

Section 2

IntelliBar Extensions to HP PCL Commands

This section describes IntelliBar HP PCL print and format command extensions and bar code generation command extensions.*

PRINT AND FORMAT COMMAND EXTENSIONS

The following print and format extension commands have been added to the existing IntelliBar HP PCL5 command set to take full advantage of features found in the printer.

NOTE: If you are using multiple print and format extension commands to control the printer, the IntelliBar PCL5 Extension Commands should be sent in the following order.

- Variable Form Length— defines printable area on labels longer or shorter than 11 inches, clarifies label length and character clipping
- Print Speed — controls the IntelliBar printing speed
- Density — controls print density (lightness/darkness of printed image)
- Print and Tear — executes the tear command
- Print and Cut — controls the operation of the optional cutter bar

You can easily control printer operation using these five extension commands (plus the standard HP PCL reset, number of copies, and text position commands described in Section 3).

In the following sections, the name of the command is followed by the escape sequence, its decimal and hex formats, and a description of how to use the command.

Variable Form Length

ESC !f1Z
Decimal: 027 033 102 049 090
Hex: 1B 21 66 31 5A

Use the Variable Form Length command to define the size of printable area on the label, clarify the label length, and eliminate character clipping.

This command enables variable form length and sets the job (page) size to the last selected value (Letter, Executive, A4, Legal, COM-10, Monarch C5, or DL).

Variable Form Length consists of a command group used to define labels longer or shorter than 11-inches. The command group includes

- Setting Variable Form Length
- Disabling Variable Form Length

In all cases, the top of the logical page corresponds to the top of the printable area.

If “Ignore Margins” is set using the control panel menu buttons, or if a host command is received to set the top margin to zero (0), the vertical cursor position of 0 is printable as the first printable scan line on the page. (Vertical cursor positioning in PCL is relative to the top margin). The exact location of this scan line varies with the setting of the Print Position command in the Adjustment Menu (± 3 mm).

See “Left Margin,” “Right Margin,” and “Top Margin” in Section 3 for information on margin settings for standard label sizes.

Use the following software command group to define the printable area of labels larger or smaller than 11 in. The allowable range of values is 0.5 in. to 99 in.

Setting Variable Form Length

This command is used to define labels longer or shorter than 11-inches. The allowable range is 0.5 inches to 99 inches.

ESC !f#Z
Decimal: 027 033 102 #.# 090
Hex: 1B 21 66 #.# 5A

- #: 1 = enables variable form length and sets job (page) size to the last selected value.
- # = enables variable form length and sets page length to #, where # is the form length in printer scan lines. There are 300 scan lines per inch.
- 0 = disables the variable form feature

This command sets the form length by measuring the length of the label and multiplying by 300. For example, a five-inch label has 1500 scan lines (5 x 300).

Continuous Media

For continuous media, setting the Variable Form Length command causes a soft engine reset to be executed with the label pitch length set to the form length +2 mm gap.

Therefore, the logical paper length (bitmap size) and the paper movement are always synchronized.

If Variable Form Length is not set, or the form length is set to 0, or a reset (ESC E) is received, the logical paper length and paper movement are set from the control panel using the “Operator Panel” parameter under “Label Menu.”

NOTE: Under “Label Menu”, there exists a “Label Measurement” selection that contains three choices: “Automatic”, “Fixed,” or “Operator Panel.” This selection determines how the printer synchronizes form length and label length. For example, when set to “Automatic,” the printer advances a certain number of die-cut labels during power-up in order to calculate label and label gap lengths. When set to “Fixed,” the value calculated from the last “Automatic” measurement is stored and used at power-up. This prevents feeding of blank labels. When set to “Operator Panel,” you must manually enter the label length and label gap length into NVRAM for use during power-up calculations. “Operator Panel” is primarily used for continuous label, ticket, or tag media.

