PRINTRONIX®

ThermaLine™ Series Label Printers IGP/PGL Programmer's Reference Manual

ThermaLine™ Series Label Printers IGP/PGL Programmer's Reference Manual

PRINTRONIX®

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Table of Contents

1 Introduction

2 Configuration

3 PTX_Setup

4 Commands

6 Form Examples and Exercises

7 Multinational Character Sets

1 Introduction

Chapter Contents

About this Manual

This manual explains how to use the IGP®/PGL (Intelligent Graphics Printing/Printronix® Graphics Language). Use this manual in conjunction with your printer *Setup Guide* for complete printer–IGP/PGL compatibility.

How to Locate Information

You can locate information three ways:

- Use the Table of Contents at the front of the manual.
- Use the Chapter Contents list on the first page of each chapter.
- Use the alphabetical Index at the back of the manual.

Warnings and Special Information

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

WARNING

WARNING tells you of conditions that could cause you physical harm.

CAUTION

CAUTION tells you of conditions that could damage the printer, IGP/PGL, or related equipment.

IMPORTANT

IMPORTANT gives you information vital to proper IGP/PGL operation.

NOTE: Provides information affecting IGP/PGL operation considered important enough to emphasize.

Features

IGP/PGL is the Intelligent Graphics Printing firmware for the Printronix Graphics Language, which is designed for the new Printronix PSA™ line of line-matrix, laser and thermal printers. The IGP/PGL provides on–line forms, bar codes, and many alphanumeric text–generation capabilities and is compatible with earlier versions of Printronix IGP protocol and programming. IGP/PGL graphics processing features are detailed below.

NOTE: The ThermaLine™ Series printers are not floppy disk-based printers. As a result, reference to disk drive ‘A’ implies the internal SRAM, disk drive ‘B’ corresponds to the top external memory module slot, and drive ‘C’ corresponds to the bottom memory module slot. Note also that drive ‘C‘ does not exist for the T3204 model.

On–Line Form and Label Generation makes it easy to create forms or labels with a “preprinted” look for each application. IGP/PGL programs control all graphic functions, dramatically reducing host computer programming and processing time.

Graphic capabilities include boxes, vertical and horizontal lines with user–selectable thickness, logos, and special alphanumeric print features. Forms and graphic designs can be duplicated horizontally and vertically.

Alphanumeric data can appear as prepositioned “fixed” information (entered when the form is created), can be overlayed onto the form (positioned in a specific location after the form is created), or may be dynamically merged with the form.

Selectable Bar Codes provides you with the appropriate bar code for your application using standard wide–to–narrow ratios. A wide selection of bar codes are available: Code 39, Interleaved 2 of 5, UPC–A, UPC–E, MSI A through D, Code 128 Subset B and C, Code 93, EAN 8, EAN 13, POSTNET, FIM, and PDF–417. UPC and EAN bar codes can also specify add–on data.

Expanded and Compressed Character Print attract attention where needed. Alphanumeric height and width are controlled independently for a wide range of character sizes up to 113 times the standard character size (up to 9.9 inches wide and tall). Compressed print sizes of 10 to 30 characters per inch (cpi) are available.

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

Logos are easily created using alphanumeric commands and add a variety of print and shading features for a "customized" appearance to forms, reports, and labels. You can define the format of the logo using TIFF files and PCX raster data as well as the standard IGP/PGL dots.

Reversed Print permits highlighting and contrasting by printing white characters on a dark background.

Automatic Increment/Decrement Capability allows batch form processing. You can identify individual numeric and bar code data fields, which includes automatic increment or decrement functions.

The following list summarizes the new features included in the current release:

- **Inline Commands** allows commands to appear anywhere within a line. This enables the FONT command to control text attributes for a text line. It also permits commands to be packed into a single text line to maintain line counting when using an IBM system.
- **TIFF and PCX Raster Data File Support** allowing two of the four TIFF file formats (uncompressed and packed bits compression formats) and both of the PCX raster data file formats (compressed and uncompressed).
- **Additional Bar Codes** including Code 93, an industrial bar code, and Codabar, a medical and package tracking bar code.
- **Host Control of PSA Resources** through PTX SETUP command, which manages those options that are common between printer emulations.

How the IGP/PGL Operates

IGP/PGL is an emulation that allows you to print sophisticated graphics and bar codes.

Depending on what the printer is doing, it is always in a particular mode, which is transparent to the user. These modes are discussed in more detail in Chapter 2.

When the printer is receiving text or printing text, it is in Normal mode. Any time the printer is on and is not processing IGP/PGL commands, it is in Normal mode.

When a Create Form command is issued, the printer moves from the Normal mode to the Create Form mode.

During this phase, the user sends text, images, and bar code data to the IGP/PGL. All of this data is stored in memory. An End statement terminates the IGP/PGL data string. The printer returns to Normal mode.

You can create as many forms as you wish and store them on your host or in external printer memory.

All forms have filenames. You may want to print the form, label it, and store it for future reference. Or, you can devise another method for easy retrieval. These forms can then be downloaded from your host to the printer.

When you Execute a form, you can print it as many times as you wish. This saves you time from downloading the form each time you want to print it.

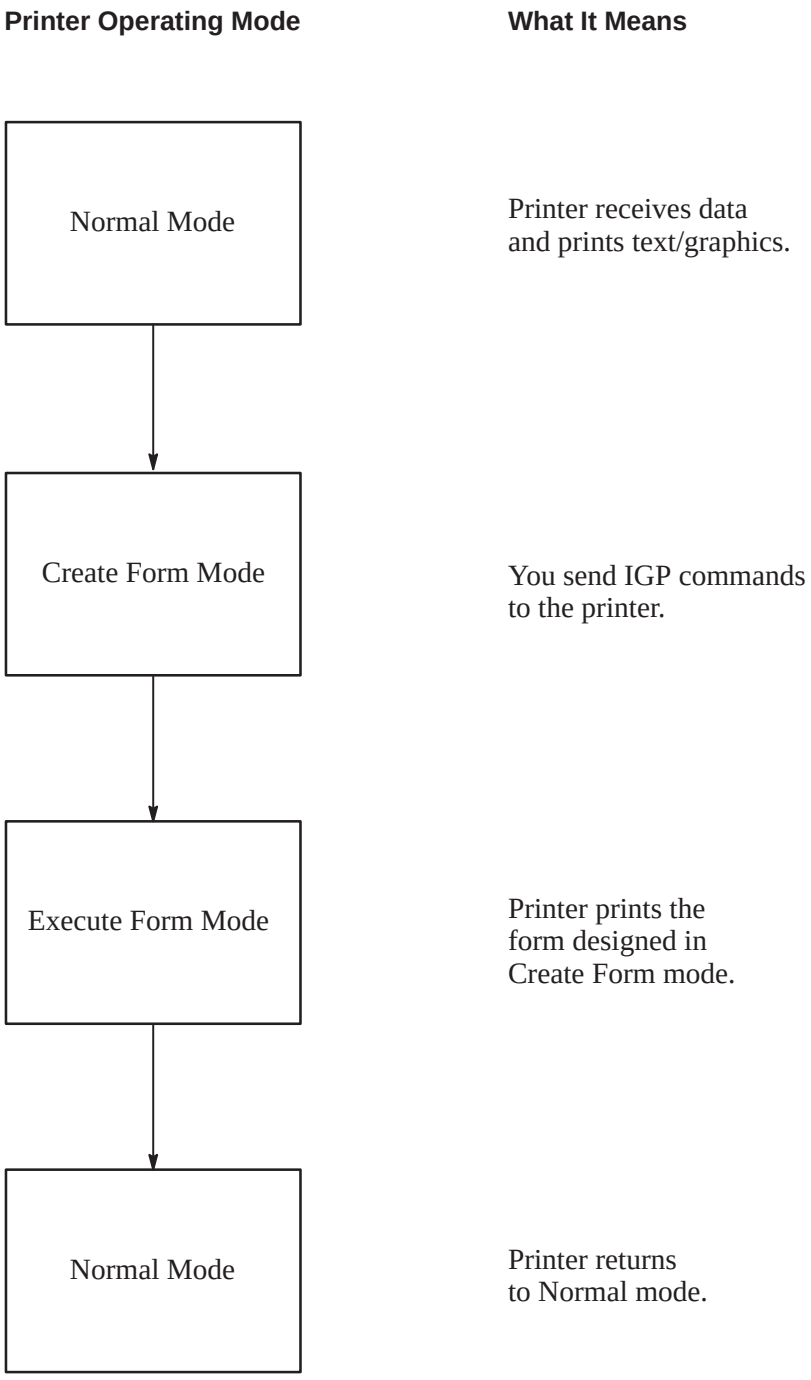


Figure 1–1. IPG/PGL Modes

Modes of Operation

The IGP/PGL has six modes of operation that use specific command sequences to control the IGP/PGL.

- In the Normal mode, the printer waits for a Special Function Control Code (SFCC) in order to perform IGP/PGL functions.
- In Quiet mode all IGP/PGL commands are ignored.
- In the Create Logo and Create Form modes, the printer produces graphics such as forms, logos, bar codes, and alphanumeric data.
- The Execute mode is the IGP/PGL printing mode, which controls when the actual printing of the bar codes and graphics will occur.
- The Configuration mode allows you to select specific IGP/PGL operations for running IGP/PGL files on your printer.

Normal Mode

Normal mode commands print data in a line printer format until a Special Function Control Character (SFCC) is detected.

Commands accessible in the Normal mode are summarized in Table 1–1 and fully described on the referenced pages. Some Normal mode commands can also be used in other modes: Compressed Print, Expand, Ignore, Select Format, and Vertical Line Spacing, which are Normal mode commands, can also be used in the Execute Form mode; the Multinational Character Set command can be used in the Normal or Create modes. Carriage Return, Form Feed, Line Feed, EVFU commands, and Paper Slew commands also operate in the Normal mode.

NOTE: All IGP/PGL commands *must* be entered in UPPERCASE, and each command line *must* be followed immediately by a line feed (or carriage return with line feed terminator) or a paper motion command.

Table 1–1. Normal Mode Commands

Command	Mnemonic	Description	Page #
Compressed Print	**DENSITY**	Defines the horizontal print density in characters per inch (cpi).	4–33
Configuration	**CONFIG**	Reconfigures IGP/PGL parameters.	4–34
Create	**CREATE**	Places the IGP/PGL in the Create Form mode where all the Create Form mode commands are available to design form elements.	4–39
Create Logo	**LOGO**	Places the IGP/PGL in the Create Logo mode, where logos can be defined using the appropriate dot placements.	4–74
Delete Form	**DELETE FORM**	Deletes a selected form name from the directory and IGP/PGL memory.	4–41
Delete Logo	**DELETE LOGO**	Deletes a selected logo name from the directory and IGP/PGL memory.	4–42
Directory	**DIRECTORY**	Provides a list of all defined forms and logos, logo assignments to forms, and memory usage and availability.	4–43
Execute	**EXECUTE**	Executes a previously created form.	4–49
Expanded Print	**EXPAND**	Expands fonts vertically and horizontally.	4–60
Font	**FONT**	Selects a specific typeface, bold, slant (italic) factor, and symbol set.	4–61
Ignore Sequence On/Off	**IGON** **IGOFF**	Enables the IGP/PGL to ignore all characters after the Ignore Sequence On command is sent until the Ignore Sequence Off command is sent. See Note on Page 1–11.	4–65
Line Spacing, Vertical	**LPI**	Defines the lines per inch (lpi) printing format.	4–66
Listen	**LISTEN**	Removes IGP/PGL from the quiet state and enables IGP/PGL operation.	4–71
Multinational Character Set	**USET** **ISET**	Use a multinational character set or create a custom user–defined character set.	Chapt. 6
Normal Mode	**NORMAL**	Places the IGP/PGL in the Normal mode, where it does not change the data stream but awaits the SFCC followed by an IGP/PGL command.	4–77
Paper	**PAPER**	Selects features such as paper cutter, print intensity, label sensor, page orientation (portrait/landscape), and print speed.	4–79
Print File	**PRINT**	Prints a file from external memory	4–83
Quiet	**QUIET**	IGP/PGL operation is disabled until a Listen command is received. Any data sent to the LinePrinter Plus Emulation is unaffected by IGP/PGL commands.	4–84
Reset	**RESET**	Deletes all forms and logos from the IGP/PGL memory.	4–85
Select Format On/Off	**SFON** **SFOFF**	Ignores all host–generated paper movement commands. See Note on Page 1–11.	4–90
Set Up	**SETUP**	Automatically executes and loads the IGP/PGL commands into the printer at power–up or after a RESET command is sent.	3–2
Printer Mode	**PMODE**	Included only for compatibility; not recommended for use.	N/A
Scaling Mode	**SMODE**	Included only for compatibility; not recommended for use.	N/A

Quiet Mode

In this mode, the host sends all data to the LinePrinter+ emulation without any IGP/PGL interpretation—the IGP/PGL is disabled and all IGP/PGL commands are ignored. The IGP/PGL looks only for LISTEN and PTX_SETUP.

Create Form Mode

Create Form mode commands design forms, all form components, and bar codes. The forms are not printed in the Create Form mode; forms are printed in the Execute Form mode after all form design is completed. To begin form design, access the Create Form mode using the Create command. The Create command is always used to enter the Create Form mode to begin form design. Remember that the CREATE command *must* be entered in UPPERCASE.

Each element has its own specific set of commands and parameters that determine size, location, and content. Listed in alphabetical order, Create Form mode commands are summarized in Table 1–2 and fully described on the referenced pages.

Print Boundaries

Print area boundaries exist for the paper size selected. All Create Form mode commands require you to identify the location for the components in your form. Boundary checking for form elements is performed only when the form length is specified. This ensures that forms can be created regardless of the type of paper you have loaded or margins you have set. The IGP/PGL checks the boundaries before the form is executed to assure that it will fit on the loaded paper size. If the debug option is used in the Create statement, the boundaries are checked against the current paper size. Refer to Appendix C for more information regarding page boundary guidelines.

Table 1–2. Create Form Mode Commands

Command	Mnemonic	Description	Page #
Alphanumerics	**ALPHA**	Defines size, location, and content of alphanumeric characters and dynamic alphanumeric data fields.	4–12
Alpha, Incremental	**ALPHA**	Defines starting data and increment amount for fixed auto–increment fields.	4–18
Bar Codes	**BARCODE**	Each bar code type has its own command to define size, location, orientation, and data as described in the "Bar Codes" chapter.	Chapter 5
Boxes	**BOX**	Defines size, location, and thickness of boxes.	4–30
Corners	**CORNER**	Defines vertical and horizontal length, location, and thickness of a set of four corners.	4–36
Duplication, Horizontal	**HDUP**	Defines the number of horizontal duplications of an element and the spacing between duplications.	4–44
Duplication, Vertical	**VDUP**	Defines the number of vertical duplications of an element and the spacing between duplications.	4–46
End	**END**	Terminates the Create Form mode.	4–48
Font	**FONT**	Selects a specific typeface, bold, slant (italic) factor, and symbol set.	4–61
Form Length	**LFORM**	Specifies the form length by total number of lines at 6 or 8 lpi.	4–64
Ignore Sequence On/Off	**IGON** **IGOFF**	Enables the IGP/PGL to ignore all characters after the Ignore Sequence On command is sent until the Ignore Sequence Off command is sent. See Note on Page 1–11.	4–65
Lines, Horizontal	**HORZ**	Defines the location, size, and thickness of horizontal lines.	4–67
Lines, Vertical	**VERT**	Defines the location, size, and thickness of vertical lines.	4–69
Logo Call	**LOGO**	Specifies the location of a previously defined logo.	4–72
Multinational Character Set	**ISET**	Selects one of the 32 Multinational character sets.	Chapter 7
Page Number	**PAGE**	Defines the location for automatically incremented page numbers.	4–78
Printer Mode	**PMODE**	Included only for compatibility; not recommended for use.	N/A
Reset	**RESET**	Deletes all forms and logos from the IGP/PGL memory.	4–85
Reverse Print	**REVERSE**	Defines the location for white–on–black printing and selects the background shade.	4–86
Scale	**SCALE**	Defines the vertical spacing and horizontal pitch for data positioning in character or dot columns and rows.	4–88
Scaling Mode	**SMODE**	Included only for compatibility; not recommended for use.	N/A
Select Format On/Off	**SFON** **SFOFF**	Ignores all host–generated paper movement commands. See Note on Page 1–11.	4–90

Create Logo Mode

The Create Logo mode is used in the Create Form mode. The Create Logo mode creates a logo design; this predefined logo is then “called” into a form in the Create Form mode. (The logo must be defined before it is “called.”)

Execute Form Mode

The Execute Form mode prints forms created in the Create Form mode. Execute Form mode commands are summarized in Table 1–3 and fully described on the referenced pages. Carriage Return, Form Feed, and Line Feed commands also operate in the Execute Form mode. Remember that the EXECUTE Form command *must* be entered in UPPERCASE, and that a single line spacing (or a line containing overlay data) must separate an EXECUTE command from a NORMAL command.

NOTE: Some systems pad the data stream with characters and spaces. If the IGP/PGL file on your system contains padded characters or spaces before the SFCC, this data must be ignored before the IGP/PGL can operate. The Ignore Sequence (IGON/IGPOFF) command, discussed on page 4–65, is provided for this purpose.

Similarly, at times you may also need the IGP/PGL to ignore host–originated paper movement commands (carriage return, line feed, form feed, etc.) in lengthy data streams. Select Format (SFON/SFOFF) discussed on page 4–90 is provided for this purpose. In addition, the Quiet command, (page 4–84), can be used to pass data unchanged to the printer.

Table 1–3. Execute Form Mode Commands

Command	Mnemonic	Description	Page No.
Compressed Print	**DENSITY**	Defines the horizontal print density in characters per inch (cpi).	4–33
Dynamic Alphanumeric Data	**AFn**	Executes the dynamic alphanumeric data provided after the (cc) EXECUTE command.	4–54
Dynamic Bar Code Data	**BFn**	Executes the dynamic bar code data provided after the (cc)EXECUTE command.	4–55
Expanded Print	**EXPAND**	Expands fonts vertically and horizontally.	4–60
Font	**FONT**	Selects a specific typeface, bold, slant (italic) factor, and symbol set.	4–61
Ignore Sequence On/Off	**IGON** **IGOFF**	Enables the IGP/PGL to ignore all characters after the Ignore Sequence On command is sent until the Ignore Sequence Off command is sent. See Note on Page 1–11.	4–65
Incremental Alphanumeric Dynamic Data	**IAFn**	Executes the incremental dynamic alphanumeric data provided after the (cc) EXECUTE command.	4–57
Incremental Bar Code Dynamic Data	**IBFn**	Executes the incremental dynamic bar code data provided after the (cc)EXECUTE command.	4–57
Line Spacing, Vertical	**LPI**	Defines the lines per inch (lpi) printing format.	4–66
Multinational Character Set	**ISET**	Selects one of the 32 multinational character sets.	Chapter 7
Normal Mode	**NORMAL**	Places the IGP/PGL in the Normal mode, where it does not change the data stream but awaits the SFCC followed by an IGP/PGL command.	4–77
Paper	**PAPER**	Selects features such as paper cutter, print intensity, label sensor, page orientation (portrait/landscape), and print speed.	4–79
Reset	**RESET**	Deletes all forms and logos from the IGP/PGL memory.	4–85
Select Format On/Off	**SFON** **SFOFF**	Ignores all host–generated paper movement commands. See Note on Page 1–11.	4–90

Configuration Mode

Selecting IGP/PGL options for running IGP/PGL files on your printer is referred to as IGP/PGL configuration. You can select IGP/PGL configuration parameters by sending commands from the host or by pressing keys on the control panel.

Chapter 4 describes all the firmware commands.

Chapter 2 shows the control panel menu and describes all of the configuration parameters. A list of the parameters is shown in Table 1–4.

Table 1–4. IGP/PGL Configuration Mode Options

NOTE: Parameters marked with an asterisk (*) indicate the factory default value. The printer must be off–line to enter the configuration structure.

Option	Parameter Value	Comments
AutoEject	DISABLE * ENABLE	If the last page of a job is only 1/2 full (the data does not fill the entire page), you can instruct the printer to eject the page or leave it in the printer. ENABLE causes the printer to eject the last page after the entire page has been processed and printed. DISABLE instructs the printer to eject the page only if you send a Page Eject command or when the printer receives the next print job.
Auto Wrap	DISABLE * ENABLE	Controls automatic “wrapping” of text to the next line down when the text exceeds the right margin. DISABLE truncates text beyond the page margin until a CR or CR + LF is received. ENABLE automatically inserts a CR + LF after a full print line. If a proportional spaced font is used, this option is ignored and the printer does not wrap text.
Define CR Code	CR = CR * CR = CR + LF	When CR = CR + LF, a line feed is automatically inserted after each CR received, otherwise data passes through unchanged.
Define LF Code	LF = LF * LF = CR + LF	When LF = CR + LF, a CR is automatically inserted before each line feed is processed, otherwise data passes through unchanged.

Option	Parameter Value	Comments
Ext Execute Copy	DISABLE* ENABLE	If DISABLED, dynamic data, overlay data, etc. are not allowed if the optional Form Count parameter is specified as part of the Execute command. If ENABLED, dynamic data, overlay data, etc. are allowed within a form in which the Form Count parameter is specified in the Execute command. In this case, the exact same form (with identical dynamic data, etc.) is printed for whatever the Form Count is. Also, each form is printed on a separate page.
Host Form Length	DISABLE ENABLE*	DISABLE sets the form length to the value set from the front panel. ENABLE sets the printer page size equal to the form length defined in the CREATE FORM mode.
Power On IGP/PGL	DISABLE ENABLE*	DISABLE puts printer in QUIET mode at power–up, otherwise ENABLE or LISTEN mode is active at power–up.
Select SFCC	1 – 255 decimal 126 *	Select any ASCII character from Table 1–5 on page 1–16 to set the binary pattern for the selected Special Function Control Character. Default is decimal 126 (~).
Uppercase	DISABLE* ENABLE	If ENABLED, all incoming data is converted to uppercase.

Option	Parameter Value	Comments
Select Font	0 * 1 2 3 4 5 6 7 8 9 10	0 = US ASCII 1 = German 2 = Swedish 3 = Danish 4 = Norwegian 5 = Finnish 6 = English 7 = Dutch 8 = French 9 = Spanish 10 = Italian 11–23 = Undefined default to ASCII. 24–31 = User–defined symbol set from the USET command.
Select LPI	1 – 10	Any integer value from 1 to 10. Default is 6.
Skip Cmd Prefix	DISABLE ENABLE*	DISABLE prints text before a valid IGP/PGL command as if a line feed preceded the command's SFCC. ENABLE ignores any text before a valid command.
Upc Descenders	DISABLE ENABLE*	If ENABLED, human readable text for UPC and EAN bar codes is embedded within the bar code. If DISABLED, the text is printed below the bar code.

Table 1–5. ASCII Conversion Table

ASCII	Dec	Hex	Binary Pattern 7 1	ASCII	Dec	Hex	Binary Pattern 7 1	ASCII	Dec	Hex	Binary Pattern 7 1	ASCII	Dec	Hex	Binary Pattern 7 1
NUL	0	00	0000000	SP	32	20	0100000	@	64	40	1000000	‘	96	60	1100000
SOH	1	01	0000001	!	33	21	0100001	A	65	41	1000001	a	97	61	1100001
STX	2	02	0000010	”	34	22	0100010	B	66	42	1000010	b	98	62	1100010
ETX	3	03	0000011	#	35	23	0100011	C	67	43	1000011	c	99	63	1100011
EOT	4	04	0000100	$	36	24	0100100	D	68	44	1000100	d	100	64	1100100
ENQ	5	05	0000101	%	37	25	0100101	E	69	45	1000101	e	101	65	1100101
ACK	6	06	0000110	&	38	26	0100110	F	70	46	1000110	f	102	66	1100110
BEL	7	07	0000111	’	39	27	0100111	G	71	47	1000111	g	103	67	1100111
BS	8	08	0001000	(	40	28	0101000	H	72	48	1001000	h	104	68	1101000
HT	9	09	0001001	)	41	29	0101001	I	73	49	1001001	i	105	69	1101001
LF	10	0A	0001010	*	42	2A	0101010	J	74	4A	1001010	j	106	6A	1101010
VT	11	0B	0001011	+	43	2B	0101011	K	75	4B	1001011	k	107	6B	1101011
FF	12	0C	0001100	,	44	2C	0101100	L	76	4C	1001100	l	108	6C	1101100
CR	13	0D	0001101	.	45	2D	0101101	M	77	4D	1001101	m	109	6D	1101101
SO	14	0E	0001110	.	46	2E	0101110	N	78	4E	1001110	n	110	6E	1101110
SI	15	0F	0001111	/	47	2F	0101111	O	79	4F	1001111	o	111	6F	1101111
DLE	16	10	0010000	0	48	30	0110000	P	80	50	1010000	p	112	70	1110000
DC1	17	11	0010001	1	49	31	0110001	Q	81	51	1010001	q	113	71	1110001
DC2	18	12	0010010	2	50	32	0110010	R	82	52	1010010	r	114	72	1110010
DC3	19	13	0010011	3	51	33	0110011	S	83	53	1010011	s	115	73	1110011
DC4	20	14	0010100	4	52	34	0110100	T	84	54	1010100	t	116	74	1110100
NAK	21	15	0010101	5	53	35	0110101	U	85	55	1010101	u	117	75	1110101
SYN	22	16	0010110	6	54	36	0110110	V	86	56	1010110	v	118	76	1110110
ETB	23	17	0010111	7	55	37	0110111	W	87	57	1010111	w	119	77	1110111
CAN	24	18	0011000	8	56	38	0111000	X	88	58	1011000	x	120	78	1111000
EM	25	19	0011001	9	57	39	0111001	Y	89	59	1011001	y	121	79	1111001
SUB	26	1A	0011010	:	58	3A	0111010	Z	90	5A	1011010	z	122	7A	1111010
ESC	27	1B	0011011	;	59	3B	0111011	[	91	5B	1011011	{	123	7B	1111011
FS	28	1C	0011100	<	60	3C	0111100	\	92	5C	1011100	|	124	7C	1111100
GS	29	1D	0011101	=	61	3D	0111101	]	93	5D	1011101	}	125	7D	1111101
RS	30	1E	0011110	>	62	3E	0111110	^	94	5E	1011110	~	126	7E	1111110
US	31	1F	0011111	?	63	3F	0111111	_	95	5F	1011111	■	127	7F	1111111

Alphanumeric Data

Based on the requirements of a specific application, you can use one of three methods to print alphanumeric data on a form: Fixed data, Overlay data, and Dynamic data. These methods are described in more detail in the "Commands" chapter.

- Fixed data prints on each form in the same "prepositioned" location, unless the location changes in the form definition. Company name, address, logo, and phone number are typical examples of alphanumeric data that can be "fixed" onto the form.
- Overlay data is variable alphanumeric data positioned on the page with line feeds and spaces to fit into exact locations. For example, specific data can be "overlayed" onto a blank form as if you were typing data into the appropriate blanks on a preprinted form. Customer names, addresses, and order numbers are examples of data overlayed onto a form.
- Dynamic data is variable data entered into specific locations on each form. Each time the form prints, a command enters new data in those locations. Customer names, addresses, or any type of variable alphanumeric or bar code data can be provided dynamically.

Incremental Data

The incremental data feature allows you to update alphanumeric and bar code data fields in an alphabetical or numeric manner automatically with just one set of data sent from the host computer.

Alphanumeric and bar code incremental fields can be used with fixed (static) data input as part of the Create Form mode or with dynamic data supplied in the Execute Form mode.

The incremental fields can be increased or decreased, repeated at specified intervals before updating, and reset to the starting value after a specified number of increments.

2 Configuration

Chapter Contents

Configuring the IGP/PGL with the Control Panel

Matching certain printer operational settings to those of the host computer is known as “printer configuration.” The settings, or configuration parameters, such as selecting the host interface, are adjusted according to the printer function key descriptions in your printer’s user manual. Configure the IGP/PGL in the same way you would configure the printer for other features.

You can select IGP/PGL default parameters directly from the control panel as explained in this chapter, or by control codes as explained in the “Commands” chapter.

The IGP/PGL parameters are described on page 2–4 and the following pages. Parameters marked with an asterisk (*) indicate the default value. The printer must be off–line to enter the configuration structure.

Enter and exit the IGP/PGL configuration menu according to your printer user manual configuration procedures. Pressing an invalid key to enter a parameter value may move you to another level in the configuration or exit the configuration menu completely.

IMPORTANT

BEFORE you reconfigure the IGP/PGL, print a configuration sheet to see all of the current settings. Refer to your printer user manual.

Configure the IGP/PGL according to your specific requirements. Please note the differences associated with the following options.

- **Left Margin Sign.** The Left Margin Sign option no longer exists in the IGP/PGL configuration menu. To establish a signed left margin and a top/bottom margin, access the option from the LP+ configuration menu.
- **Overstrike Data.** Thermal printing uses a bold font to emphasize overstrike data (e.g., data <carriage return> data <cr/lf> would overstrike “data” so that it would be bolded.)

The IGP/PGL sub–menu is shown on the following page.

The IGP/PGL Emulation Submenu

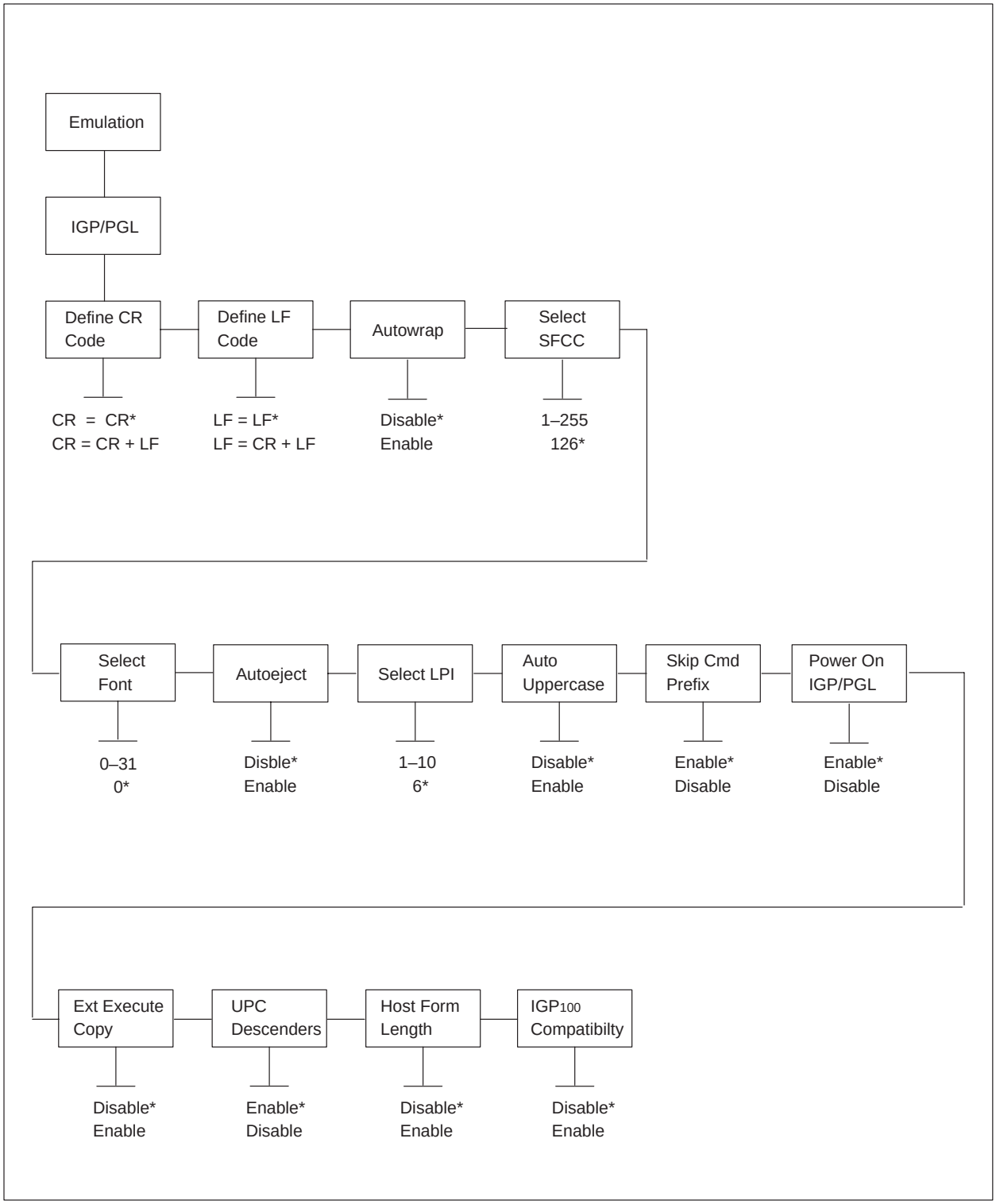


Figure 2–1. The Configuration Menu

Define CR Code (Carriage Return)

This parameter forces the printer to insert an automatic Line Feed code into the data stream whenever a Carriage Return code occurs. This is to be used only if the host computer does not send Line Feeds to the printer.

- **CR = CR**. The default. Does NOT perform a line feed. The next print position will be print position 1 of the current line.
- **CR = CR + LF**. Performs an automatic line feed. The next print position will be print position 1 of the next line.

Define LF Code (Line Feed)

This parameter forces the printer to insert an automatic Carriage Return code into the data stream whenever a Line Feed code occurs. This can be used in most installations, but it is required if the host computer does not send Carriage Returns to the printer.

- **LF = LF**. The default. Does not perform an automatic carriage return. The next print position will be the current print position of the next line.
- **LF = CR + LF**. Performs an automatic carriage return. The next print position will be print position 1 of the next line.

Autowrap

This parameter determines if text will wrap to the next line when the line of text exceeds the right margin.

- **Disable**. The default. Truncates the text beyond the right margin until a CR or CR+LF is received.
- **Enable**. Automatically inserts a CR+LF after a full print line.

Select SFCC

You can specify which decimal code (1–255) will be used as the Special Function Control Character (SFCC). The factory default setting is 126 (~). The SFCC denotes that the following data is an IGP/PGL command.

Select Font

This parameter allows you to select a font for the IGP/PGL feature. The default is 0, which is U.S. ASCII. The following values are valid choices:

0	U.S. ASCII
1	German
2	Swedish
3	Danish
4	Norwegian
5	Finnish
6	English
7	Dutch
8	French
9	Spanish
10	Italian

Values 11–23 are undefined and will default to 0. You can set values 24–31 to specific fonts; refer to the USET command.

Auto Eject

If the last page of a job is not full, that is, the data does not fill the entire page, you can instruct the printer to eject the page or to stop and hold the page at the last print position.

Enable. The printer ejects the last page after the entire job has been processed and printed.

Disable. The default. The printer does not eject the last page unless you send a Page Eject command or until the printer receives another print job.

Select LPI

This is the number of lines to be printed per inch. For example, at 6 lpi there is 1/6–inch from the top of one print line to the top of the next print line. Default is 6 lpi.

Auto Uppercase

This parameter enables the printer to print text in all uppercase.

Disable. The default. The printer will print text in upper- and lowercase.

Enable. The printer will print text in uppercase only.

Skip Command Prefix

This parameter determines if a data string before an IGP/PGL command will be ignored.

Disable. The printer will print any data before an IGP/PGL command.

Enable. The default. The printer ignores all text before an IGP/PGL command.

Power On IGP/PGL

You can set the IGP/PGL feature so that it is enabled or disabled when the printer is powered on.

Disable. The IGP/PGL is disabled when the printer is powered on. (The IGP/PGL feature is initialized to the Quiet mode.)

Enable. The default. The IGP/PGL is enabled when the printer is powered on. (The IGP/PGL feature is initialized in the Normal mode.)

Extended Execute Copy

Disable. The default. Dynamic data, overlay data, etc. are not allowed if the optional Form Count parameter (number of forms to print) is specified as part of the Execute command. (This setting is IGP100 compatible.)

Enable. Dynamic data, overlay data, etc. are allowed within a form in which the Form Count parameter is specified in the Execute command. In this case, the exact same form (with identical dynamic data, etc.) is printed for whatever the Form Count is. However, incremental data is *not* incremented since the page that is printing is exactly the same. Also, each form is printed on a separate page.

UPC Descenders

This parameter allows you to leave a gap for human readable data in the UPC/EAN bar codes.

Disable. The IGP/PGL does not leave a gap if there is no human readable data.

Enable. The default. The IGP/PGL leaves a gap, even if there is no human readable data.

Host Form Length

This parameter determines which page length setting (the one specified in the Create Form mode or the one set on the printer) will be used when you send an Execute (print) command.

Enable. The page length set in the Create Form mode is used. This is the default.

Disable. The page length set on the printer will be used.

IGP100 Compatibility

This parameter is used to make PGL compatible to the original IGP100 in cases such as exact positioning of text, etc.

Disable. Does not change PGL behavior. This is the default value.

Enable. Makes PGL behavior compatible to that of IGP100.

3 PTX_Setup

Chapter Contents

PTX_Setup Command Description

Purpose Enables the host to control PSA printer resources common to all emulations.

Mode All modes (Normal, Quiet, etc.)

Format

(cc) PTX_SETUP
<category–> [<parameter;value:> ...<parameter;value:>|<parameter;value:>.
:
:
<category–> [<parameter;value:> ...<parameter;value:>|<parameter;value:>.
PTX_END

(cc)	The Special Function Control Character. This cc is **NOT** the PGL SFCC. It is the "setup" SFCC and is set under the Maint/Misc configuration menu.
PTX_SETUP	The trigger command. Must appear in capital letters. Once the trigger is detected, all unprintable characters and spaces (i.e., characters less than 21 hex) are ignored.
<category – >	This selects which category or type of command is being entered: CONFIG, DISK_IO, ENGINE, FORMAT or TEST_CHK. All categories must appear in capital letters and must be followed by a dash (–).
<parameter;value:>	Parameter and value pair for the current category. See the listing of categories, valid parameters and ranges of values beginning on page 3–4. The parameter and value must be separated by a semicolon (;) and must be terminated by either a colon (:) or a period (.). The colon signifies that more parameter/value pairs for the current category are to follow; therefore, more than one parameter/value pair may be given for the current category. The period denotes the end of parameter/value pairs for the given category. Parameter/value pairs must not exceed 25 characters with the semicolon and terminator included.

PTX_END	The end command for the PTX_SETUP. When the PTX_END command is detected, any unprintable characters following it will be ignored. Therefore, the next printable character from the host will be sent to the active emulation.

Comments The PTX_Setup feature will only manage those options that are common between printer emulations. Each emulation is responsible for providing host commands to set emulation–specific options. If input data is invalid or causes an error, the PTX_Setup parsing is terminated and the next character is passed to the active emulation.

PTX_Setup Command Parameters and Values

The valid SETUP parameters and value ranges are listed below according to category.

DISK_IO

Valid parameter/values for performing disk–related functions are listed below. Filenames must follow the MS–DOS standard and be enclosed in double quotation marks; for example, **“a:filename.dat”**.

An invalid filename will cause the PTX_SETUP function to exit and data will be passed directly to the active emulation.

CAPTURE;“<filename>”

Stores the host data sent to the printer external memory module under the given filename enclosed in double quotation marks before being given to the emulation.

If the file previously existed, it is deleted and overwritten. Data capture is terminated when the CAPTURE setup command is sent with a blank file name (i.e., **CAPTURE;“”.** or **CAPTURE;“”:**).

NOTE: File capturing begins after the PTX_END is encountered and stops when the next PTX–SETUP is received. Commands within PTX_SETUP cannot be captured. Also, if no suffix is given, the default of “.PTX” is assumed.

RUNFILE;“<filename>”

Reads the contents of the named file enclosed in double quotation marks and passes the data as input to the active emulation. If the file is not found, no action is taken.

DRIVE;“<char>”

Changes the drive used in capturing and running file data when the drive is not explicitly given by the user. The power–up default drive is drive A. Enter ‘B’ to change the default to drive B.

DEL;“<filename>”

Deletes the given file enclosed in double quotation marks from the printer external memory. If the file is not found, no action is taken.

FONT;“[drive]<font number>”

Allows downloading of HP LaserJet II bitmap fonts into a memory module. The syntax is as follows:

```
DISK_IO–FONT;“[Drive:]<font number>”
<Font Data>
FONT_END
```

Note that when using the FONT command, it should be the only command on the line (i.e., multiple DISK_IO commands should **not** be used along with the FONT command on the same line). The <Font Data> follows immediately after the command.

All data following the FONT command will be interpreted and stored as a font on the proper module. The font will be stored on the drive specified in the command, if it was included; otherwise, it will use the default drive. The font number can be in the range of 1–99. The same font number should be used when the font is activated (using the font command).

ENGINE

The following list contains the valid parameter/values for controlling the print engine and setting the Paper Control menu options. Some parameters or values are not available or do not apply to all engines. (Consult the engine manual for specific ENGINE options.)

If a valid parameter is given but does not apply to the current engine, then it is ignored. If a valid value is outside the available range for the current engine, then the option will be set with the closest available value for that engine.

ALM_WIDE;#

Defines the Automatic Label Mapping (ALM) wide–web width in 1/1000ths of an inch increments from 0–65535.

ALM_NARROW;#
Defines the Automatic Label Mapping narrow–web width in 1/1000ths–of–an–inch increments from 0–65535.

ALM_ENABLE;<value>
Enables or disables the ALM. The value ‘N’ or ’W’ enables the ALM. A “D” disables the ALM. An ‘N’ defines a page as “narrow.” A ‘W’ defines a page as “wide.”

IMAGE_SHFT_H;#
Defines the horizontal image shift in 1/1000ths–of–an–inch increments from (–1000)–(1000).

IMAGE_SHFT_V;#
Defines the vertical image shift in 1/1000ths–of–an–inch increments from (–1000)–(1000).

LENGTH;#
Defines the page length in 1/1000ths–of–an–inch increments. The range of values is dependent upon the printer. (Refer to the *Setup Guide* for your printer.)

REWIND;#
Enables or disables the rewind function. A zero value disables rewind and a ‘1’ value enables the rewinder.

WIDTH;#
Defines the page width in 1/1000ths–of–an–inch increments. The range of values is dependent upon the printer. (See the printer manual.)

PTX_Setup Command Example

```
!PTX_SETUP
ENGINE–LENGTH;11000:WIDTH;8500.
PTX_END
```

This example sets page dimensions to 8.5” wide by 11” long.

4 Commands

Chapter Contents

IGP/PGL Command Standards

IGP/PGL commands have many options and a specific format that you must follow to obtain the desired results. Certain elements are standard for all IGP/PGL commands. These command standards are described in the following sections. Familiarize yourself with the meaning and use of these standards before operating the IGP/PGL.

Special Function Control Character (SFCC)

The SFCC identifies a command directed to the IGP/PGL to enable a specific IGP/PGL function. Based on the host computer interface requirements, various characters can be selected as the SFCC, such as the hat (^) or a tilde (~). Use caution and be certain it is compatible with your host system, if you use a nonprintable character as your SFCC. The SFCC must be placed before a command or data is entered. The examples in this manual use the tilde as the SFCC; always substitute the actual SFCC required by your system wherever the tilde is shown. In the general command formats, the SFCC is represented by (cc).

You can select the SFCC using the CONFIG command (page 4–34) or the control panel (page 2–4).

Semicolon (;)

Each parameter (alpha data, options, etc) on the command line is separated by a semicolon. Blank spaces between the semicolon and the next parameter are not allowed. A missing or misplaced semicolon causes an error message.

Uppercase

The IGP/PGL is “case sensitive.” ALL commands must be entered in uppercase.

Inline Commands

The SFCC, usually a “~”, was required to be the first character on a new line. It may now appear anywhere on the command line.

There is a configuration option that determines whether any data preceding a command is printed or ignored.

All PGL commands begin with the Special Function Control Character (SFCC). When the command is not followed by a valid line terminator, it must also end with the SFCC. Any illegal command or non–terminated command will print as text.

These features, when used in combination with the new dynamic data rule, are useful for those whose systems count the number of lines printed and automatically issue a form feed. Now, the line count can be maintained by combining overlay data and commands in a single print line. For example:

Normal text ~FONT;BOLD ON~Bold text~FONT;BOLD OFF;SLANT 1~Slanted text~EXPAND;2:2~~FONT;SLANT 0~ Enlarged upright text

would yield:

Normal text **Bold text** *Slanted text* Enlarged Upright Text

Line Terminator

Each command line must be terminated by a line feed (or a carriage return with a line feed), or a paper motion command. When an inline command is not followed by a valid line terminator, it must also end with the SFCC. The command line will not be accepted if not properly terminated. Refer to your system operator's manual for your system keyboard and your printer configuration codes to determine which key(s) (such as ENTER, LINE FEED, RETURN, etc.) perform a line feed, carriage return with line feed, or form feed function.

Printable Character

To print, alphanumeric and bar code data must be enclosed by a printable character (a delimiter). This delimiter is represented by (D) in the command format. In this manual, an asterisk (*) is used in most examples as the printable character. (The parentheses are *not* entered.) Any printable character can be used as this delimiter except a slash (/) or the SFCC.

The same printable character must be used at both the beginning and end of the text to be printed and cannot be used within the text.

Spaces

Spaces are used in the general command formats to visually separate individual command parameters. Supply the appropriate 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.

Command Parameters

Most commands include a number of parameters. Some are optional, and some are required. Each parameter must be separated by a semicolon (;) unless noted otherwise. Throughout this manual, actual commands required for input are shown exactly as they must be entered and all parameters associated with that command are shown in italics. Optional parameters are enclosed in brackets [ ], but do *not* enter the brackets.

Parentheses indicate variable data. You have a choice of what to enter, but you must enter something. Do *not* enter the parentheses themselves.

Form Name

You must use alphanumeric characters to identify the document (form or logo) you are creating (a maximum of 12 alphanumeric characters). The Form Name is also used to identify the form during the Execute Form mode. The valid Form Name characters are listed below and also apply to Logo Name. The SFCC can also be used in the Form Name. No spaces are allowed between any of the Form Name characters.

A to **Z** (upper and lowercase)
0 to **9**
Dollar sign **$**
Percent sign **%**
Dash **–**
At sign **@**
Left and right braces { }
Left and right parentheses **( )**
Tilde **~**
Single quotes **‘ ’**
Exclamation point **!**
Pound sign **#**
Ampersand **&**

Prompt

The prompt is the symbol (e.g., a dollar sign, period or greater than symbol) used to indicate that the host computer is ready for data input. In this manual, the prompt is shown as a period (.).

Numeric Values

In this manual, a lowercase **n** in the command represents a numeric value. If a command parameter includes a lowercase **n**, it must be substituted with an appropriate numeric value. If the lowercase **n** is part of an optional parameter and the option is not selected, a value for **n** is not required.

Comments in Command Lines

To aid in preparation or maintenance of a form or logo, comments can be added to many command lines. Comments must be preceded by a slash (/). However, do not use the /comment feature on lines containing an SFCC (i.e., CREATE, NORMAL, EXECUTE, etc.). Throughout this manual, comments are provided in parenthesis beside most command lines for better understanding of IGP/PGL operation but should not be included in your IGP/PGL files.

Storing Data

To send data to the IGP/PGL, use a host system command, such as PRINT. (Entering data through the keyboard does *not* store data in nonvolatile IGP/PGL memory.) Once stored in memory, the data remains until deleted, the IGP/PGL is reset with RESET command, or until the printer is turned off.

IGP/PGL files can be permanently stored to, deleted from, and retrieved from the printer external memory modules by ending CREATE, CREATE LOGO, DELETE FORM, DELETE LOGO, EXECUTE, and DIRECTORY commands with **;DISK**.

For example, the following command creates a form named ORDER and stores it in the IGP/PGL printer external memory.

(cc)CREATE;ORDER;DISK

NOTE: Executing a form or calling a logo will access the default printer memory module automatically if the object is not found in memory.

Uncompressed and Packed Bits Compression

PGL logos support uncompressed and packed bits compression methods. CCITT and LZR (used for color) compression methods are not supported. Refer to your application's documentation about TIFF files.

Character Position.Dot Position (CP.DP) Format

The CP.DP format is a special parameter available with the IGP/PGL commands. CP.DP format allows two elements plotted at nearly the same character location to be offset to eliminate overlapping. Specifying starting and ending rows and columns is its most frequent use.

Each character location is a cell. Each cell is a grid 12 dot rows high by 6 dot columns wide (printing at 6 lpi and 10 cpi). The CP.DP format allows a character cell position (CP) and a specific dot position (DP) within the cell to be identified as shown in Figure 4–1. The DP portion of the CP.DP format specifies a location down (in reference to rows) and to the right (in reference to columns) within the character cell position.

For example, refer to Figure 4–1. Suppose a line runs along character position column 13 (CP = 13). At the same time, an alphanumeric string must begin in column 13. With CP.DP format, the alphanumeric string can be offset 2 dot positions (DP = 2) in column 13 to avoid overlap. Specify 13.2 (CP = 13, DP= .2) for the starting column of the alphanumeric string. Similarly, to place a horizontal line 8 dot rows beneath another horizontal line in character row position 11, specify row 11 for one line and row 11.8 for the other line.

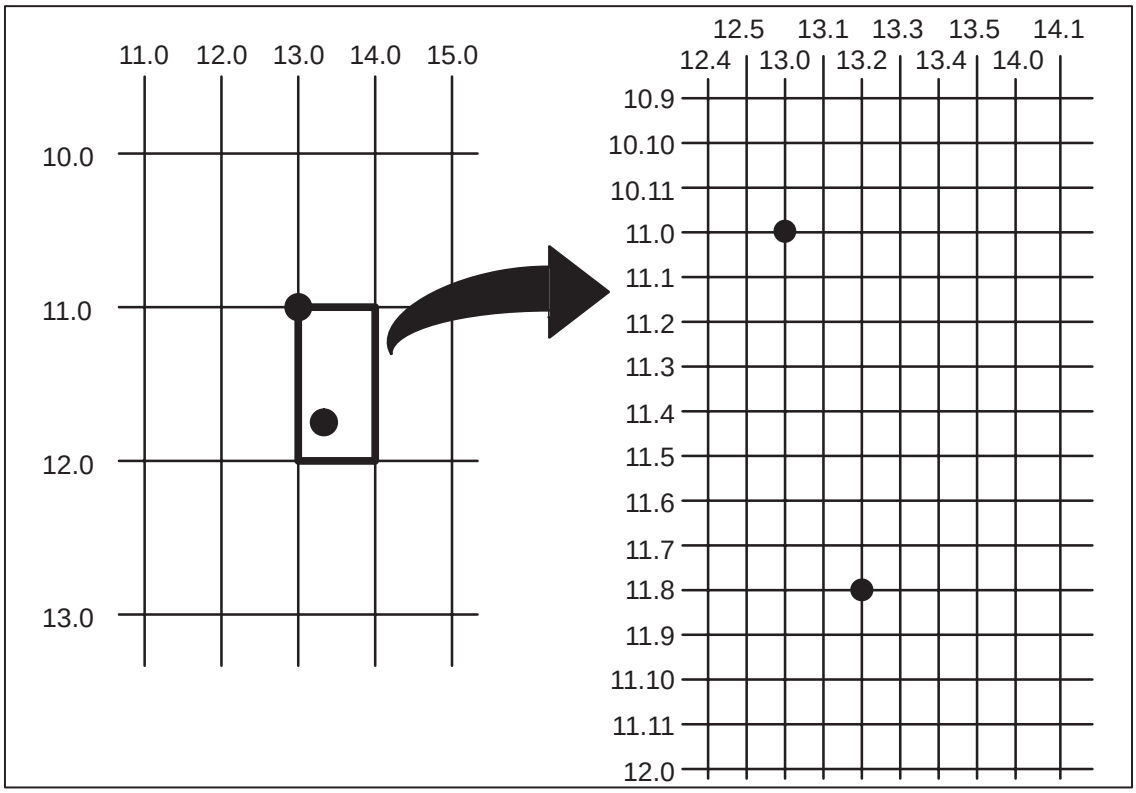


Figure 4–1. CP.DP Format Example

Data Fields for Alphanumeric and Incremental Data

Based upon the requirements of a specific application, three methods are used to print alphanumeric data on the form: fixed (or prepositioned) data, overlay data, and dynamic data.

Fixed Data

Fixed data is entered during the Create Form mode as part of the form definition. It appears as prepositioned information similar to other form elements. The fixed data is printed on each form in the same location and can only be changed by changing the form definition. Your company's name, address, logo, or phone number are typical examples of alphanumeric data that can be fixed onto the form.

Overlay Data

Overlay data is variable alphanumeric data entered during the Execute Form mode by positioning the information with line feeds and spaces into an exact location. In general, a page of data is overlayed onto a form similar to typing data in the appropriate blanks of a preprinted form. Each page of overlay data is separated by form feeds to correspond to each form printed. Customer names, addresses, and order numbers are examples of variable data that can be overlayed onto the form.

Dynamic Data

Dynamic data is variable data entered by command during the Execute Form mode. The dynamic data is entered into a location previously defined in the Create Form mode. Up to 255 locations can be identified during the Create Form mode as part of the form definition.

A command during the Execute Form mode enters new data in the identified location(s) each time the form prints. Dynamic data is the most efficient method of supplying variable data to the form. Again, customer names, addresses, or any type of variable alphanumeric or bar code data can be provided dynamically.

Incremental Data Fields

The incremental data fields feature allows alphanumeric (and bar code) data fields to automatically update numerically or alphabetically with just one set of data sent from the host computer. A maximum of 65,535 forms can print with incremental fields automatically updated.

Alphanumeric incremental fields can be used with fixed (static) data input as part of the Create Form mode or with dynamic data supplied in the Execute Form mode. Incremental data fields cannot be used with Overlay data.

Dark Printing

A DARK parameter, available in the Alpha, Reverse, and Bar Code commands, is a double–strike feature which produces bolder, darker text, denser black backgrounds for reverse print, and extra–dark, more readable bar codes. The application of the dark feature differs between line-matrix and thermal printers, as described in the following paragraphs.

Thermal Printers

Reverse and Bar Code commands automatically print in the DARK mode in thermal printers; therefore, a DARK parameter in the command line is ignored. However, a DARK parameter used with *alphanumeric text* in the ALPHA command will print using a bold font. In any event, print speed is not reduced when using the DARK parameter with thermal printers.

Line-Matrix Printers

The extra darkness provided by the DARK parameter improves the Print Contrast Ratio (PCR) and effectively extends the life of the ribbon. For bar codes, the PCR describes the difference in light reflection between the bars and spaces as a measurement of light/dark contrast in order to judge when a printed bar code will not be dark enough to be read with accuracy by a scanner.

The extra dots used to produce the darker bar code do not change the overall width of the wide bars. Figure 4–2 illustrates how the DARK parameter adds two extra dot columns to wide bar code bars without increasing bar width.

Because of the second hammer bank stroke required to plot the extra columns of dots, print speed may be reduced up to half when the DARK parameter is used with Bar Code commands. However, this decreased print speed should be weighed against the significant increase in bar code PCR and extended ribbon life.

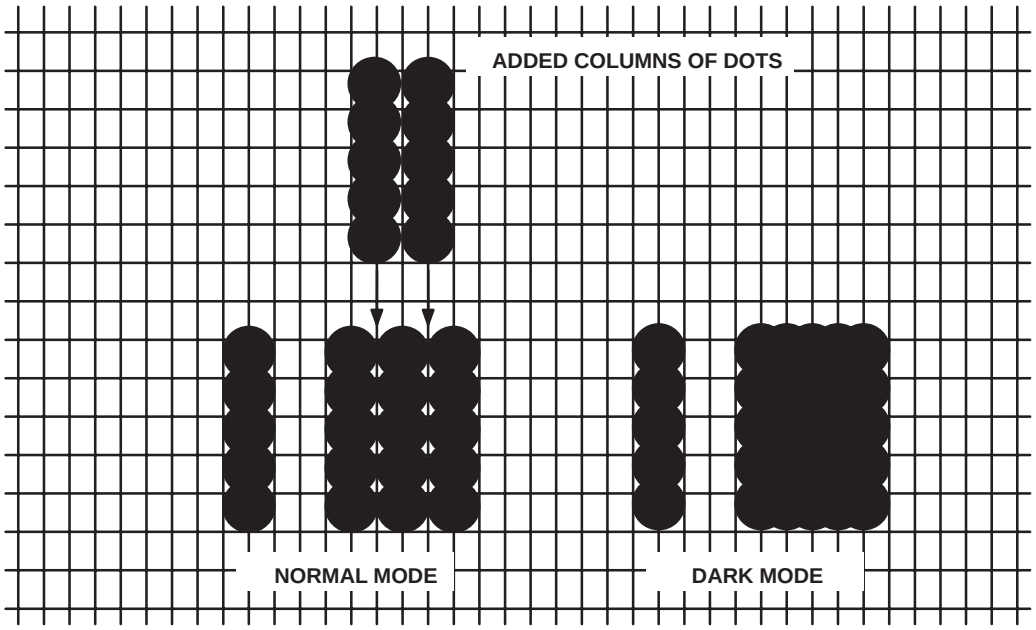


Figure 4–2. Dark Printing

NOTE: Depending on the printer used, the printed appearance and location of your print samples may vary from to those shown in this manual. The position of your print samples may also vary compared to these examples, depending on the initial print position.

Alphanumerics

Purpose Defines and positions alphanumeric data on a form as a “preprinted” static data field or as a dynamic data field.

Mode CREATE

Format ALPHA
[R;] [E;] [Cn;] [AFn;L;] [DIR;] [UC;] [POINT;] SR; SC; VE; HE; (D)text(D) STOP

ALPHA	The Alphanumeric command; enter ALPHA.
R	The optional reverse printing (white on black) parameter. Enter **R** to specify a black background.

NOTE: The **D** parameter, used in earlier line-matrix IGP/PGL versions, is ignored in thermal IGP/PGL. In addition, the **L** parameter, also used in earlier IGP/PGL versions to specify a long reverse field for descending characters in dynamic alphanumeric data, is provided automatically in this IGP/PGL. The IGP/PGL will ignore these parameters if found in a command line.

E	The optional elongated character parameter. Enter **E** to specify elongated character printing. Elongated characters are double height and single width. If used, the VE and HE parameters must be set to 0, or an error message will result. Elongated character printing is also available with rotated alphanumerics.
Cn	The optional horizontal compression parameter. Enter **C**. Then enter **n** = 10-30 to specify the number of horizontal characters per inch (cpi). 10 cpi is the default value. 10A = 10 cpi OCR–A. 10B = 10 cpi OCR–B. If used, the VE and HE parameters must be set to 0, or an error message will result.

AFn;L

The optional dynamic data field parameters for identifying the alphanumeric string location on a form and for designating the length of the alphanumeric string. If these parameters are used, the actual text cannot be entered during the Create Form mode; it must be entered dynamically during the Execute Form mode. Dynamically entering data during the Execute Form mode permits changes to the alphanumeric text without redefining or re–creating the form. To use this field, perform the following steps:

a. Enter **AF**.

b. Replace **n** with a number ranging from 1 to 255 to identify the alphanumeric string location on the form. The SR and SC parameters are used to specify the exact location of the alphanumeric field identified by **n**.

c. Replace **L** with a number equal to the number of characters in the dynamic alphanumeric string ranging from 1 to 255.

d. Dynamically enter the alphanumeric string itself in the Execute Form mode. The length of the alphanumeric string must be equal to or less than the value assigned to the length (**L**) parameter. Refer to “Execute Form: Dynamic Alphanumeric Data” on page 4–54.

e. If the dynamic data field is used, do *not* enter the ASCII TEXT parameter.

DIR

Optional parameter for rotating a character string. Use the following codes to indicate the direction of character rotation:

a. Enter **CW** for 90 degree clockwise rotation.

b. Enter **CCW** for 90 degree counterclockwise rotation.

c. Enter **INV** for inverted characters (180 degree rotation).

The default orientation prints character strings in the standard horizontal format.

NOTE: Alpha rotation parameters (CW, CCW, INV) require more memory to implement than the default orientation. Thus, characters selected for rotation may appear in the default orientation. Selecting a smaller font will correct the problem.

UC Enter **UC** to specify uppercase–only characters. When uppercase–only is specified, all lowercase alpha character codes are converted automatically to uppercase. Consequently, do not specify uppercase–only characters if lowercase characters are required.

POINT Optional parameter that changes the units for the vertical and horizontal expansion values. When the point parameter is present the VE value defines the font height in 1/72 of an inch (i.e. points). If the HE value is non–zero, it defines the character width in 1/72 of an inch, otherwise the character width is the standard width for the chosen height. Cannot be used with elongated (E) and compressed (Cn) parameters.

SR Defines the starting row of the alphanumeric data. Enter a value ranging from row 1 through one less than the length of the form. Character row or dot row is specified based on the Scale command (page 4–88), or use the CP.DP format (page 4–7).

SC Defines the starting column of the alphanumeric data. Enter a value ranging from column 1 through one less than the width of the form. Character column or dot column is specified based on the Scale command (page 4–88), or use the CP.DP format (page 4–7).

VE Defines the vertical expansion factor to enlarge characters vertically. Enter a value between 0 and 139. Zero specifies the standard font (no expansion). A VE value must be entered. Elongated (E) and compressed (Cn) characters cannot be used with a vertical expansion other than zero.

HE	Defines the horizontal expansion factor to enlarge characters horizontally. Enter a value between 0 and 139. Zero specifies the standard font (no expansion). An HE value must be entered. Elongated (E) and compressed (Cn) characters cannot be used with a horizontal expansion other than zero.
(D)	The printable character (quotation marks for example) identifying the start and finish of the alphanumeric string. Enter any printable character other than a slash (/), the SFCC, or a character used within the alphanumeric string itself. You must use the same character at both ends of the alphanumeric string, but it will not print with the data.
text	The group of ASCII characters (the alphanumeric string) to print. Enter any of the standard ASCII printable characters (except the character used to delimit the string in the **D** parameter). The data appears as "prepositioned" information on the form beginning at the location specified by SR and SC. This is the "fixed" or static alphanumeric data; once defined on the form, it is changed only by redefining the form using the Alphanumerics command.
STOP	Stop indicates the end of the Alphanumeric command; enter **STOP**, and the IGP/PGL will wait for a new command. If not entered, the IGP/PGL will wait for another set of Alphanumeric command parameters.

Comments As dynamic data, the location of the alphanumeric field is established in the Create Form mode and the actual alphanumeric data is continuously redefined before placement on the form in the Execute Form mode. You can also rotate and reverse print the alphanumeric string using this command.

Example The following program and example in Figure 4–3 illustrates the Alphanumeric command capabilities. To illustrate positioning, starting row and column are indicated on the example but do not necessarily reflect actual location on the page.

Notice the same starting row is used for all “EXAMPLE” characters, and they are all aligned on the same baseline (or bottom), regardless of expanded or compressed parameters. The string rotates around the point of intersection of the starting row and columns shown by the “pinwheel” E. A rotated 10 cpi character establishes the baseline for all character sizes.

```
ALPHA
36;37;4;4;*E*
36;41;2;3;*X*
36;44;2;2;*A*
36;46;1;1;*M*                    (Single–size character, expanded font)
C13;36;47;0;0;*P*
C15;36;48;0;0;*L*
C17;36;49;0;0;*E*
CW;36;60;2;2;*CLOCK*
CW;42;60;4;4;*WISE*
CCW;58;26;2;3;*COUNTER*
CCW;45.5;26;2;2;*CLOCK*
CCW;39.2;26;1;1;*WISE*
INV;54.5;58;0;0;*INVERTED*
R;INV;54.5;49;0;0;*REVERSE PRINT*
45;48;0;0;*E*
CW;UC;45;48;0;0;*e*              (Lowercase converted to uppercase)
CCW;45;48;0;0;*E*
INV;45;48;0;0;*E*
STOP
```

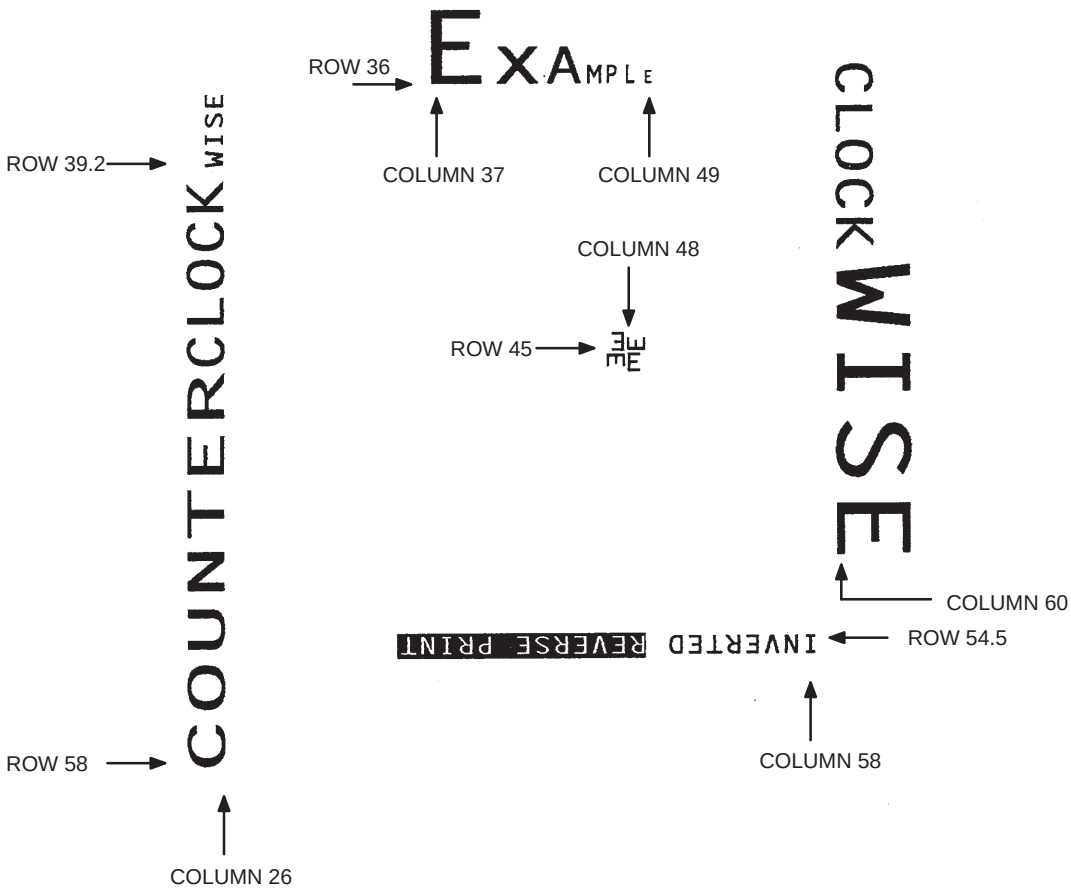


Figure 4–3. Alphanumeric Example

Alphanumerics, Incremental Fields

Purpose The incremental fields feature updates alphanumeric (and bar code) data fields in a numeric or alphabetical manner automatically using just one set of data sent from the host computer. Incremental alphanumeric data fields can be applied to fixed (static) data (page 4–22), or dynamic data (page 4–25).

