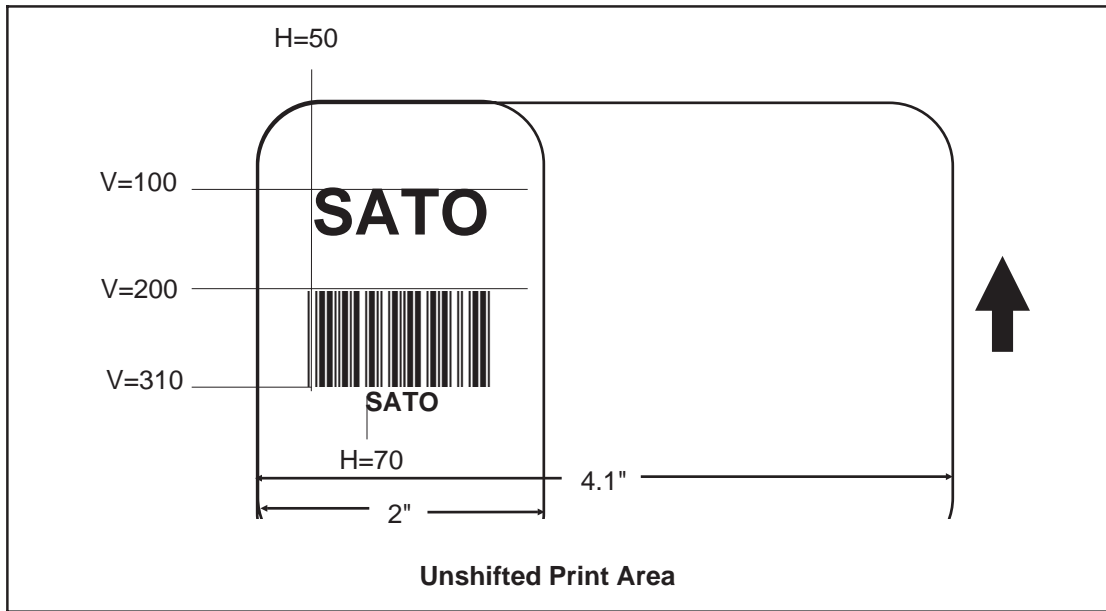
The Command Code subsection contains a sample label output for each command code. These samples reflect how the printed information would appear on a five inch wide label (see illustration). If you want to test any of the sample label outputs and are using labels less than five inches in width, you will 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.



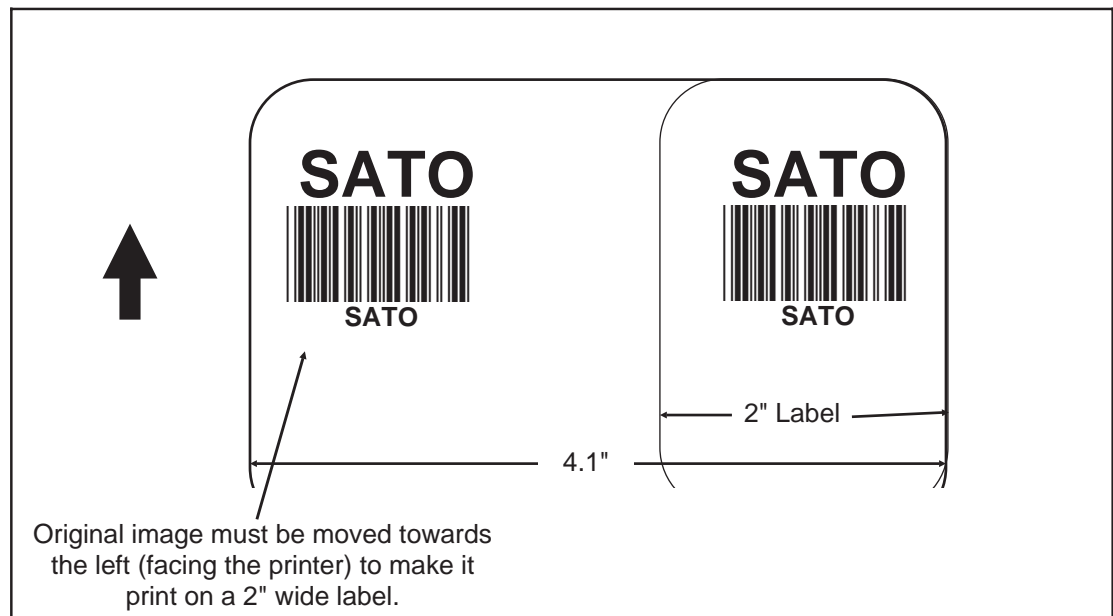
For example, the following illustrates a sample data stream and the resulting label assuming a four inch wide label:

```
<ESC>A
<ESC>H0050<ESC>V0100<ESC>L0303<ESC>MSATO
<ESC>H0050<ESC>V0200<ESC>B103100*SATO*
<ESC>H0070<ESC>V0310<ESC>L0101<ESC>USATO
<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.

```
<ESC>A
<ESC>A3H0406V0001
<ESC>H0050<ESC>V0100<ESC>L0303<ESC>MSATO
<ESC>H0050<ESC>V0200<ESC>B103100*SATO*
<ESC>H0170<ESC>V0310<ESC>L0101<ESC>USATO
<ESC>Q1<ESC>Z
```



The image reference point is set at the left edge (facing the printer) 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. There are two variations of this command.

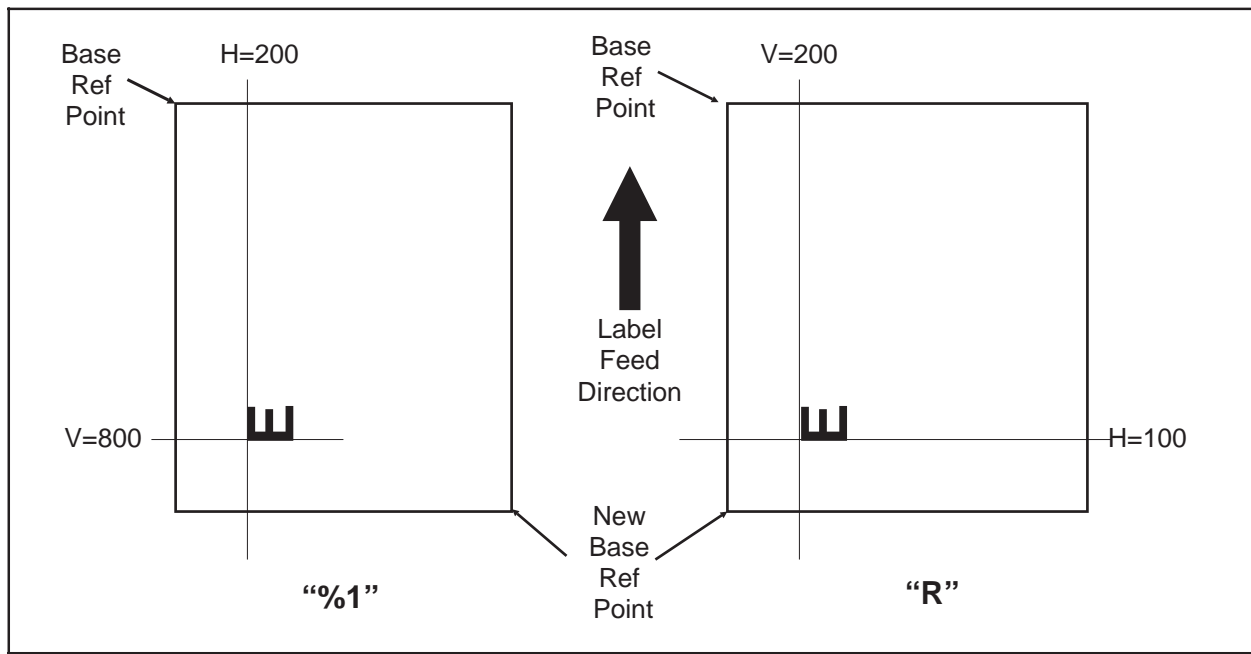
- **<ESC>%** - The field rotates, but the base reference point for the field remains the same.
- **<ESC>R** - The field *and* the base reference point rotate.

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

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

The following data stream will rotate both the field and the base reference point for that field:

