5 Page Control Commands

Introduction

Page control commands and data are associated with each printed page of a job. These commands determine such features as page source, size, orientation, margins, and text spacing. This chapter describes the commands providing page format control.

Note

If a number of consecutive pages within a job have the same format, the associated page control commands should be sent only once for that group of pages. Remember, once a PCL command is set, it remains in effect until changed by another command.

Page Size Command

The Page Size command designates the size of the paper which in turn defines the size of the logical page.

^{E}C & ℓ # A

PAPER:

= 1 - Executive (7¼ x 10½ in.)
2 - Letter (8½ x 11 in.)
3 - Legal (8½ x 14 in.)
6 - Ledger (11 x 17 in.)
26 - A4 (210mm x 297mm)
27 - A3 (297mm x 420mm)

ENVELOPES:

= 80 - Monarch (Letter - 3 7/8 x 7½ in.)
81 - Com-10 (Business - 4 1/8 x 9½ in.)
90 - International DL (110mm x 220mm)
91 - International C5 (162mm x 229mm)
100 - International B5 (176mm x 250mm)

Default = 2 (Configurable from Control Panel)

Range = 1, 2, 3, 6, 26, 27, 80, 81, 90, 91, 100 (Other values ignored)

Note

Refer to the "PCL Feature Support Matrix" in Chapter 1 of the *PCL 5 Comparison Guide* or the printer *User's Manual* for lists of supported paper and/or envelope sizes on specific printers.

Upon receipt of this command any unprinted pages are printed, the top margin, text length, and left and right margins are set to their user defaults, and any automatic macro overlay is disabled. The cursor is moved to the left edge of the logical page at the top margin on the following page (see Figure 5-5). Also, certain HP-GL/2 state variables are reset (refer to Table 5-1, under "Sending a Page Size Command:").

The factory default Page Size is **Letter** (A4 for 220v option printer); however, a user default Page Size may be selected from the control panel. The Page Size command takes precedence over the printer's control panel FORM setting.

If the Page Size command selection differs from that of the installed paper tray size and the requested page size is not currently available in another non-secure source, then a message is displayed on the control panel requesting installation of a paper tray of the specified size.

Note The Page Size command is not supported on the **HP LaserJet**,, **LaserJet+**, or the **LaserJet 500**+ **printers**.

Example

To select a legal size page, send:

$^{E}_{C}$ & ℓ 3A

If the current source paper tray is “LETTER” and the requested page size is not currently available in another non-secure source the following attendance message is displayed:

xx [1] “LOAD LEGAL”

1 *xx* = A two-letter mnemonic depending on the printer.

When the printer senses the existing paper supply has been removed and replaced with the requested paper size, the print job continues automatically.

PAPER SOURCE COMMAND

The Paper Source command designates the location to feed paper, or it prints the current page.

Esc & ℓ # H

= 0 - Print the current page
(paper source remains unchanged).
1 - Feed paper from the a printer-specific tray.
2 - Feed paper from manual input.
3 - Feed envelope from manual input.
4 - Feed paper from lower tray.
5 - Feed from optional paper source.
6 - Feed envelope from optional envelope. feeder[1]

1 Must be used in conjunction with Page Size command, envelope selection.

Default = Printer Dependent (Configurable from Control Panel)

Range = Printer Dependent

Note

Not all HP LaserJet printers support all possible paper sources. The implementation of paper source locations varies slightly from printer to printer. Refer to the “PCL Feature Support Matrix” in Chapter 1 of the *PCL 5 Comparison Guide* or the printer *User’s Manual* for paper source feature implementation details for specific HP LaserJet printers.

The Paper Source command causes the current page to be printed and the cursor to be moved to the left edge of the logical page at the top margin position for the next page (see Figure 5-5).

Example

To feed paper from the manual feed slot, send:

Esc&ℓ2H

If the selection requires operator action (such as manually feeding paper), a printer message appears in the display, prompting for the appropriate action (see the printer *User’s Manual* for specific behavior).

Logical Page Orientation Command

Orientation defines the position of the logical page and the default direction of print with respect to the physical page as shown in Figure 5-1.

