2 The Page

Introduction

This chapter describes the PCL coordinate system. It defines the logical page and the printable area; it introduces the HP-GL/2 (vector graphics) picture frame, and identifies the boundaries of each.

Logical Page

The PCL **logical page** (also referred to as the PCL addressable area) defines the area in which the PCL cursor can be positioned. Although the printer does not actually have a cursor (like the blinking underline character used on most computer terminals), the cursor position refers to the Currently Active Position of the cursor (also referred to as the **CAP**). The location of the “cursor” is the position on the logical page where the next character will be positioned. The cursor can be moved to different points on the logical page using the cursor positioning commands (see Chapter 6, *Cursor Positioning*). The PCL cursor cannot be moved outside of the logical page bounds.

The size of the logical page for the media (paper, transparencies, labels, etc.) is defined in Table 2-1 and Table 2-2.

Printed Dots

The high quality output achieved by HP LaserJet printers is due in part to the ability to lay down a fine grid of “dots” on the page. The density of this grid is referred to as the printer’s **resolution.** From the first HP LaserJet (the “LaserJet Classic”) until recently, all HP LaserJet family printers printed at a resolution of 300 dots-per-inch. In a one inch square, the printer could print a dot anywhere in a grid of up to 300 dots horizontally by 300 dots vertically, for a total of 90,000 possible dot locations per square inch (300 × 300 = 90,000).

The LaserJet 4 printer is capable of printing at either 300 or 600 dpi resolution. At 600 dots-per-inch, it becomes possible to print up to 360,000 dots per square inch (600 x 600 = 360,000). Print resolution of LaserJet 4 is selectable and can be specified either from the printer’s control panel or programmed through PJL commands.

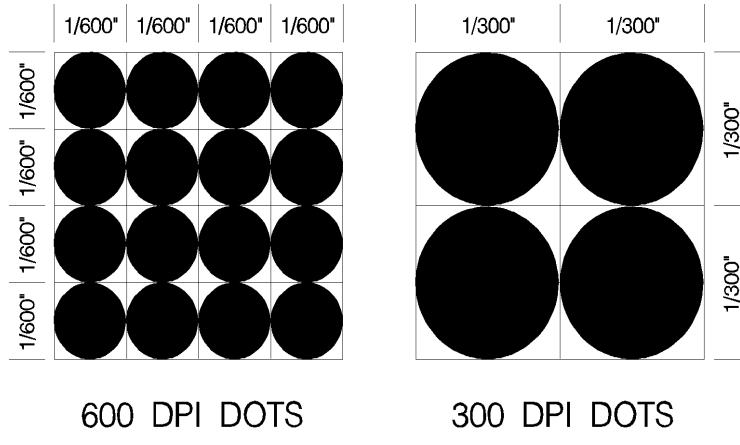

Figure 2-1 300 vs 600 DPI Dot Sizes

Note

Refer to Appendix E of the *PCL 5 Comparison Guide* or the printer *User’s Manual* to determine the default print resolution for a specific HP LaserJet printer.

The printer’s physical dot size has no direct bearing on the size of “PCL Units” used in cursor movements. PCL Units were previously referred to as “PCL dots”, but **should not be confused with the printer’s physically printed dots.** The size of PCL Units can also be specified (see the *Unit of Measure Command* in Chapter 4 for more information).

PCL Coordinate System

The PCL coordinate system is defined as shown in Figure 2-2.

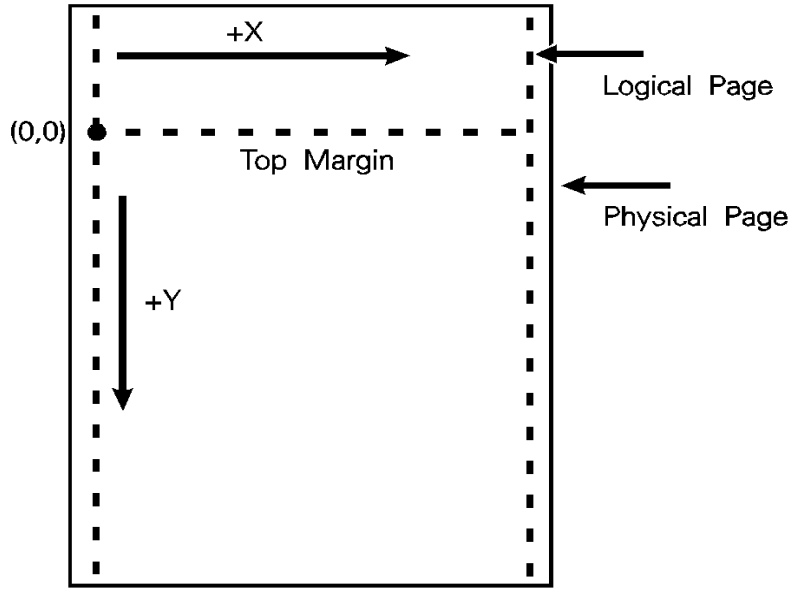

Figure 2-2 X,Y PCL Coordinates

The point (0,0) is at the intersection of the left edge of the logical page and the current top margin position.

