16 Status Readback

Introduction

This chapter describes the PCL status readback features. PCL status is requested from the printer with the commands described in this chapter. Following a status request, the printer generates a status response. This response consists of ASCII data which is sent directly from the printer, through the I/O, back to the host. Status readback allows you to obtain information from the printer such as: available printer (user) memory, current available fonts and symbol sets, and the ID numbers of downloaded macros and user-defined patterns to verify their presence.

The contents of this chapter are listed below:

- Flush All Pages Command
- Echo Command
- Status Readback Programming Hints

For status readback to work, the host system must contain a bi-directional driver to receive status response data. In network operations, some printing environments do not support bi-directional communication, such as many printer sharing devices which spool data, and some network operating systems. Applications designed to incorporate PCL status readback should be designed to function correctly in situations where no response is possible.

Note For the stand-alone DOS personal computer, bi-directional driver/applications are required to access the parallel/serial I/O communication data for not only sending to the printer but also receiving data (status) back from the printer.

FTo obtain status information you must initiate a request by sending either a request for memory status or a request for an entity status, as described on the following pages.

Memory Status Request

It is possible to identify the amount of available user memory using the memory status request. Being able to identify the available memory enables a user to determine whether sufficient memory is available for the entity being downloaded, potentially avoiding a printer memory overflow condition (control panel error 20, memory overflow).

An example memory request with its associated response is shown below.

Table 16-1 Memory Status Request Example

Description	I/O Data
Memory request (Free Space command) sent to printer from host	$^{E}_{C}$*s1M

Table 16-1 Memory Status Request Example (continued)

Status response sent from printer to host	PCL INFO MEMORY TOTAL=100000 LARGEST=25000

Entity Status

It is possible to request status for the printer's entities. An **entity** is a font, symbol set, macro, or user-defined pattern stored in the printer. Each individual entity request is limited to one specific entity, and is further limited to a specific location. To request entity status, you must send the entity status readback commands to identify a **location type** and a **location unit**, and then send the entity request command.

Location type refers to the memory locations which store entities. These memory locations include internal ROM, RAM (for downloaded entities), cartridges, user-installable ROMs (SIMMs), and one additional location identified as "currently selected." Currently selected identifies the entity which is active, such as the font or user-defined pattern last selected. (Currently selected does not apply to macros or symbol sets).

Location unit refers to a specific location (or device) within the location type. For example, location unit "1" for location type "cartridge," identifies the left cartridge on a printer with two cartridges; or, unit "1" for location type "downloaded," identifies the temporary fonts (as opposed to permanent).

The location type and unit are described in detail under the location type and unit status readback command descriptions provided later in this chapter.

Once the location type and unit are specified, the status can be requested using the Inquire Status Readback Entity command. This command identifies the entity (font, symbol set, macro, or user-defined pattern) and causes the printer to send the response.

A basic entity status request is shown in the example below. This example identifies a status request for downloaded permanent fonts. The example also includes a status readback response at the bottom. Note that this example shows only one possible request/response; for more detailed information, refer to the status readback command descriptions provided later in this chapter.

Table 16-2 Entity Status Request Example

Operation	Example PCL Command	Comments
Set location type	$^{E}_{C}$*s4T	This Set Location Type command sets the location type to “downloaded.”
Set location unit	$^{E}_{C}$*s2U	This Set Location Unit command sets the location unit to “permanent.”
Identify entity which initiates status readback (Inquire Entity)	$^{E}_{C}$*s0I	The Inquire Status Readback Entity command selects status for “fonts” and causes the printer to buffer the response.

Table 16-3

Printer status res-ponse	PCL INFO FONTS SELECT=“<Esc>(8U<Esc>(s1p__v0s0b4120T <Esc>(7X” SELECT=“<Esc>(10U<Esc> __v0s0b4157T<Esc>(21X”	Two permanent downloaded fonts exist in the printer: University Roman (4120T) and Dom Casual (4157T).

