



# **“e” AND PRO SERIES PRINTERS**

## **PROGRAMMING REFERENCE**

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# SECTION 1.

## PROGRAMMING CONCEPTS

### INTRODUCTION

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This section presents the commands that are used with the SATO Series “e” and PRO printers to produce labels with logos, bar codes and alphanumeric data. All of the SATO Programming Language commands use the same syntax. Some commands reference a physical point on the label using horizontal and vertical dot reference numbers. The allowable range for these references is dependent upon the particular printer to accommodate different print widths and resolutions. These differences are noted in tables under the commands affected

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}

## Section 1. Programming Concepts

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. Alternately, the user may define and download a set of custom Protocol Control Codes (see Appendix E).

The Protocol Control codes are selected by DIP switch DSW2-7.

CONTROL CHARACTER	STANDARD DSW2-7 OFF	NON-STANDARD DSW2-7 ON	DESCRIPTION
STX	02 Hex	7 B Hex = {	Start of Data
ETX	03 Hex	7 D Hex = }	End of Data
ESC	1B Hex 5	5 E Hex =	Command code to follow
ESC	1B Hex	5E Hex = ^	Command code to follow
ENQ	05 Hex	40 Hex = @	Get printer status, Bi-Com mode
CAN	18 Hex	21 Hex = !	Cancel print job, Bi-Com mode
Off-Line	40 Hex	5D Hex = ]	Take printer Off-Line

### USING BASIC

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

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

```
OPEN “COM1:9600,E,8,1,CS,DS”AS #1
```

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

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

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

### PRINTING WITH THE PARALLEL PORT

5 REM CL612 Parallel Example	Identifies the program as a CL612 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\$;"XL1SATO";	Sends the data "SATO" to be placed 400 dots horizontally and 100 dots vertically on the label and printed in the "XL" 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 CL612 RS232 Example	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.
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.
30 PRINT #1,CHR\$(2);	Sends an <STX> (ASCII Code a decimal "2") to the printer instructing it to prepare to receive a message.

## Section 1. Programming Concepts

50 PRINT #1,E\$;"A";	Sends an "<ESC>A" command code to Print Port #1 opened by statement 20 above.
60 PRINT #1, E\$;"H400";E\$;"V100";E\$;"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, E\$;"Q1";	Instructs the printer to print a quantity of one label.
60 PRINT #1, E\$; "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.

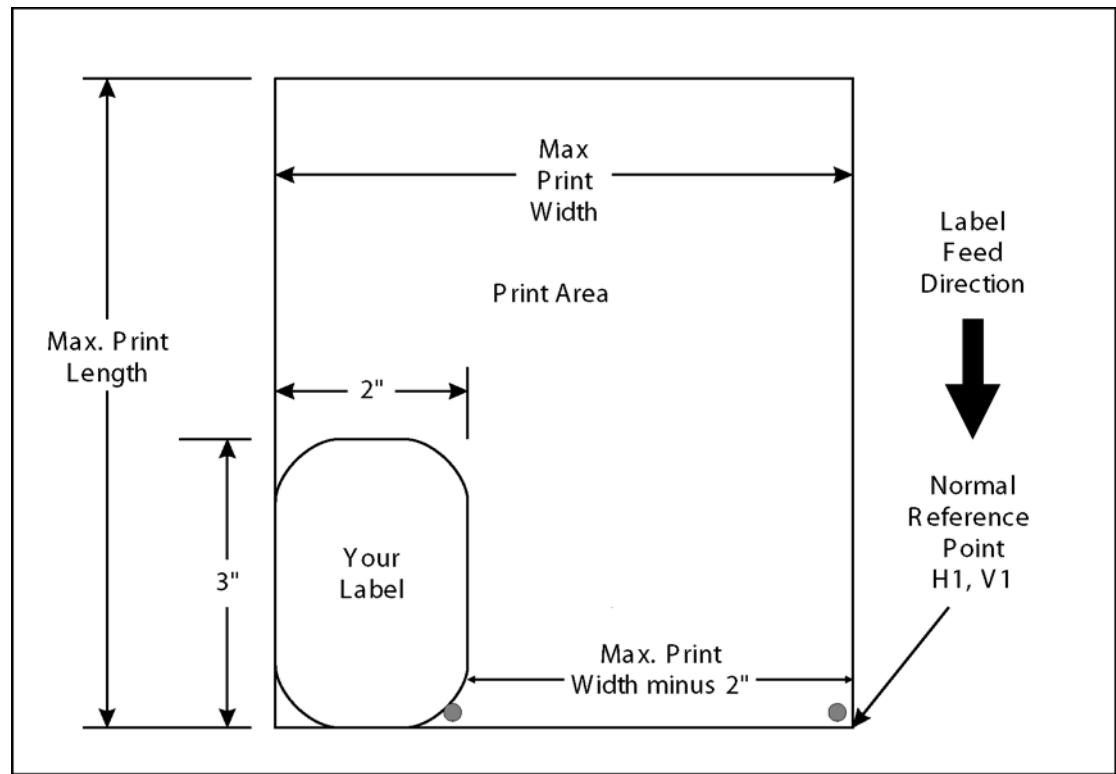
### THE PRINT AREA

---

The maximum print area for the different printer models is listed in Table 1. 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

**Table 1: Print Area**

	CL412e M-84 Pro-3	CL612e	M-10e	M-8490Se	M-84 Pro-6	M-5900RVE M-8459E	M-8485Se	CL608e M-8460Se	CL408e M-8400RVE M-84 Pro-2
Resolution dpi/dpmm	305 12	305 12	305 12	305 12	609 24	203 8	203 8	203 8	203 8
Max Print Width (Hmax) dots/inches/mm	1248 4.1 104	1984 6.5 165	6400 10.5 266.7	1344 4.4 112	2496 4.1 104	896 4.4 112	1024 5.0 128	1216 6.0 152	832 4.1 104
Std Print Length (Vmax) dots/inches/mm	2136 7.0 178	2136 7.0 178	3600 11.8 300	2136 7.0 178	4272 7.0 178	2136 7.0 178	1424 7.0 178	1424 7.0 178	1424 7.0 178
Expanded Print Length (Vmax Expanded) dots/inches/mm	9999 32.8 833	9999 32.8 833	10080 16.5 420	9999 32.8 833	9999 16.4 416	9999 49.2 1249	9999 49.2 1249	9999 49.2 1249	9999 49.2 1249

There are three methods available to make sure your printed output will appear correctly on your label. They are as follows:

## Section 1. Programming Concepts

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 an M-8400Rve 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. . . . .

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 an M-8400Rve 8 dpmm printer:

$$\text{Label Width} = 2" \times 25.4 \text{ mm/in} \times 8 \text{ dpmm} = 406 \text{ dots}$$

$$\begin{aligned} \text{New Base Reference Point} &= \text{Maximum Print Width} - \text{Label Width} \\ &= (832 \text{ dots}) - (406 \text{ dots}) = 426 \text{ dots} \end{aligned}$$

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

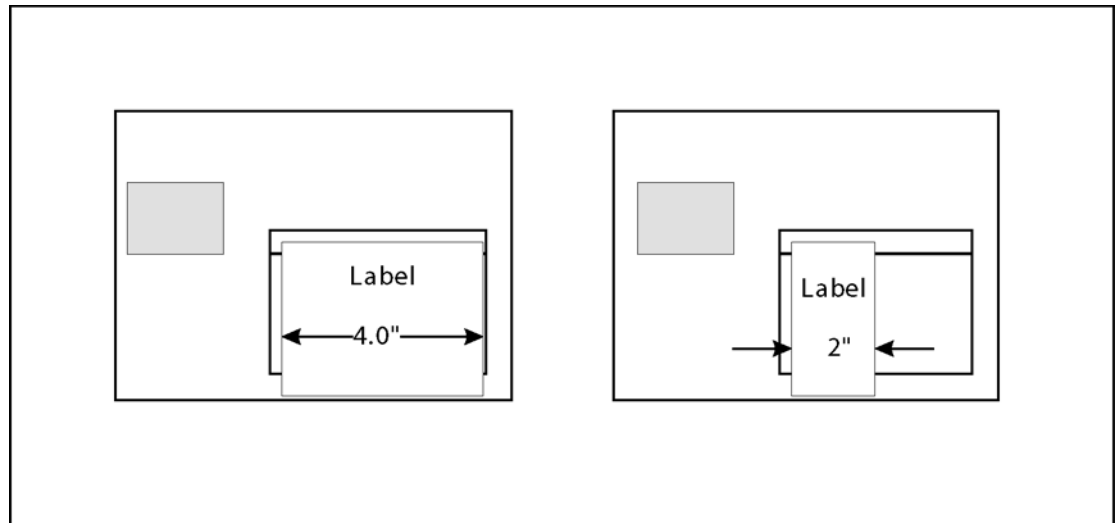
the sample data stream may help to adjust the print for your labels. See the following two examples or refer to the Base Reference Point command description.

For example, the following illustrates a sample data stream for a M-8400RVe 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

---

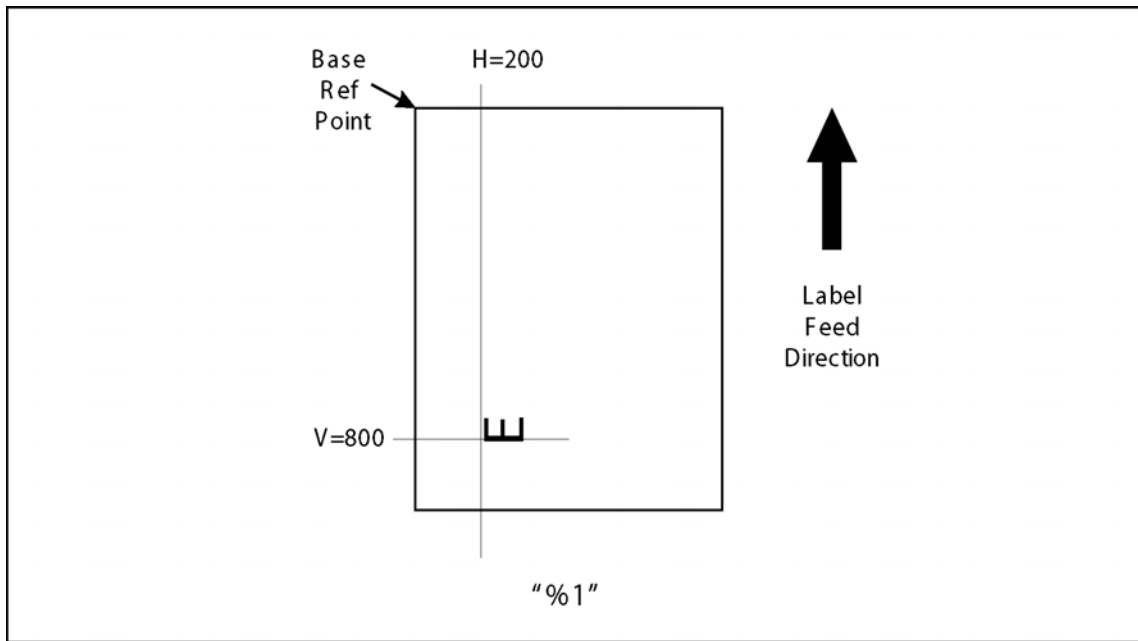
The M-8400RVe printer can rotate each print field in 90° increments using the Rotate command.

