



*LineJet™*  
Printers

**QMS® Code V™ Technical  
Reference Manual**



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# LineJet™ Printers

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Reference Manual**

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# 1

# Overview

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## About this Manual

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This manual is divided into chapters that contain all the information required to use the QMS<sup>®</sup> Code V<sup>™</sup> Emulation. Use this manual in conjunction with your printer *User's Guide* and and *PCL<sup>®</sup> -II/LinePrinter Plus<sup>®</sup> Technical Reference Manual* for complete printer-IGP<sup>®</sup> compatibility.

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## Warnings and Special Information

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Information requiring special attention is indicated under special headings. Always read and comply with this information. The heading reveals the nature of the information:

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**Warning**

**Warning messages call attention to situations that could hurt you or damage the equipment.**

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**Caution**

**Conditions that could damage the printer or related equipment.**

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**Note**

A note gives you helpful hints about printer operation and maintenance.

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## The Code V Graphics Language

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Code V Graphics Language is an Intelligent Graphics Printing (IGP) software emulation designed for your LineJet™ printer. The IGP Code V emulation of the QMS Code V Version II programming language produces on-line forms, bar codes, and alphanumeric text-generation.

### Features

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**On-Line Form and Label Generation** makes it easy to create forms or labels with the “preprinted” look for each application. Code V programs control all graphics functions, dramatically reducing host computer programming and processing time. Graphics capabilities include boxes, vertical and horizontal lines, solid and dashed lines with a variety of thickness, logos, and special alphanumeric print features. Forms and graphic designs can be duplicated horizontally and vertically.

**Variable bar codes** allow the bar code for your application to print easily with standard or user-defined ratios in vertical or horizontal orientations. Available bar codes are: Codabar, Code 39, Code 93, Code 128 with Subsets A, B, and C, and Code EAN/UCC 128, EAN 8, EAN 13, Interleaved 2 of 5, German I-2/5, MSI, UPC-A, UPC-E, POSTNET, PostBar, Royal Mail, Telepen and UPC Shipping. POSTNET is available only in the horizontal direction. This includes a dark print mode for darker, high-contrast bar codes. The IBARC bar code command prints bar codes in four orientations: horizontal, rotated 90, 180 or 270 degrees.

**Expanded and Compressed Print** draws attention where needed. Alphanumeric height and width are controlled independently for range of character sizes up to 9.9 inches wide and tall. Five compressed print sizes are available: 12, 13.33, 15, 17.65, and 20 cpi (characters per inch), permitting up to 170 columns in an 8.5-inch printed area (20 cpi).

**Rotated Alphanumerics** permit new concepts in form design. Normal, expanded, and compressed character strings can be rotated 90 degrees clockwise, counterclockwise, or printed upside down.

**Logos** are easily created using alphanumeric commands and a variety of print and shading features, providing a “customized” appearance for forms, reports, and labels. The registered trademark, copyright, TUV, GS-Mark, UL, and CSA symbols are provided as standard designs on the Code V, and you can also define custom symbols.

**Reversed and Shaded Print** permit highlighting and contrasting by printing white characters on a dark background or white characters on a gray, shaded background. Various levels or patterns of gray shading and reverse printing can be combined with other print features to create distinctive designs.

**Automatic Increment/Decrement Capability** allows batch form processing. Individual alphabetic, numeric, and bar code data fields can be identified and incremented or decremented by any amount, beginning from any specified reference point.

**Multinational Character Sets** provide you with many international character sets, 96 characters in length. The Multinational Character Sets also allow you to create your own character sets using characters defined in the Code V emulation software.

## Modes of Operation

---

The Code V has two basic modes of operation: Normal and Graphics.

### Normal Mode

In the Normal Mode, incoming data are checked by Code V software for the SFCC and the Graphics Mode Enable or the Enable Non-Graphics Free Format command, then passed to standard printer software.

All the standard ASCII emulation features (such as EVFU, elongated characters, compressed print, plot mode, etc.) are still available when in Normal Mode. However, when the Code V receives a Graphics Mode command, the Code V changes to the Graphics Mode and assumes control of the printer.

### Graphics Mode

In the Graphics Mode, all Code V functions are available. The standard graphics commands provide features such as underline print, horizontal and vertical duplication, dynamic forms, graphics plotting, and vertical formatting. A complete listing of all standard graphics commands is provided in the "Commands" chapter.

### Extended Graphics Mode

In addition to the standard graphics commands, the Code V Graphics Mode has an extended graphics command set, providing more specific graphic features for forms and labels. Alphanumeric commands, boxes, lines, logos, shading, special fonts, and all bar codes are part of the extended graphics command set.

Code V also supports the QMS Version II commands (ILOGO, IPEXP, IISO, IBARC, IREPV, IFONT,S, IHEX, IFORM,C, IFORM,D, IFORM,E, IFORM,L, and IFORM,R) as well as the original commands performing the same or similar functions to those in Version II.



# 2

## Commands

### Modes of Operation

The Code V has two modes of operation: Normal and Graphics. In the Normal mode, the data stream passes unchanged to the printer until the Special Function Control Code (SFCC) and Graphics Mode Enable command are detected, indicating that special Graphics Mode functions follow. All of the printer standard features operate in the normal mode (such as the EVFU, plot, hex dump) and the printer responds to control codes.

In the Graphics Mode, you can generate alphanumeric, graphic components and bar codes. Once the Graphics Mode is enabled, specific command sequences are used to generate a variety of graphics. The command parameters define height, width, location, and type of graphic (boxes, lines, alphanumeric characters).

Two types of command sets are used in the Graphics Mode: standard graphics and extended graphics.

Figure 1 illustrates the relationship between the normal and Graphics Modes of operation as described above. In addition, at the beginning of each command in this chapter, the Graphics Mode(s) in which that command operates are listed.

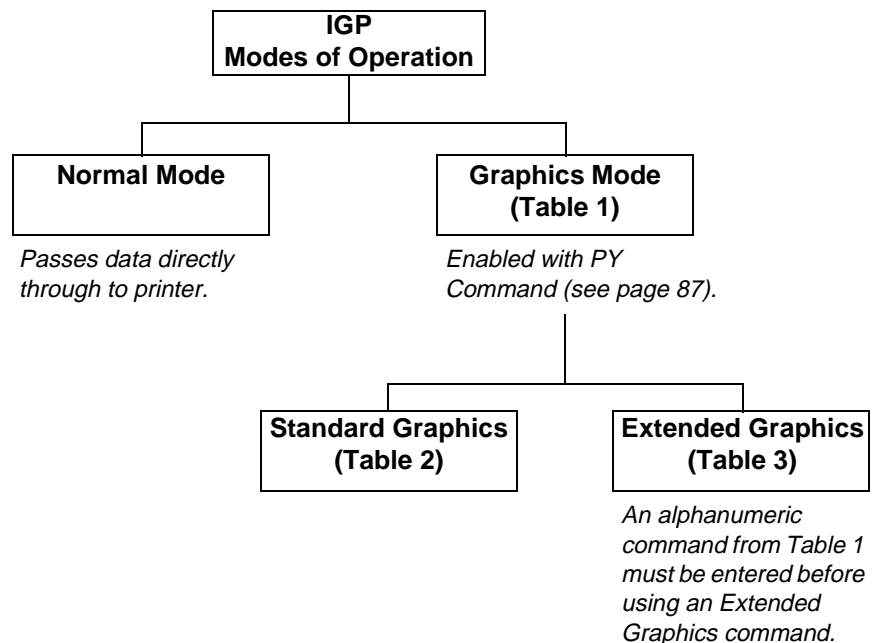


Figure 1. Modes of Operation

## Code V Command Standards

---

Many of the commands described in this chapter include an example to illustrate the application. Commas are used in the example commands to easily identify the various command parameters.

Many of the example commands shown also require the Free Format command. Using the Free Format command in the examples more clearly identifies the data and command parameters.

The commands used to operate the Code V have various selectable options and a specific format that you must follow to obtain the desired results.

These command standards are described in the following sections. Become familiar with their meaning and use before operating the Code V.

### Special Function Control Code (SFCC)

---

The SFCC identifies a command directed to the Code V to enable a specific IGP function. Based on the host computer interface or application requirements, you can set the SFCC to any character from 17 through 255 decimal (hex 11 through hex FF).

When the Code V is shipped, the caret symbol (hex 5E, dec 94), “^”, is configured as the SFCC. You can change the SFCC with the control panel as described in the *User's Guide*, or with a command as described on page 118.

Throughout the practical examples in this manual, the SFCC is shown as a ^ (caret, hex 5E, dec 94); always use the actual SFCC required by your system configuration wherever the ^ is shown.

In the general command formats, the SFCC is represented by (cc). Always substitute the actual SFCC required by your system configuration in the general command format where (cc) is shown. *Do not* enter parentheses with your SFCC.



**Note** Perform a configuration printout as described in the *User's Guide* and examine the configuration option listing to determine which SFCC is currently selected.

---

### Command Sequence

---

Individual commands are made up of various command parameters (such as character height or width parameters). Each command generally begins with the SFCC. You can string many commands together to form a command sequence, or command line. After the Graphics Mode is enabled by the Graphics Mode Enable command, you can input a command sequence. The command sequence includes all commands and data from the initial SFCC of the first command to the sequence terminator.



The Code V buffer holds, and can process, approximately 64K characters in a single graphics command sequence. However, if a single command sequence exceeds the buffer capacity, you can use the Interrupt command (page 90). The Interrupt command breaks the command sequence and specifies where the sequence begins printing again.

## Command Parameters

---

Most commands have a number of variable parameters for which input is required. Throughout this manual, actual commands required for input are shown exactly as they must be entered, while all the variable parameters associated with that command are shown in *italics*.

## Brackets

---

Paired brackets [ ] indicate an optional command parameter. You can choose to use or not use such a command parameter, but *do not enter the brackets* in the command sequence.

## Spaces

---

Spaces are used in the general command formats to visually separate individual command parameters. You must supply the information for the command parameter, but *do not enter the spaces* in the command sequence; they are shown simply as a visual aid to illustrate where one command parameter ends and another begins.

## Comma

---

The Code V accepts commas as parameter delimiters. Commas are often helpful in distinguishing the various numeric parameters within the command sequence. Commas are not allowed immediately after the SFCC or before the first data character. Commas within the command sequence are optional unless they are a part of the command format (i.e., IBARC, IFONT,S, etc.). If used, commas occupy character spaces in the buffer and require processing time. In the examples throughout this manual, commas are used in the command sequences.

## Terminator

---

Each command line, or command sequence, *must* be followed by a valid terminator. Valid terminators are as follows: carriage return (CR, hex 0D), line feed (LF, hex 0A), form feed (FF, hex 0C), vertical tab (VT, hex 0B), EVFU commands (hex 10-1F), hex 01 and hex 06, and PI line commands. A complete command sequence includes the very first character (including the SFCC) to and including the terminator.

Certain terminators have different functional effects based on their use with standard graphics commands or within extended graphics command sequences. For example, CR, FF, and LF function as sequence terminators within an extended graphics command sequence.

If the Free Format command is used, host generated terminators are ignored and only the standard graphics command terminators are recognized. Refer to Table 2 for a list of the Standard Graphics Commands and appropriate page references where additional information is provided.

## Character Height, Width, and Intercharacter Spacing

Alphanumeric height and width parameters include the intercharacter spacing, as shown in Figure 2. The intercharacter spacing is the space between characters. Intercharacter spacing is measured to the right of standard or upside-down characters and to the bottom of sideways characters. The intercharacter space is set at one dot column for every one-tenth inch of character width.

For example, specifying a character width of 0.5-inches results in a five-dot column intercharacter spacing to the right or bottom of that character based on orientation. Generally, intercharacter spacing is not accounted for to the left, above, or below characters except when printing reverse images or descending characters.

The character is not always positioned as shown.

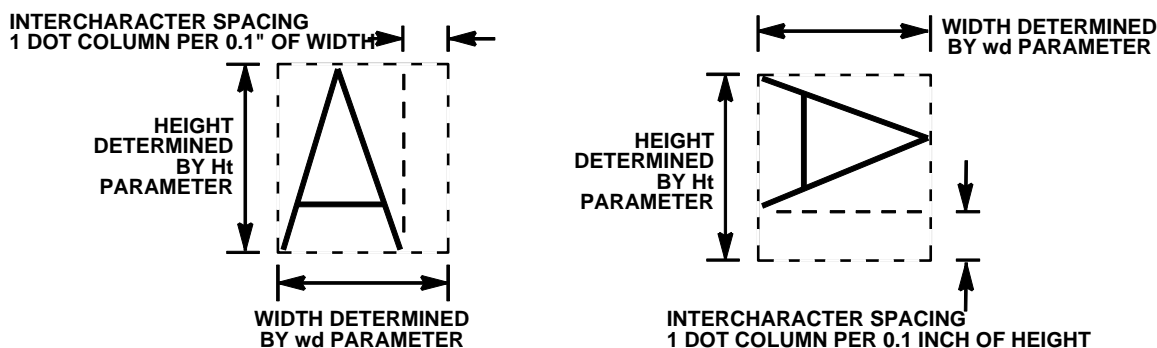


Figure 2. Character Height, Width, and Intercharacter Spacing

### Note



The character spacing shown above is only for line matrix printers. The character is not actual output and is not printed to scale.

## Normal Mode

---

In Code V Normal Mode, incoming data are checked by Code V software for the SFCC and the Graphics Mode Enable or the Enable Non-Graphics Free Format command, then passed to standard printer software. These "normal" (or "pass-through") data assume the standard 10 cpi print mode, and all other standard printer features function normally according to the configuration and programming of the printer.

**Note**

Printers must be configured at the control panel for Data Processing 10 cpi (DP 10) print mode at 6 lpi for the Code V to operate properly. To set a line spacing when Code V is active, use the Line Spacing (@L) command described on page 95.

---

## Graphics Mode

---

Some graphics commands have different functions depending on whether the command is used within an extended or a standard graphics command sequence. For example, the **W** command identifies a standard graphics command line slew; when used within an extended graphics command sequence, **W** identifies a Character Width Change command. Therefore, be certain of appropriate command usage to obtain the desired results.

### Data Positioning

---

In the Graphics Mode, you must understand certain positioning rules to obtain the desired results. Horizontal and vertical starting positions of a command are determined either by implied relative position to the prior graphics command or explicit position from a positioning command.

#### Implied Relative Positioning

For any graphics command sequence (a string of one or more extended graphics commands), the initial "relative" print position is the current dot row and column 1 or the Graphics margin, if set.

**Note**

Because previous command sequences may have been used to define prior printing on the page, the actual physical position of the print mechanism may be on a different row, but it will always be in column 1 or the Graphics margin, if set.

---

Without an immediately preceding positioning command, the starting position of any command within the sequence is dot row 1 and the first dot column past the right edge of the previous command "print envelope." This implied position may be modified horizontally or vertically by specific positioning commands.

Without explicit horizontal positioning commands, the horizontal print position constantly increases within the command sequence. Each command starts at the right edge of the previous command. Without explicit vertical positioning commands, the vertical print position for each command within a sequence is always at relative dot row 1 (the current physical position of the print mechanism resulting from printing the last sequence).

### Explicit Positioning Commands

The horizontal print position can be changed using the Horizontal Tab command. With the Horizontal Tab command, any horizontal print position on the current print line can be specified as the print position.

---

#### Note



The control panel form feed key will operate differently dependent on the source of form feed control at the time the key is pressed. Form feed is controlled by the LP+ and Code V emulation at different times.

---

The vertical print position can be changed using the Justification command or justification parameter within one of the alphanumeric commands. The Justification command or parameter specifies a vertical position down the form from the current print position. Additionally, you can use standard graphics commands for line slew, dot slew, line feed, form feed, or EVFU commands to specify a vertical print position.

These positioning commands and their use are described within this chapter. It is important to remember that the end of a command sequence always resets the starting position for all subsequent positioning to row 1, column 1 or the left Graphics margin.

### Vertical Dot Density

A vertical tenth-inch equals 7 dots based on 72 dpi vertical dot density. A true vertical tenth-inch at 72 dpi would be 7.2 dots. Since .2 dots is not printable, seven dots are used and the vertical measurement of a line, box, or similar graphic element is not exact.

You can enable the “True vert 1/10” option which allows the vertical size/position parameter to be in true inches. With this option enabled, vertical dimensions will be as close to true as possible based on a 72 dpi density (e.g., 1.0 inch is exact at 72 dots. While 1.2 inch is close at 86 dots, exact would be 86.4 dots.)

## Command Codes

---

The tables on the following pages list each Code V command according to the Graphics Mode in which it operates. Following these tables, each command in this chapter is presented in alphabetical order.

## Graphics Mode Enable Commands

In order to enable the Graphics Mode, you must use the Graphics Mode Enable command. Table 1 summarizes the Graphics Mode Enable and Disable commands and the four alphanumeric commands, which are fully described on the referenced pages. After enabling the Graphics Mode, alphanumeric commands, standard graphics commands, or extended graphics commands are available.

**Table 1. Graphics Mode Commands**

Command	Description	Page #
<b>PF</b>	Free-Format Enable, Non-Graphics	85
<b>PO</b>	Free Format Disable, Non-Graphics	86
<b>F</b>	Free Format (graphics) Enable	83
<b>O</b>	Free Format (graphics) Disable	83
<b>PY</b>	Graphics Mode Enable	87
<b>PN</b>	Graphics Mode Disable	88
<b>M</b>	Alphanumerics, Standard	26
<b>V</b>	Alphanumerics, Rotated Clockwise (Top Down)	26
<b>E</b>	Alphanumerics, Rotated Counterclockwise (Bottom Up)	26
<b>E</b>	Alphanumerics, Rotated Counterclockwise-Reverse String	26
<b>U</b>	Alphanumerics, Inverted	26
<b>U</b>	Alphanumerics, Inverted-Reverse String	26
<b>in</b>	Character Set Selection (Multinational Character Set)	Ch. 5
<b>I</b>	Interrupt	90
<b>un</b>	User Set Selection (Multinational Character Set)	Ch. 5

### Note



Some systems pad the data stream with characters and spaces. If the Code V file on your system contains padded characters or spaces before the SFCC, this padded data must be ignored before the Code V can operate. The Ignore Data command (**X**), discussed on page 89, is provided for this purpose. Similarly, sometimes you may need the Code V to ignore host-generated paper movement commands (carriage return, line feed, form feed, etc.) in lengthy data streams. The Free Format command (**F**), discussed on page 83, is designed for this purpose.

## Standard Graphics Commands

Standard graphics commands can be used any time the Code V is in the Graphics Mode. They set internal control values or are sent directly to the printer for processing. Standard graphics commands are summarized in Table 2 and fully described on the referenced pages.



**Note** The Graphics Mode (Table 1) must be enabled before issuing a Standard Graphics command.

**Table 2. Standard Graphics Commands**

Command	Description	Page #
-	Carriage Return	33
@C	Character Type	36
#x	Compressed Print	38
!	Direct Printer Command, Hex 01	44
"	Direct Printer Command, Hex 02	44
#	Direct Printer Command, Hex 03	44
\$	Direct Printer Command, Hex 04	44
%	Direct Printer Command, Hex 05	44
&	Direct Printer Command, Hex 06	44
'	Direct Printer Command, Hex 07	44
(	Direct Printer Command, Hex 08	44
.	Direct Printer Command, Hex 0E	44
/	Direct Printer Command, Hex 0F	44
D	Dot Slew	45
S	Duplication, Horizontal	45
IREPH,	Duplication, Horizontal (Version II)	47
R	Duplication, Vertical	48
Y	Auto-Increment/Decrement Vertical Duplication	50
IREPV,	Duplication, Vertical (Version II)	52
B	Dynamic Form	54
[ or {	Dynamic Form, Field Length	56
C	Dynamic Form, Copy Fields	58

Table 2. Standard Graphics Commands (continued)

Command	Description	Page #
<b>R</b>	Dynamic Form, Repeat Form	60
<b>&gt;</b>	EVFU, Start Load	62
<b>?</b>	EVFU, End Load	62
<b>0-9</b>	EVFU Channels 1 through 10	62
<b>:</b>	EVFU Channel 11	62
<b>;</b>	EVFU Channel 12	62
<b>&lt;</b>	EVFU Channel 13	62
<b>=</b>	EVFU Channel 14	62
<b>IEMUL</b>	Emulation Switch	66
<b>@E</b>	Emphasized Print	65
<b>IFONT, S</b>	Font, Selecting Default (Version II)	67
<b>,</b>	Form Feed	73
<b>L</b>	Form Length (with PI Line Enabled)	74
<b>H</b>	Form Length	74
<b>F</b>	Free Format (graphics) Enable	85
<b>O</b>	Free Format (graphics) Disable	86
<b>@H</b>	Hex Dump	88
<b>X</b>	Ignore Data	89
<b>*</b>	Line Feed	94
<b>K</b>	Line Slew	94
<b>W</b>	Line Slew	94
<b>@L</b>	Line Spacing	95
<b>Q</b>	Plotting Graphics (Rows), (Odd Dot Plot)	107
<b>C</b>	Plotting Graphics (Rows), (Even Dot Plot)	107
<b>@R</b>	Reset	110
<b>N</b>	Special Function Control Code Change	118
<b>T</b>	Tab, Horizontal (Set Graphics Margin)	125
<b>+</b>	Tab, Vertical	127
<b>@U</b>	Underlined Print	128

## Extended Graphics Commands

Specific graphics functions (lines, boxes, alphanumerics, forms, bar codes, reverse printing, etc.) are available through commands sent as part of an extended graphics command sequence. Table 3 summarizes the extended graphics commands, which are fully described on the referenced pages.

Extended commands must be used as part of an alphanumeric command sequence (after the Code V is in the Graphics Mode). In some cases, the actual command may have a different meaning and perform a different function when used within an extended graphics command sequence compared to its use as a standard graphics command.

An alphanumeric command from Table 1 must be used before issuing an Extended Graphics Command.

**Table 3. Extended Graphics Commands**

Command	Description	Page #
<b>IBARC,</b>	Bar Code (Version II)	Ch. 3
<b>B</b>	Bar Code, Horizontal	Ch. 3
<b>C</b>	Bar Code, Vertical	Ch. 3
<b>LB</b>	Boxes	31
<b>H</b>	Character Height	33
<b>W</b>	Character Width	35
<b>in</b>	Character Set Selection	Ch. 5
<b>KF</b>	Dark Print	40
<b>D</b>	Descending Characters	42
<b>IREPH,</b>	Duplication, Horizontal (Version II)	47
<b>IREPV,</b>	Duplication, Vertical (Version II)	52
<b>IFONT,S,</b>	Font, Selecting Default (Version II)	67
<b>Font</b>	Fonts, Rotatable	68
<b>S</b>	Fonts, Compressed Print Density	71
<b>LF</b>	Forms Construction	75
<b>IFORM,C</b>	Forms, Creating Dynamic (Version II)	77
<b>IFORM,D</b>	Forms, Deleting Dynamic (Version II)	78
<b>IFORM,E</b>	Forms, Executing Dynamic (Version II)	78
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Table 3. Extended Graphics Commands (continued)

Command	Description	Page #
<b>J</b>	Justification, Vertical	92
<b>LD</b>	Lines, Dashed	96
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<b>ILOGO,</b>	Logo Generation (Version II)	101
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<b>IPEXP,</b>	Pixel Expansion (Version II)	103
<b>Q</b>	Plotting Graphics (Columns)	105
<b>R</b>	Reverse Print	110
<b>KH</b>	Shading	114
<b>KL</b>	Shading Mask	116
<b>zx</b>	Symbol, Creating Standard User-Defined	118
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<b>f</b>	Fill (for Standard and Expanded User-Defined Symbols)	121
<b>Z</b>	Symbols, Printing	123
<b>T</b>	Tab, Horizontal	125

## Alphanumerics

---

<b>Purpose</b>	Produces alphanumeric text in standard, rotated or inverted orientations. A reverse string order option is also available in the rotated and inverted orientations.
<b>Mode</b>	Graphics
<b>Format</b>	(cc) <i>x ht wd jus data</i> [(cc)G] (cc)-
(cc)	Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.
<i>x</i>	Represents an Alphanumeric command. Replace <i>x</i> with one of the following alphanumeric orientations: <b>M</b> for Standard Alphanumerics <b>V</b> for Rotated Clockwise <b>E</b> for Rotated Counterclockwise <b>U</b> for Inverted
<i>ht</i>	Defines the character height in tenth (.10) inches. Enter a two-digit height value ranging from <b>00</b> through <b>99</b> to define a character height of 0.1 through 9.9 inches. The Code V automatically understands the decimal point between the first and second digits. Height values of 00 and 01 have special meanings for rotatable fonts, described on page 69.
<i>wd</i>	Defines the character width in tenth (.10) inches. Enter a two-digit width value ranging from <b>00</b> through <b>99</b> to define a character width of 0.1 through 9.9 inches. The Code V automatically understands the decimal point between the first and second digits. Width values of 00 and 01 have special meanings for rotatable fonts described on page 69.

---

**Note**


In vertical alphanumeric commands, height refers to the physical height of the character and intercharacter spacing top to bottom on the page (from the left to right edge of the printed character). Width refers to the physical width of the character from left to right on the page (from the bottom to the top of the printed character).

---

<i>jus</i>	Defines vertical justification (position) for character printing in tenth inches and dot rows. Enter a three-digit value ranging from <b>000</b> through <b>999</b> to define the printing location down from the starting position of the command sequence. The first two digits specify 0.1 through 9.9 inches downward justification; the third digit specifies an additional 0 through 9 dot rows of downward justification. The Code V automatically understands the decimal
------------	---

	point between the first two digits and the third digit is automatically interpreted as dot rows.
<i>data</i>	Identifies data characters to print or a specific graphics command (such as one of the bar code commands, a horizontal tab command, etc.).
(cc)G	(Optional) Reverses the character data from the actual input order. This parameter is available only with the Rotated Counterclockwise command (E) or the Inverted Rotated Alphanumeric command (U). Enter the SFCC for your Code V configuration immediately followed by <b>G</b> .
(cc)-	Graphics Mode CR used as a sequence terminator. Enter the SFCC for your Code V configuration immediately followed by - to end the command sequence.

**Comments** The Graphics Mode (PY) must be enabled before sending an alphanumeric command. Alphanumeric commands must be a part of the command sequence before using specific graphics commands. Alphanumeric commands must be used to initiate any extended graphic command sequence. Other data or graphic commands can be used with alphanumeric commands.

**Examples** Examples for each of the four alphanumeric orientations are provided starting below. Rotated clockwise alphanumerics print characters with a clockwise vertical rotation; the characters are read top to bottom. Rotated Counterclockwise alphanumerics print characters with a counterclockwise vertical rotation; the characters are read bottom to top. Inverted alphanumerics print characters upside down; the characters are read right to left. Rotated Counterclockwise and Inverted Rotated alphanumerics have an optional reverse string parameter option.

---

**Note**



When the alphanumeric command is used simply to introduce one of the extended graphics commands (such as Horizontal Tabs, Justification, Dark Print, etc.), the alphanumeric command parameters are optional and can be entered only as needed. However, the alphanumeric command parameters are required for bar code commands.

---

### Alphanumeric Examples

The following sample commands in this section illustrate some applications for standard, rotated, and inverted alphanumeric features. (Note that the Free Format enable and disable commands, ^F and ^O, are used.)

#### Standard Alphanumerics:

```
^PY^-^F^-
^M06,04,000AaBb^M04,06,000AaBb^-
^O^-^PN^-
```

AaBbAaBb

```
^PY^-^F^-
^M03,03,000I^M03,03,030G^M03,03,060P
^M03,03,060I^M03,03,030G^M03,03,000P^-
^O^-^PN^-
```

I G P I G P

#### Rotated Clockwise Alphanumerics:

```
^PY^-^F^-
^V06,04,000AaBb^V04,06,000AaBb^-
^O^-^PN^-
```

AaBb  
AaBb  
AaBb

```
^PY^-^F^-
^V03,03,000I^V03,03,030G^V03,03,060P
^V03,03,060I^V03,03,030G^V03,03,000P^-
^O^-^PN^-
```

I G P I G P

**Rotated Counterclockwise Alphanumerics:**

^PY^-^F^-  
 ^E06,04,000AaBb^E04,06,000AaBb^-  
 ^O^-^PN^-

AaBb  
 AaBb

^PY^-^F^-  
 ^E03,03,000I^E03,03,030G^E03,03,060P  
 ^E03,03,060I^E03,03,030G^E03,03,000P^-  
 ^O^-^PN^-

I  
 G  
 P I G P

**Inverted Alphanumerics:**

^PY^-^F^-  
 ^U06,04,000AaBb^U04,06,000AaBb^-  
 ^O^-^PN^-

AaBbAaBb

^PY^-^F^-  
 ^U03,03,000I^U03,03,030G^U03,03,060P  
 ^U03,03,060I^U03,03,030G^U03,03,000P^-  
 ^O^-^PN^-

I  
 G  
 P I G P

```
^PY^-^F^-  
^U03,03,000IGP^U03,03,060PGI^-  
^O^-^PN^-
```

IGP  
PGI

**Alphanumerics Reverse String:**

```
^PY^-^F^-  
^E08,05,000IGP^E08,05,000PGI^G^-  
^O^-^PN^-
```

IGP  
IGP  
PGI

```
^PY^-^F^-  
^U06,04,000upside down^-  
^U06,04,000upside down^G^-  
^O^-^PN^-
```

upside down  
upside down  
upside down

## Boxes

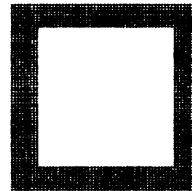
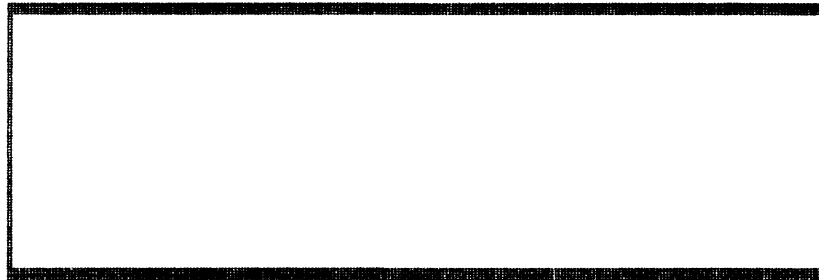
---

<b>Purpose</b>	Produces a variety of rectangular boxes.
<b>Mode</b>	Graphics with an Extended Graphics Command selected
<b>Format</b>	(cc) LB <i>horz vert h v</i> (cc)
(cc)	Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.
LB	The Box command. Enter <b>LB</b> .
<i>horz</i>	Defines the horizontal length of the box in tenth inches and dot columns. Enter a three-digit horizontal length value ranging from <b>000</b> through <b>999</b> to define a horizontal length of 00.0 through 99.9 inches and a fourth digit ranging from 0 through 9 to specify 0 through 9 additional dot columns of length. The Code V automatically understands the decimal between the second and third digits for tenth inches and automatically interprets the fourth digit as dot columns. For example, entering 0126 specifies a 1.2-inch plus 6-dot column horizontal length; entering 1016 specifies a 10.1-inch plus 6-dot column horizontal length.
<i>vert</i>	Defines the vertical length of the box in tenth inches and dot rows. Enter a three-digit vertical length value ranging from <b>000</b> through <b>999</b> to define a vertical length of 00.0 through 99.9 inches and a fourth digit ranging from 0 through 9 to specify 0 through 9 additional dot rows of length. The Code V automatically understands the decimal between the second and third digits for tenth inches and automatically interprets the fourth digit as dot rows. For example, entering 0204 specifies a 2.0-inch plus 4-dot row vertical length; entering 0242 specifies a 2.4-inch and 2-dot row vertical length.
<i>h</i>	Defines the horizontal border thickness in thousandth inches. Enter a one-digit horizontal value ranging from <b>1</b> through <b>9</b> to define a horizontal thickness of 1 through 9 IGP dots.
<i>v</i>	Defines the vertical border thickness in thousandth inches. Enter a one-digit vertical value ranging from <b>1</b> through <b>9</b> to define a vertical thickness of 1 through 9 IGP dots.
(cc)	Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.

**Comments** Box drawing uses horizontal and vertical length parameters. Boxes are positioned on the page using an alphanumeric command sequence (such as horizontal tabs, the justification parameter, etc.). Consequently, an alphanumeric command must precede a Box command. The horizontal and vertical border thickness can also be specified in varying line thicknesses. Code V dot refers to a dot in 60 x 72 dpi resolution.

**Example** Changing the horizontal and vertical length and border thickness parameter values construct a variety of boxes. (Notice the Graphics Mode Enable command and alphanumeric command appear before the box command.)

```
^PY^-^F^-  
^M^LB0425, 0150, 5, 2^-  
^M^JOB^LB0052,0123, 3, 3^T03^LB0100, 0100, 9, 9^  
^0^-^PN^-
```





## Carriage Return

---

<b>Purpose</b>	Terminates a command.
<b>Mode</b>	Graphics with a Standard Graphic Command selected
<b>Format</b>	(cc)- (cc) Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration. - The graphics CR mnemonic. Enter -.
<b>Comments</b>	The Graphics Mode carriage return (CR) performs the same function as a standard carriage return (hex 0D) when used to terminate a standard graphics command. When used to terminate a graphics sequence in an extended graphics command when Free Format is enabled, this command functions as a sequence terminator.

## Character Height

---

<b>Purpose</b>	Specifies a new alphanumeric height.
<b>Mode</b>	Graphics with an Extended Graphics Command selected
<b>Format</b>	(cc) H <i>ht</i> (cc) (cc) Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration. H The Character Height command. Enter <b>H</b> . <i>ht</i> Defines the new character height in tenth inches. Enter a two-digit height value ranging from <b>01</b> through <b>99</b> to define a character height of 0.1 through 9.9 inches. The decimal point between the digits is automatically understood by the Code V. (cc) Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.
<b>Comments</b>	The <b>H</b> command specifies a new alphanumeric height parameter without sending the complete alphanumeric command sequence again. Only the character height is affected by this command; character width, justification, rotation, or any other parameter specification remains unchanged. The Character Height command is input as part of the data in one of the alphanumeric commands.

**Example** The following sample commands illustrate character height changes. (The Graphics Mode Enable command was previously sent to enable Graphics Mode but is not shown in the examples.)

`^M12,06,000Aa^H10Bb^H05Cc^-`

The text "AaBbCc" is displayed in a monospaced font. The characters 'A', 'B', and 'C' are tall, while 'a', 'b', and 'c' are shorter. The 'a' and 'b' characters are slightly wider than the 'c' characters.

`^V05,05,000I^H10G^H15P^-`

The text "IGP" is displayed in a monospaced font. The 'I' is tall, 'G' is medium height, and 'P' is the tallest character, extending significantly below the baseline.

`^U03,04,000up^H05side^H10down^-`

The text "upside down" is displayed in a monospaced font, rotated 180 degrees counter-clockwise. The characters are 'u', 'p', 's', 'i', 'd', 'e', 'n', 'o', 'w'.

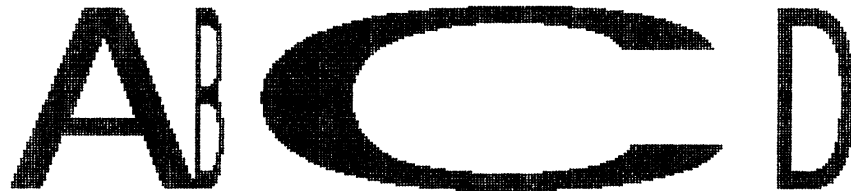
## Character Width

<b>Purpose</b>	Specifies a new alphanumeric width.
<b>Mode</b>	Graphics with an Extended Graphics Command selected
<b>Format</b>	(cc) <i>W wd</i> (cc)
	(cc) Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.
	<i>W</i> The Character Width command. Enter <b>W</b> .
	<i>wd</i> Defines the new character width in tenth inches. Enter a two-digit width value ranging from <b>01</b> through <b>99</b> to define a character width of 0.1 through 9.9 inches. The Code V automatically understands the decimal point between the digits.
	(cc) Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.

**Comments** The **W** command specifies a new alphanumeric width parameter without sending the complete alphanumeric command sequence again. Only the character width is affected by this command; character height, justification, rotation, or any other parameter specification remains unchanged. The **W** command is input as part of the data in one of the alphanumeric commands.

**Example** The following sample commands illustrate character width changes.

```
^PY^-
^M10,10,000A^W02B^W30C^W05D^-
^PN^-
```



```
^PY^-
^V05,05,000I^W10G^W15P^-
^PN^-
```



The command sequence below also uses the Horizontal Tab (T012,5 and T017,5) command for character spacing.

```
^PY^-
^E10,10,000I^T012,5^W02G^T017,5^W25P^-
^PN^-
```



```
^PY^-
^U05,05,000DOWN^W01SIDE^W10UP^-
^PN^-
```



## Character Type

<b>Purpose</b>	Selects a character type or character per inch (dpi) density.
<b>Mode</b>	Graphics with a Standard Graphic Command selected
<b>Format</b>	(cc) @ C type(cc) data (cc)*
(cc)	Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.
@	Specifies one of the @ commands. Enter @ to begin an @ command function.
C	Specifies the Character Type command. Enter C.
type (cc)	Represents the type parameter. Enter one of the 2-digit codes shown in Table 4 to select a character type, followed by the SFCC. For example, enter ^@C17^ to select 17.65 cpi. This cpi remains effective until a new @C command is sent.
data	The data to be printed in a selected font.
(cc)*	Graphics Mode LF. Enter the SFCC for your Code V configuration immediately followed by * to end the command sequence.

**Comments** The @C command can be used any time the Code V is in the Graphics Mode. Once a new character type is selected, all standard Graphics Mode text lines are printed in the selected type until another type is selected or the Code V returns to the Normal Mode. If another type is selected, it must be introduced on a separate line from the currently selected character type.

**Table 4. Character Type Codes**

Character Type Code	Character Type Selected
05	Double High (.2")
0A	OCR-A
0B	OCR-B
10	Standard 10 cpi
12	12 cpi
13	13.33 cpi
15	15 cpi
17	17.65 cpi



**Note** Due to different printing technologies and dot sizes, some printers may not be capable of printing small characters clearly.

**Example** The following example illustrates changing character type from the standard characters to 17.65 cpi characters.

```

^pY^-
Standard Characters in the Graphics Mode
^F^-^@C17^*Compressed 17 65 cpi characters after the Character
Type command^*
^@C10^-
^0^-^PN^-
    
```



**Note** The second character type is sent to return the Code V to standard 10 cpi print.

Standard Characters in the Graphics Mode  
Compressed 17.65 cpi characters after the CharacterType command

## Compressed Print

- Purpose** Selects a compressed print font.
- Mode** Graphics with a Standard Graphic Command selected
- Format** (cc) #x (cc)- data (cc)\* (cc) #0 (cc)-  
 (cc) Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.  
 #x Specifies the compressed print font to use. For example, enter **#2** for a 12 cpi font as shown in Table 5.

**Table 5. Compressed Print Fonts**

Selection Code (x)	Compressed Print Font Characters Per Inch (cpi)
0	Terminate compressed print
1	10 cpi half-dot
2	12 cpi half-dot
3	13.33 cpi half-dot
4	15 cpi half-dot
5	17.65 cpi half-dot
6	OCR-A
7	OCR-B
8	12 cpi full-dot
9	15 cpi full-dot

- (cc)- Graphics Mode CR used as a sequence terminator representing an end to the initial command sequence. Enter the SFCC for your Code V configuration immediately followed by - to end the initial sequence.
- data The data for compressed print. All characters are printed in the specified compressed print font until the compressed print command is terminated (0).
- (cc)\* Graphics Mode LF used as a sequence terminator representing an end to the data sequence. Enter the SFCC for your Code V configuration immediately followed by \* to end the data sequence.

- (cc)#0 The command to terminate compressed printing. On a separate line, enter the SFCC for your Code V configuration immediately followed by #0 to terminate use of the compressed print font.
- (cc)- Graphics Mode CR. Enter the SFCC for your Code V configuration immediately followed by - to end the command sequence.

**Comments** The Compressed Print command can be used any time the Code V is in the Graphics Mode to select one of the compressed print fonts.

The Compressed Print Off command must be on a separate line from a Compressed Print On command.

Do not place compressed print and alphanumeric commands from the Extended Graphics command set on the same print line.

All pass-through text data input after the Compressed Print On command and before the Compressed Print Off command will print in the selected compressed print font.

**Examples #1: 12 cpi Half-Dot Compressed Print Font.** The following command generates the uppercase alphabet with numbers 0-9 in the 12 cpi half-dot compressed print font. Compare this example to the following 12 cpi full-dot example.

```
^PY^-
^#2^-ABCDEFGHJKLMNOPQRSTUVWXYZ 0123456789^*
^#0^-
^PN^-
```

```
ABCDEF GHIJKLMNOPQRSTUVWXYZ 0123456789
```

**#2: 12 cpi Full-Dot Compressed Print Font.** The following command generates the uppercase alphabet with numbers 0-9 in the 12 cpi full-dot compressed print font (compared to the previous example using 12 cpi half-dot).

```
^PY^-
^#8^-ABCDEFGHJKLMNOPQRSTUVWXYZ 0123456789^*
^#0^-
^PN^-
```

```
ABCDEF GHIJKLMNOPQRSTUVWXYZ 0123456789
```

**#3: 13.33 cpi Compressed Print Font.** The following command generates the uppercase alphabet with numbers 0-9 in the 13.33 cpi compressed print font.

```
^PY^-
^#3^-ABCDEFGHJKLMNOPQRSTUVWXYZ 0123456789^*
^#0^-
^PN^-
```

```
ABCDEF GHIJKLMNOPQRSTUVWXYZ 0123456789
```

**#4: 15 cpi Compressed Print Font.** The following command generates the uppercase alphabet with numbers 0-9 in the 15 cpi compressed print font.

```
^PY^-
^#4^-ABCDEFGHIJKLMN0PQRSTUUVWXYZ 0123456789^*
^#0^-
^PN^-

ABCDEFGHIJKLMN0PQRSTUUVWXYZ 0123456789
```

**#5: 17.65 cpi Compressed Print Font.** The following command generates the uppercase alphabet with numbers 0-9 in the 17.65 cpi compressed print font.

```
^PY^-
^#5^-ABCDEFGHIJKLMN0PQRSTUUVWXYZ 0123456789^*
^#0^-
^PN^-

ABCDEFGHIJKLMN0PQRSTUUVWXYZ 0123456789
```

## Dark Print

<b>Purpose</b>	Activates the dark printing feature to produce darker images.
<b>Mode</b>	Graphics with an Extended Graphics Command selected
<b>Format</b>	(cc) KF <i>data</i> (cc) KF (cc)
	(cc) Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.
	KF The Dark Print command. Enter <b>KF</b> to turn on the dark printing feature.
	<i>data</i> Represents the data characters for dark printing.
	(cc) KF Following the data, enter the Special Function Control Code (SFCC) for your Code V configuration and <b>KF</b> to turn off the dark printing feature.
	(cc) Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.

**Comments** Dark Print command prints all dot positions at half-dot resolution to produce images with a darker intensity. The **KF** command provides special attention when used with bar codes to provide darker bar codes, yet not change the critical bar-width dimensions. Human readable data, however, will print in non-dark mode. Dark print is discussed further in the “Bar Codes” chapter.

The **KF** command operates as a toggle. The first **KF** command enables dark printing, the second **KF** disables dark printing, the third **KF** enables dark printing, and so on.



All data following the first **KF** command will print dark until the second **KF** command is encountered.

The **KF** command is a part of the data contained in an alphanumeric command. When the alphanumeric command sequence is terminated, dark printing is also disabled.

Reverse printing and shading or mask shading can be combined with dark printing to produce a variety of different shades.

**Example** The following sample commands illustrate dark printing. Combining shading and dark print is also shown.

```
^PY^-
^M03,03,000IGP^KFIGP^KHIGP^KH^KF^-
^PN^-
```

IGP IGP IGP

```
^PY^-
^V05,05,000IGP^KFIGP^KHIGP^KF^KH^-
^PN^-
```



## Descending Characters

**Purpose** Prints descending lowercase characters one of two ways: 1) by extending below the print baseline with the command on, or 2) by raising the characters slightly to completely contain the descending characters above the print baseline with the command off.

**Mode** Graphics with an Extended Graphics Command selected

**Format** (cc) D *data* (cc) D (cc)

- (cc) Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.
- D The Descending Character command. Enter **D**.
- data* The data characters for descending character printing. Only lowercase descending characters are printed extending below the print baseline.
- (cc) D Following the data, enter the Special Function Control Code (SFCC) for your Code V configuration and **D** to turn off descending character printing.
- (cc) Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.

**Comments** Descending characters are the lowercase characters *g*, *j*, *p*, *q*, and *y* and are the only characters affected by this command. Normal descending characters extend below the baseline of normal print. Unless specified, the Code V begins each alphanumeric command sequence with descending character print turned off, which means the characters are printed completely above the print baseline.

The **D** command operates as a toggle. The first **D** command enables descending characters to print below the baseline, the second **D** command disables this feature, the third **D** command enables, and so on.

All lowercase descending character data following the first **D** command prints below the print baseline until the next **D** command is encountered.

The **D** command is input as part of the data in one of the alphanumeric commands. When the alphanumeric command sequence is terminated, descending character printing is also terminated.

When the **D** command is turned on, the Code V automatically allows space for the descending characters whether or not descending characters are part of the data. The amount of space allowed is two dot rows per tenth inch of character height. This space produces a gap under the standard print baseline of non-descending characters. This space also produces a larger reverse print character image background area.



**Note**

The default setting for the **D** command is OFF. The default setting for the IFONT command, however, is ON. If the **D** command is before an IFONT command terminator, the setting will always be ON. The IFONT command always overrides a **D** command. If the **D** command follows an IFONT command terminator, the setting is determined by the **D** command.

**Example** The following sample commands illustrate descending character printing. In the first example, notice that the alphanumeric command sequence terminator was also used to end descending character printing. In the second example, notice that when using the rotate clockwise (^V) command with descending characters, and dots are positioned in the *first* dot column, a .10-inch tab was required to prevent out-of-bounds descending characters.

```
^PY^-
^M02,02,000IGP or igp^D and IGP or igp^-
^PN^-
```

IGP or i9P and IGP or igp

```
^PY^-
^V03,03,000^T0010igp^Digg^D^-
^PN^-
```



## Direct Printer Commands

**Purpose** Sends Control Codes for special purposes directly to the ASCII emulation.

**Mode** Graphics with a Standard Graphic Command selected

**Format** See Table 6.

**Table 6. Direct Printer Commands**

Direct Command	Hex Code Sent to the Printer
^!	01
^"	02
^#	03 (see note below)
^\$	04
^%	05
^&	06
^'	07
^(	08
^.	0E
^/	0F

**Note**



To avoid confusion with the Compressed Print command described on page 38, when direct printer command ^# is used to send hex 03 to the printer, it can not occur at the start of a line.

**Comments** An understanding of ASCII emulation function and response to the Control Codes is recommended. Refer to your ASCII programming manual for information regarding the hex codes for various printer commands.

The Graphics Mode must be entered before sending the direct printer commands. However, do not use these commands within an extended graphics command sequence.

**Example** The following example command sequence sends hex 05 to the printer, initiating the printer plot command to plot the data.

```
^PY^-
^% data ^-
```

## Dot Slew

---

<b>Purpose</b>	Changes the vertical print position by specifying a number of dot rows to advance the paper from the current print position.
<b>Mode</b>	Graphics with a Standard Graphic Command selected
<b>Format</b>	(cc) D <i>n</i> (cc)-
	(cc) Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.
	D The Dot Slew command. Enter <b>D</b> .
	<i>n</i> Specifies the number of dot rows to advance (slew) the paper from the current print position. Enter a two-digit number of dot rows ranging from <b>01</b> through <b>99</b> . For example, enter 05 to slew 5 dot rows, 21 to slew 21 dot rows.
	(cc)- Graphics Mode CR. Enter the SFCC for your Code V configuration immediately followed by - to end the command sequence.
<b>Comments</b>	The ^Dxx Dot Slew command dot values will be interpreted as 72 dpi P-Series dots.

## Duplication, Horizontal

---

<b>Purpose</b>	Activates horizontal duplication.
<b>Mode</b>	Graphics with a Standard Graphics Command selected
<b>Format</b>	(cc) S <i>n spacing</i> (cc)- <i>data</i> (cc)S (cc)-
	(cc) Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.
	S The Horizontal Duplication command. Enter <b>S</b> to turn on the horizontal duplication feature.
	<i>n</i> Specifies the number of horizontal duplications to print. Enter a two-digit number ranging from <b>00</b> through <b>99</b> to specify the number of copies.
	<i>spacing</i> Represents the amount of spacing, in tenth inches, between each duplication. The spacing amount should include a sufficient space to contain the complete printed result of the duplicated command sequence plus space for a margin between copies. The right edge of the last duplication must not exceed the selected page width. Enter a two-digit number ranging from <b>00</b> through <b>99</b> to specify a 0.0 through 9.9 inch spacing for the copies.

- (cc)- Graphics Mode CR used as a sequence terminator representing an end to the data. Enter the SFCC for your Code V configuration immediately followed by - to end the command sequence.
- data* Represents the data to be repeated. Enter any valid Code V Graphics Mode command. Specific command sequences are input as part of the horizontal duplication data. These commands are then repeated as specified in the Horizontal Duplication command.
- (cc)S (cc)- Mandatory Horizontal Duplication command sequence terminator. Enter the SFCC for your Code V configuration immediately followed by **S**, another SFCC, and - to end terminate the Horizontal Duplication command sequence.

**Comments** The **S** command operates as a toggle. The first **S** command enables horizontal duplication, the second **S** command disables horizontal duplication, the third **S** command enables duplication, and so on. All data following the first **S** command will repeat the number of times specified until the second **S** command is encountered.

Copies are produced across the page as many times as requested or until the page width is reached. Any duplications that would print beyond column 132 are lost and cause an Element Off Page error (Error 48).

**Example** The following sample command illustrates horizontal duplication. This extended graphics command sequence consists of a Standard Alphanumeric command using the letters "IGP" printed at a height of 0.2 inches. "IGP" is being duplicated 5 times with a gap of 0.8 inches between each duplication (0.6 inch space plus a 0.2 inch margin between each duplication).

```
^PY^-
^S05,08^-^M02,02,000IGP^-^S^-
^PN^-
```

IGP IGP IGP IGP IGP

## Duplication, Horizontal (Version II)

This command performs the same function as (cc)S described on page 45. The IREPH command can also operate within an Extended Graphics command. You must enable the Free Format command for this command to work properly.

**Purpose** Defines both the number of times data is horizontally duplicated (repeated), and the horizontal spacing between each duplication.

**Mode** Graphics with a Standard Graphics Command selected or Graphics with an Extended Graphics Command selected

**Format** (cc) IREPH, *n*, *spacing* (cc)G *data* (cc)IREPE

(cc) Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.

IREPH, The horizontal duplication command. Enter **IREPH,**.

*n*, Represents the number of times to duplicate the data horizontally. Enter a value which allows the characters to print within the horizontal page boundaries. Enter a value ranging from **1** through **9999**.

*spacing* Represents the amount of horizontal spacing between the start of each set of repeated data. Enter up to three numbers.

The first and second digits represent horizontal tenths, and the third digit represents horizontal dots. If less than three digits are entered, zeros will automatically be inserted from left to right.

Example:

001

012

123

(cc)G The universal terminator. Enter the SFCC for your Code V configuration immediately followed by **G** to terminate the IREPH command.

*data* Represents the data to be repeated. Enter any valid Code V Graphics Mode command. Specific command sequences are input as part of the horizontal duplication data. These commands are then repeated as specified in the Horizontal Duplication command.

One Horizontal Duplication command can be nested within a Horizontal Duplication command. The total number of characters within the command sequence (including all repetitions) must be 256 characters less than the maximum size of the input buffer.

(cc)IREPE The horizontal duplication end command. Enter the SFCC for your Code V configuration immediately followed by **IREPE** to end the horizontal duplication command.

**Comments** Multiple IREPH/IREPE duplication loops can be used in a form and can also be nested. Vertical duplication loops (IREPV/IREPE) can also be used in conjunction with IREPH. Each IREPH must have a corresponding IREPE.

**Example** The following command will repeat “IGP” 3 times horizontally using the IREPH, command, separating each set of “IGP” with 5 tenths plus 2 dots of horizontal spacing.

```
^PY^-^F^-
^IREPH,3,52^G^M02,02,000IGP^-^IREPE
^O^-^PN^-
```

IGPI GPIGP

## Duplication, Vertical

**Purpose** Prints multiple copies of data vertically down the page.

**Mode** Graphics with a Standard Graphics Command selected

**Format** (cc) R *n* (cc)- *data* (cc)Z(cc)-

(cc) Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.

R Specifies the Vertical Duplication command. Enter **R** to activate vertical repetition.

*n* Specifies the number of times to repeat the data; that is, specifies the number of copies to print. Enter a four digit number ranging from **0000** through **9999** to specify the number of copies.

(cc)- Mandatory Graphics Mode CR terminator. Enter the SFCC for your Code V configuration immediately followed by - to end the initial Vertical Duplication command sequence.

*data* Represents the data to be repeated. Enter any valid Code V Graphics Mode command. Specific command sequences are input as part of the vertical duplication data. These commands are then repeated as specified in the Vertical Duplication command.



One Vertical Duplication command can be nested within a Vertical Duplication command. The total number of characters within the command sequence (including all repetitions) must be 256 characters less than the maximum size of the input buffer.

(cc)Z(cc)- Mandatory Vertical Duplication command sequence terminator. Enter the SFCC for your Code V configuration immediately followed by Z, another SFCC, and - to end the Vertical Duplication command sequence. If a Vertical Duplication command is nested within a Vertical Duplication command, this single terminator sequence terminates both Vertical Duplication commands.

If Auto Increment/Decrement command parameters (page 50) are used with this command, this terminator causes all the numeric fields to increase/decrease (as specified by the Auto Increment/Decrement command) at the end of the repeat pass. If the (cc)ZO(cc)- (alpha O) terminator is used, all numeric fields are updated sequentially within the repeat pass. Refer to the Auto Increment/Decrement command description for more information.

**Example** The following example illustrates the Vertical Duplication command. Alphanumeric commands, line elements, and standard graphics commands are repeated 3 times down the page. The ^^\* causes the two line feeds on which the data is repeated. Refer to the Free Format commands discussed on page 83 and page 85.

```
^PY^-^F^-
^R0003^-^M03,03,000A Line^LS0100,0010^-
^M^D^S4compressed characters^-
^M^D^S1Repeated 3 times^^*^Z^-
^O^-^PN^-
```

```
A Line ██████████
compressed characters
Repeated 3 times

A Line ██████████
compressed characters
Repeated 3 times

A Line ██████████
compressed characters
Repeated 3 times
```

## Auto Increment/Decrement Vertical Duplication

**Purpose** Updates increment and decrement data within a Vertical Duplication command sequence (page 48).

**Format** (cc) Y *start# inc/dec amount* (cc)G

(cc)	Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.
Y	Specifies the Auto Increment/Decrement command. Enter <b>Y</b> to activate automatic update of repeated alphanumeric data fields.
<i>start#</i>	Represents the starting alphanumeric data to automatically update. Enter the starting reference of the alphanumeric data field ranging from <b>1</b> through <b>12</b> digits. This reference is the first alphanumeric data printed and subsequently updated according to the <i>inc/dec</i> and <i>amount</i> parameters. Spaces are converted to zeros when necessary.
<i>inc/dec</i>	Specifies increment or decrement updates to the alphanumeric data. Enter <b>+</b> to increment the data or enter <b>-</b> to decrement the data.
<i>amount</i>	Represents the alphanumeric amount to update the data field. Enter the update amount ranging from <b>1</b> through <b>12</b> digits. Spaces are converted to zeros when necessary.
(cc)G	The universal terminator. Enter the SFCC for your Code V configuration immediately followed by <b>G</b> to terminate the auto increment/decrement command.

**Comments** The Auto Increment/Decrement command is input as part of the vertical duplication command data.

Any type of an alphanumeric sequence can be updated, including bar code data fields. (Although not yet implemented, the (cc)Y command in conjunction with the IREPV Vertical Duplication command described on page 52, any alphabetical sequence can also be updated, including bar code data fields.) The Horizontal Tab command also can be updated, causing the tab position to increment/decrement with each repeat pass. If the data is non-alphanumeric (except for space characters) and you are using the (cc)Y command with the (cc)R Vertical Duplication command described on page 48, an error will occur. If the data exceeds 12 digits in length, an error will also occur.

The terminator used in the Vertical Duplication command determines when each inner auto increment field of a nested repeat sequence is updated (incremented/decremented). If the **(cc)Z(cc)**- Vertical Duplication command terminator is used, each inner field is updated at the end of the repeat pass.

