18 The Picture Frame

Introduction

When importing an existing HP-GL/2 file, or creating an HP-GL/2 image within an application, you use several PCL commands to set up the picture frame size, choose the picture frame location, and enter and exit HP-GL/2 mode. This chapter explains these PCL commands.

The following terms are used in this discussion:

Picture presentation directives are a group of PCL commands which:

- Provide the means to enter and exit HP-GL/2 context.
- Define a delimiting rectangle for the graphic image.
- Specify a scaling factor so existing HP-GL/2 graphics can be scaled and placed anywhere on the PCL logical page.

Picture frame refers to the destination rectangle when transferring HP-GL/2 graphics into the PCL logical page. The PCL picture frame size commands specify the size of the destination rectangle.

Picture frame scaling factor is the ratio of the size of the picture frame to the size of the source HP-GL/2 plot. There may actually be two scaling factors, one for the *x* direction and one for the *y* direction.

Picture frame anchor point refers to the upper left corner of the picture frame, which is set to the current active position (CAP) in the PCL environment at the time the picture frame anchor point command is executed.

Defining the Image Area(PCL Picture Frame)

There is a group of commands that allows you to specify an area on the page for placing an HP-GL/2 graphic image. These commands are the *Picture Presentation Directives* and are used to define a bounding rectangle to contain the HP-GL/2 image.

Figure 18-1 illustrates the Picture Presentation Directives. The rectangular area surrounding the image is the *PCL Picture Frame* and the location on the page of the PCL Picture Frame is determined by the *picture frame anchor point*. Refer to Figures 2-3 and 2-4 for the default picture frame size.

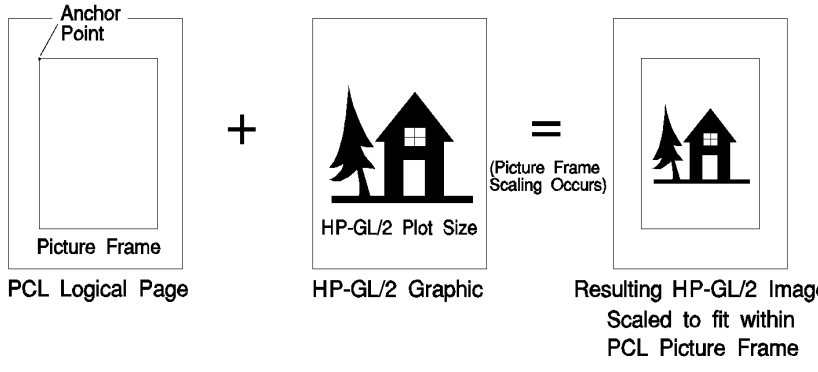


Figure 18-1 The Picture Presentation Directives

Automatically Adjusting Image Size to Fit the PCL Picture Frame

FrameImported HP-GL/2 drawings can be adjusted automatically to fit the size of the PCL Picture Frame without changing the locations of P1 and P2 (in Scale mode, as described earlier). This is called *picture frame scaling*.

When using picture frame scaling, specify the HP-GL/2 plot size unless the drawing is page size-independent (described below). If a drawing *is not* page size-independent, the printer will not adjust the size of the image to fit the picture frame without the HP-GL/2 plot size command; the drawing and the picture frame are assumed to be the same size. If a drawing *is* page size-independent, it automatically enlarges or reduces to fit within the picture frame without specifying an HP-GL/2 plot size.

Creating a Page Size-Independent Plot

As mentioned, if an imported HP-GL/2 drawing is page size-independent, it is adjusted automatically to fit different page sizes without specifying the HP-GL/2 plot size. For a drawing to be page size-independent, it must not specify any parameters in absolute units. This implies that:

- No parameter of any command is in plotter units. The scaled mode (SC command) must be used exclusively; either the default locations of P1 and P2 are used, or their positions are specified with the IR (Input Relative P1 and P2) command. The default window is used, or the window is specified in user-units (using the IW command).
- For labels, only the SR (Relative Character Size) mode is used; the SI (Absolute Character Size) mode is not used.
- The Pen Width selection mode (WU) is specified as relative instead of metric.
- The pattern length for the Line Type (LT) is specified as relative instead of metric.
- Scalable fonts are used exclusively.
- The default window is used, or the window is specified in user-units.
- The DR command (relative direction) is used for label direction (*not* DI — absolute direction).