- <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:

```
<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:

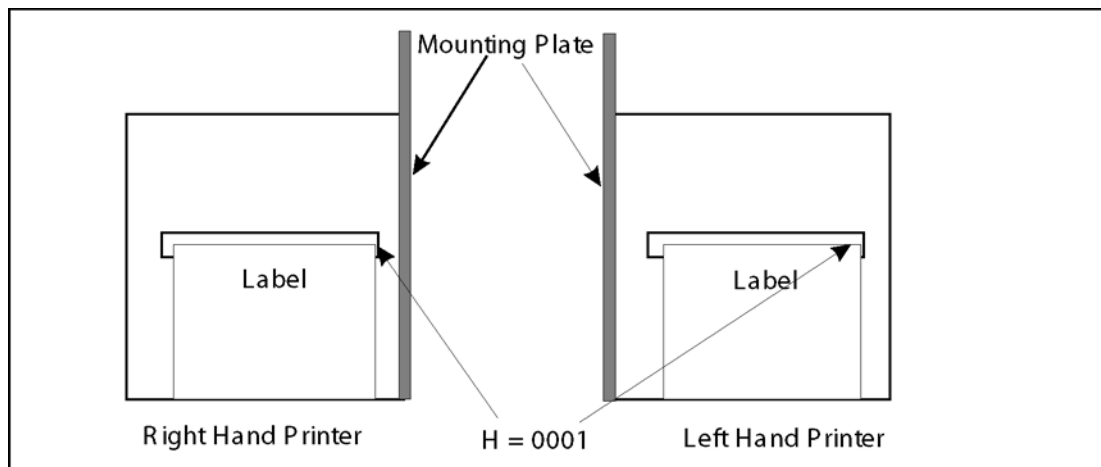
COMMAND	DEFAULT	NOTE
Print Rotation	0°	(1)
Vertical Reference Point	0	(1)
Horizontal Reference Point	0	(1)
Character Pitch	2 (	(1)
Base Reference Point	H=0, V=0	(2)
Character Expansion	1	(1)
Print Darkness	-	(1)(3)
Print Speed (DSW2-8 = On)	-	(2)(3)
Print Speed (DSW2-8 = Off)	-	(2)(3)
Proportional Spacing	Enabled	(1)
Cutter Command	Disabled	(1)

### 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.
3. This default setting is printer dependent.

## OPPOSITE HAND"SE" PRINTERS

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



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

## SECTION 2.

# COMMAND CODES

---

This section contains the basic Command Codes for the SATO “e” and PRO Series 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 5 inch wide label in a M-8400Rve printer. The labels for all other printers will be similar, but, because of different resolutions and print widths may be larger or scaled differently.*

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**

- a = 0 Codabar
- 1 Code 39
- 2 Interleaved 2 of 5 (I 2/5)
- 3 UPC-A / EAN-13
- 4 EAN-
- 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)
- 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: &lt;ESC&gt;BD103200

Placement: Immediately preceding data to be encoded

Default: None

**Command Function**

To print bar code images on a label. With this command, there are 14 standard bar code symbologies available to be printed and three two dimensional symbols (see *Section 5. Two Dimensional Symbols*). Each of the bar code symbologies are unique, and it is important to know the differences. See *Appendix B* for specific information on using each individual bar code symbol.

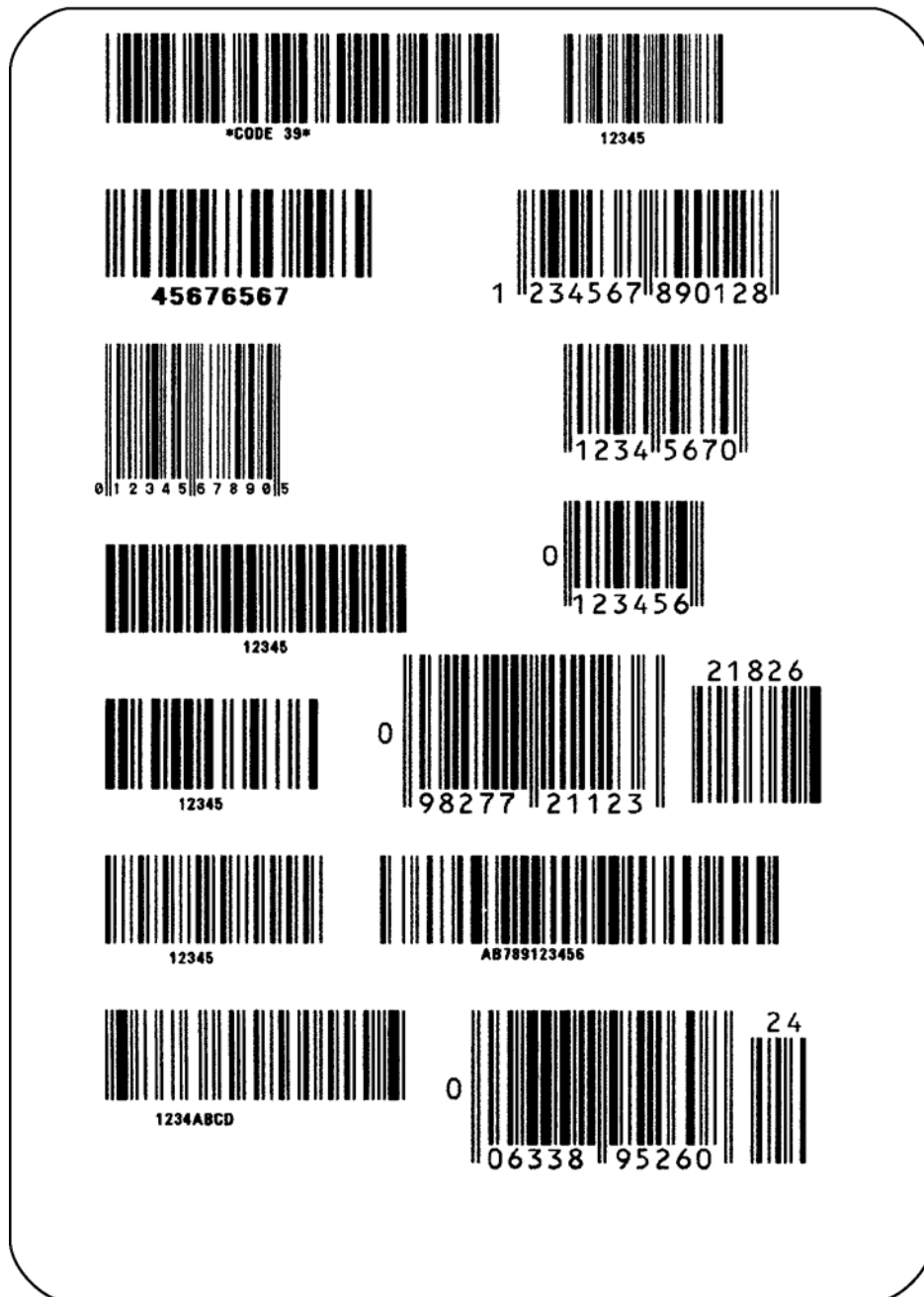
## Section 2: Command Codes

### Input to Printer

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

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

Printer Output



**UCC-128**

Without Incrementing

<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.



---

## Bar Codes, Expansion

---

**Command Structure**      **<ESC>BWaabb**

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**abbccdde

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

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

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

aaaa = Horizontal Print Offset (-Hmax to +Hmax)

bbbb = Vertical Print Offset (-Vmax to +Vmax)

Example: **<ESC>A3H100V0050**

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

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

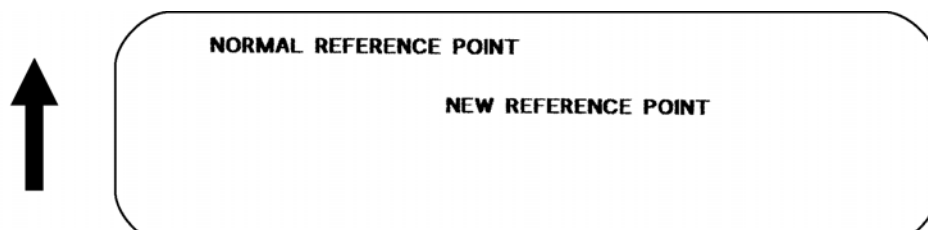
## Command Function

To establish a new base reference point for the current label. The base reference point is the top left corner or lorigin from where all print position commands are based. This command may be very helpful when using labels less than four inches wide to place images on the printable label surface. It may also be used to move images past preprinted fields on a label.

## Input to Printer

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

## Printer Output



### Special Notes

1. Use of this command will set the Vertical/Horizontal Offset setting of the printer configuration until a new Base Reference Point command is issued or the setting is changed from the operator panel.
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 "Se" 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).
7. See Table 1 in *Section 1. Programming Concepts* for values of Hmax and Vmax.

# Characters, Custom-Designed

## Command Structure

Store Command: **<ESC>Tabcc**

Recall Command: **<ESC>Kab90cc**

a = 1 16x16 matrix  
2 24x24 matrix

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

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

(data) = Data to describe the character

Example:

**<ESC>T1H3F**

**<ESC>K1H903F**

See Appendix C for a more detailed explanation

Placement:

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

Default:

None

## Command Function

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

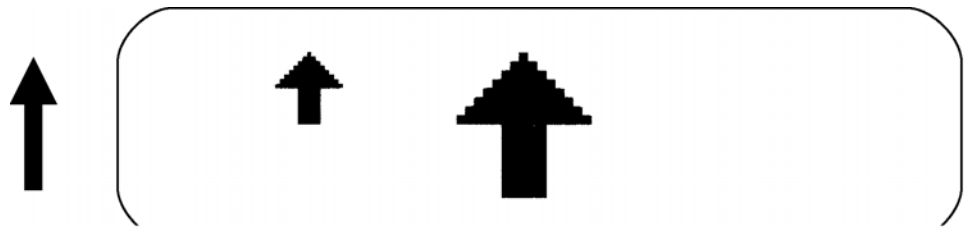
## Printer Input

See Appendix C for a detailed explanation.

**<ESC>A <ESC>T1H3F0100038007C00FE01FF03FF87FFCFFFE  
07C007C007C007C007C007C007C007C0  
<ESC>Z**

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

### Printer Output



### Special Notes

1. When printing the custom character using the 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 Characters, Custom-Designed
3. The Character Expansion value is in effect for the current print job until a new expansion command is specified.
4. The Line and Box command, if used within the data stream, may return all subsequent text to the default expansion of 1 x 1. Therefore, either send the Character Expansion command before all printed data, or send Line and Box commands last, preceding the <ESC>Q Quantity command.



---

## Character, Fixed Spacing

---

**Command Structure**

<ESC>**PR**

Example:            See Above

Placement:        Preceding the data

Default:            The default is Proportional Spacing.

**Command Function**

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

**Printer Input**

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

**Printer Output**



**PROPORTIONAL SPACING**  
**FIXED SPACING**

**Special Notes**

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

# Character Pitch

<b>Command Structure</b>	<p>&lt;ESC&gt;Paa</p> <p>aa = Number of dots between characters (00-99)</p> <p>Example: &lt;ESC&gt;P03</p> <p>Placement: Preceding the text to be printed</p> <p>Default: &lt;ESC&gt;<b>P02</b></p>
<b>Command Function</b>	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.
<b>Input to Printer</b>	<pre>ESC&gt;A &lt;ESC&gt;H0025&lt;ESC&gt;V0025&lt;ESC&gt;L0202&lt;ESC&gt;XB1SATO &lt;ESC&gt;H0025&lt;ESC&gt;V0125&lt;ESC&gt;L0202&lt;ESC&gt;<b>P20</b>&lt;ESC&gt;XB1SATO &lt;ESC&gt;H0025&lt;ESC&gt;V0225&lt;ESC&gt;L0202&lt;ESC&gt;<b>P40</b>&lt;ESC&gt;XB1SATO &lt;ESC&gt;Q1&lt;ESC&gt;Z</pre>
<b>Printer Output</b>	



**SATO**  
**S A T O**  
**S A T O**

### 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  
 $\text{Pitch} = (03) \times (03) = 9 \text{ dots}$
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

<b>Command Structure</b>	<b>&lt;ESC&gt;PS</b>	Set to proportional spacing
	<b>&lt;ESC&gt;PR</b>	Reset to fixed spacing
	Example:	See above
	Placement:	Preceding the data to be proportionally spaced
<b>Command Function</b>	Default:	<b>&lt;ESC&gt;PS</b>
	To specify the printing of proportional or fixed spacing for proportionally spaced fonts.	
	<b>Printer Input</b>	
	<pre> &lt;ESC&gt;A &lt;ESC&gt;H0025&lt;ESC&gt;V0050&lt;ESC&gt;PS &lt;ESC&gt;L0202&lt;ESC&gt;XMPROPORTIONAL SPACING &lt;ESC&gt;H0025&lt;ESC&gt;V0130&lt;ESC&gt;PR &lt;ESC&gt;L0202&lt;ESC&gt;XMFIXED SPACING &lt;ESC&gt;Q1&lt;ESC&gt;Z </pre>	

**Printer Output**



**PROPORTIONAL SPACING**  
**FIXED SPACING**

## Special Notes

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

# Clear Print Job(s) & Memory

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

---

# Continuous Forms Printing

---

**Command Structure**

None

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

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

# Copy Image Area

## Command Structure

**<ESC>WDHaaaaVbbbbXccccYdddd**

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

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

cccc = Horizontal length of the image area to be copied

dddd = Vertical length of the image area to be copied

Example: **<ESC>WDH0100V0050X0600Y0400**

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

Default: None

## Command Function

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

## Input to Printer

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

## Printer Output



**SATOSATOSATOSATOSATOSATOSATO  
SATOSATOSATOSATOSATOSATOSATO  
SATOSATOSATOSATOSATOSATOSATO  
SATOSATOSATOSATOSATOSATOSATO**

**SATOSATOSATOSATOSATO  
SATOSATOSATOSATOSATO  
SATOSATOSATOSATOSATO  
SATOSATOSATOSATOSATO**

**Special Notes**

1. Use the Print Position commands (V and H) to locate the new area for the duplicate image.
2. Position of the new target area must not be inside the original image.
3. If you use the Rotate command, V, H, X and Y axis will be reversed.
4. If the reference area of the target image exceeds the print area, it will not be printed.
5. See Table 1 in *Section 1. Programming Concepts* for values of Hmax and Vmax.



# 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

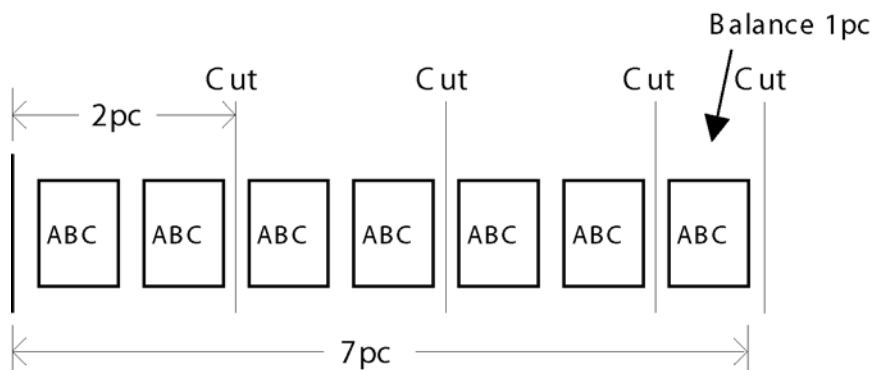
To control the cutting of labels when using a SATO cutter unit with the printer. This command allows the cutting of a multi-part tag or label at a specified interval within a print job. It differs from the <ESC>~ Cut Job command in that it does not interact with the quantity command.

## 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.

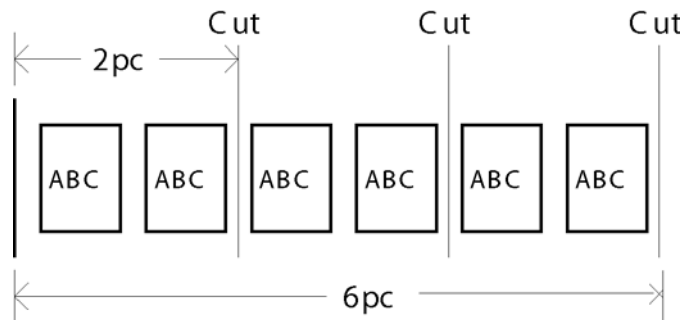


## Special Notes

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

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



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

# Cut Last

## Command Structure

<ESC>~B

Example: <ESC>~B

Placement: Separate data stream sent to the printer

Default: None

## Command Function

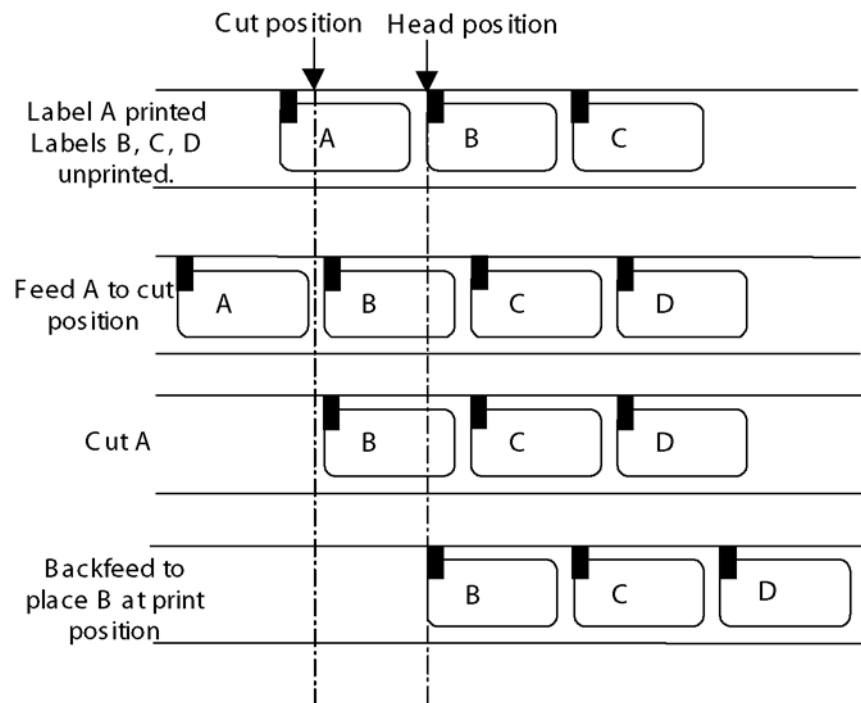
To control the cutting of labels when using a SATO cutter unit with the printer. This command allows the cutting of a printed multi-part tag or label that is left in the printer after a job is cut.

## 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	OCR-A font (see note 7 for matrix)		
OB	OCR-B font (see note 7 for matrix)		

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

## Input to Printer

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

Printer Output



Special Notes

1. Characters may be enlarged through the use of the Character Expansion command.
2. Character spacing may be altered through the use of the Character Pitch command. The default is 2 dots between characters. It is recommended to use a spacing of 5 dots for OCR-A and 1 dot for OCR-B.
3. You may also create custom characters or fonts. See the <ESC>T Custom-Designed Characters command.
4. A font must be defined for each field to be printed. There is no default font.
5. Fonts U, S, M, OA and OB are identical to fonts U, S, M, OA and OB on the SATO M-8400 printer. (Note: These fonts, except the OA and OB fonts which are fixed in size, will be 33% smaller on a 300 dpi printer and 67% smaller on a 600 dpi printer)
6. The proportionally spaced fonts XU, XS, XM, XL and XA can be printed with fixed spacing using the <ESC>PS Proportional Space command.
7. The matrices for the OA and OB fonts are scaled so that they will remain a constant size according to the OCR-A and OCR-B specifications when printed on different resolution printers.

	203 dpi (8 dpm)	305 dpi (12 dpmm)	609 dpi (24 dpmm)
OA Font	15 dots W x 22 dots H	22 dots W x 33 dots H	44 dots W x 66 dots H
OB Font	20 dots W x 24 dots H	30 dots W x 36 dots H	60 dots W x 72 dots H

# Font, Raster

## Command Structure

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

a = A CG Times font style  
B CG Triumvirate font style.

bb = Always 00

ccc = Horizontal size (16 - 999 dots or P08 - P72)

ddd = Vertical size (16 - 999 dots or P08 - P72)

nn..n = Data to be printed.

Example: <ESC>**RDA00,014,018ABCD**

Placement: Within normal command stream.

Default: None

## Command Function

To print point size characters created using font definitions.

## Input to Printer

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

## Printer Output



CG Times  
CG Triumvirate

## Special Notes

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

---

# Font, Vector

---

## Command Structure

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

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

a = A Helvetica Bold (proportional spacing)  
B Helvetica Bold (fixed spacing)

b = Font width (50-999)

c = Font height (50-999 dots)

d = Font variation (0-9) as follows:

- 0 Standard
- 1 Standard open (outlined)
- 2 Gray (mesh) pattern 1
- 3 Gray (mesh) pattern 2
- 4 Gray (mesh) pattern 3
- 5 Standard open, shadow 1
- 6 Standard open, shadow 2
- 7 Standard mirror image
- 8 Italic 9 Italic open, shadow

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

Placement: Immediately preceding data to be printed.

Default: None

## Command Function

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

## Input to Printer

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

Printer Output



**SATO AMERICA  
VECTOR FONT**

***SATO***

**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

<b>Command Structure</b>	Font WB: <ESC> <b>WBa</b>	Font XB: <ESC> <b>XBa</b>
	Font WL: <ESC> <b>WLa</b>	Font XL: <ESC> <b>XLa</b>
	a = 0 Disables auto-smoothing of font 1 Enables auto-smoothing of font (see notes below)	
	Example:	<ESC> <b>WB1123456</b>
	Placement:	Preceding the data to be printed
	Default:	None
<b>Command Function</b>	To print text images on a label. These are the four auto-smoothing fonts available on the printer.	

Non-Proportional		Proportional <sup>(1)</sup>	
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.

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

## Printer Output



SATO	<b>SATO</b>
SATO	<b>SATO</b>
<b>SATO</b>	SATO
<b>SATO</b>	SATO

## Special Notes

1. Auto-smoothing (when enabled) is only effective if the character expansion rate is at least (3) times in each direction.
2. Characters may be enlarged through the use of the <ESC>L Character Expansion command.
3. Character spacing may be altered through the use of the <ESC>A Character Pitch command.
4. A font must be defined for each field to be printed. There is no default font.
5. The proportionally spaced fonts XU, XS, XM, XL and XB can be printed with fixed spacing using the <ESC>PS Proportional Space command.

---

## Form Feed

---

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

# Form Overlay, Recall

## Command Structure

<ESC>/

Example: See above

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

Default: None

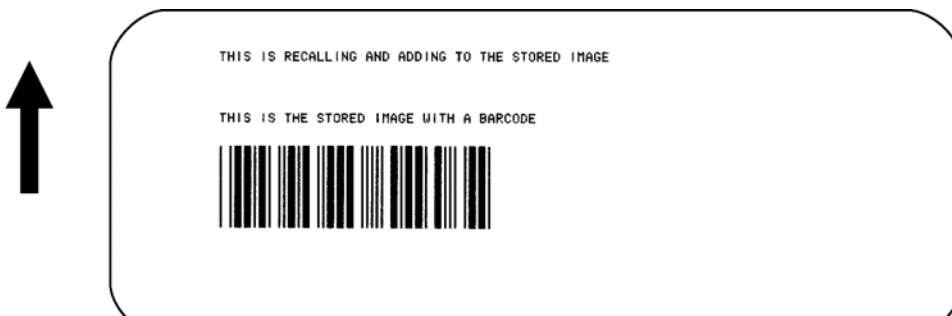
## Command Function

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

## Input to Printer

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

## Printer Output



## Special Notes

1. The overlay is stored using the <ESC>& Form Overlay Store command.
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

---

<b>Command Structure</b>	<ESC>&
Example:	See above
Placement:	Must be preceded by all other data and placed just before the Stop command (<ESC>Z)
Default:	None
<b>Command Function</b>	To store a label image in the volatile form overlay memory. Only one label image may be stored in this memory area at a time.
<b>Input to Printer</b>	<ESC>A <ESC>H0100<ESC>V0125 <ESC>STHIS IS THE STORED IMAGE WITH A BARCODE <ESC>H0100<ESC>V0165<ESC>B103100*12345* <ESC>& <ESC>Z
<b>Printer Output</b>	There is no output from this command. It stores the label image in the overlay buffer.
<b>Special Notes</b>	<ol style="list-style-type: none"> <li>1. Remember that this storage is volatile. Therefore, if the printer loses power, the overlay must be sent again.</li> <li>2. The overlay is recalled using the &lt;ESC&gt;/ Form Overlay Recall command.</li> <li>3. Form overlays do not have to be recompiled each time they are called to be printed and therefore may result in much faster print output.</li> </ol>

---

# Graphics, Custom

---

**Command Structure**<ESC>**G**abbbccc(data)

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

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

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

(data) = Hex data to describe the graphic image

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

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

Default: None

**Command Function**

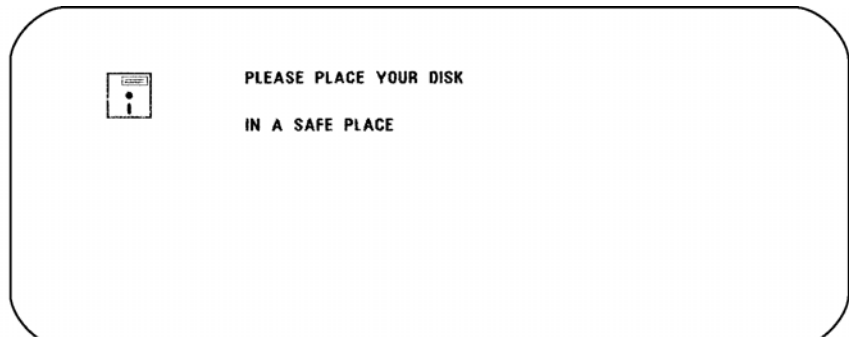
To create and print custom graphics (logos, pictures, etc.) on a label.  
The graphic image may be printed along with other printed data to  
enhance label appearance or eliminate the need for preprinted label  
stock. Using a dot-addressable matrix, design the graphic image in 8 dot  
by 8 dot blocks,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

**Printer Input**

```
<ESC>A
<ESC>H0100<ESC>V0100<ESC>GH006006
FFFFFFFFFFFFFFFFFFFFFFFFC00000000003
C00000000003C000FFFFFFFFF3C00080000013
C00080000013C0009FFFFF13C00080000013
C00080000013C0009FFFFF13C00080000013
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**

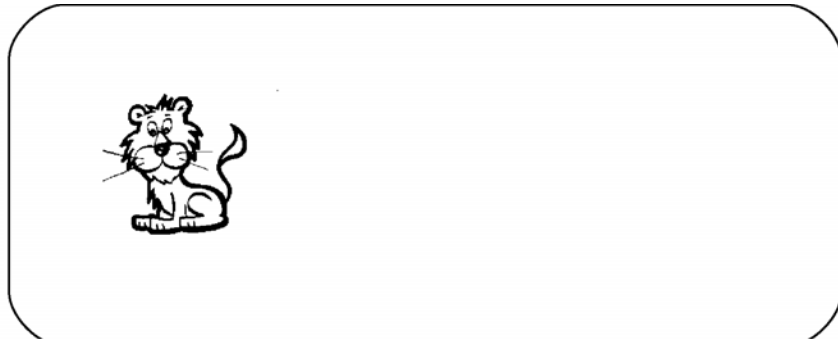
1. Do not use ASCII <CR> or <LF> characters (carriage return or line feed) as line delimiters within the graphic data or the actual image will not be printed as specified.
2. A custom graphic cannot be enlarged by the <ESC>L Character Expansion command.
3. A custom graphic is not affected by either of 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%.
6. See Table 1 in *Section 1. Programming Concepts* for values of Hmax and Vmax.
7. Use the <ESC>E0 Expanded Print Length command to get the maximum label length.

---

# Graphics, BMP

---

<b>Command Structure</b>	<p>&lt;ESC&gt;<b>GM</b>aaaaa,(data)</p> <p>aaaaa = Number of bytes to be downloaded</p> <p>Example: &lt;ESC&gt;<b>GM32000</b>, ... data...</p> <p>Placement: Anywhere within the job data stream</p> <p>Default: None</p>
<b>Command Function</b>	To allow the creation and printing of graphic images using a BMP file format.
<b>Printer Input</b>	<p>See Appendix Appendix C for a detailed example</p> <p>&lt;ESC&gt;A          &lt;ESC&gt;V0100&lt;ESC&gt;H0100&lt;ESC&gt;<b>GM03800</b>,(...Data...)          &lt;ESC&gt;Q1          &lt;ESC&gt;Z</p>

**Printer Output****Special Notes**

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



# Graphics, PCX

## Command Structure

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

aaaaa = Number of bytes to be downloaded

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

Placement: Anywhere within the job data stream

Default: None

## Command Function

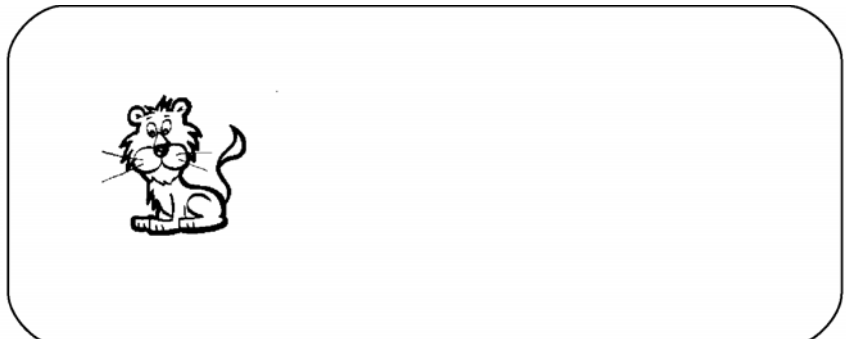
To allow the creation and printing of graphic images using a PCX file format.

## Printer Input

See Appendix Appendix C for a detailed example

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

## Printer Output



## Special Notes

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

---

## Job ID Store

---

<b>Command Structure</b>	<p>&lt;ESC&gt;IDaa</p> <p>aa = Job ID assigned (01 to 99)</p> <p>Example: &lt;ESC&gt;ID09</p> <p>Placement: Immediately following the &lt;ESC&gt;A in the job data stream.</p> <p>Default: None</p>
<b>Command Function</b>	To add an identification number to a job. The status of the job can then be determined using the ENQ command in the Bi-Com status mode (See <i>Operators Manual</i> for the specific printer for more information).
<b>Printer Input</b>	<p>&lt;ESC&gt;A</p> <p>&lt;ESC&gt;ID02</p> <p>... Job ...</p> <p>&lt;ESC&gt;Z</p>
<b>Printer Output</b>	There is no printer output as a result of this command.
<b>Special Notes</b>	<ol style="list-style-type: none"> <li>1. Works only in Bi-Communications modes. The Job ID number must be stored before Bi-Com status mode can be used.</li> <li>2. If more than one ID number is sent in a single job, i.e. <p>&lt;ESC&gt;A</p> <p>&lt;ESC&gt;ID01</p> <p>.....</p> <p>&lt;ESC&gt;ID02</p> <p>.....</p> <p>the last number transmitted will be used.</p> </li> </ol>

---

## Job Name

---

**Command Structure**

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

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

Example: <ESC>**WKSATO**

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

Default: None

**Command Function**

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

**Printer Input**

<ESC>A

<ESC>**WKSATO**

. . . Job . . .

<ESC>Z

**Printer Output**

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

**Special Notes**

1. Works only in Bi-Com 4 mode. The Job Name must be stored before Bi-Com status mode can be used.
2. If more than one Job Name is sent in a single job, i.e.

<ESC>A

<ESC>**WKSATO**

. . . . .

<ESC>**WKSATO AMERICA**

. . . . .

the last name transmitted will be used.

---

# Journal Print

---

**Command Structure**

&lt;ESC&gt;J

Example: See above

Placement: Immediately following &lt;ESC&gt;A

Default: None

**Command Function**

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

**Input to Printer**

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

**Printer Output**

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

**Special Notes**

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

# Lines and Boxes

## Command Structure

Line: **<ESC>FWaabcccc**

- aa = Width of horizontal line in dots (01-99)
- b = Line orientation H Horizontal line V Vertical Line
- cccc = Length of line in dots (see 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

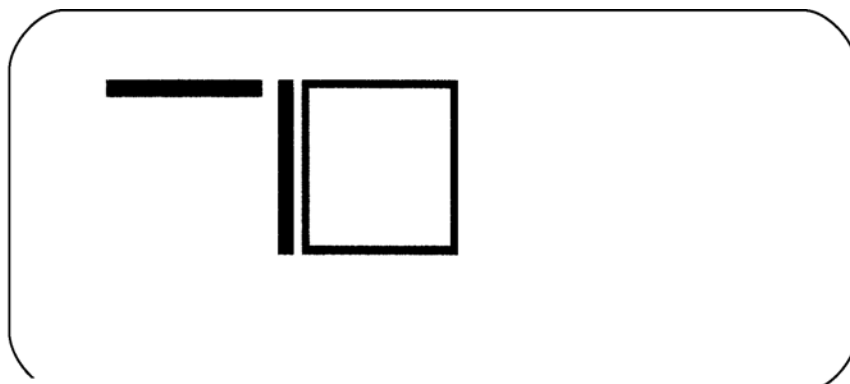
## Command Function

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. See Table 1 in *Section 1. Programming Concepts* for values of Hmax and Vmax.
3. Use the <ESC>E0 Expanded Print Length command for maximum label length.

# Line Feed

## Command Structure

<ESC>**Eaaa**

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

Example: <ESC>**E010**

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

Default: None

## Command Function

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

## Input to Printer

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

## Printer Output



```
THIS IS THE 1ST LINE
THIS IS THE 2ND LINE
THIS IS THE 3RD LINE
```

## Special Notes

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

---

## Media Size

---

Command Structure	<p><b>&lt;ESC&gt;A1aaaabbbb</b></p> <p>aaaa = Label Width in dots (0 to Hmax)</p> <p>bbbb = Label Length in dots (0 to Vmax)</p> <p>Example: <b>&lt;ESC&gt;A108323200</b></p> <p>Placement: Separate data stream to the printer.</p> <p>Default: <b>&lt;ESC&gt;A108322136</b></p>
COMMAND FUNCTION	To set the size of the media.
INPUT TO PRINTER	<p><b>&lt;ESC&gt;A</b></p> <p><b>&lt;ESC&gt;A108321424</b></p> <p><b>&lt;ESC&gt;Z</b></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"> <li>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.</li> <li>2. If the label size is changed, then this command must be respecified to center the print image on the label.</li> <li>3. All eight variables “aaaa” and “bbbb” must be included in this command.</li> <li>4. See Table 1 in <i>Section 1. Programming Concepts</i> for max length for values of Hmax and Vmax.</li> </ol>



# Mirror Image

## Command Structure

<ESC>**RM**

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

Placement: After label data

Default None

## Command Function

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

## Input to Printer

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

## Printer Output



## Special Notes

1. The <ESC>A1 Media defines the area to be mirrored.
2. This command can be used with the <ESC>% Rotate Fixed Base Reference Point command. Please note that the reference point rotation is dependent upon the location of the <ESC>% command in the data stream
3. This command should not be specified more than once in any single job.
4. This command cannot be used with commands requiring re-editing of the print area, such as Sequential Numbering, Real time clock or Copy Image Area.
5. Any data outside the area defined by the <ESC>A1 Media Size command is not mirrored the command is treated as a command error. Any print job containing the <ESC>RM command and without any print data will be treated as a command error.