Mode CREATE (for fixed data) or EXECUTE (for dynamic data)

NOTE: Throughout the discussion of incremental fields, the term “increment” or “incremental” means the field is automatically updated by a specified amount (or increment). The field can actually be increased/decreased in specified increments/decrements within the command.

Comments Incremental fields can increase or decrease, repeat at specified intervals before updating, and reset to the starting value after a specified number of increments. A maximum of 65,535 fields can print.

Using Incremental Alphanumeric Data

The IGP/PGL internally counts incremental static (fixed) alphanumeric fields. A maximum of 255 incremental fixed alphanumeric fields are allowed per form.

Incrementing is controlled with the STEPMASK and STARTDATA command parameters as described in Table 4–1. The parameters are part of the Incremental Alphanumeric Fixed Data command or part of the Execute command when using incremental alphanumeric dynamic data.

The STEPMASK parameter performs the following three functions:

1. It defines the increment amount (step);
2. It defines the number of characters allowed in the data field (STARTDATA); and
3. It provides a “mask” to link or unlink subfields of the data to be incremented independently. The data provided in the STEPMASK field combined with the data in the STARTDATA field determine the result of these functions.

The increment amount is defined by the numeric value of the STEPMASK data. For example, a STEPMASK value of 1 increments the STARTDATA by 1; a STEPMASK value of 2 increments the STARTDATA by 2.

The maximum number of characters allowed in the STARTDATA field is defined by the number of characters in the STEPMASK field; the STARTDATA field cannot contain more characters than used in the STEPMASK field.

Linked and unlinked masking of subfields within the STARTDATA is defined by the **L** value in the STEPMASK field. **L** indicates linked but non–incremental data in the corresponding position of the STARTDATA field; any alpha character other than **L** in the STEPMASK field indicates a non–incremental, non–linked STARTDATA subfield.

Table 4–1. Increment Alphanumeric

STEPMASK	START DATA	Character Type and Function
0 – 9	A – Z	Alpha characters incremented by amount in STEPMASK field
0 – 9	0 – 9	Numeric characters incremented by amount in STEPMASK field
0 – 9	Space	Same character type as character in the next right adjacent, linked increment position. Character type will be numeric if in least significant position.
0 – 9	Not A – Z or 0 – 9	Error
Not 0 – 9 or L	Any	Non–incrementing alphanumeric character
L	Any	Linked, non–incrementing alphanumeric character

The examples on the following pages illustrate incremental alphanumeric data fields. All cases in the examples use a repeat count parameter value of 1 and a reset count parameter value of 0. The three vertical dots illustrate the natural progression for each column and unit of data based on the incremental count and its impact on linked and unlinked data fields.

	Value	Description
STARTDATA:	ABC123	*Linked subfields: ABC and 123*
STEPMASK:	000001	*RPT = 1*
		RST = 0
Printed Results:	ABC123	
	ABC124	
	.....	
	.....	
	.....	
	ABC999	
	ABD000	
	.....	
	.....	
	.....	
	ZZZ999	
	AAA000	

	Value	Description
STARTDATA:	1ABC123	*Two separate but linked numeric subfields: 1 and 123, while fixed data ABC is nonincrementing*
STEPMASK:	0LLL001	*RPT = 1*
		RST = 0
Printed Results:	1ABC123	
	1ABC124	
	. ...	
	. ...	
	. ...	
	1ABC999	
	2ABC000	

	Value	Description
STARTDATA:	ABC123	*Two separate unlinked subfields: ABC and 3, while fixed data 1 and 2 is nonincrementing*
STEPMASK:	001XX1	*RPT = 1*
		RST = 0
Printed Results:	ABC123	
	ABD124	
	. .	
	. .	
	. .	
	ABI129	
	ABJ120	

	Value	Description
STARTDATA:	___1	*Single numeric field with leading spaces (_)*
STEPMASK:	0001	*RPT = 1*
		RST = 0
Printed Results:	___1	
	___2	
	....	
	....	
	....	
	__10	

	Value	Description
STARTDATA:	_AA98	*Two separate but linked numeric subfields: AA and 98, with leading space (_); fixed data AA is nonincrementing*
STEPMASK:	0LL01	*RPT = 1*
		RST = 0
Printed Results:	_AA98	
	. .	
	. .	
	. .	
	1AA00	

	Value	Description
STARTDATA:	_42AR	*Two separate but linked alpha subfields: A and R, with leading space (_); fixed data 42 is nonincrementing*
STEPMASK:	0LL01	*RPT = 1*
		RST = 0
Printed Results:	_42AR	
	_42AS	
	. ..	
	. ..	
	. ..	
	_42ZZ	
	A42AA	

	Value	Description
STARTDATA:	9AA02	*Single numeric field decremented by 1, while fixed data 9 and AA are nonincrementing*
STEPMASK:	–XXX01	
		RPT = 1
Printed Results:	9AA02	*RST = 0*
	9AA01	*STEP = –1*
	9AA00	
	9AA99	
	..	
	..	
	9AA03	

Alphanumerics, Incremental: Fixed Data Fields

Purpose To automatically increment/decrement fixed alphanumeric data fields.

Mode CREATE

NOTE: In the command format below, incremental alphanumeric command parameters are shown in **boldface** type; standard alphanumeric command parameters and optional nonincremental parameters are shown in *italics*. Due to space constraints, the command parameters are separated into two lines. During actual IGP/PGL input, DO NOT separate command parameters.

Format *ALPHA*
[R;] [E;] [Cn;] **I**; *[DIR;] [UC;] SR; SC; VE; HE;[***idir***]* **STEPMASK**;
*[***RPTn;***] [***RSTn;***]* **(D)STARTDATA(D)**
STOP

I Identifies this alphanumeric command as an Incremental Alphanumeric command; enter **I**.

idir The optional increment direction parameter to specify an increment (add) or decrement (subtract) to the data. Enter a plus sign (+) or leave the field blank to increment (the default). Enter a minus sign (–) to decrement.

STEPMASK Defines the increment amount (step), the number of character positions in the data field, and provides a mask to control the increment function on specific parts of the data. Enter **STEPMASK**, and enter the appropriate value. Refer to Table 4–1 on page 4–19 for complete information on STEPMASK parameter values.

RPTn The optional incremental repeat count parameter to specify the number of times a particular field value is repeated before it is incremented. A repeated field value is useful when printing multiple rows/columns of identical labels before increasing to the next value.

To use the repeat count parameter, enter **RPT** and replace **n** with a numeric value ranging from 1 to 65,535 to specify the repeat count. The default repeat count parameter is 1, which will increment the field value each time it prints.

RSTn The optional incremental reset count parameter to specify the number of times an incremented field is printed (on one or more forms) before it is reset to the starting value. A reset count is useful when printing a hierarchy of fields where a low–level field generates a sequence of numbers, is reset, and the next higher field level is incremented (such as in a unit/box/carton application).

To use the reset count parameter, enter **RST** and replace **n** with a number ranging from 1 to 65,535 to specify the reset count. The default reset count value is 0.

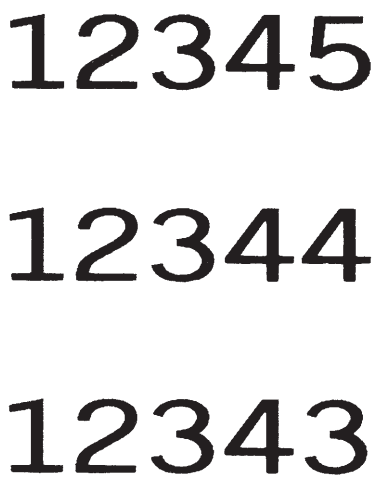
STARTDATA Defines the starting value of the incrementing field. Enter **STARTDATA** and the appropriate value. Refer to “Using Incremental Alphanumeric Data” on page 4–18 for complete information on STARTDATA and STEPMASK parameter values.

The maximum amount of STARTDATA characters must be equal to or less than the number of characters in the STEPMASK field. If the number of data characters is less than the number used in STEPMASK, the data will print right justified with preceding spaces.

Characters allowed for incrementing fields (STEPMASK values of 0 – 9) are numeric 0 – 9 and alpha A – Z (uppercase only). Any printable character is allowed in nonincrementing fields (STEPMASK values not 0 – 9).The STARTDATA must be enclosed within standard printable character delimiters just as a standard alphanumeric data field is enclosed within delimiters.

Comments The Incremental Alphanumeric Fixed Data Fields command is a revised version of the standard IGP/PGL alphanumeric command, but it does not replace the standard alphanumeric command.

```
~CREATE;TEST;288          (Enters Create Form mode)
VDUP;3;6                  (Repeat alpha string)
ALPHA                     (Alpha command)
I;6;5;4;4;–00001;*12345*
STOP                      (Ends Alpha command)
VDUP;OFF
END                       (Terminates Create Form mode)
~EXECUTE;TEST             (Prints form)

~NORMAL
```



Alphanumerics, Incremental: Dynamic Data Fields

Purpose Automatically increments/decrements dynamic alphanumeric data fields. Specifies the location and size of the incremental dynamic data field during the Create Form mode; STEPMASK and STARTDATA parameters are supplied in the Execute command during the Execute Form mode.

Mode CREATE

NOTE: In the command format below, incremental alphanumeric command parameters are shown in **boldface** type; standard alphanumeric command parameters and optional nonincremental parameters are shown in *italics*.

Format *ALPHA*
[R;] [E;] [Cn;] **IAFn;L;** *[DIR;] [UC;] SR; SC; VE; HE STOP*

IAFn;L Identifies this alphanumeric command as an Incremental Alphanumeric Dynamic Data Field command. The command parameter string identifies the incremental dynamic data field location on the form and defines the length of the alphanumeric data. If these parameters are used, the STEPMASK and STARTDATA parameters cannot be entered in the Create Form mode; they are entered dynamically during the Execute Forms mode. To use the incremental dynamic data field, perform the following steps:

a. Enter **IAF** to specify an incremental alphanumeric dynamic data field.

b. Replace **n** with a number ranging from 1 to 255 to identify the alphanumeric string location on the form. The standard alphanumeric SR and SC command parameters specify the exact location of the field identified by **n**.

c. Replace **L** with a number equal to the number of characters in the dynamic alphanumeric string (STARTDATA) ranging from 1 to 255.

d. Dynamically enter the STEPMASK and STARTDATA parameters in the Execute Form mode. The length of the data must be equal to or less than the value assigned to the length (**L**) parameter. Refer to “Execute Form: Incremental Dynamic Data” on page 4–56 for more information.

Comments The Incremental Alphanumeric Dynamic Data Fields command is a variation of the standard IGP/PGL Alphanumeric command, but does not replace the standard alphanumeric command.

As with standard dynamic data fields, incremental dynamic data fields allow the starting data to be changed without changing the form definition program. Increment parameters can also change with each new job without changing the form definition program.

Duplicating Incremental Alphanumeric Fields – Incremental alphanumeric fixed and dynamic data fields are duplicated horizontally using the HDUP command and vertically using the standard VDUP command. Duplicated incremental fields increment in left–to–right, top–to–bottom order. The following examples illustrate the results of duplicated incremental fields.

	Value	Description
STARTDATA:	01	*Single numeric field (01)* *RPT = 1* *RST = 0* *HDUP = 3* *VDUP = 2*
STEPMASK:	01	
Printed Results:		
Page #1:	01 02 03 04 05 06	
Page #2:	07 08 09 10 11 12	

	Field A	Description
STARTDATA:	A01	*Unlinked subfields, alpha (A), numeric (01)* *RPT = 3* *RST = 9* *HDUP = 3* *VDUP = 3*
STEPMASK:	X01	
	Field B	
STARTDATA:	B01	*Unlinked subfields, alpha (B), numeric (01)* *RPT = 1* *RST = 0* *(No HDUP or VDUP)*
STEPMASK:	X01	
Printed Results:		
Page #1:	A01 A01 A01 B01 A02 A02 A02 A03 A03 A03	
Page #2:	A01 A01 A01 B02 A02 A02 A02 A03 A03 A03	

Example The following program will produce the Incremental Alphanumeric data example at the bottom of the previous page. The program elements are also defined. (Refer to the command format on page 4–22.)

```
ALPHA
I;1;1;0;0;001;RPT3;RST9;*A01*
I;3;1;0;0;001;RPT1;RST0;*B01*
STOP
```

where:

I;1;1;0;0;001;RPT3;RST9;*A01*

> **I**ncremental alphanumeric command;
> SR of **1**; SC of **1**;
> VE and HE are **0**;
> **001** stepmask increments by 1;
> **RPT3** repeats each field value 3 times;
> **RST9** prints and increments each field 9 times before resetting;
> ***A01*** is the starting value.

I;3;1;0;0;001;RPT1;RST0;*B01*

> **I**ncremental alphanumeric command;
> SR of **1**; SC of **1**; VE and HE are **0**;
> **001** stepmask increments by 1;
> **RPT1** repeats each field value once;
> **RST0** prints and increments each field 0 times before resetting;
> ***B01*** is the starting value.

```
~CREATE;TEST;288          (Enters Create Form mode)
VDUP;3;6                  (Repeats alpha string)
ALPHA                     (Alpha command)
IAF1;5;6;5;4;4
STOP                      (Ends Alpha command)
VDUP;OFF
END                       (Terminates Create Form mode)
~EXECUTE;TEST             (Prints form)
~IAF1;+00002;*45678*

~NORMAL
```

45678

45680

45682

Boxes

Purpose Produces any variety of rectangular boxes.

Mode CREATE

Format BOX
LT; SR; SC; ER; EC
STOP

BOX	The Box command; enter **BOX**. Boxes expand down and to the right from the given row and column. (Note the position of the ending row and ending column; they do not include the line thickness.)
LT	Defines the line thickness, measured in dots. Line thickness is based on dot dimensions of 1/72" vertically and 1/60" horizontally. Enter a value of 1 or greater.
SR	Defines the starting row of the box. Enter a value ranging from row 1 through one less than the length of the form. Character row or dot row is specified based on the Scale command (page 4–88), or use the CP.DP format (page 4–7).
SC	Defines the starting column of the box. Enter a value ranging from column 1 through one less than the width of the form. Character column or dot column is specified based on the Scale command (page 4–88), or use the CP.DP format (page 4–7).
ER	Defines the ending row of the box. Enter a value ranging from row 2 through the last row of the form. The ending row must be greater than the starting row. Character row or dot row is specified based on the Scale command (page 4–88), or use the CP.DP format (page 4–7).

NOTE: If the SCALE;DOT command is used to specify the dot resolution, the line thickness will be specified in that dot scale, rather than as the standard 1/72” line.

EC	Defines the ending column of the box. Enter a value ranging from column 2 through the last column of the form. The ending column must be greater than the starting column. Character column or dot column is specified based on the Scale command (page 4–88), or use the CP.DP format (page 4–7).
STOP	Stop indicates the end of the Box command; enter **STOP**, and the IGP/PGL will wait for a new command. If not entered, the IGP/PGL will wait for another set of Box command parameters.

Example The following program and example in Figure 4–4 defines two boxes. To illustrate positioning, the starting row and column are indicated on the example but do not necessarily reflect actual location on the page. (Note the position of the ending row and ending column; they do not include the line thickness.)

```
BOX
3;24;16;51;63        (One box three dot rows thick)
2;44;48;46;58        (One box two dot rows thick)
STOP
```

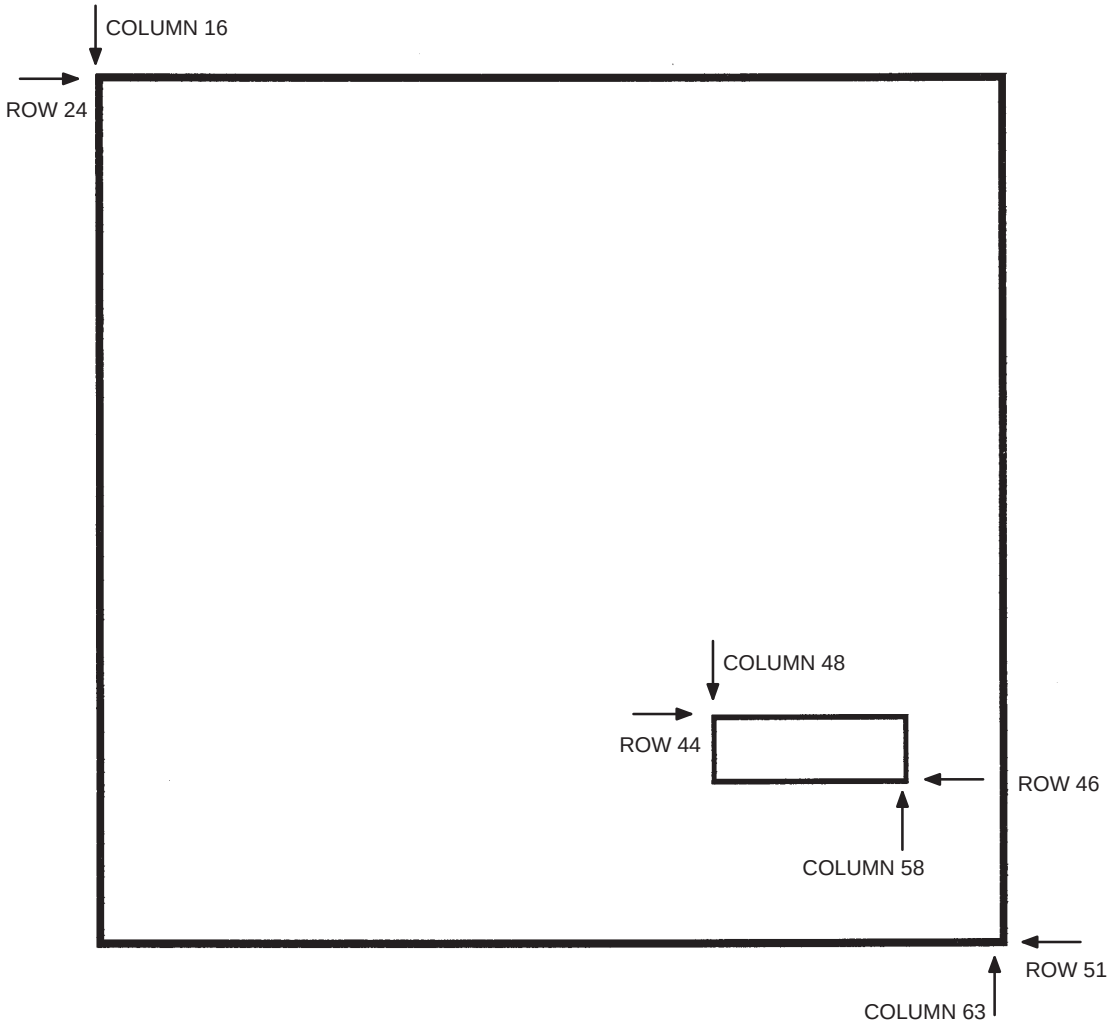


Figure 4–4. Box Example

Compressed Print (Density)

Purpose Defines the horizontal print density in characters per inch (cpi).

Mode NORMAL, EXECUTE

Format (cc) DENSITY *;n*

(cc)	The Special Function Control Character.
DENSITY	The Density command; enter **DENSITY**.
n	Selects the density in cpi, OCR–A, or OCR–B; enter a value of **10**, **12**, **13**, **15**, **17** or **20** to specify the density in characters per inch (the default is 10 cpi), or **10A** to select 10 cpi OCR–A or **10B** to select 10 cpi OCR–B.

Comments Print density formats of 10, 12, 13, 15, 17 or 20 cpi are available. Default print density is 10 cpi. After a Density command is entered, all subsequent alphanumerics print at the specified density until another Density command, a Normal mode command, or a Reset command is entered. The Density command also permits the standard printer editing function (carriage return editing). After the Density command is entered, data in the print buffer can be edited.

Example The following command selects 15 cpi printing format until another Density command, a Normal mode command, or a Reset command is entered.

```
~DENSITY;15
```

Configuration

Purpose Places the IGP/PGL in the Configuration mode, where changes to any or all of the IGP/PGL configuration parameters via software control can be made instead of from the printer control panel.

Mode NORMAL

NOTE: A separate line is required for the CONFIG command, the parameters and values, and the END command.

Format (cc)CONFIG
parameter;value
END

(cc)	The Special Function Control Character (SFCC).
CONFIG	The Configuration command; enter **CONFIG**.
parameter;*value*	The parameter for which a configuration change is desired, and the value associated with that parameter. The available parameters are listed in Table 4–2, and the associated values are shown in Table 1–4 on page 1–13.
END	Terminates the CONFIG command; enter **END**.

Table 4–2. CONFIG Command Parameters

AUTO WRAP	LEFT MARGIN	SLEW RANGE
AUTO EJECT	RESET	TOP/BOTTOM MARGIN
CARRIAGE RETURN DEF	SFCC	UPPERCASE
LINE FEED DEF	SKIP PREFIX	

NOTE: All CONFIG parameters except RESET must be followed by a semicolon (;). Any CONFIG parameters not entered in UPPERCASE and exactly as listed in this table will result in an Error 156. (Refer to the “Error Codes” chapter.)

Comments The IGP/PGL configuration parameters available are also defined in Chapter 2.

Any or all parameters can be used within one CONFIG command, and they can be listed in any order. List each *parameter;value* on a separate line, terminating with the END command. Each CONFIG parameter, except the RESET parameter, must be followed by a semicolon (;). Default configuration values can be reset using the CONFIG command.

Parameters not followed by a value, and parameters followed by any non–zero value are interpreted as “true” or “enabled” values. For carriage return and line feed definitions, a zero value does not change the data stream. However, for non–zero values, a carriage return character or line feed character will be interpreted as a carriage return plus a line feed.

Parameters not listed in this command remain unchanged. If a parameter error is detected for parameters other than 0 or 1 (i.e., SFCC, Top/Bottom Margin, Left Margin), the value will default to the current configuration from external printer memory.

Example 1 The following command enables IGP/PGL Auto Wrap, disables Auto Eject, and selects 6 lpi printing.

```
~CONFIG
AUTO WRAP;1
AUTO EJECT;0
LPI;6
END
```

Example 2 The following command resets all control panel IGP/PGL configuration parameters back to default values.

```
~CONFIG
RESET
END
```

Corners

Purpose Defines corner sets.

Mode CREATE

Format CORNER
LT; SR; SC; ER; EC; VL; HL
STOP

CORNER	Enter **CORNER** to expand corners down and to the right from the given row and column.
LT	Defines the line thickness, measured in dots. Line thickness is based on dot dimensions of 1/72" vertically. Enter a value of 1 or greater.
SR	Defines the starting row of the corner. Enter a value ranging from row 1 through one less than the length of the form. Character row or dot row is specified based on the Scale command (page 4–88), or use the CP.DP format (page 4–7).
SC	Defines the starting column of the corner. Enter a value ranging from column 1 through one less than the width of the form. Character column or dot column is specified based on the Scale command (page 4–88), or use the CP.DP format (page 4–7).
ER	Defines the ending row of the corner. Enter a value ranging from row 2 through the last row of the form. The ending row must be greater than the starting row. Character row or dot row is specified based on the Scale command (page 4–88), or use the CP.DP format (page 4–7).

NOTE: If the SCALE;DOT command is used to specify the dot resolution, the line thickness will be specified in that dot scale, rather than as the standard 1/72” line.

EC	Defines the ending column of the corner. Enter a value ranging from column 2 through the last column of the form. The ending column must be greater than the starting column. Character column or dot column is specified based on the Scale command (page 4–88), or use the CP.DP format (page 4–7).
VL	Defines the length of the vertical arm (including the line thickness) of each corner in the set. Enter a value of 1 or greater specified in character or dot rows based on the Scale command (page 4–88), or use the CP.DP format (page 4–7).
HL	Defines the length of the horizontal arm (including the line thickness) of each corner in the set. Enter a value of 1 or greater specified in character or dot columns based on the Scale command (page 4–88), or use the CP.DP format (page 4–7).
STOP	Stop indicates the end of the CORNER command; enter **STOP**, and the IGP/PGL will wait for a new command. If not entered, the IGP/PGL will wait for another set of Corner command parameters.

Example The following program specifies a corner set as shown in Figure 4–5. To illustrate positioning, the starting row and column are indicated on the example but do not necessarily reflect actual location on the page. (Note the position of the ending row and ending column; they do not include the line thickness.)

```
CORNER
5;27;27;42;55;4;6      (Each corner in the set is 5 dot rows thick)
STOP                   (4 character rows high, 6 character columns wide)
```

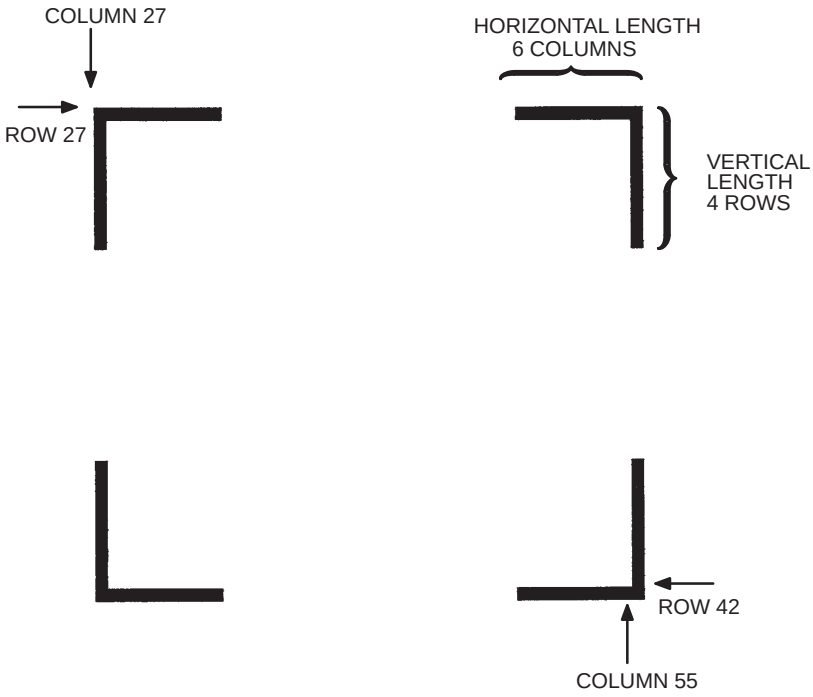


Figure 4–5. Corner Example

Create

Purpose Places the IGP/PGL in the Create Form mode, where forms and form elements can be defined using the appropriate commands.

Mode NORMAL

Format (cc)CREATE; *[/]formname [;FL] [;DISK]*

(cc)	The Special Function Control Character.
CREATE	The Create Form mode command; enter **CREATE**.
/	The optional debug character to check the program line by line for incorrect parameters and print boundaries using the current page size; enter the slash symbol (/) to debug the program. No checks are made until the completed program is sent to the IGP/PGL for storage (when the form is executed by printing the file with the IGP/PGL program). Then the form name is entered into the directory, and the program is evaluated. If errors are detected, the program will print, line by line (including the error on the line where the error occurs), followed by the error–free sections of the form. Correct all errors and delete the slash. Refer to "Solving Program Errors" on page 6–49.
formname	Defines the form name of the form being created. The form name should be no more than 12 characters in length. Refer to page 4–5 for a list of allowable form name characters. If a form is created with the same name as a form already existing in memory, the newly created form will replace the existing form. All future reference to the form (editing, executing, or deleting the form from the directory) must be made using the assigned name.

FL The optional forms length parameter to specify the maximum length of the form. (Form length cannot exceed the physical length of the page. Refer to Appendix C). Specify the form length in one of three ways:

a. Enter **0** to define a form of unspecified length. The form will end after the longest element; that is, the form length is automatically controlled to contain all elements without extra length beyond the longest element. This can be used to eliminate wasted paper after producing short forms.

b. Enter a value for the form length ranging from 1 to 65,535 to specify the forms length in dot rows. (12 dot rows per line = 6 lpi spacing; 9 dot rows per line = 8 lpi spacing.)

NOTE: Dot row range for setting the forms length depends on the forms length configuration. Refer to page 4–64 for information on how to configure the forms length.

When the host form length configuration option is enabled, the form length and width values defined in this command, set the physical length and width page size.

c. To specify the default forms length of 792 dot rows (11 inches at 6 lpi), do not enter a value in the form length parameter.

DISK Optional parameter to store the form on the IGP/PGL external memory module. Enter **DISK**.

Example The following command creates a form named ORDER with the default forms length:

(cc)CREATE;ORDER

Delete Form

Purpose Deletes the form identified by the form name from the directory and the IGP/PGL memory.

Mode NORMAL

Format (cc)DELETE FORM; *formname [;DISK]*

(cc)	The Special Function Control Character.
DELETE FORM	The Delete Form command; enter **DELETE FORM**.
formname	Identifies the form to be deleted. Enter the name of the form exactly as it was created. You can delete an entire form directory by inputting ***ALL** as the form name.
DISK	Optional parameter to delete the form from the printer external memory module where it was originally stored. Enter **DISK**.

NOTE: *ALL cannot be used in conjunction with DISK parameter.

Comments For more information, refer to the Directory Example and the Delete Example on pages 6–47 and 6–48.

Example The following command deletes the form named “PAY#” from the directory, IGP/PGL memory, and the printer external memory.

~DELETE FORM;PAY#;DISK

Delete Logo

Purpose Deletes the logo identified by the logo name from the directory and the IGP/PGL memory.

Mode NORMAL

Format (cc)DELETE LOGO; *logoname [;DISK]*

(cc)	The Special Function Control Character.
DELETE LOGO	The Delete Form command; enter **DELETE LOGO**.
logoname	Identifies the logo to be deleted. Enter the name of the logo exactly as it was created. You can delete an entire logo directory by inputting ***ALL** as the logo name.
DISK	Optional parameter to delete the logo from the printer external memory module where it was originally stored. Enter **DISK**.

Comments Printing a form that contains a deleted logo will produce an error message. For more information, refer to the Directory Example and the Delete Example on pages 6–47 and 6–48.

Example The following command deletes the logo named “MEMO” from the directory, IGP/PGL memory, and the printer external memory.

~DELETE LOGO;MEMO;DISK

Directory

Purpose Prints the following information: (1) all defined forms and logos, (2) logo assignment to forms, and (3) memory usage and availability.

Mode NORMAL

Format (cc)DIRECTORY

(cc)	The Special Function Control Character.
DIRECTORY	The Directory command; enter **DIRECTORY**.

Comments As many forms and logos as printer memory allows may be stored in IGP/PGL memory. If the memory is full, the form will not print; available space in the memory must be at least the size of the form being executed.

For more information, refer to the Directory Example on page 6–47.

Duplication, Horizontal

Purpose Defines both the number of times form elements are duplicated horizontally and the spacing between each duplication.

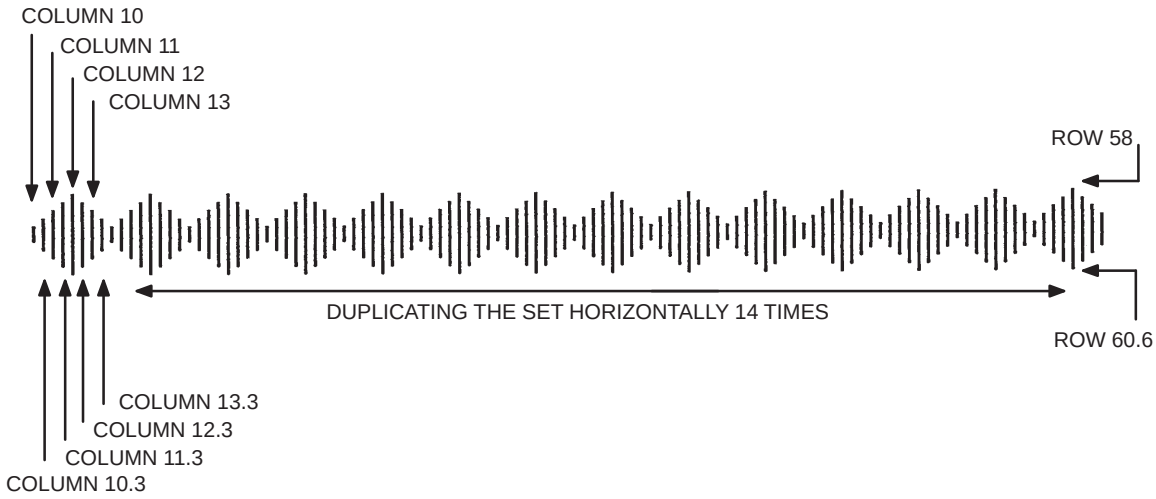
Mode CREATE

Format HDUP; *dup#; offset#*
elements to be duplicated
HDUP;OFF

HDUP	The Horizontal Duplication command; enter **HDUP**.
dup#	Specifies the duplication number, which is the number of times the entered form element(s) will repeat horizontally. Enter a value ranging from 1 to 255.
offset#	Specifies the horizontal offset to establish the horizontal spacing between each duplication of the form element(s) specified in the body of the command. Enter a value in terms of dot or character columns based on the Scale command (page 4–88), or use the CP.DP format (page 4–7). The offset is from starting column to starting column.
HDUP;OFF	Terminates the Horizontal Duplication command; enter **HDUP;OFF**. If not entered, the IGP/PGL expects another form element to be defined for duplication. A single HDUP command can define different types of elements for duplication.

Example The following example is a horizontal duplication of a series of vertical lines. To illustrate positioning, starting row and column are indicated on the example but do not necessarily reflect actual location on the page.

HDUP;14;4	(14 duplications with 4–character column spacing)
VERT	(Command to duplicate horizontally)
1;10;59;59.6	(Note CP.DP format: 59.6)
1;10.3;58.9;59.9	
1;11;58.6;60	
1;11.3;58.3;60.3	
1;12;58;60.6	
1;12.3;58.3;60.3	
1;13;58.6;60	
1;13.3;58.9;59.9	
STOP	(Stops the command to duplicate element)
HDUP;OFF	(Terminates the horizontal duplication)



Duplication, Vertical

Purpose Defines both the number of times elements are duplicated vertically and the spacing between each duplication.

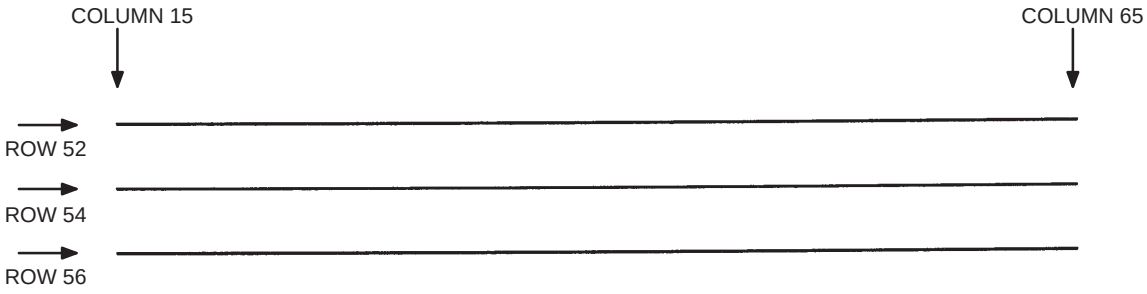
Mode CREATE

Format VDUP; *dup#; offset#*
elements to be duplicated
VDUP;OFF

VDUP	The Vertical Duplication command; enter **VDUP**.
dup#	Specifies the duplication number – the number of times the entered form element(s) will repeat vertically. Enter a value ranging from 1 to 255.
offset#	Specifies the vertical offset to establish the vertical spacing between each duplication of the form element(s) specified in the body of the command. Enter a value in terms of dot or character columns based on the Scale command (page 4–88), or use the CP.DP format (page 4–7). The offset is from starting row to starting row.
VDUP;OFF	Terminates the Vertical Duplication command; enter **VDUP;OFF**. If not entered, the IGP/PGL expects another form element to be defined for duplication. A single VDUP command can define different types of elements for duplication.

Example The following example is a vertical duplication of one horizontal line. The line is duplicated three times. To illustrate positioning, the starting row and column are indicated on the example but do not necessarily reflect actual location on the page.

```
VDUP;3;2          (3 duplications with 2–character row spacing)
HORZ              (Command to duplicate vertically)
1;52;15;65
STOP              (Stops the command to duplicate element)
VDUP;OFF          (Terminates the vertical duplication)
```



End

Purpose Terminates the current mode of operation and must be used before entering a new mode command (EXECUTE, LOGO, NORMAL, or even CREATE).

Mode CREATE

Format END

Comments After the End command is received, the IGP/PGL flushes program errors, stores the error–free portions of the form program just completed, and then returns to the Normal mode. If the debug slash (/) is included in the Create command, the program prints with any corresponding error messages.

Execute Form Mode

How to Use the Execute Command

Forms are printed in the Execute Form mode. In addition to printing the form in the Execute Form mode, variable data can also be entered onto the form "dynamically" during the Execute Form mode. This dynamic data input during the Execute Form mode includes page numbers, alphanumeric data fields, and bar code data fields. Pagination, described on page 4–78, is performed in the Execute Form mode. Dynamic alphanumeric and bar code data require additional commands within the Execute Form mode.

The fastest method for repeated forms printing is to use the form feed character. Rather than sending a series of Execute/Normal commands, which slows the process by performing an *open—print—close* form sequence, the form feed character instructs the IGP/PGL to start a new page with new dynamic and overlay data using the existing Execute commands for the form. The *Dynamic Data—Overlay Data—Form Feed Character* sequence can be repeated indefinitely while maintaining the optimum print speed within the original Execute command.

Remember, when a form count is not specified, a single line spacing (or a line containing overlay data) must always separate an EXECUTE command from a NORMAL command.

To Execute Forms Rapidly

In order to save reloading time, the PGL remembers the last form executed. However, a form must be loaded if it was not the last form executed, if it was used with a CREATE command since the last EXECUTE, or if any logo has been created.

Use the SETUP command to define forms at power up and execute them from internal memory rather than from external memory.

When the form to be executed is not found in internal memory, the default external memory module is automatically searched. If the form is found, it is loaded into internal memory and execution resumes; otherwise, the "FORM NOT FOUND" error is printed.

NOTE: If an older application uses the disk parameter for the execute command, it is ignored and the above steps are taken.

Print Formats in the Execute Form Mode

The Execute Form mode has two print formats. The *standard* execute command format, shown below, is used for executing nonincremental data and incremental fixed data. An *incremental* Execute command format, containing two additional parameters, is used for executing incremental dynamic data and is discussed on page 4–56.

During the Execute Form mode, the IGP/PGL responds to regular print format commands such as 8 lpi, and elongated characters. Some commands can be used in other modes in addition to the Execute Form mode. For example, Compressed Print, Expanded Print, Execute, Ignore, Select Format, and Vertical Line Spacing, which are also Normal mode commands, can be used in the Execute or Create Form modes. The IGP/PGL alternate character set can also be used in the Execute Form mode.

Execute Form: General Format

Purpose Prints forms created in the CREATE mode.

Mode NORMAL

Format

(cc)EXECUTE ;*formname [;PAGEn] [;FC] [;ICNTn] [;IRSTn]*
[(cc)AFn; *(D)ASCII text(D)]*
[(cc)BFn; *(D)data(D)]*
[(cc)IAFn; *[idir] STEPMASK; [RPTn;] [RSTn;] (D)STARTDATA(D)]*
[(cc)IBFn; *[idir] STEPMASK; [RPTn;] [RSTn;] (D)STARTDATA(D)]*
[Overlay Data]
[Form Feed character]
(cc)NORMAL

(cc)	The Special Function Control Character.
EXECUTE	The Execute Form command; enter **EXECUTE**.
formname	Identifies a previously defined form by name. Enter the form name exactly as used when created.
PAGE n	The optional Pagination command; enter **PAGE** and replace **n** with the decimal number of the starting page in a sequence of multiple pages. The number may be eight digits long and range between 0 and 99999999. The next page after 99999999 is 0. Leave a blank space between the PAGE command and the **n** value. The page number will print on the form in the location defined by the Page Number command in the Create Form mode. If the location of the pagination field was not specified in the Create Form mode, the page field is printed in the upper left corner of the form.

FC The optional form count parameter specifies the number of copies of the form to print. Enter the appropriate number.

When the last page prints, the IGP/PGL returns to the Normal mode automatically. *Do not* use the form count parameter if dynamic data (AFn and BFn parameters), incremental data (ICNT or IRST parameters), overlay data, or EVFU data are used in the Execute command.

ICNTn The optional incremental form count. Enter **ICNT** and the Incremental value as described in the Execute Incremental Dynamic Data command described on page 4–56.

IRSTn The optional incremental reset count parameter. Enter **IRST** and the reset value as described in the Execute Incremental Dynamic Data command described on page 4–56.

AFn*;(D)ASCII text(D)*
The Execute Dynamic Alphanumeric Data command. Enter the dynamic alphanumeric data during the Execute Form mode as described in "Execute Form: Dynamic Alphanumeric Data" on page 4–54.

BFn *;(D)data(D)* The Execute Dynamic Bar Code Data command. Enter the dynamic bar code data during the Execute Form mode as described in "Execute Form: Dynamic Bar Code Data" on page 4–55.

(cc)IAFn*;[idir] STEPMASK;[RPTn;] [RSTn;] (D)STARTDATA(D)*
The Execute Incremental Dynamic Alphanumeric Data command. Supply the data as described on page 4–57.

(cc)IBFn*; [idir] STEPMASK; [RPTn;] [RSTn;](D)STARTDATA(D)*
The Execute Incremental Dynamic Bar Code Data command. Supply the data as described on page 4–57.

Overlay Data

Overlay data can be entered during the Execute Form mode. (The words “Overlay Data” are not part of the Execute command. They are shown in the command sequence to indicate that actual overlay data can be entered following the Execute command.) Refer to “Execute Form: Overlay Data” on page 4–59.

Form Feed Character

Optional command instructing the IGP/PGL to start a new page with *new* EVFU, dynamic, and overlay data using the existing Execute commands for the current form. Using this *EVFU Data—Dynamic Data and Overlay Data—Form Feed Character* sequence can be repeated indefinitely, while maintaining the optimum print speed, within the original Execute command.

(cc)NORMAL

The Normal mode command. If the form count parameter was not used in the Execute command, enter the SFCC and **NORMAL** to return the IGP/PGL to the Normal mode.

The Normal mode command is input following all other Execute commands to enter variable data. (Refer to the following sections.) Input a line terminator to leave a blank line before entering the Normal command.

Execute Form: Dynamic Alphanumeric Data

Purpose Incorporates the dynamic alphanumeric data into a previously identified location on a form.

Mode EXECUTE

Format (cc)AFn; *(D)ASCII text(D)*

AFn	Indicates a dynamic alphanumeric field (AF) and its data (n). Enter **AF** and replace **n** with the number of the data field corresponding to the number used to identify the field when it was defined with the Alphanumeric command in the Create Form mode.
D	The printable character identifying the start and finish of the alphanumeric data. Enter any printable character other than a slash (/), the SFCC, or a character used within the data. The same character must be used at both ends of the data field but will not be printed with the data.
ASCII text	The group of ASCII characters (the alphanumeric string) to print. Enter any of the standard ASCII printable characters (except the character used as delimiters described in the **D** parameter). The data appears on the form at the location identified by **n.**

NOTE: Commands can appear anywhere in the overlay text with PGL.

Comments The location for the Dynamic alphanumeric data must have been previously identified using the AFn;L parameters of the alphanumerics command in the Create Form mode. Inputting individual commands enters the new data into the identified location each time the form is printed.

You can repeat the (cc)AFn;(D)ASCII text(D) sequence to complete as many data fields as you defined on the form in the Create Form mode. You can also combine the Execute Dynamic Bar Code Data command in the same Execute command sequence. Each “page” of dynamic data (the dynamic fields, data, and overlay data) for the form must be separated from the next page of new dynamic data by a form feed.

Execute Form: Dynamic Bar Code Data

Purpose Incorporates the dynamic bar code data into a previously identified location on a form.

Mode EXECUTE

Format (cc)BFn; *(D)data field(D)*

BFn	Indicates a dynamic bar code field (BF) and its data (n). Enter **BF** and replace **n** with the number of the data field corresponding to the number used to identify the field when it was defined with the bar code command during the Create Form mode.
D	The printable character (quotation marks for example) identifying the start and finish of the bar code data. Enter any printable character other than a slash (/), the SFCC, or a character used within the data. The same character must be used at both ends of the data field but will not be printed with the data.
data field	Enter the characters for the bar code data. The type of characters allowed in the data varies with the type of bar code. Refer to the data field descriptions for the selected bar code types.

NOTE: Commands can appear anywhere in the overlay text with PGL.

Comments The bar code location must have been previously identified using the BFn;L or BFn parameters of a bar code command in the Create Form mode. Then use the appropriate bar code command to enter the bar code data in that location. Inputting individual commands enters new bar code data into the identified location each time the form is printed.

You can repeat the (cc)BFn;(D)data field(D) sequence to complete as many bar code data fields as were defined on the form in the Create Form mode. You can also combine the Execute Dynamic Alphanumeric Data command in the same Execute command sequence. Each “page” of dynamic data (the dynamic fields, data, and overlay data) for the form must be separated from the next page of new dynamic data by a form feed.

Execute Form: Incremental Dynamic Data

Purpose Incorporates incremental/decremental capability to dynamic alphanumeric or bar code data supplied as a part of the Execute Form mode.

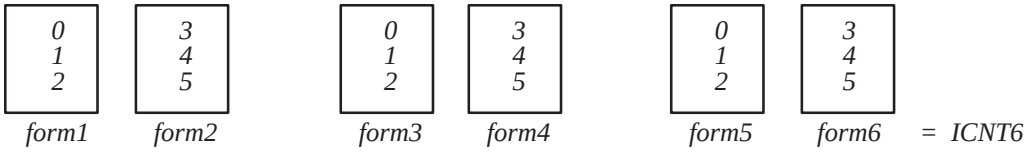
Mode NORMAL

NOTE: In the command below, incremental Execute parameters are shown in **boldface** type; standard Execute command parameters are shown in *italics*. The general Execute format is shown on page 4–51.

Format (cc)EXECUTE; *formname [;PAGE n] [;FC]* ***[;ICNTn]*** ***[;IRSTn]***

ICNTn	Identifies the incremental form count to specify the number of forms to generate with the incremental fields automatically updated. Enter **ICNT** and replace **n** with a value ranging from 1 to 65,535 to specify the number of forms.
IRSTn	The optional incremental reset count parameter to specify the number of forms to generate before resetting all incremental fields to their starting values. The reset count parameter is useful in dividing the total number of forms generated into multiple groups of identical copies. To use this parameter, enter **IRST** and replace **n** with a value ranging from 1 to 65,535 to specify the reset count (how many forms generated before resetting the incremental fields). If the reset count value is equal to or greater than the incremental count value, the reset will never occur.

Example The following forms were generated from ICNT6, IRST2. (To duplicate incremental fields within a form, refer to page 4–25.)



Supplying Dynamic Data for Incremental Fields

Incremental dynamic data fields are created in the Create Form mode using the incremental alphanumeric or bar code commands. The incremental dynamic data itself is supplied during the Execute Form mode at the top of the form prior to any overlay data. The incremental dynamic data (either alphanumeric or bar code data) can be changed with each new batch of forms. Incremental dynamic data fields specified in the Create Form mode will not appear on the form if corresponding incremental dynamic data is not supplied in the Execute Form mode.

Format

For incremental dynamic alphanumeric data:
(cc)IAFn; *[idir] STEPMASK; [RPTn;] [RSTn;] (D)STARTDATA(D)*

For incremental dynamic bar code data:
(cc)IBFn; *[idir] STEPMASK; [RPTn;] [RSTn;] (D)STARTDATA(D)*

(cc)	The Special Function Control Character.
IAF	Identifies the command as incremental alphanumeric dynamic data; enter **IAF**.
IBF	Identifies the command as incremental bar code dynamic data; enter **IBF**.
n	Identifies the field number of the dynamic data field as entered in the Create Form mode. Replace **n** with the number used to identify the field when it was defined.
idir	The optional increment direction parameter to specify an increase or decrease of the data. Enter a plus sign (+) or leave the field blank to increment (the default). Enter a minus sign (–) to decrement.
STEPMASK	Defines the increment amount (step), the number of character positions in the data field, and provides a mask to control the increment function on specific parts of the data. Refer to “Incremental Bar Code Fields” on page 5–116 or “Alphanumerics, Incremental Fields” on page 4–18 for complete information on STEPMASK parameter values.

RPTn

The optional incremental repeat count parameter to specify the number of times a particular field value is repeated before it is incremented. A repeated field value is useful when printing multiple rows/columns of identical labels before incrementing to the next value.

To use the repeat count parameter, enter **RPT** and replace **n** with a numeric value ranging from 1 to 65,535 to specify the repeat count. The default repeat count parameter is 1, which will increment the field value each time it is printed.

RSTn

The optional incremental reset count parameter to specify the number of times an incremented field is printed (on one or more forms) before it is reset to the starting value. A reset count is useful when printing a hierarchy of fields where a low–level field generates a sequence of numbers, is reset, and the next higher field level is incremented (such as in a unit/box/carton application).

To use the reset count parameter, enter **RST** and replace **n** with a number ranging from 1 to 65,535 to specify the reset count. The default reset count value is 0.

STARTDATA

Defines the starting value of the incrementing field. The maximum amount of STARTDATA characters must be equal to or less than the number of characters in the STEPMASK field. If the number of data characters in dynamic alphanumeric data commands is less than the number used in STEPMASK, the data will print right justified with preceding spaces. (Leading spaces are not provided for bar code data.)

For dynamic bar code data, the type of characters allowed for incrementing fields is based on the type of bar code. Refer to the individual bar code descriptions in the “Bar Codes” chapter for information on valid type and quantity of data characters. The STARTDATA must be enclosed within standard printable character delimiters just as a standard data field is enclosed within delimiters.

Execute Form: Overlay Data

Overlay data is variable alphanumeric data entered onto a predefined form. The form is completed by positioning the data in the exact location it will appear on the form when printed. The data is placed horizontally using tabs and spaces, and vertically using line feeds, form feeds, and the EVFU.

For example, if the serial number field on the form begins at character row 22, and column 14, enter 22 line feeds, space over 14 columns, and input serial number overlay data. An entire form can be completed with a page of overlay data in this manner. Overlay data at the end of a form is printed on a new form until all overlay data is used. Then, to advance to the next form, use a form feed.

The IGP/PGL Electronic Vertical Format Unit can be used to control vertical spacing of the overlay data. In place of line feed commands input individually, the EVFU can be programmed (during the Execute Form mode) to slew the overlay data page to the predetermined lines with a single command.

NOTE: When using the PGL, the Dynamic Data command and Overlay IGP/PGL commands may be issued on the same line as the overlay text to synchronize the printer with systems that count lines (e.g., IBM). See the IGP/PGL command standard for inline command format on page 4–3.

Expanded Print

Purpose Selects font sizes other than the default font.

Mode NORMAL, EXECUTE

Format (cc)EXPAND; *VE; HE*

(cc)	The Special Function Control Character.
EXPAND	The Expanded Print command; enter **EXPAND**.
VE	Specifies the vertical expansion factor; enter a value ranging from 0 to 139.
HE	Specifies the horizontal expansion factor; enter a value ranging from 0 to 139. Both *VE* and *HE* parameters must be zero or non–zero. One expansion value cannot be specified as 0 if the other is not. A *VE* or *HE* setting of 1 expands the appropriate plane but produces single–size characters. A *VE* and *HE* setting of 0 produces standard–size characters.

Comments The Expanded Print command uses the 0.10–inch, 10 cpi Gothic typeface as the default base value from which alphanumeric characters are expanded. (Refer to the Font command on page 4–61 for more information about available typefaces and styles.)

The character height can be up to a maximum of 13.9 inches, which means if a page is 13.9 inches high, you can print a character that fills the entire height of the page.

After an Expanded Print command is entered, all subsequent alphanumerics print at the specified expansion until another Expanded Print command, a Normal mode command, or a Reset command is entered. An Expanded Print command with *VE* and *HE* set to 0 selects standard character printing.

Example The following command results in character printing at 25 times its vertical and 40 times its horizontal size.

```
~EXPAND;25;40
```

Font

Purpose Selects typefaces other than the default Gothic font.

Mode NORMAL, CREATE, EXECUTE

Format (cc)FONT *[;FACE #] [;BOLD #] [;SLANT #] [;SYMSET #] [;POINT #]*

NOTE: The font is activated according to the changed options upon receipt of the font command.

(cc)	The Special Function Control Character. (If you are using the Font command in the CREATE mode, *do not* enter the SFCC.)
FONT	The Font command; enter **FONT**.
FACE #	Identifies the specific typeface. Enter **FACE**, a space, and the 5 digit typeface number representing the selected typeface. 93952 = Courier Bold 93779 = Letter Gothic Bold Other font numbers correspond to optional typefaces. Refer to the font instructions (that come packaged with the optional font external memory modules) for typeface numbers. See Appendix D. Do not use this command to select OCR–A and OCR–B. Instead, use either the Cn parameter in the Alphanumerics command or use the Compressed Print Density command.

NOTE: The font # range 1–99 is reserved for HP LaserJet II downloadable fonts (refer to page 3–5, in Chapter 3).

BOLD # Selects a bold attribute. Enter **BOLD**, a space, and **ON** or **1** to turn bold on, or **OFF** or **0** for no bold attribute.

SLANT # Selects a slanting factor. (Slant is similar to italic, but also offers a backward slant.) Enter **SLANT**, a space, and **RIGHT** or **1** for a typical italic slant, **LEFT** or **–1** for a backward slant, or **OFF** or **0** for no slant attribute.

SYMSET # Selects a font symbol set other than the default ASCII symbol set. Enter **SYMSET**, a space, and a value ranging from 0 to 31 representing the symbol set as identified in Table 7–1 on page 7–2 in the "Multinational Character Sets" chapter.

POINT # Selects the point size for the current typeface. Enter **POINT**, a space, and a point size ranging from 4 to 999. Point sizes are available in quarter–point increments. Horizontal pitch is automatically adjusted based on the point size selected.

The point parameter cannot be used when in CREATE mode. Use the point parameter of the alpha command.

NOTE: The fonts available are the standard font (#93779) and (#93952); OCR–A (#90993); and OCR–B (#91409). Other type face numbers will correspond to the CG Triumvirate font. CG Triumvirate is the proportional font and is available in the following point sizes.

5	**6**	**8**	**10**	**12**	**14**	**18**	**24**	**30**	**36**

Comments Font parameters in Normal and Execute modes do not affect the fonts that have already been established and saved on a form.

Font commands issued in the Create mode affect only the current form being created and not any of the fonts on other forms or for Execute or Normal mode text.

You can use any or all Font parameters, listed in any order, in a single Font command. (Do not list font parameters on separate lines.) Parameters and symbol sets not specified retain the previously selected value. Parameters incorrectly specified retain the previously selected value.

All Font command parameters are reset to default values upon receiving a NORMAL, RESET, CONFIG;RESET, or new CREATE command. Multiple font commands within a single form will save the *last* font command parameters specified. Symbol sets can also be selected using the ISET or USET commands. (Refer to the “Multinational Character Sets” chapter.)

Fonts in the HP LaserJet II format may also be downloaded to the printer. They may be downloaded into either the SRAM or FLASH memory modules, and then will be available permanently (at least as long as the FLASH or SRAM module is installed). Note that these fonts are proportional fonts. They may be selected using the FONT command; however, the POINT size, BOLD, ITALIC and SYMSET parameters are ignored.

Use the PTX_SETUP command to download a font. Refer to Chapter 3 in this manual for details.

The downloaded fonts are selected in the same manner as are the other expansion fonts, i.e., with the FONT command. The font number given in the download command will be the same number used in the FONT command to select it.

Example The following command selects the Letter Gothic font (#93779) with a right slant. This font will continue to print until another Font command, a Normal mode command, or a Reset command is entered.

~FONT;FACE 93779

Form Length

Purpose Sets the length of the form to a specific number of lines at 6 or 8 lpi.

Mode CREATE

Format LFORM6; *n* or LFORM8; *n*

LFORM6	The Form Length command for 6 lpi forms; enter **LFORM6**.
LFORM8	The Form Length command for 8 lpi forms; enter **LFORM8**.
n	Specifies the forms length in total number of lines allowed per form. The range depends on the paper size used and the top/bottom margin setting. An error message will result if the maximum line values are exceeded.

NOTE: This command affects only printed text inside of IGP/PGL forms, not the printer lpi. The LFORM8 command considers a line as 9 dot rows; the LFORM6 command considers a line as 12 dot rows. The 9 and 12 dot rows per line matches the dot rows of the printer in the DP mode if set to 8 or 6 lpi, respectively.

Example The following example establishes a forms length of 8 inches (48 lines at 6 lpi):

```
LFORM6;48
```

NOTE: Additional information about page boundaries can be found in Appendix C.

Ignore Sequence

Purpose Enables the IGP/PGL to ignore all characters after the Ignore Sequence On (IGON) command is entered. All characters are ignored until the Ignore Sequence Off (IGOFF) command is entered.

Mode NORMAL, CREATE, or EXECUTE

Format (cc)IGON or (cc)IGOFF

NOTE: A line terminator is not required in the Ignore Sequence.

(cc)	The Special Function Control Character.
IGON	Ignore Sequence On command; enter **IGON**.
IGOFF	Exits Ignore Sequence

Comments IGON and IGOFF can also be used anywhere in the data stream.

NOTE: Commands in PTX_SETUP and control characters used to download TIFF and PCX logos are *not* ignored.

Line Spacing

Purpose Defines the lines per inch (lpi) printing format.

Mode NORMAL, EXECUTE

Format (cc)LPI; *n*

(cc)	The Special Function Control Character.
LPI	The Vertical Line Spacing command; enter **LPI**.
n	Selects the line spacing in lpi; enter any integer value from 1 to 10.

Comments Standard line spacing is 6 lpi. After a Vertical Line Spacing command is entered, all subsequent alphanumerics print at the specified lpi until another Vertical Line Spacing command, a Normal mode command, or a Reset command is entered.

Example The following command selects 9 lpi printing format until another Line Spacing command, a Normal mode command, or a Reset command is entered.

~LPI;9

Lines, Horizontal

Purpose Defines horizontal lines.

Mode CREATE

Format

HORZ
LT; R; SC; EC
STOP

HORZ	The Horizontal Line command; enter **HORZ**.
LT	Defines the line thickness, measured in 1/72” dots. Enter a value of 1 or greater. Horizontal line thickness expands downward from the given row.
R	Defines the row to draw the horizontal line. Enter a value ranging from row 1 through one less than the length of the form. Character row or dot row is specified based on the Scale command (page 4–88), or use the CP.DP format (page 4–7).
SC	Defines the starting column of the horizontal line. Enter a value ranging from column 1 through one less than the width of the form. Character column or dot column is specified based on the Scale command (page 4–88), or use the CP.DP format (page 4–7).
EC	Defines the ending column of the horizontal line. Enter a value ranging from column 2 through the last column of the form. The ending column must be greater than the starting column. Character column or dot column is specified based on the Scale command (page 4–88), or use the CP.DP format (page 4–7).
STOP	Stop indicates the end of the HORZ command; enter **STOP**. If not entered, the IGP/PGL will expect another set of Horizontal Line command parameters.

Example The following example specifies 2 horizontal lines. The first line uses the character row in the R parameter, and the second line uses CP.DP format. To illustrate positioning, the starting row and column are indicated on the example but do not necessarily reflect actual location on the page.

```
HORZ
1;60;15;65
1;60.5;15;65
STOP
```

NOTE: If the SCALE;DOT command is used to specify the dot resolution, then the line thickness will be specified in that scale.

Lines, Vertical

Purpose Defines vertical lines.

Mode CREATE

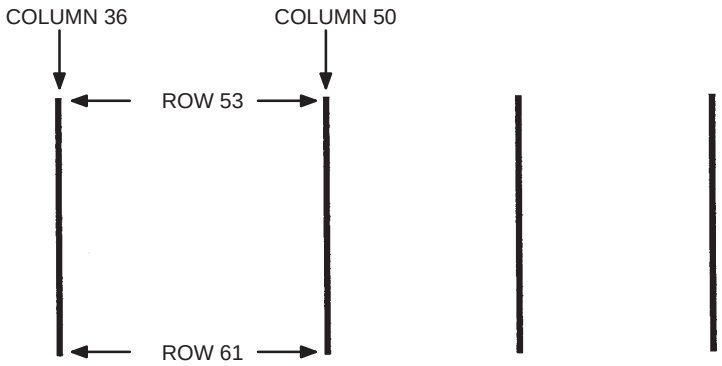
Format

VERT
LT; C; SR; ER
STOP

VERT	The Vertical Line command; enter **VERT**.
LT	Defines the line thickness, measured in 1/60” dots. Enter a value of 1 or greater. Vertical line thickness expands to the right from the starting column.
C	Defines the column where the vertical line begins. Enter a value ranging from column 1 through one less than the width of the form. Character column or dot column is specified based on the Scale command (page 4–88), or use the CP.DP format (page 4–7).
SR	Defines the starting row of the vertical line. Enter a value ranging from row 1 through one less than the length of the form. Character row or dot row is specified based on the Scale command (page 4–88), or use the CP.DP format (page 4–7).
ER	Defines the ending row of the vertical line. Enter a value ranging from row 2 through the last column of the form. The ending row must be greater than the starting row. Character row or dot row is specified based on the Scale command (page 4–88), or use the CP.DP format (page 4–7).
STOP	Stop indicates the end of the VERT command; enter **STOP**. If not entered, the IGP/PGL expects another set of Vertical Line command parameters.

Example The following program specifies 4 vertical lines. To illustrate positioning, the starting row and column are indicated on the example but do not necessarily reflect actual location on the page.

```
VERT
2;36;53;61
2;50;53;61
2;60;53;61
2;70;53;61
STOP
```



NOTE: If the SCALE; DOT command is used to specify the dot resolution, the line thickness will be specified in that scale.

Listen

Purpose Disables the IGP/PGL from the "quiet" state and enables the IGP/PGL for standard operation. (The Quiet command is explained on page 4–84.)

Mode NORMAL

Format (cc)LISTEN

(cc)	The Special Function Control Character.
LISTEN	The Listen command; enter **LISTEN**.

NOTE: When the IGP/PGL is in the quiet state, the currently selected line printer emulation commands are active. Refer to your printer *Setup Guide* for a description of these commands.

Logo Call

Purpose Selects and positions previously defined logo(s). (The logo itself is actually defined separately in the Create Logo mode.) The logo may be defined using TIFF files, PCX raster data, or IGP/PGL dots.