In addition to the normal status responses, if an invalid request is made, the printer returns an error response. Error responses are described under the Inquire Status Readback Entity command, later in this chapter.

Status Response

When the printer receives a status request (command), it processes that request and forms the response data. This data is then stored in an I/O status buffer. The response is saved in this buffer until it is either read (by any user) or the printer is turned off.

In addition to clearing the status buffer by reading the status response or by turning off the printer, status responses are cleared if one the following settings are changed:

- Printer resolution (600/300)
- Page protection
- Language personality

Status requests and their associated response are processed in the order in which they are received.

The number of responses the printer can buffer varies, depending on internal printer operations. When requesting status, especially in the case where multiple applications or users are sharing one printer, HP recommends that you request one item, and then read its response prior to making another request.

Note Since the printer may contain a status response requested by a previous application's operation, it is important to use the Echo command (described later in this chapter) to synchronize your application's request with the printer's responses. Refer to the Echo command description and to the "Programming Hints" section at the back of this chapter for additional information.

Note The number of status responses a printer can buffer varies from printer to printer. The HP LaserJet 4 printer can store 5 responses. Refer to the *PCL 5 Comparison Guide* for printer specific information.

A status response is returned to the printer I/O port from which it was requested.

Status Response Syntax

All status responses start with the letters “PCL” followed by a Carriage Return control code (decimal 13; <CR>) and a Line Feed control code (decimal 10; <LF>). In addition, each remaining line of the response is terminated by a Carriage Return and Line Feed control code. Finally, status responses are terminated by a Form Feed control code (decimal 12; <FF>). The basic syntax for the status response is shown below.

```
PCL<CR><LF>
INFO TITLE<CR><LF>
KEYWORDn=DATAn<CR><LF>
KEYWORDn=DATAn<CR><LF>
  ⋮
<FF>
```

TITLE, *KEYWORDn*, and *DATAn* are strings that vary depending on the particular status readback command being executed. Each status readback response has one or more keyword lines associated with it. A slight variation of this is the Echo command response. This response is shown below.

```
PCL<CR><LF>
ECHO ValueField<CR><LF>
<FF>
```

ValueField is the decimal number taken from the Echo command value field.

Note Keywords may be added for future printers that are not documented here. Applications that use status readback should be designed to ignore lines with keywords they do not recognize.

Two example status responses are shown below.

```
PCL<CR><LF>
INFO MEMORY<CR><LF>
TOTAL=100000<CR><LF>
LARGEST=25000<CR><LF>
<FF>
```

```
PCL<CR><LF>
INFO FONTS<CR><LF>
SELECT="<Esc>(8U<Esc>(s0p10.00h12.00v0s0b3T"<CR><LF>
SELECT="<Esc>(0N<Esc>(s0p16.67h8.5v0s0b0T"<CR><LF>
SELECT="<Esc>(s1p__v1s0b4101T<Esc>(78X"<CR><LF>
SYMBOLSETS="0D,0I,0N,0S,0U,1E,1F,1G,..."<CR><LF>
SELECT="<Esc>(8U<Esc>(s1p__v0s3b4148T"<CR><LF>
<FF>
```

Notes

In the example listings, "<CR>," "<LF>," and "<FF>" identify the Carriage Return (decimal 13), Line Feed (decimal 10), and Form Feed (decimal 12) control codes. The "<Esc>" following the "SELECT=" keyword is a five character representation (the printable characters: "<," "E," "s," "c," and ">") and does not identify an escape control code (decimal 27).

The examples in the remainder of this chapter do not show the status response line termination ("<CR><LF>") control codes, or the termination ("<FF>") control code.

Example responses in this chapter for "SYMBOLSETS=" do not list the complete list of internal available symbol sets, only a partial list: "0D,0I,0N,0S,0U,1E,1F,1G,..." The internal symbol sets are printer dependent and may vary from printer to printer. Refer to the *PCL 5 Comparison Guide* for printer specific information.

Set Status Readback Location Type Command

The Set Location Type command sets the status location type to the specified value. Location type is used in conjunction with the location unit to identify an entity location for a status request (Inquire Status Readback Entity command).