---

## Off-Line/Pause

---

<b>Command Structure</b>	<p>&lt;ESC&gt;@,nn . . . n</p> <p>nn...n = Optional message to be displayed on the LCD. Maximum of 32 characters.</p> <p>Example: See above Placement: Anywhere in the print job between the &lt;ESC&gt;A and &lt;ESC&gt;Z</p> <p>Default: None</p>
<b>Command Function</b>	To specify the printer to come to an off-line state. When used within a print job, the printer goes off-line after finishing the print job.
<b>Input to Printer</b>	<p>&lt;ESC&gt;A</p> <p>&lt;ESC&gt;@, <b>LOAD BLUE LABELS AND PLACE PRINTER ON-LINE</b></p> <p>...Job...</p> <p>&lt;ESC&gt;Z</p>
<b>Printer Output</b>	There is no printer output for this command. The printer is placed in the Off-Line mode as soon as the current print job is finished.
<b>Special Notes</b>	<ol style="list-style-type: none"><li>1. You must press the LINE key on the front panel to return the printer to an On-Line status</li><li>2. Remember, when using this command, that the print job specifies &lt;ESC&gt;Q10, all ten labels will print before the printer goes off-line</li></ol>

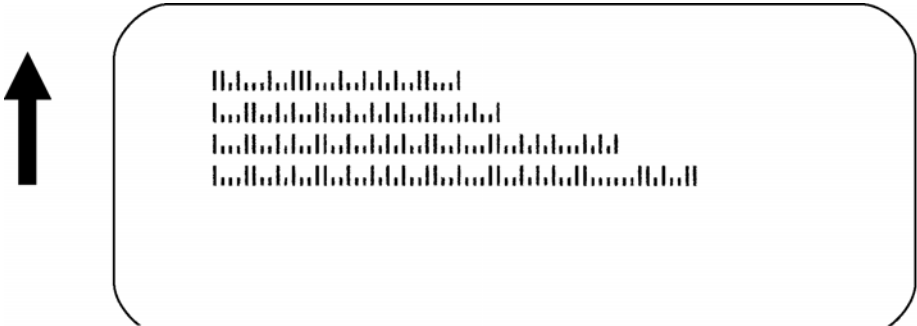
---

# Postnet

---

Command Structure	<b>&lt;ESC&gt;BPn...n</b>  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: <b>&lt;ESC&gt;BP123456789</b>  Placement: Immediately preceding the data to be encoded  Default: None
Command Function	To print Postnet bar codes
Printer Input	<b>&lt;ESC&gt;A</b> <b>&lt;ESC&gt;H0100&lt;ESC&gt;V0120&lt;ESC&gt;BP94089</b> <b>&lt;ESC&gt;H0100&lt;ESC&gt;V0160&lt;ESC&gt;BP123456</b> <b>&lt;ESC&gt;H0100&lt;ESC&gt;V0200&lt;ESC&gt;BP123456789</b> <b>&lt;ESC&gt;H0100&lt;ESC&gt;V0240&lt;ESC&gt;BP12345678901</b> <b>&lt;ESC&gt;Q1&lt;ESC&gt;Z</b>

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

---

<b>COMMAND STRUCTURE</b>	<p><b>&lt;ESC&gt;#Ea</b></p> <p>a = Print Darkness Value (see note 2 for allowable range)</p> <p>Example: <b>&lt;ESC&gt;#E2</b></p> <p>Placement: Must be placed immediately after &lt;ESC&gt;A and immediately before &lt;ESC&gt;Z in its own separate data stream</p> <p>Default: See Operator Manual for the specific printer</p>
<b>COMMAND FUNCTION</b>	To specify a new print darkness settings. This command allows software control of the darkness setting for unique media and ribbon combinations.
<b>INPUT TO PRINTER</b>	<p>&lt;ESC&gt;A</p> <p>&lt;ESC&gt;<b>#E2</b></p> <p>&lt;ESC&gt;Z</p>
<b>PRINTER OUTPUT</b>	There is no printer output for this command.
<b>SPECIAL NOTES</b>	<ol style="list-style-type: none"> <li>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.</li> <li>2. See the specific printer Operator Manual for the valid head ranges.</li> <li>3. The lightest setting is the smallest value and the darkest setting is the largest value.</li> </ol>

# Print Length, Expanded

<b>Command Structure</b>	<b>&lt;ESC&gt;EX0</b>	Sets the print length to maximum
	<b>&lt;ESC&gt;AR</b>	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")
<b>Command Function</b>	To increase the maximum print length (in feed direction) for a label.	
<b>Input to Printer</b>	<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. See Section 1, Table 1 for values of Vmax.
3. When this command is used with the <ESC>& Store Form Overlay command the Form length cannot exceed the maximum specified.
4. If a job contains elements out of the memory range, it is ignored.
5. 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 Hmax) See Note 2.

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

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

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

Default: <ESC>H0001  
<ESC>V0001

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

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

**Printer Output**



SATO  
SATO

**SPECIAL NOTES**

1. To expand the print length to the maximum limit, the <ESC>EX0 Expanded Print Length command must be used.
2. See Table 1 in *Section 1. Programming Concepts* for values of Hmax and Vmax.
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 any part of an image is placed past maximum allowable dots across the label, that part of the image will be lost.
5. If you attempt to print where there is no paper, you may damage the print head.
6. For these commands, the leading zeroes do not have to be entered. The command "V1" is equivalent to "V0001".



# Print Quantity

## Command Structure

<ESC>**Q**aaaaaa

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

Example: <ESC>**Q500**

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

Default: None

## Command Function

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

## Input to Printer <

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

## Printer Output

Three labels containing the data "M-8485S" will be printed.

## Special Notes

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

# Print Speed

## Command Structure

<ESC>**CSa**

a = Designates the speed selection in ips

Example: <ESC>**CS6**

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

Default: As previously set in the printer configuration

## Command Function

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

## Input to Printer

<ESC>A <ESC>**CS6** <ESC>Z

## Printer Output

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

## Special Notes

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

Print Speed	M-8459Se M-5900RVe	M-8485Se	M-8460Se	M-8490Se	CL4XX	CL6XX	M-84Pro-2	M-84Pro-3	M-84Pro-6	M10e
2 ips 50 mm/s	X				X		X	X	X	
3 ips 75 mm/s	X				X				X	X
4 ips 100 mm/s	X	X	X	X	X	X	X	X	X	X
5 ips 125 mm/s	X				X				X	X
6 ips 150 mm/s							X	X	X	
8 ips 200 mm/s							X	X		
10 ips 250 mm/							X			
12 ips 300 mm/s										

---

## Repeat Label

---

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

# Replace Data (Partial Edit)

<b>Command Structure</b>	<p>&lt;ESC&gt;0(&lt;ESC&gt;zero)</p> <p>Example:     See above</p> <p>Placement:   Must follow &lt;ESC&gt;A and precede all other print data</p> <p>Default:       None</p>
<b>Command Function</b>	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.
<b>Input to Printer</b>	<pre> &lt;ESC&gt;A &lt;ESC&gt;H0025&lt;ESC&gt;V0020&lt;ESC&gt;WB0Company Name &lt;ESC&gt;H0025&lt;ESC&gt;V0085&lt;ESC&gt;WB1SATO &lt;ESC&gt;H0025&lt;ESC&gt;V0150&lt;ESC&gt;WL0SATO &lt;ESC&gt;H0025&lt;ESC&gt;V0215&lt;ESC&gt;WL1SATO &lt;ESC&gt;Q1&lt;ESC&gt;Z  &lt;ESC&gt;A&lt;ESC&gt;0&lt;ESC&gt;H0025&lt;ESC&gt;V0020&lt;ESC&gt;WB0SATO &lt;ESC&gt;Q1&lt;ESC&gt;Z </pre>

Printer Output



Company Name

SATO

**SATO**

**SATO**



SATO

SATO

**SATO**

**SATO**

### **Special Notes**

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

# Reverse Image

## Command Structure

<ESC>(aaaa,bbbb

a = Horizontal length in dots of reverse image area

b = Vertical height in dots of reverse image area. See Section 1 Table 1 for maximum field ranges.

Example: <ESC>(100,50

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

Default: None

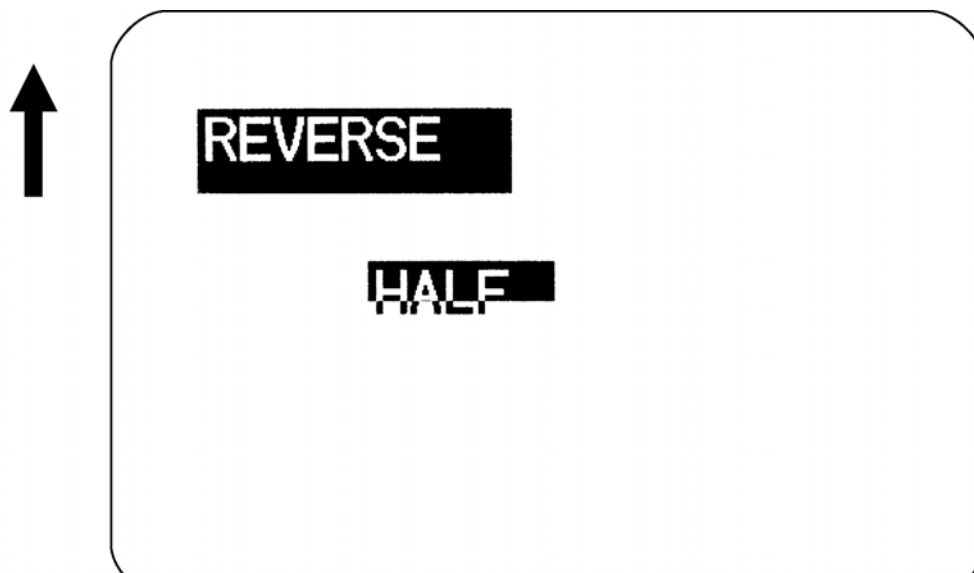
## Command Function

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

## Input to Printer

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

## Printer Output



### Special Notes

1. A reverse image area is affected by the rotate commands. Therefore, always assume the printer is in the normal print orientation when designing and sending the Reverse Image command.
2. If using reverse images with the form overlay, place this command before the Form Overlay command in the data stream.
3. If the height and width to be reversed contain other than alphanumeric data, the area is not printed.
4. If the values specified exceed the maximum ranges, the reverse image is not created.
5. See Table 1 in *Section 1. Programming Concepts* for values of Hmax and Vmax.

# 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

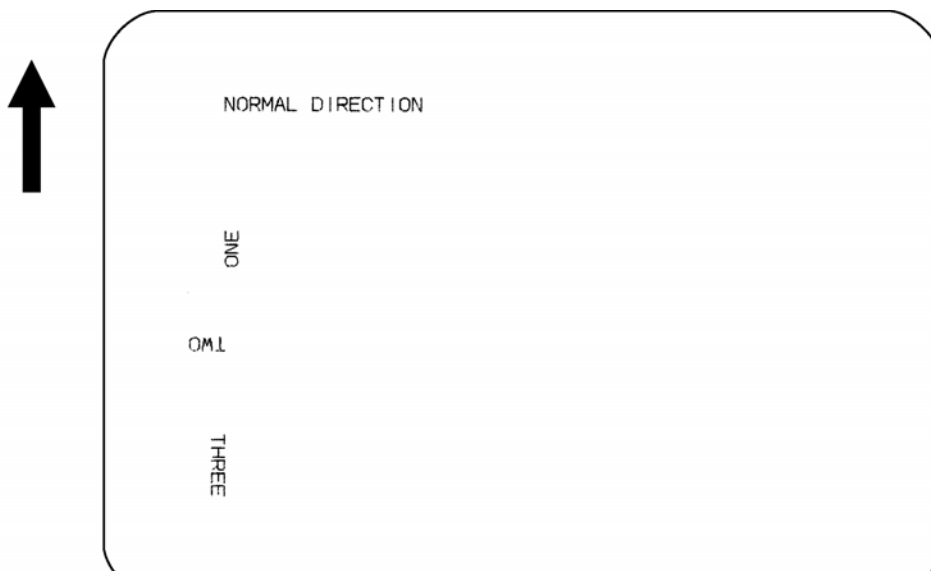
## Command Function

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





## Section 2: Command Codes

### **Special Notes**

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

# Sequential Numbering

## Command Structure

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

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

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

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

dd = Number of digits for sequential numbering (01-99). The first incrementing character position starts after the positions exempted from sequential numbering as specified in ee. If these digits are left out, the default is 8. ,

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

g = Count base 1 Decimal Count 2 Hexadecimal Base

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

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

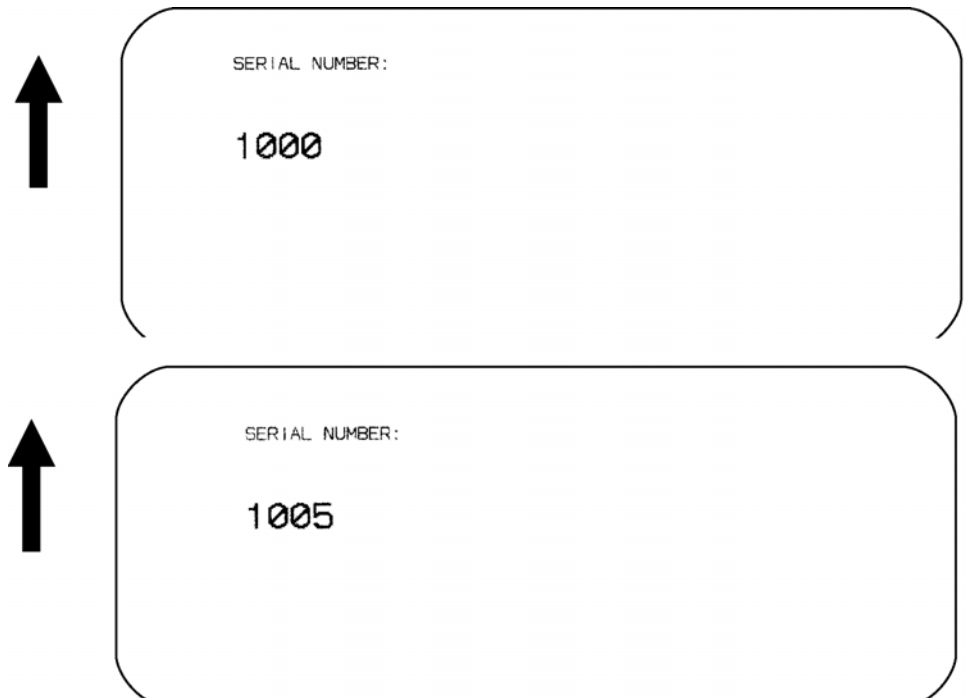
## Command Function

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

---

<b>Command Structure</b>	Start Command:	<ESC> <b>A</b>
	Stop Command:	<ESC> <b>Z</b>
	Example:	See above
	Placement:	<ESC>A must precede data <ESC>Z must follow data
	Default:	None
<b>Command Function</b>	For all print jobs, the Start command must precede the data, and the Stop command must follow. The print job will not run properly if these are not in place.	
<b>Input to Printer</b>	<ESC> <b>A</b> <ESC>H0001<ESC>V0100<ESC>WB1SATO <ESC>H0130<ESC>V0200<ESC>B103150*M-8485S* <ESC>H0170<ESC>V0360<ESC>L0202<ESC>S*M-8485S* <ESC>Q1<ESC> <b>Z</b>	
<b>Printer Output</b>	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.**

# **CALENDAR COMMANDS**

---

The following commands in this section are used to control the Calendar Functions. The Calendar Functions require the Calendar Option (except for the “Se” print engines which include it in the standard configuration).

# Calendar Increment

## Command Structure

**<ESC>WPabbb**

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

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

Example: **<ESC>WPM03**

Placement: Anywhere within the data stream

Default: None

## Command Function

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

## Input to Printer

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

## Printer Output



**Current Date: 01/01/95**

**Expiration Date: 07/01/95**

### Special Notes

1. Once the year increments past "99" it will wrap back to "00". 2. This command can only be used once per data stream.
2. The printer's internal clock may be set through the Calendar Set command.
3. Calendar Commands
4. If a print quantity of more than one label per job is used, the same time and date will be on each label of the entire print job.
5. Calendar Increment Example: 1998 January 15 (ww = 03) plus 48 weeks = week 51
6. The Week Calendar specification follows ISO8601. Days of the week are numbered 1 thru 7, beginning with Monday. The first week of the year is the week containing the first Thursday. If January 1st falls on Friday, it belongs to the last week of the previous year. If December 31st falls on a Wednesday, it belongs to the first week of the following year. If Calendar Increment calculation extends over the year, the result belongs to the week number of the following year.

# Calendar Print

## Command Structure

**<ESC>WA(elements)**

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

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

Placement: Anywhere within the data stream.

Default: None

## Command Function

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

## Input to Printer

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

## Printer Output



**The current date is: 01/01/95**

**The current time is: 00:00**



### Special Notes

1. The date and time elements may be placed in any order for printing.
2. Use a slash (/) to separate date elements and a colon (:) to separate time elements.
3. The font for the date/time elements must be specified before this command.
4. The printer's internal clock may be set through the Calendar Set command.
5. This command can be used up to six times per job.
6. The Copy (<ESC>WD), Mirror Image (<ESC>RM) or Reverse Image (<ESC>/) commands cannot be used with this command.
7. Up to 16 characters can be used with this command.
8. Century ranges are: For Year = YY, any year equal to or greater than 80 and less than or equal to 99, then the century equals 19. For Year specified as YYYY=1999, and printed as <ESC>WAYY, will be equal to 99.
9. The Julian date is the accumulated day from January 1st to the current date. The first day of the year is January 1st (001) and the last day of the year is December 31st (365 or 366 for leap years).
10. The TT command should not be specified for printing in numeric only bar codes.

---

# Calendar Set

---

<b>Command Structure</b>	<b>&lt;ESC&gt;WTaabbccdde</b>  aa = Year (00-99) bb = Month (01-12) cc = Day (01-31) dd = Hour (00-23) ee = Minute (00-59)  Example: <b>&lt;ESC&gt;WT9101311200</b>  Placement: This command must be sent in an independent data stream.  Default: None
<b>Command Function</b>	To set the time and date of the printer's internal clock.
<b>Input to Printer:</b>	<b>&lt;ESC&gt;A</b> <b>&lt;ESC&gt;WT9312251300</b> <b>&lt;ESC&gt;Z</b>
<b>Printer Output</b>	There is no printer output for this command. It sets the current date to December 25, 1993 and the current time to 1:00 PM in the printer.
<b>Special Notes</b>	None

## SECTION 4.

# 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

---

<b>Command Structure</b>	<p><b>&lt;ESC&gt;*a,bbb</b></p> <p>a = Memory card section to be cleared</p> <ul style="list-style-type: none"><li>G To clear SATO graphic files from memory card</li><li>P To clear PCX graphic files</li><li>F To clear formats from the memory card</li><li>O To clear TrueType fonts</li><li>R To clear BMP graphic files</li></ul> <p>bbb = Memory Card storage area to be cleared</p> <ul style="list-style-type: none"><li>001 to 999 for Graphics, PCX or Formats</li><li>000 to 099 for TrueType fonts</li></ul> <p>Example: <b>&lt;ESC&gt;*G,01</b></p> <p>Placement: This command should be sent to the printer immediately following the &lt;ESC&gt;CC Memory Area Select command.</p> <p>Default: None</p>
<b>Command Function</b>	To clear individual memory areas in the Expanded Memory.
<b>Input to Printer</b>	<p>&lt;ESC&gt;A</p> <p>&lt;ESC&gt;CC1&lt;ESC&gt;*O,09</p> <p>&lt;ESC&gt;Z</p>
<b>Printer Output</b>	There is no printer output as a result of this command.
<b>Special Notes</b>	<ol style="list-style-type: none"><li>1. To clear everything in the Expanded Memory, use the &lt;ESC&gt;BJF Expanded Memory Initialize command.</li><li>2. This command is ignored if there is no data to be cleared.</li><li>3. This command is ignored if Expanded Memory is not installed in the printer.</li></ol>

# Fonts, TrueType Recall

## Command Structure

<ESC>**BJR**abbcdddeefffgg...g

<ESC>**BJT**,aa,bb,cc,dd,ee,ffff,gg...g

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

Example: <ESC>**BJR1020201000004SATO**

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

Default: None

## Command Function

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

## Printer Input

<ESC>A  
 <ESC>V0100<ESC>H0100<ESC>CC1<ESC>**BJT,1,02,02,01,00,0004,SATO**  
 <ESC>Q1<ESC>Z

## Printer Output



**SATO**

## Special Notes

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

# Fonts, TrueType Store

<b>Command Structure</b>	Begin Download	<ESC> <b>BJ</b> ( aa...abb..b
	Download	< ESC> <b>BJD</b> ccccccddddee...e
	End Download	<ESC> <b>BJ</b> )
	aa..a	= 40 byte font description
	bb..b	= 10 byte date information
	cccc	= Memory offset (hexadecimal)
	dddd	= Number of data bytes to be stored (0001-2000)
	ee...e	= Font data to be downloaded
	Example:	<ESC> <b>BJ</b> { <b>50 byte header</b> }<ESC> <b>BJD</b> { <b>5 byte hex memory offset</b> }{data}<ESC> <b>BJ</b> )
	Placement:	Immediately following the <ESC>CC Slot Select command.
<b>Command Function</b>	Default:	None
	This command allows bit mapped TrueType fonts to be stored in a Expanded Memory	
	The download data stream is very complex and it is recommended that the True Type Dowload utility program be used instead of manuallycreating the required command and data stream.	
	The is no printer output as a result of this comand. See <ESC>BJR True Type Font Recall command.	
	<ol style="list-style-type: none"> <li>1. This command requires the Expanded Memory option. See your SATO representative for details.</li> <li>2. The SATO True Type Dowload utility program can be used to automate the download process from a computer running Windows 3.1 or above. For a copy of this utility program contact your SATO representative.</li> </ol>	

# Format/Field Recall

## Command Structure

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

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

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

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

Default: None

## Command Function

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

## Printer Input

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

## Printer Output



**TWO FIELDS OF  
VARIABLE DATA**

## Special Notes

1. This command requires the Expanded Memory option. See your SATO representative for details.
2. Only one format can be recalled at a time. However, multiple fields can be recalled from the same format.
3. The number of data characters contained in the "cc...c" field cannot exceed the value designated in the <ESC>/N Field Store command. If it does, the data will be truncated to fit the field length defined in the store command.

# Format/Field Store

Command Structure	<b>&lt;ESC&gt;YS,aa&lt;ESC&gt;/N,bb,cc{.....}</b>  aa = Format number to be stored (01-99) bb = Field number to be stored (01-99) cc = Length of field to be stored (01-99) {.....} = Command stream describing the field to be stored.  Example: <b>&lt;ESC&gt;YS,01&lt;ESC&gt;/N,01,05</b>  Placement:   Immediately after <ESC>CC Memory Area Select command.  Default:      None			
Command Function	To store a format field description in the memory card.			
Printer Input	ESC>A <ESC>CC1 <ESC>YS,02<ESC>/N,01,13<ESC>V0100<ESC>H0100<ESC>XB1 <ESC>/N,02,13<ESC>V0200<ESC>H0200<ESC>XB1 <ESC>Z			
Printer Output	There is no printer output as a result of this command. See <ESC>YR Format/Field Recall command.			
Special Notes	<ol style="list-style-type: none"><li>1. This command requires the Expanded Memory option. See your SATO representative for details.</li><li>2. Each job should be sent individually. If more than one job is sent in a data stream, only the first one will be accepted and the remainder ignored.</li><li>3. The following commands cannot be stored in a format:</li></ol>			
	<ESC>CS	Print Speed	<ESC>C	Repeat Label
	<ESC>NULL	Cut Label	<ESC>Q	Print Quantity
	<ESC>/D	Recall Field	<ESC>EX	Expanded Label Storage
	<ESC>T	Custom Characters	<ESC>&	Store Form Overlay
	<ESC>@	Off Line	<ESC>#E	Print Darkness
	<ESC>BJ	TrueType Fonts	<ESC>ID	Store Job ID
	<ESC>G	Store Custom Graphics	<ESC>*	Clear Memory & Buffer
	<ESC>BT	Variable Ratio Bar Codes	<ESC>PI Store	PCX Graphics
	<ESC>0	Partial Edit		



---

# Form Overlay Recall

---

<b>Command Structure</b>	<p>&lt;ESC&gt;&amp;R,aa</p> <p>aa = Storage Number (01 to 99)</p> <p>Example: &lt;ESC&gt;&amp;R,01</p> <p>Placement: Following The &lt;ESC&gt;CC Memory Area Select Command</p>
<b>Command Function</b>	To recall the label image from stored in the Expanded Memory.
<b>Input to the Printer</b>	<p>&lt;ESC&gt;A</p> <p>&lt;ESC&gt;CC1</p> <p>&lt;ESC&gt;&amp;R,01</p> <p>&lt;ESC&gt;Q1&lt;ESC&gt;Z</p>
<b>Printer Output</b>	To be added
<b>Special Notes</b>	<ol style="list-style-type: none"> <li>1. The Expanded Memory option is required for this command. See your SATO representative for details.</li> <li>2. The &lt;ESC&gt;CC Memory Area Select Command must be sent prior to this command.</li> <li>3. Several label images stored under different Storage Numbers can be printed with this command.</li> <li>4. The Storage number must be specified.</li> <li>5. A Read/Write error will occur if an unused Storage number is specified by this command.</li> <li>6. The label image reference point will be V=1 H=1 if the window area has not been specified.</li> <li>7. The label image can be moved by using the &lt;ESC&gt;V and &lt;ESC&gt;H commands when it is stored along with a window size. If it exceeds the printable area by being moved, the label image will be truncated.</li> </ol>

---

## Form Overlay Store

---

<b>Command Structure</b>	<p><code>&lt;ESC&gt;&amp;S,aa,bbbb,cccc</code></p> <p>aa = Store Number (01 to 99) bbbb = Horizontal size of window (50 to H max) cccc = Vertical size of window (50 to V max)</p> <p>Example: <code>&lt;ESC&gt;&amp;S,01</code></p> <p>Placement: Following the <code>&lt;ESC&gt;CC</code> Memory Area select Command</p> <p>Default: None</p>
<b>Command Function</b>	To store a label image in Expanded Memory
<b>Printer Input</b>	<code>&lt;ESC&gt;A</code> <code>&lt;ESC&gt;CC1</code> <code>&lt;ESC&gt;&amp;S,01</code> <code>&lt;ESC&gt;Z</code>
<b>Printer Output</b>	There is no printer output as a result of this command.
<b>Special Notes</b>	<ol style="list-style-type: none"><li>1. The <code>&lt;ESC&gt;CC</code> Memory Area Select command must be sent before this command.</li><li>2. The label image must be divided from other label images by the <code>&lt;ESC&gt;A</code> and <code>&lt;ESC&gt;Z</code> bounding commands.</li><li>3. The parameters of “bbbb” and “cccc” may be omitted. By specifying them, the label image can be moved by using the <code>&lt;ESC&gt;V</code> and <code>&lt;ESC&gt;H</code> position commands when recalling the label image. If the repositioned label image exceeds beyond the printable area, the image will be truncated. If an <code>&lt;ESC&gt;A1</code> Media Size Command has been sent to the printer, the maximum size form that can be stored is the size of label defined by the command.</li><li>4. A label image cannot be stored in a location that already contains data.</li><li>5. Graphics, PCX and BMP files can be stored with this command.</li><li>6. As many as 99 Form Overlays can be stored, however their combined storage area cannot exceed the available memory.</li><li>7. The forms stored by this command are cleared by the <code>&lt;ESC&gt;*R</code> command.</li></ol>

# BMP Graphics Recall

## Command Structure

<ESC>**GC**aaa

aaa = Storage Number (001 to 999)

Example: E <ESC>GC001

Placement: After the CC Memory Area Select command.