```
<ESC>A<ESC>R<ESC>V0200<ESC>H0100<ESC>L0202<ESC>P02<ESC>WB1E<ESC>Q1<ESC>Z
```



**COMMAND DEFAULT SETTINGS**

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

<b>COMMAND</b>	<b>DEFAULT</b>	<b>NOTE</b>
Print Rotation	0°	(1)
Vertical Reference Point	0	(1)
Horizontal Reference Point	0	(1)
Character Pitch	2	(1)
Base Reference Point	H=0, V=0	(2)
Character Expansion	1	(1)
Print Darkness	3	(1)
Print Speed	3 ips	(2)

NOTES:

- (1) The settings for these commands will revert to the default value when the printer receives an <ESC>Z or an <ESC>\*.
- (2) These values transmitted with these commands will remain in effect until a new command is received.

**PRINTER CONFIGURATION**

The CX200 oprinters are different from other SATO models in that they do not use DIP switches for printer configuration. Instead, all printer configuration is done via software commands. The parameters that can be configured are:

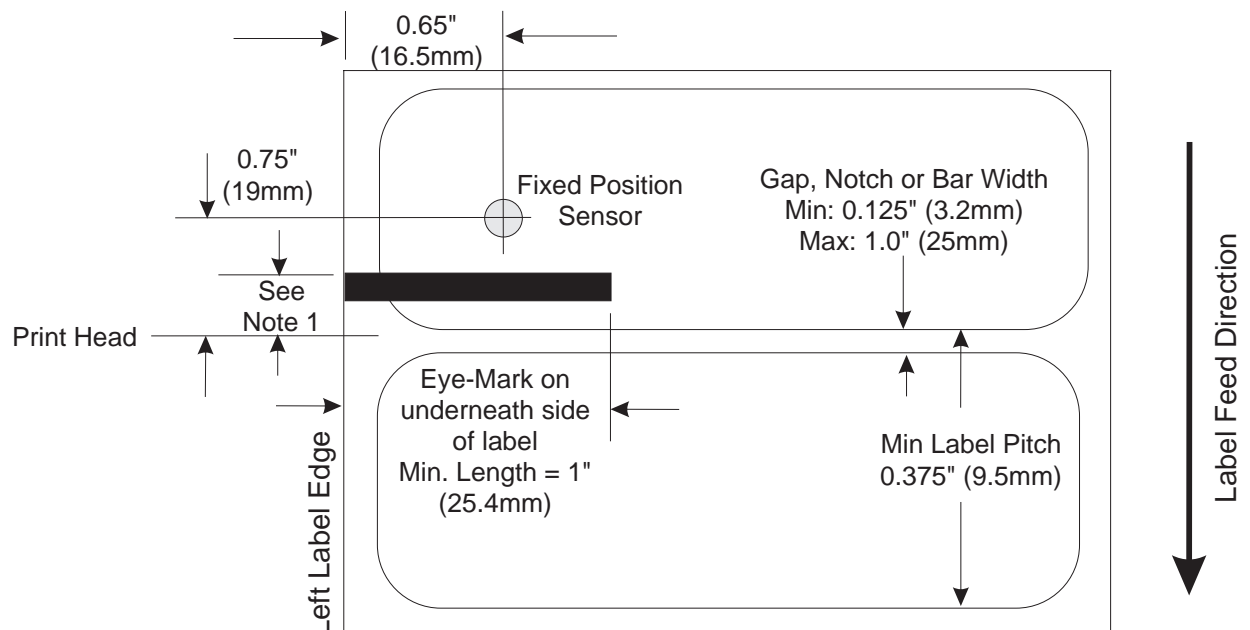
- Sensor Calibration
- Protocol Codes

- Print Darkness Range
- Sensor Type
- RS232 Parameters
- Label Tear-Off Position
- Backfeed Enable/Disable

Because there are no DIP switches to indicate the current printer settings, a Test Label can be printed that lists the active settings in the printer. This Test Label lists all of the information a user needs to ascertain the printer configuration. Test Labels can be printed out by sending a command via software (see Page 93) or by using the FEED and On-Line/Off-Line Indicator buttons on the control panel (see Page 7 of the CX200 User's Guide).

## LABEL SENSING

The CX200 printers can use eye-mark (black bar), gap or notch label sensing. The gap and notch sensor is a transmissive or see-thru type with an infrared light source directed through the label/ribbon combination from above and detected by a separate sensor underneath the label. A reflective sensor is used to detect eye-marks printed on the bottom of the label liner or tag. The eye-mark must not reflect more than 12% of the light. Since the same receiving sensor is used for all three types of sensing, it must be calibrated with the media that will be used. The ribbon must be installed while the calibration is being performed.



*Note 1: The the trailing-edge of the black eye-mark can be positioned anywhere within the 0 to +98mm range of sensor offset adjustment and the first print line (V=000) can be adjusted to the desired position using the <ESC>CB Label Tear-Off command. If the pitch offset is 11mm (the factory setting), placing the eye-mark trailing edge at 8mm will place the first print position at the top edge of the label.*

When calibrating the printer sensors, the gap or eye-mark sensor type must be selected first using the <ESC>CI command (see page 94) and then the Direct Thermal or Thermal Transfer print mode must be specified with an <ESC>CP command (see page 92). These two commands are followed by an <ESC>CA calibrate command (see page 86) to instruct the printer to preform the calibration procedure. The resulting calibration values are stored in the printer and used until the unit is recalibrated. A separate value is stored for direct thermal and thermal transfer modes because the settings will differ significantly because of the inclusion of the ribbon for thermal transfer. For example, the following command stream will calibrate the printer in the thermal transfer mode for gap sensing:

```
<ESC>A<ESC>CP1<ESC>CI2<ESC>CA<ESC>Z
```

## COMMAND CODE PAGE REFERENCE

---

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

The purpose of this section is to:

1. Explain the different commands and provide examples of their usage.
2. To provide a detailed reference for programming.

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

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

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

---

# Bar Codes

---

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

- a    =    Bar Code Symbol
- 0    Codabar
  - 1    Code 39
  - 2    Interleaved 2 of 5 (I 2/5)
  - 3    UPC-A / EAN-13
  - 4    EAN-8
  - A    MSI
  - C    Code 93
  - 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 13 standard bar code symbologies available to be printed and three two dimensional symbols (see Two Dimensional bar code symbols starting on Page 80).

## Input to Printer

```

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

```

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



Printer Output



**UCC-128**

Without Incrementing

```
<ESC>A  
<ESC>H0100<ESC>V0100<ESC>BI07150101234567000000001  
<ESC>Q2<ESC>Z
```



With Incrementing

```
<ESC>A  
<ESC>H0100<ESC>V0100<ESC>F001+001<ESC>BI07150101234567000000001  
<ESC>Q2<ESC>Z
```



**Special Notes**

1. UPC and EAN bar codes are not affected by the different types of narrow to wide ratios. Instead, the <ESC>D command adds descender bars to these codes where needed to meet UPC specifications. The <ESC>BD command puts descender 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 and Code 39 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 symbols are covered separately (see Page 80).
6. For UCC128, the FNC1 code is automatically inserted and the Mod 10 and Mod 103 check digits are automatically calculated.
7. For the MSI bar code, the check digit is not automatically calculated.
8. 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 of the 13 digit string.

---

# Bar Codes, Expansion

---

**Command Structure**    <ESC>**BW**aa**bbb**

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

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

Example:    <ESC>**BW02100**

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

Default:    None

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

**Input to Printer:**    <ESC>A  
                          <ESC>H0050<ESC>V0050<ESC>**BT101030103**  
                          <ESC>BW04100\*1234\*  
                          <ESC>Q1<ESC>Z

**Printer Output:**



- Special Notes**
1. This command must be preceded by the Variable Ratio Bar Codes <ESC>BT command (see Page 17).
  2. The following bar codes will be affected by the Character Pitch command: Codabar, Code 39 and Interleaved 2 of 5.

# Bar Codes, Variable Ratio

**Command Structure**    <ESC>**BT**abbccddee

a    =    Bar Code Symbol:  
          0    Codabar  
          1    Code 39  
          2    Interleaved 2 of 5

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

Example:    <ESC>**BT**101030103

Placement:    Following print position commands and preceding the <ESC>**BW** command.

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 three bar code types shown.

**Input to Printer:**

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

**Printer Output:**



**Special Notes**

1. This command must be immediately followed by the <ESC>BW Bar Code Expansion command (see Page 16).
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.

# Base Reference Point

**Command Structure**    <ESC>**A3H-aaaaVbbbb**

-        =        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 (-0832 to +0832)

bbbb =        Vertical Print Offset (0001 to 1424)

Example:        <ESC>**A3H100V0050**

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

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

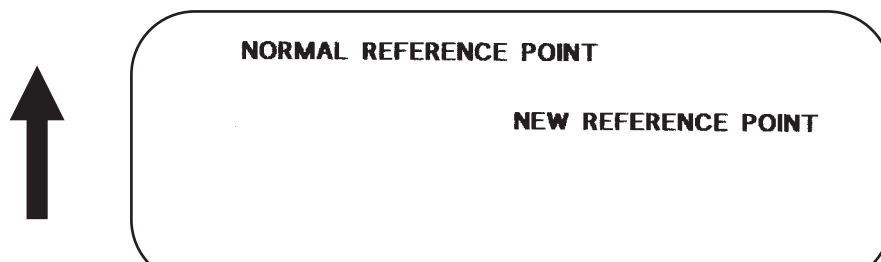
**Command Function**        To establish a new base reference point for the current label. The base reference point is the top left corner or “origin” from where all print position commands are based.

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

**Input to Printer:**

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

**Printer Output:**



**Special Notes**

1. Use of this command will set the Vertical/Horizontal Offset setting of the printer configuration until a new Base Reference Point command is issued.
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 (see Page 53).

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 (Page 4).
5. The CX200 printers 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).



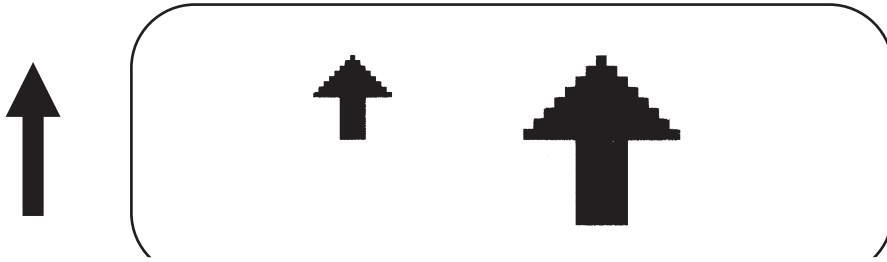
# Characters, Custom-Designed

<b>Command Structure</b>	<p>Store Command: <b>&lt;ESC&gt;Tabcc</b>  Recall Command: <b>&lt;ESC&gt;Kab90cc</b></p> <p>a = 1 16x16 matrix  2 24x24 matrix</p> <p>b = Specifies the character encoding method for the data stream  H Hexadecimal characters  B Binary characters</p> <p>cc = Memory location to store/recall the character. Valid memory locations are 21 to 52 (counting in Hex) or “!” to “R” in Binary</p> <p>(data) = Data to describe the character</p> <p>Example: <b>&lt;ESC&gt;T1H3F</b>  <b>&lt;ESC&gt;K1H903F</b>  See Appendix C for a more detailed explanation</p> <p>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.</p> <p>Default: None</p>
<b>Command Function</b>	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.
<b>Printer Input</b>	See Appendix C for a detailed explanation.