$^{E}_{C}$ * s # T

=0- Invalid location
1 - Currently selected
2 - All Locations
3 - Internal
4 - Downloaded Entity
5 - Cartridge
7 - User-installable ROM device (SIMMs)

Default = 0
Range = 0 - 5, 7

If a value outside the range is received, the location type is set to 0.

When the location type is 0 and an Inquire Entity command is received, an error response is generated (refer to the “Status Response Error Codes” section later in this section for additional information).

A printer reset returns the location type setting to 0.

The printer retains the location type setting. If the Set Status Readback Location Type command is not sent to change the setting for an entity request, then the existing location type setting is used.

Set Status Readback Location Unit Command

The Set Location Unit command sets the status location unit to the specified value. Location unit is used in conjunction with the location type to identify an entity location for a status request (Inquire Status Readback Entity command). Note that the unit value is interpreted differently, depending on the location type specified.

$$E_C * s \# U$$

Table 16-4 Set Status Readback Location Unit Command

Location Type		Location Unit		
0	#	=	*	Invalid location
1		=	*	Currently selected
2		=	*	All Locations
3		=	0	All internal
4		=	0	All downloaded
		=	1	Temporary downloaded
		=	2	Permanent downloaded
5		=	0	All cartridges
		=	1	Highest priority cartridge
			⋮	⋮
			n	Lowest priority cartridge
7		=	0	All SIMMs
		=	1	Highest priority SIMM
			⋮	⋮
			n	Lowest priority SIMM

Default = 0
Range = 0 through n, where n is printer dependent. Refer to the *PCL 5 Comparison Guide*.

* - For location type values 0, 1 and 2, the unit value is ignored; it may be any value.

A value of 0 indicates all units of the location type.

A printer reset ($^{E}_{C}$E) returns the location unit to its default value, 0.

The printer retains the location unit setting. If this command is not sent to change the setting for an entity request, then the existing location unit setting is used.

Note The location type and unit may be set in any order. Invalid combinations are not determined until the Inquire Entity command is received. Therefore, even if the unit value is out of range, the unit is set to that value so that an appropriate error response is sent when the Inquire Entity command is received.

Inquire Status Readback Entity Command

The Inquire Entity command identifies the entity type and causes the printer to create a status response for the entity specified in the status readback location (type and unit).

$^{E}_{C}$ * s # I

=0- Font
1 - Macro
2 - User-defined pattern
3 - Symbol Set (for unbound scalable fonts)
4 - Font Extended

Default = NA
Range = 0 - 4

The entity status responses for the value field parameters vary depending on the setting of the location type and location unit (refer to the Set Location Type and Set Location Unit commands described on the preceding pages).

The entity status and error responses are described on the following pages.

Entity Status Responses

The status response for an Inquire Status Readback Entity command varies depending on the type of entity requested. The status responses for font, font extended, macro, user-defined pattern, and symbol set are described below.

Font Response

The status response information returned for font (inquire entity value field 0) varies. Depending on whether the printer's font is a bitmap, unbound scalable, or bound scalable, different keywords are returned. The response is also somewhat different if the location type is set to 1 (currently selected, as explained in more detail later). The list of possible keywords for a font request is shown below.

SELECT=
SYMBOLSETS=
LOCTYPE=
LOCUNIT=

An example of an inquire entity font (entity type 0) status response is shown below. Notice the variation in the keyword lines for the three fonts, listed in order below:

Internal, bitmap, Line Printer
Internal, unbound scalable, CG Times italic
Downloaded, bound scalable, (CG Palacio)

Font status:

```
PCL
INFO FONTS
SELECT="<Esc>(8U<Esc>(s0p16.67h8.5v0s0b0T"
SELECT="<Esc>(s1p__v1s0b4101T"
SYMBOLSETS="0D,0I,0N,0S,0U,1E,1F,1G,..."
SELECT="<Esc>(1U<Esc>(s1p__v0s0b4111T<Esc>(21X"
  ⋮
```

In a font status response, individual fonts are identified by the "SELECT=" keyword line, as shown in the example above. This line identifies the font by specifying the font selection characteristics (symbol set, spacing, pitch, height, style, stroke weight, and typeface). The characteristics are listed as they would be sent to the printer to select the font (in priority order, highest priority to lowest). "SELECT=" is returned for all font types.

