12 Macros

Introduction

A Macro is a group of PCL and H”P-GL/2 commands and/or data created by the user that is downloaded and stored in the printer. Once stored in the printer, a macro can be invoked upon request (using the assigned macro ID number), using a single command. When printing letters, for example, which include a company letterhead, the letterhead is repeated for each letter. This letterhead can be created as a macro and stored in the printer. Thus, whenever the letter is printed a macro command, sent to the printer, initiates the command sequence to print the letterhead.

Note

HP-GL/2 commands are not supported within macros on all HP LaserJet printers. Refer to the “PCL Feature Support Matrix” in Chapter 1 of the *PCL 5 Comparison Guide* for specifics.

Macros eliminate the need to download the same information repeatedly, thus saving transmission time. However, the trade-off is that they consume user memory. If memory usage is a concern, a possible solution might be an HP custom macro cartridge.

Custom macros can be written and stored in ROM (read only memory), such as font-type cartridges or SIMM modules. When ROM-based macros are installed in the printer, they become available for selection. There is no need to download the macro and no user memory is consumed.

Hewlett-Packard provides a service to assist you by developing these custom products. For information contact:

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Macro Creation

Designate a unique identification (ID) number prior to the definition of a macro using the Macro ID command. This number is assigned to the macro. If a macro is already associated with this ID number, the previously existing macro is deleted from user memory during the definition of the new macro. Subsequent macro operations are accomplished using the macro ID number.

A macro is created in the printer in several steps. First, the start macro command is sent to the printer to indicate the start of a macro definition. Next, the printer commands, control codes, and data that constitute the macro are sent to the printer, in the intended order of their execution. Finally, the End Macro command is sent to the printer to indicate the end of the macro definition

Table 12-1

Assign ID Number	Macro ID command ($^{E}_{C}$&f14Y) assigns a unique identification number (14) to the macro.
Start Macro Definition	Macro Control command, $^{E}_{C}$&f0X, indicates the following commands and data are to be stored as a macro.
Macro data • • • Macro data	Escape sequences, control codes, HP-GL/2 commands and text required to perform the desired operation.
Stop MacroDefinition	Macro Control command, $^{E}_{C}$&f1X, identifies the end of the macro data (definition).

To invoke a macro, send the Macro ID command with the ID number of the macro, then send the Macro Control command with a value field of 2, 3, or 4 ($^{E}_{C}$&f2X, $^{E}_{C}$&f3X, or $^{E}_{C}$&f4X). This performs the macro in the specified mode: Execute (value field=2), Call (value field=3), or Overlay (value field=4). Refer to the following section “Macro Invocation” for a description of these modes.

Macros occupy a portion of user memory. The number of macros that can be stored simultaneously in user memory is limited only by the amount of available user memory.

Macro Invocation

There are three ways to invoke a macro: **execute, call,** and **overlay,** using the Macro Control command.

When a macro is **executed,** it begins performing its commands using the current modified print environment. Changes made to feature settings during macro execution are recorded in the modified print environment; these changes are retained upon completion of the macro execution.

When a macro is **called,** it begins performing its commands using the current modified print environment. Before the macro is performed, the current modified print environment is saved. Changes made to feature settings during a macro call are recorded in the modified print environment; however, these changes are not retained upon completion of the macro call. The modified print environment that existed prior to the macro call is restored.

When a macro is enabled for automatic **overlay,** its execution is the final operation each time a page is printed. Before the macro is performed, the current modified print environment is saved and replaced with the overlay environment. The overlay environment is a combination of the user default and the current modified print environments. Changes, made to feature settings during macro overlay, are recorded in the modified print environment; however, these changes are not retained upon completion of the macro overlay. The modified print environment that existed prior to the macro overlay is restored.

Note HP-GL/2 commands are not supported within macros on all HP LaserJet printers. Refer to the “PCL Feature Support Matrix” in Chapter 1 of the *PCL 5 Comparison Guide* for specifics.

The overlay environment consists of the current settings for the following features with the remainder of the environmental features set to their user default values:

Table 12-2

PCL CONTEXT:	
Page length	**Paper source**
Page size	**Number of copies**
Orientation	**Cursor position stack**
Registration	
HP-GL/2 CONTEXT:	
Current Pen Position	**Scaling Points**
Hard Clip Limits	**Soft Clip Window**
Logical Page Boundaries	**Fill Attributes**
Line Attributes	

Refer to Chapter 3 for descriptions of environments.

Note The current active position (CAP, or cursor position) is not part of the modified print environment. Therefore, the cursor position is not saved when a macro is called, nor is it restored upon completion. The Push/Pop Cursor Position command can be used to save and recall a cursor position.

Temporary / Permanent Macros

During its definition, a macro is automatically designated as temporary. A temporary macro is deleted from user memory during a printer reset. A macro can be designated as permanent to prevent the printer from deleting it during a printer reset. A macro is designated as temporary or permanent by reference to its ID number, using the Macro Control command described later in this chapter.

Note Temporary and permanent macros are removed from user memory whenever the printer's power is turned off.

