PostScript™ Language Reference Manual Supplement
Adobe Systems Incorporated

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Contents

List of Figures vii

List of Tables ix

Chapter 1: Overview 1

1.1 Introduction 1
   PostScript Language Level 2 Parameters 1
   PostScript Language Level 2 Resources 2
   Other Extensions to PostScript Language Level 2 2
   Compatibility Operators 2

1.2 Terminology Used in This Manual 3

1.3 Related Publications 3

Chapter 2: Page Device Parameters 5

2.1 Details Dictionaries 15

2.2 PostScript Language Interface to Fax 16
   The Fax Job Interface 17
   Sending Raster Images 18
   Transmitting PostScript Language Files 19
   The Fax Options Dictionary Keys 20
   CoverSheet, Confirmation, and PageCaption Procedures 28
   Broadcast Transmission of Faxes 30
   Some Sample Fax Jobs 32

2.3 Envelope Orientation in User Space 34

2.4 Errors Generated by Page Device Parameters 35
   typecheck Errors 35
   rangecheck Errors 36
   undefined Errors 37
   invalidaccess Errors 37
   limitcheck Errors 38
Chapter 3: Interpreter Parameters 39

3.1 Two Kinds of Unencapsulated Jobs 39
3.2 Passwords for System and Device Parameters 40
3.3 User Parameters 41
3.4 System Parameters 44
  System Parameter Table 45
3.5 Device Parameters 53
  Device Parameter Set Types 54
  Device Parameters Associated with Communications 55
  File System Parameters 109
  %os% Device Parameters 117
  Scsi Bus Parameter Set 118
  Engine Device Parameters 120
  Console Device Parameters 121
  Emulator Parameters 124
3.6 The Fax Environment Interface 130
  Fax Device Parameters 130
  The %Fax% Device 130
  The %Calendar% Device 137
  Administrative Resources 138
  Translations Dictionaries in the FaxDefaultProcs ProcSet 145

Chapter 4: Resources 151

4.1 Regular Resources 151
4.2 Implicit Resources 153
4.3 Resources Used to Define New Resources 155
4.4 Accessing Product Page Device Capability Information 155
4.5 Accessing Product Hardware Options Information 156
4.6 Accessing Information on Natural Languages Supported by the Product 157
4.7 Accessing Information on Languages Interpreted by the Product 158
Chapter 5: Other Extensions to PostScript Language Level 2 161

5.1 Type 6 Halftone Dictionary 161
5.2 Type 10 Halftone Dictionary 162
5.3 Type 42 Font Dictionary 166
5.4 CRD Selection Based On Rendering Intent 166
   findcolorrendering 167
   Relationship to Graphics State Parameters 169
   Inside findcolorrendering 169
   Modifying the CRD Selection Process 171
5.5 CID Font Format 172
   CIDFont and CMap Resource Categories 172
   Extensions to Existing Operators 173
   New Operator 174

Chapter 6: Compatibility 177

6.1 Compatibility Operators 177
6.2 Compatibility Operator Descriptions 179
   Error Behavior 180
   Using a Password to Change Persistent Values 180
   SCC Operations 194
   Paper Size Operations 198
   Paper Tray Operations 199
   Page Duplex Compatibility Operators 200
   Device Compatibility Operators 202
   Imagesetter Compatibility Operators Found in Statusdict 204

Appendix A: Changes Since Earlier Versions 207
A.1 Changes since Version 2014, March 10, 1994 207
A.2 Changes since Version 2013, March 31, 1993 208
A.3 Changes since Version 2012, November 25, 1992 210
A.4 Changes since Version 2011, January 24, 1992 211

Index 213
## List of Figures

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td>Default user space orientation for a portrait envelope</td>
<td>35</td>
</tr>
<tr>
<td>3.1</td>
<td>Relationship between network communications protocols and physical communications medium</td>
<td>56</td>
</tr>
<tr>
<td>3.2</td>
<td>Relationship between the communication parameter sets</td>
<td>59</td>
</tr>
<tr>
<td>3.3</td>
<td>Communications parameters sets using NV values</td>
<td>60</td>
</tr>
<tr>
<td>3.4</td>
<td>Communications parameter sets using “hard wired” values</td>
<td>61</td>
</tr>
<tr>
<td>5.1</td>
<td>Halftone cell graphically represented in device space</td>
<td>163</td>
</tr>
<tr>
<td>5.2</td>
<td>Halftone cell divided into two squares</td>
<td>163</td>
</tr>
<tr>
<td>5.3</td>
<td>Halftone cell and two squares tiled across device space</td>
<td>164</td>
</tr>
</tbody>
</table>
**List of Tables**

<table>
<thead>
<tr>
<th>Table</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td>Page device parameters</td>
<td>6</td>
</tr>
<tr>
<td>2.2</td>
<td>PageSize entry in the Policies dictionary</td>
<td>14</td>
</tr>
<tr>
<td>2.3</td>
<td>Fax options dictionary entries</td>
<td>21</td>
</tr>
<tr>
<td>2.4</td>
<td>Entries in the second dictionary used by CoverSheet, Confirmation and PageCaption</td>
<td>29</td>
</tr>
<tr>
<td>3.1</td>
<td>User parameters</td>
<td>42</td>
</tr>
<tr>
<td>3.2</td>
<td>System parameters</td>
<td>45</td>
</tr>
<tr>
<td>3.3</td>
<td>Parameters common to all device parameter sets</td>
<td>55</td>
</tr>
<tr>
<td>3.4</td>
<td>Parameters present in parameter sets of type /Communications</td>
<td>62</td>
</tr>
<tr>
<td>3.5</td>
<td>Parameters present in %Serial% communications parameter sets</td>
<td>67</td>
</tr>
<tr>
<td>3.6</td>
<td>Parameters present in %Parallel% communications parameter sets</td>
<td>72</td>
</tr>
<tr>
<td>3.7</td>
<td>Parameters present in %SCSI% communications parameter sets</td>
<td>75</td>
</tr>
<tr>
<td>3.8</td>
<td>Parameters present in %LocalTalk% communications parameter sets</td>
<td>77</td>
</tr>
<tr>
<td>3.9</td>
<td>Parameters present in %EtherTalk% communications parameter sets</td>
<td>79</td>
</tr>
<tr>
<td>3.10</td>
<td>Parameters present in %TokenTalk% communications parameter sets</td>
<td>81</td>
</tr>
<tr>
<td>3.11</td>
<td>Node address forms</td>
<td>84</td>
</tr>
<tr>
<td>3.12</td>
<td>Parameters present in the %LPR% communications parameter set</td>
<td>85</td>
</tr>
<tr>
<td>3.13</td>
<td>Parameters present in the %AppSocket% communications parameter set</td>
<td>87</td>
</tr>
<tr>
<td>3.14</td>
<td>Parameters present in the %Telnet% communications parameter set</td>
<td>91</td>
</tr>
<tr>
<td>3.15</td>
<td>Parameters present in the %RemotePrinter% communications parameter set</td>
<td>92</td>
</tr>
<tr>
<td>3.16</td>
<td>Parameters present in the %PrintServer% communications parameter set</td>
<td>93</td>
</tr>
<tr>
<td>3.17</td>
<td>Parameters present in the %SNMP% parameter set</td>
<td>95</td>
</tr>
<tr>
<td>3.18</td>
<td>Parameters present in the %Syslog% parameter set</td>
<td>97</td>
</tr>
<tr>
<td>3.19</td>
<td>Parameters present in the %TCP% parameter set</td>
<td>99</td>
</tr>
<tr>
<td>3.20</td>
<td>Parameters present in the %UDP% parameter set</td>
<td>100</td>
</tr>
<tr>
<td>3.21</td>
<td>Parameters present in the %IP% parameter set</td>
<td>100</td>
</tr>
<tr>
<td>3.22</td>
<td>Parameters present in the %IPX% parameter set</td>
<td>104</td>
</tr>
<tr>
<td>3.23</td>
<td>Parameters present in the %EthernetPhysical% parameter set</td>
<td>105</td>
</tr>
<tr>
<td>3.24</td>
<td>Parameters present in the %TokenRingPhysical% parameter set</td>
<td>107</td>
</tr>
<tr>
<td>3.25</td>
<td>Parameters present in the %Serial% parameter set</td>
<td>108</td>
</tr>
<tr>
<td>3.26</td>
<td>Parameters common to device sets of type /FileSystem</td>
<td>109</td>
</tr>
<tr>
<td>3.27</td>
<td>Parameters present in %disk% (/FileSystem) devices</td>
<td>110</td>
</tr>
<tr>
<td>3.28</td>
<td>Parameters present in %cartridge% or %rom% (/FileSystem) devices</td>
<td>114</td>
</tr>
<tr>
<td>3.29</td>
<td>Parameters present in the %os% parameter sets</td>
<td>117</td>
</tr>
<tr>
<td>3.30</td>
<td>Parameters present in the %Scsi% parameter sets</td>
<td>118</td>
</tr>
<tr>
<td>3.31</td>
<td>Parameters present in the %Engine% parameter set</td>
<td>120</td>
</tr>
<tr>
<td>3.32</td>
<td>Parameters present in the %Console% parameter set</td>
<td>122</td>
</tr>
</tbody>
</table>
Table 3.33  Parameters present for the %PCL% device (LaserJet 4 emulator) 125
Table 3.34  Parameters present for the %LaserJetIII% device  
            (LaserJet III emulator) 125
Table 3.35  Parameters present for the %LaserJetIIP% device (LaserJet IIP  
            emulator) 128
Table 3.36  Parameters present for the color version of the %HP7475A% device  
            (HP7475A plotter emulator) 129
Table 3.37  Parameters present for the %Diablo630% device (Diablo630 emulator) 130
Table 3.38  Parameters present in the %Fax% parameter set 131
Table 3.39  Parameters present in the %Calendar% parameter set 137
Table 3.40  Operators for accessing fax job logs 139
Table 3.41  Entries in a fax job dictionary 139
Table 3.42  Entries in a Calls dictionary 141
Table 3.43  Operators for accessing job queues 142
Table 3.44  Dictionary generated by transmitjobsforall 143
Table 3.45  Dictionary generated by receivejobsforall 144
Table 3.46  Entries in a dictionary contained in TranslationDicts 146
Table 4.1   Regular resources 151
Table 4.2   Resources whose instances are implicit 153
Table 4.3   Resources used in defining new resource categories 155
Table 4.4   Description of keys present in an instance of the category OutputDevice 156
Table 4.5   Possible instances of the HWOptions resource category 157
Table 4.6   Description of keys present in an instance of the categories PDL and  
            ControlLanguage 159
Table 4.7   Possible instances of the PDL resource category 160
Table 4.8   Possible instances of the ControlLanguage resource category 160
Table 5.1   Entries in a Type 6 halftone dictionary 162
Table 5.2   Entries in a Type 10 halftone dictionary 165
Table 5.3   Rendering intent list 168
Table 5.4   Extensions to existing operators 173
Table 5.5   New operator 174
Table 6.1   Stop bits 194
Table 6.2   Data bits 194
Table 6.3   Flow control 194
Table 6.4   Parity 194
Table 6.5   Options byte to device parameters conversion 195
Table 6.6   Device parameters to options byte conversion 195
Table 6.7   Paper size compatibility operators (in userdict) 198
Table 6.8   Paper tray compatibility operators 199
Overview

1.1 Introduction

The main purpose of the PostScript™ Language Reference Manual Supplement is to provide a supplement to the PostScript Language Reference Manual, Second Edition describing PostScript language Level 2 changes since the publication of the manual. Specifically, it describes:

- Additions to the standard page device, user, system and device parameters.
- New resource categories and instances.
- Other extensions to PostScript language Level 2 such as the Type 6 and Type 42 font dictionaries.

In addition, this document lists the Level 1 compatibility operators and procedures that Adobe™ supports in all PostScript language Level 2 implementations.

The intended audience for this supplement consists of independent software vendors (ISVs) who want to write PostScript language device drivers that can be used for more than one type of device. This document will help ISVs produce drivers that support all of the features and capabilities of existing and future PostScript output devices.

1.1.1 PostScript Language Level 2 Parameters

Level 2 of the PostScript language introduces several operators that take dictionaries as arguments and return dictionaries as results. The key-value pairs in these dictionaries are referred to as parameters because their values typically select optional features or control the operation of some part of the PostScript language implementation. The use of dictionaries as containers for parameters provides an extensible method of adding support for new features by adding a new parameter key to the appropriate dictionary. This approach avoids adding new operators to the language on a per-feature basis, thereby maintaining the device independence of the PostScript language.
Specific PostScript language implementations include only the parameters that pertain to that product. It is not intended that all of the parameters described in this supplement be present in all products. Once a parameter is defined in any product, it is always used for the same feature in any subsequent products that support it.

Four classes of parameters exist in PostScript language Level 2: page device, user, system and device parameters. Each class corresponds to a pair of PostScript operators: one that returns the current values of a set of parameters and one that takes as an argument a collection of parameters that are to be set. These operators are:

\begin{verbatim}
  currentpagedevice  setpagedevice
  currentuserparams setuserparams
  currentsystemparams setsystemparams
  currentdevparams  setdevparams
\end{verbatim}

In terms of functionality, parameters fall into two broad categories. The first category corresponds to printing capabilities (for example, optional trays, duplex and collating, among others). These are the page device parameters. The second category corresponds to the operation and behavior of the PostScript interpreter. These are the interpreter parameters which include the system, user and device parameters. Chapter 2 describes the new page device parameters and chapter 3 describes the new interpreter parameters that have been added since the publication of PostScript Language Reference Manual, Second Edition.

1.1.2 PostScript Language Level 2 Resources

In Level 2, PostScript language objects such as fonts, patterns, filters and so on, can be managed as open-ended collections of resources. Chapter 4 lists the resources that have been added since the publication of the PostScript Language Reference Manual, Second Edition.

1.1.3 Other Extensions to PostScript Language Level 2

The Postscript language continues to evolve. Chapter 5 lists those extensions to the language (besides parameters and resources) since the publication of the PostScript Language Reference Manual, Second Edition.

1.1.4 Compatibility Operators

For compatibility with existing Level 1 PostScript language driver software, which might depend on operators that were often present in PostScript Level 1 products, a collection of compatibility operators and procedures is included in each Level 2 implementation. These compatibility operators are described in chapter 6.
1.2 Terminology Used in This Manual

Throughout this manual, the following terms are used.

*device:* A device is defined as a piece of hardware under the control of a PostScript interpreter. There are several categories of devices:

*page device:* A page device can be, for example, a laser print engine producing paper output.

*communication device:* A communication device can be, for example, serial, parallel, or LocalTalk communications hardware and software.

*file system device:* A file system device can be, for example, a disk or cartridge system.

*host:* A host is defined as a computer system (for example, a personal computer or workstation) connected to a PostScript printer product via one of its communications devices. The host sends PostScript language programs over the communications channel to the printer. The printer executes them.

*PostScript interpreter:* A PostScript interpreter is defined as a body of software that executes programs written in the PostScript language and produces effects such as generating printed output on a page device.

*PostScript language product:* A PostScript language product is defined as a system consisting of a PostScript interpreter controlling one or more devices.

1.3 Related Publications

*Adobe Communications Protocols Specification,* available both from the Adobe Developers Association and in the “Adobe Printer Developer Guide: Core Software Components Volume” describes several protocols that can be used to communicate over a serial or parallel connection to a PostScript language printing device.

*PostScript Language Program Design* (Reading, MA: Addison-Wesley, 1988) teaches programming principles unique to the Level 1 PostScript language and contains many usable samples. It is for programmers interested in the effective and efficient design of PostScript language programs and printer drivers.

This chapter describes the new page device parameters that have been added or modified since the publication of the *PostScript Language Reference Manual, Second Edition*. These parameters are part of a dictionary that is used to model the internal state of a *page device*, which is usually a raster output device that produces a sequence of pages on physical media such as sheets of paper. Two operators, `currentpagedevice` and `setpagedevice` respectively, read and set the parameter values.


The following page device parameters are described in the *PostScript Language Reference Manual, Second Edition*. The description of these parameters is unchanged.

- **AdvanceDistance**
- **AdvanceMedia**
- **BeginPage**
- **Collate**
- **CutMedia**
- **Duplex**
- **EndPage**
- **HWResolution**
- **ImagingBBox**
- **Install**
- **Jog**
- **ManualFeed**
- **MediaColor**
- **MediaType**
- **MediaWeight**
- **MirrorPrint**
- **NegativePrint**
- **NumCopies**
- **Orientation**
- **OutputAttributes**
- **OutputFaceUp**
- **OutputType**
- **PageSize**
- **Policies**
- **Separations**
- **Tumble**

Table 2.1 on page 6 describes the page device parameters that have been defined or amended since the publication of the *PostScript Language Reference Manual, Second Edition*.

Section 2.1 on page 15 explains the semantics of the *Details* dictionaries.

Section 2.2 on page 16 explains the PostScript language fax interface and describes the *FaxOptions* dictionary keys.

Section 2.3 on page 34 explains envelope orientation in user space.
Section 2.4 on page 35 describes errors generated by page device parameters.

### Table 2.1 Page device parameters

<table>
<thead>
<tr>
<th>Key</th>
<th>Type</th>
<th>Semantics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bind</td>
<td>integer</td>
<td>This parameter requests that the document be bound. The document will be bound at a specific time indicated by an integer code:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Code</td>
</tr>
<tr>
<td>BindDetails</td>
<td>dictionary</td>
<td>This dictionary describes product-specific details related to how a document is to be bound. For more information on Details dictionaries, see section 2.1, “Details Dictionaries.”</td>
</tr>
<tr>
<td>Booklet</td>
<td>boolean</td>
<td>This parameter requests that the document be stapled, trimmed and folded into booklet form.</td>
</tr>
<tr>
<td>BookletDetails</td>
<td>dictionary</td>
<td>This dictionary describes product-specific details related to how a document is to be stapled, trimmed and folded. For more information on Details dictionaries, see section 2.1, “Details Dictionaries.”</td>
</tr>
<tr>
<td>DeferredMediaSelection</td>
<td>boolean</td>
<td>This page device key is found on those devices that support two different media models. A value of \textit{false} indicates that media selection is to be done as described in section 4.11.4 of the \textit{PostScript Language Reference Manual, Second Edition}. A value of \textit{true} indicates that the product will be completely responsible for verifying the media requests. The motivation for this is usually that the product is handing the requests off to another “entity” that will guarantee the media requests will be satisfied at printing time. This is the reason for the name \textit{DeferredMediaSelection}—the actual selection of the media is deferred to a time later than the time of this execution of \texttt{setpagedevice}. Note: When \textit{DeferredMediaSelection} is true and the \textit{PageSize} is rejected by a product, \textit{PageSize} policies 0 and 3 through 6 will result in a configuration error. Also, if \textit{PageSize Policy} 7 is being used and \textit{DeferredMediaSelection} is true, it is product-dependent as to whether or not media will be pulled from the current tray.</td>
</tr>
</tbody>
</table>

When `DeferredMediaSelection` transitions between `true` and `false`, some media parameters may need to be initialized again. For example, each media selection model may have its own notion of the default page size that should be used if `PageSize` has not been explicitly specified.

**DeviceRenderingInfo**

This dictionary provides a location for individual OEMs or products to specify their own device rendering parameters. The only required key is `Type` of type integer. When `setpagedevice` is executed, the entries in the `DeviceRenderingInfo` dictionary will be checked only if the `Type` value matches the value expected by the printing device. If the value does not match, the `setpagedevice` implementation will consult `Policies`. If the `Type` key is not specified in the `DeviceRenderingInfo` dictionary, an **undefined** error will result.

**ExitJamRecovery** boolean

If `true`, pages that jam in the exit path are reprinted. If `false` (jam recovery disabled), performance might be improved because more overlapping of page processing is possible.

**FaxOptions** dictionary

For a description of the `FaxOptions` key as well as of the fax interface, see “PostScript Language Interface to Fax,” section 2.2.

**Fold** integer

This parameter requests that the document be folded. The document will be folded at a specific time indicated by an integer code:

<table>
<thead>
<tr>
<th>Code</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Do not fold.</td>
</tr>
<tr>
<td>1</td>
<td>Fold at device deactivation.</td>
</tr>
<tr>
<td>2</td>
<td>Fold at the end of the job.</td>
</tr>
<tr>
<td>3</td>
<td>Fold after each set.</td>
</tr>
<tr>
<td>4</td>
<td>Fold after each <code>showpage</code> or <code>copypage</code>.</td>
</tr>
</tbody>
</table>


**FoldDetails** dictionary

This dictionary describes product-specific details related to how a document is to be folded. For more information on `Details` dictionaries, see section 2.1, “Details Dictionaries.”

**ImageShift** array

This array, `[x y]`, specifies the distance, in default user space, that each image on a page is to be shifted in the x direction for `x` units and in the y direction for `y` units. For page images that are to appear on a front side, the horizontal shift is to the right if `x > 0`, or to the left if `x < 0`. The vertical shift is to the top if `y > 0`, or to the bottom if `y < 0`. For page images that are to appear on a back side, the horizontal shift is to the left if `x > 0`, or to the right if `x < 0`. The vertical shift is to the bottom if `y > 0`, or the top if `y < 0`. 
**InputAttributes** dictionary

If **InputAttributes** is null instead of a dictionary, the PostScript interpreter has no previous knowledge of the available media. When **setpagedevice** is executed, the interpreter simply presents media selection requests to the device implementation, which is fully responsible for determining if they can be satisfied. This arrangement exists in products where actual printing of the output is deferred to some process not directly under the control of the PostScript interpreter.

The **InputAttributes** dictionary normally contains an entry for each input media source. The entry consists of an integer representing the input paper slot and an associated dictionary. Some products may support the **InsertSheet** boolean entry in the slot dictionaries that are sub-dictionaries of **InputAttributes**. This entry indicates whether or not the slot holds special insert sheet media. **InsertSheet** is used during the media matching process and compared against the **setpagedevice** key **InsertSheet** (described next).

**InsertSheet** boolean

This parameter specifies whether or not to select inserted media. **setpagedevice** compares it with the **InsertSheet** value, if any, in the **InputAttributes** entries for all media that it considers. Refer to section 4.11.4, “Media Selection” in the *PostScript Language Reference Manual, Second Edition*, keeping in mind that **InsertSheet** is also an input media entry found within the **InputAttributes** dictionary.

A side-effect of executing **setpagedevice** with **InsertSheet** equal to true and selecting an insert sheet slot is that the imageable area gets set to a zero-area region to ensure that nothing is imaged on the inserted sheet. That is, the insert sheet is explicitly not imaged. The insert sheet slot has the special property that the media coming from this slot is not sent through the fuser (a hot device in laser printers that fuses the toner to the paper) on its way to the output bin. The media pulled from an **InsertSheet** slot does not go through the normal paper path. Photographic material is a good example of **InsertSheet** media which has the special requirement that it cannot tolerate being imaged to, nor sent through the fuser, without major damage.

Here is an example of how to use **InsertSheet**:

```
%... PostScript language code for page n
%... page n+1 is an inserted sheet
%
  save
  <<</InsertSheet true>> setpagedevice % selects InsertSheet media
  showpage
  %send the InsertSheet media on to the output bin as page n+1
  restore %implicitly go back to using the regular media
%
%...PostScript language code for page n+2
```
Laminate boolean If true, the page is to be laminated. If false, the page is not to be laminated. How a page is laminated is product-specific.

ManualFeedTimeout integer The number of seconds the printer waits for a page to be fed manually before generating a time-out error. A zero value means no time-out (infinite wait).

Margins array If the device supports multiple resolutions (that is, different values of \texttt{HWResolution}), the margin values are interpreted according to some canonical default resolution and are scaled appropriately at other resolutions. This ensures that they represent the same physical distance when the resolution is varied. The canonical default resolution is product-dependent and specified in the \textit{Addendum} for the product. For more information on Margins, see Table 4.11 in section 4.11.3 of the \textit{PostScript Language Reference Manual, Second Edition}.

MediaPosition integer or null This is an integer that indicates the slot that is to be used. The interpretation of the integer is product-specific since slot numbers themselves are product-specific. If media matching is in effect, \texttt{MediaPosition} does not override the matching process but does alter (making use of policy whenever possible) it so that if the requested slot number can at all be chosen in a manner that is consistent with media matching, it will be used. If media matching is not in effect (for example, \texttt{DeferredMediaSelection} is supported and true) then it is a product decision as to how to resolve potential conflicts between the various media requests and the \texttt{MediaPosition} request. If \texttt{MediaPosition} is set to null, it plays no role in the media selection process. If the \texttt{PageSize} policy is 7 or if manually feeding, \texttt{MediaPosition} is ignored.

OutputDevice name or string This parameter selects an output device in environments in which the PostScript interpreter can generate output for multiple page devices. In some environments, it selects among different types of output devices, such as a printer and a fax modem, a printer and a display screen, or a printer and an imagesetter. In other environments, it may select among similar devices, such as two or more imagesetters.

When the value of \texttt{OutputDevice} changes, the usual inheritance of values not specified in the operand to \texttt{setpagedevice} does not happen. Instead, all new values are generated in a manner that is specific to each product. Also, the set of acceptable keys for \texttt{setpagedevice} can change when changing the value of \texttt{OutputDevice} since different devices have different features that can be controlled or queried.

The name specified must be one of the names in the product’s \texttt{OutputDevicesDict} dictionary (for example, /Printer, /Fax and /FaxReceived).
OutputPage boolean If true, processing is normal. If false, no pages are actually printed, but all other processing is done as if the page were to be printed, including rasterizing to a frame buffer. Thus, when OutputPage is false, the time to process a page includes everything except time spent waiting for the marking engine.

Furthermore, rasterization occurs synchronously with execution of showpage instead of being overlapped with processing of subsequent pages. This facilitates measuring the complete cost of page execution.

PageDeviceName string, name or null This parameter is used by the findcolorrendering operator and is a string which provides a way to label a specific device setup. Refer to page 166 for details about the findcolorrendering operator.

PageOffset array This array, [x y], contains two real numbers which are used to relocate the page image on the media x units in the device x coordinate direction and y units in the y device coordinate direction. x and y are always expressed in units of 1/72 of an inch. This positioning is typically accomplished by altering the current transformation matrix (CTM). However, on some products, this positioning can be accomplished by device-dependent means that are independent of the graphics state (the CTM in particular). The PageOffset key is typically found on imagesetters and is used to control where the image is to appear on the media.

PageSize array Refer to Table 4.10 on page 232 in the PostScript Language Reference Manual, Second Edition for a description of PageSize. Further clarification is needed, though, regarding how the PageSize matching tolerance is used during the media matching process.

When using roll media, the media is considered to be a match (with respect to the PageSize) when the requested media size is less than or equal to the actual size of the physical media plus 5 additional default user space units. Hence, even if a match succeeds, the requested dimensions may in fact be larger than the actual dimensions of the physical media.

For non-roll media, the the requested size must lie between the actual size minus 5 default user space units and the actual size plus 5 units in order to be considered a match (in other words, the absolute difference between the actual and request sizes is no more than 5 units). When non-roll media is matched, the dimensions used are the actual dimensions of the actual media selected. Failure to match any available media within this tolerance triggers the PageSize recovery policy in either case.

PostRenderingEnhance boolean If true, product-specific image enhancements are enabled. These enhancements are made after the page is rasterized in memory.
PostRenderingEnhanceDetails
dictionary This dictionary describes product-specific details related to the post-rendering image enhancement. For more information on Details dictionaries, see section 2.1, “Details Dictionaries.”

PreRenderingEnhance
dictionary This dictionary describes product-specific details related to pre-rendering image enhancement. For more information on Details dictionaries, see section 2.1, “Details Dictionaries.”

ProcessColorModel
name or string This name or string value specifies the colorant model used for rendering process colors in the device. It affects rendering for all color spaces, with the exception of Separation color spaces that actually produce separations. It does not affect the interpretation of color values in any color space; it controls only the rendering method.

Legal values are /DeviceGray, /DeviceRGB, /DeviceCMYK, /DeviceCMY, and /DeviceRGBK. For example, /DeviceRGB specifies that the process colorants are named red, green and blue; /DeviceCMYK specifies cyan, magenta, yellow and black. These are the process colorant names used to select halftones in a Type 5 halftone dictionary and to control the production of separations in SeparationColorNames and SeparationOrder.

Each of the ProcessColorModel values implies a specific native color space for the device. The native color space is the PostScript language device color space into which user-specified colors are converted if necessary; see section 6.2 in the PostScript Language Reference Manual, Second Edition.

• /DeviceGray, /DeviceRGB and /DeviceCMYK select the correspondingly named native device color space.

• /DeviceCMY and /DeviceRGBK both select /DeviceRGB as the native device color space, but they cause the device to render the /DeviceRGB color values in special ways. For /DeviceCMY, the device renders the RGB colors using the complementary subtractive colors. For /DeviceRGBK, the device uses a separate rendering method for RGB color values that represent pure shades of gray.

SeparationColorNames array This parameter specifies those Separation color spaces that the device supports. This array can contain either names or strings, for example, [/ Pink /Green] or [(Pink) (Green)] or [/ Pink (Green)].
If the name used in a \[Separation name \ldots\] \texttt{setcolorspace} operation is included in this array, that colorant will be used, rather than the alternate color space. Any other color will be mapped to one or more of the named colors through the alternate color space and tintTransform parameter of the \texttt{setcolorspace} operator. This is described in section 4.8.4 of the \textit{PostScript Language Reference Manual, Second Edition}.

The names of the colorants of the native color space are included implicitly, regardless of the contents of the array. Thus:

- for /DeviceCMY, the empty array [] is equivalent to [/Cyan /Magenta /Yellow].
- for /DeviceCMYK, the empty array [] is equivalent to [/Cyan /Magenta /Yellow /Black].
- for /DeviceRGB, the empty array [] is equivalent to [/Red /Green /Blue].
- for /DeviceRGBK, the empty array [] is equivalent to [/Red /Green /Blue /Black].
- for /DeviceGray, the empty array [] is equivalent to [/Gray].

\textbf{SeparationOrder} array

If separations are being made, this parameter specifies that they be produced in the order given by the array of color names (where an array can contain either names or strings, such as [/Cyan /Magenta] or [(Cyan) (Magenta)]). Legal values are the names of the colorants of the native color space, as well as any additional names specified by \texttt{SeparationColorNames}.

A separation will be produced for each occurrence of a name; multiple occurrences will produce multiple separations. No separations will be produced for colors whose names are not given regardless of their appearance in \texttt{SeparationColorNames}. The named separation color space is defined (as opposed to reverting to the alternative color space), but the output for that separation is discarded when a certain color name is not given.

An empty array [ ] requests that separations for all colors of the native color space, as well as all colors requested by \texttt{SeparationColorNames}, be produced in an unspecified order.

When not making separations, some devices may use \texttt{SeparationOrder} to determine the colorants and the order in which they are to be applied to the composite image.
**Signature**  
boolean  
If `true`, the job will be “signatured.” That is, pages of a document will be arranged so that, when folded, the pages will be in the right order. How signatureing is performed is device-dependent. On some devices, the engine may provide the resources (memory, disk space) to signature the job. On other devices, the interpreter may have to reorder the virtual pages in order to deliver the pages to the engine in the correct order. In the latter case, a **Signature** value of `true` implies that the interpreter must store the results of executing the page description for multiple pages in order to deliver the pages correctly ordered. This use of **Signature** is supported by relatively few products and is subject to resource limits in products that do support it.

**SlipSheet**  
integer  
This parameter requests that slip sheets (slip sheet media selection is productspecific) be inserted. There is no way to render a slip sheet (the imageable area gets set to a zero-area region); the engine is simply told when to insert it. For example, a slip sheet can be a colored sheet of paper that visually separates multiple copies. A slip sheet may go through the fuser or a separate paper path. Compare with the description of **InsertSheet** above.

Slip sheets will be inserted at specific times indicated by an integer code:

<table>
<thead>
<tr>
<th>Code</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Do not insert slip sheets.</td>
</tr>
<tr>
<td>1</td>
<td>Insert slip sheet at device deactivation.</td>
</tr>
<tr>
<td>2</td>
<td>Insert slip sheet at the end of the job.</td>
</tr>
<tr>
<td>3</td>
<td>Insert slip sheet at the end of the set.</td>
</tr>
<tr>
<td>4</td>
<td>Insert slip sheet after each <strong>showpage</strong> or <strong>copypage</strong>.</td>
</tr>
</tbody>
</table>

See the descriptions of **Collate** and **Jog** in section 4.11.3 of the *PostScript Language Reference Manual, Second Edition*, for a description of the above terminology.

**Staple**  
integer  
This parameter requests that the job be stapled. The job will be stapled at a specific time indicated by an integer code:

<table>
<thead>
<tr>
<th>Code</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Do not staple.</td>
</tr>
<tr>
<td>1</td>
<td>Staple at device deactivation.</td>
</tr>
<tr>
<td>2</td>
<td>Staple at the end of the job.</td>
</tr>
<tr>
<td>3</td>
<td>Staple after each set.</td>
</tr>
<tr>
<td>4</td>
<td>Staple after each <strong>showpage</strong> or <strong>copypage</strong>.</td>
</tr>
</tbody>
</table>

See the descriptions of **Collate** and **Jog** in section 4.11.3 of the *PostScript Language Reference Manual, Second Edition*, for a description of the above terminology.

**StapleDetails**  
dictionary  
This dictionary describes product-specific details related to how a document is to be stapled. For more information on **Details** dictionaries, see section 2.1, “Details Dictionaries.”
TraySwitch  boolean  If true, automatic tray switching is provided. This option is offered by some devices with multiple input trays. When one input tray runs out of media, another tray with the same type of media can be used automatically, without alerting you that the printer is out of media.

Trim  integer  This parameter requests that the job be trimmed. The job will be trimmed at a specific time indicated by an integer code:

<table>
<thead>
<tr>
<th>Code</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Do not trim.</td>
</tr>
<tr>
<td>1</td>
<td>Trim at device deactivation.</td>
</tr>
<tr>
<td>2</td>
<td>Trim at the end of the job.</td>
</tr>
<tr>
<td>3</td>
<td>Trim after each set.</td>
</tr>
<tr>
<td>4</td>
<td>Trim after each showpage or copypage.</td>
</tr>
</tbody>
</table>


Table 2.2 describes changes to the PageSize entry in the Policies page device dictionary.

<table>
<thead>
<tr>
<th>Key</th>
<th>Type</th>
<th>Semantics</th>
</tr>
</thead>
<tbody>
<tr>
<td>PageSize</td>
<td>integer</td>
<td>This parameter specifies the recovery policy to use when the PageSize cannot be matched (within a tolerance of 5 units) with any available media. The policy values 0-6 are described in Table 4.14 in section 4.11.5, “Policies,” in the PostScript Language Reference Manual, Second Edition. The new policy value 7 has been added since the publication of the manual. 7 Disable media selection altogether and impose the requested PageSize on the previously selected medium without adjusting it in any way. That is, set up the page device as if the selected medium were of the requested size, ignoring the medium's actual size. The manner in which the page image will be positioned on the medium is product-dependent and unpredictable. When the PageSize policy is 7, it takes effect during every execution of setpagedevice. This is unlike all other policies, which take effect only if a request cannot be satisfied. This policy exists solely for use in the emulations of certain Level 1 compatibility operators that perform media selection and page device setup separately. PageSize policy 7 should never be used in a Level 2 application. Its semantics violate the Level 2 page device model, and documents using it are not portable.</td>
</tr>
</tbody>
</table>
2.1 Details Dictionaries

Certain page device features have many variables which determine precisely how the feature functions; these variables may be quite different on different products. Such a feature is enabled or disabled by a primary page device entry while the exact way in which the feature functions is determined by secondary entries in a Details dictionary page device entry. This allows an application that is not knowledgable about the details of the feature to enable and disable it, while more sophisticated utilities can be used to configure the details separately.

An example of this is the stapling feature. Many applications will want to either enable or disable stapling with the assumption that the number, location, and orientation of the staples has been configured correctly. The nature of the configuration will be dependent on the printing device. For example, for some engines it may be possible to specify an arbitrary staple location on the sheet while on others, staples may be placed only in the four corners.

Primary page device entries for such features are either booleans or integers. If the value is a boolean, then the feature is enabled if the value is true and disabled if the value is false. If the value is an integer, the feature is disabled if the value is zero. The non-zero values enable the feature in different ways that are consistent across all products. For example, the binding feature can be enabled for binding at the end of device deactivation, at the end of a job, at the end of each set or at each showpage or copypage.

A consistent naming convention is used for Details dictionaries. The name of the dictionary is the name of the primary key with “Details” appended. For example, if the Staple feature is present and has a details dictionary, this dictionary is named StapleDetails.

A Details dictionary will be present for a given feature on a given product only if additional information beyond that of the primary entry is needed to control it. For example, a product supporting a post rendering enhancement feature that can only be enabled or disabled without further control will not have a Details dictionary for this feature. Such a Details dictionary would be present on a printer with more configurable post-rendering enhancement. Applications which are simply enabling and disabling a feature should never reference a Details dictionary. More sophisticated applications intentioned to control a Details dictionary should never assume that one is present unless the exact nature of the printing device on which they are executing is known.

During the execution of setpagedevice, the entries in any Details dictionary are checked to be syntactically correct only if the Type value matches what is expected by the printing device. If the Type key is not specified in the Details dictionary, an undefined error will result. When the Type value is a number
not known by the printing device, policy is consulted. When the Type value is known, the validity of the values within the Details dictionary are only checked if the feature will be enabled for the page device in effect as a result of \texttt{setpagedevice}. As with all page device entries, syntactically incorrect settings result in appropriate PostScript language errors (for example, \texttt{typecheck}) and invalid values result in policy being consulted.

**The Type Entry**

Every Details dictionary has a Type entry whose integer value completely determines how the Details dictionary entries affect the feature. That is, if two different products have Details dictionaries for the same feature and the Type entry is the same for each, then the dictionaries will have exactly the same named entries and the syntax and semantics of each entry will be the same. This allows an application, based solely on the value of the Type entry, to change entries in a Details dictionary for a feature.

If Details dictionary entries are being set, whether the new dictionary overwrites the current one or is merged with it, is determined by the Type entry. The criteria for merging versus overwriting is product-dependent. Details dictionaries and their associated Type entries are registered by Adobe Systems.

### 2.2 PostScript Language Interface to Fax

This section is intended for use by programmers who are building PostScript language drivers and utility software to work with PostScript fax printers. PostScript language drivers create pages to be printed and sent via fax, and consequently need to know how to create PostScript fax jobs in addition to PostScript language print jobs.

PostScript fax printers require utility software on the host computer to set variables in the printer, such as time-of-day, number of rings to answer on, speaker settings, and so on. These settings persist across multiple fax jobs and multiple users. Programmers developing utility software need a language interface to read and write this data.

The description of the PostScript language interface to fax is broken down into two major sections.

- “PostScript Language Interface to Fax,” section 2.2, describes the interface which controls individual fax jobs. “Some Sample Fax Jobs,” section 2.2.7 presents several example raster and PostScript fax jobs.
• “The Fax Environment Interface,” section 3.6, describes the device parameters and administrative resources needed to set, control, and examine the fax environment shared by all jobs and all users connected to the fax printer.

2.2.1 The Fax Job Interface

PostScript fax printers may send faxes in two different ways: they may send raster images, and they may send PostScript language files. Raster images may be received by any ITU (International Telecommunications Union) Group 3 fax machine. PostScript language files may only be received by suitably equipped machines. The PostScript language interfaces for these two different, but related, methods are described in sections 2.2.2, “Sending Raster Images” and 2.2.3, “Transmitting PostScript Language Files.” Common to both is a collection of dictionary keys which contain information, such as telephone numbers, necessary to carry out the fax operation. These keys are described in section 2.2.4, “The Fax Options Dictionary Keys.”