As mentioned, variations in the font response occur as a result of the font being a bitmap, bound scalable, unbound scalable, soft (downloaded) font, or the location type set to 1 (currently selected). These variations include slight differences in the information included in the “SELECT=” line, with the addition of different keywords (“SYMBOLSETS=” “LOCTYPE=” and “LOCUNIT=”). These variations are described in detail in the following paragraphs.

Notes

In the status response, an escape character is represented by the five characters: “**&**”.

Keywords which follow a “SELECT=” keyword apply to the font identified by that “SELECT=” keyword.

Bitmap Fonts

For bitmap fonts, the “SELECT=” line is returned (which identifies the font selection characteristics as described above). For example, the printer’s internal, bitmap, Roman-8 Line Printer font would be returned as shown below.

```
PCL
INFO FONTS
SELECT=“<Esc>(8U<Esc>(s0p16.67h8.5v0s0b0T”
```

Also see soft font description below.

Scalable Fonts

For bound scalable fonts, two underscores, “...s 1 p __ v 0 s...,” in the “SELECT=” line indicate that the font is a bound scalable. In addition, only the relevant characteristics are listed. Depending on whether the font is proportional or fixed spaced, only either height or pitch is listed. For example, the printer’s internal scalable Symbol font (proportionally spaced) would be returned as shown below.

```
PCL
INFO FONTS
SELECT=“<Esc>(19M<Esc>(s1p__v0s0b16686T”
```

Also see the soft font description below.

Unbound Scalable Fonts

For unbound fonts, since multiple symbol sets can be associated with an unbound font, the “SYMBOLSETS=” keyword is added to list the available symbol sets and the symbol set sequence is no longer present in the “SELECT=” line. For example, the printer’s internal unbound scalable Courier (medium, fixed spaced) font and CG Times (bold italic, proportional spaced) fonts would be returned as shown below.

```
PCL
INFO FONTS
SELECT=“<Esc>(s0p__h0s0b4099T”
SYMBOLSETS=“0D,0I,0N,0S,0U,1E,1F,1G,...
SELECT=“<Esc>(s1p__v1s3b4101T”
SYMBOLSETS=“0D,0I,0N,0S,0U,1E,1F,1G,...”
```

Soft Fonts

For soft fonts (bitmap, bound scalable or unbound scalable), the font ID number is also included at the end (a font downloaded with an ID of 27 would be presented as “ ...<Esc>(27X ”). For example, a downloaded bitmap Courier with a font ID of 39 and a downloaded, unbound scalable, Dom Casual typeface with a font ID of 78 would be returned as shown below.

```
PCL
INFO FONTS
SELECT=“<Esc>(8U<Esc>(s0p10.00h12.0v0s0b3T<Esc>(39X”
SELECT=“<Esc>(s1p__v1s0b4148T<Esc>(78X”
SYMBOLSETS=“0D,0I,0N,0S,0U,1E,1F,1G,...”
```

Location Type 1 (Currently Selected) Font

For a status location type 1 (currently selected) font, only a single font, the printer’s currently selected font, is returned. The keywords and data returned are described as follows.

- “LOCTYPE=” and “LOCUNIT=” are returned after the “SELECT=” line for each font.
- “SELECT=” line changes for bound and unbound scalable fonts.
  - For all scalable fonts, the actual size (either height or pitch) is listed in place of the underscores.
  - For unbound scalable fonts, the symbol set currently bound to the font is listed.

- For all fonts, if the font is a secondary font, then the “(“ characters are replaced by ”)” characters in the “SELECT=” line.