For example, four fields within a repeat pass would all be updated together at the end of each repeat pass. If, however, the **(cc)ZO(cc)**- Vertical Duplication command terminator is used in the same example, each of the four inner fields is updated sequentially within the overall repeat pass.

**Example 1** The following example illustrates the Vertical Duplication command with Auto Increment/Decrement of numeric fields updated at the end of the repeat. The ^\* on the fourth line causes a line feed on which the second set of invoice data is printed. Refer to the Free Format commands discussed on page 83 and page 85.

```
^PY^-^F^-
^R0002^-^M02,02,000Invoice
^J010^LS0106,0004^J000 #^Y5010+5^G^-
^R0004^-^M01,01,010Part #^Y130+2^G^-^*^Z^-
^O^-^PN^-
```

```

Invoice----- #5010
Part #130

Part #130

Part #130

Part #130
Invoice----- #5015
Part #132

Part #132

Part #132

Part #132
```

**Example 2** The following example illustrates the same Vertical Duplication command but uses the different terminator for Auto Increment/Decrement of numeric fields updated sequentially within the repeat. The ^\* on the fourth line causes a line feed on which the second set of Invoice data is printed. Refer to the Free Format commands discussed on page 83 and page 85.

```
^PY^-^F^-
^R0002^-^M02,02,000Invoice
^J010^LS0100,0004^J000 #^Y5010+5^G^-
^R0004^-^M01,01,010Part #^Y130+2^G^-^*^ZO^-
^O^-^PN^-
```

Invoice———— #5010

Part #130

Part #132

Part #134

Part #136

Invoice———— #5015

Part #138

Part #140

Part #142

Part #144

## Duplication, Vertical (Version II)

This command performs an enhanced function of the (cc)R command described on page 48. The IREPV command can also operate within an Extended Graphics command, and vertical spacing between each duplication can be specified. You must enable the Free Format command for this command to work properly.

- Purpose** Defines both the number of times data is vertically duplicated (repeated), and the vertical spacing between each duplication.
- Mode** Graphics with an Extended Graphics Command selected
- Format** (cc) IREPV, *n*, *spacing* (cc)G *data* (cc)IREPE
- (cc) Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.
- IREPV, The vertical duplication command. Enter **IREPV**,.
- n*, Represents the number of times to duplicate the data vertically. Enter a value ranging from **1** through **9999**.

- spacing* Represents the amount of vertical spacing to separate each set of repeated data. Enter up to four numbers.  
The first, second and third digits represent vertical tenths, and the fourth digit represents vertical dots. If less than four digits are entered, zeros will automatically be inserted from left to right.  
Example:  
0001  
0012  
0123  
1234
- (cc)G The universal terminator. Enter the SFCC for your Code V configuration immediately followed by **G** to terminate the IREPV command.
- data* Represents the data to be repeated. Enter any valid Code V Graphics Mode command. Specific command sequences are input as part of the vertical duplication data. These commands are then repeated as specified in the Vertical Duplication command.  
One vertical duplication command can be nested within a vertical duplication command. The total number of characters within the command sequence (including all repetitions) must be 256 characters less than the maximum size of the input buffer.
- (cc)IREPE The vertical duplication end command. Enter the SFCC for your Code V configuration immediately followed by **IREPE** to end the vertical duplication command.

**Comments** Multiple IREPV/IREPH duplication loops can be used in a form and can also be nested. Horizontal duplication loops (IREPH/IREPE) can also be used in conjunction with IREPV. Each IREPV must have a corresponding IREPE. The printer will only process the data when it has received an even number of IREPH/IREPV and IREPE commands.

**Example** The following command will repeat "IGP" 3 times vertically using the IREPV command, separating each line with 4 dots of vertical spacing.

```
^PY^-^F^-
^IREPV,3,4^G^M02,02,000IGP^-^IREPE
^O^-^PN^-
```

```
IGP
IGP
IGP
```

## Dynamic Form Commands

<b>Purpose</b>	Permits an entire form or label to be sent to the Code V with variable data entered into specific locations on each form.
<b>Mode</b>	Graphics with a Standard Graphic Command selected
<b>Format</b>	(cc) B (cc)- <i>data</i> (cc)t
	(cc) Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.
	B Specifies the Dynamic Form command. Enter <b>B</b> to begin dynamic forms.
	(cc)- The Graphics Mode CR. Enter the SFCC for your Code V configuration immediately followed by - to terminate the initial Dynamic Form command sequence.
	<i>data</i> Represents the dynamic form data. Any text, graphics command sequences, or Dynamic Form Field Length, Copy or Repeat commands are entered as part of the data. (See Comments.)  This is <i>not</i> the dynamic data for the variable fields; this data represents all information required for the designated form.
	(cc)t Terminates the complete Dynamic Form command sequence. Enter the SFCC for your Code V configuration immediately followed by ] or } to terminate the Dynamic Form processing. The dynamic data for the variable fields can be sent following termination of the completed Dynamic Form command. The terminator is mandatory.

**Comments** Dynamic form commands allow a designated form to be transmitted once. The data that changes with each form is provided in the variable data fields after the the Dynamic Form command is terminated. Variable fields can include bar code data fields.

The Dynamic Form commands consist of the primary Dynamic Form command referenced above, which enables dynamic form generation, and three additional commands listed. These additional commands are added to the primary command according to your particular dynamic form requirements:

- **Dynamic Form Field Length** (defined on page 56) specifies the number of data bytes expected to fill a variable data field.
- **Dynamic Form Copy Fields** (defined on page 58) copies fields within the form.
- **Dynamic Form Repeat Form** (defined on page 60) repeats the complete form.

## Dynamic Form Special Command Definitions

The graphics carriage return, line feed, form feed, vertical tab, and universal terminator commands are interpreted differently when used within the Dynamic Form commands. These interpretations are described below.

**(CR) Carriage Return (^-).** Fills the remainder of the current dynamic field with spaces. If this is the only input, the entire field is filled with spaces.

**(LF) Line Feed (^\*).** Fills the remainder of the current dynamic field and all remaining dynamic fields in the form with spaces. If this is the only input, the entire field is filled with spaces. If used within a dynamic copy command, all fields to the end of the current copy are filled with spaces. If used with a dynamic repeat command, all remaining fields of all copies are filled with spaces. Filling will not apply to bar code data.

**(FF) Form Feed (^,).** Performs the same function as LF, except for use within a dynamic copy command. If used within a dynamic copy command, all fields to the end of copy are filled with spaces, and all fields continue to fill with spaces until the copy count is complete.

**(VT) Vertical Tab (^+).** Causes the remainder of the current dynamic field to be ignored. No data will be printed in the current dynamic field if this is the only input in the field.

**(G) Universal Terminator (^G).** Terminates the Dynamic Form function and completes the current graphics command sequence.

**Example** Examples using the Dynamic Data command features are provided following the discussion of each command.

## Dynamic Form: Field Length

**Purpose** Assigns a field length to each variable field in a boilerplate dynamic form.

**Format** (cc) *x length* (cc)

(cc)	Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.
<i>x</i>	Specifies the Dynamic Form Field Length command. Enter [ or { to designate a field length follows.
<i>length</i>	Represents the field length. Enter a three-digit number to inform the Code V how many data bytes are expected to fill a certain variable data field. Each variable data field on the form must have an associated field length.
(cc)	Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.

**Comments** This dynamic *length* command is supplied as part of the data within the Dynamic Form command. The length is assigned to a variable field at the current position based on all other commands and data within the Dynamic Form command. For example, if alphanumeric commands are input followed by a tab followed by this *length* command, the length is assigned beginning at the position after the alphanumeric command and tab are executed.

Each variable field in a boilerplate dynamic form must have a field length assigned. The field length specifies how many data bytes are required to fill the field. For example, a form might have a variable field called "quantity" which could be specified as three data bytes. The Code V would then expect three data bytes supplied dynamically to fill that field.

Following the completed Dynamic Form command, the data is sent and the forms are processed. The data is sent in the order of the variable fields. The first data sent fills the first variable field; the second data sent fills the second variable field, etc. The data must be the same length as the field or special dynamic form commands (CR, LF, FF explained on page 55) must be used to fill the field.



**Example** The following example illustrates the Dynamic Form command. In the example, three variable fields are used: Price, Quantity, and Total. Following the command sequence, the dynamic data is sent to fill the variable fields. The special use of the CR command for dynamic forms is shown in the example with the dynamic data.

```

^PY^-^F^-
^B^-^M02,02,000Price^T0220^[005^-
^M02,02,002Quantity^T0220^[002^-
^M02,02,002Total^T0220^[006^-^^^*^]
$1.5004$6.00^-
$1.0525$26.25
$8.950^-
^G
^O^-^PN^-

```

Three sets of dynamic data in the above example are defined as follows:

1. \$1.50 Price, 04 Quantity, \$6.00 Total, CR to fill with spaces
2. \$1.05 Price, 25 Quantity, \$26.25 total
3. \$8.95 Price, 0 Quantity, CR to fill with spaces
4. End of data (^G)

Price	\$1.50
Quantity	04
Total	\$6.00
Price	\$1.05
Quantity	25
Total	\$26.25
Price	\$8.95
Quantity	0
Total	

## Dynamic Form: Copy Fields

<b>Purpose</b>	Duplicates specific fields or data within a form at the same time as the print job.
<b>Format</b>	(cc) C n <i>copydata</i> (cc)Z(cc)-
(cc)	Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.
C	Specifies the Dynamic Form Copy Fields command. Enter <b>C</b> to copy fields within the form.
n	Specifies the number of copies. Enter a two-digit number to inform the Code V how many copies of the copy data to make within the form.
<i>copydata</i>	Represents the copy data. Any text or graphics command sequences (including Dynamic Form Field Length) are entered as part of the data.  This is <i>not</i> the dynamic data for the variable fields; this data represents all information to copy within the designated form.
(cc)Z(cc)-	Terminates the copy sequence. Enter the SFCC for your Code V configuration immediately followed by <b>Z</b> , another SFCC, and - or another valid graphics command mnemonic to terminate the Dynamic Form Copy Fields sequence.

**Comments** The dynamic copy command is supplied as part of the data within the Dynamic Form command. Do not use this command with the Dynamic Form Repeat Form command (page 60).

The LF and FF commands have an additional meaning when used with Dynamic Form Copy Fields commands as previously described on page 55.

**Example** The following example illustrates the Dynamic Form Copy Fields command. As in the previous example, the same three variable fields are used for Price, Quantity, and Total, except that the Price and Quantity fields are copied. Following the Dynamic Form command sequence, the dynamic data is sent to fill the variable fields. The special use of the LF command for dynamic form copy fields is shown in the example with the dynamic data.

```

^PY^-^F^-
^B^-^M02,02,000Price^T0160^[005^*^*^*
^C02^M01,01Quantity^T0100^[002
^M01,01^T0170Total^T0250^[006^-
^^^Z^-^^^*^^]
$1.5004$06.00
10$15.00
$1.0525$26.25
50$52.50
$8.9502$17.90
^*
$8.95^,
^G
^O^-^PN^-

```

The dynamic data in the above example is defined below. A printout of the above program is shown.

1. \$1.50 Price, 04 Quantity, \$06.00 Total
2. 10 Quantity, \$15.00 Total
3. \$1.05 Price, 25 Quantity, \$26.25 Total
4. 50 Quantity, \$52.50 Total
5. \$8.95 Price, 02 Quantity, \$17.90 Total
6. End of data in these fields (^\*)
7. \$8.95 Price, 0 Quantity, and FF to fill all fields with spaces until copy count is complete.
8. End of data (^G)

```

Price      $1.50
Quantity  04      Total   $06.00
Quantity  10      Total   $15.00

```

```

Price      $1.05
Quantity  25      Total   $26.25
Quantity  50      Total   $52.50

```

```

Price      $8.95
Quantity  02      Total   $17.90
Quantity           Total

```

```

Price      $8.95
Quantity           Total
Quantity           Total

```

## Dynamic Form: Repeat

**Purpose** Repeats (duplicates) an entire form at the same time as the print job.

**Format** (cc) R *formdata* (cc)Z(cc)-

(cc) Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.

R Specifies the Dynamic Form Repeat Form command. Enter **R** to repeat the boilerplate form.

*formdata* Represents the dynamic form data. Any text, graphics command sequences, or dynamic form field length, are entered as part of the data.

This is *not* the dynamic data for the variable fields; this data represents all information required for the designated form to be repeated. The number of copies of the form is specified as part of the dynamic data sequence after the dynamic form is processed.

(cc)Z(cc)- Terminates the repeat sequence. Enter the SFCC for your Code V configuration immediately followed by **Z**, another SFCC, and - or another valid graphics command mnemonic to terminate the Dynamic Form Copy Fields sequence.

**Comments** The Dynamic Form Repeat Form command is supplied as the first input of the data parameter within the Dynamic Form command. Do not use this command with the Dynamic Form Copy Fields command (page 58).

The LF and FF commands have an additional meaning when used with Dynamic Form Repeat Form commands as previously described on page 55.

When the data is supplied, the first parameter becomes a four-digit repeat number field. For example, 0003 before the first dynamic data byte specifies three repeated forms with the data. The repeat number field must be supplied with each set of data when the Dynamic Form Repeat Form command is used. If only one copy of the form is required, enter 0001 as the repeat number.

**Example** The following example illustrates the Dynamic Form Repeat Form command. In the example, the Price field repeats with a five-digit field length. Following the Dynamic Form command sequence, the dynamic data with the repeat quantities is sent. The special use of the CR command for dynamic forms is shown in the example with the dynamic data.

```
^PY^-^F^-
^B^-^R^-^M00,00,000^T0160Price^[005^-
^*^*^Z^-^]
0003$1.50
0002$1.00
0001$8.95
0000^G
^O^-^PN^-
```

The dynamic data in the above example is defined as follows:

1. 3 copies with \$1.50 Price
2. 2 copies with \$1.00 Price, CR to fill with spaces
3. 1 copy with \$8.95 Price
4. No data (^G)

Price	\$1.50
Price	\$1.50
Price	\$1.50
Price	\$1.00
Price	\$1.00
Price	\$8.95
Price	

## Electronic Vertical Format Unit (EVFU)

**Purpose** To use the software-controlled vertical formatter, which allows you to program frequently used lines on forms and documents for efficient printing processes when merging operations (such as invoicing or payrolling).

**Mode** Graphics with a Standard Graphics Command selected

**Format** See Table 7.

**Table 7. EVFU Command Codes**

EVFU Code	IGP Command
Start Load	^>
Channel 1	^0
Channel 2	^1
Channel 3	^2
Channel 4	^3
Channel 5	^4
Channel 6	^5
Channel 7	^6
Channel 8	^7
Channel 9	^8
Channel 10	^9
Channel 11	^:
Channel 12	^;
Channel 13	^<
Channel 14	^=
End Load	^?

**Comments** By flagging each line to be printed, the EVFU automatically moves the printhead to the identified lines. The EVFU provides 14 channels (line identification codes) to identify up to 132 lines on a form. For complete EVFU information, refer to your *PCL-II/LinePrinter Plus Technical Reference Manual*.

The EVFU is loaded with a program of line identification codes, one code for each line of the form. The program includes a Start Load code to initiate the load routine, a series of line identification codes, and an End Load code. After the memory is loaded, a line identification code occurring in the data stream causes the EVFU to slew to the identified line. To clear the EVFU memory, send a Start Load code with no channel codes or End Load code.

The Start Load, End Load, and Channel Code commands are listed in Table 7. A sample EVFU form is shown in Table 8.

**Table 8. Sample EVFU Form**

Form Data		Form Line #	EVFU Load Program	EVFU Command Code
			Start Load	^>
		1	Ch 2	^1
		2	Ch 2	^1
Company:	Timmy's Toys	3	Ch 1	^0
		4	Ch 2	^1
		5	Ch 2	^1
		6	Ch 2	^1
		7	Ch 2	^1
Item:	Tricycle	8	Ch 3	^2
		9	Ch 2	^1
Color:	Red	10	Ch 4	^3
		11	Ch 2	^1
		12	Ch 2	^1
Quantity:	45	13	Ch 5	^4
		14	Ch 2	^1
		15	Ch 2	^1
P/O Number:	TT-1203	16	Ch 6	^5
		17	Ch 2	^1
		18	Ch 2	^1
Date:	12/24/86	19	Ch 7	^6
		20	Ch 2	^1
			End Load	^?

The format for the form definition program sent from the host computer is as follows:

1. The EVFU Start Load code (^>) is sent first. The Code V must be in the Graphics Mode to load and use the EVFU in the Graphics Mode.
2. The Channel 2 code (^1) is sent twice to assign the first two lines of the form as fillers. Filler lines are not called by the print program. The same channel code can be used to assign all filler lines of the form.
3. The Channel 1 code (^0), which is the top-of-form (TOF) code, is sent to assign form line number 3. This is the first line of the form with print data. In the sample form, this line is used for company name information. (Alternately, the TOF code could be assigned to the first line of the form and a unique channel code assigned to line 3.)
4. The Channel 2 code is again sent four times to assign line numbers 4 through 7 as fillers.
5. The Channel 3 code (^2) is sent to assign line number 8. In the sample form, this line is used for item information.
6. The Channel 2 code is sent to assign line number 9 as a filler.
7. The Channel 4 code (^3) is sent to assign line number 10. In the sample form, this line is used for color information.
8. The Channel 2 code is sent twice to assign line numbers 11 and 12 as fillers.
9. The Channel 5 code (^4) is sent to assign line number 13. In the sample form, this line is used for quantity information.
10. The Channel 2 code is sent twice to assign line numbers 14 and 15 as fillers.
11. The Channel 6 code (^5) is sent to assign line number 16. In the sample form, this line is used for purchase order number information.
12. The Channel 2 code is sent twice to assign line numbers 17 and 18 as fillers.
13. The Channel 7 code (^6) is sent to assign line number 19. In the sample form, this line is used for date information.
14. The Channel 2 code is sent to assign line number 20 as a filler.
15. The EVFU End Load code (^?) is sent last to terminate the memory load routine.

After the EVFU is loaded, sending one of the EVFU codes in the data stream (or as a line terminator) causes the printer to slew the paper to the line assigned to the EVFU code sent.



## Emphasized Print

---

<b>Purpose</b>	Selects emphasized (bold) character printing.
<b>Mode</b>	Graphics with a Standard Graphics Command selected
<b>Format</b>	(cc) @ E (cc)-
	(cc) Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.
	@ Specifies one of the @ commands. Enter @ to begin an @ command function.
	E Specifies the Emphasized Print command. Enter E and all characters on the line are emphasized. Emphasized print is automatically reset upon receipt of the line terminator.
	(cc)- Graphics Mode CR. Enter the SFCC for your Code V configuration immediately followed by - to end the command sequence.

**Comments** Emphasized print is available when the Code V is in the Graphics Mode. Emphasized print is a line-by-line print attribute; it is selected once and all characters in the line are emphasized. The @E command must be used prior to any printable data in the line, and it is automatically reset when a line terminator is received. When printing text, this command produces the same output as the Dark Print command.

**Example** The following example illustrates changing character type from the standard characters to emphasized characters.

```
^PY^-
Standard Characters in the Graphics Mode^*
^@E^-Emphasized characters: ABCDEFGHIJKLMNOP^^*
^PN^-
```

```
Standard Characters in the Graphics Mode
```

```
Emphasized Characters: ABCDEFGHIJKLMNOP
```

## Emulation Switch

---

**Purpose** Switch to a different emulation.

**Mode** Graphics with a Standard Graphics Command selected

**Format** (cc) IEMUL *des* (cc)-

(cc) Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.

IEMUL The emulation switch command.

*des* Three letter symbol to represent the emulation to switch to. Presently, **PGL** is the only choice available.

(cc) Enter the SFCC for your Code V configuration.

- Immediately follows (cc). The graphic CR mnemonic which ends the command sequence.

**Comments** Once the system is switched to a new emulation, Code V will be reset as the default. There is no need to exit the graphic mode separately.

## Font, Selecting Default (Version II)

<b>Purpose</b>	Selects a default font.
<b>Mode</b>	Standard Graphics or Graphics with an Extended Graphics Command selected. When this command is executed as an Extended Graphics command, descender mode automatically turns on.
<b>Format</b>	(cc) IFONT,S, <i>n</i> (cc)G
	(cc) Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.
	IFONT,S, Specifies the IFONT command. Enter <b>IFONT,S,</b> .
	<i>n</i> Represents the selected font value. Replace <i>n</i> with a value ranging from <b>1</b> through <b>4</b> or <b>10</b> through <b>13</b> , according to the IFONT values shown in Table 9.
	(cc)G The universal terminator. Enter the SFCC for your Code V configuration immediately followed by <b>G</b> to terminate the IFONT,S, command.

**Table 9. IFONT Values**

Font #	Font Description
1	Draft 10 cpi
2	Draft 12 cpi
3	Draft 15 cpi
4	Draft 17.5 cpi
10	OCR-A Size 1 10 cpi
11	OCR-B Size 1 10 cpi
12	Draft 10 cpi
13	Draft 10 cpi

**Comments** When this command is used within an Extended Graphics command, the default font is selected for Extended Graphics printing and the four orientations of the Alphanumerics command (page 26) are available. When this command is used in a Standard Graphics command, the default font is selected for standard printing only.

## Fonts, Rotatable

<b>Purpose</b>	Using special parameter values within any of the four alphanumeric commands described on page 26, you can specify four different fonts.
<b>Mode</b>	Normal resolution Graphics with an Extended Graphics Command selected.
<b>Format</b>	(cc) <i>expand font jus data</i> (cc)-
	(cc) Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.
	<i>expand</i> Represents one of the alphanumeric command mnemonics: Enter <b>M</b> for horizontal, <b>V</b> for clockwise, <b>E</b> for counterclockwise, or <b>U</b> for inverted.
	<i>font</i> Represents the four-digit font parameter value which selects the font. Font parameter values are shown in Table 10.
	<i>jus</i> Defines vertical justification (position) for character printing in tenth inches and dot rows. Enter a three-digit value ranging from <b>000</b> through <b>999</b> to define the printing location down from the starting position of the command sequence. The first two digits specify 0.1 through 9.9 inches downward justification; the third digit specifies an additional 0 through 9 dot rows of downward justification. The decimal point between the first two digits is automatically understood by the Code V and the third digit is automatically interpreted as dot rows.

### Note



If your data to be printed begin with a number (not a character), then you must complete the field; otherwise, the Code V will assume the number is a digit in the field value.

<i>data</i>	The data characters for printing in the rotatable font.
(cc)-	Graphics Mode CR used as a sequence terminator. Enter the SFCC for your IGP configuration immediately followed by - to end the command sequence.

**Comments** Compressed print density fonts provide six other fonts with higher density print characteristics. Refer to “Fonts, Compressed Print Density” on page 71.

Each of the three pitches, 10 cpi, 12 cpi, and 15 cpi (measured in characters per inch, cpi) produce non-expandable characters 0.1-inch high and 3, 4, or 5 dot columns wide with a one-dot column intercharacter spacing.

The 7 cpi font produces non-expandable characters 0.2-inch high and 0.15-inch wide with a 2-dot column intercharacter spacing at approximately 7 cpi.

There is no rotated Optical Character Recognition (OCR) font available.

You can select any specific font from any of the four alphanumeric commands using the Font Parameter (special combinations of the alphanumeric command height and width parameters) as described in Table 10.

The Rot. Char Size option setting (from the control panel menu) determines if rotated (clockwise / counter-clockwise), expanded characters have a different size than an unrotated character with the same size parameters ("Adjusted") or the same size ("Not Adjusted").

The Adjusted mode reflects rotating a fixed 5x7 cell character on a 60x72 dpi, non-symmetrical printer. The Not Adjusted mode reflects rotating on a symmetrical dpi printer.

**Table 10. Rotatable Fonts**

Font Size	Line Matrix Printer Character Dimensions* (Vert X Horiz)	Alphanumeric Command Font Parameter Value
7 cpi	14 dots (V) x 16 dots	00,00
10 cpi	7 dots (V) x 10 dots	01,01
12 cpi	7 dots (V) x 8 dots	00,01
15 cpi	7 dots (V) x 6 dots	01,00

\*10, 12, and 15 cpi use an intercharacter spacing of one dot position. The elongated font uses an intercharacter spacing of two dot positions.

**Examples** The following examples illustrate the available fonts. For each example, the Graphics Mode command (^PY^-) was previously sent but not shown.

**10 cpi Font.** The following command generates the uppercase alphabet with numbers 0-9 in 10 cpi:

```
^M01,01,000ABCDEFGHIJKLMN0PQRSTUVWXYZ 0123456789^-
```

```
ABCDEFGHIJKLMN0PQRSTUVWXYZ 0123456789
```

**12 cpi Font.** The following command generates the uppercase alphabet with numbers 0-9 in 12 cpi:

```
^M00,01,000ABCDEFGHIJKLMNOPQRSTUVWXYZ 0123456789^-
```

```
ABCDEFGHIJKLMNOPQRSTUVWXYZ 0123456789
```

**15 cpi Font.** The following command generates the uppercase alphabet with numbers 0-9 in 15 cpi:

```
^M01,00,000ABCDEFGHIJKLMNOPQRSTUVWXYZ 0123456789^-
```

```
ABCDEFGHIJKLMNOPQRSTUVWXYZ 0123456789
```

**7 cpi Font.** The following command generates the uppercase alphabet with numbers 0-9 in 7 cpi:

```
^M00,00,000ABCDEFGHIJKLMNOPQRSTUVWXYZ 0123456789^-
```

```
ABCDEFGHIJKLMNOPQRSTUVWXYZ 0123456789
```

**Rotatable Font.** The following commands combine rotated fonts with alphanumeric commands.

```
^M05,05,000IGP^M01,01,000IGP^-
```

```
IGPIGP
```

```
^V03,03,0003 X 3^V01,00,000IGP^-
```

```
3IGP  
X  
3
```

## Fonts, Compressed Print Density

- Purpose** Defines the horizontal print density in characters per inch (cpi).
- Mode** Graphics with an Extended Graphics Command selected
- Format** (cc) S *f* data (cc)-
- (cc) Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.
  - S The Compressed Print Density command. Enter **S**.
  - f* Represents the Compressed Print Density font. Replace *f* with a value ranging from **1** through **9** to select the compressed print density font as described in Table 11. Standard print density is 10 cpi. Each character font is .1-inch high. The font sizes are illustrated in the examples beginning on the next page.
  - data* The data characters for printing in the Compressed Print Density font.
  - (cc)- Graphics Mode CR used as a sequence terminator. Enter the SFCC for your IGP configuration immediately followed by - to end the command sequence.

**Table 11. Compressed Print Density Font Selection**

<i>f</i>	Font Selected
1	10 cpi
2	12 cpi
3	13.33 cpi
4	15 cpi
5	17.65 cpi
6	OCR-A font at 10 cpi
7	OCR-B font at 10 cpi
8	12 cpi (full-dot)
9	15 cpi (full-dot)

**Comments** Use Compressed Print Density commands as part of the Alphanumeric command. Reverse print and rotated commands are not available with the Compressed Print feature. Characters selected with this command print *only* in the standard horizontal orientation. A Reverse Print or Rotated Alphanumeric command specified in the command sequence is ignored.

**Examples** The following examples illustrate the commands and print samples which generate the uppercase alphabet with numbers 0-9 in the available compressed print density fonts. Notice the height and width parameters of the alphanumeric command do not apply to the data specified for compressed print.

**f = 1 (10 cpi)**

```
^PY^-
^M03,02,000^S1ABCDEFGHIJKLMN0PQRSTUVWXYZ 0123456789^-
^PN^-

    ABCDEFGHIJKLMN0PQRSTUVWXYZ 0123456789
```

**f = 2 (12 cpi)**

```
^PY^-
^M03,02,000^S2ABCDEFGHIJKLMN0PQRSTUVWXYZ 0123456789^-
^PN^-

    ABCDEFGHIJKLMN0PQRSTUVWXYZ 0123456789
```

**f = 3 (13.33 cpi)**

```
^PY^-
^M03,02,000^S3ABCDEFGHIJKLMN0PQRSTUVWXYZ 0123456789^-
^PN^-

    ABCDEFGHIJKLMN0PQRSTUVWXYZ 0123456789
```

**f = 4 (15 cpi)**

```
^PY^-
^M03,02,000^S4ABCDEFGHIJKLMN0PQRSTUVWXYZ 0123456789^-
^PN^-

    ABCDEFGHIJKLMN0PQRSTUVWXYZ 0123456789
```

**f = 5 (17.65 cpi)**

```
^PY^-
^M03,02,000^S5ABCDEFGHIJKLMN0PQRSTUVWXYZ 0123456789^-
^PN^-

    ABCDEFGHIJKLMN0PQRSTUVWXYZ 0123456789
```



**f = 6 (OCR-A 10 cpi)**

```
^PY^-
^M03,02,000^S6ABCDEFGHIJKLMNOPQRSTUVWXYZ 0123456789^-
^PN^-
```

```
ABCDEFGHIJKLMNOPQRSTUVWXYZ 0123456789
```

**f = 7 (OCR-B 10 cpi)**

```
^PY^-
^M03,02,000^S7ABCDEFGHIJKLMNOPQRSTUVWXYZ 0123456789^-
^PN^-
```

```
ABCDEFGHIJKLMNOPQRSTUVWXYZ 0123456789
```

**f = 8 (12 cpi full-dot)**

```
^PY^-
^M03,02,000^S8ABCDEFGHIJKLMNOPQRSTUVWXYZ 0123456789^-
^PN^-
```

```
ABCDEFGHIJKLMNOPQRSTUVWXYZ 0123456789
```

**f = 9 (15 cpi full-dot)**

```
^PY^-
^M03,02,000^S9ABCDEFGHIJKLMNOPQRSTUVWXYZ 0123456789^-
^PN^-
```

```
ABCDEFGHIJKLMNOPQRSTUVWXYZ 0123456789
```

## Form Feed

---

**Purpose** Performs a form feed (hex 0C) function to advance the paper to the next top of form when used to terminate a standard graphics command.

**Mode** Graphics with a Standard Graphics Command selected

**Format** (cc),  
(cc) Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.  
, The graphics FF mnemonic. Enter ,.

**Comments** The form feed command functions as a terminator only when used to terminate a graphics sequence in an extended graphics command when free format is enabled.

The control panel form feed key will operate differently dependent on the source of form feed control at the time the key is pressed. Form feed is controlled by the LP+ and Code V emulation at different times.

## Form Length

---

<b>Purpose</b>	Defines the length of the form in total number of lines.
<b>Mode</b>	Graphics with a Standard Graphics Command selected
<b>Format</b>	(cc) L <i>length</i> (cc)- or (cc) H <i>length</i> (cc)-  (cc)            Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.
<b>L or H</b>	The Form Length command. If your Code V is configured with the PI line enabled, enter <b>L</b> . If your Code V is configured with the PI line disabled, enter <b>H</b> .
<i>length</i>	Represents the form length in total number of lines. Enter a two-digit number of total lines on the form ranging from <b>01</b> through <b>99</b> . For example, enter 05 for a 5-line form length, 21 for a 21-line form length.
(cc)-	Graphics Mode CR. Enter the SFCC for your Code V configuration immediately followed by - to end the command sequence.

**Comments** The **L** command is available any time the Code V is in the Graphics Mode. The physical length of the paper for the form is a product of the total lines per form and the current lines per inch (lpi) settings for the printer. For example, a typical 66-line form at 6 lpi is 11 inches long. A 48-line form at 6 lpi is 8 inches long; the same 48-line form at 8 lpi is 6 inches long.

Form feeds following this command advance the form from the current print position to the top of the next form.

With the Host Form Length configuration option enabled, the form length defined by this command will set the physical page length on the printer.

## Forms Construction

---

<b>Purpose</b>	Produces vertical lines inside a box to construct forms.
<b>Mode</b>	Graphics with an Extended Graphics Command selected.
<b>Format</b>	(cc) LF <i>horz vert h v line1 t line2 t</i> (cc)G(cc)-
(cc)	Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.
LF	The Forms Construction command. Enter <b>LF</b> .
<i>horz</i>	Defines the horizontal length of the form in tenth inches and dot columns. Enter a three-digit horizontal length value ranging from <b>000</b> through <b>999</b> to define a horizontal length of 00.0 through 99.9 inches. Add a fourth digit ranging from 0 through 9 to specify 0 through 9 additional dot columns of length. The Code V automatically understands the decimal between the second and third digits for tenth inches and automatically interprets the fourth digit as dot columns. For example, entering 0126 specifies a 1.2-inch plus 6-dot column horizontal length; entering 1016 specifies a 10.1-inch plus 6-dot column horizontal length.
<i>vert</i>	Defines the vertical length of the form in tenth inches and dot rows. Enter a three-digit vertical length value ranging from <b>000</b> through <b>999</b> to define a vertical length of 00.0 through 99.9 inches. Add a fourth digit ranging from 0 through 9 to specify 0 through 9 additional dot rows of length. The Code V automatically understands the decimal between the second and third digits for tenth inches and automatically interprets the fourth digit as dot rows. For example, entering 0204 specifies a 2.0-inch plus 4-dot row vertical length; entering 0242 specifies a 2.4-inch plus 2-dot row vertical length.
<i>h</i>	Defines the horizontal border thickness in dot columns. Enter a number ranging from <b>1</b> through <b>9</b> to specify a horizontal border thickness from 1 through 9 dots.
<i>v</i>	Defines the vertical border thickness in dot rows. Enter a number ranging from <b>1</b> through <b>9</b> to specify a vertical border thickness from 1 through 9 dots.
<i>line1</i>	Defines the vertical line position in tenth inches and dot columns from the form left edge or prior vertical line right edge. Therefore, the line value for all but the first vertical line is actually the gap between the right edge of the previous line and the left edge of the current line. Enter a three-digit position value ranging from <b>000</b> through <b>999</b> to define a position

of 00.0 through 99.9 inches. Add a fourth digit ranging from 0 through 9 to specify 0 through 9 additional dot columns. The Code V automatically understands the decimal between the second and third digits for tenth inches and automatically interprets the fourth digit as dot columns. For example, entering 0126 specifies a 1.2-inch plus 6-dot column position from the left edge or last vertical line position; entering 1016 specifies a 10.1-inch plus 6-dot column position.

- t* Defines the vertical line thickness in dot columns. Enter a number ranging from **1** through **9** to specify a line thickness from 1 through 9 dots.
- line2* The line position parameter is entered repeatedly as needed for the number of lines required in the form.
- t* The line thickness parameter is entered for each vertical line position parameter.
- (cc)G Enter the SFCC for your Code V configuration followed by **G**, the universal terminator, or another valid Graphics Mode command to end the input of vertical line and form data.
- (cc)- Graphics Mode CR used as a sequence terminator. Enter the SFCC for your Code V configuration immediately followed by - to end the command sequence.

**Note**

You must supply leading and trailing zeros for all fields.

**Comments** The **LF** command produces vertical lines inside a box using a single command sequence. Forms are positioned by the parameters or commands of an Alphanumerics command sequence (such as horizontal tabs, the justification parameter, etc.). Therefore, one of the Alphanumerics commands must precede an **LF** command.

Using appropriate values for the horizontal and vertical length parameters constructs a variety of form shapes. The horizontal and vertical border thickness can also be specified in varying line thicknesses. Any number of vertical lines can be drawn inside the form. The position of the vertical line is based on the left edge of the form or the last vertical line drawn.

**Example** The following sample command illustrates forms construction. In addition to enabling the free format, an Alphanumeric command was sent for form positioning.

```
^PY^-^F^-
^M01,01,000
^LF0500,0320,2,2,0123,1,0200,3,0090,1^G^-
^O^-^PN^-
```

--	--	--	--

## Forms, Creating Dynamic (Version II)

This command operates similar to the Dynamic Form Commands described beginning on page 54.

**Purpose** Creates a new dynamic form and stores it in memory under a specified name.

**Mode** Graphics with an Extended Graphics Command selected

**Format** (cc) IFORM,C *name* (cc)G *data* (cc)]

(cc) Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.

IFORM,C The command to create buffered forms. Enter **IFORM,C**.

*name* Represents the form name. Enter a name up to 15 characters long. Another form in memory by the same name will be overwritten with the new form.

(cc)G Terminator. Enter the SFCC for your Code V configuration immediately followed by **G**, the universal terminator, or another valid Graphics Mode command to end the input of the form name.

<i>data</i>	The form data. Enter any number of valid Graphics or Extended Graphics command sequences.
(cc)]	Ends the form and all contents. Enter the specific SFCC for your Code V configuration followed by the right bracket to end the form.

## Forms, Deleting Dynamic (Version II)

---

<b>Purpose</b>	Deletes an existing dynamic form stored in memory under a specified name.
<b>Mode</b>	Graphics with an Extended Graphics Command selected
<b>Format</b>	(cc) IFORM,D <i>name</i> (cc)G
(cc)	Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.
IFORM,D	The command to delete the form. Enter <b>IFORM,D</b> .
<i>name</i>	Represents the form name. Enter the form name exactly as created in the IFORM,C command (page 77).
(cc)G	Terminator. Enter the SFCC for your Code V configuration immediately followed by <b>G</b> , the universal terminator, or another valid Graphics Mode command terminator to end the data.

## Forms, Executing Dynamic (Version II)

---

This command operates similar to the Dynamic Form Commands described beginning on page 54.

<b>Purpose</b>	Executes an existing dynamic form stored in memory under a specified name.
<b>Mode</b>	Graphics with an Extended Graphics Command selected
<b>Format</b>	(cc) IFORM,E <i>name</i> (cc)G
(cc)	Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.
IFORM,E	The command to execute the form. Enter <b>IFORM,E</b> .
<i>name</i>	Represents the form name. Enter the form name exactly as created in the IFORM,C command (page 77).
(cc)G	Terminator. Enter the SFCC for your Code V configuration immediately followed by <b>G</b> , the universal terminator, or another valid Graphics Mode command terminator to end the data.

## Forms, Listing Dynamic (Version II)

---

<b>Purpose</b>	Lists all previously created forms, including the form size in bytes, used by each form name.
<b>Mode</b>	Graphics with an Extended Graphics Command selected
<b>Format</b>	(cc) IFORM,L
	(cc) Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.
	IFORM,L The command to list the forms in memory. Enter <b>IFORM,L</b> .
	(cc)G Terminator. Enter the SFCC for your Code V configuration immediately followed by <b>G</b> , the universal terminator, or another valid Graphics Mode command terminator to end the data.

## Forms, Predefined (Version II)


---

<b>Purpose</b>	Loads one of three predefined forms from memory (AIAG, Primary Metals, and Odette). These forms are selected and completed using the commands and legends described.
<b>Mode</b>	Graphics with standard Graphics Command selected
<b>Format</b>	(cc) IFORM,E[ <i>formname</i> ].QMS (cc)G
	(cc) Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.
	IFORM,E[ <i>formname</i> ].QMS The command to retrieve the specified predefined form. Enter <b>IFORM,E[<i>formname</i>].QMS</b> . <i>formname</i> may be one of the following: <b>AIAG</b> , <b>EMETALS</b> or <b>ODETTE</b> .
	(cc)G Terminator. Enter the SFCC for your Code V configuration immediately followed by <b>G</b> , the universal terminator, or another valid Graphics Mode command terminator to end the data.
<b>Comments</b>	The IFORM,E command not only loads the desired predefined form, but provides the means to fill out the form. The following three examples show the method of specifying the data to be placed on the forms.

**Example 1** The following sample command illustrates forms construction after loading the AIAG form from memory.

```

^PY^-^F^-
^IFORM,EAIAG.QMS^G
14015248^+
14015248^+
900^+900^+
046068722
046068722
1284^+1284^+
Acme Motor Company^+
^G
^O^-^PN^-
    
```

PART NO. (P) <b>14015248</b> 	
QUANTITY (Q) <b>900</b> 	
SUPPLIER (V) <b>046068722</b> 	
SERIAL (S) <b>1284</b>  Acme Motor Company	



**Example 2** The following sample command illustrates forms construction after loading the Primary Metals form from memory.

```

^IFORM, EMETALS.QMS^G
D9ABAB37401C^+D9ABAB37401C^+
51403^+51403^+
B1834001^+B1834001^+
06-441001-6075906-441001-60759^+
0072818^+0072818^+
3812038120
3740137401
1^+1^+
.034^+
44.000^+
COIL^+
GA SJ EX 6M61X^
TRIAL COIL^+
REF.4162A-216^+
^G



```

1-PRODUCT IDENT. <b>D9ABAB37401C</b> (P)	
2-SUPPLIER <b>51403</b> (V)	
3-SERIAL <b>B1834001</b> (S)	
4-CSTM R ORD. <b>06-441001-60759</b> (A)	
5-HEAT/PROCESS <b>0072818</b> (H)	
6-ACTUAL WT <b>38120</b> (I)	7-THEO WT/LGTH <b>37401</b> (J)
8-PIECES <b>1</b> (K)	9-SIZE <b>.034</b> <b>44.000</b> <b>COIL</b>
10-SPECIAL DATA <b>GA SK EX 6M61X</b> <b>TRIAL COIL</b> <b>REF.4162A-216</b>	

**Example 3** The following sample command illustrates forms construction after loading the Odette form from memory.

```

^IFORM, EODETTE.QMS^G
ABC CAR CORP^+
DETROIT^+
-005^+
143576451143576451
CHICAGO^
240^+270^+
16-6^+1345935^+
1882^+1882^+
P04^+^+880223
216231627S216231627
8801006^+8801006^+
CHICAGO, IL^+^G
    
```

RECEIVER ABC CAR CORP DETROIT	DOCK/GATE -005
ADVICE NOTE NO (N) 143576451 	SUPPLIER ADR CHICAGO
PART NO (P) <b>1345935</b> 	NET WT (KG) 240    GROSS WT (KG) 270    NO. BOXES 16-6
QUANTITY (Q) 350 	DESCRIPTION /PANEL B-H
SUPPLIER (V) 1882 	SUPPLIER PART NO 1345935
SERIAL (S/M/G) 216231627 	ENGR. CHANGE P 04
CHICAGO, IL	PROD DATE 880223    HAZARD CODE CHARGE NO (H) 8801006 

## Forms, Resetting Dynamic (Version II)

---

<b>Purpose</b>	Resets dynamic form memory by deleting all forms stored in memory.
<b>Mode</b>	Graphics with an Extended Graphics Command selected
<b>Format</b>	(cc) IFORM,R (cc) Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration. IFORM,R The command to reset forms memory. Enter <b>IFORM,R</b> .
<b>Comments</b>	Standard predefined forms will not be deleted from forms memory with this command. If predefined forms were previously deleted, they will be reinstalled in the forms memory after execution of this command.

## Free Format (Enable/Disable)

---

<b>Purpose</b>	Enables the Code V to ignore all host generated paper motion commands ranging from 00 through 1F hex.
<b>Mode</b>	Graphics with a Standard Graphics Command selected
<b>Format</b>	(cc) F (cc)- <i>data</i> (cc) O (cc)- (cc) Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration. F Specifies the Free Format command. Enter <b>F</b> . (cc)- Graphics Mode CR. Enter the SFCC for your Code V configuration immediately followed by - to end the command sequence. <i>data</i> Represents the data, commands, and all other codes for processing in the Free Format. All Code V features are available when Free Format is enabled. (cc)O Turns off the Free Format mode. Following the data for processing in the Free Format, enter the SFCC for your Code V configuration immediately followed by <b>O</b> (alpha O) to end the Free Format. (cc)- Graphics Mode CR. Enter the SFCC for your Code V configuration immediately followed by - to end the command sequence.

**Comments** Some host systems automatically generate forms control codes such as CR or LF after a specific number of characters. These host generated forms control codes could prematurely terminate the graphics command sequence. The Free Format command allows the Code V to accept incoming data as one continuous stream even though the data stream may include host generated forms control codes.

Free Format is available when the Code V is in the Graphics Mode. When enabled, the Code V recognizes only the Free Format terminator commands (Table 12) for forms control until the Free Format is disabled. If the Graphics Mode is disabled, Free Format command is automatically disabled. You can use the Free Format command in repeated forms.



**Note** Free Format commands may be used in the normal Graphics Mode even though Free Format is not enabled. However, when the Free Format command *is* enabled, the only valid terminators are the Free Format commands; others are ignored.

**Table 12. Free Format Terminator Commands**

Command	Meaning
^*	Line Feed (LF)
^,	Form Feed (FF)
^-	Carriage Return (CR)
^+	Vertical Tab (VT)
^>	EVFU Start Load
^?	EVFU End Load
^0-9	EVFU Channels 1-10
^:	EVFU Channel 11
^;	EVFU Channel 12
^<	EVFU Channel 13
^=	EVFU Channel 14

**Example** The following command enables and disables Free Format in the Graphics Mode.

```
^PN^-^F^-
data
^0^-PN^-
```

---

## Free Format Enable, Non-Graphics

---

**Purpose** Permits the Code V to override host-generated paper motion commands when *not* in Graphics Mode.

**Mode** Normal

**Format** (cc) PF (cc)-  
 (cc) Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.  
 PF Specifies the Enable Non-Graphics Free Format command; enter **PF**.  
 (cc)- Terminator. Enter the SFCC for your Code V configuration immediately followed by - (Graphics Mode CR) or other valid terminator.

**Comments** Use the **PF** command with host systems that send blocks of data padded with NULs or other Control Codes that may interfere with a graphics sequence (such as unformatted LU 3 mode, coaxial environments). When the Graphics Mode Disable command (^PN^-) is used to exit the Graphics Mode, it also automatically terminates the Free Format command and disables the Ignore Data commands. This can result in unwanted paper motion if Graphics Mode is exited between forms or labels, since host-generated line feeds, form feeds, etc., are no longer ignored by the firmware. Refer to the Free Format (page 83) and Ignore Data (page 89) commands for more information on these functions.

The **PF** command must be issued *before* the Graphics Mode Enable command (PY). Host-generated line terminators are then ignored by the Code V and only the following standard graphics format control commands are recognized:

(cc) \*Line Feed (Hex 0A)  
 (cc), Form Feed (Hex 0C)  
 (cc)- Carriage Return (Hex 0D)

---

**Note**



When the Code V is in the Graphics Mode, the Enable Non-Graphics Free Format command has no effect on the host data stream. In the Graphics Mode, use the Free Format (page 83) and Ignore Data (page 89) commands to ignore unwanted data.

---

**Example** The example below illustrates the use of the Enable Non-Graphics Free Format command:

```

^PF^- (LF) (LF) (LF) (LF) ^PY^-F^-^M02,02,100 data for form one
^^^X extraneous, unwanted host data^A^M01,01,000 more form one
data
^- (LF) (LF) (FF) ^PN^-^^^* (LF) (LF)
^PY^-^F^-^M02,02,000 data for form two, etc^-

```

In this example, all of the host-generated line and form feed commands, represented by (LF) and (FF), are ignored and paper motion is controlled by the Code V standard graphics format control commands (^-), (^\*), and (^,). This is done even though Graphics Mode is exited and reentered between the forms. Between the forms two standard graphics line feed commands (^\*) are used to move the paper instead of the host-generated (LF) commands. Notice that after the Graphics Mode is enabled, the Free Format and Ignore Data commands (^F^-), (^X), and (^A) are used to ignore the unwanted host data. When all of the labels or forms are completed, sending Free Format Non-Graphics Disable command returns the Code V to the fully-transparent Normal Mode.

## Free Format Disable, Non-Graphics

**Purpose** Disables the Non-Graphics Free Format command (PF), which allows host-generated paper motion when the Code V Graphics Free Format command is disabled.

**Mode** Normal

**Format** (cc) PO (cc)-

(cc) Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.

PO Specifies the End Non-Graphics Free Format command; enter **PO**.

(cc)- Terminator. Enter the SFCC for your Code V configuration immediately followed by - (Graphics Mode CR) or other valid terminator.

**Comments** Send the PO command anytime *after* the Graphics Mode Disable command (PN).

**Example** The following command disables Free Format in Non-Graphics Mode.

```

^PO^-

```

## Graphics Mode Enable

---

<b>Purpose</b>	Enables use of Graphics Mode commands.
<b>Mode</b>	Normal
<b>Format</b>	(cc) PY (cc)-
	(cc) Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.
	PY Specifies the Graphics Mode Enable command; enter <b>PY</b> .
	(cc)- Terminator. Enter the SFCC for your Code V configuration immediately followed by - (the Graphics Mode CR) or other valid terminator.

**Comments** Following the **PY** command, the Graphics Mode commands (page 21) are available.

For the Graphics Mode Enable command to be recognized and accepted by the Code V, the following rules *must* be followed:

- a. If Midline PY is enabled, the Graphics Mode Enable command can be placed anywhere on a line. If Midline PY is disabled, the Graphics Mode Enable command *must* be the first characters of a new line.
- b. The command line *must* also terminate with a line terminator (CR, LF, FF, etc.).
- c. The Code V ignores all characters between the command and the line terminator.

**Example** The following command enables the Graphics Mode.

```
^PY^-
```

## Graphics Mode Disable

---

**Purpose** Exits the Code V from Graphics Mode and returns to the Normal Mode.

**Mode** Graphics

**Format** (cc) PN (cc)-  
 (cc) Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.  
 PN Specifies the Graphics Mode Disable command; enter **PN**.  
 (cc)- Terminator. Enter the SFCC for your Code V configuration immediately followed by - (Graphics Mode CR) or other valid terminator.

**Example** The following command disables the Graphics Mode.

`^PN^-`

## Hex Dump

---

**Purpose** Prints all data in hexadecimal code equivalent.

**Mode** Graphics with a Standard Graphics Command selected

**Format** (cc) @ H 0 (cc)-  
 (cc) Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.  
 @ Specifies one of the @ commands. Enter @ to begin an @ command function.  
 H Specifies the Hex Dump command. Enter **H**.  
 0 Specifies the Hex Dump parameter. Enter **0** (zero).  
 (cc)- Graphics Mode CR. Enter the SFCC for your Code V configuration immediately followed by - to end the command sequence.

**Comments** The @H command is available when the Code V is in the Graphics Mode. To disable the hex dump, place the printer offline and change the hex dump parameter from Enable to Disable. Refer to your *User's Guide* for instructions.



---

## Ignore Data

---

<b>Purpose</b>	Instructs the Code V to ignore data until a (cc)A command is received. (See Comments below.)
<b>Mode</b>	Graphics with a Standard Graphics Command selected
<b>Format</b>	(cc) X <i>data</i> (cc)A
	(cc) Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.
	X Specifies the Ignore Data command. Enter <b>X</b> to ignore all subsequent characters until the Ignore Data command is disabled.
	<i>data</i> Represents the data. Any text and characters sent following the Ignore Data command are not processed.
	(cc)A Disables Ignore Data. Enter the SFCC for your Code V configuration immediately followed by <b>A</b> to disable the Ignore Data feature in order to process characters.

---

**Note**


No function occurs if a **(cc)A** command is used independent of the **(cc)X** command.

---

**Comments** Some host systems use fixed record lengths which causes the end of a line of data in the data stream to be filled with characters and spaces. If the Code V file on your system contains padded characters or spaces before the SFCC, this padded data must be ignored before the Code V can operate. When the **X** command is sent to ignore data, all data following the command is ignored until the **(cc)A** command to ignore data is disabled.

## Interrupt

---

<b>Purpose</b>	In cases where a single command sequence exceeds the buffer capacity, an interrupt can be used to break the command sequence and specify the position where the sequence begins printing again.
<b>Mode</b>	Graphics with or without an Extended Graphics Command selected
<b>Format</b>	(cc) I <i>dis</i> [(cc)-]
	(cc) Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.
	I Specifies the Interrupt command. Enter <b>I</b> .
	<i>dis</i> Defines the interrupt position in tenth inches and dot columns. Enter a two-digit interrupt position value ranging from <b>00</b> through <b>99</b> to define a position of 0.0 through 9.9 inches. Add a third digit ranging from 0 through 9 to specify additional dot columns. The Code V automatically understands the decimal between the first and second digits for tenth inches and automatically interprets the third digit as dot columns. For example, entering 126 specifies a 1.2-inch plus 6-dot column interrupt position. Setting the interrupt position parameter to all zeros processes all data in the Code V buffer before the next sequence is initiated.
	(cc)- Graphics Mode CR used as a command terminator. Enter the SFCC for your Code V configuration immediately followed by - to end the command sequence.

---

**Note** Only required outside of an Extended Graphics sequence.




---

**Comments** The Code V buffer holds and can process approximately 64K characters in a single graphics command sequence, which is sufficient for most applications. However, infrequent situations may arise where the command sequence is too large for the Code V buffer to hold for processing as a single command sequence. In such cases, use the I command to break the printing command sequence at a specified position and specify where the sequence resumes printing. Interrupted command sequences are processed as if a single command sequence occurred.

The I command can also be used for vertical positioning. Use the I command to skip to a new vertical position and print the data. Interrupt commands also can be included in a Vertical Duplication command sequence. Like the alphanumeric commands, the Interrupt command also enables extended graphics functions, if not already in an extended graphics sequence.

To complete the printing of all interrupted command sequences, use ^I000^- or no ^I command in the last command sequence. The last technique is used in the following example.

**Example** The following commands illustrate the interrupt function combined with form construction using tabs and various character parameters. The Free Format Enable command is also used.

```

^PY^-^F^-
^M01,01,000^LF0550,0200,2,2,0123,3,0150,1,0120,3^I020^-
^M02,02,005^T0010P/N^T0150DESC^T0300QTY^T0420PRICE^I020^-
^M01,01,020^T0010M1011^T0150Marbles^T0300200^T0420$2.50^I020^-
^M01,01,020^T0010J0620^T0150Jacks^T0300035^T0420$1.89^I020^-
^M01,01,020^T0010S4223^T0150Stickers^T0300100^T0420$
.99^I020^-
^M01,01,020^T0010C5632^T0150Cards^T0300012^T0420$ .69^I020^-
^M05,05,084^T0149COMPLETE^-
^O^-^PN^-

```

P/N	DESC	QTY	PRICE
M1011	Marbles	200	\$2.50
J0620	Jacks	035	\$1.89
S4223	Stickers	100	\$ .99
C5632	Cards	012	\$ .69

# COMPLETE

## Justification, Vertical

---

<b>Purpose</b>	Specifies a lower vertical print position relative to the print position of the alphanumeric command. This feature is useful for positioning data within boxes or columns on a form.
<b>Mode</b>	Graphics with an Extended Graphics Command selected
<b>Format</b>	(cc) J <i>jus</i> (cc)-
(cc)	Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.
J	The Vertical Justification command. Enter <b>J</b> .
<i>jus</i>	Defines the new vertical justification (position) for character printing in tenth inches and dot rows. Enter a three-digit value ranging from <b>000</b> through <b>999</b> to define the new print location down from the starting position of the command sequence. The first two digits specify 0.1 through 9.9 inches downward justification; the third digit specifies an additional 0 through 9 dot rows of downward justification. The decimal point between the first two digits is automatically understood by the Code V and the third digit is automatically interpreted as dot rows.
(cc)-	Graphics Mode CR used as a sequence terminator. Enter the SFCC for your IGP configuration immediately followed by - to end the command sequence.

---

**Note**


This command will cause extra vertical blank spaces at the bottom of a form if its value is greater than the bottom edge of any previously drawn graphical element in the current command sequence.

---

**Comments** The **J** command is input as part of the data in one of the alphanumeric commands and only affects the justification; other parameters (such as height and width) are not changed.

A justification of 2 inches specifies a print position 2 inches down from the position of the alphanumeric command; a subsequent justification of 1 specifies the print position at 1 inch down from the position of the alphanumeric command.

**Example** The following sample commands illustrate character justification changes.

```
^PY^-^F^-
^M05,05,000Aa^J105Bb^M10,05,050Cc^J100Dd^-
^O^-^PN^-
```

Aa  
BbCcDd

```
^PY^-^F^-
^V05,05,000I^J050G^J025P^-
^O^-^PN^-
```

I  
G P

```
^PY^-^F^-
^E05,05,000IGP^J050IGP^J100IGP^-
^O^-^PN^-
```

IGP  
IGP  
IGP  
IGP

```
^PY^-^F^-
^U03,05,000DOWN^J100SIDE^J050UP^-
^O^-^PN^-
```

DOWN  
SIDE  
UP

## Line Feed

---

**Purpose** Performs a line feed (hex 0A) and a carriage return function when used to terminate a standard graphics command.

**Mode** Graphics with a Standard Graphics Command selected

**Format** (cc)\*

(cc) Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.

\* The graphics LF mnemonic. Enter \*.

**Comments** The line feed command functions as a carriage return only when it is used to terminate a graphics sequence in an extended graphics command when Free Format Mode is enabled.

## Line Slew

---

**Purpose** Changes the vertical print position by specifying a number of lines to advance the paper from the current print position.