Cover sheets, transmission reports and page captions are traditional elements of fax communication. The job interface makes it possible to generate these items. This is described in section 2.2.5, “CoverSheet, Confirmation, and PageCaption Procedures.”

Fax Job Transmissions

Fax job transmissions can be made to single or multiple destinations.

A fax transmission in raster form to a single destination will be made in a single call if there is sufficient storage to hold all of the raster pages of the job. However, the transmission may be broken into multiple calls if there is not sufficient storage. If the storage for the raster pages is exhausted, then a call will be made before rasterization is complete. Transmission and rasterization will then take place simultaneously. If transmission succeeds in sending all prepared pages before rasterization of the job is finished, the call will end. A subsequent call will be made either when all of the rasterization is done or when storage is again exhausted. Thus, a transmission may be broken into multiple calls. It is also possible that when transmission and rasterization are taking place simultaneously, rasterization keeps up with transmission. In this case, this transmission will be the last call for the job.

If the storage in use is disk storage, there will typically be sufficient storage for all of the raster pages of a job and the fax will be transmitted in a single call.
It is possible to request that a transmission take place at a particular time. These delayed transmissions, of course, are made with a single call. Since the pages of a raster job are prepared when the job is submitted, all of the pages of a delayed raster transmission must fit in storage otherwise the job will fail.

The transmission of a PostScript language file to a single destination is always made in a single call. This call takes place only after the entire file is in storage. If the file will not all fit in storage, the job will fail.

The transmission of raster files and PostScript language files to multiple destinations is described in “Broadcast Transmission of Faxes,” section 2.2.6.

2.2.2 Sending Raster Images

PostScript language files can be sent as raster images to ITU Group 3 fax machines by selecting /Fax as the current page device with the setpagedevice operator:

```
<</OutputDevice /Fax
other key-value pairs >> setpagedevice
```

With a call to setpagedevice, one of three cases is possible:

1. A new page device is established that does not change the value of OutputDevice in the current page device. In this case, entries in the new page device which are not specified in the argument dictionary to setpagedevice are inherited from the current page device.

2. A new page device is established when there is no current page device. In this case, entries in the new page device which are not specified in the argument dictionary to setpagedevice are initialized to product-dependent default values.

3. A new page device is established that changes the value of OutputDevice in the current page device. In this case, entries in the new page device are not inherited from the current page device; rather, the entries in the new page device which are not specified in the argument dictionary to setpagedevice are initialized to product-dependent default values.

When the OutputDevice is /Fax, one of the entries in the page device dictionary is the FaxOptions dictionary. Values in the FaxOptions dictionary, if any, supplied as part of the argument dictionary to setpagedevice are merged to one level into the FaxOptions dictionary held in the page device. This is similar to the treatment of InputAttributes and OutputAttributes. Section 2.2.4, “The Fax Options Dictionary Keys,” describes the entries found in the FaxOptions dictionary and also lists typical default values.
If the call to the `setpagedevice` operator does not change the `OutputDevice`, (case 1 above) then the `FaxOptions` dictionary before and after the merge of the argument dictionary is considered. If the `FaxOptions` dictionary has been changed in any way, then it is assumed that this is a new transmission; the previous one is finished (cover sheets are generated, the phone call is queued, and so forth) and a new transmission context is started. The reliable technique is to establish all the `FaxOptions` during the first call to `setpagedevice` that has the `OutputDevice` set to `/Fax`.

**The FaxOptions DialCallee Key**

One of the entries in the `FaxOptions` dictionary, the `DialCallee` key, contains the phone number for the fax machine to call. If the `DialCallee` key has a null value, the fax transmission cannot proceed, and a `typecheck` error will be raised. The `DialCallee` key is described in greater detail in section 2.2.4.

If entries in the new page device are initialized to product-dependent default values (see cases 2 and 3 above), then the argument dictionary must contain an entry for `FaxOptions` which in turn must contain a value for the `DialCallee` key. If the `FaxOptions` dictionary does not contain a value for the `DialCallee`, it will be assigned the product-dependent default value (a null). Fax transmission cannot proceed using a null value as the phone number to call and a `configurationerror` will be raised.

### 2.2.3 Transferring PostScript Language Files

It is possible to transmit jobs as PostScript language files between consenting PostScript fax printers. A job may be sent in PostScript language form by using the `faxsendps` operator found in the `FaxOps ProcSet` instance:

```latex
file OptionsDict
/FaxOps /ProcSet findresource /faxsendps get exec
```

*OptionsDict* is an argument dictionary consisting of a set of `FaxOptions` keys. Two entries in this argument dictionary control the transmission of jobs as PostScript language files. These are `RevertToRaster` and `PostScriptPassword`. The `%Fax% device’s `ReceivePostScript` and `PostScriptPassword` parameters (see Table 3.38 on page 131) control the receipt of PostScript language jobs by a fax printer.

*file* is typically `currentfile`, representing the remainder of the current job. The `faxsendps` operator will either send this file to the remote printer to be executed as a PostScript language job, or execute it locally producing a raster fax. The following four steps describe how this is done.
1. The file is read with the contents being saved internally. This continues until end-of-file (EOF) is reached or until fax storage is all used up.

   If there is not sufficient storage to hold the entire file, the RevertToRaster key in the FaxOptions dictionary is consulted. If RevertToRaster is false, the job fails and the message “Storage to assemble PostScript transmission exhausted” will be sent to %stdout. If it is true, then the local machine will execute the equivalent of

   \[
   \langle /OutputDevice /Fax /FaxOptions OptionsDict >> \\
   \text{setpagedevice} \\
   \text{file cvx exec}
   \]

   resulting in a raster image fax transmission. The process terminates here, and steps 2 through 4 do not occur.

2. The DialCallee phone number in the FaxOptions dictionary is dialed, and the receiver queried regarding its willingness to receive PostScript language files from the sender. The PostScriptPassword from the FaxOptions dictionary may be used in this process.

3. If the receiver is willing, the contents of the file saved internally as well as any remainder of the file not yet read into the fax/printer will be sent to the remote machine.

4. If the receiver is not willing, the sending machine hangs up. RevertToRaster is consulted. If it is true then the local machine will execute the equivalent of

   \[
   \langle /OutputDevice /Fax /FaxOptions OptionsDict >> \\
   \text{setpagedevice} \\
   \text{file cvx exec}
   \]

   resulting in a raster image fax transmission. If RevertToRaster is false, no transmission will occur. The job will end and the message “Callee rejected PostScript transmission” will appear in the log.

2.2.4 The Fax Options Dictionary Keys

Both the FaxOptions dictionary and the argument dictionary passed to the faxsendps operator contain the information used to direct a fax transmission. These dictionaries also provide a number of ways of customizing fax jobs. Information in the dictionaries is placed on cover sheets and transmission reports, and is recorded in logs. Procedures in the dictionaries are used for page captions, cover sheets, and transmission reports. Other values in the dictionaries control broadcast, delayed transmission, and high resolution capabilities.
Table 2.3 on page 21 lists all of the keys present in these dictionaries. Only these keys may be present. For each key, the allowed type of the associated value and typical default values are listed.

As described above, if there is no current page device or the new page device’s `OutputDevice` is different from that of the current page device, the `FaxOptions` dictionary initially contains the keys listed below with their associated default values. Merging of the `setpagedevice`’s argument dictionary then takes place. For the `faxsendps` operator, keys not present in its `OptionsDict` argument dictionary are treated as if their default values were given.

**Table 2.3 Fax options dictionary entries**

<table>
<thead>
<tr>
<th>Key</th>
<th>Type</th>
<th>Semantics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CalleePhone</strong></td>
<td>string or null</td>
<td>This key indicates the human-readable telephone number of the callee fax machine. The value of <code>CalleePhone</code> is used for the <code>Confirmation</code>, <code>CoverSheet</code>, and <code>PageCaption</code> procedures. It differs from <code>DialCallee</code> primarily in that it omits or alters routing prefixes and suffixes. For example, the Swiss number in the example under <code>DialCallee</code> might be written here (0041-5-55-55-55732) or (CH 5-55-55-55732). If the value of <code>CalleePhone</code> is null, the value of <code>DialCallee</code> is used.</td>
</tr>
<tr>
<td><strong>CallerID</strong></td>
<td>string or null</td>
<td>The ID is defined by the ITU (1988) fax protocol and is a string of up to 20 characters which the caller uses to identify himself to the callee. If it has a null value (the default), then the value of <code>ID</code> from the <code>%Fax%</code> device parameter set will be used (see Table 3.38 on page 131). If <code>ID</code> is not set, then the string returned by the system parameter <code>PrinterName</code> will be used. If this string is greater than 20 characters, then the left-most 20 characters will be used.</td>
</tr>
<tr>
<td><strong>CallerPhone</strong></td>
<td>string or null</td>
<td>This key indicates the human-readable telephone number of the caller fax machine.</td>
</tr>
<tr>
<td><strong>Confirmation</strong></td>
<td>procedure or null</td>
<td>This key prints a confirmation sheet (on the local sending print mechanism) for this job. The <code>Confirmation</code> procedure is executed when the fax job has finished and the transmission, if any, has completed. You can omit confirmation reports (by setting <code>Confirmation</code> to null) or customize them (by providing your own procedure). You may, for example, want to print a report only if there is an unusual printer status.</td>
</tr>
</tbody>
</table>

The `Confirmation` procedure must explicitly call the `showpage` operator to print the page. This allows confirmation to be sent to the host computer instead of being printed. Therefore, if an alternate definition of the confirmation report is to print upon job completion, the procedure definition

---

2.2 PostScript Language Interface to Fax 21
must include a call to showpage. The details of writing these procedures are given in section 2.2.5, “CoverSheet, Confirmation, and PageCaption Procedures.”

The default value depends on the value of the %Fax% parameter DefaultConfirmOn. If DefaultConfirmOn is true (see Table 3.38 on page 131), then the default value is

{/DefaultConfirmation faxopsexec}

which provides a simple, generic report. If DefaultConfirmOn is false, then the default value of Confirmation is null.

Note: The faxopsexec operator is one of the operators in the FaxOps ProcSet.

Copies
array of dictionaries or null

This array of dictionaries provides a means by which the same raster or PostScript language file may be broadcast to multiple recipients. The only keys allowed in these dictionaries are the same ones allowed in the FaxOptions dictionaries (except that Copies may not be present). Each dictionary from the array is merged with the original FaxOptions dictionary (without the Copies entry) and used to direct the “mailing” of the common body of the fax to a different recipient. Where the same key is defined in both dictionaries, the value from the Copies element takes precedence. For more information on this broadcast facility and a discussion of some of the details and exceptions to this dictionary merging, see section 2.2.6, “Broadcast Transmission of Faxes.”

CoverNote
array of strings or null

This key passes information to the CoverSheet procedure. This information is intended to be a quick note on the cover sheet. It could also be used for the entire message if the fax consists of only a cover sheet.

CoverSheet
procedure or null

This PostScript language procedure generates cover sheets for the document. Fax documents are often preceded (and occasionally followed) by cover sheets. These serve some of the same purposes as envelopes for normal mail. They specify to whom the document is to be delivered, how he or she might be found, who claims to be the sender, what to do if the document is found to be incomplete, and so on. You can define CoverSheet as a PostScript language procedure that produces a customized page. The details for writing these procedures are given in section 2.2.5, “CoverSheet, Confirmation, and PageCaption Procedures.”
Sometimes the PostScript language job will contain all of the pages that the sender wants the recipient to receive. For example, a one-page letter that contains an inside address and a return address may not require a cover sheet as well. Whenever CoverSheet is defined as null, the fax software will not generate cover pages.

The default value for this key depends on the %Fax% parameter, DefaultCoversOn, (see Table 3.38 on page 131). If this parameter is true, then the default is

```
{/DefaultCoverSheet faxopsexec}
```

which will generate simple cover sheets using Sender..., Recipient..., and other optional values from the FaxOptions dictionary. If the parameter is false, the default value will be null.

The CoverSheet procedure should not include a showpage operator. showpage is called automatically after the CoverSheet procedure is invoked.

CoverSheetOnly boolean This key indicates that it is all right to send an “empty” job. If this boolean is false and the PostScript language job produces no pages, then no phone call is made and nothing is sent. If this boolean is true and CoverSheet is non-null, then the page generated by the cover sheet procedure is sent in any case. The default value is false.

DialCallee string This key indicates the phone number of the fax machine to call. This string will be sent to the telephone auto-dialer in the fax printer. It consists of a sequence of the following characters:

<table>
<thead>
<tr>
<th>Character</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>Begin pulse dialing (initial default).</td>
</tr>
<tr>
<td>T</td>
<td>Begin DTMF (Dual Tone Multi-Frequency, in other words, Touch-Tone) dialing.</td>
</tr>
<tr>
<td>0-9</td>
<td>Send signal digit to telephone exchange.</td>
</tr>
<tr>
<td>* #</td>
<td>Send DTMF symbol to telephone exchange.</td>
</tr>
<tr>
<td>,</td>
<td>Pause - see note below.</td>
</tr>
<tr>
<td>W</td>
<td>Wait for dial tone.</td>
</tr>
<tr>
<td>others</td>
<td>Ignore.</td>
</tr>
</tbody>
</table>

Note: A comma internal to a dialing string will cause dialing to pause for 2 seconds before proceeding. A comma at the end of the string will cause the system to pause for up to 10 seconds (more) waiting for the call to make its way through all switches involved and a connection to be made. This can be necessary, for example, when making international calls in which the time elapsed before ringing starts is considerably longer than with domestic calls.
In certain countries, limits may automatically be placed on how much of a delay is actually possible at the end of dialing. Thus, the final commas should be viewed as requests rather than absolute commands.

For example, to dial a Swiss fax machine from a private branch exchange in the USA, you might use the string:

T9,011-41-5-55-55-55732#

Notice that this string contains a routing prefix (T9,011) to establish tone, international switching from the PBX (Private Branch Exchange). It also contains the suffix #, which is used by most American telephone operating companies as a signal that all digits have been sent and switching should commence immediately. This string has a maximum length of 100 characters.

**ErrorCorrect**  boolean  Controls whether error correction should be attempted in the transmission. The receiving machine must be capable of error correction in order for the attempt to succeed. If the receiver does not have the capability, the transmission will take place without it. The default value is true.

**FaxType**  integer or null  This key determines how the actual page contents are prepared and transmitted. If the value is an integer, it should be 0 or 1 coding the following information:

<table>
<thead>
<tr>
<th>Code</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Use standard ITU Group 3 resolution.</td>
</tr>
<tr>
<td>1</td>
<td>Use fine ITU Group 3 resolution.</td>
</tr>
</tbody>
</table>

If the FaxType is 0, then the transmitted y-resolution will be approximately 100 lines per inch; if 1, the y-resolution will be twice as fine (and the transmission time will be correspondingly longer). As the ITU standards evolve, other integers may trigger other modes. If the value associated with FaxType is null, then the value of the %Fax% device parameter DefaultResolution, which is 0 or 1, will be used to select the resolution (see Table 3.38 on page 131).

**HostJobID**  integer  This key allows jobs to be tagged with identifiers that can then be used to track the progress of those jobs. The value of the key is saved in the transmission logs and it is also carried with a job as it progresses through the various stages of processing and transmission. The value of this key is included in each dictionary placed on the stack by the transmitjobstforall (see page 139) operator from the FaxAdminOps ProcSet instance. The default value is 0.

**MailingTime**  array of integers or null  This key indicates when the fax message is to be transmitted. This is used, for example, to send documents at night when phone rates are lower. The value is an array of integers with entries as follows:
<table>
<thead>
<tr>
<th>Index</th>
<th>Meaning</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Year</td>
<td>[1980-2079]</td>
</tr>
<tr>
<td>1</td>
<td>Month</td>
<td>[1-12]</td>
</tr>
<tr>
<td>2</td>
<td>Day</td>
<td>[1-31]</td>
</tr>
<tr>
<td>3</td>
<td>Hour</td>
<td>[0-23]</td>
</tr>
<tr>
<td>4</td>
<td>Minute</td>
<td>[0-59]</td>
</tr>
<tr>
<td>5</td>
<td>Second</td>
<td>[0-59]</td>
</tr>
</tbody>
</table>

If this key has the null value (the default) associated with it, then the time of job submission will be used, meaning “send immediately.” Delayed mailings are only possible if the machine has sufficient storage (disk or RAM) to save the entire job until it is to be sent.

MaxRetries integer or null

This key indicates how many additional tries after the first should be made before giving up on the transmission of a fax message. Attempts can fail, for example, because of a busy or no-answer when the call is placed. If the value is null, then the value used is given by the %Fax% parameter DefaultRetryCount (see Table 3.38 on page 131). The maximum value is 100. If an attempt is being made to send a PostScript language file and the job reverts to raster, the count of the number of failed calls, in effect, is reset to 0. This is because reverting is equivalent to submitting a new job.

nPages integer or null

This key supplies the application’s estimate of the number of pages in the job exclusive of automatically generated cover sheets. In some cases the transmitting machine has not processed the complete job before the transmission starts (and the cover sheet must be sent). In this case, the number of pages will not be known to the printer, so if nPages is provided, it will be used. If nPages is null (the default) then the cover sheet will list an unknown number of pages.

PageCaption procedure or null

This PostScript language procedure generates information lines on the top of transmitted fax pages. Typically, such information will contain the sender’s name, the recipient’s name, and the current page number. The PageCaption procedure should not call the showpage operator since the procedure only makes alterations to the existing page image. The generation of captions will not occur if PageCaption is null. For more information on the interface to a PageCaption procedure, see section 2.2.5, “CoverSheet, Confirmation, and PageCaption Procedures.”

The default value for this key depends on the %Fax% parameter, DefaultCaptionOn (see Table 3.38 on page 131). If this parameter is true, then the default is the procedure

```
{/DefaultPageCaption faxopsexec}
```

If DefaultCaptionOn is false, then the default value is null.
PostScriptPassword

string or null
This parameter specifies a password to use in gaining permission from the callee to transmit the fax job as a PostScript language file. This entry is used only by the \texttt{faxsendps} operator. The default is null, which means that no password is being supplied. See section 3.6.2, “The \%Fax\% Device,” for a description of how this password is used.

ProcInfo
dictionary or null
This dictionary may be used to supply any number of additional application-specific key-value pairs. These key-value pairs are used to convey variable information for application-defined cover sheets, confirmation reports and page captions.

RecipientID
string or null
This key contains a string that uniquely identifies the recipient within the organization (at that fax number). It is intended to be computer readable and usable for subsequent electronic delivery of the fax message within the receiver’s organization. If this value is null, a string of nulls will be used. This string is placed in the Adobe Non-standard Facilities frame and becomes the \texttt{EmailDest} that the receiver logs. It also becomes the string placed in the subaddress frame when generated.

RecipientLanguage
string or null
The value is the name of the natural language to use when preparing cover sheets and page captions. If the value is null or a translation dictionary for the named language cannot be found, the value of the \%Fax\% device parameter \texttt{LocalLanguage} will be consulted. If there is a translation dictionary for the named language it will be used, otherwise the one for English will be used. See section 3.6.5 on page 145 for more information on translation dictionaries.

RecipientMailStop
string or null
This key contains information helpful for hand delivery of the fax message. For example, Mail Stop 23A, Bldg. 19.

RecipientName
string or null
This key indicates the document’s intended recipient; for example, Dr. John Doe. A null value for \texttt{RecipientName} causes the software to seek an alternative non-null value to store in the job log. The first alternative is to use the value of \texttt{RecipientOrg}. If \texttt{RecipientOrg} also has a null value, then the value of \texttt{CalleePhone} is used. If \texttt{CalleePhone} also has a null value, then the value of \texttt{DialCallee} is used. The default value is null.

RecipientOrg
string or null
This key indicates the recipient’s company or organization name. This value is also stored in the job logs. The fall back sequence is \texttt{RecipientName} and then \texttt{DialCallee}.
RecipientPhone
string or null
This key indicates the recipient’s voice telephone number. It is not the same as DialCallee, which is the fax phone number. The RecipientPhone is used for purposes like custom cover sheets that would give routing instructions to an attendant on the fax receiving end. As with RecipientName, if the value associated with this key is null, fall backs are sought to store in the log. The full back sequence is CalleePhone and then DialCallee. The default value is null.

Regarding
string or null
This key passes information to the CoverSheet procedure. This string would typically be used to add a “Subject” line to the cover page.

RetryInterval
integer or null
This key is a positive integer that specifies the number of minutes to wait before retrying to send a fax that failed. If the value is null, then the value is determined by the %Fax% device parameter DefaultRetryInterval (see Table 3.38 on page 131); the maximum value is 60 minutes.

RevertToRaster
boolean
This entry is ignored by the setpagedevice operator but used by the faxsendps operator to decide what to do when the receiving machine refuses to accept a PostScript language transmission. If true, the PostScript language job will be imaged locally and a rasterized fax transmission will be made instead. If false, no transmission will occur. The default value is true.

SenderId
string or null
This key contains a string that uniquely identifies the sender within the organization (at that fax number).

SenderMailStop
string or null
This key contains information helpful for hand delivery of a return fax message. For example, Mail Stop 43A, Bldg. 2.

SenderName
string or null
This key indicates the document’s sender; for example, Dr. Jane Green. A null value for SenderName causes the software to seek an alternative non-null value to store in the job log. The first alternative is to use the value of SenderOrg. If SenderOrg has a null value then CallerID is used. If this too is null, then the value of the %Fax% device parameter ID is used.

SenderOrg
string or null
This key indicates the sender’s company or organization name. If SenderOrg is null, then the value of SenderName is used. If SenderName is null, the value of the %Fax% device parameter ID is used (see Table 3.38 on page 131).

SenderPhone
string or null
This key indicates the sender’s voice telephone number.
TrimWhite  boolean  If TrimWhite is true when preparing a raster transmission, then white space at the top and bottom of pages will be removed before the pages are transmitted. This can result in shorter phone calls, but also a mixture of page lengths. The default is false.

### 2.2.5 CoverSheet, Confirmation, and PageCaption Procedures

The CoverSheet, Confirmation, and PageCaption procedures in the options dictionary can be used to customize individual fax jobs. If these are not given, default procedures will be used. The default procedures are contained in a writable ProcSet instance named FaxDefaultProcs. By redefining entries in this ProcSet instance outside the server loop, it is possible to change the default report procedures. Initial VM is built with this ProcSet instance pointing at the product’s built-in procedures.

The report procedure entries contained in FaxDefaultProcs are

<table>
<thead>
<tr>
<th>Key</th>
<th>Initial Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>DefaultCoverSheet</td>
<td>{/InternalDefaultCoverSheet faxopsexec}</td>
</tr>
<tr>
<td>DefaultPageCaption</td>
<td>{/InternalDefaultPageCaption faxopsexec}</td>
</tr>
<tr>
<td>DefaultConfirmation</td>
<td>{/InternalDefaultConfirmation faxopsexec}</td>
</tr>
<tr>
<td>DefaultReportJobList</td>
<td>{/InternalReportJobList faxopsexec}</td>
</tr>
</tbody>
</table>

The last item here, DefaultReportJobList, is the procedure behind the reportjoblist operator from the FaxAdminOps ProcSet (see section 3.6.4). Activity reports are produced using this operator.

For more information on the FaxDefaultProcs ProcSet instance, see section 3.6.5.

The CoverSheet, Confirmation, and PageCaption procedures should make no change to the global state that would affect the subsequent printed appearance of the PostScript language job. These procedures are called with no parameters. However, there will be two dictionaries on the dictionary stack which provide the information required for these procedures to do their work.

The first dictionary is the FaxOptions dictionary. Since the Confirmation procedure may be run long after the fax job was processed and since the OutputDevice will have been set to Printer typically before this procedure is run, the dictionary provided to Confirmation is actually a copy of the FaxOptions dictionary from when the fax job was processed. This dictionary has the PageCaption and CoverSheet entries removed.
The second dictionary contains a at least the key-value entries listed in Table 2.4.

**Table 2.4 Entries in the second dictionary used by CoverSheet, Confirmation and PageCaption**

<table>
<thead>
<tr>
<th>Key</th>
<th>Type</th>
<th>Semantics</th>
</tr>
</thead>
<tbody>
<tr>
<td>CalleeID</td>
<td>string</td>
<td>This string is defined by the ITU (1988) fax protocol as a string of up to 20 characters with which the callee can identify himself to the caller. It is transmitted between the two stations when they first handshake with each other. It is not present in the dictionaries provided to the <strong>CoverSheet</strong> and <strong>PageCaption</strong> procedures. For multiple call transmissions, the value determined on the first phone call is used.</td>
</tr>
<tr>
<td>CallLength</td>
<td>integer</td>
<td>This key provides the number of seconds that the transmission session lasted. It is not present in the dictionaries provided to the <strong>CoverSheet</strong> and <strong>PageCaption</strong> procedures.</td>
</tr>
<tr>
<td>CoverType</td>
<td>integer</td>
<td>This key is only meaningful to the <strong>CoverSheet</strong> procedures. It has a value indicating the type of cover needed.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>CurrentPageNo</td>
<td>integer</td>
<td>This is the number of the page currently being prepared. This value can be used for generating page captions. Cover sheets are not included in this running count.</td>
</tr>
<tr>
<td>ErrorArray</td>
<td>array of strings</td>
<td>This array describes particular error conditions. It is indexed by <strong>ErrorIndex</strong>.</td>
</tr>
<tr>
<td>ErrorIndex</td>
<td>integer</td>
<td>This integer can be used to retrieve a string from <strong>ErrorArray</strong> describing the status of this job.</td>
</tr>
<tr>
<td>IncludesFinalPage</td>
<td>boolean</td>
<td>This key indicates whether this session is the last and final transmission session for this job. If <strong>true</strong>, then this session includes the last page of the overall job; if <strong>false</strong>, it does not. For more information on transmission sessions, see <strong>InitialPage</strong> and <strong>LimitPage</strong>.</td>
</tr>
<tr>
<td>InitialPage and LimitPage</td>
<td>integer</td>
<td>This key determines which pages of an overall job have been or will be sent in this transmission. The job may get broken into more than one distinct transmission session due to errors on the telephone line, overruns or underruns, and so on. If cover pages are being generated, then each distinct transmission will have its own cover sheet. The two items here can be used by the cover page procedure to figure out how many pages are in a particular transmission and where they fall with respect to other transmissions (if any).</td>
</tr>
</tbody>
</table>
**InitialPage** is the page number of the first page of the session less one. (That is, it is 0 if this transmission includes the first page of the job.) **LimitPage** is the total number of pages in this session and all preceding sessions of this job excluding all cover sheets.

**NumberOfCalls** integer This key specifies the number of separate telephone calls used to make the transmission. It is not meaningful in the dictionaries provided to the **CoverSheet** and **PageCaption** procedures.

**PagesSent** integer This key specifies a count of the number of pages sent to the destination fax machine. It is not present in the dictionaries provided to the **CoverSheet** and **PageCaption** procedures.

**SendPostScript** boolean This key indicates whether the job is a PostScript language file transmission. A value of *true* indicates that it is; *false* indicates that it is not.

**TimeSent** array of integers This array contains date and time information.

<table>
<thead>
<tr>
<th>Index</th>
<th>Meaning</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Year</td>
<td>[1980-2079]</td>
</tr>
<tr>
<td>1</td>
<td>Month</td>
<td>[1-12]</td>
</tr>
<tr>
<td>2</td>
<td>Day</td>
<td>[1-31]</td>
</tr>
<tr>
<td>3</td>
<td>Hour</td>
<td>[0-23]</td>
</tr>
<tr>
<td>4</td>
<td>Minute</td>
<td>[0-59]</td>
</tr>
<tr>
<td>5</td>
<td>Second</td>
<td>[0-59]</td>
</tr>
</tbody>
</table>

For confirmation reports, this is the time of the first call (of possibly many) made for the job. For cover sheets and page captions, this is the time the PostScript language job was submitted and processed.

### 2.2.6 Broadcast Transmission of Faxes

The purpose of providing a broadcast capability for fax is to optimize throughput. For a raster fax, the common body is rasterized and compressed only once. For a PostScript language file transmission, the out-bound file is assembled only once. Then, in either case, the previously prepared material is transmitted multiple times—one copy to each different recipient specified in the **Copies** array. Thus, one requirement for a broadcast job to succeed is that there must be sufficient storage (RAM or disk) to hold all outgoing files that form the fax. Broadcast transmissions are not broken into multiple calls.

As described earlier, the entries in the **Copies** array are individually merged with the original **FaxOptions** dictionary or **faxsendps** argument dictionary to produce a sequence of new dictionaries which are used to direct the
mailings. Where the same key is defined in both the original dictionary and the \texttt{Copies} element, the value from the \texttt{Copies} element takes precedence (except as noted in the following discussion).

When raster is being sent, most of the \texttt{FaxOptions} entries provide mailing information and thereby determine how the fax is sent; however, a few of the entries actually affect what is to be sent. For those entries which affect the common pages to be sent, the values in the original \texttt{FaxOptions} dictionary prevail and the ones in the \texttt{Copies} dictionaries are ignored. The entries in this category are: \texttt{FaxType}, \texttt{TrimWhite}, and \texttt{PageCaption}.

The \texttt{PageCaption} procedure designated by the original \texttt{FaxOptions} will be used to place captions on the common pages (or no captions, if that is desired). Two dictionaries are placed on the dictionary stack before calling the \texttt{PageCaption} procedure. One of these is a \texttt{FaxOptions} dictionary. If broadcast pages are being prepared, the original \texttt{FaxOptions} will be used. This means that accesses to items such as \texttt{RecipientName} and \texttt{RecipientPhone} will retrieve the values from this dictionary and not from any of the merged dictionaries. Thus, giving these keys values like (\texttt{Distribution}) or (\texttt{Mailing List}), makes sense if the \texttt{PageCaption} procedure will be using them.

If a raster is to be broadcast, individual cover sheets will be produced for each recipient, as determined by the \texttt{CoverSheet} procedures in the merged \texttt{FaxOptions} dictionaries. These cover sheets are imaged separately from the common pages and may contain recipient-specific information derived from the merged \texttt{FaxOptions} dictionaries.

When a PostScript language file is being broadcast and cover sheets are asked for, the first part of the file sent to each recipient contains code to reproduce a dictionary. The dictionaries are used by the receivers to create customized cover sheets specific to each receiver. The dictionaries which are coded up are derived from the merged dictionaries, not just the top level \texttt{FaxOptions} dictionary.

Different \texttt{Copies} entries may have different values for the \texttt{RevertToRaster} key, just as they may each have a different \texttt{PostScriptPassword}. When a job asks to broadcast a PostScript language file, that is all that is initially prepared. Transmission starts and proceeds until some recipient requires raster. At this point, rasterization and compression will begin. The phoning and transmitting of a PostScript language file continues at the same time. If other recipients are found which demand raster, they are recorded so that when the common rasterization is performed, a new phone call can be placed. Cover sheets are imaged separately, as needed.
The value of `nPages` in different `Copies` dictionaries may vary, although this would seem to be illogical. The value of `nPages` is irrelevant in the context of broadcast anyway since the entire job must be rasterized before any transmissions take place. It is only used if transmission must start before imaging is done.

`CoverSheetOnly` is another key whose values may vary. It may have different values in different dictionaries. However, this could mean that as a result of the broadcast, some recipients will get one page (a cover sheet) and others will not even be called.

### 2.2.7 Some Sample Fax Jobs

This section presents several example PostScript fax jobs. These examples show some of the major features of the job interface.

#### A Simple Example Sending a Raster File

This snippet of PostScript language code produces a cover page (if the value of the `%Fax%` parameter `DefaultCoversOn` is `true`; see Table 3.38 on page 131) and the document page on the fax machine answering the phone at 415-555-3710.

```
2 dict dup
begin
 /OutputDevice /Fax def
 /FaxOptions 10 dict dup begin
 /DialCallee (T9,1-415-555-3710) def
 /RecipientName (Joe Smith) def
 /FaxType 0 def
 end
 def
 end
 end
setpagedevice

% now comes the real document
/Bookman-Light findfont 20 scalefont setfont
100 400 moveto (Hello, world!) show
showpage
```

A transmission report will also be produced on the local printer.

#### An Example with User-defined Procedures

This is an extension of the previous example, and shows the use of custom `Cover sheet`, `PageCaption` and `Confirmation` procedures.
2 dict dup
begin
/OutputDevice /Fax def
/FaxOptions 10 dict dup begin
/DialCallee (T9,1-415-555-3710) def
/RecipientName (Joe Smith) def

% A simple coversheet
/CoverSheet { /Times-Roman findfont 40 scalefont setfont 200 400 moveto (FAX Cover) show } def

% A different page caption
/PageCaption { /Times-Roman findfont 8 scalefont setfont % put caption at very top of page 300 755 moveto (Communicate by Fax!) show } def

% Confirmation report - prints locally
/Confirmation { /Times-Roman findfont 40 scalefont setfont 200 400 moveto (Fax Transmission Report) show 200 200 moveto (Pages: ) show % access one of the dictionaries PagesSent 5 string cvs show showpage } def end
def end setpagedevice

% now comes the real document
/Bookman-Light findfont 20 scalefont setfont 100 400 moveto (Hello, world!) show showpage
A Simple Example Sending a PostScript Language File

This example sends the same fax message as the first example, but does it by sending the PostScript language file instead of a rasterized image.

```
currentfile
10 dict dup begin
/DialCallee (T9,1-415-555-3710) def
/RecipientName (Joe Smith) def
/FaxType 0 def
/RevertToRaster true def
end
/FaxOps /ProcSet findresource /faxsendps get exec

% now comes the real document
/Bookman-Light findfont 20 scalefont setfont
100 400 moveto (Hello, world!) show
showpage
```

*Note* If the fax machine being called is not willing to accept a PostScript language file (or if it requests a password, which the above code has not provided), the fax printer will hang up, image the page locally and then transmit the rasterized page with a second phone call.

2.3 Envelope Orientation in User Space

This section describes how default user space is oriented relative to the flap on an envelope. This discussion assumes that the Install procedure does not alter the default transformation matrix.

If the PageSize value is portrait ([width height] with width < height), then default user space is set up so that the origin is on the opposite edge of the envelope from the flap and in the diagonally opposite corner from the return address (on a U.S. business envelope). The default user space is set up this way regardless of how envelopes are fed into the printer on a particular product.

Figure 2.1 illustrates two envelopes: one with its flap along the long edge of the envelope, and one with its flap along the short edge of the envelope. The dashed line indicates that the flap is on the side of the envelope facing down.

If the flap is along the long edge of the envelope, then default user space for a portrait PageSize is set up as in panel A of Figure 2.1.

If the flap is along the short edge of the envelope, then the default user space for a portrait PageSize is set up as in panel B of Figure 2.1.
For landscape PageSize values ([width height] with width > height), the orientation of default user space is defined relative to the orientation for portrait PageSize values. This relationship is described in Table 4.10 in section 4.11 of the PostScript Language Reference Manual, Second Edition.

2.4 Errors Generated by Page Device Parameters

In addition to a configurationerror, the setpagedevice operator can generate a typecheck, rangecheck, undefined, or invalidaccess error under certain conditions.

If a feature is unknown for a product, then policy is invoked for that feature, without checking the type of the value. Therefore, the only error that can be generated for unknown features is a configurationerror, and only if the policy specifies that this is to be done. For most products, the default policy for unknown features is to ignore them.

2.4.1 typecheck Errors

A typecheck error is generated if:

- The type of the value for a feature is not one of the acceptable types for that feature, or a component value within a compound value is not the correct type. Each of the following examples would generate a typecheck error:
• A literal array is given for a value that should be a procedure. However, an executable array is acceptable wherever an array value is expected. Packed arrays are always acceptable wherever an array is acceptable. The first two examples below would generate a \texttt{typecheck} error, and the third would not:

\begin{verbatim}
<< /Install [2 3 4] >> setpagedevice
This example generates a \texttt{typecheck} error.
\end{verbatim}

\begin{verbatim}
<< /Policies <</PolicyReport [5 6 7] >> >> setpagedevice
This example generates a \texttt{typecheck} error.
\end{verbatim}

\begin{verbatim}
<< /PageSize {612 792} >> setpagedevice
This example is correct.
\end{verbatim}

• The operand to \texttt{setpagedevice} is not a dictionary. The following example would generate a \texttt{typecheck} error:

\begin{verbatim}
true setpagedevice
This example generates a \texttt{typecheck} error.
\end{verbatim}

2.4.2 rangecheck Errors

A \texttt{rangecheck} error is generated if:

• An array value of the wrong length is given, either as the value for a feature, or as a component of a value within a compound value. Each of the following examples would generate a \texttt{rangecheck} error:

\begin{verbatim}
<< /HWResolution [300] >> setpagedevice
This example generates a \texttt{rangecheck} error.
\end{verbatim}

\begin{verbatim}
<< /InputAttributes << 0 >> >> setpagedevice
This example generates a \texttt{rangecheck} error.
\end{verbatim}
• A value of the right type, but beyond the acceptable range of values, is
given either as the value for a feature, or as a component of a value within
a compound value. Each of the following examples would generate a
**rangecheck** error:

<TT><</PreRenderingEnhanceDetails </Type -1 >> setpagedevice</TT>
This example generates a **rangecheck** error.

<TT></Jog 10 >> setpagedevice</TT>
This example generates a **rangecheck** error if Jog is known.

### 2.4.3 undefined Errors

An **undefined** error is generated if:

• The **Type** key is not specified in a **Details** dictionary. For example:

<TT><</Fold 4 /FoldDetails </FoldType (ZFold) >> setpagedevice</TT>
This example generates an **undefined** error. The **Type** key is mandatory in
the **FoldDetails** dictionary and it is missing in this example.

### 2.4.4 invalidaccess Errors

An **invalidaccess** error is generated if:

• A string, array, or dictionary value is given whose access is more restric-
tive than **read-only**, either as the value for a feature or as a component
value within a compound value. An exception is that for values that are
procedures, the value can be **execute-only**. The first two examples below
would generate **invalidaccess** errors; the third would not:

<TT></MediaColor (blue) noaccess >> setpagedevice</TT>
This example generates an **invalidaccess** error.

<TT></PageSize (612 792) executeonly >> setpagedevice</TT>
This example generates an **invalidaccess** error.

<TT></BeginPage {pop} executeonly >> setpagedevice</TT>
This example is correct.

• The operand to **setpagedevice** is a dictionary whose access is more
restrictive than **read-only**. The following example would generate an
**invalidaccess** error:

<TT></PageSize [612 792] >> noaccess setpagedevice</TT>
This example generates an **invalidaccess** error.
2.4.5 limitcheck Errors

A limitcheck error is generated if there is insufficient storage during the invocation of `setpagedevice`.
The various interpreter parameters control the operation and behavior of the PostScript interpreter. Many of them have to do with allocation of memory and other resources for specific purposes. For example, there are parameters to control the maximum amount of memory used for VM, font cache, and halftone screens. Some input/output devices have parameters that control the behavior of each device individually.

A printer is initially configured with interpreter parameter values that are appropriate for most applications. However, a PostScript language program can alter the interpreter parameters to favor a certain type of functionality or to adapt the product to special requirements. There are three classes of interpreter parameters: system, user, and device parameters.

For each class there is a PostScript operator to read the parameter values and an operator to set the parameter values. The resulting six operators are currentuserparams, setuserparams, currentsystemparams, setsystemparams, currentdevparams, and setdevparams.

Refer to the *PostScript Language Reference Manual, Second Edition*, Chapter 8, for descriptions of these operators, and to Appendix C in the same manual for further information about interpreter parameters.