Deleting Macros

There are several mechanisms provided by PCL macro control for explicit deletion of macros from user memory. These include commands to delete all macros, all temporary macros, or an individual macro by reference to its macro ID number, using the Macro Control command described later in this chapter.

Both temporary and permanent macros are deleted from memory whenever the printer's power is turned off.

Macro ID

The Macro ID command specifies an ID number for use in subsequent macro commands.

$^{E}_{C}$ **& f # Y**

=Macro ID number

Default **=** 0
Range **=** 0 - 32767

This number is used in subsequent macro operations.

The factory default macro ID is 0.

Example

To establish a macro ID number of 5, send:

$^{E}_{C}$ **& f 5 Y**

Macro Control

The macro control command provides mechanisms for definition, invocation, and deletion of macros.

$^{E}_{C}$ **& f # X**

Table 12-3

# =	0 - Start macro definition (last ID specified)
	1 - Stop macro definition
	2 - Execute macro (last ID specified)
	3 - Call macro (last ID specified)
	4 - Enable macro for automatic overlay (last ID specified)
	5 - Disable automatic overlay
	6 - Delete all macros
	7 - Delete all temporary macros
	8 - Delete macro (last ID specified)
	9 - Make macro temporary (last ID specified)
	10 - Make macro permanent (last ID specified)

Notes

A macro may call or execute another macro, which in turn may call or execute another macro; two levels of “nesting” are allowed.

Other than call and execute, no macro control operations may occur within a macro.

A printer reset command ($^{E}_{C}$E or UEL) is not allowed in a macro.

HP-GL/2 commands are not supported within macros on all HP LaserJet printers. Refer to the “PCL Feature Support Matrix” in Chapter 1 of the &cguide; for specifics. HP-GL/2 commands as well as the PCL command “Enter HP-GL/2 mode” ($^{E}_{C}$%#B) and the PCL picture frame directives are not recommended within a macro.

PCL macro control commands are not allowed while in HP-GL/2 context.

ROM-Based Macros

Macros can be supplied in ROM (read only memory), such as custom macro cartridges or on SIMM modules. The following considerations apply to all ROM-based macros.

- ROM-based macros include the macro ID numbers for their macros. These numbers cannot be changed. It is possible for a downloaded macro to be assigned the same ID number as a ROM macro. If this occurs, the downloaded macro has precedence. To access the ROM macro, the downloaded macro must be deleted.
- The ID numbers for ROM-based macros range from 0-32767.
- In case of conflicting ID numbers in ROM-based macros, the following priorities apply:

  1 Cartridge macros. (In printers that have two cartridge slots, one cartridge has priority over the other. This priority depends on the printer. Refer to Appendix E of the *PCL 5 Comparison Guide* for the macro cartridge priority.)

  2 SIMM macros. SIMM 1=highest, then SIMM 2, etc.

Example

To define a macro with an ID of 7, send:

$^{E}_{C}$**&f7y0X**

•
•
•

escape sequences, control codes, and data

•
•
•

To stop the macro definition, send:

$^{E}_{C}$**&f1X**

To make the macro with an ID of 7 permanent, send:

$^{E}_{C}$**&f7y10X**

To enable the macro with an ID of 7 for automatic overlay, send:

$^{E}_{C}$**&f7y4X**

To delete the macro with an ID of 7, send:

$^{E}_{C}$**&f7y8X**

Macro Control Example

The following illustrates the definition of a letterhead macro.

Table 12-4

$^{E}_{C}$**&f1Y**	Specify the Macro ID as one.
$^{E}_{C}$**&f0X**	Start Macro Definition.
$^{E}_{C}$**&a540h360V**	Position logo at (540, 360) decipoints in the PCL coordinate system.
$^{E}_{C}$***t150R**	Set graphics resolution to
150 dots-per-inch.	
$^{E}_{C}$***r1A**	Start raster image of logo.
$^{E}_{C}$***b60W [Raster data]**	Send the first raster line.
•	•
•	•
•	•
$^{E}_{C}$***b60W [Raster data]**	Send the last raster line.
$^{E}_{C}$***rC**	Stop raster graphics.
$^{E}_{C}$**&a540h780V**	Position for lettering at (540, 780) decipoints.
$^{E}_{C}$**(1X**	Select font with ID of 1.
ABC Corp.	Text
Post Office Box 15	Text

Table 12-4 (continued)

Fred, Texas 83707	Text
$^{E}_{C}$**&a540h960V**	Position first rule at (540, 960) decipoints**.**
$^{E}_{C}$***c10v4680H**	Set rule height and width.
$^{E}_{C}$***c0P**	Print the first rule.
$^{E}_{C}$**&a540h980V**	Position second rule at (540, 980) decipoint**s.**
$^{E}_{C}$***c&zero;P**	Print second rule.
$^{E}_{C}$**&a54&zero;h12&zero;&zero;V**	Position for first line of text at (540, 1200) decipoints.
$^{E}_{C}$**&f1X**	Stop Macro Definition.

This macro now can be **executed**, **called,** or **enabled** for automatic **overlay**.