



DCS & Labeling Worldwide

CX400 / 410

DESKTOP PRINTER



**PROGRAMMING
REFERENCE**

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TABLE OF CONTENTS

SECTION 1. PROGRAMMING CONCEPTS

Introduction.....	1-1
The SATO Programming Language	1-1
Selecting Protocol Control Codes	1-2
Using Basic	1-2
The Print Area.....	1-4
Rotated Fields	1-7
Command Default Settings	1-8
Printer Configuration	1-9
Label Sensing.....	1-10

SECTION 2. COMMAND CODES

Bar Codes.....	2-2
Bar Codes, Expansion	2-7
Bar Codes, Variable Ratio	2-8
Base Reference Point	2-10
Characters, Custom-Designed.....	2-12
Character Expansion	2-14
Character, Fixed Spacing	2-15
Character Pitch	2-16
Character, Proportional Spacing	2-18
Clear Print Job(s) & Memory	2-19
Continuous Forms Printing	2-20
Copy Image Area	2-21
Cut	2-23
Cut Job	2-24
Cut Last	2-25
Fonts U, S, M, OA, OB, XU, XS & XM	2-26
Font, Vector	2-28
Fonts WB, WL, XB & XL	2-30
Form Feed	2-32
Form Overlay, Recall.....	2-33

Table of Contents

Form Overlay, Store	2-34
Graphics, Custom	2-35
Graphics, PCX.....	2-37
Journal Print	2-38
Lines and Boxes	2-39
Line Feed	2-41
Media Size.....	2-42
Off-Line/Pause	2-43
Postnet	2-44
Print Darkness	2-45
Print Length, Expanded	2-46
Print Position.....	2-47
Print Quantity	2-49
Print Speed	2-50
Repeat Label.....	2-51
Replace Data (Partial Edit)	2-52
Reverse Image	2-54
Rotate, Fixed Base Reference Point	2-56
Sequential Numbering	2-57
Start/Stop Label.....	2-59

SECTION 3. EXPANDED MEMORY

Clear Expanded Memory	3-2
Graphics, Custom Recall.....	3-3
Graphics, Custom Store	3-4
Graphics, PCX Recall	3-6
Graphics, PCX Store	3-7
Initialize	3-8
Memory Area Select	3-9
Status	3-10

SECTION 4. TWO-DIMENSIONAL SYMBOLS

Maxicode.....	4-2
PDF417	4-4

SECTION 5. CONFIGURATION COMMANDS

Backfeed Enable	5-2
Calibrate Sensor	5-3
Custom Protocol Command Codes Download	5-4
Label Tear-Off	5-6
Print Darkness Range.....	5-7
Sensor Select.....	5-8
Serial Interface Parameters	5-9
Test Label.....	5-10

Table of Contents

SECTION 1.

PROGRAMMING CONCEPTS

INTRODUCTION

This section presents the commands that are used with the SATO CX400 / CX410 printers to produce labels with logos, bar codes and alphanumeric data. All of the SATO Programming Language commands use the same syntax. All of the CX400 / CX410 commands are compatible with their larger SATO industrial printer cousins. Exceptions include commands that are dependent upon the print width and resolution of the printers. In these instances, the allowable ranges are specified in the commands.

The following information is presented in this section:

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

THE SATO PROGRAMMING LANGUAGE

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

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

<ESC>{Command}

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

<ESC>{Command} {Data}

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

<ESC>{Command} {Parameter}

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

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

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

SELECTING PROTOCOL CONTROL CODES

Protocol codes are the special control characters that prepare the printer to receive instructions. For example, the <ESC> character tells the printer that a command code will follow and the <ENQ> character asks for the printer status. There are two pre-defined different sets of Protocol Control codes to choose from. Each set is made up of six special characters. The Standard Protocol Control codes are non-printable characters, and the Non-Standard Protocol Control codes are printable characters. The Non-Standard set may be useful on host computers using protocol converters or in an application where non-printable ASCII characters cannot be sent from the host. This manual uses the Standard Protocol Control codes for all of the examples.

If Protocol Control codes other than the standard set are desired, they must be downloaded from the host using the <ESC>LD command. 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 CX400 / 410 User’s Guide, page 9)..

CONTROL CHARACTER	STANDARD HEX VALUE	DESCRIPTION
STX	02 Hex	Start of Data
ETX	03 Hex	End of Data
ESC	1B Hex 5	Command code to follow
ESC	1B Hex	Command code to follow
ENQ	05 Hex	Get printer status, Bi-Com mode
CAN	18 Hex	Cancel print job, Bi-Com mode
Off-Line	40 Hex	Take printer Off-Line

USING BASIC

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

1. Set the WIDTH of the output device to 255 characters to avoid automatically sending <CR> and <LF> characters after every line. The command string should be continuous and uninterrupted by <CR> and/or <LF> commands. The examples given in this manual are printed on separate lines because they will not fit on one line and do not contain any <CR> and/or <LF> characters. If these characters are needed, they are explicitly noted by the inclusion of <CR> and <LF> notations.
2. If you are using the printer’s RS232C interface, it is necessary to set the COM port on the PC such that the CTS and DSR signals will be ignored. Send your OPEN “COM” statement in the following way:

OPEN "COM1:9600,E,8,1,CS,DS"AS #1

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

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

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

PRINTING WITH THE PARALLEL PORT

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

PRINTING WITH THE RS232C PORT

REM RS232 Example	Identifies the program as an RS232C port print label. The "REM" prevents this data from being sent to the printer and displays it only on the screen.
10 E\$=CHR\$(27)	Sets the "E\$" string as an <ESC> character.
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.

Section1. Programming Concepts

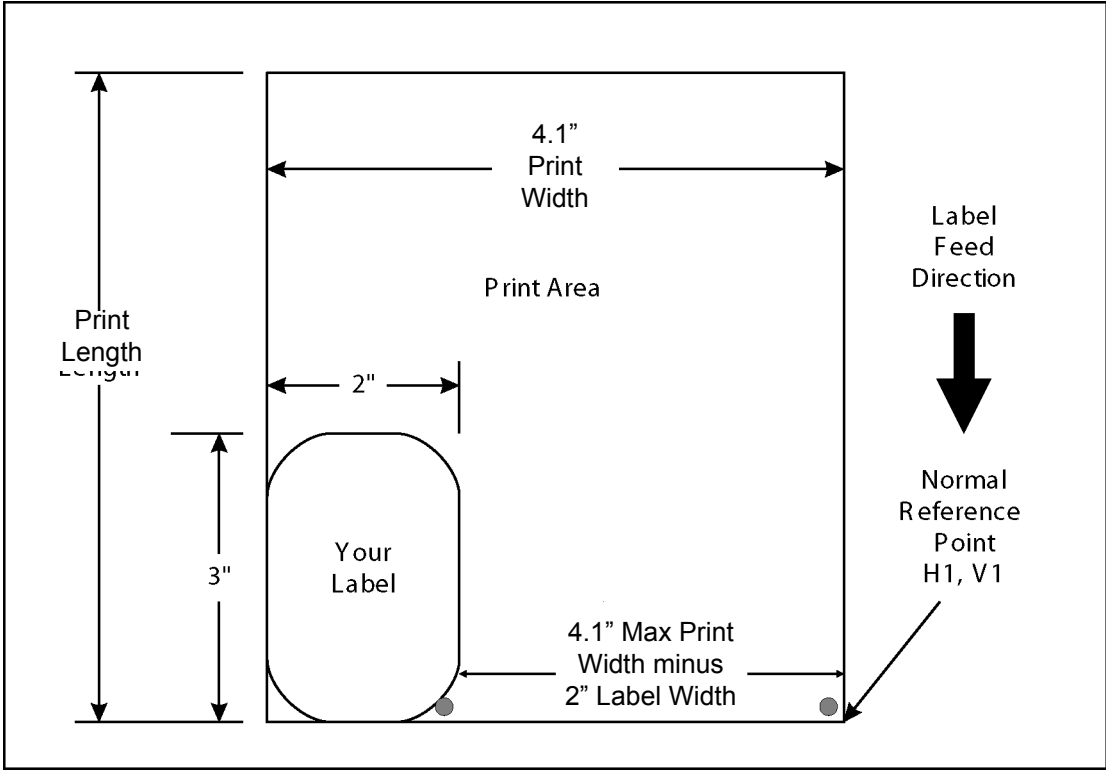
30 PRINT #1,CHR\$(2);	Sends an <STX> (ASCII Code a decimal "2") to the printer instructing it to prepare to receive a message.
50 PRINT #1,ESC;"A";	Sends an "<ESC>A" command code to Print Port #1 opened by statement 20 above.
60 PRINT #1, ESC;"H400";ESC;"V100";ESC;"XL1SATO";	Sends the data "SATO" to be placed 400 dots horizontally and 100 dots vertically on the label and printed in the "XL" autosmoothed font.
50 PRINT #1, ESC;"Q1";	Instructs the printer to print a quantity of one label.
60 PRINT #1, ESC; "Z";	Tells the printer that the last command has been sent. The printer can now create and print the job.
70 PRINT #1,CHR\$(3);	Sends an <ETX> (ASCII Code decimal "3") to the printer telling it that this is the end of the message. Identifies the program as a CL612e RS232C port print label. The "REM" prevents this data from being sent to the printer and displays it only on the screen.

THE PRINT AREA

The maximum print area for the CX400 / CX410 is 45 inches long. Many of your label applications may not require labels that fill the entire print 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 frustration when you cannot see the printed output.

The diagram below illustrates the maximum print area and a sample 2 inch wide by 3 inch long label placed within this area. As can be seen, your label will be oriented against the inside left edge of the printer as viewed from the front 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).

1



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

1. **Media Size Command.** Use the <ESC>A1 Media Size Command. This command specifies the width and length of the label. The printer will automatically calculate the correct offsets for printing labels of that size. However, if you specify a label size with this command, the labels loaded should match the size specified to correctly position the label.
2. **Base Reference Point Command.** Send the <ESC>A3 Base Reference Point command as part of your data to the printer to set a new base reference point for your label.

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

For a CX400 8 dpmm printer , this would be:

$$\text{LABEL WIDTH} = 2" \times 25.4 \text{ MM/IN} \times 8 \text{ DPMM} = 406 \text{ DOTS}$$

The new Base Reference Point then becomes:

$$\begin{aligned} \text{NEW BASE REFERENCE POINT} &= \text{MAXIMUM PRINT WIDTH} - \text{LABEL WIDTH} \\ &= (832 \text{ DOTS}) - (406 \text{ DOTS}) = 426 \text{ DOTS} \end{aligned}$$

Issue the Base Reference Point command <ESC>A3 after the Start command in your data stream.

```
<ESC>A<ESC>A3H0426V0001. . . . .
```

Section 1. Programming Concepts

This resets the reference point for all the following data.

3. **Add the correct offset to all horizontal commands.** 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.

For a CX400 8 dpmm printer:

Label Width = 2" x 25.4 mm/in x 8 dpmm = 406 dots

New Base Reference Point = Maximum Print Width - Label Width
= (832 dots) - (406 dots) = 426 dots

Each <ESC>H command would have the value "426" added to it to correctly position each field.

Note: The <ESC>A3 Base Reference Point command can also shift the reference point in a negative direction (toward the outside edge of the label).

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. If you want to test any of the sample label outputs and are using labels less than five inches in width, we suggest that you add the Base Reference Point command to the data stream in order for the images to print on your labels.