If a drawing does not meet the above criteria and the drawing is not the same size as the picture frame, the HP-GL/2 plot size must be specified to accomplish the desired scaling. If it is not specified, the image is clipped to the effective window and no scaling occurs.

Note

The above bulleted items are required for automatic scaling when the picture frame size changes, *without* specifying the HP-GL/2 plot size. However, if an HP-GL/2 plot size is specified, *any* unscaled HP-GL/2 image (any image created without the SC command) is automatically enlarged or reduced to fit the PCL Picture Frame; the amount of enlargement or reduction is determined by the picture frame scaling factor (the ratio of the HP-GL/2 plot size to the PCL Picture Frame size). See Chapter 19 to specify an HP-GL/2 plot size.

Typical HP-GL/2 PlotCommand Sequence

Before we discuss the actual commands and how they operate, we will demonstrate the general sequence in which these commands are used to print HP-GL/2 files.

The following command sequence is usually followed when creating HP-GL/2 images:

- Send the *job control* and *page control* commands, and any other PCL commands that you wish to send before drawing the HP-GL/2 image. (See Chapters 3, 4, and 5 for job control and page control information.)
- Specify the PCL Picture Frame dimensions using the $^{E}_{C}$*c#X (Picture Frame Horizontal Size) and $^{E}_{C}$*c#Y (Picture Frame Vertical Size) commands. These commands determine the boundary of the window in which you place or draw your image. The PCL Picture Frame represents the maximum boundary for your HP-GL/2 drawing.
- Specify the *picture frame anchor point* using the $^{E}_{C}$*c0T (Set Picture Frame Anchor Point) command. This command determines the position on the logical page where the upper left corner of the PCL Picture Frame is placed. Receipt of this command establishes the PCL picture frame anchor point at the PCL current cursor position.
- If importing an existing plot, defined in absolute units, specify the HP-GL/2 plot size using the $^{E}_{C}{}^{E}_{C}$*c#K (Horizontal HP-GL/2 Plot Size) and $^{E}_{C}$*c#L (Vertical HP-GL/2 Plot Size). This plot size represents the size of the original HP-GL/2 image. *If you are creating a drawing within an application, do not send these commands.*
- Enter HP-GL/2 mode using the $^{E}_{C}$%#B command.
- Send HP-GL/2 commands (IN;SP1;. . .).
- Exit HP-GL/2 mode by sending the $^{E}_{C}$%#A (Enter PCL Mode) command.
- Send more PCL commands if desired or issue an $^{E}_{C}$E command to end the job and eject the page.

Note

Whenever a printer reset ($^{E}_{C}$E) is sent at the beginning of a job, precede it with a UEL ($^{E}_{C}$%–12345X) command; whenever a printer reset is sent at the end of a job, follow it with a UEL command.