```
<ESC>A
<ESC>T1H3F
0100038007C00FE01FF03FF87FFCFFFE07C007C007C007C007C007C007C0
<ESC>Z
```

```
<ESC>A
<ESC>H150<ESC>V100<ESC>L0505<ESC>K1H903F
<ESC>H350<ESC>V100<ESC>L1010<ESC>K1H903F
<ESC>Q1<ESC>Z
```

## Printer Output



## Special Notes

1. When printing the custom character using the <ESC>K Recall command, the character is affected by the following commands:
  - Character Expansion (see Page 23)
  - Character Pitch (see Page 26)
  - Line Feed (see Page 47)
  - Rotate, Fixed Base Reference Point (see Page 62)
  - Rotate, Moving Base Reference Point (see Page 64)
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>L0304

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

**Printer Output**



**Special Notes**

This command will expand the following fonts:

1. Fonts U, S, M, XU, XS, XM, OA & OB (see Page 34) and fonts WB, WL, XB and XL (see Page 36).
2. This command will also affect the following commands:  
Character Pitch (see Page 26)  
Characters, Custom-Designed (see Page 21)
3. The Character Expansion value is in effect for the current print job until a new expansion command is specified.
4. The Line and Box command, if used within the data stream, may return all subsequent text to the default expansion of 1 x 1. Therefore, either send the Character Expansion command before all printed data, or send Line and Box commands last, preceding the <ESC>Q Quantity command.

# Character, Fixed Spacing

**Command Structure**    <ESC>PR

Example:                See Above

Placement:            Preceding the data

Default:                The default is Proportional Spacing.

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

**Printer Input**

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

**Printer Output**



**Special Notes**

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

---

# Character Pitch

---

**Command Structure**    <ESC>Paa

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

Example:    <ESC>P03

Placement:    Preceding the text to be printed

Default:    <ESC>P02

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

**Input to Printer:**    <ESC>A  
<ESC>A<ESC>H0025<ESC>V0025<ESC>L0202<ESC>XB1SATO  
<ESC>H0025<ESC>V0125<ESC>L0202<ESC>P20<ESC>XB1SATO  
<ESC>H0025<ESC>V0225<ESC>L0202<ESC>P40<ESC>XB1SATO  
<ESC>Q1<ESC>Z

**Printer Output:**



**Special Notes**

1. This command is affected by the <ESC>L Character Expansion command (see Page 23). 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 (see Page 34) and fonts WB, WL, XB and XL (see Page 36)
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 and Code 39 bar codes.

---

# Character, Proportional Spacing

---

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

Example:                See above

Placement:            Preceding the data to be proportional spaced

Default:                <ESC>PS

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

**Printer Input**

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

**Printer Output**



**Special Notes**

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



---

# Clear Print Job(s) & Memory

---

<b>Command Structure</b>	<ESC>*a
	<p>a = Specifies the internal memory section to be cleared</p> <p>T To clear the custom character memory</p> <p>&amp; To clear the form overlay memory</p> <p>X To clear all internal memory</p>
	<p>Example: &lt;ESC&gt;*</p> <p>&lt;ESC&gt;*&amp;</p>
	<p>Placement: This command should be sent to the printer as an independent data stream.</p>
	<p>Default: None</p>
<b>Command Function</b>	To clear individual memory or buffer areas of the printer.
<b>Input to Printer:</b>	<p>&lt;ESC&gt;A</p> <p>&lt;ESC&gt;*</p> <p>&lt;ESC&gt;Z</p>
<b>Printer Output:</b>	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.
<b>Special Note</b>	<ol style="list-style-type: none"> <li>1. It is not necessary to clear the printer's memory between each print job.</li> <li>2. When the "a" parameter is used, the section of memory specified will not be cleared until the label is printed.</li> <li>3. When the "a" parameter is not included, all sections of memory will be cleared (same as &lt;ESC&gt;*X).</li> </ol>

---

# 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 sending the <ESC>C10 command to disable the sensor (See Page 93).

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

# Copy Image Area

**Command Structure**    <ESC>**WDHaaaaVbbbbXccccYdddd**

aaaa =    Horizontal position of the top left corner of the area to be copied  
          0001 to 832  
bbbb =    Vertical position of the top left corner of the area to be copied  
          0001 to 1424  
cccc =    Horizontal length of the image area to be copied  
          0001 to 0832  
dddd =    Vertical length of the image area to be copied  
          0001 to 1424

Example:    <ESC>**WDH0100V0050X0600Y0400**

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

Default:    None

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

**Input to Printer:**    <ESC>A  
                          <ESC>H0050<ESC>V0050<ESC>E010<ESC>XM  
                          SATOSATOSATOSATOSATOSATOSATO  
                          SATOSATOSATOSATOSATOSATOSATO  
                          SATOSATOSATOSATOSATOSATOSATO  
                          SATOSATOSATOSATOSATOSATOSATO  
                          <ESC>H0180<ESC>V0250<ESC>WDH0130V0050X0400Y0200  
                          <ESC>Q1<ESC>Z

**Printer Output:**



**SATOSATOSATOSATOSATOSATOSATO  
SATOSATOSATOSATOSATOSATOSATO  
SATOSATOSATOSATOSATOSATOSATO  
SATOSATOSATOSATOSATOSATOSATO**

**SATOSATOSATOSATOSATO  
SATOSATOSATOSATOSATO  
SATOSATOSATOSATOSATO  
SATOSATOSATOSATOSATO**

**Special Notes**

1. Use the Print Position commands (V and H) to locate the new area for the duplicate image (see Page 53).
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.

---

# CutterCommand

---

<b>Command Structure</b>	<p>&lt;ESC&gt;~aaaa or &lt;ESC&gt;&lt;NUL&gt;aaaa</p> <p>aaaa =     Number of labels to print between each cut (0001 to 9999)</p> <p>Example:     &lt;ES&gt;~0002</p> <p>Placement:   Following the &lt;ESC&gt;Q Print Quantity command</p> <p>Default:     Cut after each label if cutter installed</p>
<b>Command Function</b>	To control the cutting of labels when using a SATO cutter unit with the printer. This command allows the cutting of multi-part tags or labels at a specified interval within a print job.
<b>Input to Printer</b>	<pre>&lt;ESC&gt;A &lt;ESC&gt;H020&lt;ESC&gt;V020&lt;ESC&gt;WB1TEST LABEL &lt;ESC&gt;Q3 &lt;ESC&gt;~002 &lt;ESC&gt;Z</pre>
<b>Printer Output</b>	This set of commands will print 6 labels, with 2 labels between cuts.
<b>Special Notes</b>	<ol style="list-style-type: none"> <li>1. You must have the optional printer Cutter installed to use this function. Contact your SATO representative for more information</li> <li>2. To use this command, you must have the cutter enabled.</li> <li>3. If the cut value is set at aaaa = 0000, the cutter is inactive.</li> <li>4. When using the Cutter command, the total number of labels printed is the product of the cut value times the print quantity. For example, if the cut value is 2 and the print quantity is 20, then 40 (20 sets of 2) labels will be printed.</li> <li>5. Sending a Cutter command to a printer without a cutter installed will enable the Backfeed operation.</li> </ol>

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

**Command Structure**

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

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.

	<b>NON-PROPORTIONAL</b>	<b>PROPORTIONAL<sup>(1)</sup></b>
U	5W x 9H dot matrix	XU 5W x 9H dot matrix
S	8W x 15H dot matrix	XS 17W x 17H dot matrix
M	13W x 20H dot matrix	XM 24W x 24H dot matrix
OA	OCR-A font 15W x 22H	
OB	OCR-B font 20W x 24H	

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

**Input to Printer**

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

**Printer Output**



**Special Notes**

1. Characters may be enlarged through the use of the Character Expansion command (see Page 23).
2. Character spacing may be altered through the use of the Character Pitch command (see Page 26). 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 (Page 21).
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 XA can be printed with fixed spacing using the <ESC>PS Proportional Space command.

# Fonts WB, WL, XB & XL

**Command Structure**      Font WB: <ESC>**WB**a              Font XB: <ESC>**XB**a  
                                  Font WL: <ESC>**WL**a              Font XL: <ESC>**XL**a

a      =      Provided for compatibility with CL Printers.  
                  Can be either a 0 or a 1

Example:      <ESC>**WB1123456**

Placement:      Preceding the data to be printed

Default:      None

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

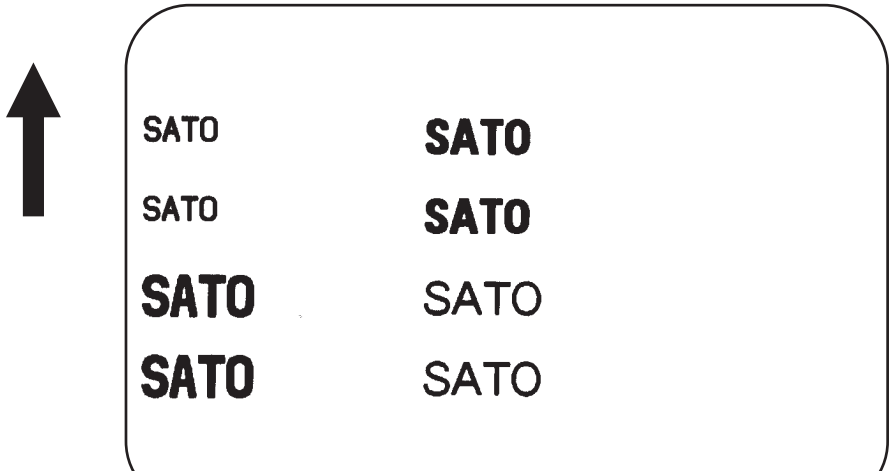
<b>NON-PROPORTIONAL</b>		<b>PROPORTIONAL<sup>(1)</sup></b>	
WB	18W x 30H dot matrix	XB	48W x 48H dot matrix
WL	28W x 52H dot matrix	XL	48W x 48H dot matrix

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

**Input to Printer:**

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

**Printer Output:**





**Special Notes**

1. Characters may be enlarged through the use of the <ESC>L Character Expansion command (see Page 23).
2. Character spacing may be altered through the use of the <ESC>A Character Pitch command (see Page 26).
3. A font must be defined for each field to be printed. There is no default font.
4. 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

---

<b>Command Structure</b>	<ESC>A(space)<ESC>Z
Example:	See above
Placement:	Separate data stream sent to printer
Default:	None
<b>Command Function</b>	To feed a blank tag or label, which is the equivalent of a “form feed”
<b>Input to Printer</b>	<ESC>A(space) <ESC>Z
<b>Printer Output</b>	Blank label or tag

# Form Overlay, Recall

**Command Structure**    <ESC>/

Example:    See above

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

Default:    None

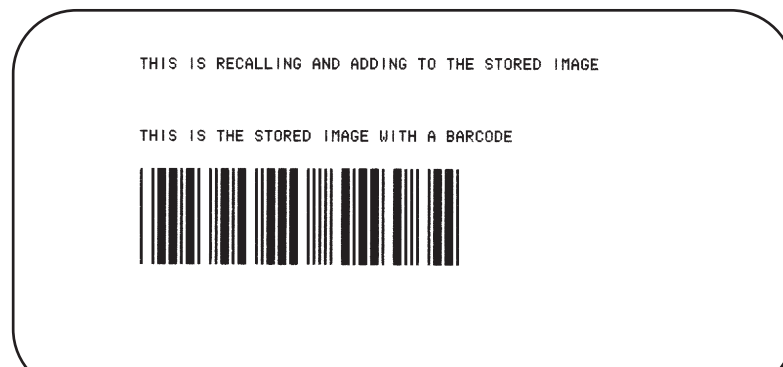
**Command Function**    To recall the label image from the form overlay memory for printing. This command recalls a stored image from the overlay memory. Additional or different data can be printed with the recalled image.

**Input to Printer**

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

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

**Printer Output**



**Special Notes**

1. The overlay is stored using the <ESC>& Form Overlay Store command (see Page 40).
2. The <ESC>AX Expanded Print Length command (see Page 51) cannot be used with Forms Overlay.

---

# Form Overlay, Store

---

<b>Command Structure</b>	<ESC>&
	Example: See above
	Placement: Must be preceded by all other data and placed just before the Stop command (<ESC>Z)
	Default: None
<b>Command Function</b>	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.
<b>Input to Printer</b>	<ESC>A <ESC>H0100<ESC>V0125 <ESC>STHIS IS THE STORED IMAGE WITH A BARCODE <ESC>H0100<ESC>V0165<ESC>B103100*12345* <ESC>& <ESC>Z
<b>Printer Output</b>	There is no output from this command. It stores the label image in the overlay buffer.
<b>Special Notes</b>	<ol style="list-style-type: none"><li>1. Remember that this storage is volatile. Therefore, if the printer loses power, the overlay must be sent again.</li><li>2. The overlay is recalled using the &lt;ESC&gt;/ Form Overlay Recall command (see Page 39).</li><li>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.</li><li>4. The Expanded Print Length &lt;ESC&gt;AX (see Page 51) cannot be used with this command. The maximum length label that can be used with Forms Overlay is 7".</li></ol>

# Graphics, Custom

<b>Command Structure</b>	<b>&lt;ESC&gt;Gabbccc(data)</b>
a	= Specifies format of data stream to follow B Binary format H Hexadecimal format
bbb	= Number of horizontal 8 x 8 blocks 001 to 104
ccc	= Number of vertical 8 x 8 blocks 001 to 178 (001 to 356 for Expanded Length)
(data)=	Hex data to describe the graphic image
Example:	<ESC>GH006006 See Appendix C for a detailed example
Placement:	May be placed anywhere within the data stream after the necessary position commands.
Default:	None

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

## Printer Input