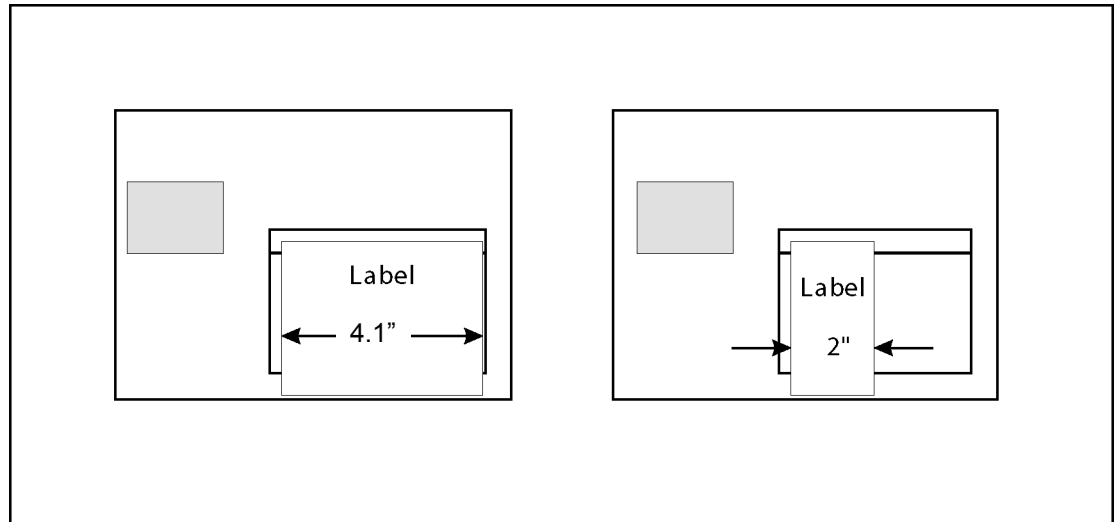
You must be careful not to print off the label surface as the label provides a heat sink for the print head elements. Doing so will cause irreparable damage to the head. This damage is not covered under the print head warranty. The addition of the Base Reference Point command to the sample data stream may help to adjust the print for your labels. See the following two examples or refer to the Base Reference Point command description.

For example, the following illustrates a sample data stream for a CX400 printer and the resulting label assuming a 4 inch wide label:

```
<ESC>A
<ESC>H0050<ESC>V0100<ESC>L0303<ESC>XMSATO
<ESC>H0050<ESC>V0200<ESC>B103100*SATO*
<ESC>H0070<ESC>V0310<ESC>L0101<ESC>XUSATO
<ESC>Q1<ESC>Z
```

If you are using a 2 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>XMSATO
<ESC>H0050<ESC>V0200<ESC>B103100*SATO*
<ESC>H0170<ESC>V0310<ESC>L0101<ESC>XUSATO
<ESC>Q1
<ESC>Z
```



The image is moved horizontally to the right 2 inches (406 dots) so that it can be printed on a 2 inch wide label. For more information, see the Base Reference Point command description.



ROTATED FIELDS

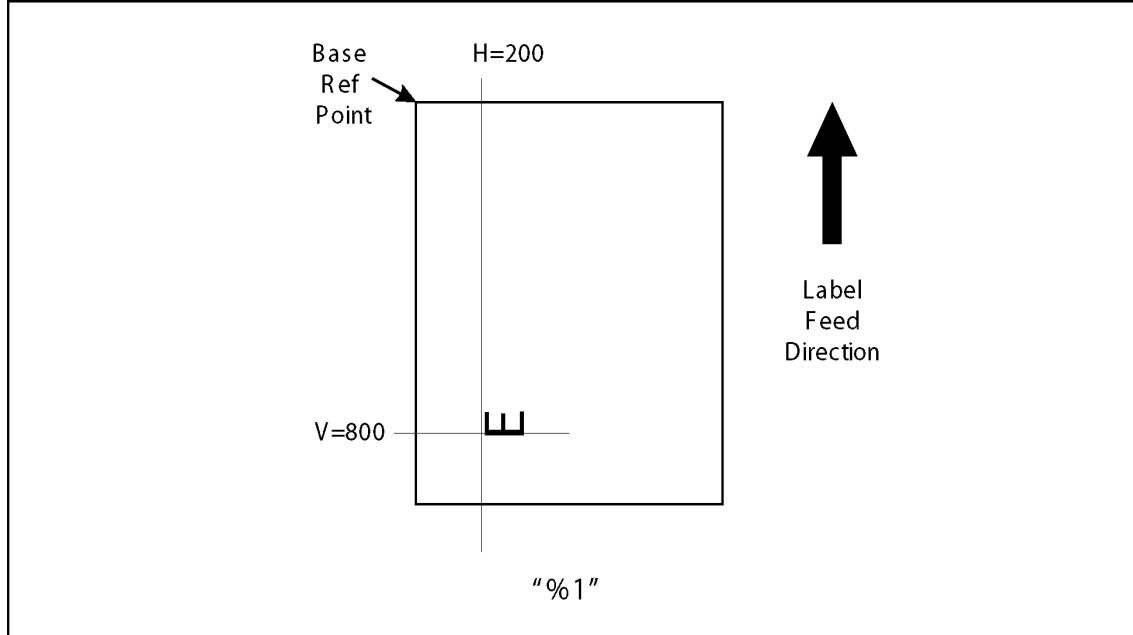
The CX400 / CX410 printer can rotate each print field in 90° increments using the Rotate command.

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

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

Section1. Programming Concepts

<ESC>A<ESC>%1<ESC>V800<ESC>H200<ESC>L0202<ESC>XB1E<ESC>Q1<ESC>Z



COMMAND DEFAULT SETTINGS

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

COMMAND	DEFAULT	NOTE
Print Rotation	0°	(1)
Vertical Reference Point	0	(1)
Horizontal Reference Point	0	(1)
Character Pitch	2	(1)
Base Reference Point	H=0, V=0	(2)
Character Expansion	1	(1)
Print Darkness	200	(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. The values transmitted with these commands will remain in effect until a new command is received.

PRINTER CONFIGURATION

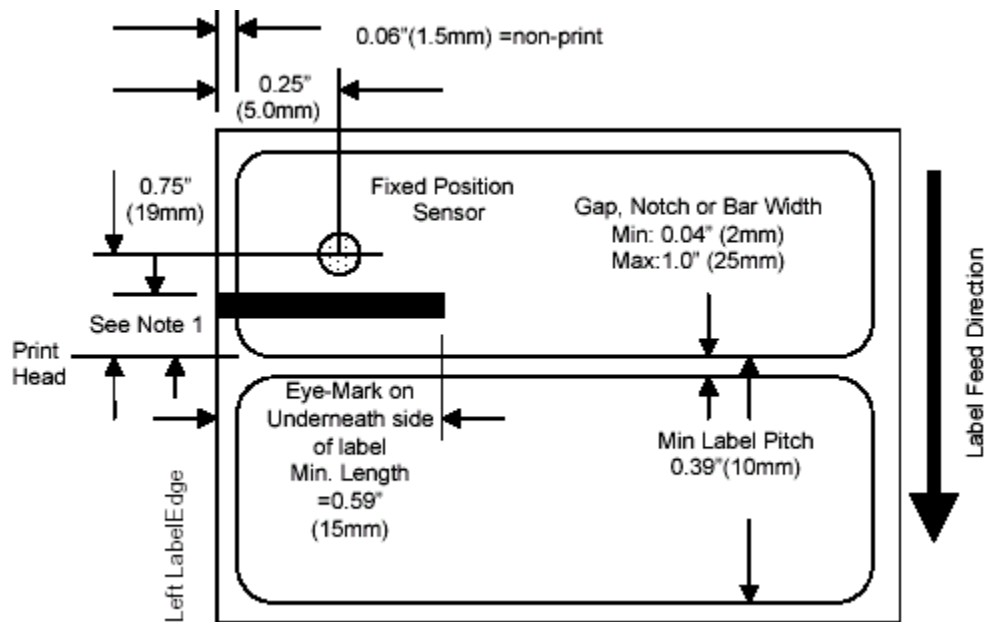
The CX400 / CX410 printers are different from other SATO printers in that they do not use DIP switches for printer configuration. Instead, all printer configuration is done via software commands. The parameters that can be configured are:

- Sensor Calibration
- Protocol Control 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 must be printed to list the active printer settings. This Test Label lists all of the information a user needs to ascertain the printer configuration. Test Labels can be printed using the <ESC>CT command or by simultaneously pressing the FEED button while turning the printer on.

LABEL SENSING

The CX400 / CX410 printers can use an eye-mark (black bar) label gap or label notch sensing. The gap and notch sensor is a transmissive or see-thru type with an infrared light source directed through the label from above and detected by a separate receiving sensor underneath the label liner or tag. 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. For thermal transfer printing, the ribbon must be installed while the calibration is performed.



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

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


SECTION 2. COMMAND CODES

This section contains the basic Command Codes for the SATO CX400 / CX410 printers. Commands for the options and specialized functions are provided in the following sections. 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:

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

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. However, certain commands require the exact number of matching characters. A command with two parameters listed following the command code without a comma delimiter, such as **aaaabbbb** require the exact number of digits to be entered. If the value of **aaaa** is “800” and the value of **bbbb** is “300”, then the parameters must be entered as “08000300”. It is recommended that you make it a practice to always enter leading zeros to prevent any mistakes.

NOTE: These examples assume the use of the Standard Protocol Command Codes, a parallel interface and a 4 inch wide label in a CX400 / CX410 printer.

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

Bar Codes

Command Structure	1:3 narrow/wide bar ratio: <ESC> Babbcccd
	2:5 narrow/wide ratio: <ESC> BDabbcccd
	1:2 narrow/wide bar ratio: <ESC> Dabbcccd
	<ul style="list-style-type: none"> a = 0 Codabar 1 Code 39 2 Interleaved 2 of 5 (I 2/5) 3 UPC-A / EAN-13 4 EAN-8 5 Industrial 2 of 5 6 Matrix 2 of 5 7 reserved 8 reserved 9 reserved A MSI B reserved C Code 93 D reserved E UPC-E F Bookland G Code 128 I UCC 128
	bb = Number of dots (01-12) for narrow bar and narrow space
	ccc = Bar height in dots (001-999)
	<ul style="list-style-type: none"> 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 two 2-dimensional symbols

Section 2: Command Codes

Input to Printer

```
<ESC>A<ESC>H025<ESC>V0025<ESC>B103100*CODE 39*  
<ESC>H0205<ESC>V0130<ESC>XS*CODE 39*  
<ESC>H025<ESC>V0175<ESC>BD20310045676567  
<ESC>H0190<ESC>V0285<ESC>XM45676567  
<ESC>H025<ESC>V0325<ESC>BD30215001234567890  
<ESC>H025<ESC>V0525<ESC>BD50310012345  
<ESC>H0225<ESC>V0635<ESC>XS12345  
<ESC>H025<ESC>V0675<ESC>BD60310012345  
<ESC>H0205<ESC>V0785<ESC>XS12345  
<ESC>H025<ESC>V0825<ESC>BA03100123455  
<ESC>H0145<ESC>V935<ESC>XS12345  
<ESC>H025<ESC>V980<ESC>BC03100081234ABCD  
<ESC>H0130<ESC>V1095<ESC>XS1234ABCD  
<ESC>H450<ESC>V0980<ESC>B002100A12345B  
<ESC>H500<ESC>V1090<ESC>XS12345  
<ESC>H0505<ESC>V0025<ESC>BD303100123456789012  
<ESC>H0565<ESC>V0525<ESC>BD4031001234567  
<ESC>H0550<ESC>V175<ESC>DE03100123456  
<ESC>H0525<ESC>V0225<ESC>OB0  
<ESC>H0558<ESC>V0280<ESC>OB123456  
<ESC>H0300<ESC>V0325<ESC>D30315009827721123  
<ESC>L0101<ESC>H0275<ESC>V0400<ESC>OB0  
<ESC>H0315<ESC>V0478<ESC>OB98277  
<ESC>H0455<ESC>V0478<ESC>OB21123  
<ESC>H605<ESC>V0365<ESC>BF0313021826  
<ESC>H620<ESC>V0335<ESC>OB21826  
<ESC>H0425<ESC>V0675<ESC>D30315000633895260  
<ESC>L0101<ESC>H0400<ESC>V0750<ESC>OB0  
<ESC>H0440<ESC>V0828<ESC>OB06338  
<ESC>H0580<ESC>V0828<ESC>OB95260  
<ESC>H0730<ESC>V0705<ESC>BF0314024  
<ESC>H0745<ESC>V0675<ESC>OB24  
<ESC>H0025<ESC>V1130<ESC>BG03100>GAB>B789>C123456  
<ESC>H0265<ESC>V1235<ESC>XSAB789123456<ESC>Q1  
<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