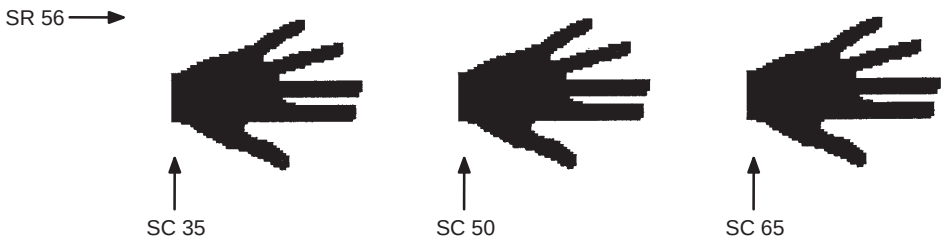
Mode CREATE

Format LOGO
SR; SC; logoname
STOP

LOGO	The Logo Call command; enter **LOGO**.
SR	Defines the starting row of the logo. The SR (and SC) parameter specifies the location for the logo based on the upper left corner of the grid in which the logo was defined. Enter a value ranging from row 1 through one less than the length of the form. Character row or dot row is specified based on the Scale command (page 4–88), or use the CP.DP format (page 4–7).
SC	Defines the starting column of the logo. The SC (and SR) parameter specifies the location for the logo based on the upper left corner of the grid in which the logo was defined. Enter a value ranging from column 1 through one less than the width of the form. Character column or dot column is specified based on the Scale command (page 4–88), or use the CP.DP format (page 4–7).
logoname	Identifies a previously defined logo by name for use on the form. Enter the logo name exactly as used to define and store the logo.
STOP	Stop indicates the end of the LOGO command; enter **STOP**, and the IGP/PGL will wait for a new command. If not entered, the IGP/PGL will expect another set of Logo Call command parameters.

Example The following sample program specifies three logo calls placing the same logo at three different locations. (The logo was previously defined and stored.) The starting row and column specify the upper left corner of the grid in which the logo was defined. To illustrate positioning, the starting row and column are indicated on the example but do not necessarily reflect actual location on the page.

```
LOGO
56;35;HAND
56;50;HAND
56;65;HAND
STOP
```



When the logo to be executed is not found in memory, the default external memory module is automatically searched. If the logo is found, it is loaded into memory and execution resumes; otherwise, the “LOGO NOT FOUND” error is printed.

NOTE: If an older application uses the disk parameter for the execute command, it is ignored and the above steps are taken.

Logo Mode, Create

Purpose Places the IGP/PGL in the Create Logo mode, where logos can be defined using the appropriate dot placements. (See TIFF Logo, page 4–92, and PCX Logo, page 4–81, commands to define logos using TIFF or PCX data.)

Mode NORMAL

Format (cc)LOGO; *logoname; VL; HL [;DISK]*
row#; dot; dot1–dot2; dot
END

(cc)	The Special Function Control Character.
LOGO	The Logo command; enter **LOGO**.
logoname	Enter a maximum of 12 alphanumeric characters for the name of the logo. (Refer to page 4–5 for a list of allowable Logo Name characters.) All future references to this logo (Delete Logo or Logo Call commands) must use this name. If a logo is defined with the same name as a logo already existing in memory, the newly defined logo will replace the existing logo.
VL	Defines the vertical length of the logo grid in dot rows; enter a value sufficient for the vertical size of the logo, not exceeding 252. The dot rows are vertically spaced 1/72–inch apart.
HL	Defines the horizontal length of the logo grid in dot columns; enter a value sufficient for the horizontal size of the logo, not exceeding 240. On each row, the dots are horizontally spaced 1/60–inch apart.
DISK	Optional parameter to store the logo in the IGP/PGL internal memory modules. Enter **DISK**.
row#	Identifies the row number for each row of dots in the logo. Enter each row number on a separate command line. Rows are numbered sequentially from top to bottom.

dot	Identifies a single dot position in the row. Enter each dot number used. Dots are numbered sequentially from left to right.
dot1–dot2	Identifies a series of dot positions within the row, including dot1 on the left end and dot2 on the right end. Enter the series of dot rows. Series of dot rows can be combined with single dot positions in the same command line.
END	Terminates the Create Logo mode; enter **END**.

Comments The logo is defined by specifying the overall size and the rows of data used. The actual number of logos you can create and store depends on the memory required for each logo.

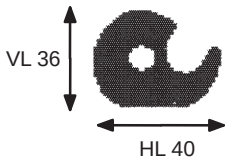
The maximum logo size allowed is 252 rows high (3.5 inches) and 240 columns wide (4 inches). Values exceeding either of these dimensions will produce an error. To maximize memory space, do not define the vertical and horizontal length of the logo grid larger than is required to capture the design.

The printer produces a grid with 72 dots per inch vertically and 60 dots per inch horizontally. Consequently, a logo must be designed using this scale.

The Logo Call command (page 4–72) in the Create Form mode brings the predefined logo into a form. The starting row and column parameters refer to the upper left corner of the logo grid. Once created, the logo is ready to be used in any form and will print at the size shown.

Example The following program shown on the next page produced the tape holder logo.

~LOGO;TAPEHOLD;36;40
1;12–18
2;10–20
3;9–22
4;8–24
5;7–25
6;6–26
7;5–26
8;4–25
9;4–25
10;3–24
11;3–24
12;2–23
13;2–23
14;2–14;17–23
15;1–12;19–22;38–39
16;1–12;20–23;37–40
17;1–11;20–23;37–40
18;1–11;20–23;36–40
19;1–11;20–23;36–40
20;1–11;20–23;35–40
21;1–12;20–24;35–40
22;1–12;19–24;34–39
23;1–14;17–25;33–39
24;1–28;31–39
25;1–39
26;2–38
27;2–38
28;2–37
29;3–37
30;3–36
31;3–36
32;4–35
33;5–34
34;6–33
35;7–32
36;9–30
END



Normal Mode

Purpose Places the IGP/PGL in the Normal mode of operation, where the data stream is not changed but monitored for a Special Function Control Character followed by an IGP/PGL command.

Mode NORMAL, EXECUTE

Format (cc)NORMAL

(cc)	The Special Function Control Character.
NORMAL	The Normal mode command; enter **NORMAL**.

Comments Normal mode is entered automatically when the printer is powered on with IGP/PGL. In Normal mode, the IGP/PGL uses the default font and line spacing values.

A blank line or overlay data must always separate an EXECUTE command from a NORMAL command, unless a form count is given for the EXECUTE.

Page Number

Purpose Defines where a page number is placed on a form and automatically increases the page number on each page.

Mode CREATE

Format PAGE; *SR; SC*

PAGE	The Page Number command; enter **PAGE**.
SR	Defines the starting row of the page number. Enter a value ranging from row 1 through one less than the length of the form. Character row or dot row is specified based on the Scale command (page 4–88), or use the CP.DP format (page 4–7).
SC	Defines the starting column of the page number. Enter a value ranging from column 1 through one less than the width of the form. Character column or dot column is specified based on the Scale command (page 4–88), or use the CP.DP format (page 4–7). If the SR or SC extends beyond the page boundaries, an Error 76 will occur in the Execute Form mode, and default page number SR SC values are used.

Comments To begin automatically incrementing the page numbers, the starting page number must be specified during the Execute command.

Example The following command places the page numbers at row 60 column 70 on the form.

```
PAGE;60;70
```

Paper

Purpose Controls the printer cutter, print intensity, label sensor, page orientation (portrait/landscape), and print speed.

Mode NORMAL, EXECUTE

NOTE: More than one option may follow the paper command.

Format (cc)PAPER [;option[#]]

NOTE: Not all options may be available with your printer. Consult your printer's *Setup Guide* to determine which options are available. If an option is not available, the emulation will ignore the corresponding command.

(cc)	The Special Function Control Character.
PAPER	The PAPER command; enter **PAPER**. Refer to Table 4–3, on page 4–80.
CUT #	Sets the printer to cut a label after a specified number of labels. Enter **CUT**, a space, and a number in the range of 1 to 100 (1 implies no cutting).
EJECT	Prints all labels that are in the buffer. Enter **EJECT**.
INTENSITY #	Specifies the darkness of the dots. Enter **INTENSITY**, a space, and a number in the range of –10 to +10.
LABELS #	Specifies the label sensor. Enter **LABELS**, then a space, then a number: 0 = disable; 1 = Reflective Sensor; 2 = Transmissive Sensor.
LANDSCAPE	Identifies the selected paper cassette in the landscape orientation. Enter **LANDSCAPE**. See ROTATE.
PORTRAIT	Identifies the selected paper cassette in the portrait (default) orientation. Enter **PORTRAIT**. See ROTATE.

ROTATE # Specifies the label rotation. Enter **ROTATE**, a space, and either **0** (default) or **180**, for portrait, or **90** or **270**, for landscape.

SPEED Specifies the print speed in lines per minute. Enter **SPEED**, followed by a number in the range of 0 to 9999.

RIBSAVE # Enables (or disables) the Ribbon Saver option. Replace # with 1 to enable or with 0 to disable the option.

TEAR # Sets the printer to present the label (so you can tear off a label). Enter **TEAR**, a space, and 0 or 1 (0 = no pause and 1 = tearoff).

Comments You can use any or all Paper parameters, listed in any order, in a single Paper command. (Do not list any parameters on separate lines.) Parameters not specified or specified incorrectly retain the previously selected value. All Paper command parameters are reset to default values upon receiving a RESET command. Multiple paper commands within a single form will save the *last* paper command parameters specified.

Changing orientation between Portrait and Landscape may cause previously defined forms to produce boundary error messages when the form is executed because width and height values are switched.

Example Based on power-up printer defaults, the following command selects the landscape orientation.

~PAPER;LANDSCAPE

Table 4–3. Printer Speeds

Printer Model	Min. Speed (ips)	Max. Speed (ips)	Increments (ips)
T3204	2	10	0.5
T3304	2	8	0.5
T3306	2	8	0.5
T3308	2	9	0.5

PCX Logo

Purpose Places the IGP/PGL in the Create Logo mode, where logos can be defined using the PCX file format.

Mode NORMAL

Format (cc)(LOGO;*logoname;PCX[;DISK](T)*
<PCX raster data> (cc) RASTEREND [T]
END(T)

(cc)	The Special Function Control Character.
LOGO	The Logo command; enter **LOGO**.
logoname	Enter a maximum of 12 alphanumeric characters for the name of the logo. (Refer to page 4–5 for a list of allowable Logo Name characters.) All future references to this logo (Delete Logo or Logo Call commands) must use this name. If a logo is defined with the same name as a logo already existing in memory, the newly defined logo will replace the existing logo.
PCX	The command denoting raster data in PCX format; enter **PCX**.
DISK	Optional parameter to store the logo in the IGP/PGL external memory modules. Enter **DISK**.
T	Line terminator.
PCX raster data	Scanned data in PCX format; data must be black and white. Grey scales or color PCX files are currently not supported. Both uncompressed and compressed formats are supported.
(cc)	The Special Function Control Character.
RASTEREND	Denotes the end of the PCX raster data. Enter **RASTEREND**.
END	Terminates the PCX logo; enter **END**.

Comments The size and number of raster image logos are bounded by printer memory.

The logo call command in the Create Form mode brings the predefined logo into a form. The starting row and column parameters refer to the upper left corner of the logo grid. Once created, the logo is ready to be used in any form and will print at the size shown.

Raster images may contain data that is interpreted by your host as control codes. This may affect the way the host sends data to the printer. Consult your host's *Setup Guide* for sending binary data.

Be careful when editing PCX output files because most TEXT editors insert carriage returns and line feeds. If a PCX file must be edited, use a binary or hex editor.

Print File

Purpose Prints files from the external memory module. Print File can be used to show the SETUP functions that exist.

Mode NORMAL

Format (cc)PRINT; *filename*

(cc)	The Special Function Control Character.
PRINT	The Print File command; enter **PRINT**.
filename	The filename to be printed.

Comments Do not use wildcard characters because the Print File command will attempt to print any file in the external memory.

Forms and logos stored in the external memory module are stored in PGL format, not in the format sent from the module; therefore, do not attempt to print .frm or .lgo files.

Example Examples of how to print setup.ptx:

~PRINT;SETUP.PTX

Quiet

Purpose Places the IGP/PGL in the Quiet mode, where all data passed to the LinePrinter+ Emulation is unaffected by IGP/PGL commands except for the LISTEN, SFON/SFOFF, IGON/IGOFF, and PTX_SETUP commands.

Mode NORMAL

Format (cc)QUIET

(cc)	The Special Function Control Character.
QUIET	The Quiet command; enter **QUIET**. The IGP/PGL remains in the quiet state until the Listen command is received.

Comments In the Quiet mode IGP/PGL ignores all commands except LISTEN, SFON/SFOFF, IGON/IGOFF, and PTX_SETUP. All commands for the currently selected protocol in the LinePrinter+ will be interpreted. See the *LinePrinter+ User's Manual* for details.

The IGP/PGL remains quiet until the LISTEN command (page 4–71) enables standard IGP/PGL operation. The Quiet command is ignored if the IGP/PGL is in the Execute Form mode.

Reset

Purpose Deletes all forms and logos from IGP/PGL memory. The Reset performs the following tasks:

- Prints any objects in the current page
- Selects the portrait orientation
- Deletes all forms and logos resident in memory
- Sets the font to the default Gothic 12 point/10CPI
- Releases all user–defined character mappings
- Runs the SETUP file if present

Mode NORMAL, CREATE, or EXECUTE

Format (cc)RESET

(cc)	The Special Function Control Character.
RESET	The Reset command; enter **RESET**.

Comments This command deletes all forms and logos, *including* those input by other operators on shared IGP/PGL systems. To prevent the loss of information contained in the 2K–byte input buffer of the serial interface, the Reset command sequence must be the last item sent to the printer.

IMPORTANT

Wait several seconds after issuing a RESET command before sending another IGP/PGL command. The RESET process must be thoroughly completed before new IGP/PGL data is sent, or new data may be lost or damaged.

Reverse Print

Purpose Defines an area of the form where form elements are reverse printed (white on black).

Mode CREATE

Format REVERSE
[DARK;] SR; SC; ER; EC
STOP

REVERSE	The Reverse Printing command; enter **REVERSE**.
DARK	Optional parameter to select a denser black background. Enter **DARK**, or **DA**, to select the denser background. More information about dark printing is provided on page 4–10.
SR	Defines the starting row of the reverse print field. Enter a value ranging from row 1 through one less than the length of the form. Character row or dot row is specified based on the Scale command (page 4–88), or use the CP.DP format (page 4–7).
SC	Defines the starting column of the reverse print field. Enter a value ranging from column 1 through one less than the width of the form. Character column or dot column is specified based on the Scale command (page 4–88), or use the CP.DP format (page 4–7).
ER	Defines the ending row of the reverse print field. Enter a value ranging from row 2 through the last row of the form. The ending row must be greater than the starting row. Character row or dot row is specified based on the Scale command (page 4–88), or use the CP.DP format (page 4–7).

EC	Defines the ending column of the reverse print field. Enter a value ranging from column 2 through the last column of the form. The ending column must be greater than the starting column. Character column or dot column is specified based on the Scale command (page 4–88), or use the CP.DP format (page 4–7).
STOP	Stop indicates the end of the REVERSE command; enter **STOP**, and the IGP/PGL will wait for a new command. If not entered, the IGP/PGL will expect another set of Reverse Print command parameters.

Comments You can use reverse print with *all* form elements (alpha, lines, boxes, etc.). The IGP/PGL can also reverse print bar codes, but reverse printed bar codes are unreadable by bar code scanning devices.

Scale

Purpose Defines the vertical line spacing and the horizontal pitch of the form for data positioning specified by *character* row and column or *dot* row and column.

Mode CREATE

Format SCALE; *DOT [;horz;vert]* or SCALE; *CHAR [;lpi] [;cpi]*

SCALE	The Scale command; enter **SCALE**.
DOT	Specifies the dot scale. Enter **DOT**.
CHAR	Specifies the character scale. Enter **CHAR**.
lpi	The optional vertical line spacing parameter (in lines per inch) for character scaling. Enter: **any integer value from 1 to the target DPI**. The default is 6 lpi.
cpi	The optional horizontal pitch parameter (in characters per inch) for character scaling. Enter **10**, **12, 13**, **15**, **17,** or **20**. The default is 10 cpi.
horz/vert	Gives resolution for the dot parameter. Default is 60 dpi (horizontal) by 72 dpi (vertical).

Comments If the *character* scale is selected, starting row/column or ending row/column parameters are specified by *character* row and column. The lines per inch (lpi) value for a character scale form can be set to any integer value from 1 to the target DPI. Characters per inch (cpi) horizontally can be either 10, 12, 13, 15, 17, or 20. For example, on a printer with a maximum print width of 80 columns, an 8–1/2 x 11–inch form at the 6 lpi 10 cpi default has 66 rows and 80 columns in the character scale. (Refer to your printer *Setup Guide* to determine your maximum print boundaries.)

If the *dot* scale is selected, the parameters are specified in *dot* row and column. For example, based on a 60 dpi horizontal and 72 dpi vertical dot scale, a form of 8–1/2 x 11 inches has 792 rows (72 dpi x 11 inches) and 510 columns (60 dpi x 8–1/2 inches), and a form of 8 x 11 inches has 792 rows and 480 columns. Refer to Appendix C for more information about maximum values with other paper sizes.

The default scale factor uses *character* row and column (6 lpi and 10 cpi). Anytime CP.DP format (page 4–7) is used, the scale assumes 6 lpi and 10 cpi and a 60 x 72 dpi format.

You can change the Scale at any time during forms creation by using either of the Scale commands. Elements designed before the scale change will print at the former scale, while those elements following the scale change will print at the current scale.

NOTE: Scale affects data *position*, not the printed data itself. For example, alphanumeric data printed at 10 cpi will still print at 10 cpi after a Scale change; however, *where* the data is placed on the page is affected. Also, Scale affects line thickness if dot scale and horizontal/vertical scaling are given.

Select Format

Purpose Enables the IGP/PGL to ignore all host–generated paper movement commands (00–0F hex).

Mode NORMAL, CREATE or EXECUTE

Format (cc)SFON or (cc)SFOFF

NOTE: A line terminator is not required in the Select Format Sequence.

(cc)	The Special Function Control Character.
SFON	The Select Format On command. Enter **SFON**.
SFOFF	Exits Select Format. Enter **SFOFF**.

Comments During Select Format, you may enter the following IGP/PGL paper movement commands. All the commands must be entered in UPPERCASE. These commands can only be used with the Select Format command. If used at any other time, an error condition may result.

Command	**Paper Movement Function**
(cc)CR	Sends a carriage return (hex 0D)
(cc)LF	Sends a line feed (hex 0A)
(cc)FF	Sends a form feed (hex 0C)

Although the Select Format command enables the IGP/PGL to ignore all host–generated paper movement commands, you can input IGP/PGL paper movement commands with Select Format on.

SFON/SFOFF cannot be used during Ignore Sequence (page 4–65).

Also, during the downloading of TIFF and PCX logos, the SFON/SFOFF commands are ignored, and, instead, the printer receives the *raw* data.

Setup

Purpose Automatically executes and loads IGP/PGL commands such as forms, logos, customized print environments, etc., from external memory to the printer whenever printer power is applied or when the RESET command (page 4–85) is sent.

Mode NORMAL

Format (cc)SETUP
HOST DATA
(cc)SETUPEND

(cc)	The Special Function Control Character.
SETUP	The Setup command; enter **SETUP**.
HOST DATA	Any IGP/PGL commands, form definitions, text, etc. to be stored and executed at power–up.
SETUPEND	Finishes storing host data and returns the printer to the NORMAL mode. Enter **SETUPEND**.

Comments Because the RESET command causes the setup routine to be executed, the RESET command can not be in the SETUP information or else an infinite loop will occur.

If IGP/PGL commands have not been added between the SETUP and SETUPEND commands, the SETUP.PTX file in the IGP/PGL external memory module is automatically deleted, and no IGP/PGL SETUP commands are executed upon printer power–up.

NOTE: The SETUP.PTX is automatically created by the IGP/PGL when the ~SETUPEND command is received. When the SETUP.PTX file is not in external memory, no extra IGP/PGL commands are performed on power up.

TIFF Logo

Purpose Places the IGP/PGL in the Create Logo mode, where logos can be defined using a Tagged Image File Format (TIFF).

Mode NORMAL

Format (cc)(LOGO;*logoname;TIFF[;DISK](T)*
<TIFF raster data> (cc) RASTEREND [T]
END(T)

(cc)	The Special Function Control Character.
LOGO	The Logo command; enter **LOGO**.
logoname	Enter a maximum of 12 alphanumeric characters for the name of the logo. (Refer to page 4–5 for a list of allowable Logo Name characters.) All future references to this logo (Delete Logo or Logo Call commands) must use this name. If a logo is defined with the same name as a logo already existing in memory, the newly defined logo will replace the existing logo.
TIFF	The command denoting raster data in TIFF format; enter **TIFF**.
DISK	Optional parameter to store the logo in the IGP/PGL external memory module. Enter **DISK**.
T	Line terminator.
TIFF raster data	Scanned data in TIFF format; data must be black and white. Grey scales or color TIFF files are currently not supported. Both uncompressed and packed–bits compression formats are supported.
(cc)	The Special Function Control Character.
RASTEREND	Denotes the end of the TIFF raster data. Enter **RASTEREND**.
END	Terminates the TIFF logo; enter **END**.

Comments The size and number of raster image logos are bounded by printer memory.

The logo call command in the Create Form mode brings the predefined logo into a form. The starting row and column parameters refer to the upper left corner of the logo grid. Once created, the logo is ready to be used in any form and will print at the size shown.

Raster images may contain data that is interpreted by your host as control codes. This may affect the way the host sends data to the printer. Consult your host's *Setup Guide* for sending binary data.

Be careful when editing TIFF output files because most TEXT editors insert carriage returns and line feeds. If a TIFF file must be edited, use a binary or hex editor.

NOTE: Be careful sending TIFF data. The LOGO line must be terminated and then the TIFF data must follow immediately (with no extra CR/LF's). Otherwise, improper operation will result.

5 Bar Codes

Chapter Contents

Overview

A bar code is a graphic representation of alphanumeric characters. Bar codes are produced by entering bar code commands in the Create Form Mode. The IGP/PGL bar codes are listed below, in Table 5–1, with detailed bar code information provided on the referenced pages.

All parameters must be separated by a semicolon (;) unless noted otherwise. Throughout this chapter, actual commands required for input are shown exactly as they must be entered, while all parameters associated with that command are shown in italics. Optional parameters are enclosed in brackets. Spaces are used only to visually separate the command parameters, but *do not enter these spaces* in your command.

Table 5–1. Available Bar Codes

BAR CODE	MNEMONIC	SYMBOL LENGTH	CODE SET	PAGE NO.
Code 39	C39	Variable	Alphanumeric	(Page 5–21)
Code 93	CODE 93	Variable	Alphanumeric	(Page 5–28)
Code 128 – Subset B	C128B	Variable	Alphanumeric	(Page 5–35)
PDF417	PDF417	Variable	Alphanumeric	(Page 5–35)
Code 128 – Subset C	C128C	Variable	Numeric	(Page 5–35)
Codabar	CODABAR	Variable	Alphanumeric	(Page 5–35)
Code UCC– 128	UCC–128	19 or 20 digits	Numeric	(Page 5–51)
EAN 8	EAN8	7 digits	Numeric	(Page 5–57)
EAN13	EAN13	12 digits	Numeric	(Page 5–64)
FIM	FIM	N/A	A, B, C, or D	(Page 5–71)
Interleaved 2/5	I–2/5	Variable	Numeric	(Page 5–78)
MSI	MSI	13 or 14 digits	Variable	(Page 5–85)

Table 5–1. Available Bar Codes (Continued)

BAR CODE	MNEMONIC	SYMBOL LENGTH	CODE SET	PAGE NO.
Postnet	POSTNET	5, 9 or 11 digits	Numeric	(Page 5–98)
UPC–A	UPC–A	Numeric	Numeric	(Page 5–104)
UPC–E and UPC–E0	UPC–E UPC–E0	11 or 6	Numeric	(Page 5–111)

User–Defined Variable Bar Code Ratios [R[D]ratio]

The user–defined variable ratio for bar codes is an optional parameter. The default ratios shown in Table 5–2 through Table 5–9 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 greater than 0. Enter **R**, followed by the actual bar code ratio. A colon must separate each element of the ratio.

Like standard bar code ratios, user–defined 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.* Either enter four or eight values depending upon the bar code type.

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

NOTE: The IGP/PGL 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.

Table 5–2. T3306 & T3308 Binary Bar Code Sizes (Normal & Inverted Drawing)

Format	Size	Avg. X Dim.	Ratio
C 3/9, Codabar (Portrait Page)	X1	16.7 mil	2.8:1
	X1A	16.7 mil	2.2:1
	X1B	13.3 mil	2.5:1
	X1C	13.3 mil	2.75:1
	X1D	13.3 mil	2.25:1
	X1E	10 mil	2.67:1
	X1F	10 mil	2.33:1
	X1G	6.7 mil	2.5:1
	X2	33.3 mil	2.8:1
	X3	50 mil	2.8:1
	X4	66.7 mil	2.8:1

Table 5–2. T3306 & T3308 Binary Bar Code Sizes (Continued)

Format	Size	Avg. X Dim.	Ratio
C 3/9 Codabar (Landscape Page)	X1	16.7 mil	3:1
	X1A	16.7 mil	2.1:1
	X1B	13.3 mil	2.56:1
	X1C	13.3 mil	2.71:1
	X1D	13.3 mil	2.14:1
	X1E	10 mil	2.71:1
	X1F	10 mil	2.14:1
	X1G	8.3 mil	2.6:1
	X2	35 mil	2.8:1
	X3	50 mil	2.8:1
	X4	66.7 mil	2.8:1
I 2/5 (Portrait Page)	X1	16.7 mil	2.8:1
	X1A	20 mil	2.67:1
	X1B	16.7 mil	2.2:1
	X1C	13.3 mil	2.5:1
	X1D	13.3 mil	2.75:1
	X1E	10 mil	2.67:1
	X1F	10 mil	2.33:1
	X1G	6.7 mil	2.5:1
	X2	36.7 mil	2.27:1
	X2A	30 mil	2.33:1
	X3	53.3 mil	2.5:1
	X4	70 mil	2.43:1

I 25 (Landscape Page)	X1	16.7 mil	2.8:1
	X1A	20 mil	2.67:1
	X1B	16.7 mil	2.2:1
	X1C	13.3 mil	2.5:1
	X1D	13.3 mil	2.75:1
	X1E	10 mil	2.67:1
	X1F	10 mil	2.33:1
	X1G	6.7 mil	2.6:1
	X2	36.7 mil	2.27:1
	X2A	30 mil	2.33:1
	X3	53.3 mil	2.5:1
	X4	70 mil	2.43:1

Table 5–2. T3306 & T3308 Binary Bar Code Sizes (Continued)

Format	Size	Avg. X Dim.	Ratio
MSI (Portrait Page)	X1	16.7 mil	2.8:1
	X2	23.3 mil	2.57:1
	X3	33.3 mil	2.3:1
	X4	40 mil	2.33:1
MSI (Landscape Page)	X1	16.7 mil	2.8:1
	X2	23.3 mil	2.57:1
	X3	33.3 mil	2.3:1
	X4	40 mil	2.33:1

Table 5–3. T3306 & T3308 Binary Bar Code Sizes (CW & CCW Drawing)

Format	Size	Avg. X Dim.	Ratio
C 3/9 Codabar (Portrait Page)	X1	20 mil	2.5:1
	X1A	13.3 mil	2.75:1
	X1B	20 mil	2.83:1
	X1C	13.3 mil	2.71:1
	X1D	13.3 mil	2.14:1
	X1E	10 mil	2.71:1
	X1F	10 mil	2.14:1
	X1G	8.3 mil	2.6:1
	X2	26.7 mil	2.88:1
	X3	40 mil	2.92:1
	X4	53.3 mil	2.94:1

C 3/9 Codabar (Landscape Page)	X1	20 mil	2.5:1
	X1A	13.3 mil	2.75:1
	X1B	20 mil	2.83:1
	X1C	13.3 mil	2.75:1
	X1D	13.3 mil	2.25:1
	X1E	10 mil	2.67:1
	X1F	10 mil	2.33:1
	X1G	6.7 mil	2.5:1
	X2	26.7 mil	2.88:1
	X3	40 mil	2.92:1
	X4	53.3 mil	2.94:1

Table 5–3. T3306 & T3308 Binary Bar Code Sizes (Continued)

Format	Size	Avg. X Dim.	Ratio
I 2/5 (Portrait Page)	X1	20 mil	2.5:1
	X1A	13.3 mil	2.75:1
	X1B	20 mil	2.83:1
	X1C	13.3 mil	2.71:1
	X1D	13.3 mil	2.14:1
	X1E	10 mil	2.71:1
	X1F	10 mil	2.14:1
	X1G	8.3 mil	2.6:1
	X2	26.7 mil	2.88:1
	X2A	26.7 mil	2.13:1
	X3	40 mil	2.92:1
	X4	53.3 mil	2.94:1

I 25 (Landscape Page)	X1	20 mil	2.5:1
	X1A	13.3 mil	2.75:1
	X1B	20 mil	2.83:1
	X1C	13.3 mil	2.75:1
	X1D	13.3 mil	2.25:1
	X1E	10 mil	2.67:1
	X1F	10 mil	2.33:1
	X1G	6.7 mil	2.5:1
	X2	26.7 mil	2.88:1
	X2A	26.7 mil	2.13:1
	X3	40 mil	2.92:1
	X4	53.3 mil	2.94:1
MSI (Portrait Page)	X1	16.7 mil	2.8:1
	X2	23.3 mil	2.57:1
	X3	33.3 mil	2.3:1
	X4	40 mil	2.33:1
MSI (Landscape Page)	X1	16.7 mil	2.8:1
	X2	23.3 mil	2.57:1
	X3	33.3 mil	2.3:1
	X4	40 mil	2.33:1

Table 5–4. T3306 & T3308 4-Element Bar Code Sizes (Normal & Inverted Drawing)

Format	Size	Avg. X Dim.	Ratio
UPC EAN (Portrait Page)	X1	13.3 mil (Mag: 1.03)	4:3:2:1
	X1.5	16.7 mil (Mag: 1.28)	4:3:2:1
	X0.5	11.7 mil (Mag: 0.90)	4:3:2:1
UPC EAN (Landscape Page)	X1	13.3 mil (Mag: 1.03)	4:3:2:1
	X1.5	16.7 mil (Mag: 1.28)	4:3:2:1
	X0.5	11.7 mil (Mag: 0.90)	4:3:2:1
C128 C93 (Portrait Page)	X1	16.7	4:3:2:1
	X1.5	23.3	4:3:2:1
	X1A	13.3	4:3:2:1
	X2	33.3	4:3:2:1
	X3	50	4:3:2:1
	X4	66.7	4:3:2:1
	X5	83.3	4:3:2:1
C128 C93 (Landscape Page)	X1	16.7	4:3:2:1
	X1.5	23.3	4:3:2:1
	X1A	13.3	4:3:2:1
	X2	33.3	4:3:2:1
	X3	50	4:3:2:1
	X4	66.7	4:3:2:1
	X5	83.3	4:3:2:1

Table 5–5. T3306 & T3308 4-Element Bar Code Sizes (CW & CCW Drawing)

Format	Size	Avg. X Dim.	Ratio
UPC EAN (Portrait Page)	X1	13.3 mil (Mag: 1.03)	4:3:2:1
	X1.5	16.7 mil (Mag: 1.28)	4:3:2:1
	X0.5	11.7 mil (Mag: 0.90)	4:3:2:1

Table 5–5. T3306 & T3308 4-Element Bar Code Sizes (Continued)

Format	Size	Avg. X Dim.	Ratio
UPC EAN (Landscape Page)	X1	13.3 mil (Mag: 1.03)	4:3:2:1
	X1.5	16.7 mil (Mag: 1.28)	4:3:2:1
	X0.5	11.7 mil (Mag: 0.90)	4:3:2:1
C128 C93 (Portrait Page)	X1	13.3 mil	4:3:2:1
	X1.5	20 mil	4:3:2:1
	X1A	10 mil	4:3:2:1
	X2	26.7 mil	4:3:2:1
	X3	40 mil	4:3:2:1
	X4	53.3 mil	4:3:2:1
	X5	80 mil	4:3:2:1
C128 C93 (Landscape Page)	X1	13.3 mil	4:3:2:1
	X1.5	20 mil	4:3:2:1
	X1A	10 mil	4:3:2:1
	X2	26.7 mil	4:3:2:1
	X3	40 mil	4:3:2:1
	X4	53.3 mil	4:3:2:1
	X5	80 mil	4:3:2:1

Table 5–6. T3204 & T3304 Binary Bar Code Sizes (Normal & Inverted Drawing)

Format	Size	Avg. X Dim.	Ratio
C 3/9, Codabar (Portrait Page)	X1	16.7 mil	2.67:1
	X1A	16.7 mil	2.33:1
	X1B	13.3 mil	2.6:1
	X1C	13.3 mil	2.5:1
	X1D	13.3 mil	2:1
	X1E	10 mil	2.5:1
	X1F	10 mil	2.5:1
	X1G	6.7 mil	3:1
	X2	33.3 mil	2.7:1
	X3	50 mil	2.8:1
	X4	66.7 mil	2.8:1

Table 5–6. T3204 & T3304 Binary Bar Code Sizes (Continued)

Format	Size	Avg. X Dim.	Ratio
C 3/9, Codabar (Landscape Page)	X1	16.7 mil	2.67:1
	X1A	16.7 mil	2.33:1
	X1B	13.3 mil	2.6:1
	X1C	13.3 mil	2.5:1
	X1D	13.3 mil	2:1
	X1E	10 mil	2.5:1
	X1F	10 mil	2.5:1
	X1G	8.3 mil	2:1
	X2	35 mil	2.7:1
	X3	50 mil	2.8:1
	X4	66.7 mil	2.8:1

I 2/5 (Portrait Page)	X1	16.7 mil	2.67:1
	X1A	20 mil	2.75:1
	X1B	16.7 mil	2.33:1
	X1C	13.3 mil	2.5:1
	X1D	13.3 mil	2:1
	X1E	10 mil	2.5:1
	X1F	10 mil	2.5:1
	X1G	6.7 mil	3:1
	X2	36.7 mil	2.2:1
	X2A	30 mil	2.67:1
	X3	53.3 mil	2.43:1
	X4	70 mil	2.36:1
I 2/5 (Landscape Page)	X1	16.7 mil	2.67:1
	X1A	20 mil	2.75:1
	X1B	16.7 mil	2.33:1
	X1C	13.3 mil	2.5:1
	X1D	13.3 mil	2:1
	X1E	10 mil	2.5:1
	X1F	10 mil	2.5:1
	X1G	6.7 mil	2:1
	X2	36.7 mil	2.2:1
	X2A	30 mil	2.67:1
	X3	53.3 mil	2.43:1
	X4	70 mil	2.36:1

Table 5–6. T3204 & T3304 Binary Bar Code Sizes (Continued)

Format	Size	Avg. X Dim.	Ratio
MSI (Portrait Page)	X1	16.7 mil	2.67:1
	X2	23.3 mil	2.56:1
	X3	33.3 mil	2.23:1
	X4	40 mil	2.25:1

MSI (Landscape Page)	X1	16.7 mil	2.67:1
	X2	23.3 mil	2.56:1
	X3	33.3 mil	2.23:1
	X4	40 mil	2.25:1

Table 5–7. T3204 & T3304 Binary Bar Code Sizes (CW & CCW Drawing)

Format	Size	Avg. X Dim.	Ratio
C 3/9, Codabar (Portrait Page)	X1	20 mil	2.5:1
	X1A	13.3 mil	2.5:1
	X1B	20 mil	2.75:1
	X1C	13.3 mil	2.5:1
	X1D	13.3 mil	2:1
	X1E	10 mil	2.5:1
	X1F	10 mil	2:1
	X1G	8.3 mil	2.33:1
	X2	26.7 mil	2.8:1
	X3	40 mil	2.88:1
	X4	53.3 mil	2.9:1
C 3/9, Codabar (Landscape Page)	X1	20 mil	2.5:1
	X1A	13.3 mil	2.5:1
	X1B	20 mil	2.75:1
	X1C	13.3 mil	2.5:1
	X1D	13.3 mil	2:1
	X1E	10 mil	2.5:1
	X1F	10 mil	2:1
	X1G	6.7 mil	2:1
	X2	26.7 mil	2.8:1
	X3	40 mil	2.88:1
	X4	53.3 mil	2.9:1

Table 5–7. T3204 & T3304 Binary Bar Code Sizes (Continued)

Format	Size	Avg. X Dim.	Ratio
I 2/5 (Portrait Page)	X1	20 mil	2.5:1
	X1A	13.3 mil	2.5:1
	X1B	20 mil	2.75:1
	X1C	13.3 mil	2.5:1
	X1D	13.3 mil	2:1
	X1E	10 mil	2.5:1
	X1F	10 mil	2:1
	X1G	8.3 mil	2.33:1
	X2	26.7 mil	2.8:1
	X2A	26.7 mil	2:1
	X3	40 mil	2.88:1
	X4	53.3 mil	2.9:1
I 2/5 (Landscape Page)	X1	20 mil	2.5:1
	X1A	13.3 mil	2.5:1
	X1B	20 mil	2.75:1
	X1C	13.3 mil	2.5:1
	X1D	13.3 mil	2:1
	X1E	10 mil	2.5:1
	X1F	10 mil	2:1
	X1G	6.7 mil	2:1
	X2	26.7 mil	2.8:1
	X2A	26.7 mil	2:1
	X3	40 mil	2.88:1
	X4	53.3 mil	2.9:1
MSI (Portrait Page)	X1	16.7 mil	2.66:1
	X2	23.3 mil	2.56:1
	X3	33.3 mil	2.23:1
	X4	40 mil	2.25:1
MSI (Landscape Page)	X1	16.7 mil	2.66:1
	X2	23.3 mil	2.56:1
	X3	33.3 mil	2.23:1
	X4	40 mil	2.25:1

Table 5–8. T3204 & T3304 4-Element Bar Code Sizes (Normal & Inverted Drawing)

Format	Size	Avg. X Dim.	Ratio
UPC EAN (Portrait Page)	X1	13.3 mil (Mag: 1.03)	4:3:2:1
	X1.5	16.7 mil (Mag: 1.28)	4:3:2:1
	X0.5	11.7 mil (Mag: 0.90)	4:3:2:1
UPC EAN (Landscape Page)	X1	13.3 mil (Mag: 1.03)	4:3:2:1
	X1.5	16.7 mil (Mag: 1.28)	4:3:2:1
	X0.5	11.7 mil (Mag: 0.90)	4:3:2:1
C128 C93 (Portrait Page)	X1	16.7	4:3:2:1
	X1.5	23.3	4:3:2:1
	X1A	13.3	4:3:2:1
	X2	33.3	4:3:2:1
	X3	50	4:3:2:1
	X4	66.7	4:3:2:1
	X5	83.3	4:3:2:1
C128 C93 (Landscape Page)	X1	16.7	4:3:2:1
	X1.5	23.3	4:3:2:1
	X1A	13.3	4:3:2:1
	X2	33.3	4:3:2:1
	X3	50	4:3:2:1
	X4	66.7	4:3:2:1
	X5	83.3	4:3:2:1

Table 5–9. T3204 & T3304 4-Element Bar Code Sizes (CW & CCW Drawing)

Format	Size	Avg. X Dim.	Ratio
UPC EAN (Portrait Page)	X1	13.3 mil (Mag: 1.03)	4:3:2:1
	X1.5	16.7 mil (Mag: 1.28)	4:3:2:1
	X0.5	11.7 mil (Mag: 0.90)	4:3:2:1

Table 5–9. T3204 & T3304 4-Element Bar Code Sizes (Continued)

Format	Size	Avg. X Dim.	Ratio
UPC EAN (Landscape Page)	X1	13.3 mil (Mag: 1.03)	4:3:2:1
	X1.5	16.7 mil (Mag: 1.28)	4:3:2:1
	X0.5	11.7 mil (Mag: 0.90)	4:3:2:1
C128 C93 (Portrait Page)	X1	13.3 mil	4:3:2:1
	X1.5	20 mil	4:3:2:1
	X1A	10 mil	4:3:2:1
	X2	26.7 mil	4:3:2:1
	X3	40 mil	4:3:2:1
	X4	53.3 mil	4:3:2:1
	X5	80 mil	4:3:2:1
C128 C93 (Landscape Page)	X1	13.3 mil	4:3:2:1
	X1.5	20 mil	4:3:2:1
	X1A	10 mil	4:3:2:1
	X2	26.7 mil	4:3:2:1
	X3	40 mil	4:3:2:1
	X4	53.3 mil	4:3:2:1
	X5	80 mil	4:3:2:1

Variable Ratio Sample

```
~CREATE;TEST                    (Enters Create Form mode)
SCALE;CHAR
ALPHA                           (Alpha command)
2;5;1;1;1;*Std. Ratio*
STOP                            (Ends Alpha command)
BARCODE                         (Bar code command)
C3/9;X1;H7;3;5
“CODE39”
PDF;B;N                         (Printable data field)
STOP                            (Ends bar code command)
/
/
/
/
/
ALPHA                           (Alpha command)
2;30;1;1;*Var. Ratio*
STOP                            (Ends bar code command)
BARCODE                         (Bar code command)
C3/9;XRD2:2:5:5;H7;3;30
“CODE39”
PDF;B;N                         (Printable data field)
STOP                            (Ends bar code command)
END                             (Terminates Create Form mode)
~EXECUTE;TEST;1                 (Prints the form)
```

Std. Ratio

CODE39

Var. Ratio

CODE39

PDF Character Sizes [PDF [;LOC] [;FONT] (T)]

UPC and EAN

For UPC and EAN bar codes, a smaller Letter Gothic font will be substituted for OCR–A or OCR–B when the bar code symbol is not large enough to accommodate a 10 CPI font.

Other Bar Codes

For all other bar codes, OCR–A and OCR–B will print at 10 CPI. However, when using the Normal font, the PDF will be automatically sized to fit the length of the bar code symbol, if necessary.

NOTE: The DARK parameter is ignored for all bar codes.

Code 39

The Code 39 structure is shown in Figure 5–1 and described on the following pages.

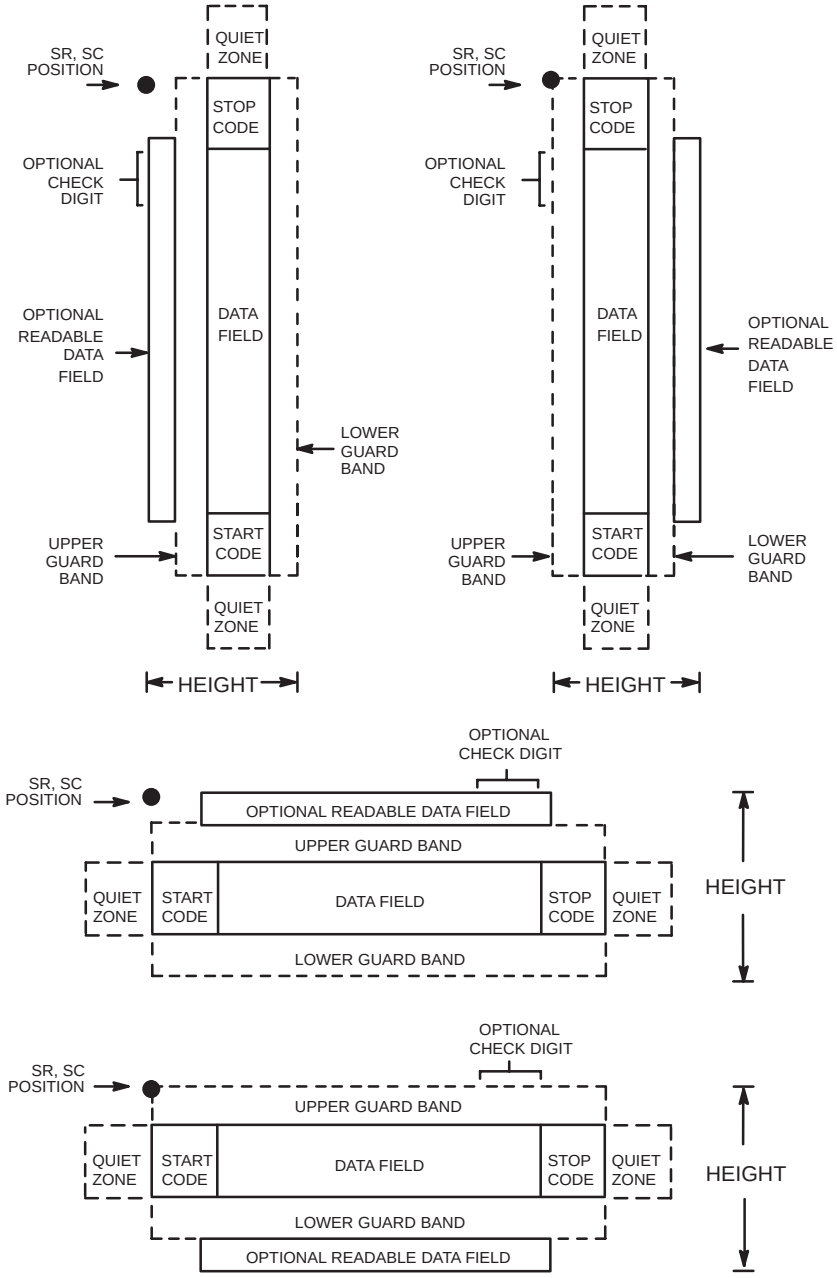


Figure 5–1. Code 39 Structure

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 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 one element; each character in the data field has nine elements. The structure is three wide elements (bars or spaces) out of the nine total elements which compose one character.

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 optional modulo–43 check digit can be inserted into the bar code to verify accurate scanning.

Code 39 Command Format

NOTE: Although commonly referred to as Code “39,” you must enter the command as “C3/9” (including the slash) during IGP/PGL input.

BARCODE
C3/9 [CD]; [VSCAN;] *[MAG;] [Hn[.m];] [*BF*n;L;] [*DARK*;] SR; SC [(D)data field(D)]*
*[*PDF *[;LOC] [;FONT]]*
STOP

BARCODE	The Bar Code command; enter **BARCODE**.
C3/9 CD	Designates bar code type C39; enter **C3/9**. To calculate and plot the optional modulo–43 check digit with the bar code symbol automatically, enter **CD**.
VSCAN	Optional parameter to orient the bar code structure vertically. To select a vertical bar code, enter **VSCAN**. If VSCAN is not entered, the bar code is oriented horizontally.
MAG	Optional parameter to magnify (horizontally expand) the bar code symbol. The magnification default value is X1. As required for scanning, enter a magnification value to increase the magnification. Increasing the magnification adjusts printed character density. You can also use XR or XRD as defined on page 5–4.
Hn[.m]	Optional parameter to adjust the overall height (vertical expansion) of the bar code symbol (including the upper and lower 0.1– inch guard bands and any human readable data). Height adjustments are made in 0.1–inch increments plus dots; enter **H** and a value from 4 to 99 to select height adjustments from 0.4 to 9.9 inches. The default value is 0.9 inch. .m is an additional number of dots for the bar code height. (Dots are in the current dot scale.)

BF*n;L*

Optional parameters for assigning a dynamic bar code data field location on a form and for designating the length of the data field. With these parameters, the actual data for the bar code data field is dynamically provided during the Execute Form Mode; the data is not specified during the Create Form Mode. To use this field, perform the following steps:

a. Enter **BF**.

b. Replace **n** with a number ranging from 1 to 255 to identify the bar code field. The SR and SC parameters specify the exact location of the bar code field identified by **n**.

c. Replace **L** with a number equaling the total number of characters in the field. (The actual data provided dynamically during the Execute Form Mode can be less than **L**.)

d. The information for the data field is entered dynamically during the Execute Form Mode. (Refer to "Execute Form: Dynamic Bar Code Data" on page 4–55 in the "Commands" chapter.) Do not use the *data field* parameter to enter data when the BFn;L parameters are used. However, refer to the *data field* description for available characters.

DARK

Optional parameter to produce darker looking bar codes. Enter **DARK**. Refer to Dark Printing on page 4–10 for more information.

SR

Defines the starting row for the bar code. Enter a value ranging from row 1 to one less than the length of the form. Character row or dot row is specified based on the Scale command (page 4–88), or use the CP.DP format (page 4–7).

SC	Defines the starting column of the bar code. Enter a value ranging from column 1 to one less than the width of the form. Character column or dot column is specified based on the Scale command (page 4–88), or use the CP.DP format (page 4–7).
D	The printable character (delimiter) identifying the start and finish of the data field. Enter any printable character other than a slash (/), the SFCC, or a character used within the data. The same character must be used at both ends of the data field, but it is not printed with the data.
data field	Contains the bar code characters. A null data field (no characters) is permitted. The length of the data field is variable; however, the maximum length is usually limited to 32 characters to minimize potential reading errors.
PDF	Optional parameter to enable printing of the human readable data field. Enter **PDF** to print the data field. If the parameter is not used, the human readable data will not print. This parameter is not allowed if a null data field is specified.
LOC	Optional parameter to identify the location of the printable data field. The default value is **B**, locating the human readable data below the bar code. **A** locates the printable data field above bar code. To compensate for printing the 0.1–inch high data, the height of the bar code body is reduced 0.1 inch.
FONT	Optional parameter to select the font for the human readable data field. The default value is **N**, selecting the normal ASCII 10 cpi font. Enter **O** to select the OCR–A 10 cpi font; enter **X** to select the OCR–B 10 cpi type font.
STOP	Ends the Bar Code command while the IGP/PGL continues in the Create Form Mode. Enter **STOP**. If STOP is not entered, an error message results.

Table 5–10. Code 39 Character Set

C= Character H = Hex									
C	**H**	**C**	**H**	**C**	**H**	**C**	**H**	**C**	**H**
0	30	A	41	K	4B	U	55	–	2D
1	31	B	42	L	4C	V	56	.	2E
2	32	C	43	M	4D	W	57	/	2F
3	33	D	44	N	4E	X	58		
4	34	E	45	O	4F	Y	59		
5	35	F	46	P	50	Z	5A		
6	36	G	47	Q	51	Space	20		
7	37	H	48	R	52	$	24		
8	38	I	49	S	53	%	25		
9	39	J	4A	T	54	+	2B		

Code 39 Example

Figure 5–2 illustrates a horizontal and vertical Code 39 bar code generated by the following program:

```
~CREATE;C39              (Enter Create Form Mode)
BARCODE                  (Bar Code Command)
C3/9;DARK;40;15          (Dark Code 39 at SR 40, SC 15)
*SAMPLE C3/9*            (Data Field)
PDF                      (Printable Data Field)
STOP                     (Ends Bar Code Command)
BARCODE                  (New Bar Code Command)
C3/9;VSCAN;H14;DARK;27;58
                         (Vert Dark Code 39, H 1.4, at SR 27, SC 58)
*SAMPLE C3/9*            (Data Field)
PDF                      (Printable Data Field)
STOP                     (Ends Bar Code Command)
END                      (Terminates Create Form Mode)
~EXECUTE;C39;1           (Execute the form, form count of 1)
```

Figure 5–2. Sample Code 39 Bar Codes

Code 93

The Code 93 structure is shown in Figure 5–3 and described on the following pages.

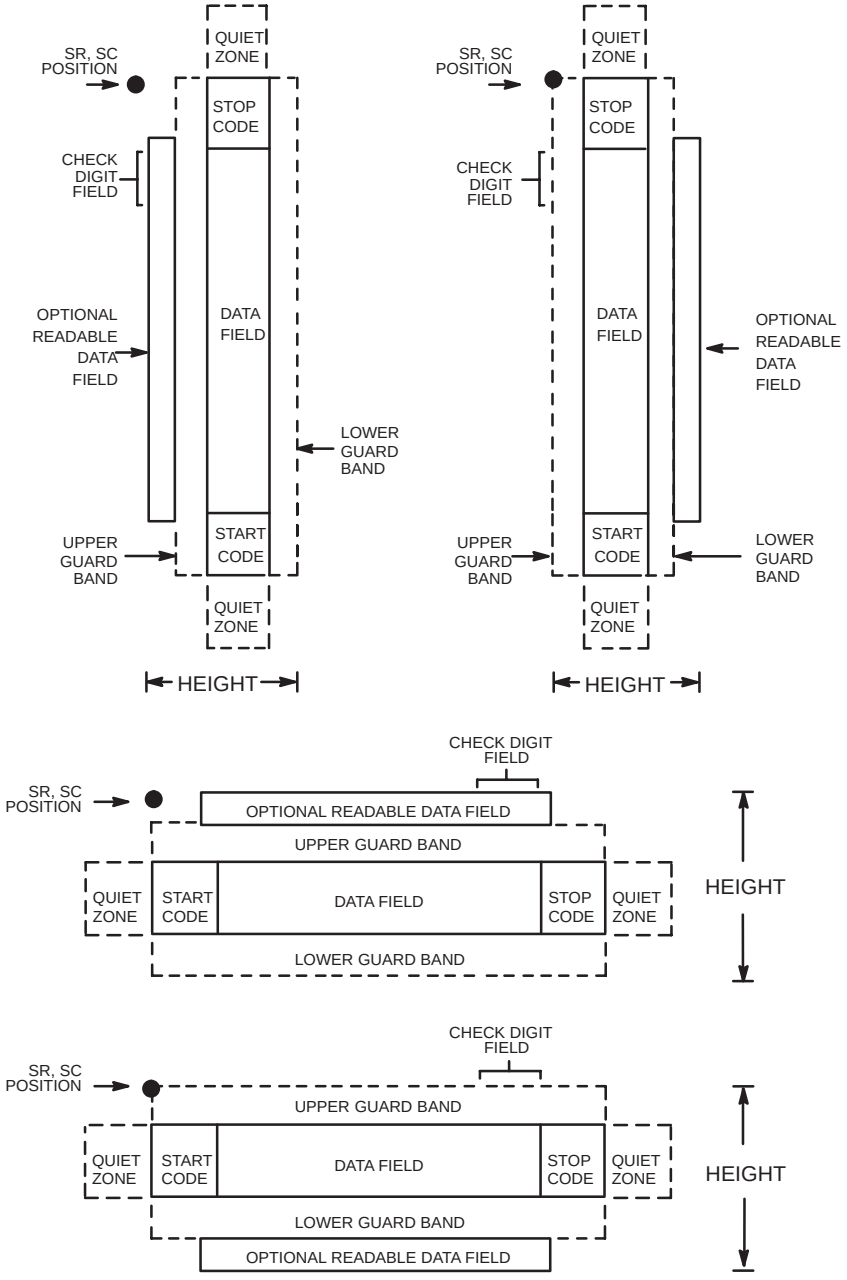


Figure 5–3. Code 93 Structure

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.

Code 93 Data Field

The bar code symbol uses a series of varying width bars and spaces to represent an extensive character set. The bars and spaces vary in width from one to four modules. Each character consists of three bars and three spaces that total 11 modules.

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.

Code 93 Command Format

BARCODE
CODE93[;VSCAN]*[;MAG][Hn[.m]][;*BF*n;L*[;DARK];*SR;SC(T)*
[(D)<data field>(D)(T)]
*[*PDF*[;LOC][;FONT](T)]*
STOP

BARCODE	The Bar Code command; enter **BARCODE**.
CODE93	Designates bar code type Code 93; enter **CODE93**.
VSCAN	Optional parameter to orient the bar code structure vertically. To select a vertical bar code, enter **VSCAN**. If VSCAN is not entered, the bar code is oriented horizontally.
MAG	Optional parameter to magnify (horizontally expand) the bar code symbol. The magnification default value is **X1**. Increasing the magnification adjusts printed character density. You can also use XR or XRD as defined on page 5–4. (You must specify 8 digits for MAG for variable ratio.)
Hn[.m]	Optional parameter to adjust the overall height (vertical expansion) of the bar code symbol (including the upper and lower 0.1–inch guard bands and any human readable data). Height adjustments are made in 0.1–inch increments; enter **H** and a value from 4 to 99 to select height adjustments from 0.4 to 9.9 inches. The default value is 0.9 inch. .m is an additional number of dots for the bar code height. (Dots are in the current dot scale.)
BFn;L	Optional parameters for assigning a dynamic bar code data field location on a form and for designating the length of the data field. With these parameters, the actual data for the bar code data field is dynamically provided during the Execute Form Mode; the data is not specified during the Create Form Mode.

To use this field, perform the following steps:

a. Enter **BF**.

b. Replace **n** with a number ranging from 1 to 255 to identify the bar code field. The SR and SC parameters specify the exact location of the bar code field identified by **n**.

c. Replace **L** with a number equaling the total number of characters in the field. (The actual data provided dynamically during the Execute Form Mode can be less than **L**.)

d. The information for the data field is entered dynamically during the Execute Form Mode. (Refer to "Execute Form: Dynamic Bar Code Data" on page 4–55 in the "Commands" chapter.) Do not use the *data field* parameter to enter data when the BFn;L parameters are used. However, refer to the *data field* description for available characters.

DARK — Optional parameter to produce darker looking bar codes. Enter **DARK**. Refer to "Dark Printing" on page 4–10 for more information.

SR — Defines the starting row for the bar code. Enter a value ranging from row 1 to one less than the length of the form. Character row or dot row is specified based on the Scale command (page 4–88), or use the CP.DP format (page 4–7).

SC — Defines the starting column of the bar code. Enter a value ranging from column 1 to one less than the width of the form. Character column or dot column is specified based on the Scale command (page 4–88), or use the CP.DP format (page 4–7).

D — The printable character (delimiter) identifying the start and finish of the data field. Enter any printable character other than a slash (/), the SFCC, or a character used within the data.

	The same character must be used at both ends of the data field, but it will not print with the data.
data field	Enter the data for the bar code. A null data field (no characters) is permitted. The length of the data field is variable; however, the maximum length is usually limited to 32 characters to minimize potential reading errors.
PDF	Optional parameter to enable printing of the human readable data field. Enter **PDF** to print the data field. If the parameter is not used, the human readable data will not print. This parameter is not allowed if a null data field was specified.
LOC	Optional parameter to identify the location of the printable data field. The default value is **B**, locating the human readable data below the bar code. **A** locates the printable data field above bar code. To compensate for printing the 0.1–inch high data, the height of the bar code body is reduced 0.1 inch.
FONT	Optional parameter to select the font for the human readable data field. The default value, **N**, selects the normal ASCII 10 cpi font. Enter **O** to select the OCR–A 10 cpi font; enter **X** to select the OCR–B 10 cpi type font.
STOP	Ends the Bar Code command while the IGP/PGL continues in the Create Form Mode. Enter **STOP**. If STOP is not entered, an error message results.

Table 5–11. Code 93 Character Set

Character	Hex	Character	Hex
0	0	Q	51
1	1	R	52
2	2	S	53
3	3	T	54
4	4	U	55
5	5	V	56
6	6	W	57
7	7	X	58
8	8	Y	59
9	9	Z	5A
A	41	–	2D
B	42	.	2E
C	43	SPACE	20
D	44	$	3F
E	45	/	2F
F	46	+	2B
G	47	%	25
H	48	S1	N/A
I	49	S2	N/A
J	4A	S3	N/A
K	4B	S4	N/A
L	4C	Start	N/A
M	4D	Stop	N/A
N	4E		
O	4F		
P	50		

Code 93 Example

The illustration below shows a horizontal Code 93 bar code generated by the following program:

```
~CREATE;TEST;288          (Enters Create Form mode)
SCALE;CHAR
BARCODE                   (Bar code command)
CODE93;X1;H7;10;20
“ABCD5678”
PDF;B;N                   (Printable data field)
STOP                      (Ends bar code command)
END                       (Terminates Create Form mode)
~EXECUTE;TEST             (Prints form)

~NORMAL
```

Codabar

The Codabar structure is shown in Figure 5–4 and described on the following pages.

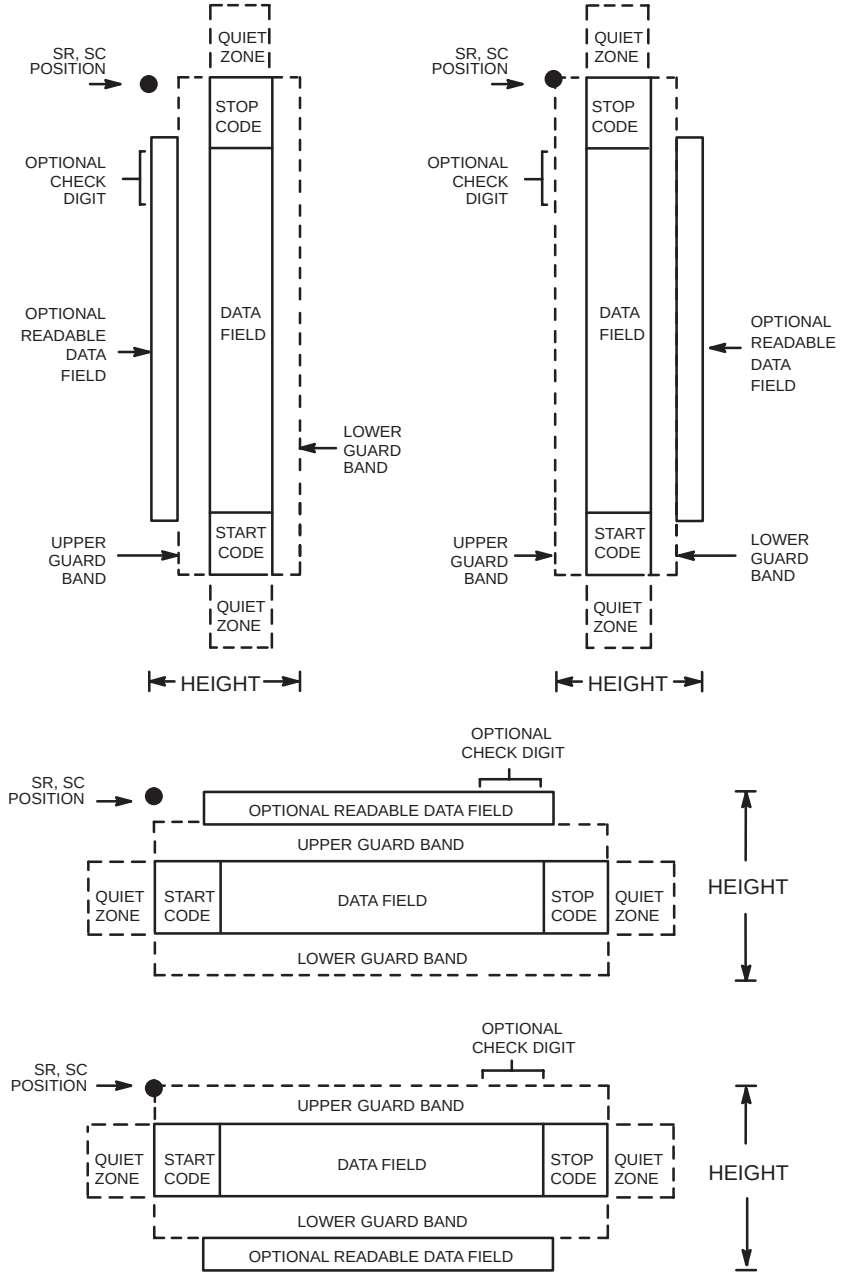


Figure 5–4. Codabar Structure

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 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 one element; each character in the data field has nine elements. The structure is three wide elements (bars or spaces) out of the nine total elements which compose one character.

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 optional modulo–43 check digit can be inserted into the bar code to verify accurate scanning.

Codabar Command Format

BARCODE
CODABAR [CD]; [VSCAN;] *[MAG;] [Hn[.m];] [*BF*n;L;] [*DARK*;] SR; SC*
[(D)data field(D)]
*[*PDF *[;LOC] [;FONT]]*
STOP

BARCODE	The Bar Code command; enter **BARCODE**.
CODABAR CD	Designates bar code type Codabar; enter **CODABAR**. To calculate and plot the optional modulo–43 check digit with the bar code symbol automatically, enter **CD**.
VSCAN	Optional parameter to orient the bar code structure vertically. To select a vertical bar code, enter **VSCAN**. If VSCAN is not entered, the bar code is oriented horizontally.
MAG	Optional parameter to magnify (horizontally expand) the bar code symbol. The magnification default value is X1. As required for scanning, enter a magnification value to increase the magnification. Increasing the magnification adjusts printed character density. You can also use XR or XRD as defined on page 5–4.
Hn[.m]	Optional parameter to adjust the overall height (vertical expansion) of the bar code symbol (including the upper and lower 0.1– inch guard bands and any human readable data). Height adjustments are made in 0.1–inch increments; enter **H** and a value from 4 to 99 to select height adjustments from 0.4 to 9.9 inches. The default value is 0.9 inch. .m is an additional number of dots for the bar code height. (Dots are in the current dot scale.)