Esc & ℓ # O

= 0 - Portrait
1 - Landscape
2 - Reverse Portrait
3 - Reverse Landscape

Default = 0

Range = 0-3 (Other values ignored)

Notes

This command can be used only once per page. To print multiple directions per page use the Print Direction command.

This command affects the HP-GL/2 environment (refer to Table 5-1 and the ***"HP-GL/2 and PCL Orientation Interaction" section in Chapter 15 for additional information).

The Orientation command causes the page length, top margin, text length, left and right margins, horizontal motion index (HMI), and vertical motion index (VMI) to return to their user default values, and disables the automatic macro overlay. All data received prior to this command is printed, and a Form Feed and Carriage Return executed. The cursor is moved to the left edge of the logical page at the top margin cursor position (see Figure 5-5).

The factory default orientation is portrait. Landscape orientation may be selected as the user default orientation using the control panel.

Note

The HP LaserJet 2000, LaserJet IID, LaserJet IIP and all PCL 5 printers automatically rotate all fonts to the current orientation.

Table 5-1 shows how changing certain PCL features (such as a reset, orientation, page size or page length) or changing the HP-GL/2 picture presentation directives (picture frame width or height, horizontal or vertical plot size, or picture frame anchor point) affect the HP-GL/2 state variables.

Table 5-1 HP-GL/2 State Variables

^{E}cE or Control Panel Reset:	• executes “IN” command • defaults picture frame • defaults picture frame anchor point • defaults HP-GL/2 plot size
Changing Orientation or Sending a Page Size Command:	• Defaults picture frame anchor point. • Defaults picture frame. • Defaults HP-GL/2 plot size. • Defaults P1 and P2 (“IP;”). • Defaults soft-clip window (“IW;”). • Clears the polygon buffer (“PM0;PM2”). • Updates the current position to the lower-left corner of the picture frame (P1).
Redefinition of the horizontal and/or vertical picture frame:	• Defaults P1 and P2 (“IP”). • Defaults soft-clip window (“IW”). • Clears the polygon buffer (“PM0;PM2”). • Updates the current position to the lower-left corner of the picture frame (P1).
Redefinition of the Picture Frame Anchor Point:	• Defaults P1 and P2 (“IP”). • Defaults soft-clip window (“IW”). • Clears the polygon buffer (“PM0;PM2”). • Updates the current position to the lower-left corner of the picture frame (P1).
Specifications of a New HP-GL/2 Plot Size:	• Changes the picture frame scaling factor.

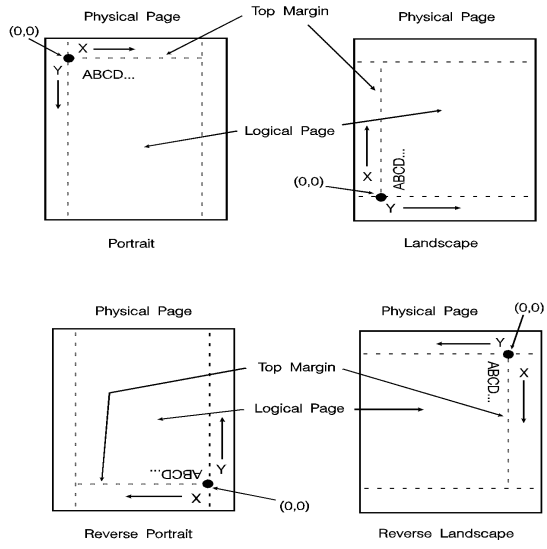

Figure 5-1 Page Orientation With Default Print Direction

The orientation of the HP-GL/2 picture is also affected by the logical page orientation. Figure 5-2 illustrates the effect of logical page orientation on the HP-GL/2 picture orientation. It is possible to alter the HP-GL/2 picture orientation within the logical page using the HP-GL/2 RO command (refer to Chapter 21, for additional information).

Most HP-GL/2 state variables retain their previous HP-GL/2 value upon receipt of this command (they are not affected by PCL mode). However, certain changes to the PCL state can affect the HP-GL/2 state (see Table 5-1).