```
<ESC>A
<ESC>H0100<ESC>V0100<ESC>GH006006
FFFFFFFFFFFFFFFFFFFFFFFFC000000000003
C00000000003C000FFFFFFFF3C00080000013
C00080000013C0009FFFFFF13C00080000013
C00080000013C0009FFFFFF13C00080000013
C00080000013C000FFFFFFFF3C00000000003
C00000000003C00000000003C00000000003
C00000000003C00000000003C00003C00003
C00007E00003C0000FF00003C0000FF00003
C0000FF00003C0000FF00003C00007E00003
C00003C00003C00003C00003C00003C00003
C00003C00003C00003C00003C00003C00003
C00003C00003C00001800003C00000000003
C00000000003FFFFFFFFFFFFFFFFFFFFFFFF
<ESC>H0300<ESC>V0100<ESC>XSPLEASE PLACE YOUR DISK
<ESC>H0300<ESC>V0150<ESC>XSIN A SAFE PLACE
<ESC>Q1<ESC>Z
```

## Printer Output



## Special Notes

1. Do not use ASCII <CR> or <LF> characters (carriage return or line feed) as line delimiters within the graphic data or the actual image will not be printed as specified.
2. A custom graphic cannot be enlarged by the <ESC>L Character Expansion command (Page 23).
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. The binary format reduces the transmission time by 50%.

# Graphics, PCX

**Command Structure**    <ESC>**GP**aaaaa,(data)

aaaaa    =    Number of bytes to be downloaded

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

Placement:    Anywhere within the job data stream

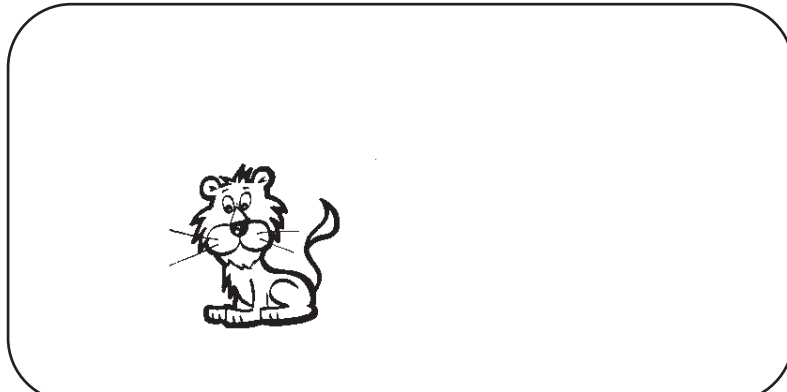
Default:    None

**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 image created by this command cannot be rotated.
4. The file size specified by this command is the DOS file size in bytes.

---

# 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 S 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

---

<b>Command Structure</b>	Line	<code>&lt;ESC&gt;FWaabcccc</code>
	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:	<code>&lt;ESC&gt;FWaabbVccccHdddd</code>
	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 (0001 to 1424)
	dddd	= Length of horizontal side in dots (0001 to 0832)
	Example:	<code>&lt;ESC&gt;FW02H0200</code>
	Placement:	Following the necessary positioning commands
	Default:	None
<b>Command Function</b>	To print horizontal lines, vertical lines, and boxes as images on the label.	
<b>Input to Printer</b>	<code>&lt;ESC&gt;A</code> <code>&lt;ESC&gt;H0100&lt;ESC&gt;V0100&lt;ESC&gt;FW20H0200</code> <code>&lt;ESC&gt;H0320&lt;ESC&gt;V0100&lt;ESC&gt;FW20V0200</code> <code>&lt;ESC&gt;H0350&lt;ESC&gt;V0100&lt;ESC&gt;FW1010H0200V0200</code> <code>&lt;ESC&gt;Q1&lt;ESC&gt;Z</code>	

**Printer Output**



**Special Notes**

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

# Line Feed

## Command Structure

`<ESC>Eaaa`

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

Example: `<ESC>E010`

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

Default: None

## Command Function

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

## Input to Printer

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

## Printer Output



```
THIS IS THE 1ST LINE
THIS IS THE 2ND LINE
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 `<ESC>Q` Quantity command.
3. This command is invalid only if the value specified is zero.
4. Following this command with a `<CR>` character will allow you to print with auto line feed. The print position will be determined from the value specified and the H value set in the printer. If you specify several H values after this command, the print position will be determined by the H value last specified. You must redefine the font to be used after each H command.

---

# Off-Line/Pause

---

<b>Command Structure</b>	<ESC>@  Example: See above  Placement: Anywhere in the print job between the <ESC>A and <ESC>Z  Default: None
<b>Command Function</b>	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.
<b>Input to Printer</b>	<ESC>A <ESC>@...Job... <ESC>Z
<b>Printer Output</b>	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.
<b>Special Notes</b>	<ol style="list-style-type: none"><li>1. You must press the READY indicator key on the front panel to return the printer to an On-Line status .</li><li>2. Remember, when using this command, that the print job specifies &lt;ESC&gt;Q10, all ten labels will print before the printer goes off-line.</li><li>3. This command will clear the print buffer.</li></ol>

# Postnet

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

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

Example:        <ESC>**BP123456789**

Placement:    Immediately preceding the data to be encoded

Default:        None

**Command Function**    To print Postnet bar codes

**Printer Input**

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

**Printer Output**



**Special Notes**

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

---

# Print Darkness

---

**Command Structure**    <ESC>#Ea

a    =    Print darkness value  
a = 1, 2, 3, 4 or 5

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 setting. 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 lightest setting is the smallest value and the darkest setting is the largest value.
3. This command adjusts the print darkness in discrete steps. The range of this command is set using the <ESC>CD Print Darkness Fine Adjustment command (Page 90). Changing the Print Darkness Fine Adjustment setting will affect this command.

# Print Length, Expanded

**Command Structure**    <ESC>AX Sets the print length to 14" (356 mm)  
                                  <ESC>AR Resets the maximum print length to 7" (178 mm)

Example:            See above

Placement:        Must follow the Start Code command (see Page 68)  
                                  and be in it's own separate data stream.