### 3.1 Two Kinds of Unencapsulated Jobs

An unencapsulated job is entered by executing the Level 2 operator `startjob` or the Level 1 operator `exitserver`. These operators require a password to be presented. The password must be equal to the value of either the `StartJobPassword` or the `SystemParamsPassword` system parameter. If the password is equal to the value of `StartJobPassword`, an ordinary unencapsulated job is started (see section 3.7.7 of the *PostScript Language Reference Manual, Second Edition*). If the password is equal to the value of `SystemParamsPassword`, a system administrator job is started. (If the `SystemParamsPassword` is a zero-length string or has never been set, every unencapsulated job is a system administrator job.)
3.2 Passwords for System and Device Parameters

The system parameters **StartJobPassword** and the **SystemParamsPassword** are explained in section C.3.1, “Passwords” of the *PostScript Language Reference Manual, Second Edition*. Section C.4 makes the statement “*setdevparams* is very similar to *setsystemparams*; the same restrictions apply.” This needs to be clarified a little. When setting device parameters, most but not all will require a password equal to the **SystemParamsPassword**. Also, there is one system parameter that does not require a password. The exceptions to the rules are as follows.

- The **FactoryDefaults** system parameter does not require a password if **FactoryDefaults** is the only entry in the dictionary passed to **setsystemparams**. If the only other key in the dictionary is the password, it is ignored. This is necessary so that if the **SystemParamsPassword** has been forgotten, there will still be a way to reset it (see **FactoryDefaults** described in Table 3.2 on page 45).

- The device parameters **Interpreter** and **Protocol** found in device sets of type /Communications do not require a password if one or both are the only entries in the dictionary passed to **setdevparams**. If the only additional key in the dictionary is the password, it is ignored (see **Interpreter** described in Table 3.4 on page 62 and **Protocol** described in Table 3.5 on page 67).
### 3.3 User Parameters

Any PostScript language program can set user parameters during job execution; no password is required. The initial value of user parameters when the printer is turned on for the first time is product dependent.

Unless otherwise specified, all user parameters are subject to save and restore. (At this time, JobTimeout is the only parameter that does not obey save and restore.) This means that if an unencapsulated job changes user parameters, these new values are the initial values for subsequent encapsulated jobs. There are exceptions to this generalization. For a system parameter whose name is the same as a user parameter, the value of the system parameter is used to initialize the corresponding user parameter at the beginning of each job. In any case, changes made to any user parameter by an encapsulated job have no effect on the initial value of user parameters for subsequent jobs.

User parameters are maintained on a per context basis in environments that support multiple contexts.

The following user parameters are described in Table C.1, Appendix C of the PostScript Language Reference Manual, Second Edition. The description of these parameters is unchanged.

| Parameter            | Description          | Value
|----------------------|----------------------|-------
| MaxDictStack         |                      | Integer
| MaxExecStack         |                      | Integer
| MaxFontItem          |                      | Integer
| MaxFormData          |                      | Integer
| MaxFontStack         |                      | Integer
| MaxFontItem          |                      | Integer
| MaxPatternItem       |                      | Integer
| MaxScreenItem        |                      | Integer
| MaxUPathItem         |                      | Integer
| MinFontCompress      |                      | Integer
| VMReclaim            |                      | Integer
| VMThreshold          |                      | Integer

Each user parameter is identified by a key, which is always a name object. The value of the parameter is usually an integer.

Table 3.1 describes user parameters that have been defined or amended since the publication of the PostScript Language Reference Manual, Second Edition.

*Note* In this table, ‡ means that this key is typically present in all job server (that is, printer) implementations.
### Table 3.1 User parameters

<table>
<thead>
<tr>
<th>Key</th>
<th>Type</th>
<th>Semantics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AccurateScreens</strong></td>
<td>boolean</td>
<td>This parameter controls whether the accurate screen algorithm is used during subsequent executions of the <code>setscreen</code> and <code>setcolorscreen</code> operators. This parameter has no effect on screens established by <code>sethalftone</code>. See section 6.4.4 of the <em>PostScript Language Reference Manual, Second Edition</em>, for a description of accurate screening for the <code>sethalftone</code> operator.</td>
</tr>
<tr>
<td><strong>Legal values:</strong></td>
<td></td>
<td><code>true</code>, <code>false</code></td>
</tr>
<tr>
<td><strong>Errors:</strong></td>
<td></td>
<td>None.</td>
</tr>
<tr>
<td><strong>JobName‡</strong></td>
<td>string</td>
<td>This parameter establishes <code>string</code> as the name of the current job. If defined as a non-zero length string, status responses generated during the remainder of the current job will include a job field that reports the text of this string. The characters should be within the ASCII printable range, because this information is transmitted across arbitrary communications channels and is intended for display to users.</td>
</tr>
<tr>
<td><strong>Legal values:</strong></td>
<td></td>
<td>Any sequence of byte values up to an implementation-dependent maximum length. However, it should not contain the characters ‘;’ or ‘]’ because they would disrupt the syntax of status messages. If the maximum length is exceeded, the string is truncated.</td>
</tr>
<tr>
<td><strong>Errors:</strong></td>
<td></td>
<td><code>limitchek</code>, <code>typecheck</code></td>
</tr>
<tr>
<td><strong>JobTimeout</strong></td>
<td>integer</td>
<td>Setting <code>JobTimeout</code> to a positive value establishes this value as the current job time-out, the number of seconds a job is allowed to execute before it is aborted and a PostScript language <code>timeout</code> error is generated. The current value is decremented during the job, and reading it returns the number of seconds remaining before the job time-out will occur. Time spent waiting for communications and correcting device error conditions is not considered as part of the job execution time. Setting this parameter to 0 disables job time-out altogether.</td>
</tr>
<tr>
<td><strong>JobTimeout</strong> is not subject to <code>save</code> and <code>restore</code>. It is initialized to the value of the <code>JobTimeout</code> system parameter at the beginning of each job.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Legal values:</strong></td>
<td></td>
<td>Any non-negative integer.</td>
</tr>
<tr>
<td><strong>Errors:</strong></td>
<td></td>
<td><code>typecheck</code></td>
</tr>
<tr>
<td><strong>WaitTimeout‡</strong></td>
<td>integer</td>
<td>This parameter indicates the current wait time-out which is the number of seconds the interpreter waits to receive additional characters from the host before it aborts the current job by executing a PostScript language <code>timeout</code> command.</td>
</tr>
</tbody>
</table>

---

5 December 1994
error. A value of 0 indicates an infinite time-out. This parameter is initialized to the value of the **WaitTimeout** system parameter at the beginning of each job.

**Legal values:** Any non-negative integer.

**Errors:** typecheck
3.4 System Parameters

In general, setting system parameters requires a password. System parameter values persist across jobs. (Depending upon the product, some system parameters are stored in non-volatile memory and are persistent across restarts of the interpreter.)

System parameters are global to the PostScript language environment and, in particular, are not maintained on a per context basis in the environments that support multiple contexts. The initial value of system parameters when the device is turned on for the first time and which parameters are stored in non-volatile memory depends on the product implementation.

Some system parameters are read-only. That is, they are returned by `currentsystemparams`, but any attempt to change one using `setsystemparams` has no effect. Other parameters are write-only. They can be set by `setsystemparams`, but are not returned by `currentsystemparams`.

Each system parameter is identified by a key, which is always a name object. The following system parameters are described in the PostScript Language Reference Manual, Second Edition. The description of these parameters is unchanged.

**Note** In the following lists, as well as in Table 3.2, ‡ means that this key is typically present in all job server (that is, printer) implementations.

<table>
<thead>
<tr>
<th>ByteOrder</th>
<th>CurDisplayList</th>
<th>CurFontCache</th>
</tr>
</thead>
<tbody>
<tr>
<td>CurFormCache</td>
<td>CurOutlineCache</td>
<td>CurPatternCache</td>
</tr>
<tr>
<td>CurScreenStorage</td>
<td>CurUPathCache</td>
<td>MaxDisplayList</td>
</tr>
<tr>
<td>MaxFontCache</td>
<td>MaxFormCache</td>
<td>MaxOutlineCache</td>
</tr>
<tr>
<td>MaxPatternCache</td>
<td>MaxScreenStorage</td>
<td>MaxUPathCache</td>
</tr>
<tr>
<td>RealFormat</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3.2 describes system parameters that have been defined or amended since the publication of the PostScript Language Reference Manual, Second Edition.
### System Parameter Table

**Table 3.2 System parameters**

<table>
<thead>
<tr>
<th>Key</th>
<th>Type</th>
<th>Semantics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BuildTime</strong></td>
<td>integer</td>
<td><em>(Read-only)</em> A time stamp identifying a specific build of the PostScript interpreter. The values returned by <strong>BuildTime</strong> on two different products need not be comparable, and in general, <strong>BuildTime</strong> should only be interpreted in conjunction with the manufacturer’s product documentation. Legal values: Any integer. Errors: None.</td>
</tr>
<tr>
<td><strong>CurBufferType</strong></td>
<td>name</td>
<td><em>(Read-only)</em> This parameter (typically found on imagesetters) indicates information about how the raster memory is used. The choices are /Band and /Hybrid. /Band indicates that the system will render to bands (groups of scan lines) regardless of the amount of RAM available. When /Hybrid is returned, if <strong>MaxRasterMemory</strong> is large enough to contain a full-page frame buffer, the interpreter will render into the full-page buffer. Otherwise, it will render to bands. Legal values: /Band, /Hybrid Errors: None.</td>
</tr>
<tr>
<td><strong>CurInputDevice</strong></td>
<td>string</td>
<td><em>(Read-only)</em> This parameter indicates the name of the communications device corresponding to the current input file for the currently executing PostScript language program. The string that is returned corresponds to the communications device parameter set name whose values are normally stored in RAM; for example, (%Serial%). For more information on communications devices, see section 3.5.2, “Device Parameters Associated with Communications.” Legal values: A string containing a communications device name. Errors: None.</td>
</tr>
<tr>
<td><strong>CurOutputDevice</strong></td>
<td>string</td>
<td><em>(Read-only)</em> This parameter indicates the name of the communications device corresponding to the current output file for the currently executing PostScript language program. The string that is returned corresponds to the communications device parameter set whose values are normally stored in</td>
</tr>
</tbody>
</table>
RAM; for example, (%Serial%). For more information on communications devices, see section 3.5.2, “Device Parameters Associated with Communications.”

**Legal values:** A string containing a communications device name.

**Errors:** None.

**CurSourceList** integer *(Read-only)* This parameter indicates the number of bytes currently occupied by source lists. A source list holds the internal data representation for sampled image source data and uncached character pixel arrays.

**Legal values:** Any non-negative integer.

**Errors:** None.

**CurStoredFontCache** integer *(Read-only)* This parameter indicates the number of bytes that the storage device font cache currently occupies.

**Legal values:** Any positive integer.

**Errors:** None.

**CurStoredScreenCache** integer *(Read-only)* This parameter indicates the number of bytes currently used for screen files on the storage device which includes the currently active screens.

**Legal values:** Any positive integer.

**Errors:** None.

**DoStartPage** boolean This parameter indicates whether the start page should print during system initialization. The start page prints if the value of **DoStartPage** is *true* during system initialization.

**Legal values:** *true, false*

**Errors:** typecheck

**FactoryDefaults** boolean This parameter is usually *false*. Setting it to *true* and immediately turning off the printer causes all non-volatile parameters to revert to factory default values at the next power-on. The job that sets **FactoryDefaults** to *true* must be the last job executed before power-off; otherwise, the request is ignored. This required physical interaction reduces the chance of malicious jobs resetting the device to factory defaults.
A password is not required in the dictionary passed to `setsystemparams` if `FactoryDefaults` is the only entry in the dictionary. This allows the factory defaults to be reestablished even though the system parameters password might have become corrupted.

*Note: The passwords are among those reset by this operation.*

The exact collection of parameters reset to factory defaults by this action is product dependent. In most products, `PageCount` is not reset.

**Legal values:** true, false

**Errors:** typecheck

### FatalErrorAddress  
A fatal system software error causes a PostScript output device to stop execution and, in most products, to restart the PostScript interpreter. Before execution is stopped, the address at which the error occurs is stored in the parameter `FatalErrorAddress` and also is transmitted to the host over the communications channel. A non-zero value of this parameter indicates that a fatal system error has occurred earlier. On some products, if this value is non-zero during system initialization, the address is printed on the start page or possibly on a separate page.

**Legal values:** Any integer.

**Errors:** None.

### FontResourceDir  
This parameter controls the location of external fonts. Fonts are resources in PostScript language Level 2. The `Font` category implementation concatenates the `FontResourceDir` and the font name to get the external location of the font. For example, if the `FontResourceDir` were `(Resource/Font/)`, then the Times-Roman resource of the `Font` category would be in `(Resource/Font/Times-Roman)`.

This parameter is provided separately from the `GenericResourceDir` system parameter to allow backward compatibility with applications that expect fonts to be located under `(fonts/)`. In such a case, `FontResourceDir` should be set to `(fonts/)`.

*Note: Applications and users should access external fonts only through the resource operators or `findfont` or, if necessary to access them as files, through `ResourceFileName`. (See the PostScript Language Reference*
Manual, Second Edition, section 3.9, “Named Resources.”) The above parameter should be used only to control the location of external fonts by the resource management mechanism.

**Legal values:** Any string with non-null characters.

**Errors:** limitcheck, typecheck

GenericResourceDir ‡ and GenericResourcePathSep ‡

These parameters control the location of external resources for the Generic category and all categories based upon it (currently Category, Encoding, Form, Pattern, ProcSet, ColorSpace, Halftone, and ColorRendering). The Generic category implementation concatenates the GenericResourceDir, the category name, the GenericResourcePathSep, and the resource name to get the external location of the resource. For example, if the GenericResourceDir and GenericResourcePathSep were (Resource/) and (/), respectively, then the AdobeLogo resource of the Pattern category would be in Resource/Pattern/AdobeLogo.

The GenericResourceDir should be an absolute path, that is, a path beginning at the root of the storage device. It must contain any trailing path separator. It should include a storage device (for example, %os%) if only a single device is to be considered, or should omit the device if all searchable devices are to be considered. If there is a device specifically for generically managed resources (for example, %GenericResource%) that may access resources through a network server or along a search path, then

GenericResourceDir should be set to that device. Resource files are expected to be in subdirectories with names the same as category names. The resource file name should be the same as the name of the resource it defines. In the above example, the file named Resource/Pattern/AdobeLogo should contain a PostScript language program which, when run, will define the AdobeLogo instance in the Pattern resource category.

**Note:** Applications and users should access external resources only through the resource operators or, if necessary to access them as files, through ResourceFileName. (See the PostScript Language Reference Manual, Second Edition, section 3.9, “Named Resources.”) The above parameters should be used only to control the location of external resources by the resource management mechanism.

For products with no external resources (and, presumably, no file systems), GenericResourceDir should be set to (%null). This mechanism can also be used by site administrators to temporarily disable access to external resources.

**Legal values:** Any string with non-null characters.

**Errors:** limitcheck, typecheck
**JobTimeout**  
**integer**  
This parameter indicates the value in seconds to which the user parameter **JobTimeout** is initialized at the beginning of each job. Trying to set the system parameter **JobTimeout** to a negative value is ignored and the previous setting of **JobTimeout** is used. A value of 0 indicates that the timeout is infinite. Trying to set a number between 1 and 14 will result in 15 being set (in other words, 15 is the minimum value). The reason for the minimum value of 15 is that if small values were allowed, this might prevent a subsequent job from setting **JobTimeout** to another value successfully.

**Legal values:** 0 or any integer greater than or equal to 15.

**Errors:** **typecheck**

**LicenseID**  
**string**  
This parameter contains the Adobe-assigned license identifier. Its value is unique to each product.

**Legal values:** Any string of non-null characters.

**Errors:** **limitcheck, typecheck**

**MaxHWRenderingBuffer**  
**integer**  
This parameter indicates the amount of memory, in bytes, to reserve for use by a hardware rendering device, such as PixelBurst™, to store display list data. The memory is permanently allocated during system initialization. If the value being set is outside of the legal range, **MaxHWRenderingBuffer** is set to the nearest acceptable value. The minimum value meets the requirements of the rendering device and the maximum value is an amount that will not jeopardize the execution of a PostScript language job.

**Legal values:** Product dependent. Any positive integer, typically 8192 or greater.

**Errors:** None.

**MaxImageBuffer**  
**integer**  
This parameter indicates the maximum number of bytes that can be utilized for a single image buffer. An image buffer holds an internal data representation for sampled image source data. The parameter may be rounded by the interpreter if a requested value is out of range.

**Legal values:** Any integer.

**Errors:** **typecheck**

**MaxRasterMemory**  
**integer**  
This parameter indicates the largest amount of memory, in bytes, that may be allocated to the frame buffer. This parameter may be used to limit the amount of raster memory; unused raster memory is available for use as VM. Thus, **MaxRasterMemory** allows the user to trade-off raster memory allocation (which will allow larger page sizes and higher resolutions) against VM...
(which will allow more downloaded fonts and the production of more complex pages). \texttt{MaxRasterMemory} is consulted only during system initialization; any changes to the value of the parameter will not take effect until then.

\textbf{Legal values:} Product dependent.

\textbf{Errors:} typecheck

\texttt{MaxSourceList} \footnote{integer} This parameter indicates the maximum number of bytes that can be utilized for source lists. A source list holds internal data representation for sampled image source data and uncached character pixel arrays. This parameter may be rounded by the interpreter if a requested value is out of range.

\textbf{Legal values:} Any positive integer.

\textbf{Errors:} typecheck

\texttt{MaxStoredFontCache} \hspace{1cm} integer This parameter defines the maximum number of bytes that the storage device font cache can occupy on the chosen storage device (such as the disk). Setting \texttt{MaxStoredFontCache} to 0 has the effect of turning off stored caching. Setting \texttt{MaxStoredFontCache} to -1 (or to a value too large), sets the number of bytes that the font cache can occupy to the logical size of the storage device. If the logical size of the storage device is not known, an implementation dependent value is used.

\textbf{Legal values:} -1, 0, or any positive integer.

\textbf{Errors:} typecheck

\texttt{MaxStoredScreenCache} \hspace{1cm} integer This parameter defines the maximum number of bytes that the storage device screen cache can occupy on the chosen storage device. Setting \texttt{MaxStoredScreenCache} to 0 turns off stored caching. Setting \texttt{MaxStoredScreenCache} to a negative value (or to a positive value too large), sets the number of bytes that the screen cache can occupy to the logical size of the storage device. If the logical size of the storage device is not known, an implementation dependent value is used.

\textbf{Legal values:} Any integer.

\textbf{Errors:} typecheck
MinBandBuffers integer This parameter (typically found on imagesetters) is used to specify the minimum number of band buffers (groups of scan lines) to be allocated from memory set aside as raster memory. The default value depends on the product and the amount of memory installed. Typically on imagesetters, the default is 2 for configurations with 32 megabytes of memory or less and 3 otherwise.

Legal values: Any positive integer.

Errors: None.

PageCount integer (Read-only) The PageCount parameter indicates the number of pages that have successfully been processed since manufacture. The PageCount parameter is incremented when the interpreter finishes executing each page. The page count is incremented at these times by the value of the current copy count. If one or more pages are not actually printed for any reason, including manual feed time-out and job abort, PageCount is not decreased accordingly. In most products, PageCount is not reset at a user request to return to factory defaults. However, PageCount may be reset if the non-volatile memory in which it is stored has been corrupted.

Note: In releases prior to PostScript Language version 2014, the PageCount parameter is incremented when a page completes printing, rather than during execution of the showpage or copypage operators.

Legal values: Any non-negative integer.

Errors: None.

PrinterName string This parameter establishes string as the current name of the device. If the device is on a network, this name might be used by the system as part of a name identifier for the device considered as a node on the network. PrinterName is usually printed on the start page and so it should consist of printable characters, although this is not required. Setting this parameter to a zero-length string causes PrinterName to be set to the value of the product string in systemdict.

Legal values: Any string of 32 or fewer non-null characters.

Errors: limitcheck, typecheck
**RamSize**  
integer  
*(Read-only)* This parameter indicates in bytes the amount of installed RAM available to the product. In some cases, this value might be less than the total amount of installed RAM. For example, the system diagnostics might have determined that certain banks of RAM are defective and would consider them unavailable.

**Legal values:** Any non-negative integer.

**Errors:** None.

**Revision**  
integer  
*(Read-only)* This parameter designates the current revision level of the product in which the PostScript interpreter is running. Each product has its own numbering system for revisions, independent of those of any other product. The value is identical to the value of the integer `revision` in `systemdict`.

**Legal values:** Any integer.

**Errors:** None.

**StartJobPassword**  
string  
If a program starts an unencapsulated job using `startjob` or `exitserver`, and the password it presents to that operator is the value of `StartJobPassword`, then the subsequent unencapsulated job will need to present a password equal to the `SystemParamsPassword` each time `setsystemparams`, `setdevparams` or other system administrator operations are invoked.

**Legal values:** Any string of 32 or fewer non-null characters.

**Errors:** `limitcheck`, `typecheck`

**StartupMode**  
integer  
This parameter controls whether the system start file (Sys/Start) or some other start-up procedure should be executed during system initialization. The Sys/Start file executes if the value of `StartupMode` is 1 during system initialization. If the `StartupMode` value is 0, no special start-up procedures are run during system initialization. Other values of `StartupMode` can occur in specific products and result in product-dependent start-up procedure execution.

**Legal values:** Product dependent, but restricted to values between 0 and 255.

**Errors:** `typecheck`

**SystemParamsPassword**  
string  
If a program starts an unencapsulated job using `startjob` or `exitserver`, and the password it presents to that operator is the value of `SystemParamsPassword`, then the subsequent unencapsulated job is permitted to invoke `setsystemparams`, `setdevparams`, or other system
administrator operations without presenting a password each time. This extends to Level 1 compatibility operators that change system parameters but provide no means to present a password.

**Legal values:** Any string of 32 or fewer non-null characters.

**Errors:** limitcheck, typecheck

ValidNV  boolean  *(Read-only)* This parameter indicates whether non-volatile memory is currently used to store persistent parameters. During system initialization, if non-volatile memory is corrupt, factory defaults are reestablished. If further testing indicates that non-volatile memory is defective, it will not be used, and ValidNV is false; otherwise, ValidNV is true. In many products, if non-volatile memory is defective, it is emulated in RAM. The operating behavior is the same, except that persistent parameter values are lost when the printer is powered off or restarted and factory defaults are used at power-on.

**Legal values:** true, false

**Errors:** None.

WaitTimeout  integer  This parameter indicates the value in seconds to which the user parameter WaitTimeout is initialized at the beginning of each job. A value of 0 indicates that the time-out is infinite. Trying to set the system parameter WaitTimeout to a negative value is ignored and the previous setting of WaitTimeout is used.

**Legal values:** 0 or any positive integer.

**Errors:** typecheck

### 3.5 Device Parameters

Device parameters are set using the operator `setdevparams` and are read using the operator `currentdevparams`. Device parameters are similar to system parameters in that they require a password (if the SystemParamsPassword is set), are global to the PostScript language environment, and persist across jobs. As with system parameters, some of these parameters may be stored persistently in non-volatile memory.

Device parameters are subdivided into sets that correspond to a particular device (for example, %Serial%, %disk2%). More generally, “device” in this context really means “named parameter set.” Each named parameter set known to the `currentdevparams/setdevparams` operators corresponds to an instance of the IODEvice resource category and can represent a set of parameters describing the configuration of a physical or logical communications channel, storage device, hardware device, or software entity.
such as a language emulator (see section C.4 of the Postscript Language Reference Manual, Second Edition for more details). Even if two products have the same named device, the parameters in the set might differ, for example, because the hardware support for that device differs on each product.

**Note** Not all of the device parameters listed in tables 3.4 to 3.35 will be present in every printer product. Refer to the product addendum for a complete list of parameters supported by any given product.

### Device Parameter Dependencies

One property that distinguishes device parameters from both system and user parameters is that device parameters can be interdependent. The legality of a value for a given parameter may depend on the value of another parameter.

For example, in the serial communications device set there is an **Interpreter** and a **Protocol** parameter. The **Interpreter** parameter determines which page description language is to be used for an incoming job on that channel. The **Protocol** parameter determines the communications protocol used to send and receive data. **Protocol** can be set to `/Binary`, `/Normal`, `/Raw`, or `/TBCP`. The serial channel cannot be configured to have **Protocol** set to `/Raw` and **Interpreter** set to `/PostScript`. This would be an illegal combination of device parameters. This condition is termed a **configuration error**. A PostScript language error (**configurationerror**) occurs if `setdevparams` attempts to establish such an illegal configuration.

Most configuration dependencies are between parameters in the same device parameter set; there is a dependency among all communications devices, however, that requires at least one of the communications channels to be **On** and **Enabled**. There might also be cases where certain device parameter sets have interdependencies. For example, if both LocalTalk® and a serial channel share the same hardware port on a printer, there is a requirement that both never be **On** at the same time. If one channel is already **On** and the other is turned **On**, the first is turned off and disabled.

#### 3.5.1 Device Parameter Set Types

Every device parameter set has a key-value pair which indicates its type. The key is **Type** and the value can be `/Communications`, `/Emulator`, `/FileSystem`, or `/Parameters`. 
Table 3.3 Parameters common to all device parameter sets

<table>
<thead>
<tr>
<th>Key</th>
<th>Type</th>
<th>Semantics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>name</td>
<td>(Read-only) This parameter designates the general category of parameters in a device parameter set. Every device parameter set shall contain a Type entry.</td>
</tr>
</tbody>
</table>

**Legal values:** /Communications, /Emulator, /FileSystem, /Parameters

**Errors:** None.

### 3.5.2 Device Parameters Associated with Communications

A raster output device can have various physical communications channels and can speak many different protocols over these channels. Host computers can communicate with these products by way of diverse network topologies and/or by way of direct point-to-point connections.

**Communications Possibilities**

There are many ways to communicate with raster output devices. The choices of physical hardware for point-to-point communications include serial, unidirectional and/or bidirectional parallel, and SCSI bus. In the realm of network communications hardware, some choices are Ethernet, Token Ring, LocalTalk and PhoneNet®. There are network adaptors (e.g., line multiplexers, parallel to Ethernet adaptors and SCSI to Ethernet adaptors, among others) that allow the raster output device to connect to networks to which it does not otherwise have a direct physical connection. However, the network parameters described later in this chapter are relevant only to raster output devices that are true “peers” of the network with a direct connection to it. These products may support any of the popular protocol stacks, such as, TCP/IP, AppleTalk®, and the Novell® NetWare® (IPX®/SPX®). Although the design of most of these protocols predate the Open Systems Interconnection (OSI) Reference Model of the International Standards Organization (ISO), we shall use the OSI model in our description of the parameters associated with the functional layers of these protocol stacks.

There are various device parameter sets defined to aid system administrators in setting up and maintaining network printers. These parameter sets correspond to layers within the OSI model. Only the application layer (of OSI) possesses a parameter set of type /Communications. The PostScript interpreter (or emulator) receives its jobs from this layer. The device parameter sets which correspond to the transport, network, data link and physical layers are of type /Parameters. The parameter set associated with an implementation of the network layer must reference a parameter set associated with an instance of the data link/physical layer (in other words, a
distinct interface to the network). For example, if there is only one network layer implementation, but it is connected to \( n \) network interfaces, then for each network layer parameter set there is a unique data link/physical parameter set named within it. A parameter set for the network layer can be viewed as a distinct binding of the network address and the network interface.

There are various \textit{de facto} standard communications protocols that raster output devices must speak in order to reside directly on networks. The choices of protocols and the physical hardware medium on which they reside are limited in certain ways. Figure 3.1 illustrates the present relationship between these protocols and physical communications hardware. The arrows in this diagram indicate that the network protocols can be used with the physical medium pointed to in order to deliver and receive messages.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure3.1}
\caption{Relationship between network communications protocols and physical communications medium}
\end{figure}

The Novel Netware\textsuperscript{©} communications protocols were originally derived from the Xerox Network System (XNS) protocols. For example, the Novell Internetwork Packet Exchange (IPX) is virtually identical to the Xerox network layer protocol called IDP (Internetwork Datagram Protocol). The Novell transport protocol is called Sequenced Packet Exchange (SPX)\textsuperscript{1}.

AppleTalk is the name Apple Computer, Inc. chose for their networking software that is built into every Macintosh computer. The data link protocol LocalTalk Link Access Protocol (LLAP) is used while communicating over LocalTalk or PhoneNET networks. (ELAP) EtherTalk Link Access Protocol and (TLAP) TokenTalk Link Access Protocol are the data link protocols for communicating over Ethernet\textsuperscript{®} and Token Ring respectively. AppleTalk over Ethernet is called EtherTalk and AppleTalk over Token Ring is called TokenTalk\textsuperscript{®}.

\begin{footnotesize}
\begin{enumerate}
\item Malamud, Carl: \textit{Analyzing Novell\textsuperscript{®} Networks}, Van Nostrand Reinhold, New York, page 81, © 1992.
\end{enumerate}
\end{footnotesize}
TCP/IP is a network architecture sponsored by the Defense Advanced Research Project Agency (DARPA) and has been adopted by a large number of vendors. TCP stands for Transmission Control Protocol and is a transport layer protocol. IP stands for Internet Protocol and is the network layer protocol used by TCP. UDP (User Datagram Protocol) is a connectionless protocol. It is also dependent on IP for routing to the destination but does not ensure that the destination receives the packets.

Refer to Computer Networks by Andrew S. Tanenbaum² for an excellent description of Token Ring and Ethernet.

See Inside AppleTalk® for a description of AppleTalk.³

Before describing various communication parameter sets, let us first think more about how parameter sets of type /Communications are manipulated.

**Communications Parameter Sets**

There can be different ways to set up a product’s communications parameters, including the use of front panels, hardware switches, and PostScript operators and procedures. The scheme described in this section provides a generic model for setting communications parameters. This model works across a variety of products and enables PostScript language spoolers and utilities to use the same model when reading and writing communication device parameters.

A raster output device typically has several hardware ports for communications. For example, a printer might have a parallel port and two serial ports named channel A and channel B. The parallel port is associated with the parameter device set named %Parallel%. Serial channel A, which is wired to a 25-pin RS-232A connector, is associated with the parameter device set named %SerialA%. Serial channel B, which is wired to either an 8- or 9-pin connector, is associated with the parameter device set named %SerialB% or with the parameter set named %LocalTalk%. In this example, two device sets are associated with the same hardware port.

For any given communications device set, there are three sets of parameters. If the name of the device is %CommName%, the names of the three parameter sets are %CommName_NV%, %CommName%, and %CommName_Pending%. For example, in a printer with an SCC chip and a parallel port, the following parameter sets probably would be available:

---

The three parameter sets for a communications channel have the following general characteristics:

- `%CommName_NV%` values usually are stored in non-volatile memory.

- `%CommName%` values usually are stored in RAM and do not persist when the printer is powered off.

- `%CommName_Pending%` is a read-only parameter set whose values are used to configure the communications hardware and software at the beginning of the next job. This parameter set reflects either the current values of some writable parameter set, such as `%CommName%`, or some predetermined values selected via a switch or front panel. How the system computes the values in `%CommName_Pending%` is described below.

- When there are multiple instances of a certain communications parameter set, the naming convention is `%CommName%`, `%CommNameB%`, `%CommNameC%`, and so on.

The name `%CommName_NV%` is only a hint of actual behavior. In products with limited non-volatile memory, only some of the `%CommName_NV%` set parameters may actually be saved to non-volatile memory, while products with sufficient non-volatile memory typically save all writeable `%CommName_NV%` parameters. PostScript language utility programs need not take these differences into account. If their specific intent is to affect persistent values, they should use `%CommName_NV%`. The implementation will do the best it can given the amount of non-volatile memory available in the product.

There is a hierarchical relationship between these parameter sets as described below. On some products these three sets may not be distinct from each other. The reason for the presence of the three sets on all products is to provide for a consistent model that is product independent.

**Basic Hierarchy of Parameter Sets**

This description begins with a simple subset of the model and progresses to more complex situations.
Figure 3.2 shows the basic relationship of the three parameter sets. In this figure, values written to %CommName% are written through to %CommName_Pending%; and values written to %CommName_NV% are written through to %CommName% and thence to %CommName_Pending%. Beyond this, several variables exist:

- The product may have a front panel. The values set by the user at the front panel are written to %CommName% or to %CommName_NV% (if the values are to persist across restarts and power cycles). Some products store to only one of these sets.

- The product may have switches through which it can be directed to use either %CommName_NV% parameter sets or built-in (hard-wired) values. (This situation is discussed at length later in this section.)

Most products do not have both a front panel and switches.

- PostScript language programs (usually spoolers or utilities) may write parameter values to %CommName% or %CommName_NV% (usually the former) at any time. This is true whether the output device has a front panel or has switches.

In Figure 3.2, the %CommName% parameter set, which is in RAM and does not persist when the printer is powered off, is used in many cases (but not all) to update the %CommName_Pending% set. Thus, on many products (those with a front panel but no switches), the %CommName% and %CommName_Pending% sets always have the same values and appear redundant.

The %CommName_NV% set usually stores the parameters in non-volatile storage. In the simple case in Figure 3.2, writing to %CommName_NV% writes through to %CommName%, which in turn writes through to %CommName_Pending%. 
In general, a spooler or utility almost always should write to \%CommName\%. It should write to \%CommName\_NV\% only if parameters are to persist when the printer is turned off.

A front panel usually writes to \%CommName\_NV\% to change the power-on parameters, although the front panel also can write to \%CommName\%.

**Multiple Non-Volatile Sets**

Complicating this picture, it is possible to have more than one non-volatile parameter set. Such sets are correctly named as follows: \%CommName\_NV\%, \%CommName\_NV2\%, \%CommName\_NV3\%, and so on. As is the case with a single non-volatile set, these parameter sets obtain their values by being written to by a PostScript language spooler or utility.

*Figure 3.3 Communications parameters sets using NV values*

<table>
<thead>
<tr>
<th>Switch Settings (active)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>HW1</td>
<td>HW2</td>
<td>NV</td>
<td>NV2</td>
<td>NV3</td>
<td></td>
</tr>
</tbody>
</table>

\%CommName\_NV\%, \%CommName\_NV2\%, \%CommName\_NV3\%

\%CommName\%

\%CommName\_Pending\%

Figure 3.1 shows a situation in which there are three non-volatile sets. Only one of these sets can be active at any given time. The switch setting indicates which one is active. In this figure, the active set is \%CommName\_NV2\%, which is indicated by the switch setting. When the switch is set to this position, or when the product is restarted or powered up with the switch in this position, the values in \%CommName\_NV2\% are written through to \%CommName\% and to \%CommName\_Pending\%. While the setting \%CommName\_NV2\% is active, a PostScript language job can write to any of the non-volatile parameter sets, but only if it wrote to \%CommName\_NV2\% would the values migrate to \%CommName\% and \%CommName\_Pending\%. Changing the switch to the position corresponding to \%CommName\_NV3\% would cause \%CommName\_NV3\% values to become the active ones in \%CommName\% and \%CommName\_Pending\% instead.
**Predetermined Parameter Values**

In addition to the switch settings that indicate which non-volatile parameter set should be used, there can also be other switch settings that short-cut this hierarchy of parameter sets and cause a predetermined set of communications parameters to be written directly to %CommName_Pending%. This situation is shown in Figure 3.4.

Figure 3.4  Communications parameter sets using “hard wired” values

In the figure, switch positions 1 and 2 designate two such “hard-wired” parameter sets. When the switch is set to position 1, for example, PostScript language programs may still write to one of the %CommName_NV% sets or to %CommName%, but there is no effect on %CommName_Pending% unless the switch is reset to one of positions 3 through 5.

This example explains the existence of the %CommName_Pending% set as separate from the %CommName% set: it allows absolute determination of the communication parameters that will be used, no matter what other activity occurs.

Note  Reading the %CommName_NV% set or the %CommName% set gives you no information about the parameters being used for the current job or the next job, but simply returns the values last written to these sets. Reading %CommName_Pending% returns the values to be used for the next job.  

Determining the parameters of the current job is of little interest. Either the job is a page description, in which case it should not be accessing device parameters at all, or the job is a utility that is interested in either determining or affecting the settings for future jobs. If the device parameters are used as described above, utilities can be written without concern for exactly which parameters are stored in non-volatile memory and without concern for whether a utility job, front panel, or switch is used to establish communication parameters.
As in the case described in the previous section, a spooler or utility almost always should write to %CommName%. It should write to %CommName_NV% only if parameters are to persist across restarts and power cycles.

Changes to parameters of type /Communications take effect after the current file (containing one or more PostScript language jobs) is fully processed by the interpreter and prior to reading from the next file.


**Parameters Present in Parameter Sets of Type /Communications**

The parameters listed in Table 3.4 on page 62 are those found in all device parameter sets of type /Communications.

### Table 3.4 Parameters present in parameter sets of type /Communications

<table>
<thead>
<tr>
<th>Key</th>
<th>Type</th>
<th>Semantics</th>
</tr>
</thead>
<tbody>
<tr>
<td>DelayedOutputClose</td>
<td>boolean</td>
<td>This parameter selects how the output channel is managed after each job finishes executing. The printer does not wait for the pages of the job to finish printing, but instead immediately starts executing the next job. The DelayedOutputClose boolean parameter is set independently for each communications channel. When DelayedOutputClose is true:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• An end-of-file (EOF) is not sent until all pages of a job have been printed. On network channels, the connection remains open until the job finishes printing.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• If a job produces output, and if there are preceding jobs that have not finished printing that are using the same output channel, the output will not be sent until those jobs have completed printing and the EOFs for them have been sent.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Spontaneous messages, such as printer error messages, are sent to the channel if it is either the output channel for the job executing or the output channel for jobs that have finished executing but have not finished printing.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>When DelayedOutputClose is false:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• An EOF is sent as soon as a job finishes executing in the interpreter. On network channels, the connection may be closed when the job finishes executing, even though pages produced by the job might not have finished printing.</td>
</tr>
</tbody>
</table>
• Output generated by a job can be transmitted without delay, even if there are previous jobs using the same output channel that have not finished printing (the EOF for those jobs will have already been sent).

• Spontaneous messages, such as printer error messages, are sent to the channel only if it is the output channel for the job executing, even if it is the output channel for previous jobs that have not finished printing.

The **DelayedOutputClose** setting for a job source is controlled by the parameter sets for the output channel of that job source. So, if the serial B channel is used for the output of jobs received on the parallel port, then the **DelayedOutputClose** value in the %SerialB% parameter set applies to jobs received on both the serial B and parallel ports.

The **DelayedOutputClose** parameter does not appear in a communications parameter set if the channel has no output or if all messages generated asynchronously from the interpreter are directed to a logically separate channel.

*Note: In versions prior to 2014, upon completion of each job, the interpreter waits for all pages of the job to be printed before sending an EOF or closing a connection, and before starting to execute another job. Thus, any output associated with the job, including printer error messages, is always sent before the next job begins and before sending the EOF or closing a connection.*

**Legal values:** true, false

**Errors:** None.

**Enabled** boolean This parameter designates whether data arriving on the communications channel represented by the parameter set should be considered as a job to be scheduled for execution by the PostScript interpreter or an emulator. If **Enabled** is true, arriving data is scheduled as an executable job. If **Enabled** is false, the data will not be scheduled as an executable job, but the channel can be used directly by a job for reading and writing data. A **configurationerror** is generated if setting **Enabled** would produce either of the following situations:

• When trying to set **On** to false and **Enabled** to true within the same parameter set, a **configurationerror** will result.
• When trying to turn off Enabled in one communications device parameter set results in all channels having Enabled set to false, a configurationerror will result.

Legal values:  true, false

Errors:  configurationerror, typecheck

HasNames  boolean  (Read-only) This parameter indicates whether the communications channel represented by the parameter set supports named files. HasNames is always false in device parameter sets of type /Communications. This parameter is defined only in device parameter sets of type /FileSystem or /Communications.

Legal value:  false

Errors:  None.