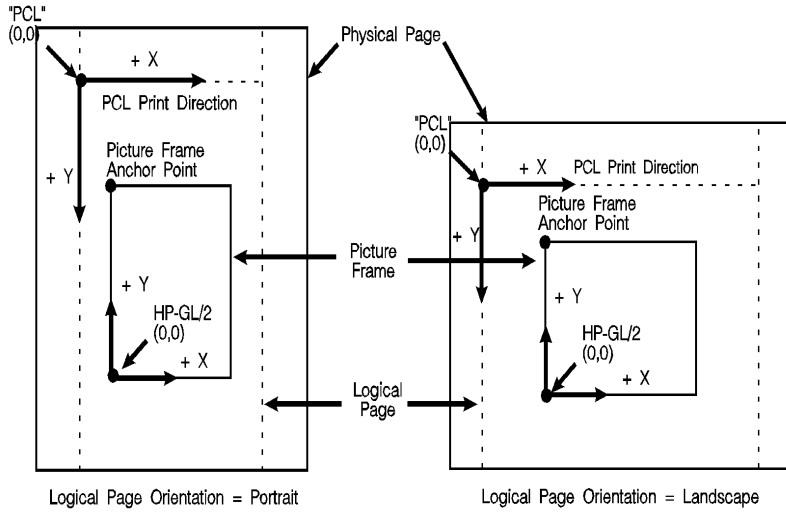

Figure 5-2 HP-GL/2 Picture Orientation with Respect to Logical Page Orientation

Print Direction Command

The Print Direction command rotates the logical page coordinate system **with respect to the current orientation** without performing a page eject. This rotation is performed in 90° increments in a **counterclockwise** direction. This allows printing in four directions on the same page.

Esc & a # P

= 0 - 0° rotation.
90 - 90° ccw rotation.
180 - 180° ccw rotation.
270 - 270° ccw rotation.

Default = 0

Range = 0, 90, 180, 270 (Other values ignored)

Changing the print direction causes the following:

- The print origin moves with the logical page rotation. For example, rotating a default page (portrait orientation, 0° print direction) 90° causes data to print in the landscape direction across the “portrait” page.
- The margins are translated (when the print direction changes by 90°, the left margin becomes the new top margin, the former top margin becomes the new right margin, etc.)
- The cursor position remains at the same physical location.
- All subsequent printing (characters, area fill patterns, raster images) is rotated to coincide with the new print direction.
- Any current raster graphics end when the print direction changes.
- Print Direction does not default HMI.

Note

The Print Direction Command does **not** affect HP-GL/2 vector graphic images. HP-GL/2 graphics can be rotated only with the Orientation command (**Esc&ℓ#O**) or the HP-GL/2 “RO” command.

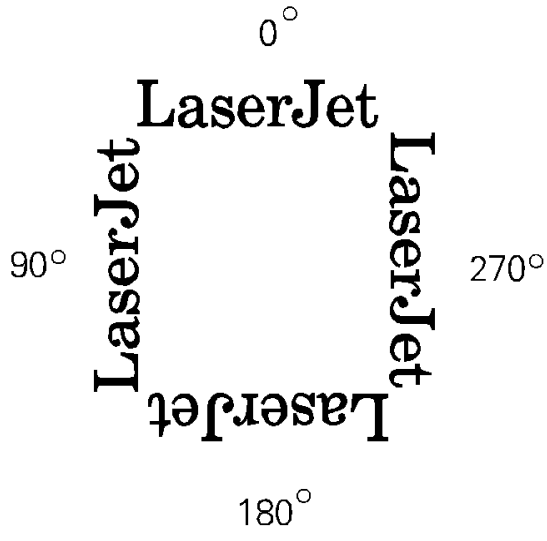

Figure 5-3 Changing Print Direction on a Page

Text Area

Text printing may be restricted to a specific area within the logical page using the Left Margin, Right Margin, Top Margin, Text Length, and Perforation Skip Mode commands. This area is known as the text area.

The left margin defines the distance between the left edge of the logical page and the left edge of the text area. The right margin defines the distance between the left edge of the logical page and the right edge of the text area. The width of the text area is the distance between the left and right margins. The top margin defines the distance between the top of the logical page and the top of the text area. The text length defines the length of the text area which in effect defines the bottom margin. The perforation region is the distance from the bottom of the text area to the top of the text area (top margin) on the next page. The text area is shown in Figure 5-4.