Default:            <ESC>AR

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

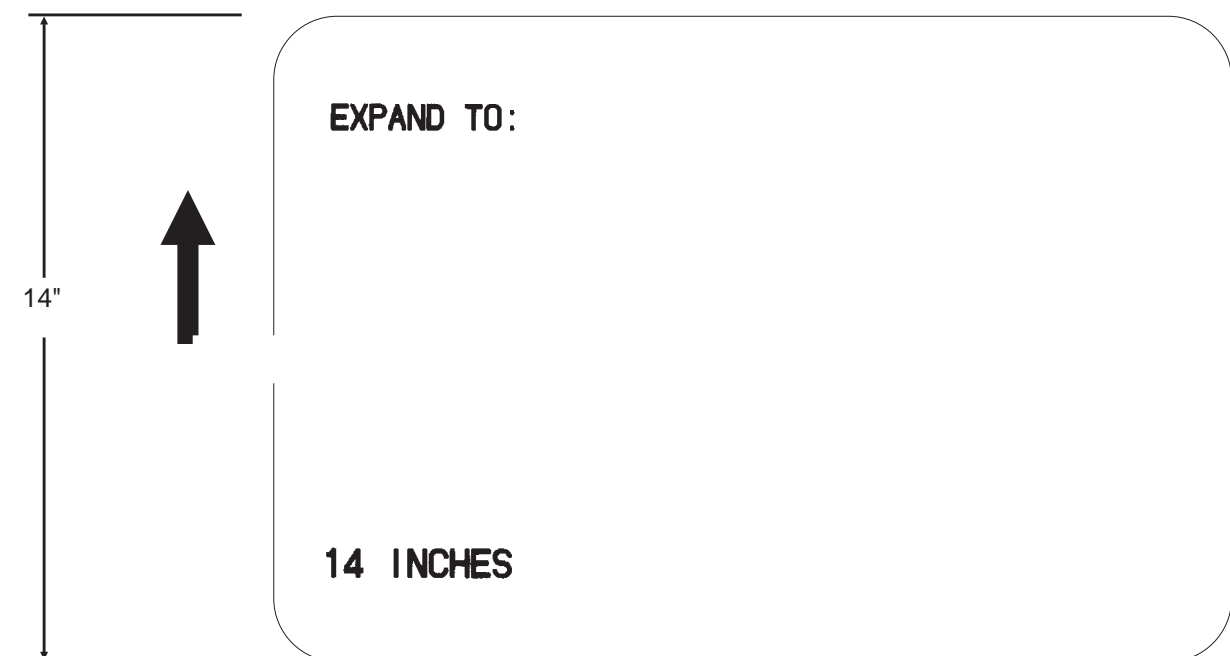
**Input to Printer:**

```
<ESC>A
<ESC>AX
<ESC>Z

<ESC>A
<ESC>H0050<ESC>V0100<ESC>WB1EXPAND TO:
<ESC>H0050<ESC>V2700<ESC>WB114 INCHES
<ESC>Q1<ESC>Z

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

**Printer Output:**



**Special Notes**

1. AX 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:
3. This command is cannot be used with the <ESC>& Store Form Overlay command (see Page 40).



# Print Position

<b>Command Structure</b>	Horizontal Position:	<code>&lt;ESC&gt;Haaaa</code>
	Vertical Position:	<code>&lt;ESC&gt;Vbbbb</code>
	aaaa =	Number of dots horizontally from the base reference point 0001 to 0832.
	bbbb =	Number of dots vertically from the base reference point 0001 to 1424 (0001 to 2848 with Expanded Print Length).
	Example:	<code>&lt;ESC&gt;H0020&lt;ESC&gt;V0150</code>
	Placement:	Preceding any printed field description of lines/boxes, fonts, bar codes or graphics.
	Default:	<code>&lt;ESC&gt;H0001</code> <code>&lt;ESC&gt;V0001</code>

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

**Input to Printer**

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

**Printer Output**



## Special Notes

1. The print position of a field is affected by both the Rotate (`<ESC>R` and `<ESC>A3`) commands.

2. If any part of an image is placed past the maximum number of dots for standard length.
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

---

<b>Command Structure</b>	<p>&lt;ESC&gt;Qaaaaaa</p> <p>aaaaaa = Total number of labels to print (1 to 65535)</p> <p>Example: &lt;ESC&gt;Q500</p> <p>Placement: Just preceding &lt;ESC&gt;Z, unless &lt;ESC&gt;~ Cutter command exists, then preceding that. This command must be present in every print job.</p> <p>Default: None</p>
<b>Command Function</b>	To specify the total number of labels to print for a given print job.
<b>Input to Printer</b>	<pre>&lt;ESC&gt;A &lt;ESC&gt;H0100&lt;ESC&gt;V0100&lt;ESC&gt;WB1SATO &lt;ESC&gt;Q3 &lt;ESC&gt;Z</pre>
<b>Printer Output</b>	Three labels containing the data "SATO" will be printed.
<b>Special Notes</b>	<ol style="list-style-type: none"> <li>1. To cancel a print job, you must turn off the printer.</li> <li>3. When used with the &lt;ESC&gt;F Sequential Numbering command (see Page 66, the Print Quantity value should be equal to the total number of labels to be printed.</li> <li>4. If you do not specify a Print Quantity, the printer will not print a label.</li> <li>5. For this command, leading zeroes do not have to be entered. The command Q1 is equivalent to Q000001.</li> </ol>

---

# Print Speed

---

**Command Structure**    <ESC>**CSa**

a    =    Designates the speed selection  
2    =    2 ips (50 mm/s)  
3    =    3 ips (75 mm/s)

Example:    <ESC>**CS3**

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

**Input to Printer**    <ESC>A  
                          <ESC>**CS3**  
                          <ESC>Z

**Printer Output**    There is no printer output for this command. It sets the print speed of the printer to 3 inches per second..

**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 the power.

---

# Repeat Label

---

<b>Command Structure</b>	<ESC>C
Example:	See above
Placement:	Must be placed immediately after <ESC>A and immediately before <ESC>Z in its own separate data stream
Default:	None
<b>Command Function</b>	To print duplicate of the last label printed
<b>Input to Printer</b>	<ESC>A <ESC>C <ESC>Z
<b>Printer Output</b>	A duplicate of the previous label will be printed.
<b>Special Notes</b>	1. This command will have no effect if the power to the printer was cycled off and back on since printing the previous label.

---

# Replace Data (Partial Edit)

---

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

Example:            See above

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

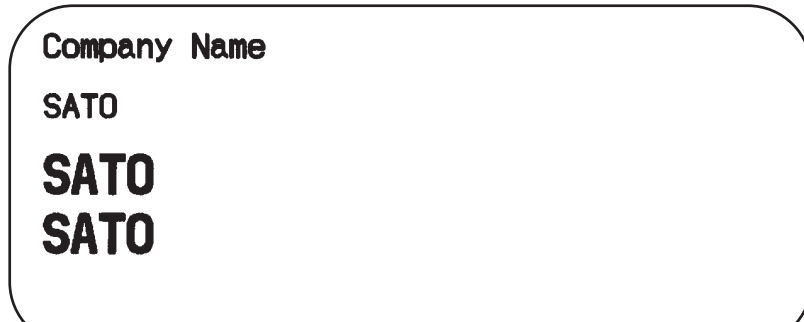
Default:            None

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

**Input to Printer**

```
<ESC>A  
<ESC>H0025<ESC>V0020<ESC>WB0Company Name  
<ESC>H0025<ESC>V0085<ESC>WB1SATO  
<ESC>H0025<ESC>V0150<ESC>WL0SATO  
<ESC>H0025<ESC>V0215<ESC>WL1SATO  
<ESC>Q1<ESC>Z  
  
<ESC>A  
<ESC>0<ESC>H0025<ESC>V0020<ESC>WB0SATO  
<ESC>Q1<ESC>Z
```

**Printer Output**



**Special Notes**

1. Specify the exact same parameters for the image to be replaced as were specified in the original data stream, including rotation, expansion, pitch, etc. This will ensure that the new data will exactly replace the old image. If the replacement data contains fewer characters than the old data, then the characters not replaced will still be printed.
2. This command will not function if the power has been cycled off and back on since the last label was printed.
3. Proportional Pitch text cannot be used with this command.

---

# Reverse Image

---

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

- a    =    Horizontal length in dots of reverse image area  
          0000 to 0832
- b    =    Vertical height in dots of reverse image area.  
          0000 to 1424

Example:    <ESC>(100,50

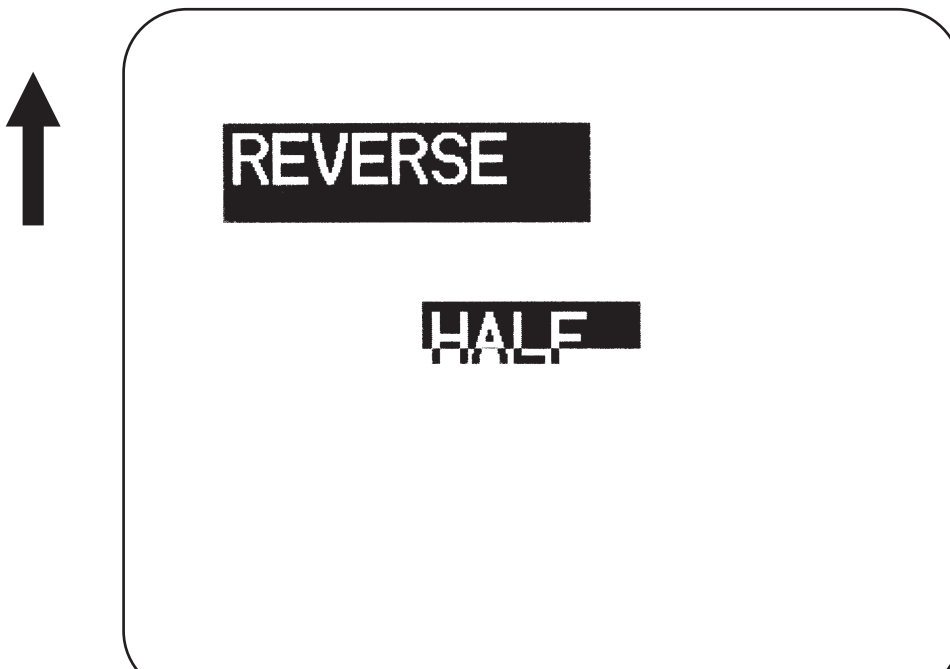
Placement:    This command must be preceded by all other data and be placed just before <ESC>Q

Default:    None

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

**Input to Printer**    <ESC>A  
<ESC>H0050<ESC>V0120<ESC>L0202<ESC>WB1REVERSE  
<ESC>H0250<ESC>V0300<ESC>L0202<ESC>WB1HALF  
<ESC>H0040<ESC>V0110<ESC>(370,100  
<ESC>H0240<ESC>V0290<ESC>(220,47  
<ESC>Q1<ESC>Z

**Printer Output**





**Special Notes**

1. A reverse image area is affected by the rotate commands. Therefore, always assume the printer is in the normal print orientation when designing and sending the Reverse Image command.
2. If using reverse images with the form overlay, place this command before the Form Overlay command in the data stream.
3. If the Rotate commands are used with this command, the V and H parameters are reversed.
4. If the height and width to be reversed contain other than alphanumeric data, the area is not printed.
5. If the values specified exceed the maximum ranges, the reverse image is not created.

# Rotate, Fixed Base Reference Point

**Command Structure**    <ESC>%a

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

Example:    <ESC>%3

Placement:    Preceding any printed data to be rotated

Default:    <ESC>%0

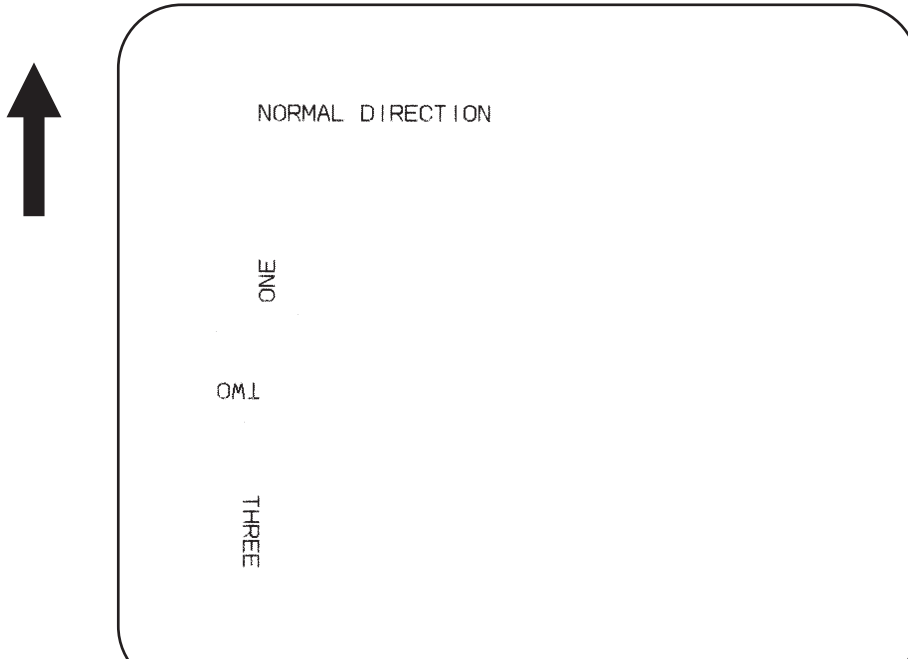
**Command Function**    To rotate the print direction in 90° increments without changing the location of the base reference point. The diagram below illustrates the use of the <ESC>% Rotate command. Note that the entire print area is shown, but your label will probably not be as large as the entire area.

**Input to Printer**