“LOCTYPE=” identifies the location type of the currently selected font. The value returned corresponds to the value field of the Set Status Readback Type command.

“LOCUNIT=” identifies the location unit of the currently selected font. The value returned corresponds to the value field of the Set Status Readback Unit command.

For example, if the printer’s currently selected font is a bold 14 point Presentation bitmap font selected from a cartridge, and a font entity request with the location type set to 1 is made, the response would be returned as shown below.

```
PCL
INFO FONTS
SELECT=“<Esc>(1U<Esc>(s0p10.00h14.0v0s3b11T
LOCTYPE=5
LOCUNIT=1
```

For example, assume the printer’s currently selected font is unbound scalable Dom Casual font with the following characteristics:

- downloaded (font ID of 78)
- temporary
- Roman-8 (specified for printing)
- secondary font
- 18 point

If an entity request is made with the location type set to 1 (currently selected), the following response is returned.

```
PCL
INFO FONTS
SELECT=“<Esc>)8U<Esc>)s1p18.00v1s0b4148T<Esc>)78X”
LOCTYPE=4
LOCUNIT=1
```

Font Extended Response

The font extended response (inquire entity value field 4) provides a way to return the name and internal ID number of the font, as well as the “SELECT=” line. It is the same as a font status response (inquire entity value field 1), in that “SELECT=,” “SYMBOLSETS=,” “LOCTYPE=,” and “LOCUNIT=” are returned in the same manner. They are not re-described here; refer to the “Font Response” section for a description of their operation. However, for a font extended request, two additional keywords, “DEFID=” and “NAME=” are returned as described below.

“**DEFID=**” identifies the font’s internal ID number. This is the number which appears on the font printout. It is the number used to select the font as the default font from either the printer’s control panel or from PJL (refer to the *Printer Job Language Technical Reference Manual* for information on PJL font selection). The “DEFID=” number consists of two parts, a location and an ID number, such as “I 21,” where “I” is the location and “21” is the font’s internal ID number. The possible locations are listed below:

Table 16-5

I	-	Internal
C	-	Cartridge - single cartridge printers
Cn	-	Cartridge - multiple cartridge printers where n is printer specific
S	-	Permanent soft fonts
Mn	-	SIMMs where n is the number of the SIMM slot for example: M2 is SIMM in #2 slot.
NONE	-	Temporary soft fonts

Note

The cartridge (Cn) and SIMMs (Mn) location identifiers are printer specific. Refer to Chapter 1 of the *PCL 5 Comparison Guide* for printer-specific values for “n.”

Since temporary soft fonts do not have an internal ID number (they cannot be selected as the default from the control panel or PJL), NONE is returned as their “DEFID=NONE”.

The font’s internal ID number is assigned to fonts by the printer. This number is different than the soft font download ID number assigned to a downloaded font using the Font ID (^EC*c#D) command.

“**NAME=**” is returned for font extended status requests only. It identifies the name of the font, such as, Courier, Times Roman, Univers, etc., and its treatment (such as BdIt - bold italic) as listed in the font printout.

For example, the font extended response for the printer’s internal bitmap Line Printer font and a downloaded unbound CG Palacio temporary font would be returned as shown below.

```
PCL
INFO FONTS EXTENDED
SELECT=“<Esc>(8U<Esc>(s0p10.00h12.0v0s0b0T”
DEFID=“I 45”
NAME=“Line Printer”
SELECT=“<Esc>(s1p__v1s3b4111T<Esc>(7X”
SYMBOLSETS=“0D,0I,0N,0S,0U,1E,1F,1G,...”
DEFID=NONE
NAME=“CG Palacio   BdIt”
SELECT=“...
⋮
```

Or, for example, a font extended response with the location type set to 1 (currently selected) where the currently selected font is the internal CG Times (18 point specified for printing) bold, the response would be returned as shown below.

```
PCL
INFO FONTS EXTENDED
SELECT=“<Esc>(8U<Esc>(s0p18.00h0s3b4101T”
DEFID=“I 002”
NAME=“CG Times   Bd”
LOCTYPE=3
LOCUNIT=1
```

Macro Response

The status response for macros (inquire entity value field 1) lists all of the macro IDs (“IDLIST=”) for the macros in the specified location.