**Mode** Graphics with a Standard Graphics Command selected

**Format** (cc) *slew n* (cc)-

(cc) Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.

*slew* Represents a Line Slew command. Enter **K** or **W**. (Both **K** and **W** perform the same line slew command.)

*n* Specifies the number of lines to advance (slew) at the current lines per inch (lpi) setting. Enter a two-digit number of lines ranging from **01** through **99**. For example, enter 05 to slew 5 lines, 21 to slew 21 lines.

(cc)- Graphics Mode CR. Enter the SFCC for your Code V configuration immediately followed by - to end the command sequence.

## Line Spacing

<b>Purpose</b>	Selects a new line spacing in lines per inch (lpi).
<b>Mode</b>	Graphics with a Standard Graphics Command selected
<b>Format</b>	(cc) @ L <i>newlpi</i> (cc)-
(cc)	Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.
@	Specifies one of the @ commands. Enter @ to begin an @ command function.
L	Specifies the Line Spacing command. Enter L to change the line spacing.
<i>newlpi</i>	Represents the line spacing parameter. Enter one of the two-digit codes shown in Table 13 to select a new line spacing. For example, enter 10 to select 10 lpi.  Not all values are available on all printer models. Check the <i>User's Guide</i> for the line spacing options available.  Once the new line spacing is selected, all lines are printed at the new lpi setting until another line spacing is selected or the Code V returns to the Normal Mode.
(cc)-	Graphics Mode CR. Enter the SFCC for your Code V configuration immediately followed by - to end the command sequence.

**Table 13. Line Spacing Codes**

Line Spacing Code	Line Spacing (lpi) Selected
01	1
02	2
03	3
04	4
06	6
08	8
09	9
10	10
12	12
18	18
72	72

**Note**

Values above 20 (except 72) default to 18. Values selected but not shown on the table are rounded to the next higher value. For example, selecting a line spacing code of 05, would be rounded up to 06.

**Example** The following example illustrates different line spacings.

```
^PY^-^F^-
Standard Characters in the Graphics Mode^*
at the standard line spacing^*
of 6 lines per inch.^*
^@L08^-Standard Characters in the Graphics Mode^*
at the new line spacing^*
of 8 lines per inch.^*
^@L06^-
^O^-^PN^
```

```
Standard Characters in the Graphics Mode
at the standard line spacing
of 6 lines per inch.
Standard characters in the Graphics Mode
at the new line spacing
of 8 lines per inch.
```

## Lines, Dashed

**Purpose** Produces dashed lines.

**Mode** Graphics with an Extended Graphics Command selected

**Format** (cc) LD *horz vert* (cc)-

(cc)	Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.
LD	The Dashed Line command. Enter <b>LD</b> .
<i>horz</i>	Defines the horizontal length of the line in tenth inches and dot columns. Enter a three-digit horizontal length value ranging from <b>000</b> through <b>999</b> to define a horizontal length of 00.0 through 99.9 inches. Add a fourth digit ranging from 0 through 9 to specify 0 through 9 additional dot columns of length. The Code V automatically understands the decimal between the second and third digits for tenth inches and automatically interprets the fourth digit as dot columns. The additional dots are only printed if the length is an even number. If the length is an odd number, the space for the additional dots is provided but the dots are not printed. For example, entering 0126 specifies a 1.2-inch plus 6-dot column horizontal line length, and the dots are printed. Entering 1016 specifies a 10.1-inch plus 6-dot column horizontal line length, but the additional 6 dots are not printed.



- The **LD** command is ignored if the length parameter is zero plus zero dots.
- vert* Defines the vertical length of the line in tenth inches and dot rows. Enter a three-digit vertical length value ranging from **000** through **999** to define a vertical length of 00.0 through 99.9 inches. Add a fourth digit ranging from 0 through 9 to specify 0 through 9 additional dot rows of length. The Code V automatically understands the decimal between the second and third digits for tenth inches and automatically interprets the fourth digit as dot rows. The additional dots are only printed if the length is an even number.
- If the length is an odd number, the space for the additional dots is provided but the dots are not printed. For example, entering 0004 specifies a 0.0-inch plus 4-dot row vertical line length, and the dots are printed. Entering 0242 specifies a 2.4-inch plus 2-dot row vertical line length, but the additional 2 dots are not printed. The LD command is ignored if the length parameter is zero plus zero dots.
- (cc)- Graphics Mode CR used as a sequence terminator. Enter the SFCC for your IGP configuration immediately followed by - to end the command sequence.

**Comments** Line drawing is positioned by the parameters or commands of an alphanumeric command sequence (such as horizontal tabs, the justification parameter, etc.). Consequently, an alphanumeric command must precede a line drawing command.

Using appropriate values for the horizontal and vertical line length parameters constructs a variety of vertical and horizontal lines in varying line thicknesses. The dashed line is produced by printing the odd tenth inches of length only; the even tenth inches of length are blanked. If the length ends in an even number (2.4 inch for example), the last even tenth inch is blank, making the line appear one-tenth inch too short. A 2.4 inch dashed line appears to be the same length as a 2.3 inch dashed line due to the blanking of the last even tenth inch.

The vertical or horizontal orientation of the dashed line is determined by the horizontal and vertical length parameters. If the horizontal length parameter is the longest, a dashed horizontal line is printed; conversely, if the vertical length parameter is the longest, a dashed vertical line is printed. If the horizontal and vertical line length parameters are equal, the Code V prints a horizontal dashed line.

**Example** The following examples illustrate dashed lines. Note that changing the horizontal and vertical line length parameter values constructs a variety of dashed vertical and horizontal lines in varying line thicknesses. With horizontal lines, the horizontal length parameter actually specifies line length and the vertical length parameter determines line thickness. Similarly with vertical lines, the vertical length parameter specifies line length and the horizontal length parameter determines line thickness. Notice that an alphanumeric command is required for line positioning.

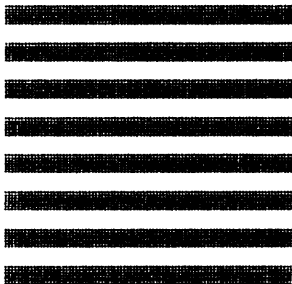
```
^PY^-  
^M01,01,000^LD0200,0010^LD0200,0001^-  
^PN^-
```



```
^PY^-  
^M01,01,000^LD0150,0150^-  
^PN^-
```



```
^PY^-  
^M01,01,000^LD0150,0154^-  
^PN^-
```



## Lines, Solid

---

<b>Purpose</b>	Produces solid lines.
<b>Mode</b>	Graphics with an Extended Graphics Command selected
<b>Format</b>	(cc) LS <i>horz vert</i> (cc)-
	(cc) Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.
	LS The Solid Line command. Enter <b>LS</b> .
	<i>horz</i> Defines the horizontal line length in tenth inches and dot columns. Enter a three-digit horizontal length value ranging from <b>000</b> through <b>999</b> to define a horizontal length of 00.0 through 99.9 inches. Add a fourth digit ranging from 0 through 9 to specify 0 through 9 additional dot columns of length.  The Code V automatically understands the decimal between the second and third digits for tenth inches and automatically interprets the fourth digit as dot columns.  For example, entering 0120 specifies a 1.2-inch plus no-dot column horizontal line length; entering 1016 specifies a 10.1-inch plus 6-dot column horizontal line length. This command is ignored if either length parameter is zero plus zero dots.
	<i>vert</i> Defines the vertical length of the line in tenth inches and dot rows. Enter a three-digit vertical length value ranging from <b>000</b> through <b>999</b> to define a vertical length of 00.0 through 99.9 inches. Add a fourth digit ranging from 0 through 9 to specify 0 through 9 additional dot rows of length.  The Code V automatically understands the decimal between the second and third digits for tenth inches and automatically interprets the fourth digit as dot rows.  For example, entering 0004 specifies a 0.0-inch plus 4-dot row vertical line length; entering 0240 specifies a 2.4-inch plus no-dot row vertical line length. This command is ignored if either length parameter is zero plus zero dots.
	(cc)- Graphics Mode CR used as a sequence terminator. Enter the SFCC for your IGP configuration immediately followed by - to end the command sequence.

**Comments** Line drawing is positioned by the parameters or commands of an alphanumeric command sequence (such as horizontal tabs, the justification parameter, etc.). Consequently, an alphanumeric command must precede a line drawing command.

Using appropriate values for the horizontal and vertical line length parameters constructs a variety of vertical and horizontal lines in varying line thicknesses. The horizontal or vertical orientation of the line is determined by the longest length parameter.

**Example** The following commands illustrate solid lines. As shown in the examples, changing the horizontal and vertical line length parameter values constructs a variety of vertical and horizontal lines in varying line thicknesses. With horizontal lines, the horizontal length parameter actually specifies line length and the vertical length parameter determines line thickness.

Similarly with vertical lines, the vertical length parameter specifies line length and the horizontal length parameter determines line thickness.

```
^PY^-^F^-
^M^LS0425,0010^-
^O^-^PN^-
```



```
^PY^-^F^-
^M^LS0100,0100^-
^O^-^PN^-
```



```
^PY^-^F^-
^M^LS0001,0150^-
^O^-^PN^-
```



## Logo Generation (Version II)

<b>Purpose</b>	Provides eight pre-designed logos and symbols in different sizes and rotations totaling 14 options. Logo Generation is used in conjunction with the Pixel Expansion command described on page 103.
<b>Mode</b>	Graphics with an Extended Graphics Command selected
<b>Format</b>	(cc) ILOGO, <i>value</i> (cc)G
(cc)	Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.
ILOGO,	The Logo Generation command. Enter <b>ILOGO</b> , (the comma following the command is required).
<i>value</i>	Represents the variable which selects the pre-defined logo or symbol. Enter a 2-digit value, from Table 14, representing the symbol or logo desired.
(cc)G	The required terminator for the ILOGO command. Enter the SFCC for your Code V configuration followed by a <b>G</b> to end the ILOGO command sequence.

**Table 14. Logo Generation Values**

Value	Description
41	Copyright symbol
42	Copyright symbol at 90 degrees
43	Registered Trademark symbol
44	Registered Trademark symbol at 90 degrees
45	UL symbol, large
46	UL symbol, large, at 90 degrees
47	Trademark symbol
48	Trademark symbol at 90 degrees
49	CSA symbol
4A	CSA symbol at 90 degrees
4B	UL symbol, medium
4C	UL symbol, small
61	TUV Rheinland symbol
62	GS-Mark Symbol

**Comments** The Pixel Expansion (IPEXP) command, described on page 103, may be used with all logos printed using the **ILOGO** command.

Logos and symbols created using the **z** command (described on page 118) are still available and do not conflict with the **ILOGO** command. Do not use any alphanumeric-rotation commands with **ILOGO** symbols and logos.

**Example** The following program and print sample illustrate how the copyright symbol (value 41 from Table 14) is called using the **ILOGO** command. Note that the alphanumeric command **^M** is simply “introducing” an Extended Graphics command; therefore, the alphanumeric command parameters (01,01,000) are optional.

```
^PY^-^F^-
^M^IPEXP,06,06^G^ILOGO,41^G^-
^O^-^PN^-
```



## Passing Hex Values

**Purpose** Sends specified hex values to the printer. This command can be used in Standard or Extended Graphics Mode.

**Mode** Standard or Extended Graphics Mode, with or without an Extended Graphic Command selected

**Format** (cc) IHEX, *value*

(cc)	Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.
IHEX,	The Pass Hex Values command. Enter <b>IHEX</b> ,. (The comma following the command is required).
<i>value</i>	The hex value to be sent to the printer. Valid values are hex 00 through FF.

**Comments** The IHEX command can be used to send graphic and non-graphic hex data. The difference between the use of the command is shown in example 1, Standard Graphic mode, and example 2, Extended Graphic mode.

**Example 1** The following example of the command used in the Standard Graphic mode, will print A through F with C underlined. The hex 08 is the control code for a backspace.

**Note**

The “Control Code 08” setting for the LinePrinter+ emulation must be set to “Backspace” in order for the Code V to recognize the hex code. Refer to your *User’s Guide* for details.

```
^PY^-
ABC^IHEX,08_DEF
^PN^-

ABCDEF
```

**Example 2** The following example of the command used in the Extended Graphic mode, will print Schön with the proper accent marks.

```
^PY^-
^M0202000Sch^IHEX,F6n^-
^O^-^PN^-
```

Schön

## Pixel Expansion (Version II)

<b>Purpose</b>	Expands those graphics plotted using the ILOGO command (page 101), the Plotting Graphics (cc)Q command (page 105), and the Symbols command (page 118).
<b>Mode</b>	Graphics with an Extended Graphic Command selected
<b>Format</b>	(cc) IPEXP, <i>horz vert</i> (cc)G
	(cc) Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.
	IPEXP, The Pixel Expansion command. Enter <b>IPEXP</b> , (the comma following the command is required).

**Note**

Leading zeros for values less than three digits are not required.

<i>horz</i>	The horizontal expansion of the logo or symbol. Enter a value ranging from <b>1</b> through <b>255</b> .
<i>vert</i>	The vertical expansion of the logo or symbol. Enter a value ranging from <b>1</b> through <b>255</b> . Leading zeros for values less than three digits are not required.

(cc)G The required terminator for the IPEXP command. Enter the SFCC for your Code V configuration followed by a **G** to end the IPEXP command sequence.

**Comments** Only use the **IPEXP** command in conjunction with graphics plotting and symbols which were created using the **ILOGO** command (page 101), the Plotting Graphics **Q** command (page 105), and the Symbols command (page 118). The **IPEXP** command expands these pre-designed graphics and symbols in a manner similar to the way normal characters are expanded using the Character Height and Character Width commands.



**Note** Unless this command is turned off, once an expansion factor is selected, that value remains selected until a new **IPEXP** command is received. Turn this command off by entering 1,1 for the horizontal and vertical expansion values.

**Example** The following program and print sample illustrate how the TUV Rheinland symbol (value 61 from Table 14) is applied using the ILOGO command and expanded 4X by 4X using the IPEXP command. Note that the alphanumeric command ^M is simply “introducing” an Extended Graphics command; therefore, the alphanumeric command parameters (such as 01,01,000) are optional.

```
^PY^-^F^-
^M^IPEXP,04,04^G^ILOGO,61^G^-
^PN^-
```





## Plotting Graphics (Columns)

---

- Purpose** Creates logos or other graphic patterns by plotting in dot-addressable columns.
- Plotting Graphics (Columns) replaces the “Logo” command from IGP-110/210/410.
- Do not confuse this graphics plot command, (cc)**Q**, with the odd dot plot command, (cc)**Q**, discussed on page 107. The Graphics Plot command is effective when an Extended Graphics Command is selected and plots in vertical data bytes (columns). Odd dot plot, described on page 107, plots in *horizontal* data bytes (rows) and is effective when a Standard Graphics Command is selected.
- Mode** Graphics with an Extended Graphics Command selected
- Format** (cc) Q *data* (cc) G (cc)-
- (cc) Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.
- Q The Logo command. Enter **Q**.
- data* The hexadecimal logo data. Each hexadecimal value defines one 7-dot vertical data byte (column) for each 0.1-inch row.
- (cc)G Terminator. Enter the SFCC for your Code V configuration immediately followed by **G**, the universal terminator, to end the input of logo data.
- (cc)- Graphics Mode CR used as a sequence terminator. Enter the SFCC for your IGP configuration immediately followed by - to end the command sequence.
- Comments** Logos are positioned by the parameters or commands of an alphanumeric command sequence (such as horizontal tabs, the justification parameter, etc.) and can be created only from within an alphanumeric command sequence. Consequently, an alphanumeric command must precede a Logo command.
- Any logo that can be designed using the rows of the 0.1-inch x 0.1-inch matrix grid can be produced with the **Q** command. The form example in the “Exercises and Examples” chapter, page 234, illustrates how the hand logo was produced. An arrow pattern is illustrated in the following example.
- Graphics designed using this command can not be stored in Code V memory for future use. Once your graphic pattern prints, it is automatically purged from Code V working memory.
- Example 1** The bottom-most bit of the data byte corresponds to the least significant bit (LSB) of the data byte, which corresponds to the bottom row (row #1); the data byte works up through the other bits to the top-most significant bit of the data byte, which corresponds to the top bit row (row #7).

Summing the values determines the data for each column of the logo. Figure 3 shows the decimal value sums for each data byte (column) for the arrow pattern illustrated. Each byte was calculated first in decimal and then converted to the equivalent hexadecimal value (using the ASCII chart in Appendix A). These hexadecimal values are then entered in the *data* parameter for the Q command.

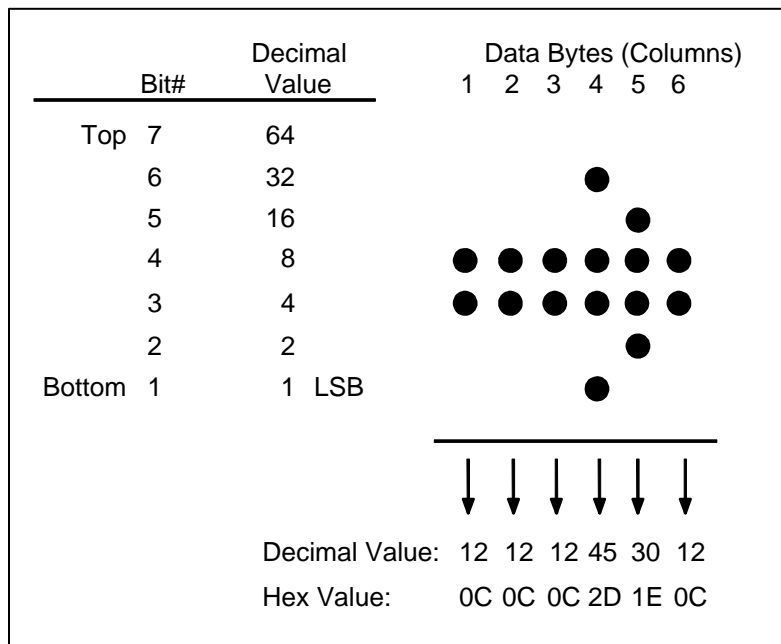
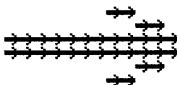


Figure 3. Graphics Logo Plot Data Format

**Example 2** The sample command below illustrates the logo function, drawing the arrow shown in Figure 3. The six hex data values for each 0.1 inch x 0.1 inch matrix are repeated and horizontal tabs and justification commands are used to produce the large arrow using the small arrow pattern. Notice that an alphanumeric command was required for logo positioning.

```

^PY^-^F^-
^M01,01,000^T0070^Q0C,0C,0C,2D,1E,0C,0C,0C,0C,2D,1E,0C^G^-
^M01,01,000^T0090^Q0C,0C,0C,2D,1E,0C,0C,0C,0C,2D,1E,0C^G^-
^M01,01,000^Q0C,0C,0C,2D,1E,0C,0C,0C,0C,2D,1E,0C,0C,0C,0C,2D,
1E,0C,0C,0C,0C,2D,1E,0C,0C,0C,0C,2D,1E,0C,0C,0C,0C,2D,1E,0C,0C,
0C,0C,2D,1E,0C,0C,0C,0C,2D,1E,0C,0C,0C,0C,2D,1E,0C,0C,0C,0C,2D,
1E,0C,0C,0C,0C,2D,1E,0C,0C,0C,0C,2D,1E,0C,0C,0C,0C,2D,1E,0C,0C,
1E,0C,0C,0C,0C,2D,1E,0C,0C,0C,0C,2D,1E,0C^G^-
^M01,01,000^Q0C,0C,0C,2D,1E,0C,0C,0C,0C,2D,1E,0C,0C,0C,0C,2D,
1E,0C,0C,0C,0C,2D,1E,0C,0C,0C,0C,2D,1E,0C,0C,0C,0C,2D,1E,0C,0C,
0C,0C,2D,1E,0C,0C,0C,0C,2D,1E,0C,0C,0C,0C,2D,1E,0C,0C,0C,0C,2D,
1E,0C,0C,0C,0C,2D,1E,0C,0C,0C,0C,2D,1E,0C^G^-
^M01,01,000^T0090^Q0C,0C,0C,2D,1E,0C,0C,0C,0C,2D,1E,0C^G^-
^M01,01,000^T0070^Q0C,0C,0C,2D,1E,0C,0C,0C,0C,2D,1E,0C^G^-
^O^-^PN^-
    
```



## Plotting Graphics (Rows)

---

**Purpose** Allows you to address and print any individual dot position using odd and even dot plot commands. The odd and even dot plot addresses each dot position using a row method (as opposed to the column method created in Extended Graphics as described on page 105).

Plotting Graphics (Rows) replaces the “Plot” command from IGP-110/210/410.

Do not confuse the graphics plot command, (cc)**Q**, with the odd dot plot command, (cc)**Q**, discussed below. The Graphics Plot command is effective when an Extended Graphics Command is selected and plots in vertical data bytes (columns). Odd dot plot, described below, plots in *horizontal* data bytes (rows) and is effective when a Standard Graphics Command is selected.

**Mode** Graphics with a Standard Graphics Command selected

**Format** (cc) *plot data* (cc)G

(cc) Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.

*plot* Represents a plot command. Enter **Q** for normal density odd dot plot, or enter **C** for high density even dot plot.

*data* The plot data. Enter the hex data required to produce the desired graphics pattern. (See Comments below.)

(cc)G Following the data, enter the (SFCC) for your Code V configuration immediately followed by any valid command character or **G**, the universal sequence terminator.

**Comments** Graphics designed using this command can not be stored in Code V memory for future use. Once your graphic pattern prints, it is automatically purged from Code V working memory.

In typical plotting, the binary pattern ASCII characters supplied as data are used to address the character columns with the Least Significant Bit (LSB) corresponding to the left-most dot column. The Code V, however, addresses the binary pattern of hex data bytes in a “mirror image” of plotting, with the LSB addressing the *right*-most dot position. Two plot types are available and defined below: odd dot plot for normal density and even dot plot for high density applications. You must define each byte of each data line in plot format, which is explained in “Plot Data Byte Format” on page 108.

**Odd dot plot** (normal density plotting) is selected with the Odd Dot Plot command, (cc)**Q** *data* (cc)G. Odd dot plot addresses the odd numbered dot columns to produce a horizontal and vertical density that varies based on the printer and mode of operation.




**Even dot plot** (high density plotting) is selected with the Even Dot Plot command, (cc)C *data* (cc)G. Even dot plot works in conjunction with the Odd Dot Plot command. The odd and even numbered dot columns are addressed to double the horizontal density.

## Plot Data Format

You must define each byte for a complete line of data in plot format. Plot Data *Byte* Format explains how to define each byte along a data line. Plot Data *Line* Format explains how to take each defined byte and create a complete line of data.

## Plot Data Byte Format

Each data byte specifies six of the twelve dot columns that compose one character column. Using odd dot plot, bits 1 through 6 of the data byte address the odd numbered dot columns; using even dot plot, bits 1 through 6 of the data byte address the even numbered dot columns.

Byte #	1	2	3	...	132
Data	1 1 0 0 0 1 0 0	1 1 1 1 1 1 1 1	1 1 1 0 0 0 0 1		
Dot Pattern					

A dot is printed for each bit that is set ("1") in the data byte. When using plot commands, bits 7 and 8 of the data byte may be set to "0" or "1". The sum of each bit in the data byte, in hexadecimal value, becomes the plot data used in the plot command.

For example, refer to Figure 4. A hex data value of C4 prints a dot at the column corresponding to the 04 bit. A hex data byte value of FF produces dots in all columns; a value of C0 leaves the column blank. The bit pattern addresses the odd columns of the character space for odd dot plot or the even columns of the character space for even dot plot. Both odd and even columns are used for high density plot. These hex data bytes to produce the graphics pattern are entered in the data parameter of the plot command. Figure 4 illustrates the plotting hex data required to produce the same arrow graphics as shown in Figure 3 for the Logo Mode.

## Plot Data Line Format

Each plotted line of data may include up to 132 data bytes. The first data byte in the line addresses the dot positions to print in the first character column; the second data byte addresses the dot positions to print in the second character column, etc. After the last byte of data, enter the terminator command (cc)G, and repeat this sequence for the number of plot lines involved.

		Byte/Character Column #1								
Odd Dot Columns:	- -	1	3	5	7	9	11			
Bit #:	8 7	6	5	4	3	2	1			
Decimal Value:	128 64	32	16	08	04	02	01	Binary Pattern	Decimal Value for the Row	Hex Data Byte for the Row
Dot Row	1						●	→ 11000100	196	C4
	2						●	→ 11000010	194	C2
	3	●	●	●	●	●	●	→ 11111111	255	FF
	4	●	●	●	●	●	●	→ 11111111	255	FF
	5						●	→ 11000010	194	C2
	6						●	→ 11000100	196	C4

Bit 7 and 8 may be "0" or "1" in Plot Mode.

↑  
LSB

**Figure 4. Odd Dot Plot Data Example**

In odd dot plot, the (cc)G terminator causes the contents of the buffer to plot and advances the paper a single dot row based on the vertical density of the current print mode. In even dot plot, the paper/printhead is not advanced.

For high density plot, the Even Dot Plot and Odd Dot Plot commands are used in conjunction with two data lines. The Even Dot command is sent with the first data line along with the (cc)G terminator. The terminator causes the contents of the buffer to plot in the even dot columns but does *not* advance the paper/printhead. The printer waits for the second line of data using the Odd Dot Plot command and a terminator. Data in the buffer is plotted in odd dot columns of the same row where even dot column data was just plotted and the paper/printhead is advanced one dot row at the vertical density of the current print mode.

**Example** The following sample command illustrates plotting, by plotting a line of arrows using the data shown in Figure 4.

```

^PY^-^F^-
^QC4,C4,C4,C4,C4,C4,C4,C4,C4,C4,C4^*
^QC2,C2,C2,C2,C2,C2,C2,C2,C2,C2,C2^*
^QFF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF^*
^QFF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF^*
^QC2,C2,C2,C2,C2,C2,C2,C2,C2,C2,C2^*
^QC4,C4,C4,C4,C4,C4,C4,C4,C4,C4,C4^*
^O^-^PN^-
    
```



## Reset

---

<b>Purpose</b>	Resets the Code V to the power-up configuration.
<b>Mode</b>	Graphics with a Standard Graphics Command selected
<b>Format</b>	(cc) @ R (cc)-
(cc)	Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.
@	Specifies one of the @ commands. Enter @ to begin an @ command function.
R	Specifies the Reset command. Enter <b>R</b> to reset the printer to the power-up configuration.
(cc)-	Graphics Mode CR. Enter the SFCC for your Code V configuration immediately followed by - to end the command sequence.

**Comments** The Reset command prints any pending page then resets the Code V to the power-up configuration as selected in the “Power-up Config.” option (see *User’s Guide*). The Code V then restarts as if just powered up (no dynamic forms in form library, character substitution sets reset, starts printing in upper left corner, etc.).



**Note** Any EVFU setting in the ASCII emulations (by direct codes or Code V (cc) L command) will not be reset (refer to page 74).

## Reverse Print

---

<b>Purpose</b>	Produces white characters on either a black printed background or any of the shaded or patterned backgrounds available with the shading and shading mask features.
<b>Mode</b>	Graphics with an Extended Graphics Command selected
<b>Format</b>	(cc) R <i>data</i> (cc)R (cc)-
(cc)	Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.
R	The Reverse Print command. Enter <b>R</b> .
<i>data</i>	The data characters for reverse printing.
(cc)R	Following the data, enter the SFCC for your Code V configuration and the Reverse Print command to turn off the reverse printing feature.
(cc)-	Graphics Mode CR used as a sequence terminator. Enter the SFCC for your IGP configuration immediately followed by - to end the command sequence.

**Comments** The **R** command is input as part of the data in one of the alphanumeric commands. The **R** command must be turned on and off by command. Any character data entered between the reverse print on and off commands is printed in reverse print. However, when the alphanumeric command sequence is terminated, reverse printing is also terminated.

Shading (page 114) or shading mask (page 116) backgrounds are also available with the **R** command. Do not use Compressed Print Fonts (discussed on page 71) with this feature.

The reverse printed character is actually created by not printing within the black or shaded background. A dark box border is automatically produced around the reverse printed characters. The black background border combined with the size of the character increases the total area of the character field. If the descending character printing feature is used with reverse print, the black background border area is increased to allow for the descending character space.

**Example** The following examples illustrate reverse printing command sequences. In the first example, notice that the alphanumeric command sequence terminator was also used to end reverse printing.

```
^PY^-
^M05,05,000IGP^RIGP^-
^PN^-
```

IGP IGP

```
^PY^-
^U05,05,000DOWN^RSIDE^RUP^-
^PN^-
```

UPSIDE DOWN

## Scaling

---

<b>Purpose</b>	Selects a new line spacing and different horizontal by vertical (H x V) dot density from the standard 120 x 72 base density. (See Comments below.)
<b>Mode</b>	Graphics with a Standard Graphics Command selected
<b>Format</b>	(cc) @ M <i>scale</i> 00 (cc)-
(cc)	Represents the Special Function Control Code (SFCC). Enter the SFCC for your Code V configuration.
@	Specifies one of the @ commands. Enter @ to begin an @ command function.
M	Specifies the Scaling command. Enter <b>M</b> to change the horizontal and vertical scaling.
<i>scale</i>	Represents the scaling parameter. Enter one of the two-digit codes shown in Table 15 to select a new scaling. For example, with an MVP printer, enter 02 to select mode 2, 120 x 72 (H x V) dpi scale.  Once the new scaling is selected, all printing reflects the new scale in horizontal by vertical dots per inch (dpi) until scaling is disabled or the Code V returns to the Normal Mode.
00	Toggles scaling on and off. When 00 is first entered, the scaling value as selected in the <i>scale</i> parameter is enabled if a printer is selected through the “Prt to Emulate” option. When 00 is entered again, scaling is disabled and the Code V returns to the default scaling configuration.
(cc)-	Graphics Mode CR. Enter the SFCC for your Code V configuration followed by - to end the command sequence.

---

**Note**


If the Code V Option “Prt to Emulate” is selected, scaling is enabled.

---

**Comments** Dot density varies by printer mode; selecting a different printer mode selects a different horizontal and vertical dot density. This varying density can affect graphic elements created in one particular mode but printed in a different mode. Scaling permits graphic elements, such as corners or boxes, to retain their physical shapes and sizes when printed in a horizontal and vertical density other than the base density of 120 x 72 dpi.



Table 15. Scaling Codes

Printer Type	Scale Code	Printer Mode	Dot Density (H x V) dpi
MVP and MVP 150B	00	Toggles Scaling On/Off	
	01	1	200 x 96
	02	2	120 x 72
	03	3	125 x 64
	04	4	100 x 48
	05	5	200 x 72
L150	00	Toggles Scaling On/Off	
	01	1	200 x 96
	02	2	120 x 72
	03	3	125 x 64
	04	4	145 x 72
	05	5	160 x 72
P3040	00	Toggles Scaling On/Off	
	01	1	180 x 96
	02	2	120 x 72
	03	3	120 x 48
	04	4	145 x 72
	05	5	160 x 72
P6000	00	Toggles Scaling On/Off	
	01	1	120 x 144
	02	2	120 x 72
	03	3	120 x 48
P9000	00	Toggles Scaling On/Off	
	01	1	180 x 96
	02	2	120 x 72
	03	3	120 x 48

**Note**

MVP and MVP 150B printers must be in Scale Mode 02 and Printer Mode 2 to produce readable bar codes. L150 printers must be in Scale Mode 04 and Printer Mode 4 to produce readable bar codes, except for UPC-A, EAN 8 and EAN 13, which require Mode 5 to produce readable bar codes.

## Setup Files Feature

---

**Purpose** Allows the printer to be automatically configured on startup or reset using a specific setup file.

**Comments** This file is stored in Flash Memory and contains any valid emulation command; e.g. load forms, select character. The file is loaded in memory once and remains until replaced. The file is replaced by overwriting with a new configuration or deleted by loading a null configuration file.

---

**Note**



Download of this file requires the use of a special utility disk. The disk is available through your authorized distributor.

---

## Shading

---

**Purpose** Produces alphanumeric characters using a black-shaded impression.

**Mode** Graphics with an Extended Graphics Command selected

**Format** (cc) KH *data* (cc) KH (cc)-

(cc)	Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.
KH	The Shading command. Enter <b>KH</b> to turn on the shading feature.
<i>data</i>	The data characters to print in shaded graphics.
(cc)KH	Following the data, enter the Special Function Control Code (SFCC) for your Code V configuration and <b>KH</b> to turn off the shading feature.
(cc)-	Graphics Mode CR used as a sequence terminator. Enter the SFCC for your Code V configuration immediately followed by - to end the command sequence.

**Comments** The **KH** feature must be turned on and off by command. Any character data entered between the **KH** on and off commands is shaded when printed. Shading commands are input as part of the data in one of the alphanumeric commands. Reverse printing (discussed on page 110) can be combined with shading.

When the shading feature is used, only certain dot positions are printed (versus every dot position in the normal graphics) which produces the shaded images. The shading *value* can be changed using the Shading Mask command discussed on page 116.

**Example** The following sample commands illustrate shading.

```
^PY^-
^M05,05,000AaBb^KHCcDd^KH^-
^PN^-
```

AaBbCcDd

```
^PY^-
^M05,03,000IGP SH^KHAD^KHING^-
^PN^-
```

IGP SHADING

```
^PY^-
^E05,05,000IGP^KHIGP^KH^-
^PN^-
```

IGP  
IGP

```
^PY^-
^E05,05,000I^KHG^KHP^-
^PN^-
```

HGP

```
^PY^-
^U03,03,000SHADING^KHDOWN^KHUPSIDE^-
^PN^-
```

UPSIDE-DOWNSHADING

## Shading Mask

<b>Purpose</b>	Activates the shading feature with a specific shading mask.
<b>Mode</b>	Graphics with an Extended Graphics Command selected
<b>Format</b>	(cc) KL <i>mask data</i> (cc)KH (cc)- (cc)            Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration. KL              The Shading Mask command. Enter <b>KL</b> to turn on the shading mask feature. <i>mask</i> Represents the shading mask factor. Enter a two-digit hex value ranging from <b>00</b> through <b>FF</b> to specify the shading mask factor. Four sample shading mask patterns are shown below. Refer to Appendix B for print samples of all masking values.

<b>Mask Value (Hex)</b>	<b>Shading Mask Produced</b>
00	
01	//////
04	\\\\\\
FF	=====

The shading mask selected remains selected until another mask value is selected or the Shading Mask command is turned off.

<i>data</i>	The data characters to print in mask shaded graphics.
(cc)KH	Following the data, enter the Special Function Control Code (SFCC) for your Code V configuration and <b>KH</b> to turn off the shading mask feature.
(cc)-	Graphics Mode CR used as a sequence terminator. Enter the SFCC for your Code V configuration immediately followed by - to end the command sequence.

**Comments** The KL command is used as part of the data contained in one of the alphanumeric commands.

Shading Mask commands must be turned on and off by command. Any character data entered between the **KL** on and off commands is shaded with the selected mask. Shading must be turned off before any commands are used to change character height, width, justification, or horizontal print position. Reverse printing can be combined with shading.

**Example** The following sample commands illustrate shading. Four mask shading factors are available to produce vertical stripes (KL00), horizontal stripes (KLFF), slanted stripes upper right to lower left (KL01), and slanted stripes upper left to lower right (KL04). For additional patterns, see Appendix B.

```
^PY^-
^M03,03,000IGP^KL00IGP^KLFFIGP^KL01IGP^KL04IGP^-
^PN^-
```

IGP I I G P I I G P I I G P I I G P

```
^PY^-
^M03,03,000IGP^KL00MASK^KL8DSHAD^KL02ING^-
^PN^-
```

IGP MASK SHADING

```
^PY^-
^V05,05,000I^KLC2G^KHP^-
^PN^-
```

I G P

```
^PY^-
^E05,05,000IGP^KL9BIGP^KLFFIGP^KLF1IGP^KH^-
^PN^-
```

P O O O  
G O O O  
H H H H

```
^PY^-
^U03,03,000ING^KL01SHAD^KL04DOWN^KL8CSIDE-^KL02UP^KH^-
^PN^-
```

ING UPSIDE-DOWN SHADING

## Special Function Control Code Change

---

<b>Purpose</b>	Changes the current Special Function Control Code (SFCC).
<b>Mode</b>	Graphics with a Standard Graphics Command selected
<b>Format</b>	(cc) N x (cc)-
	(cc) Represents the <i>current</i> Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.
	N Specifies the SFCC Change command. Enter <b>N</b> .
	x Represents the new SFCC. Enter the ASCII character for the new SFCC. You can set the SFCC to any character in the range of 17-255.
	(cc)- A Graphics Mode CR using the <i>new</i> SFCC. Enter the new SFCC, immediately followed by - to end the command sequence.

**Comments** When the SFCC is changed by the **N** command, the change is effective immediately, and the old SFCC is no longer recognized. When printer power is turned off and on, the SFCC returns to the configuration default which is defined in the selected power-on configuration.

**Example** The following command changes the SFCC from the tilde (~) to the caret (^).

```
~N^^~
```

## Symbols, Creating Standard User Defined

---

<b>Purpose</b>	To create specialized standard size symbols.
<b>Mode</b>	Graphics with an Extended Graphics Command selected
<b>Format</b>	(cc) z x data (cc)G
	(cc) Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.
	z The Create Symbol command. Enter lowercase <b>z</b> .
	x Represents the symbol being defined. Refer to Table 16 and the Comments. Enter a lowercase character from <b>a</b> through <b>g</b> to specify where your symbol is stored. Make a note of the corresponding "Print" Value; you need this number in your Print Symbols command when you print the symbol as discussed on page 123.

- data* The data required to define the symbol. Each dot row of a standard size symbol contains three character cells comprised of four dot rows each, which equals a total of 12 dots per row. Since the standard size symbol can only be 12 dot rows by 12 dot columns, the maximum number of character cells used to define a standard size symbol is 36 (12 dot rows X 3 character cells per row). ASCII characters from hex **0** through **F** are used to describe the dot pattern for each cell of the symbol. Enter hex values from 0 through F from Table 17 to describe the dot pattern.
- If more than 36 character cells are input, the extra data is ignored until a valid terminator, such as (cc)G, (cc)-, or (cc)\* is found.
- (cc)G Terminator. Enter the SFCC for your Code V configuration immediately followed by **G**, the universal terminator, or another valid Graphics Mode command.

The **zx** command *creates* a special standard-sized symbol. When you are ready to *print* that symbol, use the **Z** command as described on page 123.

The **zx** command must be within a valid graphics sequence. The symbol can measure up to 12 dot rows wide by 12 dot columns high, based on 60 x 72 dots per inch resolution. You can create and store up to seven standard size symbols in printer memory. The created symbols remain in memory until they are redefined, the printer is reset, or the printer power is turned off.

**Table 16. Standard Size Symbol Values**

<b>“Create” Value</b>	<b>“Print” Value</b>
(Registered Trademark Symbol)	1
(Copyright Symbol)	2
a	3
b	4
c	5
d	6
e	7
f	8
g	9

Table 17. Hex Codes and Dot Patterns

ASCII Hex Value	Binary Code	Dot Pattern
0	0000	○ ○ ○ ○
1	0001	○ ○ ○ ●
2	0010	○ ○ ● ○
3	0011	○ ○ ● ●
4	0100	○ ● ○ ○
5	0101	○ ● ○ ●
6	0110	○ ● ● ○
7	0111	○ ● ● ●
8	1000	● ○ ○ ○
9	1001	● ○ ○ ●
A	1010	● ○ ● ○
B	1011	● ○ ● ●
C	1100	● ● ○ ○
D	1101	● ● ○ ●
E	1110	● ● ● ○
F	1111	● ● ● ●

**Example** The following example illustrates the creation of the standard size Registered Trademark symbol defined for “a.” The symbol is 12 dot columns wide by 12 rows high.

```

^PY^-^F^-
^M0101^za0C0,
330,408,5C8,
924,924,9C4,
944,528,408,
330,0C0^G
^M01,01,000^T0020^Z3^-
^O^-^PN^-

```





## Symbols, Creating Expanded User Defined

<b>Purpose</b>	To create specialized expanded symbols. An optional fill command can define large expanded symbols.
<b>Mode</b>	Graphics with an Extended Graphics Command selected
<b>Format</b>	(cc) z x ht wd data [f n pattern] (cc)G
(cc)	Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.
z	The Create Symbol command. Enter lowercase <b>z</b> .
x	Represents the symbol being defined. Enter an uppercase character from <b>A</b> through <b>F</b> to specify where your symbol is stored. Make a note of this character; you need it in your Print Symbols command when you print the symbol as discussed on page 123.
ht	Specifies the height of the symbol in dot rows from <b>001</b> through <b>108</b> . If a value of 000 or greater than 108 is entered, it defaults to the maximum value of 108. You must include the leading zeros when entering this data.
wd	Specifies the width of the symbol in character cells from <b>001</b> through <b>022</b> . If a value of 000 or greater than 022 is entered, it defaults to the maximum value of 022. You must include the leading zeros when entering this data.
data	The data required to define the symbol. Enter a hex value of <b>0</b> through <b>F</b> to define the dot pattern for each character cell. Each character cell is comprised of 4 dots each. Refer to Table 17 to select dot patterns. Since one character cell represents 4 dot columns, the smallest symbol you can create is 4 dot columns wide by 1 dot row high. You can define up to 2,376 character cells (108 dot rows X 22 character cells per row).  If more than the total of 2,376 character cells are defined, the extra data is ignored until a valid terminator, such as (cc)G, (cc)-, or (cc)* is found.
f	(Optional) Fills a specified number of character cells with a repeated dot pattern. Enter lowercase <b>f</b> .
n	Specifies the number of character cells to fill. Enter a decimal value from <b>0001</b> through <b>9999</b> . A value of 0000 fills all remaining cells with a specified dot pattern.
pattern	Specifies the fill dot pattern. Enter a value from <b>0</b> through <b>F</b> from Table 17 to describe the dot pattern.

(cc)G Terminator. Enter the SFCC for your Code V configuration immediately followed by **G**, the universal terminator, or another valid Graphics Mode command.

If a syntax error occurs, or invalid data is entered in the command, the remaining data in the command sequence is ignored until a sequence terminator or SFCC is found. If the printer power is turned off the printer resets, and all expanded symbol data is deleted.

**Comments** The **zx** command *creates* an expanded-size symbol. When you are ready to *print* the symbol, use the **Z** command as described on page 123.

Expanded User Defined Symbols command must be within a valid graphics sequence. The symbols can measure up to 1-1/2 inches wide by 1-1/2 inches high, which equals 88 dot columns wide by 108 dot rows high. You can store a maximum of six expanded symbols in printer memory until the printer is reset or the printer power is turned off.

**Example** The following sample palm tree symbol illustrates the Expanded User Defined Symbol and the optional fill commands. The symbol measures 96 dot rows high by 64 dot columns, or 16 character cells wide, which equals a total of 1,536 character cells.

```

^PY^-
^F^-
^M01,01,020
^zA,096,016
f0112,F,f0004,F,C01,f0009,F,f0004,F,C01,f0009,F,f0003,F,8,f0003,0,1
f0004,F,03f0002,F,f0003,F,8,f0003,0,1f0004,F,03f0002,F
f0002,F,Cf0005,0,3F8,f0003,0,3F,f0002,F,Cf0005,0,3F8,f0003,0,3F
f0004,F,Cf0004,0,8,f0005,0,F,f0004,F,Cf0004,0,8,f0005,0,F
f0005,F,Cf0009,0,F,f0005,F,Cf0009,0,F,f0006,F,8f0006,0,f0003,F
f0006,F,8f0006,0,f0003,F,f0005,F,f0007,0,f0004,F,f0005,F,f0007,0,f000F
f0003,F,Cf0009,0,3f0002,F,f0003,F,Cf0009,0,3f0002,F,f0003,F,f0011,0,f0002,F
f0003,F,f0011,0,f0002,F,f0002,F,Cf0011,0,3F,f0002,F,Cf0011,0,3F
f0002,F,f0013,0,F,f0002,F,f0013,0,F,FCf0013,0,F,FCf0013,0,F
FC0,0Ff0010,0,F,FC0,0Ff0010,0,F,F03,FCf0006,0,FF01F,F03,FCf0006,0,FF01F
E3FF,f0007,0,1FF3F,E3FF,f0007,0,1FF3F,CFFC,f0008,0,3F7F,CFFC,f0008,0,3F7F
f0003,F,Cf0009,0,f0003,F,f0003,F,Cf0009,0,f0003,F,f0003,F,800,FCf0005,0,7FF
f0003,F,800,FCf0005,0,7FF,f0003,F,003FE,007C,03FF,f0003,F,003FE,007C,03FF
FFE,00,7FF,003,F80,FF,FFE,00,7FF,003,F80,FF,FFC,00,f0003,F,003,FE0FF
FFC,00,f0003,F,003,FE0FF,FF803,f0003,F,001,FF0FF,FF803,f0003,F,001,FF0FF
FF00,f0004,F,800,FFCFF,FF00,f0004,F,800,FFCFF,FF03,f0004,F800,FFDFF
FF03,f0004,F800,FFDFF,FF8,f0005,F,800,f0005,F,FF8,f0005,F,800,f0005,F
FFB,f0005,F,C00,f0005,F,FFB,f0005,F,C00,f0005,F,f0008,F,C007,f0004,F
f0008,F,8003,f0004,F,f0008,F,8003,f0004,F,f0008,F,8003,f0004,F
f0008,F,8003,f0004,F,f0008,F,8003,f0004,F,f0008,F,8003,f0004,F
f0008,F,0001,f0004,F,f0008,F,0001,f0004,F,f0008,F,0001,f0004,F
f0008,F,0001,f0004,F,f0008,F,0001,f0004,F,f0008,F,0001,f0004,F
f0007,F,E0000,f0004,F,f0007,F,E0000,f0004,F,f0007,F,Ef0004,0,f0004,F
f0007,F,Ef0004,0,f0004,F,f0007,F,Cf0004,0,f0004,F,f0007,F,Cf0004,0,f0004,F
f0007,F,f0005,0,f0004,F,f0000,F^G
^M01,01^zA^-^*^*^*^*
^PN^-

```



## Symbols, Printing

<b>Purpose</b>	Prints specialized Standard or Expanded sized symbols previously created using the <b>zx</b> commands described on page 118 and page 121, respectively.
<b>Mode</b>	Graphics with an Extended Graphics Command selected
<b>Format</b>	(cc) Z n (cc)-
(cc)	Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.
Z	The Print Symbol command. Enter uppercase <b>Z</b> .
n	Represents the symbol to print. Refer back to Table 16. Enter the number <b>1</b> to print the registered trademark symbol; enter the number <b>2</b> to print the copyright symbol; enter the User Defined number from <b>3</b> through <b>9</b> which corresponds to the alphabetical value (“a” through “g”) you specified where the standard sized symbol is stored; or, enter an upper case character from <b>A</b> through <b>F</b> to select the corresponding Expanded User Defined Symbol.  For example, in the program example shown on page 120, the symbol was created and stored at “a” (^za); when the symbol was <i>printed</i> , it was specified as 3 (^Z3).
(cc)-	Graphics Mode CR used as a sequence terminator. Enter the SFCC for your IGP configuration immediately followed by - to end the command sequence.

**Comments** The standard alphanumeric command must be input prior to the Z command. The alphanumeric height and width parameters do not affect the symbol. Horizontal tabs and justification commands and parameters do affect symbol position.

Specialized standard and expanded symbols are printable only in the horizontal orientation and are printed according to the size specification when the symbol was created. However, you can rotate the standard Registered Trademark symbol and Copyright Symbol when the Append Rotated configuration parameter is enabled.

Blank spacing occurs between plotted elements if an undefined number or character is assigned to a symbol in the Z command. Specialized symbols created with the **zx** command remain in memory until the printer is reset or the printer power is turned off.

**Note**

Printing a specialized symbol after the data is lost causes the Code V to react as if the symbol was created with null data, and blank spaces print in the place of the symbol.

**Example** The following sample commands illustrate the standard symbols. Notice that the standard alphanumeric command was sent for symbol positioning.

```
^PY^-^F^-
^M02,02,000^DCopyright^Z2 1995^-
^M03,03,000^DAcme Motor Company^Z1 Inc.^D^-
^O^-^PN^-
```

Copyright © 1995  
Acme Motor Company ® Inc.

## Tab, Horizontal

---

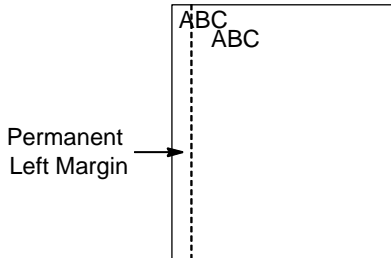
<b>Purpose</b>	Specifies a new horizontal print position relative to the left page margin.
<b>Mode</b>	Graphics with a standard or an Extended Graphics Command selected
<b>Format</b>	(cc) T <i>dis</i> [(cc)-]
	(cc) Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.
	T The Horizontal Tab command. Enter T. ^T as a Standard Graphics command sets a “permanent” left Graphics margin for the start of all Extended Graphics command sequences. A ^T as an Extended Graphics command adds to this “permanent” margin.
	<i>dis</i> Defines the horizontal tab in tenths of an inch plus dot columns from the left margin. Enter a three-digit value ranging from <b>000</b> through <b>999</b> to define a tab from 00.0 through 99.9 inches from the left margin and a fourth digit ranging from 0 through 9 to specify 0 through 9 additional dot columns. The Code V automatically understands the decimal between the second and third digits for tenth inches and automatically interprets the fourth digit as dot columns. For example, 0120 (or 012,0) specifies a 1.2-inch plus no-dot column tab; 1016 (or 101,6) specifies a 10.1-inch plus 6-dot column tab.
	(cc)- Graphics Mode CR used as a sequence terminator. Enter the SFCC for your Code V configuration immediately followed by - to end the command sequence.

**Comments** The **T** command may be input as part of the data in one of the alphanumeric commands and also may be used in standard Graphics Mode. If the **T** command is used in the Standard Graphics Mode, it sets the left margin for all data that follows this command until the system exits from the standard Graphics Mode.

A 2-inch tab specifies a position 2 inches from the left margin; a 6-inch tab specifies a position 6 inches from the left margin, etc. Since the tab specifies a print position relative to the left print margin, you can use tabs to specify a print position to the left or right of the current position (unlike a typewriter, which can only tab to the right of the current position). For example, if the current print position is 4 inches from the left margin and a 1-inch tab is specified, the next print position is 1 inch from the left margin. This left/right capability is useful for positioning data within boxes of a form or similar applications.

**Examples** The following sample shows an Extended Graphics command placed before and after the ^T command. Notice that the left margin changes:

```
^M1010ABC^-
^T0100^-
^M1010ABC^-
```



The following sample commands illustrate horizontal tabs.

```
^PY^-
^M05,05,000Aa^T020,5Bb^T040,5Cc^-
^PN^-
```

Aa            Bb            Cc

```
^PY^-^F^-
^M05,05,000Aa^T030,0Bb
^M10,05,050^T005,0Cc^T025,0Dd^-
^O^-^PN^-
```

Aa            Bb  
Cc            Dd

```
^PY^-
^V05,05,000I^V10,30,050^T010,0G^V05,05,075^T030,5P^-
^PN^-
```

I



```
^PY^-
^E05,05,000IGP^T025,5IGP^-
^PN^-
```

IGP IGP

```
^PY^-^F^-
^U06,05,000UP^U03,03,070^T010,0SIDE^U05,05,000^T022,0DOWN^-
^O^-^PN^-
```

UP DOWN  
SIDE

## Tab, Vertical

**Purpose** Performs a vertical tab (VT, hex 0B) function to advance the paper to the next vertical tab position when used to terminate a Standard Graphics Command.

**Mode** Graphics with a Standard Graphics Command selected

**Format** (cc)+

(cc) Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.

+ The graphics vertical tab mnemonic. Enter +.

**Comments** The vertical tab functions as a carriage return only when it is used to terminate a graphics sequence in an Extended Graphics Command when free format is enabled.

The vertical tab functions as a line feed:

- a. when the vertical tab is not used as a Graphics command or graphics function terminator; and
- b. when the EVFU is *not* loaded through the use of Form Length or Host commands.

If the EVFU is loaded but channel 12 is not loaded, then the vertical tab functions as a line feed. If channel 12 of the EVFU is loaded, the vertical tab skips to channel 12.

See "Electronic Vertical Format Unit (EVFU)" on page 62 for more information on EVFU and channel 12.

## Underlined Print

---

<b>Purpose</b>	Selects underlined printing.
<b>Mode</b>	Graphics with a Standard Graphics Command selected
<b>Format</b>	(cc) @ U (cc)-
	(cc) Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.
	@ Specifies one of the @ commands. Enter @ to begin an @ command function.
	U Specifies the Underlined Print command. Enter <b>U</b> and all characters on the line are underlined. Underlined print is automatically reset upon receipt of the line terminator.
	(cc)- Graphics Mode CR. Enter the SFCC for your Code V configuration immediately followed by - to end the command sequence.

**Comments** Underlined print is a line-by-line print attribute; it is selected once and all characters in the line are underlined. The **U** command must precede any printable data in the line, and it is automatically reset when a line terminator is received.

**Example** The following example illustrates underlined print.

```
^PY^-
Standard Characters in the Graphics Mode^*
^@U^-Underlined characters: ABCDEFGHIJKLMNOPQRSTUVWXYZ^*
^PN^-
```

```
Standard Characters in the Graphics Mode
Underlined characters: ABCDEFGHIJKLMNOPQRSTUVWXYZ
```



---

## Wait For Online

---

<b>Purpose</b>	Causes the Code V to discontinue processing data until you put the printer offline and then back online.
<b>Mode</b>	Graphics with a Standard Graphics Command selected
<b>Format</b>	(cc) @ W (cc)-  (cc)            Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.  @                Specifies one of the @ commands. Enter @ to begin an @ command function.  W                Specifies the Wait For Online command. Enter <b>W</b> and the control panel will display "Waiting on User" until you place the printer offline.  (cc)-            Graphics Mode CR. Enter the SFCC for your Code V configuration immediately followed by - to end the command sequence.

---

**Note**

Wait For Online must be given while the Code V is in Graphics Mode (^PY), but not inside of a graphics pass (^M.....^-).

---



---

# 3

## *Bar Codes*

---

### Overview

---

A bar code is a graphic representation of alphanumeric characters. Bar codes are produced by entering a bar code command to the Code V in the Graphics mode using an Extended Graphics command.

You can print the bar codes horizontally, vertically, with or without a human readable data field, with default bar/space ratios, or with variable ratios. The human readable data field may be printed using any of the Extended Graphics command fonts available with the (cc)S or (cc)IFONT commands.

Bar code symbols are configured in a series of varying width bars and spaces representing a specific bar code character set. These characteristics are in accordance with established industry-wide practices.

Several integrity checks are performed against the bar code data, and error messages are printed if any illegal data is discovered.

Each type of bar code has a different set of characters that can be bar coded, and the Code V ensures that the data falls within the allowable set. Some bar codes permit a variable number of data characters, while other bar codes require a fixed number of data characters. The Code V ensures that the data adheres to these constraints.

---

### Examples

---

Using different printers may affect the printed appearance of your print samples compared to those shown in this manual. This is due to the printer scaling factor and varying print mode/densities. Print position also depends on your paper top-of-form position and the initial print position. Therefore, the location of the bar code print samples in this chapter are for reference only and do not reflect the actual bar code print position.

---

### Bar Code Size/Height Requirements

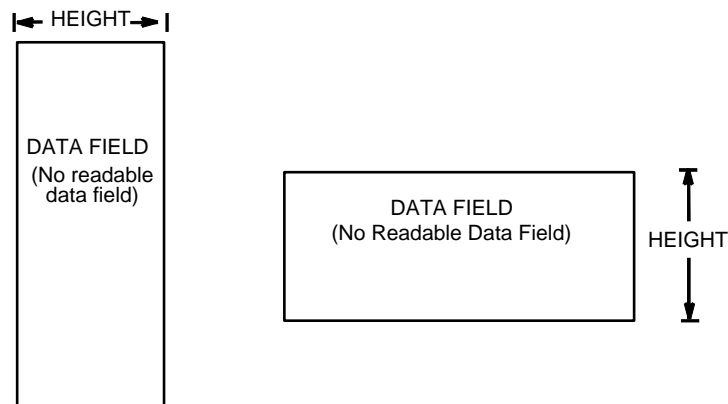
---

The length of any bar code is based on several factors: (1) the type of bar code, (2) the number of data characters encoded, and (3) the bar/space ratios.

The starting position of a bar code is determined by any justifications specified in the previous alphanumeric command.

The alphanumeric command provides the proper length (height) of the bars in bar codes.