In general, characters are printed when they fall within the text area. However, characters can be printed between the bottom of the text area and the top of the text area on the next page only if perforation skip is disabled. Characters are printed outside the text area if a cursor move escape sequence positions the cursor outside the text area (but within the printable area). Characters that fall on (or outside) a margin as a result of printing a character string, are clipped (not printed).

Notes

Attempting to print characters across a margin results in the characters being discarded.

The default text area and the default HP-GL/2 picture frame are the same.

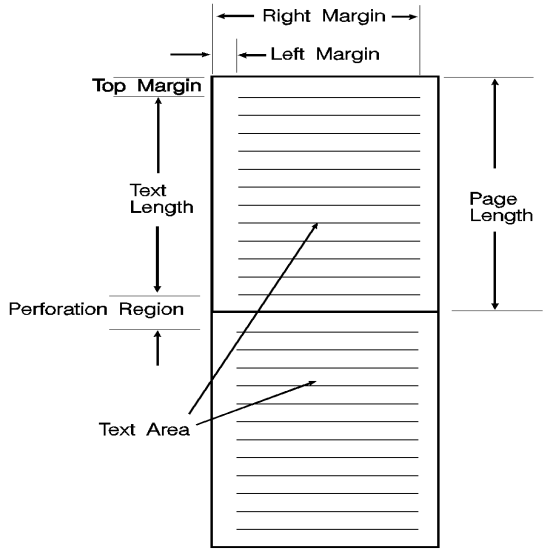

Figure 5-4 Text Area Within the Page

Left Margin Command

The Left Margin command sets the left margin to the left edge of the specified column.

$^{E}_{C}$ & a # L

= Column number

Default = Column 0 (Left bound of logical page)

Range = 0 - Right margin

The first column within a line is column 0, which is located at the left edge of the logical page (the HMI setting defines the distance between columns, which thereby defines the maximum number of columns on the logical page). If the value field specifies a column greater than the current right margin, the command is ignored.

Margins represent a physical position and once set do not change with subsequent changes in HMI.

If the cursor is to the left of the new left margin, the cursor is moved to the new left margin.

Example

To set the left margin to column 5, send:

$^{E}_{C}$&a5L

Right Margin Command

The Right Margin command sets the right margin to the right edge of the specified column.

$^{E}_{C}$ & a # M

= Column number

Default = Logical Page right bound

Range = Current left margin - Logical page right bound

The maximum right column is located at the right edge of the logical page (the HMI setting defines the distance between columns, which thereby defines the maximum number of columns on the logical page). If the value field specifies a column which is greater than the right edge of the logical page, the right margin is set to the right edge of the logical page. If the value field specifies a column less than the left margin, the command is ignored.

Margins represent a physical position and once set do not change with subsequent changes in HMI.

If the cursor position is to the right of the new right margin, the cursor is moved to the new right margin.

Example

To set the right margin to column 45, send:

$^{E}_{C}$&a45M

Clear Horizontal Margins Command

The Clear Horizontal Margins command resets the left and right margins. The left margin is set to the left edge of the logical page (column 0) and the right margin is set to the right edge of the logical page.

$^{E}_{C}$ 9

Top Margin Command

The Top Margin command designates the number of lines between the top of the logical page and the top of the text area.

^{E}C & ℓ # E

= Number of lines

Default = 1/2 inch down from top of logical page[1]

Range = 0 - Length of logical page (Other values ignored)

1 If logical page length is <½inch, then the top margin is set to top of logical page.

The Top Margin command is ignored if the value field (#) is greater than the current logical page length or if the current VMI is 0 (VMI defines the distance between lines of text).

Receipt of a Top Margin command resets the text length according to the following equation:

Text Length = (logical page length in inches) - (top margin in inches + 1/2 inch)

The top margin represents a physical position and once set does not change with subsequent changes in VMI or line spacing.

The vertical cursor position for the first line of print is determined by the current values of the top margin and VMI using the following equation:

first line in inches = top margin in inches + (0.75 X VMI)

Note

The default cursor position is not located at the intersection of the top margin and the left bound of the logical page (refer to Figure 5-5). The cursor is actually positioned down 75% of the VMI distance (0.75 × VMI) from the top margin. This positions the cursor at the relative base line position of a character cell for correct character positioning.