Interpreter  name  This parameter designates which interpreter or emulator is to be used to interpret the next incoming job arriving on this communications channel. This parameter is used only if Enabled is true and PrinterControl is /PSPrinter. For certain communication channels there is a relationship between the Interpreter and the Protocol parameters that can result in a configurationerror. See Protocol in Table 3.5 on page 67 for further details.

Either Interpreter or Protocol or both can be set without a password if no other parameters are specified in the execution of setdevparams.

Legal values:  /PostScript, /AutoSelect, /Diablo630, /EpsonFX850, /HP7475A, /LaserJetIII, /LaserJetIIP, /PCL, /ProprinterXL

Errors:  configurationerror, rangecheck, typecheck

The Interpreter value /AutoSelect is described below. For information on the other legal values, see section 3.5.8, “Emulator Parameters.”

/AutoSelect: The AutoSelect facility provides automatic and seamless switching between the available interpreters and emulators based on the input data stream. The Interpreter parameter should be set to /AutoSelect on channels that connect to hosts which alternately send PostScript language jobs, raw PCL® (LaserJet IIP or LaserJet III), and “printscreen” jobs (in the IBM® PC compatible environment). It can be used on any communications channel. When using AutoSelect for a given communications channel, it is important that the underlying communications protocol is one that preserves all incoming data. In particular, for a serial or parallel channel, this implies that Protocol is set to Raw, Binary, or TBCP.

For serial and parallel communication channels, the following is true:
• **AutoSelect** detects interpreter boundaries and job boundaries if the value of *Protocol* is set to TBCP or Binary.

• **AutoSelect** detects interpreter boundaries, job boundaries, and protocol boundaries and automatically selects the protocol if the value of *Protocol* is set to Raw. This is the recommended setting for *Protocol* when using **AutoSelect**. When **AutoSelect** detects that a PostScript language job is being received and the *Protocol* is Raw, only the Normal and TBCP protocols can be recognized (e.g., Binary is not supported).

• When **Interpreter** is set to **AutoSelect**, the value of *Protocol* must be either Binary, Raw, or TBCP; otherwise, a configuration error is generated.

For other communication channels that are binary in nature, the following is true:

• The /PCL value is used only in printers that emulate a LaserJet 4 or later LaserJet printers. For emulations of earlier LaserJets, the values /LaserJet II and /LaserJetIII are used.

• **AutoSelect** detects interpreter boundaries and job boundaries.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>On</strong></td>
<td>boolean</td>
<td>This parameter designates whether the communication channel is turned on and able to receive and send data. If the parameter is true, data transmitted to the channel by a host is buffered and flow control protocols are applied. Data sent to the channel when this parameter is false is lost. A configuration error is generated if setting the <strong>On</strong> parameter would produce a situation in which <strong>On</strong> is false and <strong>Enabled</strong> is true in the same parameter set.</td>
</tr>
</tbody>
</table>

If two communication devices share the same physical port, and setting the **On** parameter produces a situation in which both channels had **On** set to true, the one that was originally **On** is turned off and disabled, and the new one is turned **On**.

If **On** is true and **Enabled** is false, the channel is not considered as a source of jobs to be scheduled, but the channel can be used by a PostScript language job to send and receive data by means of the file operators.

During power up, if it is determined that all installed communication channels are currently off, it is up to the product to perform its own unique recovery strategy. For example, the product could search for an installed communications channel and force it on even if this was not the state.
preserved in non-volatile memory. Another alternative would be to inform the user via the operator control panel that the product cannot be initialized until the problem is rectified.

Legal values:  true, false

Errors:  configurationerror, typecheck

**PrinterControl**  name  This parameter is used to select or indicate how a host queries and controls the printer for the communication channel associated with this parameter set.

Legal values:  /PSPrinter, /PJL

Errors:  configurationerror, rangecheck, typecheck

If /PrinterControl is set to /PSPrinter, the following statements are true:

- The **Interpreter** parameter selects the page description language.

- Printer error messages are sent in usual Adobe fashion (on channels processing jobs, and in % % [ . . . ] % format).

- PJL (Printer Job Language) commands are not recognized unless the **Interpreter** parameter is /AutoSelect or /PCL. If the Interpreter parameter is /AutoSelect, **ENTER LANGUAGE** and **UEL** are handled, and other PJL commands are identified as PJL commands and discarded. If **Interpreter** is /PCL, **UEL** is handled.

If /PrinterControl is set to /PJL, the following statements are true:

- PJL (Printer Job Language) controls language selection.

- Printer error messages are in PJL format and are enabled or disabled by PJL commands. Whether a job is being processed on a channel does not affect whether messages are sent.

- All LaserJet 4 PJL commands are handled as they would be on a LaserJet 4 or 4si printer.

- The “PJL current environment” is used on each invocation of a page description language to setup the initial state.

Full LaserJet 4 emulation is selected for a channel by setting `PrinterControl` to `/PJL`. Users can also select PCL5e interpretation, without full LaserJet 4 emulation, by setting `PrinterControl` to `/PSPrinter` and setting `Interpreter` to `/PCL`. In this mode, all input is assumed to be PCL5e.

### Serial Communications Parameters

Table 3.5 on page 67 lists those parameters typically found in the device parameter sets named `%Serial%`, `%SerialB%`, `%SerialC%` and so on.

<table>
<thead>
<tr>
<th>Key</th>
<th>Type</th>
<th>Semantics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baud</td>
<td>integer</td>
<td>This parameter designates the baud rate on the underlying serial hardware. Normally this parameter can be set to any non-negative number; it will not be rounded. The underlying serial hardware will, however, round the baud rate to the nearest achievable value. Hardware rounding will not be reflected in the value of the parameter when it is read. On some products this parameter might be restricted to a small number of legal values. Legal values: Product dependent. Errors: rangecheck, typecheck</td>
</tr>
<tr>
<td>CheckParity</td>
<td>boolean</td>
<td>This parameter designates whether parity checking is done by the device on incoming data. This parameter is ignored if the value of <code>Parity</code> is <code>/None</code>. If <code>CheckParity</code> is <code>true</code> and a parity error occurs, a PostScript language <code>ioerror</code> results. If <code>CheckParity</code> is <code>false</code>, no parity checking occurs. Legal values: <code>true, false</code> Errors: typecheck</td>
</tr>
<tr>
<td>DelayedOutputClose</td>
<td>boolean</td>
<td>For the general definition of <code>DelayedOutputClose</code>, see Table 3.4 on page 62. Legal values: <code>true, false</code> Errors: None.</td>
</tr>
</tbody>
</table>
### DataBits

**Type:** integer  
**Description:** This parameter designates the number of data bits per byte communicated over the channel. If the value of this parameter is 7, the high bit of a received byte of data is set to 0. The total number of bits for each byte transmitted or received is the sum of the number of start bits (always 1), data bits, parity bits, and stop bits.  

**Legal values:** 7, 8  
**Errors:** rangecheck, typecheck

### Enabled

**Type:** boolean  
**Description:** For the general definition of Enabled, see Table 3.4 on page 62.  

**Legal values:** true, false  
**Errors:** configurationerror, typecheck

### FlowControl

**Type:** name  
**Description:** This parameter designates the serial flow control method used between the host and the device.  

*Note:* Not all serial channels support all flow control modes.  

Following are descriptions of the legal values of **FlowControl**:

- **/Dtr**: DTR (Data Terminal Ready) and DSR (Data Set Ready) hardware signals are used by the printing device and the host, respectively to indicate to the other when data may be transmitted. A high value for the signal indicates that data may be transmitted, a low value indicates that data should not be transmitted.  

- **/DtrLow**: This parameter is the same as /Dtr except the active sense of the signals is reversed. A low signal indicates that data may be transmitted and a high signal indicates that data should not be transmitted.  

- **/EtxAck**: Two characters, ETX (end-of-text) and ACK (acknowledgment), are reserved for flow control usage. The protocol is symmetric for printing device and host. Each sender knows an agreed upon maximum number of characters that the other side can receive. A sender may send up to this number of characters followed by an ETX. The sender may send more data only when it has received an ACK from the receiver on the other side.  

- **/RobustXonXoff**: This protocol operates similarly to the /XonXoff protocol except that periodically (typically every second) the interpreter will send the host an Xon if it is able to receive data.  

- **/XonXoff**: This protocol is used by PCs. Two characters, XON and XOFF, are reserved for flow control usage. For all **Protocol** settings except /Raw, the protocol is symmetric for printing device and host. If one side wishes the other to stop sending data, it sends an XOFF. When it is ready to receive data
again it sends an XON. When the On parameter is set to false, the interpreter sends an /XOFF to the host just before turning off the channel. If Protocol is set to /Raw, XON and XOFF sent from the host to the printer are treated as data and not reserved as flow control characters. XON and XOFF sent from the printer to the host are to be treated as flow control characters.

/XonXoff2: This protocol is used by UNIX® systems. It operates similarly to the /XonXoff protocol except that when the On parameter is set to false, the interpreter sends an /XON to the host. This allows the host to unload any data it wishes to send. The interpreter simply drops the data on the floor.

Legal values:  /Dtr, /DtrLow, /EtxAck, /RobustXonXoff, /XonXoff, /XonXoff2

Errors:        rangecheck, typecheck

HasNames  boolean (Read-only) This parameter always has a value of false. For the general definition of HasNames, see Table 3.4 on page 62.

Legal value:   false

Errors:        None.

Interpreter  name For the general definition of Interpreter, see Table 3.4 on page 62.

Legal values:  /PostScript, /AutoSelect, /Diablo630, /EpsonFX850, /HP7475A, /LaserJetIII, /LaserJetIP, /PCL, /ProprinterXL

Errors:        configurationerror, rangecheck, typecheck

On  boolean For the general definition of On, see Table 3.4 on page 62.

Legal values:  true, false

Errors:        configurationerror, typecheck

Parity  name This parameter designates the parity to be used between the host and the device. If Parity is /Space or /Mark, the parity bit should always be 0 or 1, respectively. If Parity is /None, neither the host nor the device should send a parity bit. If Parity is /Even, even parity is used. If Parity is /Odd, odd parity is used. The total number of bits for each byte transmitted or received is the sum of the number of start bits (always 1), data bits, parity bits, and stop bits. Most serial devices do not support 8-bit data with either space or mark parity, although setting the parameters in this manner does not generate a configurationerror. The results of this configuration, however, are unpredictable.

Legal values:  /Even, /Mark, /None, /Odd, /Space

Errors:        rangecheck, typecheck
For the general definition of **PrinterControl**, see Table 3.4 on page 62.

**Legal value:** /PSPrinter, /PJL

**Errors:** configurationerror, rangecheck, typecheck

This parameter indicates the communications protocol that is used.

**Legal values:** /Binary, /Normal, /Raw, /TBCP

**Errors:** configurationerror, rangecheck, typecheck

/Binary: In /Binary mode, an encoding scheme allows the full range of 8-bit values to be transmitted as data while also providing for certain communications functions, such as end-of-file, software flow control, abort job, status query, and so on. This protocol is suitable for use with any language (for example, the PostScript language or a printer emulation). However, it is obsolete and has been superceded by /TBCP.

/Normal: In /Normal mode, certain control characters are reserved as communications functions, such as end-of-file, software flow control, abort job, status query, and so on. These codes cannot be carried as data. This protocol is suitable for use only when sending ASCII-encoded PostScript language jobs; it is unsuitable for PostScript language jobs containing binary data or any printer emulation jobs.

/Raw: In /Raw mode, all characters are treated as data; there are no reserved characters, and one of the communications functions is available. Normally, this protocol is suitable for use only with printer emulation, not with the PostScript interpreter. However, in products that support an **Interpreter** value of /AutoSelect, protocol processing is handled by the AutoSelect facility; therefore, **Protocol** should be /Raw when **Interpreter** is set to /AutoSelect.

/TBCP: In /TBCP (Tagged Binary Communication Protocol) mode, an encoding scheme allows the full range of 8-bit values to be transmitted as data, while also providing for certain communication functions, such as end-of-file, software flow control, abort job, status query, and so on. It also provides explicit begin-protocol and end-protocol sequences that permit the receiver to switch automatically between /Normal and /TBCP mode processing. This protocol is suitable for use with any language (for example, the PostScript interpreter or a printer emulation).

For more information on these protocols, refer to technical note #5009 titled *Adobe Serial and Parallel Communications Protocols Specification*, available from the Adobe Developers Association.

A **configurationerror** is generated if setting either the **Protocol** or the **PrinterControl** parameters would result in the following combination:
• **Protocol** with a value of /Normal and **PrinterControl** with a value of /PJL.

A **configurationerror** is also generated if setting the **Protocol** or **Interpreter** parameter would produce one of the following situations when the **Enabled** parameter is *true* and the **PrinterControl** parameter is /PSPrinter:

• **Protocol** with a value of /Raw and **Interpreter** with a value of /PostScript.

• **Protocol** with a value of /Normal and **Interpreter** with a value other than /PostScript.

• **Protocol** with a value of /Normal and **Interpreter** with a value of /AutoSelect.

That is, PostScript language jobs cannot be executed over a channel using the /Raw protocol, and emulators cannot be executed over a channel using the /Normal protocol. Likewise, when doing automatic selection of interpreters and emulators, the /Normal protocol cannot be used.

Either **Protocol** or **Interpreter** or both can be set without a password if no other parameters are specified in the execution of **setdevparams**.

**StopBits**

integer  This parameter designates the number of stop bits that are transmitted by the serial hardware. The hardware will always be able to receive data transmitted with one or two stop bits. The total number of bits for each byte transmitted or received is the sum of the number of start bits (always 1), data bits, parity bits, and stop bits.

**Legal values:**  1, 2

**Errors:**  rangecheck, typecheck

**Type**

name  

(Read-only) This parameter always has a value of /Communications. For the general definition of **Type**, see Table 3.3 on page 55.

**Legal value:**  /Communications

**Errors:**  None.
Parallel Communication Parameters

Table 3.6 on page 72 lists those parameters typically found in the device parameter sets named \%Parallel\%, \%ParallelB\%, \%ParallelC\%, and so on.

Table 3.6  Parameters present in \%Parallel\% communications parameter sets

<table>
<thead>
<tr>
<th>Key</th>
<th>Type</th>
<th>Semantics</th>
</tr>
</thead>
<tbody>
<tr>
<td>DelayedOutputClose</td>
<td>boolean</td>
<td>For the general definition of DelayedOutputClose, see Table 3.4 on page 62.</td>
</tr>
</tbody>
</table>

*Note: DelayedOutputClose should only be present in this set if bidirectional communications is possible.*

**Legal values:**  true, false

**Errors:** None.

| Enabled             | boolean | For the general definition of Enabled, see Table 3.4 on page 62. |

**Legal values:**  true, false

**Errors:** configurationerror, typecheck

| Handshake           | integer | This parameter indicates the hardware/software signal interface that is to be used for communications across the parallel interface. If this key is not present, the default is unidirectional parallel. |

*Note: “The IEEE-1284 Draft Specification 2.00” refers to the document “Standard Signaling Method for a Bi-directional Parallel Peripheral Interface for Personal Computers, IEEE P1284 D2.00, September 10, 1993.”* 

*Note “IEEE-1284 Draft Specification 1.00” refers to the document “Standard Signaling Method for a Bi-directional Parallel Peripheral Interface for Personal Computers, IEEE P1284 D1.00, March 15, 1993.”*
Legal values: 0, 1, 2, 3, 4, 5, 6, 7, 8

Errors: configurationerror. rangecheck

0  Unidirectional communications commonly used by PCs and PC-compatibles.

1  Bidirectional communications as specified by version 0.6 of the Hewlett-Packard Boise specification.

2  IEEE-1284 Draft Specification 1.00.

3  Unidirectional, Ack in Busy.

4  Unidirectional, Ack after Busy (Japan implementation).

5  Unidirectional, Ack while Busy.

6  IEEE-1284 Draft Specification 2.00, Ack in Busy.

7  IEEE-1284 Draft Specification 2.00, Ack after Busy.

8  IEEE-1284 Draft Specification 2.00, Ack while Busy.

Values 1 and 2 are obsolete. Value 1 is superseded by value 2 which is superseded by values 6, 7 and 8.

Setting the OutputDevice key to %Parallel% will generate a configurationerror when the Handshake key is set to one of the unidirectional values (0, 3, 4, 5). Conversely, if the OutputDevice key is set to %Parallel%, then setting the Handshake key to one of the unidirectional values will generate a configurationerror.

HasNames boolean (Read-only) This parameter always has a value of false. For the general definition of HasNames, see Table 3.4 on page 62.

Legal values: false

Errors: None.

Interpreter name For the general definition of Interpreter, see Table 3.4 on page 62.

Legal values: /PostScript, /AutoSelect, /Diablo630, /EpsonFX850, /HP7475A, /LaserJetIII, /LaserJetIIIP, /PCL, /ProprinterXL

Errors: configurationerror. rangecheck. typecheck
nAckPulseWidth  integer  There is a signal which originates from the peripheral to the host called $n\text{Ack}$. This signal is in the form of a pulse and its meaning depends upon which mode of operation is being used or which state the peripheral device driver is currently in. The pulse width is controlled by the peripheral support circuitry or device driver. This parameter allows one to examine or change the $n\text{Ack}$ pulse width. The value is the number of nanoseconds for the duration of the pulse (rounded to nearest value that can be achieved).

**Legal values:** Normally an integer in the range of 500 to 10000.

**Errors:** rangecheck, typecheck

nStrobeExpectedPulseWidth  integer  There is a signal which originates from the host to the peripheral called $n\text{Strobe}$. This signal is in the form of a pulse and its meaning depends upon which mode of operation is being used or in which state the peripheral device driver is currently. The pulse width may vary from host to host. This parameter allows one to examine or change the expected duration of the $n\text{Strobe}$ pulse width. The value is the number of nanoseconds for the duration of the pulse (rounded to nearest value that can be achieved).

**Legal values:** Normally an integer in the range of 750 to 500000.

**Errors:** rangecheck, typecheck

On  boolean  For the general definition of **On**, see Table 3.4 on page 62.

**Legal values:**  $true$, $false$

**Errors:** configurationerror, typecheck

OutputDevice  string  This parameter specifies which communications device is to be used for `%stdout` and `%stderr`. If the value of **OutputDevice** is the empty string, `%stdout` and `%stderr` information is routed to the default back channel specified for the device.

Setting the **OutputDevice** key to `%Parallel` will generate a **configurationerror** when the **Handshake** key is set to one of the unidirectional values (0, 3, 4, 5). Conversely, if the **OutputDevice** key is set to `%Parallel` then setting the **Handshake** key to one of the unidirectional values will generate a **configurationerror**.

**Legal values:**  `%Serial`, `%SerialB`, `%SerialC`, and so forth; `%Parallel`, `%ParallelB`, `%ParallelC`, and so forth; or the empty string.

**Errors:** rangecheck, configurationerror
**PrinterControl** name  For the general definition of **PrinterControl**, see Table 3.4 on page 62.

*Legal value:* /PSPrinter, /PJL

*Errors:* configurationerror, rangecheck, typecheck

**Protocol** name  For the general definition of **Protocol**, see Table 3.5 on page 67.

*Legal values:* /Binary, /Normal, /Raw, /TBCP

*Errors:* configurationerror, rangecheck, typecheck

**Type** (Read-only) This parameter always has a value of /Communications. For the general definition of **Type**, see Table 3.3 on page 55.

*Legal value:* /Communications

*Errors:* None.

---

**SCSI Communications Parameters**

Table 3.7 on page 75 lists those parameters typically found in the device parameter sets named %ScsiComm%, %ScsiCommB%, %ScsiCommC%, and so on.

*Table 3.7 Parameters present in %SCSI% communications parameter sets*

<table>
<thead>
<tr>
<th>Key</th>
<th>Type</th>
<th>Semantics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bus</td>
<td>string</td>
<td>(Read-only) This parameter designates which SCSI bus device parameter set is associated with this %ScsiComm% channel.</td>
</tr>
</tbody>
</table>

*Legal values:* %Scsi%, %ScsiB%, %ScsiC%, and so forth

*Errors:* None.
## DelayedOutputClose

**boolean**  
For the general definition of DelayedOutputClose, see Table 3.4 on page 62.

**Legal values:**  
true, false

**Errors:**  
None.

## Enabled

**boolean**  
For the general definition of Enabled, see Table 3.4 on page 62.

**Legal values:**  
true, false

**Errors:**  
configurationerror, typecheck

## HasNames

**boolean (Read-only)**  
This parameter always has a value of false. For the general definition of HasNames, see Table 3.4 on page 62.

**Legal value:**  
false

**Errors:**  
None.

## Interpreter

**name**  
For the general definition of Interpreter, see Table 3.4 on page 62.

**Legal values:**  
/PostScript, /AutoSelect, /Diablo630, /EpsonFX850, /HP7475A, /LaserJetIII, /LaserJetIP, /PCL, /ProprinterXL

**Errors:**  
configurationerror, rangecheck, typecheck

## On

**boolean**  
For the general definition of On, see Table 3.4 on page 62.

**Legal values:**  
true, false

**Errors:**  
configurationerror, typecheck

## PrinterControl

**name**  
For the general definition of PrinterControl, see Table 3.4 on page 62.

**Legal value:**  
PSPrinter, /PJL

**Errors:**  
configurationerror, rangecheck, typecheck

## Type

**(Read-only)**  
This parameter always has a value of /Communications. For the general definition of Type, see Table 3.3 on page 55.

**Legal value:**  
/Communications

**Errors:**  
None.
LocalTalk Communications Parameters

Table 3.8 on page 77 lists those parameters typically found in the device parameter sets named %LocalTalk%, %LocalTalkB%, %LocalTalkC%, and so on.

Table 3.8 Parameters present in %LocalTalk% communications parameter sets

<table>
<thead>
<tr>
<th>Key</th>
<th>Type</th>
<th>Semantics</th>
</tr>
</thead>
<tbody>
<tr>
<td>DelayedOutputClose</td>
<td>boolean</td>
<td>For the general definition of DelayedOutputClose, see Table 3.4 on page 62.</td>
</tr>
<tr>
<td></td>
<td>Legal values:</td>
<td>true, false</td>
</tr>
<tr>
<td></td>
<td>Errors:</td>
<td>None.</td>
</tr>
<tr>
<td>Enabled</td>
<td>boolean</td>
<td>For the general definition of Enabled, see Table 3.4 on page 62.</td>
</tr>
<tr>
<td></td>
<td>Legal values:</td>
<td>true, false</td>
</tr>
<tr>
<td></td>
<td>Errors:</td>
<td>configurationerror, typecheck</td>
</tr>
<tr>
<td>Filtering</td>
<td>name</td>
<td>This parameter indicates whether the input stream needs further filtering before the data can be correctly interpreted as a page description language.</td>
</tr>
<tr>
<td></td>
<td>Legal values:</td>
<td>/InterpreterBased, /None</td>
</tr>
<tr>
<td></td>
<td>Errors:</td>
<td>configurationerror, rangecheck, typecheck</td>
</tr>
<tr>
<td></td>
<td></td>
<td>/InterpreterBased: In this mode, the input stream is filtered as necessary to conform to the language. For example, the data stream may have been sent to the printer encoded as a TBCP PostScript language job and must be decoded to a normal PostScript language job before it is passed to the interpreter (see Protocol in Table 3.5 on page 67 for a description of TBCP).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>/None: Pass the data unchanged to the interpreter.</td>
</tr>
<tr>
<td></td>
<td>Warning</td>
<td>In a complete AppleTalk/Macintosh environment, Filtering should be set to /None or you will encounter communications problems.</td>
</tr>
<tr>
<td>HasNames</td>
<td>boolean</td>
<td>(Read-only) This parameter always has a value of false. For the general definition of HasNames, see Table 3.4 on page 62.</td>
</tr>
<tr>
<td></td>
<td>Legal value:</td>
<td>false</td>
</tr>
<tr>
<td></td>
<td>Errors:</td>
<td>None.</td>
</tr>
</tbody>
</table>
Interpreter name For the general definition of Interpreter, see Table 3.4 on page 62.

Legal values: /PostScript, /AutoSelect, /Diablo630, /EpsonFX850, /HP7475A, /LaserJetIII, /LaserJetIIP, /PCL, /ProprinterXL

Errors: configurationerror, rangecheck, typecheck

LocalTalkType string This parameter represents the type piece of the AppleTalk entity name. The entity consists of three pieces: zone, type, and object, each of which is a string of 32 or fewer non-null characters. The object piece is set to the value of the PrinterName system parameter and the zone is set to the wildcard character (asterisk).

If the printer also supports EtherTalk and/or TokenTalk communications, setting the LocalTalkType string will set the EtherTalkType and/or TokenTalkType parameter to the same value. The appletalktype compatibility operator will reflect a change to the LocalTalkType parameter. Therefore, getting the LocalTalkType parameter will always yield the same value as getting the EtherTalkType and/or the TokenTalkType parameter and will match what is returned by the appletalktype compatibility operator.

Legal values: Any string of 32 or fewer non-null characters.

Errors: limitcheck, typecheck

NodeID integer (Read-only) This parameter represents the local network address of the device. Legal addresses are 0 or values between 128 to 254 inclusive. If the value of NodeID is 0, this indicates that the address has not been established. The value is used as an address hint when first establishing addresses as part of the LocalTalk protocol. As such, the parameter might not represent the actual address until that portion of the protocol is complete during initialization of the LocalTalk device.

Legal values: 0 or any integer between 128 and 254 inclusive.

Errors: None.

On boolean For the general definition of On, see Table 3.4 on page 62.

Legal values: true, false

Errors: configurationerror, typecheck

PrinterControl name For the general definition of PrinterControl, see Table 3.4 on page 62.

Legal value: /PSPrinter, /PJL

Errors: configurationerror, rangecheck, typecheck
Type name (Read-only) This parameter always has a value of /Communications. For the general definition of Type, see Table 3.3 on page 55.

Legal value: /Communications

Errors: None.

EtherTalk Communications Parameters

Table 3.9 on page 79 lists those parameters typically found in the device parameter sets named %EtherTalk%, %EtherTalkB%, %EtherTalkC%, and so on.

<table>
<thead>
<tr>
<th>Key</th>
<th>Type</th>
<th>Semantics</th>
</tr>
</thead>
<tbody>
<tr>
<td>DelayedOutputClose</td>
<td>boolean</td>
<td>For the general definition of DelayedOutputClose, see Table 3.4 on page 62.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Legal values: true, false</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Errors: configurationerror, typecheck</td>
</tr>
<tr>
<td>Enabled</td>
<td>boolean</td>
<td>For the general definition of Enabled, see Table 3.4 on page 62.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Legal values: true, false</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Errors: configurationerror, typecheck</td>
</tr>
<tr>
<td>EthernetAddress</td>
<td>string (Read-only) This parameter is a unique string that represents the Ethernet address of the printer. The string is of the form (xx:xx:xx:xx:xx:xx) where each x represents a digit in hexadecimal.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Legal values: A string of 17 characters representing a legal Ethernet address.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Errors: None.</td>
</tr>
<tr>
<td>EtherTalkType</td>
<td>string</td>
<td>This parameter represents the type piece of the EtherTalk entity name. The entity name consists of three pieces: zone, type, and object, each of which is a string of 32 or fewer non-null characters. The object piece is set to the value of the PrinterName system parameter. The zone is set to the printer zone name.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If the printer also supports LocalTalk and/or TokenTalk communications, setting the EtherTalkType string will set the LocalTalkType and/or TokenTalkType parameter to the same value. The appletalktype</td>
</tr>
</tbody>
</table>
compatibility operator will reflect a change to the **EtherTalkType** parameter. Therefore, getting the **EtherTalkType** parameter will always yield the same value as getting the **LocalTalkType** and/or the **TokenTalkType** parameter and will match what is returned by the **appletalktype** compatibility operator.

**Legal values:** Any string of 32 or fewer non-null characters.

**Errors:** typecheck

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Type</th>
<th>Description</th>
<th>Legal values</th>
<th>Errors</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EtherTalkZone</strong></td>
<td>string</td>
<td>This parameter represents the zone piece of the EtherTalk entity name.</td>
<td>Any string of 32 or fewer non-null characters.</td>
<td>typecheck</td>
</tr>
</tbody>
</table>

**Filtering**

This parameter indicates whether the input stream needs further filtering before the data can be correctly interpreted as a page description language. For the general definition of **Filtering**, see Table 3.8 on page 77.

**Warning** *In a normal network environment, Filtering should be set to /None or you will encounter communications problems.*

**Legal values:** /InterpreterBased, /None

**Errors:** configurationerror, rangecheck, typecheck

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Type</th>
<th>Description</th>
<th>Legal values</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HasNames</strong></td>
<td>boolean</td>
<td>(Read-only) This parameter always has a value of false. For the general definition of <strong>HasNames</strong>, see Table 3.4 on page 62.</td>
<td>false</td>
</tr>
</tbody>
</table>

**Errors:** None.

**Interpreter**

For the general definition of **Interpreter**, see Table 3.4 on page 62.

**Legal values:** /PostScript, /AutoSelect, /Diablo630, /EpsonFX850, /HP7475A, /LaserJetIII, /LaserJetIIIP, /PCL, /ProprinterXL

**Errors:** configurationerror, rangecheck, typecheck

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Type</th>
<th>Description</th>
<th>Legal values</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NodeID</strong></td>
<td>integer</td>
<td>(Read-only) This parameter represents the local network address of the device. Legal addresses are values between 1 to 254 inclusive. If the value of <strong>NodeID</strong> is 0, this indicates that the address has not been established. The value is used as an address hint when first establishing addresses as part of</td>
<td></td>
</tr>
</tbody>
</table>
the EtherTalk protocol. As such, the parameter might not represent the actual address until that portion of the protocol is complete during initialization of the EtherTalk device.

**Legal values:** Any integer between 0 and 254 inclusive.

**Errors:** None.

**On**

boolean

For the general definition of **On**, see Table 3.4 on page 62.

**Legal values:** true, false

**Errors:** configurationerror, typecheck

**PrinterControl**

name

For the general definition of **PrinterControl**, see Table 3.4 on page 62.

**Legal value:** /PSPrinter, /PJL

**Errors:** configurationerror, rangecheck, typecheck

**Type**

name (Read-only) This parameter always has a value of /Communications. For the general definition of **Type**, see Table 3.3 on page 55.

**Legal value:** /Communications

**Errors:** None.

---

**TokenTalk Communications Parameters**

Table 3.10 on page 81 lists those parameters typically found in the device parameter sets named `%TokenTalk%`, `%TokenTalkB%`, `%TokenTalkC%`, and so on.

Table 3.10 Parameters present in `%TokenTalk%` communications parameter sets

<table>
<thead>
<tr>
<th>Key</th>
<th>Type</th>
<th>Semantics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Address</td>
<td>string</td>
<td>(Read-only) This parameter is a unique string that represents the TokenRing address of the unit. The string is of the form (xx:xx:xx:xx:xx:xx) where each x represents a digit in hexadecimal.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Legal values:</strong> A string of 17 characters representing a legal address.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Errors:</strong> None.</td>
</tr>
<tr>
<td>Bridging</td>
<td>name</td>
<td>Bridging, on the token ring, can be done in several different ways. When this parameter is set to /Transparent, this implies a transparent bridging where the entire “universe” is one large single ring structure and all identities are</td>
</tr>
</tbody>
</table>
unique. When set to /SourceRoute, routing is done via specifying an explicit path including the ring identification, RIF. When set to the default value /Adaptive, the software will automatically recognize the routing style and respond in kind (either as a one-time determination or when processing each connection).

**Legal values:** /Transparent, /SourceRoute, /Adaptive

**Errors:** configurationerror, typecheck

**DelayedOutputClose**

boolean For the general definition of **DelayedOutputClose**, see Table 3.4 on page 62.

**Legal values:** true, false

**Errors:** None.

**Enabled**

boolean For the general definition of **Enabled**, see Table 3.4 on page 62.

**Legal values:** true, false

**Errors:** configurationerror, typecheck

**Filtering**

name This parameter indicates whether the input stream needs further filtering before the data can be correctly interpreted as a page description language. For the general definition of **Filtering**, see Table 3.8 on page 77.

**Warning** In a normal network environment, **Filtering** should be set to /None or you will encounter communications problems.

**Legal values:** /InterpreterBased, /None

**Errors:** configurationerror, rangecheck, typecheck

**HasNames**

boolean *(Read-only)* This parameter always has a value of false. For the general definition of **HasNames**, see Table 3.4 on page 62.

**Legal value:** false

**Errors:** None.

**Interpreter**

name For the general definition of **Interpreter**, see Table 3.4 on page 62.

**Legal values:** /PostScript, /AutoSelect, /Diablo630, /EpsonFX850, /HP7475A, /LaserJetIII, /LaserJetIP, /PCL, /ProprinterXL

**Errors:** configurationerror, rangecheck, typecheck
### NodeID

**integer**  
*(Read-only)* This parameter represents the local network address of the device. Legal addresses are values between 1 to 254, inclusive. If the value of `NodeID` is 0, this indicates that the address has not been established. The value is used as an address hint when first establishing addresses as part of the TokenTalk protocol. As such, the parameter might not represent the actual address until that portion of the protocol is complete during initialization of the TokenTalk device.

**Legal values:** An integer between 0 and 254 inclusive.

**Errors:** None.

### On

**boolean**  
For the general definition of `On`, see Table 3.4 on page 62.

**Legal values:** `true`, `false`

**Errors:** `configurationerror`, `typecheck`

### PrinterControl

**name**  
For the general definition of `PrinterControl`, see Table 3.4 on page 62.

**Legal value:** `/PSPrinter`, `/PJL`

**Errors:** `configurationerror`, `rangecheck`, `typecheck`

### TokenTalkType

**string**  
This parameter represents the *type* piece of the TokenTalk *entity name*. The *entity name* consists of three pieces: *zone*, *type*, and *object*, each of which is a string of 32 or fewer non-null characters. The *object* piece is set to the value of the `PrinterName` system parameter. The *zone* is set to the printer zone name.

If the printer also supports LocalTalk and/or EtherTalk communications, setting the `TokenTalkType` string will set the `LocalTalkType` and/or `EtherTalkType` parameter to the same value. The `appletalktype` compatibility operator will reflect a change to the `TokenTalkType` parameter. Therefore, getting the `TokenTalkType` parameter will always yield the same value as getting the `LocalTalkType` and/or the `EtherTalkType` parameter and will match what is returned by the `appletalktype` compatibility operator.

**Legal values:** Any string of 32 or fewer non-null characters.

**Errors:** `typecheck`

### Type

**name**  
*(Read-only)* This parameter always has a value of `/Communications`. For the general definition of `Type`, see Table 3.3 on page 55.

**Legal value:** `/Communications`

**Errors:** None.
Zone string
This parameter represents the zone piece of the TokenTalk entity name.

Legal value: Any string of 32 or fewer non-null characters.

Errors: typecheck

OSI Application Layer Communications Parameters

This section describes those device parameter sets which correspond to the application protocol layer. This is the layer to which the PostScript interpreter (or language emulator) attaches for the purpose of receiving jobs and sending data back to the host. Certain parameter sets have been defined by Adobe Systems, Inc. which allow for the use of the TCP/IP protocol over Ethernet. These are %LPR%, %AppSocket%, and %Telnet%. There are also parameter sets associated with the Novell Netware application layer. They are %RemotePrinter% and %PrintServer%. Each of these sets identifies a unique job source device for the PostScript interpreter or language emulator.

Node Address

Before listing the various network communications parameter sets, we must define the term node address. A node address is a unique address for a node on some network. The node address is in the form appropriate for the protocol being used to communicate with the node. The following table lists the various forms that a node address can take.

<table>
<thead>
<tr>
<th>Protocol</th>
<th>Node address forms</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TCP/IP</td>
<td>N.N.N.N</td>
<td>Each N is a decimal number in the range 0 to 255.</td>
</tr>
<tr>
<td>Novell SPX/IPX</td>
<td>XXXXXXXXX:xxxxxxxxx</td>
<td>Each X and each x is a hexadecimal digit in the range 0 to F (upper or lower case) XXXXXXXXX is the network part of the address and xxxxxxxxxxxxx is the Media Access Control part known as the Novell Node Number.</td>
</tr>
<tr>
<td>AppleTalk DDP</td>
<td>N.N.n</td>
<td>Each N and each n are decimal numbers in the range of 0 to 25. N.N represent the network part of the address and n represents the node ID.</td>
</tr>
</tbody>
</table>
LPR

The UNIX command `lpr` has the effect of sending a printer job to a printer. On the printer side, the LPR device name is used as the job source for incoming `lpr` jobs. There is an `%LPR%` device parameter set and it is described in Table 3.9 on page 79. TCP port 515 is used for LPR. Because LPR (or `lpr` daemon) is by definition unidirectional, any `%stdout` or `%stderr` information is transmitted by means of the Syslog facility described in “Syslog” on page 97. The LPR service depends upon the TCP/IP protocol.

Table 3.12 Parameters present in the `%LPR%` communications parameter set

<table>
<thead>
<tr>
<th>Key</th>
<th>Type</th>
<th>Semantics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enabled</td>
<td>boolean</td>
<td>For the general definition of <code>Enabled</code>, see Table 3.4 on page 62.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Legal values: true, false</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Errors: configurationerror, typecheck</td>
</tr>
<tr>
<td>Filtering</td>
<td>name</td>
<td>This parameter indicates whether the input stream needs further filtering before the data can be correctly interpreted as a page description language. For the general definition of <code>Filtering</code>, see Table 3.8 on page 77.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Warning: In a normal network environment, <code>Filtering</code> should be set to /None or you will encounter communications problems.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Legal values: /InterpreterBased, /None</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Errors: configurationerror, rangecheck, typecheck</td>
</tr>
<tr>
<td>HasNames</td>
<td>boolean</td>
<td>(Read-only) This parameter always has a value of false. For the general definition of <code>HasNames</code>, see Table 3.4 on page 62.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Legal value: false</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Errors: None.</td>
</tr>
<tr>
<td>Interpreter</td>
<td>name</td>
<td>For the general definition of <code>Interpreter</code>, see Table 3.4 on page 62.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Legal values: /PostScript, /AutoSelect, /Diablo630, /EpsonFX850, /HP7475A, /LaserJetIII, /LaserJetIP, /PCL, /ProprinterXL</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Errors: configurationerror, rangecheck, typecheck</td>
</tr>
</tbody>
</table>
**PrinterControl** name  
For the general definition of **PrinterControl**, see Table 3.4 on page 62.

**Legal value:** /PSPrinter, /PJL

**Errors:** configurationerror, rangecheck, typecheck

**On** boolean  
For the general definition of **On**, see Table 3.4 on page 62.

**Legal values:** true, false

**Errors:** configurationerror, typecheck

**PrintHost** string  
This parameter is a list of at most 2 IP addresses for hosts that have access to the unit; an empty string gives unrestricted access.

**Legal values:** An empty string or a string (of 31 or fewer non-null characters) which specifies up to 2 IP addresses separated by the ASCII blank character. An IP address can be of the form N.N.N.N where each N is a decimal number in the range 0 to 255. IP addresses cannot be set to illegal values (e.g., trying to use an IP address equal to 0.0.0.0, 127.0.0.0, 255.255.255.255, N.N.N.255 or other illegal values will result in a rangecheck error).

**Errors:** typecheck, limitcheck, rangecheck

**ReceiveWindowSize** integer  
Specifying the receive window size is a means of tuning the code for optimal throughput. This setting is enacted at boot time, when memory is allocated for use by the network communications software. The actual window size is established when the connection is opened and may be smaller than this parameter states in order to accommodate the host’s expectations. The receive window size specified here overrides any request for this parameter in the associated sets of type /Parameters, for example, %TCP%.