Section 2: Command Codes

UCC-128

Without Incrementing

<EXC>A<EXC>H0100<EXC>V0100
<EXC>**B107150101234567000000001**
<ESC>Q2<ESC>Z



With Incrementing



<ESC>A<ESC>H0100<ESC>V0100
<ESC>**F001+001**<ESC>**B107150101234567000000001**
<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, Code 39, Industrial 2 of 5, and Matrix 2 of 5 bar codes are affected by the Character Pitch command. This command must be placed before the Bar Code command.
4. Because of their unique characteristics, two-dimensional (2D) symbols are covered separately.
5. For UCC128, the FNC1 code is automatically inserted and the Mod 10 and Mod 103 check digits are automatically calculated. For the MSI bar code, the check digit is not automatically calculated.
6. The <ESC>D and <ESC>BD commands are not valid for the MSI, Code 128, Code 93, UPC-E, Bookland, UCC128 and Postnet symbologies.
7. To select UPC-A, 11 digits of data are 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. If 13 digits of data are sent, the check digit is not created and must be supplied by the programmer. It must be the last digit in the 13 digit string.
8. See *SATO Programming Reference: Appendix A* PN 9001096 for symbology specific formatting information.

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 (004-999 dots)

Example: <ESC>**BW02100**

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

Default: None

Command Function

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

Input to Printer

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

Printer Output



Special Notes

1. This command must be preceded by the Variable Ratio Bar Codes <ESC>BT command.
2. The following bar codes will be affected by the Character Pitch command: Codabar, Code 39, Interleaved 2 of 5, Matrix 2 of 5.

Bar Codes, Variable Ratio

Command Structure

<ESC>**BT**abbccdee

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

bb = Narrow space in dots (01-99)

cc = Wide space in dots (01-99)

dd = Narrow bar in dots (01-99)

ee = Wide bar in dots (01-99)

Example: <ESC>**BT**101030103

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

Default: Current setting

Command Function

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

Input to Printer

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

Printer Output



Section 2: Command Codes

Special Notes

1. This command must be immediately followed by the <ESC>BW Bar Code Expansion command.
2. You may use only one variable ratio bar code per label.
3. If the data specified in this command is incorrect, the command is ignored and the ratio used will be based on the previous setting.

Base Reference Point

Command Structure	<code><ESC>A3H-aaaa-Vbbbb</code>
	- = 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 (-9999 to 9999)
Example:	<code><ESC>A3H100V0050</code>
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 iorigin 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.

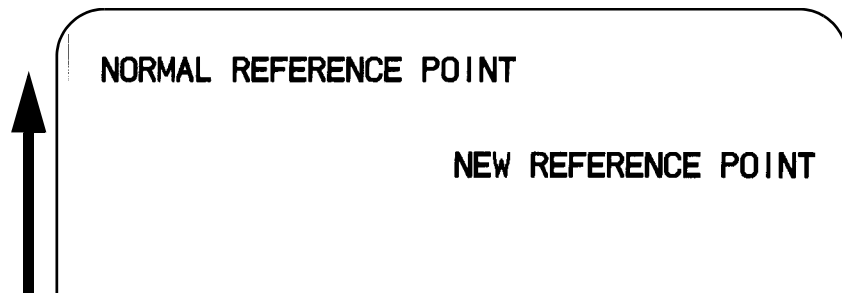
Input to Printer

```

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

```

Printer Output



Special Notes

1. Use of this command will set the Vertical/Horizontal Offset setting of the printer configuration until a new Base Reference Point command is issued or the setting is changed from the operator panel.
2. This command may be used more than once in a print job.
3. An alternative to using this command is to make changes to your current Horizontal and Vertical Print Position commands.

Example: Let us 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 *Section 1. Print Area*.
5. The CX400 / CX410 print engines can print as close as 2 mm to the inside edge of the label.
6. The 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

Command Structure

Store Command: <ESC>**Tabcc**

Recall Command: <ESC>**Kab90cc**

- a = 1 16x16 matrix
2 24x24 matrix
- b = Specifies the character encoding method for the data stream
H Hexadecimal characters
B Binary characters
- cc = Memory location to store/recall the character. Valid memory locations are 21_H to 52_H or “!” or “R” in Binary.
- (data) = Data to describe the character in either Hex or Binary format.

Example:

<ESC>**T1H3F**

<ESC>**K1H903F**

See Appendix C for a more detailed explanation

Placement:

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

Default:

None

Command Function

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

Printer Input

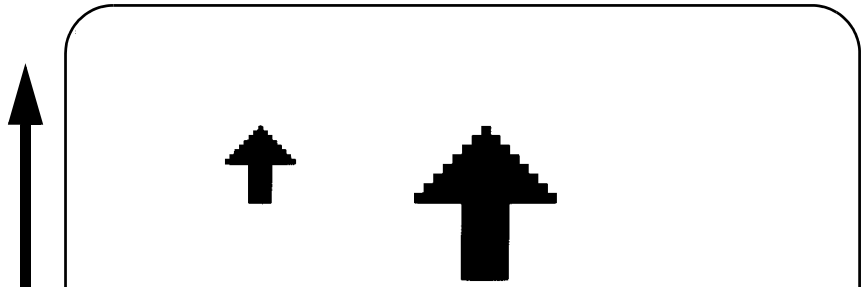
See Appendix C for a detailed explanation.

```
<ESC>A <ESC>T1H3F0100038007C00FE01FF03FF87FFCFFFE
07C007C007C007C007C007C007C0
<ESC>Z
```

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

Section 2: Command Codes

Printer Output



Special Notes

1. When printing the custom character using the Recall command, the character is affected by the following commands: Character Expansion, Character Pitch, Line Feed, Rotate, Fixed Base Reference Point
2. The characters are stored in volatile memory and must be reloaded if the printer power is lost.
3. Do not use ASCII <CR> or <LF> characters (carriage return or line feed) as line delimiters within the graphic data or the actual image will not be printed as specified.

Character Expansion

Command Structure

<ESC>Laabb

aa = Multiple to expand horizontally (01-12)

bb = Multiple to expand vertically (01-12)

Example: <ESC>L0305

Placement: Preceding the data to be expanded

Default: <ESC>L0101

Command Function

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

Input to Printer

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

Printer Output



Special Notes

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

Character, Fixed Spacing

Command Structure	<ESC> PR
Example:	See Above
Placement:	Preceding the data
Default:	The default is Proportional Spacing.
Command Function	To reset proportional spacing and place the printer back to fixed spacing.
Printer Input	<ESC>A <ESC>H0050<ESC>V0050<ESC>PS <ESC>L0202<ESC>XMPROPORTIONAL SPACING <ESC>H0050<ESC>V0180<ESC> PR <ESC>L0202<ESC>XMFIXED SPACING <ESC>Q1<ESC>Z

Printer Output



Special Notes

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

Character Pitch

Command Structure	<ESC>Paa aa = Number of dots between characters (00-99) Example: <ESC>P03 Placement: Preceding the text to be printed Default: <ESC> P02
Command Function	To designate the amount of spacing (in dots) between characters. This command provides a means of altering character spacing for label constraints or to enhance readability.
Input to Printer	ESC>A <ESC>H0025<ESC>V0025<ESC>L0202<ESC>XB1SATO <ESC>H0025<ESC>V0125<ESC>L0202<ESC> P20 <ESC>XB1SATO <ESC>H0025<ESC>V0225<ESC>L0202<ESC> P40 <ESC>XB1SATO <ESC>Q1<ESC>Z

Printer Output

Section 2: Command Codes

Special Notes

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

Example:

<ESC>L0304

<ESC>P03

Pitch = (03) x (03) = 9 dots

2. To avoid confusion, you may want to include the <ESC>L Character Expansion command and this command together in your program.
3. This command affects fonts U, S, M, XU, XS, XM, OA & OB, WB, WL, XB and XL, and the vector font.
4. Character Pitch will always revert to the default value unless it is specified before each new font command in the data stream.
5. This command also affects Codabar, Code 39 and Industrial 2 of 5 bar codes.

Character, Proportional Spacing

Command Structure	<ESC> PS Set to proportional spacing
	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	<pre> <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 </pre>

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 an <ESC>PR Fixed Spacing command is sent.

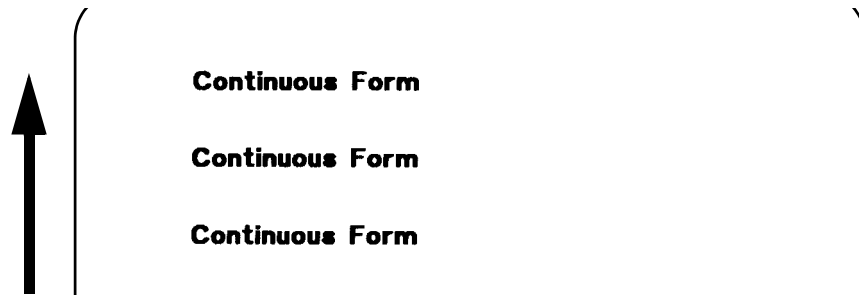
Clear Print Job(s) & Memory

Command Structure	<ESC>*a
	a = If the “a” parameter is not included with this command and the printer is in the multi-buffer mode, this command clears all print jobs in the printer memory, including the current print job.
	a = If “a” is included with this command, it specifies the internal memory section to be cleared. T To clear the custom character memory & To clear the form overlay memory X To clear all internal memory
	Example: <ESC>* <ESC>*&
	Placement: This command should be sent to the printer as an independent data stream.
	Default: None
Command Function	To clear individual memory or buffer areas of the printer.
Input to Printer:	<ESC>A <ESC>* <ESC>Z
Printer Output:	There is no printer output as a result of this command. The current print job in the buffer will be terminated and all other print jobs in the buffer cleared.
Special Note	<ol style="list-style-type: none">1. See Expanded Memory Functions for variations of this command used to clear data from the optional Expanded Memory.2. It is not necessary to clear the printer’s memory between each print job.3. When the “a” parameter is used, the section of memory specified will not be cleared until the label is printed.4. When the “a” parameter is not included, all sections of memory will be cleared (same as <EXC>*X).

Continuous Forms Printing

Command Structure	None
Command Function	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.
Input to Printer	<ESC>A <ESC> C10 <ESC>H100<ESC>V50<ESC>XMContinuous Forms Printing <ESC>Q3<ESC>Z

Printer Output



Special Notes

1. 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_H) if necessary. There is no command code to control label length.

