Chapter 2: Job Setup

Contents of this Chapter

This chapter contains information on job setup performed outside of a PCL job (for information on job setup within PCL, see Chapter 6).

2.1 Introduction

At the beginning of every print job, some basic setup commands must be issued before sending print data to HP printers. This is especially true if the printer is connected to the network. The printer language may need to be changed (e.g., PCL to PostScript) or the user defaults modified from the last print job. Manual control panel setup is often inconvenient and may even be impossible as control panels become more simplified. Some job control commands, such as a user-default reset (*EscE*) may be sent within the print data itself, but this method significantly limits system management on a network. To satisfy these system control needs, HP printers are now supporting job control languages like PJL (Printer Job Language) and PML (Peripheral Management Language), which reside logically above the PCL and PostScript printer languages.

This chapter is a general description of job control, both for printers that support PJL or PML and those that do not.

2.2 Defaults

Defaults are feature settings that are programmed at the factory or selected at the control panel. Feature settings may be changed from their defaults when a job is printed; but then these job-specific settings may need to be changed by the next job. Each new job must be able to set the device to a known state. For example, if the number of copies is set to 65 copies by the previous application, the new application would also print 65 copies. Starting with the user default environment at the beginning of each job eliminates the need to set each feature individually.

The printer's current feature settings are collectively called the ***Print Environment.*** Some devices may maintain all five of the print environments described below, with only one active at a time. Not all PCL devices have all five environments, and the feature set in each environment may vary between devices.

Factory Default Environment

Factory defaults are set at the factory. Factory defaults become active when the printer is first powered on before control panel settings are changed or any printer commands are sent from an application.

Generally, a simple power recycle or reset does not restore the factory environment. (although this is device-dependent); a special sequence of button presses or commands (e.g., the PJL INITIALIZE) must be used.

User Default Environment

The User Default environment contains the control panel settings. The User Default Environment may be changed at the control panel or by PJL or PML commands. Printer language commands override user defaults. A control panel, printer command reset, or power recycle (this is device-dependent) restores the user default environment.

PJL Current Environment (PJL printers only)

The PJL Current Environment is the same as the User Default Environment at the beginning of a PJL job. The PJL SET command modifies the Current Environment for the duration of a PJL job (between JOB and EOJ, or until the next UEL if JOB and EOJ commands are not used). Within a PJL job, Current Environment settings override User Default settings.

Modified Print Environment

At the beginning of a PCL job, a PCL reset (*EscE*) loads the current environment (PJL printers) or user default environment (non-PJL printers) into the Modified Print Environment. Modified print enviroment settings are changed using printer language commands (such as PCL escape sequences).

The Modified Print Environment is saved during a macro call or overlay and restored upon completion.

Overlay Print Environment

The Overlay Print Environment becomes active whenever a macro overlay is enabled; the modified print environment is saved. Upon completion of the macro, the modified print environment is restored.

Print Environment Hierarchy

The print environment is a hierarchical structure. Factory defaults are overridden by control panel
settings, PJL DEFAULT commands, or PML commands — creating the User Default Environment. On
PJL printers, PJL SET commands override user defaults — creating the PJL Current Environment. Printer
commands from an application override the user default and current environments — creating the
Modified Print Environment. A macro overlay creates the Overlay Environment, which overrides the
modifed print environment.