Default: None

## Command Function

To recall a previously stored BMP file stored in Expanded Memory

## Printer Input

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

## Printer Output



## Special Notes

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

---

## BMP Graphics Store

---

### Command Structure

<ESC>**GT**aaa,bbbb,nn...n

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

Example: <ESC>**GT001**

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

Default: None

### Command Function

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

### Printer Input

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

### Printer Output

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

### Special Notes

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

# Graphics, Custom Recall

<b>Command Structure</b>	<p><b>&lt;ESC&gt;GRaaa</b></p> <p>aaa = Graphics storage number (001-999)</p> <p>Example: <b>&lt;ESC&gt;GR111</b></p> <p>Placement: The Recall command is sent in a secondary data stream to print the graphic, and follows any necessary position or size commands.</p> <p>Default: None</p>
<b>Command Function</b>	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>H0250<ESC>L0505
<ESC>GR001
<ESC>Q1<ESC>Z
```

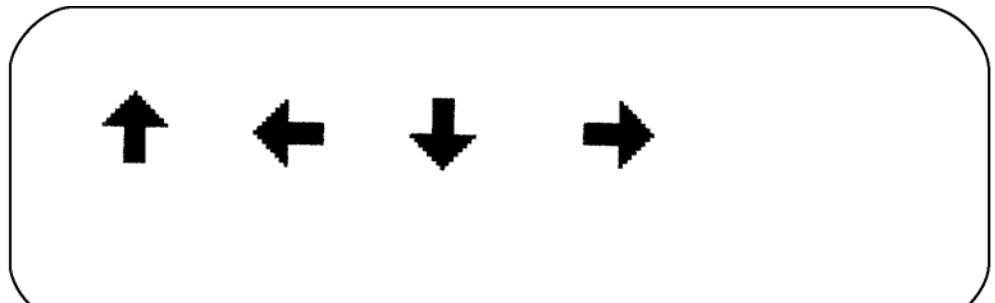
### Graphic Rotated 90°

```
<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>H0700<ESC>L0505
<ESC>GR001
<ESC>Q1<ESC>Z
```

## Printer Output



## Special Notes

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

# Custom Store

## Command Structure

**<ESC>Glabbbccddd{data}**

- a = Specifies character format of the data
    - H Hex data
    - B Binary data
  - bbb = Number of horizontal 8 x 8 blocks (see Note 7 for range)
  - ccc = Number of vertical 8 x 8 blocks (see Note 7 for range)
  - ddd = Graphics storage number (001-099)
  - {data} = Hex or binary data to describe the graphic image
- Example: See Appendix C for detailed information on creating Hex and Binary graphic files.
- Placement: Immediately following the <ESC>CC Memory Area Select command.
- Default None

## Command Function

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

## Printer Input

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

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

## Printer Output

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

### Special Notes

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

Example of correct data stream:

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

Example of incorrect data stream:

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

5. Do not use ASCII <CR> or <LF> characters (carriage return or line feed) as line delimiters within the graphic data or the actual image will not be printed as specified.
6. The graphics storage number (ddd) must be specified with this command.
7. See Table 1 in *Section 1. Programming Concepts* for values of Hmax and Vmax. The number of allowable blocks is determined by dividing this number by 8

# 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.



---

# PCX Store

---

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

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

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

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

Default: None

**Command Function**

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

**Printer Input**

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

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

**Printer Output**

There is no printer output as a result of this command. See &lt;ESC&gt;PY PCX Graphics Recall command.

**Special Notes:**

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

---

# Initialize

---

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

---

# Memory Area Select

---

<b>Command Structure</b>	<p>&lt;ESC&gt;<b>CCa</b></p> <p>a = Memory Area  1 Memory Area 1  2 Memory Area 2</p> <p>Example: &lt;ESC&gt;<b>CC1</b></p> <p>Placement: Immediately following the &lt;ESC&gt;A Start Code.</p> <p>Default: Last selected Memory Area.</p>
<b>Command Function</b>	Selects the Memory Area to be used for following Expanded Memory commands.
<b>Printer Input</b>	<ESC>A <ESC> <b>CC1</b> {commands} <ESC>Z
<b>Printer Output</b>	There is no printer output as a result of this command.
<b>Special Notes</b>	<ol style="list-style-type: none"> <li>1. This command requires the Expanded Memory option. See your SATO representative for more information.</li> <li>2. The Memory Areas specified by this command may be reversed using the LCD menu/configuration panel.</li> <li>3. Unless otherwise modified via the LCD menu/configuration panel (see the printerspecific Operational Manual), CC1 selects the PCMCIA Expanded Memory and CC2 selects the internal Expanded Memory.</li> </ol>

# Status

## Command Structure

<ESC>**BJS**

Example: <ESC>BJS

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

Default: None

## Command Function

Casues the printer to print the card status.

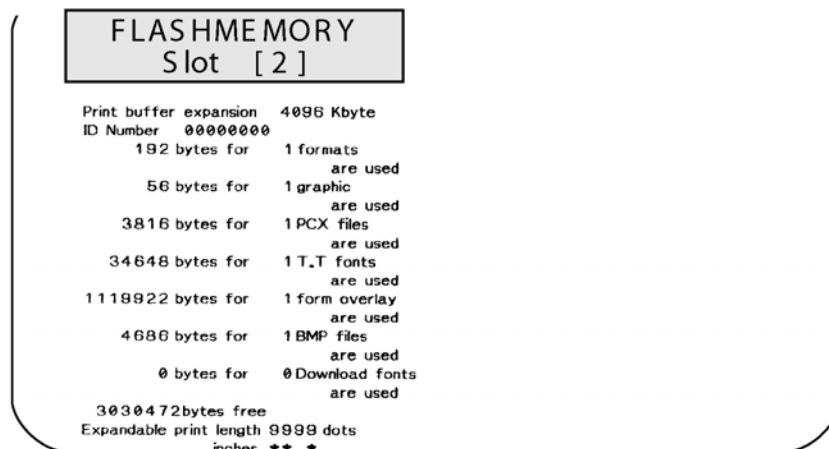
## Printer Input

<ESC>A

<ESC>CC1<ESC>**BJS**

<ESC>Z

## Printer Output



## Special Notes

1. This command requires the Expanded Memory option. See your SATO representative for more information
2. The following information is provided on the status label:  
 Line 1: Memory size in Kbytes  
 Line 2: The ID number assigned with the <ESC>BJF command  
 Line 3: Number of formats stored and bytes used  
 Line 4: Number of graphics stored and bytes used  
 Line 5: Number of PCX files and bytes used  
 Line 6: Number of bit-mapped TT fonts stored and bytes used  
 Line 7: Number of BMP files stored and bytes used  
 Line 7: Remaining free memory  
 Line 8: Max expandable print length

## **SECTION 5.**

# **TWO-DIMENSIONAL SYMBOLS**

---

The following commands are used to create the two-dimensional symbologies supported by the SATO “e” and PRO printers.

# Data Matrix, Data Format

<b>Command Structure</b>	<p>&lt;ESC&gt;<b>BX</b><i>aa</i><i>bb</i><i>cc</i><i>dd</i><i>eee</i><i>fff</i><i>g</i><i>hh</i></p> <p><i>aa</i> = Format ID. 01-06. If ECC200 is selected (<i>bb</i>=20), this field is ignored.</p> <p><i>bb</i> = Error correction level. 00 ,05, 08, 10, 14 or 20. All other values will be processed as a 00.</p> <p><i>cc</i> = Horizontal cell size. 03 - 12 dots/cell.</p> <p><i>dd</i> = Vertical cell size. 03 - 12 dots/cell.</p> <p><i>eee</i> = Number of cells in one column. Use 000 to optimize.</p> <p><i>fff</i> = Number of cell in one row. Use 000 to optimize.</p> <p><i>g</i> = Mirror Image (ignored for ECC200) 0 = Normal Print 1 = Reverse Print</p> <p><i>hh</i> = Guide Cell Thickness. 01-15. 01 indicates normal type. Ignored for ECC200.</p> <p>Example: = &lt;ESC&gt;<b>BX030805050000000001</b></p> <p>Placement: Immediately preceding data to be encoded</p> <p>Default: None</p>
<b>Command Function</b>	To designate the format for a Data Matrix two-dimensional bar code image on a label.
<b>Printer Input</b>	<p>&lt;ESC&gt;A</p> <p>&lt;ESC&gt;%0&lt;ESC&gt;V0100&lt;ESC&gt;H0100&lt;ESC&gt;<b>BX050510100000000001</b></p> <p>&lt;ESC&gt;<b>DCDATA MATRIX DATA MATRIX</b></p> <p>&lt;ESC&gt;Q1&lt;ESC&gt;Z</p>
<b>Printer Output</b>	There is no printer output as a result of this command. See the <ESC>DC Print Data command for printer output.
<b>Special Notes</b>	<ol style="list-style-type: none"> <li>1. If any of the parameters entered are outside the valid range, a symbol will not be printed when the &lt;ESC&gt;DC Print Data command is sent to the printer.</li> <li>2. The number of cells per line (<i>eee</i>) and the number of cell lines (<i>fff</i>) should be specified as all zeroes, allowing the printer to automatically calculate the optimum configuration for the symbol.</li> <li>3. The Reference Point for the Data Matrix symbol is the upper-left corner.</li> <li>4. The Format ID specified for “<i>aa</i>” is defined by the following table. The printer only supports the Format ID’s defined in the table.</li> </ol>

<b>ECC Level (bb)</b>	<b>IFormat ID (aa)</b>					
	<b>01</b>	<b>02</b>	<b>03</b>	<b>04</b>	<b>05</b>	<b>06</b>
<b>00 (ECC000)</b>	500	452	394	413	310	271
<b>05 (ECC050)</b>	457	333	291	305	228	200
<b>08 (ECC080)</b>	402	293	256	268	201	176
<b>10 (ECC100)</b>	300	218	190	200	150	131
<b>14 (ECC140)</b>	144	105	91	96	72	83
<b>20 (ECC200)</b>	NUMERIC				3116	
	ALPHANUMERIC				2336	
	ISO 8-BIT 01H - FFH)				1556	

5. The character set or each Format ID is:

<b>ID Number</b>	<b>Character Set</b>	<b>Encoding Scheme</b>
<b>16 Bit CRC</b>		
01	Numeric, Space	Base 11
02	Upper Case Alpha, Space	Base 27
03	Upper Case Alpha, Space,Comma, Period, Slash, Minus	Base 41
04	Upper Case Alphanumeric, Space	Base37
05	ASCII 7-bit, Full Keyboard (20H -7FH)	ACSCII
06	ISO 8-bit, International (20H -FFH)	8-Bit

6. The ECC200 symbol data capacity is:


SYMBOL SIZE		MAXIMUM DATA CAPACITY		
Row	Column	Numeric	Alphanumeric	Full ASCII
10	10	6	3	1
12	12	10	6	3
14	14	16	10	6
16	16	24	16	10
18	18	36	25	16
20	20	44	31	20
22	22	60	43	28
24	24	72	52	34
26	26	88	64	42
32	32	124	91	60
36	36	172	127	84
40	40	228	169	112
44	44	288	214	142
48	48	348	259	172
52	52	408	304	202
64	64	560	418	278
72	72	736	550	366
80	80	912	682	454
88	88	1152	862	574
96	96	1392	1042	694
104	104	1632	1222	814
120	120	2100	1573	1048
132	132	2608	1954	1302
144	144	3116	2335	1556
8	18	10	6	3
8	32	20	13	8
12	26	32	22	14
12	36	44	31	20
16	36	64	46	30
16	48	98	72	47



---

# Data Matrix, Print Data

---

Command Structure	<div>&lt;ESC&gt;<b>DC</b>xx...x</div> <div>xx...x = Data to be encoded</div> <div>Example: &lt;ESC&gt;<b>DC00006000</b></div> <div>Placement: Immediately following the &lt;ESC&gt;BC Data Format designation command or the &lt;ESC&gt;FX Sequential Numbering command.</div> <div>Default None</div>
Command Function	To print a Data Matrix two-dimensional bar code image on a label.
Printer Input	<ESC>A <ESC>%0<ESC>V0100<ESC>H0100<ESC> <b>BX05051010000000001</b> <ESC> <b>DCDATA MATRIX DATA MATRIX</b> <ESC>Q1<ESC>Z
Printer Output	<div><div>↑</div><div></div></div>
Special Notes	<div>1. If an &lt;ESC&gt;BX Data Format designation command contains any parameters out of the valid range, no symbol will be printed when this command is sent.</div>

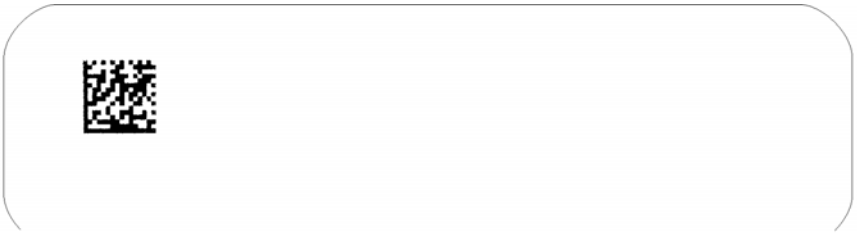
# Sequential Numbering

Command Structure	<ESC>FXaaabcccddeee
	aaa = Number of duplicate labels to be printed (001 - 999)
	b = Increment or Decrement + = Increment - = Decrement
	ccc = Increment/Decrement Steps (001 - 999)
	ddd = Sequential numbering start position (001 - 999) Referenced to left side.
	eee = Incremented data length measured from start position (001 - 999)
Placement:	Immediately following the <ESC>BX Data Format designation command and preceding the <ESC>DC Print Data Command.
Default:	None

**Command Function** To print sequential numbered Data Matrix symbols.

**Printer Input** <ESC>A  
<ESC>V0100<ESC>H0100  
<ESC>BX03081010000000001  
<ESC>FX002+001005003<ESC>DC000060000  
<ESC>Q4<E SC>Z

**Printer Output** Label Set #1



**Special Notes**

1. The maximum number of <ESC>FX Sequential Numbering commands that can be used in one job is eight.
2. In the example above four total labels will be printed (<ESC>FX002+005003<ESC>DC00006000), the sequential numbering will start at position 5 and the three digits "600" will be incremented in steps of 1. A total of two sets of labels will be printed, the first set of two labels with the value "00006000" and the next two label set with the value "00006010". Label Set #1 Label Set #2 1st Label 00006000 3rd Label 00006010 2nd Label 00006000 4th Label 00006010
3. The <ESC>Q Label Quantity command must be set for the total number of labels to be printed. In the above example, the value for the <ESC>Q command should be 2 sets x 2 labels/set = 4. If, in the above example, it was set to a value of "1", only the first label would be printed.

# Maxicode

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

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

ddd..dd    =    9 digit numeric Postal Code

eee        =    3 digit numeric Country Code

fff        =    3 digit numeric Service Class

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

Example:     <ESC>**BV1,2,3,123456789,222,333,MESSAGE<ESC>**

Placement:    Immediately preceding data to be encoded

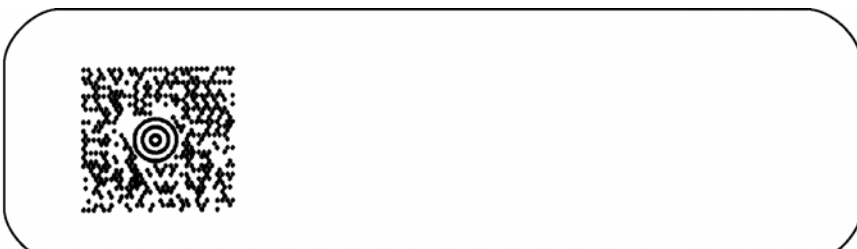
Default        None

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

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