Note

Since the point (0,0) is always at the intersection of the left edge of the **logical page** and the **current top margin** position, it moves if the top margin is changed, and rotates around the page if the orientation is changed.

Units of the PCL Coordinate System

The units of the X-axis of the PCL coordinate system may be **PCL Units, decipoints**, or **columns**. The units of the Y-axis may be PCL Units, decipoints, or **rows**.

PCL Units

These are user-definable units of measure which are used in PCL commands affecting various PCL cursor moves. The number of units-per-inch used in PCL cursor moves is determined by the current setting of the **Unit of Measure** command (see “Unit of Measure Command” in Chapter 4).

Note

PCL Units were formerly referred to as “PCL Dots”. They were renamed “PCL Units” to prevent confusion with the printer’s physically printed “dots”, which are determined by the printer’s resolution.

Decipoints

In PCL terminology, a decipoint is 1/720 inch or one-tenth of a PCL point (a PCL point is 1/72 inch as opposed to a typographic point which is 1/72 inch).

Columns & Rows

The width of a column is defined by the current **horizontal motion index (HMI)**. The distance between rows is defined by the current **vertical motion index (VMI)**, or **lines-per-inch (lpi)**. HMI, VMI and lpi are described in Chapter 5, *Page Control Commands*.

Printer Internal Units

Internally, the printer uses a different unit of measure. It maps PCL Units, decipoints, and columns and rows to this unit of measure. This internal unit is 1/7200 inch. All positioning is kept in internal units and rounded to physical dot positions when data is printed.

HP-GL/2 Picture Frame

In addition to text and raster graphics, **HP-GL/2 vector graphics** can be placed on the PCL logical page. HP-GL/2 vector graphics are incorporated using the concept of the HP-GL/2 picture frame (see Figure 2-3). Within this picture frame, HP-GL/2 uses its own coordinate system and units of measure. The HP-GL/2 coordinate system and units are described in detail in Chapter 17, *An Introduction to HP-GL/2 Vector Graphics*, and Chapter 18, *The Picture Frame*.

Note

If no HP-GL/2 picture frame size is specified (using the commands described in Chapter 18), then the default HP-GL/2 picture frame is used. The default HP-GL/2 picture frame is the current top and bottom margins and the left and right edges of the logical page. The HP-GL/2 picture frame rotates with the PCL page orientation, but is not affected by the PCL print direction.

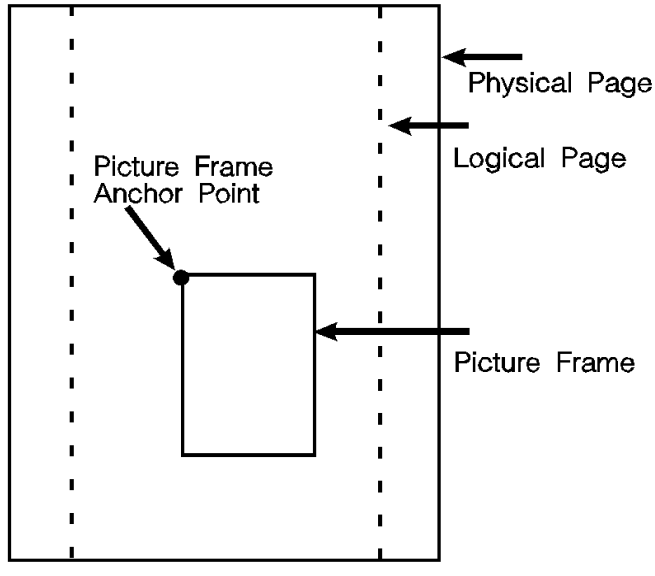

Figure 2-3 PCL Logical Page with HP-GL/2 Picture Frame

Printable Area

The **printable area** is the area of the physical page in which the printer is able to place a dot. The **physical page** refers to the size of the media (letter, legal, etc.) installed in the printer.

The relationship between physical page, logical page, default picture frame, and printable area is defined in Table 2-1 and Table 2-2.