Copy Image Area

Command Structure

<ESC>**WDH**aaaa**V**bbbb**X**cccc**Y**dddd

aaaa = Horizontal position of the top left corner of the area.
(0001 to 0832)

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

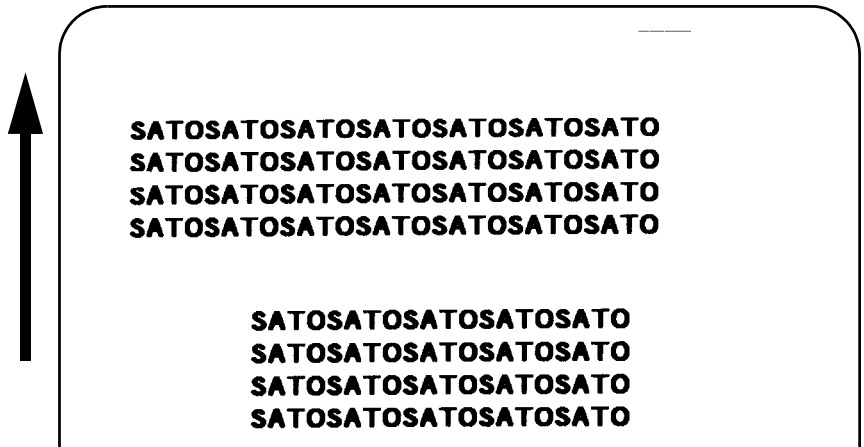
Command Function

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
SATOSATOSATOSATOSATOSATOSATO
<ESC>H0180<ESC>V0250<ESC>WDH0130V0050X0400Y0200
<ESC>Q1<ESC>Z
```

Printer Output



Special Notes

1. Use the Print Position commands (V and H) to locate the new area for the duplicate image.
2. Position of the new target area must not be inside the original image.
3. If you use the <ESC>R 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.

Cut

Command Structure `ESC>~Aaaaa`

`aaaa` = Number of labels to print between each cut (1-9999)

Example: `<ESC>~A2`

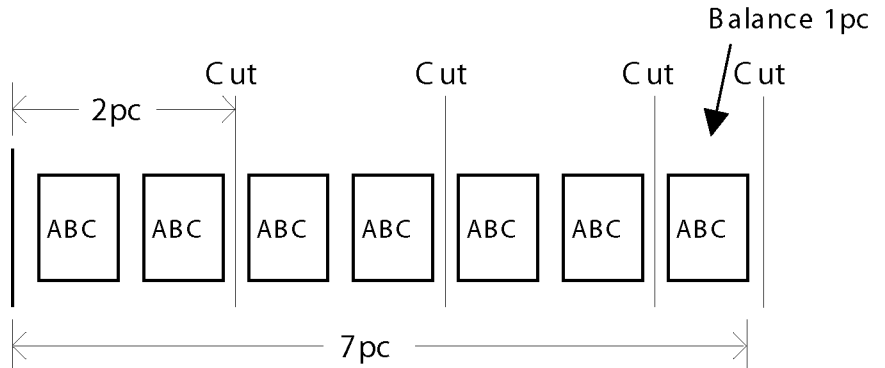
Placement: Preceding the `<ESC>Q` Print Quantity command.

Default: `<ESC>~A1` (if cutter enabled)

Command Function To control the cutting of labels when using a SATO cutter unit with the printer. This command allows the cutting of a multi-part tag or label at a specified interval within a print job. It differs from the `<ESC>~` Cut Job command in that it does not interact with the quantity command.

Input to Printer `<ESC>A`
`<ESC>H0020<ESC>V0020<ESC>XB1ABC<ESC>~A0002`
`<ESC>Q7<ESC>Z`

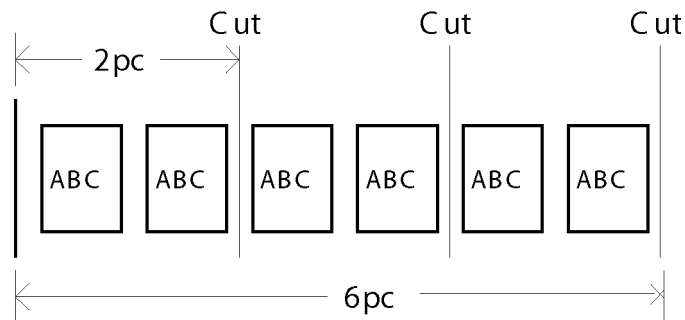
Printer Output This set of commands will print seven labels with two labels between each cut. One label will be cut separately.



- Special Notes**
1. You must have the optional printer Cutter to use this function. Contact your SATO representative for more information.
 2. To use this command, the printer configuration must have the cutter option enabled. See Configuration Commands in this section of the manual.
 3. If the cutter option has been enabled in the printer configuration and the cut value (`a = 0`), the cutter is inactive.
 4. This command is independent of the `<ESC>Q` Quantity command. It will cut the specified number of labels.

Cut Job

Command Structure	<p><ESC>~aaaa</p> <p>aaaa = Number of labels to print between each cut (1-9999)</p> <p>Example: <ESC>~2</p> <p>Placement: Following the Print Quantity command <ESC>Q</p> <p>Default: <ESC>~1 (if cutter enabled)</p>
Command Function	To control the cutting of labels when using a SATO cutter unit with the printer. This command allows the cutting of a multi-part tag or label at a specified interval within a print job.
Input to Printer	<pre><ESC>A <ESC>H0020<ESC>V0020<ESC>XB1ABC<ESC>Q3 <ESC>~0002 <ESC>Z</pre>
Printer Output	This set of commands will print 6 labels (3 x 2) with two labels between each cut.



Special Notes	<ol style="list-style-type: none"> 1. You must have the optional printer Cutter to use this function. Contact your SATO representative for more information. 2. To use this command, the printer configuration must have the cutter option enabled. See Printer Configuration commands in this section manual. 3. If the cutter option has been enabled in the printer configuration and the cut value (a = 0), the cutter is inactive. 4. A "~" (tilde) character or <NUL> (ASCII 00 Hex) character can be used in this command. It is recommended that the "~" be used whenever possible. 5. 5. When using the Cutter command, the total number of labels printed is the product of the cut value and the print quantity.
----------------------	--

Cut Last

Command Structure

<ESC>~B

Example: <ESC>~B

Placement: Separate data stream sent to the printer

Default: None

Command Function

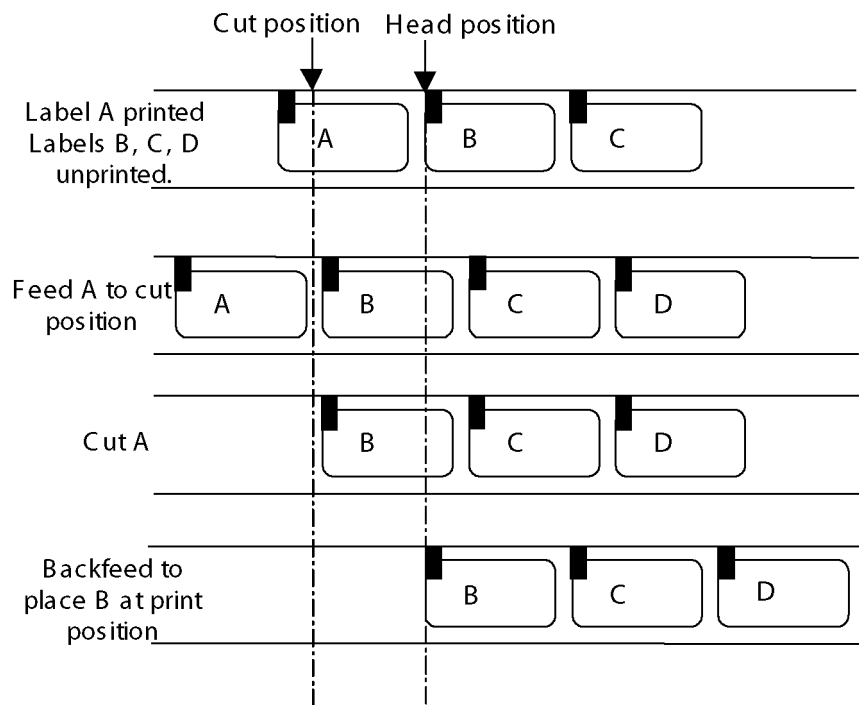
To control the cutting of labels when using a SATO cutter unit with the printer. This command allows the cutting of a printed multi-part tag or label that is left in the printer after a job is cut.

Input to Printer

<ESC>A
<ESC>~B
<ESC>Z

Printer Output

This command will feed the last printed label to the cut position, cut the label and then back feed to the head position in preparation for printing the next job.



Special Notes

1. You must have the optional printer Cutter to use this function. Contact your SATO representative for more information.

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

Command Structure	Font XU: <ESC> XU	Font U: <ESC> U
	Font XS: <ESC> XS	Font S: <ESC> S
	Font XM: <ESC> XM	Font M: <ESC> M
	Font OA: <ESC> OA	Font OB: <ESC> OB
	Example: See above	
	Placement: Preceding the data to be printed	
	Default: None	

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

	Non-Proportional		Proportional(1)
U	5W x 9H dot matrix	XU	5W x 9H dot matrix
S	8W x 15H dot matrix	XS	17W x 17H dot matrix
M	13W x 20H dot matrix	XM	24W x 24H dot matrix
OA	15W x 22H OCR-A font	OB	20W x 24H OCR-B font

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

Input to Printer

```

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

```

Printer Output



Special Notes

1. Characters may be enlarged through the use of the Character Expansion command.
2. Character spacing may be altered through the use of the Character Pitch command. The default is 2 dots between characters. It is recommended to use a spacing of 5 dots for OCR-A and 1 dot for OCR-B.
3. You may also create custom characters or fonts. See the <ESC>T Custom-Designed Characters command.
4. A font must be defined for each field to be printed. There is no default font.
5. Fonts U, S, M, OA and OB are identical to fonts U, S, M, OA and OB on the SATO M-8400 printer. The proportionally spaced fonts XU, XS, XM, XL and XA can be printed with fixed spacing using the <ESC>PS Proportional Space command.
6. The matrices for the OA and OB fonts are scaled so that they will remain a constant size according to the OCR-A and OCR-B specifications when printed on different resolution printers.

Font, Vector

Command StructureSpecify Vector Font: <ESC>**\$a,b,c,d**Data for Vector Font: <ESC>**\$(data)**

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

Example: <ESC>**\$A,100,200,0<ESC>\$(123456)**

Placement: Immediately preceding data to be printed.

Default: None

Command Function

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

Input to Printer

```
<ESC>A
<ESC>H0100<ESC>V0100<ESC>$A,100,100,0
<ESC>$(SATO AMERICA)
<ESC>H0100<ESC>V0200<ESC>$(VECTOR FONT)
<ESC>H0100<ESC>V0350<ESC>$A,200,300,9<ESC>$(SATO
<ESC>Q1<ESC>Z
```

Printer Output



Special Notes

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

Fonts WB, WL, XB & XL

Command Structure	Font WB: <ESC> 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 "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.

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

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

Input to Printer

```

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

```

Section 2: Command Codes

Printer Output



Special Notes

1. Characters may be enlarged through the use of the <ESC>L Character Expansion command.
2. Character spacing may be altered through the use of the <ESC>A Character Pitch command.
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

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

Form Overlay, Recall

Command Structure

<ESC>/

Example: See above

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

Default: None

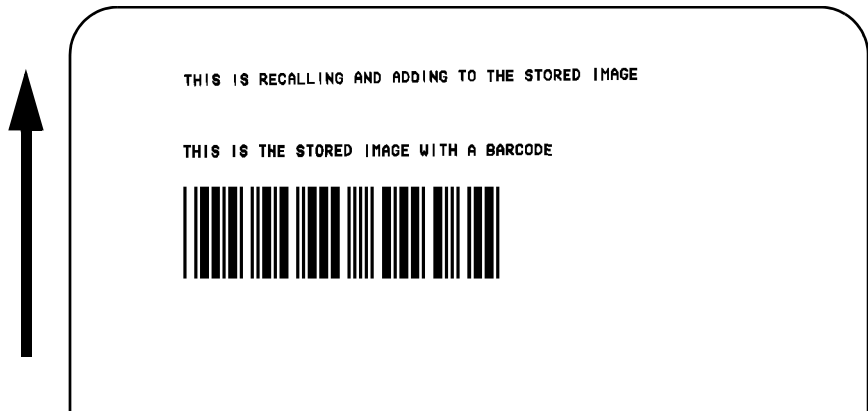
Command Function

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

Input to Printer