Any feature not set by the active environment defaults to the value set in the next lower environment in
the hierarchy.
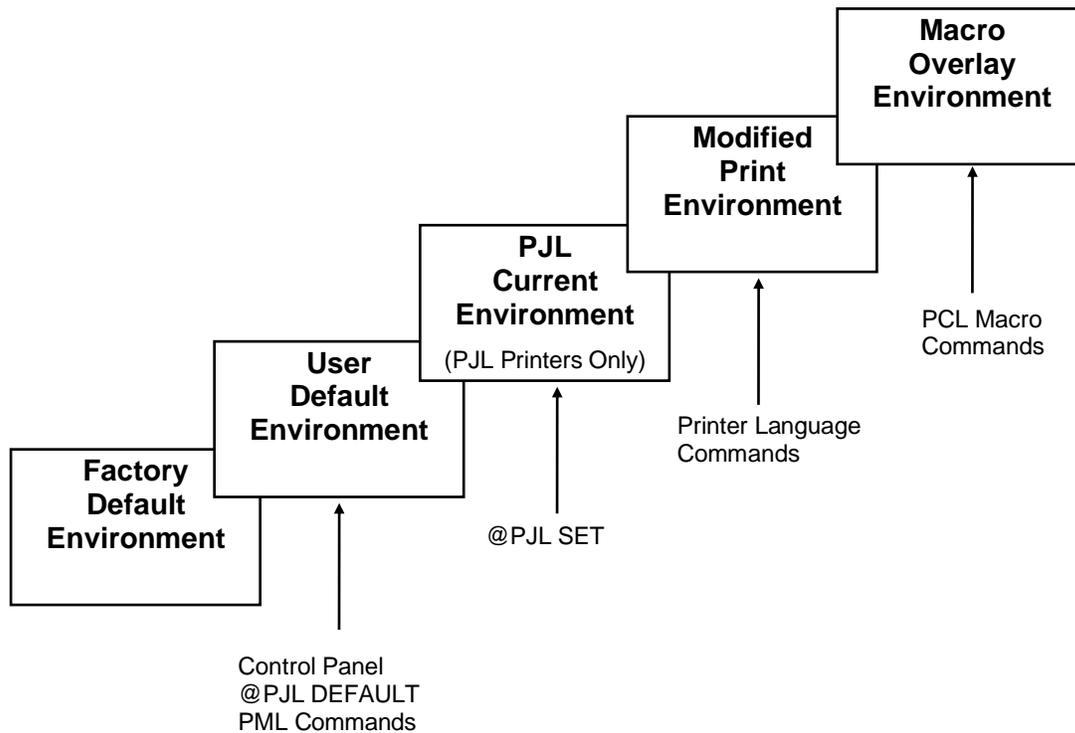
2.3 Setup without a Job Control Language

The job setup procedure for printers that do not support a job control language such as PJL ~~or PML~~ consists of the following four steps:

1. Reset the printer at the beginning of the jobs using *EscE*.

2. Send the printer commands that set the printer to a desired state and override any environment settings that could have been set using the control panel. The following are examples of environmental variables that may be set with PCL commands:

Number of Copies	*Esc&l#X*
Duplex printing	*Esc&l#S*
Page Size	*Esc&l#A*
Tray/Manual Feed (paper source)	*Esc&l#H*
Orientation (portrait, landscape)	*Esc&l#O*
Number of Lines per Page	*Esc&l#C*
Symbol Set	*Esc(ID*
Selected Font	*Esc(s#p#h#v#s#b#T*

3. Send the print data.

4. Reset (*EscE*) the printer at the end of the job.

2.4 Printer Job Language (PJL)

PJL resides logically above the PCL and PostScript language parsers. PJL provides language switching plus a broad range of features including status readback and the manipulation of control panel settings.

All PJL devices support at least the following three commands:

Universal Exit Language (UEL)
Enter Language
Comment

These commands are inserted in the data stream between print jobs in the sequence shown below:

Universal Exit Language/Start of PJL

Comment

Enter Language

(Begin PCL or Postscript Print Job)

...

(End of Print Job)

Universal Exit Language/Start of PJL

PJL contains many other commands for status readback and modifying printer enviroment settings. Some of these are:

COMMENT	INQUIRE
DEFAULT	INITIALIZE
DINQUIRE	JOB
ECHO	RESET
ENTER	SET
USTATUS	USTATUSOFF
INFO	OPMSG
RDYMSG	STMSG
EOJ	UEL

For a complete description, see *The Printer Job Language External Reference Specification*.

All PJL commands except UEL must begin with the uppercase "@PJL" prefix. The portion of the PJL command following the prefix may be either upper or lower case. All PJL commands except UEL must end with a LF, which may be preceded by an optional CR. Spaces in PJL commands depend on their location; some spacing is required and some is optional. Spacing requirements are shown below:

```
@PJL<WS>Command<WS>Option[<WS>]=[<WS>]Value[<CR>]<LF><WS>
```

where <ws> indicates white space resulting from one or more of either <SP> or <HT>, and [ ] indicates optional fields.