For horizontal bar codes, the graphics height command specifies bar code height; for vertical bar codes, graphics *width* specifies bar code height. Bar code height/width parameters are specified in the two-digit Extended Graphics command. A decimal point is automatically interpreted between the first and second character digits.



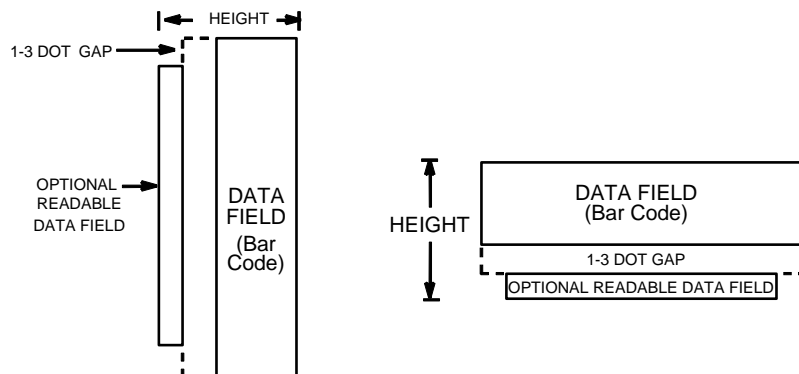
**Figure 5. Bar Code Size/Height Requirements**

Code V allows you to add a human readable data field to the bar code. Also, you can specify a 1 or 3 dot gap between the human readable field and the bar code.

When you insert a human readable field, the height of the bar code automatically shortens. For example, you print a bar code that is 1 inch high. Later, you add a human readable data field. The bar code height is 1 inch minus the 1 or 3 dot gap and the text, which is 1/10 inch or 1/5 inch.

If the bar code height is less than the height of the human readable text, the bar code height adjusts to the height of one dot. The gap and the human readable text remain the same.

Horizontal bar code data is printed below the bar code; vertical bar code data is printed to the left of the bar code. Figure 6 illustrates the readable data adjustment feature.



**Figure 6. Bar Code Height Adjustment**

## Bar Code Command Format

---

Bar code commands are Extended Graphics commands which must occur within the Graphics Mode and must be introduced by an SFCC and one of the four alphanumeric commands (^M, ^V, ^E, and ^U). Data provided in the alphanumeric command sequence identifies specific height, width, and justification information used to define bar code length (height) and position. Complete alphanumeric command information is explained in the “Commands” chapter.

Throughout this manual, the caret (^) is used to represent the Special Function Control Code introducer and terminator for graphics and bar code commands. Be sure to use the appropriate control code for your Code V configuration.

Code V offers a choice between two types of bar code command formats which are described on the following pages: Standard (^B and ^C) bar code format, and IBARC, (a QMS Version II command). Neither format offers significantly more or less features; both formats will accomplish the same task. The format you select is a matter of personal choice. In each bar code section throughout this chapter, each of the command parameters is fully described and examples provided using the standard bar code format (^B and ^C) .

When using variable ratio bar code commands, you must ensure the “scanability” of your bar codes, including toner spread compensation. Make sure the variable ratio conforms to the specification.

The bar code command and associated parameters for standard bar codes are described on page 134. IBARC, bar codes, associated parameters and examples are described on page 135.

Each bar code parameter is visually separated by spaces, and optional parameters are marked by paired brackets [ ]; *do not enter these spaces or brackets* in your command sequence; they are provided throughout the manual for clarity in distinguishing parameters. Italicized text represents a variable parameter for which a value must be inserted. Command parameters not italicized must be input exactly as shown.

## Standard Bar Code Command Format

<b>Default Ratio:</b>	<i>(cc) dir p type data (cc)G</i>
<b>Variable Ratio:</b>	<i>(cc) dir p [9] [:] type [ratio] data (cc)G</i>
<i>(cc)</i>	Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.
<i>dir</i>	Represents the direction of the bar code. Enter <b>B</b> for horizontal bar codes; enter <b>C</b> for vertical bar codes.
<i>p</i>	Prints the optional readable data field by selecting one of five codes representing the font and gap size for the readable data field. The readable data field is printed below a horizontally configured bar code (picket fence orientation) and on the left-hand side of a vertically configured bar code (ladder orientation). The bar code size is automatically adjusted to allow for the height of the data field font and the spacing between the data and bar code.
<i>[9] or [:]</i>	Selects the variable ratio length bar code feature. The variable ratio bar code permits unique bar and space width ratios adjusted for specific applications. Enter the number <b>9</b> to select variable ratio bar codes.  If the <b>:</b> parameter is specified, the ratios are represented in printer dots instead of Code V dots (60 x 72 dpi).
<i>type</i>	Represents the bar code type from Table 18. Invalid codes are treated as errors.
<i>[ratio]</i>	Represents unique ratio data for variable ratio bar codes. The default ratios shown in Table 18 are overridden by this feature. Four- and eight-digit ratios are used, depending upon the bar code selected.
<i>data</i>	Represents the data to be bar coded.
<i>(cc)G</i>	Terminates the bar code command. Enter the SFCC for your Code V configuration immediately followed by any valid command character or <b>G</b> , the universal sequence terminator.



**Note** POSTNET command is not applicable to standard bar code type C.

## IBARC, (Version II) Bar Code Command Format

---

**Default Ratio:** (cc) IBARC, *type*, *loc*, *data* (cc)G

**Variable Ratio:** (cc) IBARC, *type*, [R [D] *ratio*,] *loc*, *data* (cc)G

When using the IBARC, bar code command format, the type code changes from a single alphanumeric value to a mnemonic as shown in Table 18. Using the appropriate alphanumeric command (^M, ^V, ^E, and ^U), IBARC, bar codes allow you to print bar codes in four orientations: horizontal, or rotated 90, 180, or 270 degrees. In addition, a *loc* parameter allows you to select one of three ways in which the printable data field can appear below the bar code.

The bar code command parameters applicable to IBARC, bar codes are defined below. At the end of this section, several IBARC, examples are provided illustrating applications for these parameters.

(cc)	Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.
IBARC,	The bar code command. Enter <b>IBARC</b> , (the comma is required).
<i>type</i> ,	Represents the IBARC, bar code type from Table 18. Invalid codes are treated as errors.
[R [D] <i>ratio</i> ,]	Optional parameter representing the ratios for variable ratio bar codes. The default ratios shown in Table 18 are overridden by the variable ratio feature. Four- and eight-digit ratios can be used, depending upon the bar code selected. Ratio data must be decimal values from 0 through 99. Enter <b>R</b> , followed by the actual bar code ratio.

---

**Note** A colon must separate each element of the ratio.



Like standard bar code ratios, IBARC, ratios are also interpreted from left to right, measuring the size of each bar or space, in dot width, in the following pattern: *narrow bar : narrow space : wide bar : wide space*.

---

**Note** The Code V does not verify that ratio data creates acceptable wide/narrow element relationships for bar code readability. When designing unique ratio data, carefully plot wide and narrow ratios to conform to readable bar codes.



<i>loc</i>	Represents the location of the printable data field. Enter <b>N</b> for no printable data field, <b>E</b> to have the data field embedded in the bar code, or <b>B</b> to print the data field below the bar code. If this parameter is selected, the printable data field will print in the
------------	--

	current font as selected by the (cc)S or (cc)IFONT commands or the default font selected. This parameter is optional for POSTNET.
<i>data</i>	Represents the data to be bar coded. The maximum amount of data depends on which bar code has been selected from Table 18.
(cc)G	Terminates the bar code command. Enter the SFCC for your Code V configuration immediately followed by any valid command character or <b>G</b> , the universal sequence terminator.

### IBARC, Examples

The following examples illustrate use of the IBARC, command format using Code 39. In the command sequence, Graphics mode data is *italicized* and bar code data is **boldface**. Refer to the “Commands” chapter for a detailed description of alphanumeric commands.

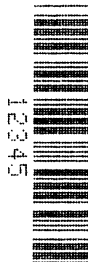
**Example 1.** Code 39 horizontal bar code with embedded printable data field:

```
^PY^-^M05,05,000^IBARC,C39,E,12345^G^-^PN^-
```



**Example 2.** Code 39 bar code rotated 90° with printable data field printed below the bar code.

```
^PY^-^V05,05,000^IBARC,C39,B,12345^G^-^PN^-
```



**Example 3.** Code 39 bar code rotated 180° with printable data field printed below the bar code.

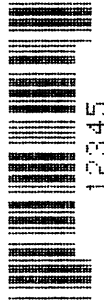
```
^PY^-^U05,05,000^IBARC,C39,B,12345^G^-^PN^-
```





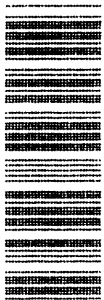
**Example 4.** Code 39 bar code rotated 270° with embedded printable data field.

`^PY^-^E05,05,000^TIBARC,C39,E,12345^G^-^PN^-`



**Example 5.** Code 39 bar code rotated 90° with no printable data field.

`^PY^-^V05,05,000^TIBARC,C39,N,12345^G^-^PN^-`



**Example 6.** Code 39 horizontal bar code, embedded printable data field, and double the default ratio:

`^PY^-^M05,05,000^TIBARC,C39,R2:2:6:6,E,12345^G^-^PN^-`



## Bar Codes

When using standard bar code types (either (cc) B or (cc) C) select from the Standard Type Code column in Table 18. When using the IBARC bar code, select the appropriate type code from the IBARC Type Code column.

**Table 18. Code V Bar Code Types**

Bar Code Description	Standard Type Code	IBARC, Type Code	# of Data	Check Digits	Default Bar/Space Ratios	Page #
Codabar	D	CBAR	1-40	None	1:2:3:4:1:1:1:1	141
Code 39	A	C39	1-40	None	1:1:3:3	146
		LOGMAR	1-40	None	1:1:3:3	
		AIAG	1-40	None	1:1:3:3	
		EMBARC	1-40	None	1:1:3:3	
	B	C39A	1-40	None	1:2:4:5	
	C	C39M43	1-40	Mod 43	1:1:3:3	
		HIBCC	1-40	Mod 43	1:1:3:3	
Code 93	i	C93	1-40	Mod 43	1:1:2:2:3:3:4:4	152
Code 128	Z	C128	1-40	Mod 103	1:1:2:2:3:3:4:4	155
EAN 8 EAN 8+2 EAN 8+5	U	EAN8	7	Mod 10	1:1:2:2:3:3:4:4	163
	o	EAN8+2	9			
	p	EAN8+5	12			
EAN 13 EAN 13+2 EAN 13+5	T	EAN13	12	Mod 10	1:1:2:2:3:3:4:4	167
	m	EAN13+2	14			
	n	EAN13+5	17			
German Interleaved 2/5	V	POSTAGI	11	Mod 10	1:3:5:7	171
	W	POSTAGL	13			
Identicon	E	IDENTICON	1-40	None	1:1:3	176
Interleaved 2/5	K	INT2/5	1-40	None	1:1:3:3	179
	k	INT2/5CD	1-40	Mod 10	1:1:3:3	
	L	INT2/5A	1-40	None	1:2:4:5	
	I	INT2/5CDA	1-40	Mod 10	1:2:4:5	
MSI	F	MSI	1-13	None	1:1:2:2	184
	G	MSI10	1-13	Mod 10		
	H	MSI1010	1-13	Mod 10/10		
	I	MSI 1110	1-13	Mod 11/10		
	X	MSI 11	1-13	Mod 11		
POSTNET	*	POSTNET	5,9, or 11	Mod 10	n/a	189
Royal Mail	Y	ROYALBAR	Variable	Mod 6	n/a	193
Telepen	J	TELEPEN	1-40	Mod 127	1:1:3:3	195
UCC/EAN-128	q	UCC128	see Note below	Mod 103/10	1:1:2:2:3:3:4:4	200

Table 18. Code V Bar Code Types (continued)

Bar Code Description	Standard Type Code	IBARC, Type Code	# of Data	Check Digits	Default Bar/Space Ratios	Page #
UPC-A	P	UPCA	11	Mod 10	1:1:2:2:3:3:4:4	211
UPC-A+2	a	UPCA+2	13			
UPC-A+5	b	UPCA+5	16			
UPC-A 80%	0	UPCA 80	11	Mod 10	1:1:2:2:3:3:4:4	
UPC-A 100%	1	UPCA 100	11	Mod 10	1:1:2:2:3:3:4:4	
UPC-E	Q	UPCE	10	Mod 10	1:1:2:2:3:3:4:4	216
UPC-E0	R	UPCE0	6			
UPC-E+2	c	UPCE+2	12			
UPC-E+5	d	UPCE+5	15			
UPC-E0+2	e	UPCE0+2	8			
UPC-E0+5	f	UPCE0+5	11			
UPCSHIP	\$	UPCSHIP	13	Mod 10	1:1:3:3	222
UPS 11	u	UPS11	10	Mod 103	1:1:2:2:3:3:4:4	225

**Note**



Data requirements for UCC/EAN-128 are determined by the application identifier preceding the bar code data. There is a wide range of selections.

## Dark Print

Dark print bar codes double strike the wide bars, resulting in darker looking bar codes. The extra darkness improves the Print Contrast Ratio (PCR) and effectively extends the life of the ribbon. (The PCR describes the difference of light reflection between bars and spaces as a measurement of light/dark contrast in order to judge when a printed bar code is not dark enough to be read accurately by a scanner.)

The extra dots to produce the darker bar code do not change the overall width of the wide bars. Figure 7 illustrates how Dark Print adds two extra dot columns to the wide bars without an increase in bar width.

Printing speed decreases somewhat when Dark Print is used. This is due to the second stroke of the hammer bank required to plot the extra dot columns. The slight decrease in printing speed should be weighed against the significant increase in bar code PCR and extended ribbon life.

The KF command activates Dark Print. The format for the Dark Print command is shown below. The Dark Print command includes your system SFCC, KF to activate Dark Print, the data (the bar code command), terminated with the SFCC, and followed by KF.

(cc) KF *data* (cc) KF (cc)-

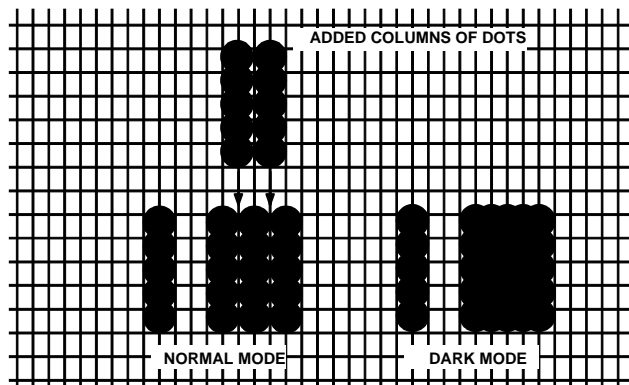
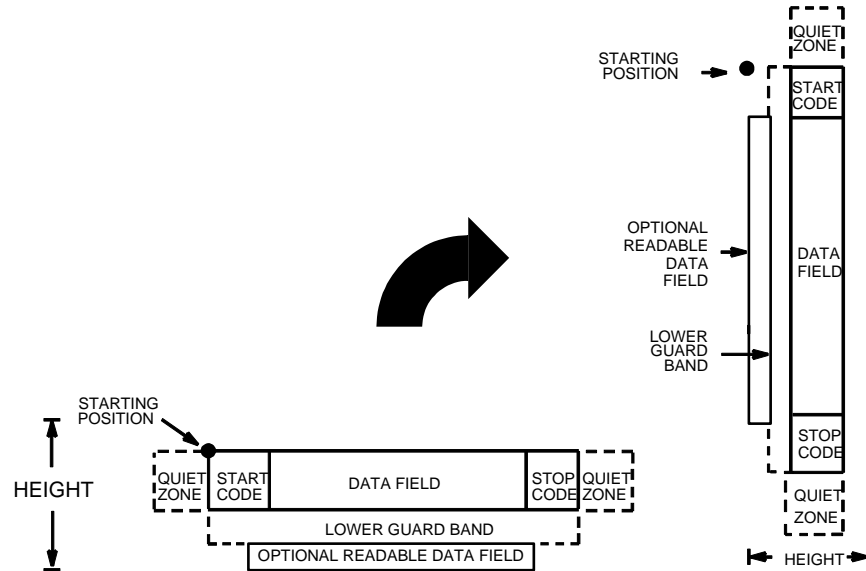


Figure 7. Dark Printing

## Codabar

The Codabar structure is shown in Figure 8 and described on the following pages.



**Figure 8. Codabar Structure**

### Quiet Zone

Quiet zones extend on both ends of the bar code to permit the scan to begin and end in a blank area. The quiet zones should be at least 0.25 inches wide and completely blank to ensure accurate reading of the start/stop codes and to prevent adjacent bar codes from overlapping. You are responsible for providing sufficient space on the form for the quiet zones.

### Start/Stop Codes

The start/stop codes identify the leading and trailing end of the bar code. Four start/stop code characters (A, B, C, and D) are available in any combination as start/stop codes. The start/stop code character must be included in the data field to be produced with the bar code.

### Data Field

The bar code symbol uses a series of wide and narrow bars and spaces to represent numeric characters and six control codes. Each character is represented by seven elements consisting of four bars and three spaces, either wide or narrow.

### Readable Data

The optional readable data field provides a readable interpretation of the bar code data. Human readable data is printed below the horizontal bar code symbol and to the left of a vertical bar code symbol. The lower guard band is provided when the readable data field is selected.

## Standard Codabar Command Format

Refer to page 135 for the IBARC, command format and definitions.

**Default Ratio:** (cc) *dir* *p* *D* *data* (cc)G

**Variable Ratio:** (cc) *dir* *p* [9] [:] *D* [*ratio*] *data* (cc)G

- (cc) Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.
- dir* Represents the direction of the bar code. Enter **B** for horizontal bar codes; enter **C** for vertical bar codes.
- p* Prints the optional readable data field. The readable data field is printed below a horizontal bar code or on the left side of a vertical bar code.
- Replace *p* in the bar code command with one of the codes listed in Table 19 to print the readable data field in the corresponding font with the specified guard band gap.

**Table 19. Printable Data Field Fonts**

Font	Gap	<i>p</i> code
Standard 10 cpi	3 dots	Y
OCR-A	3 dots	O
OCR-A	.1-inch	S
OCR-B	3 dots	B
OCR-B	.1-inch	T
None		N

**Note**



Vertical bar codes print only in standard 10 cpi font because OCR fonts cannot be rotated. If an OCR-type font is selected with a vertical bar code command, the standard 10 cpi font is substituted automatically.

- 9 Optional parameter to select a variable ratio bar code. Enter the number **9** to select a variable ratio bar code. This feature overrides the default Codabar ratio 1:2:3:4:1:1:1:1.
- If the : parameter is specified, the ratios are represented in printer dots instead of Code V dots (60 x 72 dpi).
- D The Codabar type code. Enter **D**.

*ratio* Optional parameter (used in conjunction with **9** above) representing the ratios for variable ratio bar codes. The default ratios are overridden by the variable ratio feature. The ratio data must be hexadecimal numbers from 0 through 9 or A through F; the Code V automatically checks the input for validity. If an invalid character is found in the ratio, an error message is generated.

**Note**

The Code V automatically checks ratio data for validity only within the allowable hexadecimal range. The Code V does not verify that ratio data creates acceptable wide/narrow element relationships for bar code readability. For example, the Code V accepts wide/narrow ratio values of 2 and 5, respectively; however, a narrow element larger than the wide element produces an unreadable bar code. When designing unique ratio data, carefully plot wide/narrow ratios to conform to readable bar codes.

Codabar bar codes require an eight-digit ratio. The ratios are interpreted from left to right, measuring the size of each bar or space in dot width. The first four digits are interpreted as follows: *narrow bar : narrow space : wide bar : wide space*. The sixth digit specifies the number of dots for the intercharacter spacing. The fifth, seventh and eighth digits are not used; any data in these positions is ignored. For example, if the Codabar ratio data was 24681211, it would be translated as follows:

2-dot-wide narrow bar  
 4-dot-wide narrow space  
 6-dot-wide wide bar  
 8-dot-wide wide space  
 ignore data  
 2-dot-wide intercharacter spacing  
 ignore data  
 ignore data

*data* The bar code data. Codabar encodes from 1 through 40 characters from the Codabar Character Set shown in Table 20. Characters A, B, C, and D are strictly start/stop codes.

(cc)G Terminates the bar code command. Enter the SFCC for your Code V configuration immediately followed by any valid command character or **G**, the universal sequence terminator.

Table 20. Codabar Character Set

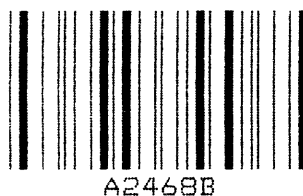
Character	Hex	Character	Hex
0	30	+	2B
1	31	-	2D
2	32	.	2E
3	33	/	2F
4	34	\$	24
5	35	:	3A
6	36	A*	41
7	37	B*	42
8	38	C*	43
9	39	D*	44

\*A, B, C and D are start/stop codes only.

### Codabar Examples

The following command generates the horizontal variable ratio Codabar bar code below. In the command sequence, Graphics Mode data is *italicized* and bar code data is **boldface**. Refer to the "Commands" chapter for a detailed description of alphanumeric commands.

```
^PY^-^M10,10,000^KF^BYDA2468B^G^KF^-^PN^-
```



^PY^- enabled the graphics command sequence. ^M introduced the standard alphanumeric command. The character height selected was 1.0 inches and character width selected was at 1.0 inches. A 0.0 justification value plus 0 additional dots was selected for the data placement. ^KF activated Dark Print. ^B introduced the bar code command. Y selected the standard 10 cpi font to print the optional readable data field. Letter D selected Codabar bar code type. A2468B is the bar code data, and ^G terminated the bar code command sequence. ^KF^- at the end of the bar code turned off Dark Print, and ^PN^- terminated the Graphics Mode.



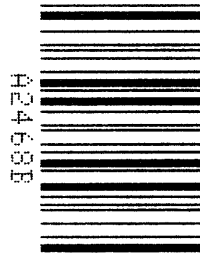
The following command generated the horizontal Codabar bar code below using OCR-B font, double the default ratio, and data of A2468B:

```
^PY^-^M10,10,000^KF^BB9D24681211A2468B^G^KF^-^PN^-
```



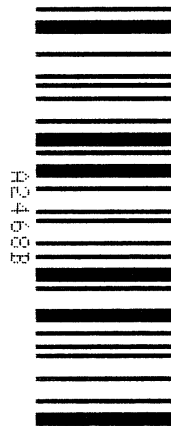
The following command generated the vertical Codabar bar code below using standard 10 cpi font with the standard default ratio and data of A2468B:

```
^PY^-^M10,10,000^KF^CYDA2468B^G^KF^-^PN^-
```



The following command generates the same vertical Codabar bar code described above, except that double the default ratio is used:

```
^PY^-^M10,10,000^KF^CY9D24681211A2468B^G^KF^-^PN^-
```



## Code 39

The Code 39 structure is shown in Figure 9 and described on the following pages.

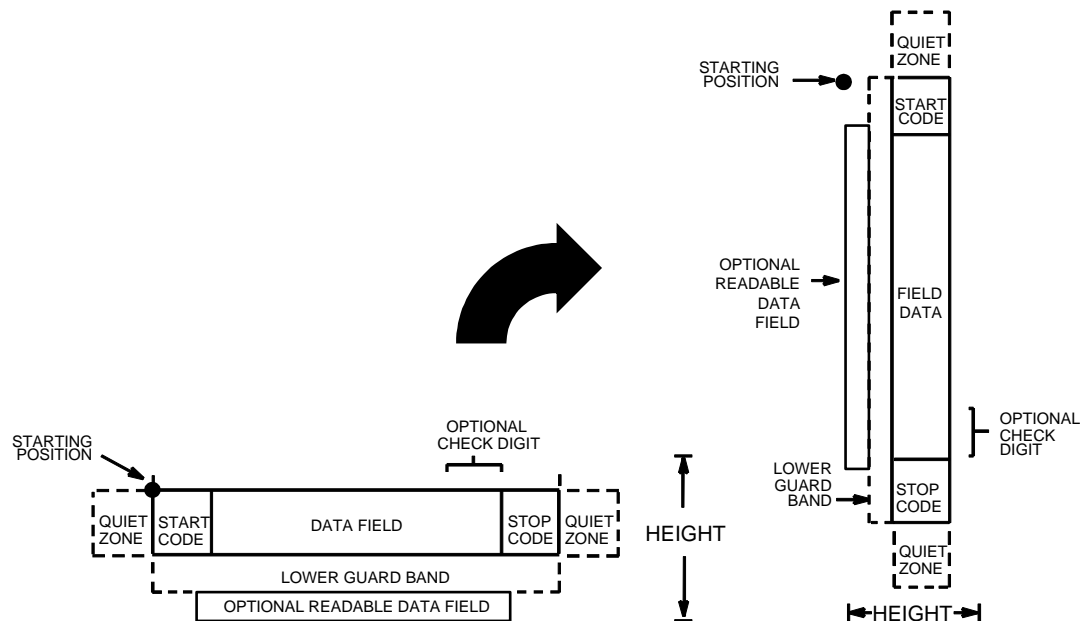


Figure 9. Code 39 Structure

### Quiet Zone

Both ends of the bar code structure require blank quiet zones. The quiet zones should be at least 0.25 inches wide and completely blank to ensure accurate reading of the start/stop codes and to prevent adjacent bar codes from overlapping. You are responsible for providing sufficient space on the form for the quiet zones.

### Start/Stop Codes

The start/stop code is a unique character identifying the leading and trailing end of the bar code. The start/stop code is automatically produced with each bar code. The start/stop code structure permits bidirectional bar code scanning.

### Data Field

The bar code symbol uses a series of wide and narrow bars and spaces to represent standard alphanumeric characters. Each wide or narrow bar or space is 1 element; each character in the data field has 9 elements. The structure is 3 wide elements (bars or spaces) out of the 9 total elements that compose one character.

## Readable Data

The optional readable data field provides a readable interpretation of the bar code data. Readable data is printed below the horizontal bar code symbol and to the left of a vertical bar code symbol. The lower guard band is provided when the readable data field is selected.

## Check Digit

Code 39 Type C inserts the modulo-43 check digit into the bar code. This feature provides a means of verifying accurate scanning.

## Standard Code 39 Command Format

Refer to page 135 for the IBARC, command format and definitions.

**Default Ratio:** (cc) *dir p type data* (cc)G

**Variable Ratio:** (cc) *dir p [9] [:] type [ratio] data* (cc)G

(cc) Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.

*dir* Represents the direction of the bar code. Enter **B** for horizontal bar codes; enter **C** for vertical bar codes.

*p* Prints the optional readable data field. The readable data field is printed below a horizontal bar code or on the left hand side of a vertical bar code. Replace *p* in the bar code command with one of the codes listed in Table 21 to print the readable data field in the corresponding font with the specified guard band gap.

**Table 21. Printable Data Field Fonts**

Font	Gap	<i>p</i> code
Standard 10 cpi	3 dots	Y
OCR-A	3 dots	O
OCR-A	.1-inch	S
OCR-B	3 dots	B
OCR-B	.1-inch	T
None		N

9 or : Optional parameter to select a variable ratio bar code. Enter the number **9** to select a variable ratio bar code. This feature overrides a default Code 39 ratio.

If the : parameter is specified, the ratios are represented in printer dots instead of Code V dots (60 x 72 dpi).

*type* Selects the bar code type. Code 39 types available are shown in Table 22. Enter the Type Code corresponding to the Code 39 type desired.

**Table 22. Code 39 Bar Codes**

Standard Type Code	IBARC, Type Code	# of Data Characters	Check Digits	Default Bar/Space Ratios*	Ratio
A	C39	1-40	None	1:1:3:3	1:3
B	C39A	1-40	None	1:2:4:5	1:3
C	C39M43	1-40	Mod 43	1:1:3:3	1:3
	LOGMAR	1-40	None	1:1:3:3	
	HIBCC	1-40	Mod 43	1:1:3:3	
	AIAG	1-40	None	1:1:3:3	
	EMBARC	1-40	None	1:1:3:3	

\* Ratios represent dot width of the bar/space elements as follows:  
*Narrow Bar : Narrow Space : Wide Bar : Wide Space.*

[ratio] Optional parameter (used in conjunction with parameter 9) representing the ratios for variable ratio bar codes. The default ratios are overridden by the variable ratio feature. The ratio data must be hexadecimal numbers from 0 through 9 or A through F. The Code V automatically checks the input for validity. If an invalid character is found in the ratio, an error message is generated.

Code 39 bar codes use four-digit ratios. The ratios are interpreted from left to right, measuring the size of each bar or space, in dot width according to the following pattern: *narrow bar : narrow space : wide bar : wide space*. For example, enter 2266 in the ratio parameter for:  
 2 dot-wide narrow bar  
 2 dot-wide narrow space  
 6 dot-wide wide bar  
 6 dot-wide wide space.

The Code V automatically checks ratio data for validity only within the allowable hexadecimal range. The Code V does not verify that ratio data creates acceptable wide/narrow element relationships for bar code readability. For example, the Code V accepts wide/narrow ratio values of 2 and 5, respectively; however a narrow element larger than the wide element produces an unreadable bar code. When designing unique ratio data, carefully plot wide and narrow ratios to conform to readable bar codes.

- data* The bar code data. Code 39 encodes from 1 through 40 characters from the Code 39 full ASCII Character Set shown in Table 23.
- (cc)G Terminates the bar code command. Enter the SFCC for your Code V configuration immediately followed by any valid command character or **G**, the universal sequence terminator.

Table 23. Code 39 Character Set

ASCII	CODE 39	ASCII	CODE 39	ASCII	CODE 39	ASCII	CODE 39
NUL	%U	SP	Space	@	%V	`	%W
SOH	\$A	!	/A	A	A	a	+A
STX	\$B	"	/B	B	B	b	+B
ETX	\$C	#	/C	C	C	c	+C
EOT	\$D	\$	/D	D	D	d	+D
ENQ	\$E	%	/E	E	E	e	+E
ACK	\$F	&	/F	F	F	f	+F
BEL	\$G	'	/G	G	G	g	+G
BS	\$H	(	/H	H	H	h	+H
HT	\$I	)	/I	I	I	i	+I
LF	\$J	*	/J	J	J	j	+J
VT	\$K	+	/K	K	K	k	+K
FF	\$L	,	/L	L	L	l	+L
CR	\$M	—	—	M	M	m	+M
SO	\$N	.	.	N	N	n	+N
SI	\$O	/	/O	O	O	o	+O
DLE	\$P	0	0	P	P	p	+P
DC1	\$Q	1	1	Q	Q	q	+Q
DC2	\$R	2	2	R	R	r	+R
DC3	\$S	3	3	S	S	s	+S
DC4	\$T	4	4	T	T	t	+T
NAK	\$U	5	5	U	U	u	+U
SYN	\$V	6	6	V	V	v	+V
ETB	\$W	7	7	W	W	w	+W
CAN	\$X	8	8	X	X	x	+X
EM	\$Y	9	9	Y	Y	y	+Y
SUB	\$Z	:	/Z	Z	Z	z	+Z
ESC	%A	;	%F	[	%K	{	%P
FS	%B	<	%G	\	%L		%Q
GS	%C	=	%H	]	%M	}	%R
RS	%D	>	%I	^	%N	^	%S
US	%E	?	%J	—	%O	DEL	%T %X %Y %Z

**Note**

Character pairs /M, /N, and /P through /Y are reserved for future control code pairs.

### Code 39 Examples

The following command generates the horizontal default ratio Code 39 bar code shown below. In the command sequence, graphics mode data is *italicized* and bar code data is **boldface**. Refer to the “Commands” chapter for a detailed description of alphanumeric commands.

```
^PY^-^M10,10,000^KF^BYA$25NW20%^G^KF^-^PN^-
```



*^PY^-* enabled the graphics command sequence. *^M* introduced the standard alphanumeric command. The character height selected was 1.0 inches and character width was selected at 1.0 inch. A 0.0 justification value plus 0 additional dots was selected for the data placement. *^KF* activated Dark Print. *^B* introduced the bar code command. *Y* selected the standard 10 cpi font to print the optional readable data field. Letter *A* selected Code 39 Type A. **\$25NW20%** is the bar code data, and *^G* terminated the bar code command sequence. *^KF^-* at the end of the bar code sequence turned off Dark Print, and *^PN^-* terminated the graphics mode.

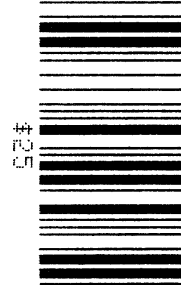
The following command generated the horizontal Code 39 bar code below using OCR-A font, double the default ratio, and data of \$25NW20%:

```
^PY^-^M10,10,000^KF^B09A2266$25NW20%^G^KF^-^PN^-
```



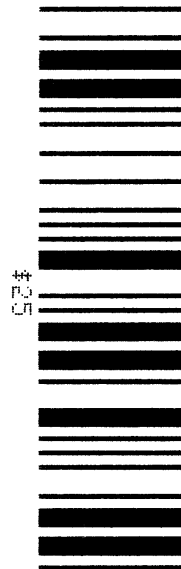
The following command generated the vertical Code 39 bar code below using standard 10 cpi font, the standard default ratio, and data of \$25:

```
^PY^-^M10,10,000^KF^CYB$25^G^KF^-^PN^-
```



The following command generates the same vertical Code 39 bar code described above, except that double the default ratio is used:

```
^PY^-^M10,10,000^KF^CY9B248A$25^G^KF^-^PN^-
```



## Code 93

The Code 93 structure is shown in Figure 10 and described below.

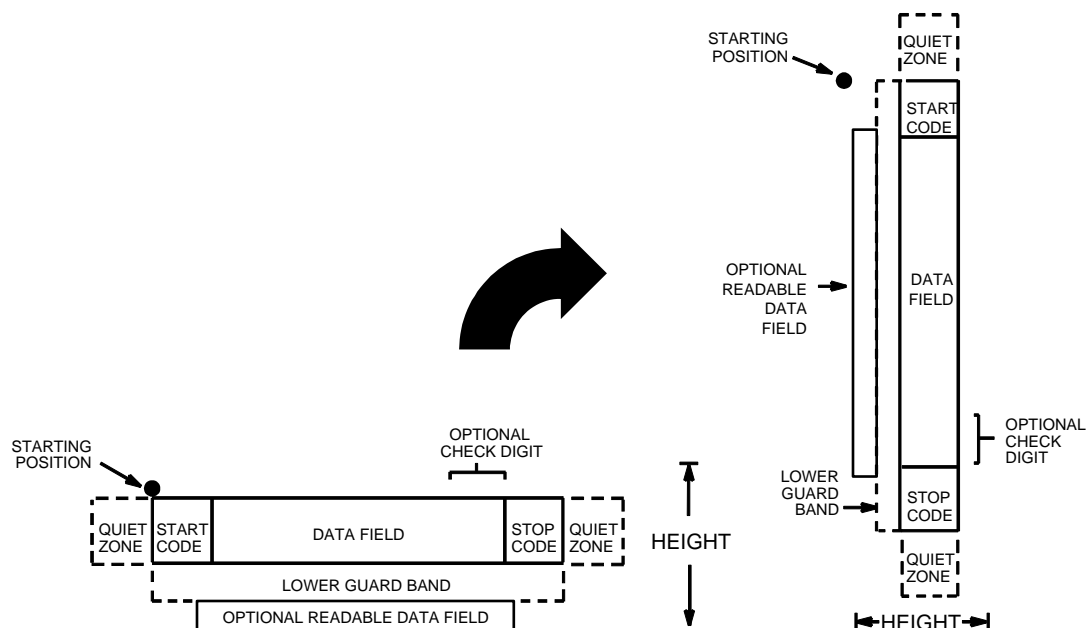


Figure 10. Code 93 Structure

### Quiet Zone

Both ends of the bar code structure require blank quiet zones. The quiet zones should be at least 0.25 inches wide and completely blank to ensure accurate reading of the start/stop codes and to prevent adjacent bar codes from overlapping. You are responsible for providing sufficient space on the form for the quiet zones.

### Start/Stop Codes

The start/stop code is a unique character identifying the leading and trailing end of the bar code. The start/stop code is automatically produced with each bar code. The start/stop code structure permits bidirectional bar code scanning.

### Data Field

The bar code symbol uses a series of varying width bars and spaces to represent the full ASCII character set. Bars and spaces vary in width from 1 through 4 modules. Each character consists of 2 bars and two spaces that total 7 modules. The symbol coding of the left data field is different from the right data field to permit read direction sensing.



## Readable Data

The optional readable data field provides a readable interpretation of the bar code data. Readable data is printed below the horizontal bar code symbol and to the left of a vertical bar code symbol. The lower guard band is provided when the readable data field is selected.

## Check Digit

Code 93 inserts the modulo-43 check digit into the bar code. This feature provides a means of verifying accurate scanning.

## Standard Code 93 Command Format

Refer to page 135 for the IBARC, command format and definitions.

**Default Ratio:** (cc) *dir p i data* (cc)G

**Variable Ratio:** (cc) *dir p [9] [:] i [ratio] data* (cc)G

(cc) Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.

*dir* Represents the direction of the bar code. Enter **B** for horizontal bar codes; enter **C** for vertical.

*p* Prints the optional readable data field. The readable data field is printed below a horizontal bar code or on the left hand side of a vertical bar code. Replace *p* in the bar code command with one of the codes listed in Table 24 to print the readable data field in the corresponding font with the specified guard band gap.

**Table 24. Printable Data Field Fonts**

Font	Gap	<i>p</i> code
Standard 10 cpi	3 dots	Y
OCR-A	3 dots	O
OCR-A	.1-inch	S
OCR-B	3 dots	B
OCR-B	.1-inch	T
None		N

9 Optional parameter to select a variable ratio bar code. Enter the number **9** to select a variable ratio bar code. This feature overrides a default ratio.

If the : parameter is specified, the ratios are represented in printer dots instead of Code V dots (60 x 72 dpi).

- i** Type code for Code 93. Enter **i**.
- ratio** Optional parameter (used in conjunction with parameter **9**) representing the ratios for variable ratio bar codes. The default ratios are overridden by the variable ratio feature. The ratio data must be hexadecimal numbers from **0** through **9** or **A** through **F**. The Code V automatically checks the input for validity. If an invalid character is found in the ratio, an error message is generated.
- Code 93 bar codes use eight-digit ratios. The ratios are interpreted from left to right, measuring the size of each bar or space in dot width, in the following pattern: *1 module wide bar : 1 module wide space : 2 module wide bar : 2 module wide space : 3 module wide bar : 3 module wide space : 4 module wide bar : 4 module wide space*. For example, enter 22446688 in the ratio data field for:  
 2 module wide bar  
 2 module wide space  
 4 module wide bar  
 4 module wide space  
 6 module wide bar  
 6 module wide space  
 8 module wide bar  
 8 module wide space

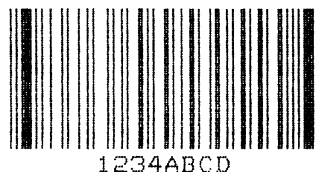
The Code V automatically checks ratio data for validity only within the allowable hexadecimal range. The Code V does not verify that ratio data creates acceptable bar/space element relationships for bar code readability. When designing unique ratio data, carefully plot bar/space ratios to conform to readable bar codes.

- data** The bar code data. Code 93 encodes from 1 through 40 characters. They can be any ASCII characters 0-127.
- (cc)G** Terminates the bar code command. Enter the SFCC for your Code V configuration immediately followed by any valid command character or **G**, the universal sequence terminator.

### Code 93 Example

The following command generates the bar code shown below.

```
^PY^-^F^-  
^M1010100^T0100^TBARC,C93,B,1234ABCD^G^-  
^PN^-
```



## Code 128

Code 128 includes three subsets: A, B, and C. All contain the same bar patterns, except for the unique start character instructing the bar code reader which subset is being used. Special characters are available for switching between the subsets in order to generate the shortest possible bar code.

The Code 128 structure is shown in Figure 11 and described below.

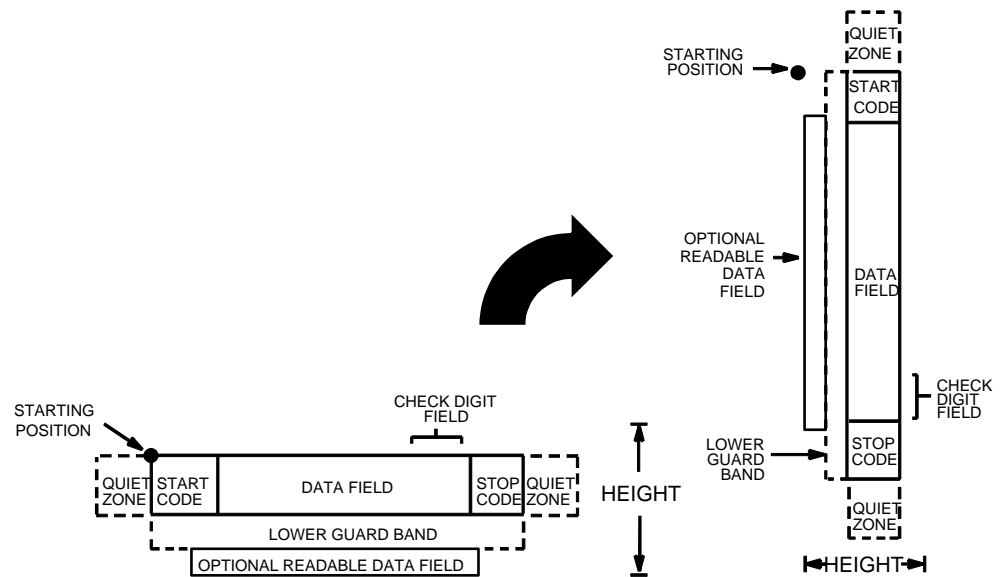


Figure 11. Code 128 Structure

### Quiet Zone

Both ends of the bar code structure require blank quiet zones. The quiet zones should be at least 0.25 inches wide and completely blank to ensure accurate reading of the start/stop codes and to prevent adjacent bar codes from overlapping. You are responsible for providing sufficient space on the form for the quiet zones.

### Start/Stop Codes

Code 128 contains special characters which use unique start/stop codes to identify the leading and trailing end of the bar code. In the automatic mode, start and stop codes are generated automatically. In the manual mode, you must supply the start code, but the stop code is generated automatically.

### Data Field

Code 128 bar codes support a full ASCII character set: Subset A provides standard alphanumeric keyboard characters, control and special characters; subset B includes all standard alphanumeric keyboard characters, lowercase alphabetical characters, and special characters; subset C provides 100 digit pairs, from 00 through 99, plus special characters. Table 26 lists the full Code 128 character set.

Control codes, identified by a “greater than” (>) symbol, introduce special function control codes so that you can manually supply control codes to shift between subsets as described in the “Mode Selection” section, below. The bars and spaces vary in width from 1 through 4 modules. Each character consists of 3 bars and 3 spaces that total 11 modules.

### Readable Data

The optional readable data field provides a readable interpretation of the bar code data. Readable data is printed below the horizontal bar code symbol, and to the left of a vertical bar code symbol. The lower guard band is provided when the readable data field is selected. The readable data field is available only in the automatic mode.

### Check Digit

The modulo-103 check digit is automatically calculated and inserted in the bar code symbol. The check digit verifies accurate scanning. The start code is included in the check digit algorithm.

### Mode Selection

The Code V generates Code 128 bar codes in one of two modes: automatic or manual.

#### Automatic Mode

The Code V creates the shortest possible bar code by automatically sending the subset switch characters (characters preceded by >) to switch from subset B into subset C whenever strings of four or more consecutive numeric characters are provided. As long as the data includes ordinary keyboard characters and no subset switch, the Code V switches in and out of subsets B and C automatically before and after numeric character strings. Start codes, stop codes, and check digits are generated automatically.

---

**Note**

The code >0 is not a special character; the Code V recognizes >0 as the “greater than” character (>) on a standard ASCII chart.

---

#### Manual Mode

The manual mode is selected by inputting a subset switch character (characters preceded by >) anywhere in the bar code data. In the manual mode, you must insert the special codes into the bar code command to switch to another subset. Once a special code is found in the data, all automatic switching features are suspended, the readable data field option is cancelled, and the Code V expects you to provide all special code switching commands. In this mode, you must supply the start code; if no start code is provided, the Code V inserts a subset B start code. Stop codes and check digits are generated automatically in the manual mode. More information about manual mode is provided in the following section.

## Manual Mode Operation

In the manual mode, you are responsible for correct implementation of Code 128 in accordance with the Code 128 Standards Manual.

The Code 128 character set is shown in Table 26. The **Alternate** column identifies the special subset switch characters that switch the Code V to the manual mode. These > characters are also horizontally aligned with functions also performed in an automatic mode. For example, >/ represents SI in subset A, o in subset B, and value 79 in subset C. Thus, the following commands generate the same bar code using **Alternate** characters, or subsets B or C:

Subset Switch Characters: ^BNZ>7>, >->.>/^G

Subset C: ^BNZ>576777879^G

Subset B: ^BNZ>6lmno^G

Non-ASCII characters are specified by using the subset switch character (from >1 through >8 in the **Alternate** column in Table 26) which corresponds to your application. The **Value** column is used when manually translating subset B and C bar codes into their briefest form.

---

### Note



The subset switch start codes, >5, >6, and >7 have two functions. At the beginning of a line, they start manual mode data in subset C, B, or A, respectively. When these codes are used anywhere in the data other than at the start of a line, they are interpreted as the non-ASCII characters in Table 26.

---

**Subset B and C Switching.** In the automatic mode, the Code V creates the briefest, most compact bar code by automatically switching from subset B to subset C. For example, the data LT436682 could be entered directly into a typed bar code command as ^BNZLT436682^G. The Code V automatically selects the appropriate start code, and switches to subset C to compact the continuous numeric data characters (436682).

In the manual mode, however, you must specify the start code and all special function codes to switch subsets. For example, to create the same bar code as generated automatically in the previous paragraph (data of LT436682), the subset B start code is entered. This is followed by the alpha data (LT), and the subset switch character to switch to subset C is entered followed by the continuous numeric characters. A typical bar code command, in the manual mode, for the data is: ^BNZ>6LT>5Kbr^G. The pairs of continuous numeric data were manually translated to subset B, data Kbr, corresponding to the subset C values of 436682, respectively, as shown in Table 26. If the data (LT436682) had been entered directly into the bar code command as ^BNZ>6LT>5436682, the bar code generated would have been: Start Code B: LT, subset C: 20 19 22 22 24 18, as determined by the value of the individual data characters in Table 26.

---

### Note



If a start code is not entered in the manual mode, the Code V provides a subset B start code.

---

**Subset A.** Subset A operates in the manual mode only. Subset A data characters include mostly normal printable ASCII characters which require no subset switching and can be entered directly. For example, the data ABC123 in subset A is input in the bar code command as: ^BNZ>7ABC123^. Switching to another subset will not generate a shorter bar code.

Non-printable control codes in subset A can be generated by either:

1. using the subset B lowercase character equivalent from Table 26
2. using the subset switch characters (>1 through >8, or >SP through >/) from the **Alternate** column of Table 26

### Standard Code 128 Command Format

Refer to page 135 for the IBARC, command format and definitions.

**Default Ratio:** (cc) *dir* *p* Z *data* (cc)G

**Variable Ratio:** (cc) *dir* *p* [9] [:] Z [*ratio*] *data* (cc)G

- (cc) Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.
- dir* Represents the direction of the bar code. Enter **B** for horizontal bar codes; enter **C** for vertical bar codes.
- p* Prints the optional readable data field. The readable data field is printed below a horizontal bar code or on the left-hand side of a vertical bar code.  
  
Replace *p* in the bar code command with one of the codes listed in Table 25 to print the readable data field in the corresponding font with the specified guard band gap.

**Table 25. Printable Data Field Fonts**

Font	Gap	<i>p</i> code
Standard 10 cpi	3 dots	Y
OCR-A	3 dots	O
OCR-A	.1-inch	S
OCR-B	3 dots	B
OCR-B	.1-inch	T
None		N

- 9 or : Optional parameter to select a variable ratio bar code. Enter the number **9** to select a variable ratio bar code. This feature overrides the default Code 128 ratio 1:1:2:2:3:3:4:4.

If the `:` parameter is specified, the ratios are represented in printer dots instead of IGP dots (60 x 72 dpi).

**Z** Type code for Code 128. Enter **Z**.

*ratio* Optional parameter (used in conjunction with **9** above) representing the ratios for variable ratio bar codes. Default ratios are overridden by the variable ratio feature. The ratio data must be hexadecimal numbers from **0** through **9** or **A** through **F**; the Code V automatically checks the input for validity. If an invalid character is found in the ratio, an error message is generated.

Code 128 bar codes use eight-digit ratios. The ratios are interpreted from left to right, measuring the size of each bar or space in dot width, in the following pattern: *1 module wide bar : 1 module wide space : 2 module wide bar : 2 module wide space : 3 module wide bar : 3 module wide space : 4 module wide bar : 4 module wide space*. For example, enter 22446688 in the ratio data field for:  
 2 module wide bar  
 2 module wide space  
 4 module wide bar  
 4 module wide space  
 6 module wide bar  
 6 module wide space  
 8 module wide bar  
 8 module wide space

The Code V automatically checks ratio data for validity only within the allowable hexadecimal range. The Code V does not verify that ratio data creates acceptable bar/space element relationships for bar code readability. When designing unique ratio data, carefully plot bar/space ratios to conform to readable bar codes.

*data* The bar code data. In the automatic mode, whenever a string of 4 or more contiguous numeric digits are detected, the Code V inserts a subset C command at the start of the numeric string. When the string of numeric digits is broken, the Code V inserts a subset B command. Code 128 encodes from 1 through 40 characters from the character set of the subset code selected. Use the appropriate subset code from the Code 128 Character Set in Table 26.

When data is provided in the manual mode, readable data field is not printed.

(cc)G Terminates the bar code command. Enter the SFCC for your Code V configuration immediately followed by any valid command character or **G**, the universal sequence terminator.

Table 26. Code 128 and UCC/EAN-128 Character Set

Value	Subset A	Subset B	Subset C	Value	Subset A	Subset B	Subset C	Alternate
0	SP	SP	00	54	V	V	54	
1	!	!	01	55	W	W	55	
2	"	"	02	56	X	X	56	
3	#	#	03	57	Y	Y	57	
4	\$	\$	04	58	Z	Z	58	
5	%	%	05	59	[	[	59	
6	&	&	06	60	\	\	60	
7	,	,	07	61	]	]	61	
8	(	(	08	62	^	^	62	
9	)	)	09	63	—	—	63	
10	*	*	10	64	NUL	'	64	>SP
11	+	+	11	65	SOH	a	65	>!
12	,	,	12	66	STX	b	66	>"
13	-	-	13	67	ETX	c	67	>#
14	.	.	14	68	EOT	d	68	>\$
15	/	/	15	69	ENQ	e	69	>%
16	0	0	16	70	ACK	f	70	>&
17	1	1	17	71	BEL	g	71	>'
18	2	2	18	72	BS	h	72	>(
19	3	3	19	73	HT	i	73	>)
20	4	4	20	74	LF	j	74	>*
21	5	5	21	75	VT	k	75	>+
22	6	6	22	76	FF	l	76	>,
23	7	7	23	77	CR	m	77	>.
24	8	8	24	78	SO	n	78	>/
25	9	9	25	79	SI	o	79	
26	:	:	26	80	DLE	p	80	
27	;	;	27	81	DC1	q	81	
28	<	<	28	82	DC2	r	82	
29	=	=	29	83	DC3	s	83	
30	>	>	30	84	DC4	t	84	
31	?	?>	31	85	NAK	u	85	
32	@	@	32	86	SYN	v	86	
33	A	A	33	87	ETB	w	87	
34	B	B	34	88	CAN	x	88	
35	C	C	35	89	EM	y	89	
36	D	D	36	90	SUB	z	90	
37	E	E	37	91	ESC	{	91	
38	F	F	38	92	FS	:	92	
39	G	G	39	93	GS	}	93	
40	H	H	40	94	RS	~	94	
41	I	I	41	95	US	DEL	95	>1
42	J	J	42	96	FNC3	FNC3	96	>2
43	K	K	43	97	FNC2	FNC2	97	>3
44	L	L	44	98	SHIFT	SHIFT	98	>4
45	M	M	45	99	CODE C	CODE C	99	>5
46	N	N	46	100	CODE B	FNC4	CODE B	>6
47	O	O	47	101	FNC4	CODE A	CODE A	>7
48	P	P	48	102	FNC1	FNC1	FNC1	>8
49	Q	Q	49					
50	R	R	50					
51	S	S	51	103	START CODE A*			>7
52	T	T	52	104	START CODE B*			>6
53	U	U	53	105	START CODE C*			>5

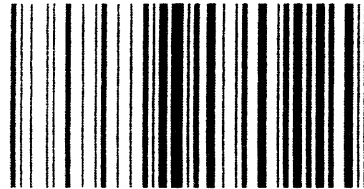
\*Used at the beginning of manual mode commands.



## Code 128 Examples

The following command generates the horizontal default ratio Code 128 bar code below in the automatic mode. In the command sequence, graphics mode data is *italicized* and bar code data is **boldface**. Refer to the "Commands" chapter for a detailed description of alphanumeric commands.

```
^PY^-^M10,10,000^KF^BNZABC123456^G^KF^-^PN^-
```



^PY^- enabled the graphics command sequence. ^M introduced the standard alphanumeric command. The character height selected was 1.0 inches and character width was selected at 1.0 inches. A 0.0 justification value plus 0 additional dots was selected for data placement. ^KF activated Dark Print. ^B introduced the bar code command. N deselected printing the optional readable data field. Letter Z selected Code 128. ABC123456 is the bar code data, and ^G terminated the bar code command sequence. ^KF^- at the end of the bar code sequence turned off Dark Print, and ^PN^- terminated the graphics mode.

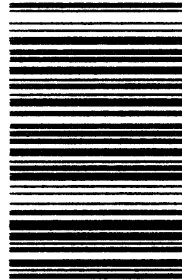
The following command generated the Code 128 bar code below in the automatic mode using standard 10 cpi font, double the default ratio, and data of ABC123456. The bar code data begins in subset B and automatically switches to subset C for the numeric data.

```
^PY^-^M10,10,000^KF^BY9Z22446688ABC123456^G^KF^-^PN^-
```



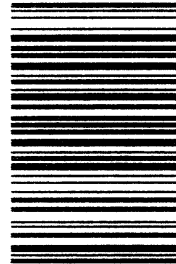
The command below generates the following vertical Code 128 bar code with data of 123@25% in manual mode, subset A.

```
^PY^-^M10,10,000^KF^CNZ>7123@25%^G^KF^-^PN^-
```



The command below generates the same vertical Code 128 bar code in the automatic mode, subset B. Because less than 4 consecutive numeric digits were provided in the data, no subset switching occurred, and the bar code remained in subset B.

```
^PY^-^M10,10,000^KF^CNZ123@25%^G^KF^-^PN^-
```



## EAN 8

The EAN 8 bar code is related to the Universal Product Code (UPC) group. EAN 8 can be printed with or without a 2- or 5-digit add-on data field, which is placed at the end of the bar code. The EAN 8 (European Article Number) bar code structure is shown in Figure 12 and described on the following pages.

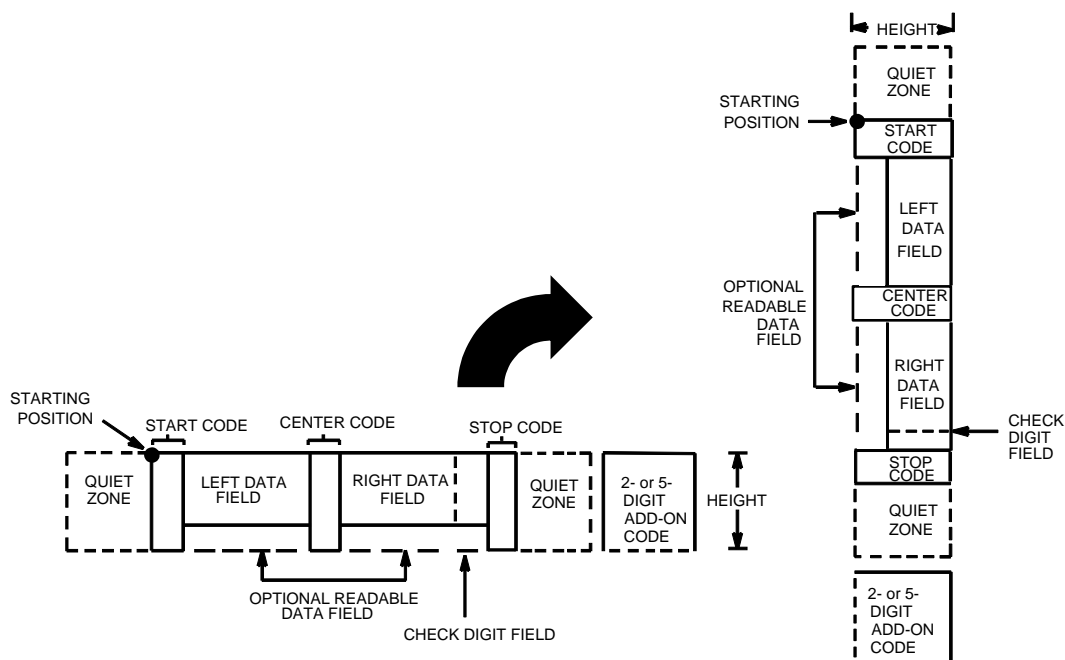


Figure 12. EAN 8 Structure

### Quiet Zone

Both ends of the bar code structure have blank quiet zones. The quiet zones should be at least 0.25 inches wide and completely blank to ensure accurate reading of the start/stop codes and to prevent adjacent bar codes from overlapping. You are responsible for providing sufficient space on the form for the quiet zones. A trailing quiet zone is provided automatically if an add-on code has been specified in the bar code command.