BF*n;L*

Optional parameters for assigning a dynamic bar code data field location on a form and for designating the length of the data field. With these parameters, the actual data for the bar code data field is dynamically provided during the Execute Form Mode; the data is not specified during the Create Form Mode. To use this field, perform the following steps:

a. Enter **BF**.

b. Replace **n** with a number ranging from 1 to 255 to identify the bar code field. The SR and SC parameters specify the exact location of the bar code field identified by **n**.

c. Replace **L** with a number equaling the total number of characters in the field. (The actual data provided dynamically during the Execute Form Mode can be less than **L**.)

d. The information for the data field is entered dynamically during the Execute Form Mode. (Refer to "Execute Form: Dynamic Bar Code Data" on page 4–55 in the "Commands" chapter.) Do not use the *data field* parameter to enter data when the BFn;L parameters are used. However, refer to the *data field* description for available characters.

DARK

Optional parameter to produce darker looking bar codes. Enter **DARK**. Refer to Dark Printing on page 4–10 for more information.

SR

Defines the starting row for the bar code. Enter a value ranging from row 1 to one less than the length of the form. Character row or dot row is specified based on the Scale command (page 4–88), or use the CP.DP format (page 4–7).

SC	Defines the starting column of the bar code. Enter a value ranging from column 1 to one less than the width of the form. Character column or dot column is specified based on the Scale command (page 4–88), or use the CP.DP format (page 4–7).
D	The printable character (delimiter) identifying the start and finish of the data field. Enter any printable character other than a slash (/), the SFCC, or a character used within the data. The same character must be used at both ends of the data field, but it is not printed with the data.
data field	Contains the bar code characters. A null data field (no characters) is permitted. The length of the data field is variable; however, the maximum length is usually limited to 32 characters to minimize potential reading errors.
PDF	Optional parameter to enable printing of the human readable data field. Enter **PDF** to print the data field. If the parameter is not used, the human readable data will not print. This parameter is not allowed if a null data field is specified.
LOC	Optional parameter to identify the location of the printable data field. The default value is **B**, locating the human readable data below the bar code. **A** locates the printable data field above bar code. To compensate for printing the 0.1–inch high data, the height of the bar code body is reduced 0.1 inch.
FONT	Optional parameter to select the font for the human readable data field. The default value is **N**, selecting the normal ASCII 10 cpi font. Enter **O** to select the OCR–A 10 cpi font; enter **X** to select the OCR–B 10 cpi type font.
STOP	Ends the Bar Code command while the IGP/PGL continues in the Create Form Mode. Enter **STOP**. If STOP is not entered, an error message results.

Table 5–12. Codabar Character Set

Character	Hex	Character	Hex
0	0	$	24
1	1	:	3A
2	2	/	2F
3	3	.	2E
4	4	+	2B
5	5	A	41
6	6	B	42
7	7	C	43
8	8	D	44
9	9		
–	2D		

Codabar Example

```
~CREATE;TEST;288                (Enter Create Form mode)
SCALE;CHAR
BARCODE                         (Bar code command)
CODABAR;VSCAN;X1;H7;5;20
“A12345B”
PDF;B;N                         (Printable data field)
STOP                            (Ends bar code command)
END                             (Terminates Create Form mode)
~EXECUTE;TEST

~NORMAL
```

The Code 128 structure is shown in Figure 5–5 and described on the following pages.

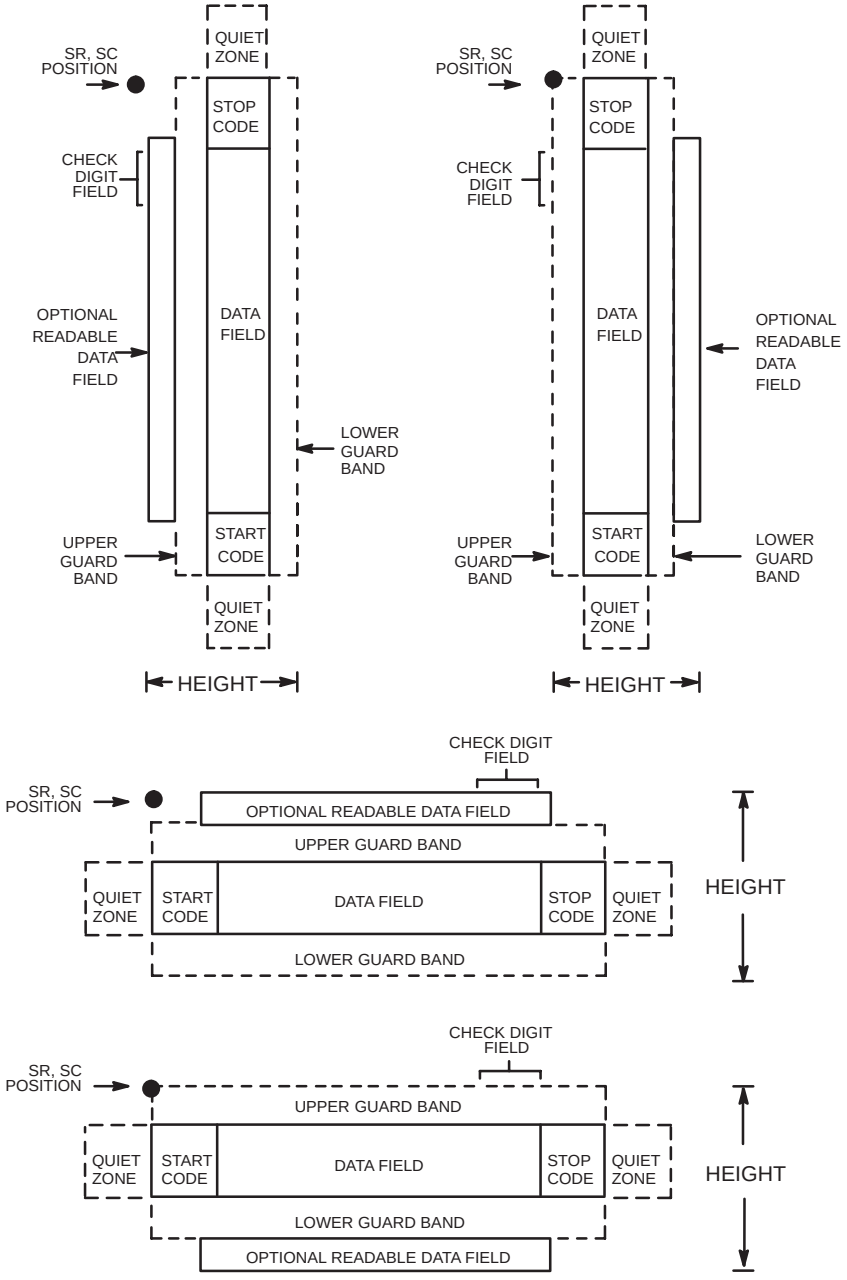


Figure 5–5. Code 128 Structure

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 Code 128 subsets uses a unique start code and a common stop code, both automatically provided by the IGP/PGL.

Code 128B Data Field

The bar code symbol uses a series of varying width bars and spaces to represent an extensive character set (96 ASCII characters and seven control characters). The bars and spaces vary in width from one to four modules. Each character consists of three bars and three spaces that total 11 modules.

Code 128C Data Field

The bar code symbol uses a series of varying width bars and spaces to represent 100 pairs of numeric digits (00 through 99) and 3 control characters. The bars and spaces vary in width from 1 to 4 modules. Each character consists of three bars and three spaces that total 11 modules.

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.

Code 128 Command Format

BARCODE

C128B *or* C128C; [VSCAN;] *[MAG;] [Hn[.m];] [*BF*n;L;]* [DARK;] *SR; SC [(D)data field(D)]*

*[*PDF *[;LOC] [;FONT]]*

STOP

BARCODE	The Bar Code command; enter **BARCODE**.
C128B or C12BC	Designates bar code type Code 128; enter **C128B** or **C128C**.
VSCAN	Optional parameter to orient the bar code structure vertically. To select a vertical bar code, enter **VSCAN**. If VSCAN is not entered, the bar code is oriented horizontally.
MAG	Optional parameter to magnify (horizontally expand) the bar code symbol. The magnification default value is **X1**. Increasing the magnification adjusts printed character density. You can also use XR or XRD as defined on page 5–4. (You must specify 8 digits for MAG for variable ratio.)
Hn[.m]	Optional parameter to adjust the overall height (vertical expansion) of the bar code symbol (including the upper and lower 0.1–inch guard bands and any human readable data). Height adjustments are made in 0.1–inch increments; enter **H** and a value from 4 to 99 to select height adjustments from 0.4 to 9.9 inches. The default value is 0.9 inch. .m is an additional number of dots for the bar code height. (Dots are in the current dot scale.)
BFn;L	Optional parameters for assigning a dynamic bar code data field location on a form and for designating the length of the data field. With these parameters, the actual data for the bar code data field is dynamically provided during the Execute Form Mode; the data is not specified during the Create Form Mode.

To use this field, perform the following steps.

a. Enter **BF**.

b. Replace **n** with a number ranging from 1 to 255 to identify the bar code field. The SR and SC parameters specify the exact location of the bar code field identified by **n**.

c. Replace **L** with a number equaling the total number of characters in the field. (The actual data provided dynamically during the Execute Form Mode can be less than **L**.)

d. The information for the data field is entered dynamically during the Execute Form Mode. (Refer to "Execute Form: Dynamic Bar Code Data" on page 4–55 in the "Commands" chapter.) Do not use the *data field* parameter to enter data when the BFn;L parameters are used. However, refer to the *data field* description for available characters.

DARK — Optional parameter to produce darker looking bar codes. Enter **DARK**. Refer to "Dark Printing" on page 4–10 for more information.

SR — Defines the starting row for the bar code. Enter a value ranging from row 1 to one less than the length of the form. Character row or dot row is specified based on the Scale command (page 4–88), or use the CP.DP format (page 4–7).

SC — Defines the starting column of the bar code. Enter a value ranging from column 1 to one less than the width of the form. Character column or dot column is specified based on the Scale command (page 4–88), or use the CP.DP format (page 4–7).

D — The printable character (delimiter) identifying the start and finish of the data field. Enter any printable character other than a slash (/), the SFCC, or a character used within the data.

	The same character must be used at both ends of the data field, but it will not print with the data.
data field	Enter the data for the bar code. A null data field (no characters) is permitted. Whenever a string of 6 or more contiguous numeric digits are detected, the IGP/PGL automatically inserts a Code C at the start of the numeric string and outputs numeric digit pairs packed into single bar code characters. When the string is broken (non–numeric data or an unpaired numeric digit occurs), the IGP/PGL automatically inserts a Code B and returns to normal C128B symbols. The length of the data field is variable; however, the maximum length is usually limited to 32 characters to minimize potential reading errors. The data field can contain any of the characters listed in Table 5–13 and Table 5–14, except the system SFCC.
PDF	Optional parameter to enable printing of the human readable data field. Enter **PDF** to print the data field. If the parameter is not used, the human readable data will not print. This parameter is not allowed if a null data field was specified.
LOC	Optional parameter to identify the location of the printable data field. The default value is **B**, locating the human readable data below the bar code. **A** locates the printable data field above bar code. To compensate for printing the 0.1–inch high data, the height of the bar code body is reduced 0.1 inch.
FONT	Optional parameter to select the font for the human readable data field. The default value, **N**, selects the normal ASCII 10 cpi font. Enter **O** to select the OCR–A 10 cpi font; enter **X** to select the OCR–B 10 cpi type font.
STOP	Ends the Bar Code command while the IGP/PGL continues in the Create Form Mode. Enter **STOP**. If STOP is not entered, an error message results.

Table 5–13. Code 128B Character Set

Character	Hex	Character	Hex	Character	Hex	Character	Hex	
SP	20	:	3A	T	54	n	6E	
!	21	;	3B	U	55	o	6F	
”	22	<	3C	V	56	p	70	
#	23	=	3D	W	57	q	71	
$	24	>	3E	X	58	r	72	
%	25	?	3F	Y	59	s	73	
&	26	@	40	Z	5A	t	74	
’	27	A	41	[	5B	u	75	
(	28	B	42	\	5C	v	76	
)	29	C	43	]	5D	w	77	
*	2A	D	44		5E	x	78	
+	2B	E	45	–	5F	y	79	
,	2C	F	46	‘	60	z	7A	
–	2D	G	47	a	61	{	7B	
.	2E	H	48	b	62	|	7C	
/	2F	I	49	c	63	}	7D	
0	30	J	4A	d	64	~	7E	
1	31	K	4B	e	65	■	7F	
2	32	L	4C	f	66	FNC 3	23	*See NOTE*
3	33	M	4D	g	67	FNC 2	22	*See NOTE*
4	34	N	4E	h	68	SHIFT	28	*See NOTE*
5	35	O	4F	i	69	CODE C	27	*See NOTE*
6	36	P	50	j	6A	FUNC 4	24	*See NOTE*
7	37	Q	51	k	6B	CODE A	25	*See NOTE*
8	38	R	52	l	6C	FNC 1	21	*See NOTE*
9	39	S	53	m	6D	START B	(N/A)	
						STOP	(N/A)	

NOTE: Access for the alternate set of control function characters is by using SO (Shift Out, hex 0E). The SO control code identifies the next character as the control function character, which must be inserted before *each* alternate character required.

Table 5–14. Code 128C Character Set

Character	Hex	Character	Hex	Character	Hex	Character	Hex
00	30 30	27	32 37	54	35 34	81	38 31
01	30 31	28	32 38	55	35 35	82	38 32
02	30 32	29	32 39	56	35 36	83	38 33
03	30 33	30	33 30	57	35 37	84	38 34
04	30 34	31	33 31	58	35 38	85	38 35
05	30 35	32	33 32	59	35 39	86	38 36
06	30 36	33	33 33	60	36 30	87	38 37
07	30 37	34	33 34	61	36 31	88	38 38
08	30 38	35	33 35	62	36 32	89	38 39
09	30 39	36	33 36	63	36 33	90	39 30
10	31 30	37	33 37	64	36 34	91	39 31
11	31 31	38	33 38	65	36 35	92	39 32
12	31 32	39	33 39	66	36 36	93	39 33
13	31 33	40	34 30	67	36 37	94	39 34
14	31 34	41	34 31	68	36 38	95	39 35
15	31 35	42	34 32	69	36 39	96	39 36
16	31 36	43	34 33	70	37 30	97	39 37
17	31 37	44	34 34	71	37 31	98	39 38
18	31 38	45	34 35	72	37 32	99	39 39
19	31 39	46	34 36	73	37 33	CODE B	26 *See NOTE*
20	32 30	47	34 37	74	37 34	CODE A	25 *See NOTE*
21	32 31	48	34 38	75	37 35	FNC 1	21 *See NOTE*
22	32 32	49	34 39	76	37 36	START C	(N/A)
23	32 33	50	35 30	77	37 37	STOP	(N/A)
24	32 34	51	35 31	78	37 38		
25	32 35	52	35 32	79	37 39		
26	32 36	53	35 33	80	38 30		

NOTE: Access for the alternate set of control function characters is by using SO (Shift Out, hex 0E). The SO control code identifies the next character as the control function character, and must be inserted before *each* alternate character required.

Code 128B Example

Figure 5–6 illustrates a horizontal and vertical Code 128B bar code generated by the following program:

```
~CREATE;128B                (Enter Create Form Mode)
BARCODE                     (Bar Code command)
C128B;DARK;40;15            (Dark Code 128B at SR 40, SC 15)
*SAMPLE CODE 128B*          (Data Field)
PDF;A                       (Upper Printable Data Field)
STOP                        (Ends Bar Code command)
BARCODE                     (New Bar Code command)
C128B;VSCAN;H12;DARK;31;55
                            (Vert. Dark C128B, H 1.2 at SR 31, SC 55)
*SAMPLE CODE 128B*          (Data Field)
PDF                         (Printable Data Field)
STOP                        (Ends Bar Code command)
END                         (Terminate Create Form Mode)
~EXECUTE;128B;1             (Execute the form, form count of 1)
```

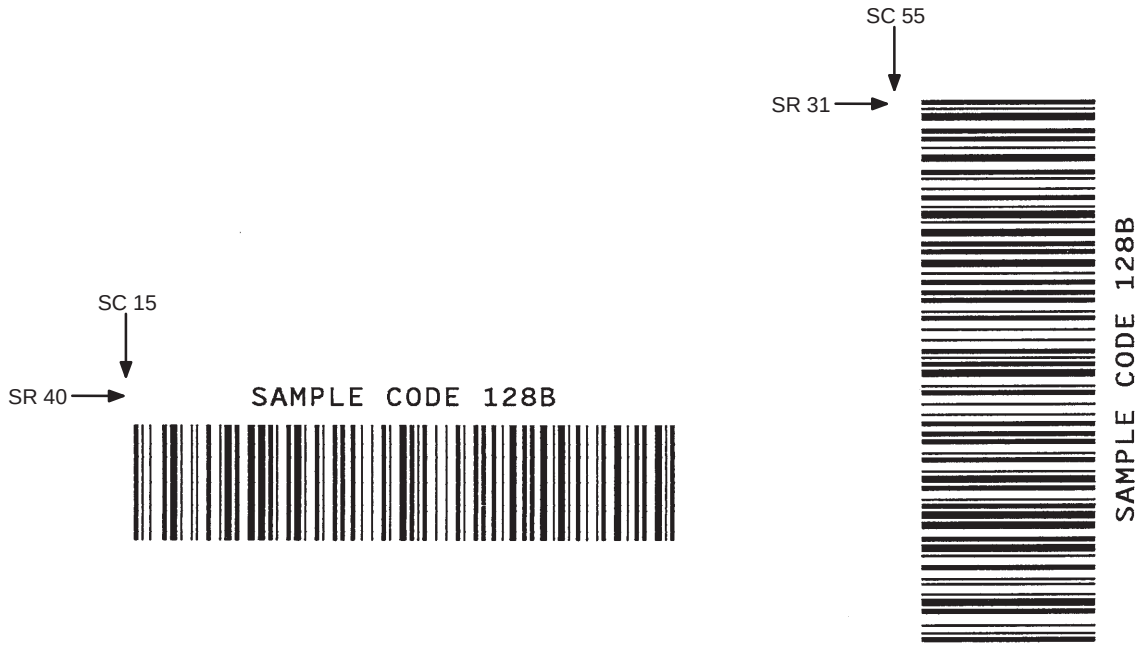


Figure 5–6. Sample Code 128B Bar Codes

Code 128C Example

Figure 5–7 illustrates a horizontal and vertical Code 128C bar code generated by the following program:

```
~CREATE;128C                (Enter Create Form Mode)
BARCODE                     (Bar Code command)
C128C;DARK;35;15            (Dark Code 128C at SR 35, SC 15)
*1234567890*                (Data Field)
PDF                         (Printable Data Field)
STOP                        (Ends Bar Code command)
BARCODE                     (New Bar Code command)
C128C;VSCAN;H12;DARK;27;50
                            (Vert. Dark C128C, H 1.2 at SR 27, SC 50)
*1234567890*                (Data Field)
PDF                         (Printable Data Field)
STOP                        (Ends Bar Code command)
END                         (Terminates Create Form Mode)
~EXECUTE;128C;1             (Execute the form, form count of 1)
```

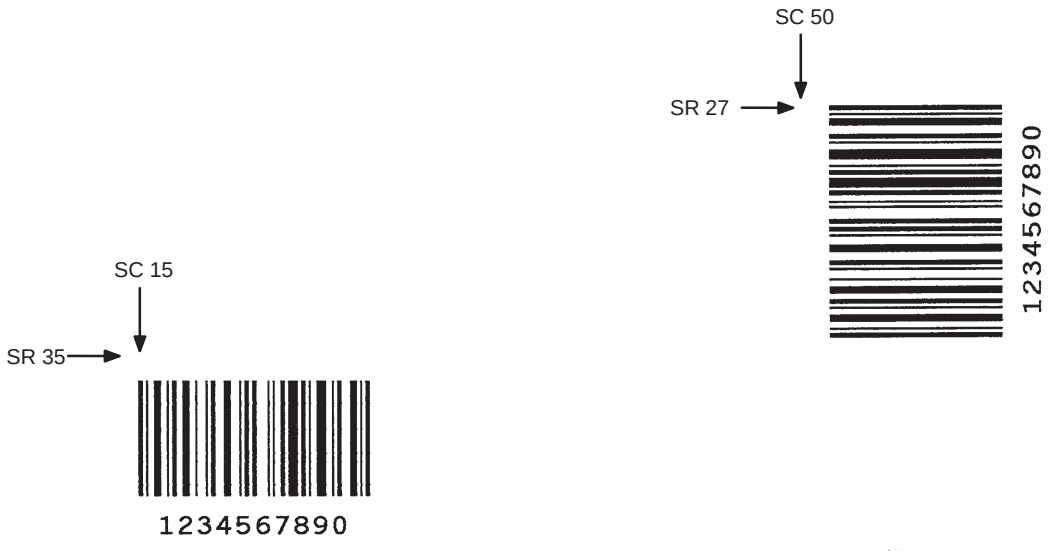


Figure 5–7. Sample Code 128C Bar Codes

Code UCC –128

The Code UCC–128 structure is shown in Figure 5–8 and described on the following pages.

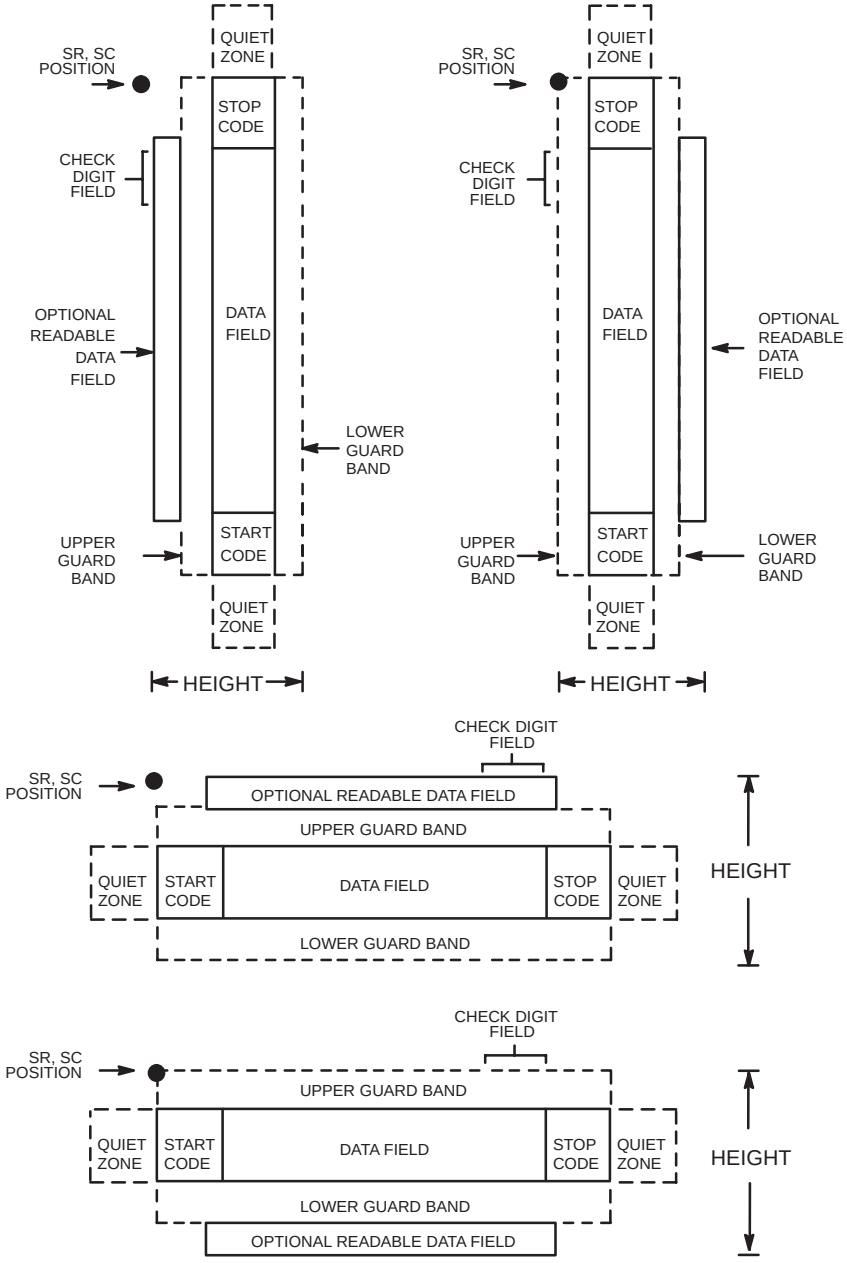


Figure 5–8. Code UCC–128 Structure

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 Code UCC–128 subsets uses a unique start code and a common stop code, both automatically provided by the IGP/PGL.

Data Field

The bar code symbol uses a series of varying width bars and spaces to represent 100 pairs of numeric digits (00 through 99) and 3 control characters. The bars and spaces vary in width from 1 to 4 modules. Each character consists of three bars and three spaces that total 11 modules.

The IGP/PGL inserts a Function 1 character before the data. A mod–10 check digit is calculated from 19 digits that represents a 2–digit qualifier, and 17–digit data portion.

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, appears in 13 CPI, and is broken up by spaces to denote UCC–128 data fields.

Check Digit

The modulo–10 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.

The modulo–103 check digit is also 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.

Code UCC–128 Command Format

BARCODE
UCC–128; [VSCAN;] *[MAG;] [Hn[.m];] [*BF*n]* [DARK;] *SR; SC [(D)data field(D)]*
*[*PDF *[;LOC] [;FONT]]*
STOP

BARCODE	The Bar Code command; enter **BARCODE**.
UCC–128	Designates bar code type Code UCC–128; enter **UCC–128**.
VSCAN	Optional parameter to orient the bar code structure vertically. To select a vertical bar code, enter **VSCAN**. If VSCAN is not entered, the bar code is oriented horizontally.
MAG	Optional parameter to magnify (horizontally expand) the bar code symbol. The magnification default value is **X1**. Increasing the magnification adjusts printed character density. You can also use XR or XRD as defined on page 5–4. (You must specify 8 digits for MAG for variable ratio.)
Hn[.m]	Optional parameter to adjust the overall height (vertical expansion) of the bar code symbol (including the upper and lower 0.1–inch guard bands and any human readable data). Height adjustments are made in 0.1–inch increments; enter **H** and a value from 4 to 99 to select height adjustments from 0.4 to 9.9 inches. The default value is 0.9 inch. .m is an additional number of dots for the bar code height. (Dots are in the current dot scale.)

BF*n*

Optional parameters for assigning a dynamic bar code data field location on a form and for designating the length of the data field. With these parameters, the actual data for the bar code data field is dynamically provided during the Execute Form Mode; the data is not specified during the Create Form Mode.

To use this field, perform the following steps:

a. Enter **BF**.

b. Replace **n** with a number ranging from 1 to 255 to identify the bar code field. The SR and SC parameters specify the exact location of the bar code field identified by **n**.

c. The length of the data field need not be specified, since it is fixed at 19 digits, plus any add–on data.

d. The information for the data field is entered dynamically during the Execute Form Mode. (Refer to “Execute Form: Dynamic Bar Code Data” on page 4–55 in the “Commands” chapter.) Do not use the *data field* parameter to enter data when the BFn parameters are used. However, refer to the *data field* description for available characters.

DARK

Optional parameter to produce darker looking bar codes. Enter **DARK**. Refer to “Dark Printing” on page 4–10 for more information.

SR

Defines the starting row for the bar code. Enter a value ranging from row 1 to one less than the length of the form. Character row or dot row is specified based on the Scale command (page 4–88), or use the CP.DP format (page 4–7).

SC

Defines the starting column of the bar code. Enter a value ranging from column 1 to one less than the width of the form. Character column or dot column is specified based on the Scale command (page 4–88), or use the CP.DP format (page 4–7).

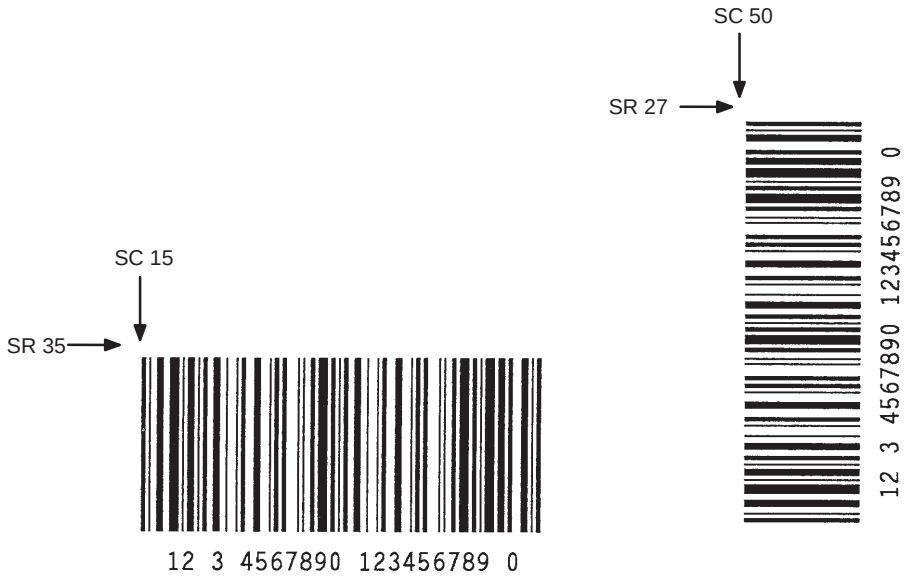
D	The printable character (delimiter) identifying the start and finish of the data field. Enter any printable character other than a slash (/), the SFCC, or a character used within the data. The same character must be used at both ends of the data field, but it will not print with the data.
data field	Enter the characters for the bar code data, restricted to exactly 19 digits. Enter the Packaging Type Number, followed by the 7 digit Manufacturing Number (including Number System Character preceded by zero if a UPC number). Enter the 9 digit Shipping Container Serial Number. The characters available for the data field are 0 through 9 (30 through 39 hex, respectively).
PDF	Optional parameter to enable printing of the human readable data field. Enter **PDF** to print the data field. If the parameter is not used, the human readable data will not print. This parameter is not allowed if a null data field was specified.
LOC	Optional parameter to identify the location of the printable data field. The default value is **B**, locating the human readable data below the bar code. **A** locates the printable data field above bar code. To compensate for printing the 0.1–inch high data, the height of the bar code body is reduced 0.1 inch.
STOP	Ends the Bar Code command while the IGP/PGL continues in the Create Form Mode. Enter **STOP**. If STOP is not entered, an error message results.

NOTE: Refer to the Code 128C Character Set Table on page 5–48, for information on character sets.

Code UCC–128 Example

Figure 5–9 illustrates a horizontal and vertical Code UCC–128 bar code generated by the following program:

```
~CREATE;UCC–128          (Enter Create Form Mode)
BARCODE                  (Bar Code command)
UCC–128;DARK;35;15       (Dark Code UCC–128 at SR 35, SC 15)
*1234567890123456789*    (Data Field)
PDF                      (Printable Data Field)
STOP                     (Ends Bar Code command)
BARCODE                  (New Bar Code command)
UCC–128;VSCAN;H12;DARK;27;50
                         (Vert. Dark UCC–128, H 1.2 at SR 27, SC 50)
*1234567890123456789*    (Data Field)
PDF                      (Printable Data Field)
STOP                     (Ends Bar Code command)
END                      (Terminates Create Form Mode)
~EXECUTE;UCC–128;1       (Execute the form, form count of 1)
```



Note: When using the PDF (printable data field) parameter, 13 cpi is the only option available.

Figure 5–9. Sample Code UCC-128 Bar Codes

EAN 8

The EAN 8 bar code structure is shown in Figure 5–10 and described on the following pages.

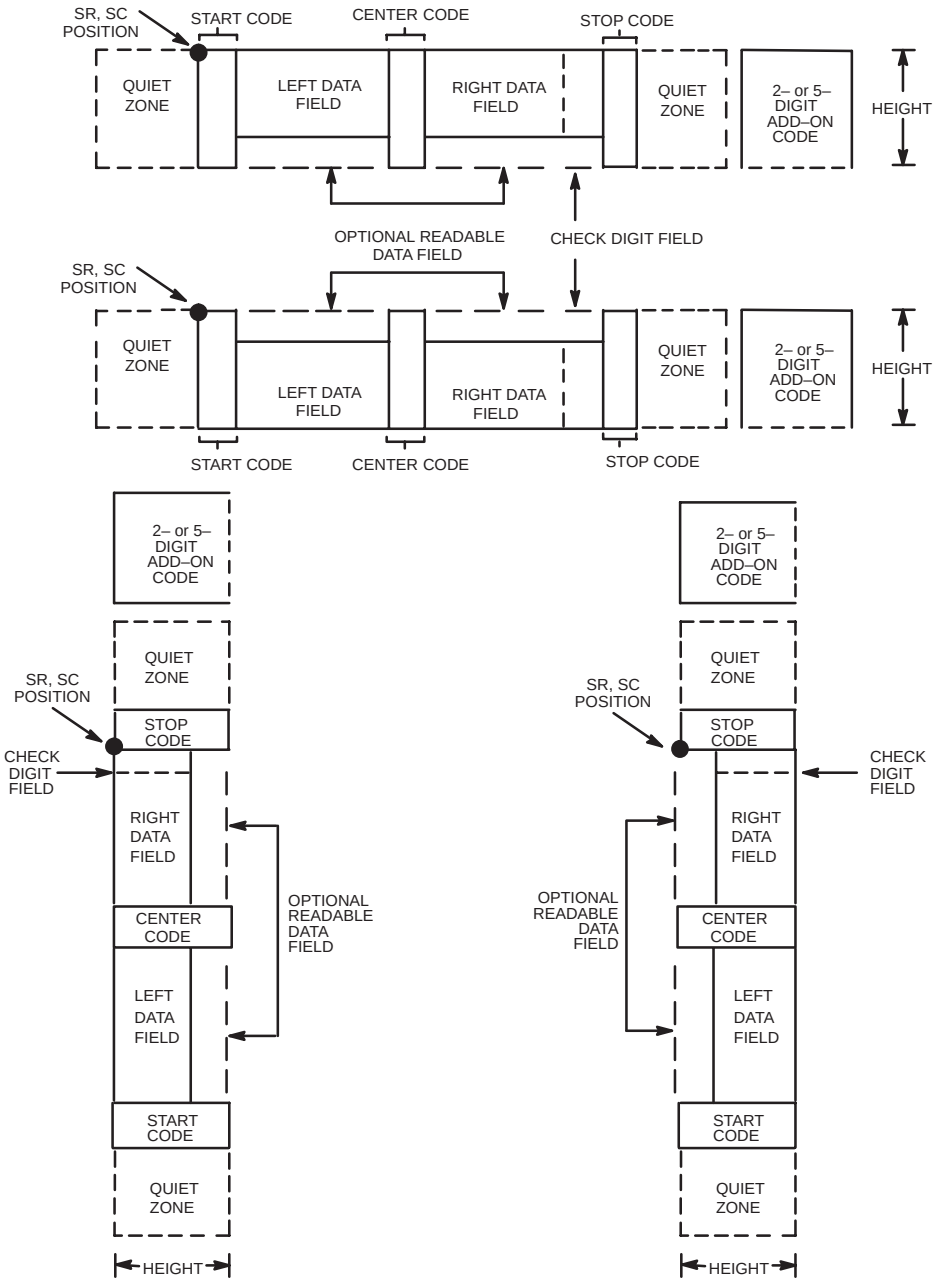


Figure 5–10. EAN 8 Structure

Quiet Zone

Both ends of the bar code structure have 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. The IGP/PGL automatically produces the left quiet zone; be sure to provide sufficient space on the form for the right quiet zone.

Start/Center/Stop Codes

The start/center/stop codes are special character codes marking those portions of the bar code. These codes are automatically provided.

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 one to four modules. Each character consists of two bars and two spaces that total seven modules. The symbol coding of the left data field is different from the right data field to permit read direction sensing.

The optional 2– or 5–digit add–on data, placed within the delimiter at the end of the bar code, typically identifies a periodical issue number or price, respectively.

Readable Data

The human readable data field provides a readable interpretation of the bar code data. It can either be suppressed or printed below the bar code symbol.

Check Digit

The modulo–10 check digit is automatically calculated and inserted in the bar code symbol. The check digit verifies accurate scanning.

EAN 8 Command Format

BARCODE
EAN8 *[+n]*; [VSCAN;] *[SCB;] [MAG;] [Hn[.m];] [BFn;]* [DARK;] *SR; SC*
[(D)data field(D)]
*[*PDF *[;LOC] [;FONT]]*
STOP

BARCODE	The Bar Code command; enter **BARCODE**.
EAN8	Designates bar code type EAN 8; enter **EAN8**.
+n	Optional parameter to provide a 2– or 5–digit add–on code at the end of the bar code data field. Enter a plus sign (**+**) and a value of **2** or **5**. The first bar of the add–on code is separated by nine modules from the last bar of the EAN symbol and a left guard pattern. No center or right guard pattern exists.
VSCAN	Optional parameter to orient the bar code structure vertically. To select a vertical bar code, enter **VSCAN**. If VSCAN is not entered, the bar code is oriented horizontally.
SCB	This option shortens the length of the center guard bars, which are normally full length.
MAG	Optional parameter to magnify (horizontally expand) the bar code symbol. The magnification default value is **X1**. You can also use XR or XRD as defined on page 5–4. (You must specify 8 digits for MAG for variable ratio.)
Hn[.m]	Optional parameter to adjust the overall height (vertical expansion) of the bar code symbol (including the upper and lower 0.1–inch guard bands and any human readable data).

Height adjustments are made in 0.1–inch increments; enter **H** and a value from 4 to 99 to select height adjustments from 0.4 to 9.9 inches. The default value is 1.3 inches.

. .m is an additional number of dots for the bar code height. (Dots are in the current dot scale.)

BF*n* Optional parameter for assigning a dynamic bar code data field location on a form. With this parameter, the actual data for the bar code data field is dynamically provided during the Execute Form Mode; the data is not specified during the Create Form Mode. To use this field:

a. Enter **BF**.

b. Replace **n** with a number ranging from 1 to 255 to identify the bar code field. The SR and SC parameters specify the exact location of the bar code field identified by **n**.

c. The length of the data field need not be specified since it is fixed at seven digits, plus any add–on data.

d. The information for the data field is entered dynamically during the Execute Form Mode. (Refer to “Execute Form: Dynamic Bar Code Data” on page 4–55 in the “Commands” chapter.) Do not use the *data field* parameter to enter data when the BFn parameters are used. However, refer to the *data field* description for available characters.

DARK Optional parameter to produce darker looking bar codes. Enter **DARK**. Refer to “Dark Printing” on page 4–10 for more information.

SR	Defines the starting row for the bar code. Enter a value ranging from row 1 to one less than the length of the form. Character row or dot row is specified based on the Scale command (page 4–88), or use the CP.DP format (page 4–7).
SC	Defines the starting column of the bar code. Enter a value ranging from column 1 to one less than the width of the form. Character column or dot column is specified based on the Scale command (page 4–88), or use the CP.DP format (page 4–7).
D	The printable character (delimiter) identifying the start and finish of the data field. Enter any printable character other than a slash (/), the SFCC, or a character used within the data. The same character must be used at both ends of the data field, but it will not print with the data.
data field	The characters of the bar code data are restricted to exactly seven digits. If the 2– or 5–digit add–on data option 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).
PDF	Optional parameter to print the human readable data field. The data field prints automatically unless the PDF–suppress command is specified in the **FONT** parameter. The human-readable data field can be printed above or below the bar code symbol. This parameter is not allowed if a null data field is specified. If no **PDF** command is entered, the data field will print automatically in the default OCR–B font.
LOC	Optional parameter to identify the location of the printable data field. The default value is **B**, locating the human readable data below the bar code. **A** locates the printable data field above bar code. To compensate for printing the 0.1–inch high data, the height of the bar code body is reduced 0.1 inch.

FONT	Optional parameter to select the font for the human readable data field. The default value, **N**, selects the normal ASCII 10 cpi font. Enter **O** to select the OCR–A 10 cpi font; enter **X** to select the OCR–B type font. Enter **S** to suppress printing the data field and the trailing lower portions of the EAN bar code.
STOP	Ends the Bar Code command while the IGP/PGL continues in the Create Form Mode. Enter **STOP**. If STOP is not entered, an error message results.

EAN 8 Example

Figure 5–11 illustrates a horizontal and vertical EAN 8 bar code generated by the following program:

```
~CREATE;EAN8                    (Enter Create Form Mode)
BARCODE                         (Bar Code command)
EAN8+2;H9;DARK;33;15            (Dark Code EAN 8, 2–digit add–on,
                                 H 0.9, SR 33, SC 15)
*123456722*                     (Data Field plus 2–digit add–on Data Field)
PDF                             (Printable Data Field)
STOP                            (Ends Bar Code command)
BARCODE                         (New Bar Code command)
EAN8+2;VSCAN;H10;DARK;33;55
                                (Vertical Dark EAN 8, 2–digit add–on,
                                 H 1.0, SR 33, SC 55)
*123456722*                     (Data Field plus 2–digit add–on Data Field)
PDF                             (Printable Data Field)
STOP                            (Ends Bar Code command)
END                             (Terminates Create Form Mode)
~EXECUTE;EAN8;1                 (Execute the form, form count of 1)
```

Figure 5–11. Sample EAN 8 Bar Codes

EAN 13

The EAN 13 bar code structure is shown in Figure 5–12 and described on the following pages.

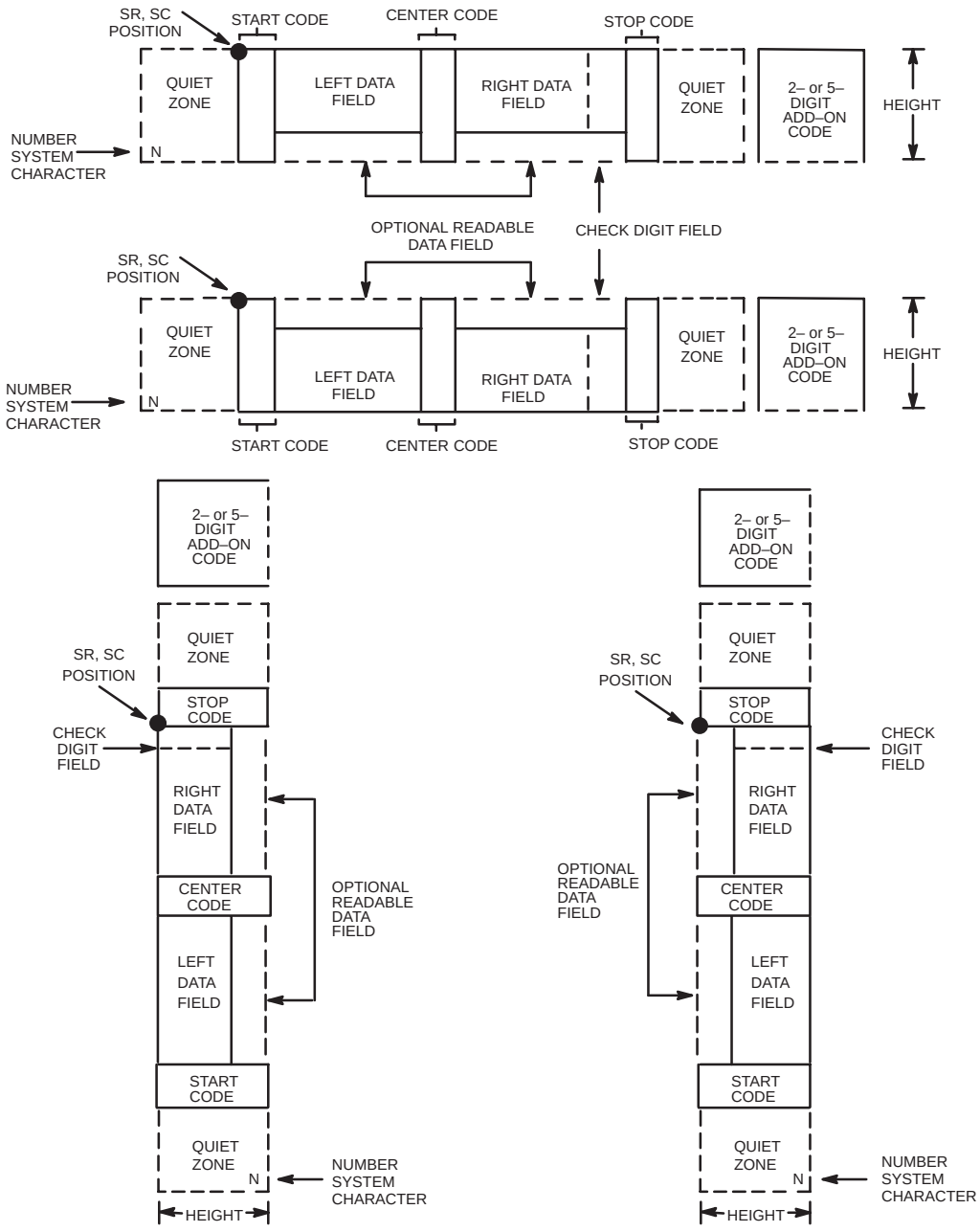


Figure 5–12. EAN 13 Structure

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 IGP/PGL automatically produces an 11-module-wide left quiet zone; you are responsible for providing sufficient space (minimum of seven modules) on the form for the right quiet zone. The number system character is also printed automatically in the left quiet zone.

Start/Center/Stop Codes

The start/center/stop codes are special character codes marking those portions of the bar code. These codes are automatically provided.

Number System Character

The number system character field allows you to provide a code to a class or type of item. 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 one to four modules. Each character consists of two bars and two spaces that total seven modules. The symbol coding of the left data field is different from the right data field to permit read direction sensing.

The optional 2– or 5–digit add–on data field is placed within the delimiter at the end of the bar code data and typically identifies a periodical issue number or price, respectively.

Readable Data

The human readable data field provides a readable interpretation of the bar code data. It can either be suppressed or printed below the bar code symbol.

Check Digit

The modulo–10 check digit is automatically calculated and inserted in the bar code symbol. The check digit verifies accurate scanning. The number system character is included in the check digit algorithm.

EAN 13 Command Format

BARCODE

EAN13 *[+n]*; [VSCAN;] *[SCB;] [MAG;] [Hn[.m];] [*BF*n;]* [DARK;] *SR; S*C

[(D)data field(D)]

*[*PDF *[;LOC] [;FONT]]*

STOP

BARCODE	The Bar Code command; enter **BARCODE**.
EAN13	Designates bar code type EAN 13; enter **EAN13**.
+n	Optional parameter to provide a 2– or 5–digit add–on code at the end of the bar code data field. Enter a plus sign (**+**) and a value of **2** or **5**. The first bar of the add–on code is separated by nine modules from the last bar of the EAN symbol and a left guard pattern. No center or right guard pattern exists.
VSCAN	Optional parameter to orient the bar code structure vertically. To select a vertical bar code, enter **VSCAN**. If VSCAN is not entered, the bar code is oriented horizontally.
SCB	This option shortens the length of the center guard bars, which are normally full length.
MAG	Optional parameter to magnify (horizontally expand) the bar code symbol. The magnification default value is **X1**. Increasing the magnification adjusts printed character density. You can also use XR or XRD as defined on page 5–4. (You must specify 8 digits for MAG for variable ratio.)

Hn[.m]

Optional parameter to adjust the overall height (vertical expansion) of the bar code symbol (including the upper and lower 0.1–inch guard bands and any human readable data). Height adjustments are made in 0.1–inch increments; enter **H** and a value from 4 to 99 to select height adjustments from 0.4 to 9.9 inches. The default value is 1.3 inches.

.m is an additional number of dots for the bar code height. (Dots are in the current dot scale.)

BF*n*

Optional parameter for assigning a dynamic bar code data field location on a form. With this parameter, the actual data for the bar code data field is dynamically provided during the Execute Form Mode; the data is not specified during the Create Form Mode. To use this field, perform the following steps:

a. Enter **BF**.

b. Replace **n** with a number ranging from 1 to 255 to identify the bar code field. The SR and SC parameters specify the exact location of the bar code field identified by **n**.

c. The length of the data field need not be specified, since it is fixed at 12 digits, plus any add–on data.

d. The information for the data field is entered dynamically during the Execute Form Mode. (Refer to “Execute Form: Dynamic Bar Code Data” on page 4–55 in the “Commands” chapter.) Do not use the *data field* parameter to enter data when the BFn parameters are used. However, refer to the *data field* description for available characters.

DARK

Optional parameter to produce darker looking bar codes. Enter **DARK**. Refer to “Dark Printing” on page 4–10 for more information.

SR

Defines the starting row for the bar code. Enter a value ranging from row 1 to one less than the length of the form. Character row or dot row is specified based on the Scale command (page 4–88), or use the CP.DP format (page 4–7).

SC

Defines the starting column of the bar code. Enter a value ranging from column 1 to one less than the width of the form. Character column or dot column is specified based on the Scale command (page 4–88), or use the CP.DP format (page 4–7).

D

The printable character (delimiter) identifying the start and finish of the data field. Enter any printable character other than a slash (/), the SFCC, or a character used within the data. The same character must be used at both ends of the data field, but it is not printed with the data.

data field

Enter the characters of the bar code data, restricted to exactly 12 digits. If the 2– or 5–digit add–on data option 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). The first character is interpreted as the number system character.

The left side of the data field (or lower side on vertically oriented symbols) can be encoded in either format A or format B as determined by the value of the number system character. (A bar code character is *not* produced for the number system character.)

The number system character is derived from the left side data field encoding. The right side of the data field (or upper side on vertically oriented symbols) and check digit are always encoded in format C.
Table 5–15 defines the left side data field format based on the number system character.

PDF — Optional parameter which affects printing of the human readable data field. The data field will print automatically in the OCR–B font (default) unless the PDF–suppress command is specified in the **FONT** parameter. The human-readable data field can be printed above or below the bar code symbol. This parameter is not allowed if a null data field is specified.

LOC — Optional parameter to identify the location of the printable data field. The default value is **B**, locating the human readable data below the bar code. **A** locates the printable data field above bar code. To compensate for printing the 0.1–inch high data, the height of the bar code body is reduced 0.1 inch.

FONT — Optional parameter to select the font for the human readable data field. The default value, **N**, selects the normal ASCII 10 cpi font. Enter **O** to select the OCR–A 10 cpi font; enter **X** to select the OCR–B type font; enter **S** to suppress printing the data field and the trailing lower portions of the EAN bar code.

STOP — Ends the Bar Code command while the IGP/PGL continues in the Create Form Mode. Enter **STOP**. If STOP is not entered, an error message results.

Table 5–15. Left Side Data Field Format

Number System Character Value	Format for Left Side Data Field Positions					
	12	**11**	**10**	**9**	**8**	**7**
0	A	A	A	A	A	A
1	A	A	B	A	B	B
2	A	A	B	B	A	B
3	A	A	B	B	B	A
4	A	B	A	A	B	B
5	A	B	B	A	A	B
6	A	B	B	B	A	A
7	A	B	A	B	A	B
8	A	B	A	B	B	A
9	A	B	B	A	B	A

EAN 13 Example

Figure 5–13 illustrates a horizontal and vertical EAN 13 bar code generated by the following program:

~CREATE;EAN13	(Enter Create Form Mode)
BARCODE	(Bar Code Command)
EAN13+5;DARK;28;15	(Dark Code EAN 13, 5–digit add on, at SR 28, SC 15)
12345678987655555	(Data Field plus 5–digit add–on Data Field)
PDF	(Printable Data Field)
STOP	(Ends Bar Code command)
BARCODE	(New Bar Code command)
EAN13+5;VSCAN;H12;DARK;27;39	(Vertical Dark EAN 13, 2–digit add on, H 1.2, at SR 27, SC 39)
12345678987655555	(Data Field plus 5–digit add on Data Field)
PDF	(Printable Data Field)
STOP	(Ends Bar Code command)
END	(Terminates Create Form Mode)
~EXECUTE;EAN13;1	(Execute the form, form count of 1)

Figure 5–13. Sample EAN 13 Bar Codes

FIM

The FIM (Facing Identification Mark) bar code structure is shown in Figure 5–14 and Figure 5–15 and described on the following pages. The left boundary must begin 3 inches from the right edge of the mail piece. The right–most bar must be 2 inches ± 1/8–inch from the right edge of the mail piece. Bars must be 5/8–inch ± 1/8–inch tall; the top of the bars must be no lower than 1/8–inch from the top edge of the mail piece (and may touch the top edge of the mail piece). The bar code baseline must be within 1/8–inch from the bottom edge of the clear zone.

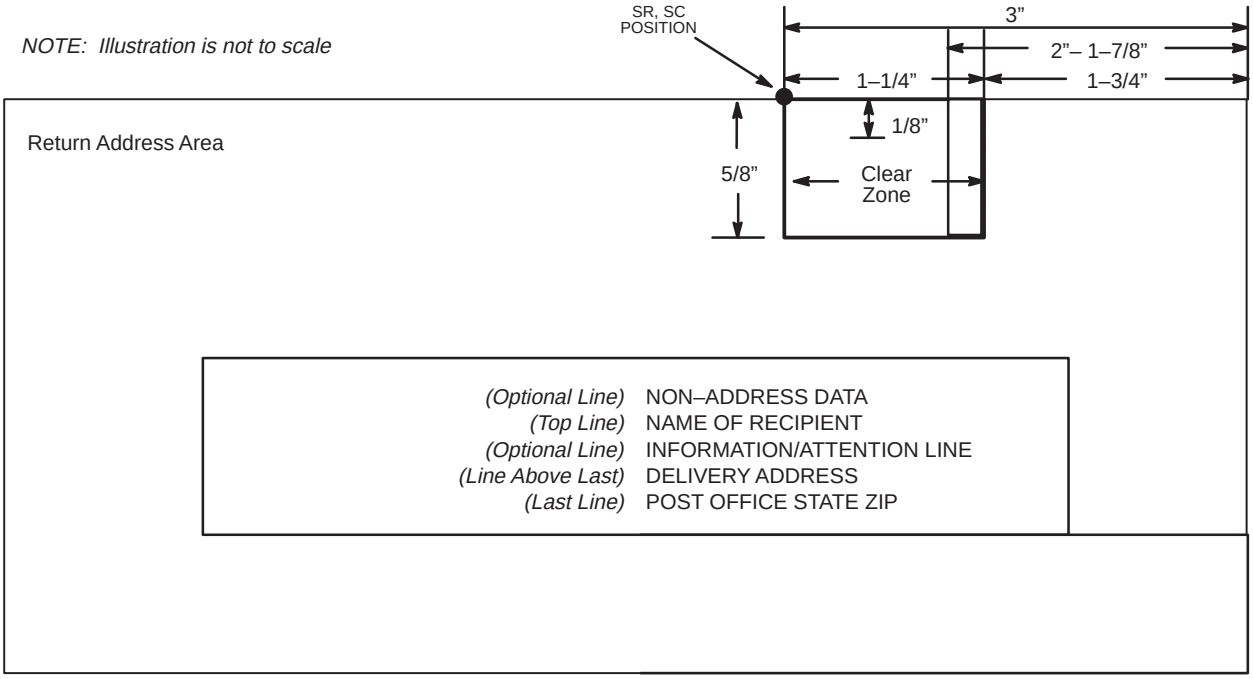


Figure 5–14. FIM Structure

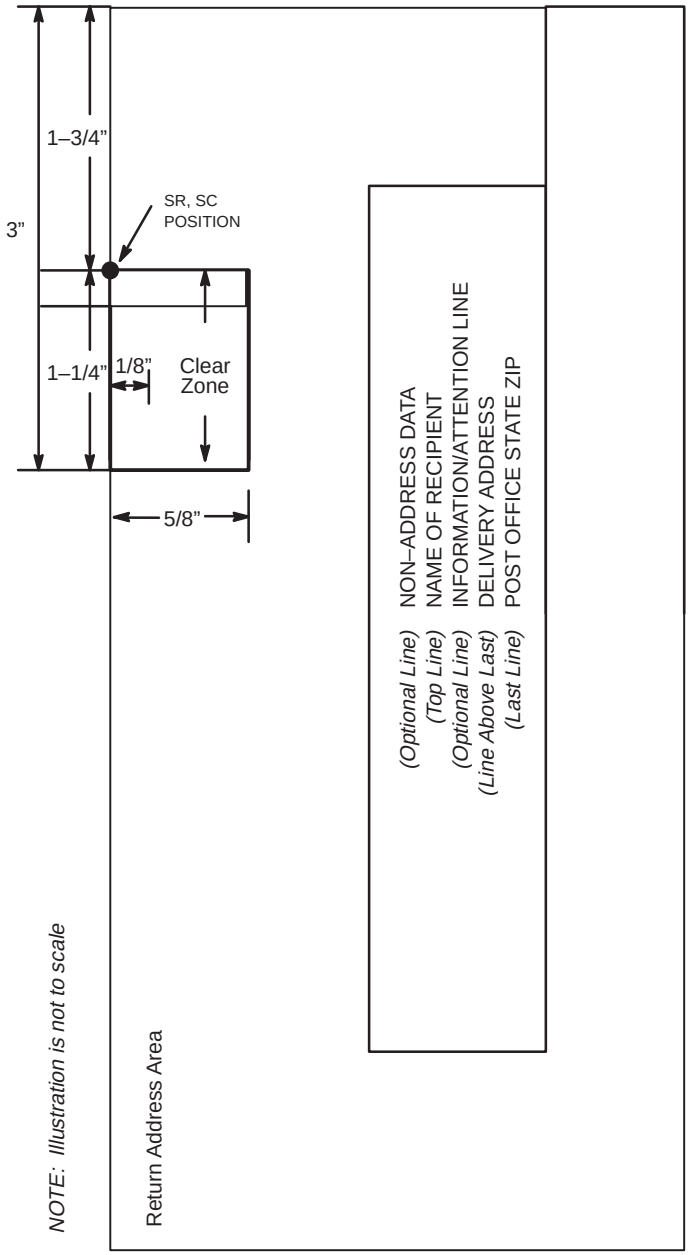


Figure 5–15. FIM Structure (VSCAN)

NOTE: Additional information regarding FIM bar code requirements can be obtained from the U.S. Postal Service’s Publication 25: *A Guide to Business Mail Preparation.*

Clear Zone

The bar code structure requires a completely blank, 1/4–inch wide, 5/8–inch tall clear zone, reserved for only the appropriate FIM pattern. Be sure to provide sufficient space for this zone.

Start/Stop Code

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 nine–position bar/no–bar pattern of tall (full) bars of uniform height. Minimum *height* must be 5/8– inch ± 1/8–inch. (Bar height may be longer to wrap around the top of the envelope.) Minimum bar *width* is .031–inch ± .008–inch. Spacing (pitch) between each bar/no–bar must be 1/16–inch. Bar tilt (slant) can vary ± 5 degrees (relative to a line perpendicular to the top edge of the envelope).

FIM Command Format

BARCODE
FIM; *[VSCAN;] [Hn[.m];] [BFn;] [DARK;] SR; SC [(D)data field(D)]*
STOP

BARCODE	The Bar Code command; enter **BARCODE**.
FIM	Designates bar code type FIM; enter **FIM**.
VSCAN	Optional parameter to orient the bar code structure vertically. To select a vertical bar code, enter **VSCAN**. If VSCAN is not entered, the bar code is oriented horizontally.
Hn[.m]	Optional parameter to adjust the overall height (vertical expansion) of the bar code symbol (including the upper and lower 0.1–inch guard bands and any human readable data). Height adjustments are made in 0.1–inch increments; enter **H** and a value from 6 to 99 to select height adjustments from 0.6 to 9.9 inches. The default value is 0.6 inches. .m is an additional number of dots for the bar code height. (Dots are in the current dot scale.)
BF*n*	Optional parameter for assigning a dynamic bar code data field location on a form. With this parameter, the actual data for the bar code data field is dynamically provided during the Execute Form Mode; the data is not specified during the Create Form Mode. To use this field, perform the following steps: a. Enter **BF**. b. Replace **n** with a number ranging from 1 to 255 to identify the bar code field. The SR and SC parameters specify the exact location of the bar code field identified by **n**.

c. The information for the data field is entered dynamically during the Execute Form Mode. (Refer to “Execute Form: Dynamic Bar Code Data” on page 4–55 in the “Commands” chapter.) Do not use the *data field* parameter to enter data when the BFn parameters are used. Refer to the *data field* description for available characters.

DARK — Optional parameter to produce darker looking bar codes. Enter **DARK**. Refer to “Dark Printing” on page 4–10 for more information.

SR — Defines the starting row for the bar code. Enter a value 1/8–inch from the top edge of the mail piece. Character row or dot row is specified based on the Scale command (page 4–88), or use the CP.DP format (page 4–7).

data field — A single–character data field to designate one of four available FIM patterns: **A**, **B**, **C**, or **D**. Based on your application (check with your Postal Service for more information), replace **n** with one of the following FIM types:

- **A** Used only on courtesy reply envelopes bearing a preprinted POSTNET bar code (page 5–98); it requires a luminescent stamp or meter mark to be accepted in the facer/canceler.
- **B** Used on Business Reply Mail, Penalty Mail, and Franked Mail without a preprinted POSTNET bar code, and does not require luminescent indicia.
- **C** Used on Business Reply Mail, Penalty Mail, or Franked Mail bearing a preprinted POSTNET bar code (page 5–98).
- **D** Used on OCR readable mail (usually courtesy reply window envelopes) without a preprinted POSTNET bar code.

STOP — Ends the Bar Code command while the IGP/PGL continues in the Create Form Mode. Enter **STOP**. If STOP is not entered, an error message results.

FIM Example

Figure 5–16 below illustrates a horizontal FIMB bar code from the following program without the POSTNET preprinted bar code (POSTNET is discussed on page 5–98.)

```
~CREATE;FIMB                    (Enter Create Form Mode)
ALPHA                           (Alpha command)
23;11;0;0;*PRINTRONIX, INC.*
25;11;0;0;*ATTN: CUSTOMER SERVICE*
27;11;0;0;*P.O. BOX 19559*
29;11;0;0;*IRVINE, CA 92714–9559*
STOP                            (Ends Alpha command)
BARCODE                         (Bar Code command)
FIM;DARK;15;22                  (Dark FIM Bar Code at SR 15, SC 22)
*B*                             (Data field selecting FIMB Bar Code)
STOP                            (Ends FIMB Bar Code command)
END                             (Terminates Create Form Mode)
~EXECUTE;FIMB;1                 (Executes the form, form count of 1)
```

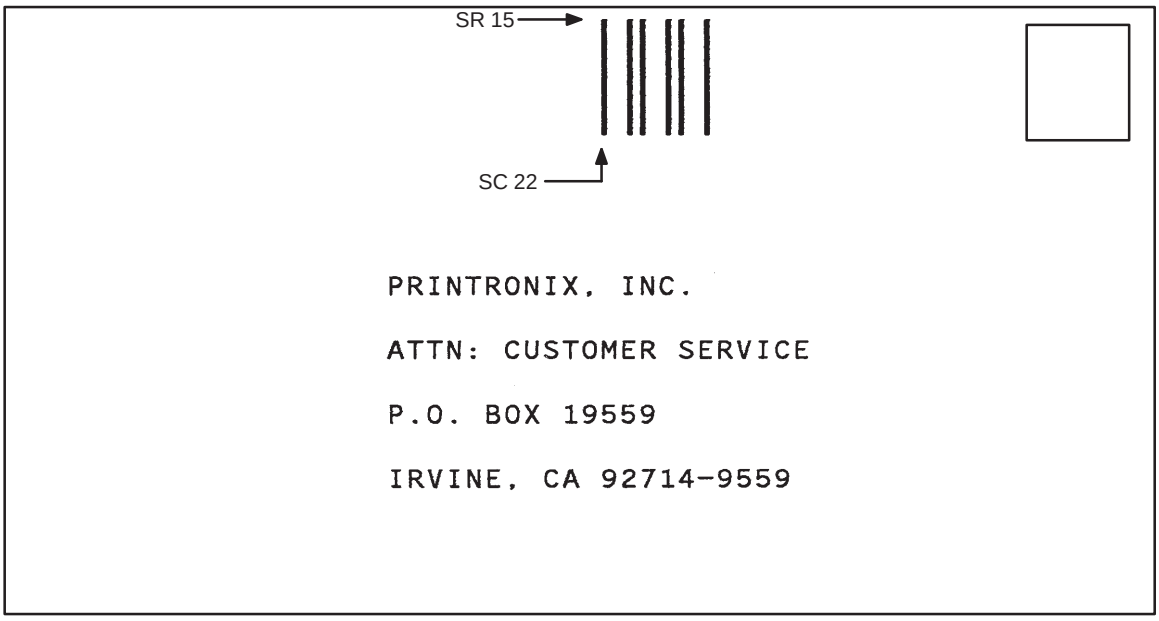


Figure 5–16. Sample FIMB Bar Code

Figure 5–17 illustrates a horizontal FIMC bar code generated by the following program and bears the preprinted POSTNET bar code.

```
~CREATE;FIMC              (Enter Create Form Mode)
ALPHA                     (Alpha command)
23;11;0;0;*PRINTRONIX, INC.*
25;11;0;0;*ATTN: CUSTOMER SERVICE*
27;11;0;0;*P.O. BOX 19559*
29;11;0;0;*IRVINE, CA 92714–9559*
STOP                      (Ends Alpha command)
BARCODE                   (Bar Code command)
FIM;DARK;17;25            (Dark FIM Bar Code at SR 17, SC 25)
*C*                       (Data field selecting FIMC Bar Code)
STOP                      (Ends Bar Code command)
BARCODE                   (New Bar Code command)
POSTNET;DARK;33.3;15      (Dark POSTNET Bar Code at SR 33.3, SC 15)
*927149559*               (POSTNET data field)
STOP                      (Ends POSTNET Bar Code command)
END                       (Terminates Create Form Mode)
~EXECUTE;FIMC;1           (Executes the form, form count of 1)
```

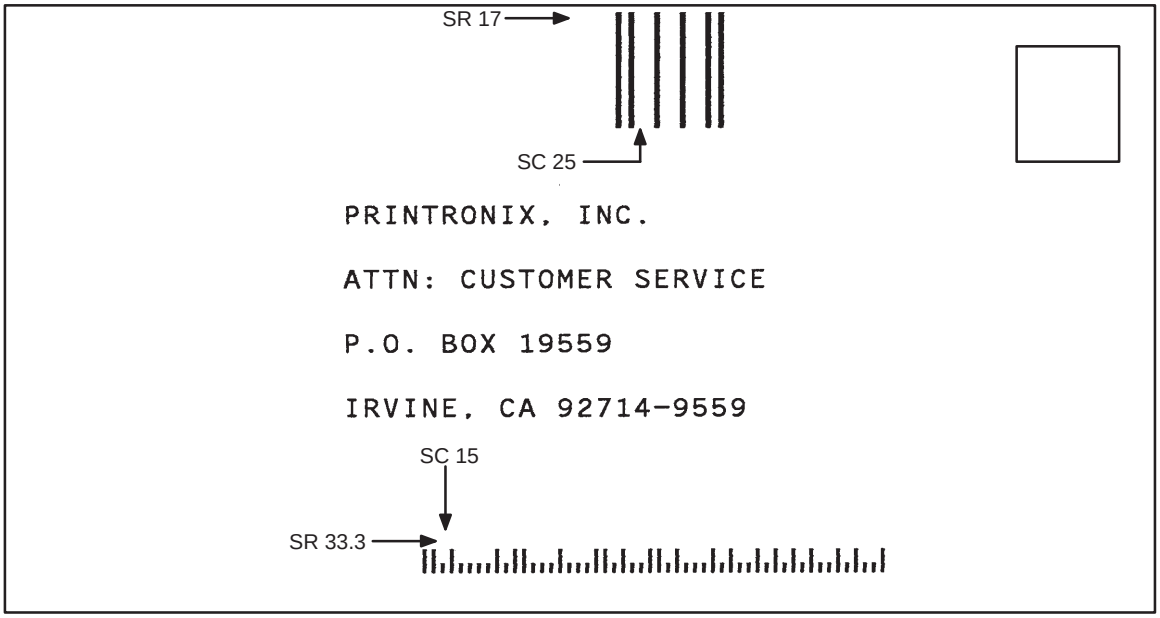


Figure 5–17. Sample FIMC Bar Code

Interleaved 2/5 (I–2/5), German I–2/5

The I–2/5 bar code structure is shown in Figure 5–18 and described on the following pages.