Universal Exit Language (UEL)   *Esc%-12345X*

The UEL command, which is used at the beginning and end of every PJL job, transfers control to PJL. At the beginning of a job, the X at the end of the command must be immediately followed by another PJL command; there can be no spaces or characters between the X and the @ that begins the next command. On the other hand, the UEL at the end of the job is the final part of the job and does not require anything to follow it.

This command performs the following actions:

- Prints all data received before this command.
- Performs a reset: *EscE* in PCL, *IN* in HP-GL/2, or *Cntrl-D* (end of job) in PostScript.
- Turns control over to PJL.

In the PCL and HP-GL/2 contexts, this command is always recognized except in HP-GL/2 label mode with TD = 1, during a PCL binary transfer, or in Text Parsing Method 2 (*Esc&t#P*).

This command is also a valid HP-GL/2 terminator.

NOTE: UEL must be immediately followed by "@PJL". Characters or control codes (e.g., CR or LF) other than @PJL enable the default language and process the job in that language.

NOTE: All jobs should start and end with UEL. In addition to entering PJL, UEL has the same effect as the *EscE*; but *EscE* should always be included for backward compatibility.

DEVICE NOTE: DJ3xx's, DJ5xx's, and LJ's prior to LJIIISi do not support PJL. They ignore and print all PJL commands.

Enter Language   **@PJL ENTER LANGUAGE=PERSONALITY**

```
@PJL ENTER LANGUAGE = {PCL/POSTSCRIPT}[<CR>]<LF>
```

If the printer does not receive this command, it will try to determine the appropriate language to use. If automatic language switching is supported and enabled, the printer chooses from the available languages; otherwise, the default language is used. This increases the probability that applications not supporting PJL switching will correctly print.

Comment   **@PJL COMMENT** words

This command designates the current line as a comment, which is ignored.

```
@PJL COMMENT <Words>[<CR>]<LF>
```

2.5 Job Setup for PJL Printers

The job setup procedure for printers that support PJL consists of the following fours steps:

1. Send a UEL command (*Esc%-12345X*) at the beginnning of the job to give control to PJL.

2. Use the PJL ENTER LANGUAGE command to enter the desired printer language.

3. Reset the printer using *EscE* reset before sending PCL commands.

4. Send printer commands to set the printer to a desired state and to override any environmental settings that could have been set using the control panel.

5. Send the print data.

6. Reset the printer at the end of the job using *EscE* followed by the UEL command.

For printers that support status readback, the PJL INQUIRE command may be used after UEL at the beginning of the job to request the status of environment variables. PJL status readback commands can provide the name of the printer, its configuration, and a list of environment settings. Environment feature settings may be set using PJL SET or PCL commands.

2.6 Peripheral Management Language (PML)

PJL is best suited for job level status and control that is synchronous with the PCL or PostScript data stream. PML provides asynchronous status readback and remote printer control commands by using multiple physical channels or multiple logical channels; commands and responses can be received immediately on a channel different than the data without waiting until all the data is sent. PML permits prompt printer control; for example, a network administrator could use a remote device reset to troubleshoot a clogged spooler.

The implementation of MLC (Multiple Logical Channels), and MIO 6.0 allows asynchronous printer monitoring and control on a separate channel. PML utilizes multiple-channel capability to provide asynchronous status and control of the entire printer, allowing device configuration and error messages to occur asynchronously to the data stream. By utilizing this separate control channel capability, PML can provide asynchronous control that supplements PJL.

To take advantage of this asynchronous capability, PML requires an I/O with separate channels for data and control/monitoring. Extended capabilities ports (ECP) like IEEE-P1284 and MIO 6.0 provide this functionality. Parallel half-duplex bi-directional ports allow implementation of a multiple logical channels (MLC) packet protocol that provides simultaneous control and data transmission.

Devices without an ECP port or MIO 6.0 port may still use "encapsulated" PML. The Peripheral Configuration command (*Esc&b#W*) provides a way for PCL to send PML commands. This method may be used even for devices with an ECP port if synchronization between the PCL data stream and the asynchronous control of PML is desired.

PML provides unsolicited status, called *traps*, to hosts that request it. Trapped objects may relate to information on:

Device status — changes: paper jam, out-of-paper, out-of-ink, etc.
Job status — job starts and ends.
Page status — the job to which the page belongs, and the page number within the job.