```
<ESC>A
<ESC>H01000<ESC>V0125
<ESC>STHIS IS THE STORED IMAGE WITH A BARCODE
<ESC>H0100<ESC>V0165<ESC>B103100*12345*
<ESC>&<ESC>Z
<ESC>A<ESC>H0100<ESC>V0050
<ESC>STHIS IS RECALLING AND ADDING TO THE STORED
IMAGE<ESC>/
<ESC>Q1<ESC>Z
```

Printer Output



Special Notes

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

Form Overlay, Store

Command Structure	<ESC>&
Example:	See above
Placement:	Must be preceded by all other data and placed just before the Stop command (<ESC>Z)
Default:	None
Command Function	To store a label image in the volatile form overlay memory. Only one label image may be stored in this memory area at a time.
Input to Printer	<pre> <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 </pre>
Printer Output	There is no output from this command. It stores the label image in the overlay buffer.
Special Notes	<ol style="list-style-type: none"> 1. Remember that this storage is volatile. Therefore, if the printer loses power, the overlay must be sent again. 2. The overlay is recalled using the <ESC>/ Form Overlay Recall command. 3. Form overlays do not have to be recompiled each time they are called to be printed and therefore may result in much faster print output.

Graphics, Custom

Command Structure

<ESC>**G**abbccc(**data**)

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 356

(data) = Hex or Binary data to describe the graphic image.

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

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

Default: None

Command Function

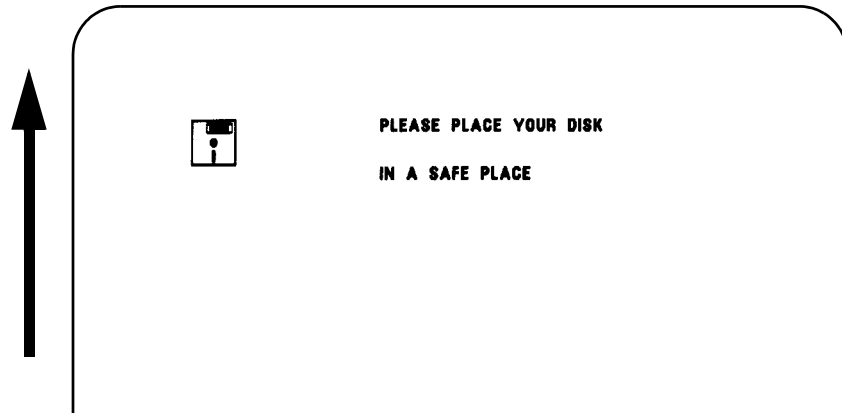
To create and print custom graphics (logos, pictures, etc.) on a label. The graphic image may be printed along with other printed data to enhance label appearance or eliminate the need for preprinted label stock. Using a dot-addressable matrix, design the graphic image in 8 dot by 8 dot blocks, then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

Printer Input

```
<ESC>A
<ESC>H0100<ESC>V0100<ESC>GH006006
FFFFFFFFFFFFFFFFFFFFFFFFC00000000003
C00000000003C000FFFFFFFFF3C00080000013
C00080000013C0009FFFFFF13C00080000013
C00080000013C0009FFFFFF13C00080000013
C00080000013C000FFFFFFFFF3C00000000003
C00000000003C00000000003C00000000003
C00000000003C00000000003C00003C00003
C00007E00003C0000FF00003C0000FF00003
C0000FF00003C0000FF00003C00007E00003
C00003C00003C00003C00003C00003C00003
C00003C00003C00003C00003C00003C00003
C00003C00003C00003C00003C00003C00003
C00003C00003C00001800003C00000000003
C00000000003FFFFFFFFFFFFFFFFFFFFFFFF
<ESC>H0300<ESC>V0100<ESC>XSPLEASE PLACE YOUR DISK
<ESC>H0300<ESC>V0150<ESC>XSIN A SAFE PLACE
<ESC>Q1<ESC>Z
```

See Appendix C for a details on the data format.

Printer Output



Special Notes

1. Do not use ASCII <CR> or <LF> characters (carriage return or line feed) as line delimiters within the graphic data or the actual image will not be printed as specified.
2. A custom graphic cannot be enlarged by the <ESC>L Character Expansion command.
3. A custom graphic is not affected by either of the Rotation commands. Therefore, always design and locate your graphic image to print in the appropriate orientation.
4. To store graphic images in optional Expanded Memory, see the Expanded Memory Functions section.
5. The binary format reduces the transmission time by 50%.

Graphics, PCX

Command <ESC>GPaaaa,(data)

Structure

aaaa = Number of bytes to be downloaded

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

Placement: Anywhere within the job data stream

Default: None

Command Function

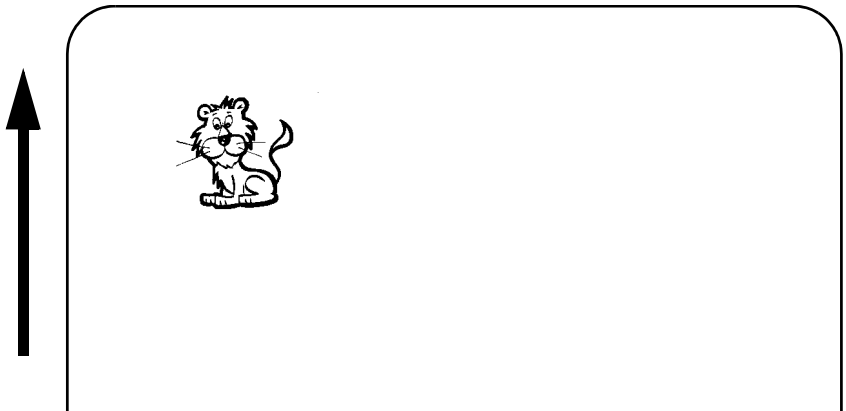
To allow the creation and printing of graphic images using a PCX file format.

Printer Input

See Appendix Appendix C for a detailed example

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

Printer Output

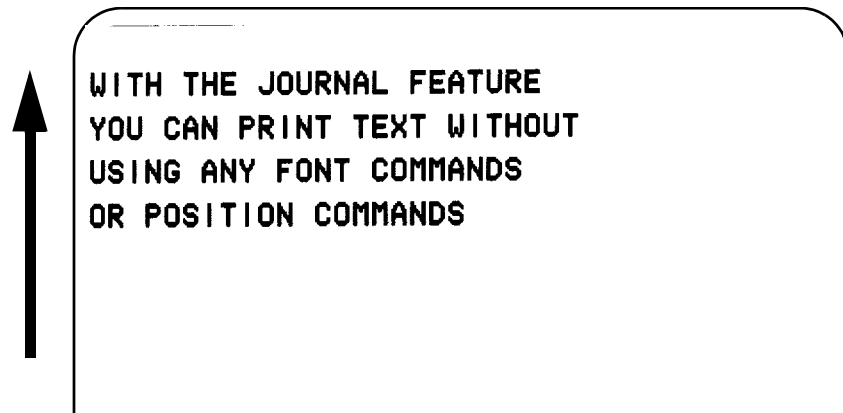


Special Notes

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

Journal Print

Command Structure	<ESC>J Example: See above Placement: Immediately following <ESC>A Default: None
Command Function	To print text in a line by line format on a label. By specifying this command, you automatically select Font XS with a Character Expansion of 2x2. You also establish a base reference point of H2,V2. The character pitch is 2 dots and the line gap is 16 dots. Simply issue an ASCII <CR> at the end of each text line.
Input to Printer	<ESC>A <ESC>J WITH THE JOURNAL FEATURE YOU CAN PRINT TEXT WITHOUT USING ANY FONT COMMANDS OR POSITION COMMANDS <ESC>Q1<ESC>Z

Printer Output**Special Notes**

1. Journal mode assumes a maximum label width . Otherwise, you may print where there is no label and damage your print head.
2. It is effective only for the current print job.
1. The <ESC>A3 Base Reference Point command cannot be used to change the margins.

Lines and Boxes

Command Structure

Line: `<ESC>FWaabcccc`

- aa = Width of horizontal line in dots (01-99)
- b = Line orientation H Horizontal line V Vertical Line
- cccc = Length of line in dots (see Section 1 Table 1 for max length)

Box: `<ESC>FWaabbVccccHdddd`

- aa = Width of horizontal side in dots (01-99)
- bb = Width of vertical side in dots (01-99)
- cccc = Length of vertical side in dots (see Section 1 Table 1 for max length)
- dddd = Length of horizontal side in dots (see Section 1 Table 1 for max length)

Example: `<ESC>FW02H0200`

Placement: Following the necessary positioning commands

Default: None

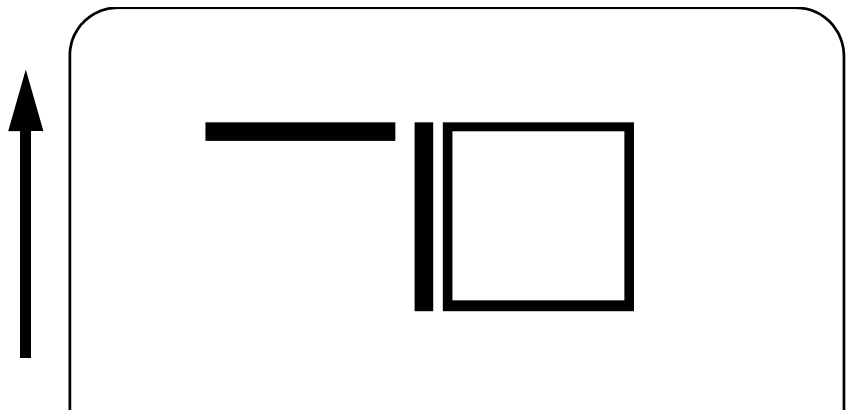
Command Function

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

Input to Printer

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

Printer Output



Special Notes

1. It is recommended that all lines and boxes be specified in the normal print direction.
2. Use the <ESC>E0 Expanded Print Length command for maximum label length.

Line Feed

Command Structure

<ESC>Eaaa

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

Example: <ESC>E010

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

Default: None

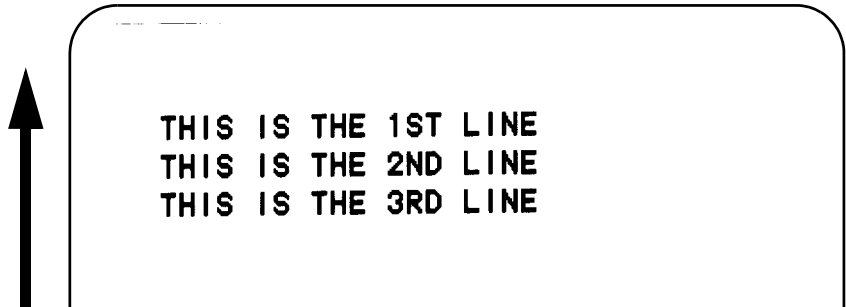
Command Function

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

Input to Printer

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

Printer Output



Special Notes

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

Media Size

Command Structure	<p><ESC>A1aaaabbbb</p> <p>aaaa = Label Width in dots (1 to 832)</p> <p>bbbb = Label Length in dots (1 to 8120)</p> <p>Example: <ESC>A108323200</p> <p>Placement: Separate data stream to the printer.</p> <p>Default: <ESC>A108322136</p>
COMMAND FUNCTION	To set the size of the media.
INPUT TO PRINTER	<p><ESC>A</p> <p><ESC>A108321424</p> <p><ESC>Z</p>
PRINTER OUTPUT	There is no printer output resulting from this command. It is used to automatically adjust the offset values for the size of label being used. The sample command stream specifies a label 832 dots wide by 1424 dots long.
SPECIAL NOTES	<ol style="list-style-type: none"> 1. The Base Reference point is always the on the right (looking at the front of the printer) side of the print head. This command adjusts the Base Reference Point to correspond with the right edge of the loaded media. 2. If the label size is changed, then this command must be respecified to center the print image on the label. 3. All eight variables “aaaa” and “bbbb” must be included in this command.

Off-Line/Pause

Command Structure	<ESC>@ Example: See above Placement: Anywhere in the print job between the <ESC>A and <ESC>Z Default: None
Command Function	To specify the printer to come to an off-line state. When used within a print job, the printer goes off-line after finishing the print job.
Input to Printer	<ESC>A <ESC>@ ...Job... <ESC>Z
Printer Output	There is no printer output for this command. The printer is placed in the Off-Line mode as soon as the current print job is finished.
Special Notes	<ol style="list-style-type: none">1. You must press the FEED key on the front panel for more than 5 seconds to return the printer to an On-Line status. Note: the print buffer will be cleared.2. Remember, when using this command, that the print job specifies <ESC>Q10, all ten labels will print before the printer goes off-line

Postnet

Command Structure<ESC>**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 those listed, the command is ignored.
2. Only numeric data will be accepted.

Print Darkness

COMMAND STRUCTURE <ESC>#Ea

a = Print Darkness Value (1 - 5)

Example: <ESC>#E2

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

Default: See Operator Manual for the specific printer

COMMAND FUNCTION

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

INPUT TO PRINTER

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

PRINTER OUTPUT

There is no printer output for this command.

SPECIAL NOTES

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

Print Length, Expanded

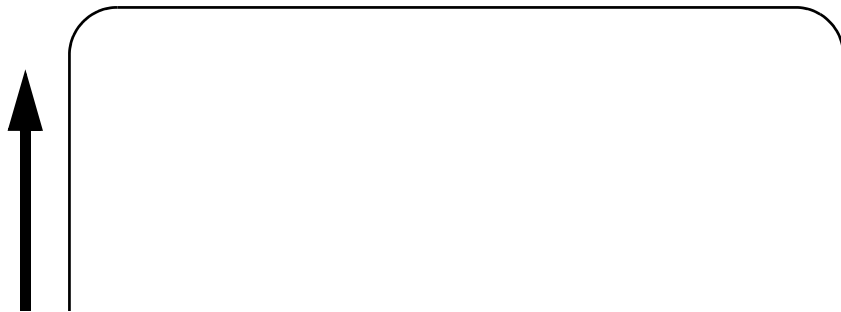
Command Structure	<ESC> EX0	Sets the print length to 40" (1015 mm))
	<ESC> AR	Resets the maximum print length to 7" (178 mm)
	Example:	See above
	Placement:	Must follow the Start Code command and be in it is own separate data stream.
	Default:	<ESC>AR(7")

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

Input to Printer