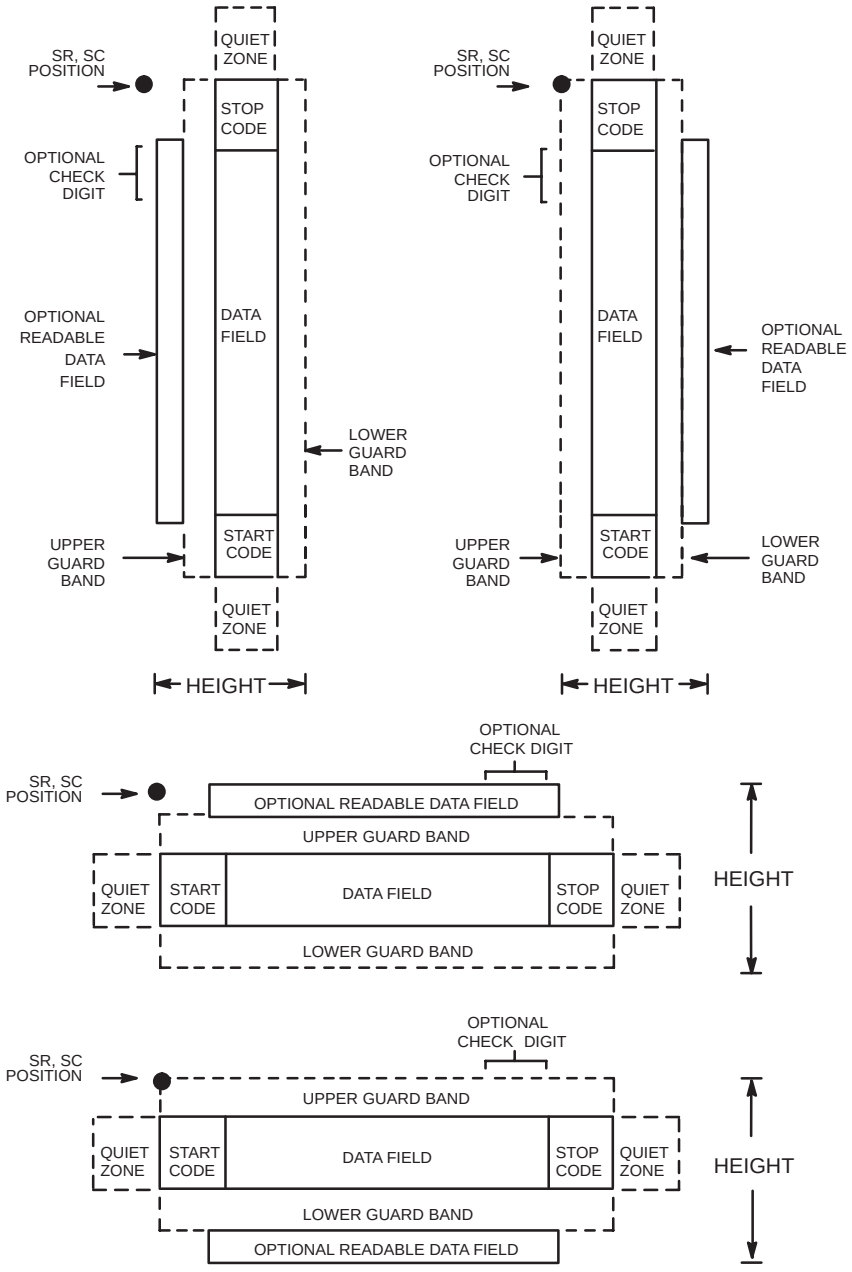


Figure 5–18. I–2/5 Structure

Quiet Zone

Both ends of the bar code structure have 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

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 the first character in the pair and spaces are used to represent the second character in the pair.

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-10 check digit can be inserted into the bar code to verify accurate scanning. For the German variation of I-2/5, the checksum digit is always automatically calculated and inserted.

I–2/5 Command Format

BARCODE
I–2/5 [CD]; [VSCAN;] *[MAG;] [Hn[.m];] [*BF*n;L;]* [DARK;] *SR; SC [(D)data field(D)]*
*[*PDF *[;LOC] [;FONT]]*
STOP

I–2/5 German Command Format

BARCODE
I25GERMAN; [VSCAN;] *[MAG;] [Hn[.m];] [*BF*n;L;]* [DARK;] *SR; SC [(D) data field (D)]*
*[*PDF *[;LOC] [;FONT]]*
STOP

BARCODE	The Bar Code command; enter **BARCODE**.
I–2/5 CD	Designates bar code type Interleaved 2/5; enter **I–2/5**. To calculate and plot the optional modulo–10 check digit with the bar code symbol automatically, enter **CD.** For the German variation of the bar code, enter **I25GERMAN**, instead of **I-2/5** (the checksum digit is always automatically calculated for German I-2/5).
VSCAN	Optional parameter to orient the bar code structure vertically. To select a vertical bar code, enter **VSCAN**. If VSCAN is not entered, the bar code is oriented horizontally.
MAG	Optional parameter to magnify (horizontally expand) the bar code symbol. The magnification default value is **X1**. For the German variation of the bar code, the default magnification is **X1A**. As required for scanning, enter a magnification value to increase the magnification. Increasing the magnification adjusts printed character density. You can also use XR or XRD as defined on page 5–4.

Hn[.m]

Optional parameter to adjust the overall height (vertical expansion) of the bar code symbol (including the upper and lower 0.1–inch guard bands and any human readable data).

Height adjustments are made in 0.1–inch increments; enter **H** and a value from 4 to 99 to select height adjustments from 0.4 to 9.9 inches. The default value is 0.9–inch.

.m is an additional number of dots for the bar code height. (Dots are in the current dot scale.)

BF*n;L*

Optional parameters for assigning a dynamic bar code data field location on a form and for designating the length of the data field. With these parameters, the actual data for the bar code data field is dynamically provided during the Execute Form Mode; the data is not specified during the Create Form Mode. To use this field, perform the following steps:

a. Enter **BF**.

b. Replace **n** with a number ranging from 1 to 255 to identify the bar code field. The SR and SC parameters specify the exact location of the bar code field identified by **n**.

c. Replace **L** with a number equaling the total number of characters in the field. (The actual data provided dynamically during the Execute Form Mode can be less than **L**.)

d. The information for the data field is entered dynamically during the Execute Form Mode. (Refer to “Execute Form: Dynamic Bar Code Data” on page 4–55 in the “Commands” chapter.) Do not use the *data field* parameter to enter data when the BFn;L parameters are used. However, refer to the *data field* description for available characters.

DARK

Optional parameter to produce darker looking bar codes. Enter **DARK**. Refer to “Dark Printing” on page 4–10 for more information.

SR	Defines the starting row for the bar code. Enter a value ranging from row 1 to one less than the length of the form. Character row or dot row is specified based on the Scale command (page 4–88), or use the CP.DP format (page 4–7).
	Defines the starting column of the bar code. Enter a value ranging from column 1 to one less than the width of the form. Character column or dot column is specified based on the Scale command (page 4–88), or use the CP.DP format (page 4–7).
D	The printable character (delimiter) identifying the start and finish of the data field. Enter any printable character other than a slash (/), the SFCC, or a character used within the data.
	The same character must be used at both ends of the data field, but it will not print with the data.
data field	Enter the characters for the bar code data. A null data field (no characters) is permitted. The length of the data field is variable; however, the maximum length is usually limited to 32 characters to minimize potential reading errors.
	For *German* I-2/5, however, data length should be either 11 or 13.
	For regular I-2/5, an even number of characters is required for the interleaving process. Consequently, if an odd number of characters are entered in the data field, a leading zero is added automatically.
	The characters available for the data field are 0 through 9 (30 through 39 hex, respectively).
PDF	Optional parameter to enable printing of the human readable data field. Enter **PDF** to print the data field. If the parameter is not used, the human readable data is not printed.
	This parameter is not allowed if a null data field was specified.

LOC	Optional parameter to identify the location of the printable data field. The default value is **B**, locating the human readable data below the bar code. **A** locates the printable data field above bar code. To compensate for printing the 0.1–inch high data, the height of the bar code body is reduced 0.1–inch.
FONT	Optional parameter to select the font for the human readable data field. The default value, **N**, selects the normal ASCII 10 cpi font. Enter **O** to select the OCR–A 10 cpi font; enter **X** to select the OCR–B type font.
STOP	Ends the Bar Code command while the IGP/PGL continues in the Create Form Mode. Enter **STOP**. If STOP is not entered, an error message results.

I–2/5 Example

Figure 5–19 illustrates a horizontal and vertical I–2/5 bar code generated by the following program:

```
~CREATE;I25                 (Enter Create Form Mode)
BARCODE                     (Bar Code command)
I–2/5;DARK;49;27            (Dark Code I–2/5, at SR 49, SC 27)
*24688642*                  (Data Field)
PDF;A                       (Upper Printable Data Field)
STOP                        (Ends Bar Code command)
BARCODE                     (New Bar Code command)
I–2/5;VSCAN;H12;DARK;44;52
                            (Vertical Dark I–2/5, H 1.2 at SR 44, SC 52)
*24688642*                  (Data Field)
PDF                         (Printable Data Field)
STOP                        (Ends Bar Code command)
END                         (Terminates Create Form Mode)
~EXECUTE;I25;1              (Execute the form, form count of 1)
```

Figure 5–19. Sample I–2/5 Bar Codes

The MSI bar code structure is shown in Figure 5–20 and described on the following pages.

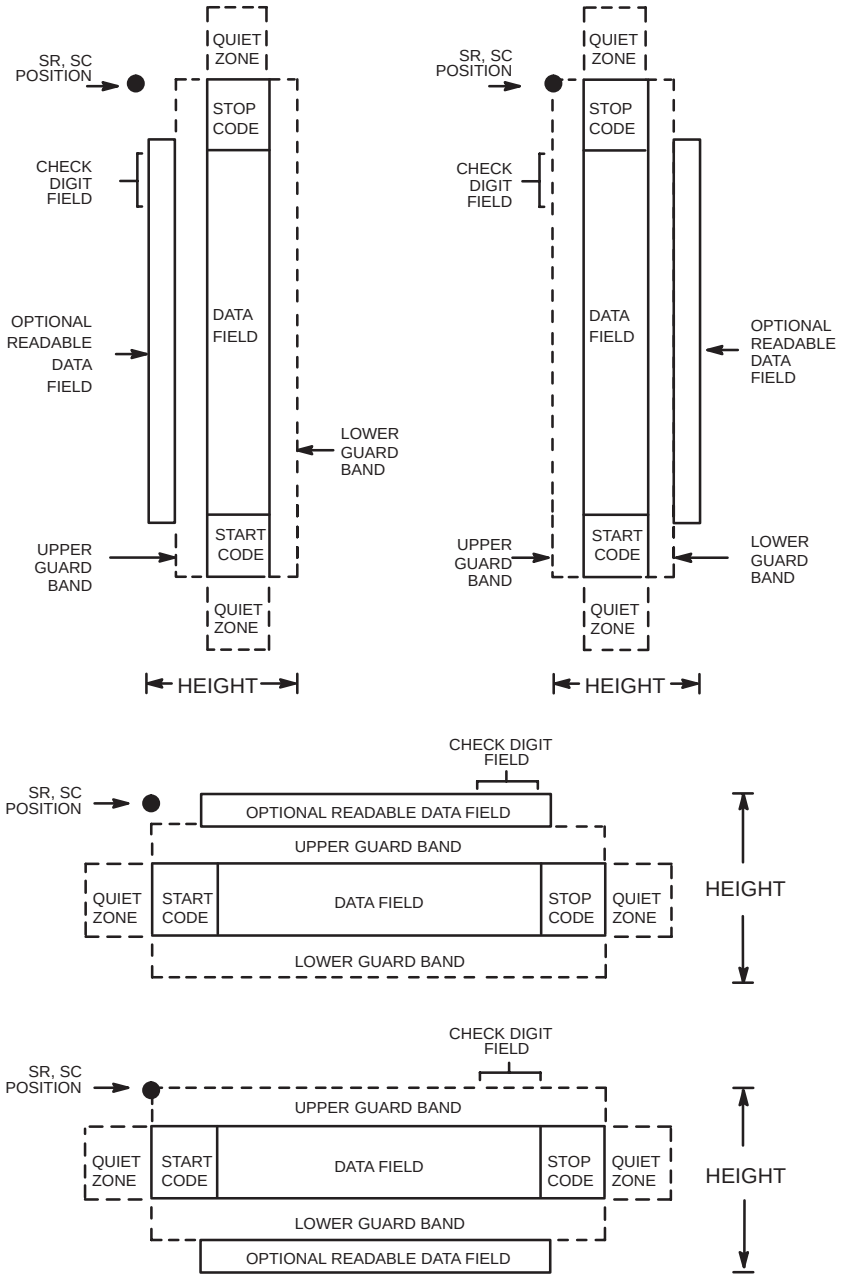


Figure 5–20. MSI Structure

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 Code

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 each numeric character. The structure is four wide elements (bars or spaces) and four narrow elements. Each character contains four data bits, with each 0–bit made up of a narrow bar/wide space arrangement and each 1–bit made up of a wide bar/narrow space arrangement.

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

If specified, the modulo–10 or modulo–11 (or both) check digit is automatically calculated and inserted in the bar code symbol. The check digit verifies accurate scanning. A number system character is included in the check digit algorithm.

MSI Command Format

BARCODE
MSI *n;* [VSCAN;] *[MAG;] [Hn[.m];] [*BF*n;L;]* [DARK;] *SR; SC [(D)data field(D)]*
*[*PDF *[;LOC] [;FONT]]*
STOP

BARCODE	The Bar Code command; enter **BARCODE**.
MSI	Designates bar code type MSI; enter **MSI**.
n	Designates the type of check digit combinations for the bar code. Replace **n** with one of the following codes to specify the check digit. **A** single–digit modulo–10 followed by a second modulo–10 digit **B** single–digit modulo–11 followed by a single modulo–10 digit **C** single–digit modulo–10 **D** single–digit modulo–11
VSCAN	Optional parameter to orient the bar code structure vertically. To select a vertical bar code, enter **VSCAN**. If VSCAN is not entered, the bar code is oriented horizontally.
MAG	Optional parameter to magnify (horizontally expand) the bar code symbol. The magnification default value is **X1**. As required for scanning, enter a magnification value to increase the magnification. Increasing the magnification adjusts printed character density. You can also use XR or XRD as defined on page 5–4.
Hn[.m]	Optional parameter to adjust the overall height (vertical expansion) of the bar code symbol (including the upper and lower 0.1–inch guard bands and any human readable data). Height adjustments are made in 0.1–inch increments; enter **H** and a value from 4 to 99 to select height adjustments from 0.4 to 9.9 inches.

The default value is 0.9–inch. .m is an additional number of dots for the bar code height. (Dots are in the current dot scale.)

BF*n;L* — Optional parameters for assigning a dynamic bar code data field location on a form and for designating the length of the data field. With these parameters, the actual data for the bar code data field is dynamically provided during the Execute Form Mode; the data is not specified during the Create Form Mode. To use this field:

a. Enter **BF**.

b. Replace **n** with a number ranging from 1 to 255 to identify the bar code field. The SR and SC parameters specify the exact location of the bar code field identified by **n**.

c. Replace **L** with a number equaling the total number of characters in the field. (The actual data provided dynamically during the Execute Form Mode can be less than **L**.)

d. The information for the data field is entered dynamically during the Execute Form Mode. (Refer to “Execute Form: Dynamic Bar Code Data” on page 4–55 in the “Commands” chapter.) Do not use the *data field* parameter to enter data when the BFn;L parameters are used. However, refer to the *data field* description for available characters.

DARK — Optional parameter to produce darker looking bar codes. Enter **DARK**. Refer to “Dark Printing” on page 4–10 for more information.

SR — Defines the starting row for the bar code. Enter a value ranging from row 1 to one less than the length of the form. Character row or dot row is specified based on the Scale command (page 4–88), or use the CP.DP format (page 4–7).

SC	Defines the starting column of the bar code. Enter a value ranging from column 1 to one less than the width of the form. Character column or dot column is specified based on the Scale command (page 4–88), or use the CP.DP format (page 4–7).
D	The printable character (delimiter) identifying the start and finish of the data field. Enter any printable character other than a slash (/), the SFCC, or a character used within the data. The same character must be used at both ends of the data field, but it will not print with the data.
data field	Enter the characters for the bar code data. A null data field (no characters) is permitted. The length of the data field is variable; however, a maximum of 14 data characters are allowed if a one–character check digit field is specified; a maximum of 13 data characters are allowed if a two–character check digit field is specified. The characters available for the data field are 0 through 9 (30 through 39 hex, respectively).
PDF	Optional parameter to enable printing of the human readable data field. Enter **PDF** to print the data field. If the parameter is not used, the human readable data will not print.
LOC	Optional parameter to identify the location of the printable data field. The default value is **B**, locating the human readable data below the bar code. **A** locates the printable data field above the bar code. To compensate for printing the 0.1–inch high data, the height of the bar code body is reduced 0.1–inch.

FONT	Optional parameter to select the font for the human readable data field. The default value, **N**, selects the normal ASCII 10 cpi font. Enter **O** to select the OCR–A 10 cpi font; enter **X** to select the OCR–B type font.
STOP	Ends the Bar Code command while the IGP/PGL continues in the Create Form Mode. Enter **STOP**. If STOP is not entered, an error message results.

MSI Example

Figure 5–21 illustrates a horizontal and vertical MSI bar code generated by the following program:

```
~CREATE;MSI                 (Enter Create Form Mode)
BARCODE                     (Bar Code command)
MSIA;DARK;32;27             (Dark Bar Code MSIA at SR 32, SC 27)
*24688642*                  (Data Field)
PDF;X                       (Printable Data Field, OCR–B)
STOP                        (Ends Bar Code command)
BARCODE                     (New Bar Code command)
MSIB;VSCAN;X2;H12;DARK;32;54
                            (Vertical Dark MSIB, Mag 2, H 1.2 at SR 32, SC
54)
*24688642*                  (Data Field)
PDF;A                       (Upper Data Field)
STOP                        (Ends Bar Code command)
END                         (Terminates Create Form Mode)
~EXECUTE;MSI;1              (Execute the form, form count of 1)
```

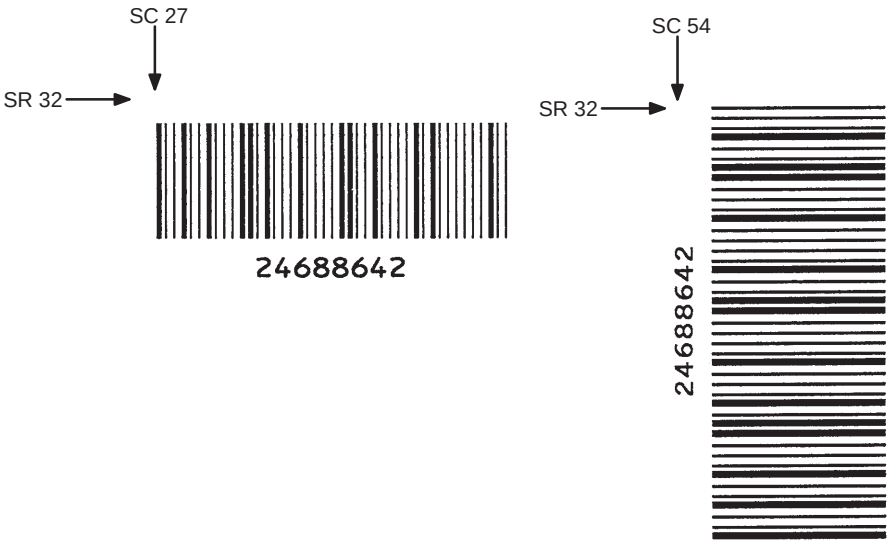


Figure 5–21. Sample MSI Bar Codes

The PDF417 structure is shown in Figure 5–22 and described on the following pages.

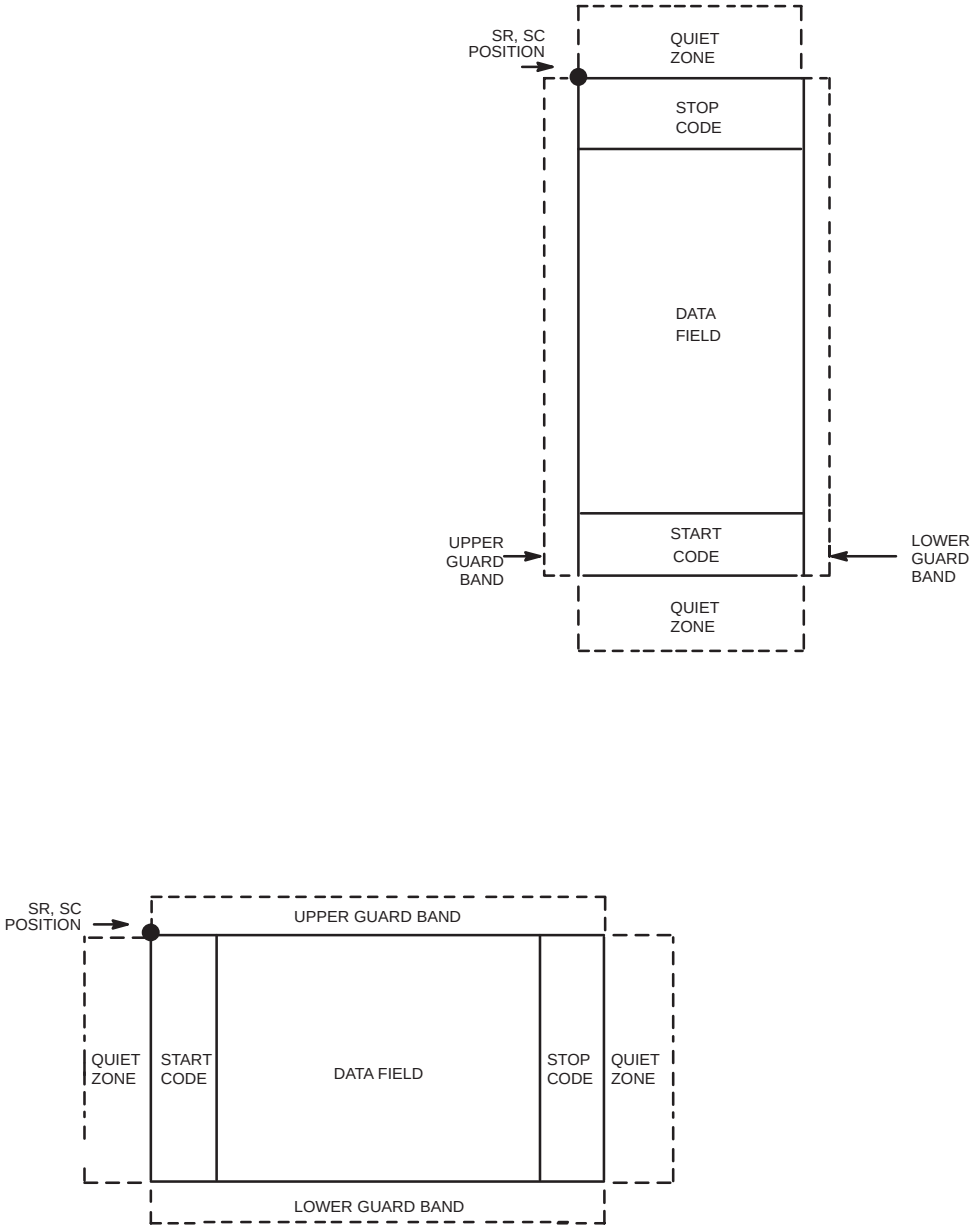


Figure 5–22. PDF417 Structure

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.

Data Field

PDF417 provides twelve modes to encode data. The first three are pre–established (the remaining nine are user modes, which can be defined by users or industry associations according to specific applications):

1. Extended Alphanumeric Compaction mode (EXC). Comprised of four sub–modes, this mode offers encodation of all printable ASCII characters. This is the default mode; the PGL uses shift or latch characters to enable other modes.

2. Binary/ASCII Plus mode. This offers encodation for all ASCII characters, printable or not, and binary values.

3. Numeric Compaction mode. This offers encodation for numeric values to a density of almost 3 digits per code word.

The PGL will automatically switch between modes to provide the smallest encodation for the data.

Security Level

PDF417 can detect and correct errors. Each label has 2 code words of error detection. You can select the error correction capacity based on application needs. Specify a security level in the range of 0 – 8, at the time of printing. PDF417 can also recover from omissions and misdecodes of code words.

Since it requires two code words to recover from a misdecode, one to detect the error and one to correct for it, a given security level can support half the number of misdecodes that it can of undecoded words.

PDF Print Data Field is not offered due to the large amount of data that can be encoded.

PDF417 Command Format

BARCODE

PDF417; *[X[D]n;] [Y[D]n;] [(Hn)| (Wn);] [ASPECTh:w;] [(Rn)| (Cn);] [Sn;]*[BF*n;L;] [DARK;]* SR; SC(T)

[(D)data field(D)(T)]

STOP (T)

BARCODE	The Bar Code command; enter **BARCODE**.
PDF417	Designates bar code type PDF417; enter **PDF417**.
X[D]n	Optional parameter to designate the width of the narrow element in either the default 60 x 72 dots per inch or, if the D is given, in *target dots*. (The target dot is 300 dpi for the T3308, T3306 and T3304 printer models and 203 dpi for the T3204 printer model.) The default size is 1/60th of an inch.
Y[D]n	Optional parameter to designate the height of the bar code in either the default 60 X 72 dots per inch or, if the D is given, in *target dots*. (The target dot is 300 dpi for the T3308, T3306 and T3304 printer models and 203 dpi for the T3204 printer model.) The default size is 2/72nd of an inch.
Hn	Optional parameter to adjust the overall height of the bar code symbol (including human readable data). Height adjustments are made in 0.1–inch increments; enter **H** and a value from 4 to 99 to select height adjustments from 0.4 to 9.9 inches. Parameters Wn, Rn, Cn or ASPECT can not be entered if this parameter is used.
Wn	Optional parameter for the maximum width of the symbol based on the narrow element width. Enter **Wn**; where n is the overall width in tenths of an inch. Parameters Hn, Rn, Cn or ASPECT can not be entered if this parameter is used.

ASPECT;h:w — Optional parameter for specifying the symbol height–to–width ratio where h is the height and w is the width, both expressed as integers. The default is 1:2. Parameters Hn, Wn, Rn, or Cn cannot be entered if this parameter is used.

Rn — Optional parameter that specifies the number of rows the symbol will have. Enter **R**; followed by the number of rows in the range of 3 to 90 in multiples of 3. Parameters Hn, Wn, Cn or ASPECT can not be entered if this parameter is used.

Cn — Optional parameter that specifies the number of columns the symbol will have. Enter **C**; followed by the number of columns in the range of 1 to 90. Parameters Hn, Wn, Rn or ASPECT can not be entered if this parameter is used.

Sn — Optional parameter that specifies the security level. Enter **S**; followed by the security level in the range of 0–8. The default is 2.

BFn;L — Optional parameters for assigning a dynamic bar code data field location on a form and for designating the length of the data field. With these parameters, the actual data for the bar code data field is dynamically provided during the Execute Form Mode; the data is not specified during the Create Form Mode. To use this field, perform the following steps:

a. Enter **BF**.

b. Replace **n** with a number ranging from 1 to 255 to identify the bar code field. The SR and SC parameters specify the exact location of the bar code field identified by **n**.

c. Replace **L** with a number equaling the total number of characters in the field. (The actual data provided dynamically during the Execute Form Mode can be less than **L**.)

d. The information for the data field is entered dynamically during the Execute Form Mode. (Refer to “Execute Form: Dynamic Bar Code Data” on page 4–55 in the “Commands” chapter.) Do not use the *data field* parameter to enter data when the BFn;L parameters are used. However, refer to the *data field* description for available characters.

DARK — Optional parameter to produce darker looking bar codes. Enter **DARK**. Refer to “Dark Printing” on page 4–10 for more information.

SR — Defines the starting row for the bar code. Enter a value ranging from row 1 to one less than the length of the form. Character row or dot row is specified based on the Scale command (page 4–88), or use the CP.DP format (page 4–7).

SC — Defines the starting column of the bar code. Enter a value ranging from column 1 to one less than the width of the form. Character column or dot column is specified based on the Scale command (page 4–88), or use the CP.DP format (page 4–7).

D — The printable character (delimiter) identifying the start and finish of the data field. Enter any printable character other than a slash (/), the SFCC, or a character used within the data. The same character must be used at both ends of the data field, but it will not print with the data.

data field — Enter the data for the bar code. A null data field (no characters) is not permitted. The data field can contain any character including carriage returns and line feeds. The length of the data field is variable; however, the maximum length is usually limited to1024 bytes to minimize potential reading errors.

NOTE: New lines (i.e. carriage returns/line feeds) are allowed in the PDF417 data field and as PDF417 dynamic data field input.

STOP	Ends the Bar Code command while the IGP/PGL continues in the Create Form Mode. Enter **STOP**. If STOP is not entered, an error message results.

PDF417 Example

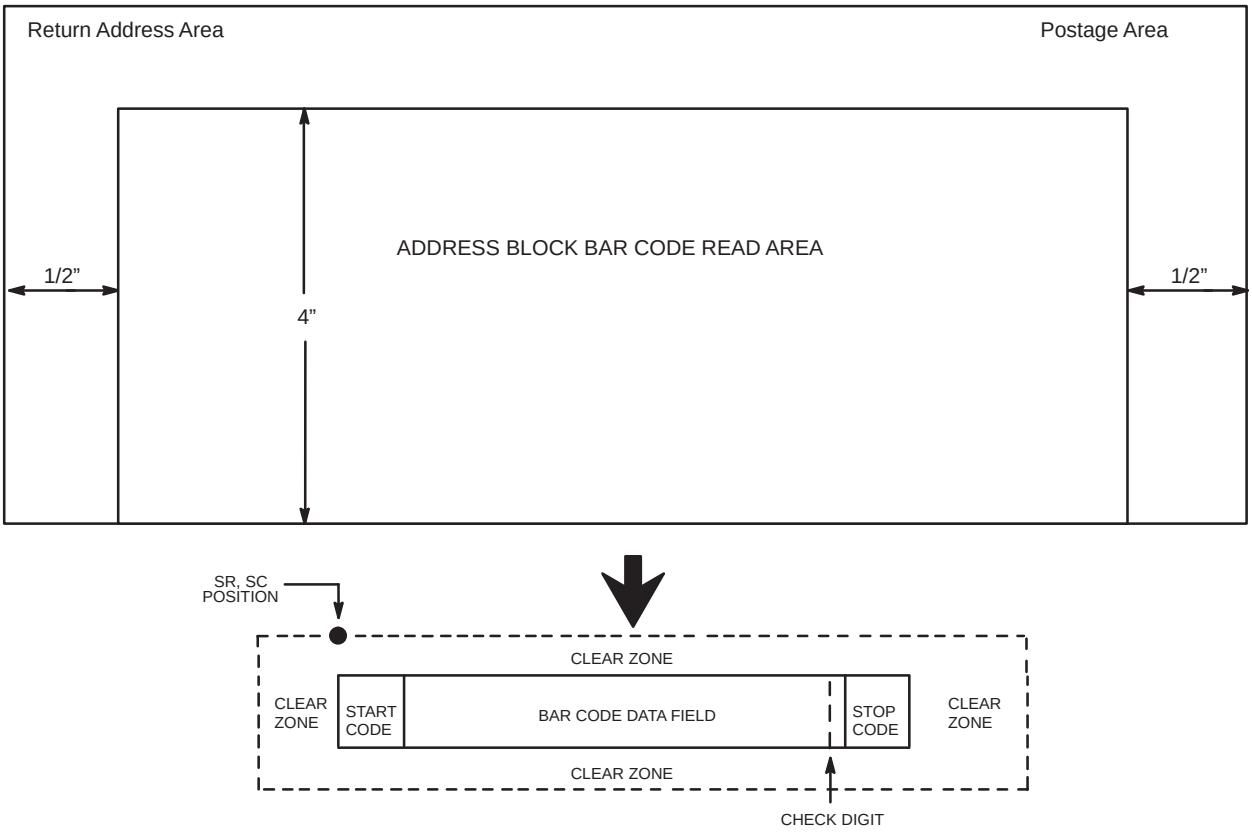
Figure 5–23 illustrates a horizontal PDF417 bar code generated by the following program:

```
~CREATE;PDF417          (Enter Create Form Mode)
BARCODE                 (Bar Code command)
PDF417;XD3;YD9;S0;7;21  (PDF417; width; height, security level, SR, SC)
*PRINTRONIX SUPPORTS PRINTING OF PDF417 TWO–DIMENSIONAL
BAR CODE SYMBOLOGY 12345678901234567890123456789012345678 9*
STOP                    (Ends Bar Code command)
END                     (Terminate Create Form Mode)
~EXECUTE;PDF            (Execute the form)
```

Figure 5–23. Sample PDF417 Bar Code

POSTNET

The POSTNET bar code structure is illustrated in Figure 5–24 and Figure 5–25 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 mailpiece.



NOTE: Illustration is not to scale

Figure 5–24. 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.*

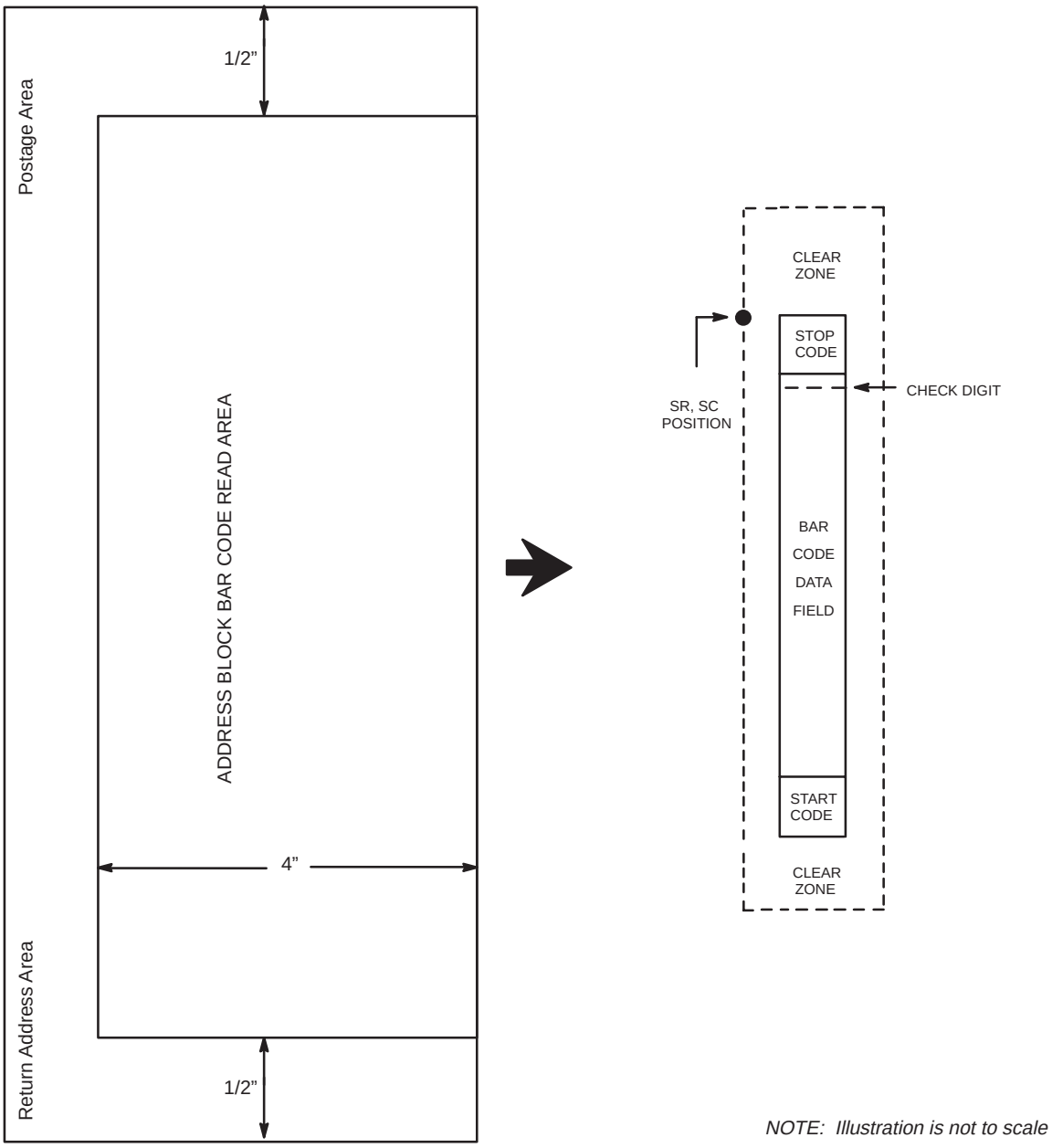


Figure 5–25. POSTNET Structure (VSCAN)

Clear Zone

The bar code structure requires a completely blank clear zone which extends 4.75 inches from the right edge of the mailpiece. In addition, a minimum clear zone of 0.040–inch above and below the bar code data must also be provided. Be sure to 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.

Each bar *width* is equal, and must be .020–inch ± .005–inch. Each bar *height* is either a tall (full) or short (half) bar, representing a 1 or 0, respectively. Each tall bar must be .125–inch ± .010–inch; each short bar must be .050–inch ± .010–inch. Horizontal spacing between bars (pitch) must be 22 bars ± 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 check digit is added automatically to verify accurate scanning.

POSTNET Command Format

BARCODE
POSTNET; [VSCAN;] *[*BF*n;L;]* [DARK;] *SR; SC*
[(D)data field(D)]
STOP

BARCODE	The Bar Code command; enter **BARCODE**.
POSTNET	Designates bar code type POSTNET; enter **POSTNET**.
VSCAN	Optional parameter to orient the bar code structure vertically. To select a vertical bar code, enter **VSCAN**. If VSCAN is not entered, the bar code is oriented horizontally.
BF*n;L*	Optional parameters for assigning a dynamic bar code data field location on a form and for designating the length of the data field. With these parameters, the actual data for the bar code data field is dynamically provided during the Execute Form Mode; the data is not specified during the Create Form Mode. To use this field, perform the following steps: a. Enter **BF**. b. Replace **n** with a number ranging from 1 to 255 to identify the bar code field. The SR and SC parameters specify the exact location of the bar code field identified by **n**. c. Replace **L** with a number equaling the total number of characters in the field. The data field must be numeric and contain exactly 5, 9 or 11 digits. d. The information for the data field is entered dynamically during the Execute Form Mode. (Refer to “Execute Form: Dynamic Bar Code Data” on page 4–55 in the “Commands” chapter.) Do not use the *data field* parameter to enter data when the BFn parameters are used. However, refer to the *data field* description for available characters.

e. Replace **L** with a number equaling the total number of characters in the field. (The actual data provided dynamically during the Execute Form Mode can be less than **L**.)

f. The information for the data field is entered dynamically during the Execute Form Mode. (Refer to “Execute Form: Dynamic Bar Code Data” on page 4–55 in the “Commands” chapter.) Do not use the *data field* parameter to enter data when the BFn parameters are used. However, refer to the *data field* description for available characters.

DARK — Optional parameter to produce darker looking bar codes. Enter **DARK**. Refer to “Dark Printing” on page 4–10 for more information.

SR — Defines the starting row for the bar code. Enter a value within the range of the 4–inch vertical address block. Character row or dot row is specified based on the Scale command (page 4–88), or use the CP.DP format (page 4–7).

SC — Defines the starting column of the bar code. Enter a value between the 1/2–inch left and right margins of the mailpiece. Character column or dot column is specified based on the Scale command (page 4–88), or use the CP.DP format (page 4–7).

D — The printable character (delimiter) identifying the start and finish of the data field. Enter any printable character other than a slash (/) the SFCC, or a character used within the data. The same character must be used at both ends of the data field but it will not print with the data.

data field — The bar code data. Enter 5 digits (for zip code), 9 digits for a nine–digit zip code, or 11 digits (for the Advanced Bar Code format). The available characters for the data field are 0 through 9 (30 through 39 hex, respectively).

STOP	Ends the Bar Code command while the IGP/PGL continues in the Create Form Mode. Enter **STOP**. If STOP is not entered, an error message will result.

Figure 5–26 illustrates a horizontal and vertical POSTNET bar code generated by the following program:

```
~CREATE;POSTNET          (Enter Create Form Mode)
BARCODE                  (Bar code command)
POSTNET;DARK;10;40       (Dark POSTNET bar code at SR 10, SC 40)
*601159912*              (ZIP + 4 data field 60115–9912)
STOP                     (Ends Bar Code command)
END                      (Terminates Create Form Mode)
~CREATE;POSTNET          (Enter Create Form Mode)
BARCODE                  (Bar code command)
POSTNET;VSCAN;DARK;10;20
                         (Dark Vertical bar code POSTNET at SR 10, SC 40)
*601159912*              (ZIP + 4 data field 60115–9912)
STOP                     (Ends Bar Code command)
END                      (Terminates Create Form Mode)
~EXECUTE;POSTNET;1       (Execute the form, with a form count of 1)
```

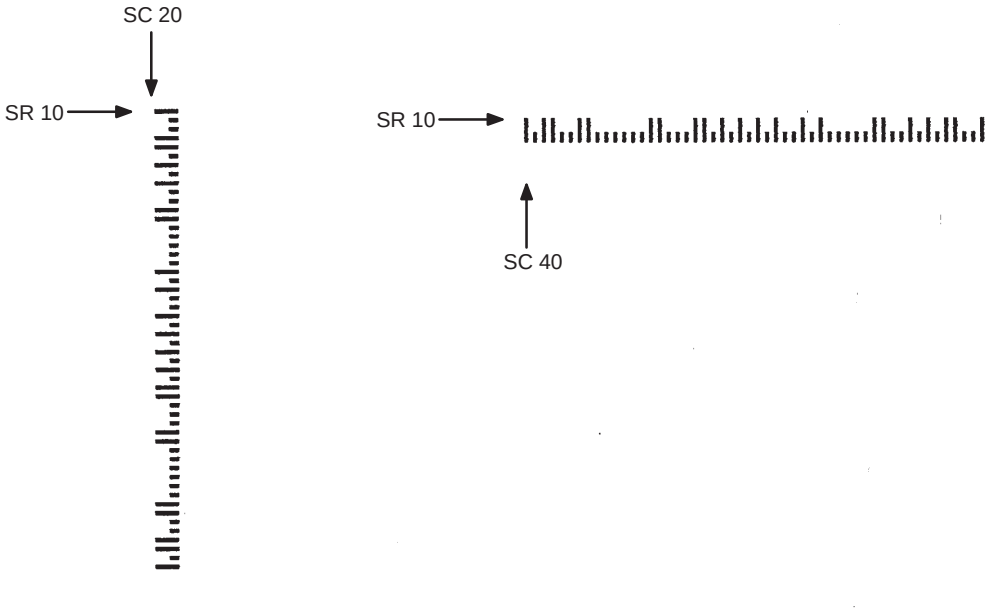


Figure 5–26. Sample POSTNET Bar Codes

The UPC–A bar code structure is shown in Figure 5–27 and described on the following pages.

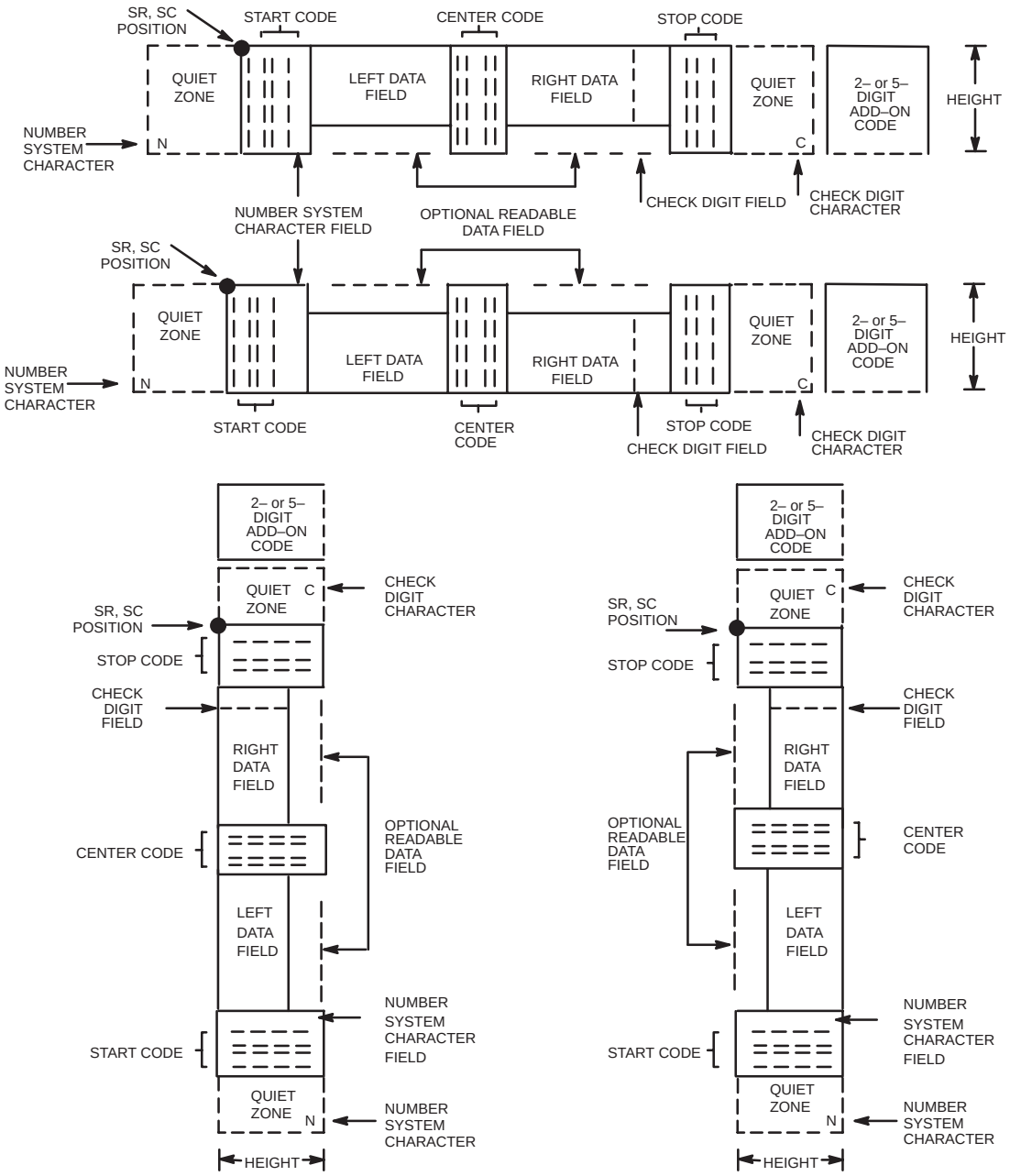


Figure 5–27. UPC–A Structure

Quiet Zone

Quiet zones extend on both ends of the bar code to permit the scan to begin and end in a blank area. The IGP/PGL automatically produces an 11–module wide left quiet zone; you are responsible for providing sufficient space (minimum of seven modules) on the form for the right quiet zone. The number system character is also printed automatically in the left quiet zone.

Start/Center/Stop Codes

The start/center/stop codes are special character codes marking those portions of the bar code. These codes are automatically provided.

Number System Character

The number system character field allows you to provide a code to a class or type of item. 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 one to four modules. Each character consists of two bars and two spaces that total seven modules. The symbol coding of the left data field is different from the right data field to permit read direction sensing.

The optional 2– or 5–digit add–on data field is placed at the end of the bar code and typically identifies a periodical issue number or price, respectively.

Readable Data

The human readable data field provides a readable interpretation of the bar code data. It can either be suppressed or printed below the bar code symbol.

Check Digit

The modulo–10 check digit is automatically calculated and inserted in the bar code symbol. The check digit verifies accurate scanning. The number system character is included in the check digit algorithm.

UPC–A Command Format

BARCODE
UPC–A *[+n]*; [VSCAN;] *[SCB;] [MAG;] [Hn[.m];] [*BF*n;]* [DARK;] *SR; SC*
[(D)data field(D)]
*[*PDF *[;LOC] [;FONT]*
STOP

BARCODE	The Bar Code command; enter **BARCODE**.
UPC–A	Designates bar code type UPC–A; enter **UPC–A**.
+n	Optional parameter to provide a 2– or 5–digit add–on code at the end of the bar code data field. Enter a plus sign (**+**) and a value of **2** or **5**. The first bar of the add–on code is separated by nine modules from the last bar of the UPC symbol and a left guard pattern.
VSCAN	Optional parameter to orient the bar code structure vertically. To select a vertical bar code, enter **VSCAN**. If VSCAN is not entered, the bar code is oriented horizontally.
SCB	This option shortens the length of the center guard bars, which are normally full length.
MAG	Optional parameter to magnify (horizontally expand) the bar code symbol. The magnification default value is **X1**. Enter a magnification value to increase the magnification. Increasing the magnification adjusts printed character density. You can also use XR or XRD as defined on page 5–4. (You must specify 8 digits for MAG for variable ratio.)

Hn[.m]

Optional parameter to adjust the overall height (vertical expansion) of the bar code symbol (including the upper and lower 0.1–inch guard bands and any human readable data). Height adjustments are made in 0.1–inch increments; enter **H** and a value from 4 to 99 to select height adjustments from 0.4 to 9.9 inches. The default value is 1.3 inches.

.m is an additional number of dots for the bar code height. (Dots are in the current dot scale.)

BF*n*

Optional parameter for assigning a dynamic bar code data field location on a form. With this parameter, the actual data for the bar code data field is dynamically provided during the Execute Form Mode; the data is not specified during the Create Form Mode. To use this field, perform the following steps:

a. Enter **BF**.

b. Replace **n** with a number ranging from 1 to 255 to identify the bar code field. The SR and SC parameters specify the exact location of the bar code field identified by **n**.

c. The length of the data field need not be specified, since it is fixed at 11 digits, plus any add–on data.

d. The information for the data field is entered dynamically during the Execute Form Mode. (Refer to “Execute Form: Dynamic Bar Code Data” on page 4–55 in the “Commands” chapter.) Do not use the *data field* parameter to enter data when the BFn parameters are used. However, refer to the *data field* description for available characters.

DARK

Optional parameter to produce darker looking bar codes. Enter **DARK**. Refer to “Dark Printing” on page 4–10 for more information.

SR	Defines the starting row for the bar code. Enter a value ranging from row 1 to one less than the length of the form. Character row or dot row is specified based on the Scale command (page 4–88), or use the CP.DP format (page 4–7).
SC	Defines the starting column of the bar code. Enter a value ranging from column 1 to one less than the width of the form. Character column or dot column is specified based on the Scale command (page 4–88), or use the CP.DP format (page 4–7).
D	The printable character (delimiter) identifying the start and finish of the data field. Enter any printable character other than a slash (/), the SFCC, or a character used within the data. (It will not print with the data.) Use the same character at both ends of the data field.
data field	Enter the characters for the bar code data, restricted to exactly 11 digits. If the 2– or 5–digit add–on data option is used, include this data at the end of the data field. The first digit is interpreted as the number system character. The remaining 10 digits are the data field characters. The characters available for the data field are 0 through 9 (30 through 39 hex, respectively).
PDF	Optional parameter which affects printing of the human readable data field. The data field will print automatically unless the PDF–suppress command is specified in the **FONT** parameter. OCR-B characters can be printed above or below the bar code symbol. This parameter is not allowed if a null data field is specified. If the **PDF** command is not entered in the UPC–A command format, the data field automatically prints in OCR–B.

LOC	Optional parameter to identify the location of the printable data field. The default value is **B**, locating the human readable data below the bar code. **A** locates the printable data field above bar code. To compensate for printing the 0.1–inch high data, the height of the bar code body is reduced 0.1–inch.
FONT	Optional parameter to select the font for the human readable data field. The default font type for UPC–A bar codes is OCR–B; if no PDF command is entered in the command format, the data field is printed automatically in OCR–B. Entering **X** will also designate the OCR–B type font. Enter **N** to select the normal ASCII 10 cpi font; enter **O** to select the OCR–A 10 cpi font. Enter **S** to suppress printing the data field and the trailing lower portions of the UPC bar code.
STOP	Ends the Bar Code command while the IGP/PGL continues in the Create Form Mode. Enter **STOP**. If STOP is not entered, an error message results.

UPC–A Example

Figure 5–28 illustrates a horizontal and vertical UPC–A bar code generated by the following program:

~CREATE;UPCA	(Enter Create Form Mode)
BARCODE	(Bar Code command)
UPC–A+5;H9;DARK;39;15	(Dark Code UPC–A, 5–digit add–on, H 0.9, SR 39, SC 15)
1234567887655555	(Data Field plus 5–digit add–on data field)
PDF	(Printable Data Field)
STOP	(Ends Bar Code command)
BARCODE	(New Bar Code command)
UPC–A+5;VSCAN;H12;DARK;39;50	(Vertical Dark UPC–A, 5–digit add–on, H 1.2, SR 39, SC 50)
1234567887655555	(Data Field plus 5–digit add–on data field)
PDF	(Printable Data Field)
STOP	(Ends Bar Code command)
END	(Terminates Create Form Mode)
~EXECUTE;UPCA;1	(Executes the form, form count of 1)

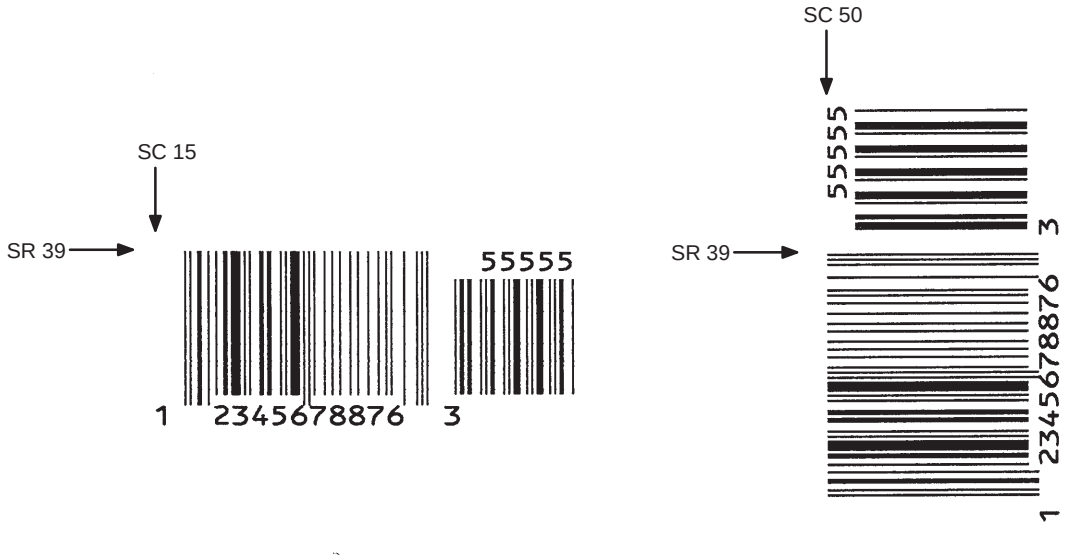


Figure 5–28. Sample UPC–A Bar Codes with Add–On Data

The UPC–E and UPC–E0 bar code structure is shown in Figure 5–29 and described on the following pages.

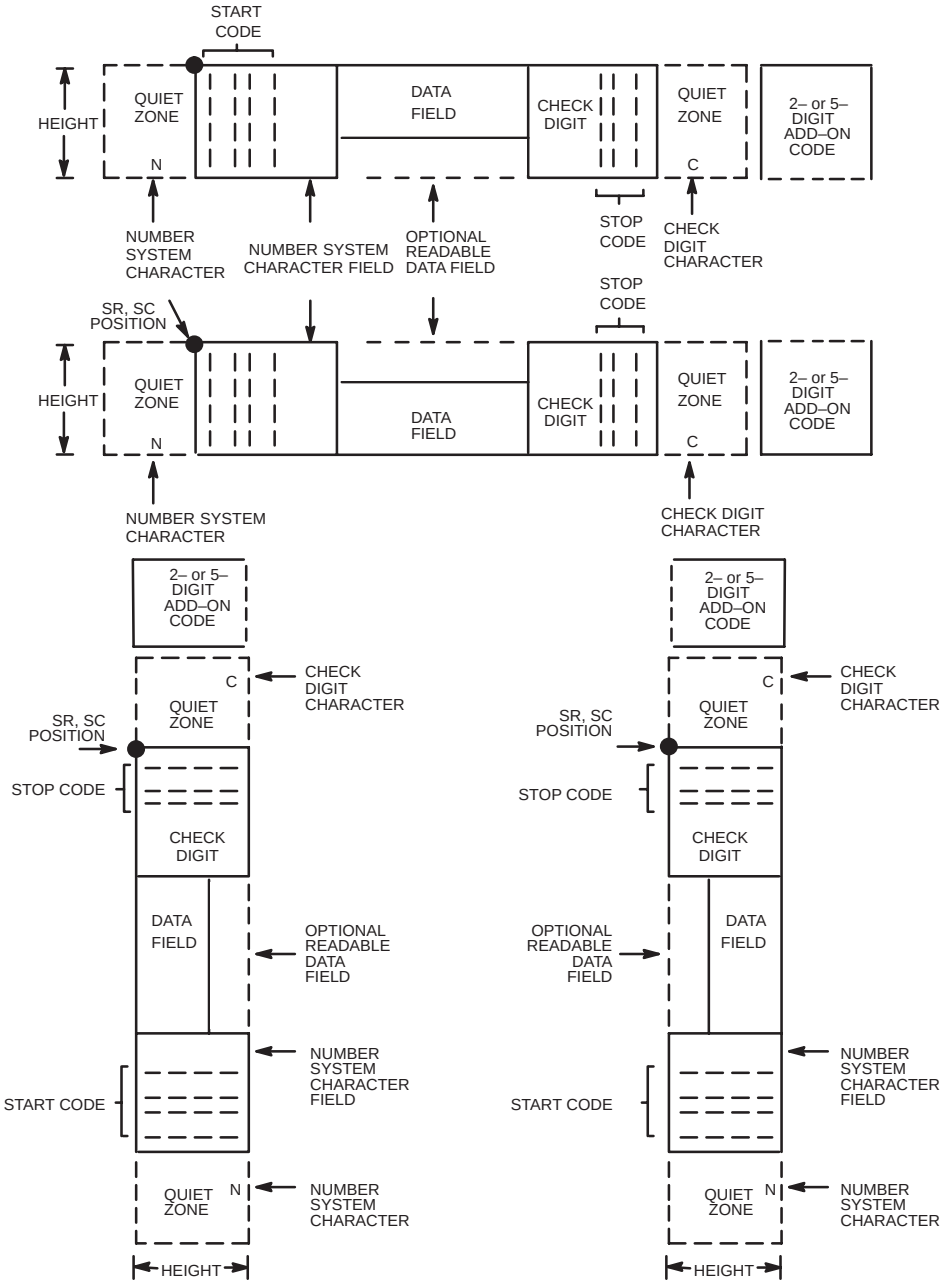


Figure 5–29. UPC–E and UPC–E0 Structure

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 IGP/PGL automatically produces an 11–module wide left quiet zone. You must provide sufficient space (minimum of seven modules) on the form for the right quiet zone. The number system character is also printed automatically in the left quiet zone.

Start/Stop Codes

The start/stop codes are special character codes marking those portions of the bar code. These codes are automatically provided.

Number System Character

The number system character field for all UPC–E and UPC–E0 bar codes must be zero.

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 one to four modules. Each character consists of two bars and two spaces that total seven modules.

For UPC–E, eleven digits are expected, which are compressed down to the six encoded symbol characters. For UPC–E0, six compressed digits are expected.

The optional 2– or 5–digit add–on data field is placed at the end of the bar code and typically identifies a periodical issue number or price, respectively.

Readable Data

The human readable data field provides a readable interpretation of the bar code data. It can either be suppressed or printed above or below the bar code symbol.

Check Digit

The modulo–10 check digit is automatically calculated and inserted in the bar code symbol. The check digit verifies accurate scanning. The number system character is included in the check digit algorithm.

UPC–E and UPC–E0 Command Format

BARCODE

UPC-E or UPC-EO *[+n]*; [VSCAN;] *[MAG;] [Hn[.m];] [*BF*n;]* [DARK;] *SR; SC*

[(D)data field(D)]

*[*PDF *[;LOC] [;FONT]]*

STOP

BARCODE	The Bar Code command; enter **BARCODE**.
type	Designates bar code type UPC–E or UPC–E0; enter **UPC–E** or **UPC–E0**.
+n	Optional parameter to provide a 2– or 5–digit add–on code at the end of the bar code. Enter plus (+) and a value of **2** or **5**. The first bar of the add–on code is separated by nine modules from the last bar of the UPC symbol and a left guard pattern.
VSCAN	Optional parameter to orient the bar code structure vertically. To select a vertical bar code, enter **VSCAN**. If VSCAN is not entered, the bar code is horizontal.
MAG	Optional parameter to magnify (horizontally expand) the bar code symbol. The magnification default value is **X1**. Enter a magnification value to increase the magnification. Increasing the magnification adjusts printed character density. You can also use XR or XRD as defined on page 5–4. (You must specify 8 digits for MAG for variable ratio.)
Hn[.m]	Optional parameter to adjust the overall height (vertical expansion) of the bar code symbol (including the upper and lower 0.1–inch guard bands and any human readable data). Height adjustments are made in 0.1–inch increments; enter **H** and a value from 4 to 99 to select height adjustments from 0.4 to 9.9 inches. The default value is 1.3 inches. .m is an additional number of dots for the bar code height. (Dots are in the current dot scale.)