**Legal value:** An integer in the range from 1024 to 59392.

**Errors:** typecheck, rangecheck
Specifying the send window size is a means of tuning the code for optimal throughput. This setting is enacted at boot time, when memory is allocated for use by the network communications software. The actual window size is established when the connection is opened and may be smaller than this parameter states in order to accommodate the host’s expectations. The send window size specified here overrides any request for this parameter in the associated sets of type /Parameters, for example, %TCP%.

**Legal value:** An integer in the range from 1024 to 59392.

**Errors:** typecheck, rangecheck

**Type**  
(Read-only) This parameter always has a value of /Communications. For the general definition of Type, see Table 3.3 on page 55.

**Legal value:** /Communications

**Errors:** None.

### AppSocket

AppSocket was created to support TranScript™ software from Adobe Systems, Inc. It provides a more robust interface than LPR because it utilizes bidirectional communications directly. The AppSocket protocol can be used by drivers other than TranScript and for transmitting data other than PostScript language jobs.

**Table 3.13 Parameters present in the %AppSocket% communications parameter set**

<table>
<thead>
<tr>
<th>Key</th>
<th>Type</th>
<th>Semantics</th>
</tr>
</thead>
<tbody>
<tr>
<td>ControlPortNumber</td>
<td>integer</td>
<td>This parameter denotes a port used by the unit for the purpose of handshaking between the host and the unit while setting up a session. A session with the printer prevents other hosts from being able to interrupt the printer to run other jobs. Communications is via TCP, not UDP. The suggested default value is 9101.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Legal values:</strong> A positive integer representing a port number not reserved by any of the standard services.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Errors:</strong> typecheck, rangecheck, configurationerror</td>
</tr>
</tbody>
</table>
DataPortNumber integer This parameter denotes a bidirectional port for transmission of printer language jobs. The suggested default value is 9100. Users are free to use another port number to avoid a conflict with another unit on the network already using 9100.

**Legal values:** A positive integer representing a port number not reserved by any of the standard services.

**Warning** An error is *not* raised when a port number is specified that has been previously reserved for some other purpose.

**Errors:** typecheck, rangecheck, configurationerror

DelayedOutputClose boolean For the general definition of DelayedOutputClose, see Table 3.4 on page 62.

**Legal values:** true, false

**Errors:** None.

Enabled boolean For the general definition of Enabled, see Table 3.4 on page 62.

**Legal values:** true, false

**Errors:** configurationerror, typecheck

Filtering name This parameter indicates whether the input stream needs further filtering before the data can be correctly interpreted as a page description language. For the general definition of Filtering, see Table 3.8 on page 77.

**Warning** In a normal network environment, Filtering should be set to /None or you will encounter communication problems.

**Legal values:** /InterpreterBased, /None

**Errors:** configurationerror, rangecheck, typecheck

HasNames boolean *(Read-only)* This parameter always has a value of false. For the general definition of HasNames, see Table 3.4 on page 62.

**Legal value:** false

**Errors:** None.
Interpreter name For the general definition of Interpreter, see Table 3.4 on page 62.

Legal values: /PostScript, /AutoSelect, /Diablo630, /EpsonFX850, /HP7475A, /LaserJetIII, /LaserJetIP, /PCL, /ProprinterXL

Errors: configurationerror, rangecheck, typecheck

On boolean For the general definition of On, see Table 3.4 on page 62.

Legal values: true, false

Errors: configurationerror, typecheck

PrinterControl name For the general definition of PrinterControl, see Table 3.4 on page 62.

Legal value: /PSPrinter, /PJL

Errors: configurationerror, rangecheck, typecheck

PrintHost string This parameter is a list of at most 2 IP addresses for hosts that have access to the unit; an empty string gives unrestricted access.

Legal values: An empty string or a string (of 31 or fewer non-null characters) which specifies up to 2 IP addresses separated by the ASCII blank character. An IP address can be of the form N.N.N.N where each N is a decimal number in the range 0 to 255. IP addresses cannot be set to illegal values (e.g., trying to use an IP address equal to 0.0.0.0, 127.0.0.0, 255.255.255.255, N.N.N.255 or other illegal values will result in a rangecheck error).

Errors: typecheck, limitcheck, rangecheck

ReceiveWindowSize integer Specifying the receive window size is a means of tuning the code for optimal throughput. This setting is enacted at boot time, when memory is allocated for use by the network communications software. The actual window size is established when the connection is opened and may be smaller than this parameter states in order to accommodate the host’s expectations. The receive window size specified here overrides any request for this parameter in the associated sets of type /Parameters, for example, %TCP%.

Legal value: An integer in the range from 1024 to 59392.

Errors: typecheck, rangecheck
SendWindowSize  integer  Specifying the send window size is a means of tuning the code for optimal throughput. This setting is enacted at boot time, when memory is allocated for use by the network communications software. The actual window size is established when the connection is opened and may be smaller than this parameter states in order to accommodate the host’s expectations. The send window size specified here overrides any request for this parameter in the associated sets of type /Parameters, for example, %TCP%.

Legal value: An integer in the range from 1024 to 59392.

Errors: typecheck, rangecheck

StatusPortNumber  integer  This parameter denotes a port used by the unit for the purpose of sending status information back to the host. When using TCP/IP, communications is via UDP, not the TCP transport layer. The suggested default value is 9101. Users may use another port number to avoid a conflict with another unit on the network already using 9101.

Legal value: A positive integer representing a port number not reserved by any of the standard services.

Warning An error is not raised when a port number is specified that has been previously reserved for some other purpose.

Errors: typecheck, rangecheck, configurationerror

Type  name  (Read-only) This parameter always has a value of /Communications. For the general definition of Type, see Table 3.3 on page 55.

Legal value: /Communications

Errors: None.
**Telnet**

Telnet gives network users interactive access to and exclusive use of the PostScript interpreter (or emulator). Port 23 is used for Telnet. Telnet is a TCP/IP network service.

*Table 3.14 Parameters present in the %Telnet% communications parameter set*

<table>
<thead>
<tr>
<th>Key</th>
<th>Type</th>
<th>Semantics</th>
</tr>
</thead>
<tbody>
<tr>
<td>DelayedOutputClose</td>
<td>boolean</td>
<td>For the general definition of DelayedOutputClose, see Table 3.4 on page 62.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Legal values:</strong> true, false</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Errors:</strong> None.</td>
</tr>
<tr>
<td>Enabled</td>
<td>boolean</td>
<td>For the general definition of Enabled, see Table 3.4 on page 62.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Legal values:</strong> true, false</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Errors:</strong> configurationerror, typecheck</td>
</tr>
<tr>
<td>HasNames</td>
<td>boolean</td>
<td><em>(Read-only)</em> This parameter always has a value of false. For the general</td>
</tr>
<tr>
<td></td>
<td></td>
<td>definition of HasNames, see Table 3.4 on page 62.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Legal value:</strong> false</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Errors:</strong> None.</td>
</tr>
<tr>
<td>Interpreter</td>
<td>name</td>
<td>For the general definition of Interpreter, see Table 3.4 on page 62.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Legal values:</strong> /PostScript, /AutoSelect, /Diablo630, /EpsonFX850,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>/HP7475A, /LaserJetIII, /LaserJetIIP, /PCL, /ProprinterXL</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Errors:</strong> configurationerror, rangecheck, typecheck</td>
</tr>
<tr>
<td>On</td>
<td>boolean</td>
<td>For the general definition of On, see Table 3.4 on page 62.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Legal values:</strong> true, false</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Errors:</strong> configurationerror, typecheck</td>
</tr>
<tr>
<td>PrinterControl</td>
<td>name</td>
<td>For the general definition of PrinterControl, see Table 3.4 on page 62.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Legal value:</strong> /PSPrinter, /PJL</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Errors:</strong> configurationerror, rangecheck, typecheck</td>
</tr>
</tbody>
</table>
Type name (Read-only) This parameter always has a value of /Communications. For the general definition of Type, see Table 3.3 on page 55.

Legal value: /Communications

Errors: None.

The Novell Remote Printer

This is an application that is managed by a Novell print server and takes print jobs downloaded from a print server. A remote printer may be shared by many print servers.

Table 3.15 Parameters present in the %RemotePrinter% communications parameter set

<table>
<thead>
<tr>
<th>Key</th>
<th>Type</th>
<th>Semantics</th>
</tr>
</thead>
<tbody>
<tr>
<td>DelayedOutputClose</td>
<td>boolean</td>
<td>For the general definition of DelayedOutputClose, see Table 3.4 on page 62.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Legal values: true, false</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Errors: None.</td>
</tr>
<tr>
<td>Enabled</td>
<td>boolean</td>
<td>For the general definition of Enabled, see Table 3.4 on page 62.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Legal values: true, false</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Errors: configurationerror, typecheck</td>
</tr>
<tr>
<td>Filtering</td>
<td>name</td>
<td>For the general definition of Filtering, see Table 3.8 on page 77. Filtering allows for transport of data not initially intended for this network protocol. For example, if the host environment thought it was transmitting data over a parallel interface, such as LPT of a PC, and the printer is connected through a network interface, Filtering would need to be set to /InterpreterBased.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Legal values: /InterpreterBased, /None</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Errors: configurationerror, rangecheck, typecheck</td>
</tr>
<tr>
<td>HasNames</td>
<td>boolean</td>
<td>(Read-only) This parameter always has a value of false. For the general definition of HasNames, see Table 3.4 on page 62.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Legal value: false</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Errors: None.</td>
</tr>
</tbody>
</table>
**Interpreter name**

For the general definition of **Interpreter**, see Table 3.4 on page 62.

**Legal values:** /PostScript, /AutoSelect, /Diablo630, /EpsonFX850, /HP7475A, /LaserJetIII, /LaserJetIP, /PCL, /ProprinterXL

**Errors:** configurationerror, rangecheck, typecheck

**On boolean**

For the general definition of **On**, see Table 3.4 on page 62.

**Legal values:** true, false

**Errors:** configurationerror, rangecheck, typecheck

**PrinterControl name**

For the general definition of **PrinterControl**, see Table 3.4 on page 62.

**Legal value:** /PSPrinter, /PJL

**Errors:** configurationerror, rangecheck, typecheck

**Type**

*(Read-only)* This parameter always has a value of /Communications. For the general definition of **Type**, see Table 3.3 on page 55.

**Legal value:** /Communications

**Errors:** None.

---

**The Novell Print Server**

This is the application that communicates with Novell file servers to download print jobs from the print queues. A print server may communicate with multiple file servers and access multiple print queues.

**Table 3.16 Parameters present in the %PrintServer% communications parameter set**

<table>
<thead>
<tr>
<th>Key</th>
<th>Type</th>
<th>Semantics</th>
</tr>
</thead>
<tbody>
<tr>
<td>DelayedOutputClose</td>
<td>boolean</td>
<td>For the general definition of <strong>DelayedOutputClose</strong>, see Table 3.4 on page 62.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Legal values:</strong> true, false</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Errors:</strong> None.</td>
</tr>
<tr>
<td>Enabled</td>
<td>boolean</td>
<td>For the general definition of <strong>Enabled</strong>, see Table 3.4 on page 62.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Legal values:</strong> true, false</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Errors:</strong> configurationerror, rangecheck, typecheck</td>
</tr>
</tbody>
</table>
Filtering name For the general definition of Filtering, see Table 3.8 on page 77. Filtering allows for transport of data not initially intended for this network protocol. For example, if the host environment thought it was transmitting data over a parallel interface, such as LPT of a PC, and the printer is connected through a network interface, Filtering would need to be set to /InterpreterBased.

Legal values: /InterpreterBased, /None

Errors: configurationerror, rangecheck, typecheck

HasNames boolean (Read-only) This parameter always has a value of false. For the general definition of HasNames, see Table 3.4 on page 62.

Legal value: false

Errors: None.

Interpreter name For the general definition of Interpreter, see Table 3.4 on page 62.

Legal values: /PostScript, /AutoSelect, /Diablo630, /EpsonFX850, /HP7475A, /LaserJetIII, /LaserJetIIP, /PCL, /ProprinterXL

Errors: configurationerror, rangecheck, typecheck

LoginPassword string This string parameter specifies the password that the print server application uses to gain access to the job queue. Setting this parameter to the empty string indicates that no password has been specified. The value of this parameter returned by the currentdevparams operator is the string (INVALID) regardless of what the password is set to. Attempts to set the LoginPassword to the string (INVALID) will be ignored.

Legal values: A string of up to 32 characters.

Errors: limitcheck, typecheck

On boolean For the general definition of On, see Table 3.4 on page 62.

Legal values: true, false

Errors: configurationerror, typecheck

PrinterControl name For the general definition of PrinterControl, see Table 3.4 on page 62.

Legal value: /PSPrinter, /PJL

Errors: configurationerror, rangecheck, typecheck
**Type**

*(Read-only)* This parameter always has a value of /Communications. For the general definition of **Type**, see Table 3.3 on page 55.

**Legal value:** /Communications

**Errors:** None.

---

**Parameter Sets that Correspond to Various Network Services**

This section covers the device parameter sets of type /Parameters that control various network services. The services are known as SNMP and Syslog.

**SNMP**

SNMP (Simple Network Management Protocol) provides a means for the system administrator to query for information about the unit. The information that can be queried is driven by a database called a Management Information Base (MIB). Refer to “A Simple Network Management Protocol” for details about SNMP\(^4\). It is not a communications port for PostScript language jobs, thus the parameter set is of type /Parameters. The parameters listed in Table 3.17 on page 95 are those SNMP parameters that need to be accessible from the PostScript language. These are the only parameters that are changeable from an environment separate from SNMP (the net-work side). The rules about when changes take effect to each parameter within this parameter set are described in Table 3.17 on page 95.

**Table 3.17 Parameters present in the %SNMP% parameter set**

<table>
<thead>
<tr>
<th>Key</th>
<th>Type</th>
<th>Semantics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PrivateHost</strong></td>
<td>string</td>
<td>This parameter is a single node address (refer to Table 3.11 on page 84) per protocol of a host that is able to set those SNMP variables that can be written; an empty string indicates that no host has access. The empty string is the usual default value so that the unit will need to have this parameter explicitly set via the PostScript operator <strong>setdevparams</strong> prior to using SNMP. Changes to this parameter do not take effect until the unit is re-initialized.</td>
</tr>
</tbody>
</table>

**Legal values:** An empty string or a string (of 49 or fewer non-null characters) which specifies up to one node address per protocol separated by the ASCII blank character.

**Errors:** typecheck, rangecheck, limitcheck

---

SysContact string  The convention is to use the name and phone number or address of the person responsible for the unit. Changes to this parameter take effect immediately.

Legal value:  A string of 32 or fewer non-null characters.

Errors:  typecheck, limitcheck

SysLocation string  Location of the raster output device unit. Changes to this parameter take effect immediately.

Legal value:  A string of 32 or fewer non-null characters.

Errors:  typecheck, limitcheck

SysName string  Name of the raster output device unit (expected by SNMP). Changes to this parameter take effect immediately.

Legal value:  A string of 32 or fewer non-null characters.

Errors:  typecheck, limitcheck

TrapHost string  This parameter is a list of one or more \( \text{node-address/community} \) pairs for each protocol with a host that is able to receive traps. Refer to Table 3.11 on page 84 for the syntax of a node address. A slash is used as a delimiter between the \text{node-address} and the \text{community} string. The ASCII blank is used to separate each pair in the list. The \text{community} string portion is case insensitive. An empty string indicates that no traps are being sent to the host. Here are some example \text{community} strings:

- public
- proxy
- private
- regional
- core

For example, the value \((130.248.224.46/public)\) is an IP address for a trap host node in a public community.
The empty string is the usual default value so that the unit will need to have this parameter explicitly set via the PostScript operator setdevparams prior to using the trap host facility. Changes to this parameter do not take effect until the unit is re-initialized.

**Legal values:** An empty string or a string which specifies one or more (node-address/community) pairs separated by the ASCII blank character.

**Errors:** typecheck, rangecheck, limitcheck

**Type**: (Read-only) This parameter always has a value of /Parameters. For the general definition of Type, see Table 3.3 on page 55.

**Legal value:** /Parameters

**Errors:** None.

---

**Syslog**

Syslog is a logging facility that sends log messages back to a UNIX host. The LogPriority value indicates which log messages will be seen by the host. Most of the messages contain network-specific information, but may include any other pertinent information the unit wishes to convey. Communication for %Syslog% is via the UDP (User Datagram Protocol) transport layer. Changes to this parameter set do not take effect until the unit is re-initialized.

<table>
<thead>
<tr>
<th>Key</th>
<th>Type</th>
<th>Semantics</th>
</tr>
</thead>
<tbody>
<tr>
<td>LogHost</td>
<td>string</td>
<td>This string contains an IP address for a host that receives Syslog messages from the unit; an empty string indicates that no Syslog messages are to be sent by the unit.</td>
</tr>
</tbody>
</table>

**Legal values:** An empty string or a string (of 15 or fewer non-null characters) which specifies a legal IP address. An IP address is of the form N.N.N.N where each N is a decimal number in the range 0 to 255. Trying to use an IP address equal to 0.0.0.0, 255.255.255.255 or N.N.N.255 will result in a rangecheck error.

**Errors:** typecheck, limitcheck
**LogPriority** integer

This parameter designates which logging messages are to be sent on to the Syslog host. All logging messages associated with the specified LogPriority and those of higher priority (smaller numbers are higher priority) are sent. The following is a list, from the BSD (Berkeley Software Distribution) UNIX and SunOS™ convention, of priorities and their corresponding meaning.

0 – Unit is no longer usable.

1 – Messages indicating immediate action is needed on the part of a system administrator.

2 – Critical error messages.

3 – Error messages.

4 – Warning messages.

5 – Normal but significant conditions.

6 – Informational messages.

7 – Debugging messages.

**Legal values:** An integer in the range from 0 to 7.

**Errors:** typecheck, rangecheck

**Type** name **(Read-only)** This parameter always has a value of /Parameters. For the general definition of Type, see Table 3.3 on page 55.

**Legal value:** /Parameters

**Errors:** None.

---

**Communications Parameter Sets Which Correspond to Lower Protocol Layers**

This section describes the device parameter sets of type /Parameters that control the transport, network, data link and physical layers of the TCP/IP or IPX/SPX protocol services.

**TCP**

TCP stands for Transmission Control Protocol and is the transport layer responsible for reliable data transfer by guaranteeing message delivery and reception. It is a connection-oriented protocol. If a packet is lost, it will be retransmitted. Changes to parameters in the TCP set do not take effect until the unit is re-initialized.
Table 3.19  Parameters present in the %TCP% parameter set

<table>
<thead>
<tr>
<th>Key</th>
<th>Type</th>
<th>Semantics</th>
</tr>
</thead>
<tbody>
<tr>
<td>On</td>
<td>boolean</td>
<td>A value of \textit{true} means that the TCP protocol is activated at boot time. Otherwise it is off.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>\textbf{Legal values:} \textit{true}, \textit{false}</td>
</tr>
<tr>
<td></td>
<td></td>
<td>\textbf{Errors:} configurationerror, typecheck</td>
</tr>
<tr>
<td>ReceiveWindowSize</td>
<td>integer</td>
<td>Specifying the receive window size is a means of tuning the code for optimal throughput. This setting is enacted at boot time, when memory is allocated for use by the network communications software. The actual window size is established when the connection is opened and may be smaller than this parameter states in order to accommodate the host’s expectations.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>\textbf{Legal values:} An integer in the range from 1024 to 59392.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>\textbf{Errors:} typecheck, rangecheck</td>
</tr>
<tr>
<td>SendWindowSize</td>
<td>integer</td>
<td>Specifying the send window size is a means of tuning the code for optimal throughput. This setting is enacted at boot time, when memory is allocated for use by the network communications software. The actual window size is established when the connection is opened and may be smaller than this parameter states in order to accommodate the host’s expectations.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>\textbf{Legal values:} An integer in the range from 1024 to 59392.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>\textbf{Errors:} typecheck, rangecheck</td>
</tr>
<tr>
<td>Type</td>
<td>name</td>
<td>(\textit{Read-only}) This parameter always has a value of /Parameters. For the general definition of \textit{Type}, see Table 3.3 on page 55.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>\textbf{Legal value:} /Parameters</td>
</tr>
<tr>
<td></td>
<td></td>
<td>\textbf{Errors:} None.</td>
</tr>
</tbody>
</table>
User Datagram Protocol (UDP)

UDP is a connectionless (or datagram) protocol used in the TCP/IP networking suite. When using UDP with a peer host, there is no need for “handshaking” prior to communication. UDP packets are sent without any guarantee of delivery and may arrive at the destination in any order.

Table 3.20 Parameters present in the %UDP% parameter set

<table>
<thead>
<tr>
<th>Key</th>
<th>Type</th>
<th>Semantics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Checksum</td>
<td>boolean</td>
<td>This boolean specifies whether checksum values will be inserted in outgoing packets formed by the software. The default should be true.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Legal values:</strong> true, false</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Errors:</strong> configurationerror, typecheck</td>
</tr>
<tr>
<td>On</td>
<td>boolean</td>
<td>A value of true means that the UDP protocol is activated at boot time. Otherwise it is off.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Legal values:</strong> true, false</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Errors:</strong> configurationerror, typecheck</td>
</tr>
<tr>
<td>Type</td>
<td>(Read-only)</td>
<td>This parameter always has a value of /Parameters. For the general definition of Type, see Table 3.3 on page 55.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Legal value:</strong> /Parameters</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Errors:</strong> None.</td>
</tr>
</tbody>
</table>

IP

IP stands for Internet Protocol and is the network layer responsible for routing messages to their destinations. This layer decides which physical interface is to send outgoing messages and which transport layer is to receive incoming message. Changes to parameters in the IP set do not take effect until the unit is re-initialized.

Table 3.21 Parameters present in the %IP% parameter set

<table>
<thead>
<tr>
<th>Key</th>
<th>Type</th>
<th>Semantics</th>
</tr>
</thead>
<tbody>
<tr>
<td>BroadcastAddress</td>
<td>string</td>
<td>This parameter is the broadcast address mask used when broadcasting messages to the local network. BroadcastAddress shall reflect the current broadcast address mask in use by the unit. In order to “set” the BroadcastAddress explicitly and have it take effect the next time the unit is initialized, you must have IPAddressDynamic set to false when issuing setdevparams.</td>
</tr>
</tbody>
</table>
Note: If the `BroadcastAddress` is not legal with respect to the `IPAddress` and `NetworkMask` given, it shall be changed to a value that is legal with no warning to the user. For example, suppose the `IPAddress` is 134.14.15.16 and the `BroadcastAddress` is 134.14.255.255. If the user changes `IPAddress` to 134.15.15.16 without explicitly changing the `BroadcastAddress`, the `BroadcastAddress` shall automatically be changed to 134.15.255.255.

**Legal values:** A string of 15 or fewer non-null characters that specifies a legal `BroadcastAddress`. A `BroadcastAddress` is of the form `N.N.N.N` where each `N` is a decimal number in the range 0 to 255.

**Errors:** limitcheck, typecheck, rangecheck

**GatewayAddress** string This parameter contains the `(destination-address/gateway-address)` pairs to other networks. The empty string specifies that dynamic routing, if available in the product, be enabled. In accordance with the route command, a `GatewayAddress` is fully defined here as a `destination-address` and a `gateway-address`. The slash is used as delimiter between the two subfields. Multiple address pairs can be specified and are separated by a space delimiter. In accordance with the route command, a `destination-address` is defined as specifying the network address. A valid network address varies according to the class. A class A network address requires the first field be non-zero. The others may be zero (for a net with no subnets), or contain subnet address information. A class B network address requires the first two fields to be non-zero. A class C network address requires the first three fields to be non-zero. A network address of 0.0.0.0 is a special case used by default if no previous network address matches the desired target IP address. If multiple entries have the same address, then the earlier entry will be ignored. `GatewayAddress` shall reflect the current `(destination address/gateway-address)` pairs to other networks in use by the unit. The `GatewayAddress` parameter may be “set” explicitly at any time. It will only take effect upon unit initialization, and then only if the `IPAddressDynamic` parameter is set to false via `setdevparams`. If `IPAddressDynamic` is set to true at unit initialization time, the `GatewayAddress` parameter will not take effect. The routing information will be gathered via dynamic routing using a RIP (Routing Information Protocol) request to the network. The default should be the empty string, implying dynamic routing.

**Legal values:** An empty string or a string which specifies one or more legal `(destination-address/gateway address)` pairs. These addresses are Internet Protocol addresses of the form `N.N.N.N` where each `N` is a decimal number in the range
0 to 255. Loopback addresses (127.N.N.N) and broadcast addresses (N.N.255) are illegal for either the destination or gateway part of the pair.

**Errors:** limitcheck, typecheck, rangecheck

**IPAddress** string This is a unique string which represents the Internet Protocol address of the unit. The Internet Protocol address is mapped directly to the lowest physical address by which the unit is known (for example, EthernetAddress if Physical is %EthernetPhysical%). IPAddress shall reflect the current IP address in use by the unit. In order to “set” the IPAddress explicitly and have it take effect the next time the unit is initialized, you must have IPAddressDynamic set to false when issuing setdevparams. The default should be an empty string which implies that the IP protocol layer is not active.

*Note: Whenever IPAddressDynamic is true, currentdevparams will return a value for the parameter IPAddress that has been determined by a BOOTP or RARP sequence during boot up. Changing the IPAddress parameter to some other value via setdevparams has the effect of changing the user explicit value which is only used if IPAddressDynamic is false. currentdevparams will return the user explicit value of IPAddress only when IPAddressDynamic is false.*

**Legal values:** An empty string or a string (of 15 or fewer non-null characters) which specifies a legal IP address. An IP address is of the form N.N.N.N where each N is a decimal number in the range 0 to 255 (trying to set an IP address equal to 0.0.0.0, 255.255.255.255, 127.N.N.N, N.N.0, N.N.N.255 or any address whose first field is in the range 224 to 255 will result in a rangecheck error).

**Errors:** limitcheck, typecheck, rangecheck

**IPAddressDynamic** boolean A value of true indicates that the IPAddress is obtained by a BOOTP or RARP (Reverse Address Resolution Protocol) sequence during boot up. The value of false means that the IPAddress must be explicitly set by a PostScript language job via setdevparams in order for connections to be made on the local network. The default value is usually false.

**Legal values:** true, false

**Errors:** typecheck

**NetworkMask** string This parameter indicates which fields of the IPAddress designate the network portion of the IP address and which designate the node portion. For example, the value 255.255.255.0 is a NetworkMask for a class B network
with subnets. The **NetworkMask** is used to determine if a certain IP address is on the same network as the unit. **NetworkMask** shall reflect the current network mask in use by the unit. In order to “set” the **NetworkMask** explicitly and have it take effect the next time the unit is initialized, you must have **IPAddressDynamic** set to `false` when issuing `setdevparams`.

**Note:** If **NetworkMask** is set to a value that is not legal when compared to the **IPAddress**, the **NetworkMask** shall be changed to a value that is legal with no warning to the user. For example, if a class B **IPAddress** is given with a class A network mask, the **NetworkMask** shall be changed to the default class B network mask. The default class A network mask is 255.0.0.0. The default class B network mask is 255.255.0.0. The default class C network mask is 255.255.255.0. No subnets are accounted for in these default network masks.

**Legal values:** A string of 15 or fewer non-null characters which specifies a legal IP mask. IP masks are of the form `N.N.N.N` where each `N` is a decimal number in the range 0 to 255.

**Errors:** limitcheck, typecheck

**On**

**boolean**

A value of `true` means that the IP protocol layer is activated at boot time. Otherwise it remains off.

**Legal values:** `true, false`

**Errors:** configurationerror, typecheck

**Physical**

**string** *(Read-only)* This parameter specifies the physical layer over which IP is accessed. The string is set to a device parameter set corresponding to a physical communications medium, such as the string `%EthernetPhysical%`. A network layer parameter set can be associated with one and only one physical layer parameter set by the **Physical** parameter.

**Legal values:** A string of 32 or fewer non-null characters which specifies a physical layer.

**Errors:** None.
TransmitEncapsulation

This parameter specifies the transmit encapsulation type. The value /802.3-2-SNAP indicates IEEE 802.3 MAC (Media Access Control) header followed by a 802.2 LLC (Logical Link Control) and SNAP (Sun Network Access Protocol) header. The value /DIX indicates Ethernet Version II. The default should be /DIX for Ethernet.

Legal values: /802.3-2-SNAP, /DIX, /802.5-2-SNAP

Errors: typecheck

Type

(Read-only) This parameter always has a value of /Parameters. For the general definition of Type, see Table 3.3 on page 55.

Legal value: /Parameters

Errors: None.

Sequenced Packet Exchange (SPX) Protocol

SPX is the Novell Netware connection oriented protocol. When using SPX to communicate with a peer host, there is “handshaking” before the connection is ready. The delivery of SPX packets are expected to be acknowledged to guarantee delivery and packets arrive in sequence at the destination. Unlike TCP, it does not provide a sliding window functionality for flow control.

Table 3.22 Parameters present in the %SPX% parameter set

<table>
<thead>
<tr>
<th>Key</th>
<th>Type</th>
<th>Semantics</th>
</tr>
</thead>
<tbody>
<tr>
<td>On</td>
<td>boolean</td>
<td>A value of true means that the SPX protocol is activated at boot time. Otherwise it is off.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Legal values: true, false</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Errors: configurationerror, typecheck</td>
</tr>
</tbody>
</table>

ReceiveWindowSize

Specifying the receive window size is a means of tuning the code for optimal throughput. This setting is enacted at boot time, when memory is allocated for use by the network communications software. The actual window size is established when the connection is opened and may be smaller than this parameter states in order to accommodate the host’s expectations.

Legal values: An integer in the range from 1024 to 59392.

Errors: typecheck, rangecheck
**Type**

*(Read-only)* This parameter always has a value of /Parameters. For the general definition of **Type**, see Table 3.3 on page 55.

**Legal value:** /Parameters

**Errors:** None.

---

**Internetwork Packet Exchange (IPX) Protocol**

IPX is the Novell Netware connectionless (or datagram) protocol. When using IPX with a peer host, there is no need for “handshaking” prior to communication. IPX packets are sent without any guarantee of delivery and may arrive at the destination in any order. Netware broadcasting is done using IPX.

**Table 3.23 Parameters present in the %IPX% parameter set**

<table>
<thead>
<tr>
<th>Key</th>
<th>Type</th>
<th>Semantics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Checksum</strong></td>
<td>boolean</td>
<td>This boolean specifies whether checksum values will be inserted in outgoing packets formed by the software. The default should be <em>true</em>.</td>
</tr>
<tr>
<td><strong>NetworkAddress</strong></td>
<td>string</td>
<td><em>(Read-only)</em> This parameter identifies the network in which the unit is located. The concatenation of the NetworkAddress and the Novell Node Number will uniquely identify the unit on the network. The Novell Node Number is derived from the Media Access Control (MAC) address of the networking media. For Ethernet, the Novell Node Number is the <strong>EthernetAddress</strong> parameter of the %EthernetPhysical% set. The <strong>NetworkAddress</strong> is obtained from the Novell file server on the local net upon booting the printer. An empty string or a string (of 8 or fewer non-null characters) which specifies a legal Novell network address. A Novell network address is of the form XXXXXXXX where each X represents a digit in hexadecimal in the range 0 to F.</td>
</tr>
<tr>
<td><strong>On</strong></td>
<td>boolean</td>
<td>A value of <em>true</em> means that the IPX protocol layer is activated at boot time. Otherwise it remains off.</td>
</tr>
</tbody>
</table>

**Legal values:** *true, false*

**Errors:** None.
**Physical** string  *(Read-only)* This parameter specifies the physical layer over which IPX is accessed. The string is set to a device parameter set corresponding to a physical communications medium, such as the string (%EthernetPhysical%). A network layer parameter set can be associated with one and only one physical layer parameter set by the Physical parameter.

**Legal values:** A string of 32 or fewer non-null characters which specifies a physical layer.

**Errors:** None.

**TransmitEncapsulation** name This parameter specifies the transmit encapsulation type. The value /802.3-2 is for specifying an 802.3 header followed by 802.2 header for IEEE-standard-protocols. The value /802.3-X is for specifying an 802.3 header followed by an XNS header (used by IPX only). The value /802.3-2-SNAP indicates IEEE 802.3 MAC header followed by a 802.2 LLC and SNAP header for non-IEEE-standard protocols. The value /DIX indicates Ethernet Version II. The value of /Adaptive indicates that by the nature of the interaction between host and printer, an encapsulation format to use in responses to the host can be derived at boot time. The default should be /802.3-X for Ethernet connectivity.

**Legal values:** /802.3-2, /802.3-X, /802.3-2-SNAP, /802.5-2-SNAP, /DIX, /Adaptive

**Errors:** typecheck

**Type** *(Read-only)* This parameter always has a value of /Parameters. For the general definition of Type, see Table 3.3 on page 55.

**Legal value:** /Parameters

**Errors:** None.

**EthernetPhysical**

The %EthernetPhysical% device parameter set corresponds to a physical Ethernet connector and its associated hardware and the data link layer software which handles events from this device. Changes to parameters in this set do not take effect until the unit is re-initialized.
### Table 3.24 Parameters present in the %EthernetPhysical% parameter set

<table>
<thead>
<tr>
<th>Key</th>
<th>Type</th>
<th>Semantics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ConnectorType</strong></td>
<td>name</td>
<td><em>(Read-only)</em> This parameter indicates which Ethernet connector type is being used.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Legal values:</strong> /RJ45, /BNC, /AUI, /AAUI</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Errors:</strong> None.</td>
</tr>
<tr>
<td><strong>EthernetAddress</strong></td>
<td>string</td>
<td><em>(Read-only)</em> This parameter returns a unique string that represents the Ethernet address of the unit. The string is of the form ((XX:XX:XX:XX:XX:XX)) where each (X) represents a digit in hexadecimal.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Note:</strong> When using Novell, the Ethernet address is also known as the Novell Node Number.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Legal values:</strong> A string of 17 characters representing a legal Ethernet address.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Errors:</strong> None.</td>
</tr>
<tr>
<td><strong>Name</strong></td>
<td>string</td>
<td><em>(Read-only)</em> This parameter specifies the mnemonic name, such as (\text{le0}) for “Lance chip interface unit 0” or (\text{so0}) for “Sonic chip interface unit 0”, for the Ethernet interface used.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Legal values:</strong> Any string of 16 or fewer non-null characters.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Errors:</strong> None.</td>
</tr>
<tr>
<td><strong>On</strong></td>
<td>boolean</td>
<td>A value of (true) means that the Ethernet channel is enabled at boot time. Otherwise it remains off.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Legal values:</strong> (true, false)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Errors:</strong> configurationerror, typecheck</td>
</tr>
<tr>
<td><strong>Type</strong></td>
<td>name</td>
<td><em>(Read-only)</em> This parameter always has a value of /Parameters. For the general definition of Type, see Table 3.3 on page 55.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Legal value:</strong> /Parameters</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Errors:</strong> None.</td>
</tr>
</tbody>
</table>
TokenRingPhysical

The %TokenRingPhysical% device parameter set corresponds to a physical Token Ring connector and its associated hardware and the data link layer software which handles events from this device. Changes to parameters in this set do not take effect until the unit is re-initialized.

Table 3.25 Parameters present in the %TokenRingPhysical% parameter set

<table>
<thead>
<tr>
<th>Key</th>
<th>Type</th>
<th>Semantics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Address</td>
<td>string</td>
<td><em>(Read-only)</em> This parameter returns a unique string that represents the Ethernet address of the unit. The string is of the form (XX:XX:XX:XX:XX:XX) where each X represents a digit in hexadecimal. Legal values: A string of 17 characters representing a legal Token Ring address. Errors: None.</td>
</tr>
<tr>
<td>Bridging</td>
<td>name</td>
<td>Bridging, on the token ring, can be done in several different ways. When this parameter is set to /Transparent, this implies a transparent bridging where the entire “universe” is one large single ring structure and all identities are unique. When set to /SourceRoute, routing is done via specifying an explicit path including the ring identification, RIF. When set to /Adaptive, the software will automatically recognize the routing style and respond in kind (either as a one-time determination or when processing each connection). Legal values: /Transparent, /SourceRoute, /Adaptive Errors: configurationerror, typecheck</td>
</tr>
<tr>
<td>ConnectorType</td>
<td>name</td>
<td><em>(Read-only)</em> This parameter indicates which TokenRing connector type is being used. Legal values: /RJ45, /DB9, /MAU Errors: None.</td>
</tr>
<tr>
<td>Name</td>
<td>string</td>
<td><em>(Read-only)</em> This parameter specifies the mnemonic name, such as (le0) for “Lance chip interface unit 0” or (so0) for “Sonic chip interface unit 0”, for the Token Ring interface used. Legal values: Any string of 16 or fewer non-null characters. Errors: None.</td>
</tr>
</tbody>
</table>
On  boolean  A value of true means that the Token Ring channel is enabled at boot time. Otherwise it remains off.

**Legal values:**  true, false

**Errors:**  configurationerror, typecheck

**Speed**  integer  This parameter indicates the speed at which the ring is operated, in megabits per second.

**Legal values:**  4, 16

**Errors:**  configurationerror, typecheck

**Type**  (Read-only) This parameter always has a value of /Parameters. For the general definition of Type, see Table 3.3 on page 55.

**Legal value:**  /Parameters

**Errors:**  None.

---

### 3.5.3 File System Parameters

**Parameters Present in Parameter Sets of Type /FileSystem**

**Table 3.26 Parameters common to device sets of type /FileSystem**

<table>
<thead>
<tr>
<th>Key</th>
<th>Type</th>
<th>Semantics</th>
</tr>
</thead>
<tbody>
<tr>
<td>HasNames</td>
<td>boolean</td>
<td>(Read-only) This parameter indicates whether the device represented by the parameter set supports named files. If the device is not mounted, this parameter has a value of false. This is defined only in device parameter sets of the Type /FileSystem or /Communications.</td>
</tr>
</tbody>
</table>

**Legal values:**  true, false

**Errors:**  None.

---

**Disk, Cartridge and Rom Parameter Tables**

Table 3.27 on page 110 contains a list of the current disk parameters. Table 3.28 on page 114 contains a list of the current cartridge or ROM parameters. The name “%rom%” is used instead of “%cartridge%” for a cartridge that is non-removable and non-writeable.
Read-only refers to their access by language operators (for example, `setdevparams`, `currentdevparams`). A read-only parameter can change value but not as the result of invoking `setdevparams`. Changes to parameters of type `/FileSystem` take place immediately.

In Table 3.27 on page 110 and Table 3.28 on page 114, it should be understood that a page is a unit of storage whose size is file-system dependent.

### Table 3.27 Parameters present in `%disk%` (/FileSystem) devices

<table>
<thead>
<tr>
<th>Key</th>
<th>Type</th>
<th>Semantics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BlockSize</strong></td>
<td>integer</td>
<td><em>(Read-only)</em> This parameter indicates the disk/cartridge formatting size of a page (for the logical and physical size of the media). The formatting size of a page for a cartridge is 1 byte per block. The formatting size of a page for a disk using the Adobe file system is 1024 bytes per block. Legal values: A positive integer, typically 1024. Errors: None.</td>
</tr>
<tr>
<td><strong>Bus</strong></td>
<td>string</td>
<td><em>(Read-only)</em> With Adobe’s storage device implementation, <code>Bus</code> will indicate the name of the SCSI bus on which this disk resides. This parameter is in the form of a string that can be used as input to <code>setdevparams</code> or <code>currentdevparams</code> to get bus parameters. Legal values: <code>%Scsi%</code>, <code>%ScsiB%</code>, <code>%ScsiC%</code>, and so forth Errors: None.</td>
</tr>
<tr>
<td><strong>Free</strong></td>
<td>integer</td>
<td><em>(Read-only)</em> This parameter indicates the amount of free space available on the media for the device in <code>pages</code>, where the <code>page</code> size is indicated by the parameter <code>BlockSize</code>. This parameter is valid only if the device is mounted (that is, <code>Mounted</code> is set to <code>true</code>). A value of 0 indicates that either the device is not mounted or the media is completely full. Legal values: 0 or any positive integer. Errors: None.</td>
</tr>
<tr>
<td><strong>HasNames</strong></td>
<td>boolean</td>
<td><em>(Read-only)</em> This parameter indicates whether the device supports named files. This parameter is valid only if the device is mounted (that is, <code>Mounted</code> is set to <code>true</code>). If the device is not mounted, this parameter has a value of <code>false</code>. Legal values: <code>true</code>, <code>false</code> Errors: None.</td>
</tr>
</tbody>
</table>
**InitializeAction** integer This parameter specifies an action for initializing the device. The following are valid values for disks:

0 — Indicates no action and is the value returned when the parameter is read.