Example

To set the top margin to line 4, send:

^{E}C&ℓ4E

Note The first line of the logical page is line 0.

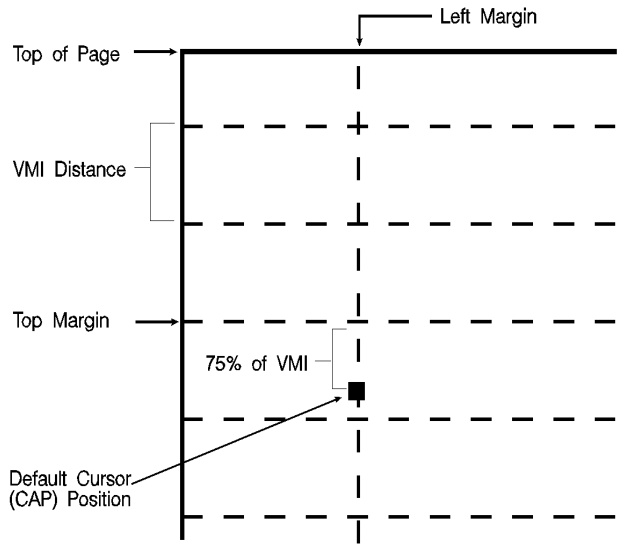

Figure 5-5 Margin Cursor Positioning

Text Length Command

The Text Length command designates the number of lines (at a given VMI) within the logical page available for printing text, the text area. This effectively defines the bottom margin.

Esc & ℓ # F

\# = Number of lines

Default = 1/2 inch less than maximum text length1

Range = Logical page length minus top margin

1 Maximum text length = INT(logical page length - top margin). However, if the max text length is less than ½inch, the text length is set to the maximum allowable.

The value field (#) sets the text length in lines referenced from the top margin. If a value greater than the logical page length minus the top margin is specified or if the current VMI is 0, the command is ignored. The user default text length is invoked whenever the orientation, page length, page size, or top margin is changed. The user default text length is computed as follows:

$$\text{Integer portion of Text Length in Lines} = \left((\text{logical page length in inches}) - (\text{top margin in inches}) - (1/2\text{ inch}) \times \frac{48}{\text{VMI}}\right)$$

$$\text{Factory Default Text Length in Lines} = \left((\text{Logical page length in inches} - 1\text{ inch}) \times \frac{48}{8}\right)$$

Note The user default VMI is selectable using the control panel; VMI is calculated from the FORM menu setting.

Example

To select a text length of 60 lines, send:

Esc&ℓ6ØF

Perforation Skip Command

The perforation region is the distance from the bottom of the text area of one page to the top of the text area (top margin) of the next page. When perforation skip is enabled, a Line Feed or Half-Line Feed, which would move the cursor beyond the bottom of the text area, causes the cursor to move to the top of the text area on the next page. When perforation skip is disabled, a Line Feed or Half-Line Feed allows the cursor to move to the next line or half-line in the perforation region, allowing printing to continue there.

^{E}C & ℓ # L

\# = 0 - Disable
1 - Enable

Default = 1

Range = 0-1 (Other values ignored)

Whenever the perforation skip mode is changed, the top margin and page length are returned to their default values.

Note

When perforation skip is disabled, some print lines can fall outside the printable area and be lost. If lines of data could fall into the unprintable area, perforation skip should be enabled.

Horizontal Motion Index (HMI) Command

The Horizontal Motion Index (HMI) command designates the width of the columns.

$^{E}_{C}$ & k # H

= Number of 1/120 inch increments.

Default = Determined by the pitch value in the default font header.

Range = 0 - 32767 (valid to four decimal places)

The value field is valid to 4 decimal places. A value of zero (0) indicates no horizontal motion.

When fixed pitch fonts are selected, all printable characters including the Space and Backspace characters are affected by HMI. When proportional fonts are selected, the HMI affects only the Space control code character.

HMI is reset to match the new font when any of the font characteristics are changed and when switching between primary and secondary fonts with Shift In and Shift Out.