BF*n*

Optional parameter for assigning a dynamic bar code data field location on a form. With this parameter, the actual data for the bar code data field is dynamically provided during the Execute Form Mode; the data is not specified during the Create Form Mode. To use this field:

a. Enter **BF**.

b. Replace **n** with a number ranging from 1 to 255 to identify the bar code field. The SR and SC parameters specify the exact location of the bar code field identified by **n**.

c. The length of the data field need not be specified, since it is fixed at 6 or 11 digits, plus any add–on data.

d. The information for the data field is entered dynamically during the Execute Form Mode. (Refer to "Execute Form: Dynamic Bar Code Data" on page 4–55 in the "Commands" chapter.) Do not use the *data field* parameter to enter data when the BFn parameters are used. However, refer to the *data field* description for available characters.

DARK

Optional parameter to produce darker looking bar codes. Enter **DARK**. Refer to "Dark Printing" on page 4–10 for more information.

SR

Defines the starting row for the bar code. Enter a value ranging from row 1 to one less than the length of the form. Character row or dot row is specified based on the Scale command (page 4–88), or use the CP.DP format (page 4–7).

SC

Defines the starting column of the bar code. Enter a value ranging from column 1 to one less than the width of the form. Character column or dot column is specified based on the Scale command (page 4–88), or use the CP.DP format (page 4–7).

D

The printable character (delimiter) identifying the start and finish of the data field. Enter any printable character other than a slash (/), the SFCC, or a character used within the data. The same character must be used at both ends of the data field but it will not print with the data.

data field

The characters available for the data field are 0 through 9 (30 through 39 hex, respectively).

For UPC–E, eleven digits are expected: Enter the number system character first by entering **0**; followed by the five–digit Manufacturer Number; ending with the five–digit Item Number. The Manufacturing Number and Item Number sequences must conform to one of the number pattern sequences shown in Table 5–17.

The IGP/PGL will compress the 11 characters of data down to the six encoded UPC–E symbol characters. Include the 2– or 5–digit add–on data within the delimiter at the end of this data field.

For UPC–E0, six digits are expected. These six digits must be a valid compressed UPC–E number. Otherwise, Error 96 (bar code data field has illegal number) will be generated.

PDF

Optional parameter which affects printing of the human readable data field. The data field will print automatically unless the PDF–suppress command is specified in the **FONT** parameter. UCR-B characters can be printed above or below the bar code symbol.

This parameter is not allowed if a null data field is specified. If the PDF is not entered in the UPC–E command format, the data field automatically prints in OCR–B.

LOC	Optional parameter to identify the location of the printable data field. The default value is **B**, locating the human readable data below the bar code. **A** locates the printable data field above bar code. To compensate for printing the 0.1–inch high data, the height of the bar code body is reduced 0.1–inch.
FONT	Optional parameter to select the font for the human readable data field. The default font type for UPC–E bar codes is OCR–B; if no PDF command is entered in the command format, the data field will print automatically in OCR–B. Entering **X** will also designate the OCR–B type font. Enter **N** to select the normal ASCII 10 cpi font; enter **O** to select the OCR–A 10 cpi font. Enter **S** to suppress printing the data field and the trailing lower portions of the UPC bar code.
STOP	Ends the Bar Code command while the IGP/PGL continues in the Create Form Mode. Enter **STOP**. If STOP is not entered, an error message results.

Table 5–16. Eleven Digit Compression

1. Manufacturer's Number — **Product Numbers that can be used 00000–00999**

					(__ __)	(__ __ __)	(__)
X	X	0	0	0	first two digits of manufacturer's number	last three digits of the product number	third digit of the manufacturer's number, use 0 thru 2 only
X	X	1	0	0			
X	X	2	0	0			

2. Manufacturer's Number — **Product Numbers that can be used 00000–00999**

					(__ __ __)	(__ __)	(3)
X	X	3	0	0	first three digits of manufacturer's number	last two digits of the product number, use 00–99 only	depends on how many digits appear in the manufacturer's number
X	X	9	0	0			

3. Manufacturer's Number — **Product Numbers that can be used 00000–00999**

					(__ __ __ __)	(____)	(4)
X	X	X	X	0	first four digits of manufacturer's number	last digit of product number, use 0–9 only	depends on how many digits appear in the manufacturer's number

4. Manufacturer's Number — **Product Numbers that can be used 00000–00999**

					(__ __ __ __ __)	(____)
X	X	X	X	X	all five digits of manufacturer's number	last digit of product number, use 5–9 only

Table 5–17. Six–Digit Zero Expansion

if the 6 digit number ends with:	*then the MFPS Number is:*	*and the Product Number is:*
(1) 0 Example: 124560	the first 2 digits (of the zero suppressed number) plus 000 12000	00 plus the THIRD, FOURTH and FIFTH digit (of the zero suppressed number) 00456
(2) 1 Example: 275831	the first two digits plus 100 27100	same as above 00583
(3) 2 Example: 412022	the first two digits plus 200 41200	same as above 00202
(4) 3 Example: 876543	the first three digits plus 00 87600	000 plus the FOURTH and FIFTH digit 00007
(5) 4 Example: 753774	the first four digits plus 0 75370	0000 plus the FIFTH digit 00007
(6) 5, 6, 7, 8, 9 Examples: 213756 517019	the first five digits of the zero suppressed number 21375 51701	0000 plus the SIXTH digit 00006 00009

UPC–E and UPC–E0 Example

Figure 5–30 illustrates a horizontal and vertical UPC–E bar code generated by the following program:

~CREATE;UPCE	(Enter Create Form Mode)
BARCODE	(Bar Code command)
UPC–E+2;H9;DARK;34;15	(Dark Code UPC–E, 2–digit add–on, H 0.9, at SR 34, SC 15)
0927400000522	(Data Field plus the 2–digit add–on data field)
PDF	(Printable Data Field)
STOP	(Ends Bar Code command)
BARCODE	(New Bar Code command)
UPC–E0+2;VSCAN;H10;DARK;34;50	(Vertical Dark UPC–E0, 2–digit add–on, H 1.0, at SR 34, SC 50)
92745422	(Data Field plus the 2–digit add–on data field)
PDF	(Printable Data Field)
STOP	(Ends Bar Code command)
END	(Terminates Create Form Mode)
~EXECUTE;UPCE;1	(Executes the form, form count of 1)

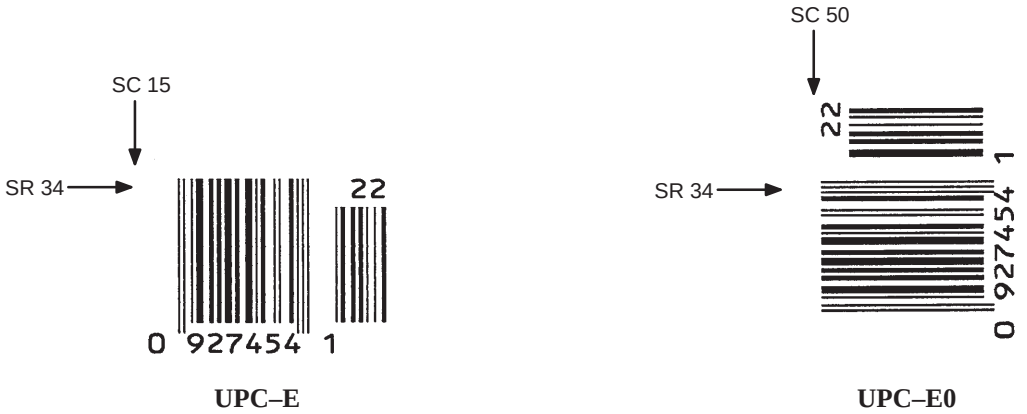


Figure 5–30. Sample UPC–E Bar Codes

Incremental Bar Code Fields

With the incremental bar code fields feature, you can update bar code (and alphanumeric) data fields in a numeric or alphabetical manner automatically with just one set of data sent from the host computer. You can print up to 65,535 forms with incremental fields automatically updated.

NOTE: Throughout the discussion of incremental fields, the term "increment" or "incremental" means the field is automatically updated by a specified amount (or increment). You can actually increment the field by a positive amount (added) or a negative amount (subtracted) as specified within the command.

You can use bar code incremental fields with fixed (static) data input as part of the Create Form Mode, or with dynamic data supplied in the Execute Form Mode. New formats and parameters are required in the bar code commands for static and dynamic incremental fields.

In addition, the Execute Form command requires a new format and parameters when you use incremental fields with dynamic data. You can increment or decrement incremental fields, repeat at specified intervals before updating, and reset to the starting value after a specified number of increments.

Incrementing Bar Code Data

The IGP/PGL internally counts incremental static (fixed) bar code data fields. A maximum of 255 incremental fixed bar code data fields are allowed per form.

Incrementing is controlled with the STEPMASK and STARTDATA command parameters as described in Table 5–18. The parameters are part of the bar code command or part of the Execute command when using the Incremental Bar Code Dynamic Data command.

The STEPMASK parameter performs three functions:

1. It defines the increment amount (step);
2. It defines the number of characters allowed in the data field (STARTDATA); and
3. It provides a “mask” to link or unlink subfields of data for individual incremental activity. The data provided in the STEPMASK field combined with the data in the STARTDATA field determine the result of these functions.

Table 5–18. Incremental Bar Code Data

STEPMASK	STARTDATA	Character Type and Function
0 – 9	A – Z	Alpha characters are incremented by amount in STEPMASK field.
0 – 9	0 – 9	Numeric characters are incremented by amount in STEPMASK field.
0 – 9	Space	Same character type as character in the next right adjacent, linked increment position. Character type is numeric if in the least significant position.
0 – 9	Not A – Z or 0 – 9	Error
Not 0 – 9 or L	Any	Non–incrementing alphanumeric character
L	Any	Linked, non–incrementing alphanumeric character

The increment amount is defined by the numeric value of the STEPMASK data. For example, a STEPMASK value of 1 increments the STARTDATA by 1; a STEPMASK value of 2 increments the STARTDATA by 2.

The maximum number of characters allowed in the STARTDATA is defined by the number of characters in the STEPMASK field and depends on the specific type of bar code; the STARTDATA field cannot contain more characters than used in the STEPMASK field and can only contain the number and type of characters allowed by the bar code.

Linked and unlinked masking of subfields within the STARTDATA is defined by using the **L** value in the STEPMASK field. **L** indicates linked but nonincrementing data in the corresponding position of the STARTDATA field. Any alphanumeric character other than **L** in the STEPMASK field indicates a nonincrementing, non–linked STARTDATA subfield.

The following examples illustrate incrementing of bar code data fields. All cases in the examples use a repeat count parameter value of 1 and a reset count parameter value of 0. Incremental bar code data is generated identically to incremental alphanumeric data except the IGP/PGL does not add leading spaces to bar code data.

NOTE: In the following bar code examples, the *value* of the data is shown automatically incrementing. In practical applications, the bar code itself would print corresponding to the incremented data as shown in the Auto Increment Fields Example on page 6–14 in the “Commands” chapter.

	Value	Description
STARTDATA:	ABC123	*Linked subfields: ABC and 123* *RPT = 1* *RST = 0*
STEPMASK:	000001	
Results:	ABC123 ABC124 .... ABC999 ABD000 .... ZZZ999 AAA000	

	Value	Description
STARTDATA:	1ABC123	*Two separate, but linked numeric subfields: 1 and 123, while fixed data ABC is nonincrementing* *RPT = 1* *RST = 0*
STEPMASK:	0LLL001	
Results:	1ABC123 1ABC124 . ... 1ABC999 2ABC000	

	Value	Description
STARTDATA:	ABC123	*Two separate, unlinked subfields: ABC and 3, while fixed data 1 and 2 is nonincrementing* *RPT = 1* *RST = 0*
STEPMASK:	001XX1	
Results:	ABC123 ABD124 ABE125 . . . . . . ABI129 ABJ120	

Incremental Bar Code Fixed Data Fields

The Incremental Bar Code Fixed Data Fields command is a variation of the standard IGP/PGL bar code commands. Use this command with the appropriate parameters from the standard bar code command when automatic incrementing of fixed bar code data fields is required.

The Incremental Bar Code Fixed Data Fields command format is shown and defined below. (Incremental command parameters are shown in **boldface** type; standard bar code command parameters and optional nonincremental parameters are shown in *italics*.)

BARCODE
type; [VSCAN;] *[MAG;] [Hn;]* **I;** [DARK;] *SR; SC*
[idir] STEPMASK; [RPTn;] [RSTn;] (D)STARTDATA(D)
*[*PDF *[;LOC] [;FONT]]*
STOP

I — Identifies this bar code command as an Incremental Bar Code command; enter **I**.

idir — The optional increment direction parameter to specify an increment (add) or decrement (subtract) to the data. Enter a plus sign (+) or leave the field blank to increment (the default). Enter a minus sign (–) to decrement.

STEPMASK — Defines the increment amount (step), number of character positions in the data field, and provides a mask to control the increment function on specific parts of the data. Refer to “Incrementing Bar Code Data” on page 5–121 for complete information on STEPMASK parameter values.

RPTn — The optional incremental repeat count parameter to specify the number of times a particular field value will repeat before it is incremented. A repeated field value is useful when printing multiple rows/columns of identical labels before increasing to the next value.

To use the repeat count parameter, enter **RPT** and replace **n** with a numeric value ranging from 1 to 65,535 to specify the repeat count.

The default repeat count parameter is 1, which will increment the field value each time it is printed.

RSTn

The optional incremental reset count parameter to specify the number of times an incremented field is printed (on one or more forms) before it is reset to the starting value. A reset count is useful when printing a hierarchy of fields where a low–level field generates a sequence of numbers, is reset, and the next higher field level is incremented (such as in a unit/box/carton application).

To use the reset count parameter, enter **RST** and replace **n** with a number ranging from 1 to 65,535 to specify the reset count. The default reset count value is 0.

STARTDATA

Defines the starting value of the incrementing field. The maximum amount of STARTDATA characters must be less than or equal to the number of characters in the STEPMASK field. Characters allowed for incrementing fields is based on the type of bar code; refer to the individual bar code descriptions for information on valid type and quantity of data characters.

The STARTDATA must be enclosed within standard printable character delimiters just as a standard bar code data field is enclosed within delimiters.

```
~CREATE;TEST;288          (Enters Create Form mode)
VDUP;3;6
BARCODE                   (Bar code command)
C3/9;H7;I;6;5
–00001;*12345*
PDF                       (Printable data field)
STOP                      (Ends bar code command)
VDUP;OFF
END                       (Terminates Create Form mode)
~EXECUTE;TEST             (Prints form)

~NORMAL
```

Incremental Bar Code Dynamic Data Fields

The Incremental Bar Code Dynamic Data Field command specifies the location and size of the incremental dynamic data field during the Create Form Mode. STEPMASK and STARTDATA parameters are supplied in the Execute command during the Execute Form Mode. As with standard dynamic data fields, incremental dynamic data fields allow you to change the starting data without changing the form definition program. Additionally, you can also change the increment parameters with each new job without changing the form definition program.

The Incremental Bar Code Dynamic Data Fields command is a variation of the standard IGP/PGL bar code commands. Use this command with the appropriate parameters from the standard bar code command when automatic incrementing of dynamic bar code data fields is required. The Incremental Bar Code Dynamic Data Fields command format is shown and defined below. (Incremental command parameters are shown in **boldface** type; standard bar code command parameters and optional nonincremental parameters are shown in *italics*.)

BARCODE
type; [VSCAN;] *[MAG;] [Hn;]* **IBFn;L** [DARK;] *SR; SC*
*[*PDF *[;LOC] [;FONT]]*
STOP

IBFn;L Identifies this bar code command as an Incremental Bar Code Dynamic Data Field command. The command parameter string identifies the incremental dynamic data field location on the form and defines the length of the bar code data. If these parameters are used, *do not* enter the STEPMASK and STARTDATA parameters in the Create Form Mode; enter them dynamically during the Execute Form Mode. To use the incremental dynamic data field:

a. Enter **IBF** to specify an incremental bar code dynamic data field.

b. Replace **n** with a number ranging from 1 to 255 to identify the bar code string location on the form. The standard bar code SR and SC command parameters specify the exact location of the field identified by **n**.

c. Replace **L** with a number equal to the number of characters in the dynamic bar code string (STARTDATA) ranging from 1 to 1024. The number of characters and type of characters depends on the type of bar code used. Refer to the individual bar code descriptions for information on type and quantity of data allowed for the specific bar code type.

d. Dynamically enter the STEPMASK and STARTDATA parameters in the Execute Form Mode. The length of the data must be less than or equal to the value assigned to the length (**L**) parameter. Refer to "Execute Form: Incremental Dynamic Data" on page 4–56 in the "Commands" chapter for more information.

Duplicating Incremental Bar Code Fields

Fixed and dynamic incremental bar code data fields are duplicated horizontally and vertically in the same way that incremental alphanumeric fixed and dynamic data fields are duplicated. Refer to page 4–26 in the "Commands" chapter for more information on duplicating incremental data.

```
~CREATE;TEST;288                (Enters Create Form mode)
VDUP;3;6
BARCODE                         (Bar code command)
C3/9;H7;IBF1;6;6;5
PDF
STOP                            (Ends bar code command)
VDUP;OFF
END                             (Terminates Create Form mode)
~EXECUTE;TEST                   (Prints form)
~IBF1;+000001;*123459*

~NORMAL
```

6 Form Examples and Exercises

Chapter Contents

Form Examples

NOTE: The examples in this manual were produced on an L1016 printer. Using a different type of printer or a different configuration could affect the appearance of your printed samples compared to those shown in this manual.

Additionally, depending on the paper, top–of–form setting and initial print position, the positioning of your printed samples on the page may vary compared to the examples shown here; these samples have been positioned on the page to correspond with the related text.

The following examples are written to print on 11–in paper, and some of them have to be modified accordingly to print on a typical 4–in–long thermal printer label.

The example on the following page demonstrates how to use Create commands in the Create Form mode using the CP.DP format. The printed output for this program is shown in Figure 6–1 on page 6–4. (The Hand logo used in this example was previously defined and stored and, thus, is not shown in the form program.) The box surrounding the form represents the paper size.

NOTE: If comment lines are used on command lines, they must be preceded by a slash (/). Do not use / comments on–lines containing an SFCC (NORMAL, CREATE, EXECUTE, etc.). Comments in parentheses in this section are provided for better understanding of IGP/PGL operation but should not be included in your IGP/PGL files.

```
~CREATE;BASICFRM

BOX
/LT;SR;SC;ER;EC
1;1;1;25;25
STOP

ALPHA
/[R[D][L];][E;][Cn;][AFn;L;][DIR;[UC;]DARK]SR;SC;VE;HE;(D)ASCII TEXT(D)
3;3;0;0;*STATIC ALPHA DATA*
AF1;18;4;3;0;0
/DIR;SR;SC;VE;HE
CW;8;4;1;1;*PRINTRONIX*
R;15;5;2;2;*IGP*
STOP

CORNER
/LT;SR;SC;ER;EC;VL;HL
1;18;2;23;7;2;2
STOP

HDUP;5;1
VERT
/LT;C;SR;ER
1;17;18;22
STOP
HDUP;OFF

VDUP;5;1
HORZ
/LT;R;SC;EC
1;18;17;21.1
STOP
VDUP;OFF

LOGO
10;13;HAND
/(PREVIOUSLY DEFINED AND STORED)
STOP

END

~EXECUTE;BASICFRM
~AF1;*DYNAMIC ALPHA DATA*



  OVERLAY DATA

~NORMAL
```

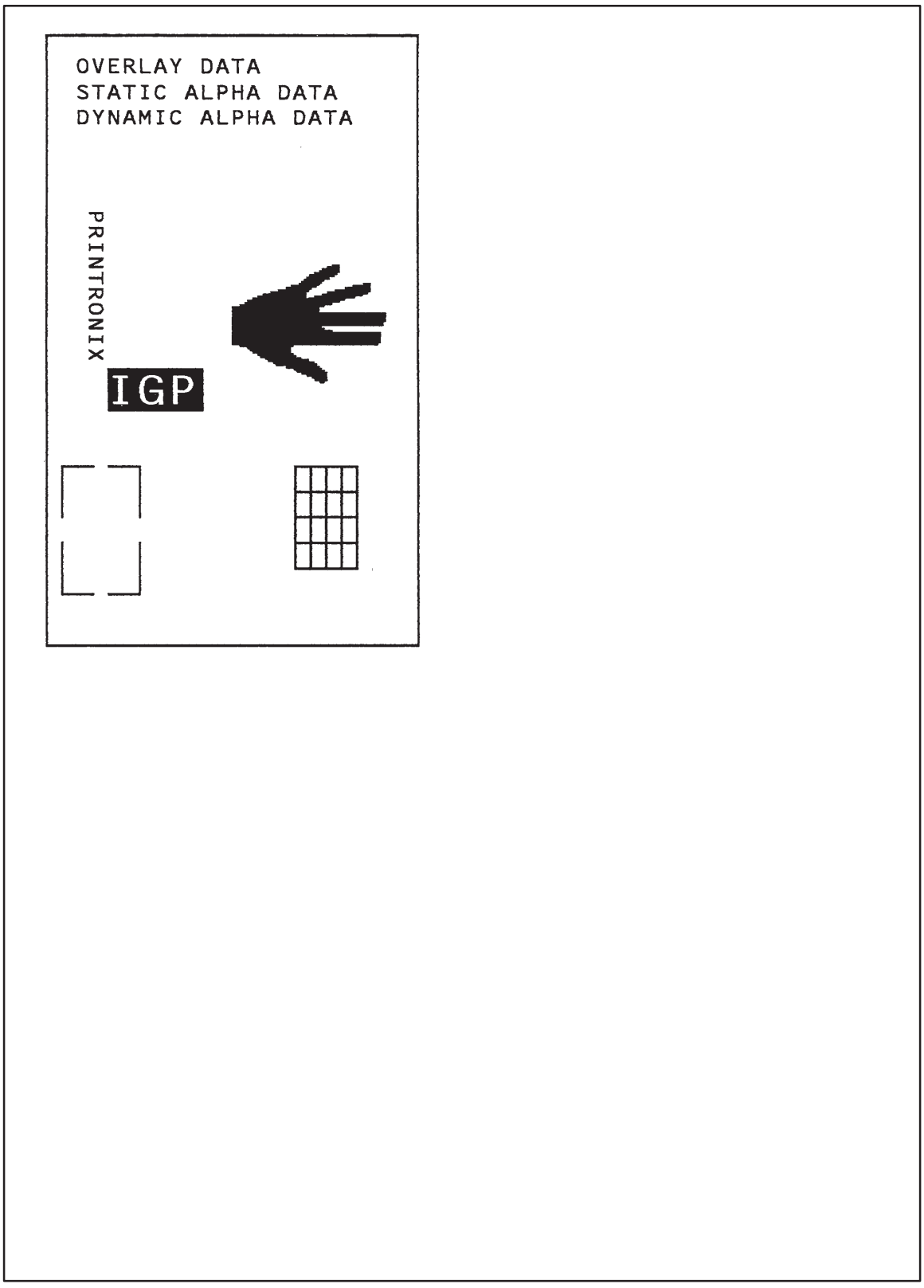


Figure 6–1. Basic Create Form Example

Example: Using the Setup Command

The following example demonstrates how the margins,landscape orientation, 8LPI and font double wide are automatically SETUP at power–up.

```
~SETUP
CONFIG
TOP/BOTTOM MARGIN ; 1
LEFT MARGIN ; 10
END
~PAPER ; ROTATE 270
~LPI ; 8
~EXPAND ; 1 ; 2
~SETUPEND
```

Example: Dynamic Data

The process of executing dynamic alphanumeric and bar code data fields is explained in the following exercises. Each stage includes printing the program; however, the total program may be entered as one unit. Each stage offers the option of choosing features applicable to specific needs.

Basic Design

The SAMPLE program below, shown in Figure 6–2, is a basic design in CP.DP format and defined by standard Create Form mode command sequences. The label is duplicated twice horizontally on an approximate form length of 8 1/2 x 5 1/2 inches (390 dots), with three bar code locations specified per label. The result is two “forms” — two labels per form, four labels printed on one 8-1/2 x 11-inch “page.” On the next few pages, you will add bar code data, dynamic alphanumeric data, and dynamic bar code data. Then you will execute and print the complete form (Figure 6–3).

When entering command lines, remember to correctly terminate each line with a line feed or carriage return with line feed. Use your system commands to open a file for the label program. When you have finished, exit the file (if necessary for your system) and print.

```
~CREATE;SAMPLE;390      (Create Form; form length is 390 dots)
HDUP;2;37               (2 horizontal dupes, 37 columns apart)
BOX                     (Box command)
2;3.5;9;30;35
STOP                    (Stop the Box command)
HORZ                    (Horizontal Line command)
1;14.5;9;35
1;19.5;9;35
1;24.5;9;35
STOP                    (Stop the Horizontal Line command)
CORNER                  (Begin Corner command)
2;4;11;9;33;1.2;2
2;9.6;11;13.6;33;1.2;2
STOP                    (Stop the Corner command)
ALPHA                   (Begin Alphanumeric command)
4.8;12;0;0;*FROM:*      (This is "fixed" text on the form)
6.3;12;2;2;*PRINTRONIX*
C15;7.3;16;0;0;*17500 CARTWRIGHT RD.*
C15;8.1;16;0;0;*IRVINE , CA 92714*
10;12;0;0;*TO*
14.8;11;0;0;*S.O.*
19.8;11;0;0;*S/N:*
24.8;11;0;0;*P/N:*
STOP                    (Stop the Alphanumeric command)
HDUP;OFF                (Stop the horizontal duplication)
END                     (End the Create Form mode)
~EXECUTE;SAMPLE;1
~NORMAL                 (Execute form)
```

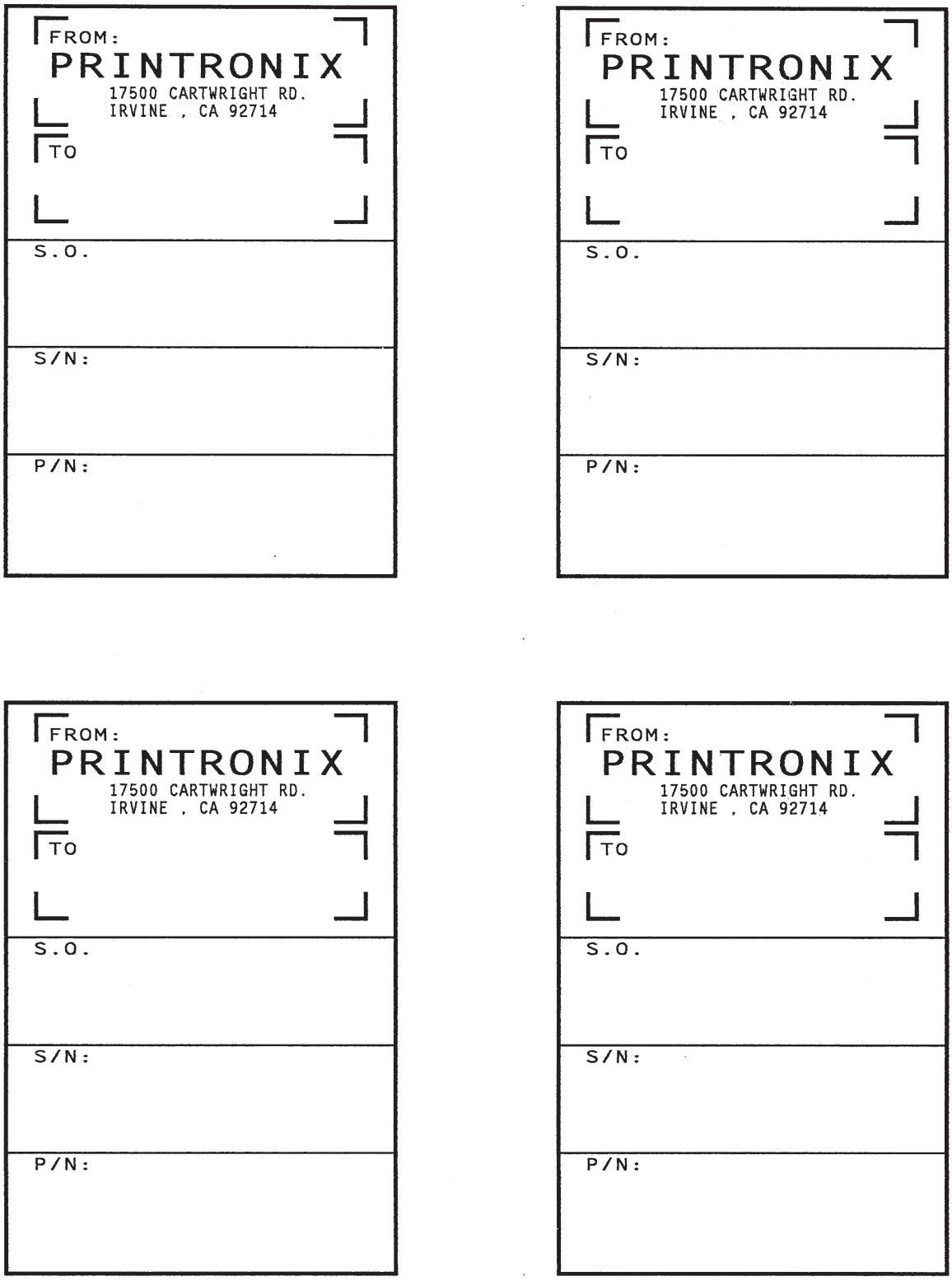


Figure 6–2. Sample Form

Bar Code Fields

Identify the location of the data fields for each of the six bar codes (one location at each S.O., S/N, and P/N field on the form). The type of bar code and the human readable data information is also specified within the bar code commands. (Refer to the “Bar Codes” chapter for detailed bar code information.)

Each bar code must be designated separately. The bar code commands are part of the Create Form mode; therefore, they must be entered in the Create Form mode *before* the END command. However, because each dynamic field is assigned a unique number, the commands should not be duplicated. Reopen the file and input the following commands before the END command line but after the HDUP;OFF command.

NOTE: The IGP/PGL will horizontally or vertically duplicate dynamic bar code or alphanumeric data fields if required. This will also duplicate the **n** parameter identifying the dynamic data fields. If unique data fields are required, do not duplicate the commands.

```
BARCODE                 (First bar code command)
                        (Upper left S.O. field, assigned number 1)
C3/9;H7;BF1;8;DARK;15.1;10.4
PDF;O                   (Print the data field in OCR–A font)
STOP                    (Stop the first bar code command)
BARCODE                 (New bar code command)
                        (Upper left S/N field, assigned number 2)
C3/9;H7;BF2;8;DARK;20;10.4
PDF;O
STOP
BARCODE                 (Upper left P/N field, assigned number 3)
C3/9;H7;BF3;8;DARK;25.5;10.4
PDF;O
STOP
BARCODE                 (Upper right S.O. field, assigned number 4)
C3/9;H7;BF4;8;DARK;15.1;47.4
PDF;O
STOP
BARCODE                 (Upper right S/N field, assigned number 5)
C3/9;H7;BF5;8;DARK;20;47.4
PDF;O
STOP
BARCODE                 (Upper right P/N field, assigned number 6)
C3/9;H7;BF6;8;DARK;25.5;47.4
PDF;O
STOP                    (Stop the bar code command)
```

Dynamic Alphanumeric Fields

Identify the location of the dynamic alphanumeric fields using the alphanumerics command. Input the following alphanumeric command lines after the HDUP;OFF command and *before* the Create Form mode END line. A separate alphanumerics command sequence is used in order to assign unique numbers to each dynamic data field. (If unique identifying numbers were not required, these alphanumeric commands would be added to the existing alphanumeric commands being duplicated to produce the fixed form alphanumeric data.)

NOTE: Before the following dynamic data commands can be entered, delete the form count parameter from the existing Execute command line (the ;1 at the end of the Execute command line shown on the program on page 6–6). The Form Count parameter cannot be used when data is supplied dynamically. The Execute command line should now read ~EXECUTE;SAMPLE and must be correctly terminated. This is the Execute command for the first page of dynamic data.

```
ALPHA                (Begin alpha command for dynamic data)
AF1;20;10.8;12;0;0   (AF1 is the first line of upper left TO area)
AF2;20;11.8;12;0;0   (AF2 is the second line of upper left TO area)
AF3;20;12.8;12;0;0   (AF3 is the third line of upper left TO area)
AF4;20;10.8;49;0;0   (AF4 is the first line of lower left TO area)
AF5;20;11.8;49;0;0   (AF5 is the second line of lower left TO area)
AF6;20;12.8;49;0;0   (AF6 is the third line of lower left TO area)
STOP                 (Stop the alphanumerics command)
```

Dynamic Alphanumeric and Bar Code Data

Enter the following dynamic data following the Execute command. These dynamic data commands will supply the variable data to the bar code and alphanumeric fields previously identified in the Create Form mode. After entering the data, exit the file (if necessary with your system) and print. The completed form is shown in Figure 6–3.

```
~EXECUTE;SAMPLE
~AF1;*B AND C CO.*          (Upper left label addressee)
~AF2;*P.O. BOX 212*
~AF3;*LOS ANGELES, CA 90051*
~AF4;*M. H. INC*            (Upper right label addressee)
~AF5;*101 BEACH RD*
~AF6;*MALIBU, CA 97772*
~BF1;*S05995*               (Upper left label S.O.)
~BF2;*011233*               (Upper left label S/N)
~BF3;*190204*               (Upper left label P/N)
~BF4;*S05996*               (Upper right label S.O.)
~BF5;*000535*               (Upper right label S/N)
~BF6;*104523*               (Upper right label P/N)
~FF                         (Completes 1st form–upper labels)
~AF1;*ABC CORPORATION*      (Lower left label addressee)
~AF2;*1234 ANYWHERE ST*
~AF3;*YOUR TOWN, MA 03498*
~AF4;*XYZ COMPUTERS*        (Lower right label addressee)
~AF5;*845 N. ALLEN ST*
~AF6;*WEST BEND, OR 97601*
~BF1;*S05997*               (Lower left label S.O.)
~BF2;*456789*               (Lower left label S/N)
~BF3;*102245*               (Lower left label P/N)
~BF4;*S05999*               (Lower right label S.O.)
~BF5;*567890*               (Lower right label S/N)
~BF6;*103764*               (Lower right label P/N)
~NORMAL                     (Completes 2nd form–lower labels)
```

Multiple page documents must be separated by a form feed. (The “page” of data includes the Execute command, the dynamic data commands, and the Normal command.) Using the SFON command (described on page 4–90), a ~FF (form feed) command will allow as many forms as required to print with the appropriate new data supplied dynamically. When the SFOFF command is used, send a hex 0C instead of ~FF to print multiple pages with new dynamic data.

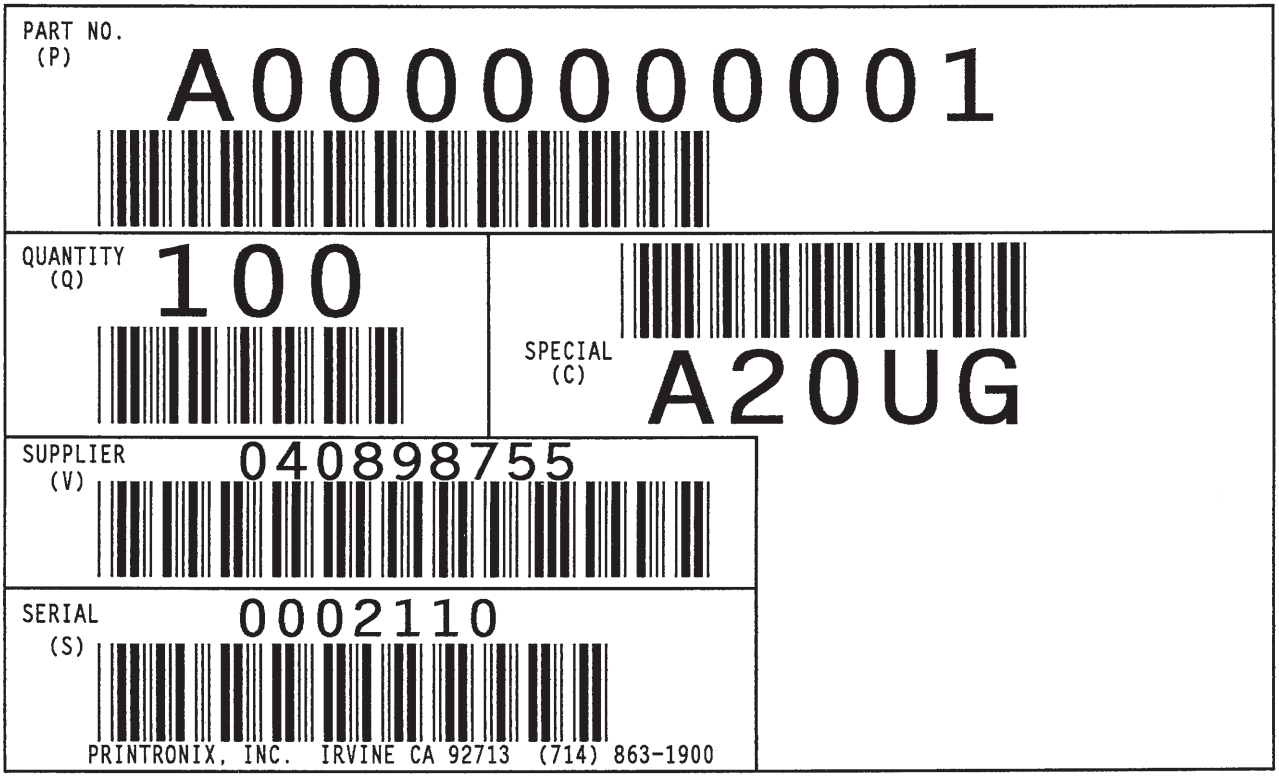
Figure 6–3. Dynamic Data Example

Example: Auto Increment Fields

The following program, designed in accordance with current specifications for AIAG–B–3 shipping label standards, creates four automatically incrementing/decrementing AIAG labels with alphanumeric and bar code data. The printed output of this program is shown on pages 6–17 and 6–18.

```
                                                /LOWER LABEL
BOX
1;31.2;1;55.2;66.5
STOP
HORZ                                            /THREE HORIZONTAL
1;38.5;1;66.5
1;44.9;1;40
1;49.10;1;40
STOP
VERT                                            /TWO VERTICAL LINES
1;26;38.5;44.9
1;40;44.9;55.2
STOP
ALPHA
C15;31.8;2;0;0;*PART NO.*
C15;32.6;2;0;0;* (P)*
I;34.3;9;4;4;00000000002;*A0000000002*    /LABEL COUNT ALPHA INCREMENT
C15;38.9;2;0;0;*QUANTITY*
C15;39.6;2;0;0;*  (Q)*
40.5;8;4;4;*100*
C15;41.9;28;0;0;*SPECIAL*
C15;42.6;28;0;0;*  (C)*
I;43.9;34;4;4;-00002;*A20UF*                /ALPHA DECREMENT
C15;45;2;0;0;*SUPPLIER*
C15;45.10;2;0;0;*  (V)*
45.7;7;2;2;*   040898755*
C15;50.4;2;0;0;*SERIAL*
C15;51.2;2;0;0;*  (S)*
50.8;7;2;2;*   0002110*
C15;54.5;4;0;0;*  PRINTRONIX, INC.  IRVINE CA 92713  (714) 863-1900*
STOP

BARCODE
C3/9;H7;I;DARK;34.7;5.5
X000000002;*A000000002*                     /BARCODE INCREMENT
STOP
BARCODE
C3/9;H7;DARK;40.9;5.5
*Q100*
STOP
BARCODE
C3/9;H7;I;DARK;38.1;33
-X00002;*CA2OUF*                            /BAR CODE DECREMENT
STOP
BARCODE
C3/9;H7;DARK;45.11;5.5
*V040898755*
STOP
BARCODE
C3/9;H7;DARK;50.9;5.5
*S0002110*
STOP
END                                          / REPEAT LABEL TWO TIMES

~EXECUTE;AIAG;2

~NORMAL
```

```
~CONFIG
TOP/BOTTOM MARGIN:50
LEFT MARGIN:50
END
~CREATE:AIAG

BOX                                          /UPPER LABEL
1;1.2;1;25.2;66.5
STOP
HORZ                                         /THREE HORIZONTAL LINES
1;8.4;1;66.5
1;14.9;1;40
1;19.6;1;40
STOP
VERT                                         /TWO VERTICAL LINES
1;26;8.4;14.9
1;40;14.9;25.2
STOP
ALPHA
C15;1.8;2;0;0;*PART NO.*
C15;2.6;2;0;0;* (P)*
I;4.3;9;4;4;00000000002;*A0000000001*      /LABEL COUNT ALPHA INCREMENT
C15;8.9;2;0;0;*QUANTITY*
C15;9.6;2;0;0;*  (Q)*
10.5;8;4;4;*100*
C15;11.9;28;0;0;*SPECIAL*
C15;12.6;28;0;0;*  (C)*
I;13.9;34;4;4;-00002;*A20UG*                 /ALPHA DECREMENT
C15;15;2;0;0;*SUPPLIER*
C15;15.10;2;0;0;*  (V)*
15.6;7;2;2;*   040898755*
C15;20;2;0;0;*SERIAL*
C15;21;2;0;0;*  (S)*
20.5;7;2;2;*   0002110*
C15;24.4;4;0;0;*  PRINTRONIX, INC.  IRVINE CA 92713  (714) 863-1900*
STOP

BARCODE
C3/9;H7;I;DARK;4.7;5.5
X000000002;*A000000001*                      /BAR CODE COUNT INCREMENT
STOP
BARCODE
C3/9;H7;DARK;10.9;5.5
*Q100*
STOP
BARCODE
C3/9;H7;I;DARK;8.1;33
-X00002;*CA20UG*                             /BAR CODE  DECREMENT
STOP
BARCODE
C3/9;H7;DARK;15.7;5.5
*V040898755*
STOP
BARCODE
C3/9;H7;DARK;20.8;5.5
*S0002110*
STOP
```



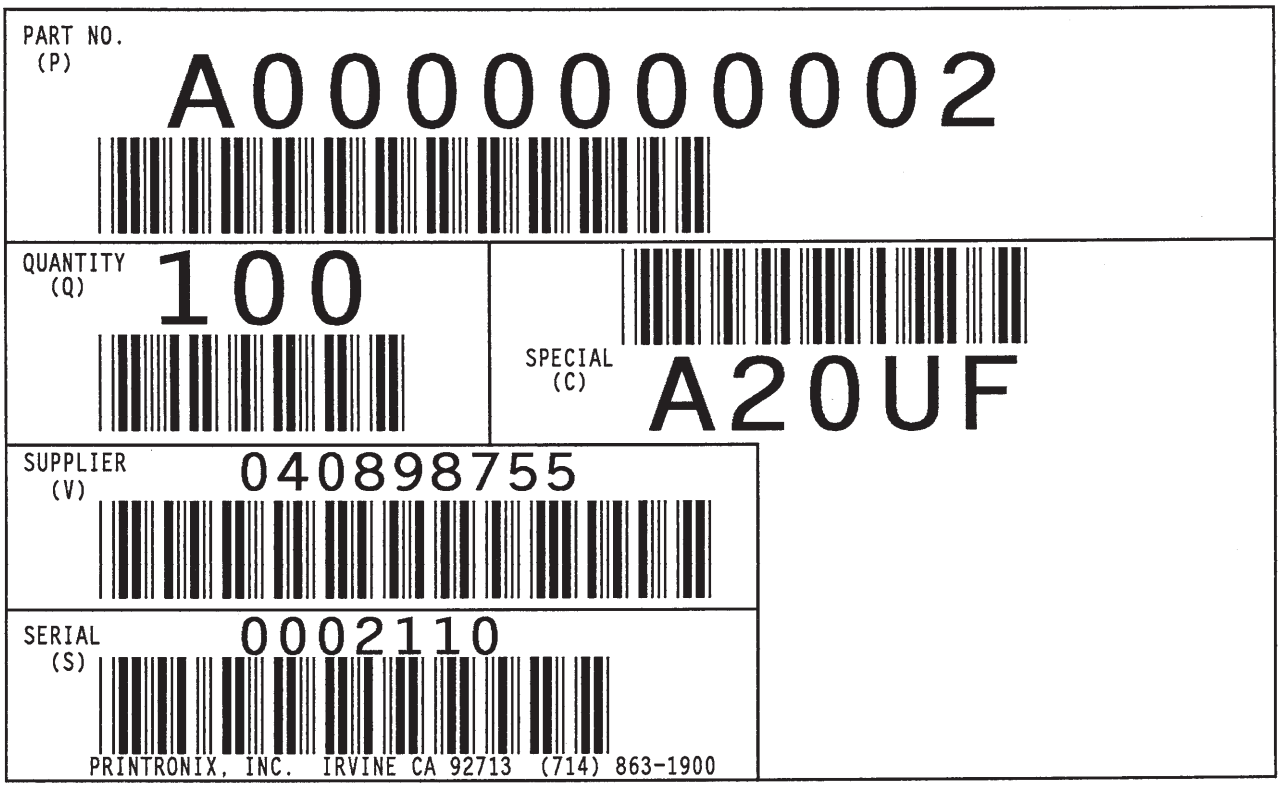


Figure 6–4. Auto Increment Fields Example

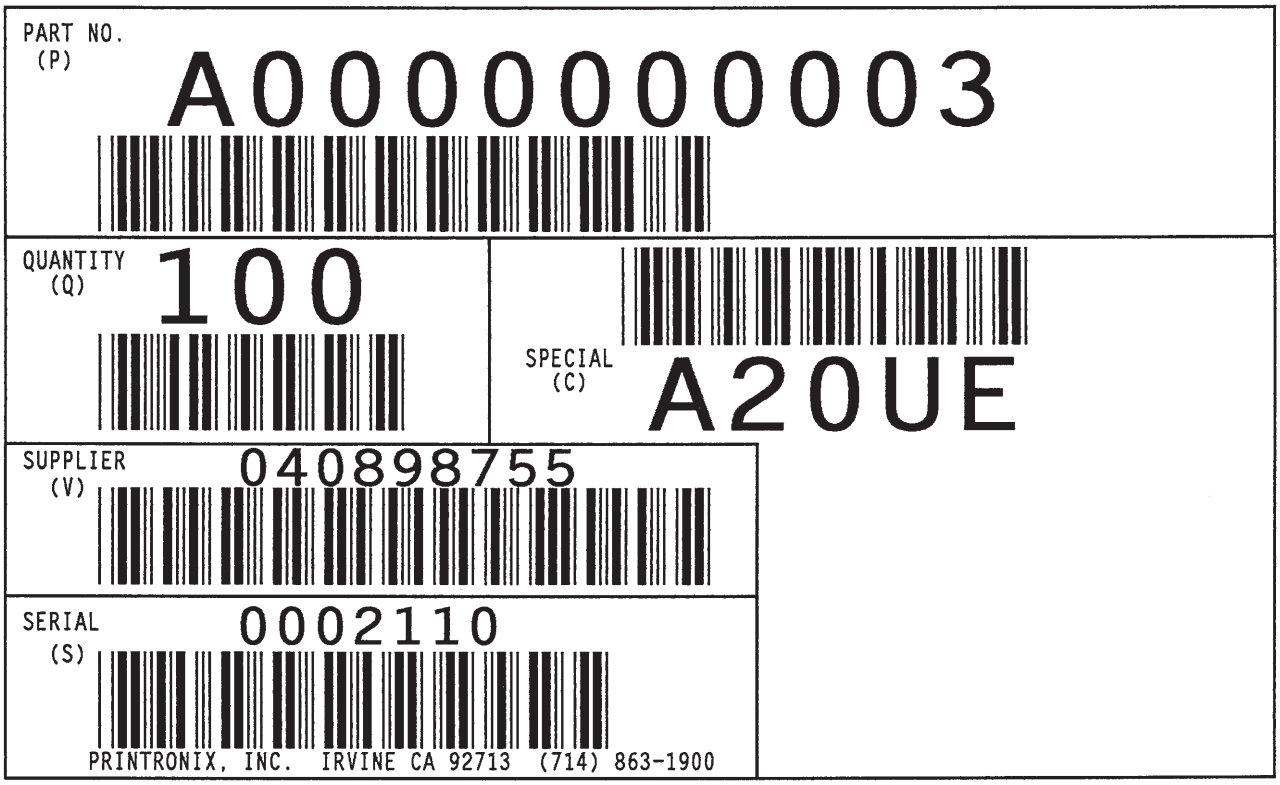


Figure 6–5. Auto Increment Fields Example

Form Exercise

In the following example, you will create and execute a form. Using character scaling (discussed in detail on page 4–88) on a 60 x 72 dot per inch (dpi) grid, your form will include the following:

- a box
- a set of corners
- vertical lines
- alphanumeric data
- horizontal lines
- a bar code

This exercise will help you become familiar with the IGP/PGL by taking you through 14 steps to build a complete form. Detailed command descriptions for producing forms, bar codes, and logos are described in the "Commands" chapter.

All the data and commands for the form are entered into a file in the host computer. The filename used in this exercise is PRACTC.FRM, and the form name used is PRACTICE. If another form named PRACTICE already exists, it will be deleted by this exercise.

Begin each step by reading the explanation. The information you input is listed under the word **Enter**. The parameters of each command have a specific order for data entry; input the data exactly as shown, but always use the actual SFCC required by your system where the ~ is shown. The general command format is listed under the word **Format** next to each example. The SFCC is represented by (cc) in the general format.

Use the standard commands on your system to open, close, or print the file with the form data where your system format is required.

NOTE: Do not forget to terminate each command line with a line feed (or carriage return with line feed), or a paper motion command. Enter all commands in uppercase. Make sure the printer power is on and the printer is READY, ON–LINE.

Creating a Box and Corners

1. On your host computer, open/create a file for your practice form. For example:

Enter	Format
PRACTC.FRM	(system format)

2. Enter the Create Form mode, and specify a form name. This is the first input for every new form. Use the Create command and PRACTICE as the form name.

Enter	Format
~CREATE;PRACTICE	(cc)CREATE[/];*formname[;FL]*[;DISK]

3. The IGP/PGL is now ready for Create Form mode commands. Design a box with a line thickness (LT) of 2 dots, a top left corner at starting row (SR) 35, starting column (SC) 16, and a bottom right corner at ending row (ER) 53, ending column (EC) 61. The STOP command must be entered to inform the IGP/PGL that the Box command is complete.

Enter	Format
BOX	BOX
2;35;16;53;61	*LT;SR;SC;ER;EC*
STOP	STOP

4. Use the Corner command to set the box off with corners having a line thickness (LT) of 3 dots, a top left corner at row (SR) 30, column (SC) 13, a bottom right corner at row (ER) 57, column (EC) 64, a vertical length (VL**)** 5 character spaces long, and a horizontal length (HL) 7 character spaces long. The STOP command must be entered to stop the Corner command and END must be entered to terminate the Create Form mode to prepare for printing.

Enter	Format
CORNER	CORNER
3;30;13;57;64;5;7	*LT;SR;SC;ER;EC;VL;HL*
STOP	STOP
END	END

5. Now use the Execute command and form name to prepare for printing. Enter a blank line using a terminator and then the Normal command to instruct the IGP/PGL to return to the Normal mode after executing the form.

Enter	Format
~EXECUTE;PRACTICE	(cc)EXECUTE*;formname*[;PAGE n]*[;FC]*[;DISK]
~NORMAL	(cc)NORMAL

6. To print the form, exit the file (if necessary for your system) and use the system print command to print the file. For example, after exiting the file and your system prompt returns:

Enter	Format
PRINT PRACTC.FRM	(System Format)

The form should look like the one shown in Figure 6–6. When it was printed, the form program was stored in the IGP/PGL memory. If errors are detected in the program, error messages are printed and only the error–free portions of the program are stored in the IGP/PGL memory. (Refer to “Solving Program Errors” on page 6–49.)

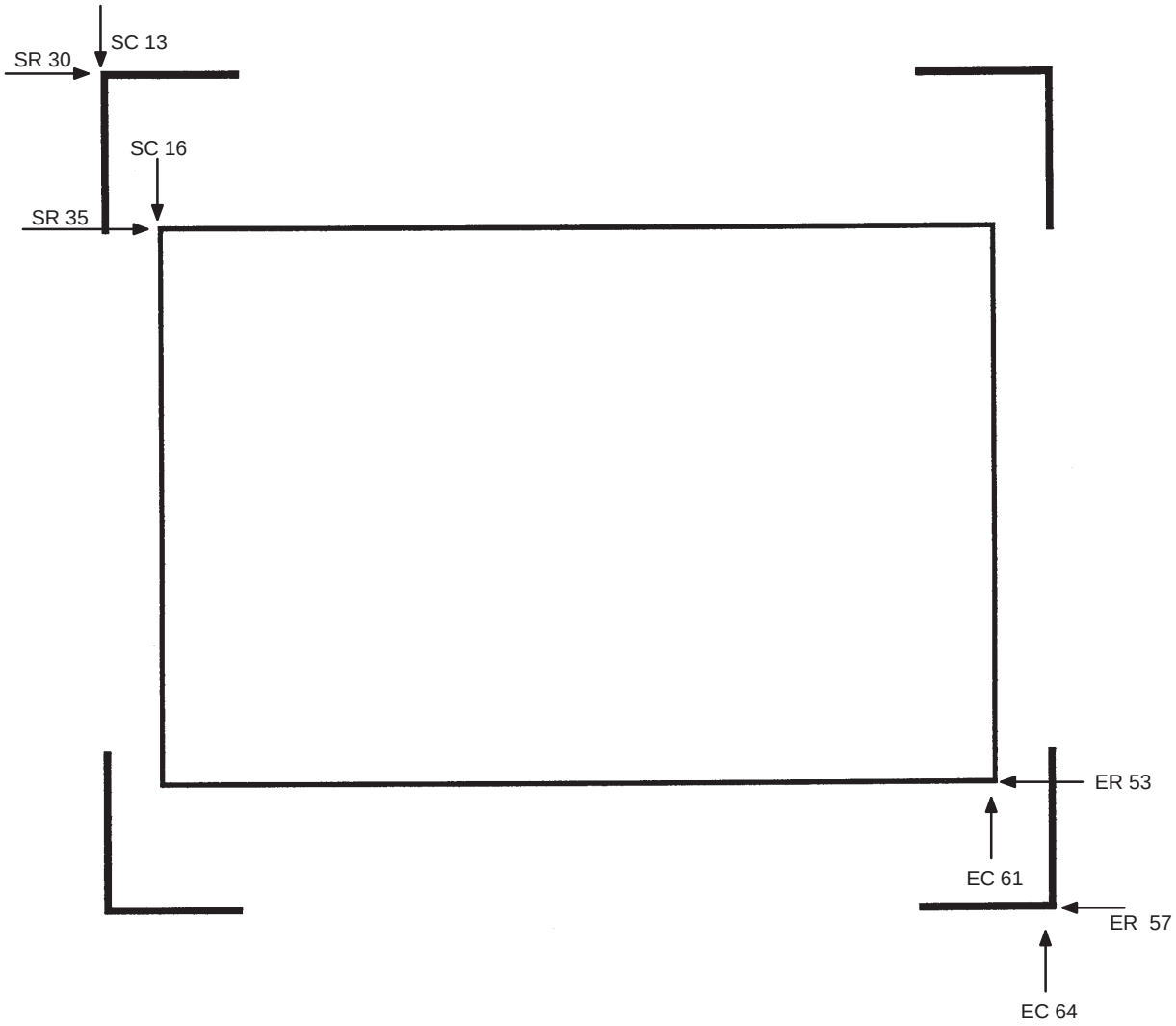


Figure 6–6. Box and Corner Example

7. Now return to the file. When the file reopens, the existing program (the contents of the file) is displayed. Use your system commands to reopen the file. For example:

Enter	Format
PRACTC.FRM	(System Format)

8. All Create Form mode commands must be entered into the program before the End command line. Add three horizontal lines, each with a thickness (LT) of 1 at rows (R) 40, 45, and 49 and each ranging from column (SC) 16 to column (EC) 61.

Enter	Format
HORZ	HORZ
1;40;16;61	*LT;R;SC;EC*
1;45;16;61	
1;49;16;61	
STOP	STOP

9. Add two vertical lines, each with a thickness (LT) of 1, both in column (C) 49, one ranging from row (SR) 40 to row (ER) 45 and the other ranging from row (SR) 49 to row (ER) 53.

Enter	Format
VERT	VERT
1;49;40;45	*LT;C;SR;ER*
1;49;49;53	
STOP	STOP

The last two commands have added to the form definition. PRACTICE now looks like Figure 6–7.

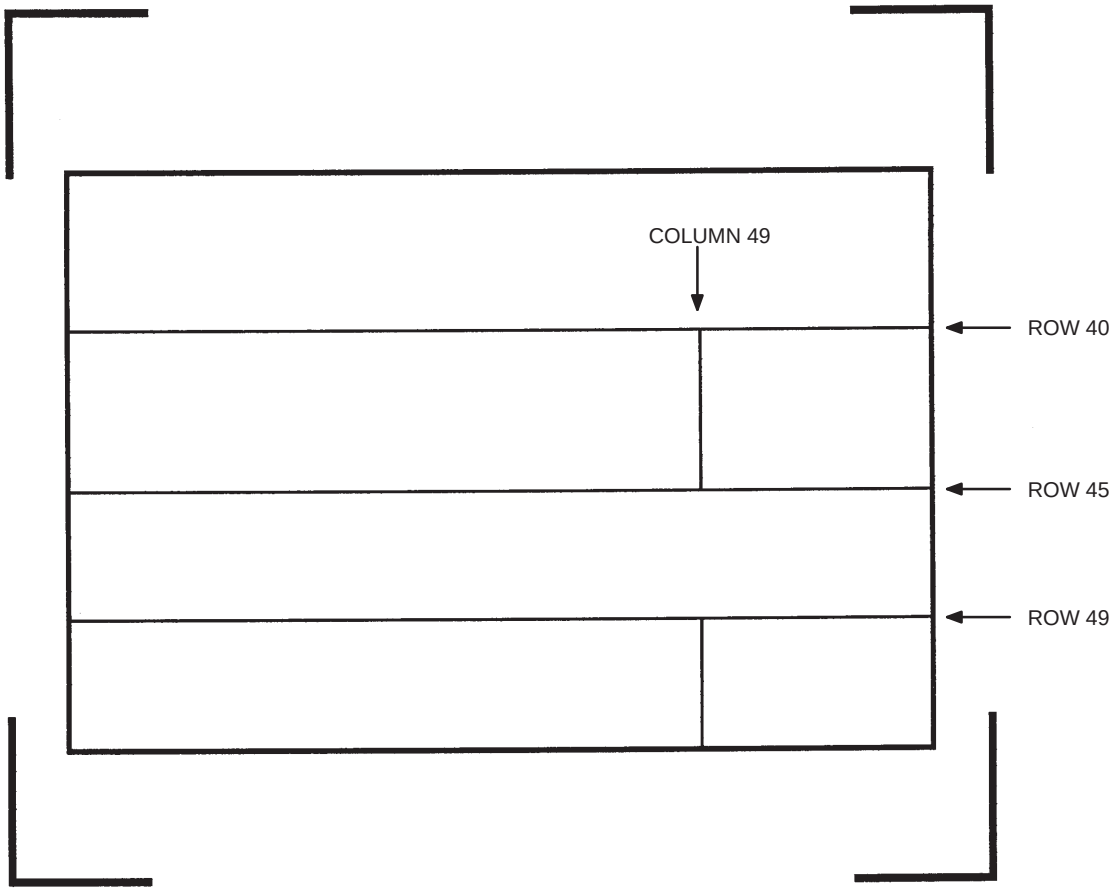


Figure 6–7. Box/Corner Example with Horizontal and Vertical Lines

Adding Fixed Alphanumeric Text

10. Use the Create Form mode Alpha command to add some fixed alphanumeric text to the form. Specify some compressed print (Cn), the starting row (SR) and starting column (SC) for each alphanumeric string, any vertically (VE**)** or horizontally (HE) expanded strings, and the alphanumeric string itself which must be within the printable character (quotation marks or asterisks, for example). Substitute your own name, address, etc. in the appropriate areas. If you do not want to include some of the data on your form, do not enter the line.

    Enter

    ALPHA
    31;22;0;0;*PRINTRONIX, INC*
    32;22;0;0;*17500 CARTWRIGHT ROAD*
    33;22;0;0;*IRVINE, CA 92714*
    35.9;17;0;0;*SERIAL NUMBER*
    40.3;17;0;0;*PART NUMBER*
    40.3;50;0;0;*MFG. DATE*
    45.3;17;0;0;*DESCRIPTION*
    49.3;17;0;0;*INTERFACE*
    49.3;50;0;0;*VERSION*
    C13;31;16;0;0;*FROM:*
    C15;54;26;0;0;*Call PRINTRONIX for more information.*
    C15;55;34;0;0;*(714)863–1900*
    STOP

    Format

    ALPHA
    [R;][E;]*[Cn;][*AF*n;L;][DIR;]*[UC;][DARK;]*SR;SC;VE;HE;(D)Text(D)*
    STOP

NOTE: The sample data entered above uses CP.DP format (such as 35.9, 40.3, etc.) in the starting row (SR) parameters. This precisely positions the data to avoid overlapping the alphanumeric data with the box and horizontal line data previously entered. For complete information on the CP.DP format, refer to the “Commands” chapter.

At this point, the PRACTC.FRM file should contain the following form program data:

```
~CREATE;PRACTICE
BOX
2;35;16;53;61
STOP
CORNER
3;30;13;57;64;5;7
STOP
HORZ
1;40;16;61
1;45;16;61
1;49;16;61
STOP
VERT
1;49;40;45
1;49;49;53
STOP
ALPHA
31;22;0;0;*PRINTRONIX, INC.*
32;22;0;0;*17500 CARTWRIGHT ROAD*
33;22;0;0;*IRVINE, CA 92714*
35.9;17;0;0;*SERIAL NUMBER*
40.3;17;0;0;*PART NUMBER*
40.3;50;0;0;*MFG. DATE*
45.3;17;0;0;*DESCRIPTION*
49.3;17;0;0;*INTERFACE*
49.3;50;0;0;*VERSION*
C13;31;16;0;0;*FROM:*
C15;54;26;0;0;*Call PRINTRONIX for more information.*
C15;55;34;0;0;*(714)863–1900*
AF1;7;38.7;19.3;4;3
AF2;11;43;20;2;2
AF3;31;47.3;20;2;1
AF4;33;51.3;20;2;1
STOP
END

~EXECUTE; PRACTICE
~NORMAL


PRINT PRACTC.FRM  (Host system command to send file to printer.)
```

Notice that the END, EXECUTE;PRACTICE and NORMAL statements are still in the file. These are always necessary to end the storage of the form in the IGP/PGL and cause it to print. Remember, a blank line must *always* separate the EXECUTE and NORMAL commands. Print the file PRACTC.FRM. The PRACTICE form should look like Figure 6–8, except for any alphanumeric data substitutions you made. Again, if error messages occur, refer to “Solving Program Errors” on page 6–49 .