```

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

**Printer Output**



**Special Notes**

1. Do not combine this command and the <ESC>R Rotate command (see Page 64) in the same data stream.
2. The specified values are valid until another Rotate (<ESC>%) command is received.
3. Receipt of a Stop Print (<ESC>Z) command will reset the setting to the default value.

# Rotate, Moving Base Reference Point

**Command Structure**

Normal Direction: <ESC>N  
 Rotated Direction: <ESC>R

Example: See above

Placement: Preceding any printed data to be rotated

Default: <ESC>N

**Command Function**

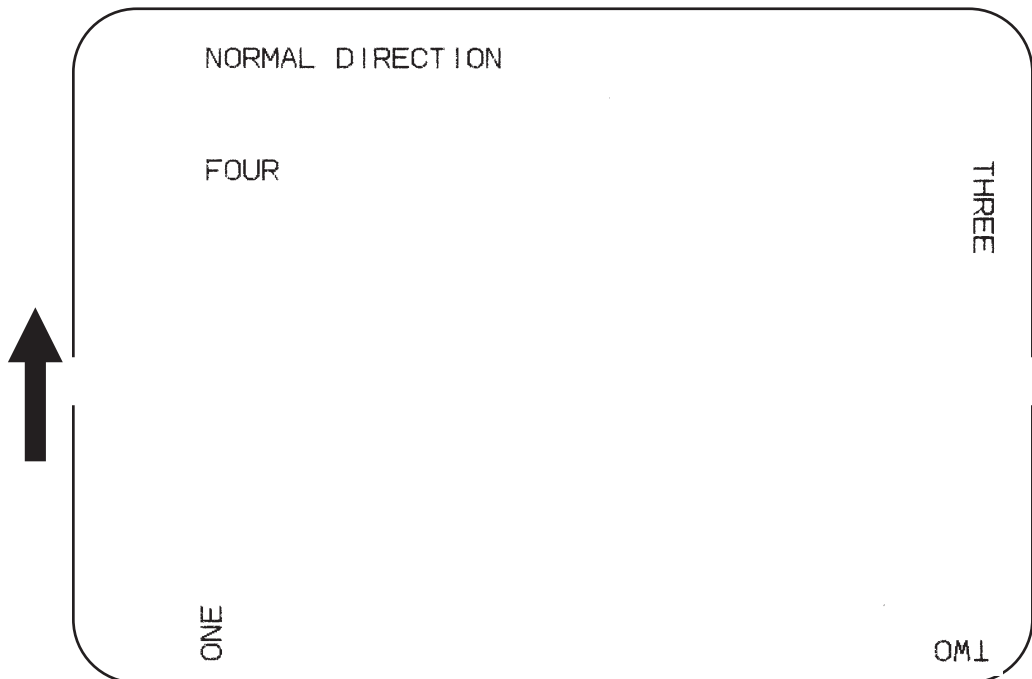
The <ESC>R command rotates the printing of all subsequent images in a print job by 90° counterclockwise each time it is used. It also moves the base reference point to a different corner of the print area.

The <ESC>N command returns to the original base reference point and returns printing to the normal orientation.

**Input to Printer**

```
<ESC>A
<ESC>N<ESC>L202<ESC>H0100<ESC>V0010<ESC>MNORMAL DIRECTION
<ESC>R<ESC>H0100<ESC>V0100<ESC>MONE
<ESC>R<ESC>H0100<ESC>V0100<ESC>MTWO
<ESC>R<ESC>H0100<ESC>V0100<ESC>MTHREE
<ESC>R<ESC>H0100<ESC>V0100<ESC>MFOUR
<ESC>Q1<ESC>Z
```

**Printer Output**



**Special Notes**

1. This command is provided for compatibility with other SATO printers. It is not recommended for new label designs and the <ESC>% rotate command should be used.
2. Do not combine this command and the <ESC>% rotate command (see Page 62) in the same data stream.
3. A custom graphic is not affected by this command. Therefore, always design and locate your graphic image to print in the appropriate orientation.
4. See Rotated Fields, Page 7, for more information.
5. The specified values are valid until another Rotate (<ESC>R) command is received.
6. Receipt of a Stop Print (<ESC>Z) command will reset the setting to the default value.

# Sequential Numbering

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

- 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.

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

Decrementing

004321321

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.

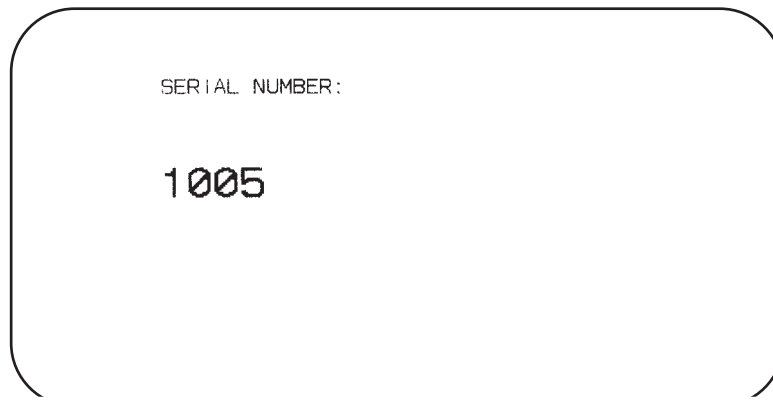
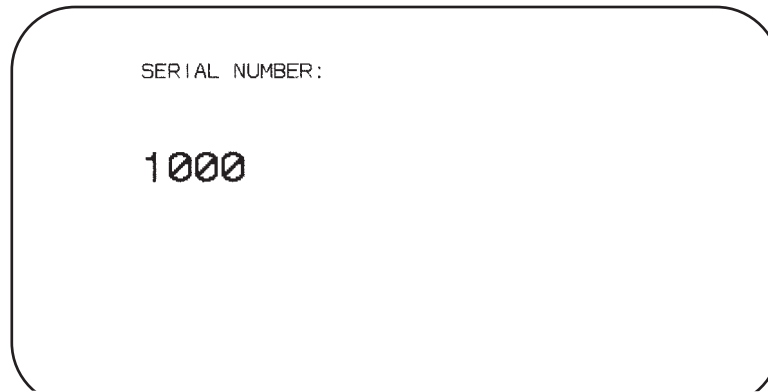
**Default:**        None

**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**

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

## Printer Output



## Special Notes

1. The value specified for Print Quantity (see Page 55) should be equal to the number of different sequential values desired multiplied by the number of repeats specified.

## Example:

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

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

2. It is necessary to specify the print position for each sequential field on a label.
3. Up to eight different sequential fields can be specified per label.
4. This command ignores alpha characters in the sequential number field.
5. This command can not be used with the following commands:
  - Copy Image, Page 31
  - Reverse Image, Page 60
  - Line Feed, Page 47

---

# Start/Stop Label

---

<b>Command Structure</b>	Start Command: <ESC>A Stop Command: <ESC>Z  Example: See above  Placement: <ESC>A must precede data <ESC>Z must follow data  Default: None
<b>Command Function</b>	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.
<b>Input to Printer</b>	<ESC>A <ESC>H0001<ESC>V0100<ESC>WB1SATO <ESC>H0130<ESC>V0200<ESC>B103150*SATO* <ESC>H0170<ESC>V0360<ESC>L0202<ESC>S*SATO* <ESC>Q1<ESC>Z
<b>Printer Output</b>	There is not 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.



## Expanded Memory Option Commands

---

These commands require the Expanded Memory Option.

The first 2MB of Expanded Memory installed is designated as memory area CC1.  
If 4MB of Expanded Memory is installed, second 2MB (i.e. the area above the first 2 MB) is designated as memory area CC2.

---

# Expanded Memory Function Fonts, TrueType Recall

---

**Command Structure**    <ESC>BJRabbccddeeeff...f

- a    =    Font ID (0 thru 9)
- bb   =    Horizontal Expansion (01 thru 12)
- cc   =    Vertical Expansion (01 thru 12)
- dd   =    Character Pitch (01 thru 99)
- eeee =    Number of characters to be printed using the font
- fff =    Data to be printed

**Example:**    <ESC>BJR1020201000004SATO

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

**Default:**        None

**Command Function**    This command recalls previously stored TrueType fonts from Expanded Memory.

**Printer Input**         <ESC>A  
<ESC>V0100<ESC>H0100<ESC>CC1<ESC>BJR1020201000004SATO  
<ESC>Q1<ESC>Z

**Printer Output**



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

---

# Expanded Memory Function Fonts, TrueType Store

---

The conversion from a TrueType font to a format that can be downloaded to the printer is very complex and requires the use of a TrueType Download utility program. See your SATO representative for details. This process requires the Expanded Memory option.