1 — Indicates that the current file system (if any) is to be deleted and a new one of size **LogicalSize** created (the media is assumed to have been formatted already). The device must first be mounted; otherwise an ioerror will result. For more information, see **LogicalSize**.

2 — Reformats the entire media before creating a new file system of size **LogicalSize**. The **Interleave** parameter also plays a role in how the media is to be formatted. See **Interleave** below for details.

3 — Or greater has the same effect as the value 2 and also carries out product dependent actions, which typically consist of reformatting the disk and running integrity tests before creating the file system. Some devices can have additional parameters that serve as arguments to **InitializeAction**.

**Legal values:** Any non-negative integer.

**Errors:** None.

**Interleave** integer The purpose of **Interleave** is to arrange logically contiguous sectors on the disk in a way that is most efficient for the system using that disk. This parameter is used only when the media is being formatted (refer to **InitializeAction**, described above).

For example, assume there are 16 sectors going around a single track on a disk. If the first sector has a logical number of 1, the second 2, the third 3, and so on, it is referred to as “1 to 1 interleave” and the value of **Interleave** is 1. In this case the system must be very fast in order to be able to take data from the disk, one sector immediately after another. If the system fails to consume the first sector in time for the second sector, the system has to wait an entire revolution of the disk to get the next sector. This can give very poor performance.

If the first sector has a logical number of 1, the third has a logical number of 2, the fifth has a logical number of 3, and so on, the system will need to be able to consume the current sector while the head passes over a sector in time for the next logical sector. This is referred to as “2 to 1 interleave” and the value of **Interleave** is 2. The sectors in between are used for higher logical numbers and it takes a minimum of two revolutions to get an entire track’s data off the disk. In this example, the second physical sector on the disk would be between logical sectors 1 and 2 and it would be logical number 9.
Similarly, “3 to 1 interleave” has an `Interleave` value of 3 and the first sector has a logical number of 1, the fourth one of 2, and so on. Normally, the interleave should be set to a value that allows the software to use the information during the time between sectors, but not waste any time. It is difficult to determine what the proper value is and it is highly dependent on the job accessing the disk. Some drives provide buffering for a full track of data. For these drives, “1 to 1 interleave” is almost always most efficient.

**Legal values:** Any positive integer; the legality of the value is disk-dependent.

**Errors:** `ioerror`

---

**LogicalSize**

`integer`

When set, this parameter specifies the size of the file system to be created and is used as an argument to the action carried out by `InitializeAction`. If `LogicalSize` is 0, `InitializeAction` uses a default size that is normally the size of the entire media within the device. For more information, see `InitializeAction`.

When queried, this parameter indicates the *current size* of the file system on the device in *pages*, where the *page* size is indicated by the parameter `BlockSize`. A value of 0 indicates that the device is not mounted.

If `LogicalSize` is set with a certain value and then the device is reformatted, a query of `LogicalSize` should return the value that was set. However, if the parameter is queried at any time before the media within the device is reformatted, it may return a different value from what was set because it may return the *current* size.

**Legal values:** Any non-negative integer or 0. The value of `LogicalSize` must be less than or equal to the value of `PhysicalSize`.

**Errors:** `rangecheck`, `typecheck`

---

**Mounted**

`boolean`

If this parameter is set to `true`, the system attempts to mount the device. If set to `false`, the system attempts to dismount the device. Mounting a device makes it known to the system and makes it at least readable, depending on the nature of the device. A device will not mount successfully if it does not contain a valid file system.

When queried, the return value indicates whether the device is *currently* mounted. Obtain the result of an attempted mount by querying `Mounted` immediately after setting it.
**Mounted** raises a **configurationerror** if it is set to *true* and mounting fails, or if it is set to *false* and dismounting fails.

**Legal values:**  *true, false*

**Errors:**  configurationerror, typecheck

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PhysicalSize</strong></td>
<td>integer <em>(Read-only)</em> This parameter indicates the size of the media in <em>pages</em>, where the page size is indicated by the parameter <strong>BlockSize</strong>. This parameter is only valid when the device is mounted (that is, Mounted is set to <em>true</em>). A value of 0 indicates that the device is not mounted.</td>
</tr>
<tr>
<td><strong>Removable</strong></td>
<td>boolean <em>(Read-only)</em> This parameter indicates whether the device supports removable media. Depending on how the removable media device operates, setting Mounted to <em>false</em> will either eject the media or allow its removal. When the media has been removed, it cannot be mounted again until it is re-inserted.</td>
</tr>
<tr>
<td><strong>Searchable</strong></td>
<td>boolean This parameter indicates whether the device participates in searches in file system operations that have specified a file name without specifying a device. See section 3.8.2, “Named Files” of the <em>PostScript Language Reference Manual, Second Edition</em> for more information. Note: Devices that support removable media (on some products) will initially have Searchable set to <em>false</em>. Searchable must be explicitly set to <em>true</em> to have the media be searched.</td>
</tr>
<tr>
<td><strong>SearchOrder</strong></td>
<td>integer This parameter indicates the priority at which the device participates when searching for a file in operations where no device has been specified. A lower integer indicates a higher priority. This parameter is ignored if the Searchable parameter is <em>false</em>.</td>
</tr>
</tbody>
</table>

**Legal values:**  *true, false*

**Errors:**  None.

**Legal values:**  Any non-negative integer.

**Errors:**  None.
<table>
<thead>
<tr>
<th>Key</th>
<th>Type</th>
<th>Semantics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>name</td>
<td><em>(Read-only)</em> This parameter always has a value of <code>/FileSystem</code>. For the general definition of <code>Type</code>, see Table 3.3 on page 55.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Legal value:</strong> <code>/FileSystem</code></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Errors:</strong> None.</td>
</tr>
<tr>
<td>Writeable</td>
<td>boolean</td>
<td><em>(Writeable, but only during a mount)</em> This parameter indicates whether the files on the device can be open for write access. This parameter can be set to <code>true</code> or <code>false</code> only during a mount (that is, when <code>Mounted</code> is being set to <code>true</code> in a call to <code>setdevparams</code>) and only if the media is not write-protected. If the media is already write-protected, this parameter is a constant equal to <code>false</code>. When the device is not mounted, this parameter indicates whether or not the drive will support writeable media.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Legal values:</strong> <code>true</code>, <code>false</code></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Errors:</strong> None.</td>
</tr>
</tbody>
</table>

Table 3.28  Parameters present in `%cartridge% or %rom% (/FileSystem) devices

<table>
<thead>
<tr>
<th>Key</th>
<th>Type</th>
<th>Semantics</th>
</tr>
</thead>
<tbody>
<tr>
<td>BlockSize</td>
<td>integer</td>
<td><em>(Read-only)</em> For the general definition of <code>BlockSize</code>, see Table 3.27 on page 110.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Legal values:</strong> Any non-zero positive integer (typically 1).</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Errors:</strong> None.</td>
</tr>
<tr>
<td>CartridgeID</td>
<td>integer</td>
<td><em>(Read-only)</em> This parameter indicates an ID that uniquely identifies this cartridge on a product. <code>CartridgeID</code> is used by the interpreter to determine if a cartridge has been removed from a slot and a different cartridge inserted.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Legal values:</strong> Any integer.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Errors:</strong> None.</td>
</tr>
<tr>
<td>CartridgeType</td>
<td>integer</td>
<td><em>(Read-only)</em> This parameter indicates the category classification of the cartridge. This classification is a registry maintained by Adobe Systems.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Legal values:</strong> Any integer.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Errors:</strong> None.</td>
</tr>
<tr>
<td>Parameter</td>
<td>Type</td>
<td>Description</td>
</tr>
<tr>
<td>--------------</td>
<td>-----------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Free</td>
<td>integer</td>
<td><em>(Read-only)</em> For the general definition of <strong>Free</strong>, see Table 3.27 on page 110.</td>
</tr>
<tr>
<td>HasNames</td>
<td>boolean</td>
<td><em>(Read-only)</em> For the general definition of <strong>HasNames</strong>, see Table 3.26 on page 109.</td>
</tr>
<tr>
<td>InitializeAction</td>
<td>integer</td>
<td>This parameter specifies an action for initializing the device. The following are valid values for writeable cartridges (setting InitializeAction for a read only cartridge has no effect):</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LogicalSize</td>
<td>integer</td>
<td>For the general definition of <strong>LogicalSize</strong>, see Table 3.27 on page 110.</td>
</tr>
<tr>
<td>Mounted</td>
<td>boolean</td>
<td>For the general definition of <strong>Mounted</strong>, see Table 3.27 on page 110.</td>
</tr>
<tr>
<td>PhysicalSize</td>
<td>integer</td>
<td><em>(Read-only)</em> For the general definition of <strong>PhysicalSize</strong>, see Table 3.27 on page 110.</td>
</tr>
<tr>
<td>Parameter</td>
<td>Type</td>
<td>Description</td>
</tr>
<tr>
<td>-------------</td>
<td>---------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Removable</td>
<td>boolean</td>
<td><em>(Read-only)</em> For the general definition of <strong>Removable</strong>, see Table 3.27 on page 110.</td>
</tr>
<tr>
<td>Searchable</td>
<td>boolean</td>
<td>For the general definition of <strong>Searchable</strong>, see Table 3.27 on page 110.</td>
</tr>
<tr>
<td>SearchOrder</td>
<td>integer</td>
<td>For the general definition of <strong>SearchOrder</strong>, see Table 3.27 on page 110.</td>
</tr>
<tr>
<td>Type</td>
<td>name</td>
<td><em>(Read-only)</em> This parameter always has a value of /FileSystem. For the general definition of <strong>Type</strong>, see Table 3.3 on page 55.</td>
</tr>
<tr>
<td>Writeable</td>
<td>boolean</td>
<td><em>(Writeable, but only during a mount)</em> For the general definition of <strong>Writeable</strong>, see Table 3.27.</td>
</tr>
</tbody>
</table>
3.5.4 %os% Device Parameters

The %os% device parameter set is present only in Display PostScript products or in other products which are UNIX-based. It is not present in printers. Since the UNIX file system is an entity separate from PostScript, most of the %os% parameter set has constant, read-only values. A minimal description set of parameters is provided primarily for consistency with other types of file systems.

Table 3.29 Parameters present in the %os% parameter sets

<table>
<thead>
<tr>
<th>Key</th>
<th>Type</th>
<th>Semantics</th>
</tr>
</thead>
<tbody>
<tr>
<td>HasNames</td>
<td>boolean</td>
<td>(Read-only) This parameter always returns a value of true. For the general definition of HasNames, see Table 3.26 on page 109.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Legal value: true</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Errors: None.</td>
</tr>
<tr>
<td>InitializeAction</td>
<td>integer</td>
<td>(Read-only) This parameter always returns a value of 0. For the general definition of InitializeAction, see Table 3.27 on page 110.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Legal value: 0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Errors: None.</td>
</tr>
<tr>
<td>Mounted</td>
<td>boolean</td>
<td>(Read-only) This parameter always returns a value of true. For the general definition of Mounted, see Table 3.27 on page 110.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Legal value: true</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Errors: typecheck</td>
</tr>
<tr>
<td>Removable</td>
<td>boolean</td>
<td>(Read-only) This parameter always returns a value of false. For the general definition of Removable, see Table 3.27 on page 110.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Legal value: false</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Errors: None.</td>
</tr>
<tr>
<td>Searchable</td>
<td>boolean</td>
<td>(Read-only) This parameter always returns a value of true. For the general definition of Searchable, see Table 3.27 on page 110.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Legal values: true, false</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Errors: None.</td>
</tr>
</tbody>
</table>
**SearchOrder** integer  This parameter *initially* returns a value of 2. For the general definition of SearchOrder, see Table 3.27 on page 110.

**Legal values:** Any non-negative integer.

**Errors:** None.

**Type** name  *(Read-only)* This parameter always returns a value of /FileSystem. For the general definition of Type, see Table 3.3 on page 55.

**Legal value:** /FileSystem

**Errors:** None.

**Writeable** boolean  *(Read-only)* This parameter always returns a value of true. For the general definition of Writeable, see Table 3.27 on page 110.

**Legal value:** true

**Errors:** None.

### 3.5.5 Scsi Bus Parameter Set

The parameters in Table 3.30 on page 118 are used to configure the SCSI bus. The (%Scsi%) parameter set is always present in a printer that has a SCSI bus, even if no devices are present on the SCSI bus. If more than one SCSI bus is present, the first is called %Scsi%, the second %ScsiB%, the third %ScsiC%, and so on. Changes to SCSI parameters do not take effect until the next time the system is initialized.

**Table 3.30  Parameters present in the %Scsi% parameter sets**

<table>
<thead>
<tr>
<th>Key</th>
<th>Type</th>
<th>Semantics</th>
</tr>
</thead>
<tbody>
<tr>
<td>BootDelay(^\d)</td>
<td>integer</td>
<td>This parameter indicates how long the disk I/O driver should wait (in seconds) during system initialization for the disk to spin up, before determining that a disk is not present or not responding. A value of 0 means that there is no waiting for the disk to spin up. You should set this parameter in accordance with the characteristics of the disk attached to the printer.</td>
</tr>
</tbody>
</table>

**Legal values:** 0 or any positive integer.

**Errors:** None.
**CheckParity**  boolean  This parameter indicates if parity on the SCSI bus is to be checked. The default value is usually *true*.

**Warning**  Setting *CheckParity* to *true* on products that do not support parity checking would be unwise. Refer to the individual product addendum for information on whether or not a given product can do this checking.

**Legal values:**  *true, false*

**Errors:**  None.

**InitiatorId**†  integer  This parameter is the address on the SCSI bus used by the printer when it serves as initiator. The default value is usually 7.

**Legal values:**  Any integer in the range 0 to 7.

**Errors:**  configurationerror

**Poll**†  integer  This parameter is a bit-encoded specification of which addresses on the SCSI bus should be polled by the printer when it looks for disks during system initialization. For example, a 1 in bit 0 means poll for %disk0%. Any bits in this mask which correspond to addresses that are used as the printer’s *InitiatorId* or *TargetId*, as the *InitiatorId* for other hosts on the bus, or as the *TargetId* of peripherals belonging to other hosts on the bus should be set to 0 (meaning “do not poll”). If the bit is set to poll the address corresponding to the printer's *InitiatorId* or *TargetId*, a configurationerror is generated. If the bit is set to poll an address that shouldn’t be polled, anomalies may occur on the bus. *Poll* is expressed as an integer bit mask in the range 0 to 254 (never 255 since all bits cannot be on—one bit must be reserved for *InitiatorId*). The default value is usually 127 (7F in hexadecimal).

**Legal values:**  An integer bit mask in the range 0 to 254.

**Errors:**  configurationerror

**TargetId**†  integer  This parameter is the SCSI bus address reserved by the printer for use as the %ScsiComm% communications channel. This address may be the same as the *InitiatorId*.

**Legal values:**  An integer in the range 0 to 7.

**Errors:**  configurationerror
Type name (Read only) This parameter always has a value of /Parameters. For the general definition of Type, see Table 3.3 on page 55.

Legal value: /Parameters

Errors: None.

* = present only when ScsiComm is used on the bus
† = present only when disks are present on the bus

3.5.6 Engine Device Parameters

Table 3.31 on page 120 lists the parameters associated with the engine device.

Table 3.31 Parameters present in the %Engine% parameter set

<table>
<thead>
<tr>
<th>Key</th>
<th>Type</th>
<th>Semantics</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSizeStandard name</td>
<td>This parameter assists the engine in determining the physical dimensions of the paper when B4 or B5 paper is selected. There are two choices for the value of BSizeStandard:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>/ISO: ISO is the abbreviation for the International Standards Organization, which is the international body that defines the “metric” paper sizes (A4, A3, B5, B4, B3 and so forth). These are the paper sizes used in Europe and much of the rest of the world. The table below lists the dimensions for the B4 and B5 paper sizes as defined by ISO:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Paper Size</td>
<td>Dimensions</td>
</tr>
<tr>
<td></td>
<td>B4</td>
<td>250 x 353 mm. or 709 x 1001 default units.</td>
</tr>
<tr>
<td></td>
<td>B5</td>
<td>176 x 250 mm. or 499 x 709 default units.</td>
</tr>
<tr>
<td></td>
<td>/JIS: JIS is the abbreviation for the Japanese Institute for Standardization, the national body which specifies standards for use in the country of Japan. Japan also uses the standard “A” paper sizes. However, they use a slightly different definition of the “B” paper sizes. The table below lists the dimensions for the B4 and B5 paper sizes for JIS:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Paper Size</td>
<td>Dimensions</td>
</tr>
<tr>
<td></td>
<td>B4</td>
<td>257 x 364 mm. or 729 x 1032 default units.</td>
</tr>
<tr>
<td></td>
<td>B5</td>
<td>182 x 257 mm. or 516 x 729 default units.</td>
</tr>
</tbody>
</table>

Note: In the above tables, a “default unit” denotes 1/72 of an inch.

Legal values: /ISO, /JIS

Errors: rangecheck
### Darkness

**real**  
This parameter controls the overall lightness or darkness of the rendered page. This parameter does not affect the frame buffer, nor does it have any computational overhead. Legal values are real numbers from 0.0 through 1.0. A value of 0.0 means minimum darkness, 1.0 means maximum darkness. This option is provided in some products whose marking hardware allows software control of colorant application. The default value is product dependent.

**Legal values:** Real numbers in the range [0.0 – 1.0] inclusive.

**Errors:** rangecheck

### PageCount

**integer**  
This parameter is a count of all pages fed by the engine. The count includes all of the pages successfully printed as well as the pages that were jammed or spoiled. The value of PageCount is determined by querying the engine.

**Legal values:** Any non-negative integer or 0.

**Errors:** typecheck

### TimeToStandby

**integer**  
After the specified number of minutes, the engine will go into a “standby” mode, in which it stops trying to keep itself ready to print a page; that is, it stops keeping its fuser hot. The next time the controller sends a feed or prefeed command, the engine will enter the “warming up” state until it is ready to print. The range of acceptable values for TimetoStandby are product-specific. An unallowed value is rounded to the nearest allowed value. Specifying a value of 0 for this parameter has the effect of never letting the printer enter the “standby” mode.

**Legal values:** Product-specific. Typically an integer in the range 0 – 720.

**Errors:** rangecheck

### Type

**name**  
(Read-only) This parameter always has a value of /Parameters. For the general definition of Type, see Table 3.3 on page 55.

**Legal value:** /Parameters

**Errors:** None.

---

### 3.5.7 Console Device Parameters

The %Console% device parameter set provides a means of setting and controlling characteristics of the operator console of an output device which includes the Adobe PostScript language. The keys currently defined in this set provide an extensible way of selecting the natural language (for example,
English, Japanese) in which information will be displayed on the operator console. Table 3.32 on page 122 lists the parameters associated with the console device.

Table 3.32 Parameters present in the %Console% parameter set

<table>
<thead>
<tr>
<th>Key</th>
<th>Type</th>
<th>Semantics</th>
</tr>
</thead>
<tbody>
<tr>
<td>CharSet</td>
<td>name</td>
<td>This parameter specifies the name of a character set. This may be either the name of a standard character set or a vendor specific character set. If it is a standard character set, the name will designate the standard (and where applicable, the variant within the standard); for example, ISO-646-ISV (for ASCII). If it is vendor specific, then the name should designate the vendor and the identification of the character set used by that vendor; for example, IBM-Codepage-550. Because the same character set may be known by several names (for example, ASCII and ISO-646-ISV), aliases are allowed for character set names; that is, the same character set may be designated by more than one name.</td>
</tr>
</tbody>
</table>

**Legal values:**

<table>
<thead>
<tr>
<th>Value</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>/ASCII</td>
<td>This is the same as ISO-646-IRV except for the “$.”</td>
</tr>
<tr>
<td>/ISO-646-ISV</td>
<td>This is ASCII with a currency symbol instead of “$.”</td>
</tr>
<tr>
<td>/ISO-8859-1</td>
<td>This is the ISO 8-bit Latin-1 characters set.</td>
</tr>
<tr>
<td>/Adobe-Japan1-0</td>
<td>This is the CID-keyed Japanese Character Collection.</td>
</tr>
</tbody>
</table>

**Errors:** rangecheck

<table>
<thead>
<tr>
<th>Key</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Country</td>
<td>name</td>
</tr>
</tbody>
</table>

This parameter indirectly specifies the dialect of the language by referring to the country in which the dialect is used. The country is indicated using a name which is a two character country code from the ISO 3166 Standard (these codes represent the names of countries).

**Legal values:** (source - ISO 3166)

<table>
<thead>
<tr>
<th>Value</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>/AR</td>
<td>Argentina</td>
</tr>
<tr>
<td>/AU</td>
<td>Australia</td>
</tr>
<tr>
<td>/BE</td>
<td>Belgium</td>
</tr>
<tr>
<td>/BO</td>
<td>Bolivia</td>
</tr>
<tr>
<td>/BR</td>
<td>Brazil</td>
</tr>
<tr>
<td>/CA</td>
<td>Canada</td>
</tr>
<tr>
<td>/CL</td>
<td>Chile</td>
</tr>
<tr>
<td>/CN</td>
<td>Peoples Republic of China</td>
</tr>
<tr>
<td>/TW</td>
<td>Taiwan</td>
</tr>
<tr>
<td>Language name</td>
<td>Meaning</td>
</tr>
<tr>
<td>---------------</td>
<td>----------------------------------------------</td>
</tr>
<tr>
<td>/CS</td>
<td>Czech</td>
</tr>
<tr>
<td>/DA</td>
<td>Danish</td>
</tr>
<tr>
<td>/DE</td>
<td>German</td>
</tr>
<tr>
<td>/EL</td>
<td>Greek</td>
</tr>
<tr>
<td>/EN</td>
<td>English</td>
</tr>
<tr>
<td>/FI</td>
<td>Finnish</td>
</tr>
<tr>
<td>/FR</td>
<td>French</td>
</tr>
<tr>
<td>/GA</td>
<td>Irish</td>
</tr>
<tr>
<td>/HU</td>
<td>Hungarian</td>
</tr>
<tr>
<td>/IT</td>
<td>Italian</td>
</tr>
</tbody>
</table>

Errors: typecheck
Type name  (Read-only) This parameter always has a value of /Parameters. For the general definition of Type, see Table 3.3 on page 55.

Legal value: /Parameters

Errors: None.

3.5.8 Emulator Parameters

An emulator is an alternative interpreter for the input stream. Some PostScript printers have the ability to emulate other printers. The Interpreter device parameter (described in Table 3.4 on page 62) specifies what rules a printer will use to interpret the stream of input characters in order to make marks on the page. If the value of the Interpreter parameter is something other than /PostScript, the printer is being asked to emulate the functions of some other printer.

For example, the Diablo ® 630 is a daisy wheel printer which has very limited capabilities for putting marks on a page. The input stream is code for characters; the printer assumes one character to follow another until a carriage return or line feed is reached.

Thus, to emulate a Diablo630 printer, the code:

`(Serial) `<</Interpreter /Diablo630 /Protocol /Raw>> setdevparams`

gives Diablo630-like functionality to the serial input channel on a PostScript printer that has a Diablo630 emulator. This functionality is invoked at the next job boundary.

The LaserJet 4 emulator, the LaserJet III emulator, the LaserJet IIP emulator, the color version of the HP7475A plotter emulator, and the Diablo630 emulator have parameters that allow the user to specify default values. The emulator parameters can be set with the setdevparams operator and read
with the `currentdevparams` operator. The LaserJet 4 emulator has a device parameter set called `%PCL%` that breaks the tradition of naming these sets using the emulator name.

Tables 3.33 through 3.37 describe the parameters for the LaserJet 4 emulator, the LaserJet III emulator, the LaserJet IIP emulator, the color version of the HP7475A plotter emulator, and the Diablo630 emulator.

### Table 3.33 Parameters present for the `%PCL%` device (LaserJet 4 emulator)

<table>
<thead>
<tr>
<th>Key</th>
<th>Type</th>
<th>Semantics</th>
</tr>
</thead>
<tbody>
<tr>
<td>MaxPermanentStorage</td>
<td>integer</td>
<td>This parameter specifies the maximum amount of memory to be dedicated for use by the PCL emulator.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Legal values:</strong> Product-dependent integer.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Errors:</strong> rangecheck, typecheck</td>
</tr>
<tr>
<td>Type</td>
<td>name</td>
<td><em>(Read-only)</em> <strong>Type</strong> has the value of Emulator. For the general definition of <strong>Type</strong>, see Table 3.3 on page 55.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Legal value:</strong> /Emulator</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Errors:</strong> None.</td>
</tr>
</tbody>
</table>

### Table 3.34 Parameters present for the `%LaserJetIII%` device (LaserJet III emulator)

<table>
<thead>
<tr>
<th>Key</th>
<th>Type</th>
<th>Semantics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copies</td>
<td>integer</td>
<td>This parameter specifies the default number of copies of a document to be printed.</td>
</tr>
<tr>
<td>Duplex</td>
<td>integer</td>
<td>This parameter sets the initial state of duplexing within a PCL job for printers which are capable of duplex operation. Language commands within the print stream can override the setting of this parameter. Acceptable values for <strong>Duplex</strong> are listed below.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Value</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FontFixed</td>
<td>boolean</td>
<td>If <code>true</code>, a fixed pitch font (for example, Courier) is requested. If it is <code>false</code>, a proportional spaced font is requested.</td>
</tr>
</tbody>
</table>
**FontHeight** integer  This is the height of the font, applicable to scalable proportional fonts. This value is a point-size quantity, multiplied by 100 to avoid floating-point representation. A font that is 8.5 points in height would have the value “850” in this parameter. Note that this value is only used if the font specified by the combination **FontSource** and **FontNumber** is scalable and proportional.

**FontItalic** boolean  If true, an italic or oblique font is requested.

**FontNumber** integer  This parameter selects the default font within the current **FontSource**. Applicable values are determined based upon the **FontSource** and the number of fonts that are available from that font source. Use font numbers found printed on the font sample page. If a **FontNumber** is specified that is outside the range, the value 0 is used instead.

**FontPitch** integer  This is the number of characters-per-inch for mono-space scalable fonts. The value is multiplied by 100 to avoid floating-point representations. Thus, to select a 12-pitch font, use the value 1200. This parameter is only used by the PCL5 interpreter if the font specified by the combination **FontSource** and **FontNumber** is scalable and mono-space.

**FontSource** integer  This parameter selects the source of the desired font. Current values are:
- 0 = Internal font, 1 = Downloaded font. Additionally, the value -1 is used when the default font is not to be selected. If the -1 value is used, then the default font is selected via an obsolete method which uses the parameters **FontFixed**, **FontItalic**, **FontWeight** and **FontTypeface**. If it is not -1, these four parameters are not used to select the default font.

**FontSymbolSet** integer  This value is the equivalent of the Symbol Set code. The applicable values are described in Hewlett-Packard manuals. Note that this value is only consulted if the font specified by the combination FontSource and FontNumber is an unbound font. There are 35 legal values.

<table>
<thead>
<tr>
<th>Value</th>
<th>Symbol Set Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>OD (ISO-60 Norweg)</td>
</tr>
<tr>
<td>6</td>
<td>OF (ISO-25 French)</td>
</tr>
<tr>
<td>7</td>
<td>OG (German)</td>
</tr>
<tr>
<td>9</td>
<td>OI (ISO-15 Italian)</td>
</tr>
<tr>
<td>11</td>
<td>OK (ISO-14 JISASCII)</td>
</tr>
<tr>
<td>14</td>
<td>ON (ECMA-94 Latin 1)</td>
</tr>
<tr>
<td>19</td>
<td>OS (ISO-11 Swedish)</td>
</tr>
<tr>
<td>21</td>
<td>OU (ISO-6 ASCII)</td>
</tr>
<tr>
<td>36</td>
<td>1D (ISO-61 Norweg)</td>
</tr>
<tr>
<td>37</td>
<td>1E (ISO-4 UK)</td>
</tr>
<tr>
<td>38</td>
<td>1F (ISO-69 French)</td>
</tr>
<tr>
<td>39</td>
<td>1G (ISO21 German)</td>
</tr>
<tr>
<td>51</td>
<td>1S (Spanish)</td>
</tr>
<tr>
<td>53</td>
<td>1U (Legal)</td>
</tr>
<tr>
<td>75</td>
<td>2K (ISO -57 Chinese)</td>
</tr>
<tr>
<td>83</td>
<td>2S (ISO-17 Spanish)</td>
</tr>
<tr>
<td>85</td>
<td>2U (ISO-2 IRV)</td>
</tr>
</tbody>
</table>
FontTypeface integer This parameter describes the typeface (for example, Times, Helvetica, Palatino). The integer value (which can be up to 16 bits) comes from a table published by Hewlett-Packard.

FontWeight integer This value, between -7 and +7, describes the “weight” or “boldness” of the font. -7 is very light and +7 is very bold.

Landscape boolean If true, the default orientation of the page is landscape unless otherwise specified in the PCL description of the page.

LineWrap boolean If true, long lines wrap to the next line. If false, long lines are truncated.

MaxLJMemory integer This parameter specifies the maximum amount of memory that the emulator will ask for from the page allocator to store downloaded fonts and macros. This limit is important because the emulator will acquire memory at the expense of the PostScript interpreter’s memory needs, such as VM or the font cache. MaxLJMemory is rounded to the nearest multiple of a memory block size (8192 bytes).

PaperSize integer This parameter sets the paper size to be used within the PCL job. This parameter has results similar to the “paper size command” ([Esc]61#A) within the PCL5 language.

The PaperSize parameter can specify any of the supported page sizes available to the LaserJet III printer. In addition, there is a special value, -1, which means “unspecified.” This allows the printer to draw paper from the default slot. The paper sizes available to the LaserJet III printer and their associated integer values are listed below.
<table>
<thead>
<tr>
<th>Value</th>
<th>Paper Size</th>
<th>Dimensions (in default units)</th>
</tr>
</thead>
<tbody>
<tr>
<td>–1</td>
<td>Unspecified</td>
<td>Default slot</td>
</tr>
<tr>
<td>1</td>
<td>Executive</td>
<td>522 x 756</td>
</tr>
<tr>
<td>2</td>
<td>Letter</td>
<td>612 x 792</td>
</tr>
<tr>
<td>3</td>
<td>Legal</td>
<td>612 x 1008</td>
</tr>
<tr>
<td>26</td>
<td>A4</td>
<td>595 x 842</td>
</tr>
<tr>
<td>80</td>
<td>Monarch Envelope</td>
<td>279 x 540</td>
</tr>
<tr>
<td>81</td>
<td>Com-10 Envelope</td>
<td>297 x 684</td>
</tr>
<tr>
<td>90</td>
<td>International DL Envelope</td>
<td>312 x 624</td>
</tr>
<tr>
<td>91</td>
<td>International C5 Envelope</td>
<td>459 x 649</td>
</tr>
</tbody>
</table>

*Note: In the above tables, a “default unit” denotes 1/72 of an inch.*

The default value of `PaperSize` is –1, indicating “unspecified,” the default tray.

**TopMargin** integer Amount of white space at the top of the page, specified in IPU (1/7200 inch). The default is 3600 (1/2 inch).

**Type** name **Type** has the value of `/Emulator`. For the general definition of **Type**, see Table 3.3 on page 55.

**VMI** integer This parameter specifies the space between lines of text in 1/7200 inch units.

**WaitTimeout** integer This parameter specifies the wait time-out (in seconds) after which a page is ejected. The default is 30.

---

**Table 3.35 Parameters present for the %LaserJetIIP% device (LaserJet IIP emulator)**

<table>
<thead>
<tr>
<th>Key</th>
<th>Type</th>
<th>Semantics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copies</td>
<td>integer</td>
<td>This parameter specifies the default number of copies of a document to be printed.</td>
</tr>
<tr>
<td>FontFixed</td>
<td>boolean</td>
<td>If true, a fixed pitch font is requested. If it is false, a proportional spaced font is requested.</td>
</tr>
<tr>
<td>FontHeight</td>
<td>real</td>
<td>This parameter specifies the desired font height in 1/72 of an inch units.</td>
</tr>
<tr>
<td>FontItalic</td>
<td>boolean</td>
<td>If true, an italic (or oblique) font is requested.</td>
</tr>
<tr>
<td>FontPitch</td>
<td>real</td>
<td>This parameter is used only if <code>FontFixed</code> is true. <code>FontPitch</code> takes a real number specifying the number of characters per inch.</td>
</tr>
<tr>
<td>FontSymbolSet</td>
<td>integer</td>
<td>This parameter specifies the mapping from 7 or 8 bit numbers to glyphs that appear on the page. The value of this parameter is the number associated with this field in a downloaded font.</td>
</tr>
</tbody>
</table>
**FontTypeface** integer The value of **FontTypeface** is the number assigned to a particular font (for example, Times, Helvetica, Palatino). The integer value (which can be up to 16 bits) comes from a table published by Hewlett-Packard.

**FontWeight** integer This parameter specifies the “weight” or “boldness” of desired font. The parameter ranges from -7 to +7, where -7 is very light and +7 is very bold.

**Landscape** boolean If *true*, the initial orientation of the page is landscape instead of portrait.

**LinesPerInch** real This parameter specifies the default value for the “vertical motion index.” This determines the interline spacing (and hence the number of lines on the page).


**MaxLJMemory** integer This parameter allows the user to limit the amount of memory that the LaserJet IIP emulator will use for its needs. This limit is important because the emulator will acquire memory at the expense of the PostScript interpreter’s memory needs, such as VM or the font cache. Within a given emulation job, the LaserJet IIP emulator will use temporary memory in excess of **MaxLJMemory** to hold fonts and macros.

**Type** name **Type** has the value of */Emulator*. For the general definition of **Type**, see Table 3.3 on page 55.

**WaitTimeout** integer The value of **WaitTimeout** (in seconds) is used by the LaserJet IIP emulator as the minimum amount of time the emulator will wait for additional incoming characters before declaring the job finished. A value of 0 indicates to the emulator that it should wait forever. The parameter typically has a default value of 30.

---

### Table 3.36 Parameters present for the color version of the %HP7475A% device (HP7475A plotter emulator)

<table>
<thead>
<tr>
<th>Key</th>
<th>Type</th>
<th>Semantics</th>
</tr>
</thead>
<tbody>
<tr>
<td>ColorSetup</td>
<td>string</td>
<td>This parameter allows the user to change the default pen color. The <strong>ColorSetup</strong> parameter is a string which contains a list of numbers. There must be a multiple of five numbers in the string. Each set of five specifies the pen number (integer), width of the pen’s line in millimeters (real), the red color value (real, between 0 and 1.0), the green color value (real, between 0 and 1.0), and the blue color value (real, between 0 and 1.0).</td>
</tr>
<tr>
<td>Type</td>
<td>name</td>
<td><strong>Type</strong> has the value of <em>/Emulator</em>. For the general definition of <strong>Type</strong>, see Table 3.3 on page 55.</td>
</tr>
</tbody>
</table>
Table 3.37 Parameters present for the %Diablo630% device (Diablo630 emulator)

<table>
<thead>
<tr>
<th>Key</th>
<th>Type</th>
<th>Semantics</th>
</tr>
</thead>
<tbody>
<tr>
<td>AutoLF</td>
<td>boolean</td>
<td>If <em>true</em>, automatic line feeding is specified.</td>
</tr>
<tr>
<td>BoldFontName</td>
<td>name</td>
<td>This parameter specifies the name of the PostScript language font used for boldface printing when ECS is <em>false</em>.</td>
</tr>
<tr>
<td>ECS</td>
<td>boolean</td>
<td>If <em>true</em>, the printer emulates the IBM PC Graphics ECS (extended character set) print wheel. If <em>false</em>, the printer emulates the 96-character plastic print wheel.</td>
</tr>
<tr>
<td>ECSDataWidth</td>
<td>integer</td>
<td>Selects 7- or 8-bit data when ECS is <em>true</em>.</td>
</tr>
<tr>
<td>Pitch</td>
<td>integer</td>
<td>The font width and initial HMI (Horizontal Motion Index) is determined from Pitch. Pitch can have a value of 10, 12 or 15. Any other value will result in a rangecheck error.</td>
</tr>
<tr>
<td>RegFontName</td>
<td>name</td>
<td>This parameter specifies the name of the PostScript language font used for regular printing when ECS is <em>false</em>.</td>
</tr>
<tr>
<td>Type</td>
<td>name</td>
<td><em>Type</em> has the value of /Emulator. For the general definition of Type, see Table 3.3 on page 55.</td>
</tr>
</tbody>
</table>

3.6 The Fax Environment Interface

This section describes the facilities available for setting, controlling and examining the fax environment shared by all jobs and all users connected to the fax printer. These facilities fall into two categories: fax device parameters and administrative resources.

3.6.1 Fax Device Parameters

Several device settings can be established that control various aspects of the facsimile transmission and receipt. These are stored within the fax printer in non-volatile memory. They persist through multiple fax jobs and are consistent across multiple users connected to a fax printer. These device settings are accessed by means of the %Fax% and %Calendar% device parameter sets which are accessed through the currentdevparams and setdevparams operators (see 3.5, “Device Parameters”).

3.6.2 The %Fax% Device

The %Fax% device is used to control the general, global operation of the fax capability of the fax printer. The semantics of the various parameters in the %Fax% device parameter set are described in Table 3.38 on page 131.
Table 3.38 Parameters present in the %Fax% parameter set

<table>
<thead>
<tr>
<th>Key</th>
<th>Type</th>
<th>Semantics</th>
</tr>
</thead>
</table>
| ActivityReport     | boolean| If true, then an activity report is printed automatically whenever the activity buffer is full. If false, then no activity report is printed automatically. Printing of the report does not clear the recorded information; the oldest entries are overwritten with new entries. Reports may always be generated by request from the host computer (see also section 3.6.4, “Administrative Resources.”). The default is false.  
Legal values: true, false  
Errors: typecheck |
| DefaultCaptionOn   | boolean| This parameter determines whether the default page caption routine will place captions on the fax pages. The default value is true.  
Legal values: true, false  
Errors: typecheck |
| DefaultConfirmOn   | boolean| This parameter determines whether confirmation reports are produced by the default procedures. The default value is true.  
Legal values: true, false  
Errors: typecheck |
| DefaultCoversOn    | boolean| This parameter determines whether the default page cover procedure should actually generate cover pages. The default value is true.  
Legal values: true, false  
Errors: typecheck |
| DefaultResolution  | integer| If the value of FaxType in the FaxOptions dictionary is null, then the value of this parameter determines the resolution of the raster fax being prepared. It must have a value of 0 or 1; 1 is the default and specifies to use fine ITU group 3 resolution.  
Legal values: 0, 1  
Errors: rangecheck, typecheck |
**DefaultRetryCount** integer  This integer parameter is the number of retries attempted if the value of **MaxRetries** in the options dictionary is null. It must be in the range of 0 to 100 inclusive. The default value is 0.