```
<ESC>A
<ESC>EX0
<ESC>Z
<ESC>A
<ESC>H0050<ESC>V0100<ESC>WB1EXPAND TO:
<ESC>H0050<ESC>V2700<ESC>WB1MAX INCHES
<ESC>Q1<ESC>Z
<ESC>A
<ESC>AR
<ESC>Z
```

Printer Output



SPECIAL NOTES

1. EX0 is effective until AR is sent to reset the printer to its standard print length, or until the printer is re-powered.
2. When this command is used with the <ESC>& Store Form Overlay command the Form length cannot exceed the maximum specified.
3. If a job contains elements out of the memory range, it is ignored.
4. If the Forms Overlay command <ESC>& is used with Expanded Memory to expand the print area, the Form Overlay length is still limited to the maximum.

Print Position

COMMAND STRUCTURE Horizontal Position **<ESC>Haaaa**
Vertical Position: **<ESC>Vbbbb**

aaaa = Number of dots horizontally from the base reference point (1 to 832)
bbbb = Number of dots vertically from the base reference point (1 to 8120)

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

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

Default: **<ESC>H0001**
<ESC>V0001

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

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

Printer Output



SPECIAL NOTES

1. To expand the print length to the maximum limit, the <ESC>EX0 Expanded Print Length command must be used.
2. The print position of a field is affected by both the <ESC>R Rotate and <ESC>A3 Base Reference Point commands.
3. If any part of an image is placed past the maximum number of dots, that part of the image will be lost.
4. If you attempt to print where there is no paper, you may damage the print head.
5. For these commands, the leading zeroes do not have to be entered. The command "V1" is equivalent to "V0001".

Print Quantity

Command Structure	<code><ESC>Qaaaaaa</code> <code>aaaaaa = Total number of labels to print (1-65535)</code> Example: <code><ESC>Q500</code> Placement: Just preceding <code><ESC>Z</code> , unless <code><ESC>~</code> exists, then preceding that. This command must be present in every print job. Default: None
Command Function	To specify the total number of labels to print for a given print job.
Input to Printer <	<code>ESC>A</code> <code><ESC>H0100<ESC>V0100<ESC>WBSATO</code> <code><ESC>Q3</code> <code><ESC>Z</code>
Printer Output	Three labels containing the data "SATO" will be printed.
Special Notes	<ol style="list-style-type: none">1. To cancel a print job, you must turn off the printer.2. When used with the <code><ESC>F</code> Sequential Numbering command, the Print Quantity value should be equal to the total number of labels to be printed.3. If you do not specify a Print Quantity, one copy will be printed.4. For this command, leading zeroes do not have to be entered. The command "Q1" is equivalent to "Q000001".

Print Speed

Command Structure	<p><ESC>CSa</p> <p>a = Designates the speed selection in ips</p> <p>1 = 1 ips (25 mm/s)</p> <p>2 = 2 ips (50 mm/s)</p> <p>3 = 3 ips (75 mm/s)</p> <p>4 = 4 ips (100 mm/s)</p>
=	<p>Example: <ESC>CS3</p> <p>Placement: Must be placed immediately after <ESC>A and immediately before <ESC>Z in a separate data stream</p> <p>Default: As previously set in the printer configuration</p>
Command Function	<p>To specify a unique print speed through software for a particular label. This allows flexibility in finding the best performance and quality for the particular label format, media, and ribbon. All subsequent labels will print at this speed unless the speed is changed with this command or through the Operator Panel.</p>
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.
Special Notes	This becomes the new setting for all subsequent print jobs, unless changed. The setting is stored in non-volatile memory and is not affected by cycling the power. The allowable speed ranges are:

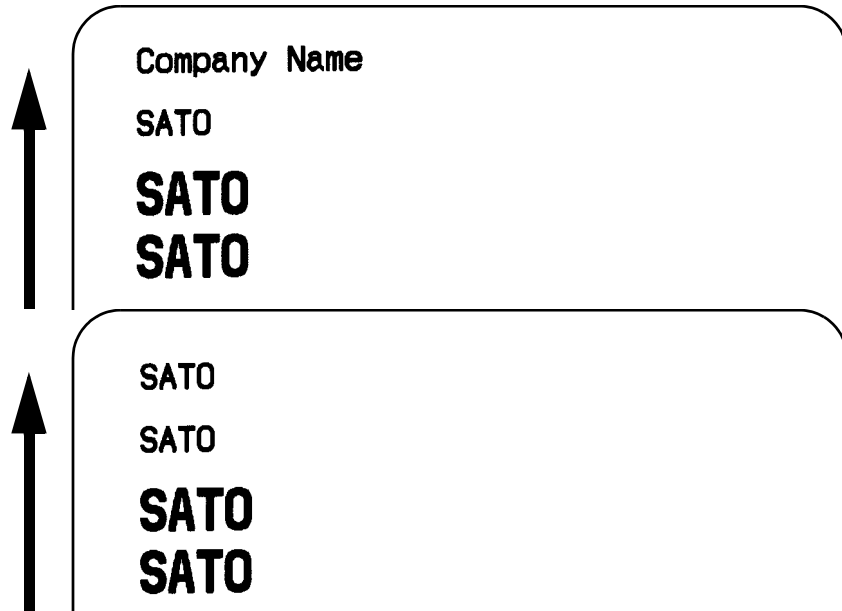
Repeat Label

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

Replace Data (Partial Edit)

Command Structure	<ESC>0(<ESC>zero) Example: See above Placement: Must follow <ESC>A and precede all other print data Default: None
Command Function	To replace a specified area of the previous label with new data. This command will cause the previous label to print along with any changes specified within the current data stream.
Input to Printer	<ESC>A <ESC>H0025<ESC>V0020<ESC>WB0Company Name <ESC>H0025<ESC>V0085<ESC>WB1SATO <ESC>H0025<ESC>V0150<ESC>WL0SATO <ESC>H0025<ESC>V0215<ESC>WL1SATO <ESC>Q1<ESC>Z <ESC>A<ESC>0<ESC>H0025<ESC>V0020<ESC>WB0SATO <ESC>Q1<ESC>Z

Printer Output



Section 2: Command Codes

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
1 to 832

b = Vertical height in dots of reverse image area.
1 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

Section 2: Command Codes

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 the Rotate commands are used with this command, the V and H parameters are reversed.
3. If using reverse images with the form overlay, place this command before the Form Overlay command in the data stream.
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

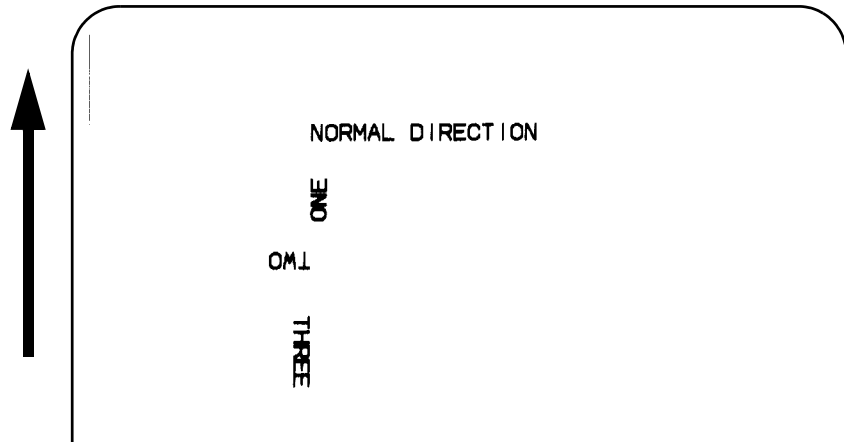
Command Function

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. The specified values are valid until another Rotate (<ESC>%) command is received.
2. Receipt of a Stop Print (<ESC>Z) command will reset the setting to the default value.

Sequential Numbering

Command Structure

<ESC>**F**aaaabcccc,dd,ee,g

- aaaa = Number of times to repeat the same data (0001-9999)
- b = Plus or minus symbol (+ for increments; - for decrements)
- cccc = Value of step for sequence (0001-9999) ,
- dd = Number of digits for sequential numbering (01-99). The first incrementing character position starts after the positions exempted from sequential numbering as specified in ee. If these digits are left out, the default is 8. ,
- ee = Number of digits free from sequential numbering (00-99) starting with the right most position. If these digits are left out, the default is 0.
- g = Count base 1 Decimal Count 2 Hexadecimal Base

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

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

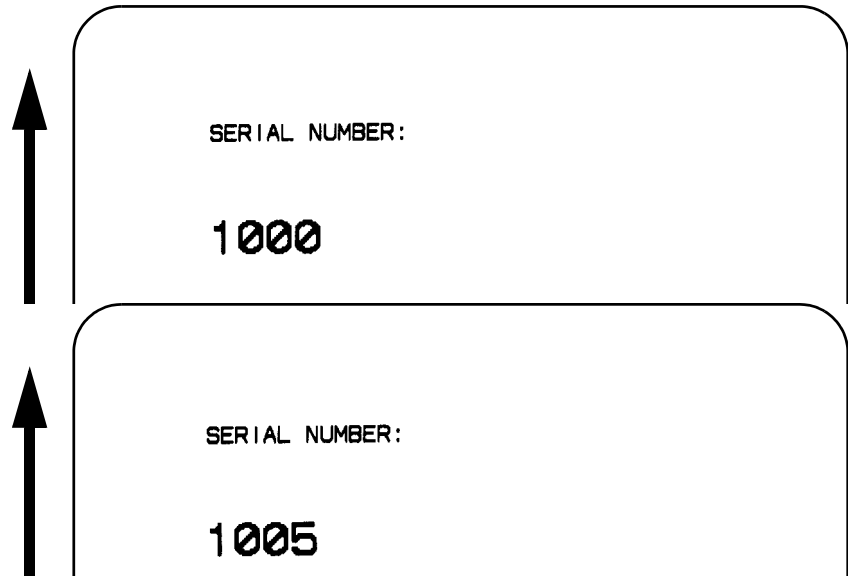
Command Function

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>Z1
```

Printer Output



Special Notes

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

Example:

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

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

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

Start/Stop Label

Command Structure	Start Command: <ESC>A Stop Command: <ESC>Z Example: See above Placement: <ESC>A must precede data <ESC>Z must follow data Default: None
Command Function	For all print jobs, the Start command must precede the data, and the Stop command must follow. The print job will not run properly if these are not in place.
Input to Printer	<ESC>A <ESC>H0001<ESC>V0100<ESC>WB1SATO <ESC>H0130<ESC>V0200<ESC>B103150*SATO* <ESC>H0170<ESC>V0360<ESC>L0202<ESC>S*SATO* <ESC>Q1<ESC>Z
Printer Output	There is no output for these commands they are not accompanied by other label printing commands. However, these commands must precede and follow each print job sent to the printer.