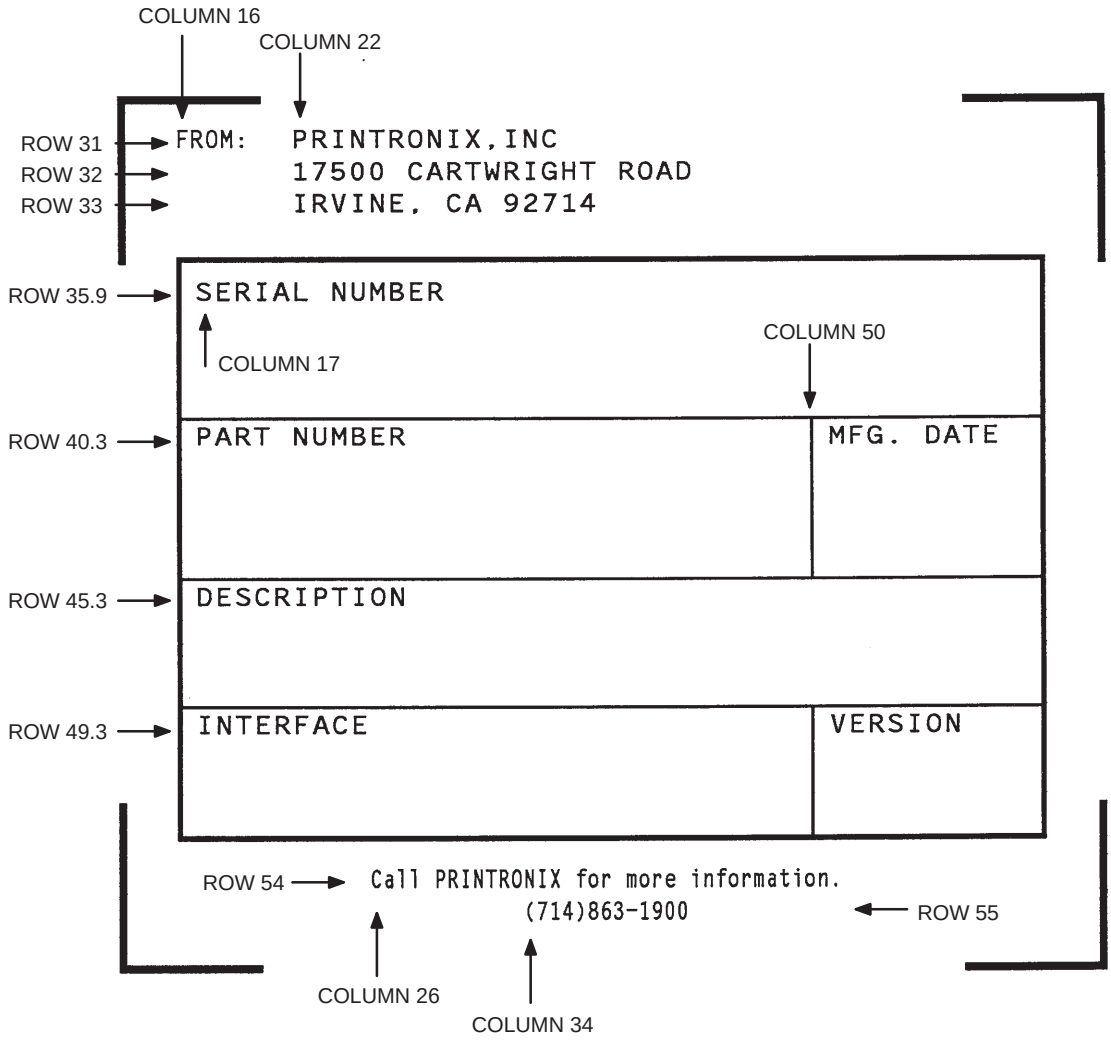


Figure 6–8. Practice Form Example

Adding a Bar Code

11. Change the form definition by adding bar code type Code 39 (C39), one of the codes available on the IGP/PGL. First, reopen the file. Bar codes are defined in the Create Form mode; therefore, the Bar Code command *must* be entered before the End command line. In the Bar Code command, specify type C39 and 0.8 inch height (Hn**)**. Use a dynamic bar code data field (BF) identified by the number (n) 1 with a length (L) of 5. The actual data will be provided dynamically in the Execute Form mode. Specify the starting row (SR) 35.7 and starting column (SC) 39, and stop the command.

    Enter

    BARCODE
    C3/9;H8;BF1;5;DARK;35.7;39
    STOP

    Format

    BARCODE
    C3/9[CD];[VSCAN;]*[MAG;][Hn;]*[BF*n;L;]*[DARK;]*SR;SC*
    [(D)data field(D)]
    *[*PDF*[;LOC][;FONT]]*
    STOP

12. To dynamically input alphanumeric data fields, first identify the locations for the data in the Create Form mode as part of the form definition. Enter the locations in the existing Alpha command sequence (or use a new Alpha command). In the Alpha command sequence, enter the alphanumeric field (AF), the field number (n), length (L), starting row (SR) and column (SC), and any vertical (VE) or horizontal (HE) expansion. To enter this alphanumeric data in the existing Alpha command sequence, the data must be entered before the existing Alpha command STOP line.

    Enter

    AF1;7;38.7;19.3;3;3
    AF2;11;43;20;2;2
    AF3;31;47.3;20;2;1
    AF4;33;51.3;20;2;1

    Format

ALPHA (previously input)
[R;][E;]*[Cn;][*AF*n;L;][DIR;]*[UC;]*SR;SC;VE;HE;(D)Text(D)*
STOP (previously input)

13. Supply the dynamic data during the Execute Form mode (following the EXECUTE;PRACTICE line). Use the SFCC, specify the dynamic alphanumeric field (AF), bar code field (BF**)**, the field number (corresponding to those just entered in the form definition), and the data itself. (This method can be repeated to supply new data to each form printed by separating the pages of data with a form feed. Refer to "Execute Form: Dynamic Alphanumeric Data" on page 4–54 in the "Commands" chapter.)

Enter	**Format**
~AF1;*49114*	(cc)AFn;(D)*data*(D)
~AF2;*106772–902*	
~AF3;*INTELLIGENT GRAPHICS PROCESSOR*	
~AF4;*PARALLEL – CENTRONICS*	
~BF1;*49114*	(cc)BFn;(D)*data*(D)

14. Now the PRACTC.FRM file contains all the following information (the complete form program). Print the form by printing the file. The completed form is shown in Figure 6–9.

```
~CREATE;PRACTICE
BOX
2;35;16;53;61
STOP
CORNER
3;30;13;57;64;5;7
STOP
HORZ
1;40;16;61
1;45;16;61
1;49;16;61
STOP
VERT
1;49;40;45
1;49;49;53
STOP
```

```
ALPHA
31;22;0;0;*PRINTRONIX, INC.*
32;22;0;0;*17500 CARTWRIGHT ROAD*
33;22;0;0;*IRVINE, CA 92714*
35.9;17;0;0;*SERIAL NUMBER*
40.3;17;0;0;*PART NUMBER*
40.3;50;0;0;*MFG. DATE*
45.3;17;0;0;*DESCRIPTION*
49.3;17;0;0;*INTERFACE*
49.3;50;0;0;*VERSION*
C13;31;16;0;0;*FROM:*
C15;54;26;0;0;*Call PRINTRONIX for more information.*
C15;55;34;0;0;*(714)863–1900*
AF1;7;38.7;19.3;4;3
AF2;11;43;20;2;2
AF3;31;47.3;20;2;1
AF4;33;51.3;20;2;1
STOP
BARCODE
C3/9;H8;BF1;5;DARK;35.7;39
STOP
END
~EXECUTE;PRACTICE
~AF1;*49114*
~AF2;*106772–902*
~AF3;*INTELLIGENT GRAPHICS PROCESSOR*
~AF4;*PARALLEL – CENTRONICS*
~BF1;*49114*

~NORMAL
```

PRINT PRACTC.FRM (Host system command to send file to printer.)

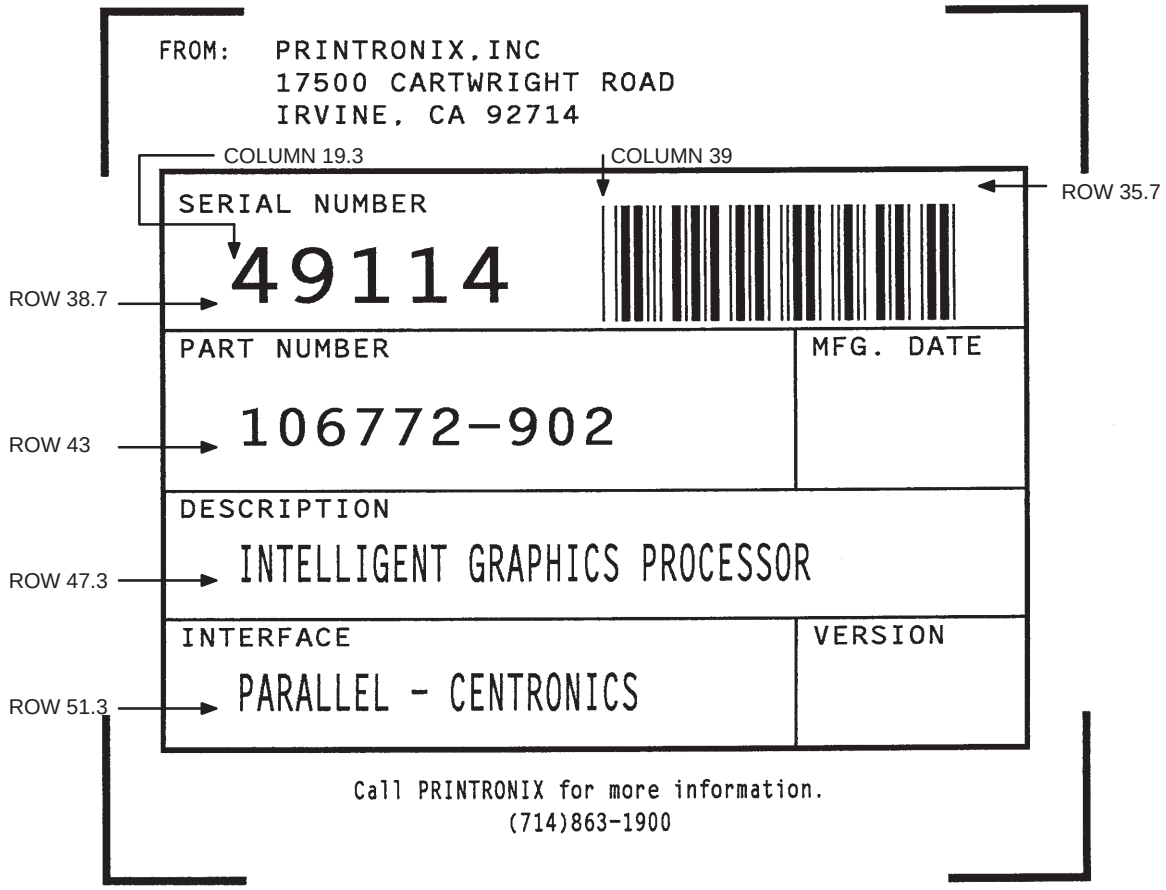


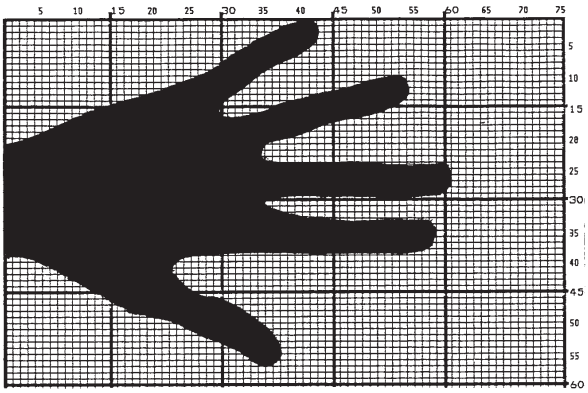
Figure 6–9. Completed Practice Form Example

Logo Exercise

In this exercise, you will generate a logo. The following sample uses a hand logo. Using dot scaling (discussed in detail on page 4–88) on an 8–1/2 x 11–inch form, a hand was drawn on a grid, with each dot tabulated by row and column position. If a grid coordinate occupies half or more of a dot position, include that position in your logo program. (Grid samples are located in Appendix B.)

Each dot position used must be identified individually. However, you can use a hyphen between the starting and ending columns to indicate a section of consecutive dots. For example, this hand logo requires dots in row 1, columns 40–42, shown in Figure 6–10. A sequential row order is not required.

A logo is created and stored as an element in the definition of a form. For example, to use a logo, first design it in the Create Logo mode; then add it to a form in the Create Form mode; then execute the form (with the logo) in the Execute Form mode. The following logo exercise includes all three of these steps.



DOT POSITIONS		DOT POSITIONS	
Row	**Column**	**Row**	**Column**
1	40–42	31	1–36
2	35–42	32	1–39
3	36–42	33	1–58
4	35–42	34	1–58
5	33–41	35	1–58
6	31–40	36	1–58
7	30–38	37	1–58
8	29–36	38	1–57
9	28–35	39	4–24
10	27–34;52–54	40	7–23
11	24–33;48–54	41	8–23
12	22–31;45–54	42	9–23
13	19–30;41–54	43	11–24
14	16–29;38–53	44	12–25
15	13–29;36–51	45	14–27
16	11–29;33–48	46	15–30
17	9–44	47	17–32
18	7–42	48	18–35
19	6–39	49	22–34
20	4–36	50	25–35
21	1–34	51	26–36
22	1–34	52	28–37
23	1–34	53	30–37
24	1–60	54	32–37
25	1–60	55	33–37
26	1–60	56	35–36
27	1–60		
28	1–59		
29	1–59		
30	1–35		

Figure 6–10. Sample Logo

Creating a Logo

1. Use your system commands to open a file for the logo program with the filename HNDLGO.FOM. For example:

Enter	Format
HNDLGO.FOM	(System Format)

2. Input the Special Function Control Character and Logo mode command to put the IGP/PGL in the Create Logo mode. Include HAND as the logo name; specify a vertical length (VL) of 56 (column length) and a horizontal length (HL) of 60 (row length).

Enter	Format
~LOGO;HAND;56;60	(cc)LOGO;*logoname;VL;HL*[;DISK]

3. Enter each row of dot positions as tabulated from the grid and shown in Figure 6–10. The format is Row;Column (for example, 15;13–29;36–51). Each row is entered on a separate line. After all the dot positions are entered, terminate the Create Logo mode by entering an End command line.

4. Use the Special Function Control Character and Create command to create a form with the form name LEFTHAND. To add the logo to the form, input a Create Form mode Logo Call command, identify the logo starting row (SR) 45 and starting column (SC) 33, and specify the logo to use by its name (HAND). Stop the Logo command and end the Create Form mode.

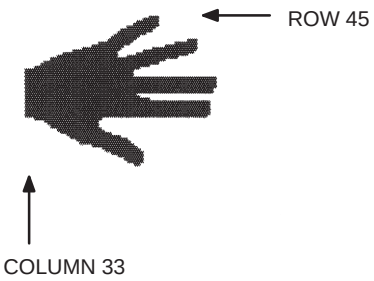
Enter	Format
~CREATE;LEFTHAND	(cc)CREATE;[/]*formname[;FL]*[;DISK]
LOGO	LOGO
45;33;HAND	*SR;SC;logoname*[;DISK]
STOP	STOP
END	END

5. Input the Special Function Control Character and Execute command for the LEFTHAND form just created. Input a blank line, the Special Function Control Character, and the Normal command to instruct the IGP/PGL to return to the Normal mode after execution.

Enter	Format
~EXECUTE;LEFTHAND	(cc)EXECUTE;*formname*[;PAGE n]*[;FC]*
~NORMAL	(cc)NORMAL

6. Use system commands to exit the HNDLGO.FOM file and print. The finished program and logo should look like the following sample. If error messages occur, refer to “Solving Program Errors” on page 6–49 .

```
~LOGO;HAND;56;60
1;40–42
2;38–42
3;36–42
4;35–42
5;33–41
6;31–40
7;30–38
8;29–36
9;28–35
10;27–34;52–54
11;24–33;48–54
12;22–31;45–54
13;19–30;41–54
14;16–29;38–53
15;13–29;36–51
16;11–29;33–48
17;9–44
18;7–42
19;6–39
20;4–36
21;1–34
22;1–34
23;1–34
24;1–60
25;1–60
26;1–60
27;1–60
28;1–59
29;1–59
30;1–35
31;1–36
32;1–39
33;1–58
34;1–58
35;1–58
36;1–58
37;1–58
38;1–57
39;4–24
40;7–23
41;8–23
42;9–23
43;11–24
44;12–25
45;14–27
46;15–30
47;17–32
48;18–33
49;22–34
50;25–35
51;26–36
52;28–37
53;30–37
54;32–37
55;33–37
56;35–36
END
~CREATE;LEFTHAND
LOGO
45;33;HAND
STOP
END
~EXECUTE;LEFTHAND
~NORMAL
```



Form Design

In this exercise, you will produce a complete form by sketching it out on a grid in the same way the logo was designed. Again, this exercise uses character scaling on an 8–1/2 x 11–inch (60 x 72 dpi) page. (Again, the thermal printer does not use the 8–1/2– x 11–in format, so modifications are necessary.) (Refer to page 4–88 in the “Commands” chapter, where character scaling is discussed in detail.)

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 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. (Appendix C discusses the printable area for different form sizes in more detail.)

Using the grids provided in Appendix B, sketch out the form layout and identify the starting and ending values. These values will be used to input IGP/PGL command parameters.

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 salespeople 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 this 12–step task as described below.

1. First, design the form on the Standard Grid provided in Appendix B. Figure 6–11 shows the locations of the various form components. Compensate for expanded characters and plan for the logo.

2. Define the logo and then return to the form to add all the form components. Modify the hand logo already on file as the HandCraft logo. Use the Logo Grid in Appendix B, and refer to Figure 6–12, which shows the dot positions of the hand logo with a boat added to the hand. When dot positions (or a range of dot positions) are *not* specified, the boat image in the hand emerges.

3. Open a file named HNDCFT.FOM to contain all the form information. As shown in the following example, use the Create Logo mode command, name the logo HANDCRFT, specify the logo height (VL) and width (HL), enter the dot positions used, and end the Logo command.

Enter	Format
HNDCFT.FOM	(System Format)
~LOGO;HANDCRFT;56;60	(cc)LOGO;*logoname*;*VL;HL*[;DISK]
1;40–42	*row#;dot;dot1–dot2;dot*
2;38–42	
3;36–42	
4;35–42	
5;33–41	
6;31–40	
7;30–38	
8;29–36	
9;28–35	
10;27–34;52–54	
11;24–33;48–54	
12;22–31;45–54	
13;19–30;41–54	
14;16–29;38–53	
15;13–17;19–29;36–51	
16;11–17;20–29;33–48	
17;9–17;21–44	
18;7–17;22–42	
19;6–17;22–39	
20;4–17;23–36	
21;1–17;24–34	
22;1–17;25–34	
23;1–17;26–34	
24;1–17;27–60	
25;1–17;28–60	
26;1–17;29–60	
27;1–17;30–60	
28;1–17;31–59	
29;1–17;19–59	
30;1–17;19–35	
31;1–4;33–36	
32;1–5;33–39	
33;1–6;33–58	
34;1–7;33–58	
35;1–58	
36;1–58	
37;1–58	
38;1–57	
39;4–24	
40;7–23	
41;8–23	
42;9–23	
43;11–24	
44;12–25	
45;14–27	
46;15–30	
47;17–32	
48;18–33	
49;22–34	
50;25–35	
51;26–36	
52;28–37	
53;30–37	
54;32–37	
55;33–37	
56;35–36	
END	END

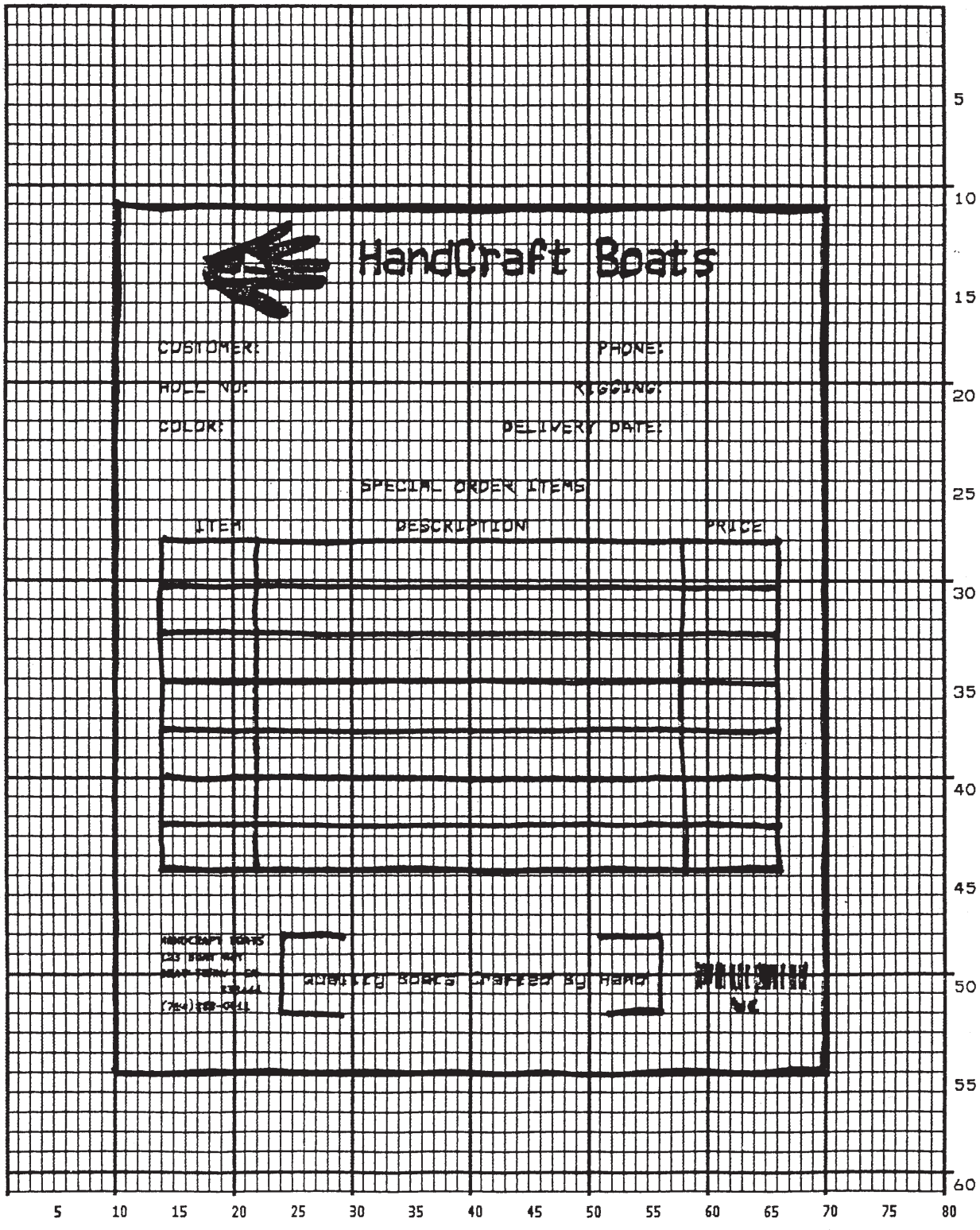


Figure 6–11. Sample Form Design

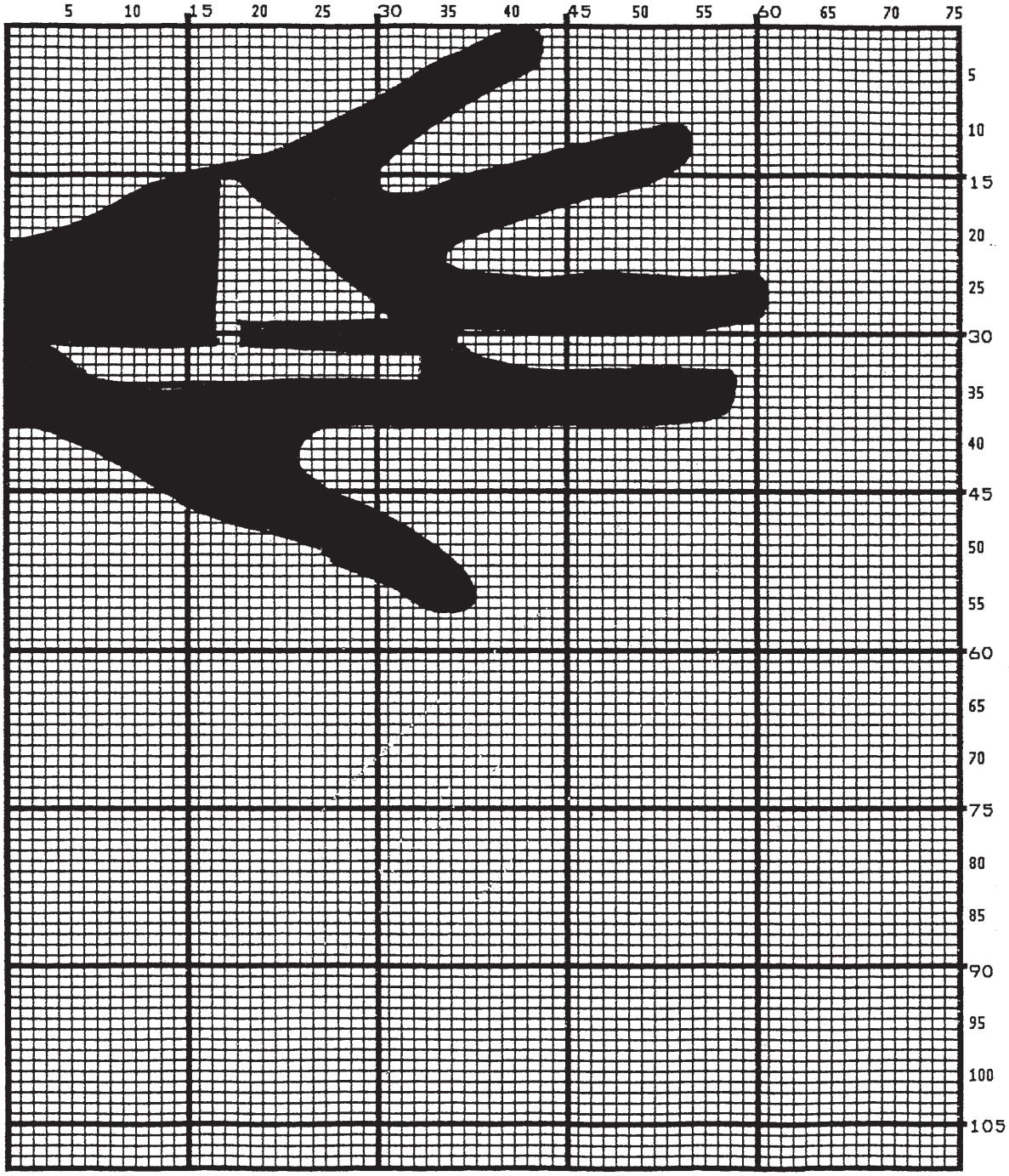


Figure 6–12. Logo Design

4. Now create the form and start adding the form components from the layout grid. (Refer to Figure 6–11). Use the Special Function Control Character and Create command to define a form named HCBOATS. Use the Box command to define the outer border with a line thickness (LT) 3, top left corner at row (SR) 11 column (SC) 10, and bottom right corner at row (ER) 55, column (EC) 70. In the same Box command sequence, define another box with a line thickness of 2, top left corner at row 28 column 14, and bottom right corner at row 44.9 column 66. After defining the boxes, stop the Box command.

Enter	Format
~CREATE;HCBOATS	(cc)CREATE;[/]*formname[;FL]*[;DISK]
BOX	BOX
3;11;10;55;70	*LT;SR;SC;ER;EC*
2;28;14;44.9;66	
STOP	STOP

5. Mr. Handcraft would like corners around the slogan. Use the Corner command to define a line thickness (LT) of 2, top left corner at row (SR) 48 column (SC) 24, and bottom right corner at row (ER) 52 column (EC) 56. Make the vertical (VL) corner piece 4 spaces long and the horizontal (HL) corner piece 5 spaces long. Then stop the Corner command.

Enter	Format
CORNER	CORNER
2;48;24;52;56;4;5	*LT;SR;SC;ER;EC;VL;HL*
STOP	STOP

6. To make the columns for the special order items, add two vertical lines each with a line thickness (LT) of 1, one line in column (C) 22 and the other line in column 58. Each line will start at row (SR) 28 and end at row (ER) 44.9.

Enter	Format
VERT	VERT
1;22;28;44.9	*LT;C;SR;ER*
1;58;28;44.9	
STOP	STOP

7. To add the horizontal lines, define one line and then duplicate that line using the Vertical Duplication command. The line will have a single line thickness (LT), be in row (R) 30.4, starting in column (SC) 14 and ending in column (EC) 66. With vertical duplication, the line will be duplicated (DN) 6 times with 2.5 row offset (OF) spacing between each duplication. The Vertical Duplication command must be input, the horizontal line being duplicated must be input, and the Vertical Duplication command must be turned off.

Enter	**Format**
VDUP;6;2.5	VDUP;*dup#*;*offset#*
HORZ	HORZ
1;30.4;14;66	*LT;R;SC;EC*
STOP	STOP
VDUP;OFF	VDUP;OFF

8. All the text shown on the grid is fixed into position on the form with a single Alpha command sequence. The starting row, starting column, and text can be taken right from the grid and put into the program.

Enter

```
ALPHA
14;31;3;2;*HandCraft Boats*
18;14;0;0;*CUSTOMER:*
18;51;0;0;*PHONE:*
20;14;0;0;*HULL NO:*
20;49;0;0;*RIGGING:*
22;14;0;0;*COLOR:*
22;43;0;0;*DELIVERY DATE:*
25;31;1;1;*SPECIAL ORDER ITEMS*
27;17;0;0;*ITEM*
27;34;0;0;*DESCRIPTION*
27;60;0;0;*PRICE*
50;26;1;1;*Quality Boats Crafted By Hand*
C17;48;14;0;0;*HandCraft Boats*
C17;48.10;14;0;0;*123 Boat Way*
C17;49.8;14;0;0;*Boat Town, CA*
C17;50.6;19;0;0;*333444*
C17;51.4;14;0;0;*(714)555–0011*
STOP
```

Format

ALPHA
[R;][E;]*[Cn;][*AF*n;L;][DIR;]*[UC;][DARK;]*SR;SC;VE;HE;(D)text(D)*
STOP

9. HandCraft Boats uses bar code type Code 128B (C128B) in many applications. Use bar code C128B, height (Hn) of .5–inch, starting at row (SR) 49, column (SC) 59, code the West Coast Sales Region as *WC*, and print the data field (PDF) below the symbol.

NOTE: Due to space constraints, the C128B command below is separated into two lines. During actual input, *do not* separate the command parameters.

Enter	**Format**
BARCODE	BARCODE
C128B;H5;49;59	C128B;[VSCAN;]*[MAG;][Hn;][*BF*n;L;]*
	[DARK;]*SR;SC*
WC	[(D)*datafield*(D)]
PDF	*[*PDF*[;LOC][;FONT]]*
STOP	STOP

NOTE: The decimal point is not entered in the height parameter (H5) above because values are expected in .10–inch increments. Values from 4 to 99 (.4–inch to 9.9 inches) are accepted.

10. Add the logo and end the Create Form mode. Use the Logo Call command, specify the starting row (SR) at 12 and column (SC) at 18 as shown on the grid and call the logo by name (HANDCRFT). (The starting row and column of the logo refer to the upper left corner of the grid used in the logo design.)

Enter	**Format**
LOGO	LOGO
12;18;HANDCRFT	*SR;SC;logoname*[;DISK]
STOP	STOP
END	END

11. Execute the form (HCBOATS), return to the Normal mode (remember the blank line before the NORMAL command), exit the file using your system commands (if necessary), and print the document.

Enter	Format
~EXECUTE;HCBOATS	(cc)EXECUTE;*formname*[;PAGE n]*[;FC]*[;DISK]
~NORMAL	(cc)NORMAL
PRINT HNDCFT.FOM	(System Format)

NOTE: *Always* separate the EXECUTE and NORMAL commands by a line.

Figure 6–13 shows the finished form. If Mr. Handcraft would like to rearrange the words, change line thickness of a box, etc., simply reopen the file and change the appropriate command lines. Otherwise, his salespeople have a new form for notes on custom orders.

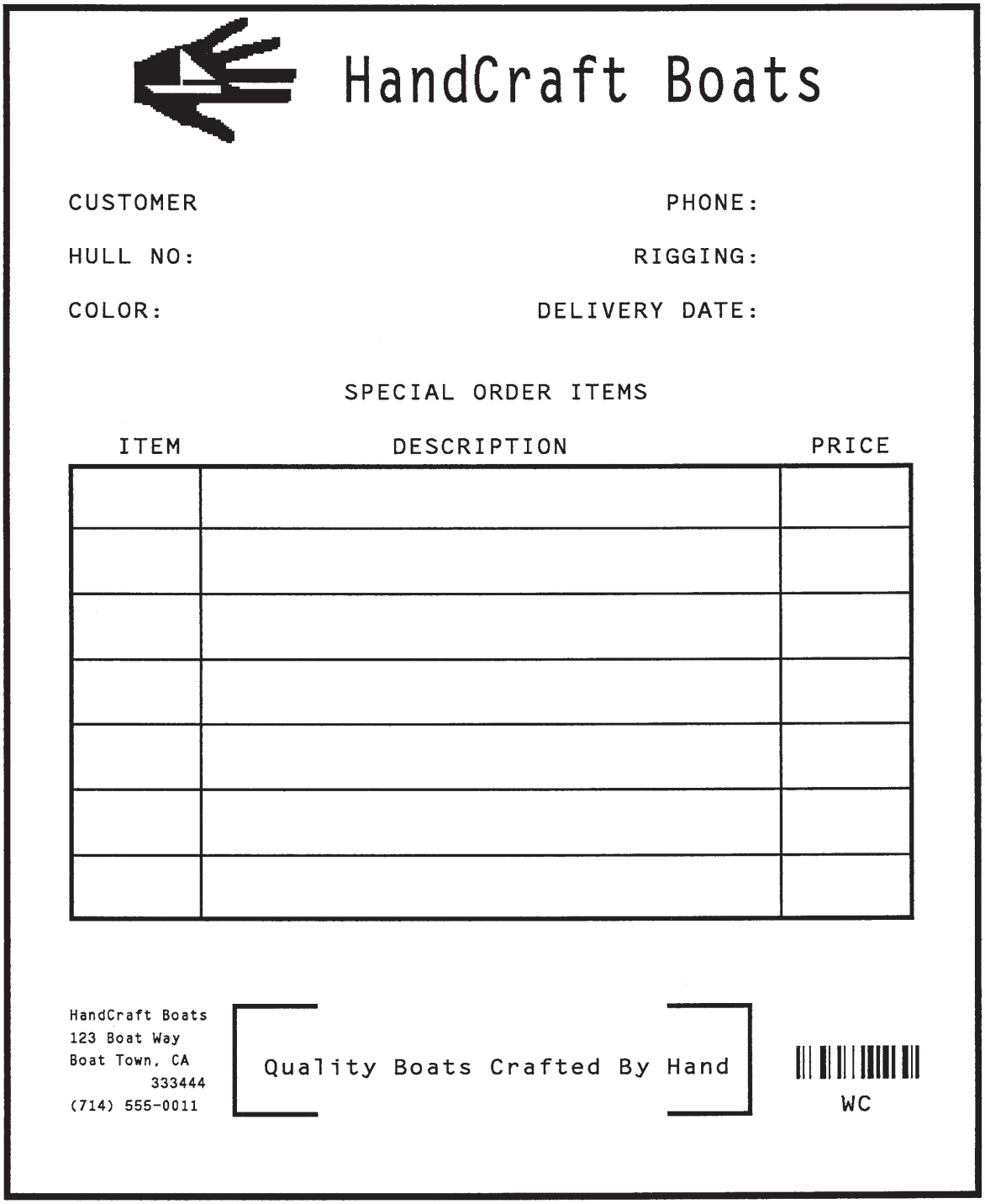


Figure 6–13. Completed Sample Form

Directory Example

The Directory command lists the contents of the IGP/PGL directory in the printer system. The directory command provides the following information:

All form names currently defined
All logo names currently defined
The association of logos to forms
The amount of memory used for form storage
The amount of dynamic storage space used and available

A form will not execute unless enough room exists in the memory as indicated in the work space bytes free portion of the directory listing. To print the directory, open a file, input the directory command, exit the file, and print.

For example (see Figure 6–14):

Enter	Format
DIRECT.FOM	(System Format)
~DIRECTORY	(cc)DIRECTORY
PRINT DIRECT.FOM	(System Format)

The Directory command can only be used when the IGP/PGL is in the Normal mode. Upon completion of the directory listing, the IGP/PGL returns to the Normal mode. If the IGP/PGL is not in the Normal mode, input the Normal mode command before the Directory command.

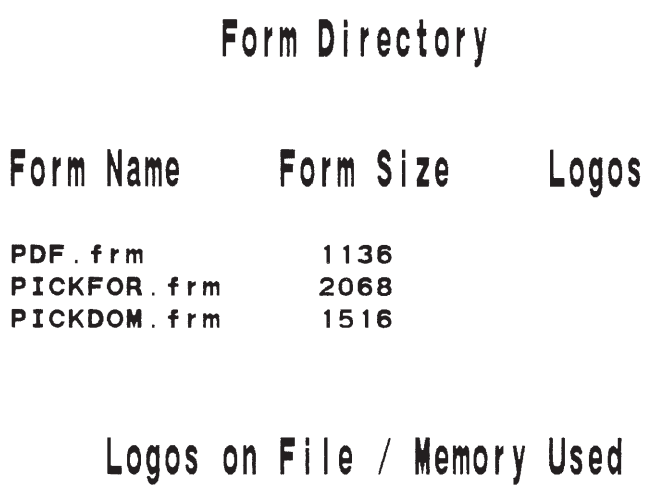


Figure 6–14. Sample Printout

Delete Example

The Delete command deletes any individual form or logo from the IGP/PGL memory module. The deletion of a form includes its directory entry and any alphanumeric or vector information associated with it. The Delete command is used only when the IGP/PGL is in the Normal mode.

Deletion of a logo includes its directory entry and its data in the logo storage area. Deletion of a valid logo which is still combined with a form will not cause an error at the time it is deleted; however, an error will occur if you execute a form that contains a previously deleted logo.

From the directory printed in the preceding section, delete the practice form, the HandCraft Logo, and the HandCraft Boats form. Similar to the format used with other command sequences, the procedure is as follows: open a file, input the commands, exit the file, and print. For example:

Enter	Format
DELETE.FRM	(System Format)
~DELETE FORM;PRACTICE	(cc)DELETE FORM;*formname*
~DELETE FORM;HCBOATS	
~DELETE LOGO;HANDCRFT	(cc)DELETE LOGO;*logoname*
PRINT DELETE.FRM	(System Format)

NOTE: List the directory again to verify that the forms and logos were deleted.

To delete a form or logo from the IGP/PGL memory module, add the DISK parameter to the above DELETE FORM or DELETE LOGO command:

~DELETE FORM;*formname;*DISK
~DELETE LOGO;*logoname*;DISK

A form cannot execute if insufficient space exists in the IGP/PGL memory. The directory Dynamic Work Space Bytes Free must be greater than the total size (in bytes) of the form. Delete older forms or logos to allow memory space for new forms and logos, or include the Delete command as the last statement in a logo or form program to immediately delete the data after it is processed. Creating a form (or logo) with the same name as an existing IGP/PGL form (or logo) will automatically delete the existing form (or logo).

Solving Program Errors

If you make an error in the program to create a form or an element in the form, a coded error message and program line containing the error will print when the form is executed. These error codes are defined in the “Error Codes” chapter.

To solve program errors, perform the following steps:

1. Locate the error message in the listing provided in the “Error Codes” chapter for a description of the error.
2. Analyze the related portion of the program to find the error.
3. Correct the error and reprint the file containing the program.
4. If the error persists or you cannot locate it in the program, use the debug parameter [/] in the Create command as described in the *Error Codes* chapter. Print the file with the IGP/PGL program. The debug parameter lists the program, line by line (including the error on the line where the error occurs), followed by the error–free sections of the form. Correct the error and print the file again. When the error has been corrected, delete the debug parameter.

For example, assume you made two errors in the Box and Corner commands input in steps 3 and 4 of the Form and Bar Code Example on page 6–19. Using the debug parameter in the Create command produces the following sample listing:

```
/PRACTICE
BOX
2;35;16:53;61
*** ERROR 24 : BOX format or delimiter error in input parameters
STOP
CORNER
3;300;13;57;64;5;7
*** ERROR 35 : CORNER vertical length VL out of bounds
*** ERROR 31 : CORNER starting row SR out of bounds
*** ERROR 39 : CORNER starting row SR > ending row ER
STOP
END
```

From the description of the error messages and the incorrect line identified by the error message, the errors are easily located and corrected. Notice a colon was accidentally input in the Box command where a semicolon was required (error number 24).

```
/PRACTICE
BOX
2;35;16:53;61
*** ERROR 24 : BOX format or delimiter error in input parameters
STOP
```

In the Corner command, the starting row was too large. This single input error caused the vertical length of the corner to extend beyond the form boundaries (error number 35), the starting row to begin outside the form boundaries (error number 31), and the starting/ending row parameters to be out of order (error number 39).

```
CORNER
3;300;13;57;64;5;7
*** ERROR 35 : CORNER vertical length VL out of bounds
*** ERROR 31 : CORNER starting row SR out of bounds
*** ERROR 39 : CORNER starting row SR > ending row ER
STOP
END
```

7 Multinational Character Sets

Chapter Contents

About the Multinational Character Set

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 IGP/PGL command. Individual characters in the font can be accessed with the use of data bit 8.

Character Sets Available

The Multinational Character Set provides the IGP/PGL with space for 32 character sets, 96 characters each. The character sets and their corresponding set values are listed in Table 7–1.

Table 7–1. Multinational Character Sets and Set Values

Character Set	Value	Character Set	Value
U.S. ASCII	0	Dutch	7
German	1	French	8
Swedish	2	Spanish	9
Danish	3	Italian	10
Norwegian	4	Reserved	11–23
Finnish	5	User–Defined Sets	24–31
English	6		

Sets 0 through 10 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. The last eight addressable 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 7–11 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 to 7F. The extended character set, which contains the multinational characters, resides at hex addresses ranging from 80 to FF. Table 7–2 shows each multinational character substitution hex value and the applicable ASCII hex values. To access the extended character set, the IGP/PGL 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 allows up to 16 character substitutions (located at 21, 22, 23, 24, 25, 26, 40, 5B, 5C, 5D, 5E, 60, 7B, 7C, 7D, and 7E hex). The most common character substitutions specific to a particular country are provided in each set and shown in Table 7–2.

For example, when the Danish character set (page 7–11) is selected, calling character address cell 5B substitutes the Danish character residing at C6 (Æ) from the Multinational Character Set (page 7–11); when the Spanish character set (page 7–12) 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.

The entire symbol tables may also be mapped. To replace any of the symbol sets, you must store in internal memory, a file with the new symbol set; and you must BOOT with this file in memory. Thus, to set up a printer, you must first download the file using the PTX_SETUP commands; and then cycle power to start up with the new code table(s).

The file name should be 3XX.map, where XX is between 01 and 10, for symbol sets; or 5XX.map, where XX is between 00 and 17, for overlay sets. (Note that these correspond to the symbol set selections within PGL, LP+ and VGL.)

Each file contains only one set. Any ‘C’ style comments are allowed. The table entries must be separated by a non-digit character, like a comma.

If the table has n entries, they will be used to overwrite the first n entries of the corresponding symbol set (or overlay set). Also, the hex representation of the characters are not permitted (you must use the decimal character values.)

The error checking is not extensive, but if an error is found, e.g., missing '/' at the end of comments or bad file name, etc., the mapping does *not* occur. The set should be enclosed in brackets.

For example, a "normal" table of the 3XX.map format would probably contain 256 different values, one for each code point. The values select which value within the multinational character table to use for each code point.

Leave locations 0—31 alone. They are special characters that are used internally. They should always be mapped back to 0—31. Also, if you are using the CG-Triumvirate font, then you will get wrong results.

The standard code table for it is *not* the multinational table, so the mappings do not reselect from within the multinational table. You will really map from one CG-Triumvirate character to another, not from the multinational table to the CG-Triumvirate table. Finally, for PGL and VGL, the default symbol set is 305, and the LP+ symbol set is 308.

The foreign language sets are:

500—Germany	506—Dutch
501—Swedish	507—French
502—Danish	508—Spanish
503—Norwegian	509—Italian
504—Finnish	510—Turkish
505—English	

Table 7–2. Substitution Set Hex Values

Character Set	Substitution Hex Value															
U.S. ASCII	21	22	23	24	25	26	40	5B	5C	5D	5E	60	7B	7C	7D	7E
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

OCR Character Sets

Purpose Accesses OCR–A and OCR–B character sets.

Mode CREATE, NORMAL and EXECUTE

Format See Comments

Comments In the Create mode, you can access OCR fonts using the alphanumeric command. Use the *Cn* parameter in the ALPHA command (“Commands” chapter, page 4–12) for more information.

In the Normal and Execute modes, you can access OCR fonts using the Compressed Print (Density) command (“Commands” chapter, page 4–33).

NOTE: OCR fonts are only available in 10 cpi.

Data Bit 8

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 and are accessible without reconfiguration.

NOTE: Data bit 8 must be set high 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 7–1 (0 through 11) as the default character set at printer power–up. The IGP/PGL configuration settings determine which character set is the default character set at power–up. Refer to the “Installation and Configuration” chapter to configure the IGP/PGL for a specific character set. (See Select Font in the configuration menu.)

The character font selected at power–up will remain active until the ISET command is selected or the configuration is changed. OCR and user–definable character sets cannot be configured as the default character set at printer power–up.

User–Defined Set Command (USET)

Purpose Creates custom character sets (except OCR fonts) from existing characters stored on the IGP/PGL memory module.

Mode NORMAL

Format (cc)USET *n*
ca;fa
END

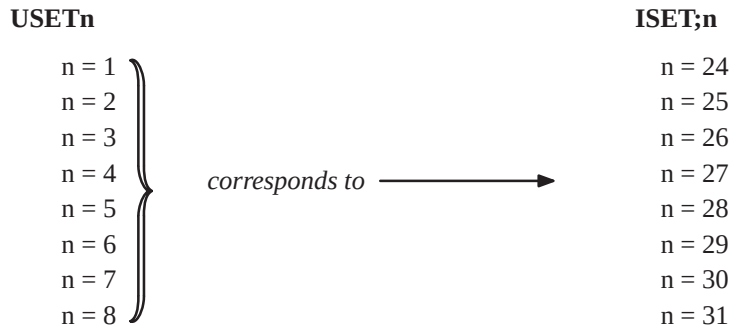
(cc)	Represents the Special Function Control Character.
USET	The User Set command; enter **USET**.
n	Selects USET character set number; enter a value ranging from 1 to 8.
ca	Represents the ASCII character cell hex address, which will have its contents replaced with the character located in the font address (*fa*). The *ca* value must be one of the 16 hex values specified in Table 7–2 on page 7–5.
fa	Represents the hexadecimal value for the font address of a specified character in the Multinational character set (page 7–11) which will replace the current contents of *ca*. The *fa* value is the character substitution for the cell address (*ca*). The value of *fa* may range from 20 to FF hex.
END	Ends the USET command.

Comments You can define up to 16 character substitutions for *each* of the eight user–definable character sets. It is not necessary to address all 16 spaces available for character substitutions with a single USET command.

The character sets in the USET command are numbered 1 through 8. The character set values in the Character Set Selection (ISET) command (page 7–10) are numbered 24 through 31 and correspond to User Sets 1 through 8. The ISET command accesses and prints that custom character set.

The USET and ISET commands are related as shown in Table 7–3. Therefore, ISET;24 selects the substitution set defined as USET1, ISET;29 selects USET6, etc.

Table 7–3. USET–ISET Relationship



Example The following example defines User Set 1 to contain the Multinational font addresses B1 (±), A1 (¡), and BF (¿) at the hex cell addresses 23, 24, and 25, respectively. Therefore, if *ca* = 23 and *fa* = B1, each time that cell address 23 is received, it will select the character located at font address B1 (±).

```
~USET1
23;B1
24;A1
25;BF
END
```

User Set 1 now contains the following: 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). To print User Set 1, you must use the ISET command discussed on page 7–10.

Character Set Selection Command (ISET)

Purpose Accesses one of the 32 multinational character sets from Table 7–3. Use this command to access a different character set from the configured power–up default character set.

Mode NORMAL, CREATE, and EXECUTE

Format In Normal and Execute modes: (cc)ISET; *n*

In the Create mode (SFCC not required): ISET; *n*

(cc)	Represents the Special Function Control Character.
ISET	The Multinational Character Set command; enter **ISET**.
n	The character substitution set number; enter a value ranging from 0 to 31. Character sets 0 through 23 represent resident character sets. Values from 24 through 31 correspond to the customized USET character sets 1 through 8, respectively. For example, refer to Table 7–3 on page 7–9. If you want to use the User Set 1 created in the example on page 7–9, call ISET;24. Similarly, if you want User Set 5 that you had previously defined, call ISET;28 to select and print the User Set 5 substitution set.

Comments You can issue the ISET command as many times within a form as needed. The character set selected will remain active until a new character set is selected. If you choose an incorrect character set value or make a syntax error, an error message will result. If a value for **n** is not specified, an error message will print.

Using the ISET command in the Execute mode declares the character set for use in conjunction with the dynamic data within that Execute command. Fixed form data specified in the Create mode is not affected by an ISET command in the Execute mode. The character set selected will remain in effect until another character set is selected.

IGP-50 MULTINATIONAL Set

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0				0	@	P	‘	p	IJ		™	○	À	Đ	à	ð
1			!	1	A	Q	a	q	ij		¡	±	Á	Ñ	á	ñ
2			"	2	B	R	b	r	Pt		¢	²	Â	Ò	â	ò
3			#	3	C	S	c	s	|		£	³	Ã	Ó	ã	ó
4			$	4	D	T	d	t	ℸ		¤	´	Ä	Ô	ä	ô
5			%	5	E	U	e	u	¬		¥	µ	Å	Õ	å	õ
6			&	6	F	V	f	v	Ğ		¦	¶	Æ	Ö	æ	ö
7			’	7	G	W	g	w	ğ		§	·	Ç	×	ç	÷
8			(	8	H	X	h	x	Ş		¨	¸	È	ø	è	ø
9			)	9	I	Y	i	y	ş		©	¹	É	Ù	é	ù
A			*	:	J	Z	j	z	ł		ª	º	Ê	Ú	ê	ú
B			+	;	K	[	k	{	¨		«	»	Ë	Û	ë	û
C			,	<	L	\	l	¦			¬	¼	Ì	Ü	ì	ü
D			-	=	M	]	m	}			ÿ	½	Í	Ý	í	ý
E			.	>	N	^	n	~			®	¾	Î	Þ	î	þ
F			/	?	O	_	o	▒			¯	¿	Ï	ß	ï	

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	ß
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	¡	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			₺	1	A	Q	a	q
2			Ç	2	B	R	b	r
3			ç	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	Ğ	k	ş
C			,	<	L	ö	l	ö
D			-	=	M	Ü	m	ü
E			.	>	N	ğ	n	ł
F			/	?	O	_	o	▒

OCR-A 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	.

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	

8 Error Codes

Chapter Contents

The Purpose of Error Codes

The IGP/PGL provides coded error messages to assist in “debugging” programs. The printer will print an error message number and the program line which contains the error when an error is detected. To help determine exactly where the error occurred, use the following debug command sequence:

(CC)CREATE;/FORM NAME

The slash (/) places the IGP/PGL in a debug mode, and the program prints, line by line, with the error number and message printed below the specific error in the program. The error–free portions of the form will print following the program. After correcting the error(s), print the file again. When the errors have been corrected, delete the slash. (A sample debug listing is shown in “Solving Program Errors” on page 6–49.)

In the Execute mode, that part of the form which was correctly defined and stored during the Create mode will print, including any dynamic data and overlay text which was accepted before the error occurred. (Sections containing errors must be corrected before storage in the Directory can take place.) Any error messages will print following the printed form, and processing will continue in the Normal mode.

In the Create Form or Create Logo mode, any error messages will print first, followed by that part of the form/logo which was correctly defined. Incorrectly defined elements are excluded from the form/logo.

The error codes are broken down into the categories listed in the Chapter Table of Contents, on page 8–1. In each category, the number preceding each error message is the actual error code reported by the printer, and the error shown in bold is the error message printed.

Horizontal Line Errors

01 **HORiZontal line starting row SR out of bounds**
The row specified by the second parameter in the horizontal line command places the horizontal line outside the boundaries of the form.

02 **HORiZontal line starting column SC out of bounds**
The left (starting) column of the horizontal line specified by the third parameter in the horizontal line command places the horizontal line outside the boundaries of the form.

03 **HORiZontal line ending column EC out of bounds**
The right (ending) column of the horizontal line specified by the fourth parameter in the horizontal line command places the horizontal line outside the boundaries of the form.

04 **HORiZontal line format or delimiter error**
Some type of format or delimiter error was detected in the parameters of the horizontal line command. This error is usually caused by one or more of the following:

a. A missing semicolon;
b. A colon in place of a semicolon;
c. Too many or too few parameters in the command string;
d. Alpha characters instead of numeric characters in the parameters.

05 **Insufficient memory to store the HORiZontal line**
No more room in the IGP/PGL memory exists for another horizontal line. The rest of the horizontal line commands are flushed until the Stop command is found. Processing will then continue normally. To create space in the IGP/PGL memory, delete forms with horizontal line elements that are no longer required.

06 **HORiZontal line starting column SC > ending column EC**
The left (starting) column parameter of the horizontal line command is greater than or equal to the right (ending) column parameter.

07 **HORiZontal line thickness LT error**
The thickness of the horizontal line specified by the first parameter in the horizontal line command is incorrect. This error is usually caused by specifying a thickness of zero.

08–09 Not defined.

Vertical Line Errors

10 **VERTical line starting column SC out of bounds**
The column specified by the second parameter in the vertical line command places the vertical line outside the form boundaries.

11 **VERTical line starting row SR out of bounds**
The upper (starting) row of the vertical line specified by the third parameter in the vertical line command places the vertical line outside the boundaries of the form.

12 **VERTical line ending row ER out of bounds**
The lower (ending) row of the vertical line specified by the fourth parameter in the vertical line command places the vertical line outside the boundaries of the form.

13 **VERTical line format or delimiter error**
Some type of format or delimiter error was detected in the parameters of the vertical line command. This error is usually caused by one or more of the following:

a. A missing semicolon;
b. A colon in place of a semicolon;
c. Too many or too few parameters in the command string;
d. Alpha characters instead of numeric characters in the parameters.

14 **Insufficient memory to store the VERTical line**
No more room in the IGP/PGL memory exists for another vertical line. The rest of the vertical line commands are flushed until the Stop command is found. Processing will then continue normally. To create space in the IGP/PGL memory, delete forms with vertical line elements that are no longer required.

15 **VERTical line starting row SR > ending row ER**
The upper (starting) row parameter of the vertical line command is greater than or equal to the lower (ending) row parameter.

16 **VERTical line thickness LT error**
The thickness of the vertical line specified by the first parameter in the vertical line command is incorrect. This error is usually caused by specifying a thickness of zero.

17–19 Not defined.

Box Errors

20 **BOX starting column SC out of bounds**
The left (starting) column specified by the third parameter in the box command places the box outside the form boundaries.

21 **BOX starting row SR out of bounds**
The upper (starting) row of the box specified by the second parameter in the box command will place the box outside the boundaries of the form.

22 **BOX ending column EC out of bounds**
The right (ending) column specified by the fifth parameter in the box command places the box outside the form boundaries.

23 **BOX ending row ER out of bounds**
The lower (ending) row of the box specified by the fourth parameter in the box command will place the box outside the boundaries of the form.

24 **BOX format or delimiter error in input parameters**
Some type of format or delimiter error was detected in the parameters of the box command. This error is usually caused by one or more of the following:

a. A missing semicolon;
b. A colon in place of a semicolon;
c. Too many or too few parameters in the command string;
d. Alpha characters instead of numeric characters in the parameters.

25 **Insufficient memory to store the BOX**
No more room in the IGP/PGL memory exists for another box. The rest of the box commands are flushed until the Stop command is found. Processing will then continue normally. To create space in the IGP/PGL memory, delete forms with box elements that are no longer required.

26 **BOX starting column SC > ending column EC**
The left (starting) column parameter of the box command is greater than or equal to the right (ending) column parameter.

27 **BOX starting row SR > ending row ER**
The upper (starting) row parameter of the box command is greater than or equal to the lower (ending) row parameter.

28 **BOX line thickness LT error**
The thickness of the box specified by the first parameter in the box command is incorrect. This error is usually caused by specifying a thickness of zero.

29 Not defined.

Corner Errors

30 **CORNER starting column SC out of bounds**
The left (starting) column specified by the third parameter in the corner command places the corner outside the form boundaries.

31 **CORNER starting row SR out of bounds**
The upper (starting) row of the corner specified by the second parameter in the corner command will place the corner outside the boundaries of the form.

32 **CORNER ending column EC out of bounds**
The right (ending) column specified by the fifth parameter in the corner command places the corner outside the form boundaries.

33 **CORNER ending row ER out of bounds**
The lower (ending) row of the corner specified by the fourth parameter in the corner command will place the corner outside the boundaries of the form.

34 **CORNER horizontal length HL out of bounds**
The length of the horizontal arms of the corner specified by the seventh parameter in the corner command will cause parts of the corner to extend outside the form boundaries.

35 **CORNER vertical length VL out of bounds**
The length of the vertical arms of the corner specified by the sixth parameter in the corner command will cause parts of the corner to extend above or below the boundaries of the form.

36 **CORNER format or delimiter error in input parameters**
Some type of format or delimiter error was detected in the parameters of the corner command. This error is usually caused by one or more of the following:

a. A missing semicolon;
b. A colon in place of a semicolon;
c. Too many or too few parameters in the command string;
d. Alpha characters instead of numeric characters in the parameters.

37 **Insufficient memory to store the CORNER**
No more room in the IGP/PGL memory exists for another corner. The rest of the corner commands are flushed until the Stop command is found. Processing will then continue normally. To create space in the IGP/PGL memory, delete forms with corner elements that are no longer required.

38 **CORNER starting column SC > ending column EC**
The left (starting) column parameter of the corner command is greater than or equal to the right (ending) column parameter.

39 **CORNER starting row SR > ending row ER**
The upper (starting) row parameter of the corner command is greater than or equal to the lower (ending) row parameter.

40 **ALPHA leading and trailing delimiters mismatched**
The leading delimiter (printable character) of the actual text string was not matched with an ending delimiter before the line terminator was found.

41 **ALPHA starting row SR out of bounds**
The starting row parameter in the Alpha command will cause the text string to print either above or below the limits of the form.

NOTE: Expanded print text strings expand up from the specified row. This could cause an attempt to print the text string above the top of the form and generate the error message.

42 **ALPHA starting column SC out of bounds**
The starting column parameter in the Alpha command is either extending the alpha string beyond the left margin of the form or the starting column parameter, plus the actual length of the text is extending the string beyond the right margin of the page.

43 **ALPHA string length > 255 characters**
The string contains more than 255 characters.

44 **ALPHA format or delimiter error in input parameters**
Some type of format or delimiter error was detected in the parameters of the alpha command. This error is usually caused by one or more of the following:

a. A missing semicolon;
b. A colon in place of a semicolon;
c. Too many or too few parameters in the command string;
d. Alpha characters instead of numeric characters in the parameters.

45 **Insufficient memory to store the ALPHA string**
No more room in the IGP/PGL memory exists for another alpha string. The rest of the Alpha commands are flushed until the Stop command is found. Processing of the form will then continue normally. To create space in the IGP/PGL memory, delete forms with alpha string elements that are no longer required.

46 **ALPHA X expansion HE and Y expansion VE must be zero**
When the expanded character parameters VE and HE are used within the ALPHA command, both values must be either zero or non–zero values. If the elongated characters parameter [E] or the compressed characters parameter [Cn] is used in the ALPHA command, the VE and HE values must be set to 0.

47 **ALPHA X expansion factor HE out of bounds (> 139)**
The horizontal expansion factor is greater than 139.

48 **ALPHA Y expansion factor VE out of bounds (> 139)**
The vertical expansion factor is greater than 139.

49 **Compression Cn or Density error (10, 10A, 10B, 12, 13, 15, 17, 20)**
The optional compression parameter (**Cn**) which defines the horizontal pitch of the text was specified incorrectly. The pitches currently available are 10, 10A, 10B, 12, 13, 15, 17, and 20 cpi.

Logo Errors

50 **LOGO horizontal width HL > 240 or dot row > HL**

a. The horizontal width of the logo is equal to zero or greater than 240. The IGP/PGL automatically reverts to Normal mode when this occurs.

b. A dot position specified in the logo program exceeds the specified horizontal width of the logo. When this occurs, the buffer is flushed until a line terminator is found, and then logo construction continues normally.

51 **LOGO vertical length VL > 252 or dot row n > VL**

a. The vertical length of the logo is equal to zero or greater than 252. The IGP/PGL automatically reverts to Normal mode when this occurs.

b. A dot row specified in the logo program exceeds the specified vertical length of the logo. When this occurs, the buffer is flushed until a line terminator is found, and then logo construction continues normally.

52 **LOGO hyphen syntax error in input parameters**

The beginning or ending dots are out of order, or a parameter is missing. The buffer is flushed until a line terminator is found, and then logo construction continues normally.

53 **Insufficient memory to create the LOGO**

No more room exists in IGP/PGL memory to construct a logo for the size specified. When this occurs, the IGP/PGL automatically reverts to Normal mode. To create space in IGP/PGL memory, delete forms with logo elements (including the logos) that are no longer required.

54 **LOGO format or delimiter error**

Some type of format or delimiter error was detected in the Logo command. If this occurs while specifying the size and name of the logo, the IGP/PGL automatically reverts to the Normal mode. If this occurs during the actual construction of the logo, the buffer is flushed until a line terminator is found, and then logo construction continues normally.

55 **LOGO call not previously defined**

An attempt was made in the Create Form mode to incorporate an undefined logo into a form. This error is not generated during the Logo Form mode. When this error occurs, the buffer is flushed until a line terminator is found, and then forms creation continues normally.

56 **Insufficient memory for another LOGO call**
IGP/PGL memory cannot store another logo call. To create space in the IGP/PGL memory, delete forms with logo elements (including the logos) no longer required.

57 **LOGO call starting row SR out of bounds**
During form creation, the parameter specifying the row position of a logo places the logo above or below the margins of the form. The buffer is flushed until a line terminator is found, and then processing continues normally.

58 **LOGO call starting column SC out of bounds**
During form creation, the parameter specifying the column position of a logo places the logo outside the form boundaries. When this occurs, the buffer is flushed until a line terminator is found, and then processing continues normally.

59 **Color or GRAY scale not supported with LOGOS**
Color or gray scale information was received from the TIFF data, but it is not supported with the LOGO command.

Create Errors

60 **Directory full – cannot CREATE the form or LOGO**
The directory is full, or no more room exists in the IGP/PGL memory for another form. When this occurs, the IGP/PGL automatically reverts to the Normal mode. To create space in the IGP/PGL memory, delete forms that are no longer required.

61 **CREATE function unrecognized**
An unrecognizable command is entered during the Create Form mode. At this point, the buffer is flushed until a Stop command is found, and then processing continues.

62 **CREATE horizontal duplication parameter HDUP error**
Either a format error was detected or a parameter was exceeded. The duplication number must be no greater than 255, and the offset must be no greater than 792 (dot scale). If this error occurs, the Horizontal Duplication command is ignored, and forms processing continues.

63 **CREATE vertical duplication parameter VDUP error**
Either a format error was detected, or a parameter was exceeded. The duplication number must be no greater than 255 and the offset must be no greater than the specified length of the form. If this error occurs, the Vertical Duplication command is ignored, and forms processing continues.

64 **CREATE scale factor parameter SCALE invalid**
Either a format error was detected, or a parameter was specified incorrectly. The vertical lines per inch can be specified as 1 to the target DPI. The horizontal characters per inch can be specified only as 10, 12, 13, 15, 17 or 20 cpi. If this error occurs, the Scale command is ignored and forms processing continues.

65 **CREATE page starting row PAGE SR out of bounds**
When you specify the position of the page parameters with the Page command in the Create Form mode, the row position specified will place the page number above or below the boundaries of the form. When this error occurs, the IGP/PGL will automatically revert to the Normal mode.

66 **CREATE page starting column PAGE SC out of bounds**
When you specify the position of the page parameters in the Create command, the column position specified will place the page number outside the form boundaries. When this error occurs, the IGP/PGL will automatically revert to the Normal mode.

67 **CREATE STOP command missing**
This error occurs when the IGP/PGL receives a new function command, an End command, or a mode command without receiving a Stop command. The IGP/PGL will continue to process subsequent commands correctly.

68 **Insufficient memory to store the SETUP program**
No more room in the IGP/PGL memory exists for storing the SETUP routine.

69 **Insufficient memory to store the form**
The directory is full, or no more room exists in the IGP/PGL memory for another form. When this occurs, the IGP/PGL automatically reverts to the Normal mode. To create space in the IGP/PGL memory, delete forms that are no longer required.

Execute Errors

70 **EXECUTE form count parameter FC error**
This error occurs when the parameter specifying the number of blank forms to print was entered incorrectly. When this error occurs, the IGP/PGL will automatically revert to the Normal mode. Form count can be from 1 to 65,535.

71 **EXECUTE/DELETE form not found in the directory**
An attempt was made to execute or delete a form which does not exist in the forms directory. When this error occurs, the IGP/PGL reverts to the Normal mode.

72 **EXECUTE EVFU load error**
This error is generated only during the Execute Form mode while programming the EVFU. If more channels than lines per physical page are specified during a load sequence, this error is generated, and the IGP/PGL automatically reverts to the Normal mode.

73 **EXECUTE EVFU terminator invalid**
This error is generated only during the Execute Form mode. The EVFU LOAD is missing an END LOAD code. If the line terminator cannot be deciphered, an error is generated, and the IGP/PGL reverts to the Normal mode.

74 **EXECUTE form too wide for current page setting**
The form was defined in one orientation while sent to print in another orientation. Use the debug slash (/) when creating a form to show which element is out of bounds (see page C–2).