Note Status location type 1 (currently selected) is an invalid location for macros and returns an error (“ERROR=NONE”).

A macro status response might appear as shown below.

```
PCL
INFO MACROS
IDLIST=“1,3,8,29,32”
```

User-Defined Pattern Response

The status response for user-defined patterns (inquire entity value field 2) lists all of the user-defined pattern IDs (“IDLIST=”) for the patterns in the specified location.

A user-defined pattern response might appear as shown below.

```
PCL
INFO PATTERNS
IDLIST=“1,2,9,13,27,456”
```

If the location type is set to 1 (currently selected), then “LOCTYPE=” and “LOCUNIT=” lines are added.

“LOCTYPE=” is returned for a status location type 1 request only. It identifies the location type of the currently selected pattern.

“LOCUNIT=” is returned for a status location type 1 request only. It identifies the location unit of the currently selected pattern.

A user-defined pattern response for the currently selected pattern might appear as shown below.

```
PCL
INFO PATTERNS
IDLIST=“88”
LOCTYPE=4
LOCUNIT=2
```

If the current pattern is set to one of the internal HP-defined patterns (no pattern ID number assigned), then no number is available and the response, “ERROR=NONE” is returned.

```
PCL
INFO PATTERNS
ERROR=NONE
```

Symbol Set Response

The response for symbol sets (inquire entity value field 3) lists all of the symbol set IDs (“IDLIST=”) for all of the symbol sets that can be bound to unbound scalable fonts in the specified location (type and unit).

A symbol set response might appear as shown below.

```
PCL
INFO SYMBOLSETS
IDLIST=“0U,2K,8M,8U,11U”
```

Notes

Status location type 1 (currently selected) is an invalid location for unbound font symbol sets and returns an error (“ERROR=NONE”).

Example responses in this chapter for “SYMBOLSETS=” do not list the complete list of internal available symbol sets, only a partial list: “0D,0I,0N,0S,0U,1E,1F,1G,...” The internal symbol sets are printer dependent and may vary from printer to printer; refer to the *PCL 5 Comparison Guide* for printer specific information.

Entity Error Codes

If you request out-of-range values in the command value fields, or if the entity is unsupported or does not exist, or if the request is inappropriate, the printer responds with one of four possible errors:

- **Invalid Entity**
- **Invalid Location**
- **None**
- **Internal Error**

ERROR=INVALID ENTITY

If the entity type specified in the escape sequence is out of range or unsupported, an invalid entity error is returned. For example, if the Inquire Entity command contained an out of range value of 8 ($^{E}_{C}$***s8I**), the following error response would be generated.

```
PCL
INFO ENTITY
ERROR=INVALID ENTITY
```

ERROR=INVALID LOCATION

If the entity type is valid but the location (either the type, the unit, or the combination) is invalid or if the specified device is not installed, an invalid location error is returned. For example, if you requested a status for a cartridge type but identified an out of range location unit of 9 ($^{E}_{C}$***s5t9U**), the following error response would be generated:

```
PCL
INFO FONTS
ERROR=INVALID LOCATION
```

ERROR=NONE

If the entity type and location are valid, but there are no entities of the specified type in that location, or if the type is inappropriate for the specified entity (internal user-defined pattern or currently selected macro), then an error response is generated. For example, if you request the downloaded symbol sets and there are no downloaded symbol sets, the following error response would be generated:

```
PCL
INFO SYMBOLSETS
ERROR=NONE
```

ERROR=INTERNAL ERROR

The status response for some requests can be fairly large (such as for fonts). In processing status responses, if the printer runs out of memory, an internal error is returned, as shown below:

```
PCL
INFO SYMBOLSETS
ERROR=INTERNAL ERROR
```

Note The error conditions described above are the only conditions for which an error response is generated. If you make a syntax error in the escape sequence, or send a command which the printer cannot interpret, the printer ignores the command and no error response is given.