```
<ESC>A<ESC>V0100<ESC>H0100
<ESC>BV1,1,2,123456789,840,001,I)><RS>01<GS>961Z01547089<GS>PSN
<GS>056872<GS>349<GS>99999999<GS>001/005<GS>029<GS>N<GS>
<GS>LENEXA<GS>KS<RS><EOT>
<ESC>Q001<ESC>Z
```

**Printer Output**



**Special Notes**

1. <RS> represents Hex 1E, <GS> represents Hex 1D, <EOT> represents Hex 04, <ESC> represents Hex 1B and <SP> represents Hex 20.

# PDF417

## Command Structure

<ESC>**BKaabbcddeefffn...n,g**

- aa = Minimum module dimension (01-09 dots). Will not print if values of 01, 02 or greater than 10 are specified.
- bb = Minimum module pitch dimension (01-24 dots). Will not print if values of 01, 02, 03 or greater than 25 are specified.
- c = Security (error detection) Level (1-8).
- dd = Code words per line (01-30). If 00 is specified for both dd and ee, the printer automatically optimizes the number of rows per symbol.
- ee = Rows per symbol (00 or 03-40). If 00 is specified for both dd and ee, the printer automatically optimizes the number of rows per symbol.
- fff = Number of characters to be encoded (0001-2700).
- nn...n = Data to be printed.
- g = PDF417 type. If not specified, standard PDF417  
T Truncated PDF417  
M Micro PDF417

Example: <ESC>**BK0304400000021**

Placement: Immediately preceding data to be encoded.

Default: None

## Command Function

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

## Printer Input

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

## Printer Output



**Special Notes**

1. When the code words per line and the number of rows per symbol ("dd" and "ee") are set to all zeroes, the printer will calculate the optimum configuration.
2. If the product of the values entered for "dd" and "ee" are not equal to or less than the value of "f f f f" (i.e. "f f f f" is greater than "dd" x "ee", an error will occur and the symbol will not be printed. It is recommended that these values each be set to "000" and the printer be allowed to automatically calculate the optimum values.
3. The values for "dd" and "ee" need to be made larger if the security level is increased.
4. The maximum data length is 2700 characters, but may be less depending upon:
  - the minimum module dimension ("aa")
  - the security level specified by "c".
  - the number of data characters
5. The Reference Point of the PDF417 symbol is the upper-left corner.
6. The <ESC>F Sequential Numbering command cannot be used with this command.
7. The <ESC>E Line Feed command cannot be used with this command.
8. The values 00H thru 1FH can be specified as print data.
9. This command can be stored in a format.
10. The print height of the symbol will vary depending upon the data specified; numeric only, alpha only or alphanumeric.
11. For module dimensions less than "4", symbol quality may be degraded.

---

# QR Code

---

## Command Structure

<ESC>**2D3m,a,bb,c,d** (,ee,f f,gg)

<ESC>**DSk,nn.....n**

<ESC>**DNIIII,xx.....x**

m = Model

0 = Model 2

1 Model 1

2 Micro QR Code

a = Error Correction Level

L 7%

M 15%

Q 25%

H 30%

bb = Cell Size (01 to 32 dots/cell)

d = Connection Mode

0 Normal

1 Connection (parameters "ee", "ff" and "gg" will be used if the file is split into several blocks as independent symbols)

ee = Total Connection Number (01 - 16)

ff = Connection number of each symbol encoded as an independent symbol (01 - 16)

gg = Connection Mode Parity Data (00H - FFH)

k = Input Data Type

1 Numeric

2 Alphanumeric

3 Kanji (shift JIS Code)

nn...n = Data

xx...x = Data Size. Used in Automatic or Manual mode with binary data (0001 - 2953 bytes)



**Special Notes**

1. Contact SATO Technical Support for specific usage information.
2. Parameters “c”, “d”, “ee”, “f f” and “gg” are not used for Micro QR Code.
3. Parameter “xx...x” is limited to 0001 to 0486 bytes for Model 1 and Micro QR Code.
4. The data command should be used according to the input mode or data type.
5. In Automatic Mode, the data for 80H to 9FH or E0H to FFH will be interpreted as Kanji, not binary data.
6. In Manual Mode, The multiple data fields for numeric, alphanumeric, Kanji and binary can be specified in a job. In this case, the data fields for <ESC>2D30 and each data field must follow the data field. Also, the maximum data size should be less than 7000 bytes and the maximum block number for the data field is 200.
7. If the parameters are not correctly specified, the symbol will not be printed.

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## **SECTION 6.**

# **CONFIGURATION COMMANDS**

---

These commands are used to change to operating configuration of the printer.

---

# Custom Protocol Command Codes Download

---

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

- a = Replacement character for STX
- b = Replacement character for ETX
- c = Replacement character for ESC
- d = Replacement character for ENQ
- e = Replacement character for CAN
- f = Replacement character for NUL
- g = Replacement character for OFFLINE
- h = Auto-Online. Printer powers up in the On Line mode.  
     0 Yes  
     1 No
- i = Zero Slash. Places a slash through the "0" character.  
     0 Yes  
     1 No
- jj = Hexadecimal code for Eurocharacter

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

Placement: 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.



STX = 7B      ETX = 7      D ESC = 25  
ENQ = 23      CAN = 26      NULL = 2A  
OFFLINE = 7E  
AUTO ONLINE =      YES  
ZERO SLASH =      YES

Press the “FEED” key to activate the User  
Default or power the printer off to ignore them.

**Special Notes**

- 1. Commas must be used to separate the parameters. If a parameter is omitted between two commas, the default Non-Standard Protocol Command codes for that parameter will be used.
- 2. This command must be sent as an independent data stream immediately following the <ESC>A Start code and immediately preceding the <ESC>Z Stop code. No other commands can be included in the data stream.
- 3. If more or less than nine commas are included in the command, the entire command sequence will be ignored. The command must contain exactly nine commas.
- 4. If two characters are specified for a parameter, it will be interpreted as a hex value. For example:

Command Parameter	Resulting Command Code
2B	+
+	+

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

- 5. Downloading Auto Online and Zero Slash settings will overwrite the values selected using the LCD panel. If these settings are changed using the LCD panel, they will overwrite any previously downloaded settings.

# Printer Setting

**COMMAND STRUCTURE**    <ESC>PCaa,a,b,c,d,e,f,g,h,i,j,k,l,m,n,o,p,q,r,s,t,u,v,w,x,y,z  
                                   <ESC>PCaa,bb

aa    =    Setting to be changed (01 to 26). Only relevant setting can be c

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

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

## Section 6: Configuration Commands

	Placement:	Separate data stream sent to printer
	Default:	None
<b>COMMAND FUNCTION</b>	To set the printer default configuration into EEPROM	
<b>INPUT TO PRINTER</b>	<ESC>A <ESC> <b>PC26,0</b> <ESC>Z	
<b>PRINTER OUTPUT</b>	There is no printer output as a result of this command. This command example enables the buzzer.	
<b>SPECIAL NOTES</b>	<ol style="list-style-type: none"><li>1. All command setting values must be in ASCII format.</li><li>2. These settings are stored in EEPROM and will remain valid until receipt of another &lt;ESC&gt;PC command.</li><li>3. All positions in this command must be separated by a comma. If the parameter. To change multiple settings, the correct number of commas must be placed in the command, i.e. to change the label gap sensor to reflective (eye-mark), the command would be: &lt;ESC&gt;PC,,,,,,0,,,,,,,,,,,,.</li><li>4. If only one setting is to be changed, the “aa” parameter must be an “F”.</li></ol>	



---

# Pitch Offset

---

**COMMAND STRUCTURE**<ESC>**PO**abcc

a = 3 Continuous

b = + Positive Offset  
- Negative Offset

cc = 00 to 99, Offset value in dots

Example: See above

Placement: Separate data stream sent to printer

Default: Default value set by &lt;ESC&gt;PG command

**COMMAND FUNCTION**

To set the pitch offset used for a job.

**INPUT TO PRINTER**

&lt;ESC&gt;A

<ESC>**PO3+20**

&lt;ESC&gt;Z

**PRINTER OUTPUT**

Blank label

**SPECIAL NOTES**

1. When power is cycled, the value set by this command is lost and replaced by the default value stored in the EEPROM.
2. To change the value stored in the EEPROM, use the <ESC>PC Printer Setting command or use the Printer Setting Utility program contained on the CDROM shipped with the printer.

---

## Print Mode

---

**COMMAND STRUCTURE**    <ESC>PMa

- |   |   |                                   |
|---|---|-----------------------------------|
| a | = | 0 Continuous                      |
|   |   | 1 Tear-Off                        |
|   |   | 2 Reserved                        |
|   |   | 3 Reserved                        |
|   |   | 4 Reserved                        |
|   |   | 5 Reserved                        |
|   |   | 6 Reserved                        |
|   |   | 7 Dispense, Backfeed after print  |
|   |   | 8 Dispense, Backfeed before print |

Example:            See above

Placement:        Separate data stream sent to printer

Default:            Default value set by <ESC>PC command

**COMMAND FUNCTION**

To set the print mode for a job.

**INPUT TO PRINTER**

<ESC>A  
<ESC>PM1  
<ESC>Z

**PRINTER OUTPUT**

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

**SPECIAL NOTES**

1. When power is cycled, the value set by this command is lost and replaced by the default value stored in the EEPROM.
2. To change the value stored in the EEPROM, use the <ESC>PC Printer Setting command or use the Printer Setting Utility program contained on the CDROM shipped with the printer.
3. The Print Mode can also be set using DSW3-1, 3-2 and 3-4. The setting priority is determined by the Priority Setting in the LCD Panel Service Mode.

---

# Print Type

---

**COMMAND STRUCTURE**<ESC>**PHa**

a = 0 Thermal Transfer printing  
1 Direct Thermal Printing

Example: See above

Placement: Separate data stream sent to printer

Default: Default value set by <ESC>PC command.

**COMMAND FUNCTION**

To set the printing method used for a job

**INPUT TO PRINTER**

<ESC>A  
<ESC>**PH1**  
<ESC>Z

**PRINTER OUTPUT**

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

**SPECIAL NOTES**

1. When power is cycled, the value set by this command is lost and replaced by the default value stored in the EEPROM.
2. To change the value stored in the EEPROM, use the <ESC>PC Printer Setting command or use the Printer Setting Utility program contained on the CDROM shipped with the printer.
3. The Print Type can also be set using DSW2-1. The setting priority is determined by the Priority Setting in the LCD Panel Service Mode.

---

## Sensor Type

---

<b>Command Structure</b>	<p>&lt;ESC&gt;IGa</p> <p>a = 0 Reflective (Eye Mark) sensor 1 See-thru (transmissive) sensor 2 Sensor not used</p> <p>Example: See above</p> <p>Placement: Separate data stream sent to printer</p> <p>Default: Default value set by &lt;ESC&gt;PC command</p>
<b>Command Function</b>	To select the label sensing method for a job.
<b>Input to Printer</b>	<ESC>A <ESC>IG1 <ESC>Z
<b>Printer Output</b>	There is no printer output as a result of this command
<b>Special Notes</b>	<ol style="list-style-type: none"><li>1. When power is cycled, the value set by this command is lost and replaced by the default value stored in the EEPROM.</li><li>2. To change the value stored in the EEPROM, use the &lt;ESC&gt;PC Printer Setting command or use the Printer Setting Utility program contained on the CD-ROM shipped with the printer.</li><li>3. The Sensor Type can also be set using DSW3-2 and DSW3-3. The setting priority is determined by the Priority Setting in the LCD Panel Service Mode.</li></ol>

# Serial Interface Parameters

## COMMAND STRUCTURE

<ESC>I2abcde

- |   |   |   |                         |
|---|---|---|-------------------------|
| a | = | 0 | Baud rate, 9600 bps     |
|   |   | 1 | Baud Rate, 19200 bps    |
|   |   | 2 | Baud Rate, 38400 bps    |
|   |   | 3 | Baud Rate, 57600 bps    |
| b | = | 0 | 8 Data bits             |
|   |   | 1 | 7 Data Bits             |
| c | = | 0 | No Parity               |
|   |   | 1 | Odd Parity              |
|   |   | 2 | Even Parity             |
| d | = | 0 | 1 Stop Bit              |
|   |   | 1 | 2 Stop Bits             |
| e | = | 0 | Single Item Buffer      |
|   |   | 1 | Multi Item Buffer       |
|   |   | 2 | X-On/X-Off Flow Control |
|   |   | 3 | Bi-Com 4                |
|   |   | 4 | Bi-Com 3                |

Example: See above

Placement: Separate data stream sent to printer

Default: Default value set by <ESC>PC command

## COMMAND FUNCTION

To set the operating parameters of the RS232 Interface for a job.

## INPUT TO PRINTER

<ESC>  
<ESC>I230011  
<ESC>Z

## PRINTER OUTPUT

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

## SPECIAL NOTES

1. The settings are stored in the EEPROM by this command and they will remain in effect until a new <ESC>I2 command is received. Cycling power will have no effect on these settings.
2. To change the value stored in the EEPROM, use the <ESC>PC Printer Setting command or use the Printer Setting Utility program contained on the CDROM shipped with the printer.
3. All command parameters must be present in the data stream sent to the printer.
4. Selecting X-On/X-Off, Bi-Com3 or Bi-Com4 will automatically place the printer in the Multi Buffer mode.

---

## CR/LF Delete

---

**COMMAND STRUCTURE**    <ESC>**CLa**

a    =    0    Do not delete CR/LF  
         1    Delete CR/LF

Example:            <ESC>**CL0**

Placement:        In a separate data stream before label data is transmitted.

Default:            a=0

**COMMAND FUNCTION**    To remove CR/LF commands from the dat stream.

**PRINTER INPUT**        <ESC>A  
                         <ESC>**CL0**  
                         <ESC>Z

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

**Special Notes**            1. This command can also be set using the LCD panel. The last setting received, whether it is via this command or manually input via the LCD panel will be active.

---

# Zero Slash

---

**COMMAND STRUCTURE** <ESC>LHa

a = 0    Print zeroes without slash  
      1    Print zeroes with slash.

Example:        <ESC>LH1

Placement:     .In a separate data stream before any label data is transmitted.

Default:        a=0

**COMMAND FUNCTION**    To allow printing of numeric zeroes with a slash.

**PRINTER INPUT**        <ESC>A  
                              <ESC>LH0  
                              <ESC>Z

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

**Special Notes**

1. This command can also be set using the LCD panel. The last setting received, whether it is via this command or manually input via the LCD panel will be active.

---

# Auto Online

---

**COMMAND STRUCTURE**    <ESC>A0a

a    =    0    Printer automacially powers up in the Online mode.  
              1    Printer automatically powers up in the Offline mode.

Example:            <ESC>A01

Placement:        In a separate command stream before label data is transmitted to the printer.

Default:            a=1

**COMMAND FUNCTION**    To allow the printer to power up in the Online mode ready to receive data.

**PRINTER INPUT**        <ESC>A  
                              <ESC>A01  
                              <ESC>Z

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

**Special Notes**

1. TThis command can also be set using the LCD panel. The last setting received, whether it is via this command or manually input via the LCD panel will be active.
2. The printer default setting can be set by user download.



---

# Online Feed

---

**COMMAND STRUCTURE**    <ESC>LFa

a    =    0    Enables label feed when online.  
         1    Disables label feed when online.

Example:            <ESC>LF1

Placement:        In a separate command stream before label data is transmitted.

Default:            a=1

**COMMAND FUNCTION**    To enable label feeding when in the online mode.

**PRINTER INPUT**        <ESC>A  
                          <ESC>LF0  
                          <ESC>Z

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

**Special Notes**        1. This command can also be set using the LCD panel. The last setting received, whether it is via this command or manually input via the LCD panel will be active.

---

# Test Print

---

**COMMAND STRUCTURE**    <ESC>TPa

a	=	0	Small User test print.
		1	Large User test print
		2	Small Factory test print
		3	Large Factory test print

Example:            <ESC>TP3

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>TP2  
                             <ESC>Z

**PRINTER OUTPUT**

Small Factory test print  
TBA

**Special Notes**

1. A test print can also be initiated via the LCD panel.

## SECTION 7.

# BI-DIRECTIONAL COMMUNICATIONS

---

This is a two-way communications protocol between the host computer and the printer, thus enabling the host to check printer status. When Bi-Com 4 communications is selected, there is no busy signal from the printer. The host must request the complete status from the printer, including ready/busy. The host may request status in two different ways.

### ENQUIRE/ACK/NAK

---

In the Bi-Com 4 mode, the host transmits an **ENQ** (05 hexadecimal) to the printer and the printer will respond with its status within five milliseconds. If printing, it will respond upon finishing the current label, then resume printing. In order for this protocol to work properly with an RS232C Interface, pin 6 (**DTR**) and pin 5 (**CTS**) must be held high by the host. One way to ensure these pins are always in the correct state is to tie pin 20 (**DTR**) to pin 6 (**DSR**) and pin 4 (**RTS**) to pin 5 (**CTS**) at the printer end of the cable.

#### ENQUIRE (ENQ)

Upon receipt of an **ENQ** command, the printer responds with 25 bytes of status information bounded by an **STX/ETX** pair. The Bi-Com protocol works only in the Multi Job Buffer mode. The status information is defined as follows:

**<STX>{ 2 Byte ID}{1 Status Byte}{6 Byte Label Remaining}{16 Byte Job Name}<ETX>**

- **ID** - This is a two byte number identifying the current print job ID. The print job ID is defined using the **<ESC>ID** Job ID command transmitted with the print job (see Job ID Store in the command listing for more information on how to use this command). The range is from 00 to 99.
- **Status** - A single byte defining the current status of the printer (see the Status Byte Definition table).
- **Label Remaining** - Six bytes defining the number of labels remaining in the current print job. The range is from 000000 to 999999 labels.
- **Job Name** - 16 bytes of ASCII characters identifying the name assigned to the job by the **<ESC>WK** Job Name command. If the Job Name is less than 16 characters, the field will be padded with leading zeroes.

If an **ENQ** is received after the print job specified in the ID bytes has been completed, or there is no data in the buffer, the printer will respond with two “space” characters (20 hexadecimal) for the ID number, six “zero” characters (30 hexadecimal) in the Remaining Labels bytes and the 16 byte Job Name.

#### CANCEL (CAN)

If a **CAN** (18 hexadecimal) command is received, it will stop the print job and clear all data from the receive and print buffers. A delay of five milliseconds or more is required before any new data can be downloaded. The **CAN** command is effective immediately upon receipt, even if the printer is off-line or in an error condition. The printer will return an **ACK** (06

hexadecimal) if there is no printer error condition and a **NAK** (15 hexadecimal) if an error condition exists.

### PRINT JOB

Upon receipt of a valid print job (<ESC>A . . . <ESC>Z), an **ACK** (06 hexadecimal) will be returned by the printer if there are no errors and a **NAK** (16 hexadecimal) if a printer error exists (this protocol only works with the RS232C interface).

### PRINT STOP (DLE)

If a **DLE** (10 hexadecimal) is received by the printer, the print process is stopped and an **ACK** (06 hexadecimal) is returned if there are no errors and a **NAK** (16 hexadecimal) if a printer error exists.

### PRINT START (DC1)

If the printer has been stopped by receipt of a **DLE** (10 hexadecimal) command, it can be restarted by sending a **DC1** (hexadecimal 11) command. Upon receipt of this command an **ACK** (06 hexadecimal) is returned if there are no errors and a **NAK** (16 hexadecimal) if a printer error exists.

*(1) To provide compatibility with older SATO printers, the RS232C interface can be configured to use an earlier Bi-Com 3 ENQ/ACK/NAK protocol selected via DSW2-8 and DSW1-7/8 (on the RS232C Interface module). The earlier protocol did not have provisions for the Job Name and did not respond to the DLE or DCI commands. Also, there are additional Response Codes in the Status Byte Definition. It is recommended that you use the current protocol rather than the earlier version unless it is necessary for compatibility with existing software.*

## STATUS RESPONSE

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

### PRINTER STATUS (SOH + MG)

Upon Receipt of an **SOH** (hexadecimal 01) followed immediately by an ASCII **MG** causes the printer to return a 30 byte Printer Status Word bounded by an **STX-ETX** pair that reports the current operating status of the printer.

BYTE NUMBER	HEX VALUE	DESCRIPTION
1	00	Thermal Transfer Print Type Direct Thermal Print Type
	01	
2	00	203 dpi Resolution 305 dpi Resolution
	01	

BYTE NUMBER	HEX VALUE	DESCRIPTION
3	00	2 ips Print Speed
	01	3 ips Print Speed
	02	4 ips Print Speed
	03	5 ips Print Speed
	04	6 ips Print Speed
	05	7 ips Print Speed
	06	8 ips Print Speed
	07	9 ips Print Speed
	08	10 ips Print Speed
	09	12 ips Print Speed
4	00	Not Supported
	01	Not Supported
	02	Not Supported
	03	Label Dispense Print mode
	04	Reserved
5	00	Not Supported
	01	Not Supported
	02	Not Supported
6	00	Dispense at head position
	01	Dispense at dispense position
7	00	Reserved
8	41	Not Supported
	42	Not Supported
	43	Not Supported C
9	00	Print Density Level 1
	01	Print Density Level 2
	02	Print Density Level 3
	03	Print Density Level 4
	04	Print Density Level 5
10	00	Reflective (Eye-Mark)
	01	Sensor Gap (See-Thru) Sensor
	02	No Sensor
11	00	Zero Slash Disabled
	01	Zero Slash Enabled
12	00	Reserved
13	00	Not Supported
	01	Not Supported
14	00	Online FeedDisabled
	01	Online Feed Enabled
15	00	Fixed Pitch
	01	Proportional Pitch

BYTE NUMBER	HEX VALUE	DESCRIPTION
16-17	00 to C80 00 to 12C	Not Supported
18-19	00 to 340 00 to 4E0	Not Supported
20-21	00 to 3E7 FFFF to FC19	Vertical Base Reference Point Offset in dots (0 to 792) Vertical Base Reference Point Offset in dots (-1 to -792)
22-23	00 to 320 00 to FCE0	Horizontal Base Reference Point Offset in dots (0 to 800) Horizontal Base Reference Point Offset in dots (-1 to -800)
24	00 to 63 FF to 9D	Not Supported
25	00 to 63 FF to 9D	Not Supported
26	00 to 63 FF to 9D	Not Supported
27	00 to 63 FF to 9D	Dispense Offset in dots (0 to 99) Dispense Offset in dots (-1 to -99)
28	00 01	Compatibility Mode Enabled Compatibility Mode Disabled
29	08 to 40	Not Supported
30	00 01	Buzzer Enabled Buzzer Disabled

**COUNTER STATUS (SOH + ME)**

Upon Receipt of an **SOH** (hexadecimal 01) followed immediately by an ASCII **ME** causes the printer to return a 28 byte Head Counter Status Word bounded by an **STX-ETX** pair that reports the current status of the printer life counters.

BYTE NUMBER	HEX VALUE	DESCRIPTION
1 - 8	Hex	Current Life Counter in dots
9 - 12	Hex	1st (Current) Head Counter in dots
13 - 16	Hex	2nd (Previous) Head Counter in dots
17 - 20	Hex	3rd Head Counter in dots
21 - 24	Hex	Not Supported
25 - 28	Hex	Not Supported

**SENSOR STATUS (SOH + SG)**

Upon Receipt of an SOH (hexadecimal 01) followed immediately by an ASCII **SG** causes the printer to return a 4 byte Sensor Status Word bounded by an **STX-ETX** pair that reports the values of the printer counters.

BYTE NUMBER	VALUE	DESCRIPTION
1	Hex	Reflective Sensor Level
2	Hex	Transmissive Sensor Level
3	00H 01H	Out of Paper Paper Present
4	00H 01H	Head Open Head Closed

**HEAD STATUS (SOH + HC)**

Upon Receipt of an **SOH** (hexadecimal 01) followed immediately by an ASCII **HC** causes the printer to return a 1 byte Head Fault Status Word bounded by an **STX-ETX** pair that reports the current operating status of the print head. Before the printer will respond to this command, it must be in the Head Check Mode (DSW2-3 = On).

BYTE NUMBER	HEX VALUE	DESCRIPTION
1	00 01	Print Head OK Electrical Fault in Print Head

**SYSTEM VERSION INFORMATION (SOH + SB)**

Upon Receipt of an SOH (hexadecimal 01) followed immediately by a ASCII **SB** causes the printer to return a 50 byte Printer Status Word bounded by an **STX-ETX** pair that reports the system version of the printer.

BYTE NUMBER	VALUE	DESCRIPTION
1-50	ASCII	Firmware Version Information

**MEMORY STATUS (SOH + EB)**

Upon Receipt of an **SOH** (hexadecimal 01) followed immediately by an ASCII **EB** causes the printer to return a 24 byte Memory Status Word bounded by an **STX-ETX** pair that reports the current user memory allocation.

BYTE NUMBER	VALUE	DESCRIPTION
1-4	Hex	Free Font Memory
5-8	Hex	Total Font Memory
9-12	Hex	Free Form Overlay Memory
13-16	Hex	Total Form Overlay Memory
17-20	Hex	Free Graphic Memory
21-24	Hex	Total Graphic Memory

**FORM OVERLAY STATUS (SOH + FO)**

Upon Receipt of an **SOH** (hexadecimal 01) followed immediately by an ASCII **FO** causes the printer to return a 18 byte Form Overlay Status Word bounded by an **STX-ETX** pair that reports the Forms downloaded into the printer.

BYTE NUMBER	VALUE	DESCRIPTION
1-2	01 to 99	Form Registration Number (ASCII value)
3-18	ASCII	Form Name



**FONT CONFIGURATION (SOH + FG)**

Upon Receipt of an **SOH** (hexadecimal 01) followed immediately by an ASCII **FG** causes the printer to return a 102 byte Font/Graphics Status Word bounded by an **STX-ETX** pair that reports information on the stored font or graphic.

*Note: The printer must be in the Font/Graphic Download (See the specific printer Operators Manual) mode before a response will be received.*

BYTE NUMBER	VALUE	DESCRIPTION
1-2	ASCII Font	ID Number
3-4	00H 01H	Font Graphic
5-36	ASCII	Font Name
37-48	ASCII	Font Style
49-52	ASCII	Font Point Size
53-54	Hex	Character Width in dots
54-60	Hex	Character Height in dots
57-60	Hex	Font Size
58-64	Hex	Font Registration Number
65-68	Hex	Font Data Top Address
69-72	Hex	Total Size
73-74	Hex	Vertical/Horizontal Writing Flag
75	Hex	Character Pitch, Fixed/Variable
76	Hex	Family Attribute
77	Hex	Character Set
78	Hex	Italic Attribute
79-80	Hex	Weight Attribute
81-82	Hex	Spread
83-84	Hex	Assent in dots
85-86	Hex	Registration Start Code
86-8	Hex	Registration End Code
88-95	Hex	Reserved
96-98	Hex	Code
99-100	Hex	Horizontal Valid Size
101-102	Hex	Left Gap Size

**INTERFACE STATUS (SOH + IG)**

Upon Receipt of an **SOH** (hexadecimal 01) followed immediately by an ASCII **IG** causes the printer to return a 1 byte Interface Status Word bounded by an **STX-ETX** pair that reports the type of interface connection currently set in the printer.

BYTE NUMBER	VALUE	DESCRIPTION
1	0	IEEE 1284 Parallel
	1	Serial RS232
	2	Local Area Network
	3	Universal Serial Bus

**SERIAL INTERFACE SETTINGS (SOH + H2)**

Upon Receipt of an **SOH** (hexadecimal 01) followed immediately by an ASCII **H2** causes the printer to return a 5 byte Serial IF Status Word bounded by an **STX-ETX** pair that reports the current operating parameters of the Serial RS232 Interface.

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

**STATUS BYTE DEFINITION, BI-COM PROTOCOL**

ASCII	HEX	DEFINITION
<b>OFF-LINE</b>		
0	30	No Errors
1	31	Ribbon Near End
2	32	Buffer Near Full
3	33	Ribbon Near End and Buffer Near Full

ASCII	HEX	DEFINITION
4 <sup>(1)</sup>	34	Print Stop (no error)
<b>ON-LINE, WAITING FOR DATA</b>		
A	41	No Errors
B	42	Ribbon Near End
C	43	Buffer Near Full
D	44	Ribbon Near End and Buffer Near Full
E <sup>(1)</sup>	45	Print Stop (without error)
<b>ON-LINE PRINTING</b>		
G	47	No Errors
H	48	Ribbon Near End
I	49	Buffer Near Full
J	4A	Ribbon Near End and Buffer Near Full
K <sup>(1)</sup>	4B	Print Stop (without error)
<b>ON-LINE, WAITING TO DISPENSE A LABEL</b>		
M	4D	No Errors
N	4E	Ribbon Near End
O	4F	Buffer Near Full
P	50	Ribbon Near End and Buffer Near Full
Q <sup>(1)</sup>	51	Print Stop (without error)
<b>ON-LINE, COMPILING PRINT JOB</b>		
S	53	No Errors
T	5	4 Ribbon Near End
U	55	Buffer Near Full
V <sup>(1)</sup>	56	Ribbon Near End and Buffer Near Full
W <sup>(1)</sup>	56	Print Stop (without error)
<b>OFF-LINE, ERROR CONDITION</b>		
b	62	Head Open
c	63	Paper End
d	64	Ribbon End
e	65	Media Error

## Section 7: Bi-Directional Communications

ASCII	HEX	DEFINITION
f	66	Sensor Error
g	67	Head Error
j	6A	Cutter Error
k	6B	Other Error Condition
(¹)Not supported by legacy Bi-Com protocols		

# APPENDIX A.

## COMMAND CODE QUICK REFERENCE

Instruction	Description	Page
A	<b>Start Code.</b> Begins all print jobs	2-66