### Start/Center/Stop Codes

The Start/Center/Stop codes are special character codes marking those portions of the bar code. These codes are produced with each bar code.

### Data Field

The bar code symbol uses a series of varying width bars and spaces to represent a limited numeric character set (numbers 0-9 and Special Characters Start, Center, and Stop). The bars and spaces vary in width from 1 through 4 modules. Each character consists of 2 bars and 2 spaces that total 7 modules. The symbol coding of the left data field is different from the right data field to permit read direction sensing.

## Readable Data

The human readable data field provides a readable interpretation of the bar code data. Readable data is printed below the horizontal bar code symbol, and to the left of a vertical bar code symbol.

## Check Digit

The modulo-10 check digit is calculated and inserted in the bar code symbol. The check digit provides the means to verify accurate scanning.

## Standard EAN 8 Command Format

Refer to page 135 for the IBARC, command format and definitions.

**Default Ratio:** (cc) *dir p type data* (cc)G

**Variable Ratio:** (cc) *dir p [9] [:] type [ratio] data* (cc)G

(cc) Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.

*dir* Represents the direction of the bar code. Enter **B** for horizontal bar codes; enter **C** for vertical bar codes.

*p* Prints the optional readable data field. The readable data field is printed below a horizontal bar code or on the left-hand side of a vertical bar code. Replace *p* in the bar code command with one of the codes listed in Table 27 to print the readable data field in the corresponding font with the specified guard band gap.

**Table 27. Printable Data Field Fonts**

Font	Gap	<i>p</i> code
Standard 10 cpi	3 dots	Y
OCR-A	3 dots	O
OCR-A	.1-inch	S
OCR-B	3 dots	B
OCR-B	.1-inch	T
None		N

9 or : Optional parameter to select a variable ratio bar code. Enter the number **9** to select a variable ratio bar code. This feature overrides the default EAN 8 ratio 1:1:2:2:3:3:4:4.

If the `:` parameter is specified, the ratios are represented in printer dots instead of IGP dots (60 x 72 dpi).

*type* Represents the bar code type. Enter **U** for standard EAN 8; enter **o** (lowercase alpha o) for EAN 8 plus a 2-digit add-on data field; enter **p** for EAN 8 plus a 5-digit add-on data field.

*ratio* Optional parameter (used in conjunction with **9** above) representing the ratios for variable ratio bar codes. Default ratios are overridden by the variable ratio feature. However, unique variable ratios for EAN 8 bar codes easily generate large, out-of-spec bar codes. Ratio data must be hexadecimal numbers from **0** through **9** or **A** through **F**; the Code V automatically checks the input for validity. If an invalid character is found in the ratio, an error message is generated.

EAN 8 bar codes use eight-digit ratios. The ratios are interpreted from left to right, measuring the size of each bar or space, in dot width, in the following pattern: *1 module wide bar : 1 module wide space : 2 module wide bar : 2 module wide space : 3 module wide bar : 3 module wide space : 4 module wide bar : 4 module wide space.*

The Code V automatically checks ratio data for validity only within the allowable hexadecimal range. The Code V does not verify that ratio data creates acceptable bar/space element relationships for bar code readability. When designing unique ratio data, carefully plot bar/space ratios to conform to readable bar codes.

*data* The bar code data. Standard EAN 8 bar codes encode exactly 7 digits. The first four data characters are in the left half of the data field, and the last 3 characters are in the right half of the data field. (A check digit is automatically computed and printed at the end of the right data field). If the 2- or 5-digit add-on data field is used, include this data at the end of the data field.

The characters available for the data field are **0** through **9** (30 through 39 hex, respectively).

(cc)G Terminates the bar code command. Enter the SFCC for your Code V configuration followed by any valid command character or **G**, the universal sequence terminator.

## EAN 8 Examples

The following command generated the horizontal default ratio EAN 8 bar code below. In the command sequence, graphics mode data is *italicized* and bar code data is **boldface**. Refer to the “Commands” chapter for a detailed description of alphanumeric commands.

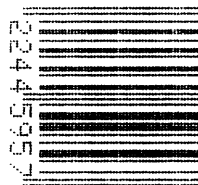
```
^PY^-^M10,10,000^KF^BYU2244595^G^KF^-^PN^-
```



^PY^- turned on the graphics command sequence. ^M introduced the standard alphanumeric command. The character height selected was 1.0 inches and character width was selected at 1.0 inches. A 0.0 justification value plus 0 additional dots was selected for data placement. ^KF activated Dark Print. ^B introduced the bar code command. Y selected the standard 10 cpi font to print the optional readable data field. Letter U selected the EAN 8 bar code type. 2244595 is the 7-digit bar code data, and ^G terminated the bar code command sequence. ^KF^- at the end of the bar code sequence turned off Dark Print, and ^PN^- terminated the graphics mode.

The following command generated the vertical EAN 8 bar code below using standard 10 cpi font with the standard default ratio and data of 2244595:

```
^PY^-^M10,10,000^CYU2244595^G^PN^-
```



## EAN 13

The EAN 13 bar code is related to the Universal Product Code (UPC) group. EAN 13 can be printed with or without a 2- or 5-digit add-on data field, which is placed at the end of the bar code. The EAN 13 (European Article Number) bar code structure is shown in Figure 13 and described on the following pages.

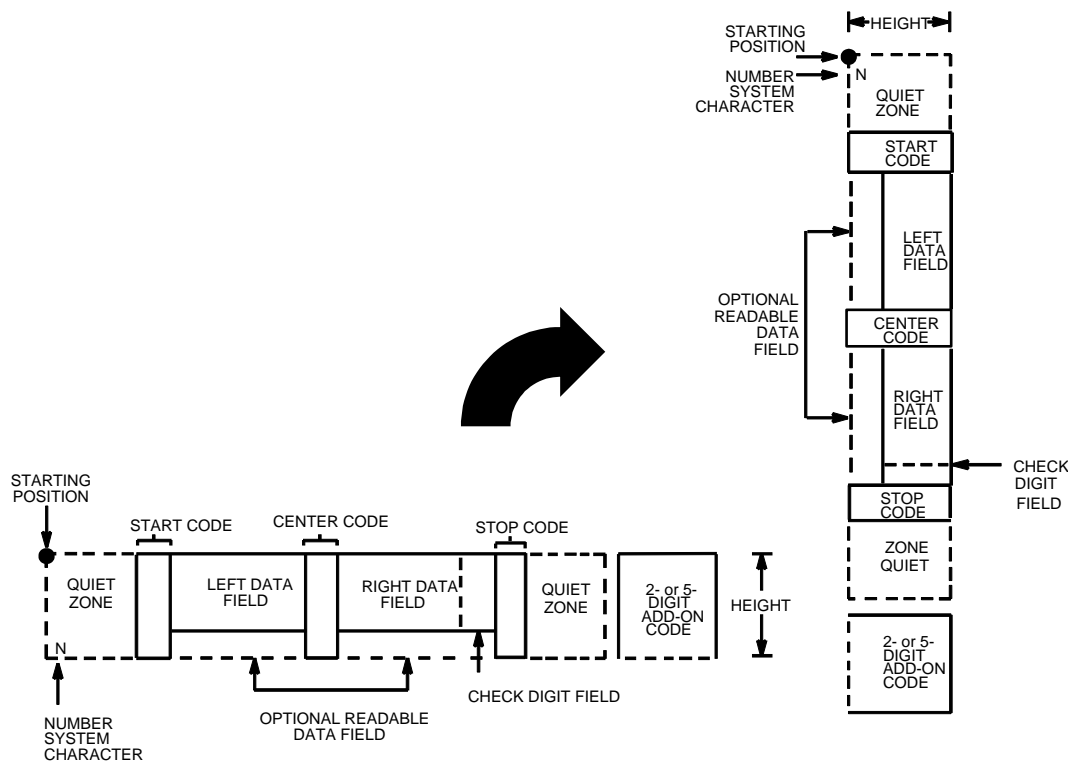


Figure 13. EAN 13 Structure

### Quiet Zone

Quiet zones extend on both ends of the bar code to permit the code to begin and end in a blank area. You are responsible for providing sufficient space on the form for the quiet zones. A trailing quiet zone is provided automatically if an add-on code has been specified in the bar code command.

### Start/Center/Stop Codes

The Start/Center/Stop codes are special character codes marking those portions of the bar code. These codes are automatically produced with each bar code.

### Number System Character

The number system character field allows you to apply a code to a class or type of item. The first character in the data field is used as the number system character; it is printed in the left quiet zone.

## Data Field

The bar code symbol uses a series of varying width bars and spaces to represent a limited character set (numbers 0-9 and Special Characters Start, Center, and Stop). The bars and spaces vary in width from 1 through 4 modules. Each character consists of 2 bars and two spaces that total 7 modules. The symbol coding of the left data field is different from the right data field to permit read direction sensing.

## Readable Data

The human readable data field provides a readable interpretation of the bar code data. Readable data is printed below the horizontal bar code symbol and to the left of a vertical bar code symbol.

## Check Digit

The modulo-10 check digit is automatically calculated and inserted in the bar code symbol. The check digit provides the means to verify accurate scanning. The number system character is included in the check digit algorithm.

## Standard EAN 13 Command Format

Refer to page 135 for the IBARC, command format and definitions.

<b>Default Ratio:</b>	(cc) <i>dir p type data</i> (cc)G
<b>Variable Ratio:</b>	(cc) <i>dir p [9] [:] type [ratio] data</i> (cc)G
(cc)	Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.
<i>dir</i>	Represents the direction of the bar code. Enter <b>B</b> for horizontal or <b>C</b> for vertical bar codes.
<i>p</i>	Prints the optional readable data field. The readable data field is printed below a horizontal bar code or on the left-hand side of a vertical bar code. Replace <i>p</i> in the bar code command with one of the codes listed in Table 28 to print the readable data field in the corresponding font with the specified guard band gap.

**Table 28. Printable Data Field Fonts**

Font	Gap	<i>p</i> code
Standard 10 cpi	3 dots	Y
OCR-A	3 dots	O
OCR-A	.1-inch	S
OCR-B	3 dots	B
OCR-B	.1-inch	T
None		N



**9 or :** Optional parameter to select a variable ratio bar code. Enter the number **9** to select a variable ratio bar code. This feature overrides the default EAN 13 ratio 1:1:2:2:3:3:4:4.

If the **:** parameter is specified, the ratios are represented in printer dots instead of IGP dots (60 x 72 dpi).

**type** Represents the bar code type. Enter **T** for standard EAN 13; enter **m** for EAN 13 plus a 2-digit add-on data field; enter **n** for EAN 13 plus a 5-digit add-on data field.

**ratio** Optional parameter (used in conjunction with **9** above) representing the ratios for variable ratio bar codes. Default ratios are overridden by the variable ratio feature. However, unique variable ratios for EAN 13 bar codes easily generate large, out-of-spec bar codes. Ratio data must be hexadecimal numbers from **0** through **9** or **A** through **F**; the Code V automatically checks the input for validity. If an invalid character is found in the ratio, an error message is generated.

EAN 13 bar codes use eight-digit ratios. The ratios are interpreted from left to right, measuring the size of each bar or space, in dot width, in the following pattern: *1 module wide bar : 1 module wide space : 2 module wide bar : 2 module wide space : 3 module wide bar : 3 module wide space : 4 module wide bar : 4 module wide space.*

The Code V automatically checks ratio data for validity only within the allowable hexadecimal range. The Code V does not verify that ratio data creates acceptable bar/space element relationships for bar code readability. When designing unique ratio data, carefully plot bar/space ratios to conform to readable bar codes.

**data** The bar code data. EAN 13 bar codes encode exactly 12 digits. The first character input is interpreted as the number system character. (A bar code character is not produced for the number system character.) The next six characters are the left side (the upper side on vertically oriented symbols). The final five characters are the right side (or the lower side on vertically oriented symbols). A thirteenth character is an automatic check digit which is computed and printed in the last character position in the right data field. If the 2- or 5-digit add-on data field is used, include this data at the end of the data field. The characters available for the data field are **0** through **9** (30 through 39 hex, respectively).

(cc)G Terminates the bar code command. Enter the SFCC for your Code V configuration immediately followed by any valid command character or **G**, the universal sequence terminator.

### EAN 13 Examples

The following command generated the horizontal default ratio EAN 13 bar code below. In the command sequence, graphics mode data is *italicized*, and bar code data is **boldface**. Refer to the “Commands” chapter for a detailed description of alphanumeric commands.

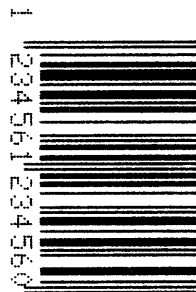
```
^PY^-^M10,10,000^KF^BYT123456123456^G^KF^-^PN^-
```



*^PY^-* enabled the graphics command sequence. *^M* introduced the standard alphanumeric command. The character height selected was 1.0 inches and character width was selected at 1.0 inches. A 0.0 justification value plus 0 additional dots was selected for data placement. *^KF* activated Dark Print. *^B* introduced the bar code command. *Y* selected the standard 10 cpi font to print the optional readable data field. Letter *T* selected the EAN 13 bar code type. 123456123456 is the 12-digit bar code data, and *^G* terminated the bar code command sequence. *^KF^-* at the end of the bar code sequence turned off Dark Print, and *^PN^-* terminated the graphics mode.

The following command generated the vertical EAN 13 bar code below using standard 10 cpi font with the standard default ratio and data of 123456123456:

```
^PY^-^M10,10,000^KF^CYT123456123456^G^KF^-^PN^-
```



## German Interleaved 2/5

The German Interleaved 2/5 bar code structure is shown in Figure 14 and described on the following pages.

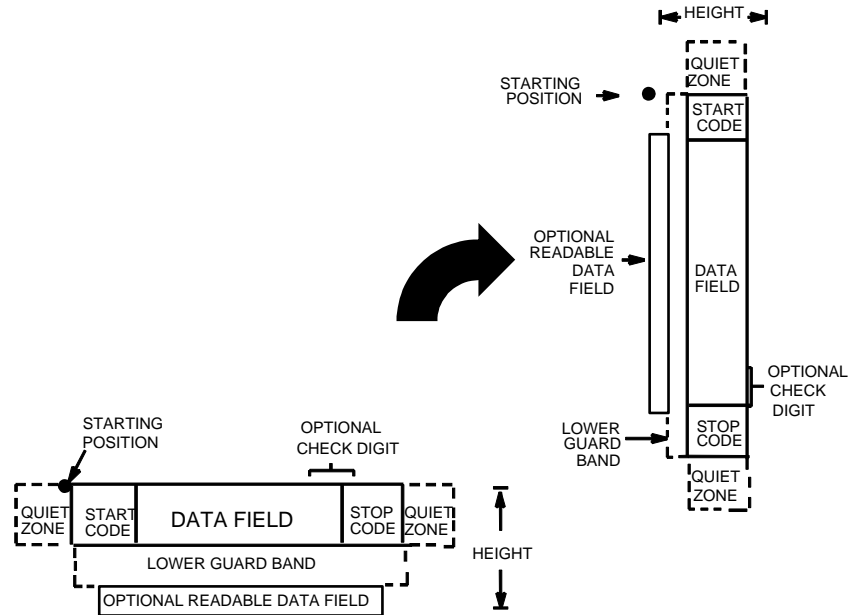


Figure 14. German Interleaved 2/5 Structure

### Quiet Zone

Both ends of the bar code structure have blank quiet zones. The quiet zones should be at least 0.25 inches wide and completely blank to ensure accurate reading of the start/stop codes and to prevent adjacent bar codes from overlapping. You are responsible for providing sufficient space on the form for the quiet zones.

### Start/Stop Codes

Unique start and stop codes permit bidirectional scanning. Both start and stop codes contain bars and spaces. They are automatically produced.

### Data Field

The bar code symbol uses a series of wide and narrow bars and spaces to represent numeric characters. The structure is 2 wide elements (bars or spaces) and 3 narrow elements. In the bar code, two characters are interleaved (paired); bars are used to represent data characters occupying the odd-numbered positions, and spaces are used to represent data characters occupying the even-numbered positions.

### Readable Data

The optional readable data field provides a readable interpretation of the bar code data. Bar code data is printed below the horizontal bar code symbol and to the left of a vertical bar code symbol. The lower guard band is provided when the readable data field is selected.

### Check Digit

The modulo-10 check digit is automatically calculated and inserted in the bar code symbol. The check digit provides the means to verify accurate scanning.

### German Interleaved 2/5 Command Format

**NOTE:** See page 135 for the IBARC, command format and definitions.

**Default Ratio:** (cc) *dir p type data* (cc)G

**Variable Ratio:** (cc) *dir p [9] [:] type [ratio] data* (cc)G

(cc) Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.

*dir* Represents the direction of the bar code. Enter **B** for horizontal bar codes; enter **C** for vertical bar codes.

*p* Prints the optional readable data field. The readable data field is printed below a horizontal bar code or on the left-hand side of a vertical bar code.

Replace *p* in the bar code command with one of the codes listed in Table 29 to print the readable data field in the corresponding font with the specified guard band gap.

**Table 29. Printable Data Field Fonts**

Font	Gap	<i>p</i> code
Standard 10 cpi	3 dots	Y
OCR-A	3 dots	O
OCR-A	.1-inch	S
OCR-B	3 dots	B
OCR-B	.1-inch	T
None		N

9 or : Optional parameter to select a variable ratio bar code. Enter the number **9** to select a variable ratio bar code. This feature overrides the default German Interleaved 2/5 ratio 1:3:5:7.

If the : parameter is specified, the ratios are represented in printer dots instead of Code V dots (60 x 72 dpi).

*type* Represents the bar code type. Select one of the German Interleaved 2/5 bar code type codes shown in Table 30.

**Table 30. German Interleaved 2/5 Bar Codes**

Standard Type Code	IBARC, Type Code	# of Data Characters	Check Digits	Default Bar/Space Ratios*
V	POSTAGI**	11	Mod 10	1:3:5:7
W	POSTAGL	13	Mod 10	1:3:5:7

\*Ratios represent dot width of the bar/space elements as follows:  
*Narrow Bar : Narrow Space : Wide Bar : Wide Space.*  
 \*\*The last character of this type command is the uppercase "i" character (hex 49), not to be confused with a lowercase "L" character (hex 6C).

*ratio* Optional parameter (used in conjunction with **9** or : above) representing the ratios for variable ratio bar codes. Default ratios are overridden by the variable ratio feature. The ratio data must be hexadecimal numbers from **0** through **9** or **A** through **F**. The Code V automatically checks the input for validity. If an invalid character is found in the ratio, an error message is generated.

German Interleaved 2/5 bar codes use four-digit ratios. The ratios are interpreted from left to right, measuring the size of each bar or space, in dot width, in the following pattern: *narrow bar : narrow space : wide bar : wide space*. For example, enter 2266 in the ratio parameter for:

- 2 dot-wide narrow bar
- 2 dot-wide narrow space
- 6 dot-wide wide bar
- 6 dot-wide wide space

**NOTE:** The Code V automatically checks ratio data for validity only within the allowable hexadecimal range. The Code V does not verify that ratio data creates acceptable wide/narrow element relationships for bar code readability. For example, the Code V accepts wide/narrow ratio values of 2 and 5, respectively; however a narrow element larger than the wide element produces an unreadable bar code. When designing unique ratio data, carefully plot wide and narrow ratios to conform to readable bar codes.

<i>data</i>	The bar code data. German Interleaved 2/5 encodes either 11 or 13 characters. The characters available for the data field are <b>0</b> through <b>9</b> (hex 30 through 39).
(cc)G	Terminates the bar code command. Enter the SFCC for your Code V configuration immediately followed by any valid command character or <b>G</b> , the universal sequence terminator.

### German Interleaved 2/5 Examples

The following command generates the horizontal default ratio German Interleaved 2/5 bar code shown below. In the command sequence, graphics mode data is *italicized* and bar code data is **boldface**. Refer to the "Commands" chapter for a detailed description of alphanumeric commands.

```
^PY^-^M10,10,000^KF^BTV01853624568^G^KF^-^PN^-
```



*^PY^-* enabled the graphics command sequence.  
*^M* introduced the standard alphanumeric command.  
 The character height selected was 1.0 inches and character width was selected at 1.0 inches.  
 A 0.0 justification value plus 0 additional dots was selected for data placement.  
*^KF* activated Dark Print.  
*^B* introduced the bar code command.  
 T selected the .1-inch OCR-B font to print the optional readable data field.  
 Letter V selected the 11-digit German Interleaved 2/5 with the default 1:3:5:7 ratio.  
 01853624568 is the bar code data.  
*^G* terminated the bar code command sequence.  
*^KF^-* at the end of the bar code sequence turned off Dark Print.  
*^PN^-* terminated the graphics mode.

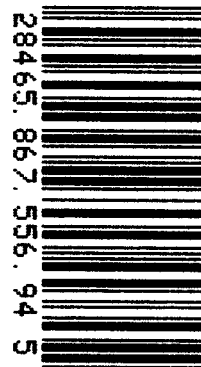
The following command generated the 11-digit horizontal German Interleaved 2/5 bar code below using standard font, the default ratio, and data of 10518475232:

`^PY^-^M05,05,000^KF^IBARC,POSTAGI,B,10518475232^G^KF^-^PN^-`



The following command generated the 13-digit vertical German Interleaved 2/5 bar code below using the .1-inch OCR-B font, the default ratio, and data of 2846586755694:

`^PY^-^M10,10,000^KF^CTW2846586755694^G^KF^-^PN^-`



## Identicon

The Identicon bar code structure is shown in Figure 15 and described on the following pages.

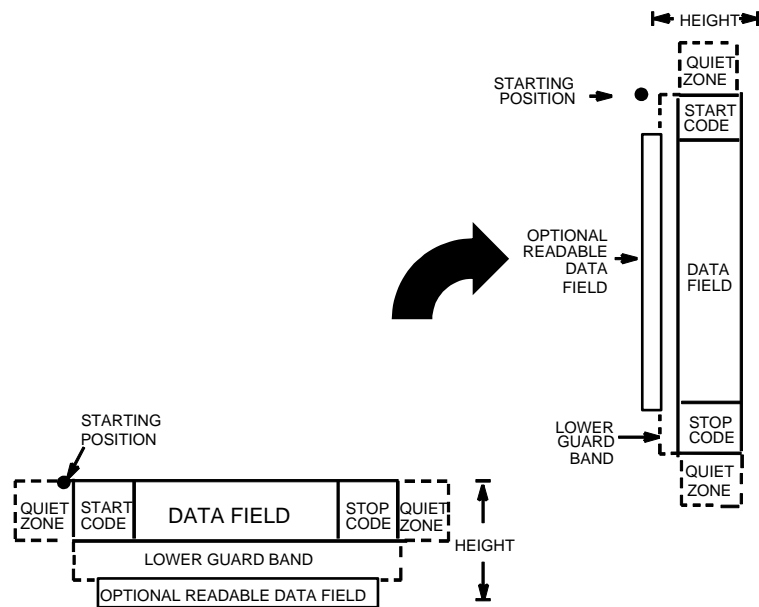


Figure 15. Identicon Structure

### Quiet Zone

Quiet zones extend on both ends of the bar code to permit the scan to begin and end in a blank area. The quiet zone should be at least 0.25 inch wide and completely blank.

### Start/Stop Codes

The Start/Stop codes identify the leading and trailing end of the bar code. The Start/Stop code is automatically produced with each bar code.

### Data Field

The bar code symbol uses a series of wide and narrow bars to represent the 10 numeric characters (0 - 9) and Start/Stop codes. All the information is contained in the width of the bars, the spaces serving only to separate the individual bars. The wide bars are conventionally three times the widths of the narrow bars. The spaces may be any reasonable width but are typically equal to the narrow bars. The bar code can encode up to 40 numbers. Each data character is represented by 5 bars separated by spaces. There must be two wide bars among the 5 bars. Refer to Table 31 for symbol coding.

### Readable Data

Readable data is printed below the horizontal bar code and to the left of the vertical bar codes. The lower guard band is provided when the readable data field is selected.



Table 31. Identicon Symbol Coding

Character	Code
0	00110
1	10001
2	01001
3	11000
4	00101
5	10100
6	01100
7	00011
8	10010
9	01010
Start	110
Stop	101

### Standard Identicon Command Format

Refer to page 135 for the IBARC, command format and definitions.

**Default Ratio:** (cc) *dir p E data* (cc)G

**Variable Ratio:** (cc) *dir p [9] [:] E [ratio] data* (cc)G

(cc) Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.

*dir* Represents the direction of the bar code. Enter **B** for horizontal bar codes; enter **C** for vertical bar codes.

*p* Prints the optional readable data field. The readable data field is printed below a horizontal bar code or on the left-hand side of a vertical bar code.

Replace *p* in the bar code command with one of the codes listed in Table 32 to print the readable data field in the corresponding font with the specified guard band gap.

Table 32. Printable Data Field Fonts

Font	Gap	p code
Standard 10 cpi	3 dots	Y
OCR-A	3 dots	O
OCR-A	.1-inch	S
OCR-B	3 dots	B
OCR-B	.1-inch	T
None		N

**9** or **:** Optional parameter to select a variable ratio bar code. Enter the number **9** to select a variable ratio bar code. This feature overrides the default Identicon ratio, 1:1:3.

If the **:** parameter is specified, the ratios are represented in printer dots instead of Code V dots (60 x 72 dpi).

**E** Type code for Identicon. Enter **E**.

*ratio* Optional parameter (used in conjunction with **9** above) representing the ratios for variable ratio bar codes. Default ratios are overridden by the variable ratio feature. The ratio data must be hexadecimal numbers from **0** through **9** or **A** through **F**. The Code V automatically checks the input for validity. If an invalid character is found in the ratio, an error message is generated.

The Code V automatically checks ratio data for validity only within the allowable hexadecimal range. The Code V does not verify that ratio data creates acceptable wide/narrow element relationships for bar code readability. For example, the Code V accepts wide/narrow ratio values of 2 and 5, respectively; however a narrow element larger than the wide element produces an unreadable bar code. When designing unique ratio data, carefully plot wide and narrow ratios to conform to readable bar codes.

*data* The bar code data. IDENTICON encodes from 1 through 40 characters. The characters available for the data field are **0** through **9** (30 through 39, hex, respectively).

(cc)G Terminates the bar code command. Enter the SFCC for your Code V configuration immediately followed by any valid command character or **G**, the universal sequence terminator.

## Interleaved 2/5

The Interleaved 2/5 bar code structure is shown in Figure 16 and described on the following pages.

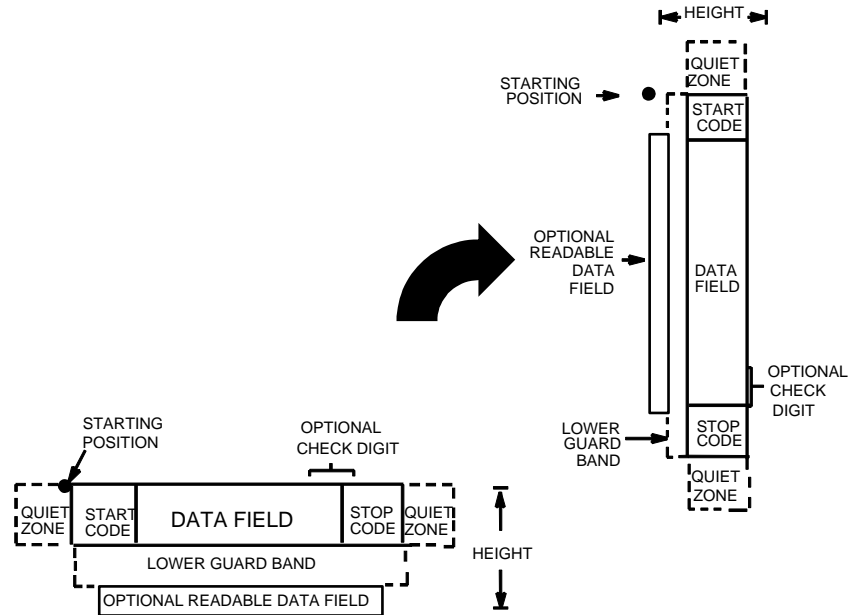


Figure 16. Interleaved 2/5 Structure

### Quiet Zone

Both ends of the bar code structure have blank quiet zones. The quiet zones should be at least 0.25 inches wide and completely blank to ensure accurate reading of the start/stop codes and to prevent adjacent bar codes from overlapping. You are responsible for providing sufficient space on the form for the quiet zones.

### Start/Stop Codes

Unique start and stop codes permit bidirectional scanning. Both start and stop codes contain bars and spaces. They are automatically produced.

### Data Field

The bar code symbol uses a series of wide and narrow bars and spaces to represent numeric characters. The structure is 2 wide elements (bars or spaces) and 3 narrow elements. In the bar code, two characters are interleaved (paired); bars are used to represent data characters occupying the odd-numbered positions, and spaces are used to represent data characters occupying the even-numbered positions. The interleaving process requires an even number of characters; if an odd number of characters are encoded, a leading zero is automatically inserted to change the number of characters to an even number.

## Readable Data

The optional readable data field provides a readable interpretation of the bar code data. Readable data is printed below the horizontal bar code symbol and to the left of a vertical bar code symbol. The lower guard band is provided when the readable data field is selected.

## Check Digit

An optional check digit is inserted for type k and l bar codes. The optional check digit is automatically calculated and inserted in the bar code symbol. The check digit provides the means to verify accurate scanning.

## Standard Interleaved 2/5 Command Format

Refer to page 135 for the IBARC, command format and definitions.

**Default Ratio:** (cc) dir p type data (cc)G

**Variable Ratio:** (cc) dir p [9] [:] type [ratio] data (cc)G

- (cc) Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.
- dir Represents the direction of the bar code. Enter **B** for horizontal bar codes; enter **C** for vertical bar codes.
- p Prints the optional readable data field. The readable data field is printed below a horizontal bar code or on the left-hand side of a vertical bar code.
- Replace *p* in the bar code command with one of the codes listed in Table 33 to print the readable data field in the corresponding font with the specified guard band gap.

**Table 33. Printable Data Field Fonts**

Font	Gap	p code
Standard 10 cpi	3 dots	Y
OCR-A	3 dots	O
OCR-A	.1-inch	S
OCR-B	3 dots	B
OCR-B	.1-inch	T
None		N

- 9 or : Optional parameter to select a variable ratio bar code. Enter the number **9** to select a variable ratio bar code. This feature overrides the Interleaved 2/5 default ratios.

If the `:` parameter is specified, the ratios are represented in printer dots instead of Code V dots (60 x 72 dpi).

*type* Represents the bar code type. Select one of the Interleaved 2/5 codes shown in Table 34.

**Table 34. Interleaved 2/5 Bar Codes**

Standard Type Code	IBARC, Type Code	# of Data Characters	Check Digits	Default Bar/Space Ratios*
K	INT2/5	1-40	None	1:1:3:3
k	INT2/5CD	1-40	Mod 10	1:1:3:3
L	INT2/5A	1-40	None	1:2:4:5
l	INT2/5CDA	1-40	Mod 10	1:2:4:5

\*Ratios represent dot width of the bar/space elements as follows:  
*Narrow Bar : Narrow Space : Wide Bar : Wide Space.*

*ratio* Optional parameter (used in conjunction with **9** above) representing the ratios for variable ratio bar codes. Default ratios are overridden by the variable ratio feature. The ratio data must be hexadecimal numbers from **0** through **9** or **A** through **F**. The Code V automatically checks the input for validity. If an invalid character is found in the ratio, an error message is generated.

Interleaved 2/5 bar codes use four-digit ratios. The ratios are interpreted from left to right, measuring the size of each bar or space, in dot width, in the following pattern: *narrow bar : narrow space : wide bar : wide space*. For example, enter 2266 in the ratio parameter for:

2 dot-wide narrow bar  
 2 dot-wide narrow space  
 6 dot-wide wide bar  
 6 dot-wide wide space

The Code V automatically checks ratio data for validity only within the allowable hexadecimal range. The Code V does not verify that ratio data creates acceptable wide/narrow element relationships for bar code readability. For example, the Code V accepts wide/narrow ratio values of 2 and 5, respectively; however, a narrow element larger than the wide element produces an unreadable bar code. When designing unique ratio data, carefully plot wide and narrow ratios to conform to readable bar codes.

<i>data</i>	The bar code data. Interleaved 2/5 encodes from 1 through 40 characters. The characters available for the data field are <b>0</b> through <b>9</b> (hex 30 through 39, respectively). If an odd number of characters are encoded, a leading zero is automatically inserted in the data field to change the number of characters to an even number.
(cc)G	Terminates the bar code command. Enter the SFCC for your Code V configuration immediately followed by any valid command character or <b>G</b> , the universal sequence terminator.

### Interleaved 2/5 Examples

The following command generates the horizontal default ratio Interleaved 2/5 bar code shown below. In the command sequence, graphics mode data is *italicized* and bar code data is **boldface**. Refer to the “Commands” chapter for a detailed description of alphanumeric commands.

```
^PY^-^M10,10,000^KF^BYK2244595^G^KF^-^PN^-
```



*^PY^-* enabled the graphics command sequence. *^M* introduced the standard alphanumeric command. The character height selected was 1.0 inches and character width was selected at 1.0 inches. A 0.0 justification value plus 0 additional dots was selected for data placement. *^KF* activated Dark Print. *^B* introduced the bar code command. *Y* selected the standard 10 cpi font to print the optional readable data field. Letter *K* selected Interleaved 2/5 with the default 1:1:3:3 ratio. 2244595 is the bar code data, and *^G* terminated the bar code command sequence. *^KF^-* at the end of the bar code sequence turned off Dark Print, and *^PN^-* terminated the graphics mode.

The following command generated the Interleaved 2/5 bar code below using OCR-B font, double the default ratio, and data of 2244595:

```
^PY^-^M10,10,000^KF^BB9L248A2244595^G^KF^-^PN^-
```



The following command generates the vertical Interleaved 2/5 bar code below using standard 10 cpi font with the standard default ratio and data of 2244595:

```
^PY^-^M10,10,000^KF^CYK2244595^G^KF^PN^-
```



## MSI

The MSI structure is shown in Figure 17 and described on the following pages.

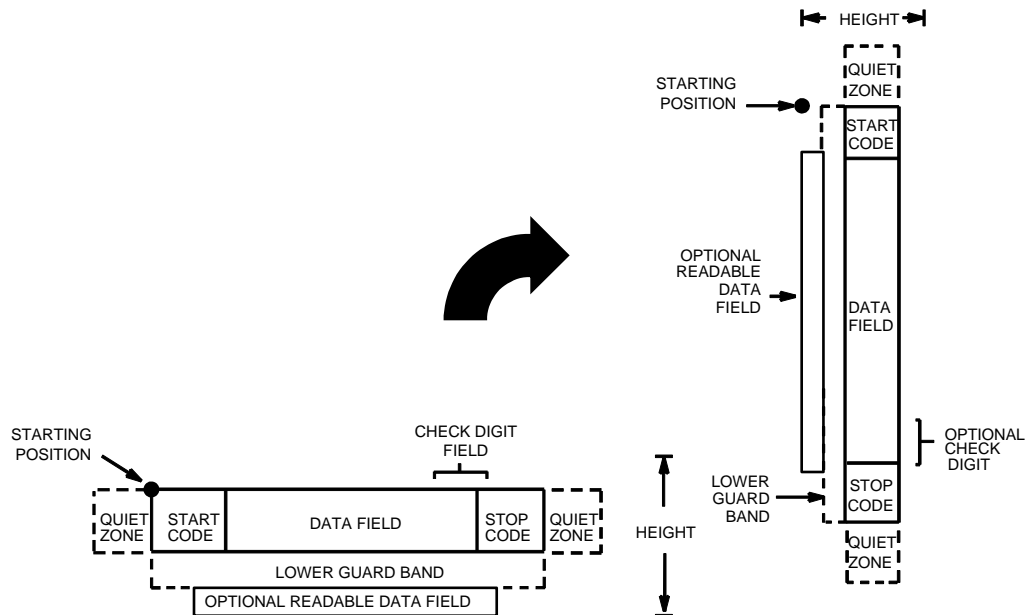


Figure 17. MSI Bar Code Structure

### Quiet Zone

Both ends of the bar code structure require blank quiet zones. The quiet zones should be at least 0.25 inches wide and completely blank to ensure accurate reading of the start/stop codes and to prevent adjacent bar codes from overlapping. You are responsible for providing sufficient space on the form for the quiet zones.

### Start/Stop Codes

The start/stop code is a unique character identifying the leading and trailing end of the bar code. The start/stop code is automatically produced with each bar code, and permits bidirectional bar code scanning.

### Data Field

The MSI bar code symbol uses a series of wide and narrow bars and spaces to represent numeric characters. The structure is 1-module-wide narrow elements and 2-module-wide wide elements; elements can be a bar or a space. Each character is composed of 4 data bits, with each bit made up of a bar and a space totalling 3 modules.



## Readable Data

The optional readable data field provides a readable interpretation of the bar code data. Readable data is printed below the horizontal bar code symbol, and to the left of a vertical bar code symbol. The lower guard band is provided when the readable data field is selected.

## Check Digit

The check digit provides the means of verifying accurate scanning. For MSI Types G, H, I, and X, a specific check digit, Modulo-10 or Modulo-11 (or both), is automatically calculated and appended in the bar code symbol. MSI Type F does not use a check digit.

## Standard MSI Command Format

Refer to page 135 for the IBARC, command format and definitions.

**Default Ratio:** (cc) *dir p type data* (cc)G

**Variable Ratio:** (cc) *dir p [9] [:] type [ratio] data* (cc)G

(cc) Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.

*dir* Represents the direction of the bar code. Enter **B** for horizontal or **C** for vertical bar codes.

*p* Prints the optional readable data field. The readable data field is printed below a horizontal bar code or on the left-hand side of a vertical bar code. Replace *p* in the bar code command with one of the codes listed in Table 35 to print the readable data field in the corresponding font with the specified guard band gap.

**Table 35. Printable Data Field Fonts**

Font	Gap	<i>p</i> code
Standard 10 cpi	3 dots	Y
OCR-A	3 dots	O
OCR-A	.1-inch	S
OCR-B	3 dots	B
OCR-B	.1-inch	T
None		N

9 or : Optional parameter to select a variable ratio bar code. Enter the number **9** to select a variable ratio bar code. This feature overrides the MSI default ratio 1:1:2:2.

If the : parameter is specified, the ratios are represented in printer dots instead of IGP dots (60 x 72 dpi).

*type* Represents the bar code type. As shown in Table 36, MSI Types **F**, **G**, **H**, **I**, and **X** are available. Enter the type code corresponding to the MSI bar code type desired.

**Table 36. MSI Bar Codes**

Standard Type Code	IBARC, Type Code	# of Data Characters	Check Digits	Default Bar/Space Ratios*
F	MSI	1-13	None	1:1:2:2
G	MSI10	1-13	Mod 10	1:1:2:2
H	MSI1010	1-13	Mod 10, Mod 10	1:1:2:2
I	MSI1110	1-13	Mod 11, Mod 10	1:1:2:2
X	MSI11	1-13	Mod 11	1:1:2:2

\*Ratios represent dot width of the bar/space elements as follows:  
*Narrow Bar : Narrow Space : Wide Bar : Wide Space.*

*ratio* Optional parameter (used in conjunction with **9** above) representing the ratios for variable ratio bar codes. Default ratios are overridden by the variable ratio feature. The ratio data must be hexadecimal numbers from **0** through **9** or **A** through **F**. The Code V automatically checks the input for validity. If an invalid character is found in the ratio, an error message is generated.

MSI bar codes use four-digit ratios. The ratios are interpreted from left to right, measuring the size of each bar or space, in dot width, in the following pattern: *narrow bar : narrow space : wide bar : wide space*. For example, enter 2244 in the ratio parameter for:  
 2 dot-wide narrow bar  
 2 dot-wide narrow space  
 4 dot-wide wide bar  
 4 dot-wide wide space

The Code V automatically checks ratio data for validity only within the allowable hexadecimal range. The Code V does not verify that ratio data creates acceptable wide/narrow element relationships for bar code readability. For example, the Code V accepts wide/narrow ratio values of 2 and 5, respectively; however, a narrow element larger than the wide element produces an unreadable bar code. When designing unique ratio data, carefully plot wide and narrow ratios to conform to readable bar codes.

<i>data</i>	The bar code data. MSI encodes from 1 through 13 characters. The available characters for the data field are <b>0</b> through <b>9</b> (30 through 39 hex, respectively).
(cc)G	Terminates the bar code command. Enter the SFCC for your Code V configuration immediately followed by any valid command character or <b>G</b> , the universal sequence terminator.

## MSI Bar Code Examples

The following command generates the horizontal default ratio MSI bar code shown below. In the command sequence, graphics mode data is *italicized* and bar code data is **boldface**. Refer to the "Commands" chapter for a detailed description of alphanumeric commands.

```
^PY^-^M10,10,000^KF^BYH87654321^G^KF^-^PN^-
```



*^PY^-* enabled the graphics command sequence. *^M* introduced the standard alphanumeric command. The character height selected was 1.0 inches and character width was selected at 1.0 inches. A 0.0 justification value plus 0 additional dots was selected for the data placement. *^KF* activated Dark Print. *^B* introduced the bar code command. *Y* selected the standard 10 cpi font to print the optional readable data field. Letter *H* selected MSI bar code Type H, which automatically appends two Mod 10 check digits to the bar code data. 87654321 is the bar code data, and *^G* terminated the bar code command sequence. *^KF^-* at the end of the bar code sequence turned off Dark Print, and *^PN^-* terminated the graphics mode.

The following command generated the horizontal MSI bar code below using OCR-B font and double the default ratio:

```
^PY^-^M10,10,000^KF^BB9X224487654321^G^KF^-^PN^-
```



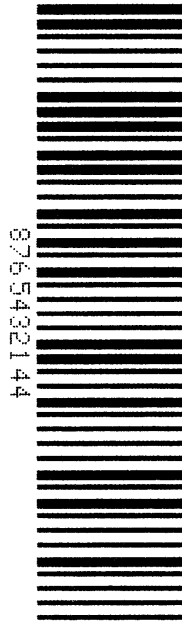
The following command generates the vertical MSI bar code below using standard 10 cpi font, the standard default ratio, and data of 87654321:

```
^PY^-^M10,10,000^KF^CYF87654321^G^KF^-^PN^-
```



The following command generates the same vertical MSI bar code above, except that double the default ratio is used:

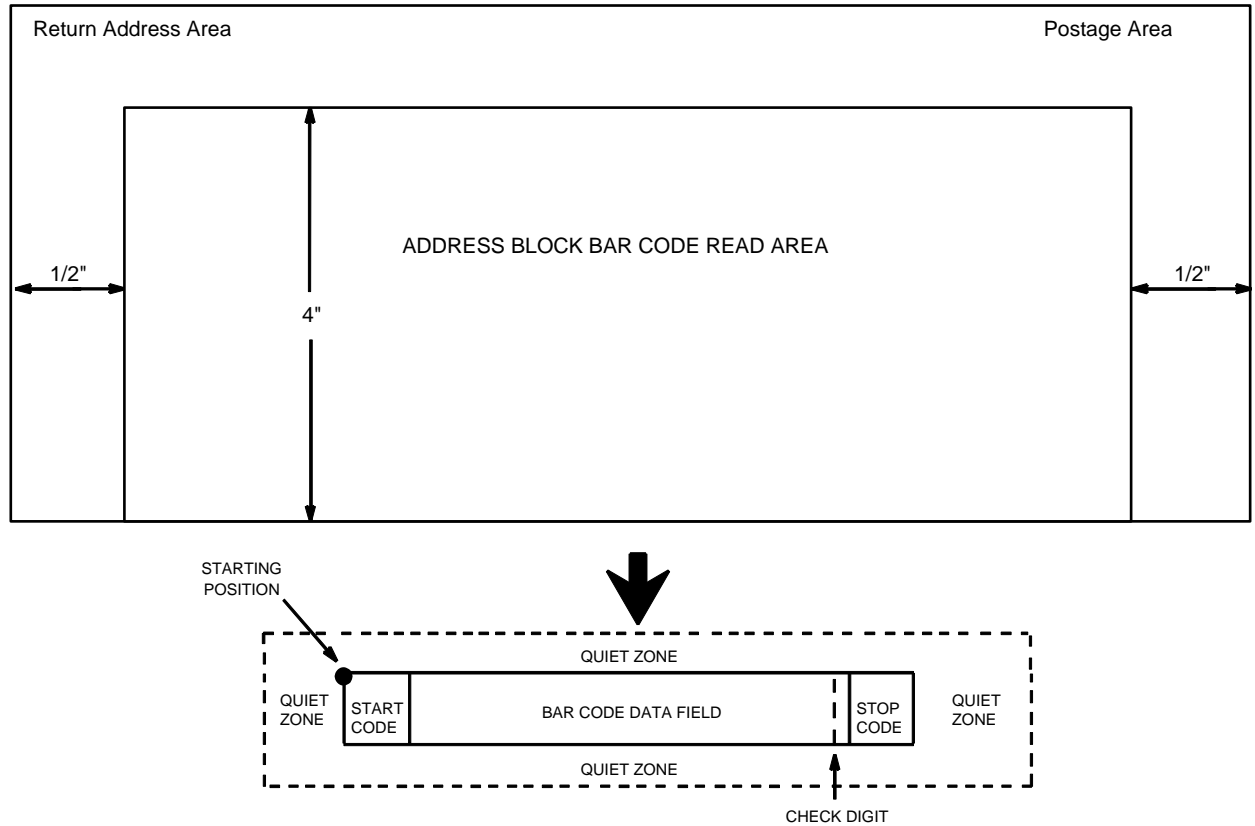
```
^PY^-^M10,10,000^KF^CY9I224487654321^G^KF^-^PN^-
```



## POSTNET

The POSTNET bar code structure is illustrated in Figure 18 and Figure 19 and described on the following pages. The POSTNET code can be a part of the address block and appear anywhere within a vertical 4-inch area across the length of the mail piece.

The POSTNET bar code cannot use variable ratio and does not have a readable data field.



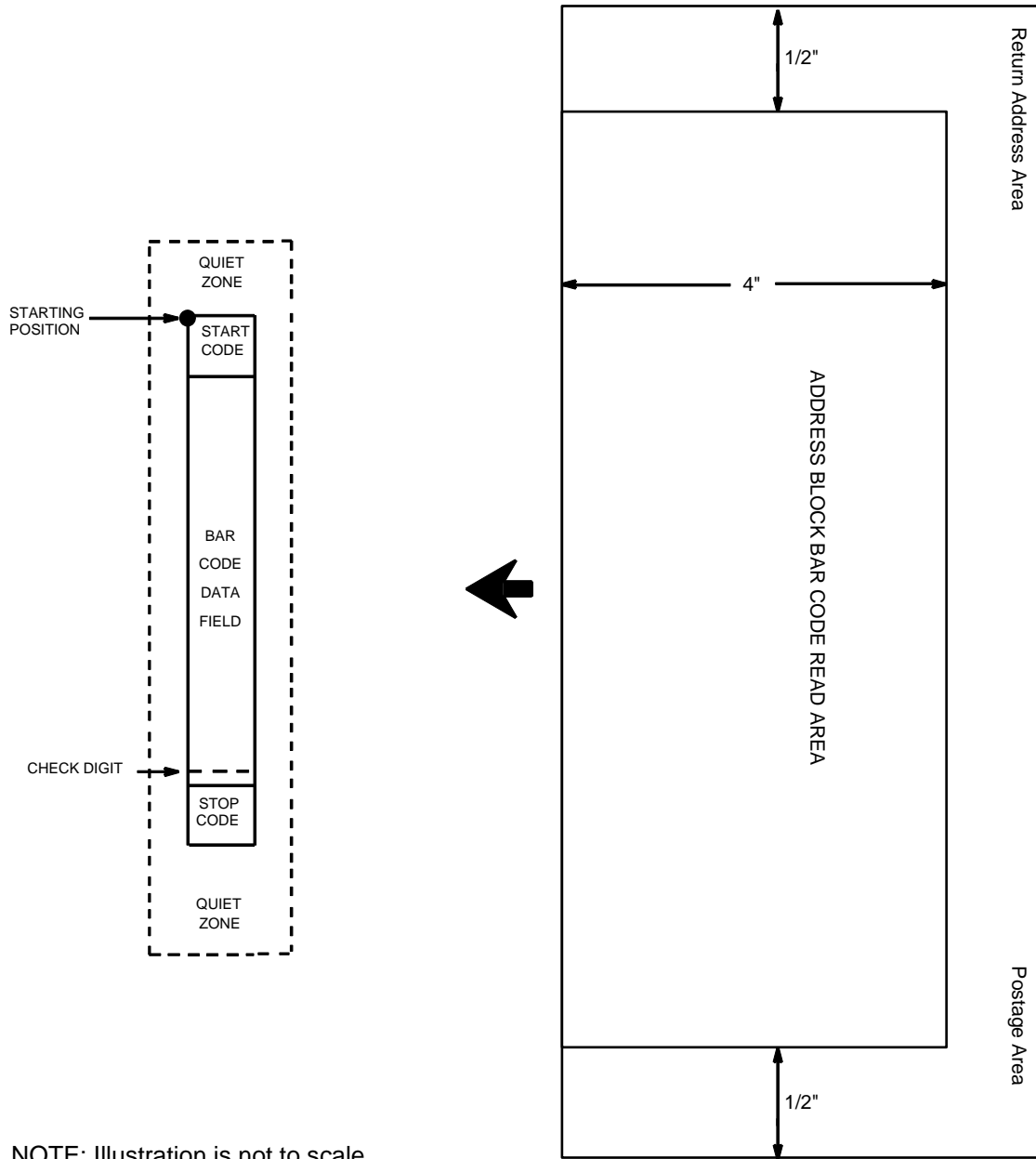
NOTE: Illustration is not to scale

**Figure 18. POSTNET Structure**

**Note**



Additional information regarding POSTNET bar code requirements can be obtained from the U.S. Postal Service's Publication 25: *A Guide to Business Mail Preparation*.



NOTE: Illustration is not to scale.

Figure 19. POSTNET Structure (Vertical Bar)

## Quiet Zone

The bar code structure requires a completely blank quiet zone which extends 4.75 inches from the right edge of the mail piece. In addition, a minimum quiet zone of 0.040-inch above and below the bar code data must also be provided. You must provide sufficient space for this zone.

## Start/Stop Code

The start and stop codes are referred to as “framing bars” in POSTNET. The start and stop codes are each one tall bar, one identifying the leading and trailing end of the bar code. The start/stop code is automatically produced with each bar code. The start/stop code structure permits bar code scanning in a left-to right direction only.

## Data Field

The bar code data produces a single field of 30 bars for a 5-digit field, 50 bars for a 9-digit data field, or 60 bars for an 11-digit data field. The bars are grouped in sets of five. Each set of five bars (comprised of two tall bars and three short bars) represents one of the five digits of the zip code, plus the four-digit zip code extension. If the Advanced bar code is used, an additional two-digit code is also added to make an 11-digit data field.

Exact bar code dimensions depend on the type of printer used, but fall within the following specifications:

Each bar *width* is equal and is .020-inch  $\pm$  .005-inch. Each bar *height* is either a tall (full) or short (half) bar, representing a 1 or 0, respectively. Each tall bar is .125-inch  $\pm$  .010-inch; each short bar is .050-inch  $\pm$  .010-inch. Horizontal spacing between bars (pitch) is 22 bars  $\pm$  2 bars per inch over any 0.50-inch portion of the bar code. Horizontal spacing at 24 and 20 bars per inch is 0.0416-inch and .050-inch, respectively, with a clear vertical space ranging from 0.012-inch to 0.040-inch between bars.

## Check Digit

The sixth, tenth, or twelfth digit represents the automatic check digit character for the 5, 9, or 11-digit data field, respectively. The Mod 10 check digit is added automatically to verify accurate scanning.

### Standard POSTNET Command Format

<b>Default Ratio:</b>	(cc) <i>dir</i> [N] * <i>data</i> (cc)G
(cc)	Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.
<i>dir</i>	Represents the direction of the bar code. Enter <b>B</b> for horizontal bar codes. Enter <b>C</b> for vertical bar codes.
N	Provides a switch to turn off the readable data field. <b>N</b> or no input are the only options.
*	Type code for POSTNET. Enter *.
<i>data</i>	The bar code data. POSTNET bar codes encode exactly 5, 9, or 11 numeric digits. A check digit is automatically added by the Code V.
(cc)G	Terminates the bar code command. Enter the SFCC for your Code V configuration immediately followed by any valid command character or <b>G</b> , the universal sequence terminator.



**Note** The POSTNET bar code symbol height is fixed at 0.125 inches.

### POSTNET Example

`^PY^-^M^KF^BN*927047563^G^KF^-^PN^-`





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## Royal Mail

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The Royal Mail bar code, like POSTNET, is used for mailing applications. However, the bar code can encode full addresses on labels. Royal Mail bar codes are similar to POSTNET in terms of bar space and width, but have four different types of bars (Full Height, Ascender, Descender, and Tracker), whereas POSTNET only has two bar types (Tall and Short).

The Royal Mail symbology converts alphanumeric characters into patterns of four bars, using combinations of Full Height, Ascender, Descender, and Trackers. It also adds start and stop bar codes as well as a check digit.

### Quiet Zone

The bar code structure requires a completely blank quiet zone which is a 2mm border on each side of the bar code.

### Start/Stop Code

The start and stop bars identify the orientation of the bar code. The start bar consists of an ascender bar, and is positioned at the leftmost end of the bar code. The stop bar consists of a full height bar, and is positioned at the rightmost end of the bar code adjacent to the check digit.

### Data Field

Royal Mail bar codes use four types of bars to encode its data: Full Height, Ascender, Descender, and Tracker. Each Full Height bar is 0.198 inch  $\pm$  0.030 inch. The Ascender and Descender bars are about 62.5% of the Full Height bar in length, while the Tracker bar is about 25% of the Full Height bar.

Each bar *width* is equal, and must be .020-inch  $\pm$  .005-inch. Horizontal spacing between bars (pitch) must be 22 bars  $\pm$  2 bars per inch over any 0.50-inch portion of the bar code.

Royal Mail bar codes have a variable length of data field, which consists of valid characters '0' through '9' and 'A' through 'Z'. Each character is encoded with four bars of varied types.

### Check Digit

A modulo-6 check digit is added automatically to the end of the bar code to verify accurate scanning.

## Standard Royal Mail Command Format

<b>Default Ratio:</b>	<i>(cc) dir [N] Y data (cc)G</i>
<i>(cc)</i>	Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.
<i>dir</i>	Represents the direction of the bar code. Enter <b>B</b> for horizontal bar codes. Enter <b>C</b> for vertical bar codes.
<i>N</i>	Provides a switch to turn off the readable data field. <b>N</b> or no input are the only options.
<i>Y</i>	Type code for Royal Mail. Enter <b>Y</b> .
<i>data</i>	The bar code data. A check digit is automatically added by the Code V.
<i>(cc)G</i>	Terminates the bar code command. Enter the SFCC for your Code V configuration immediately followed by any valid command character or <b>G</b> , the universal sequence terminator.

## Royal Mail Example

```
^PY^-^M10,10,000^KF^BNY050LU178XE2B^G^KF^-^PN^-
```



## Telepen

The Telepen structure is shown in Figure 20 and described on the following pages.