**Legal values:** Any integer in the range of 0 to 100 inclusive.

**Errors:** rangecheck, typecheck

**DefaultRetryInterval** integer  If **RetryInterval** in the options dictionary has a value of null, this value is used as the number of minutes to wait between retries. It has a default value of 3, and must be in the range of 1 to 60.

**Legal values:** Any positive integer in the range of 1 to 60.

**Errors:** rangecheck, typecheck

**DialToneWaitPeriod** integer  At the onset of dialing, and whenever a “w” is encountered in the dialing string, the fax printer waits for a dial tone. This parameter indicates the maximum number of seconds to wait each time. If no dial tone is heard within this period of time, the wait is considered a failure. The default value is 1.

**Legal values:** Any positive integer in the range of 1 to 10.

**Errors:** rangecheck, typecheck

**Group3Adjustment** integer  This parameter determines how received raster faxes are processed for printing.

A value of 0 causes the received raster to be upsampled 2-to-3 (for fine mode). If the resulting image is too long to fit on one page of the selected medium, a continuation page will be printed containing the remainder of the page, assuming it is at least 1/10 inch long. The medium is selected using **PageSize Policy** 5.

A value of 1 invokes a method that treats the raster as if it were 300x300 dpi (for fine raster data). The net effect of this is that pages are printed at approximately two thirds original size with no continuation pages—even for legal on letter. The default medium for the **FaxReceived** device is used.

The default value is 2. A value of 2 causes the raster to be scaled for best fit on a single page that is selected using **PageSize Policy** 5. Halftones may be severely marred by this technique.
Values of 10001 and above are used to invoke a user-programmable procedure. The procedure `ProgrammableGroup3Adjustments` contained in the writeable `ProcSet` instance `FaxDefaultProcs` is called. When this procedure is called, a dictionary on the dictionary stack contains the following entries describing the raster needing to be printed:

<table>
<thead>
<tr>
<th>Key</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>firstNonblank</code></td>
<td>Integer line number of first non-blank line in the raster data.</td>
</tr>
<tr>
<td><code>lastNonBlank</code></td>
<td>Integer line number of last non-blank line.</td>
</tr>
<tr>
<td><code>nRows</code></td>
<td>Integer number of scan lines in the raster data.</td>
</tr>
<tr>
<td><code>highres</code></td>
<td>Boolean saying whether the raster data is in fine mode or not.</td>
</tr>
<tr>
<td><code>strm</code></td>
<td>A file object that may be read to obtain the raster data.</td>
</tr>
</tbody>
</table>

**Legal values:** Any integer in the range of 0 to 20000.

**Errors:** `rangecheck, typecheck`

**ID** string Provides the string by which the fax machine identifies itself to other fax machines. It is usually set to the company name or the telephone number of the line to which the machine is attached. The string can have up to 20 characters and is defined according to the 1988 CCITT fax protocol.

**Legal values:** A string of up to 20 characters.

**Errors:** `limitcheck, typecheck`

**LocalLanguage** string This parameter provides the name of the natural language to use when printing transmission reports and activity logs. The default is (English). The other values supported by all version 2014 (or greater) products with fax support are (Dutch), (French), (German), (Italian) and (Spanish). Translation dictionaries for other languages may also be loaded into the printer. When a report is to be generated, if a translation dictionary for the named language is not present, the one for English will be used. For more information on translation dictionaries see section 3.6.5.

**Legal values:** A string of up to 50 characters.

**Errors:** `limitcheck, typecheck`

**MaxFaxBuffer** integer This parameter sets an upper bound on the number of bytes of printer RAM that may be used for incoming and outgoing fax data. It is only relevant if `StorageDevice` has a value of (%ram%). This is only an upper limit; no space is set aside based on this parameter’s value. The minimum value for
MaxFaxBuffer is 350000. The default and maximum values are product specific and may be a function of the actual amount of memory in the fax printer.

Legal values:  Product dependent.

Errors:  rangecheck, typecheck

PostScriptPassword  string  This password is used by the receiving machine to determine if the sender is authorized to send PostScript language programs. In certain situations, a particular machine may only want to receive PostScript language programs from certain other machines. For this reason, the PostScriptPassword exists. It has a maximum length of 32 characters. Its current value is not returned by the currentdevparams operator. Instead the string (INVALID) is always shown as the value associated with this key. Attempts to set the PostScriptPassword to the string (INVALID) will be ignored.

When a telephone connection is established and the receiving machine is willing to accept PostScript language files (that is, ReceivePostScript is true), the sending machine is asked to encrypt some arbitrary value (issued by the receiver) using the PostScriptPassword from the options dictionary passed to the faxsendps operator. The receiver then encrypts the arbitrary value with its own PostScriptPassword and compares the encrypted results.

If the encrypted results match, the PostScript language file transmission can take place. If the encrypted results do not match, the receiver refuses to accept the PostScript language file transmission from the sender and the telephone connection is broken. Depending upon the value of RevertToRaster in the FaxOptions dictionary of the sender, the sending machine may or may not revert to a raster image fax transmission at this point.

This password mechanism can be sidestepped if the PostScriptPassword value in the receiving machine is the empty string. In this case, all jobs received in PostScript language form are accepted (if the value of ReceivePostScript is true). However, when they are run, attempts to change system or device parameters will fail unless accompanied with a password equal to the SystemParamsPassword. If the SystemParamsPassword is not set, attempts to change system or device parameters will fail. Those jobs will also not be able to generate outbound faxes themselves or to access any of the FaxAdminOps facilities.

Legal values:  A string of up to 32 characters.

Errors:  invalidaccess, limitcheck, typecheck
**ProtocolVersion** string *(Read only)* This parameter reports the version number of the T.30 fax code present in the printer.

**Legal values:** string

**Errors:** None.

**ReceivePostScript** boolean If *true*, the machine is willing to receive and execute fax jobs that are PostScript language files. This is the default. If *false*, then any attempt to send PostScript language files to this machine is rejected. Only faxes in ITU compressed raster form are accepted.

**Legal values:** *true, false*

**Errors:** typecheck

**Rings** integer In order to allow a telephone to be shared by the fax printer and a person, the printer needs to let the phone ring several times to give the person time to answer. If the phone is not shared, it is desirable for the printer to answer the phone as quickly as possible. The integer value supplied with this key determines how many rings of the telephone are to be ignored before the fax printer answers. For example if the value is 2 the printer will attempt to answer the phone just after the second ring.

**Legal values:** Any integer in the range of 1 to 10.

**Errors:** rangecheck, typecheck

**ServiceEnable** integer This parameter acts as the master on-off control for fax send and receive functions. The parameter takes an integer value with these meanings:

<table>
<thead>
<tr>
<th>Code</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Fax completely disabled.</td>
</tr>
<tr>
<td>1</td>
<td>Send only enabled.</td>
</tr>
<tr>
<td>2</td>
<td>Receive only enabled.</td>
</tr>
<tr>
<td>3</td>
<td>Both send and receive enabled.</td>
</tr>
</tbody>
</table>

The default value is 3. If receive is not enabled, then the ringing phone will not be answered. If send is not enabled, then execution of `faxsendps` or any execution of `setpagedevice` that attempts to establish a `/Fax OutputDevice` will fail and a PostScript `ioerror` will be raised.

**Legal values:** 0, 1, 2, or 3

**Errors:** rangecheck, typecheck
**Speaker** integer This parameter controls the use of the speaker associated with the fax modem. The use of the speaker is determined by an integer code:

<table>
<thead>
<tr>
<th>Code</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Off at all times.</td>
</tr>
<tr>
<td>1</td>
<td>On until a connection is established, 10-20 seconds.</td>
</tr>
<tr>
<td>2</td>
<td>On at all times.</td>
</tr>
</tbody>
</table>

The default value is 1 which allows a human to monitor connections being made for both transmissions and receptions.

Legal values: 0, 1, or 2

Errors: rangecheck, typecheck

**StorageDevice** string This parameter designates the name of the storage device used to hold received fax data (either PostScript language files or raster) before it is printed, and to hold outgoing fax data (either PostScript language files or raster) before it is transmitted. The default is a value of (%ram%) which means that printer RAM is to be used. For devices other than %ram% (such as a disk), a parameter set must exist and the parameters Mounted and Writeable must be defined and set to true.

If there is a disk on the fax printer, setting this parameter to its name (for example, (%disk0%)) will mean that the disk is used for storage. Because there is typically more space available on disk than in RAM, this will mean that longer faxes can be received and that longer faxes can be transmitted with just one phone call. Changes to this parameter do not take effect until the fax printer is power-cycled or rebooted.

Legal values: String name of any writeable storage device.

Errors: ioerror, limitcheck

**Type** name (Read only) This parameter always has a value of /Parameters. For the general definition of Type, see Table 3.3 on page 55.

Legal value: /Parameters

Errors: None.

**WaitForDialTone** boolean This parameter designates whether the fax printer will wait for a dial tone before it starts to dial. If WaitForDialTone is false, the call is dialed regardless of whether a dial tone is heard. If WaitForDialTone is true, then the fax printer will listen (for up to DialToneWaitPeriod seconds) for a dial
tone. If one is heard, dialing will start. If one is not heard, then the call is considered a failure similar to a busy signal (that is, the retry count is decremented and so forth). The default value is true.

**Legal values:** true, false

**Errors:** typecheck

### 3.6.3 The %Calendar% Device

The fax printer has a battery powered time-of-day clock that is used to provide the time for cover sheets and scheduling fax transmissions. This clock must be set once initially, and then twice a year to follow daylight savings time.

The string (%Calendar%) identifies the calendar device and the entries in the dictionary describe the local date and time. The entries in the dictionary are described in Table 3.39 on page 137.

<table>
<thead>
<tr>
<th>Key</th>
<th>Type</th>
<th>Semantics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day</td>
<td>integer</td>
<td>This parameter represents the day of the month.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Legal values:</strong> An integer in the range of 1 to 31.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Errors:</strong> rangecheck</td>
</tr>
<tr>
<td>Hour</td>
<td>integer</td>
<td>This parameter represents the hour.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Legal values:</strong> An integer in the range of 0 to 23.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Errors:</strong> rangecheck</td>
</tr>
<tr>
<td>Minute</td>
<td>integer</td>
<td>This parameter represents the minute.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Legal values:</strong> An integer in the range of 0 to 59.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Errors:</strong> rangecheck</td>
</tr>
<tr>
<td>Month</td>
<td>integer</td>
<td>This parameter represents the month.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Legal values:</strong> An integer in the range of 1 to 12.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Errors:</strong> rangecheck</td>
</tr>
</tbody>
</table>
Running  boolean  This parameter turns the clock off and on. When turning the clock on (setting the value to \textit{true}), the time elements should also be set at the same time in order to avoid a \texttt{rangecheck} error.

The clock must be on in order to set the time. If the clock is turned off (to preserve battery power) or is assumed to be inaccurate, the time returned is January 1, 1980 00:00:00.

\textbf{Legal values:}  \textit{true, false}

\textbf{Errors:}  \texttt{rangecheck}

Second  integer  This parameter represents the second.

\textbf{Legal values:}  An integer in the range 0 to 59.

\textbf{Errors:}  \texttt{rangecheck}

Year  integer  This parameter represents the year. The value of this parameter returned by \texttt{currentdevparams}, has special significance. If it is non-zero and in the range 1980 to 2079, then it represents the year. If it is 0, then the clock is either turned off (to preserve battery power) or is assumed to be inaccurate.

\textbf{Legal values:}  An integer in the range 1980 to 2079.

\textbf{Errors:}  \texttt{rangecheck}

3.6.4 Administrative Resources

Operators have been defined to assist in overseeing the general operation of the fax printer. Job records and telephone connections can be checked with these operators. The operators are available as a Level 2 resource named \texttt{FaxAdminOps} in the category \texttt{ProcSet}. They may be reached by use of the Level 2 \texttt{findresource} operator:

\begin{verbatim}
/FaxAdminOps /ProcSet findresource begin
\end{verbatim}

In this example, a dictionary containing the administrative fax operator definitions is placed on the operand stack. The \texttt{begin} that follows moves that dictionary to the dictionary stack so that the operators can be executed directly.
Job Records

The fax printer keeps logs on various aspects of all transmitted and received fax jobs. These records can be accessed by using the four operators described in Table 3.40 on page 139.

Table 3.40 Operators for accessing fax job logs

<table>
<thead>
<tr>
<th>Operator</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>proc deletejobsforall boolean</td>
<td>Selectively deletes entries from the logs.</td>
</tr>
<tr>
<td>proc jobsforall</td>
<td>Allows programmers to perform other functions besides reports.</td>
</tr>
<tr>
<td>proc reportjoblist boolean</td>
<td>Prints one or more pages on the printer listing the log entries. This is similar to the activity report which may be generated automatically. For more information, see the %Fax% parameter ActivityReport in Table 3.38 on page 131. See also section 2.2.5.</td>
</tr>
<tr>
<td>proc returnjoblist boolean</td>
<td>Sends an ASCII string to the connected computer made up of individual log entries. The components of each log entry are separated by double colons (::).</td>
</tr>
</tbody>
</table>

Each of these operators goes through the list of log entries. For each entry, a job dictionary is placed on the operand stack, and then the procedure proc is executed. proc is expected to consume the job dictionary from the operand stack. For deletejobsforall, the proc must leave a boolean on the stack indicating whether the log entry should be deleted—true means delete. For reportjoblist and returnjoblist, the proc must leave a boolean on the stack indicating whether the entry is to be included in the report—true means it is included. For jobsforall the proc should carry out whatever actions it desires and not push a return value on the stack.

Table 3.41 Entries in a fax job dictionary

<table>
<thead>
<tr>
<th>Entry</th>
<th>Type</th>
<th>Semantics</th>
</tr>
</thead>
<tbody>
<tr>
<td>CallCount</td>
<td>integer</td>
<td>The value of CallCount indicates the number of calls involved in this transmission; it is also the number of entries in the Calls array. This value is always 1 for received faxes.</td>
</tr>
<tr>
<td>CalleeID</td>
<td>string</td>
<td>For received faxes, this is empty. For transmitted faxes, this is the string the called machine used to identify itself. This is the station ID which is usually the phone number or company name for the receiving machine.</td>
</tr>
<tr>
<td>Calls</td>
<td>array of dictionaries</td>
<td>The dictionaries in the Calls array describe the individual calls of the possibly multiple call fax job. The contents of each dictionary in Calls are described in Table 3.42 on page 141.</td>
</tr>
<tr>
<td>Variable</td>
<td>Type</td>
<td>Description</td>
</tr>
<tr>
<td>-------------------</td>
<td>----------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>DialCallee</td>
<td>string</td>
<td>See the description of DialCallee in Table 2.3 on page 21.</td>
</tr>
<tr>
<td>EmailDest</td>
<td>string</td>
<td>For sent faxes, this is the RecipientID string from the FaxOptions dictionary. For received faxes, this is the string supplied in Adobe Non-standard Facilities frame, if any.</td>
</tr>
<tr>
<td>ErrorArray</td>
<td>array of strings</td>
<td>This is an array of strings which describe status conditions. It is indexed by the ErrorIndex entries described in Table 3.42 on page 141.</td>
</tr>
<tr>
<td>HostJobID</td>
<td>integer</td>
<td>For transmitted faxes, the value is the same as the one for HostJobID in the FaxOptions dictionary. For faxes received, it is always 0.</td>
</tr>
<tr>
<td>JobId</td>
<td>integer</td>
<td>This entry is a unique identifier for this send or receive job.</td>
</tr>
<tr>
<td>RecipientLanguage</td>
<td>string</td>
<td>For transmitted faxes, the value is the same as was given for RecipientLanguage in the job’s FaxOptions dictionary. If this was not specified then the value of the (%Fax%) parameter LocalLanguage (at the time the job was prepared) is given. For received faxes, this string is empty.</td>
</tr>
<tr>
<td>RecipientName</td>
<td>string</td>
<td>For transmitted faxes, the value of RecipientName is the same as was given in the job’s FaxOptions dictionary. If RecipientName in the job’s FaxOptions dictionary is null, a non-null value to store in the log is sought according to the scheme described under RecipientName in Table 2.3 on page 21.</td>
</tr>
<tr>
<td>RecipientOrg</td>
<td>string</td>
<td>For transmitted faxes, the value of RecipientOrg is the same as was given in the job’s FaxOptions dictionary. If RecipientOrg in the job’s FaxOptions dictionary is null, a non-null value to store in the log is sought according to the scheme described under RecipientOrg in Table 2.3 on page 21.</td>
</tr>
<tr>
<td>RecipientPhone</td>
<td>string</td>
<td>For transmitted faxes, the value of RecipientPhone is the same as was given in the job’s FaxOptions dictionary. If RecipientPhone in the job’s FaxOptions dictionary is null, a non-null value to store in the log is sought according to the scheme described under RecipientPhone in Table 2.3 on page 21.</td>
</tr>
<tr>
<td>SenderName</td>
<td>string</td>
<td>For transmitted faxes, the value of SenderName is the same as was given in the job’s FaxOptions dictionary. If SenderName in the job’s FaxOptions dictionary is null, a non-null value to store in the log is sought according to the scheme described under SenderName in Table 2.3 on page 21.</td>
</tr>
</tbody>
</table>

For received faxes, this item is not present.
SenderOrg string For transmitted faxes, the value of SenderOrg is the same as was given in the job’s FaxOptions dictionary. If SenderOrg in the job’s FaxOptions dictionary is null, a non-null value to store in the log is sought according to the scheme described under SenderOrg in Table 2.3 on page 21.

For received faxes, this item is not present.

SubAddress string For sent faxes, this is the RecipientID string from the FaxOptions dictionary.

For received faxes, this is the string sent by the transmitter in the subaddress frame (if any) during the initial protocol negotiations.

TimeBegan array of integers This parameter indicates the time when the job was submitted.

TotalPages integer This parameter indicates the sum of all pages imaged or received.

TotalPagesSent integer This parameter indicates the number of pages transmitted (not including cover sheets) or printed.

Table 3.42 on page 141 describes the entries in a Calls dictionary.

<table>
<thead>
<tr>
<th>Entry</th>
<th>Type</th>
<th>Semantics</th>
</tr>
</thead>
<tbody>
<tr>
<td>CallLength</td>
<td>integer</td>
<td>This key designates the length of the call in seconds.</td>
</tr>
<tr>
<td>CoverPagesSent</td>
<td>integer</td>
<td>This key designates a count of the number of cover sheets transmitted in this call; for received faxes this is always 0.</td>
</tr>
<tr>
<td>ErrorIndex</td>
<td>integer</td>
<td>This key designates the final status for the call. This integer can be used as an index into ErrorArray.</td>
</tr>
<tr>
<td>FaxKind</td>
<td>integer</td>
<td>This key designates the type of fax transmitted or received. The fax type is determined by an integer code:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Code</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Pages</td>
<td>integer</td>
<td>This key designates the number of pages prepared for this call or received. Compare with the definition of PagesSent.</td>
</tr>
</tbody>
</table>
PagesSent   integer   This key designates the number of pages actually transmitted or printed. Compare with the definition of Pages.

TimeSent   array of integers   This key designates the time when the call started.

tryphone

The tryphone operator allows diagnosis of the attachment to the telephone system. The operator takes two arguments and returns a string:

tryphone  string int tryphone string

The string object is the telephone number to be dialed in the test. The telephone number must be in the same format as described under DialCallee in Table 2.3. The input integer int is a code indicating the kind of test to be performed. If int is 0, tryphone will wait until a dial tone is detected after dialing the string. If int is 1, tryphone will wait until it receives a handshake from the remote fax machine. The returned string indicates the results of the test. If string is (Heard fax machine), then the handshake with the remote fax machine was successful (and the phone connection was dropped politely with no data transmission). Other string values indicate the results of the test. The strings that may be returned are listed below.

(Heard fax machine.)
(Heard dial tone.)
(No dial tone.)

The tryphone operator will raise a PostScript language ioerror if fax transmission is not enabled (see ServiceEnable in Table 3.38 on page 131) or if the fax hardware is not properly installed.

Job Queues

Two operators in the FaxAdminOps ProcSet instance may be used to examine the status of incoming and outgoing faxes which are currently in process or have recently finished being sent or received.

Table 3.43  Operators for accessing job queues

<table>
<thead>
<tr>
<th>Operator</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>proc transmitjobsforall</td>
<td>This operator goes through all transmit jobs that the fax printer is aware of. For each job it composes a dictionary describing the state of that job, pushes the dictionary on the stack and calls the proc. The proc is free to do whatever it wishes, but must end up removing the dictionary from the stack. In the group of jobs that the operator enumerates will be</td>
</tr>
</tbody>
</table>
- all finished transmit jobs which still have records in the non-volatile log storage;

- jobs waiting to be transmitted because they have asked for delayed transmission, are waiting to retry, or simply have not had their turn yet on the phone;

- the job currently using the modem if it is a transmit job.

Refer to Table 3.44 on page 143 for details on the dictionary created by `transmitjobsforall`.

`proc receivejobsforall`  
This operator goes through all received jobs that the fax printer is aware of. For each job it composes a dictionary describing the state of that job, pushes the dictionary on the stack and calls the proc. The proc is free to do whatever it wishes, but must end up removing the dictionary from the stack. In the group of jobs that the operator enumerates will be

- all finished receive jobs which still have records in the non-volatile log storage;

- jobs waiting to be printed;

- the job currently using the modem if it is a receive job.

Refer to Table 3.45 on page 144 for details on the dictionary created by `receivejobsforall`.

---

**Table 3.44 Dictionary generated by transmitjobsforall**

<table>
<thead>
<tr>
<th>Key</th>
<th>Type</th>
<th>Semantics</th>
</tr>
</thead>
<tbody>
<tr>
<td>HostJobID</td>
<td>integer</td>
<td>From job’s <strong>FaxOptions</strong> options dictionary.</td>
</tr>
<tr>
<td>Status</td>
<td>integer</td>
<td>The following integers map to these meanings:</td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>Code</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>DialCallee</td>
<td>string</td>
<td>The dial string used to dial out.</td>
</tr>
<tr>
<td>Duration</td>
<td>integer</td>
<td>Total number of seconds on the phone spent by this job so far.</td>
</tr>
<tr>
<td>ErrorIndex</td>
<td>integer</td>
<td>Summary error code; index into <strong>ErrorArray</strong>.</td>
</tr>
<tr>
<td>ErrorArray</td>
<td>array of strings</td>
<td>Array of strings describing status conditions.</td>
</tr>
</tbody>
</table>
Table 3.45  Dictionary generated by receivejobsforall

<table>
<thead>
<tr>
<th>Key</th>
<th>Type</th>
<th>Semantics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Status</td>
<td>integer</td>
<td>The following integers map to these meanings:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Code</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>CallerID</td>
<td>string</td>
<td>Station ID of caller.</td>
</tr>
<tr>
<td>Duration</td>
<td>integer</td>
<td>Total number of seconds on the phone spent by this job so far.</td>
</tr>
<tr>
<td>ErrorIndex</td>
<td>integer</td>
<td>Summary error code; index into ErrorArray.</td>
</tr>
<tr>
<td>ErrorArray</td>
<td>array of strings</td>
<td>Array of strings describing status conditions</td>
</tr>
<tr>
<td>Kind</td>
<td>integer</td>
<td>0 for raster fax, 1 for PostScript language file transmission jobs.</td>
</tr>
<tr>
<td>Pages</td>
<td>integer</td>
<td>Number of pages received if raster, 1 if PostScript file transmission jobs.</td>
</tr>
</tbody>
</table>
Recipient | string or null | Subaddress field or other in-bound routing information.
Time     | array of integers | Time the call started.

### 3.6.5 Translations Dictionaries in the FaxDefaultProcs ProcSet

As noted earlier (see section 2.2.5), a writeable ProcSet instance called FaxDefaultProcs contains the default procedures for cover sheets, transmission reports, page captions and activity reports. These procedures all generate their text by looking in a language specific dictionary of messages. The dictionary to use is selected by the procedure from a dictionary of such dictionaries based on a language key. This dictionary of translation dictionaries is contained in the FaxDefaultProcs ProcSet instance and can therefore be overwritten. Thus, the text of existing messages can be changed, and entirely new languages can be added. Six translation dictionaries are present initially—those for English, German, French, Spanish, Italian and Dutch. The fonts used with a particular language are determined by entries in that language’s translation dictionary, and are therefore also changeable.

The dictionary of translation dictionaries located in the FaxDefaultProcs ProcSet instance is called TranslationDicts:

```
/TranslationDicts <<
/languageName1 translationDict1
/languageName2 translationDict2
...
/languageNameN translationDictN
>> bind def
```

Each dictionary in TranslationDicts contains the same set of keys. These are described below in Table 3.46 on page 146.

Many of the keys are strings. Some of the strings are used to generate messages containing variable information such as the number of pages or number of phone calls. The characters %1 (and sometimes also %2 and %3) are used to indicate the points at which the variable data will be inserted. For example, the translation dictionary entry

(We sent %1 pages.)

can be used to generate messages on a report such as

We sent 15 pages.
Similarly,

(It took %1 calls, lasting a total of %2 seconds.)

could give rise to

It took 3 calls, lasting a total of 341 seconds.

Other keys in the dictionary are procedures that return a font on the stack. These procedures are called by the default report procedures to obtain the correct fonts for various uses—page titles, column heading, variable data, and so on. The report procedures scale the returned fonts to the sizes needed. The fonts returned are assumed to use the encoding vector identified by the **Encoding** resource category instance **IOSLatin1Encoding**.

Table 3.46 Entries in a dictionary contained in TranslationDicts

<table>
<thead>
<tr>
<th>Key</th>
<th>Type</th>
<th>Default value in the English dictionary</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Items used on more than one report:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ToLabel</td>
<td>string</td>
<td>(To:).</td>
</tr>
<tr>
<td>FromLabel</td>
<td>string</td>
<td>(From:).</td>
</tr>
<tr>
<td>PagesLabel</td>
<td>string</td>
<td>(Pages).</td>
</tr>
<tr>
<td>FaxNumberLabel</td>
<td>string</td>
<td>(Fax Number).</td>
</tr>
<tr>
<td>PageLabel</td>
<td>string</td>
<td>(Page).</td>
</tr>
<tr>
<td>NameLabel</td>
<td>string</td>
<td>(Name).</td>
</tr>
<tr>
<td>ExcludingCovers</td>
<td>string</td>
<td>(%1, excluding cover sheets.).</td>
</tr>
<tr>
<td><strong>Items used by the cover page procedure:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CoverSheetTitle</td>
<td>string</td>
<td>(Facsimile Cover Sheet).</td>
</tr>
<tr>
<td>BackCoverTitle</td>
<td>string</td>
<td>(Facsimile Back Cover).</td>
</tr>
<tr>
<td>FollowingPages</td>
<td>string</td>
<td>(Please forward the following pages to:).</td>
</tr>
<tr>
<td>PrecedingPages</td>
<td>string</td>
<td>(Please forward the preceding pages to:).</td>
</tr>
<tr>
<td>RecipientLabel</td>
<td>string</td>
<td>(Recipient).</td>
</tr>
<tr>
<td>OrganizationLabel</td>
<td>string</td>
<td>(Organization).</td>
</tr>
<tr>
<td>PhoneNumberLabel</td>
<td>string</td>
<td>(Phone Number).</td>
</tr>
</tbody>
</table>
MailStopLabel  string     (Mail Stop).
SenderLabel    string     (Sender).
DateLabel      string     (Date).
SubjectLabel   string     (Subject).
NoteLabel      string     (Note).
WhomIt         string     (Whom it may concern).
Unspecified     string     (Unspecified).
PSTransDesc    string     (--- PostScript language Transmission ---).
UnknownDueTo   string     (PostScript language Transmission).

*Items use by the confirmation report procedure:*
TransRepHeader string     (Transmission Status Report).
Successful     string     (The following transmission completed successfully.).
NotSuccessful  string     (The following transmission was not successful.).
LocationLabel  string     (Location:).
CallerIDLabel  string     (Caller ID:).
CalleeIDLabel  string     (Callee ID:).
PrinterNameLabel string     (Printer name:).
PagesUnknownPS string     (PostScript language transmission.).
MailedLabel    string     (Mailed:).
StatusLabel    string     (Status:).
DurationLabel  string     (Duration:).
SingleCallOneMinAndSecs string     (1 minute and %1 seconds.).
SingleCallMinsAndOneSec string     (%1 minutes and 1 second.).
SingleCallOneMinAndOneSec string     (1 minute and 1 second.).
SingleCallMinsAndSecs
    string  (%1 minutes and %2 seconds.).

SingleCallSecondsOnly
    string  (%1 seconds.).

MultiCallOneMinAndSecs
    string  (1 minute and %1 seconds in %3 calls.).

MultiCallMinsAndOneSec
    string  (%1 minutes and 1 second in %3 calls.).

MultiCallOneMinAndOneSec
    string  (1 minute and 1 second in %3 calls.).

MultiCallMinsAndSecs
    string  (%1 minutes and %2 seconds in %3 calls.).

MultiCallSecondsOnly
    string  (%1 seconds in %3 calls.).

\textit{Items used by the activity report procedure:}

\textbf{ActRepHeader}  string  (FAX ACTIVITY REPORT).

\textbf{StartTimeLabel}  string  (Start Time).

\textbf{ActivityLabel}  string  (Activity).

\textbf{CallDurationLabel}  string  (Call Duration).

\textbf{PhoneNumberLabel}  string  (Phone Number).

\textbf{PagesSentOrPrintedLabel}  string  (Pages Sent or Printed).

\textbf{ExplActCodes}  string  (Explanation of Activity codes:).

\textbf{TransGroup3}  string  (Transmit group 3).

\textbf{TransPS}  string  (Transmit PostScript).

\textbf{ReceiveGroup3}  string  (Receive group 3).

\textbf{ReceivePS}  string  (Receive PostScript).

\textbf{FaxKindAbbrev}  array  {{T} {TPS} {R} {RPS}}.

\textit{Items used to describe groups of pages:}
ExcludingCover string (%1, excluding cover sheet.).

ThisFinalGroup string (%1 this final group, %2 entire document.).

ThisGroupExcludingCovers string (%1 this group, excluding cover sheet(s).).

SeeTrailers string (See trailer sheet(s) to follow.).

AlreadySent string (%1 already sent, trailer sheet(s) to follow.).

NoPagesSent string (Fax - No pages sent to destination.).

Error messages:

ErrInRecvPS string (Error in received PS code - job aborted).

OutOfRangeForRecv string (Out of memory for receive - page incomplete).

ErrInCovSheetProc string (Error in Cover Sheet Procedure).

ErrInPageCapProc string (Error in Page Caption Procedure).

ErrInConfirmProc string (Error in Confirmation Procedure).

faxerrarray array

[ (No problem.)
  (Callee didn’t respond.)
  (High-speed data transmission failed.)
  (Transmission error, disconnected.)
  (Possible success, but imperfect confirmation.
  (Callee rejected PostScript language transmission.)
  (Error in PostScript language file.)
  (No dial tone.)
  (Internal PS fax error.)
  (Callee wasn’t a PostScript language server.)
  (There were no pages to send.)
  (Storage to hold incoming data was exhausted.)
  (Storage to assemble PostScript language transmission exhausted.)
  (PS transmission rejected; Error during revert.)
  (Callee number busy)
  (Callee number blacklisted)
 ].

Items used to generate dates:

sweekdays array [(Sun)(Mon)(Tue)(Wed)(Thu)(Fri)(Sat)(Sun)].

InvalidTime string (<<Invalid time>>).

Procedures returning fonts:

ActRepTitleFont procedure Procedure returning Helvetica with ISO\texttt{Latin1}\texttt{Encoding}.

ActRepHeadingsFont procedure Procedure returning Helvetica with ISO\texttt{Latin1}\texttt{Encoding}.

ActReportDataFont procedure Procedure returning Courier with ISO\texttt{Latin1}\texttt{Encoding}.

ConfRepTitleFont procedure Procedure returning Times-Bold with ISO\texttt{Latin1}\texttt{Encoding}.

ConfRepLabelFont procedure Procedure returning Times-Bold with ISO\texttt{Latin1}\texttt{Encoding}.

ConfRepDataFont procedure Procedure returning Times-Roman with ISO\texttt{Latin1}\texttt{Encoding}.

ConfRepSummary procedure Procedure returning Times-Italic with ISO\texttt{Latin1}\texttt{Encoding}.

CaptionFont procedure Procedure returning Courier with ISO\texttt{Latin1}\texttt{Encoding}.

CoverLabelFont procedure Procedure returning Helvetica-Bold with ISO\texttt{Latin1}\texttt{Encoding}.

CoverDataFont procedure Procedure returning Bookman-Light with ISO\texttt{Latin1}\texttt{Encoding}.
Resources

In Level 2, PostScript language objects such as fonts, patterns, filters and so on, can be managed as open-ended collections of resources grouped into categories. A resource is requested by giving the resource category and name. If the resource does not reside in VM, the resource management mechanism loads it from an external source, such as a disk, a ROM cartridge, or a network file server. Named resources are discussed in section 3.9, “Named Resources” in the PostScript Language Reference Manual, Second Edition.

The resources listed in Tables 4.1, 4.2, and 4.3 are typically present in all implementations of PostScript language version 2015.

4.1 Regular Resources

Regular resources, listed in Table 4.1, are resources whose instances are ordinary, useful objects, such as font or halftone dictionaries.

<table>
<thead>
<tr>
<th>Category name</th>
<th>Instances</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIDFont</td>
<td>Only some products will have instances defined. These will mainly be products for Japanese and other Asian markets.</td>
</tr>
<tr>
<td>CMap</td>
<td>Only some products will have instances defined. These will mainly be products for Japanese and other Asian markets.</td>
</tr>
<tr>
<td><strong>Encoding</strong></td>
<td><strong>ISOLatin1Encoding</strong></td>
</tr>
<tr>
<td>--------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td><strong>Form</strong></td>
<td>No instances defined.</td>
</tr>
<tr>
<td><strong>Pattern</strong></td>
<td>No instances defined.</td>
</tr>
<tr>
<td><strong>ProcSet</strong></td>
<td><strong>Test</strong></td>
</tr>
<tr>
<td><strong>StartPage</strong></td>
<td></td>
</tr>
<tr>
<td><strong>FaxOps</strong></td>
<td></td>
</tr>
<tr>
<td><strong>FaxAdminOps</strong></td>
<td></td>
</tr>
<tr>
<td><strong>FaxDefaultProcs</strong></td>
<td></td>
</tr>
<tr>
<td><strong>GetPageDeviceName</strong></td>
<td></td>
</tr>
<tr>
<td><strong>GetHalftoneName</strong></td>
<td></td>
</tr>
<tr>
<td><strong>GetSubstituteCRD</strong></td>
<td></td>
</tr>
<tr>
<td><strong>ColorSpace</strong></td>
<td>No instances defined.</td>
</tr>
<tr>
<td><strong>Halftone</strong></td>
<td><strong>DefaultHalftone</strong></td>
</tr>
<tr>
<td><strong>ColorRendering</strong></td>
<td><strong>DefaultColorRendering</strong></td>
</tr>
</tbody>
</table>
### Implicit Resources

Implicit resources, listed in Table 4.2, are resources whose instances are not objects, but which represent some built-in capability of the PostScript interpreter.

<table>
<thead>
<tr>
<th>Category name</th>
<th>Instances</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Filter</strong></td>
<td>ASCII85Decode  ASCII85Encode</td>
</tr>
<tr>
<td></td>
<td>ASCIIHexDecode  ASCIIHexEncode</td>
</tr>
<tr>
<td></td>
<td>CCITTFaxDecode  CCITTFaxEncode</td>
</tr>
<tr>
<td></td>
<td>DCTDecode  DCTEncode</td>
</tr>
<tr>
<td></td>
<td>LZWDecode  LZWEncode</td>
</tr>
<tr>
<td></td>
<td>NullEncode  RunLengthDecode</td>
</tr>
<tr>
<td></td>
<td>RunLengthEncode  SubFileDecode</td>
</tr>
<tr>
<td><strong>ColorSpaceFamily</strong></td>
<td>CIEBasedA  CIEBasedABC</td>
</tr>
<tr>
<td></td>
<td>DeviceCMYK  DeviceGray</td>
</tr>
<tr>
<td></td>
<td>DeviceRGB  Indexed</td>
</tr>
<tr>
<td></td>
<td>Pattern  Separation</td>
</tr>
<tr>
<td><strong>Emulator</strong></td>
<td>LaserJetIII  LaserJetIIP</td>
</tr>
<tr>
<td></td>
<td>HP7475A  Diablo630</td>
</tr>
<tr>
<td></td>
<td>EpsonFX850  ProprinterXL</td>
</tr>
<tr>
<td><strong>IODevice</strong></td>
<td>%Serial%  %Serial_NV%</td>
</tr>
<tr>
<td></td>
<td>%Parallel%  %Parallel_NV%</td>
</tr>
<tr>
<td></td>
<td>%ScsiComm%  %ScsiComm_NV%</td>
</tr>
<tr>
<td></td>
<td>%LocalTalk%  %LocalTalk_NV%</td>
</tr>
<tr>
<td></td>
<td>%EtherTalk%  %EtherTalk_NV%</td>
</tr>
</tbody>
</table>
%EtherTalk_Pending%
%LPR%
%LPR_NV%
%LPR_Pending%
%AppSocket%
%AppSocket_NV%
%AppSocket_Pending%
%Telnet%
%Telnet_NV%
%Telnet_Pending%
%RemotePrinter%
%RemotePrinter_NV%
%RemotePrinter_Pending%
%PrintServer%
%PrintServer_NV%
%PrintServer_Pending%
%SNMP%
%SysLog%
%TCP%
%UDP%
%IP%
%SPX%
%IPX%
%EthernetPhysical%
%TokenRingPhysical%
%disk0%...%diskn%
%cartridge%
%rom%
%Engine%
%Console%
%Scsi%
%Fax%
%Calendar%
%PCL%
%LaserJetIII%
%LaserJetIIP%
%Diablo630%
%HP7475A%

ColorRenderingType 1
FMapType 2, 3, 4, 5, 6, 7, 8, 9
FontType 0, 1, 3, 4, 5, 6, 9, 10, 11, 42
FormType 1
HalftoneType 1, 2, 3, 4, 5, 6, 10
ImageType 1
PatternType 1
4.3 Resources Used to Define New Resources

Resources used in defining new resources, listed in Table 4.3, can be used to create new resource categories, each containing an independent collection of named instances. This is accomplished through a level of recursion in the resource machinery itself.

Table 4.3 Resources used in defining new resource categories

<table>
<thead>
<tr>
<th>Category name</th>
<th>Instances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category</td>
<td>Category Type</td>
</tr>
<tr>
<td></td>
<td>ColorRendering</td>
</tr>
<tr>
<td></td>
<td>ColorSpace</td>
</tr>
<tr>
<td>ColorRenderingType</td>
<td>Emulator</td>
</tr>
<tr>
<td>ColorSpaceFamily</td>
<td>Filter</td>
</tr>
<tr>
<td>Encoding</td>
<td>Font</td>
</tr>
<tr>
<td>FMapType</td>
<td>Form</td>
</tr>
<tr>
<td>FontType</td>
<td>Generic</td>
</tr>
<tr>
<td>FormType</td>
<td>HalftoneType</td>
</tr>
<tr>
<td>Halftone</td>
<td>ImageType</td>
</tr>
<tr>
<td>HWOptions</td>
<td>ImageType</td>
</tr>
<tr>
<td>IODEvice</td>
<td>OutputDevicePattern</td>
</tr>
<tr>
<td>PatternType</td>
<td>ProcSet</td>
</tr>
<tr>
<td>Generic</td>
<td>No instances defined.</td>
</tr>
</tbody>
</table>

4.4 Accessing Product Page Device Capability Information

The resource category OutputDevice has been added to perform the following tasks.