# Expanded Memory Function Graphics, Custom Recall

**Command Structure**    <ESC>GRaaa

aaa =     Graphics storage number (001-999)

Example:    <ESC>**GR111**

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

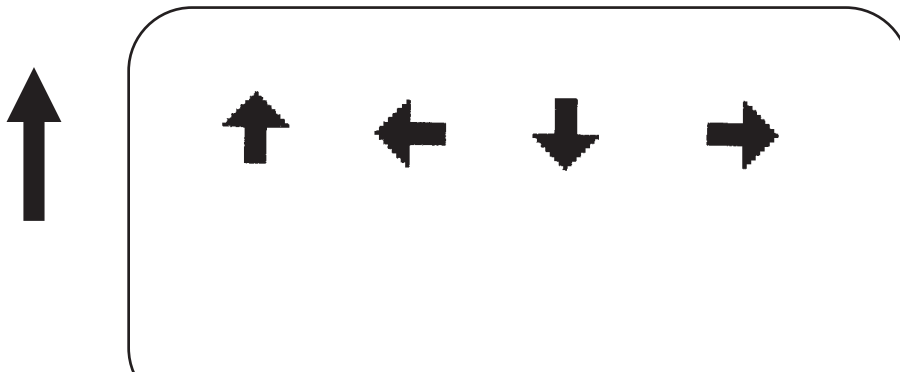
Default:     None

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

**Printer Input**

<p>Non Rotated Graphic                  &lt;ESC&gt;A&lt;ESC&gt;CC1                  &lt;ESC&gt;V0100&lt;ESC&gt;H0080&lt;ESC&gt;L0505                  &lt;ESC&gt;<b>GR001</b>                  &lt;ESC&gt;Q1&lt;ESC&gt;Z</p>	<p>Graphic Rotated 90°                  &lt;ESC&gt;A&lt;ESC&gt;CC1&lt;ESC&gt;%1                  &lt;ESC&gt;V0180&lt;ESC&gt;H0250&lt;ESC&gt;L0505                  &lt;ESC&gt;<b>GR001</b>                  &lt;ESC&gt;Q1&lt;ESC&gt;Z</p>
<p>Graphic Rotated 180°                  &lt;ESC&gt;A&lt;ESC&gt;CC1&lt;ESC&gt;%2                  &lt;ESC&gt;V0180&lt;ESC&gt;H0500&lt;ESC&gt;L0505                  &lt;ESC&gt;<b>GR001</b>                  &lt;ESC&gt;Q1&lt;ESC&gt;Z</p>	<p>Graphic Rotated 270°                  &lt;ESC&gt;A&lt;ESC&gt;CC1&lt;ESC&gt;%3                  &lt;ESC&gt;V0100&lt;ESC&gt;H0700&lt;ESC&gt;L0505                  &lt;ESC&gt;<b>GR001</b>                  &lt;ESC&gt;Q1&lt;ESC&gt;Z</p>

**Printer Output**



**Special Notes**

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



Example of correct data stream:

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

Example of incorrect data stream:

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

5. Do not use ASCII <CR> or <LF> characters (carriage return or line feed) as line delimiters within the graphic data or the actual image will not be printed as specified.
6. The graphics storage number (ddd) must be specified with this command.

# Expanded Memory Function

## Graphics, PCX Recall

**Command Structure**    <ESC>PYaaa

aa    =    Storage area number (001 thru 099)

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>H0001<ESC>PY001  
<ESC>Q1<ESC>Z

Rotate Base Reference Point  
<ESC>A<ESC>CC1<ESC>%1

<ESC>V0330<ESC>H0110<ESC>PY001  
<ESC>Q1<ESC>Z

2nd Rotation, Base Reference Point  
<ESC>A<ESC>CC1<ESC>%2

<ESC>V0330<ESC>H0550<ESC>PY001  
<ESC>Q1<ESC>Z

3rd Rotation, Base Reference Point  
<ESC>A<ESC>CC1<ESC>%3

<ESC>V0100<ESC>H0750<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>PIaaa,bbbb,{data}

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

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

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

Default:       None

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

**Printer Input**        BASIC Program to Download a PCX file to Expanded Memory Section #1 (first 2MB installed).

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

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

**Special Notes:**

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



---

# Expanded Memory Function Initialize

---

<b>Command Structure</b>	<code>&lt;ESC&gt;BJFaaaaaaa</code>  aaaaaaa = Eight character alphanumeric user ID  Example: <code>&lt;ESC&gt;BJFsato</code>  Placement: Immediately following the <code>&lt;ESC&gt;CC</code> Memory Area Select command.  Default: None
<b>Command Function</b>	This clears all of the data from the specified Memory Area and prepares the area to accept data.
<b>Input to Printer</b>	<code>&lt;ESC&gt;A</code> <code>&lt;ESC&gt;CC2&lt;ESC&gt;BJFsato</code> <code>&lt;ESC&gt;Z</code>
<b>Printer Output</b>	There is no printer output as a result of this command.
<b>Special Notes</b>	<ol style="list-style-type: none"><li>1. You must have the optional Expanded Memory to use this command. Call your local SATO representative for information.</li><li>2. All Expanded Memory must be initialized before they can be used for the first time.</li><li>3. Care should be exercised when using this command as it destroys any data previously written the specified section of memory. It will clear all data from the Expanded Memory and assign the new ID ("sato" in the above example).</li></ol>

---

# Expanded Memory Function Area Select

---

**Command Structure**    <ESC>**CCa**

- a    =    Section Select
- 1    Section1, first 2MB of Expanded Memory
  - 2    Section 2, second 2MB of Expanded Memory

Example:    <ESC>**CC1**

Placement:    Immediately following the <ESC>A Start Code.

Default:    Last selected Memory Area.

**Command Function**    Selects the section of Expanded Memory to be used for following 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.

---

# Expanded Memory Function Status

---

**Command Structure**    <ESC>**BJ**S

Example:            <ESC>**BJ**S

Placement:        After the <ESC>CC Memory AreaSelect command.

Default:            None

**Command Function**    Causes the printer to print the card status.

**Printer Input**            <ESC>A  
                              <ESC>CC1<ESC>**BJ**S  
                              <ESC>Z

**Printer Output**



**Special Notes**

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

## **Two-Dimensional Symbols**

---

The following commands are used to create the two-dimensional symbologies supported by the printers.

# Two-Dimensional Bar Codes

## Maxicode

**Command Structure**    <ESC>BUaaa,bbb,cccccc,dddd,ee...e

aaa        = Service class, numeric only (001-999)  
 bbb        = Country code, numeric only (001-999)  
 cccccc    = ZIP code, alphanumeric (000000-999999)  
 dddd       = Extended ZIP code, numeric only (0001-9999)  
 ee...e    = Low priority message, alphanumeric, 84 digits.

Example:    <ESC>BU001,840,94089,0000

Placement:    Immediately preceding data to be encoded

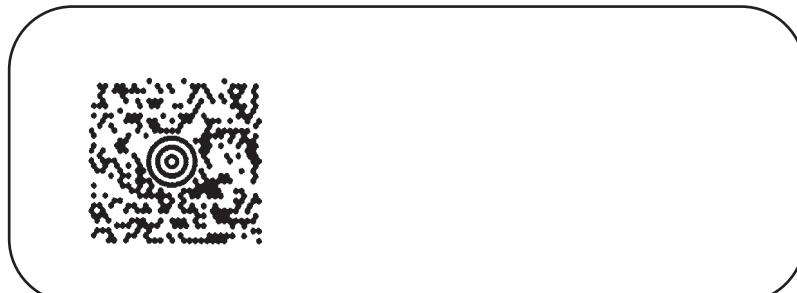
Default:        None

**Command Function**    To print a Maxicode two-dimensional bar code image on a label. See Appendix B for specific information on using each individual bar code symbol.

**Command Function**    To print a UPS Maxicode symbol.

```
<ESC>A<ESC>V0100<ESC>H0100
<ESC>BU001,840,94089,0000
]><Rs>
01<Gs>96
1Z12345675
<Gs>UPSN<Gs>12345E<Gs>089
<Gs><Gs>1/1<Gs>10.1<Gs>Y
<Gs><Gs><Gs>UT
<Rs><Eot>
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
<ESC>Q1<ESC>Z
```

**Printer Output**



**Special Notes**

1. The Secondary Message field (ee...e) must contain exactly 84 characters. If a smaller message is specified, the field must be padded with “exclamation point” character(s).
2. <Rs> represents Hex 1E, <Gs> represents Hex 1D, <Eot> represents Hex 04, <ESC> represents Hex 1B and <Sp> represents Hex 20.

# Two-Dimensional Bar Codes

## PDF417

**Command Structure** <ESC>**BK**aabbcddeefffn...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.
- fff = Number of characters to be encoded (0001-2700).
- nn...n = Data to be printed.

Example: <ESC>**BK0304400000021**

Placement: Immediately preceding data to be encoded

Default: None

**Command Function** To print a PDF417 two-dimensional bar code image on a label.

**Printer Input**

```
<ESC>A
<ESC>V0100<ESC>H0100<ESC>BK0607400000021PDF417 PDF417 PDF417
<ESC>Q1<ESC>Z
```

**Printer Output**



**Special Notes**

1. When the code words per line and the number of rows per symbol ("dd" and "ee") are set to all zeroes, the printer will calculate the optimum configuration.

2. If the product of the values entered for “dd” and “ee” are not equal to or less than the value of “fff” (i.e., “fff” 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 Macro and Truncated PDF417 symbols are not supported.
9. The values 00<sub>H</sub> thru 1F<sub>H</sub> can be specified as print data.
10. This command can be stored in a format.
11. The <ESC>R Rotate command can be used.
12. The print height of the symbol will vary depending upon the data specified; numeric only, alpha only or alphanumeric.