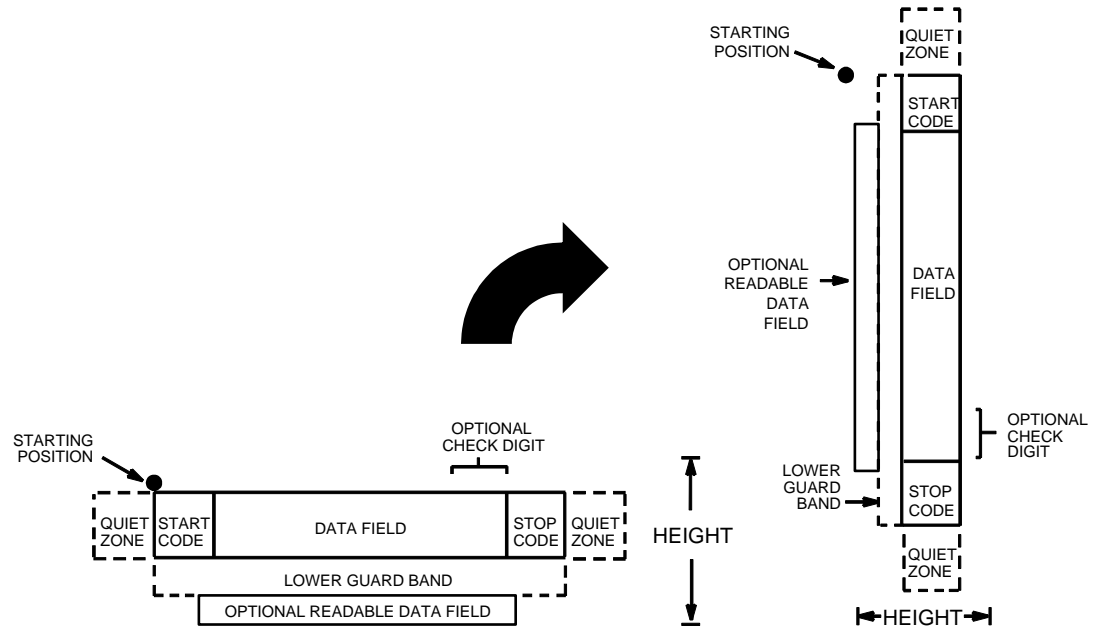


Figure 20. Telepen Structure

### Quiet Zone

Both ends of the bar code structure require blank quiet zones. The quiet zones should be at least 0.25 inches wide and completely blank to ensure accurate reading of the start/stop codes and to prevent adjacent bar codes from overlapping. You are responsible for providing sufficient space on the form for the quiet zones.

### Start/Stop Codes

The start/stop code is a unique character identifying the leading and trailing end of the bar code. The start/stop code is automatically produced with each bar code. The start/stop code structure permits bidirectional bar code scanning.

### Data Field

The bar code symbol uses a series of wide and narrow bars and spaces to represent standard alphanumeric characters. Each character is represented by a different series of bars and spaces, both wide and narrow, but is always 16 units in width (for a wide to narrow ratio of 3). Each character starts with a bar and ends with a space.

### Readable Data

The optional readable data field provides a readable interpretation of the bar code data. Bar code data is printed below the horizontal bar code symbol and to the left of a vertical bar code symbol. The lower guard band is provided when the readable data field is selected.

### Check Digit

A mandatory modulo-127 check digit is inserted into the bar code. This feature provides a means of verifying accurate scanning.

### Telepen Command Format

**NOTE:** Refer to page 135 for the IBARC, command format and definitions.

**Default Ratio:** (cc) dir p J data (cc)G

**Variable Ratio:** (cc) dir p [9] [:] J [ratio] data (cc)G

(cc) Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.

dir Represents the direction of the bar code. Enter **B** for horizontal bar codes; enter **C** for vertical bar codes.

p Prints the optional readable data field. The readable data field is printed below a horizontal bar code or on the left-hand side of a vertical bar code.

Replace *p* in the bar code command with one of the codes in Table 21 to print the readable data field in the corresponding font with the specified guard band gap.

**Table 37. Printable Data Field Fonts**

Font	Gap	p code
Standard 10 cpi	3 dots	Y
OCR-A	3 dots	O
OCR-A	.1-inch	S
OCR-B	3 dots	B
OCR-B	.1-inch	T
None		N

9 or : Optional parameter to select a variable ratio bar code. Enter the number **9** to select a variable ratio bar code. This feature overrides the default Code 128 ratio 1:1:3:3.

If the `:` parameter is specified, the ratios are represented in printer dots instead of Code V dots (60 x 72 dpi).

<b>J</b>	The type code for Telepen. Enter <b>J</b> .
<i>ratio</i>	<p>Optional parameter (used in conjunction with parameter <code>:</code> or <b>9</b>) representing the ratios for variable ratio bar codes. The default ratios are overridden by the variable ratio feature. The ratio data must be hexadecimal numbers from <b>0</b> through <b>9</b> or <b>A</b> through <b>F</b>. The Code V automatically checks the input for validity. If an invalid character is found in the ratio, an error message is generated.</p> <p>Telepen bar codes use four-digit ratios. The ratios are interpreted from left to right, measuring the size of each bar or space, in dot width according to the following pattern: narrow bar : narrow space : wide bar : wide space. For example, enter 2266 in the ratio parameter for:</p> <p style="padding-left: 40px;">2 dot-wide narrow bar 2 dot-wide narrow space 6 dot-wide wide bar 6 dot-wide wide space.</p>

**NOTE:** The Code V automatically checks ratio data for validity only within the allowable hexadecimal range. The Code V does not verify that ratio data creates acceptable wide/narrow element relationships for bar code readability. For example, the Code V accepts wide/narrow ratio values of 2 and 5, respectively; however a narrow element larger than the wide element produces an unreadable bar code. When designing unique ratio data, carefully plot wide and narrow ratios to conform to readable bar codes.

<i>data</i>	The bar code data. Telepen encodes 1 through 40 characters from the Telepen full ASCII Character Set shown in Table 38.
(cc)G	Terminates the bar code command. Enter the SFCC for your Code V configuration immediately followed by any valid command character or <b>G</b> , the universal sequence terminator.

Table 38. Telepen Character Set

ASCII	Telepen	ASCII	Telepen	ASCII	Telepen	ASCII	Telepen
NUL	%U	SP	Space	@	%V	`	%W
SOH	\$A	!	/A	A	A	a	+A
STX	\$B	"	/B	B	B	b	+B
ETX	\$C	#	/C	C	C	c	+C
EOT	\$D	\$	/D	D	D	d	+D
ENQ	\$E	%	/E	E	E	e	+E
ACK	\$F	&	/F	F	F	f	+F
BEL	\$G	'	/G	G	G	g	+G
BS	\$H	(	/H	H	H	h	+H
HT	\$I	)	/I	I	I	i	+I
LF	\$J	*	/J	J	J	j	+J
VT	\$K	+	/K	K	K	k	+K
FF	\$L	,	/L	L	L	l	+L
CR	\$M	—	—	M	M	m	+M
SO	\$N	.	.	N	N	n	+N
SI	\$O	/	/O	O	O	o	+O
DLE	\$P	0	0	P	P	p	+P
DC1	\$Q	1	1	Q	Q	q	+Q
DC2	\$R	2	2	R	R	r	+R
DC3	\$S	3	3	S	S	s	+S
DC4	\$T	4	4	T	T	t	+T
NAK	\$U	5	5	U	U	u	+U
SYN	\$V	6	6	V	V	v	+V
ETB	\$W	7	7	W	W	w	+W
CAN	\$X	8	8	X	X	x	+X
EM	\$Y	9	9	Y	Y	y	+Y
SUB	\$Z	:	/Z	Z	Z	z	+Z
ESC	%A	;	%F	[	%K	{	%P
FS	%B	<	%G	\	%L		%Q
GS	%C	=	%H	]	%M	}	%R
RS	%D	>	%I	^	%N	^	%S
US	%E	?	%J	—	%O	DEL	%T %X %Y %Z

**NOTE:** Character pairs /M, /N, and /P through /Y are reserved for future control code pairs.

## Telepen Examples

The following command generates the horizontal default ratio Telepen bar code shown below. In the command sequence, graphics mode data is *italicized* and bar code data is **boldface**. See the "Commands" chapter for a detailed description of alphanumeric commands.

```
^PY^-^M10,10,010^BOJ1234567^G^-^PN^-
```



^PY^- enabled the graphics command sequence.

^M introduced the standard alphanumeric command.

The character height selected was 1.0 inches and character width was selected at 1.0 inches.

A 0.1 justification value plus 0 additional dots was selected for the data placement.

^B introduced the bar code command.

O selected the 3-dot OCR-A font to print the optional readable data field.

J selected the Telepen barcode.

1234567 is the bar code data, and ^G terminated the bar code command sequence.

^PN^- terminated the graphics mode.

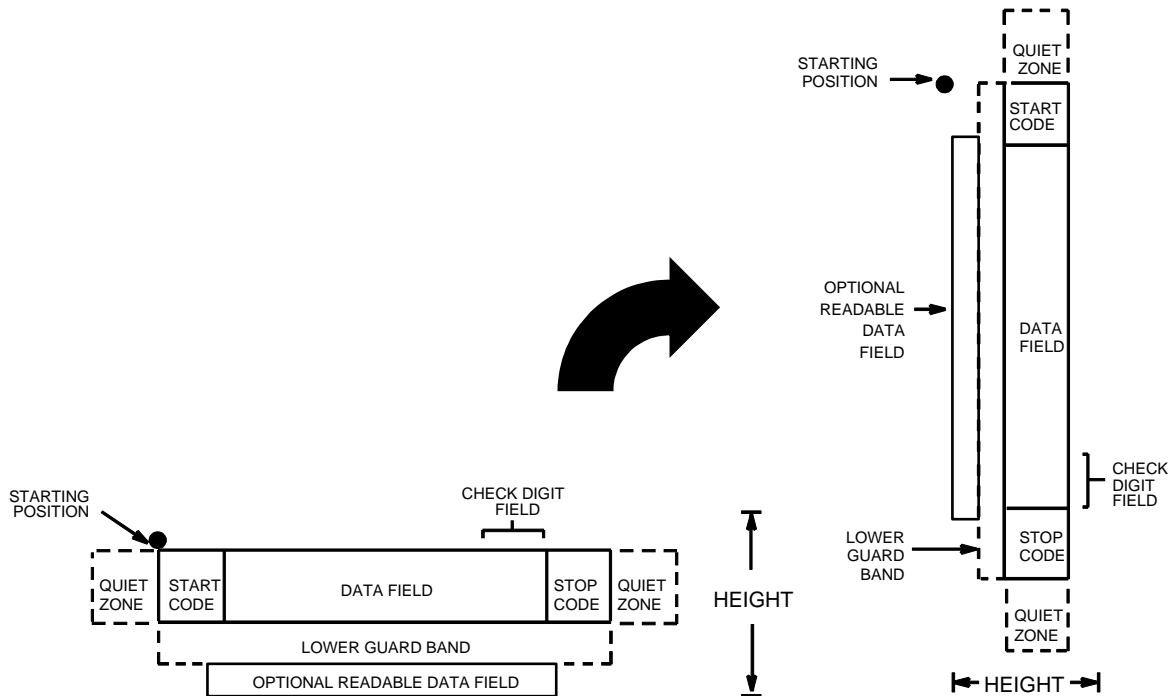
The following command generated the horizontal Telepen bar code below using Standard 10 cpi font, and data of ABCDEFG:

```
^PY^-^M10,10,010^BYJABCDEFG^G^-^PN^-
```



## UCC/EAN-128

The UCC/EAN-128 structure is shown in Figure 21 and described on the following pages.



**Figure 21. UCC/EAN-128 Structure**

UCC/EAN-128 uses the same bar code and character set as Code 128. However, in UCC/EAN-128, the Function 1 character FNC1 immediately follows the start code. The FNC1 character has been reserved exclusively for UCC/EAN-128.

The UCC/EAN-128 data structure requires an Application Identifier (AI) at the beginning of bar code data. Each AI determines the format and length of the data which follows. Refer to Table 39 for more detail.



Table 39. UCC/EAN-128 Application Identifiers

Application Identifier (AI)	Content	Format
00	Serial Shipping Container Code	n2+n18
02	Item Num. of Goods Within Another Unit	n2+n14
10	Batch or Lot Number	n2+an..20
11 (*)	Production Date (YYMMDD)	n2+n6
13 (*)	Packaging Date (YYMMDD)	n2+n6
15 (*)	Sell By Date (Quality) (YYMMDD)	n2+n6
17 (*)	Expiration Date (Safety) (YYMMDD)	n2+n6
20	Product Variant	n2+n2
21	Serial Number	n2+an..20
22	HIBCC = Quantity, Date, Batch and Link	n2+an..29
23 (**)	Lot Number (Transitional Use)	n3+n..19
240	Additional Product ID Assigned By Manufacturer	n3+an..30
250	Secondary Serial Number	n3+an..30
30	Quantity	n2+n..8
310 (***)	Net Weight, Kilograms	n4+n6
311 (***)	Length or 1st Dimension, Meters	n4+n6
312 (***)	Width, Diameter or 2nd Dimension, Meters	n4+n6
313 (***)	Depth, Thickness, Height or 3rd Dimension, Meters	n4+n6
314 (***)	Area, Square Meters	n4+n6
315 (***)	Volume, Liters	n4+n6
316 (***)	Volume, Cubic Meters	n4+n6
320 (***)	Net Weight, Pounds	n4+n6
321 (***)	Length Or 1st Dimension, Inches	n4+n6
322 (***)	Length Or 1st Dimension, Feet	n4+n6
323 (***)	Length Or 1st Dimension, Yards	n4+n6
324 (***)	Width, Diameter, or 2nd Dimension, Inches	n4+n6
325 (***)	Width, Diameter, or 2nd Dimension, Feet	n4+n6
326 (***)	Width, Diameter, or 2nd Dimension, Yards	n4+n6
327 (***)	Depth, Thickness, Height, or 3rd Dimension, Inches	n4+n6
328 (***)	Depth, Thickness, Height, or 3rd Dimension, Feet	n4+n6
329 (***)	Depth, Thickness, Height, or 3rd Dimension, Yards	n4+n6
330 (***)	Gross Weight-Kilograms	n4+n6
331 (***)	Length or 1st Dimension, Logistics	n4+n6
332 (***)	Width, Diameter, or 2nd Dimension, Meters, Logistics	n4+n6
333 (***)	Depth, Thickness, Height or 3rd Dimension, Meters, Logistics	n4+n6

Table 39. UCC/EAN-128 Application Identifiers (continued)

Application Identifier (AI)	Content	Format
334 (***)	Area, Square Meters, Logistics	n4+n6
335 (***)	Gross Volume, Liters	n4+n6
336 (***)	Gross Volume, Cubic Meters	n4+n6
337 (***)	Kilograms Per Square MEter	n4+n6
340 (***)	Gross Weight, Pounds	n4+n6
341 (***)	Length Or 1st Dimension, Inches, Logistics	n4+n6
342 (***)	Length Or 1st Dimension, Feet, Logistics	n4+n6
343 (***)	Length Or 1st Dimension, Yards, Logistics	n4+n6
344 (***)	Width, Diameter, or 2nd Dimension, Inches, Logistics	n4+n6
345 (***)	Width, Diameter, or 2nd Dimension, Feet, Logistics	n4+n6
346 (***)	Width, Diameter, or 2nd Dimension, Yards, Logistics	n4+n6
347 (***)	Depth, Thickness, Height or 3rd Dimension, Inches, Logistics	n4+n6
348 (***)	Depth, Thickness, Height or 3rd Dimension, Feet, Logistics	n4+n6
349 (***)	Depth, Thickness, Height or 3rd Dimension, Yards, Logistics	n4+n6
350 (***)	Area, Square Inches	n4+n6
351 (***)	Area, Square Feet	n4+n6
352 (***)	Area, Square Yards	n4+n6
353 (***)	Area, Square Inches, Logistics	n4+n6
354 (***)	Area, Square Feet, Logistics	n4+n6
355 (***)	Area, Square Yards, Logistics	n4+n6
356 (***)	Net Weight, Troy Ounce	n4+n6
357 (***)	Net Volume, Ounces	n4+n6
360 (***)	Volume, Quarts	n4+n6
361 (***)	Volume, Gallons	n4+n6
362 (***)	Gross Volume, Quarts	n4+n6
363 (***)	Gross Volume, Gallons	n4+n6
364 (***)	Volume, Cubic Inches	n4+n6
365 (***)	Volume, Cubic Feet	n4+n6
366 (***)	Volume, Cubic Yards	n4+n6
367 (***)	Gross Volume, Cubic Inches	n4+n6
368 (***)	Gross Volume, Cubic Inches	n4+n6
369 (***)	Gross Volume, Cubic Inches	n4+n6
37	Quantity of Units Contained (For Use With AI 02 Only)	n2+n..8
400	Customer's Purchase Order Number	n3+an..30
401	Consignment Number	n3+an..30
410	Ship To (Deliver To) Location Code Using EAN-13	n3+n13

Table 39. UCC/EAN-128 Application Identifiers (continued)

Application Identifier (AI)	Content	Format
411	Bill To (Invoice To) Location Code Using EAN-13	n3+n13
412	Purchase From (Location Code of Party From Whom Goods Are Purchased)	n3+n13
413	Ship For UCC/EAN Location Code	n3+n13
414	EAN Location Code For Physical Identification	n3+n13
420	Ship To (Deliver To) Postal Code Within a Single Postal Authority	n3+an..20
421	Ship To (Deliver To) Postal Code With 3-Digit ISO Country Code Prefix	n3+n3+an..9
8001	Roll Products-Width, Length, Core Diameter, Direction and Splices	n4+n14
8003	UPC/EAN Number and Serial Number Or Returnable Asset	n4+n14+an..16
8004	UCC/EAN Serial Identification	n4+an..30
8005	Identifies the Price Per Unit of Measure	n4+n6
8006	Component of an Article	n4+n14+n2+n2
8018	Service Relation Number	n4+n18
8100	Coupon Extended Code-Number System Character and Offer	n4+n1+n5
8101	Coupon Extended Code-Number System Character, Offer and End of Offer	n4+n1+n5+n4
8102	Coupon Extended Code-Number System Character Preceded by Zero	n4+n1+n1
90	Mutually Agreed, Between Trading Partners	n2+an..30
91	Intra-Company (Internal)	n2+an..30
92	Intra-Company (Internal)	n2+an..30
93	Intra-Company (Internal)	n2+an..30
94	Intra-Company (Internal)	n2+an..30
95	Internal-Carriers	n2+an..30
96	Internal-Carriers	n2+an..30
97	Intra-Company (Internal)	n2+an..30
98	Intra-Company (Internal)	n2+an..30
99	Internal	n2+an..30

(\*)To indicate only year and month, DD must be filled with "00"

(\*\*) Plus one digit for length indication

(\*\*\*) Plus one digit for decimal point indication

**Data Value Representation:**

a - alphabetic characters

an - alpha-numeric characters

an..3 - up to 3 alpha-numeric characters

n - numeric characters

n3 - 3 numeric characters, fixed length

n..3 - up to 3 numeric characters

### Quiet Zone

Both ends of the bar code structure require blank quiet zones. The quiet zones must be at least 0.25 inches wide and completely blank to ensure accurate reading of the start/stop codes and to prevent adjacent bar codes from overlapping. You must provide sufficient space on the form for the quiet zones.

### Start/Stop Codes

The start and stop codes identify the leading and trailing ends of the bar code. UCC/EAN-128 uses unique start codes for character subsets B and C, and a stop code common to both. An automatic mode switching feature is used to generate the correct start code based on the first four data field characters.

### Data Field

UCC/EAN-128 bar codes require a special character called “Function 1” (FNC1) to immediately follow the start code. Code V automatically supplies this character, so it must not be included in the data field by the user.

A character is made up of three bars and three spaces, each varying in width from 1 through 4 modules, for a total of eleven modules. The number of modules making up the bars is even. The stop code has four bars and is 13 modules wide.

The character set for UCC/EAN-128 is the same as the character set for Code 128, which is shown in Table 26. Every character is interpreted according to the currently active character subset. UCC/EAN-128 uses subset B and subset C only. Subset B includes all standard alphanumeric keyboard characters, lowercase alphabetical characters, and special characters. Subset C interprets the characters as pairs of numbers 00 through 99, along with some special characters as shown in Table 26. The start code or subset switch code determines whether a particular bar code character is decoded as one character or as a pair of numbers.

Do not use characters from the Alternate subset with the UCC/EAN-128 bar code. These are two character sequences starting with the “greater than” (>) symbol, which are used in the C128 bar code to provide manual mode character subset selection and inclusion of special characters such as FNC1.

### Readable Data

The optional readable data field provides a human-readable interpretation of the bar code data. When the readable data field is enabled, the overall height of the bars is reduced to make room for a guard band and the human-readable characters. The readable data field will be formatted with spaces or parentheses denoting particular data fields such as the application identifier. Special characters such as start, stop, subset switch, modulo-103 check digit, and FNC1 do not appear in the human-readable data.

Refer to Figure 21. Using Level I syntax ^B (horizontal) or ^C (vertical clockwise rotation), the readable data appears below the bar code, reading in the direction of start code toward stop code. Using Level II syntax (^IBARC), the bar code may be oriented with any of the graphics commands ^M, ^V, ^U, or ^E; and the human-readable data may be positioned above or below the bars, still reading in the direction of start code toward stop code.

### **Modulo-103 Check Digit**

A modulo-103 check digit is automatically calculated and inserted in the bar code symbol immediately in front of the stop code. The check digit verifies accurate scanning. The start code is included in the check digit algorithm. The modulo-103 check digit is not displayed in the readable data field.

### **Modulo-10 Data Field Check Digit for SSCC-18 and SCC-14**

AI 00 (called the Serial Shipping Container Code, or SSCC-18) takes eighteen additional numerical data bytes. The last data byte is a modulo-10 check digit on the preceding seventeen data bytes. Counting the two zeros of the application identifier, the modulo-10 check digit is the twentieth byte in the data field.

AI 01 (called the Shipping Container Code, or SCC-14) takes fourteen additional numerical data bytes. The last data byte is a modulo-10 check digit on the preceding thirteen data bytes. Counting the zero and the one (1) of the application identifier, the modulo-10 check digit is the sixteenth byte in the data field.

The modulo-10 data field check digit for both SSCC-18 and SCC-14 is printed in the bar code as the second half of the last number pair using subset C. It is displayed in the human-readable data field as the twentieth byte for SSCC-18 or the sixteenth byte for SCC-14.

The Code V automatically calculates the modulo-10 check digit for SSCC-18 if only 17 data digits are provided following the application identifier of 00.

### **Automatic Mode**

The Code V generates the UCC/EAN-128 bar codes in automatic mode only. In automatic mode, the start code and subset switching is done by the Code V based on the data field contents so that the bar code length is minimized. None of the start, FNC1, or subset switching characters should be in the data field; they will be provided by the Code V.

Subset C encodes each pair of numbers as a single bar code character, providing a higher character density. If the first four data digits are numbers, the bar code starts in subset C; otherwise it starts in subset B. The subset will switch from B to C at any point in the data field if the next four characters are numbers, and will switch from C to B if the next two characters are not numbers or only one character remains.

Do not use any of the Alternate subset characters anywhere in the data field. Those characters are only supported for C128.

## Standard UCC/EAN-128 Command Format

Refer to page 135 for the IBARC, command format and definitions.

**Default Ratio:** (cc) *dir p q data (cc)G*

**Variable Ratio:** (cc) *dir p [9] [:] q [ratio] data (cc)G*

- (cc) Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.
- dir* Represents the direction of the bar code. Enter **B** for horizontal bar codes; enter **C** for vertical bar codes, rotated clockwise.
- p* Prints the optional readable data field. The readable data field is printed below the bar code; this is underneath a horizontal bar code reading left to right, and to the left of a vertical bar code reading down.
- Replace *p* in the bar code command with one of the codes listed in Table 40 to print the readable data field in the corresponding font with the specified guard band gap.

**Table 40. Printable Data Field Fonts**

Font	Gap	<i>p</i> code
Standard 10 cpi	3 dots	Y
OCR-A	3 dots	O
OCR-A	.1-inch	S
OCR-B	3 dots	B
OCR-B	.1-inch	T
None		N

- 9 or : Optional parameter to select a variable ratio bar code; used in conjunction with the [ratio] field. Enter the number **9** to select a variable ratio bar code. This feature overrides the default UCC/EAN-128 ratio of 1:1:2:2:3:3:4:4.

If the : parameter is specified, the ratios are represented in printer dots instead of Code V dots (60 x 72 dpi).

- q Type code for UCC/EAN-128. Enter **q**.

*ratio* Optional parameter (used in conjunction with **9** above) representing the ratios for variable ratio bar codes. Default ratios are overridden by the variable ratio feature. The ratio data must be hexadecimal numbers from **0** through **9** or **A** through **F**; the Code V automatically checks the input for validity. If an invalid character is found in the ratio, an error message is generated.

UCC/EAN-128 bar codes use eight-digit ratios. The ratios are interpreted from left to right, measuring the size of each bar or space in dot width, in the following pattern: *1 module wide bar : 1 module wide space : 2 module wide bar : 2 module wide space : 3 module wide bar : 3 module wide space : 4 module wide bar : 4 module wide space*. For example, enter 22446688 in the ratio data field for:  
 2 module wide bar  
 2 module wide space  
 4 module wide bar  
 4 module wide space  
 6 module wide bar  
 6 module wide space  
 8 module wide bar  
 8 module wide space  
 The maximum width of an UCC/EAN-128 bar code is 165mm (6.5”).

The Code V automatically checks ratio data for validity only within the allowable hexadecimal range. The Code V does not verify that ratio data creates acceptable bar/space element relationships for bar code readability. When designing unique ratio data, carefully plot bar/space ratios to conform to readable bar codes.

*data* The bar code data. The data field for UCC/EAN-128 consists of an “application identifier” of two, three or four numbers, followed by data of appropriate length and type. See Table 39 for a list of application identifiers and their associated data fields.

Because the FNC1 character is required for UCC/EAN-128 bar codes, Code V will always generate this as the first character after the start code. It will appear in the bars but not in the human-readable field. Do not supply the FNC1 in the data field.

The proper start code and any subset switching characters will be automatically generated by Code V. Do not include characters from the Alternate subset in the data field.

(cc)G Terminates the bar code command. Enter the SFCC for your Code V configuration immediately followed by any valid command character or **G**, the universal sequence terminator.

## Code UCC/EAN-128 Examples

The following command generates the horizontal default ratio UCC/EAN-128 bar code below. In the command sequence, graphics mode data is *italicized* and bar code data is **boldface**. Refer to the “Commands” chapter for a detailed description of alphanumeric commands and dynamic forms generation.

```
^PY^- ^M10,10,000^KF^BYq0034567890123456789^G^KF^-^PN^-
```



^PY^- enabled the graphics command sequence. ^M introduced the standard alphanumeric command. The character height selected was 1.0 inches; the character width parameter does not affect bar codes. A 0.0 inch plus 0 dot vertical justification value was selected for data placement. ^KF selected dark plot mode. ^B introduced the bar code command. Y selected printing the optional readable data field in the normal 10 cpi font. Letter q selected UCC/EAN-128. The bar code data is 0034567890123456789, which is application identifier 00 plus seventeen digits for the SSCC-18 type. ^G terminated the bar code command sequence, ^KF terminated dark plot mode, and ^PN^- terminated the graphics mode.

The command below generates a vertical UCC/EAN-128 bar code giving a purchase order number using Level I syntax. Bar codes produced with Level I syntax (^C) are rotated clockwise.

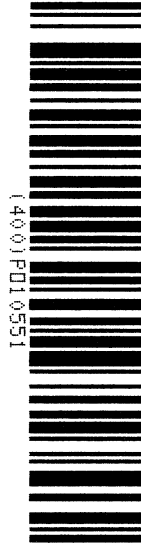
```
^PY^-^M10,10,000^CY9q22446688400PO10551^G^-^KF^-^PN^-
```





The command below generates the same vertical UCC/EAN-128 bar code, using Level II syntax. The standard graphics command ^V is used to rotate the bar code produced with Level II syntax. The rotation will be in a clockwise direction. The human-readable data is placed below the bar code with the B parameter.

```
^PY^-^F^-
^V1010000
^KF^IBARC,UCC128,R2:2:4:4:6:6:8:8,B,400PO10551^G^KF
^-
^PN^-
```



The program below illustrates the use of dynamic forms to generate part of a shipping form with three UCC/EAN-128 bar codes. An internal code (AI = 91) is used as a store number, a ship-to-postal (AI = 420) gives the customer ZIP Code as dynamic data, and a serial shipping container code (AI = 00) is also given as dynamic data. In this example, since the application identifiers are known, they are given as static data, and only the data field for each variable AI is made dynamic. The ship-to-postal takes a five digit ZIP Code; the SSCC-18 takes seventeen digits with Code V, creating the modulo-10 data field check digit automatically.

```
^PY^-^F^-  
^B^-  
^M0101000  
^X titles using compressed print ^A  
^T0010^J000^S4SHIP TO POSTAL CODE  
^T0010^J170^S4STORE  
^T0010^J340^S4SSCC-18  
^X UCC/EAN-128 bar codes ^A  
^M0808^T0030^J020^KF^BYq420^[005^G^KF  
^M0808^T0030^J190^KF^BYq911528^G^KF  
^M1208^T0030^J360^KF^BYq00^[017^G^KF  
^-  
^,^-  
^]  
92614  
34567890123456789  
  
^G^-  
^,^-  
^O^-^PN^-
```

SHIP TO POSTAL CODE



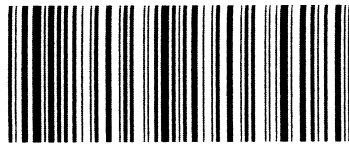
(420)92614

STORE



(91)1528

SSCC-18



(00)345678901234567895

## UPC-A

The UPC-A bar code can be printed with or without a 2- or 5-digit add-on data field, which is placed at the end of the bar code. The UPC-A bar code structure is shown in Figure 22 and described on the following pages.

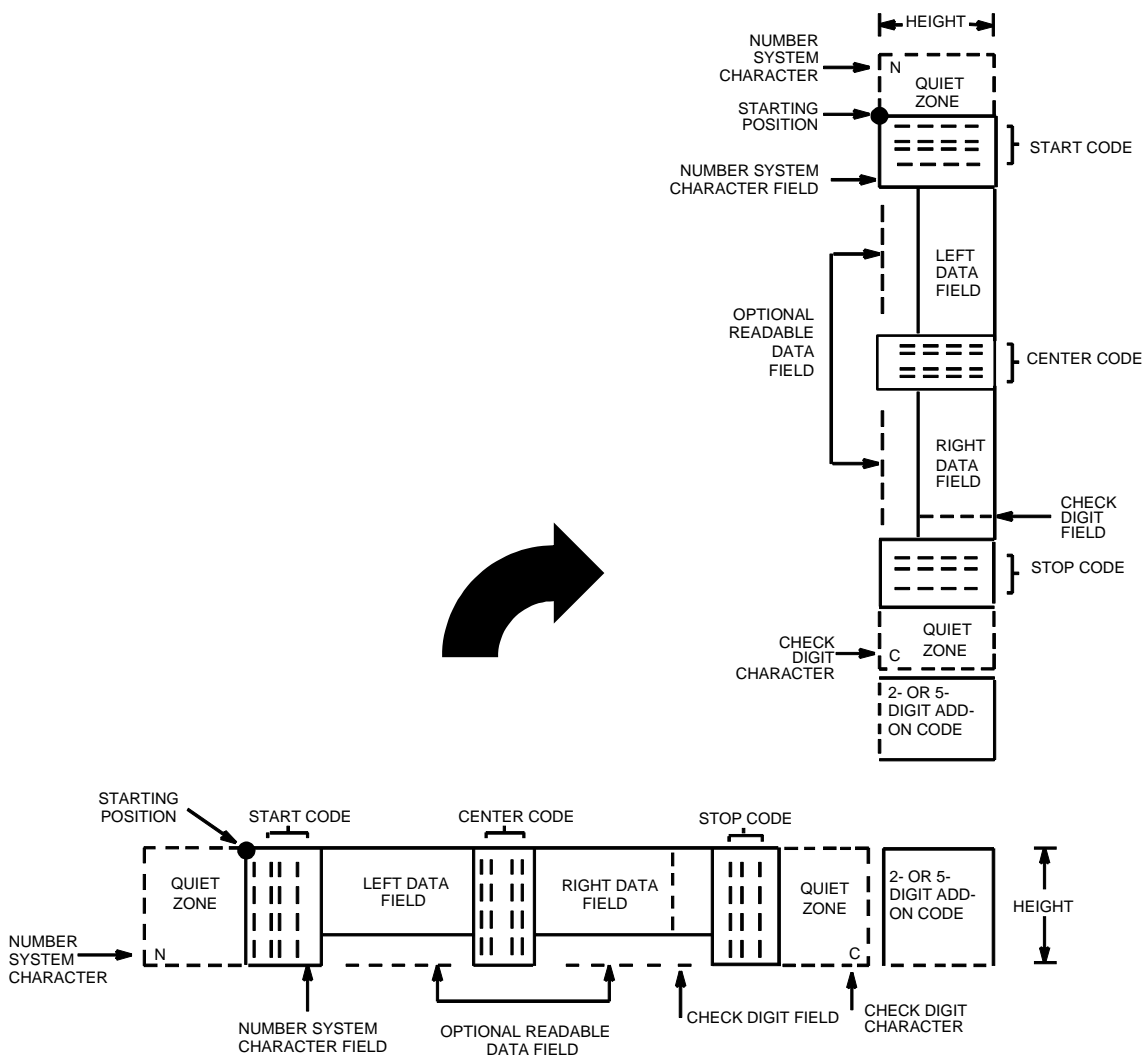


Figure 22. UPC-A Structure

### **Quiet Zone**

Quiet zones extend on both ends of the bar code to permit the scan to begin and end in a blank area. You are responsible for providing sufficient space on the form (minimum of 7 modules) for the right quiet zone. (A trailing quiet zone is provided automatically if an add-on code has been specified in the bar code command.) The number system character is printed automatically in the left quiet zone; the check digit is printed automatically in the right quiet zone.

### **Start/Center/Stop Codes**

The Start/Center/Stop codes are special character codes which extend into the printed data field area, marking the start, center, and stop portions of the bar code. These codes are automatically provided.

### **Number System Character**

The number system character field allows you to apply a code to a class or type of item and is printed in the left quiet zone. The first character in the data field is used as the number system character.

### **Data Field**

The bar code symbol uses a series of varying width bars and spaces to represent a limited character set (numbers 0-9 and Special Characters Start, Center, and Stop). The bars and spaces vary in width from 1 through 4 modules. Each character consists of 2 bars and two spaces that total 7 modules. The symbol coding of the left data field is different from the right data field to permit read direction sensing.

### **Readable Data**

The optional readable data field provides a readable interpretation of the bar code data. Readable data is printed below the horizontal bar code symbol, and to the left of a vertical bar code symbol. The lower guard band is provided when the readable data field is selected.

### **Check Digit**

The modulo-10 check digit is automatically calculated and inserted in the bar code symbol and printed in the right quiet zone, if specified. The check digit provides the means to verify accurate scanning. The number system character is included in the check digit algorithm.

## Standard UPC-A Command Format

Refer to page 135 for the IBARC, command format and definitions.

**Default Ratio:** (cc) *dir p type data* (cc)G

**Variable Ratio:** (cc) *dir p [9] [:] type [ratio] data* (cc)G

(cc) Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.

*dir* Represents the direction of the bar code. Enter **B** for horizontal bar codes; enter **C** for vertical bar codes.

*p* Prints the optional readable data field. The readable data field is printed below a horizontal bar code or on the left-hand side of a vertical bar code.

Replace *p* in the bar code command with one of the codes listed in Table 41 to print the readable data field in the corresponding font with the specified guard band gap.

**Table 41. Printable Data Field Fonts**

Font	Gap	<i>p</i> code
Standard 10 cpi	3 dots	Y
OCR-A	3 dots	O
OCR-A	.1-inch	S
OCR-B	3 dots	B
OCR-B	.1-inch	T
None		N

**Note**



For UPC 100% PDF is printed in 12 cpi Letter Gothic. For UPC 80% it is printed in 15 cpi Letter Gothic.

9 or : Optional parameter to select a variable ratio bar code. Enter the number **9** to select a variable ratio bar code. This feature overrides the default UPC-A ratio 1:1:2:2:3:3:4:4.

If the : parameter is specified, the ratios are represented in printer dots instead of Code V dots (60 x 72 dpi).

*type* Represents the bar code type. Enter **P** for standard UPC-A; enter **a** for UPC-A plus a 2-digit add-on data field; enter **b** for UPC-A plus a 5-digit add-on data field; enter **0** for UPC-A 80%; enter **1** for UPC-A 100%.

*ratio* Optional parameter (used in conjunction with **9** above) representing the ratios for variable ratio bar codes. Default ratios are overridden by the variable ratio feature. However, unique variable ratios for UPC-A bar codes easily generate large, out-of-spec bar codes. Ratio data must be hexadecimal numbers from **0** through **9** or **A** through **F**; the Code V automatically checks the input for validity. If an invalid character is found in the ratio, an error message is generated.

UPC-A bar codes use eight-digit ratios. The ratios are interpreted from left to right, measuring the size of each bar or space, in dot width, in the following pattern: *1 module wide bar : 1 module wide space : 2 module wide bar : 2 module wide space : 3 module wide bar : 3 module wide space : 4 module wide bar : 4 module wide space.*

The Code V automatically checks ratio data for validity only within the allowable hexadecimal range. The Code V does not verify that ratio data creates acceptable bar/space element relationships for bar code readability. When designing unique ratio data, carefully plot bar/space ratios to conform to readable bar codes.

*data* The bar code data. UPC-A bar codes encode exactly 11 digits. The first character is interpreted as the number system character. The next five characters are the left half of the vendor number data (on the upper side of vertically oriented symbols). The final five characters comprise the right half of the product number data (on the lower side of vertically oriented symbols). A twelfth character is an automatic check digit which is computed and printed in the last character position at the end of the product number data. If the 2- or 5-digit add-on data field is used, include this data at the end of the data field. The characters available for the data field are **0** through **9** (30 through 39 hex, respectively).

(cc)G Terminates the bar code command. Enter the SFCC for your Code V configuration immediately followed by any valid command character or **G**, the universal sequence terminator.

## UPC-A Examples

The following command generated the horizontal default ratio UPC-A bar code below. In the command sequence, graphics mode data is *italicized* and bar code data is **boldface**. Refer to the "Commands" chapter for a detailed description of alphanumeric commands.

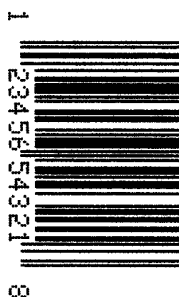
```
^PY^-^M10,10,000^KF^BYP12345654321^G^KF^-^PN^-
```



^PY^- turned on the graphics command sequence. ^M introduced the standard alphanumeric command. The character height selected was 1.0 inches and character width was selected at 1.0 inches. A 0.0 justification value plus 0 additional dots was selected for the data placement. ^KF activated Dark Print. ^B introduced the bar code command. Y selected the standard 10 cpi font to print the optional readable data field. Letter P selected the UPC-A bar code type. 12345654321 is the 11-digit bar code data (the first character, 1, is the number system character), and ^G terminated the bar code command sequence. ^KF^- at the end of the bar code sequence turned off Dark Print, and ^PN^- terminated the graphics mode.

The following command generated the vertical UPC-A bar code below using standard 10 cpi font with the standard default ratio and data of 12345654321:

```
^PY^-^M10,10,000^KF^CYP12345654321^G^KF^-^PN^-
```



## UPC-E

UPC-E bar codes are special zero-suppressed Universal Product Codes that compress 10 data characters down to 6 characters under specific rules. UPC-E bar code types include UPC-E0, UPC-E+2, UPC-E+5, UPC-E0+2, and UPC-E0+5. UPC-E also offers optional extended data fields onto existing UPC-E bar codes. The UPC-E bar code structure is shown in Figure 23 and described on the following pages.

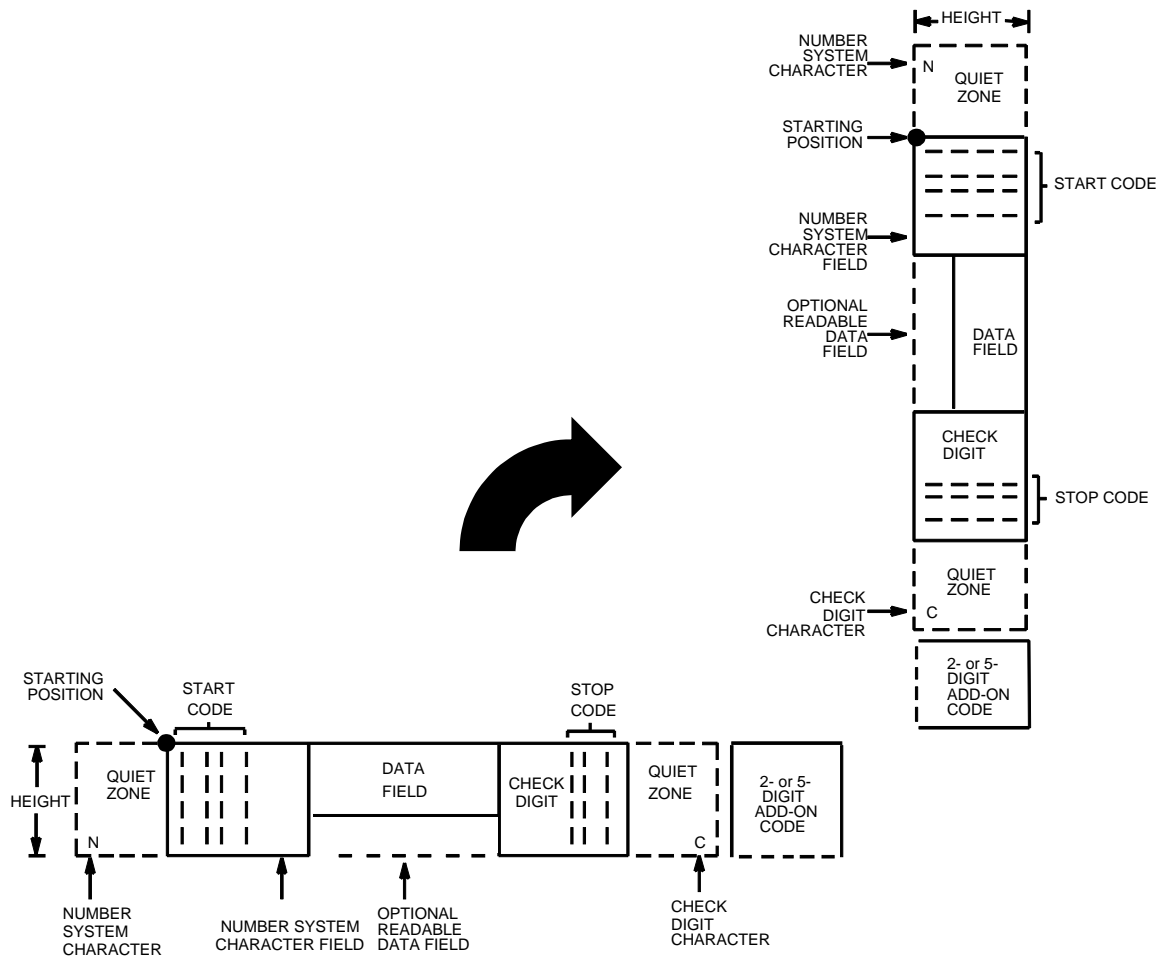


Figure 23. UPC-E Structure



## Quiet Zone

Quiet zones extend on both ends of the bar code to permit the scan to begin and end in a blank area. The Code V automatically produces an 11-module wide left quiet zone; You are responsible for providing sufficient space (minimum of 7 modules) on the form for the right quiet zone. A trailing quiet zone is provided automatically if an add-on code has been specified in the bar code command. The number system character is printed automatically in the left quiet zone. If specified, the check digit is automatically printed in the right quiet zone.

## Start/Stop Codes

The Start/Stop codes are special character codes which extend into the printed data field area, marking the start and stop portions of the bar code. These codes are automatically produced.

## Number System Character

The number system character field allows you to apply a code to a class or type of item and is printed automatically in the left quiet zone. The first character in the data field is used as the number system character.

## Data Field

The bar code symbol uses a series of varying width bars and spaces to represent a limited character set (numbers 0-9 and Special Characters Start and Stop). The bars and spaces vary in width from 1 through 4 modules. Each character consists of 2 bars and 2 spaces that total 7 modules. Six or 10 data characters are expected, depending on the UPC-E bar code type (t) selected. By modifying the syntax of the vendor number and product code, 10-digit data is compressed down to 6 digits.

## Readable Data

The optional readable data field provides a readable interpretation of the bar code data.

## Check Digit

The modulo-10 check digit is automatically calculated and inserted in the bar code symbol and printed in the right quiet zone, if specified. The check digit provides the means to verify accurate scanning. The number system character is included in the check digit algorithm.

## Standard UPC-E Command Format

Refer to page 135 for the IBARC, command format and definitions.

<b>Default Ratio:</b>	<i>(cc) dir p type data (cc)G</i>
<b>Variable Ratio:</b>	<i>(cc) dir p [9] [:] type [ratio] data (cc)G</i>
<i>(cc)</i>	Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.
<i>dir</i>	Represents the direction of the bar code. Enter <b>B</b> for horizontal bar codes; enter <b>C</b> for vertical bar codes.
<i>p</i>	Prints the optional readable data field. The readable data field is printed below a horizontal bar code or on the left-hand side of a vertical bar code.  Replace <i>p</i> in the bar code command with one of the codes listed in Table 42 to print the readable data field in the corresponding font with the specified guard band gap.

**Table 42. Printable Data Field Fonts**

Font	Gap	<i>p</i> code
Standard 10 cpi	3 dots	Y
OCR-A	3 dots	O
OCR-A	.1-inch	S
OCR-B	3 dots	B
OCR-B	.1-inch	T
None		N

*9* or *:* Optional parameter to select a variable ratio bar code. Enter the number **9** to select a variable ratio bar code. This feature overrides the default UPC-E ratio 1:1:2:2:3:3:4:4.

If the *:* parameter is specified, the ratios are represented in printer dots instead of Code V dots (60 x 72 dpi).

*type* Represents the bar code type. Enter the Type Code corresponding to the UPC-E type desired from Table 43.

Table 43. UPC-E Bar Codes

Description	Standard Type Code	IBARC, Type Code	# of Data Characters Expected	Number System Used	Default Bar/Space Ratios*
UPC-E	Q	UPCE	10*	0	1:1:2:2:3:3:4:4
UPC-E0	R	UPCE0	6	0	1:1:2:2:3:3:4:4
UPC-E+2	c	UPCE+2	12*	0	1:1:2:2:3:3:4:4
UPC-E+5	d	UPCE+5	15*	0	1:1:2:2:3:3:4:4
UPC-E0+2	e	UPCE0+2	8	0	1:1:2:2:3:3:4:4
UPC-E0+5	f	UPCE0+5	11	0	1:1:2:2:3:3:4:4

\*Type Codes **Q** (UPCE), **c** (UPCE+2), and **d** (UPCE+5) compress the data characters down to 6 by applying specific rules according to the syntax of the vendor number data. Refer to the *data* description.

*ratio*

Optional parameter (used in conjunction with **9**) representing the ratios for variable ratio bar codes. Default ratios are overridden by the variable ratio feature. However, unique variable ratios for UPC-E bar codes easily generate large, out-of-spec bar codes. Ratio data must be hexadecimal numbers from **0** through **9** or **A** through **F**; the Code V automatically checks the input for validity. If an invalid character is found in the ratio, an error message is generated.

UPC-E bar codes use eight-digit ratios. The ratios are interpreted from left to right, measuring the size of each bar or space, in dot width, in the following pattern: *1 module wide bar : 1 module wide space : 2 module wide bar : 2 module wide space : 3 module wide bar : 3 module wide space : 4 module wide bar : 4 module wide space.*

The Code V automatically checks ratio data for validity only within the allowable hexadecimal range. The Code V does not verify that ratio data creates acceptable bar/space element relationships for bar code readability. When designing unique ratio data, carefully plot bar/space ratios to conform to readable bar codes.

*data*

The bar code data. Depending on the UPC-E bar code selected from Table 43, the Code V expects a specific number of data characters to be provided. The characters available for the data field are **0** through **9** (30 through 39 hex, respectively).

When Type Code **Q**, **c**, or **d** is selected, 10 data characters are expected; the first five characters are vendor number data, and the next five characters are product code data. The +2 (Type Code **c**) and +5 (Type Code **d**) add-on data is unaffected by the compression of the first 10 data characters. The first 10 characters of the data field are automatically modified and compressed down to 6 data characters based on the syntax of the vendor number and product code. The rules for compressing data are described below:

- a. If the vendor number ends in **000**, **100**, or **200**, the 6 data characters are: the first 2 vendor numbers, the last 3 product code numbers, and the third vendor number.
- b. If the vendor number ends in **00**, the 6 data characters are: the first 3 vendor numbers, the last 2 product code numbers, and the digit "3".
- c. If the vendor number ends in **0**, the 6 data characters are: the first 4 vendor numbers, the last product code number, and the digit "4".
- d. In all other cases, the 6 data characters are: the first 5 vendors numbers and the last product code number.

For example, if the Type **Q** data field was input as 1232000001, it would be compressed down to 6 characters to read 123214: the first four vendor numbers (1232) are followed by the last product code number (1), and followed by the digit 4, resulting in 123214.

When Type Codes **R**, **e**, or **f** are selected, the Code V assumes you have already compressed the first 10 data characters down to 6 characters. The +2 (Type Codes **c** and **e**) and +5 (Type Codes **d** and **f**) add-on data is unaffected by the compression of the first 10 data characters. The bar code encodes exactly 6 digits.

Note that Type **R**, Type **e**, and Type **f** are UPC-E0 bar codes using encoding tables for 0 number system characters.

(cc)G

Terminates the bar code command. Enter the SFCC for your Code V configuration immediately followed by any valid command character or **G**, the universal sequence terminator.

## UPC-E Examples

The following command generated the horizontal default ratio UPC-E bar code below. In the command sequence, graphics mode data is *italicized* and bar code data is **boldface**. Refer to the “Commands” chapter for a detailed description of alphanumeric commands.

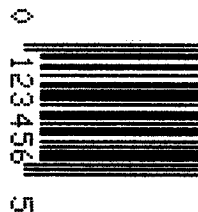
```
^PY^-^M10,10,000^KF^BYR123456^G^KF^-^PN^-
```



^PY^- turned on the graphics command sequence. ^M introduced the standard alphanumeric command. The character height selected was 1.0 inches and character width was selected at 1.0 inches. A 0.0 justification value plus 0 additional dots was selected for the data placement. ^KF activated Dark Print. ^B introduced the bar code command. Y selected the standard 10 cpi font to print the optional readable data field. Letter R selected the 6-digit, number system 0 UPC-E bar code type. 123456 is the 6-digit bar code data (the first character, 1, is the number system character), and ^G terminated the bar code command sequence. ^KF^- at the end of the bar code sequence turned off Dark Print, and ^PN^- terminated the graphics mode.

The following command generated the vertical UPC-E bar code below using standard 10 cpi font with the standard default ratio and data of 123456:

```
^PY^-^M10,10,000^KF^CYR123456^G^KF^-^PN^-
```



## UPCSHIP

The UPCSHP bar code structure is shown in Figure 24 described on the following pages.

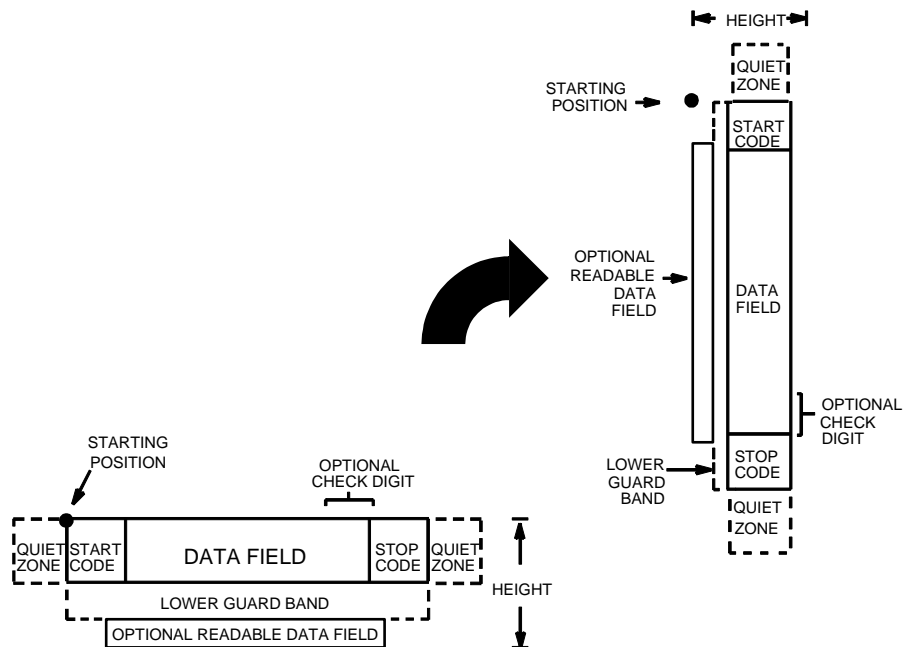


Figure 24. UPCSHP Structure

### Quiet Zone

Both ends of the bar code structure have blank quiet zones. The quiet zones should be at least 0.25 inches wide and completely blank to ensure accurate reading of the start/stop codes and to prevent adjacent bar codes from overlapping. You are responsible for providing sufficient space on the form for the quiet zones.

### Start/Stop Codes

Unique start and stop codes permit bidirectional scanning. Both start and stop codes contain bars and spaces. They are automatically produced.

### Data Field

The bar code symbol uses a series of wide and narrow bars and spaces to represent numeric characters. The structure is 2 wide elements (bars or spaces) and 3 narrow elements.

### Readable Data

The optional readable data field provides a readable interpretation of the bar code data. Readable data is printed below the horizontal bar code symbol and to the left of a vertical bar code symbol. The lower guard band is provided when the readable data field is selected.

## Check Digit

A modulo-10 check digit is automatically calculated and inserted in the bar code symbol.

## Standard UPCSHP Command Format

Refer to page 135 for the IBARC, command format and definitions.

**Default Ratio:** (cc) *dir p \$ data* (cc)G

**Variable Ratio:** (cc) *dir p [9] [:] \$ [ratio] data* (cc)G

(cc) Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.

*dir* Represents the direction of the bar code. Enter **B** for horizontal bar codes; enter **C** for vertical bar codes.

*p* Prints the optional readable data field. The readable data field is printed below a horizontal bar code or on the left-hand side of a vertical bar code.

Replace *p* in the bar code command with one of the codes listed in Table 44 to print the readable data field in the corresponding font with the specified guard band gap.

**Table 44. Printable Data Field Fonts**

Font	Gap	<i>p</i> code
Standard 10 cpi	3 dots	Y
OCR-A	3 dots	O
OCR-A	.1-inch	S
OCR-B	3 dots	B
OCR-B	.1-inch	T
None		N

9 or : Optional parameter to select a variable ratio bar code. Enter the number **9** to select a variable ratio bar code. This feature overrides the UPCSHP default ratios.

If the : parameter is specified, the ratios are represented in printer dots instead of IGP dots (60 x 72 dpi).

\$ Type code for UPCSHP. Enter **\$**.

*ratio* Optional parameter (used in conjunction with **9** above) representing the ratios for variable ratio bar codes. Default ratios are overridden by the variable ratio feature. The ratio data must be hexadecimal numbers from **0** through **9** or **A** through **F**. The Code V automatically checks the input for validity. If an invalid character is found in the ratio, an error message is generated.

UPCSHIP bar codes use four-digit ratios. The ratios are interpreted from left to right, measuring the size of each bar or space, in dot width, in the following pattern: *narrow bar : narrow space : wide bar : wide space*. For example, enter 2266 in the ratio parameter for:

2 dot-wide narrow bar  
2 dot-wide narrow space  
6 dot-wide wide bar  
6 dot-wide wide space

The Code V automatically checks ratio data for validity only within the allowable hexadecimal range. The Code V does not verify that ratio data creates acceptable wide/narrow element relationships for bar code readability. For example, the Code V accepts wide/narrow ratio values of 2 and 5, respectively; however a narrow element larger than the wide element produces an unreadable bar code. When designing unique ratio data, carefully plot wide and narrow ratios to conform to readable bar codes.

*data* The bar code data. The UPCSHP bar code requires exactly 13 characters of data.