Free Space Command

The Free Space command returns the amount of available memory. This response returns two values: the total available memory, and the largest available block of memory (refer to the “Memory Status Response” section later in this chapter for additional information).

$$E_C * s\ 1\ M$$

If a value other than 1 is sent, this command returns an error (“ERROR = INVALID UNIT,” refer to “Memory Error Response” section later in this chapter for additional information).

To identify whether the printer has enough memory available for a job, you can send the Free Space command to compare the space available with that needed. You can also identify how much memory an entity or any other data uses by checking the amount of free memory prior to downloading the data, then downloading the data, and checking memory again. The difference in these values represents the approximate memory needed.

Note

Many conditions can cause the available memory to change or appear different. Some of these conditions are listed below.

The actual printer memory required to store an item varies slightly based on printer memory fragmentation and other internal printer conditions.

Different printer models use different methods to store data. Thus, the amount of memory required to store the same amount of data may be slightly different in different printers.

While the printer is processing page data, the available memory is constantly changing due to the printer receiving new data, processing existing data, and adding new characters to the font cache, etc. Under these conditions, the available memory may change by the time the memory response is returned.

If a PostScript SIMM is installed in the printer, some memory is not reported for a Free Space command response. This memory is not reported as part of the free memory for a PCL status readback response, however, this memory is available for PCL use. Thus, it is possible for all or part of the downloaded data to be stored in this section of unreported memory and not change the memory response size.

If you determine there is insufficient memory to hold the data to be downloaded, some action is required. One method to make more memory available is to send the Flush All Pages command. This causes the printer to clear (process) the current page data from memory without accepting any new data for processing (refer to the "Flush All Pages Command" described later in this section). Another, more comprehensive method to clear memory is to send the Printer Reset ($^{E}_{C}$E) command. This not only removes data (deletes all temporary entities and the font cache) but also restores the User Default Environment settings (refer to the Printer Reset command in Chapter 4, "Job Control Commands").

Note To print characters from a scalable font, the printer converts the scalable character outlines into sized bitmaps. These bitmapped characters are created on a character-by-character basis as they are needed for printing and are stored in memory. As more pages are printed using more fonts, the bitmaps consume more memory. The bitmap characters used on the first page of a job can remain in memory until the end of a job. These stored bitmap characters are referred to as the font cache.

Note When an HP LaserJet 4 printer (or later) reaches a memory low condition it automatically deletes all of the font cache. It is possible to delete the cache immediately using a Printer Reset command. A Printer Reset clears the font cache, clears temporary entities, and restores the user default environment.

Memory Status Response

A Free Space status response returns two values:

```
TOTAL=
LARGEST=
```

"TOTAL=" identifies the total available user memory (in bytes). This value includes the largest block available and all smaller blocks.

Note Data downloaded to the printer is stored in a block (continuous section of free memory). If the printer does not have a large enough block to store the data, then the data is discarded and a memory error results.

“LARGEST=” identifies the largest continuous block of available memory (in bytes).

An example response is shown below:

```
PCL
INFO MEMORY
TOTAL=100000
LARGEST=25000
```

The above example indicates that the printer has 100,000 bytes of available memory and the largest continuous block is 25,000 bytes.

Memory Error Response

If the Free Memory command value field is out of range (not 1), then the memory status response returns an invalid unit error. For example, if the Free Space command with a value of 2 () were sent, the following error would be returned:

```
PCL
INFO MEMORY
ERROR=INVALID UNIT
```

Flush All Pages Command

The Flush All Pages command suspends accepting input data until all pages currently in the printer are printed. This gives the printer time to clear some memory.

E_C & r # F

=0- Flush all complete pages
1 - Flush all pages

Default = 0
Range = 0 - 1

A value of 0 indicates that only complete pages are to be processed. If a partial page exists, it is not processed. A value of 1 indicates that all page data including the partial page will be processed.