Table 18-1 Example: Creating and Using a PCL Picture Frame

$^{E}_{C}$**E**	Reset the printer.
$^{E}_{C}$&l2A	Set the page size to letter.
$^{E}_{C}$&l0O	Specify portrait orientation.
$^{E}_{C}$*c3060x3960Y	Specify a 4.25-inch wide by 5.5-inch high PCL Picture Frame (4.25in. x 720 decipoints/in. = 3060 decipoints; 5.5in. x 720 decipoints/in. = 3960 decipoints).
$^{E}_{C}$*p565x600Y	Move the cursor to the point you desire as the picture frame anchor point.
$^{E}_{C}$*c0T	Set the picture frame anchor point to the current cursor position.
$^{E}_{C}$*c8.5k11L	Specify that the original HP-GL/2 plot size is 8.5 inches wide by 11 inches high. This sets up a scaling factor of 2:1 because the original HP-GL/2 plot size is twice as large as the PCL Picture Frame (4.25 x 5.5 inches). (*If you are creating a drawing within an application instead of importing an existing plot, do not send this command.*)
$^{E}_{C}$%1B	Enter HP-GL/2 mode with the pen (HP-GL/2 cursor) at the PCL cursor position. In this example, the cursor would be at the picture frame anchor point (600 PCL Units down from the top of the logical page and 565 PCL Units to the right of the left logical page boundary).

Table 18-1 Example: Creating and Using a PCL Picture Frame

IN;SP1;PU50,50;	Send the HP-GL/2 commands you desire to send. (The IN command defaults the pen position to the HP-GL/2 origin, the lower-left corner of the PCL Picture Frame.)
$^{E}_{C}$%1A	Enter the PCL mode with the cursor at the current HP-GL/2 pen position.
TextTextText	Send some text or more PCL commands.
$^{E}_{C}$E	Reset the printer to end the job and eject a page.

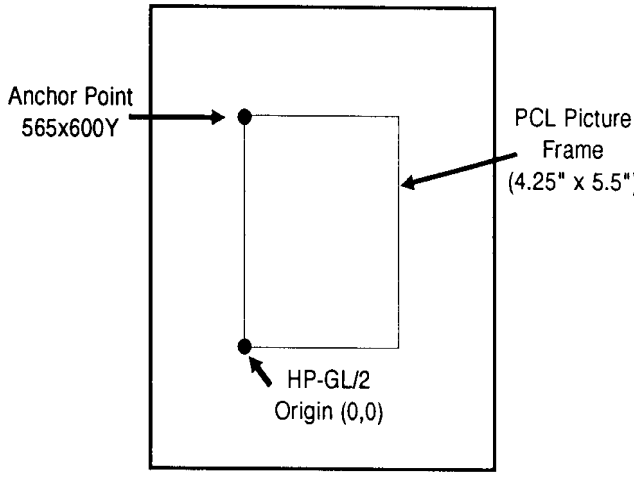


Figure 18-2

The previous example provides an idea of the commands involved in printing an HP-GL/2 plot, whether importing an existing drawing or creating one within an application. The example describes one way to print a plot, but many things can be varied such as the picture frame size and location, and the cursor position when entering and leaving HP-GL/2 mode.

Note If you have a page size-independent HP-GL/2 image, there is no need to set plot size, otherwise it is good practice to set plot size.

The commands that allow you to set up a PCL Picture Frame and enter/exit HP-GL/2 mode are discussed in detail in the rest of this chapter. By reading the following command descriptions, you can see how changing command parameters can affect your printed output.

Horizontal Picture Frame Size

This PCL command specifies the horizontal dimension of the window to be used for printing an HP-GL/2 plot.

$^{E}_{C}$ * c # X

=Horizontal size in decipoints (1/720th inch)

Default = width of the current logical page
Range = 0 - 32767 (valid to 4 decimal places)

Note The horizontal dimension specified is parallel to the PCL X-axis when the print direction is set to 0 degrees (the default).

Using this command defaults the location of P1 to the lower left corner of the picture frame, and P2 to the upper right corner of the picture frame. It also resets the soft-clip window to the PCL Picture Frame boundaries, clears the polygon buffer, and updates the HP-GL/2 pen position to the lower-left corner of the picture frame (P1), as viewed from the current orientation.

If no horizontal picture frame size command is used, the printer defaults the picture frame size to the logical page width. A parameter value of 0 or the PCL *reset*, *UE*L, *page length*, *paper size*, or *orientation* commands default the horizontal picture frame size.

If an HP-GL/2 plot size is specified, the horizontal picture frame size is used to determine the horizontal scaling factor used for scaling the image to fit in the picture frame.