(cc)G Terminates the bar code command. Enter the SFCC for your Code V configuration immediately followed by any valid command character or **G**, the universal sequence terminator.

### UPCSHIP Example

The following command generates the bar code shown below.

```
PY^-^M2020^IBARC,UPCSHIP,B,0001234567890^G^-^PN^-
```





## UPS 11

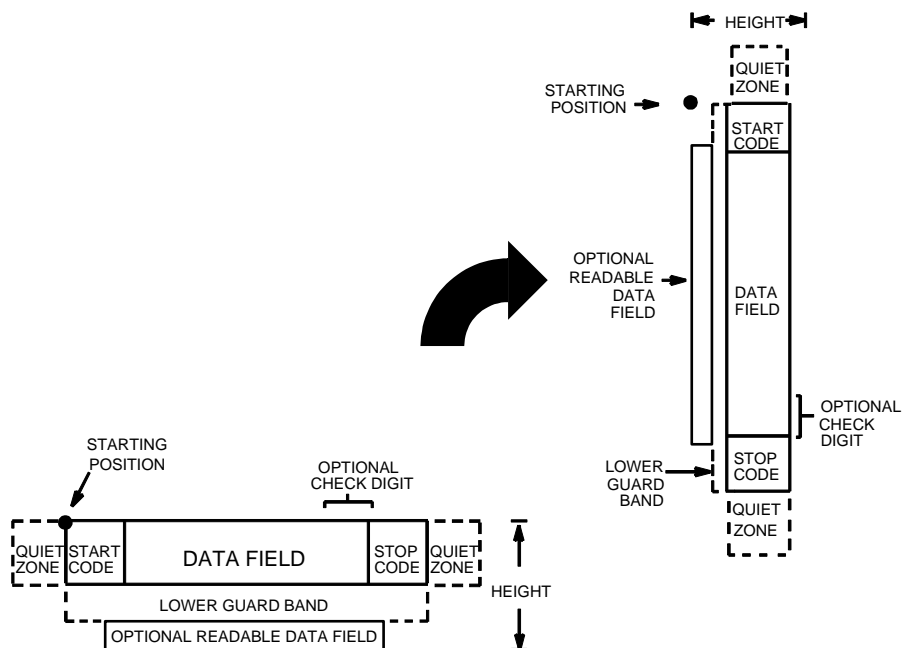


Figure 25. UPS 11 Structure

### Quiet Zone

Both ends of the bar code structure require blank quiet zones. The quiet zones must be at least 0.25 inches wide and completely blank to ensure accurate reading of the start/stop codes and to prevent adjacent bar codes from overlapping. Be sure to provide sufficient space on the form for the quiet zones.

### Start/Stop Codes

The start/stop codes identify the leading and trailing end of the bar code. Each of the UPS 11 subsets uses a unique start code and a common stop code, both automatically provided by the Code V.

### Data Field

UPS 11 is a special case of Code 128 (page 155). This bar code is restricted to 10 data characters. The first character must be 0 through 9 or A through Z. The remaining nine digits must be 0 through 9.

### Readable Data

The optional readable data field provides a readable interpretation of the bar code data. It can be printed above or below the bar code symbol.

## Check Digit

The modulo-103 check digit is automatically calculated and inserted in the bar code symbol. The check digit verifies accurate scanning. The start code is included in the check digit algorithm.

## Standard Command Format

Refer to page 135 for the IBARC, command format and definitions.

**Default Ratio:** (cc) *dir p u data* (cc)G

**Variable Ratio:** (cc) *dir p [9] [:] u [ratio] data* (cc)G

(cc) Represents the Special Function Control Code (SFCC). Enter the specific SFCC for your Code V configuration.

*dir* Represents the direction of the bar code. Enter **B** for horizontal bar codes; enter **C** for vertical bar codes.

*p* Prints the optional readable data field. The readable data field is printed below a horizontal bar code or on the left-hand side of a vertical bar code.

Replace *p* in the bar code command with one of the codes listed in Table 45 to print the readable data field in the corresponding font with the specified guard band gap.

**Table 45. Printable Data Field Fonts**

Font	Gap	<i>p</i> code
Standard 10 cpi	3 dots	Y
OCR-A	3 dots	O
OCR-A	.1-inch	S
OCR-B	3 dots	B
OCR-B	.1-inch	T
None		N

9 or : Optional parameter to select a variable ratio bar code. Enter the number **9** to select a variable ratio bar code. This feature overrides the default UPS 11 ratio of 1:1:2:2:3:3:4:4.

If the : parameter is specified, the ratios are represented in printer dots instead of Code V dots (60 x 72 dpi).

u The type code for UPS 11. Enter **u**.

*ratio* Optional parameter (used in conjunction with 9 or : above) representing the ratios for variable ratio bar codes. Default ratios are overridden by the variable ratio feature. The ratio data must be hexadecimal numbers from **0** through **9** or **A** through **F**; the Code V automatically checks the input for validity. If an invalid character is found in the ratio, an error message is generated.

UPS 11 bar codes use eight-digit ratios. The ratios are interpreted from left to right, measuring the size of each bar or space in dot width, in the following pattern: *1 module wide bar : 1 module wide space : 2 module wide bar : 2 module wide space : 3 module wide bar : 3 module wide space : 4 module wide bar : 4 module wide space*. For example, enter 22446688 in the ratio data field for:  
 2 module wide bar  
 2 module wide space  
 4 module wide bar  
 4 module wide space  
 6 module wide bar  
 6 module wide space  
 8 module wide bar  
 8 module wide space

The Code V automatically checks ratio data for validity only within the allowable hexadecimal range. The Code V does not verify that ratio data creates acceptable bar/space element relationships for bar code readability. When designing unique ratio data, carefully plot bar/space ratios to conform to readable bar codes.

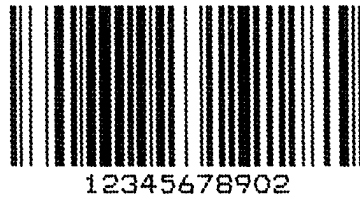
*data* The bar code data. UPS 11 bar codes are restricted to 10 data characters. The first character must be **0** through **9** or **A** through **Z**. The remaining nine digits must be **0** through **9**.

(cc)G Terminates the bar code command. Enter the SFCC for your Code V configuration immediately followed by any valid command character or **G**, the universal sequence terminator.

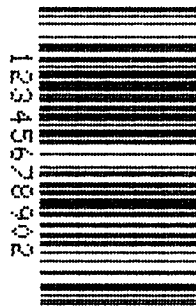
### UPS 11 Examples

The following commands generate the bar codes shown below.

`^M1010010^T0100^BYu1234567890^G^-`



`^M1010040^T0100^CYu1234567890^G^-`



# 4

## *Exercises and Examples*

### Practice Using the Code V

---

The following examples and exercises are designed to provide experience in using the Code V. The Code V command standards used in the exercises are described in the “Commands” chapter. Be sure to specifically follow the format for Code V commands to ensure proper Code V operation.

Most of the format parameters are standard to all the commands unless otherwise noted. Where applicable, some of the practice examples could be modified to use the comparable Version II commands as described in the “Commands” chapter.

Use the standard commands on your system to open a file to contain the data, and to print the file when you’re ready to print.

An explanation precedes each step in the practice exercises. Each command sequence shows the general command format (**Format**) as detailed in the “Commands” chapter. Data following **Enter** represents the input data. The parameters of each command have a specific order for data entry and a specific amount and type of data that can be entered; input the data exactly as shown with the possible exception of the SFCC. Always use the actual SFCC required by your system wherever the ^ is shown.

### Creating Alphanumeric Text

---

1. First, the Code V must be enabled for the Graphics Mode using the Graphics Mode Enable command (PY). This is the first input to change the Code V from the Normal Mode to the Graphics Mode before any graphics data or commands can be processed.

**Format:** (cc)PY(cc)-

**Enter:** ^PY^

2. To avoid accidentally terminating the graphics command sequences by a host-generated terminator, enable the Free Format command (F). This allows the Code V to accept the data as one continuous stream even though the data may contain host-generated paper motion commands. When Free Format is enabled, the Code V only recognizes the Free Format command terminators: carriage return (^-), form feed (^,), line feed (^\*), vertical tab (^+), and EVFU commands.

**Format:** (cc)F(cc)-

**Enter:** ^F^

3. Let's create some alphanumeric text. Use the standard Alphanumeric command (M) to print "IGP" in characters 1.0 inches high (*ht*) and 1.0 inches wide (*wd*). Add a pass terminator (carriage return).

**Format:** (cc)M *ht wd jus data*  
(cc)-

**Enter:** ^M10,10,000IGP  
^\_

4. To see the results, a sequence terminator must be input. For example, enable the Free Format Form Feed command (,) and print the file. The result should look like the example shown in Figure 26.

**Format:** (cc),

**Enter:** ^,



Figure 26. Practice Alphanumeric Commands

## Boxing the Alphanumeric Text

5. In order to put a box around "IGP," a certain amount of data positioning must occur. Modify the standard alphanumeric command (M) previously entered to include other commands before "IGP." Add a Justification command (J) for a 1.2 inch justification (*jus*) to move "IGP" down. Add a Horizontal Tab (T) command before "IGP" to move it 1.1 inches (*dis*) from the left margin.

**Format:** (cc)M *ht wd jus*  
(cc)J *jus* (cc)T *dis data*

**Enter:** ^M10,10,000  
^J120^T0110IGP

6. Now we can add the box around "IGP." The Box command (LB) is part of the extended graphics command set. In this example, it must be input as part of the alphanumeric command sequence (input prior to the sequence terminator). Use a Horizontal Tab command (T) to position the starting point of the box 0.9 inches (*dis*) from the left margin. Use a Justification command (J) with a zero justification to begin the box at the top of the form. Enter the Box command (LB) to create a box 4.2 inches wide (*horz*) and 2.5 inches tall (*vert*) with horizontal (*h*) and vertical (*v*) borders 3 dot rows thick.

**Format:** (cc)T *dis*  
(cc)LB *horz vert h v*

**Enter:** ^T0090^J000  
^LB0420,0250,3,3

The input file now contains the following commands. Printing the file creates a box around the name as shown in Figure 27.

```
^PY^  
^F^  
^M10,10,000  
^J120^T0110IGP  
^T0090^J000  
^LB0420,0250,3,3  
^^,
```



Figure 27. Practice Alphanumeric Commands and Box

## Creating Horizontal Lines

7. Let's put a horizontal line under "IGP." Use another Justification (J) and Horizontal Tab (T) sequence to position the line 2.3 inches (*jus*) down which is 0.3 inches under the name. Tab the line to 1.0 inches (*dis*) from the left margin which will begin the line just inside the left edge of the box. Use a Solid Line (LS) command to create a line 3.0 inches long horizontally (*horz*) and 2 dots wide vertically (*vert*). Add this data to the file before the sequence terminator. The printed result is shown in Figure 28.

**Format:** (cc)J *jus* (cc)T *dis*  
(cc)LS *horz vert*

**Enter:** ^J230^T0100  
^LS0300,0002



Figure 28. Practice Alphanumeric Commands, Box, and Line

## Creating More Alphanumeric Text

8. Use the Character Height command (H) to specify a new height (*ht*) of 0.2 inches. Use the Character Width command (W) to specify a new width (*wd*) of 0.3 inches. Use a Justification command (J) to position the word "INTELLIGENT" (*data*) at 0.1 inches (*jus*) from the starting position and a Horizontal Tab command (T) to position "INTELLIGENT" 1.1 inches (*dis*) from the left margin. Similarly, using the Justification and Tab sequence, the word "GRAPHICS" can be positioned 0.4 inches down, 1.6 inches from the left margin, and the word "PRINTING" 0.7 inches down, 2.1 inches from the left margin. Notice how it is possible to tab and justify to any position. Tabs are related to the left margin and can be specified in any print position left or right of the current print position. Justification is relative to the starting point of the command sequence and can move down and back up relative to that point.



**Format:** (cc)H *ht* (cc)W *wd*  
(cc)J *jus* (cc)T *dis data*

**Enter:** ^H02^W03  
^J010^T0110INTELLIGENT  
^J040^T0160GRAPHICS  
^J070^T0210PRINTING

9. Disable the Free Format command(O) and use the Graphics Mode Disable command (PN).

**Format:** (cc)O (cc)PN(cc)-

**Enter:** ^O^PN^-

The file now contains the following commands. The printout is shown in Figure 29.

```
^PY^-^F^-
^M10, 10, 000
^J120^ T0110IGP
^T0090^ J000
^LB0420, 0250, 3, 3
^J230^ T0100
^LS0300, 0002
^H02^W03
^J010^T0110INTELLIGENT
^J040^T0160GRAPHICS
^J070^T0210PRINTING
^-,
^, ^O^-^PN^-
```



Figure 29. Completed Practice Example

## Form Example

---

The following exercise produces a complete form by sketching it out on a grid. (Use the Standard Grid and Logo grid provided in Appendix C.) The starting and ending values are the data for the Code V command parameters. The form includes a box, a logo, a bar code, vertical and horizontal lines and alphanumeric data.

### Page Layout Considerations

---

At 6 lines per inch (lpi) and 10 characters per inch (cpi) printing, a standard 8-1/2 x 11-inch sheet of paper has a print area of 66 lines (rows) and 85 characters (columns). (The printable area varies if you are not printing at 6 lpi and 10 cpi.) Thus, the grid used to design an 8-1/2 x 11-inch form should accommodate this 66 x 85 area.

### Planning the Form Layout

---

In this example, assume you work for the HandCraft Boat Company. Your slogan is "Quality boats crafted by hand," and the owner, Mr. Handcraft, has asked you to design a simple form that his salesman can use for special orders. On the form, he wants a logo, the slogan, the customer's name, spaces for other particulars of the order, and a bar code to distinguish the sales region and boat division from other HandCraft enterprises. Begin your task as described below.

All data and commands for the form are entered into a file on the host computer. Again, use the standard commands on your system to open a file to contain the data and to print the file.

Similar to the previous examples, the information you are to input is listed under the word **Enter**. Input the data exactly as it is shown with the possible exception of the SFCC. Always use the actual SFCC required by your system wherever the ^ is shown. For each command sequence, the general command format is listed under the word **Format**. In the general format, the SFCC is shown as (cc).

Remember to properly terminate each command line. Make sure the printer power is on and the printer is ready and on line.

**HandCraft Boats**

CUSTOMER: \_\_\_\_\_ PHONE: \_\_\_\_\_  
 HULL NO: \_\_\_\_\_ RIGGING: \_\_\_\_\_  
 COLOR: \_\_\_\_\_ DELIVERY DATE: \_\_\_\_\_

SPECIAL ORDER ITEMS

ITEM	DESCRIPTION	PRICE

HANDCRAFT BOATS  
 123 MAIN ST.  
 BEAT TOWN, PA 12345  
 (764) 123-4567

QUALITY BOATS CRAFTED BY HAND  
 HANDCRAFT BOATS  
 NC

Figure 30. Sample Form Design

## Design the Form

---

1. First, design the form on a grid as shown in Figure 30. A standard grid example is provided in Appendix C. Designing the form on the grid allows you to decide where each form element will be placed. Compensate for expanded alphanumerics and plan for the logo.

### Enable Code V Graphics

2. The Code V must be enabled for the Graphics Mode using the Graphics Mode Enable command (PY). This is the first input to change the Code V from the Normal Mode to the Graphics Mode.

**Format:** (cc)PY (cc)-

**Enter:** ^PY^

3. To avoid accidentally terminating the graphics command sequence by a host-generated terminator, enable the Free Format command (F). This allows the Code V to accept the data as one continuous stream even though the data may contain host-generated paper motion commands. When Free Format is enabled, the Code V only recognizes the Free Format command terminators: Carriage Return (^-), Form Feed (^,), Line Feed (^\*), Vertical Tab (^+), and EVFU commands.

**Format:** (cc)F (cc)-

**Enter:** ^F^

4. To begin form processing at a top-of-form position, send a Free Format Form Feed command (,).

**Format:** (cc),

**Enter:** ^,

5. The Code V is now ready to accept the commands and data for the form. Most of the form and form elements are designed using the extended graphics command set. Consequently, one of the alphanumeric commands or the Interrupt command must be used to introduce, or enable, the extended graphics commands. Begin by inputting the Standard Alphanumeric command (M) immediately followed by the Dark Print command (KF) to produce the form in a darker contrast. No other Alphanumeric command parameters are needed at this time.

**Format:** (cc)M(cc)KF

**Enter:** ^M^KF

## Position Form Elements

6. Each of the various form elements must be properly positioned within the form. A Justification command (J) can be used to adjust the vertical position and a Horizontal Tab command (T) can be used to adjust the horizontal position for the first form element. Position the first element 1.1 inches (*jus*) down from the current print position and 1.0 inches (*dis*) in from the left margin.

**Format:** (cc)J *jus* (cc)T *dis*

**Enter:** ^J110^T0100

## Create the Box Around the Form

7. The outer box of the form can be input using the Box command (LB). The box should be 6.0 inches wide (*horz*), 7.4 inches tall (*vert*), with a 3-dot horizontal (*h*) and vertical (*v*) line thickness.

**Format:** (cc)LB *horz vert h v*

**Enter:** ^LB0600,0740,3,3

## Design the Logo

8. Define the logo, and return to the form to add the logo data. The HandCraft logo is a hand with a sailboat as plotted in Figure 31. Use the Logo Grid in Appendix C to plot the dot positions for your logo the same way. Drawing the logo out on a grid permits the dot positions for each vertical data byte in the logo to be computed and input as data in the Plotting Graphics (Q) command. Notice that where dot positions are *not* computed, the boat image in the hand emerges. The complete program for the HandCraft logo starts on page 240.

## Translate Logo Design Into Data

Each hexadecimal data byte specifies a seven-bit dot row portion of the logo, measuring 0.1 inch. The Most Significant Bit (MSB) of the data byte corresponds to row 7 (the top bit row), and the bit rows continue through the other bits to the Least Significant Bit (LSB) of the data byte, which corresponds to row 1 (the bottom row). If the bit is set, a dot is printed in the corresponding location. A hex data byte value of 7F prints dots in all seven rows ( $64 + 32 + 16 + 8 + 4 + 2 + 1$ ); a hex value of 40 (64 decimal) prints a dot only in bit row 7. Refer to page 105 in the "Commands" chapter for more information on the Graphics Plotting (Columns) command.

For example, the values in Table 46 have been assigned to bits 1 through 7 for the first 0.1-inch row of data bytes (1 through 42) shown in Figure 31. Each byte was first calculated in decimal and then converted to the equivalent hexadecimal value (using the ASCII chart in Appendix A). The hexadecimal values are the data for the program shown on page 240.

Table 46. Decimal to Hex Conversions

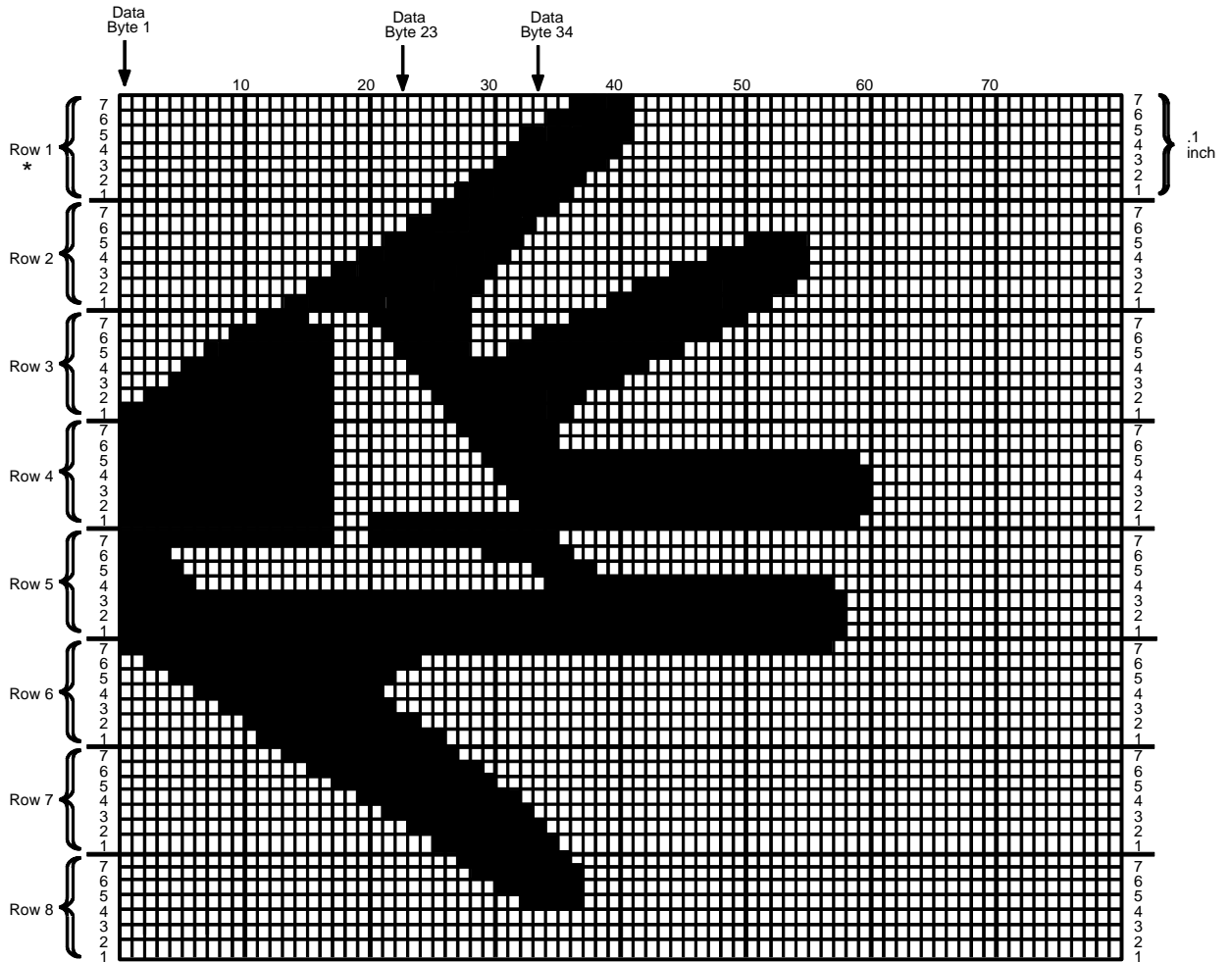
Data Byte #	Decimal Value	Converted to Hexadecimal Value
1 through 27	00	00
28	01	01
29	03	03
30	03	03
31	07 (4+2+1)	07
32	15 (8+4+2+1)	0F
33	31 (16+8+4+2+1)	1F
34	31	1F
35	63 (32+16+8+4+2+1)	3F
36	63	3F
37	126 (64+32+16+8+4+2)	7E
38	124 (64+32+16+8+4)	7C
39	124	7C
40	120 (64+32+16+8)	78
41	112 (64+32+16)	70

**Note**

Data bytes containing no value (00), such as bytes 1 through 27 above, must be listed when actual data follows. However, any remaining 00 data bytes following the *end* of data for that line, such as bytes 42 through 80, need not be listed. The universal terminator, (cc)G, signals the end of data for that line.

Following this scheme, all hex data bytes for an entire 0.1 inch row (seven vertical dot rows) of the logo can be calculated. Subsequent rows are calculated similarly. To print each 0.1-inch row of the logo, the print position is shifted down 0.1 inch using the Justification command, and then same vertical data byte columns are used. (See the second example in Figure 31.)

Use the extended command for Graphics Plotting in columns (Q). The Standard Alphanumeric command (M) introduces the Q command. The Standard Alphanumeric command is also required with the Justification (J) command to begin printing the logo 1.2 inches (*jus*) down from the original print position and subsequently adjusted 0.1 inches with each row. The Horizontal Tab (T) command is used to begin logo printing 1.7 inches and 5 dot rows (*dis*) from the left margin.



Actual size of this logo is approximately .8-inch tall by 1-inch wide.  
 \*Each 7-bit vertical data byte equals .1-inch or 1 "row".

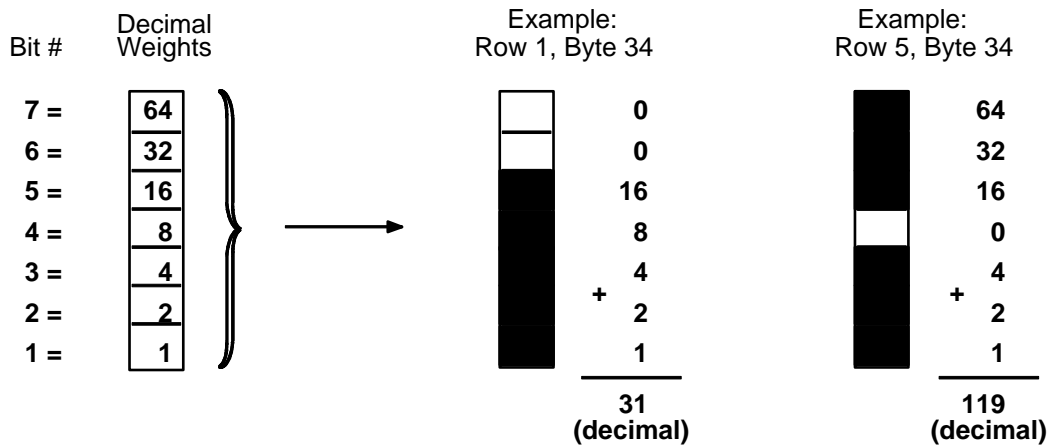


Figure 31. Logo Design

## Input the Logo Data

Input the command sequence for the Standard Alphanumeric command, Justification command, Horizontal Tab command, and Graphics Plot command for each 0.1-inch row of hex data in the logo. Each group of data below represents, from top to bottom, the eight 0.1-inch rows required to produce the logo.



The spaces separating each group are for readability; do not include these spaces in your program.

---

**Format:** (cc)M(cc)J *jus* (cc)T *dis* (cc)Q *data* (cc)G

**Enter:** ^M^J120^T0175^Q  
 00,  
 00,00,00,01,03,03,07,0F,1F,1F,3F,3F,7E,7C,7C,78,70^G

**Enter:** ^M^J130^T0175^Q  
 00,00,00,00,00,00,00,00,00,00,00,00,00,01,01,03,03,07,07,0F,0F,1F,1F,3F,  
 3F,7F,7F,7F,7E,7C,78,70,60,40,40,00,00,00,00,01,01,03,03,03,07,07,07,0F,  
 0F,0F,1F,1F,1E,1E,1C^G

**Enter:** ^M^J140^T0175^Q  
 01,01,03,03,07,0F,0F,1F,1F,3F,3F,7F,7F,7F,7F,3F,3F,00,00,00,40,60,70,78,  
 7C,7E,7F,7F,0F,0F,0F,1F,1F,3F,3F,3F,7E,7C,7C,7C,78,78,70,70,70,60,60,  
 60,40,40^G

**Enter:** ^M^J150^T0175^Q  
 7F,7F,7F,7F,7F,7F,7F,7F,7F,7F,7F,7F,7F,7F,7F,7F,00,00,00,01,01,01,  
 01,01,01,01,41,61,71,79,7D,7F,7F,7F,1F,1F,1F,1F,1F,1F,1F,1F,1F,1F,  
 1F,1F,1F,1F,1F,1F,1F,1F,1F,1F,1F,1F,1F,1F,0E^G

**Enter:** ^M^J160^T0175^Q  
 7F,7F,7F,7F,5F,4F,47,47,47,47,47,47,47,47,47,47,07,07,07,47,47,47,47,  
 47,47,47,47,47,67,67,67,67,77,7F,3F,1F,1F,0F,0F,0F,0F,0F,0F,0F,0F,0F,  
 0F,0F,0F,0F,0F,0F,0F,0F,07^G

**Enter:** ^M^J170^T0175^Q  
 40,40,60,60,70,70,78,78,7C,7C,7E,7F,7F,7F,7F,7F,7F,7F,7F,7F,77,63,  
 63,41,41,40,40,40,40,40,40,40,40,40,40,40,40,40,40,40,40,40,40,40,  
 40,40,40,40,40,40,40,40,40,40^G

**Enter:** ^M^J180^T0175^Q  
 00,00,00,00,00,00,00,00,00,00,00,00,00,00,40,40,60,60,70,70,78,78,7C,7C,7E,  
 7E,7F,7F,3F,3F,1F,0F,0F,07,03,01^G

**Enter:** ^M^J190^T0175^Q  
 00,  
 00,00,00,40,60,60,70,70,78,78,78,78,38^G



## Enter the Company Heading

9. Next to the logo, print the company name, HandCraft Boats, in characters 0.3 inches high (*ht*) and 0.2 inches wide (*wd*) using the Standard Alphanumeric command (M). Position the name 1.2 inches and 9 dot rows (*jus*) down from the current print position, using the Justification parameter of the Alphanumeric command and 3.1 inches (*dis*) from the left margin using the Horizontal Tab (T) command. An Interrupt command (I) is a most efficient way to input this type of data into various locations on the form and it is used frequently in the remainder of the form processing. Using the Interrupt command (followed by a Graphics Mode carriage return), we can print what we have programmed so far, then move the print position to 2.2 inches (*dis*) below the current start position.

**Format:** (cc)M *ht wd jus* (cc)T *dis data* (cc)G  
(cc)I *dis* (cc)-

**Enter:** ^M03,02,129^T0310HandCraft Boats^G  
^I220^-  
^O^-^PN^-

The file on the host system for this form to this point contains all the information listed below. Use your system standard command format to print the file. The form should look like the one shown in Figure 32. If errors occur, review your input and refer to the "Error Codes" chapter.

```

^PY^-
^F^-
^,
^M^KF
^J110^T0100
^LB0600,0740,3,3
^M^J120^T0175^Q
00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,
00,00,00,01,03,03,07,0F,1F,1F,3F,3F,7E,7C,7C,78,70^G
^M^J130^T0175^Q
00,00,00,00,00,00,00,00,00,00,00,00,00,01,01,03,03,07,07,0F,0F,1F,1F,3F,
3F,7F,7F,7F,7E,7C,78,70,60,40,40,00,00,00,00,01,01,03,03,03,07,07,07,0F,
0F,0F,1F,1F,1E,1E,1C^G
^M^J140^T0175^Q
01,01,03,03,07,0F,0F,1F,1F,3F,3F,7F,7F,7F,7F,3F,3F,00,00,00,40,60,70,78,
7C,7E,7F,7F,0F,0F,0F,1F,1F,3F,3F,3F,7E,7C,7C,7C,78,78,70,70,70,60,60,
60,40,40^G
^M^J150^T0175^Q
7F,7F,7F,7F,7F,7F,7F,7F,7F,7F,7F,7F,7F,7F,7F,7F,00,00,00,01,01,01,
01,01,01,01,41,61,71,79,7D,7F,7F,7F,1F,1F,1F,1F,1F,1F,1F,1F,1F,1F,1F,
1F,1F,1F,1F,1F,1F,1F,1F,1F,1F,1F,1F,0E^G
^M^J160^T0175^Q
7F,7F,7F,7F,5F,4F,47,47,47,47,47,47,47,47,47,47,07,07,07,47,47,47,47,
47,47,47,47,47,67,67,67,67,77,7F,3F,1F,1F,0F,0F,0F,0F,0F,0F,0F,0F,0F,
0F,0F,0F,0F,0F,0F,07^G
^M^J170^T0175^Q
40,40,60,60,70,70,78,78,7C,7C,7E,7F,7F,7F,7F,7F,7F,7F,7F,7F,77,63,
63,41,41,40,40,40,40,40,40,40,40,40,40,40,40,40,40,40,40,40,40,40,40,
40,40,40,40,40,40,40,40,40,40^G

```

```

^M^J180^T0175^Q
00,00,00,00,00,00,00,00,00,00,00,00,00,00,40,40,60,60,70,70,78,78,7C,7C,7E,
7E,7F,7F,3F,3F,1F,0F,0F,07,03,01^G
^M^J190^T0175^Q
00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,
00,00,00,40,60,60,70,70,78,78,78,78,38^G
^M03,02,129^T0310HandCraft Boats^G
^|220^-
^Q^-^PN^-

```

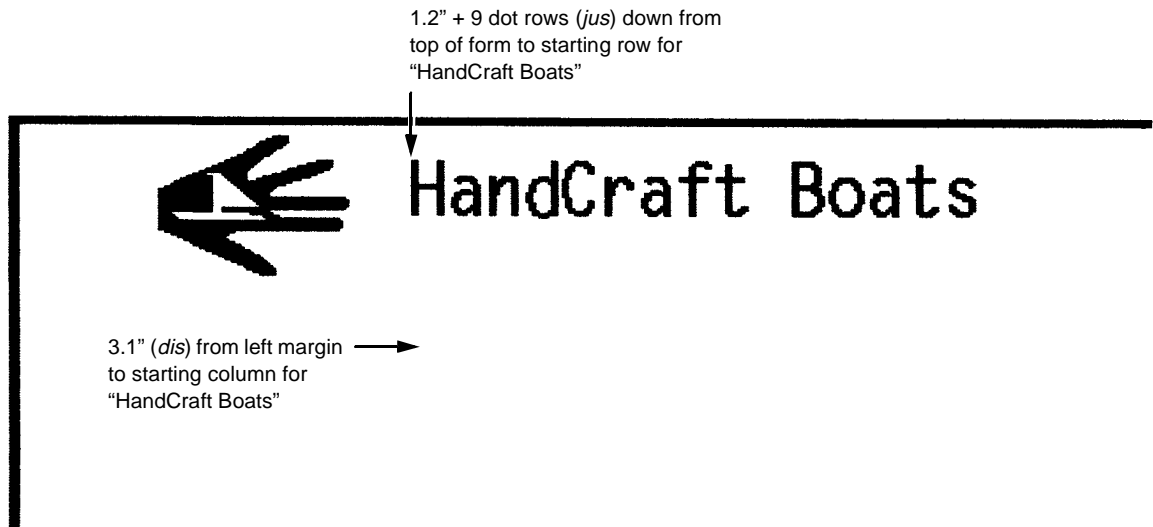


Figure 32. Box, Logo, and Alphanumeric Commands

### Enter Alphanumeric Text Throughout the Form

10. Now input the customer related information on the top portion of the form. Send the Dark Print command (KF) to specify bold character printing and use the Standard Alphanumeric command (M) to specify 0.1 inch high (*ht*) and 0.1 inch wide (*wd*) characters. With the Horizontal Tab command (T), position the CUSTOMER: data 1.5 inches (*dis*) from the left margin and position the PHONE: data 5.1 inches (*dis*) from the left margin.

**Format:** (cc)M *ht wd jus* (cc)KF *data*  
(cc)T *dis data*

**Enter:** ^M01,01,000^KF  
^T0150CUSTOMER:^T0510PHONE:

11. Other pieces of the customer type data can be added to the top part of the form from within the same alphanumeric command sequence initiated in the previous step. Using a Justification command (J), the print position can be lowered 0.4 inches (*jus*). Using Horizontal Tab commands (T), the HULL NO: data can be positioned 1.5 inches (*dis*) from the left margin and the RIGGING: data can be positioned 4.9 inches (*dis*) from the left margin.

**Format:** (cc)J *jus*  
(cc)T *dis data*

**Enter:** ^J040  
^T0150HULL NO:^T0490RIGGING:

12. The next set of customer data can be input in a similar fashion. Use the Justification command (J) to move the print position down 0.8 inches (*jus*), use the Horizontal Tab command (T) to position the COLOR: data 1.5 inches (*dis*) from the left margin and the DELIVERY DATE: data 4.4 inches (*dis*) from the left margin.

**Format:** (cc)J *jus*  
(cc)T *dis data*

**Enter:** ^J080  
^T0150COLOR:^T0440DELIVERY DATE:

13. The remaining text on the top portion of the form can now be entered, again using a combination of Justification (J) and Horizontal Tab (T) commands. Begin by justifying the print position 1.4 inches (*jus*) down and tabbing 3.2 inches (*dis*) from the left margin for the SPECIAL ORDER ITEMS heading.

Justify the print position 1.8 inches (*jus*) and tab 1.7 inches (*dis*) for the ITEM heading, 3.5 inches (*dis*) for the DESCRIPTION heading, and 6.0 inches (*dis*) for the PRICE heading. Notice that the Justification command always moves the print position relative to the last printed row position of the alphanumeric command sequence. For this reason, the SPECIAL ORDER ITEMS heading justified at 1.4 inches is 0.4 inches above the ITEM, DESCRIPTION, and PRICE headings justified at 1.8 inches.

Similarly, the Horizontal Tab command moves the print position relative to the left margin. Unlike a conventional typewriter, this allows you to move the print position to the left or the right of the current position simply by specifying a different tab position relative to the left margin.

Use the Interrupt command (I) followed by a Graphics Mode carriage return (-) to position this part of the form 2.0 inches (*dis*) from the previously active graphics command sequence (the sequence that constructed the customer data).

**Format:** (cc)J *jus*  
(cc)T *dis data*  
(cc)I *dis* (cc)-

**Enter:** ^J140  
^T0320SPECIAL ORDER ITEMS  
^J180  
^T0170ITEM^T0350DESCRIPTION^T0600PRICE  
^I200^-

## Enter the Interior Box with Horizontal and Vertical Lines

14. Now we can add the interior form (the box with vertical lines) for the item, description, and price data. The Code V Form command constructs a box complete with vertical lines at specified positions.

A Standard Alphanumeric command (M) sequence must be entered to introduce the extended graphics commands that are used. Use a Horizontal Tab command (T) to move the print position 1.5 inches (*dis*) from the left margin and specify dark print with the Dark Print command (KF). In the same sequence, use the Form command (LF) to specify a 5.2-inch horizontal width (*horz*) and 2.9-inch vertical height (*vert*) of the box, both horizontal (*h*) and vertical (*v*) edges 2 dot line thickness.

In the same form command, specify one vertical line 0.8" (*Line1*) from the edge of the form with a 1 dot line thickness (*T*) and another vertical line 3.6" (*Line2*) from the previous line also with a 1-dot line thickness (*T*).

**Format:** (cc)M (cc) T *dis* (cc)KF  
(cc)LF *horz vert h v line1 T line2 T*

**Enter:** ^M^T0150^KF  
^LF0520,0290,2,2,0080,1,0360,1

15. The horizontal lines can be added to the interior box. Again, an Interrupt command (I) is used to process and print the data 0.4 inches (*dis*) lower than the top border of the interior box. The Standard Alphanumeric command (M) is used to introduce the other commands in the sequence. Use the Dark Print command (KF) to specify dark print and use the Horizontal Tab command (T) to tab 1.5 inches from the left margin for the horizontal print position. The solid horizontal lines are generated using the Solid Line (LS) command. Specify a 5.2 inch horizontal (*horz*) length and a 0.0 and 1 dot vertical length (*vert*), used as the line thickness in this case.


**Format:** (cc)I *dis* (cc)-  
(cc)M (cc)KF (cc)T *dis* (cc)LS *horz vert*

**Enter:** ^I040^-  
^M^KF^T0150^LS0520,0001

16. To print five more horizontal lines identical to the one created in the previous step and evenly spaced 0.4 inches apart, the same command used in the previous step can be repeated five times. An Interrupt command (I) followed by a Graphics Mode carriage return is used to move the print position 0.8 inches (*dis*) lower.

**Enter:** ^I040^-  
^M^KF^T0150^LS0520,0001  
^I040^-  
^M^KF^T0150^LS0520,0001  
^I040^-  
^M^KF^T0150^LS0520,0001  
^I040^-  
^M^KF^T0150^LS0520,0001  
^I040^-  
^M^KF^T0150^LS0520,0001  
^I080^-

Now we have completed the text in the upper portion of the form and the lined box for the item, description, and price data. Our sample HandCraft Boats form now looks like the one shown in Figure 33.



# HandCraft Boats

CUSTOMER:

PHONE:

HULL NO:

RIGGING

COLOR:

DELIVERY DATE:

SPECIAL ORDER ITEMS

ITEM	DESCRIPTION	PRICE

Figure 33. Practice Form Example

## Enter the Corners

17. A series of lines can be drawn to create the corners around the slogan at the bottom of the form. A Standard Alphanumeric command (M) is used to introduce the command sequence, including the Dark Print command (KF). A Horizontal Tab command (T) is used to move the print position of the upper left horizontal line of the corner 2.5 inches (*dis*) from the left margin. A Solid Line command (LS) is used to specify the upper left line of the corner as 0.5 inches plus 5 dots horizontal length (*horz*) and 2 dots vertical length (*vert*).

**Format:** (cc)M (cc)KF (cc)T *dis* (cc)LS *horz vert*

**Enter:** ^M^KF^T0250^LS0055,0002

18. Within the same alphanumeric command sequence, another Horizontal tab command (T) is used to move the print position 5.1 inches (*dis*) from the left margin for the upper right line of the corner. Another Solid Line command (LS) is used to specify the upper right line of the corner as 0.5 inches plus 5 dots horizontal length (*horz*) and 2 dots vertical length (*vert*).

**Format:** (cc)M (cc)KF (cc)T *dis* (cc)LS *horz vert*

**Enter:** ^T0510^LS0055,0002

19. The two vertical lines of the corner set are drawn in a similar fashion within the same command sequence. For the left vertical line, the Horizontal Tab (T) command specifies a tab position 2.5 inches (*dis*) from the left margin and the Solid Line (LS) command creates a line 2 dots in horizontal length (*horz*) and 0.82 inches vertical length (*vert*). The right vertical line is positioned by a tab 5.6 inches and 5 dots (*dis*) from the left margin and the line is created 2 dots horizontal length (*horz*) and 0.82 inches vertical length (*vert*).

**Format:** (cc)T *dis* (cc)LS *horz vert*

**Enter:** ^T0250^LS0002,0082  
^T0565^LS0002,0082

20. The left and right horizontal bottom lines of the corner set are justified 0.8 inches (*jus*) down using a Justification (J) command. Following the justification, a Horizontal Tab (T) moves the print position 2.5 inches (*dis*) from the left margin for the left line created by a Solid Line command (LS) as 0.5 inches plus 5 dots horizontal length (*horz*) and 2 dots vertical length (*vert*). The right bottom line is created 0.5 inches plus 5 dots horizontal length (*horz*) and 2 dots vertical length (*vert*) at a position 5.1 inches from the left margin (*dis*).

**Format:** (cc)J *jus* (cc)T *dis* (cc)LS *horz vert*  
(cc)T *dis* (cc)LS *horz vert*

**Enter:** ^J080^T0250^LS0055,0002  
^T0510^LS0055,0002

21. To generate the HandCraft Boats company address and phone number data on the lower left of the form, justify the text 2 dots (*jus*) using the Justification (J) command, tab in 1.5 inches (*dis*) from the left margin with the Horizontal Tab (T) command, select the 17.1 cpi font with the Compressed Print (S) command, and supply the HANDCRAFT BOATS company name as the data.

**Format:** (cc)J *jus* (cc)T *dis* (cc)S F *data*

**Enter:** ^J002^T0150^S5HANDCRAFT BOATS

22. The street address line is justified 0.2 inches lower (*jus*) using a Justification command (J), positioned 1.5 inches (*dis*) from the left margin with a Horizontal Tab command (T), a 17.1 cpi compressed print command (S5) is sent for each new line of data, and the data is supplied as 123 BOAT WAY.

**Format:** (cc)J *jus* (cc)T *dis* (cc)S F *data*

**Enter:** ^J020^T0150^S5123 BOAT WAY

23. Using the same type of Justification command (J) and Horizontal Tab (T) command set, the BOAT TOWN, CA city data is justified 0.3 plus 6 dots (*jus*) and tabbed 1.5 inches (*dis*); the 333444 zip code data is justified 0.5 plus 5 dots (*jus*) and tabbed 1.9 inches plus 5 dots (*dis*); the (714) 555-0011 phone number data is justified 0.7 plus 3 dots and tabbed 1.5 inches (*dis*). A new 17.1 cpi compressed print command (S5) is required immediately preceding each line of data.

**Format:** (cc)J *jus* (cc)T *dis* (cc)S F *data*

**Enter:** ^J036^T0150^S5BOAT TOWN, CA  
^J055^T0195^S5333444  
^J073^T0150^S5(714)555-0011

## Enter the Slogan

24. Now we can add the slogan between the corners previously drawn. A Standard Alphanumeric command (M) is used to specify characters 0.1 inch high (*ht*), 0.1 inch wide (*wd*), and justified 0.4 inches (*jus*). The slogan is tabbed 2.7 inches (*dis*) from the left margin, lowercase descending characters are enabled by the Descending Characters (D) command, the slogan Quality Boats Crafted By Hand is supplied as data.

**Format:** (cc)M *ht wd jus*  
(cc)T *dis* (cc)D *data*


**Enter:** ^M01,01,040  
^T0270^DQuality Boats Crafted By Hand

25. Enter the bar code





40,40,60,60,70,70,78,78,7C,7C,7E,7F,7F,7F,7F,7F,7F,7F,7F,7F,77,63,  
63,41,41,40,40,40,40,40,40,40,40,40,40,40,40,40,40,40,40,40,40,40,  
40,  
^M^J180^T0175^Q  
00,  
7F,3F,3F,1F,0F,0F,07,03,01^G  
^M^J190^T0175^Q  
00,  
00,00,00,40,60,60,70,70,78,78,78,78,38^G  
^M03,02,129^T0310HandCraft Boats^G  
^I220^-  
^M01,01,000^KF  
^T0150CUSTOMER:^T0510PHONE:  
^J040  
^T0150HULL NO:^T0490RIGGING:  
^J080  
^T0150COLOR:^T0440DELIVERY DATE:  
^J140  
^T0320SPECIAL ORDER ITEMS  
^J180  
^T0170ITEM^T0350DESCRIPTION^T0600PRICE  
^I200^-  
^M^T0150^KF  
^L^F0520,0290,2,2,0080,1,0360,1  
^I040^-  
^M^KF^T0150^LS0520,0001  
^I040^-  
^M^KF^T0150^LS0520,0001  
^I040^-  
^M^KF^T0150^LS0520,0001  
^I040^-  
^M^KF^T0150^LS0520,0001  
^I040^-  
^M^KF^T0150^LS0520,0001  
^I040^-  
^M^KF^T0150^LS0520,0001  
^I040^-  
^M^KF^T0150^LS0520,0001  
^I080^-  
^M^KF^T0250^LS0055,0002  
^T0510^LS0055,0002  
^T0250^LS0002,0082  
^T0565^LS0002,0082  
^J080^T0250^LS0055,0002  
^T0510^LS0055,0002  
^J002^T0150^S5HANDCRAFT BOATS  
^J020^T0150^S5123 BOAT WAY  
^J036^T0150^S5BOAT TOWN, CA  
^J055^T0195^S5333444  
^J073^T0150^S5(714)555-0011^M01,01,040  
^T0270^DQuality Boats Crafted By Hand  
^H03^J050^T0590  
^BYAWC^G  
^O^-^PN^-



# HandCraft Boats

CUSTOMER:

PHONE:

HULL NO:

RIGGING

COLOR:


DELIVERY DATE:

SPECIAL ORDER ITEMS

ITEM	DESCRIPTION	PRICE

**HANDCRAFT BOATS**  
 123 BOAT WAY  
 BOAT TOWN, CA  
 333444  
 (714)555-0011

QUALITY BOATS CRAFTED BY HAND



WC

Figure 34. Completed Practice Form Example

## Label Example

---

This practice exercise is designed to provide experience in creating and processing labels of all kinds. The label includes:

- horizontal duplication
- alphanumeric data
- horizontal and vertical lines
- dynamic data fields
- boxes
- bar codes

## Design the Label

---

As in the form example, all data for the labels is entered into a file on the host computer. Use your standard system commands to open the file and print the file as needed. Also, the same Enter/Format explanations are provided in this example. You enter the data listed under **Enter**; the general command format is listed under **Format**. Always use the actual SFCC required by your system wherever the ^ is shown in the examples or where the (cc) is shown in the general format. Do not forget to properly terminate each command line. Make sure the printer power is on, and the printer is ready, and on line.

The labels for this exercise are shown in Figure 35, complete with all label elements and data. One label is actually created by the Code V commands and then duplicated horizontally on the page. When the first set of dynamic data is supplied, it is inserted in the label and in the duplicate. The second set of dynamic data is inserted in a second label and duplicate. This process could be continued to produce any number of labels.

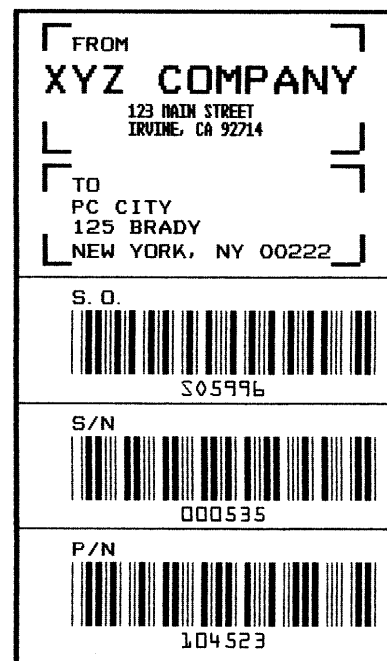
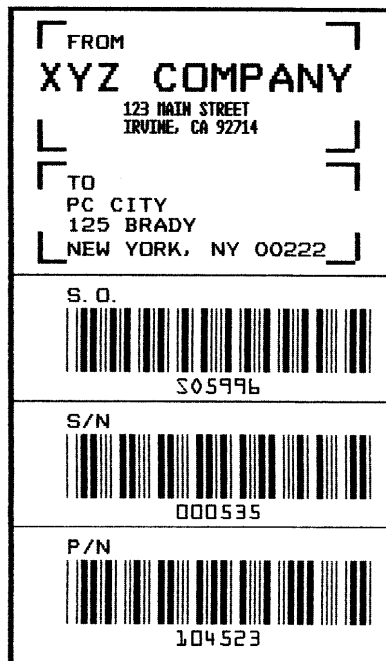
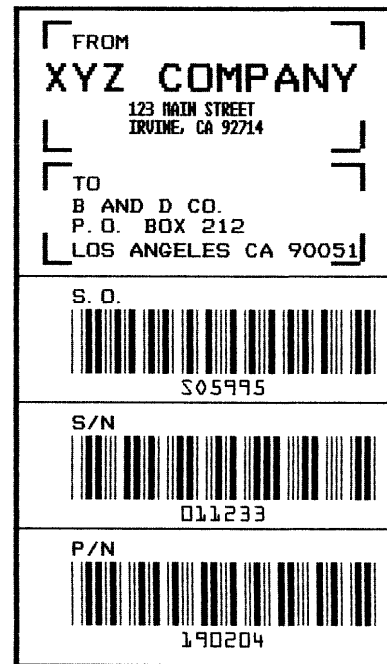
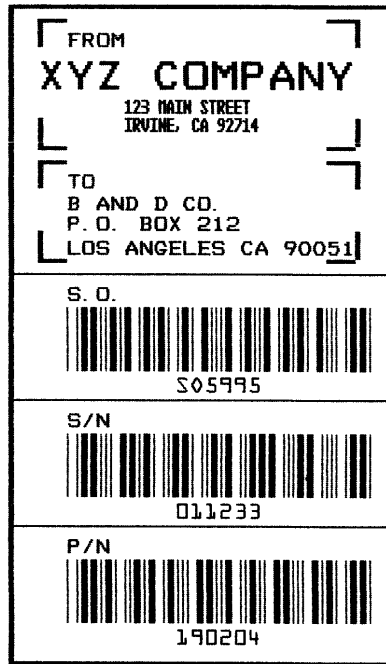


Figure 35. Sample Labels

## Enable Code V Graphics

1. The Code V must be enabled for the Graphics Mode using the Graphics Mode Enable command (PY). This is the first input to change the Code V from the Normal Mode to the Graphics Mode.

**Format:** (cc)PY (cc)-

**Enter:** ^PY^

2. To avoid accidentally terminating the graphics command sequence by a host-generated terminator, enable the Free Format command (F). This allows the Code V to accept the data as one continuous stream even though the data may contain host-generated paper motion commands. When Free Format is enabled, the Code V only recognizes the Free Format command terminators: Carriage Return (^-), Form Feed (^), Line Feed (^\*), Vertical Tab (^+), and EVFU commands.

**Format:** (cc)F (cc)-

**Enter:** ^F^

## Enable Dynamic Form Processing

3. Dynamic form processing allows specific data fields within the form/label to be identified. After all form or label components have been created, different sets of data can be supplied to the fields as copies of the label are produced. To enable dynamic form processing, the Dynamic Form command (B) is used followed by a Graphics Mode carriage return. It is part of the standard graphics command set, and must be sent to the Code V without being introduced by an alphanumeric command. Once dynamic form processing is enabled, the Code V continues in the dynamic form mode until properly completed.

**Format:** (cc)B (cc)-

**Enter:** ^B^

## Enable Horizontal Duplication

4. One label is created and duplicated on the page horizontally. This produces a duplicate copy of the label when the dynamic data is supplied. All commands required to create the label must fall between horizontal duplication on and off commands. Begin with the Horizontal Duplication (S) command to turn horizontal duplication on. Specify 2 copies (*n*) spaced 4.0 inches apart (*gap*). Send a Graphics Mode carriage return after the Horizontal Duplication command.

**Format:** (cc)S *n gap* (cc)-

**Enter:** ^S0240^

### Create the Label Box

5. Now the extended graphics command set can be used to create the label components. The Standard Alphanumeric command (M) is used to introduce the extended graphics command set. The Dark Print command (KF) is used to print the label box in a darker contrast. The Box command (LB) is used to create the box for the outer border of the label. The box is 2.6 inches plus 4 dots horizontally (*horz*) and 4.7 inches vertically (*vert*). Both the horizontal (*h*) and vertical (*v*) borders of the box have a line thickness of 2 dots.

**Format:** (cc)M (cc)KF (cc)LB *horz vert h v*

**Enter:** ^M^KF^LB0264,0470,2,2

### Create the Corners

6. Two sets of corners are used in the label, one corner set around the "From" data and the other set around the "To" data. To create these corners, one vertical and horizontal line are justified and tabbed into proper position for each corner piece, eight lines total (four corner pieces) per corner set. All the commands required for the corner sets are part of the alphanumeric command sequence initiated in the previous step. A Justification command (J), Horizontal Tab command (T), and a Solid Line command (LS) are used for each line as follows.

**Format:** (cc)J *jus* (cc)T *dis* (cc)LS *horz vert*

**Enter:** ^J010^T0020^LS0020,0002  
 ^J010^T0220^LS0020,0002  
 ^J010^T0020^LS0002,0020  
 ^J010^T0240^LS0002,0020  
 ^J080^T0020^LS0002,0020  
 ^J080^T0240^LS0002,0020  
 ^J100^T0020^LS0020,0002  
 ^J100^T0220^LS0020,0002  
 ^J110^T0020^LS0020,0002  
 ^J110^T0220^LS0020,0002  
 ^J110^T0020^LS0002,0020  
 ^J110^T0240^LS0002,0020  
 ^J160^T0020^LS0002,0020  
 ^J160^T0240^LS0002,0020  
 ^J180^T0020^LS0020,0002  
 ^J180^T0220^LS0020,0002

## Add TO/FROM Alphanumeric Data

7. Now let's add the "From" data. We will use a series of Standard Alphanumeric commands (M) to specify 0.1 inch high (*ht*) by 0.1 inch wide (*wd*) characters justified 0.2 inches (*jus*) for the FROM heading.

Use a Horizontal Tab (T) to position the heading 0.4 inches (*dis*) from the margin. In a similar command sequence, specify 0.2 inch high and 0.2 inch wide characters justified 0.4 inches down for the heading, also tabbed 0.4 inches from the margin. Justify the street address data 0.6 inches plus 5 dots (*jus*) down using a Justification command (J) and tab the address data 0.8 inches (*dis*) from the margin using a Horizontal Tab command (T). In a similar Justification and Horizontal Tab sequence, justify the city and state data 0.8 inches down and tabbed 0.9 inches from the margin.

For the address data, select the 17.65 cpi compressed print font (*F*) using the Compressed Print command (S) in a new Standard Alphanumeric command (M) sequence.

---

### Note



A compressed print command must immediately precede the compressed print data for each line it is used.

---

**Format:** (cc)M *ht wd jus* (cc)T *dis data*  
(cc)M(cc)J *jus* (cc)T *dis* (cc)S *F data*

**Enter:** ^M01,01,020^T0040FROM  
^M02,02,040^T0040XYZ COMPANY  
^M^J065^T0080^S5123 MAIN STREET  
^J080^T0080^S5IRVINE, CA 92714

8. The "To" data includes dynamic data fields for the name, street address, and city data lines of the different companies.