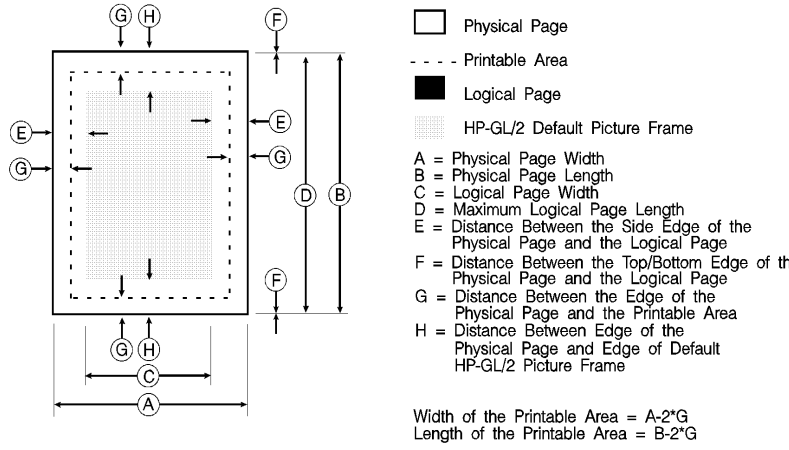

Table 2-1 Portrait Logical Page & Printable Area Boundaries

	DIMENSIONS (at 300 DPI - double for 600 DPI)							
PAPER SIZE	A	B	C	D	E	F	G	H
LETTER	2550	3300	2400	3300	75	0	50	150
Legal List 1	2550	4200	2400	4200	75	0	50	150
LEDGER	3300	5100	3150	5100	75	0	50	150
EXECUTIVE	2175	3150	2025	3150	75	0	50	150
A4	2480	3507	2338	3507	71	0	50	150
A3	3507	4960	3365	4960	71	0	50	150
COM-10	1237	2850	1087	2850	75	0	50	150
MONARCH	1162	2250	1012	2250	75	0	50	150
C5	1913	2704	1771	2704	71	0	50	150
B5	2078	2952	1936	2952	71	0	50	150
DL	1299	2598	1157	2598	71	0	50	150

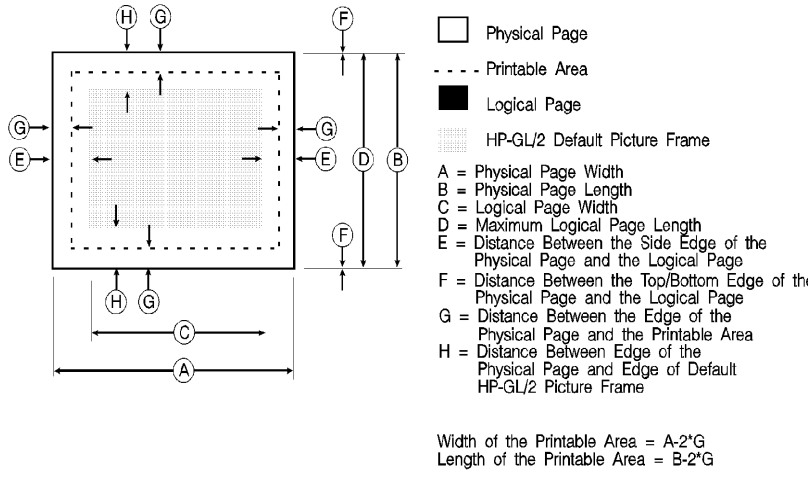

Table 2-2 Landscape Logical Page & Printable Area Boundaries

	DIMENSIONS (at 300 DPI - double for 600 DPI)							
PAPER SIZE	A	B	C	D	E	F	G	H
LETTER	3300	2550	3180	2550	60	0	50	150
Legal List 1	4200	2550	4080	2550	60	0	50	150
LEDGER	5100	3300	4980	3300	60	0	50	150
EXECUTIVE	3150	2175	3030	2175	60	0	50	150
A4	3507	2480	3389	2480	59	0	50	150
A3	4960	3507	4842	3507	59	0	50	150
COM-10	2850	1237	2730	1237	60	0	50	150
MONARCH	2250	1162	2130	1162	60	0	50	150
C5	2704	1913	2586	1913	59	0	50	150
B5	2952	2078	2834	2078	59	0	50	150
DL	2598	1299	2480	1299	59	0	50	150

The HP LaserJet printers perform pixel-level clipping. When printing characters or graphics, if any portion of the character cell or graphic is outside the printable area, only that portion outside the printable area is clipped (see Figure 2-4).

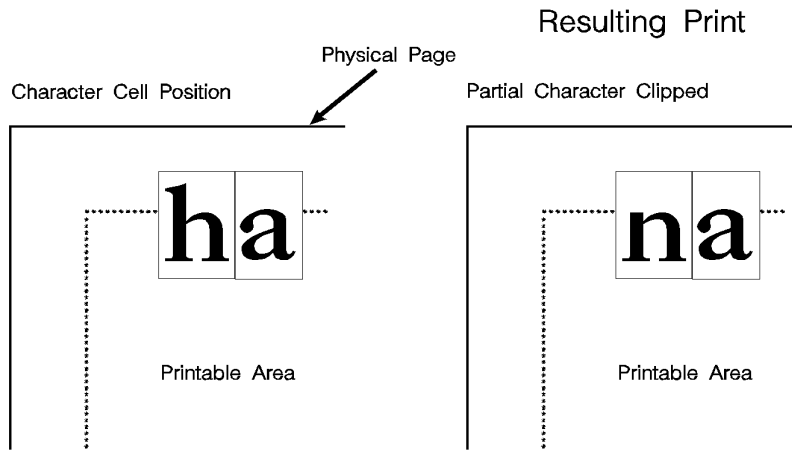

Figure 2-4 Printable Area Character Cell Positioning

Notes

Pixel level clipping can also occur at the logical page for PCL when the page is positioned using the Left Registration command.

Pixel level clipping also occurs at the picture frame for HP-GL/2.

Characters are clipped if they fall across a margin (left, right, top, and bottom). Refer to “Text Area” in Chapter 5 for additional information.