SECTION 3. EXPANDED MEMORY OPTION COMMANDS

These commands require the optional Expanded Memory.

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

Clear Expanded Memory

Command Structure	<p><ESC>*a,bbb</p> <p>a = Memory card section to be cleared</p> <ul style="list-style-type: none">G To clear SATO graphic files from memory cardP To clear PCX graphic filesF To clear formats from the memory cardO To clear TrueType fontsR To clear BMP graphic files <p>bbb = Memory Card storage area to be cleared</p> <ul style="list-style-type: none">001 to 999 for Graphics, PCX or Formats000 to 099 for TrueType fonts <p>Example: <ESC>*G,01</p> <p>Placement: This command should be sent to the printer immediately following the <ESC>CC Memory Area Select command.</p> <p>Default: None</p>
Command Function	To clear individual memory areas in the Expanded Memory.
Input to Printer	<ESC>A <ESC>CC1<ESC>*O,09 <ESC>Z
Printer Output	There is no printer output as a result of this command.
Special Notes	<ol style="list-style-type: none">1. To clear everything in the Expanded Memory, use the <ESC>BJF Expanded Memory Initialize command.2. This command is ignored if there is no data to be cleared.3. This command is ignored if Expanded Memory is not installed in the printer.

Graphics, Custom Recall

Command Structure	<code><ESC>GRaaa</code>
	aaa = Graphics storage number (001-999)
Example:	<code><ESC>GR111</code>
Placement:	The Recall command is sent in a secondary data stream to print the graphic, and follows any necessary position or size commands.
Default:	None
Command Function	Use the Recall command any time you want to print a graphic image on a label along with other printed data.

Printer Input

Non Rotated Graphic

```
<ESC>A<ESC>CC1
<ESC>V0100<ESC>H0080<ESC>L0505
<ESC>GR001
<ESC>Q1<ESC>Z
```

Graphic Rotated 180°

```
<ESC>A<ESC>CC1<ESC>%1
<ESC>V0180<ESC>H0500<ESC>L0505
<ESC>GR001
<ESC>Q1<ESC>Z
```

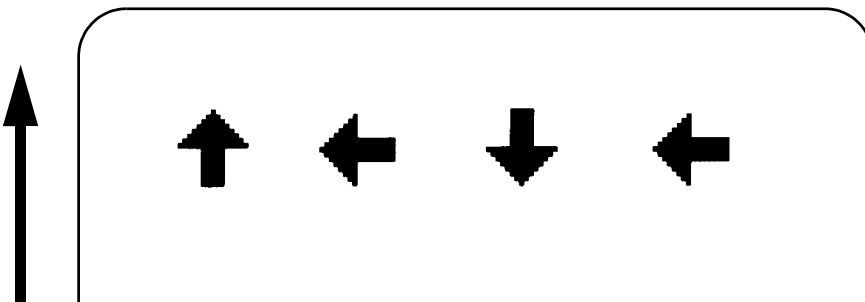
Graphic Rotated 90°<

```
<ESC>A<ESC>CC1<ESC>%1
<ESC>V0180<ESC>H0250<ESC>L0505
<ESC>GR001
<ESC>Q1<ESC>Z
```

Graphic Rotated 270°

```
<ESC>A<ESC>CC1<ESC>%3
<ESC>V0100<ESC>H0600<ESC>L0505
<ESC>GR001
<ESC>Q1<ESC>Z
```

Printer Output



Special Notes

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

Graphics, Custom Store

Command Structure	<p><ESC>Glabbbccddd{data}</p> <p>a = Specifies character format of the data H Hex data B Binary data</p> <p>bbb = Number of horizontal 8 x 8 blocks (001 to 104)</p> <p>ccc = Number of vertical 8 x 8 blocks (001 to 178)</p> <p>ddd = Graphics storage number (001-999)</p> <p>{data} = Hex or binary data to describe the graphic image</p> <p>Example: See Appendix C for detailed information on creating Hex and Binary graphic files.</p> <p>Placement: Immediately following the <ESC>CC Memory Area Select command.</p> <p>Default None</p>
Command Function	<p>To provide similar functionality to the <ESC>G Custom Graphic command, but allows for the graphic image to be stored in Expanded Memory. Use the Store command to send the graphic data to the printer, which is held in the optional Expanded Memory, even if printer power is lost.</p>
Printer Input	<p><ESC>A <ESC>CC1<ESC>GIH002002001 0100038007C00FE01FF03FF87FFCFFFE07C007 C007C007C007C007C007C007C0 <ESC>Z</p> <p>Note: See <i>SATO Programming Reference:Appendix C</i>, PN 9001096 for detailed explanation on how to format a graphics data stream.</p>
Printer Output	<p>There is no printer output as a result of this command. See <ESC>GR Recall Custom Graphics command.</p>

Special Notes

1. You must have the optional Expanded Memory to use this command. Call your SATO representative for details.
2. The maximum storage capacity is 999 graphics, up to the capacity of the memory card used.
3. If a data transmission error occurs, the ERROR LED will come on. You must then retransmit the image.
4. Each graphic to be stored must be sent in its own data stream.

Example of correct data stream:

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

Example of incorrect data stream:

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

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

Graphics, PCX Recall

Command Structure

<ESC>PYaaa

aa = Storage area number (001 thru 999)

Example: <ESC>PY001

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

Default: None

Command Function

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

Printer Input

Normal Rotation

<ESC>A<ESC>CC1
<ESC>V0100<ESC>H0050<ESC>PY001
<ESC>Q1<ESC>Z

Rotate Base Reference Point

<ESC>A<ESC>CC1<ESC>%1
<ESC>V0330<ESC>H0160<ESC>PY001
<ESC>Q1<ESC>Z

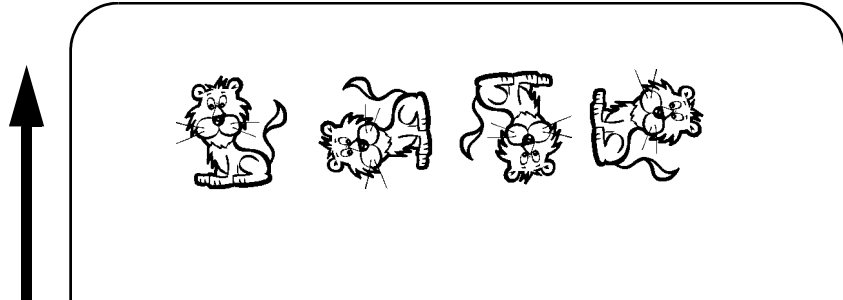
2nd Rotation, Base Reference Point

<ESC>A<ESC>CC1<ESC>%2
<ESC>V0330<ESC>H0600<ESC>PY001
<ESC>Q1<ESC>Z

3rd Rotation, Base Reference Point

<ESC>A<ESC>CC1<ESC>%3
<ESC>V0100<ESC>H0800<ESC>PY001
<ESC>Q1<ESC>Z

Printer Output



Special Notes

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

Graphics, PCX Store

Command Structure	<p><ESC>PIaaa,bbbb,{data}</p> <p>aaa = Storage area number (001 thru 999) bbbbb = Size of PCX file in bytes {data} = Data</p> <p>Example: <ESC>PI001,32000,{data}</p> <p>Placement: This command must be placed within its own data stream</p> <p>Default: None</p>
Command Function	To store for later printing a PCX graphic file in the Expanded Memory.
Printer Input	<p>BASIC Program to Download a PCX file to Expanded Memory Area #1, Storage Area #1</p> <pre> 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 </pre>
Printer Output	There is no printer output as a result of this command. See <ESC>PY PCX Graphics Recall command.
Special Notes:	<ol style="list-style-type: none"> 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.

Initialize

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

Memory Area Select

Command Structure	<p><ESC>CCa</p> <p>a = Memory Area 1 = 512K internal flash ROM 2 = 2M/4M expanded memory</p> <p>Example: <ESC>CC1</p> <p>Placement: Immediately following the <ESC>A Start Code.</p> <p>Default: Last selected Memory Area.</p>
Command Function	Selects the Memory Area to be used for following Expanded Memory commands.
Printer Input	<ESC>A <ESC> CC1 {commands} <ESC>Z
Printer Output	There is no printer output as a result of this command.
Special Notes	<ol style="list-style-type: none"> To use this command with CC2 requires the Expanded Memory option. See your SATO representative for more information.

Status

Command Structure

<ESC>**BJ**S

Example: <ESC>BJ**S**

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

Default: None

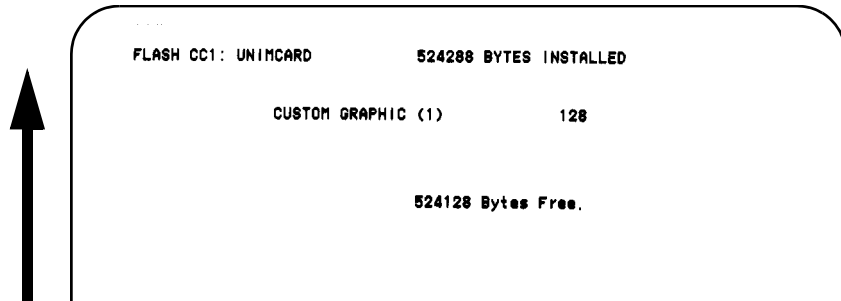
Command Function

Casues the printer to print the card status.

Printer Input

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

Printer Output



Special Notes

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

SECTION 4. TWO-DIMENSIONAL SYMBOLS

The following commands are used to create the two-dimensional symbologies supported by the CX400 / CX410.