Begin with a Standard Alphanumeric command (M) to specify the TO heading as 0.1 inch high (*ht*) by 0.1 inch wide (*wd*) characters, justified 0.2 inches down (*jus*) and tabbed 0.4 inches (*dis*) from the left margin using the Horizontal Tab command (T). Using a Justification (J) and Horizontal Tab (T) command sequence, position the company name data line 1.3 inches plus 4 dots (*jus*) down and 0.4 inches (*dis*) from the left margin.

Use a Dynamic Form Field Length command (I) to specify the maximum length (*length*) of the dynamic data field as 24 characters. Similarly, justify the street address line 1.5 inches down, tabbed 0.4 inches from the left margin, and 24 characters maximum length.

Justify the city and state data line 1.6 inches plus 5 dots down, tabbed 0.4 inches from the left margin, and 24 characters maximum length.

**Format:** (cc)M *ht wd jus* (cc) T *dis data*  
(cc)J *jus* (cc) T *dis* (cc) [ *length* (cc)G

**Enter:** ^M01,01,120^T0040TO  
^J134^T0040^[024^G  
^J150^T0040^[024^G  
^J165^T0040^[024^G

## Add Horizontal Lines

9. The three horizontal lines to separate the three bar code fields can be added to the form using Justification (J), Horizontal Tab (T) and Solid Line (LS) commands. All three lines are 2.6 inches plus 4 dots horizontally (*horz*) and 1 dot vertically (*vert*), used as the line thickness, and all three lines are tabbed 0.0 inches (*dis*) from the left margin (touching the left edge of the label). Justify the first line 1.9 inches down (*jus*), the second line 2.8 inches down, and the third line 3.7 inches down.

**Format:** (cc)J *jus* (cc)T *dis* (cc)LS *horz vert*

**Enter:** ^J190^T0000^LS0264,0001  
^J280^T0000^LS0264,0001  
^J370^T0000^LS0264,0001

## Add Headings

10. The Sales Order (S.O.), Serial Number (S/N), and the Part Number (P/N) headings can be added using a series of Justification (J) and Horizontal Tab (T) commands. Each of the headings are tabbed 0.4 inches (*dis*) from the left margin. Justify the S.O. heading 2.0 inches (*jus*) down, the S/N heading 2.9 inches down, and the P/N heading 3.8 inches down.

**Format:** (cc)J *jus* (cc)T *dis data*

**Enter:** ^J200^T0040S.O.  
^J290^T0040S/N  
^J380^T0040P/N

## Add Bar Codes and Dynamic Bar Code Data

11. The three bar codes and dynamic bar code data fields can now be input. A Standard Alphanumeric command (M) is used to specify each bar code height at 0.6 inches (*ht*) and width (*wd*) at 0.1 inch. The actual width of the bar code is determined by the type of bar code, the data, and the ratio.

The S.O. bar code is justified 2.1 inches plus 3 dots (*jus*) down, the S/N bar code 3.0 plus 3 dots down, and the P/N bar code 3.9 plus 3 dots down. Each bar code is tabbed 0.4 inches (*dis*) from the left margin using a Horizontal Tab command (T).

The horizontal Bar code command (B) with fixed ratio is used, the printable data field is selected (*p*) to produce human readable data using OCR-B characters with the bar code, and bar code type (*type*) Code 39 is selected for use. The Dynamic Form Field Length command (l) specifies a maximum of 6 data characters for each bar code.

**Format:** (cc)M *ht wd jus* T *dis data*  
(cc)B *p type* (cc)[ *length* (cc)G

**Enter:** ^M06,01,213^T0040  
^BOA^[006^G  
^M06,01,303^T0040  
^BOA^[006^G  
^M06,01,393^T0040  
^BOA^[006^G



12. To complete processing, send an Interrupt command (I) moving the print position to 5.5 inches (*dis*) lower followed by a Graphics Mode carriage return (-), end the Horizontal Duplication command (S), and end the Dynamic Form command (I).

**Format:** (cc) I (cc)-  
(cc) S (cc)-  
(cc) ]

**Enter:** ^I550^-  
^S^-  
^]

### Add Dynamic Data

13. The lines of dynamic data can now be sent.

The first line of data sent is inserted in the first dynamic field previously identified by the Dynamic Form Field Length command. In this case, the first dynamic field identified was the company name data line (page 255). Subsequent dynamic fields identified were the company street address, city, S.O., S/N, and P/N data; the corresponding data should be sent line by line in the proper order to fill the fields.

Sending a second set of the data generates a second form (with duplication) inserting the data in the fields in the order provided. If any particular data field contains less than the amount specified in the Dynamic Form Field Length command, a Graphics Mode carriage return (-) must also be sent as the last character in the data line. Any data exceeding the maximum amount will begin to fill subsequent fields.

Following the end of all data, a universal terminator (G) must be sent. The two sets of data for the labels are entered as follows.

**Enter:** B AND D CO.^-  
P.O. BOX 212^-  
LOS ANGELES CA 90051^-  
SO5995  
011233  
190204  
PC CITY^-  
125 BRADY^-  
NEW YORK, NY 00222^-  
SO5996  
000535  
104523^G

### Disable Graphics Mode

14. Complete processing by sending a Graphics Mode form feed (.), disabling the Free Format command (O), and disabling the Graphics Mode (PN).

**Enter:** ^.^O^-^PN^-

The complete program to generate the labels shown in Figure 35 on page 252 is listed on the next page. Use your system standard commands to print the file containing the program. If errors occur, check your input and refer to the "Error Codes" chapter.

^PY^-^F^-  
^B^-  
^S0240^-  
^M^KF^LB0264,0470,2,2  
^J010^T0020^LS0020,0002  
^J010^T0220^LS0020,0002  
^J010^T0020^LS0002,0020  
^J010^T0240^LS0002,0020  
^J080^T0020^LS0002,0020  
^J080^T0240^LS0002,0020  
^J100^T0020^LS0020,0002  
^J100^T0220^LS0020,0002  
^J110^T0020^LS0020,0002  
^J110^T0220^LS0020,0002  
^J110^T0020^LS0002,0020  
^J110^T0240^LS0002,0020  
^J160^T0020^LS0002,0020  
^J160^T0240^LS0002,0020  
^J180^T0020^LS0020,0002  
^J180^T0220^LS0020,0002  
^M01,01,020^T0040FROM  
^M02,02,040^T0040XYZ COMPANY  
^M^J065^T0080^S5123 MAIN STREET  
^J080^T0080^S5IRVINE, CA 92714  
^M01,01,120^T0040TO  
^J134^T0040^[024^G  
^J150^T0040^[024^G  
^J165^T0040^[024^G  
^J190^T0000^LS0264,0001  
^J280^T0000^LS0264,0001  
^J370^T0000^LS0264,0001  
^J200^T0040S.O.  
^J290^T0040S/N  
^J380^T0040P/N  
^M06,01,213^T0040  
^BOA^[006^G  
^M06,01,303^T0040  
^BOA^[006^G  
^M06,01,393^T0040  
^BOA^[006^G  
^I550^-  
^S^-  
^]  
B AND D CO.^-  
P.O. BOX 212^-  
LOS ANGELES CA 90051^-  
SO5995  
011233  
190204  
PC CITY^-  
125 BRADY^-  
NEW YORK, NY 00222^-  
SO5996  
000535  
104523^G  
^,^O^-^PN^-

## Solving Program Errors

---

If you make an error in your form program, a coded error message and the program line containing the error will print when you print the form. As soon as the Code V discovers and identifies the error, the form is printed up to the point of error, further text processing stops, and all remaining data up to the next command sequence terminator is ignored.

From the description of the error message and the line identified by the error message, you can easily locate and correct program errors. Coded error messages are defined in detail in the “Error Codes” chapter.



# 5

## *Multinational Character Sets*

### Overview

The Multinational Character Set accesses one of 32 international character sets. Each character set is 96 characters long and can be accessed by configuration selection or a Code V command. Individual characters in the font can be accessed with the use of data bit 8. The character sets and their corresponding set values are shown in Table 47.

**Table 47. Multinational Character Sets and Set Values**

Character Set	Value	Character Set	Value
US ASCII	0	Dutch	7
German	1	French	8
Swedish	2	Spanish	9
Danish	3	Italian	10
Norwegian	4	Turkish	11
Finnish	5	Reserved	12-23
English	6	User-Defined Sets	24-31

Standard sets 0 through 11 are resident character sets. Sets 12 through 23 are reserved spaces in font memory for future resident character sets. If a value from 12 through 23 is called when attempting to choose a character set, the character font will default to ASCII. Character set values 24 through 31 are reserved for user-defined sets. You can create custom character sets from existing characters in font memory. If you select a set value from 24 to 31 when no new character set has been created or assigned that value, the character font will default to ASCII.

Refer to page 271 for printouts of the primary and extended character sets and their corresponding values.

## Character Addresses

Both the ASCII and multinational character sets have hex values for each character and symbol. The primary character set (ASCII characters) resides at hex addresses ranging from 00 through 7F. The extended character set, which contains the multinational characters, resides at hex addresses ranging from 80 through FF. Table 47 shows each multinational character substitution hex value and the applicable ASCII hex values. To access the extended character set, the Code V must be configured with the data bit 8 option enabled.

## Making Character Substitutions

Multinational character sets are created by substituting the multinational character values for the standard ASCII values. Each of the 12 multinational character sets (0 through 11) allows up to 16 character substitutions (located at hex 21, 22, 23, 24, 25, 26, 40, 5B, 5C, 5D, 5E, 60, 7B, 7C, 7D, and 7E). The most common character substitutions specific to a particular country are provided in each set and shown in Table 48.

For example, when the Danish character set is selected, calling character address cell 5B substitutes the Danish character residing at C6 (Æ) from the Multinational Character Set; when the Spanish character set is selected, calling character address cell 7C substitutes the Spanish character residing at F1 (ñ) from the Multinational Character Set. These substitutions are automatically performed when a particular Multinational Character Set is selected.

**Table 48. Substitution Set Hex Values**

Character Set	Substitution Hex Value															
	21	22	23	24	25	26	40	5B	5C	5D	5E	60	7B	7C	7D	7E
U.S. ASCII																
Danish								C6	D8	C5		B0	E6	F8	E5	
Dutch			A3						80					81		
English			A3													
Finnish				A4				C4	D6	C5			E4	F6	E5	FC
French							E0	FB	E7	A7	F4	EA	E9	F9	E8	EE
German							A7	C4	D6	DC			E4	F6	FC	DF
Italian							A7	B0	E9	83		F9	E0	F2	E8	EC
Norwegian				A4			C9	C6	D8	C5	DC	E9	E6	F8	E5	FC
Spanish			82					C3	D1	D5	A1		E3	F1	F5	BF
Swedish				A4			C9	C4	D6	C5	DC	E9	E4	F6	E5	FC
Turkish	84	C7	E7	85				86	D6	DC	87	88	89	F6	FC	8A

## Accessing Characters and Character Sets

---

### Data Bit 8 Addressing

---

You can access individual characters using data bit 8 addressing. The primary character set is ASCII. These character values reside at hex addresses 20 through 7F. The Multinational or extended character sets reside at hex addresses 80 through FF.

---

**Note**

Data bit 8 must be enabled so that Multinational or extended character sets are accessible without reconfiguration.

---

### Power-Up Character Set Selection

---

You can select any one of the twelve resident multinational character sets shown in Table 47 (0 through 11) as the default character set in the Graphics Mode at printer power-up. The Code V configuration settings determine which character set is the default character set at power-up. Refer to the *User's Guide* to configure the Code V for a specific character set.

The character font selected at power-up will remain active until a new Character Set Selection command (described on page 268) is sent or the configuration is changed. OCR and user-defined character sets can not be configured as the default character set at printer power-up.

---

**Note**

Each Multinational Character Set, including the power-up default Multinational Character Set, must be accessed through the Graphics Mode.

---

## Building a Character Translation Table

The character set for resident fonts on the Graphics Controller contains special characters in hex values. These characters are not directly accessible from the keyboard. As an example, the tilde (~) may not have a corresponding key on the keyboard. There are three choices available if characters such as this are required on a regular basis.

- Select an ISO character set that contains the character as one of the substitutions. See “Selecting an ISO Character Set” on page 269.
- Use the ^IHEX command to transmit the character hex value to the printer.
- Build a character translation table.

A character translation table reassigns keys to the hex value of special characters you want to print. Use the ^ITRANS command to build a character translation table.

<b>Mode</b>	Standard Graphics or Graphics with an Extended Graphics Command selected
<b>Format</b>	(cc) ITRANS,D,xxvv,xxvv,xxvv,xxvv, ... ,xxvv (cc) G (cc) -
	(cc) Represents the Special Function Control Character (SFCC). Enter the specific SFCC for your Code V configuration.
	ITRANS,D The Build Character Translation Table command; enter <b>ITRANS,D</b> (the comma is required).
	xx The input hex value from the host.
	vv The hex value that will replace the input hex value before the data is sent to the printer.
	(cc)G Terminator. Enter the SFCC for your Code V configuration immediately followed by <b>G</b> , the universal terminator, or another valid Graphics Mode command to end the input of vertical line and form data.
	(cc)- Graphics Mode CR used as a sequence terminator. Enter the SFCC for your IGP configuration immediately followed by - to end the command sequence.



## Resetting the Character Set

---

<b>Purpose</b>	Reset the character set. This will also clear the translation table.
<b>Mode</b>	Graphics
<b>Format</b>	(cc) ITRANS,R, <i>n</i> (cc) G (cc) -
(cc)	Represents the Special Function Control Character (SFCC). Enter the specific SFCC for your Code V configuration.
ITRANS,R	The Character Set Reset command; enter <b>ITRANS,R</b> (the comma is required).
<i>n</i>	The identification of the new character set, a value from <b>00</b> through <b>08</b> .
(cc)G	Terminator. Enter the SFCC for your Code V configuration immediately followed by <b>G</b> , the universal terminator, or another valid Graphics Mode command to end the input of vertical line and form data.
(cc)-	Graphics Mode CR used as a sequence terminator. Enter the SFCC for your IGP configuration immediately followed by - to end the command sequence.

If the character set identified by *n* is not the current character set, the translation table is reset and the selected *n* character set becomes the current character set.

00 USA  
 01 UK  
 02 Sweden/Finland  
 03 Norway/Denmark  
 04 Japan  
 05 Germany  
 06 France  
 07 Italy  
 08 Spain  
 09 PC Subset  
 10 Code V Version 1

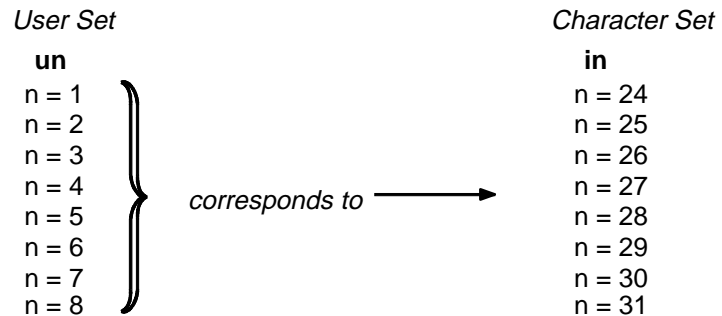
## User Set Command

<b>Purpose</b>	Creates custom character sets (except OCR fonts) from existing characters stored in printer memory.
<b>Mode</b>	Graphics
<b>Format</b>	(cc) u n ca fa (cc)-
	(cc) Represents the Special Function Control Character (SFCC). Enter the specific SFCC for your Code V configuration.
	u The User Set command; enter <b>u</b> .
	n Selects the User Character Set number; enter a value ranging from <b>1</b> through <b>8</b> . Values outside this range produce an error message and the entire command sequence is ignored.
	ca Represents the ASCII character address cell which will have its contents replaced with the character located in the font address ( <i>fa</i> ). The <i>ca</i> value must be one of the 16 hex values specified in Table 48. If the <i>ca</i> value is not one of these ASCII characters, an error message is displayed, the command sequence is ignored, and only previous valid substitutions are made.
	fa Represents the hexadecimal value for the font address of a specified character in the multinational character set which will replace the current contents of <i>ca</i> . The <i>fa</i> value is the character substitution for the cell address ( <i>ca</i> ). The value of <i>fa</i> may range from <b>20</b> through <b>FF</b> hex. If the <i>fa</i> value is outside this range, an error message is displayed and no substitutions will occur.
	(cc)- The command terminator. Enter the SFCC for your Code V configuration immediately followed by - (Graphics Mode CR) or other valid terminator. The terminator must be entered to stop this function.

**Comment** The User Set command is a stand-alone command that must appear in the first column of a line. You can define up to 16 character substitutions for *each* of the eight custom character sets, but they need not be addressed all at one time with one User Set command. Therefore, the maximum number of times *ca,fa* can be called within each User Set command is 16.

The character sets in the User Set command are numbered 1 through 8. The character set values in the Character Set Selection command are numbered 24 through 31 and correspond to the User Sets 1 through 8. The Character Set Selection command, discussed on page 268, accesses a character set and activates it for printing.

The User Set command (**cc**)**un** and the Character Set Selection command (**cc**)**in** are related as shown below. Therefore, i24 selects the substitution set defined as u1, i29 selects u6, etc.



**Example** The following example defines User Set 1 to contain the Multinational font addresses B1, A1, and BF at the hex character addresses 23, 24, and 25, respectively.

For example, suppose *ca* = 23 and *fa* = B1; each time character address 23 is called, it will be substituted with the character located at font address B1. Further, when *ca* = 24 and *fa* = A1, each time character address 24 is called, it will be substituted with the character located at font address A1. And, when *ca* = 25 and *fa* = BF, each time character address 25 is called, it will be substituted with the character located at font address BF.

---

**Note** The command sequence contains *no spaces*.




---

`^u1,23B1,24A1,25BF^-`

User Set 1 now contains the plus or minus sign (B1 hex) in place of the number sign (23 hex), the upside down exclamation point (A1 hex) in place of the dollar sign (24 hex), and the upside down question mark (BF hex) in place of the percent sign (25 hex).

## Character Set Selection Command

**Purpose** Accesses one of the multinational character sets. Use this command to access a different character set from the configured power-up default character set.

**Mode** Graphics

**Format** As a stand-alone command: `(cc) i n (cc)-`  
 Within a graphics command: `(cc) i n M ht wd jus data (cc)-`

`(cc)` Represents the Special Function Control Character.

`i` The Character Set Selection command; enter `i`.

`n` The character substitution set number; enter a value up to three digits. Sets 24 through 31 represent user-defined sets as listed previously in Table 47, and the rest of the sets are built-in. If input is not within the specified range, an error message is displayed and the command ignored.

`M ht wd jus data`

Refer to page 26 in the “Commands” chapter for a description of these alphanumeric commands.

`(cc)-` The command terminator. Enter the SFCC for your Code V configuration immediately followed by - (Graphics Mode CR) or other valid terminator. The terminator must be entered to stop this function.

**Comment** The stand-alone command must appear in the first column of a line.

**Example** The following example shows the Character Set Selection command as a stand-alone command which activates the German character set:

```
^i1^-
```

Issue the Character Set Selection command as many times as required for a form. The character set selected will remain active until a new set is selected.

The `(cc) i n (cc)-` command is inactive in the Normal Mode. However, plotted text data will print (in a compressed print mode) in the character set selected.

## Selecting an ISO Character Set

- Purpose** Accesses one of nine ISO character sets.
- Mode** Standard Graphics or Graphics with an Extended Graphics Command selected
- Format** (cc) IISO, *n* (cc)G
- (cc) Represents the Special Function Control Character.
- IISO, The ISO Character Set Selection command; enter **IISO**, (the comma is required).
- n* The character substitution set number; enter a value ranging from **0** through **8** according the the desired character set shown in Table 49. If *n* is not a value from 0 through 8, an error message is displayed and the command ignored.

**Table 49. IISO, Character Sets**

n	ISO Character Set	Hex Value:											
		23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
0	USA	#	\$	@	[	\	]	^	`	{		}	~
1	UK	£	\$	@	[	\	]	^	`	{		}	-
2	Swedish/Finnish	#	\$	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
3	Norwegian/Danish	#	\$	@	Æ	Ø	Å	Ü	`	æ	ø	å	ü
4	Japanese	#	\$	@	[	¥	]	^	`	{		}	-
5	German	#	\$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß
6	French	£	\$	á	5	ç	§	^	`	é	ù	è	¨
7	Italian	£	\$	§	5	ç	é	^	ù	à	ò	è	ì
8	Spanish	£	\$	§	i	Ñ	¿	^	`	5	ñ	ç	~

(cc)G The universal terminator. Enter the SFCC for your Code V configuration immediately followed by **G** to terminate the IISO command.

**Comments** When the IISO command is used in a Standard Graphics command, the host printer font set is changed to the new ISO character set. When the IISO, command is used with an Extended Graphics command selected, only the Extended character set is changed to the new ISO character set.

7C =	ı	94 =	ö	AA =	¬
80 =	ç	95 =	ò	AB =	½
81 =	Û	96 =	ù	AC =	¼
82 =	é	97 =	ú	AD =	¡
83 =	à	98 =	ÿ	AE =	«
84 =	ä	99 =	ö	AF =	»
85 =	à	9A =	Ü	B3 =	
86 =	ä	9B =	¢	DC =	■
87 =	ç	9C =	£	E1 =	β
88 =	é	9D =	¥	E6 =	μ
89 =	ë	9E =	₪	F1 =	±
8A =	è	9F =	ƒ	F8 =	°
8B =	ı	A0 =	á	F9 =	°
8C =	ı	A1 =	í	FA =	•
8D =	ì	A2 =	ó	FD =	²
8E =	Ä	A3 =	Ú	FE =	■
8F =	À	A4 =	ñ	FF =	
90 =	É	A5 =	Ñ		
91 =	æ	A6 =	ª		
92 =	Æ	A7 =	º		
93 =	ö	A8 =	¿		

Figure 36. PC Character Subset

## Multinational Character Sets

IGP/VGL Multinational Set

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0			0	@	P	.	p	q	r	•	°	À	Ð	à	ö	
1		!	1	A	Q	a	q	r	ij	■	±	Á	Ñ	á	ñ	
2		"	2	B	R	b	r	r	pt	■	²	Â	Ò	â	ò	
3		#	3	C	S	c	s	s		■	³	Ã	Ó	ã	ó	
4		\$	4	D	T	d	t	t		■	´	Ä	Ô	ä	ô	
5		%	5	E	U	e	u	u		■	µ	Å	Õ	å	õ	
6		&	6	F	V	f	v	v		■	¶	Æ	Ö	æ	ö	
7		'	7	G	W	g	w	w		■	·	Ç	×	ç	÷	
8		(	8	H	X	h	x	x		■	¸	È	Ø	è	ø	
9		)	9	I	Y	i	y	y		■	¹	É	Ù	é	ù	
A		*	:	J	Z	j	z	z		■	º	Ê	Ú	ê	ú	
B		+	;	K	[	k	{	{		■	»	Ë	Û	ë	û	
C		,	<	L	\	l				■	¼	Ì	Ü	ì	ü	
D		-	=	M	]	m	}	}		■	½	Í	Ý	í	ý	
E		.	>	N	^	n	~	~		■	¾	Î	ÿ	î	ÿ	
F		/	?	O	_	o	■	■		■	¸	Ï	ÿ	ï	ÿ	

ASCII Set

	0	1	2	3	4	5	6	7
0			0	@	P	.	p	
1		!	1	A	Q	a	q	
2		"	2	B	R	b	r	
3		#	3	C	S	c	s	
4		\$	4	D	T	d	t	
5		%	5	E	U	e	u	
6		&	6	F	V	f	v	
7		'	7	G	W	g	w	
8		(	8	H	X	h	x	
9		)	9	I	Y	i	y	
A		*	:	J	Z	j	z	
B		+	;	K	[	k	{	
C		,	<	L	\	l		
D		-	=	M	]	m	}	
E		.	>	N	^	n	~	
F		/	?	O	_	o	■	

GERMAN Set

	0	1	2	3	4	5	6	7
0			0	\$	P	.	p	
1		!	1	A	Q	a	q	
2		"	2	B	R	b	r	
3		#	3	C	S	c	s	
4		\$	4	D	T	d	t	
5		%	5	E	U	e	u	
6		&	6	F	V	f	v	
7		'	7	G	W	g	w	
8		(	8	H	X	h	x	
9		)	9	I	Y	i	y	
A		*	:	J	Z	j	z	
B		+	;	K	Ä	k	ä	
C		,	<	L	Ö	l	ö	
D		-	=	M	Ü	m	ü	
E		.	>	N	^	n	~	
F		/	?	O	_	o	■	

SWEDISH Set

	0	1	2	3	4	5	6	7
0			0	É	P	é	p	
1	!	1	A	Q	a	q		
2	"	2	B	R	b	r		
3	#	3	C	S	c	s		
4	¤	4	D	T	d	t		
5	%	5	E	U	e	u		
6	&	6	F	V	f	v		
7	'	7	G	W	g	w		
8	(	8	H	X	h	x		
9	)	9	I	Y	i	y		
A	*	:	J	Z	j	z		
B	+	;	K	Ä	k	ä		
C	,	<	L	Ö	l	ö		
D	-	=	M	Å	m	å		
E	.	>	N	Ü	n	ü		
F	/	?	O	_	o			

DANISH Set

	0	1	2	3	4	5	6	7
0			0	@	P	°	p	
1	!	1	A	Q	a	q		
2	"	2	B	R	b	r		
3	#	3	C	S	c	s		
4	\$	4	D	T	d	t		
5	%	5	E	U	e	u		
6	&	6	F	V	f	v		
7	'	7	G	W	g	w		
8	(	8	H	X	h	x		
9	)	9	I	Y	i	y		
A	*	:	J	Z	j	z		
B	+	;	K	Æ	k	æ		
C	,	<	L	Ø	l	ø		
D	-	=	M	Å	m	å		
E	.	>	N	^	n	~		
F	/	?	O	_	o			

NORWEGIAN Set

	0	1	2	3	4	5	6	7
0			0	É	P	é	p	
1	!	1	A	Q	a	q		
2	"	2	B	R	b	r		
3	#	3	C	S	c	s		
4	¤	4	D	T	d	t		
5	%	5	E	U	e	u		
6	&	6	F	V	f	v		
7	'	7	G	W	g	w		
8	(	8	H	X	h	x		
9	)	9	I	Y	i	y		
A	*	:	J	Z	j	z		
B	+	;	K	Æ	k	æ		
C	,	<	L	Ø	l	ø		
D	-	=	M	Å	m	å		
E	.	>	N	Ü	n	ü		
F	/	?	O	_	o			

FINNISH Set

	0	1	2	3	4	5	6	7
0			0	@	P	'	p	
1	!	1	A	Q	a	q		
2	"	2	B	R	b	r		
3	#	3	C	S	c	s		
4	¤	4	D	T	d	t		
5	%	5	E	U	e	u		
6	&	6	F	V	f	v		
7	'	7	G	W	g	w		
8	(	8	H	X	h	x		
9	)	9	I	Y	i	y		
A	*	:	J	Z	j	z		
B	+	;	K	Ä	k	ä		
C	,	<	L	Ö	l	ö		
D	-	=	M	Å	m	å		
E	.	>	N	^	n	ü		
F	/	?	O	_	o			



ENGLISH Set

	0	1	2	3	4	5	6	7
0			0	@	P	'	p	
1		!	1	A	Q	a	q	
2		"	2	B	R	b	r	
3		£	3	C	S	c	s	
4		\$	4	D	T	d	t	
5		%	5	E	U	e	u	
6		&	6	F	V	f	v	
7		'	7	G	W	g	w	
8		(	8	H	X	h	x	
9		)	9	I	Y	i	y	
A	*	:	J	Z	j	z		
B	+	;	K	[	k	{		
C	,	<	L	\	l			
D	-	=	M	]	m	}		
E	.	>	N	^	n	~		
F	/	?	O	_	o			

DUTCH Set

	0	1	2	3	4	5	6	7
0			0	@	P	'	p	
1		!	1	A	Q	a	q	
2		"	2	B	R	b	r	
3		£	3	C	S	c	s	
4		\$	4	D	T	d	t	
5		%	5	E	U	e	u	
6		&	6	F	V	f	v	
7		'	7	G	W	g	w	
8		(	8	H	X	h	x	
9		)	9	I	Y	i	y	
A	*	:	J	Z	j	z		
B	+	;	K	[	k	{		
C	,	<	L	IJ	l	ij		
D	-	=	M	]	m	}		
E	.	>	N	^	n	~		
F	/	?	O	_	o			

FRENCH Set

	0	1	2	3	4	5	6	7
0			0	à	P	ê	p	
1		!	1	A	Q	a	q	
2		"	2	B	R	b	r	
3		#	3	C	S	c	s	
4		\$	4	D	T	d	t	
5		%	5	E	U	e	u	
6		&	6	F	V	f	v	
7		'	7	G	W	g	w	
8		(	8	H	X	h	x	
9		)	9	I	Y	i	y	
A	*	:	J	Z	j	z		
B	+	;	K	û	k	é		
C	,	<	L	ç	l	ù		
D	-	=	M	\$	m	è		
E	.	>	N	ô	n	î		
F	/	?	O	_	o			

SPANISH Set

	0	1	2	3	4	5	6	7
0			0	@	P	'	p	
1		!	1	A	Q	a	q	
2		"	2	B	R	b	r	
3		¢	3	C	S	c	s	
4		\$	4	D	T	d	t	
5		%	5	E	U	e	u	
6		&	6	F	V	f	v	
7		'	7	G	W	g	w	
8		(	8	H	X	h	x	
9		)	9	I	Y	i	y	
A	*	:	J	Z	j	z		
B	+	;	K	Ã	k	ã		
C	,	<	L	Ñ	l	ñ		
D	-	=	M	Õ	m	õ		
E	.	>	N	i	n	¿		
F	/	?	O	_	o			

ITALIAN Set

	0	1	2	3	4	5	6	7
0			0	\$	P	ù	p	
1		!	1	A	Q	a	q	
2		"	2	B	R	b	r	
3		#	3	C	S	c	s	
4		\$	4	D	T	d	t	
5		%	5	E	U	e	u	
6		&	6	F	V	f	v	
7		'	7	G	W	g	w	
8	(		8	H	X	h	x	
9	)		9	I	Y	i	y	
A	*	:	J	Z	j	z		
B	+	;	K	°	k	à		
C	,	<	L	é	l	ò		
D	-	=	M		m	è		
E	.	>	N	^	n	ì		
F	/	?	O	_	o			

TURKISH Set

	0	1	2	3	4	5	6	7
0			0	@	P	Ş	p	
1		ı	1	A	Q	a	q	
2		Ç	2	B	R	b	r	
3		ç	3	C	S	c	s	
4		ı	4	D	T	d	t	
5		%	5	E	U	e	u	
6		&	6	F	V	f	v	
7		'	7	G	W	g	w	
8	(		8	H	X	h	x	
9	)		9	I	Y	i	y	
A	*	:	J	Z	j	z		
B	+	;	K	Ğ	k	ş		
C	,	<	L	Ö	l	ö		
D	-	=	M	Ü	m	ü		
E	.	>	N	ğ	n	ı		
F	/	?	O	_	o			

OCR-A Set

	0	1	2	3	4	5	6	7
0			0	@	P	H	p	
1		!	1	A	Q	a	q	
2		"	2	B	R	b	r	
3		#	3	C	S	c	s	
4		\$	4	D	T	d	t	
5		%	5	E	U	e	u	
6		&	6	F	V	f	v	
7		'	7	G	W	g	w	
8	(		8	H	X	h	x	
9	)		9	I	Y	i	y	
A	*	:	J	Z	j	z		
B	+	;	K	€	k	{		
C	,	<	L	\	l			
D	-	=	M	]	m	}		
E	.	>	N	^	n	~		
F	/	?	O	¥	o	.		

OCR-B Set

	0	1	2	3	4	5	6	7
0			0	@	P	'	p	
1		!	1	A	Q	a	q	
2		"	2	B	R	b	r	
3		#	3	C	S	c	s	
4		\$	4	D	T	d	t	
5		%	5	E	U	e	u	
6		&	6	F	V	f	v	
7		'	7	G	W	g	w	
8	(		8	H	X	h	x	
9	)		9	I	Y	i	y	
A	*	:	J	Z	j	z		
B	+	;	K	[	k	{		
C	,	<	L	\	l			
D	-	=	M	]	m	}		
E	.	>	N	^	n	~		
F	/	?	O	_	o			

---

# 6

## *Error Codes*

---

### Code V Emulation Error Codes

---

The Code V provides coded error messages to help debug programs. When the Code V detects an error, it stops text processing and prints out an error message. The error message includes the appropriate error code, a brief description of the error, and the erroneous data. All data up to the next command sequence terminator is ignored, and the form (if any) is printed up to the point of the error.

By Code V configuration, you can disable the printing of all error messages, you can disable printing of off-page errors, or you can enable printing of error location markers.

On the following pages, each error code is listed in numerical order and described in more detail.

- 01        **Alpha Command Error**  
One of the alphanumeric commands has a non-numeric height or width parameter.
- 02        **Alpha Length Error**  
Alpha data has exceeded the length of the internal alpha text buffer. The terminator of the data was not found.
- 03        Not defined.
- 04        **Box Command Error**  
A Box command (LB) has non-numeric parameter(s).
- 05        **Buffer Overflow Error**  
The internal sequence buffer has overflowed. No sequence terminator found.
- 06        **Compressed Print Error**  
A Compressed Print command (#x) has a non-numeric value for the selected compressed print font, or the line terminator is missing.
- 07        **Special Font Error**  
A High Density Look-Up Font (S) command has an invalid value for the font selected. Valid values for *f* are 1 through 7.
- 08        Not defined.
- 09        **Form Memory Error**  
The form is too big and ran out of form memory during alpha or vector buffer storage.

- 10      **Character Height Command Error**  
A Character Height command (H) has a non-numeric character for the height parameter.
- 11      **Hex Data Error**  
An invalid character was found while expecting a hexadecimal value. Only numeric characters or **A, B, C, D, E, or F** are allowed.
- 12      **Vertical Justification Change Error**  
A Vertical Justification (J) command has a non-numeric character for the justification parameter.
- 13      **Form Command Error**  
A forms construction command (LF) has a non-numeric parameter.
- 14      **Undefined Line Command Error**  
The Line command (L) was not followed by **B, D, F, or S**.
- 15      **Logo Command Error**  
A user-defined logo using the Z command contains an invalid parameter value; valid values are **1** through **9** or **A** through **F**.
- 16      **Plot Command Error**  
A Plot command (Q or C) contains invalid hexadecimal data characters. Only numeric characters or **A, B, C, D, E, or F** are allowed.
- 17      Not defined.
- 18      **Vertical Duplication (Repeated Form) Terminator Missing Error**  
A Vertical Duplication command (R) does not have a line terminator.
- 19      **Horizontal Duplication Command Error**  
A Horizontal Duplication command (S) contains a non-numeric number or gap space parameter or is not followed by a line terminator.
- 20      **Horizontal Tab Command Error**  
A Horizontal Tab command (T) contains a non-numeric distance parameter.
- 21      **Special Function Control Character Change Command Error**  
A Special Function Control Character (SFCC) change command (N) contains an illegal value for x or is not followed by a line terminator. **x** can be any control character, except the following hex characters: **00** through **09**, **0A** through **0F**, and **4E**.
- 22      **Undefined Command Error**  
An SFCC is not followed by a known command character.
- a. In Non-Graphics Mode, the following characters are allowed: **#, B, C, D, E, H, I, K, L, M, N, Q, R, S, T, U, V, W, or @**.
  - b. Within a repeated form, the following characters are allowed: **#, D, E, H, I, K, L, M, N, Q, R, S, T, U, W, Z, or -**.

- 
- c. In Graphics Mode, the following characters are allowed: **B, C, D, E, G, H, I, J, K, L, M, Q, R, S, T, U, V, W, Z**, or **-**.

- 23 **Character Width Command Error**  
A Character Width command (W) contains a non-numeric width parameter.
- 24 **Serial Overflow Error**  
The serial input buffer is full. The host probably did not honor the Code V flow control to stop sending characters.
- 25 **Line Parameter Error**  
A Line command (LS or LD) contains a non-numeric horizontal or vertical parameter.
- 26 **Undefined Shading, Mask, or Dark Command Error**  
A shading (K) command (shading, shading mask, or dark print) is followed by an unknown character. It must be followed by an **H** for standard shading, an **L** for shading mask, or an **F** for dark printing.
- 27 **Shading Mask Factor Error**  
A Shading Mask command (KL) does not include a valid hexadecimal mask parameter. Only numeric characters or **A, B, C, D, E**, or **F** are allowed.
- 28 **Vertical Duplication (Repeated Form) Parameter Error**  
A Vertical Duplication command (R) contains a non-numeric repeat parameter or is not followed by a line terminator.
- 29 **Inner Vertical Duplication (Repeated Form) Error**  
An inner (nested) Vertical Duplication command (R) contains a non-numeric repeat parameter, is not followed by a line terminator, or an inner loop already exists. Only one inner repeat loop is allowed within a repeated form.
- 30 **Plot Length Error**  
A Plot command (Q or C) exceeded the internal plot buffer size. No terminator was found.
- 31 **Auto Increment/Decrement Command Error**  
An Auto Increment/Decrement command (Y) has one of the following faults:
  - a. An invalid value was provided for the +/- parameter. Only **+** or **-** is allowed.
  - b. The increment/decrement amount is zero.
  - c. The command is not followed by (cc)G.
  - d. The increment/decrement has more characters than the operand.
- 32 **Dot Slew Command Error**  
A Dot Slew command (D) contains a non-numeric dots parameter.

- 33      **Line Slew Command Error**  
A Line Slew command (K or W) contains a non-numeric lines parameter.
- 34      **Forms Length PI Error**  
A Forms Length command (L) must use the PI line, but the Code V is configured with PI disabled. Use the **H** Forms Length command.
- 35      **Forms Length No PI Error**  
A Form Length command (H) cannot use the PI line, but the Code V is configured with PI enabled. Use the **L** Forms Length command.
- 36      **Dynamic Form Copy Command Error**  
A Dynamic Form Copy command (C) contains a non-numeric parameter.
- 37      **Dynamic Form Field Length Command Error**  
A Dynamic Form Field Length command (*[ length* or *{ length*) contains a non-numeric length parameter.
- 38      **Dynamic Form Nested Copy Error**  
A Dynamic Form Copy command (C) was encountered while already within a copy loop. Copy commands cannot be nested.
- 39      **Dynamic Data Repeat Count Error**  
A repeated dynamic form data element does not have a valid repeat count. The repeat count must be four numeric characters.
- 40      **Incomplete Bar Code Error**  
An unexpected end of a bar code command was detected. No bar code type was found, or not enough variable ratio characters were given.
- 41      **Undefined Bar Code Type Error**  
An undefined bar code type was given.
- 43      **Bar Code Data Length Error**  
The length of the bar code data is too long or too short for the bar code type selected.
- 44      **Illegal Bar Code Data Error**  
The bar code data contains a character which is not allowed by this bar code type.
- 45      **Bar Code Off Page Error**  
The bar code will not fit on the page at the starting column.
- 47      **LPI Parameter Error**  
The new lpi parameter in the Line Spacing command (@L) contains a non-numeric or 0 value.
- 48      **Element Off Page Error**  
The form element cannot fit on the page at the starting position.
- 49      Not defined.

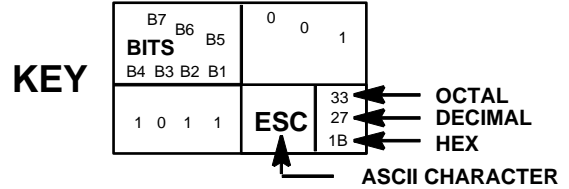
- 
- 50        **User-Defined Logo Input Error**  
The input parameter is not within the specified range. You must provide either a number ranging from **3** to **9**, or a character between **A** and **F**.
- 51        Not defined.
- 52        **Character Set Command Error**  
The character set value specified at the Character Set Selection command (i) was not within the range of **00** to **31**.
- 53        **User-Defined Character Set Command Error**  
The User-Defined Character Set command (u) contains a parameter error. This is possibly caused by an incorrect value for *n*, which must be a number from **1** through **8**, or the values for *ca* or *fa* were not within the specified ranges. The value for *ca* must be one of the following 16 hex values: **21, 22, 23, 24, 25, 26, 40, 5B, 5C, 5D, 5E, 60, 7B, 7C, 7D, 7E**; the value for *fa* must be between **20** and **FF** hex.
- 54-55    Not defined.
- 56        **Logo Generation Command Error**  
The parameters for the ILOGO command are incorrect. Logo values of **41-49, 4A, 4B, 4C, 61** and **62** are allowed.
- 57        **Pixel Expansion Command Error**  
The parameters for the IPEXP Pixel Expansion Command are incorrect. Expansion values of **1-255** are allowed. Horizontal and vertical expansion values must be separated by a comma.
- 58        **Default Font Command Error**  
The syntax or parameter(s) for the IFONT,S, command is incorrect.





# A

# Standard ASCII Character Set



BITS B7 B6 B5 B4 B3 B2 B1	ROW	0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
		COLUMN 0		1		2		3		4		5		6		7	
0 0 0 0	0	NUL	0 0 0	DLE	20 16 10	SP	40 32 20	0	60 48 30	@	100 64 40	P	120 80 50	`	140 96 60	p	160 112 70
0 0 0 1	1	SOH	1 1 1	DC1 (XON)	21 17 11	!	41 33 21	1	61 49 31	A	101 65 41	Q	121 81 51	a	141 97 61	q	161 113 71
0 0 1 0	2	STX	2 2 2	DC2	22 18 12	"	42 34 22	2	62 50 32	B	102 66 42	R	122 82 52	b	142 98 62	r	162 114 72
0 0 1 1	3	ETX	3 3 3	DC3 (XOFF)	23 19 13	#	43 35 23	3	63 51 33	C	103 67 43	S	123 83 53	c	143 99 63	s	163 115 73
0 1 0 0	4	EOT	4 4 4	DC4	24 20 14	\$	44 36 24	4	64 52 34	D	104 68 44	T	124 84 54	d	144 100 64	t	164 116 74
0 1 0 1	5	ENQ	5 5 5	NAK	25 21 15	%	45 37 25	5	65 53 35	E	105 69 45	U	125 85 55	e	145 101 65	u	165 117 75
0 1 1 0	6	ACK	6 6 6	SYN	26 22 16	&	46 38 26	6	66 54 36	F	106 70 46	V	126 86 56	f	146 102 66	v	166 118 76
0 1 1 1	7	BEL	7 7 7	ETB	27 23 17	'	47 39 27	7	67 55 37	G	107 71 47	W	127 87 57	g	147 103 67	w	167 119 77
1 0 0 0	8	BS	8 8 8	CAN	30 24 18	(	50 40 28	8	70 56 38	H	110 72 48	X	130 88 58	h	150 104 68	x	170 120 78
1 0 0 1	9	HT	9 9 9	EM	31 25 19	)	51 41 29	9	71 57 39	I	111 73 49	Y	131 89 59	i	151 105 69	y	171 121 79
1 0 1 0	10	LF	10 10 0A	SUB	32 26 1A	*	52 42 2A	:	72 58 3A	J	112 74 4A	Z	132 90 5A	j	152 106 6A	z	172 122 7A
1 0 1 1	11	VT	11 11 0B	ESC	33 27 1B	+	53 43 2B	;	73 59 3B	K	113 75 4B	[	133 91 5B	k	153 107 6B	{	173 123 7B
1 1 0 0	12	FF	12 12 0C	FS	34 28 1C	,	54 44 2C	<	74 60 3C	L	114 76 4C	\	134 92 5C	l	154 108 6C		174 124 7C
1 1 0 1	13	CR	13 13 0D	GS	35 29 1D	-	55 45 2D	=	75 61 3D	M	115 77 4D	]	135 93 5D	m	155 109 6D	}	175 125 7D
1 1 1 0	14	SO	14 14 0E	RS	36 30 1E	.	56 46 2E	>	76 62 3E	N	116 78 4E	^	136 94 5E	n	156 110 6E	~	176 126 7E
1 1 1 1	15	SI	15 15 0F	US	37 31 1F	/	57 47 2F	?	77 63 3F	O	117 79 4F	_	137 95 5F	o	157 111 6F	DEL	177 127 7F



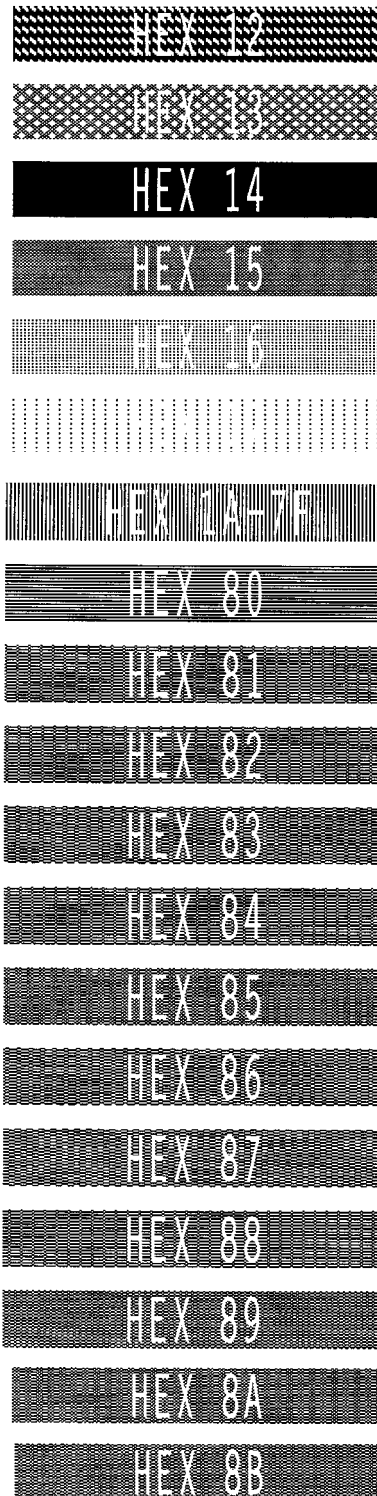
# B

## *Shading Masks*

### Selecting Masks

The Shading Mask command (KL) described on page 116 of the “Commands” chapter includes 132 different shading masks. Print samples of these masks are shown below and on the following pages. Each mask is reverse printed with the appropriate hexadecimal mask value. Replace the *mask* parameter in the KL command with one of the following hexadecimal mask values.





Both 18H and 19H produce a white shading mask when printed.

---

HEX 8C

HEX 8D

HEX 8E

HEX 8F

HEX 90

HEX 91

HEX 92

HEX 93

HEX 94

HEX 95

HEX 86

HEX 97

HEX 98

HEX 99

HEX 9A

HEX 9B

HEX 9C

HEX 9D

HEX 9E

HEX 9F

HEX A0

HEX A1

HEX A2

HEX A3

HEX A4

HEX A5

HEX A6

HEX A7

HEX A8

HEX A9

HEX AA

HEX AB

HEX AC

HEX AD

HEX AE

HEX AF

HEX B0

HEX B1

HEX B2

HEX B3

HEX B4

---

HEX B5  
HEX B6  
HEX B7  
HEX B8  
HEX B9  
HEX BA  
HEX BB  
HEX BC  
HEX BD  
HEX BE  
HEX BF  
HEX C0  
HEX C1  
HEX C2  
HEX C3  
HEX C4  
HEX C5  
HEX C6  
HEX C7  
HEX C8  
HEX C9

HEX CA  
HEX CB  
HEX CC  
HEX CD  
HEX CE  
HEX CF  
HEX D0  
HEX D1  
HEX D2  
HEX D3  
HEX D4  
HEX D5  
HEX D6  
HEX D7  
HEX D8  
HEX D9  
HEX DA  
HEX DB  
HEX DC  
HEX DD  
HEX DE



---

HEX DF  
HEX E0  
HEX E1  
HEX E2  
HEX E3  
HEX E4  
HEX E5  
HEX E6  
HEX E7  
HEX E8  
HEX E9  
HEX EA  
HEX EB  
HEX EC  
HEX ED  
HEX EE  
HEX EF  
HEX F0  
HEX F1

HEX F3

HEX F4

HEX F5

HEX F6

HEX F7

HEX F8

HEX F9

HEX FA

HEX FB

HEX FC

HEX FD

HEX FE

HEX FF

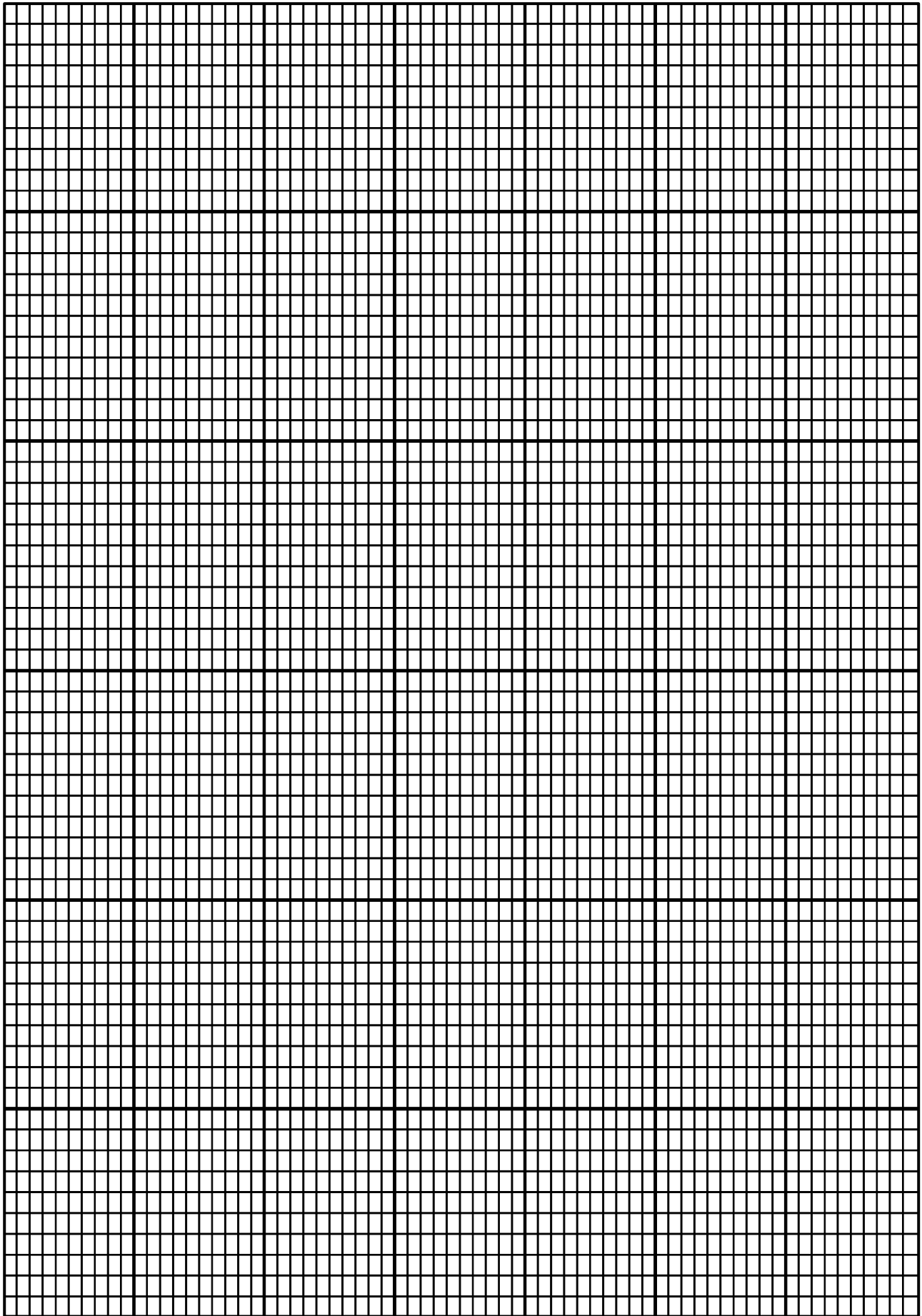
---

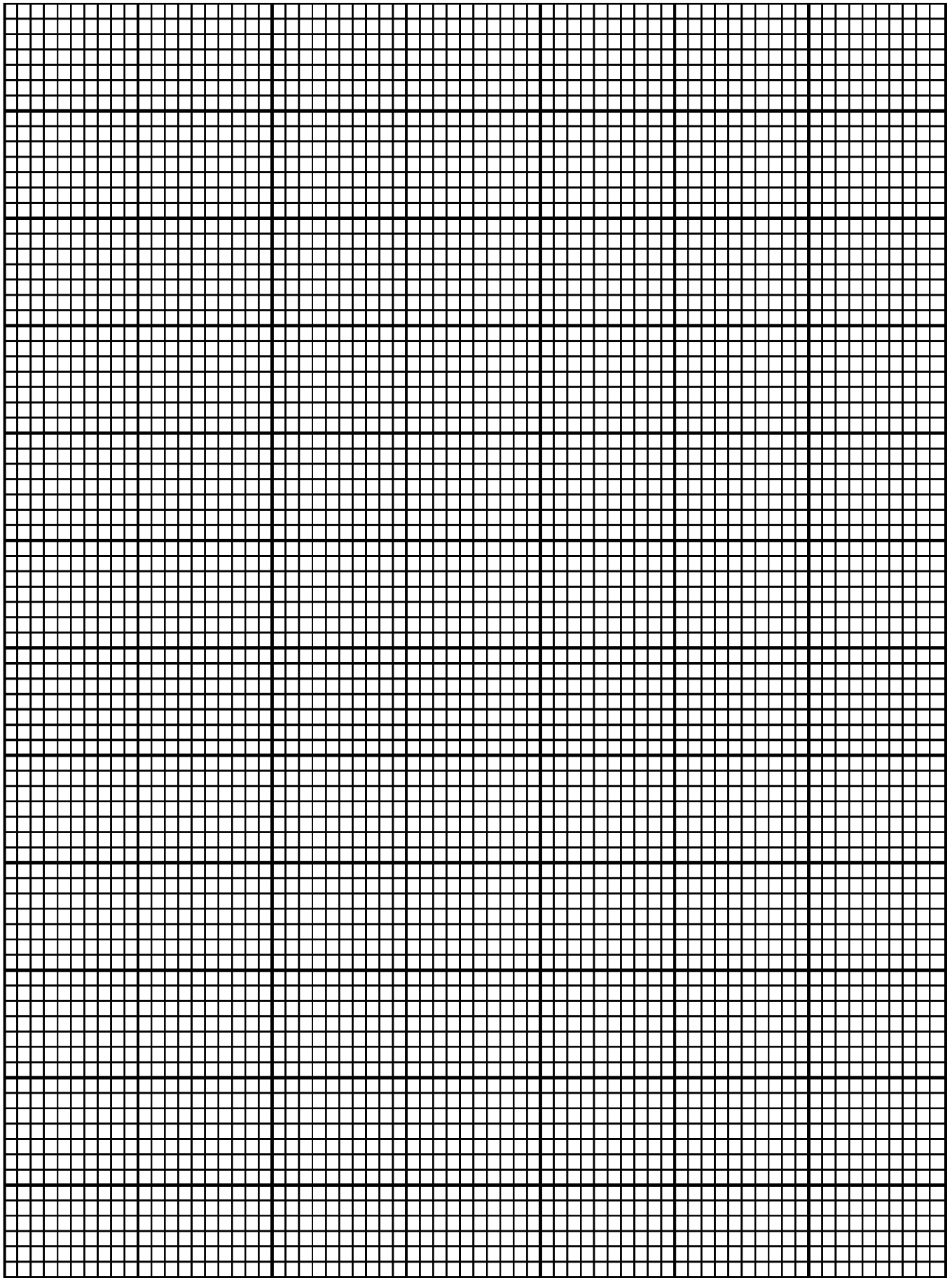
# C

## *Grid Samples*

The **Standard Grid**, provided on page 292, is used to design your form layout. At 6 lines per inch (lpi) and 10 characters per inch (cpi) printing, a standard 8-1/2 x 11-inch sheet of paper has a print area of 66 lines (rows) and 85 characters (columns). (The printable area will vary if you are not printing at 6 lpi and 10 cpi.) Thus, the grid used to design an 8-1/2 x 11-inch form should accommodate this 66 x 85 area.

The **Logo Grid**, provided on page 293, is used to design custom logos. Remember, with the logo grid, you must define the dot positions for each 7-bit *vertical* data byte, and each vertical data byte equals 1/10-inch, or one “row.” Each vertical data byte represents data used in the Plotting Graphics (Columns) command (Q) described on page 105 of the “Commands” chapter. Refer to the “Exercises and Examples” chapter for more information on designing a logo.







---

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