Example:

To specify a horizontal picture frame size of 5 inches, send:

$^{E}_{C}$*c3600X

(5 in. x 720 decipoints/in. = 3600 decipoints).

Vertical Picture Frame Size (Decipoints)

This PCL command specifies the vertical dimension of the window used for printing an HP-GL/2 plot.

$^{E}_{C}$ * c # Y

=Vertical size in decipoints (1/720th inch)

Default **=** The distance between the default top and bottom margins (the default text length)
Range **=** 0 - 32767 (valid to 4 decimal places)

Note The vertical dimension specified is parallel to the PCL Y-axis when the print direction is set to 0 degrees (the default).

Example:To specify a vertical picture frame size of 6.5 inches, send:

$^{E}_{C}$*c4680Y

(6.5 in. x 720 decipoints/in. = 4680 decipoints)

Set Picture Frame Anchor Point

This command sets the location of the PCL Picture Frame anchor point to the PCL cursor position.

$^{E}_{C}$ * c 0 T

Default = 0
Range = 0

The position of the picture frame anchor point defines the location of the upper left corner of the PCL Picture Frame. The “upper left” refers to the corner for which X and Y coordinates are minimized when the print direction is 0.

A parameter value of zero ($^{E}_{C}$*c0T) specifies that the picture frame anchor point should be set to the cursor position. Sending a cursor move command prior to sending this command places the picture frame anchor in the desired location. All parameter values other than zero are ignored, but if you do not send a Set Picture Frame Anchor command, the printer defaults the anchor point to the left edge of the logical page and the default top margin.

Note The print direction command does not affect the physical location of the anchor point or the picture frame.

Using this command defaults the location of P1 and P2, resets the soft-clip window to the PCL Picture Frame boundaries, clears the polygon buffer, and updates the HP-GL/2 pen position to the lower left corner of the picture frame (if entered with $^{E}_{C}$%0B), as viewed from the current orientation.

Example:

To set the picture frame anchor point to a position 6 inches from the left logical page boundary and 5 inches below the top margin, send:

$^{E}_{C}$*p1800x1500Y$^{E}_{C}$*c0T

In this example, the cursor is first moved to the desired location (6 inches x 300 dots/inch = 1800 dots; 5 inches x 300 dots/inch = 1500 dots). Then the $^{E}_{C}$*c0T command sets the picture frame anchor point to that location.

HP-GL/2 Plot Horizontal Size

This command specifies the horizontal size of the HP-GL/2 drawing being imported.

$^{E}_{C}$ * c # K

=The horizontal size in inches

Default **=** width of the currently selected picture frame
Range **=** 0 to 32767 (valid to 4 decimal places)

The horizontal HP-GL/2 plot size determines the horizontal scaling factor used to fit the drawing into the PCL Picture Frame. For example, if the horizontal HP-GL/2 plot size is specified as 12 inches and the PCL Picture Frame width is 4 inches, the horizontal scaling factor would be 3:1; the horizontal component of the image would be reduced to one-third its original size to fit into the PCL Picture Frame.

A parameter value of zero or a *reset*, *page length*, *paper size*, or *orientation* command defaults the HP-GL/2 plot size to the width of the currently selected picture frame, resulting in no scaling.

Example:

If the original HP-GL/2 drawing is 8.5 inches wide, send:

$^{E}_{C}$*c8.5K

HP-GL/2 Plot Vertical Size

This command specifies the vertical size of the HP-GL/2 drawing being imported.

E_C * c # L

=The vertical size in inches

Default = height of the currently selected picture frame
Range = 0 to 32767 (valid to 4 decimal places)

The vertical HP-GL/2 plot size value determines the vertical scaling factor used to fit the drawing into the PCL Picture Frame. For example, if the vertical HP-GL/2 plot size is specified as 7 inches and the PCL Picture Frame height is 14 inches, the vertical scaling factor would be 1:2; the vertical component of the image would be enlarged to twice its original size to fit into the PCL Picture Frame.