- Maxicode
- PDF417

Maxicode

Command Structure <ESC>**B**Va,b,c,ddddddddd,eee,fff,gggg.....<ESC>

- a = Position of Maxicode symbol within the set, when used in a structured append format 1~8.
- b = Total number of Maxicode symbols in the set, when used in a structured format 1~8.
- c =
 - 2 For Mode 2 Structured Carrier Message for Domestic U.S. UPS shipments
 - 3 For Mode 3 Structured Carrier Message for International UPS shipments
 - 4 Standard symbol
 - 5 Not currently supported
 - 6 Reader programming

ddd..dd = 9 digit numeric Postal Code

eee = 3 digit numeric Country Code

fff = 3 digit numeric Service Class

gg..g = Data, terminated by <ESC>

Example: <ESC>**B**V1,2,3,123456789,222,333,MESSAGE<ESC>

Placement: Immediately preceding data to be encoded

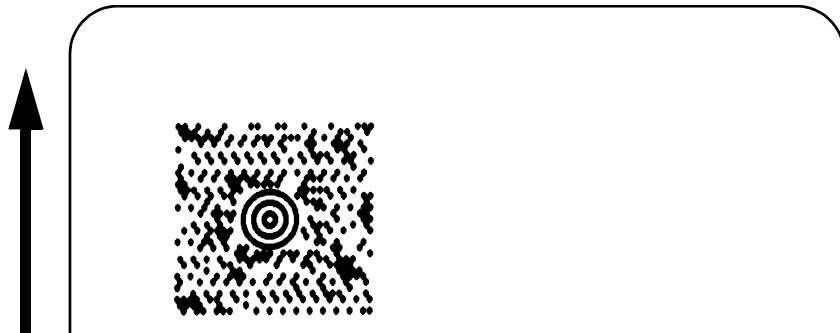
Default None

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

Command Function To print a UPS Maxicode symbol.

<ESC>A<ESC>V0100<ESC>H0100
<ESC>**B**V1,2,3,123456789,222,333,MESSAGE<ESC>Q001<ESC>Z

Printer Output



Special Notes

1. Please refer to UPS Publication "Guide to Bar Coding with UPS Online-Version 5" for the secondary message data format requirements and the latest format requirements.
2. This command implements Maxicode AIM I.S.S (UPS Version 3.1) symbol.
3. The following modes are supported:

MODE	POSTAL CODE	COUNTRY CODE	SERVICE CLASS	MESSAGE LENGTH
2	9 digits max numeric only	3 digits max numeric only	3 digits max numeric only	84 characters alphanumeric
3	6 digits fixed alphanumeric	3 digits max numeric only	3 digits max numeric only	84 characters alphanumeric
4 6	"000000" fixed data	"000" fixed data	"000" fixed data	91 characters alphanumeric

PDF417

Command Structure

<ESC>BKaabbcddeefffn...n,g

- 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

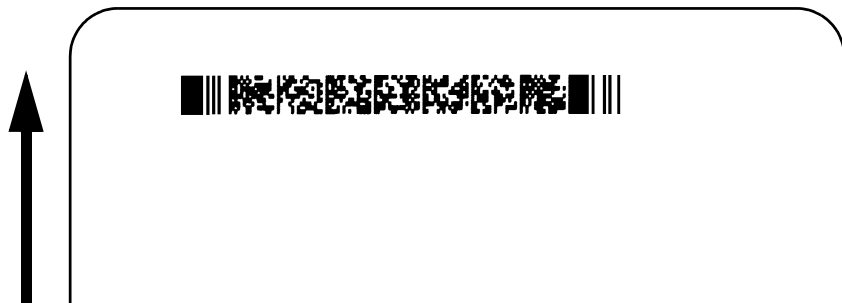
Command Function

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 values 00_H thru 1F_H can be specified as print data.
9. This command can be stored in a format.
10. The print height of the symbol will vary depending upon the data specified; numeric only, alpha only or alphanumeric.
11. The Macro and Truncated PDF417 symbols are not supported.

Section 4: Two-Dimensional Symbols

SECTION 5. CONFIGURATION COMMANDS

These commands are used to change to operating configuration of the printer. The settings currently active in the printer can be determined by printing a Test Label, either by sending the <ESC>CT Print Test Label command or by pressing the FEED button while turning the printer on.

Backfeed Enable

COMMAND STRUCTURE	<p><ESC>CEa</p> <p>a = 0 = Disables Backfeed 1 = Enables Backfeed</p> <p>Example: <ESC>CE1</p> <p>Placement: Separate data stream sent to printer</p> <p>Default: Last setting</p>
COMMAND FUNCTION	<p>To enable/disable backfeed before printing to align first print line on a label after it has been dispensed.</p>
INPUT TO PRINTER	<p><ESC>A <ESC>CE1 <ESC>Z</p>
PRINTER OUTPUT	<p>There is no output as a result of this command.</p>
SPECIAL NOTES	<ol style="list-style-type: none">1. When Backfeed is enabled, the printer will feed the last label of a print job forward to the dispense/cut position. Upon receipt of the next print job, it will retract the label to the first print line position before printing.2. This setting is saved in non-volatile memory.3. The setting becomes ineffective once a cutter or dispenser is enabled.

Calibrate Sensor

COMMAND STRUCTURE	<ESC>CA Example: <ESC>CA Placement: Separate data stream sent to printer Default: There is no default for this command.
COMMAND FUNCTION	To calibrate the label sensor for media and ribbon combinations..
INPUT TO PRINTER	<ESC>A <ESC>CA <ESC>Z
PRINTER OUTPUT	There is no output as a result of this command. It causes the printer to feed approximately 6 inches of media while the characteristics of the label backing or eye-mark are measured.
SPECIAL NOTES	<ol style="list-style-type: none">1. The sensor is calibrated for the currently selected sensor type.2. This setting is saved in non-volatile memory.3. The sensor must be recalibrated whenever the sensor type is changed or a label detect failure occurs4. When calibrating the sensor for Thermal Transfer printing, the ribbon must be installed in the printer.

Custom Protocol Command Codes Download

COMMAND STRUCTURE <ESC>LD,a,b,c,d,e,f,g,h,i,j

- a = Replacement character for STX
- b = Replacement character for ETX
- c = Replacement character for ESC
- d = Replacement character for ENQ
- e = Replacement character for CAN
- f = Replacement character for NUL
- g = Replacement character for OFFLINE
- h = Auto-Online. Printer powers up in the online mode.
0: Yes
1: No
- i = Zero Slash. Places a slash through the "0" character.
0: Yes
1: No
- j = Hexa-decimal character for Euro-character

Example: <ESC>LD,{,},%,#,&,*~,0,0,D5

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,D5
<ESC>Z

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



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 Test Label (<ESC>CT).

Label Tear-Off

COMMAND STRUCTURE	<ESC>CBabb a = + moves print line down from the top label edge - moves print line up towards the top label edge bb = Distance moved in mm (00 to 98) Example: <ESC>CB+19 Placement: Separate data stream sent to printer Default: Last valid setting
COMMAND FUNCTION	To adjust the location of the first print line on the label.
INPUT TO PRINTER	<ESC>A <ESC>CB+19 <ESC>Z
PRINTER OUTPUT	There is no printer output for this command.
SPECIAL NOTES	<ol style="list-style-type: none">1. The effects of this command are absolute, i.e. if an <ESC>CB+06 command is followed by an <ESC>CB-02, the resulting position is -02 mm.2. The maximum range for the value stored in the printer is 98 mm. Any commands received that causes the value to exceed 00 or 98 mm will result in a setting of 00 or 98 mm respectively.3. This value is stored in non-volatile 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 on the "Pitch Offset" line on the Test Label.

Print Darkness Range

COMMAND STRUCTURE <ESC>CDaaa,bbb

aaa = Darkness range adjust (0 to 400)
Media adjustment (0 to 6000)

Example: <ESC>**CD250,3000**

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

Default: CD200,3300

COMMAND FUNCTION To make fine adjustments for best print quality.

INPUT TO PRINTER <ESC>A
<ESC>**CD200,3300**
<ESC>Z

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

SPECIAL NOTES

1. This setting is stored in non-volatile memory and will not change until a new Print Darkness Range command is received.
2. The current Print Mode can be verified by printing a Test Label.
3. It is recommended that a bar code verifier be used when making adjustments with this command.

Sensor Select

Command Structure

<ESC>Cla

- a = 0 Sensor not used
- 1 Reflective (Eye Mark) sensor
- 2 See-thru (transmissive) sensor

Example: See above

Placement: Separate data stream sent to printer

Default: See-thru sensor

Command Function

To select the label sensing method for a job.

Input to Printer

<ESC>A
<ESC>I1
<ESC>Z

Printer Output

There is no printer output as a result of this command

Special Notes

1. This setting is stored in non-volatile memory. The setting will not change until another valid <ESC>Cla command is received, even if power is removed from the printer.
2. The reflective Eye-Mark, label gap or notch must be at least 2 mm wide and extend 10 mm from the left edge (facing the printer) of the label backing.

Serial Interface Parameters

COMMAND STRUCTURE<ESC>**CR**aaaaa,b,c,d

aaaaa = Baud rate, 9600, 19200, or 38400 bps

b = Parity
 N = **N**one
 O = **O**dd
 E = **E**ven

c = Number of data bits, 7 or 8

d = Number of stop bits, 1 or 2

Example: <ESC>CR9600,N,8,1

Placement: Separate data stream sent to printer

Default: 9600,N,8,1

COMMAND FUNCTION

To set the operating parameters of the RS232 Interface.

INPUT TO PRINTER

<ESC>A

<ESC>**CR9600,N,8,1**

<ESC>Z

PRINTER OUTPUT

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

SPECIAL NOTES

1. The settings must match those of the host system. The RS232 settings of the printer may be verified by printing a Test Label.
2. A two second delay after this command must separate this command and any other command sent to the printer or the following command may be lost.

Test Label

COMMAND STRUCTURE <ESC>CT

Example: <ESC>CT

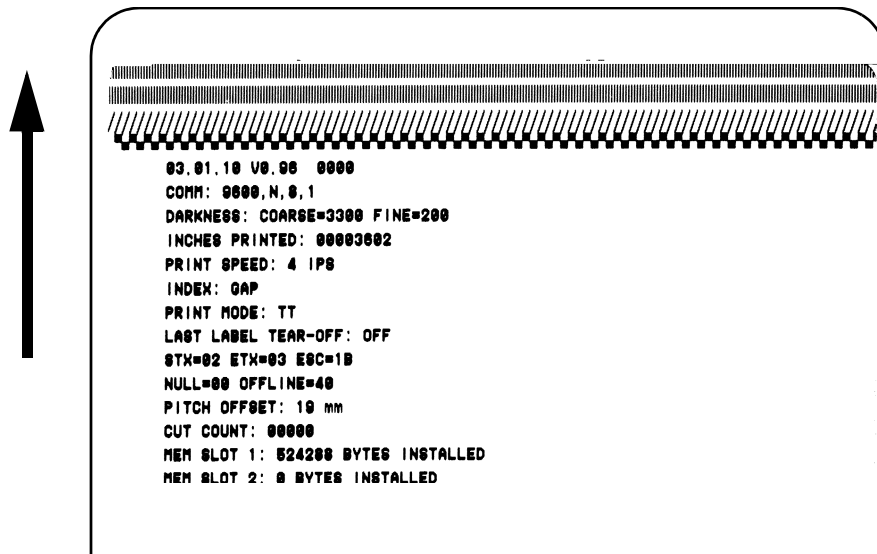
Placement: In a separate data stream.

Default: None

COMMAND FUNCTION To allow test labels to be printed via software control.

PRINTER INPUT <ESC>A
<ESC>CT
<ESC>Z

PRINTER OUTPUT



Special Notes

1. This mode is used for diagnostic troubleshooting to verify current printer settings.

Set Print Mode

Command Structure	<code><ESC>CPa</code> a = 0 = Direct Thermal Printing (no ribbon) 1 = Thermal Transfer Printing (with ribbon) 2 See-thru (transmissive) sensor Example: <code><ESC>CP0</code> Placement: Must precede all other commands in the data stream. Default: Thermal Transfer
Command Function	To select the print method..
Input to Printer	<code><ESC>A</code> <code><ESCP1</code> <code><ESC>Z</code>
Printer Output	There is no printer output as a result of this command
Special Notes	<ol style="list-style-type: none">1. This setting is stored in non-volatile memory. The setting will not change until another valid <code><ESC>CPa</code> command is received, even if power is removed from the printer.2. The current print mode may be verified by printing a test label.