A1aaaabbbb	<b>Media Size.</b> Specifies the label size. aaaa = Label length in dots (0 to Vmax) bbbb = Label width in dots (0 to Hmax)	2-46
A(space)Z	<b>Form Feed.</b> Feeds a blank tag or label.	2-33
AR	<b>Normal Print Length.</b> This command resets the printer to the Standard print length (7 inches).	2-52
A3H-aaaa -Vbbbb	<b>Base Reference Point.</b> Establishes a new base reference point position for the current label. Units of measurement are dots. - = Optional character. If included, will shift reference point in negative direction. aaaa = Horizontal reference point bbbb = Vertical reference point	2-10
Babbcccd	<b>Bar Codes.</b> Prints a 1:3 ratio bar code. 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	2-2

Instruction	Description	Page
	bb = Number of dots (01-12) for narrow bar and narrow space ccc = Bar height in dots (001-999) d = UCC 128 only 0 No human readable text 1 Human readable at top 2 Human readable at bottom	
BDabbcccd	<b>Bar Codes.</b> Prints a 2:5 ratio bar code, except for UPC, EAN, Code 93, Code 128 and UCC128 symbols, which are fixed width bar codes. For values a, bb, ccc and d see instructions for Babbcccd.  For UPC/EAN bar codes, this command puts descender bars and human readable text below the symbol.	2-2
BKaabbccd eeffnn...n	<b>PDF417.</b> Prints PDF417 2-D symbols.  aa = Minimum module dimension (03-09 dots). Will not print for values of 01, 02 or greater than 09. bb = Minimum module pitch dimension (04-240 dots). Will not print for values of 01, 02, 03 or greater than 25. c = Security level (1-8). dd = Code words per line (01-30). If 00 is specified for dd and ee, printer will automatically optimize settings. ee = Rows/symbol (00 or 03). If 00 is specified for dd <i>and</i> ee, printer will automatically optimize settings. fff = Number of characters to be encoded (0001-2700) g = Not specified, standard PDF417 M Micro PDF417 T Truncated PDF417 nn...n = Data to be printed.	5-10
BPn...n	<b>Postnet.</b> Prints Postnet bar codes.  n...n = 5 digit ZIP (Postnet-32 format) 6 digits (Postnet-37 format) 9 digit ZIP+4 (Postnet -52 format) 11 digit ZIP+4+DPC (Postnet-62, Delivery Point format).	2-49
BTabbccdde	<b>Bar Codes.</b> Variable Ratio. provides the ability to print a bar code with a ratio other than those specified through the standard bar code commands (B, BD, and D).  a = Bar code option: 0 Codabar	2-8

Instruction	Description	Page
	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)	
BVa,b,c, ddddddddd, eee,ff f,gg..g	<b>Maxicode.</b> Prints 2-D Maxicode symbols per AIM I.S.S. specification.	5-8
	a = Position of symbol within the set	
	b = Total number of symbols in the set	
	c = Mode	
	dd..d = 9 digit numeric Postal Code	
	eee = 3 digit numeric Country Code	
	ff f = 3 digit numeric Service Class	
	gg..g = Data, terminated by <ESC>	
BWaabbb	<b>Bar Codes.</b> Expansion. Works together with the BT command to specify an expansion factor and the bar code height for the particular symbol being printed.	2-7
	aa = Expansion factor by which the width of all bars and spaces is increased (01-12)	
	bbb = Bar height by dot (004-999 dots)	
BXaabbccdd eeeffghh	<b>Data Matrix.</b> Data Format. Specifies the format of the Data Matrix 2-D symbology.	5-2
	aa = Format ID (01-06, If ECC200 is selected (bb=20) this field is ignored.	
	bb = Error correction level (00, 05, 08,10,14, 20 or 200. All other values processed as 00.	
	cc = Horizontal cell size (03-12 dots/cell)	
	dd = Vertical cell size (03-12 dots per cell)	
	eee = Cells per line. Use 000 for optimized symbol.	
	fff = Cell lines. Use 000 to optimize.	
	g = Mirror image	
	0 Normal Print	
	1 Reverse Print	
	hh = Guide cell thickness (01-15) 01 indicates normal type.	

Instruction	Description	Page
C	<b>Repeat Label.</b> Prints a duplicate of the last label printed.	2-57
CSa	<b>Print Speed Selection.</b> Specifies a unique print speed in in./sec. through software for a particular label. a = Speed Range	2-56
Dabbcccd	<b>Bar Codes.</b> Prints 1:2 ratio bar code. For UPC and EAN bar codes, this will add descender bars. For values a, bb, ccc and d see instructions for Babbcccd.	2-2
DCxx...x	<b>Data Matrix.</b> Print Data. Prints data using Data Matrix format specified in BX Data Format command. xx...x = Data to be printed. Cannot exceed 500 characters.	5-5
Eaaa	<b>Line Feed.</b> Provides the ability to print multiple lines of the same character size without specifying a new print position for each line. aaa = Number of dots (1-999) between the bottom of the characters on one line to the top of the characters on the next line.	2-45
EX0	<b>Expanded Print Length.</b> Expands the print length to 9999 dots.	2-51
Faaaabcccc ddee	<b>Sequential Numbering.</b> Allows the printing of sequencing fields (text, bar codes) where all incrementing is done within the printer. aaaa = Number of times to repeat the same data (0001-9999) b = Plus or minus symbol (+ for increments; - for decrements) cccc = Value of step for sequence (001-9999) dd = No. of digits for sequential numbering (01-99, default = 8) ee = No. of digits free from sequential numbering (01-99, default=0)	2-64
FWaabcccc	<b>Line.</b> Prints a horizontal line. Units of measurement are dots. aa = Width of line b = V Vertical line H Horizontal line cccc = Length of line	2-43
FWaabbVccc Hdddd	<b>Box.</b> Prints a box. For values aa, bbbb, cc, and dddd, see instructions for horizontal and vertical lines. Units of measurement are dots. aa = Width of horizontal side bb = Width of vertical side ccc = Length of vertical side dddd = Length of horizontal side	2-43



Instruction	Description	Page
FXaaabccc dddeee	<b>Data Matrix.</b> Sequential Numbering. Prints sequential numbered Data Matrix 2-D symbols.  aaa = Number of duplicate labels (001-999) b = Increment or decrement + Increment - Decrement ccc = Increment/decrement steps (001-999) ddd = Sequential numbering start position (001-999). Referenced to left side. eee = Incremented data length (001-999). Measured from start position.	5-6
Gabbbccc(data)	<b>Custom Graphics.</b> Allows the creation and printing of graphic images using a dot-addressable matrix.  a = Specifies format of data stream to follow B Binary H Hexadecimal bbb = Number of horizontal 8 x 8 blocks (see page 5-XX for range) ccc = Number of vertical 8 x 8 blocks (see page 5-XX for range) data = Data to describe the graphic image	2-36
GMaaaaa	<b>BMP File.</b> Downloads BMP file to the internal graphics image memory.  aaaaa = No. of bytes to be downloaded (max DOS file size is 32K)	2-38
GPaaaaa	<b>PCX File.</b> Downloads PCX file to the internal graphics image memory.  aaaaa = No. of bytes to be downloaded (max DOS file size is 32K)	2-39
Haaaa	<b>Horizontal Position.</b> Specifies a field's horizontal location across the width of the label from the current base reference point. The units of measurement are dots.	2-53
IDaa	<b>Job ID Store.</b> Stores the Job ID number.  aa = Job ID number assigned (01-99)	2-40
J	<b>Journal Print.</b> Provides the ability to print text line by line. Fixed spacing between lines and characters.	2-42
Kab90cc	<b>Recall Custom Designed Characters.</b> Recalls for printing a custom character stored by the Tabcc(data) command.  a = 1 16 x 16 matrix 2 24 x 24 matrix	2-13

Instruction	Description	Page
	b = Indicates the format that data stream was stored in B Binary H Hexadecimal	
	cc = Memory location where the character was stored. Valid locations are 21 to 52 or "I" to "R" in hex values.	
Laabb	<b>Character Expansion.</b> Expands characters in both directions.	2-14
	aa = Multiple to expand horizontally (01-12)	
	bb = Multiple to expand vertically (01-12)	
M	<b>Font type.</b> Specifies the 13W x 20H dot matrix font (including descenders).	2-26
OA	<b>Font type.</b> Specifies the OCR-A font.	2-26
OB	<b>Font type.</b> Specifies the OCR-B font dot matrix.	2-26
Paa	<b>Character Pitch.</b> Designates the number of dots between characters.	2-16
	aa = Number of dots between characters (01-99)	
PR	<b>Fixed Font Spacing.</b> Returns the printer to fixed character spacing mode.	2-18
PS	<b>Proportional Font Spacing.</b> Places the printer in the proportional character spacing mode. Will not work with U Font.	2-18
Qaaaaaa	<b>Print Quantity.</b> Specifies the total number of labels to print.	2-55
	aaaaaa = Total number of labels to print for the job (000001-999999)	
RDabb,ccc, ddd,nn...n	<b>Font Type.</b> Specifies the internal AGFA raster fonts.	2-28
	a = A Specifies CG Times font B Specifies CG Triumvirate font	
	bb = Always 00	
	ccc = Horizontal Size (16 to 999 dots or P08 to P72 point size)	
	ddd = Vertical Size (16 to 999 dots or P08 to P72 point size)	
	nn..n = Data to be printed	
RMaaaa,bbbb	<b>Mirror Image.</b> Prints mirror image of data. Must be preceded by an A1 Media Size Command. Must be preceded by an <ESC>A1 Media Size command.	2-47
S	<b>Font type.</b> Specifies the 8W x 15H dot matrix font (including descenders).	2-26
Tabcc(data)	<b>Store Custom Designed Characters.</b> To create and store custom characters or images in the printer's volatile memory. See Kab90cc to recall the character for printing.	2-12
	a = 1 16 x 16 matrix	

Instruction	Description	Page
	2 24 x 24 matrix	
	b = Specifies data stream format to follow	
	B Binary	
	H Hexadecimal	
	cc = Memory location to store the character. Valid locations are 21 to 52 or "!" to "R" in hex values.	
	(data) = Data to describe the character.	
U	<b>Font type.</b> Specifies a 5W x 9L dot matrix font (including descenders).	2-26
Vbbbb	<b>Vertical Position.</b> Specifies a field's vertical location down the length of the label from the current base reference point. Units of measurement are dots.	2-53
WBa	<b>Font type.</b> Specifies the 18W x 30L dot matrix font (including descenders).	2-31
	a = 0 Disables auto-smoothing of font	
	1 Enables auto-smoothing if expansion is greater than 3	
WDHaaaaVbbbb XccccYdddd	<b>Copy Image Area.</b> To copy an image to another location of the label.	2-21
	aaaa = Horizontal position of the top left corner of image area	
	bbbb = Vertical position of the top left corner of image area	
	cccc = Horizontal length of image area	
	dddd = Vertical length of image area	
WKnn...n	<b>Job Name.</b> Stores the job name.	2-41
	nn..n = Job name, up to 16 ASCII characters	
WLa	<b>Font type.</b> Specifies the 28W x 52L dot matrix font (including descenders).	2-31
	a = 0 Disables auto-smoothing of font	
	1 Enables auto-smoothing if expansion is greater than 3	
XM	<b>Font type.</b> Specifies the 24W x 24H dot matrix font (including descenders).	2-26
XS	<b>Font type.</b> Specifies the 17W x 17H dot matrix font (including descenders).	2-26
XU	<b>Font type.</b> Specifies the 5W x 9L dot matrix font (including descenders).	2-26
XWa	<b>Font type.</b> Specifies the 48W x 48L dot matrix font (including descenders).	2-31
	a = 0 Disables auto-smoothing of font	

Instruction	Description	Page
	1 Enables auto-smoothing if expansion is greater than 3	
XBa	<b>Font type.</b> Specifies the 48W x 48L dot matrix font (including descenders). a = 0 Disables auto-smoothing of font 1 Enables auto-smoothing if expansion is greater than 3	2-31
Z	<b>Stop Code.</b> Ends all print jobs.	2-66
2D3m,a,bb,c d,ee,ff,gg	<b>QR Code.</b> Prints QR Code symbols. See command description for parameter definition and usage.	5-12
%a	<b>Rotate.</b> Fixed Base Reference Point. Rotates printing in 90° increments without changing the base reference point. a = 0 Sets print to normal direction 1 Sets print to 90° CCW 2 Sets print to 180° rotated (upside down) 3 Sets print to 270° CCW (90× CW)	2-62
\$a,b,c,d	<b>Vector font.</b> Specifies printing of the unique SATO vector font. a = A Helvetica Bold (proportional spacing) B Helvetica Bold (fixed spacing) b = Font width (50-999 dots*) c = Font height (50-999 dots*) d = Font variation (0-9) as follows: 0 Standard 1 Standard open (outlined) 2 Gray (mesh) pattern 1 3 Gray (mesh) pattern 2 4 Gray (mesh) pattern 3 5 Standard, shadow 1 6 Standard, shadow 2 7 Standard mirror image 8 Italic 9 Italic open (outlined)	2-29
\$(data)	<b>Data</b> for Vector font.	2-29
#Ea	<b>Print Darkness.</b> Specifies a new print darkness setting. The lightest setting is "1".	2-50
(aaaa,bbbb	<b>Reverse Image.</b> Reverse image from black to white and vice versa. Units of measure are dots.	2-60

Instruction	Description	Page
	aaaa = Horizontal length in dots of area to be reversed.	
	bbbb = Vertical height in dots of area to be reversed.	
&	<b>Store Form Overlay.</b> Stores a specified label image in the printer's volatile form overlay memory.	2-35
/	<b>Recall Form Overlay.</b> Recalls the label image from the printer's formoverlay memory for printing.	2-34
0 (zero)	<b>Replace Data (Partial Edit).</b> Provides the ability to replace a specified area of the previous label with new data.	2-58
*a	<b>Clear Print Job(s) and Memory.</b> Clears individual memory and buffers.	2-19
	a = When not included in command, clears print jobs in Multi-Buffer mode.	
	a = If included in command, specifies memory section to be cleared	
	T Custom character memory, printer	
	& Form overlay memory, printer	
	X Clears all memory all memory and buffers	
@,nnnn	<b>Off-Line.</b> Signals the printer to go off-line after the completion of a print job.	2-48
	nnnn = Optional message to be displayed on the LCD panel. Maximum of 32 characters.	
~aaaa	<b>Cut Job.</b> Cuts labels at a specified interval in a print job. Number of labels printed is equal to the product of the Quantity specified times the value of aaaa.	2-24
	aaaa = Number of labels between each cut (0001 to 9999)	
~Aaaaa	<b>Cut.</b> Specifies the number of labels to print between each cut. It is independent of the Quantity command.	2-23
	aaaa = Number of labels between each cut	
~B	<b>Cut Last.</b> Cuts any printed labels that remain in the printer	2-25

## CALENDAR COMMANDS

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Instruction	Description	Page
WA(elements)	<p><b>Calendar Print.</b> Prints the date and/or time field (up to 16 characters) from the printer's internal clock. Use slash to separate date elements and colon to separate time elements.</p> <p>elements = YY 2 digit Year (00-91)          YYYY 4 digit Year (1981-2080)          MM Month (01-12)          DD Day (01-31)          HH 12 Hour Clock (00-11)          hh 24 Hour Clock (00-23)          mm Minutes (00-59)          ss Seconds (00-59)          TT AM or PM          JJJ Julian Date (000-366)          WW Week (00-53)          ww Week (01-54)</p>	3-4
WPabbb	<p><b>Calendar Increment.</b> To add a value to the printer's current date and/or time. Does not change the printer's internal time setting.</p> <p>a = Y Years          M Months          D Days          h Hours</p> <p>bbb = Numeric data, Week (00-99), Years (1-9), Months (01-99), Days (001-999), Hours (001-999).</p>	3-2
WTaabbccdde	<p><b>Calendar Set.</b> To set the time and date of the printer's internal clock.</p> <p>aa = Year (00-99)          bb = Month (01-12)          cc = Day (01-31)          dd = Hour (00-23)          ee = Minute (00-59)</p>	3-6

## EXPANDED MEMORY OPTION COMMANDS

Instruction	Description	Page
BJ(aa..abb..b	<b>Start TrueType Font Storage.</b> Prepares the Expanded Memory to accept TrueType font data. aa...a = 40 byte font description bb...b = 10 byte date field	4-4
BJDccccccddd ee...e	<b>Download Bit Mapped TrueType Font Data.</b> Downloads the bit mapped TrueType font data to the memory area specified. cccc = Memory Offset (hexadecimal) dddd = Data size in bytes (max = 2000) ee...e = Font data to be downloaded	4-4
BJ	<b>End TrueType Font Storage.</b> Ends the bit mapped TrueType font storage process	4-4
BJFaaaaaaaa	<b>Initialize Expanded Memory.</b> Initializes the Memory Area and formats it for use. Should be preceded by the Memory Area Select command for the memory area to be initialized. aaaaaaaa = 8 character alphanumeric password	4-16
BJRabbccdd eeeeff..f	<b>TrueType Font Recall.</b> Recalls a previously stored bit mapped TrueType font for use. a = Font ID (1-9) bb = Horizontal Expansion (01-12) cc = Vertical Expansion (01-12) dd = Character pitch (01-99) eeee = Number of characters ff...f = Data to be printed using font	4-3
BJS	<b>Expanded Memory Status.</b> Reports the status of the currently active Memory Card to the host by printing a status label.	4-18
BJTaa,bb,cc, dd,ee,fff,gg..g	<b>TrueType Font Recall.</b> Recalls a previously stored bit mapped TrueType font for use. aa = Font ID (01-99) bb = Horizontal Expansion (01-12) cc = Vertical Expansion (01-12) dd = Reserved, always 00 ee = Character pitch (01-99) f f f f = Number of characters gg...g = Data to be printed using font	4-3

Instruction	Description	Page
CCa	<b>Memory Area Select.</b> Selects the Memory area for all following Expanded Memory commands. a = 1 Memory Area 1 b = 2 Memory Area 2	4-17
GCaaa	<b>Recall BMP Graphic.</b> Recalls BMP graphic files stored in Expanded Memory.	4-9
Glabbccdddeee	<b>Store Custom Graphics.</b> Stores a graphic image in the memory card to be called later for printing on a label. a = Specifies format of data stream to follow B Binary H Hexadecimal bbb = Number of horizontal 8 x 8 blocks ccc = Number of vertical 8 x 8 blocks ddd = Graphics storage number (001-999) eee = Data to describe the graphic image	4-10
GRccc	<b>Recall Custom Graphics.</b> Recalls for printing the graphic image stored by the GI command. ccc = Storage number (001-999)	4-11
GTaaa,bbbb,nn...n	<b>Store BMP Graphics.</b> Stores BMP files in Expanded Memory. aaa = Storage area number (001 to 999) bbbb = Size of BMP file in bytes nn...n = Data	4-10
Plaaa,bbbb,cc...c	<b>Store PCX Graphics File.</b> Stores a PCX graphic file. aaa = Storage number (001-999) bbbb = Number of bytes in the file to be stored.	4-15
PYaaa	<b>Recall PCX Graphics File.</b> Recalls a PCX graphics file. aaa = The storage number assigned to the file (001-999)	4-14
YR,aaa/D,bb,cc...c	<b>Recall Format/Field.</b> To recall a field from a format previously stored in the memory card. aaa = Number of format to be recalled (001 to 999) bb = Number of field to be recalled (01-99) cc...c = Data to be placed in field.	4-5
YS,aaa/Nbb,cc	<b>Store Format/Field.</b> To store a field in a format in the memory card. aaa = Format number (001 -999) bb = Field number (01-99) cc = Number of characters in the field	4-6



Instruction	Description	Page
&R,aa	<b>Recall Form Overlay.</b> Recalls a label image previously stored in Expanded Memory. aa = Storage number (00 to 99).	4-7
&S,aa,bbbb,cccc	<b>Store Form Overlay.</b> Stores a label image in Expanded Memory. aa = Storage number (00 to 99) bbbb = Horizontal size of window to be stored (50 to Hmax) cccc = Vertical size of window to be stored (50 to Vmax)	4-8
*a,bbb	<b>Clear Expanded Memory.</b> Clears individual memory and buffer areas. a = Memory section to be cleared G SATO graphic files (001-999) P PCX graphic file (001-999) F Stored formats (001-999) O TrueType fonts, memory card (001-009) R BMP graphic file (001-999) bbb = Storage number	4-2

## CONFIGURATION COMMANDS

Instruction	Description	Page
AOa	<b>Auto Online.</b> Allows the automatic online on power up setting to be enabled or disabled.  a    =    0       Printer powers up in Online mode 1       Printer powers up in Offline mode.	6-14
CLa	<b>CR/LF Delete.</b> Deletes the occurrence of CR/LF characters in the data stream.  a    =    0       Do not delete CR/LF. 1       Delete CR/LF	6-12
LFa	<b>Online Feed.</b> To enable or disable online label feed.  a    =    0       Enables label feed when online. 1       Disables label feed when online.	6-14
LHa	<b>Zero Slash.</b> Allows printing zeroes with or without a slash.  a    =    0       Prints zeroes without a slash. 1       Prints zeroes with a slash.	6-13
I2abcde	<b>Serial Interface.</b> Sets the operating parameters for the Serial RS232C interface. Sets the default printer configuration in Flash ROM. See Serial Interface Parameters command in the Configuration Commands of Section 5: Programming Reference of this manual for details.	6-11
IGa	<b>Sensor Type.</b> Selects the sensor type.  a    =    0       Reflective (Eye-Mark) sensor. 1       Transmissive (See-Thru) sensor 2       Sensor not used	6-10
LD,a,b,c,d,e,f,g,i,j,j	<b>Download Protocol Command Codes.</b> Downloads a user defined set of Alternate Protocol Command Codes. See Appendix E for details on the proper usage of this command.	6-2
PCaa,bb PCF,a,.....z	<b>Printer Setting.</b> Sets the default printer configuration in Flash ROM. See Printer Setting command in the Configuration Commands of Section 2: Command Codes of this manual for details.	6-4
PHa	<b>Print Type.</b> Selects the thermal printing method.  a    =    0       Thermal transfer printing 1       Direct thermal printing	6-9
PMa	<b>Print Mode.</b> Selects desired backfeed operation.  a    =    0       No backfeed, continuous operation 1       Tear-Off 2       Cut, backfeed after print	6-8

Instruction	Description	Page
	3      Cut, backfeed before print	
	4      Cut, no backfeed	
	7      Dispense, backfeed after print	
	8      Dispense, backfeed before print	
POabcc	<b>Pitch Offset.</b> Sets the pitch type, direction and offset to be used	6-7
	a    =    0      Cutter	
		1      Dispense
		2      Tear-Off
		3      Continuous
	b    =    +      Positive offset	
		-      Negative offset
	cc   =    00 to 99, offset value in dots.	
TPa	<b>Test Print.</b> Allows test labels to be printed via host command.	6-16
	a    =    0      Small user test print.	
		1      Large user test print.
		2      Small factory test print.
		3      Large factory test print.

## LEGACY COMMANDS

---

These commands are provided for legacy applications that use command streams created for older SATO printers. It is not recommended that these commands be used for new applications.

- |    |  |
|----|--|
| AX | <b>Expanded Print Length.</b> This command sets the printer to the Expanded print length (14 inches). <ESC>EX0 is the recommended replacement.   |
| N  | <b>Rotate, Moving Base Reference Point.</b> Sets the original base reference point and returns printing to normal orientation. <ESC>% is the recommended replacement.  |
| R  | <b>Rotate, Moving Base Reference Point.</b> Rotates the printing of all subsequent images by 90 degrees counterclockwise each time it is used. Also moves the base reference point. <ESC>% is the recommended replacement. |

# **APPENDIX B.**

## **BAR CODE SPECIFICATIONS**

### **BAR CODE SYMBOLOGIES**

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This section contains detailed information on the printing of bar codes on the “e” Series and PRO printers. Information on printing the following bar code symbologies is provided:

- Codbar
- Code 39
- Interleaved 2 of 5
- UPC-A/EAN-13
- EAN-8
- Industrial 2 of 5
- Matrix 2 of 5
- Code 128
- MSI
- Code 93
- UPC-E
- UPC Supplements(Bookland)
- UCC-128
- Postnet
- Data Matrix
- Maxicode
- PDF417

# Codabar

**COMMAND STRUCTURE**

1:3 ratio	<ESC> <b>B</b> 0bbcccd (data) d
2:5 ratio	<ESC> <b>BD</b> 0bbcccd (data) d
1:2 ratio	<ESC> <b>D</b> 0bbcccd (data) d

bb	=	Width of narrow element in dots (01-12)
ccc	=	Bar height in dots (001-999)
d	=	Required Start and Stop character (A, B, C, or D)
data	=	Bar code data (alphanumeric)

**CHARACTER SET**

0-9, -, \$, ., /, +  
A, B, C, D (Start/Stop characters)

## DENSITY TABLE

Printer Resolution	Narrow/Wide Ratio	Value of "bb"	"X" Dimension (mils)	Density (char/inch)
600 dpi	1:3	03	5.0	16.96
	2:5	01	3.3	27.2
	1:3	02	3.3	25.0
300 dpi	1:3	01	3.3	25.0
	1:3	02	6.7	12.6
	2:5	01	6.7	13.6
	1:2	02	3.3	15.1
200 dpi	1:3	01	5.0	16.9
	1:3	02	10.0	8.5
	2:5	01	10.0	9.2
	1:2	02	5.0	10.2

## EXAMPLE

<ESC>H0400<ESC>V0025<ESC>B002100A12345B  
<ESC>H0440<ESC>V0135<ESC>XS12345

## NOTES

1. You must add the appropriate (A, B, C or D) Start and Stop characters to the data string. The printer does not automatically add them



12345

# Code 39

**COMMAND STRUCTURE**

1:3 ratio: <ESC>**B**bbccc\* (data) \*

2:5 ratio: <ESC>**BD**1bbccc\* (data) \*

1:2 ratio: <ESC>**D**1bbccc\* (data) \*

bb = Width of narrow element in dots (01-12)

ccc = Bar height in dots (001-999)

\* = Required Start and Stop character (asterisk)

(data) = Bar code data (alphanumeric)

**CHARACTER SET** 0-9, A-Z, Space, \$, %, +, -, ., /, \* (Start/Stop character)

## DENSITY TABLE

Printer Resolution	Narrow/Wide Ratio	Value of "bb"	"X" Dimension (mils)	Density (char/inch)
	1:3	02	3.3	18.8
	1:3	03	5.0	12.7
	2:5	01	3.3	10.3
	1:2	02	3.3	11.56
	1:2	03	5.0	7.0
300 dpi	1:3	01	3.3	18.8
	1:3	02	6.7	9.5
	2:5	01	3.3	10.3
	1:2	02	6.7	23.1
	1:2	01	3.3	11.5
200dpi	1:3	01	5.0	12.7
	1:3	02	10.0	6.4
	2:5	01	10.0	7.0
	1:2	01	5.0	15.6
	1:2	02	10.0	7.8

## EXAMPLE

<ESC>H0100<ESC>V0025<ESC>B103100\*CODE 39\*

<ESC>H0230<ESC>V0130<ESC>XS\*CODE 39\*

## NOTES

You must add the "\*" Start/Stop characters to the data stream. The printer does not add them automatically.



# Interleaved Two of Five (I 2/5)

**COMMAND STRUCTURE** 1:3 ratio: <ESC>**B2bbccc (data)**

2:5 ratio: <ESC>**BD2bbccc (data)**

1:2 ratio: <ESC>**D2bbccc (data)**

bb = Width of narrow element in dots (01-12)

ccc = Bar height in dots (001-999)

(data) = Bar code data (numeric); must be an even number of digits or else the printer will add a leading zero; start and stop code are provided by the printer

**CHARACTER SET** 0-9 (numeric only)

## DENSITY TABLE

Printer Resolution	Narrow/Wide Ratio	Value of "bb"	"X" Dimension (mils)	Density (char/inch)
600 dpi	1:3	02	3.3	33.4
	1:3	03	5.0	22.6
	2:5	01	3.3	18.86
300 dpi	1:3	01	3.3	33.4
	1:3	02	6.7	16.7
	2:5	01	6.7	18.8
	1:2	02	6.7	21.4
	1:2	02	3.3	14.3
200 dpi	1:3	01	5.0	22.6
	1:3	02	10.0	11.3
	2:5	01	10.0	12.7
	1:2	01	5.0	14.5
	1:2	02	10.0	9.7

## EXAMPLE

<ESC>H0100<ESC>V0100<ESC>**B20310045676567**

<ESC>H0140<ESC>V0210<ESC>XM4567 6567

## NOTES

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





# UPC-A/EAN-13

**COMMAND STRUCTURE** <ESC>**B3bbccc (data)**  
 <ESC>**D3bbccc (data)**  
 <ESC>**BD3bbccc (data)**

bb = Width of narrow element in dots (01-12)  
 ccc = Bar height in dots (001-999)  
 (data) = Bar code data (numeric); must be exactly 13 digits. For  
 UPC-A, the first digit must be a zero and the last 11 digits  
 are the actual UPC-A data followed by a check digit.

To select UPC-A, 11 digits of data is sent. The printer adds a "0" and automatically generates the check digit. If 12 digits of data are sent, the printer assumes an EAN-13 symbol and automatically generates the check digit. The last digit of the bar code data is a modulo 10 check digit. If 13 digits of data are sent to the printer, the check digit is not created and must be supplied by the programmer. It must be the last character in the 13 digit string and can be determined by using the calculations outlined below.

**CHARACTER SET** 0-9 (numeric only)

## DENSITY TABLE

Printer Resolution	Value of "bb"	Narrow Bar Width (mils)	Magnification Factor
600 dpi	05	8.3	Below Minimum
	06	10.0	75%
	07	11.7	87.5%
	08	13.3	100%
300 dpi	02	6.7	Below Minimum
	03	10.0	75%
	04	13.3	100%
200 dpi	02	10.0	75%
	03	15.0	112%
	04	20.0	150%

## NOTES

D3 provides guide bars that extend longer than the rest of the bar code.  
 BD3 provides guide bars and the human readable text below the symbol.

## EXAMPLE

<ESC>H0100<ESC>V0375<ESC>**BD30215001234567890**

**CALCULATING THE  
MOD 10 CHECK DIGIT**

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

<b>ODD</b>	0		2		4		6		8		0	
<b>EVEN</b>		1		3		5		7		9		CD

1. First add all the numbers in the ODD positions.  
i.e.,  $0+2+4+6+8+0 = 20$
2. Multiply the result of Step 1 by 3.  
i.e.,  $20 \times 3 = 60$
3. Add up all the numbers in the EVEN positions.  
i.e.,  $1+3+5+7+9 = 25$
4. Add the result of Step 2 to that of Step 3.  
i.e.,  $60 + 25 = 85$
5. Subtract the result of Step 4 from the next highest increment of 10.  
i.e.,  $90 - 85 = 5$
6. The correct Modulo 10 check digit for the 11 digit string "01234567890" is 5.

# EAN-8

**COMMAND STRUCTURE**    <ESC>**B4bbccc** (data)  
                                  <ESC>**D4bbccc** (data)

bb        =    Width of narrow element in dots (01-12)  
 ccc      =    Bar height in dots (001 -999)  
 (data)   =    Bar code data (numeric). Must be 8 digits.

**CHARACTER SET**            0-9 (numeric only)

## DENSITY TABLE

Printer Resolution	Value of "bb"	Narrow Bar Width (mils)	Magnification Factor
600 dpi	05	8.3	Below Minimum
	06	10.0	75%
	07	11.7	87.5%
	08	13.3	100%
300 dpi	02	6.7	Below Minimum
	03	10.0	75%
	04	13.3	100%
200 dpi	02	10.0	75%
	03	15.0	112%
	04	20.0	150%

## NOTES

1. D4 provides guide bars that extend longer than the rest of the bar code and the human readable text below the symbol.
2. The check digit is automatically calculated for EAN-8.

## EXAMPLE

<ESC>H0400<ESC>V0375<ESC>**BD4031001234567**



---

## Industrial Two of Five

---

**COMMAND STRUCTURE**

1:3 ratio:	B5bbccc (data)
2:5 ratio:	BD5bbccc (data)
1:2 ratio:	D5bbccc (data)

bb = Width of narrow element in dots (01-12)

ccc = Bar height in dots (001-999)

(data) = Bar code data (numeric); must be an even number of digits or else the printer will add a leading zero

**CHARACTER SET** 0-9 (numeric only)

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

**EXAMPLE**