## **CONFIGURATION COMMANDS**

---

The following commands are used to set the operating parameters of the CX200 printers. The settings currently active in the printer can be determined by printing a Test Label, either by using the <ESC>CT Print Test Label command or by pressing the READY Indicator and FEED buttons on the front panel (see Page 9 of the CX200 User's Guide).

---

# Calibrate Sensor

---

<b>Command Structure</b>	<ESC> <b>CA</b>
Example:	<ESC> <b>CA</b>
Placement:	This command should be sent after the sensor type has been selected with the <ESC>CI command. It should not be included with print job commands.
Default:	There is no default for this command.
<b>Command Function</b>	To adjust the label sensor for unique media and ribbon combinations.
<b>Input to Printer</b>	<ESC>A <ESC>CI2 <ESC> <b>CA</b> <ESC>Z
<b>Printer Output</b>	There is no printer output for this command. It will cause the printer to feed a label while the characteristics of the label backing or eye-mark are measured.
<b>Special Notes</b>	<ol style="list-style-type: none"><li>1. The sensor is calibrated for the currently selected sensor type (Eye-Mark or Transmissive).</li><li>2. If the Sensor is disabled with a &lt;ESC&gt;CI0 command, no calibration is performed.</li><li>3. The sensor must be recalibrated whenever the sensor type is changed.</li><li>4. When calibrating the sensor for the CX200TT Thermal Transfer unit operating in the thermal transfer mode, the ribbon must be installed in the printer.</li></ol>

# Custom Protocol Command Codes Download

**Command Structure** <ESC>LD,a,b,c,d,e,f,g,h,i

a = Replacement character for STX in ASCII or hex format  
 b = Replacement character for ETX in ASCII or hex format  
 c = Replacement character for ESC in ASCII or hex format  
 d = Replacement character for ENQ in ASCII or hex format  
 e = Replacement character for CAN in ASCII or hex format  
 f = Replacement character for NULL or ~ in ASCII or hex format  
 g = Replacement character for OFFLINE in ASCII or hex format

**Example:** <ESC>LD,{,},%,#,&,\*~,0,0

**Placement:** Immediately following the <ESC>A Start command and in an independent data stream.

**Default:** Standard Protocol command Codes

**Command Function** Allows the user to defines custom Protocol Command codes.

**Printer Input**

```
<ESC>A
<ESC>LD,{,},%,#,&,*~,0,0
<ESC>Z
```

**Printer Output**

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



```
STX = 7B   ETX = 7D   ESC = 25
ENQ = 23   CAN = 26   NULL = 2A
OFFLINE = 7E
```

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.

2. This command must be sent as an independent data stream immediately following the <ESC>A Start code and immediately preceding the <ESC>Z Stop code. No other commands can be included in the data stream.
3. If more or less than nine commas are included in the command, the entire command sequence will be ignored. The command must contain exactly nine commas.
4. If two characters are specified for a parameter, it will be interpreted as a hex value. For example:

Command Parameter	Resulting Command Code
2B	+
+	+

If a combination of characters are outside the hexadecimal range, the entire command sequence will be ignored.

5. The current protocol command codes may be verified by printing a self test label (<ESC>CT).

---

# Label Tear-Off

---

**Command Structure**    <ESC>**CB**bbExample:    <ESC>**CB+03**

a =        + to move the print line down from the top edge of the label  
              - to move the print line toward the top of the label

bb =        Distance moved in millimeters (00 to 25)

Placement:    This command should be sent in a separate data stream.

Default:        Last valid setting.

**Command Function**    To adjust the location of the first print line on the label.**Input to Printer**

```
<ESC>A
<ESC>C12<ESC>CB+03
<ESC>Z
```

**Printer Output**

There is no printer output for this command. The first print line on the next printed label will be adjusted after the receipt of this command.

**Special Notes**

1. The effects of this command are cumulative, i.e. if an <ESC>CB+06 command is followed by an <ESC>CB-02, the resulting change in position is +4mm.
2. The maximum range for the value stored in the printer is 98mm. Any commands received that cause the value to exceed 00 or 98 will result in a setting of 00 or 98 respectively.
3. The value is stored in flash memory and will remain until it is modified by another valid <ESC>CBabb command, even if power is removed from the printer.
4. The current setting is printed out on the "Pitch Offset" line on the test label. This setting is referenced to the sensor position which is located 0.75" (19mm) from the first print line (V=000)
5. Separate offset settings are stored for gap and eye-mark sensing.

---

# Print Darkness Fine Adjustment

---

<b>Command Structure</b>	<code>&lt;ESC&gt;CDaaa,bbbb</code> aaa = Print Darkness Adjust (0 to 400) bbb = Media Adjustment (0 to 6000)  Example: <code>&lt;ESC&gt;CD250,3000</code>  Placement: This command should be sent in a separate data stream  Default: Print Darkness = 200, Media = 3300
<b>Command Function</b>	To make fine adjustments for best print quality for unique media and ribbon combinations.
<b>Input to Printer</b>	<code>&lt;ESC&gt;A</code> <code>&lt;ESC&gt;CD200,3300</code> <code>&lt;ESC&gt;Z</code>
<b>Printer Output</b>	There is no printer output as a result of this command
<b>Special Notes</b>	<ol style="list-style-type: none"><li>1. This command covers the complete range of heat settings. After the printer has been adjusted using the Print Darkness Adjust setting, the <code>&lt;ESC&gt;#E</code> Print Darkness Command can be used to adjust the heat setting in discrete steps referenced to the Adjust setting.</li><li>2. The Media Adjust setting is used to optimize the “dot history” algorithm which tracks the activity of each print dot from one dot row to another. This can improve the readability of rotated bar codes.</li><li>3. The factory setting for these adjustments is set to provide the optimum results when using the SATO supplied media with the printer. It is recommended that any changes be made judiciously as they can have a significant impact on print quality and bar code readability.</li><li>4. It is recommended that a bar code verifier be used when making adjustments with this command.</li></ol>

---

# Print Test Label

---

**Command Structure**    <ESC>CT

Example:            <ESC>CT

Placement:        This command should be sent in a separate data stream

Default:            There is no default for this command.

**Command Function**    To print a test label

**Input to Printer**        <ESC>A  
                              <ESC>CT  
                              <ESC>Z

**Printer Output**



**Special Notes**

1. When the printer finishes printing the Test Label, it is in the hexadecimal print mode. This mode is used for diagnostic troubleshooting and lists the current status of the printer configuration,

---

# Set Print Mode

---

<b>Command Structure</b>	<code>&lt;ESC&gt;CPa</code> a = 0 for Direct Thermal Printing (without ribbon) 1 for Thermal Transfer Printing (with ribbon)  Example: <code>&lt;ESC&gt;CP0</code>  Placement: Must precede all other commands in the data stream.  Default: 0 for CT200DT Models 1 for CT200TT Models
<b>Command Function</b>	To optimize the print head heat management algorithms.
<b>Input to Printer</b>	<code>&lt;ESC&gt;A</code> <code>&lt;ESC&gt;CP0</code> <code>&lt;ESC&gt;Z</code>
<b>Printer Output</b>	There is no printer output as a result of this command.
<b>Special Notes</b>	<ol style="list-style-type: none"><li>1. The print mode setting is stored in nonvolatile memory and will not change until a new Set Print Mode command is received. The current print mode can be verified by printing a test label.</li><li>2. This command is ignored for direct thermal (DT) models. These units are automatically set in the DT mode.</li></ol>



---

# Set RS232 Parameters

---

<b>Command Structure</b>	<code>&lt;ESC&gt;CRaaaa,b,c,d</code> aaaa = Baud Rate (2400, 4800, 9600 or 19200) b = Parity (N for <b>N</b> one, O for <b>O</b> dd, E for <b>E</b> ven) c = Number of data bits (7 or 8) d = Number of stop bits (1 or 2)  Example: <code>ESC&gt;CR9600,N,8,1</code>  Placement: Must be sent in a separate data stream.  Default: 9600,N,8,1
<b>Command Function</b>	To select the desired RS232 communications settings
<b>Input to Printer</b>	<code>&lt;ESC&gt;A</code> <code>&lt;ESC&gt;CR9600,N,8,1</code> <code>&lt;ESC&gt;Z</code>
<b>Printer Output</b>	There is no printer output as a result of this command.
<b>Special Notes</b>	<ol style="list-style-type: none"><li>1. Any commands sent to the printer over the RS232 port within two seconds of receiving this command may be lost.</li><li>2. The RS232 settings must match those of the host system. If the RS232 settings are unknown, printing a Self Test label will list the current printer settings.</li></ol>

---

# Set Sensor Type

---

<b>Command Structure</b>	<p>&lt;ESC&gt;<b>CI</b><i>a</i></p> <p>= 0 Disable Sensor 1 Reflective (Eye-Mark ) Sensing 2 Transmissive (Label Gap or Notch) Sensing</p> <p>Example: &lt;ESC&gt;<b>CI1</b></p> <p>Placement: This command should be sendt in a separate data stream.</p> <p>Default: &lt;ESC&gt;CI2 (Transmissive Sensing)</p>
<b>Command Function</b>	To select the top-of-label sensing method.
<b>Input to Printer</b>	<ESC>A <ESC> <b>CI2</b> <ESC>Z
<b>Printer Output</b>	Theres is no printer output as a result of this command.
<b>Special Notes</b>	<ol style="list-style-type: none"><li>1. The reflective Eye-Mark, label gap or notch must be a minimum of .125" wide and extend 0.85" from the left (facing the printer) edge of the label backing.</li></ol>

---

# Backfeed Enable

---

<b>Command Structure</b>	<code>&lt;ESC&gt;CEa</code> a = 0 Disable Backfeed 1 Enable Backfeed
	Example: <code>&lt;ESC&gt;CE1</code>
	Placement: This command should be sent in a separate data stream.
	Default: Last setting
<b>Command Function</b>	To select the top-of-label sensing method.
<b>Input to Printer</b>	<code>&lt;ESC&gt;A</code> <code>&lt;ESC&gt;CE1</code> <code>&lt;ESC&gt;Z</code>
<b>Printer Output</b>	There is no printer output as a result of this command.
<b>Special Notes</b>	<ol style="list-style-type: none"><li>1. When Backfeed is enabled, the printer will feed the last label of a print job forward to the dispense/cut position. Upon the receipt of the next print job, it will retract the label to the first print line position before printing.</li></ol>