Die Cut Media

For die-cut media, the Variable Form Length command changes the logical paper length (bitmap size) to the specified length. However, the pitch length in the printer remains as “Measured” (read by the “Fixed” control panel setting) or it can be set using the “Operator Panel” parameter under “Label Menu.” If the specified form length is less than the printer’s value, white space shows in each label. If the specified form length is greater than the printer’s value, the page will be formatted internally as specified, but all printing outside the engine printable area will be clipped. This is consistent with the PCL command language and allows relative movements from the bottom of the edge of the logical page to position correctly.

Within “Label Menu” exists a “Label Measurement” selection that contains three choices: “Automatic”, “Fixed”, and “Operator Panel”. These selections determine how the printer synchronizes form length and label length.

If no Variable Form Length command is received, or the form length is set to 0, or a reset (ESC E) command is received, the logical paper length and the paper movement are determined by the value measured by the control panel's "Automatic" or "Fixed" or "Operator Panel" parameters. (The self-test is printed under these conditions.)

In PCL, Line Feeds off the bottom of the logical page cause a form feed, but vertical cursor positioning commands off the bottom of the logical page position the cursor to the logical page limit without printing the page.

Disabling Variable Form Length

ESC!f0Z
Decimal: 027 033 102 048 090
Hex: 1B 21 66 30 5A

This command disables the Variable Form feature.

Print Speed

ESC !p###S
Decimal: 027 033 112 ### 83
Hex: 1B 21 70 ## 53

where ### is a number (mm) that represents increasing print speeds (see Table 2-1).

This command controls the IntelliBar printing speed. For example, ESC !p15S sets the printing speed to 15 mm/sec (0.6 in/sec).

Table 2-1 IntelliBar Print Speed Command Codes

### Value	Print Speed
15	15 mm/sec (0.6 in/sec)
20	20 mm/sec (0.8 in/sec)
30	30 mm/sec (1.2 in/sec)
40	40 mm/sec (1.6 in/sec)
60	60 mm/sec (2.4 in/sec)
80	80 mm/sec (3.1 in/sec)
100	100 mm/sec (3.9 in/sec)
120	120 mm/sec (4.7 in/sec)
150	150 mm/sec (5.9 in/sec)
200	200 mm/sec (7.9 in/sec)
250	250 mm/sec (9.8 in/sec)
300	300 mm/sec (11.8 in/sec)

Print Density

ESC !d##A

Decimal: 027 033 100 ## 65

Hex: 1B 21 64 ## 41

##: print head voltage adjustment value

This command lets you adjust the black/white contrast between the output and the label (print density) by adjusting the temperature of the print head.

ESC!d##A sets the print density for all subsequent printing, where ## = -15 to +15 (default is 0). Positive values for ## increase voltage and result in darker print; negative values decrease voltage and result in lighter print.

For example, ESC!d-3 sets the print density to a value of -3.

Print and Tear

ESC !n##T

Decimal: 027 033 110 ## 084

Hex:: 1B 21 6E ## 54

where ## equals the tear-off frequency (1 to 99, default = 1)

This command instructs the printer to print (##) labels, and then the printer pauses (with the “Tear Off Label” instruction appearing in the control panel LCD). The bottom of the last printed label is positioned at the tear bar for easy tear off. After you tear off the label stock, printing resumes automatically for the next ## labels.

For example, ESC !n3T issues a pause after every 3 labels.

NOTE: If the number of labels in the print job is less than the tear-off frequency (##), the “Tear Off Label” instruction is not displayed on the control panel LCD, and the bottom of the last printed label is not positioned at the tear bar.

For example, if the tear-off frequency is set to 15 (ESC!n15T) and the total number of labels to be printed is 20, you are prompted to tear off labels after the 15th label. After you have torn off the label, the remaining five labels print to the bottom of the 20th label positioned under the print head, not the tear bar.

Print and Cut

ESC !n##C

Decimal: 027 033 110 ## 067

Hex: 1B 21 6E ## 43

where ## equals the cut-off frequency (1 to 99, default = 1)

Use this command to control how many labels pass through the output slot before a cutting action occurs. For example, ESC !n3C issues a cut after every 3 labels.