A parameter value of zero or a *reset*, *page length*, *paper size*, or *orientation* command defaults the HP-GL/2 plot size to the height of the currently selected picture frame, resulting in no scaling.

Example:

If the original HP-GL/2 drawing is 7 inches tall, send:

E_C*c7L

Enter HP-GL/2 Mode

This command causes the printer to interpret subsequent commands as HP-GL/2 commands, instead of PCL printer language commands.

$^{E}_{C}$ % # B

=0— Position pen at previous HP-GL/2 pen position
1 — Position pen at current PCL cursor position

Default = 0
Range = 0, 1 (even values are mapped to 0; odd values are mapped to 1; $^{E}_{C}$%B is the same as $^{E}_{C}$%0B)

As soon as the printer receives this command, it switches to HP-GL/2 mode, interpreting commands as HP-GL/2 commands until it receives an Enter PCL Mode, $^{E}_{C}$E, or UEL command, or until the printer power is switched off and on. (For information on the effect of PCL settings on HP-GL/2 mode, see “Default Settings” later in this chapter.)

The value field (#) determines the cursor position once HP-GL/2 mode is entered.

0— This parameter option ($^{E}_{C}$%0B) sets the pen position to the previous HP-GL/2 position; if this is the first time HP-GL/2 mode is entered in the present print job (assuming an $^{E}_{C}$E has been sent), the pen position is at the lower left corner of the PCL Picture Frame (0,0).

1— This parameter option ($^{E}_{C}$%1B) specifies that the pen position be the same as the current PCL cursor position.

Example:

To set the pen position to the current PCL cursor position, send:

$^{E}_{C}$%1B

Enter PCL Mode

This command causes the printer to return to PCL mode from HP-GL/2 mode.

$^{E}_{C}$ % # A

=0— Position cursor at previous PCL cursor position.
1 — Position cursor at current HP-GL/2 pen position.

Default = 0
Range = 0, 1 (even values are mapped to 0; odd values are mapped to 1)

Sending the Enter PCL Mode command causes the printer to stop interpreting the incoming data as HP-GL/2 commands and to begin interpreting the data as PCL commands. The value field (#) specifies the cursor position when PCL mode is entered.

0— A 0 parameter ($^{E}_{C}$%0A) sets the pen position to the previous PCL position (the cursor position before entering HP-GL/2 mode).

1— A 1 parameter ($^{E}_{C}$%1A) sets the cursor position to the current HP-GL/2 pen position. If the current HP-GL/2 pen position is outside the bounds of the PCL logical page, the nearest point on the logical page boundary becomes the new PCL cursor position.

No PCL variables except the cursor position are affected by entering and exiting HP-GL/2 mode.

Example:

To exit HP-GL/2 mode using the current active cursor position (CAP) that existed before entering HP-GL/2 mode, send:

$^{E}_{C}$%0A

Default Settings

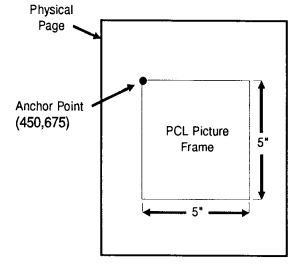
When you enter HP-GL/2 mode, most vector graphics variables retain their previous HP-GL/2 value. However, the following changes in the PCL environment can affect the HP-GL/2 environment:

- Resetting the printer ($^{E}_{C}E$ or control panel reset):
  - Executes an IN (Initialize) command
  - Defaults the PCL Picture Frame size
  - Defaults the PCL Picture Frame anchor point
  - Defaults the HP-GL/2 plot size
  - Defaults the PCL logical page orientation
- A page size, page length, or orientation command:
  - Defaults the PCL Picture Frame anchor point
  - Defaults the PCL Picture Frame
  - Defaults the HP-GL/2 plot size
  - Defaults P1 and P2 (IP,IR commands)
  - Resets the soft-clip window to the PCL Picture Frame boundaries (IW command)
  - Clears the polygon buffer (PM0,PM2)
  - Updates the cursor to the lower-left corner of the picture frame (P1).
- Redefining the PCL Picture Frame:
  - Defaults P1 and P2 (IP,IR commands)
  - Resets the soft-clip window (IW) to the PCL Picture Frame boundaries.
  - Clears the polygon buffer (PM0,PM2)
  - Updates the current pen position to the lower-left corner of the picture frame (P1)
- Setting the picture frame anchor point:
  - Defaults P1 and P2 (IP,IR commands)
  - Resets the soft-clip window to the PCL Picture Frame boundaries (IW command)
  - Clears the polygon buffer (PM0,PM2)
  - Updates the current pen position to the lower-left corner of the picture frame (P1)
- Setting an HP-GL/2 plot size:
  - Changes the picture frame scaling factor

As the printer enters HP-GL/2 mode for the first time since $^{E}_{C}$E, power-on, or control panel reset, all HP-GL/2 variables are at their default settings, as determined by the Picture Presentation Directives (the PCL Picture Frame Size, Picture Frame Anchor Point, and HP-GL/2 Plot Size commands).

Table 18-2 Example: Creating a Simple Drawing

$^{E}_{C}$E	Reset the printer.
$^{E}_{C}$&&l2A	Set the page size to letter.
$^{E}_{C}$&&l0O	Specify portrait orientation.
$^{E}_{C}$*c3600x3600Y	Specify a 5-inch wide by 5-inch high PCL Picture Frame (5in. x 720 decipoints/in. = 3600 decipoints).
$^{E}_{C}$*p450x675Y	Move the cursor to the point you desire as the picture frame anchor point.



$^{E}_{C}$*c0T	Set the picture frame anchor point to the cursor position.

Table 18-2 Example: Creating a Simple Drawing (continued)

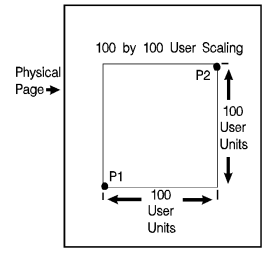
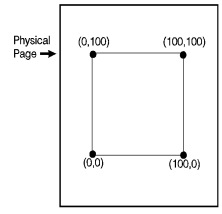
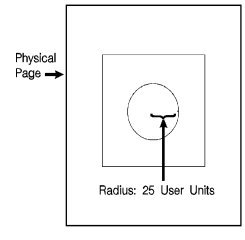
$^{E}_{C}$%1B	Enter HP-GL/2 mode with the cursor (pen) at the PCL cursor position. In this example, the cursor is at the picture frame anchor point (450 dots [1.5 in.] down from the top margin and 675 dots [2.25 in.] to the right of the left logical page boundary).
IN;SP1;	Initialize HP-GL/2 command values and select pen number 1 (black). (The IN command moves the pen position from the anchor point to the HP-GL/2 origin, the lower-left corner of the PCL Picture Frame.)
SC0,100,0,100;	Set up user scaling so that P1 is (0,0) and P2 is (100,100) (these points are the lower-left and upper-right corners of the PCL Picture Frame, respectively).
	
PD100,0,100, 100,0,100,0,0;	Draw a box marking the perimeter of the PCL Picture Frame.

Table 18-2 Example: Creating a Simple Drawing (continued)



PU50,50;CI25;	Lift the pen and move to the center of the PCL Picture Frame (50,50); draw a circle with a radius that is 25% of the picture frame width.
$^{E}_{C}$%1A	Enter the PCL mode with the cursor at the current HP-GL/2 pen position.
$^{E}_{C}$E	Reset the printer to end the job and eject a page.



Note Any line drawn along the border of the effective window will cause the line to be clipped, producing a line width one-half of the defined pen width. For example, all the lines drawn in the above example are half the width of the other lines since they are clipped at the window borders.