HMI is equal to the pitch value in the font header. The factory default font's HMI is 12 (12/120 = 1/10 inch per character, or 10 characters per inch).

Note

When HMI is not specifically set using the HMI command, PCL cursor moves are rounded to the nearest full increment determined by the current unit of measure setting. For example, if the unit of measure is set to 96 (one PCL Unit = 1/96 inch), then the HMI is rounded to the nearest 1/96 inch. If the unit of measure is set to 300 (one PCL Unit = 1/300 inch), the HMI is rounded to the nearest 1/300 inch.

Example

To print the printer's resident 16.66 pitch Line Printer font at 17.75 cpi, send **Ec(s16.66H** to select the Line Printer font, then send the command **Ec&k6.76H** to change HMI. This value field is calculated as follows:

$$\text{Desired HMI} = \frac{\text{HMI units}}{\text{Desired CPI}} = \frac{120}{17.75} = 6.76 \text{ HMI}$$

Each character then occupies 6.76/120 inch or 1/17.75 inch.

To use Courier 12 point (10 cpi) and print 80 characters across A4 paper, requires adjusting the HMI value. The HMI value is calculated as follows:

$$\text{A4 Width (inches)} = \frac{2338 \text{ dots wide*}}{300 \text{ dots/in.}} = 7.793 \text{ inches}$$

* This value was obtained from Figure 2-3 which identifies the page sizes (in 300 dpi dots).

$$\text{\# char./inch} = \frac{80 \text{ characters}}{7.793 \text{ in.}} = 10.266 \text{ cpi}$$

$$\text{Desired HMI} = \frac{120 \text{ HMI units}}{10.266 \text{ char./inch}} = 11.689 \text{ HMI value}$$

Vertical Motion Index (VMI) Command

The Vertical Motion Index (VMI) command designates the height of the rows. (The vertical distance the cursor moves for a Line Feed operation.)

Ec & ℓ # C

= number of 1/48 inch increments between rows.

Default = 8

Range = 0 - Current logical page length up to a maximum of 32767

If the specified VMI is greater than the current logical page length, the command is ignored.

The value field is valid to 4 decimal places. A Ø in the value field indicates no vertical movement.

This command affects the Line Feed and Half-Line Feed spacing.

The factory default VMI is 8, which corresponds to 6 lines-per-inch. A user default VMI can be selected from the control panel using the FORM menu item (refer to the printer *User's Manual* for additional information).

Example

To designate a VMI of 6 (8 lines-per-inch) send:

Ec&ℓ6C (6/48 = 1/8 inch/line)

The following equation converts lines-per-inch spacing to VMI:

$$VMI = 48 \times \left(\frac{1}{\#\ \text{of desired lines per inch}} \right)$$

Note

A change in the control panel FORM setting results in a modification of VMI. If the Page Length command (**Ec&ℓ#P**) follows a VMI change, the physical size of the page is recalculated. Therefore, depending on the VMI modification made, the printer may request a different paper size.

Common VMI Settings

To print 66 lines per page on letter-size paper, in portrait orientation (with one-half inch top and bottom margins) send:

ESC&l7.27C 7.27 = (10/66) x 48

To print 66 lines per page on letter or legal-size paper, in landscape orientation (with one-half inch top and bottom margins) send:

ESC&l5.45C 5.45 = (7.5/66) x 48

Line Spacing Command

The Line Spacing command sets the number of lines printed per inch. Only the values listed below are valid.

Esc & ℓ # D

```
#   = 1 -  1 lpi
      2 -  2 lpi
      3 -  3 lpi
      4 -  4 lpi
      6 -  6 lpi
      8 -  8 lpi
     12 - 12 lpi
     16 - 16 lpi
     24 - 24 lpi
     48 - 48 lpi
```

Default = 6

Range = 0,1,2,3,4,6,8,12,16,24,48 (Other values are ignored)

This command performs the same function as the Vertical Motion Index (VMI) command except that it identifies the VMI in lines-per-inch (lpi).

The factory default lines-per-inch setting is 6. A user default line spacing can be selected from the control panel using the FORM menu item.

Example

To select 12 lpi, send:

Esc&ℓ12D

Note Once a PCL command sets a parameter, that parameter remains in effect until another command changes it. The most recently received command has precedence.