75 **EXECUTE form too long for current page setting**
The form was defined in one orientation while sent to print in another orientation. Use the debug slash (/) when creating a form to show which element is out of bounds (see page C–2).

76 **EXECUTE page number error**
An error was made while specifying the page number used with the form being executed. This error can be generated because of incorrect format or a page number that is too large. The specified page number can range from 0 to 99,999,999. Since the page number is part of the Execute command, the IGP/PGL will automatically revert to the Normal mode.

77 **EXECUTE format or delimiter error**

A format or delimiter error was detected in the Execute command; the IGP/PGL will automatically revert to the Normal mode. This error is usually caused by one or more of the following:

a. A missing semicolon;
b. A colon in place of a semicolon;
c. Too many or too few parameters in the command string;
d. Alpha characters instead of decimal digits in the parameters;
e. Page command misspelled when specifying the page number.

78 **Insufficient memory to EXECUTE the form**

Insufficient memory was available to recall and execute a form. The IGP/PGL will automatically revert to the Normal mode.

79 Not defined.

Miscellaneous Errors

80 **Special function must be called from the NORMAL mode**
This special function must be called from the Normal mode and not the Create Form or Execute Form mode. This error is generally due to a missing End command in the Create Form mode. For example, an attempt to enter the Create Form mode while executing a form will cause the IGP/PGL automatically to revert to the Normal mode.

81 **No such special function**
The special function call was unrecognizable. The IGP/PGL will automatically revert to the Normal mode.

82 **Numeric value expected in input parameter**
Characters other than numeric digits (0–9) are encountered where digits are expected.

83 **Decimal input error in input parameter**
The parameter expected was a decimal number. Either the number was not there, or it was too large (greater than 65,535). This error can also be caused by entering an alpha character instead of a numeric character.

84 **Missing or wrong delimiter – must be a semicolon ;**
The delimiter is either wrong or missing. The delimiter expected is a semicolon.

85 **Missing or wrong delimiter – must be a colon :**

86 **DENSITY param error – 10, 10A, 10B, 12, 13, 15, 17, or 20**
The parameters of the Density command are improperly specified. The densities currently implemented are 10, 10A, 10B, 12, 13, 15, 17, and 20 characters per inch. The command is ignored and processing continues.

87 **LPI parameters error – must be 1 – target dot size**
The parameters of the LPI command are improperly specified. The only parameters implemented are 6, 8, 9, and 10 lpi. The command is ignored and processing continues.

88 Not defined.

89 **EXPAND parameters out of bounds or format error**
The parameters of the Expand command are improperly specified. Either the parameters are out of bounds, or some type of format error was detected. The command is ignored, and processing continues.

156 **No such CONFIGuration option**

170 **PAPER command syntax error**

171 **Invalid PAPER parameter error – out of range**

90 **Insufficient memory to store the BARCODE**
No more room exists in the IGP/PGL memory for another bar code. The rest of the bar code commands are flushed until the Stop command is found. Processing will then continue.

91 **ALPHA/BARCODE syntax error**
Some type of syntax (format) error was detected in the parameters of the bar code command. This error is usually caused by one or more of the following:

a. Misspelled keywords;
b. Lowercase used;
c. A missing semicolon;
d. A colon in place of a semicolon;
e. An ending delimiter for the data field was not found;
f. Too many or too few parameters in the command string.

The rest of the command line is flushed until the Stop command is found. Processing will then continue.

92 **BARCODE magnification factor MAG out of bounds**
The magnification factor specified in the bar code command is out of bounds. Refer to the applicable section in the “Bar Codes” chapter to determine the acceptable magnification values for the bar code symbol being used.

93 **BARCODE starting row SR out of bounds**
The starting row parameter in the bar code command will cause the bar code symbol to print either above or below the limits of the form.

94 **BARCODE starting column SC out of bounds**
The starting column parameter in the bar code command will cause the bar code symbol to print either beyond the left margin or the right margin of the form.

95 **BARCODE height Hn out of bounds – must be 4 through 99**
The height parameter specified in the bar code command is out of bounds. Acceptable values are 4 through 99.

96 **BARCODE data field has illegal character/format**
A character in the data field was not recognized as an acceptable character. Refer to the applicable section in the “Bar Codes” chapter to determine the

acceptable characters for the bar code symbol being used. The missing ending delimiter also causes this error.

97 **BARCODE data field too short or too long**
The data field in the bar code command has too few or too many data characters. Refer to the applicable section in the “Bar Codes” chapter to determine the acceptable number of data characters for the bar code symbol being used.

98 **BARCODE symbol(s) exceeds the form length**
The bar code command causes a bar code symbol to print below the limits of the form. This error occurs on the data field line of the bar code.

99 **BARCODE symbol(s) exceeds the form width**
The bar code command causes a bar code symbol to print beyond the right margin. This error occurs on the data field line of the bar code.

100 **BARCODE variable ratio 0 or not ascending.**

101 **BARCODE PDF not allowed or error – LOC: A or B – FONT: N, O, X or S**
Either the alternate font was selected for a bar code or an invalid parameter was used. Acceptable parameters must be “N” for the normal font, “O” for the OCR–A optional font, “X” for the OCR–B optional font, or “S” to suppress printing of the data field.

102 **PDF417 bar code sizing parameter illegal or too small for data.**

103 **PDF417 security level has illegal value or format.**

104 **Dynamic BARCODE data field BFn not previously defined**
Dynamic data field designated in the Execute Form mode was not defined in the Create Form mode.

105 **Dynamic ALPHA/BARCODE field number AFn/BFn error – must be 1–255**
Dynamic alpha field number (AFn) or bar code field number (BFn) must range from 1 to 255.

106 Not defined.

107 **Dynamic ALPHA data field AFn not previously defined**
The dynamic alpha field number called for was not previously defined in the Create Form mode.

108 Not defined.

109 **Dynamic BARCODE field longer than previously defined**
The BARCODE data provided exceeds the maximum length for the bar code selected.

110 **SFCC decimal input error – must be 01 to 255**
The hexadecimal value on the ASCII chart for the Special Function Control Character is not valid. Refer to page 2–4 to select a valid SFCC.

Reverse Print Errors

111 **REVERSE format error in input parameters**
Re–enter the command with proper format.

112 **REVERSE starting row SR/ending row ER out of bounds**
Exceeds the value specified to reverse the element.

113 **REVERSE starting SC/ending column EC out of bounds**
Exceeds the value specified to reverse the element.

114 **Insufficient memory to store the REVERSE element**
Insufficient memory space available for reversed print requirements.

115–116 Not defined.

117 **Unusable or illegal raster data.**

118 **Unsupported raster image type.**

119 **Unsupported raster compression type.**

120–125 Not defined.

126 **LFORMx form length parameter n error**
The number of lines exceeds 66 (for 6 lpi) or 88 (for 8 lpi) lines when using the LFORMx command.

127 **Form length > physical page length**
The form length specified exceeds the paper size loaded in the printer.

128 **FORM/LOGO name is not a legal file name**
The file name exceeds the twelve-character limitation, or an invalid character was used in the file name. Refer to IGP/PGL Command Standards in the "Commands" chapter.

129 Not defined.

Incremental Fields Errors

130 Not defined.

131 **Incremental STEPMASK parameter error**
A semicolon is missing after the STEPMASK data.

132 **Incremental REPEAT/RESET parameter error**
An illegal RPT or RST parameter value was found in the incremental command. The value must range from 1 to 65,535.

133 **Incremental STEPMASK/STARTDATA length error**
The dynamic stepmask exceeded created field length or start data exceeded stepmask.

134 **Incremental EXECUTE command error**
An illegal IRST or ICNT parameter value was found in the Execute command. The value must range from 1 to 65,535.

135 Not defined.

136 **Incremental STEPMASK/STARTDATA mismatched**
The STARTDATA value must be A–Z or 0–9, when the STEPMASK value is a value from 0–9.

137–139 Not defined.

140 **PMODE or SMODE not the first command in the CREATE mode.**

141 **PMODE or SMODE syntax error.**

142 **PMODE or SMODE printer type PT parameter error.**

143 **PMODE or SMODE scaling parameter error.**

144 **PMODE or SMODE exit mode (EM) parameter error.**

145 **PMODE entries exceeded – maximum = 8.**

146 Not defined.

147 Not defined.

148 Not defined.

149 Not defined.

Multinational Character Set Errors

150 **ISET character selection parameter n error – 00 to 31**
An ISET character set selection parameter value between 0 and 31 was expected. Error was caused possibly by an invalid numeric value or an alpha character.

151 **USET decimal input error in input parameter**
The USET command was expecting a decimal parameter and either received none or received an alpha character.

152 **USET character set n parameter error**
A USET character set selection parameter value between 1 and 8 was expected. Error was caused possibly by an invalid numeric value or an alpha character.

153 **USET substituted character illegal – must be 1 of 16**
During character substitution in the USET command, the hex value for the character being replaced must be one of the specified 16 hex values. Only the following hex values (Ca) can be replaced by another hex value (Fa): 21, 22, 23, 24, 25, 26, 40, 5B, 5C, 5D, 5E, 60, 7B, 7C, 7D, 7E.

154 **USET defined character illegal – must be hex 20–FF**
During the USET command, the hex value for the substituted character (Fa) must range between 20 and FF hex. The value given may be out of bounds.

155 **USET syntax error – END command is expected**
An END command is expected when the USET character set definition is completed.

156 **No such CONFIGuration option**

157 **Left or Top/Bottom margin too large for the current page size.**

158–159 Not defined.

Font Errors

160 **FONT command parameter error**
The FACE # parameter is either missing a space between the parameter and its value, or a semicolon is missing between font parameters.

161 **Illegal FONT typeface value – must be (9)0000–(9)9999**
An illegal FONT typeface value was used. FONT typeface values range from 90000 to 99999, or 0 to 9999.

162 **Illegal FONT bolding factor – must be ON(1) or OFF(0)**
An illegal FONT bolding value was used. ON (or 1) or OFF (or 0) must be entered.

163 **Illegal FONT slant – must be LEFT (–1), OFF (0), or RIGHT (1)**
An illegal FONT slant value was used. LEFT (or –1), OFF (or 0), or RIGHT (or 1) must be entered.

164 **Illegal FONT point size – must be 4–999**
An illegal FONT point size was used. Valid values range from 4 to 999.

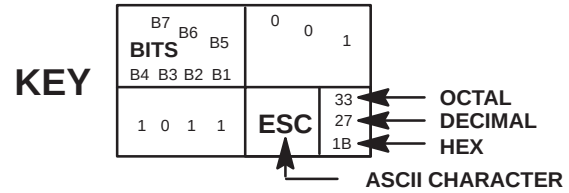
165 **Illegal FONT symbol set value**
An invalid SYMSET parameter value was used. Valid parameter values are 0 to 31.

166–169 Not defined.

170 **PAPER command syntax error**

171 **Invalid PAPER parameter error – out of range**

A Standard ASCII Character Set

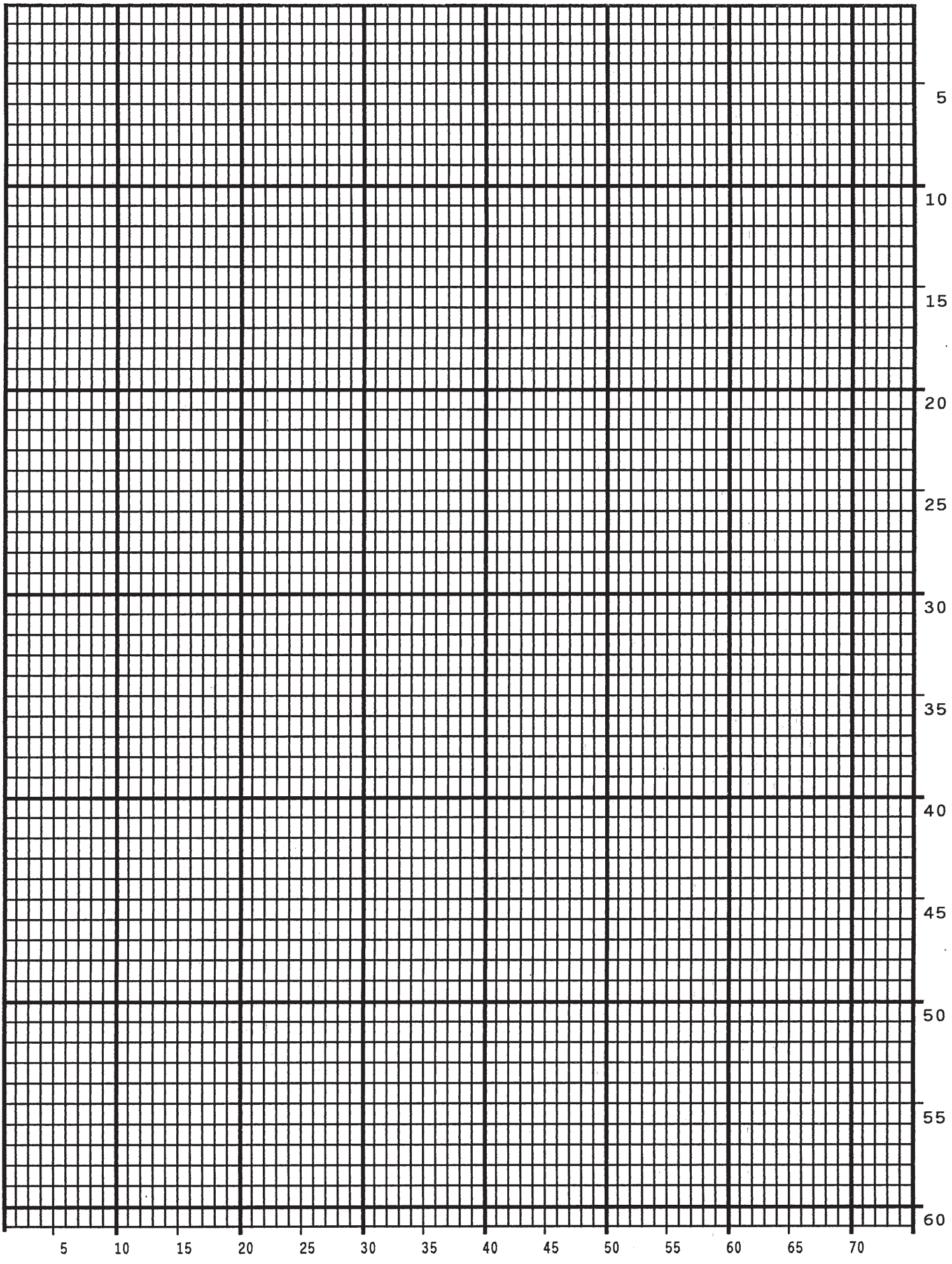


BITS B7 B6 B5 / B4 B3 B2 B1	ROW	COLUMN 0		1		2		3		4		5		6		7	
0 0 0 0	0	NUL	0 0 0	DLE	20 16 10	SP	40 32 20	0	60 48 30	@	100 64 40	P	120 80 50	`	140 96 60	p	160 112 70
0 0 0 1	1	SOH	1 1 1	DC1 (XON)	21 17 11	!	41 33 21	1	61 49 31	A	101 65 41	Q	121 81 51	a	141 97 61	q	161 113 71
0 0 1 0	2	STX	2 2 2	DC2	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	10 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	11 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	12 10 0 A	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	13 11 0 B	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	14 12 0 C	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	15 13 0 D	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	16 14 0 E	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	17 15 0 F	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 Grid Programs and Samples

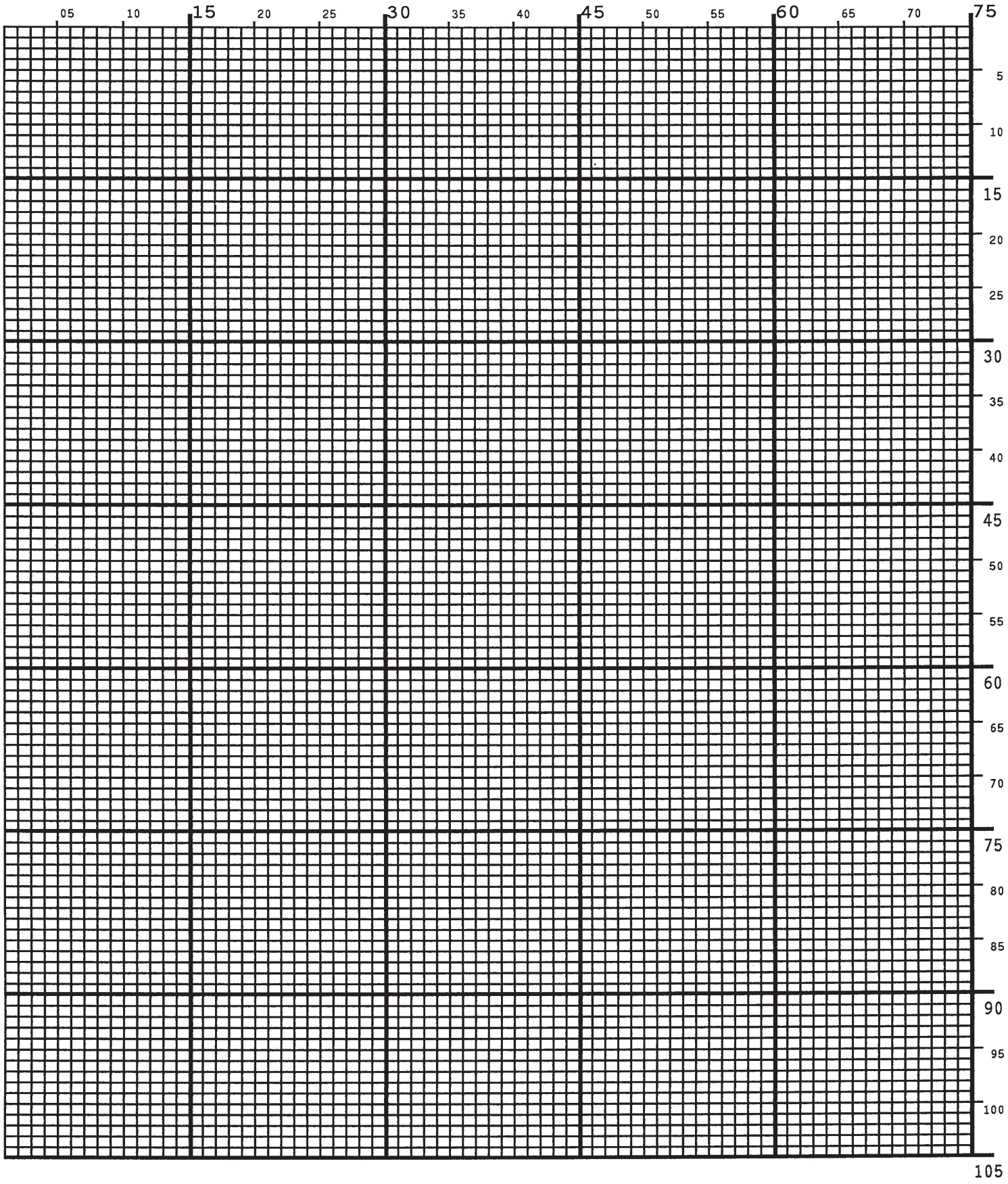
The Standard Grid – The standard grid is used for form design. The program for the standard grid is listed below, and a sample of the standard grid follows on the next page. Photocopy the grid provided or enter the grid program and make your own printout.

```
~CREATE;GRID
HDUP;75;1
VERT
1;1;1;61
STOP
HDUP;OFF
HDUP;7;10
VERT
1;5;1;61.5
2;10;1;61.5
STOP
HDUP;OFF
VERT
2;75;1;61.5
STOP
VDUP;61;1
HORZ
1;1;1;75
STOP
VDUP;OFF
VDUP;6;10
HORZ
1;5;1;76
2;10;1;76
STOP
VDUP;OFF
VERT
2;1;1;61.3
STOP
HORZ
2;1;1;75
STOP
VDUP;12;5
ALPHA
I;5.5;76;0;0;05;" 5"
STOP
VDUP;OFF
HDUP;14;5
ALPHA
C15;I;61.9;5;0;0;05;" 5"
STOP
HDUP;OFF
END

~EXECUTE;GRID;1
```



The Logo Grid – The program for a logo grid is listed below and the sample grid follows. It is not the full size logo grid; the grid can measure up to 240 columns wide by 252 rows high for a logo 4 x 3.5 inches. Photocopy the grid or enter the grid program to obtain a printout.

```
~CREATE;LOGOGRID
HDUP;75;1
VERT
1;4;4;56
STOP
HDUP;OFF
HDUP;5;15
ALPHA
C17;I;3;8.2;0;0;15;"05"
C17;I;3;13.2;0;0;15;"10"
I;3;18.2;0;0;15;"15"
STOP
VERT
2;18;3.5;56
1;8;3.9;56
1;13;3.9;56
STOP
HDUP;OFF
VDUP;105;0.6
HORZ
1;4;4;78
STOP
VDUP;OFF
VDUP;7;7.6
ALPHA
C17;I;5.11;79;0;0;015;"  5"
C17;I;8.6;79;0;0;015;" 10"
C13;I;11.5;78.2;0;0;015;"15"
STOP
HORZ
2;10.11;4;79.5
1;6;4;79
1;8.6;4;79
STOP
VDUP;OFF
END
~EXECUTE;LOGOGRID;1
```



C Page Boundaries

Paper Selection and Maximum Values

Most Create Form mode commands require you to identify specific form boundaries using the SR, SC, ER, EC parameters. This appendix addresses the page boundaries affecting IGP/PGL products for both cut–sheet page printers and continuous form printers.

All printers have maximum print boundaries according to the printer type and paper size selected. Refer to your printer *Setup Guide* for the specific page boundaries associated with your printer. Table C–1 shows the print boundaries for page printers using several different widths and lengths.

Note that while both cut–sheet page printers and continuous form printers have specific maximum *width* values based on paper size, *continuous form* printers are not bound by the same maximum page *length* values; on a continuous form printer, if you specify a page length exceeding the actual paper size, the form will continue to print until it is completed.

The maximum dot values such as those shown in Table C–1 are necessary to determine the maximum printable area on your form for your printer when modifying top/bottom margin settings or offsetting the values for left margin print positions. The following pages explain how to determine the Top/Bottom Margin and Left Margin requirements for your printer.

Create Form Mode

In the Create Form mode, both the form's length and width used for boundary checking may be specified by the user. However, if the form size is not specified, the form length defaults to 4 and the width is not checked. Boundary checking for form elements is performed only when the form length is specified.

Execute Form Mode

In the Execute Form mode, use the following guidelines to determine if a form will print on the current page size.

Not User–Defined

If the form's length/width is not user–defined, and the minimum length/width is *greater* than the current page length/ width, minus the margins, then the result will be error 74 or 75.

User–defined

If the form's length/width is user–defined *greater* than the current page length/ width, minus the margins, then the result will be error 74 or 75.

Not–defined

If the form's length/width is not–defined and the minimum length/width is *less than or equal to* the current page length/width, minus the margins, then the form length/width will equal the page length/width, minus the margins.

Table C–1. Paper Sizes and Maximum Print Area

Paper Size	Dimensions (Inches)	Maximum Dot Value* Page Width	Page Length
Letter	8.0 x 11	481	793
Letter	8.5 x 11	511	793
Legal	8.5 x 14	511	1009
A4	8.268 x 11.693	497	842
B5	6.929 x 9.842	416	709
Computer	13.2 x 11	793	793

**How to calculate Maximum Dot Values:*

1. *Page Length X 72 dpi minus Top and Bottom Margin Values + 1 = maximum height value;*
2. *Page Width x 60 dpi minus Left Margin Value + 1 = maximum width value.*

Values exceeding maximum values will produce an error message.

NOTE: Due to the printing properties of some printers (i.e., cut–sheet pages), the Starting Row and Starting Column on paper may vary slightly, possibly truncating some of the top and bottom print rows. You can avoid truncating print by setting top/bottom margins as described on page C–4, or as explained in your printer *Setup Guide*).

Setting Top/Bottom Margins

Using dot values to identify maximum vertical print positions, the page boundary parameters of an 11–inch form has 792 dot rows at n/72–inch vertically (72 dpi X 11 inches). (See Figure C–1.)

With no Top/Bottom Margin configuration setting on an 11–inch form, the first print position is Starting Row 1, Starting Column 1 (A, Figure C–1). However, if a Top/Bottom Margin value is set at 10, then Starting Row 1 is adjusted *down* by 10 dot rows (B, Figure C–1), and the Ending Row is adjusted *up* 10 dot rows (C, Figure C–1), thereby reducing the maximum vertical printable area to 773 dots (793 – [10 + 10]). The greater the top/bottom margin setting, the smaller the printable area on the form.

NOTE: The Top/Bottom margin setting on your Line-Matrix Printer Emulation must match the IGP/PGL Top/Bottom margin configuration setting.

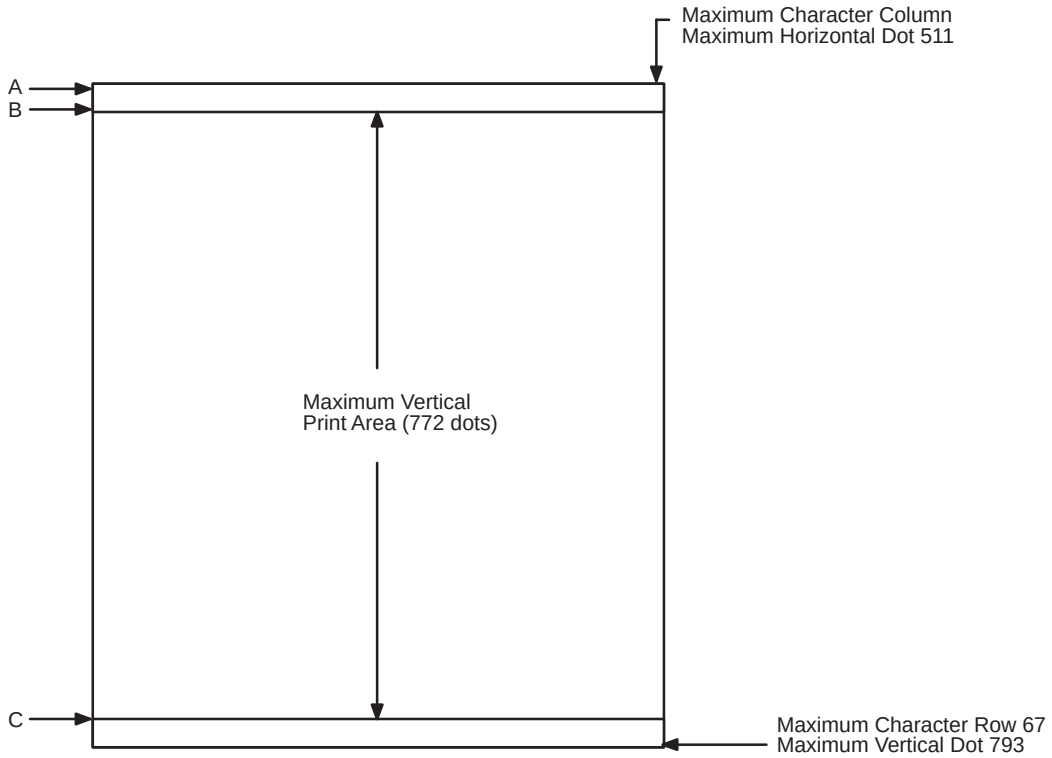


Figure C–1. Top/Bottom Margin Example

Setting Left Margins

Using dot values to identify maximum horizontal print positions, the page boundary parameters of an 8–1/2–inch wide form (85 character columns) has 510 dot columns and n/60–inch horizontally (60 dpi X 8.5 inches). (See Figure C–1.) Setting a Left Margin value repositions the Starting Column 1 position by the degree of offset required. This offset can be a 0, a positive, or negative value. The following examples explain how setting the Left Margin affects printed output:

No Left Margin Setting – When the Left Margin configuration setting is 0 on an 8–1/2–inch form, the Starting Column is 1, and the Ending Column is 511 (Figure C–2, A and B, respectively).

Positive Left Margin Setting – When the Left Margin setting is 20 on an 8–1/2–inch form, the left margin is offset by 20 dots, and that 20th dot position becomes Starting Column 1 in IGP/PGL memory (A, Figure C–3). This 20 dots also offsets the Ending Column by 20 dots, thus narrowing the maximum print width on the form from 511 to 491 dots (B, Figure C–3).

Negative Left Margin Setting – With a Left Margin setting of –20 on an 8–1/2–inch form, the left margin is offset –20 dots, and that –20 becomes the Starting Column 1 in IGP/PGL memory (A, Figure C–4). This –20 offset *appears* to expand the horizontal printable area to 531 dots (B, Figure C–4); however, the expanded area is actually beyond the addressable range of the 8–1/2–inch–wide form containing the –20 offset position and is, therefore, not accessible. Column 21 is the left–most addressable area on the page.

NOTE: Negative Left Margin configuration is a method of offsetting and printing an existing IGP/PGL file which may otherwise require modification in order to orient the output on the page properly. Use this option if your IGP/PGL file was written for applications where the leftmost printable area is not designated as the first printable character column on the form.

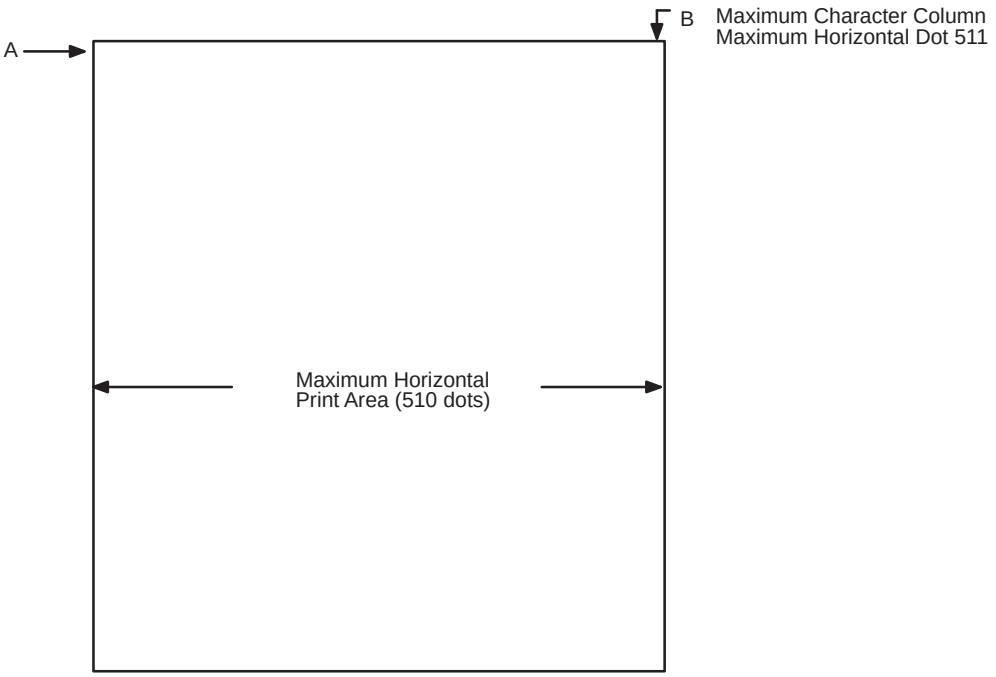


Figure C–2. Left Margin Example – No Setting

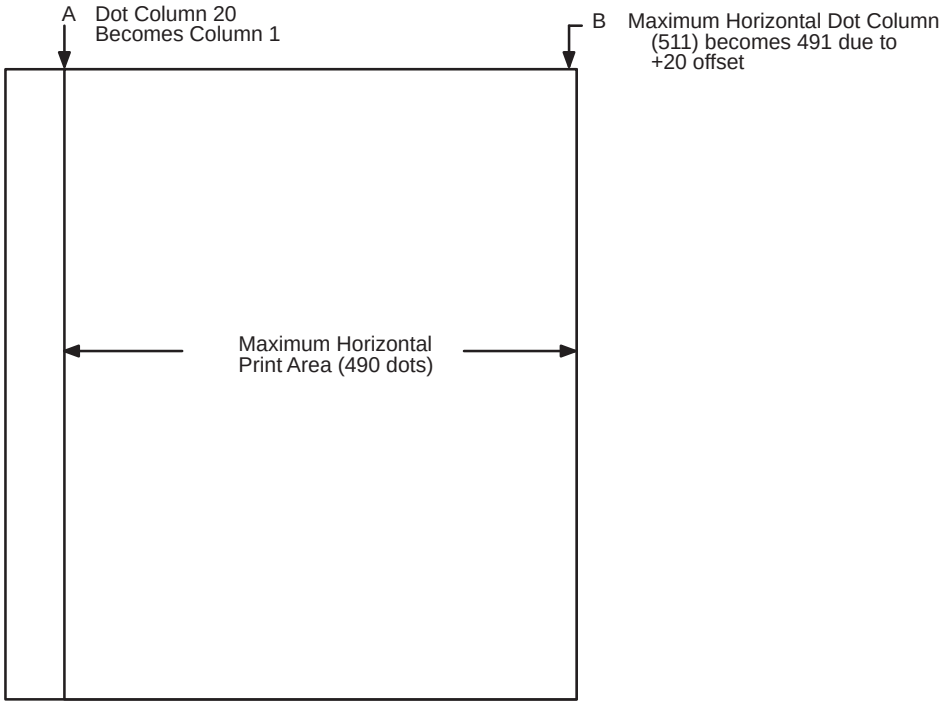


Figure C–3. Left Margin Setting +20 Example

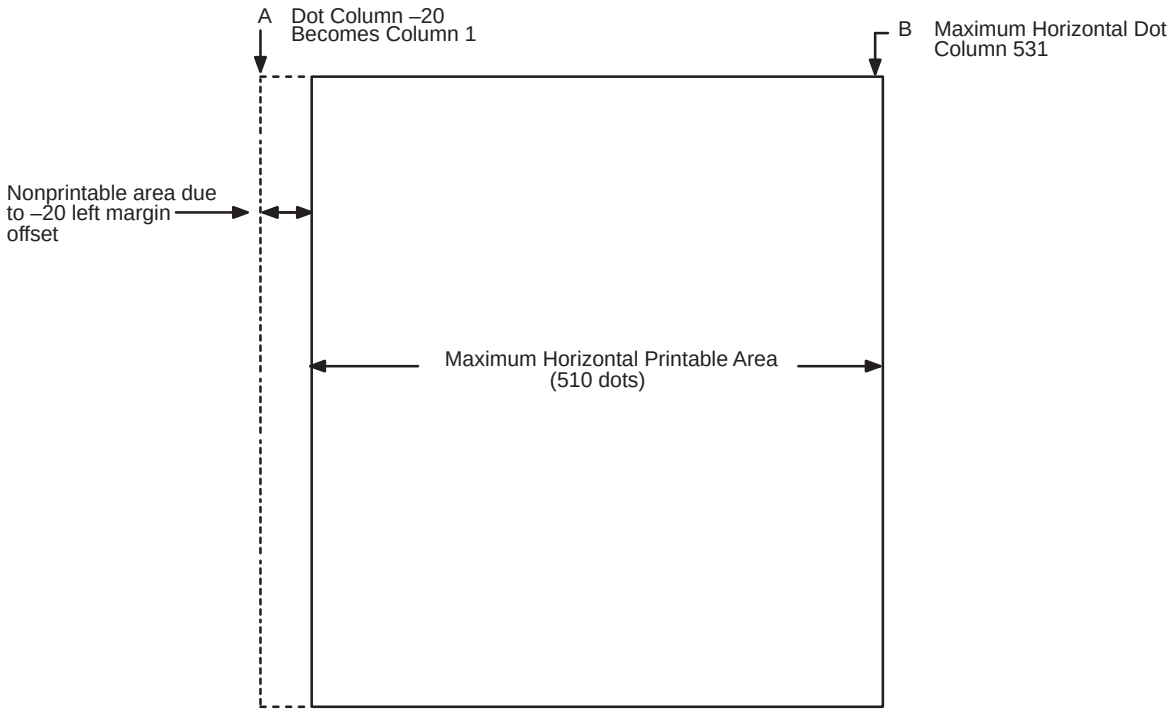


Figure C–4. Left Margin –20 Setting Example

D Typefaces

Standard and Optional Typefaces

This appendix illustrates both standard and optional typefaces available with IGP/PGL.

The standard fonts are Letter Gothic (#93779), OCR–A (#90993), and OCR–B (#91409).

Beside each typeface is the 5–digit value required in the FACE # parameter of the FONT command (page 4–61).

All other fonts are optional and can be purchased as part of one of the Printronix Additional Font Diskettes. Some fonts are sold as packages; their part numbers are in parentheses. Contact your Printronix representative for further information.

Albertus®

Albertus Medium	abcdefghijklmnoPQRSTUVWXYZ123456789	92639
Medium Oblique	*abcdefghijklmnoPQRSTUVWXYZ12345678*	92640
Bold	**abcdefghijklmnoPQRSTUVWXYZ12345678**	92641
Extrabold	**abcdefghijklmnoPQRSTUVWXYZ1234567**	92642

Antique Olive

Antique Olive	abcdefghijklmnoPQRSTUVWXYZ12345678	91119
Italic	*abcdefghijklmnoPQRSTUVWXYZ12345678*	91846
Bold	**abcdefghijklmnoPQRSTUVWXYZ12345**	91118
Compact	**abcdefghijklmnoPQRSTUVWXYZ**	91120

ITC® Avant Garde Gothic

ITC Avant Garde	abcdefghijklmnoPQRSTUVWXYZ123456789	91059
Book Oblique	*abcdefghijklmnoPQRSTUVWXYZ123456789*	91671
Bold	**abcdefghijklmnoPQRSTUVWXYZ1234567**	91060
Bold Oblique	***abcdefghijklmnoPQRSTUVWXYZ123456***	91674

Monotype™ Baskerville

Monotype Baskerville	abcdefghijklmnoPQRSTUVWXYZ123456	93884
Italic	*abcdefghijklmnoPQRSTUVWXYZ123456789*	93885
Bold	**abcdefghijklmnoPQRSTUVWXYZ123456**	93886
Bold Italic	***abcdefghijklmnoPQRSTUVWXYZ123456***	93887

ITC® Benguiat

ITC Benguiat Book	abcdefghijklmnoPQRSTUVWXYZ123	91331
Book Italic	*abcdefghijklmnoPQRSTUVWXYZ123*	91332
Bold	**abcdefghijklmnoPQRSTUVWXYZ1**	91335
Bold Italic	***abcdefghijklmnoPQRSTUVWXYZ1***	91336

CG Bodoni

CG Bodoni Book	abcdefghijklmnoPQRSTUVWXYZ12345678	92581
Book Italic	*abcdefghijklmnoPQRSTUVWXYZ1234567890*	92582
Bold	**abcdefghijklmnoPQRSTUVWXYZ123456**	92585
Bold Italic	***abcdefghijklmnoPQRSTUVWXYZ12345678***	92586

ITC® Bookman

ITC Bookman Light	abcdefghijklmnoPQRSTUVWXYZ123	91454
Light Italic	*abcdefghijklmnoPQRSTUVWXYZ123*	91455
Demi	**abcdefghijklmnoPQRSTUVWXYZ1**	91467
Demi Italic	***abcdefghijklmnoPQRSTUVWXYZ1***	91468

Decorative 1

Letraset® Aachen™ Md	abcdefghijklmnoPQRSTUVWXYZ123	91889
Coronet	*abcdefghijklmnoPQRSTUVWXYZ123456*	90249
Peignot Demibold	AbcdEfgHijklMnoPQRSTUVWXYZ123456	93098
Bold	**AbcdEfgHijklMnoPQRSTUVWXYZ12**	93099

Decorative 2

Brush	abcdefghijklmnoPQRSTUVWXYZ	90326
Dom Casual	abcdefghijklmnoPQRSTUVWXYZ1234567890(.,;:!?	90133
Park Avenue	abcdefghijklmnoPQRSTUVWXYZ123456	90349
Uncial	abcdefghijklmnoPQRSTUVWXYZ12345	90508

Decorative 3

Cooper Black	abcdefghijklmnoPQRSTUVWXYZ	90369
Letraset® Revue™ Light	abcdefghijklmnoPQRSTUVWXYZ1234567890(.,:	92127
Revue Shadow	abcdefghijklmnoPQRSTUVWXYZ1234	92129
Letraset University Roman™	abcdefghijklmnoPQRSTUVWXYZ1234567890(.,:;!	91900

Decorative 4

ECCENTRIC	ABCDEFGHIJKLMNOPQRSTUVWXYZ1234567890(.,:;''*?&!)	90775
Hobo Medium	abcdefghijklmnoPQRSTUVWXYZ123456	91774
McCollough	abcdefghijklmnoPQRSTUVWXYZ1234567890(.,:;''	90774
THUNDERBIRD EXTRA CONDENSED	ABCDEFGHIJKLMNOPQRSTUVWXYZ123456780(,.;:!''*?)	90598

Decorative 5

Goudy Handtooled	abcdefghijklmnoPQRSTUVWXYZ123	91311
Marigold™	abcdefghijklmnoPQRSTUVWXYZ1234567890(,.;:!''*?	94073
Old English	abcdefghijklmnoPQRSTUVWXYZ12345	90241
Signet Roundhand	abcdefghijklmnoPQRSTUVWXYZ1	91610

Caslon

Caslon No. 540	abcdefghijklmnoPQRSTUVWXYZ123456	91988
Italic	*abcdefghijklmnoPQRSTUVWXYZ123456789*	91989
Caslon No. 3	abcdefghijklmnoPQRSTUVWXYZ12	91990
Italic	*abcdefghijklmnoPQRSTUVWXYZ12345*	91991

ITC® Century

ITC Century Book	abcdefghijklmnoPQRSTUVWXYZ123456789	91654
Book Italic	*abcdefghijklmnoPQRSTUVWXYZ12345678*	91655
Bold	**abcdefghijklmnoPQRSTUVWXYZ12345678**	92195
Bold Italic	***abcdefghijklmnoPQRSTUVWXYZ1234567***	92196

CG Century Schoolbook

CG Century Schoolbook	abcdefghijklmnoPQRSTUVWXYZ1234	92546
Italic	*abcdefghijklmnoPQRSTUVWXYZ123*	92547
Bold	**abcdefghijklmnoPQRSTUVWXYZ1**	92548
Bold Italic	***abcdefghijklmnoPQRSTUVWXYZ1***	93812

ITC® Cheltenham Book

ITC Cheltenham Book	abcdefghijklmnoPQRSTUVWXYZ1234567890(.,:;	91430
Book Italic	*abcdefghijklmnoPQRSTUVWXYZ1234567890(.,:;*	91431
Bold	**abcdefghijklmnoPQRSTUVWXYZ1234567890**	91434
Bold Italic	***abcdefghijklmnoPQRSTUVWXYZ123456789***	91435

Clarendon

Clarendon Book	abcdefghijklmnoPQRSTUVWXYZ1234	90271
Clarendon	**abcdefghijklmnoPQRSTUVWXYZ1234**	90269
Book Condensed	abcdefghijklmnoPQRSTUVWXYZ1234567890(.	90572
Condensed	**abcdefghijklmnoPQRSTUVWXYZ1234567890(.,:;"!¡?¿**	90270

ITC® Clearface

ITC Clearface Regular	abcdefghijklmnoPQRSTUVWXYZ12345678	91571
Regular Italic	*abcdefghijklmnoPQRSTUVWXYZ12345678*	91572
Heavy	**abcdefghijklmnoPQRSTUVWXYZ1234567**	91577
Heavy Italic	***abcdefghijklmnoPQRSTUVWXYZ123456***	91578

Courier

Courier	abcdefghijklmnoPQRSTUVWXYZ123	93950
Italic	*abcdefghijklmnoPQRSTUVWXYZ123*	93951
Bold	**abcdefghijklmnoPQRSTUVWXYZ123**	93952
Bold Italic	***abcdefghijklmnoPQRSTUVWXYZ123***	93953

Futura®

Futura Book	abcdefghijklmnoPQRSTUVWXYZ12345	91810
Book Italic	*abcdefghijklmnoPQRSTUVWXYZ12345*	91811
Bold	**abcdefghijklmnoPQRSTUVWXYZ1**	91816
Bold Italic	***abcdefghijklmnoPQRSTUVWXYZ1***	91817

ITC® Galliard

ITC Galliard Roman	abcdefghijklmnoPQRSTUVWXYZ12345	92569
Italic	*abcdefghijklmnoPQRSTUVWXYZ123456*	92570
Bold	**abcdefghijklmnoPQRSTUVWXYZ123**	92571
Bold Italic	***abcdefghijklmnoPQRSTUVWXYZ12345***	92572

Garamond Antiqua

Garamond Antiqua	abcdefghijklmnoPQRSTUVWXYZ123456	91545
Kursiv	*abcdefghijklmnoPQRSTUVWXYZ1234567*	91546
Halbfett	**abcdefghijklmnoPQRSTUVWXYZ12345**	91547
Kursiv Halbfett	***abcdefghijklmnoPQRSTUVWXYZ12345***	91548

Garth Graphic®

Garth Graphic	abcdefghijklmnoPQRSTUVWXYZ1234	91413
Italic	*abcdefghijklmnoPQRSTUVWXYZ123456*	91414
Bold	**abcdefghijklmnoPQRSTUVWXYZ12**	91415
Bold Italic	***abcdefghijklmnoPQRSTUVWXYZ123***	91416

Gill Sans®

Gill Sans	abcdefghijklmnoPQRSTUVWXYZ12345678	93872
Italic	*abcdefghijklmnoPQRSTUVWXYZ1234567890*	93873
Bold	**abcdefghijklmnoPQRSTUVWXYZ123**	93874
Bold Italic	***abcdefghijklmnoPQRSTUVWXYZ123456***	93875

CG Goudy Old Style

CG Goudy Old Style	abcdefghijklmnoPQRSTUVWXYZ1234567	92542
Italic	*abcdefghijklmnoPQRSTUVWXYZ123456789*	92543
Bold	**abcdefghijklmnoPQRSTUVWXYZ12345**	92544
Extra Bold	**abcdefghijklmnoPQRSTUVWXYZ1234**	92545

Hiroshige™

Hiroshige Book	abcdefghijklmnoPQRSTUVWXYZ12345	93983
Book Italic	*abcdefghijklmnoPQRSTUVWXYZ12345*	93984
Bold	**abcdefghijklmnoPQRSTUVWXYZ12**	93987
Bold Italic	***abcdefghijklmnoPQRSTUVWXYZ12***	93988

ITC® Korinna

ITC Korinna Regular	abcdefghijklmnoPQRSTUVWXYZ1234	91097
Kursiv Regular	*abcdefghijklmnoPQRSTUVWXYZ12345*	91313
Bold	**abcdefghijklmnoPQRSTUVWXYZ123**	91098
Kursiv Bold	***abcdefghijklmnoPQRSTUVWXYZ123***	91314

Letter Gothic

Letter Gothic	abcdefghijklmnoPQRSTUVWXYZ1234	93777
Slanted	*abcdefghijklmnoPQRSTUVWXYZ1234*	93778
Bold	abcdefghijklmnoPQRSTUVWXYZ1234	93779
Bold Slanted	*abcdefghijklmnoPQRSTUVWXYZ1234*	93780

ITC® Lubalin Graph

ITC Lubalin Graph Bk	abcdefghijklmnoPQRSTUVWXYZ123	92675
Book Oblique	*abcdefghijklmnoPQRSTUVWXYZ123*	92623
Demi	**abcdefghijklmnoPQRSTUVWXYZ123**	92677
Demi Oblique	***abcdefghijklmnoPQRSTUVWXYZ12***	92625

CG Melliza

CG Melliza	abcdefghijklmnoPQRSTUVWXYZ1234	92536
Italic	*abcdefghijklmnoPQRSTUVWXYZ1234*	92537
Bold	**abcdefghijklmnoPQRSTUVWXYZ1234**	92538
Bold Italic	***abcdefghijklmnoPQRSTUVWXYZ123***	92539

Microstyle

Microstyle	abcdefghijklmnoPQRSTUVWXYZ123	90267
Bold	**abcdefghijklmnoPQRSTUVWXYZ1**	90268
Extended	abcdefghijklmnoPQRSTUV	90516
Bold Extended	**abcdefghijklmnoPQRSTUV**	90460

OCR

OCR A	abcdefghijklmnoPQRSTUVWXYZ1234567890	90993
OCR B	abcdefghijklmnoPQRSTUVWXYZ1234567890	91409

CG Omega

CG Omega	abcdefghijklmnoPQRSTUVWXYZ123456	92506
Italic	*abcdefghijklmnoPQRSTUVWXYZ123456*	92507
Bold	**abcdefghijklmnoPQRSTUVWXYZ123456**	92510
Bold Italic	***abcdefghijklmnoPQRSTUVWXYZ123456***	92511

CG Palacio

CG Palacio	abcdefghijklmnoPQRSTUVWXYZ12345	92532
Italic	*abcdefghijklmnoPQRSTUVWXYZ1234567*	92533
Bold	**abcdefghijklmnoPQRSTUVWXYZ1234**	92534
Bold Italic	***abcdefghijklmnoPQRSTUVWXYZ12345***	92535

Shannon™

Shannon Book	abcdefghijklmnoPQRSTUVWXYZ1234567	92133
Oblique	*abcdefghijklmnoPQRSTUVWXYZ12345678*	92422
Bold	**abcdefghijklmnoPQRSTUVWXYZ1234**	92424
Extrabold	**abcdefghijklmnoPQRSTUVWXYZ123**	92134

ITC® Souvenir

ITC Souvenir Light	abcdefghijklmnoPQRSTUVWXYZ1234	90316
Light Italic	*abcdefghijklmnoPQRSTUVWXYZ1234*	90332
Demi	**abcdefghijklmnoPQRSTUVWXYZ1**	90338
Demi Italic	***abcdefghijklmnoPQRSTUVWXYZ***	90339

Stymie

Stymie Medium	abcdefghijklmnoPQRSTUVWXYZ12345	90385
Medium Italic	*abcdefghijklmnoPQRSTUVWXYZ12345*	90386
Bold	**abcdefghijklmnoPQRSTUVWXYZ12345**	90067
Bold Italic	***abcdefghijklmnoPQRSTUVWXYZ12345***	90068

ITC® Tiepolo

ITC Tiepolo Book	abcdefghijklmnoPQRSTUVWXYZ123456789	93799
Book Italic	*abcdefghijklmnoPQRSTUVWXYZ12345678*	93800
Bold	**abcdefghijklmnoPQRSTUVWXYZ12345678**	93801
Bold Italic	***abcdefghijklmnoPQRSTUVWXYZ12345678***	93802

ITC Tiffany

ITC Tiffany Medium	abcdefghijklmnoPQRSTUVWXYZ123	90437
Medium Italic	*abcdefghijklmnoPQRSTUVWXYZ123*	92628
Heavy	**abcdefghijklmnoPQRSTUVWXY**	90441
Heavy Italic	***abcdefghijklmnoPQRSTUVWX***	92630

CG Times

CG Times	abcdefghijklmnoPQRSTUVWXYZ1234567	92500
Italic	*abcdefghijklmnoPQRSTUVWXYZ12345678*	92501
Bold	**abcdefghijklmnoPQRSTUVWXYZ12345**	92504
Bold Italic	***abcdefghijklmnoPQRSTUVWXYZ1234567***	92505

CG Trade

CG Trade	abcdefghijklmnoPQRSTUVWXYZ123456	92519
Italic	*abcdefghijklmnoPQRSTUVWXYZ123456*	92520
Bold No. 2	**abcdefghijklmnoPQRSTUVWXYZ123456**	92522
Bold No. 2 Italic	***abcdefghijklmnoPQRSTUVWXYZ123456***	92523

CG Triumvirate™

CG Triumvirate	abcdefghijklmnoPQRSTUVWXYZ12345	92244
Italic	*abcdefghijklmnoPQRSTUVWXYZ123456*	92245
Bold	**abcdefghijklmnoPQRSTUVWXYZ1234**	92248
Bold Italic	***abcdefghijklmnoPQRSTUVWXYZ1234***	92249

CG Triumvirate Condensed™

CG Triumvirate Condensed	abcdefghijklmnoPQRSTUVWXYZ1234567890(	92246
Condensed Italic	*abcdefghijklmnoPQRSTUVWXYZ1234567890(*	92247
Bold Condensed	**abcdefghijklmnoPQRSTUVWXYZ123456789(**	92250
Bold Condensed Italic	***abcdefghijklmnoPQRSTUVWXYZ123456789(***	92251

CG Trump Mediaeval

CG Trump Mediaeval	abcdefghijklmnoPQRSTUVWXYZ123	92557
Italic	*abcdefghijklmnoPQRSTUVWXYZ123*	92558
Bold	**abcdefghijklmnoPQRSTUVWXYZ123**	92559
Bold Italic	***abcdefghijklmnoPQRSTUVWXYZ123***	92560

Univers®

Univers Medium	abcdefghijklmnoPQRSTUVWXYZ1234	94021
Medium Italic	*abcdefghijklmnoPQRSTUVWXYZ1234*	94022
Bold	**abcdefghijklmnoPQRSTUVWXYZ1234**	94023
Bold Italic	***abcdefghijklmnoPQRSTUVWXYZ1234***	94024

Univers Condensed

Univers Medium Cond.	abcdefghijklmnoPQRSTUVWXYZ1234567890(	94029
Medium Condensed Italic	*abcdefghijklmnoPQRSTUVWXYZ1234567890(*	94039
Bold Condensed	**abcdefghijklmnoPQRSTUVWXYZ1234567890**	94030
Bold Condensed Italic	***abcdefghijklmnoPQRSTUVWXYZ1234567890***	94040

ITC® Zapf Chancery

ITC Zapf Chancery Medium	*abcdefghijklmnoPQRSTUVWXYZ1234567890(.,:;''!¡?¿*	94018
Medium Italic	*abcdefghijklmnoPQRSTUVWXYZ1234567890(.,:;''!¡?¿)*	93949
Demi	*abcdefghijklmnoPQRSTUVWXYZ1234567890(.,:;''*	94019
Bold	***abcdefghijklmnoPQRSTUVWXYZ1234567890(.,***	94020

ITC® Zapf Dingbats

ITC Zapf Dingbats		93848
Zapf Dingbats 100		93848
200		93848
300		93848

Chart Printing Package (141783–008)
Seven Fonts

ITC Bookman Light (91454)

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWwXxYyZz

1234567890987654321 0987654321 !@#$%^&*()_+{}:"<>?-=[]\;',./

ITC Bookman Demi(91467)

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWw XxYyZz

1234567890987654321 0987654321 !@#$%^&*()_+{}:"<> ?-=[]\;',./

ITC Lubalin Graphic Book (92675)

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWwXxYyZz

1234567890987654321 0987654321 !@#$%^&()_+{}:"<>?-=()\;',./*

ITC Lubalin Graphic Demi (92677)

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWwXxYyZz

1234567890987654321 0987654321 !@#$%^&*()_+{}:"<>?-=()\;',./

Shannon Book (92133)

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWwXxYyZz

1234567890987654321 0987654321 !@#$%^&*()_+{}:"<>?-=[]\;',./

Shannon Bold (92424)

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWwXxYyZz

1234567890987654321 0987654321 !@#$%^&*()_+{}:"<>?-=[]\;',./

Shannon Extrabold (92134)

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWwXxYyZz

1234567890987654321 0987654321 !@#$%^&*()_+{}:"<>?-=[]\;',./

Desktop Printing Package (141783–010)
Eight Fonts

CG Times (92500)

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWwXxYyZz

1234567890987654321 0987654321 !@#$%^&*()_+{}:"<>?-=[]\;',./

CG Times Bold (92504)

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWwXxYyZz

1234567890987654321 0987654321 !@#$%^&*()_+{}:"<>?-=[]\;',./

CG Times Italic (92501)

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWwXxYyZz

1234567890987654321 0987654321 !@#$%^&()_+{}:"<>?-=[]\;',./*

CG Times Bold Italic (92505)

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWwXxYyZz

1234567890987654321 0987654321 !@#$%^&*()_+{}:"<>?-=[]\;',./

Univers Medium Condensed (94029)

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWwXxYyZz

1234567890987654321 0987654321 !@#$%^&*()_+{}:"<>?-=[]\;',./

Univers Medium Condensed Italic (94039)

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWwXxYyZz

1234567890987654321 0987654321 !@#$%^&()_+{}:"<>?-=[]\;',./*

Univers Bold Condensed (94030)

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWwXxYyZz

1234567890987654321 0987654321 !@#$%^&*()_+{}:"<>?-=[]\;',./

Univers Bold Condensed Italic 94040

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWwXxYyZz

1234567890987654321 0987654321 !@#$%^&*()_+{}:"<>?-=[]\;',./

Label Printing Package #1 (141783–006)
Eight Fonts

Microstyle Book (90267)

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWwXxYyZz

1234567890987654321 0987654321 !@#$%^&*()_+{}:"<>?-=[]\;',./

Microstyle Bold (90268)

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWwXxYyZz

1234567890987654321 0987654321 !@#$%^&*()_+{}:"<>?-=[]\;',./

CG Trade (92519)

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWwXxYyZz

1234567890987654321 0987654321 !@#$%^&*()_+{}:"<>?-=[]\;',./

CG Trade No. 2 (92522)

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWwXxYyZz

1234567890987654321 0987654321 !@#$%^&*()_+{}:"<>?-=[]\;',./

Label Printing Package #1 (141783–006)

CG Triumverate (92244)

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWwXxYyZz

1234567890987654321 0987654321 !@#$%^&*()_+{}:"<>?-=[]\;',./

CG Triumverate Bold (92248)

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWwXxYyZz

1234567890987654321 0987654321 !@#$%^&*()_+{}:"<>?-=[]\;',./

CG Triumverate Condensed (92246)

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWwXxYyZz

1234567890987654321 0987654321 !@#$%^&*()_+{}:"<>?-=[]\;',./

CG Triumverate Bold Condensed (92250)

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWwXxYyZz

1234567890987654321 0987654321 !@#$%^&*()_+{}:"<>?-=[]\;',./

Label Printing Package #2 (141783–007)
Eight Fonts

Antique Olive (91119)

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWwXxYyZz

1234567890987654321 0987654321 !@#$%^&*()_+{}:"<>?-=[]\;',./

Antique Olive Bold (91118)

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWwXxYyZz

1234567890987654321 0987654321 !@#$%^&*()_+{}:"<>?-=[]\;',./

Gill Sans (93872)

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWwXxYyZz

1234567890987654321 0987654321 !@#$%^&*()_+{}:"<>?-=[]\;',./

Gill Sans Bold (93874)

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWwXxYyZz

1234567890987654321 0987654321 !@#$%^&*()_+{}:"<>?-=[]\;',./

Label Printing Package #2 (141783–007)

Clarendon Book (90271)

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWw
XxYyZz

1234567890987654321 0987654321 !@#$%^&*()_+{}:"<>?-
=[]\;',./

Clarendon (90269)

**AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWw
XxYyZz**

**1234567890987654321 0987654321 !@#$%^&*()_+{}:"<>?-
=[]\;',./**

Univers Medium Condensed (94029)

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWwXxYyZz

1234567890987654321 0987654321 !@#$%^&*()_+{}:"<>?-=[]\;',./

Universe Bold Condensed (94030)

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWwXxYyZz

**1234567890987654321 0987654321 !@#$%^&*()_+{}:"<>?-
=[]\;',./**

Office Printing Package (141783–009)
Eight Fonts

Garth Graphic (91413)

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWwXxYyZz

1234567890987654321 0987654321 !@#$%^&*()_+{}:"<>?-=[]\;',./

Garth Graphic Bold (91415)

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWwXxYyZz

1234567890987654321 0987654321 !@#$%^&*()_+{}:"<>?-=[]\;',./

Garth Graphic Italic (91414)

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWwXxYyZz

1234567890987654321 0987654321 !@#$%^&()_+{}:"<>?-=[]\;',./*

Garth Graphic Bold Italic (91416)

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWwXxYyZz

1234567890987654321 0987654321 !@#$%^&()_+{}:"<>?-=[]\;',./*

CG Omega (92506)

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWwXxYyZz

1234567890987654321 0987654321 !@#$%^&*()_+{}:"<>?-=[]\;',./

CG Omega Bold (92510)

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWwXxYyZz

1234567890987654321 0987654321 !@#$%^&*()_+{}:"<>?-=[]\;',./

CG Omega Italic (92507)

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWwXxYyZz

1234567890987654321 0987654321 !@#$%^&()_+{}:"<>?-=[]\;',./*

CG Omega Bold Italic (92511)

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWwXxYyZz

1234567890987654321 0987654321 !@#$%^&*()_+{}:"<>?-=[]\;',./

CG Century Schoolbook Family (141783–005)
Four Fonts

CG Century Schoolbook (92546)

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWw
XxYyZz

1234567890987654321 0987654321 !@#$%^&*()_+{}:"<>?-=[]\;',./

CG Century Schoolbook Italic (92547)

*AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWw
XxYyZz*

1234567890987654321 0987654321 !@#$%^&()_+{}:"<>?-=[]\;',./*

CG Century Scoolbook Bold (92548)

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVv
WwXxYyZz

1234567890987654321 0987654321 !@#$%^&*()_+{}:"<>?-=[]\;',./

CG Century Schoolbook Bold Italic (93812)

*AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVv
WwXxYyZz*

1234567890987654321 0987654321 !@#$%^&()_+{}:"<>?-=[]\;',./*

CG Times Family (141783–004)
Four Fonts

CG Times (92500)

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWwXxYyZz

1234567890987654321 0987654321 !@#$%^&*()_+{}:"<>?-=[]\;',./

CG Times Italic (92501)

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWwXxYyZz

1234567890987654321 0987654321 !@#$%^&()_+{}:"<>?-=[]\;',./*

CG Times Bold (92504)

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWwXxYyZz

1234567890987654321 0987654321 !@#$%^&*()_+{}:"<>?-=[]\;',./

CG Times Bold Italic (92505)

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWwXxYyZz

1234567890987654321 0987654321 !@#$%^&*()_+{}:"<>?-=[]\;',./

CG Triumverate Family (141783–003)
Four Fonts

CG Triumverate (92244)

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWwXxYyZz

1234567890987654321 0987654321 !@#$%^&*()_ + {}:"<>?- = []\;',./

CG Triumverate Italic (92245)

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWwXxYyZz

1234567890987654321 0987654321 !@#$%^&()_ + {}:"<>?- = []\;',./*

CG Triumverate Bold (92248)

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWwXxYyZz

1234567890987654321 0987654321 !@#$%^&*()_ + {}:"<>?- = []\;',./

CG Triumverate Bold Italic (92249)

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWwXxYyZz

1234567890987654321 0987654321 !@#$%^&*()_ + {}:"<>?- = []\;',./

Garamond Family (141783–011)
Four Fonts

Garamond Antique (91545)

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWwXxYyZz

1234567890987654321 0987654321 !@#$%^&*()_+{}:"<>?-=[]\;',./

Garamond Kursiv (91546)

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWwXxYyZz

1234567890987654321 0987654321 !@#$%^&()_+{}:"<>?-=[]\;',./*

Garamond Halbfett (91547)

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWwXxYyZz

1234567890987654321 0987654321 !@#$%^&*()_+{}:"<>?-=[]\;',./

Garamond Kursiv Halbfett (91548)

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWwXxYyZz

1234567890987654321 0987654321 !@#$%^&()_+{}:"<>?-=[]\;',./*

Gill Sans Family (141783–002)
Five Fonts

Gill Sans (93872)

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWwXxYyZz

1234567890987654321 0987654321 !@#$%^&*()_+{}:"<>?-=[]\;',./

Gill Sans Italic (93873)

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWwXxYyZz

1234567890987654321 0987654321 !@#$%^&()_+{}:"<>?-=[ ]\;',./*

Gill Sans Bold (93874)

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWwXxYyZz

1234567890987654321 0987654321 !@#$%^&*()_+{}:"<>?-=[]\;',./

Gill Sans Bold Italic (93875)

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWwXxYyZz

1234567890987654321 0987654321 !@#$%^&*()_+{}:"<>?- =[]\;',./

Gill Sans Family (141783–002)

Gill Sans Extrabold (94051)

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWw
XxYyZz

1234567890987654321 0987654321 !@#$%^&*()_+{}:"
<>?- =[]\;',./

Univers Family (141783–001)
Four Fonts

Univers Medium (94021)

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWwXxYyZz

1234567890987654321 0987654321 !@#$%^&*()_+{}:"<>?-=[]\;',./

Univers Medium Italic (94022)

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWwXxYyZz

1234567890987654321 0987654321 !@#$%^&()_+{}:"<>?-=[]\;',./*

Univers Bold (94023)

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWwXxYyZz

1234567890987654321 0987654321 !@#$%^&*()_+{}:"<>?-=[]\;',./

Univers Bold Italic (94024)

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Index

A

B

C

D

E

F

G

H

I

L

M

N

O

P

Q

R

S

T

U

V

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