NOTE: If the number of labels in the print job is less than the cut-off frequency (##), the last printed label is not cut.

For example, if the cut-off frequency is set to 15 (ESC!n15C) and the total number of labels to be printed is 20, cutting occurs after the 15th label. The remaining five labels will print, but no cutting occurs after the 20th label.

PCL BAR CODE COMMAND EXTENSIONS

Use the following command extensions to create bar codes with the printer's internal bar code capability. Familiarity with HP PCL is required.

NOTE: When using multiple bar code commands, send them in the following order:

First command = Set Bar Code Type
Second command = Set Bar Code Height,
Width, etc. (specific order does not matter)
Third command = Print Bar Code

Set Bar Code Type

ESC!b#C

Decimal: 027 033 098 # 067

where # is a number that sets the bar code type as follows:

- 0 only print text (default)
- 1 UPC-A
- 2 UPC-E
- 5 Code 39
- 12 Code 93
- ... etc (see below).

Supported Bar Codes

The type of bar code that you wish to produce is passed to Bar Code Library as a number in the Bar Type parameter. The following is a list of numbers to use for each bar code type:

- 1 UPC-A
- 2 UPC-E
- 3 EAN/JAN-13 (with or without 2 or 5 digit supplements)
- 4 EAN/JAN-8 (with or without 2 or 5 digit supplements)
- 5 3 of 9 (Code 39)
- 6 Extended 3 of 9
- 7 Interleaved 2 of 5
- 8 Code 128
- 9 Codabar
- 10 Zip + 4 Postnet
- 11 MSI Plessey
- 12 Code 93
- 14 UCC-128
- 15 HIBC
- 16 UPC/EAN extension (2 or 5 digit supplemental)
- 17 PDF 417

Set Bar Code Height (Decipoints)

ESC!b#H

Decimal: 027 033 098 # 072

where # is a number that sets the bar code height in decipoints (1/720 inch)

Default = 720 decipoints (1 inch)

Set Bar Code Height (Dots)

ESC!b#J

Decimal: 027 033 098 # 074

where # is a number that sets the bar code height in picture elements (pixels) (1/300 inch)

Default = 300 pixels (1 inch)

Set Bar Code Width (Dots)

ESC!b#N

Decimal: 027 033 098 # 078

where # is a number that sets the width of a narrow bar in dots (1/300 inch for IntelliBar)

Default = 2 dots

Range 1 to 6

Set Bar Code Ratio (Code 39, Extended 3 of 9, and Interleaved 2 of 5)

ESC!b#R

Decimal: 027 033 098 # 082

where # is a number that sets the ratio of wide to narrow bars as follows:

- 1 Ratio of 2 to 1
- 2 Ratio of 5 to 2 (narrow bar is double setting of width)
- 3 Ratio of 3 to 1 (default)

Set Bar Code 128 Subset Mode

ESC!b#S

Decimal: 027 033 098 # 083

where # is a number that sets subset mode for Code 128 bar codes as follows:

- 0 Automatic subset switching (default)
 - 1 Subset A (upper case/control characters)
 - 2 Subset A (upper and lower case characters)
 - 3 Subset A (double density numbers)
-

Set UPC-E Bar Code Method

ESC!b#E

Decimal: 027 033 098 # 069

where # is a number that sets the UPC-E bar code method as follows:

- 0 Requires 11 digits to print 6 digit bar code (default)
- 1 System 0 (6 digit input string)
- 2 System 1 (6 digit input string)

Print Human-Readable Text

ESC!b#T

Decimal: 027 033 098 # 084

where # is a number that determines the position of human-readable text as follows (printed with the currently selected font):

- 0 Disable (default)
- 1 Enable printing below barcode with check digit
- 2 Enable printing below bar code with check digit
- 3 Enable printing above bar code without check digit
- 4 Enable printing above bar code without check digit
- 5 Enable printing in NOTCHED bar code with check digit
- 6 Enable printing in NOTCHED bar code without check digit