```
<ESC>H0100<ESC>V0600<ESC>BD50310012345  
<ESC>H0300<ESC>V0710<ESC>XS12345
```



---

# Matrix Two of Five

---

**COMMAND STRUCTURE**

1:3 ratio:	<ESC> <b>B</b> 6bbccc (data)
2:5 ratio:	<ESC> <b>BD</b> 6bbccc (data)
1:2 ratio:	<ESC> <b>D</b> 6bbccc (data)

bb = Width of narrow element in dots (01-12)  
 ccc = Bar height in dots (001-999)  
 (data) = Bar code data (numeric only); must be an even number of digits or else the printer will add a leading zero.

**CHARACTER SET** 0-9 (numeric only)

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

**EXAMPLE**

```
<ESC>H0100<ESC>V0775<ESC>BD60310012345
<ESC>H0230<ESC>V0885<ESC>XS12345
```



# Code 128

## COMMANDSTRUCTURE <ESC>BGbbccdd (data)

- bb = Width of narrow element in dots (01-12)  
 ccc = Bar height in dots (001-999)  
 dd = Start code to specify initial subset of bar code data  
     G Subset A Start code  
     H Subset B Start code  
     I Subset C Start code  
 (data) = Includes bar code data and subset Shift codes; Shift codes are used to change the subset type within the bar code data.  
     Shift codes:  
         E Subset A Shift code  
         D Subset B Shift code  
         C Subset C Shift code

**CHARACTER SET** See Code 128 Character Table on Page B-23

## DENSITY TABLE

Printer Resolution	Value of "bb"	"X" Dimension (mls)	Density (char/inch)	
			Subsets A, B	Subset C
600 dpi	02	3.3	27.3	54.7
	03	5.0	18.2	36.5
	04	6.7	13.6	27.2
300 dpi	01	3.3	27.3	54.7
	02	6.7	13.6	27.2
	03	10	9.1	18.3
200 dpi	01	5.0	18.2	36.5
	01	10.0	9.1	18.3
	03	15.0	13.8	12.2

## EXAMPLE

The following will start in Subset A for the characters "AB", shift to Subset B for "789", then shift to Subset C for "123456".

<ESC>H0200<ESC>V0550<ESC>**BG03100>GAB>B789>C123456**  
 <ESC>H0310<ESC>V655<ESC>XSAB789123456



---

# MSI

---

**COMMAND STRUCTURE**1:3 ratio: <ESC>**BA**bbccc (data) d2:5 ratio <ESC>**BD**Abbccc (data) d1:2 ratio <ESC>**DA**bbccc (data) d

bb = Width of narrow element in dots (01-12)

ccc = Bar height in dots (001-999)

(data) = Bar code data (numeric); maximum of 15 digits

d = Required check digit

**CHARACTER SET**

0-9 (numeric only)

**EXAMPLE**<ESC>H0100<ESC>V0950<ESC>**BA03100123455**

&lt;ESC&gt;H0170&lt;ESC&gt;V1060&lt;ESC&gt;XS12345



12345

# Code 93

**COMMAND STRUCTURE**    1:3 ratio:    <ESC>**BC**bbccdd (data)

- bb    =    Width of narrow element in dots (01-12)
- ccc    =    Bar height in dots (001-999)
- dd    =    Length of data (number of digits, 00-99)
- (data)    =    Bar code data (alphanumeric); length must match value of parameter "dd", check digit is supplied by printer.

**CHARACTER SET**            0-9, A-Z, -, ., Space, \$, /, +, %

**DENSITY TABLE**

Printer Resolution	Narrow/Wide Ratio	Value of "bb"	"X" Dimension (mils)	Density (char/inch)
600 dpi	1:3	02	3.3	33.6
	1:3	03	5.0	22.5
	1:3	04	6.7	16.7
300 dpi	1:3	01	3.3	33.3
	1:3	02	6.7	16.7
	1:3	03	10	11.1
200 dpi	1:3	01	5.0	22.5
	1:3	02	10.0	11.3
	1:3	03	15	7.5

**EXAMPLE**

<ESC>H0100<ESC>V1125<ESC>**BC0310008123**  
 <ESC>H0155<ESC>V1240<ESC>XS1 234ABCD



1234ABCD



# UPC-E

## COMMAND STRUCTURE

<ESC>**BE**bbccc (data)

<ESC>**DE**bbccc (data)

bb = Width of narrow element in dots (01-03)

ccc = Bar height in dots (001-999)

(data) = Bar code data (numeric); must be exactly 6 digits

## CHARACTER SET

0-9 (numeric only)

## DENSITY TABLE

Printer Resolution	Value of "bb"	Narrow Bar Width (mils)	Magnification Factor
600 dpi	05	8.3	Below Minimum
	06	10	75%
	07	11.8	87.5%
	08	13.3	100%
300 dpi	02	6.7	Below Minimum
	03	10.0	75%
	04	13.3	100%
200 dpi	02	10.0	75%
	03	15.0	112%
	04	20.0	150%

## NOTES

Command **DE** provides guide bars that extend longer than the rest of the bar code.

## EXAMPLE

<ESC>H0400<ESC>V0550<ESC>**DE03100123456**

<ESC>H0375<ESC>V0600<ESC>OB0

<ESC>H0408<ESC>V0655<ESC>OB123456



# Bookland (UPC/EAN Supplements)

**COMMAND STRUCTURE** <ESC>BFbbccc (data)

bb = Width of narrow element in dots (01-03)  
ccc = Bar height in dots (001-999)  
(data) = Bar code data (numeric); must be exactly 2 or 5 digits

**CHARACTER SET** 0-9 (numeric only)

**DENSITY TABLE**

Printer Resolution	Value of "bb"	Narrow Bar Width (mils)	Magnification Factor
600 dpi	05	8.3	Below Minimum
	06	10	75%
	07	11.8	87.5%
	08	13.3	100%
300 dpi	02	6.7	Below Minimum
	03	10.0	75%
	04	13.3	100%
200 dpi	02	10.0	75%
	03	15.0	112%
	04	20.0	150%

**EXAMPLE**

```
<ESC>H0325<ESC>V0725<ESC>D30315009827721123
<ESC>L0101<ESC>H0295<ESC>V0800<ESC>OB0
<ESC>H0340<ESC>V0878<ESC>OB98277
<ESC>H 0480<ESC>V0878<ESC>OB21123
<ESC>H640<ESC>V0760<ESC>BF0313021826
<ESC>H655<ESC>V0730<ESC>OB21826
```



---

# UCC-128

---

**COMMAND STRUCTURE**    <ESC>**B|bbcccd (data)**

bb    =    Width of the narrow elements in dots (01 to 12)  
 ccc   =    Bar height in dots (001 to 999)  
 d      Placement of human readable text  
         0    None  
         1    Text at top of bar code  
         2    Text at bottom of bar code  
 (data)    17 digits made up of the following:  
             1st digit = Container type  
             digits 2-8 = Shipper identification  
             digits 9-17 = Container Sequential number  
             (not automatically dequenced by the printer)

**CHARACTER SET**                      See Code 128 Character Table on Page B-23

**DENSITY TABLE**                    See Code 128, Page B-10

- NOTES**
1. The Start, Function, Stop and Extension codes will be created by the printer and added automatically.
  2. The internal Modulo 10 check character will be automatically created and added by the printer. The overall Code 128 symbol check character will be automatically created by the printer and added.
  3. The automatically created human readable text will be created according to the following rules:
    - The spacing between the bar code and the text is fixed at 10 dots (.
    - If the width of the human readable text is wider than the bar code, it will start at the same position as the bar code and extend past the right of the bar code.
    - If the width of the human readable text is less than the bar code, it will be centered on the bar code.
    - The automatically generated HRI font is OCR-B.
    - If any part of the human readable text extends outside the printable area, none of it will be printed. Care should be exercised when placing the bar code to allow for any automatically created human readable text.

**EXAMPLE**

Without incrementing

```
<ESC>A  
<ESC>H0100<ESC>V0100<ESC>BI04150101234567000000001  
<ESC>Q2<ESC>Z
```



With incrementing

```
<ESC>A  
<ESC>H0100<ESC>V0100<ESC>F001+001  
<ESC>BI04150101234567000000001  
<ESC>Q2<ESC>Z
```



---

# Postnet

---

**COMMAND STRUCTURE** <ESC>BP (data)

data = 5 digits ZIP  
 = 6 digits for Postnet 37  
 = 9 digits for ZIP+4  
 = 11 digits for Delivery Point Bar Code

**CHARACTER SET** 1-9 (numeric only)**NOTES**

1. Frame bits and check digits added automatically by printer.
2. Bar code width and height are fixed and cannot be changed.
3. If the number of digits sent to the printer as data does not match one of the formats specified above (i.e. 5, 6, 9 or 11), the command is ignored and nothing will be printed.
4. If a "-" is included in the data stream (i.e. 84093-1565), it is ignored.

**EXAMPLE**

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



# Data Matrix

COMMAND STRUCTURE	Data Format	<ESC>BXaabbccddeeffghh
	aa =	Format ID. 01-06 or 11-16. The values 07 and 17 will not be accepted by the printer.
	bb =	Error correction level. 00, 05, 08, 10, 14, 20 or 200. All other values will be processed as a 00.
	cc =	Horizontal cell size. 03 - 12 dots/cell.
	dd =	Vertical cell size. 03 - 12 dots/cell.
	eee =	Number of cells in one column. Use 000 to optimize.
	fff =	Number of cell in one row. Use 000 to optimize.
	g =	Mirror Image 0 = Normal Print 1 = Reverse Print
	hh =	Guide Cell Thickness. 01-15. 01 indicates normal type.
	<b>Sequential Numbering</b>	<b>&lt;ESC&gt;FXaaabcccdddeee</b>
	aaa =	Number of duplicate labels to be printed (001 - 999)
	b =	Increment or Decrement + = Increment - = Decrement
	ccc =	Increment/Decrement Steps (001 - 999)
	ddd =	Sequential numbering start position (001 - 999) Referenced to left side.
	eee =	Incremented data length measured from start position (001 - 999)
	<b>PRINT DATA</b>	<b>&lt;ESC&gt;DCxxx...x</b>
	xx...x =	Data

**CHARACTER SET**

ID NUMBER	CHARACTER SET	ENCODING SCHEME
<b>16 Bit CRC</b>		
01	Numeric, Space	Base 11
02	Upper Case Alpha, Space	Base 27
03	Upper Case Alpha, Space, Comma, Period, Slash, Minus	Base 41
04	Upper Case Alphanumeric, Space	Base 37
05	ADCII 7-bit, Full Keyboard (20H - 7FH) ASCII	ASCII
06	ISO 8-bit, International (20H - FFH) 8-Bit	8-Bit

**NOTES**

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

**EXAMPLE**

<ESC>V0100<ESC>H0100  
 <ESC>BX05051010000000001  
 <ESC>**DCDATA MATRIX DATA MATRIX**



# Maxicode

## COMMAND STRUCTURE <ESC>BVa,b,c,ddddddddd,eee,fff,gggg.....<ESC>

- a = Position of Maxicode symbol within the set, when used in a structured append format 1~8.
- b = Total number of Maxicode symbols in the set, when used in a structured format 1~8.
- c =
- 2 For Mode 2 Structured Carrier Message for Domestic U.S. UPS shipments
  - 3 For Mode 3 Structured Carrier Message for International UPS shipments
  - 4 Standard symbol
  - 5 Not currently supported
  - 6 Reader programming
- ddd..ddd = 9 digit numeric Postal Code
- eee = 3 digit numeric Country Code
- fff = 3 digit numeric Service Class
- gg//g = Data, terminated by <ESC>

Mode	Postal Cde	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 numeric only	3 digits max numeric only	84 characters alphanumeric
4 6	"000000" fixed data	"000" fixed data	"000" fixed data	91 characters alphanumeric

## CHARACTER SET NOTES

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

## EXAMPLE

```
<ESC>A<ESC>V0100<ESC>H0100
<ESC>BV1,1,2,123456789,840,001,[]><RS>01<GS>961Z01547089
<GS>UPSN<GS>056872<GS>349<GS>99999999<GS>001/005
<GS>029<GS>N<GS><GS>LENEXA<GS>KS<RS><EOT>
<ESC>Q001<ESC>Z
```





# PDF417

<b>COMMAND STRUCTURE</b>	<b>&lt;ESC&gt;BFaabbcddeeffffnnn...n</b>
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).
gg	= PDF417 Type. If not specified, standard PDF417 T Truncated PDF417 M Micro PDF417
nn...n	= Data to be printed.
<b>CHARACTER SET</b>	ASCII 128 character set plus PC437 Extended Character set.
<b>NOTES</b>	See AIM USA Uniform Symbology Specification PDF417 for information on the structure of this symbology.
<b>EXAMPLE</b>	<ESC>V0100<ESC>H0100<ESC>BK0607400000021PDF417 PDF417 PDF417



## CODE 128 CHARACTER TABLE

---

The Code 128 Table lists 105 data values for the three subsets: A, B, and C. Each subset column displays either a single column of data or a double column of data.

- If the subset column displays a single column of data, that is the data to be entered to produce the result.
- If the subset column displays a double column of data, the first column contains the desired output, and the second column contains the actual characters to be entered.

For example, look at value 99 in the table:

If you are currently using Subset A or Subset B, you can change to Subset C by encoding “>C”.

VALUE	SUBSET A	SUBSET B	SUBSET C
99	Subset C >C	Subset C >C	99
100	Subset B >D	FNC4 >D	Subset B >D
101	FNC4 >E	Subset A >E	Subset A >E
102	FNC1 >F	FNC1 >F	FNC1 >F

- Note: When Subset C is chosen, you must specify an even number of data positions because of the interleaved encodation method.

**CODE 128 CHARACTER TABLE**

VALUE	SUBSET A	SUBSET B	SUBSET C	VALUE	SUBSET A	SUBSET B	SUBSET C
0	SP	SP	00	36	D	D	36
1	!	!	01	37	E	E	37
2	“	“	02	38	F	F	38
3	#	#	03	39	G	G	39
4	\$	\$	04	40	H	H	40
5	%	%	05	41	I	I	41
6	&	&	06	42	J	J	42
7	‘	‘	07	43	K	K	43
8	.	.	02	38	F	F	38
9	)	)	09	45	M	M	45
10	*	*	10	46	N	N	46
11	+	+	11	47	O	O	47
12	,	,	12	48	P	P	48
13	-	-	13	49	Q	Q	49
14	.	.	14	50	R	R	50
15	/	/	15	51	S	S	51
16	0	0	16	52	T	T	52
17	1	1	17	53	U	U	53
18	2	2	18	54	V	V	54
19	3	3	19	55	W	W	55
20	4	4	20	56	X	X	56
21	5	5	21	57	Y	Y	57
22	6	6	22	58	Z	Z	58
23	7	7	23	59	[	[	59
24	8	8	24	60	\	\	60
25	9	9	25	61	]	]	61
26	:	:	26	62	^	^	62
27	;	;	27	63	—	—	63
28	<	<	28	64	NUL >(space)	. >(space)	64
29	=	=	29	65	SOH >!	a or >!	65
30	>J	>J	30	66	STX >"	b or >"	66
31	?	?	31	67	ETX >#	c or >#	67

**CODE 128 CHARACTER TABLE (CONTINUED)**

VALUE	SUBSET A	SUBSET B	SUBSET C	VALUE	SUBSET A	SUBSET B	SUBSET C
32	@	@	32	68	EOT >\$	d or >\$	68
33	A	A	33	69	ENQ >%	e or >%	69
34	B	B	34	70	ACK >&	f or >&	70
35	C	C	35	71	BEL >.	g or >.	71
72	BS >(	h >(	72	89	EM >9	y >9	89
73	HT >)	i >)	73	90	SUB >:	z >:	90
74	LF >*	j >*	74	91	ESC >;	{ >;	91
75	VT >+	k >+	75	92	FS ><	><	92
76	FF >,	l >,	76	93	GS >=	} >=	93
77	CR >-	m >-	77	94	RS >>	~ >>	94
78	SO >.	n >.	78	95	US >?	DEL >?	95
79	SI >/	o >/	79	96	FNC3 >@	FNC3 >@	96
80	DLE >0	p >0	80	97	FNC2 >A	FNC2 >A	97
81	DC1 >1	q >1	81	98	SHIFT >B	SHIFT >B	98
82	DC2 >2	r >2	82	99	Subset C >C	Subset C >C	99
83	DC3 >3	s >3	83	100	Subset B >D	FNC4 >D	Subset B >D
84	DC4 >4	t >4	84	101	FNC4 >E	Subset A >E	Subset A >E
85	NAK >5	u >5	85	102	FNC1 >F	FNC1 >F	FNC1 >F
86	SYN >6	v >6	86	103	SUBSET A START CODE >G		
87	ETB >7	w >7	87	104	SUBSET B START CODE .H		
88	CAN >8	x >8	88	105	SUBSET C START CODE >I		

# APPENDIX C.

## CUSTOM CHARACTERS AND GRAPHICS

### CUSTOM DESIGNED CHARACTER EXAMPLE

The following example is presented to help understand the use of the Custom Designed Characters command. It demonstrates the design and printing of an arrow in a 16 x 16 matrix.

1. Determine which matrix size to use
  - 16 dot x 16 dots
  - 24 dots by 24 dots
2. Lay out a grid and draw the image on the grid.
  - Each square represents one dot
  - Blacken squares for each printed dot

	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
1																
2																
3																
4																
5																
6																
7																
8																
1																
2																
3																
4																
5																
6																
7																
8																

## Appendix C: Custom Characters and Graphics

- Transfer the image into two bit map representations and then into hexadecimal or binary format.

ROW	BIT MAP				HEX	
1	0000	0001	0000	0000	01	00
2	0000	0011	1000	0000	03	80
3	0000	0111	1100	0000	07	C0
4	0000	1111	1110	0000	0F	E0
5	0001	1111	1111	0000	1F	F0
6	0011	1111	1111	1000	3F	F8
7	0111	1111	1111	1100	7F	FC
8	1111	1111	1111	1110	FF	FE
9	0000	0111	1100	0000	07	C0
10	0000	0111	1100	0000	07	C0
11	0000	0111	1100	0000	07	C0
12	0000	0111	1100	0000	07	C0
13	0000	0111	1100	0000	07	C0
14	0000	0111	1100	0000	07	C0
15	0000	0111	1100	0000	07	C0
16	0000	0111	1100	0000	07	C0

- To store the custom designed character in memory using a hexadecimal data stream, the command would be:

```
<ESC>A
<ESC>T1H3F0100038007C00FE01FF03FF87FFCFFFE07C007C007C007C007C007C007C0<
ESC>Z
```

*Note: This should be a continuous data string without any CR or LF characters.*

- To recall the custom character from memory, send the following code to the printer. Note that you can print other data as well. Also note how the charactersize was expanded using the <ESC>L command.