For example, if the printer contains two complete pages (page “A” and page “B”) and one partial page (page “C”), and receives a Flush All Pages command (value field 0 - all complete pages), it ejects pages “A” and “B” and retains page “C.” If the printer received the flush all pages (value field 1) it processes and ejects pages “A,” “B,” and “C.”

The printer resumes receiving (processing) data when the last page is processed and ejected from the paper path.

Notes

Using the Flush All Pages command significantly reduces printing performance. If possible, applications should use the Free Space command to check for available memory without using the Flush All Pages command. If the memory status readback response indicates sufficient memory available to process a job, the Flush All Pages command does need not be used. If the memory response indicates insufficient memory available to run the job, then the application should use the Flush All Pages command to make memory available, and then check available memory a second time.

When possible, use the Flush All Pages command only at the beginning of a print job, prior to the receipt and processing of any data. This minimized, to minimize performance reduction.

Echo Command

The Echo command echoes its value field (in ASCII format) back to the host.

$E_C * s \# X$

\# =Echo value (ASCII)

Default = 0
Range = –32767 to 32767

If multiple users are requesting status, it can be difficult to distinguish one user's status response from another. The Echo command provides the means to label status responses. Since the user-selected value for the value field is returned, this command can be used as a user identification mark or "place holder." Sending the Echo command, with a specific user-selected value, at the beginning of a status request enables users to identify their status response data.

Notes

Status readback requests are processed in the order they are received.

Status readback responses are returned to the printer port from which they were received.

When selecting an echo value, it is important to select a number which is not likely to be used by another user, such as a random number.

This example illustrates why using the Echo command with a random number is important. Assume an application uses a fixed number each time the Echo command is sent. Further, assume the printer running the application was turned off after the application sent the Echo command followed by a Free Space command. The printer generates the status readback responses to the Echo command and Free Space commands. Since the host is not accepting data, the data will be in the printer waiting for the host to accept it. Now, assume the host computer is turned on and the application is again executed.

If the application sends the Echo command and Free Space command, the printer returns the response to the first Echo command and Free Space command, along with the response to the second request. The application will assume that the response received is the response to its last request. If the application uses random numbers in the Echo command, this type of mix-up will not occur.

Echo Response

The Echo command returns the following response:

```
PCL
ECHO ValueField
```

where "ValueField" is the Echo command value field value that was selected (within the range –32767 to 32767).

For example, if the Echo command, $^{E}_{C}$*s–999X was sent the status response would be:

```
PCL
ECHO –999
```

Status Readback Programming Hints

The following hints can assist in using the status readback feature.

- PCL status readback is useful during the development of applications. Status readback allows you to determine that fonts, macros, user-defined patterns, and symbol set resources you have downloaded were accepted by the printer.
- If the printer does not contain sufficient memory to accept a downloaded entity, the printer discards the data. Status readback can be used to determine if the printer accepted a downloaded entity.
- Status responses are directed to the printer's I/O port from which the request is received. If the status is not read and the printer switches to another I/O port, the status response is not directed to that port. The status response returns if the printer switches back to the original port (see note on following page).
- Your application should work correctly when an unexpected status response is received. For example, when requesting a PCL status, it is possible that PJL could return an unsolicited status response, if PJL is enabled.
  - All PCL status responses begin with the "PCL" header and end with the <FF> control code. When reading PCL status responses, your application should be able to read all the data between the "PCL" header and the <FF> control code. It should ignore any other status response syntax.
  - Lines within the PCL status response begin with a specific keyword (those described in this chapter) and end with the <CR> and <LF> control codes. Future printers may support new keywords in the PCL status response. Your application should be designed to ignore those lines which it does not understand.
- The first PCL status readback command an application should send is the PCL Echo command. A random number should be generated for the value field each time the command is sent. Your application should ignore all printer status readback data until the PCL Echo status readback response is received, echoing the number the application sent.
- To clear any possible unread status responses from previous applications, an application, upon starting up, may want to read any pending responses until they are cleared from the printer.