The following symbologies print the human-readable check digit in the text (if enabled):

UPC-A	Code 39	Interleaved 2 of 5
EAN/JAN-8	Extended 3 of 9	Codabar
EAN/JAN-13	Code 93	HIBC
UCC-128	Extended 93	MSI Plessey (Mod 10)

Human-Readable Positioning with Bar Code

The text is centered horizontally above or below the bar code. Text printed *above* the bar code has a baseline at 1/4 of the vertical motion index (VMI) + 5 scan lines above the top of the bar code. This leaves space for descenders and 5 blank scan lines. Text printed below the bar code has a baseline at 1 VMI below the bottom of the bar code.

Positioning after Printing a Bar Code

The horizontal position is restored. The vertical position is at the scan line after the bottom of the bar code if no text is printed or if the text is printed above the bar code. The vertical position is a VMI (line feed) below the text if text is printed below the bar code.

Printing in Notched Bar Code

The NOTCHED option only applies to UPC-A, UPC-E, EAN-8, and EAN-13 bar code types (and *only* if 2 or 5 supplemental digit code *is not* included). If the supplemental digits are included in these four bar code types, NOTCHED printing is ignored and printing defaults to below the bar code.

It is important that the application selects an appropriate size font and set the vertical motion index (VMI) accordingly when using the NOTCHED option. The depth of the NOTCH is 1/2 of the VMI and the characters are printed with the baseline at 3/4 of the VMI from the top of the notched area. The characters are evenly spaced within the notched area.

Calculate Optional Check Digit

ESC!b#K

Decimal: 027 033 098 # 075

where # is a number that enables/disables optional check digit calculation as follows:

- 0 Disable(default)
- 1 Enable
- 2 Enable optional second check digit

The following symbologies print the human-readable check digit in the text (if enabled):

UPC-A	Code 39	Interleaved 2 of 5
EAN/JAN-8	Extended 3 of 9	Codabar
EAN/JAN-13	Code 93	HIBC
UCC-128	Extended 93	MSI Plessey (Mod 10)

The following symbologies always calculate a checksum:

UPC-A	Code 128
UPC-E	UCC-128
EAN/JAN-8	MSI Plessey (Mod 10)
EAN/JAN-13	Zip+4 Postnet

The following symbologies calculate a checksum if Optional Check Digit is enabled:

Code 39	Extended 39
HIBC	Code 93
Extended 93	Interleaved 2 of 5
Codabar (Mod 16)	MSI Plessey 2 (Mod 10)

Setting the Optional Check Digit to 2 has the following effect:

Codabar calculates Mod 10 checksum.

MSI Plessey calculates 1 Mod 11 and Mod 10 checksum.

PDF417 Bar Code

PDF417 bar code capability is implemented with the following features.

Additional # for Bar Code Type selection:

ESC!b#c – Set Bar Code Type, where # is:

17 = PDF417 type bar code

Escape sequences:

ESC!b#B – Enable/disable Binary Only Mode, where # is:

0 – disable Binary Only Mode (default)

1 – enable Binary Only mode (determinant symbol size)

ESC!b#D – Set RESOLUTION for encoding data to printer.

Default = 100 DPI

Range: 75, 100, 150, 300

ESC!b#F – Enable/Disable TRUNCATED PDF symbols.

0 – disable Truncated Mode (default)

1 – enable Enable Truncated Mode

ESC!b#L – Set ECC (Error Correction Code) LEVEL

Default = 0 (i.e. Use Percentage command “ESC!b#P”).

Range: 0 through 8

ESC!b#P – Set ECC LEVEL as a PERCENTAGE of data code words

Default = 10 (10% of data code words).

Range: 0 through 400

ESC!b#Q – Set mode for stripping bits to compensate for bleeding.