```
<ESC>A
<ESC>L0505<ESC>H0150<ESC>V100<ESC>K1H903F
<ESC>L0505<ESC>H0600<ESC>V100<ESC>K1H903F
<ESC>L0303<ESC>H0125<ESC>V0250<ESC>MTHIS SIDE UP !
<ESC>Q1
<ESC>Z
```

- To store the custom designed character in memory using a binary data stream, the command would be:

```
<ESC>A
<ESC>T1B3F 01H 00H 03H 80H 07H C0H 0FH E0H 1FH F0H 3FH F8H 7FH FC H FFH FEH 07H C0H 07H
C0H 07H C0H 07H C0H 07H C0H 07H C0H 07H C0H
<ESC>Z
```

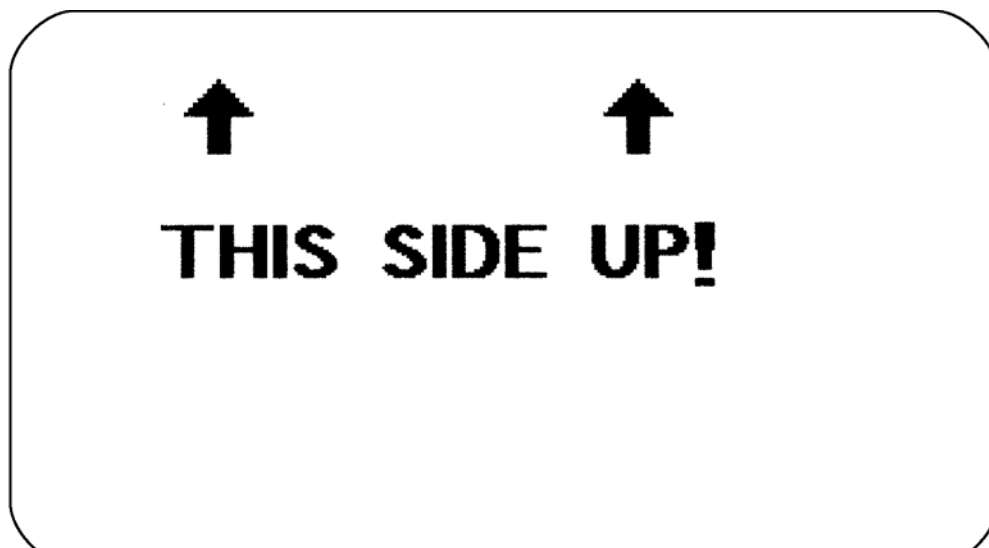
*NOTE: Spaces are shown between hexadecimal values in the above example for clarity only and are not included in the data string.*

*Note that the data stream is only half as long as the hexadecimal format. This is because we can send the binary equivalent of "11111111" (represented above in its hexadecimal value of FFH), for example, using one eight bit word while it takes two eight bit words to transmit the hexadecimal equivalent "F" and "F". To send binary characters using BASIC, the expression `!CHR (&HFF)` will send the binary equivalent of FF (i.e., 11111111).*

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

```
<ESC>A
<ESC>L505<ESC>H0150<ESC>V100<ESC>K1B903F
<ESC>L505<ESC>H0600<ESC>V100<ESC>K1B903F
<ESC>L0303<ESC>H0125<ESC>V0250<ESC>XMTHISSIDE UP !
<ESC>Q1
<ESC>Z
```

The printer output for both the hexadecimal and binary format examples is:

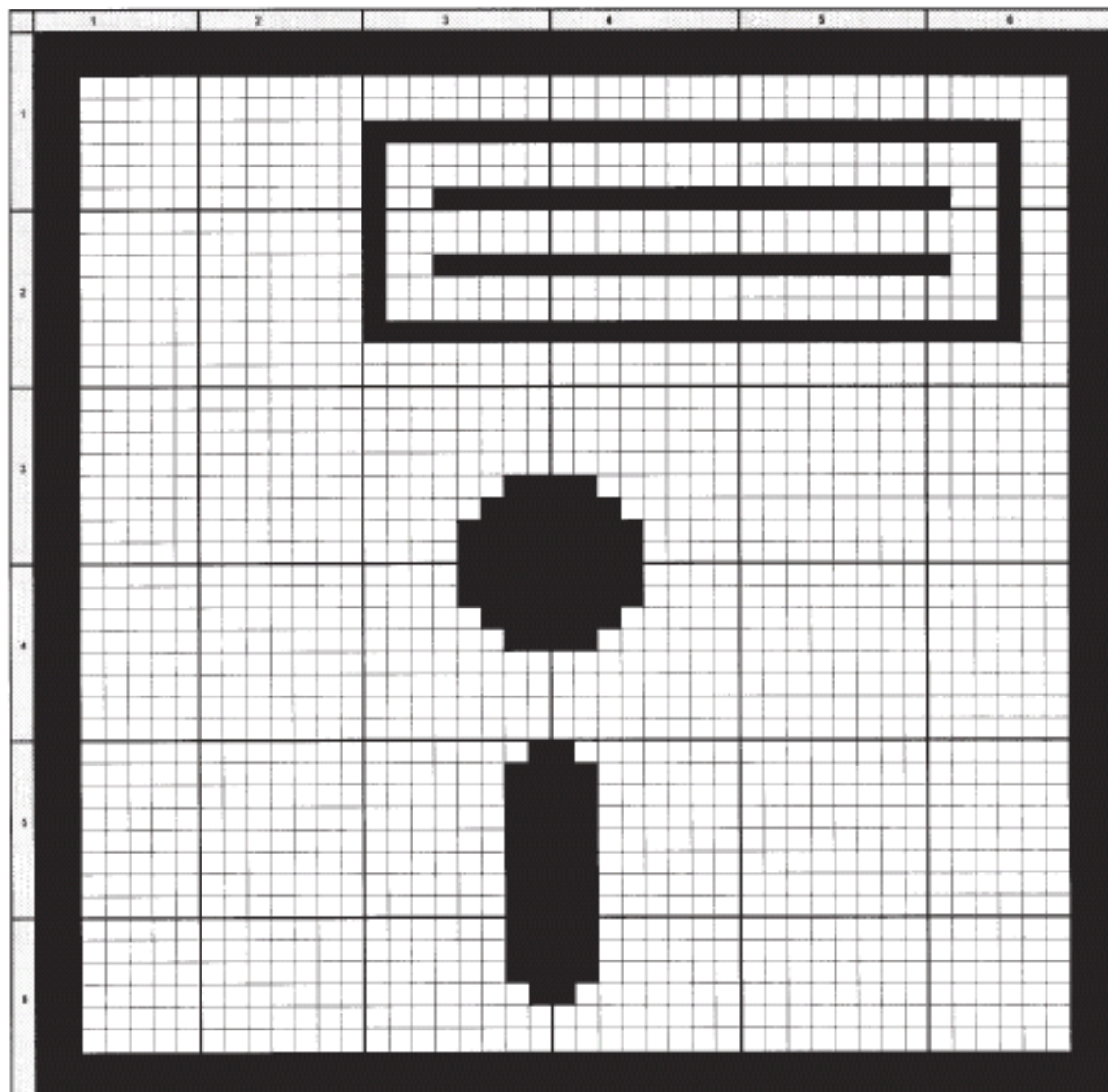


## CUSTOM GRAPHICS EXAMPLE

---

The following example is presented to help you understand the use of the CustomGraphics command. It demonstrates the design and printing of a diskette in a 48 x 48 matrix.

1. Determine the matrix size for the graphic. It must be in 8 dot by 8 dot blocks. The example here has six blocks horizontally and six blocks vertically (48 x 48).
2. Lay out a grid and draw the image on the grid.
  - Each square represents one dot
  - Blacken squares for each printed dot





3. Transfer the image into a bit map representation and then into hexadecimal format:

[illegible]

4. Using the hexadecimal data, send the following code to print the graphic image as designed.

```
<ESC>A<ESC>H0100<ESC>V0100<ESC>GH006006
FFFFFF FFFFFFF FFFFFFF FFFFFFF C00000 000003
C00000 000003 C000FF FFFF3 C00080 000013
C00080 000013 C0009F FFFF13 C00080 000013
C00080 000013 C0009F FFFF13 C00080 000013
C00080 000013 C000FF FFFF3 C00000 000003
C00000 000003 C00000 000003 C00000 000003
C00000 000003 C00000 000003 C00003 C00003
C00007 E00003 C0000F F00003 C0000F F00003
C0000F F00003 C0000F F00003 C00007 E00003
C00003 C00003 C00000 000003 C00000 000003
C00000 000003 C00000 000003 C00001 800003
C00003 C00003 C00003 C00003 C00003 C00003
C00003 C00003 C00003 C00003 C00003 C00003
C00003 C00003 C00001 800003 C00000 000003
C00000 000003 FFFFFFF FFFFFFF FFFFFFF FFFFFFF
<ESC>Q1<ESC>Z
```

*Note: Spaces shown in the hexadecimal listing above are for emphasis only. Spaces must not be encoded within the graphic portion of the data stream to the printer. Also, CR and LF characters to separate the lines must not be encoded in the data stream.*

- To send the data in binary format, the software must convert the data into binary format before transmitting it to the printer. Using the BASIC programming language for example, this is done by notation "CHR\$ (&HC0)" which sends the hexadecimal value of iC0i as binary data (11000000). The BASIC program listing for sending this graphic to the printer (using the RS232 port) in binary format is:

```
CLS
OPEN .COM2:9600,N,8,1,CS,DS. FOR OUTPUT AS #1
E$ = CHR$(27)
PRINT #1,CHR$(2); E$; .A.; E$; .V0100"; E$; .H0100"; E$; .GB006006";
PRINT #1,CHR$(&HFF);CHR$(&HFF);CHR$(&HFF);CHR$(&HFF);CHR$(&HFF);
PRINT #1,CHR$(&HFF);CHR$(&HFF);CHR$(&HFF);CHR$(&HFF);CHR$(&HFF);
PRINT #1,CHR$(&HFF);CHR$(&HFF);CHR$(&HC0);CHR$(&H00);CHR$(&H00);
PRINT #1,CHR$(&H00);CHR$(&H00);CHR$(&H03);CHR$(&HC0);CHR$(&H00);
PRINT #1,CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H03);CHR$(&HC0);
PRINT #1,CHR$(&H00);CHR$(&HFF);CHR$(&HFF);CHR$(&HFF);CHR$(&HFF);CHR$(&HF3);
PRINT #1,CHR$(&HC0);CHR$(&H00);CHR$(&H80);CHR$(&H00);CHR$(&H00);
PRINT #1,CHR$(&H13);CHR$(&HC0);CHR$(&H00);CHR$(&H80);CHR$(&H00);
PRINT #1,CHR$(&H00);CHR$(&H13);CHR$(&HC0);CHR$(&H00);CHR$(&H9F);
PRINT #1,CHR$(&HFF);CHR$(&HFF);CHR$(&H13);CHR$(&HC0);CHR$(&H00);
PRINT #1,CHR$(&H80);CHR$(&H00);CHR$(&H00);CHR$(&H13);CHR$(&HC0);
PRINT #1,CHR$(&H00);CHR$(&H80);CHR$(&H00);CHR$(&H00);CHR$(&H13);
PRINT #1,CHR$(&HC0);CHR$(&H00);CHR$(&H9F);CHR$(&HFF);CHR$(&HFF);
PRINT #1,CHR$(&H13);CHR$(&HC0);CHR$(&H00);CHR$(&H80);CHR$(&H00);
PRINT #1,CHR$(&H00);CHR$(&H13);CHR$(&HC0);CHR$(&H00);CHR$(&H80);
PRINT #1,CHR$(&H00);CHR$(&H00);CHR$(&H13);CHR$(&HC0);CHR$(&H00);
PRINT #1,CHR$(&HFF);CHR$(&HFF);CHR$(&HFF);CHR$(&HF3);CHR$(&HC0);
PRINT #1,CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H03);
PRINT #1,CHR$(&HC0);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);
PRINT #1,CHR$(&H03);CHR$(&HC0);CHR$(&H00);CHR$(&H00);CHR$(&H00);
PRINT #1,CHR$(&H00);CHR$(&H03);CHR$(&HC0);CHR$(&H00);CHR$(&H00);
PRINT #1,CHR$(&H00);CHR$(&H00);CHR$(&H03);CHR$(&HC0);CHR$(&H00);
PRINT #1,CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H03);CHR$(&HC0);
PRINT #1,CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H03);CHR$(&HC0);
PRINT #1,CHR$(&H00);CHR$(&H00);CHR$(&H03);CHR$(&HC0);CHR$(&H00);
PRINT #1,CHR$(&H03);CHR$(&HC0);CHR$(&H00);CHR$(&H07);CHR$(&H00);
PRINT #1,CHR$(&H00);CHR$(&H03);CHR$(&HC0);CHR$(&H00);CHR$(&H0F);
PRINT #1,CHR$(&HF0);CHR$(&H00);CHR$(&H03);CHR$(&HC0);CHR$(&H00);
PRINT #1,CHR$(&HF0);CHR$(&HF0);CHR$(&H00);CHR$(&H03);CHR$(&HC0);
PRINT #1,CHR$(&H00);CHR$(&HF0);CHR$(&HF0);CHR$(&H00);CHR$(&H03);
PRINT #1,CHR$(&HC0);CHR$(&H00);CHR$(&HF0);CHR$(&HF0);CHR$(&H00);
PRINT #1,CHR$(&H03);CHR$(&HC0);CHR$(&H00);CHR$(&H07);CHR$(&HE0);
PRINT #1,CHR$(&H00);CHR$(&H03);CHR$(&HC0);CHR$(&H00);CHR$(&H03);
PRINT #1,CHR$(&HC0);CHR$(&H00);CHR$(&H03);CHR$(&HC0);CHR$(&H00);
PRINT #1,CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H03);CHR$(&HC0);
PRINT #1,CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H03);
PRINT #1,CHR$(&HC0);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);
PRINT #1,CHR$(&H03);CHR$(&HC0);CHR$(&H00);CHR$(&H00);CHR$(&H00);
PRINT #1,CHR$(&H00);CHR$(&H03);CHR$(&HC0);CHR$(&H00);CHR$(&H01);
PRINT #1,CHR$(&H80);CHR$(&H00);CHR$(&H03);CHR$(&HC0);CHR$(&H00);
PRINT #1,CHR$(&H03);CHR$(&HC0);CHR$(&H00);CHR$(&H03);CHR$(&HC0);
PRINT #1,CHR$(&H00);CHR$(&H03);CHR$(&HC0);CHR$(&H00);CHR$(&H03);
PRINT #1,CHR$(&HC0);CHR$(&H00);CHR$(&H03);CHR$(&HC0);CHR$(&H00);
PRINT #1,CHR$(&H03);CHR$(&HC0);CHR$(&H00);CHR$(&H03);CHR$(&HC0);
PRINT #1,CHR$(&H00);CHR$(&H03);CHR$(&HC0);CHR$(&H00);CHR$(&H03);
PRINT #1,CHR$(&HC0);CHR$(&H00);CHR$(&H03);CHR$(&HC0);CHR$(&H00);
PRINT #1,CHR$(&H03);CHR$(&HC0);CHR$(&H00);CHR$(&H03);CHR$(&HC0);
```

```
PRINT #1,CHR$(&H00);CHR$(&H03);CHR$(&HC0);CHR$(&H00);CHR$(&H03);
PRINT #1,CHR$(&HC0);CHR$(&H00);CHR$(&H03);CHR$(&HC0);CHR$(&H00);
PRINT #1,CHR$(&H03);CHR$(&HC0);CHR$(&H00);CHR$(&H03);CHR$(&HC0);
PRINT #1,CHR$(&H00);CHR$(&H03);CHR$(&HC0);CHR$(&H00);CHR$(&H03);
PRINT #1,CHR$(&HC0);CHR$(&H00);CHR$(&H03);CHR$(&HC0);CHR$(&H00);
PRINT #1,CHR$(&H01);CHR$(&H80);CHR$(&H00);CHR$(&H03);CHR$(&HC0);
PRINT #1,CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H03);
PRINT #1,CHR$(&HC0);CHR$(&H00);CHR$(&H00);CHR$(&H00);CHR$(&H00);
PRINT #1,CHR$(&H03);CHR$(&HFF);CHR$(&HFF);CHR$(&HFF);CHR$(&HFF);
PRINT #1,CHR$(&HFF);CHR$(&HFF);CHR$(&HFF);CHR$(&HFF);CHR$(&HFF);
PRINT #1,CHR$(&HFF);CHR$(&HFF);CHR$(&HFF);
PRINT #1,E$; .Q1"; E$; .Z"; CHR$(3)
CLOSE #1
```

The printer output for both the hexadecimal and binary format example is:



## PCX GRAPHICS EXAMPLE

---

A graphics file in a PCX format may also be transmitted to the printer. The file must not be larger than 32K bytes (DOS file size reported in a DIR listing). For example, the WIZ.PCX image shown below has a file size of 15076 bytes.



The uncompressed size (PCX is a compressed file) of the file must not be greater than 64K bytes. Generally this is not a problem unless the graphic image is surrounded by large amount of white space which the PCX algorithm can compress very efficiently. If this is the case, the file should be recaptured to eliminate the surrounding white space as much as possible. The following basic program will send and print this file:

```
OPEN .WIZ.PCX. FOR INPUT AS #2
DA$ = INPUT$(15706, #2)
C$ = CHR$(27)
WIDTH .LPT1:., 255
LPRINT C$; .A.;
LPRINT C$; .V150"; C$; .H100"; C$; .GP15706,.; DA$
LPRINT C$; .Q1"; C$; .Z";
CLOSE #2
```

The printer output for this program is:



## APPENDIX D.

# CUSTOM PROTOCOL COMMAND CODES

### DESCRIPTION

---

This section contains information on creating custom Protocol Command Codes for operating the “e” Series and PRO printers. The Protocol Command codes are used to tell the printer that a specific type of information is being transmitted to it. As an example, the Standard Protocol Command Code specifies the use of an <ESC> character to tell the printer that the following character(s) will represent a specific command. Sometimes the host computer is unable to generate the character or it uses the <ESC> character to control another function. In this case, an Alternate Protocol Command Code set can be selected for use by placing DIP switch 2-7 in the ON position. When the Alternate set is selected, the <ESC> character is not used and is instead replaced with a “carrot” (^) character. A command stream would then start with an “^” instead of an “<ESC>”. These two sets of Protocol Command Codes are adequate for the majority of all applications, but occasionally situations occur where conflicts exist when using the Alternate set. In these cases, the user can define and download a custom set of Protocol Command Codes that are stored in non-volatile memory in the printer. After these are downloaded, they replace the Alternate Command Code set when DIP switch DS2-7 is in the ON position. When DIP switch DS2-7 is in the OFF position, the Standard Protocol Command Codes are used.

## DOWNLOAD COMMAND STRUCTURE

---

The command for downloading a new set of Protocol Command Codes takes the form of “<ESC>LD,a,b,c,d,e,f,g,h,i,j j”. The parameters specified for “a” through “i” can be transmitted in either ASCII characters or hex notation, allowing a complete 128 character (except for the “,”) set to be used for selecting the custom code.

PARAMETER	STANDARD SETTING	ALTERNATE SETTING (DEFAULT)
a	STX	{
b	ETX	}
c	ESC	^
d	ENQ	@
e	CAN	!
g	OFF-LINE	]
h (Auto ONLINE)	No	0 = Yes 1 = No
i (Zero Slash)	No	0 = Yes 1 = No
jj (Eurocharacter)	D5	User Defined

## RESET

---

If the custom Protocol Command codes are incorrect or if the printer does not respond to commands using the custom set, the Alternate Protocol Control Codes can be restored by the following procedure:

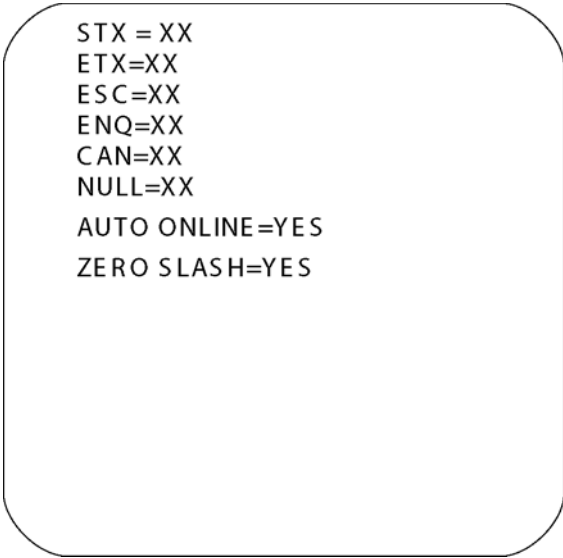
1. Turn the printer off.
2. Place DIP switch **DS2-7** in the **ON** position.
3. Turn power on while simultaneously pressing the **FEED** and **LINE** switches.
4. When the message “ALT PROTOCOL DEFAULT COMPLETED” appears on the display, turn the printer off.
5. When the printer is powered up again, the Alternate Protocol Command Code set will be active. All previous custom settings will be lost.

## DOWNLOAD PROCEDURE

---

The procedure for downloading a custom Protocol Command Code set is:

1. Reset the printer to the default settings using the Reset procedure.
2. Place DIP switch **DS2-7** in the **ON** position.
3. Turn the **POWER** switch ON while simultaneously pressing the **LINE** switch. This places the printer in the **USER DOWNLOAD** mode.
4. Set DIP switch **DS2-7** in the position to accept the Protocol Control codes to be used for downloading (i.e. DS2-7 = OFF for Standard codes and DS2-7 ON to use the Alternate set).
5. Press the **LINE** key to place the printer in the **ON-LINE** mode. The **LINE** LED should be on and the printer is ready to receive the download command data stream.
6. After the command has been sent, the unit will beep and print a status label. If it does not beep and print the label, the printer did not accept the data.
7. If the printer does not beep and print a setting label, turn the printer off, check your download command stream for errors and start the download process over at step 1.
8. If the custom codes are correct, press the **FEED** key to accept them and terminate the download process. If they are incorrect, turn the unit off without pressing the **FEED** key and begin the download process again at step 1.



STX = XX  
ETX=XX  
ESC=XX  
ENQ=XX  
CAN=XX  
NULL=XX  
AUTO ONLINE=YES  
ZERO SLASH=YES

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