0 – no reduction (default)

1 – reduce Bar Height (only valid if Y SCALE > 1)

2 – reduce Bar Width (only valid if X SCALE > 1)

3 – reduce both Bar Height and Bar Width(valid as above)

ESC!b#U – Set Row count used for sizing a PDF symbol.

Default = 0

Range: 0, 3 through 90

ESC!b#V – Set Column count used for sizing the PDF symbol.

Default = 0

Range: 0 through 30

If both ROW and COLUMN count are defaulted to 0, the bar code aspect ratio is set to 1:2, i. e., the bar code will be twice as wide as it is high

ESC!b#X – Set X Scale, also known as X Element Size (multiple of Resolution) in mils (thousandths of an inch)

Default = 1

Range 1 through 20

An X Scale of 1 with a Resolution of 100 DPI generates an X Element Size of 10 mil.

ESC!b#Y – Set Y Scale (also known as module aspect ratio), which sets the row height as an integer multiple of the X element size.

Default = 3

Range 1 through 10

Print Bar Code

ESC!b#W [data]

Decimal: 027 033 098 # 087

Prints the bar code for the given # of characters of ASCII data at the current position.

Prints only text if the Bar Code Type is 0.

If a bar code is being printed, the top, left corner of the bar code will be at the current position. If only text is being printed, the left, baseline of the first character will be at the current position. (The only reason for using this command to print only text is in order to utilize the auto-incrementing option (see below).

Auto Incrementing/Decrementing Fields

This feature lets you automatically increment or decrement fields when multiple copies of a page are requested. The following two extension commands are available:

ESC!b#I

where # is a number that increments/decrements subsequent bar code or string fields as follows:

0	Disables incrementing fields (default)
1 to 32767	Increments field by the specified number
-1 to -32767	Decrements field by the absolute value of the specified number. The field is scanned from right to left until a numeric character is encountered to use as a starting value. The width of the field remains constant. Therefore, leading spaces or zeroes should be used as place holders for the largest number expected (see the following).

ESC!b#Z

where # is a number that enables/disables printing of leading zeroes in incrementing fields as follows:

- 0 Disable (default). Use spaces as placeholders. When the field value is zero, the final zero is not suppressed.
- 1 Enable (use zeroes as placeholders).

In addition, the following standard PCL macro commands must be used:

- Specify Macro ID

ESC&f0Y
027 038 102 # 089

- Start Macro Definition

ESC&f0X
027 038 102 048 088

- Stop Macro Definition

ESC&f1X
027 038 102 049 088

- Enable Macro for Automatic Overlay

ESC&f4X
027 038 102 052 088

The application must specify the Macro ID (see Section 10), download the entire page into the macro, enable the macro for automatic overlay, set the copy count, and issue a form feed. The first copy of the page will print the macro exactly as downloaded. Subsequent copies will print with appropriately modified incrementing or decrementing fields within the macro. Incrementing/decrementing fields is limited to 20 characters each, and the number of auto-incrementing fields is limited to 10 per page.

Bar Code Generation Example

The following programming example produces the label shown in Figure 2-1 using the IntelliBar Model 48 and 412 internal bar code fonts.

```
←E←&130←&18D  
3 of 95 to 2 Ratio  
Ladder Bar Code  
←!b5C←!b150J←!b3N←!b2R←!b4W1234  
x = 3 Dots  
←!b5C←!b150J←!b4N←!b2R←!b2W12  
x = 4 Dots  
Test
```

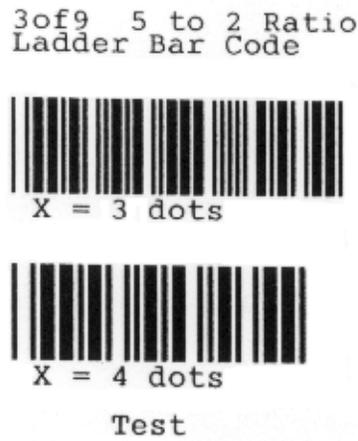


Figure 2-1 Internal Bar Code Example

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