- Enable applications to query product capabilities directly.
- Maintain functional equivalence with Level 1 (where page size capability information was present through enumeration of letter, legal, a4 or other keys in userdict).

The resource category OutputDevice is present in interpreters starting with version 2011. This category contains one instance for each OutputDevice value that setpagedevice can accept for that product. Products which do not contain the OutputDevice page device key, that is, which have only one possible page device output device, have the single instance Default for the OutputDevice category.

The value of each instance of the OutputDevice category is a dictionary that contains key-value pairs describing, certain capabilities of that particular output device, such as the possible page sizes or the possible resolutions. This dictionary does not represent the current state of the PostScript product; it simply provides a static list of some of the possible capabilities of the
product. Over time, Adobe is likely to define new entries in this dictionary to reflect added capabilities. In 2015 products, the entries listed in Table 4.4 are typically present.

**Table 4.4 Description of keys present in an instance of the category OutputDevice**

<table>
<thead>
<tr>
<th>Key</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>HWResolution</td>
<td>Array of HWResolution values that can be supported by the product. Each element within the array can be either an array of two numbers indicating a discrete HWResolution support or an array of four numbers ([x1 \ y1 \ x2 \ y2]) indicating that the range of hardware resolutions between ([x1 \ y1]) and ([x2 \ y2]) is supported. Redundant values may be present.</td>
</tr>
<tr>
<td>ManualSize</td>
<td>Array of page sizes for the product that can be fed manually. Each element can be either an array of two numbers indicating a discrete page size supported or an array of four numbers ([x1 \ y1 \ x2 \ y2]) indicating that the range of page sizes between ([x1 \ y1]) and ([x2 \ y2]) is supported. Redundant values may be present. In a product that does not support the ManualFeed page device parameter, the array of page sizes should have no entries.</td>
</tr>
<tr>
<td>PageSize</td>
<td>Array of page sizes for the product that can be fed automatically (assuming appropriate media are installed). Each element can be either an array of two numbers indicating a discrete page size supported or an array of four numbers ([x1 \ y1 \ x2 \ y2]) indicating that the range of page sizes between ([x1 \ y1]) and ([x2 \ y2]) is supported. Redundant values may be present.</td>
</tr>
<tr>
<td>ProcessColorModel</td>
<td>Array of names or strings that indicate the possible colorant models that can be chosen on the product. An element in the array can be one of the following values: /DeviceGray, /DeviceRGB, /DeviceCMYK, /DeviceCMY, and /DeviceRGBK.</td>
</tr>
</tbody>
</table>

4.5 **Accessing Product Hardware Options Information**

The resource category HWOptions has been added for the purpose of enumerating those special hardware options that are currently present on a product. The hardware options that are special do not have any other PostScript language facility for indicating that they are present other than this resource category. For example, a given product might have the ability to support Adobe’s PixelBurst™ co-processor. If the co-processor is not currently installed on the product, the HWOptions resource would not list PixelBurst. When the co-processor is installed on a given product,
PixelBurst would appear in the HWOptions dictionary. This resource category is optional. Refer to the PostScript Language Addendum for the product you are concerned with for complete details of the hardware options available.

Some possible instances of the HWOptions resource category are listed in Table 4.5.

<table>
<thead>
<tr>
<th>Table 4.5 Possible instances of the HWOptions resource category</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Instance name</strong></td>
</tr>
<tr>
<td>-------------------</td>
</tr>
<tr>
<td>Fax</td>
</tr>
<tr>
<td>Clock</td>
</tr>
<tr>
<td>PixelBurst</td>
</tr>
<tr>
<td>Type1Coprocessor</td>
</tr>
</tbody>
</table>

4.6 Accessing Information on Natural Languages Supported by the Product

The resource category Localization has been added to allow an application or printer driver some means of determining which natural languages (for example, English, Japanese and German) are supported by a given product. The resources in this category are dictionaries which have (at least) the keys, Language, Country and CharSet; or, in short, each dictionary has the localization keys in the %Console% device parameter set (see section 3.5.7, “Console Device Parameters” on page 121). Each such dictionary represents a legal combination of the values for those keys. It is expected that only a sparse subset of the set of all possible combinations will be supported on any given printer. For example, today one is likely to find the entire category consists of just the combinations:

```<</Language /EN /Country /US /CharSet /ISO-646-ISV>>
<</Language /JA /Country null /CharSet /JIS...>>```

Here, /EN is the code for English, /JA is the code for Japanese, /US is the code for the United States, and the null value is used to indicate that no dialect is identified for Japanese. For a complete list of values for Language, Country and CharSet, see Table 3.32 on page page 122.

Each instance in the Localization resource category shall have a unique name. The names need not be chosen according to a particular scheme. Although no naming scheme is required, the following discussion is presented to suggest possibilities for naming the instances (dictionaries) that make up the Localization resource category.
One scheme for naming the instances is to construct a composite name for the instance based on concatenating the three names in the dictionary separated by hyphens. Thus the two above dictionaries would be named

/EN-US-ISO-646-ISV
/JA--JIS...

This approach provides a name that is indicative of the information in the dictionary.

Another alternative, which could be used in place of or in combination with the above scheme is to provide descriptive names for the dictionaries. Thus the above dictionaries might be named

/AmericanEnglish
/Japanese

The above naming scheme provides a simple way to change the language. Using either of the above naming schemes (but choosing the second scheme for the example below) the following PostScript code changes the language to Japanese:

%set the console to the Japanese localization
(%Console%) /Japanese /Localization findresource setdevparams

Note If the SystemParamsPassword is set, you will need to put the Password key in the dictionary as well, or run this bit of code as a system administration unencapsulated job. See section 3.1, “Two Kinds of Unencapsulated Jobs” for details.

4.7 Accessing Information on Languages Interpreted by the Product

The resource category PDL has been added to allow an application or printer driver to determine which Page Description Language (PDL) interpreters are available on a given PostScript product. Similarly, the resource category ControlLanguage has been added to allow an application or printer driver to determine which control languages are available on a given PostScript product.

These resource categories are present on interpreters starting with version 2015. Each category contains an instance for each language selector available on the PostScript product.
A page description language describes how marks are placed onto media. A control language specifies how the environment and parameter sets and values are configured and determines how jobs are identified. The control language choice also determines the format of printer generated messages on the back channel.

The value of each instance of both the PDL category and the ControlLanguage category is a dictionary that contains key-value pairs describing one of the languages supported on some channel on the PostScript product. It is possible that Adobe may add new entries to these dictionaries to further identify the language. In 2015 products, the entries listed in Table 4.6 are typically present. Table 4.7 gives possible instances of the PDL resource category. Table 4.8 gives possible contents of the ControlLanguage resource category.

The value of a Selector key in a PDL category instance corresponds to one of the legal values of the Interpreter key in a parameter set of type /Communications. Selectors in the ControlLanguage category can be used as the value of the PrinterControl key in a parameter set of type /Communications. The value of such keys are set using the setdevparams operator.

Table 4.6 Description of keys present in an instance of the categories PDL and ControlLanguage

<table>
<thead>
<tr>
<th>Key</th>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selector</td>
<td>name</td>
<td>The name used to select that particular PDL or ControlLanguage interpreter, such as /PostScript or /LaserJetIII. This same name is used as the name of any parameter set associated with the interpreter. This key is required.</td>
</tr>
<tr>
<td>LanguageFamily</td>
<td>string</td>
<td>A string that specifies a family of language levels and versions, such as PostScript or PCL. This key is required.</td>
</tr>
<tr>
<td>LanguageLevel</td>
<td>string</td>
<td>A string that specifies what level of the language family is present. This can be a level identifier for languages that have an established leveling, such as 2 (PostScript Level 2) or 5e (PCL 5e), or it can be a product name where no independent level naming system exists. Where no variant of the family exists, this key may be omitted or the associated string may be empty.</td>
</tr>
<tr>
<td>LanguageVersion</td>
<td>string</td>
<td>A string that describes the particular version for which the above level of the language family has been implemented. This value is typically a microcode version identifier, such as 2015.101, but it could be a product name, such as LaserJet 4si. If there is no relevant version identifier, this key may be omitted or the associated string may be empty.</td>
</tr>
</tbody>
</table>
Table 4.7 Possible instances of the PDL resource category

<table>
<thead>
<tr>
<th>Instance name</th>
<th>Key names</th>
</tr>
</thead>
<tbody>
<tr>
<td>PostScript</td>
<td>If <code>Selector</code> is <code>/PostScript</code>, then <code>LanguageFamily</code> is (PostScript), <code>LanguageLevel</code> is (2) and <code>LanguageVersion</code> is (2015.101).</td>
</tr>
<tr>
<td>PCL</td>
<td>If <code>Selector</code> is <code>/LaserJetIII</code>, then <code>LanguageFamily</code> is (PCL) and <code>LanguageLevel</code> is (5).</td>
</tr>
<tr>
<td>PCL</td>
<td>If <code>Selector</code> is <code>/PCL</code>, then <code>LanguageFamily</code> is (PCL), <code>LanguageLevel</code> is (5e) and <code>LanguageVersion</code> is (LaserJet4).</td>
</tr>
<tr>
<td>HPGL</td>
<td>If <code>Selector</code> is <code>/HP7475A</code>, then <code>LanguageFamily</code> is (HPGL) and <code>LanguageLevel</code> is (7475A).</td>
</tr>
<tr>
<td>AutoSelect</td>
<td>If <code>Selector</code> is <code>/AutoSelect</code>, then <code>LanguageFamily</code> is (AutoSelect) and <code>LanguageVersion</code> is (2015.101).</td>
</tr>
<tr>
<td>HexDump</td>
<td>If <code>Selector</code> is <code>/HexDump</code>, then <code>LanguageFamily</code> is (HexDump).</td>
</tr>
<tr>
<td>ProPrinter</td>
<td>If <code>Selector</code> is <code>/ProprinterXL</code>, then <code>LanguageFamily</code> is (PPDS) and <code>LanguageLevel</code> is (XL).</td>
</tr>
<tr>
<td>EpsonGL</td>
<td>If <code>Selector</code> is <code>/EpsonFX850</code>, then <code>LanguageFamily</code> is (EpsonGL) and <code>LanguageLevel</code> is (FX850).</td>
</tr>
<tr>
<td>Diablo</td>
<td>If <code>Selector</code> is <code>/Diablo630</code>, then <code>LanguageFamily</code> is (Diablo) and <code>LanguageLevel</code> is (630).</td>
</tr>
</tbody>
</table>

Table 4.8 Possible instances of the ControlLanguage resource category

<table>
<thead>
<tr>
<th>Instance name</th>
<th>Key names</th>
</tr>
</thead>
<tbody>
<tr>
<td>PostScript</td>
<td>If <code>Selector</code> is <code>/PSPrinter</code>, then <code>LanguageFamily</code> is (PSPrinter) and <code>LanguageVersion</code> is (2015.101).</td>
</tr>
<tr>
<td>PJL</td>
<td>If <code>Selector</code> is <code>/PGL</code>, then <code>LanguageFamily</code> is (PGL) and <code>LanguageLevel</code> is (LaserJet4) or (LaserJet4si).</td>
</tr>
</tbody>
</table>
Since the publishing of the Postscript Language Reference Manual, Second Edition, there have been and potentially will continue to be extensions to the Level 2 PostScript language. This chapter lists those extensions for versions through 2015.

5.1 Type 6 Halftone Dictionary

This section describes the Type 6 halftone dictionary. For more information about the concepts and terms used below, see “Halftones,” section 6.4 of the PostScript Language Reference Manual, Second Edition.

The Type 6 halftone dictionary defines a halftone screen directly by specifying a threshold array at device resolution. This is similar to a Type 3 halftone dictionary, but the threshold array is obtained from a file instead of a string object. This allows threshold arrays to be larger than 65535 bytes (the implementation limit for strings); smaller threshold arrays can also be defined this way.

When presented with a Type 6 halftone dictionary, sethalftone reads width x height characters from the Thresholds file and saves the resulting threshold array in internal storage. The file must supply sufficient data; if it ends prematurely, a rangecheck error is raised.

When the current halftone is a Type 6 halftone dictionary, currenthalftone returns a halftone dictionary whose Thresholds file can be used to access the contents of the current threshold array just as if it were a read-only file. (That is, the Thresholds file object returned by currenthalftone is different from the one that was given to sethalftone.) This file treats the contents of the current threshold array as a circular buffer that can be read repeatedly; it will never reach end-of-file.

Table 5.1 lists the entries in a Type 6 halftone dictionary.
Table 5.1  Entries in a Type 6 halftone dictionary

<table>
<thead>
<tr>
<th>Key</th>
<th>Type</th>
<th>Semantics</th>
</tr>
</thead>
<tbody>
<tr>
<td>HalftoneType</td>
<td>integer</td>
<td>(Required) Must be 6.</td>
</tr>
<tr>
<td>Height</td>
<td>integer</td>
<td>(Required) Height of the threshold array, in pixels.</td>
</tr>
<tr>
<td>Thresholds</td>
<td>file</td>
<td>(Required) When sethalftone is used to make a Type 6 halftone dictionary</td>
</tr>
<tr>
<td></td>
<td></td>
<td>the current dictionary, the next width x height characters are read from</td>
</tr>
<tr>
<td></td>
<td></td>
<td>the file referenced by file and become the current threshold array. So file</td>
</tr>
<tr>
<td></td>
<td></td>
<td>must reference a file open for read or read/write access at the time</td>
</tr>
<tr>
<td></td>
<td></td>
<td>sethalftone is called. The file object can, of course, be the one returned</td>
</tr>
<tr>
<td></td>
<td></td>
<td>by the currentfile operator. In that case, the next width x height</td>
</tr>
<tr>
<td></td>
<td></td>
<td>characters are read from the input stream and saved as a threshold array.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Also, sethalftone closes file if it encounters an EOF and leaves it open</td>
</tr>
<tr>
<td></td>
<td></td>
<td>otherwise.</td>
</tr>
<tr>
<td>TransferFunction</td>
<td>procedure</td>
<td>If present, overrides the transfer function specified by settransfer or</td>
</tr>
<tr>
<td></td>
<td></td>
<td>setcolortransfer. Required in a Type 6 halftone dictionary that is used as</td>
</tr>
<tr>
<td></td>
<td></td>
<td>an element of a Type 5 halftone dictionary for a non-primary color component.</td>
</tr>
<tr>
<td>Width</td>
<td>integer</td>
<td>(Required) Width of the threshold array, in pixels.</td>
</tr>
</tbody>
</table>

5.2 Type 10 Halftone Dictionary

This section describes the Type 10 halftone dictionary. For more information about the concepts and terms used below, see “Halftones,” section 6.4 of the PostScript Language Reference Manual, Second Edition.

The Type 10 halftone dictionary can be used to specify a threshold array that represents a halftone cell with a non-zero screen angle. Either the Type 3 or Type 6 halftone dictionary can be used to specify a threshold array representing a zero-angle halftone cell, but there is no provision for other angles. Zero-angle halftone cells are easy to specify because they line up nicely with scan lines and because it is not difficult to determine where a sampled point goes. The Type 10 halftone applies a simple transformation to the halftone cell that converts it into two squares, thus making it easier to specify non-zero angle cells.

Figure 5.1 and Figure 5.2 both illustrate a halftone at 300 dpi with a frequency of 38.4 and an angle of 50.2 degrees. Figure 5.1 shows how this halftone cell can be graphically represented in device space; each asterisk is an (x,y) coordinate in device space that is mapped to a specific location in the threshold array. Figure 5.2 shows how this cell can be divided into two squares.
Figure 5.1  *Halftone cell graphically represented in device space*

If the two squares and the original halftone cell are tiled across device space, the area to the right of the upper square exactly maps into the empty area of the lower square, and the area to the right of the lower square exactly maps into the empty area of the upper square, as Figure 5.3 illustrates.
Any halftone cell will map into two squares in this fashion. The length of one side of the upper X square will equal the distance along the \( x \) axis from a point in one halftone cell to the corresponding point in the adjacent cell (the asterisks in Figure 5.3 show two such corresponding points). The length of the lower Y square will equal the distance along the \( y \) axis between the same points.
Looking at this the other way around, a halftone constructed from two squares X and Y (as described above) will have a frequency

\[
\text{frequency} = \frac{\text{resolution}}{\sqrt{X^2 + Y^2}}
\]

and an angle

\[
\text{angle} = \text{atan} \left( \frac{Y}{X} \right)
\]

The two squares are much easier to handle and store than the original cell, yet the squares contain the same information. In addition, the squares can be easily mapped into the internal representation used for all rendering.

Table 5.2 lists the entries in a Type 10 halftone dictionary.

**Table 5.2  Entries in a Type 10 halftone dictionary**

<table>
<thead>
<tr>
<th>Key</th>
<th>Type</th>
<th>Semantics</th>
</tr>
</thead>
<tbody>
<tr>
<td>HalftoneType</td>
<td>integer</td>
<td>(Required) Must be 10.</td>
</tr>
<tr>
<td>Xsquare</td>
<td>integer</td>
<td>(Required) Length of one side of the upper square.</td>
</tr>
<tr>
<td>Ysquare</td>
<td>integer</td>
<td>(Required) Length of one side of the lower square.</td>
</tr>
<tr>
<td>Thresholds</td>
<td>string or file</td>
<td>(Required) Threshold values, specified as either a string or file object, like Type 3 or Type 6 halftones, respectively, and obeying the same rules. If it is a string, it must be Xsquare * Xsquare + Ysquare * Ysquare bytes in length. If it is a file, the stream must contain at least that many bytes (like Type 6 halftones it is not necessary for a stream to reach the end-of-file precisely after the requisite number of bytes). In either case, Thresholds is ordered with the Xsquare square first, and is stored by rows starting with the upper left hand corner. Note that this is the same ordering as is used by Type 3 and Type 6 threshold arrays. The Ysquare data immediately follows the Xsquare data and is laid out in the same fashion. currenthalftone will return the original dictionary if the value of Thresholds is a string (like a Type 3 halftone). If the Thresholds value in the original dictionary is a file, it will be replaced by a new file linked to that threshold array (like a Type 6 halftone) in the dictionary returned by currenthalftone.</td>
</tr>
</tbody>
</table>
5.3 **Type 42 Font Dictionary**

PostScript interpreters can now optionally include support for font Type 42. The Type 42 font format is a TrueType™ font with a PostScript language wrapper to make it conform to the PostScript language font model. A printer driver can distinguish a product that supports font Type 42 by using the PostScript Printer Description (PPD) file to extract the appropriate query. The query looks at the resource instance `FontType` to see if Type 42 is supported. Refer to the `FontType` instance in Table 4.2 on page 153. For more information about the Adobe Type 42 Font Format, refer to technical note #5012 titled *The Type 42 Font Format Specification*, available from Adobe Developer Support.

The TrueType font format was originally developed by Apple Computer, and is currently supported by the Macintosh® and Windows 3.1 operating environments. Prior to the PostScript language version 2013, documents containing TrueType fonts could only be sent to PostScript interpreters in one of two ways. On products that supported 680X0-class controllers, the TrueType rasterizer could be downloaded prior to processing the TrueType document. Otherwise the TrueType font had to be converted into a PostScript language Type 1 or Type 3 font. Both of these methods have disadvantages: the TrueType rasterizer is large and does not work on all platforms, and conversion to Type 1 or Type 3 is not exact.

5.4 **CRD Selection Based On Rendering Intent**

There is a new method by which color rendering dictionaries (CRDs) can be selected in a device independent manner in a page description. This selection accounts for the *rendering intent* of the reproduction, the *device setup*, and the current *halftone*.

A rendering intent is information about the rendering of colors in addition to their colorimetric specification. For example, one might want to specify that a scanned image be rendered in a “pleasing” manner, much like a photograph, instead of requiring a colorimetric reproduction. Device setup refers to the state of the device. This information is kept in the *pagedevice* dictionary and consists of parameters like `MediaType` and `HWResolution`. Halftone information is resident in the graphics state.

A new operator has been created for the purpose of selecting CRDs by rendering intent. The new operator is named `findcolorrendering`. 
5.4.1 findcolorrendering

A CRD is found using the findcolorrendering operator. This operator is not a standard part of PostScript Level 2. Applications, printer drivers and utilities should test to see if it is known on any product prior to trying to use it. It is not meant for use with PostScript Level 1 interpreters.

The syntax of the findcolorrendering operator is:

```
findcolorrendering renderingintent findcolorrendering crdname bool
```

renderingintent is a name or string specifying the rendering intent. crdname is a name representing a CRD present in the ColorRendering resource category. If bool is true, crdname specifies a CRD present in the ColorRendering resource category that matches the desired rendering intent, device setup, and halftone combination. If bool is false, a CRD satisfying this combination exactly is not available. In this case, crdname specifies a substitution for the desired CRD. In either case, the CRD specified by crdname can be instantiated in the graphics state by using findresource and setcolorrendering.

findcolorrendering should be called after all commands that influence either the halftone or the device setup in order to insure that all parameters that may be considered for selection of a CRD are accounted for correctly.

An example usage of findcolorrendering that selects a perceptual CRD is shown here:

```
/findcolorrendering where
{
  % findcolorrendering available
  pop
  /Perceptual findcolorrendering
  {
    % CRD found which satisfies combination of
    % rendering intent, device setup, and halftone
    /ColorRendering findresource setcolorrendering
  }{
    % exact match for CRD not found
    % use it, or find a CRD another way
    % in this example we'll use it if it's
    % not DefaultColorRendering
    dup
    /DefaultColorRendering eq {
      pop
    }{
      /ColorRendering findresource setcolorrendering
    } else
  } else
}
```
This example first checks for the existence of \texttt{findcolorrendering}. If found it uses \texttt{findcolorrendering} to attempt to find a CRD for a perceptual rendering intent. If successful, it installs the CRD in the graphics state. If \texttt{findcolorrendering} returns false, there are three possible actions:

1.—Use the substitution CRD that is returned.

2.—Pick a different CRD using your own method.

3.—Leave in the graphics state the currently installed CRD.

In this example, a test first is made to see if \texttt{DefaultColorRendering} is returned by \texttt{findcolorrendering}. In general, this signifies that a useful substitution was not possible. In this case the best choice is to leave the graphics state’s current CRD installed. Installation of the returned CRD is appropriate if the substitution name is different than \texttt{DefaultColorRendering}.

The current list of rendering intents recognized by Adobe Systems, Inc. is kept with Adobe’s Developer Support organization. Note that not all possible rendering intents will be supported by a particular device. In addition, other devices may support additional rendering intents beyond the standard set. This is a product dependent decision.

There is purposefully a close correspondence between the Adobe rendering intents and the rendering intents of the International Color Committee (ICC) format. This correspondence is a function of the ICC format version number. Contact Adobe’s Developer Support organization for more details.

The initial list of recognized rendering intents and their descriptions are shown in Table 5.3.

<table>
<thead>
<tr>
<th>Rendering Intent</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>\texttt{AbsoluteColorimetric}</td>
<td>Absolute colorimetry is used. For reflection print this means that $y$ of unprinted paper (paper white) is less than 1. A colorimetric reproduction is provided for in-gamut colors. Out-of-gamut colors are mapped to the border of the reproducible gamut. This has the advantage of providing exact color matches from printer to printer. It has the disadvantage of causing colors with $y$ values between the paper’s white and 1 to be out-of-gamut. Example usage would be for spot colors where an exact color reproduction is desired.</td>
</tr>
</tbody>
</table>
Relative Colorimetric

Relative colorimetry is used. For reflection print this means that y of paper white is taken to be 1. All colorimetric measurements are normalized based on the paper’s colorimetry. A colorimetric reproduction is provided for in-gamut colors. Out-of-gamut colors are mapped to the border of the reproducible gamut. This has the advantage of providing a larger effective gamut so that bright colors will more likely be in-gamut. It has the disadvantage of sacrificing exact color matches for printers with different paper white points. Example usage would be for spot colors where a color reproduction relative to the paper’s white is desired.

Saturation

Saturation relative colorimetry is used. A reproduction in which saturation is emphasized. In-gamut colors may or may not be colorimetric. Example usage would be for business graphics where saturation is the most important attribute of color.

Perceptual

Relative colorimetry is used. A reproduction which provides a perceptual or pleasing appearance. This generally means both in- and out-of-gamut colors are modified from their colorimetric representation. Example usage would be for scanned images.

Further information on the default implementation of the findcolorrendering operator is available. Refer to the Specifications and Product Finishing Tools volume (previously, Specifications and Templates volume), CRD Naming and findcolorrendering Customization document for more information. All PostScript OEMs should be sure to refer to the section CRD Policy found at the end of that document.

5.4.2 Relationship to Graphics State Parameters

Currently the only graphics state parameter that is considered by findcolorrendering is the halftone. Other parameters of the graphics state like black generation, undercolor removal, and transfer functions are not accounted for since they do not require per object modification. Halftoning requires such modification.

5.4.3 Inside findcolorrendering

findcolorrendering forms the name of a color rendering dictionary from the rendering intent, the device setup, and the halftone. The resulting name takes the form:

renderingintent.devicesetup.halftone

where renderingintent is taken verbatim from the renderingintent operand, and devicesetup and halftone are found indirectly through procedures resident in the ColorRendering instance of the ProcSet resource category. devicesetup is returned by a call to the GetPageDeviceName procedure in
the ColorRendering ProcSet. halftone is returned by a call to the
GetHalftoneName procedure in the ColorRendering procset. The syntax of
GetPageDeviceName and GetHalftoneName are:

GetPageDeviceName - GetPageDeviceName devicesetup and
       - GetHalftoneName halftone

GetPageDeviceName and GetHalftoneName always return a name. If they
are unable to return a meaningful name, they return /none. Both
GetPageDeviceName and GetHalftoneName may perform a variety of
operations in an effort to return a meaningful name. GetPageDeviceName
uses as an operand to its name selection process the pagedevice key
PageDeviceName (see page 10). Like findcolorrendering itself,
PageDeviceName is not available in all PostScript Level 2 implementations.
In an analogous manner, GetHalftoneName uses the optional HalftoneName
key in the current halftone dictionary. The name selection processes for these
two procedures may be as simple as looking for the appropriate name in the
appropriate location and returning /none if it is not found. Or it may be
considerably more complex. For example, one could analyze the current
halftone in terms of angle and frequency to classify it.

If the name formed by the concatenation of rendering intent, device setup,
and halftone is not the name of a CRD in the ColorRendering resource
category, findcolorrendering calls GetSubstituteCRD. GetSubstituteCRD
is also located in the ColorRendering instance of the ProcSet resource
category. Its syntax is

GetSubstituteCRD - renderingintent GetSubstituteCRD crdname

where renderingintent is the rendering intent passed to findcolorrendering,
and crdname is the name of a substitution CRD that exists in the
ColorRendering resource category. When GetSubstituteCRD is called,
findcolorrendering always returns false since the desired CRD is not
available. findcolorrendering returns the CRD returned by
GetSubstituteCRD. If findcolorrendering does not call
GetSubstituteCRD, it returns true. GetSubstituteCRD returns
DefaultColorRendering in the event it cannot generate a meaningful CRD
substitution. All PostScript Level 2 interpreters have a CRD named
DefaultColorRendering.
5.4.4 Modifying the CRD Selection Process

`findcolorrendering` will reside in `systemdict` for PostScript Level 2 products with ROM versions 2015.100 and beyond. For earlier versions of PostScript Level 2 products, `findcolorrendering` may be downloaded by a utility outside the sever loop, or it may be downloaded on a per job basis. An implementation of `findcolorrendering` and a generic implementation of its associated machinery can be obtained from Adobe’s Developer Support organization. However it ends up in the printer, `findcolorrendering` is not meant to be overridden to achieve a modification to the CRD selection process. Its purpose is to delegate portions of this task to `GetPageDeviceName`, `GetHalftoneName`, and `GetSubstituteCRD`.

It is anticipated that `GetPageDeviceName`, `GetHalftoneName`, and `GetSubstituteCRD` may be overridden. In addition, it is anticipated that each procedure’s specific implementation will vary from device to device to account for the different resident CRDs.

Adobe supplies a baseline version for `GetPageDeviceName`, `GetHalftoneName`, and `GetSubstituteCRD`. Customizing this baseline version can be done on a product by product basis. This baseline version satisfies the stated requirements for these three procedures as well as providing a template for modifying this selection process.

To aid `GetPageDeviceName` in returning meaningful device setup information, Adobe has added to the page device dictionary a `PageDeviceName` key. In general, `GetPageDeviceName` first looks in the page device dictionary for a `PageDeviceName` key. This key’s value can be set using `setpagedevice`. If this key is not present or if its value is null, `GetPageDeviceName` constructs a name for the device setup from the current page device parameters, e.g. `MediaType`, or may simply return `/none`. This fall-back device setup name construction is device dependent and undocumented. One can override this fall-back construction by replacing `GetPageDeviceName`.

To aid `GetHalftoneName` in returning meaningful halftone information, Adobe is advocating that generators of halftone dictionaries include a `HalftoneName` key. In general, `GetHalftoneName` first looks in the current halftone dictionary for a `HalftoneName` key. If found, this key’s value is returned. If not found, `GetHalftoneName` may analyze the current halftone and attempt to form a name, or may simply return `/none`. This fall-back halftone name construction is device dependent and undocumented. One can override this fall-back construction by replacing `GetHalftoneName`.
5.5 CID Font Format

The PostScript Language has been extended to support CID-keyed composite fonts, CIDFont resources and CMap resources.

**CIDFont** dictionaries are a new base font Type. These dictionaries allow large collections of character outlines to be stored in one dictionary. The outlines are accessed by an integer **Character Identifier** (CID) rather than by a glyph name or character code.

Encoding information is stored in CMap dictionaries. CMap dictionaries define the mapping from character codes to a font selector and a character selector. A character selector is a CID, a character code or a glyph name. Single byte, multi-byte and mixed single and multi-byte encodings are supported.

An additional FMapType is now supported with composite fonts. This FMapType allows CMap dictionaries to be used to define the encoding and allows CIDFonts to be used as base fonts.

For more information, refer to the document Adobe CMap and CIDFont Files Specification, dated 11 June 1993, Technical Note 5014, and Adobe CID-Keyed Font PostScript Language Extensions, which are both available through Developer Support.

5.5.1 CIDFont and CMap Resource Categories

A CIDFont resource instance is a dictionary especially well suited for representing a large set of glyph outlines. The glyph outlines may be defined as Type 1 CharStrings, PostScript BuildGlyph procedures, or TrueType glyph procedures. An integer character identifier (CID) is used to access glyph outlines in CIDFonts. The mapping from CID to a glyph is defined by the registry and ordering information. Different language groups may have the glyphs in a different order. Several registries and glyph orders have been defined for public use.

A CMap resource instance is a dictionary that defines mappings from character codes (single or multiple byte) to CIDs or other character selectors. The CMap is used in conjunction with one or more CIDFonts or base fonts. The CIDs it produces can select glyphs from a CIDFont; the other selectors (codes or names) can select glyphs from an ordinary base font.

A composite font (FontType 0) with FMapType 9 combines a CMap dictionary with one or more CIDFont or base font dictionaries. The CMap entry in the composite font dictionary specifies the CMap, and the FDepVector array specifies the CIDFonts or base font dictionaries to be used.
The resource operators `resourceforall`, `resourcestatus`, `findresource`, `defineresource`, and `undefineresource` can be used to list, acquire status, find, define, and undefine CIDFont or CMap resource instances. If the instance is automatically loaded from an external source, it is loaded into global VM. Otherwise it is built in the VM allocation mode active when the CIDFont or CMap instance is created.

CIDFont dictionaries can be used with `makefont`, `scalefont`, `selectfont`, `setfont` and `currentfont` operators. However when a CIDFont is the current font only `glyphshow` is allowed. `glyphshow` will now take as an argument an integer as well as a name object. When the currentfont is a CIDFont the integer will be used as the CID to find and show the glyph.

The show operators `show`, `ashow`, `widthshow`, `xshow`, `xyshow`, `yshow`, `stringwidth`, `cshow` and `kshow` are not supported when the current font is a CIDFont. Also `findfont` or `/Font findresource` cannot be used to load CIDFonts into VM nor will `/Font resourceforall` list CIDFonts. The CIDFont resource category is independent of the Font resource category.

### 5.5.2 Extensions to Existing Operators

**Table 5.4 Extensions to existing operators**

<table>
<thead>
<tr>
<th>Operator/Key</th>
<th>Description</th>
</tr>
</thead>
</table>
| glyphshow    | `name glyphshow` -  
                 `int glyphshow` - |

If the current font is a CIDFont then the argument must be an integer object. The integer is used as the CID to find and show the character in the CIDFont. A `typecheck` error is raised if the element on the stack is an integer and the current dictionary is not a CIDFont or the current dictionary is a CIDFont and the object on the stack is not an integer. An `invalidfont` error is raised if `glyphshow` is executed when the current dictionary is a composite font (Type 0).

**Errors:** `invalidaccess`, `invalidfont`, `nocurrentpoint`, `stackunderflow`, `typecheck`
\texttt{show} \hspace{1cm} \texttt{string show} \\
\texttt{ashow} \hspace{1cm} \texttt{ax ay string ashow -} \\
\texttt{widthshow} \hspace{1cm} \texttt{cx cy char string widthshow -} \\
\texttt{stringwidth} \hspace{1cm} \texttt{string} \\
\texttt{wx wy} \hspace{1cm} \{ \text{other operators in show family except cshow and glyphshow} \} \\
\hspace{1cm} \text{If the current font is a composite font with FMapType 9, the CMap mapping} \\
\hspace{1cm} \text{algorithm described in the extensions to composite fonts is applied to select} \\
\hspace{1cm} \text{the glyph.} \\
\hspace{1cm} \textbf{Errors:} \hspace{.5cm} \text{Refer to the Postscript Language Reference} \\
\hspace{1cm} \text{Manual, Second Edition.} \\
\texttt{cshow} \hspace{1cm} \texttt{proc string cshow -} \\
\hspace{1cm} \text{To maintain compatibility with existing PostScript files, cshow has been} \\
\hspace{1cm} \text{modified for composite fonts that contain CIDFonts as base fonts. When the} \\
\hspace{1cm} \text{base font is a CIDFont, the code put on the stack for execution of proc is the} \\
\hspace{1cm} \text{low order 8 bits of the character code from the string. The original code is} \\
\hspace{1cm} \text{stored in an internal variable. If the proc does not change the current font but} \\
\hspace{1cm} \text{executes a show operator, the glyph is selected by using the original character} \\
\hspace{1cm} \text{code and the root composite font as the current font. For example if the input} \\
\hspace{1cm} \text{string to cshow is } <2240> \text{ the code on the stack when proc is executed would} \\
\hspace{1cm} \text{be 40 (hexadecimal). If proc put this value into a 1 byte string and did a show,} \\
\hspace{1cm} \text{the string } <2240> \text{ would be used to look up and show the glyph from the root} \\
\hspace{1cm} \text{composite font. A rangecheck error would occur if proc tried to show a} \\
\hspace{1cm} \text{string with a byte other than 40 (hexadecimal). A rangecheck error is raised} \\
\hspace{1cm} \text{if a show operator executed by proc uses a value other than the code on the} \\
\hspace{1cm} \text{stack when proc is invoked.} \\
\hspace{1cm} \textbf{Errors:} \hspace{.5cm} \text{invalidaccess, invalidfont, nocurrentpoint,} \\
\hspace{1cm} \text{rangecheck, stackunderflow, typecheck} \\

\textbf{5.5.3 New Operator} \\

\textbf{Table 5.5 New operator} \\

\begin{tabular}{ |l|l| } 
\hline
\textbf{Operator/Key} & \textbf{Description} \\
\hline
\text{composefont} & \text{name cmap array composefont font} \\
\hline
\end{tabular} \\

\hspace{1cm} \text{This operator generates a composite font made from the cmap and the Fonts} \\
\hspace{1cm} \text{or CIDFonts listed in the array. The array can contain names or the actual} \\
\hspace{1cm} \text{dictionaries. The cmap can either be a name or a CMap resource instance.} \\
\hspace{1cm} \text{The composite font that is created will have an FMapType entry set to 9 and} \\
\hspace{1cm} \text{a CMap entry set to the CMap resource instance. The FDepVector will be set} \\
\hspace{1cm} \text{to the array of Fonts or CIDFonts. The Encoding entry will be set to the} \\
\hspace{1cm} \text{identity mapping and will have the same number of elements as the}
**FDepVector.** The **FontName** of the composite font will be set to the name on the stack when **composefont** was executed. A /Font defineresource will be executed by **composefont**. This will associate the **FontName** with the font dictionary in the **FontDirectory** dictionary. This will overwrite any previous definition of a font with the same name. The **composefont** operator will always create a new font dictionary regardless whether one exists that is made from the same **CMap** and array of fonts. It is recommended that **composefont** be used to create a composite font and then use **findfont** to retrieve it from the **FontDirectory**. However the contents of **FontDirectory** are subject to **save** and **restore**. Therefore **composefont** must be used within the **save restore** before the first use of **findfont**.

**Errors:** limitcheck, rangecheck, dictfull, invalidfont, stackunderflow, typecheck, invalidaccess
The PostScript language has undergone several significant extensions. It is designed to be a universal standard for device-independent page descriptions, but each PostScript language implementation supports features and capabilities particular to that implementation. Appendix D, “Compatibility Strategies,” in the *PostScript Language Reference Manual, Second Edition*, presents guidelines for taking advantage of language extensions while maintaining compatibility with all PostScript interpreters.

Level 1 implementations provide a collection of device control and system parameter configuration operators and procedures, most of which are defined in the dictionary `statusdict`. The contents of `statusdict` are product dependent, although an attempt has been made to maintain a consistent specification for common features. It is the dictionary for product-specific operators and other definitions.

Device control and configuration of system parameters in PostScript language Level 2 is accomplished in a standard way in the language through the device setup and interpreter parameter operators. However, for compatibility with existing Level 1 PostScript language driver software, which might depend on `statusdict` operators and keys that were often present in Level 1 PostScript products, a collection of `statusdict` operators and keys is included in each Level 2 PostScript language implementation.

Almost all of these functions are implemented as PostScript language procedures that call appropriate Level 2 operators such as `setpagedevice`.

Adobe Systems recommends that you do not use the `statusdict` operators and keys in Level 2 PostScript language drivers because the presence or absence of the operators and keys is product dependent. Instead, the appropriate Level 2 standard operators should be used.

### 6.1 Compatibility Operators

The following is a list of the compatibility operators described in this chapter. They appear below in three groups by dictionary.
In the following list, as well as the tables in this chapter, these symbols are used:

† means that this compatibility operator is typically present in all releases up to and including the 2015 PostScript language implementations.

‡ means that this compatibility operator is typically present in all releases up to and including the 2015 PostScript language implementations. However, in the absence of the associated feature, it performs no function aside from its documented effect on the operand stack.

ø means that this compatibility operator is typically present in all releases up to and including the 2015 PostScript imagesetter implementations.

§ means that this compatibility operator requires execution in a system administrator job.

¶ means that this compatibility operator can affect page device parameters.

Operators without a symbol are associated with a particular feature and are defined only if the feature is present in the product.

In `statusdict`:

<table>
<thead>
<tr>
<th>Operator</th>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>a3tray</td>
<td>†</td>
<td></td>
</tr>
<tr>
<td>appletalktype</td>
<td></td>
<td></td>
</tr>
<tr>
<td>byteorder</td>
<td>†</td>
<td></td>
</tr>
<tr>
<td>defaulttimeouts</td>
<td>‡</td>
<td></td>
</tr>
<tr>
<td>dostartpage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>emulate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>initializedisk</td>
<td>‡</td>
<td></td>
</tr>
<tr>
<td>ledgertray</td>
<td></td>
<td></td>
</tr>
<tr>
<td>manualfeed</td>
<td>†</td>
<td></td>
</tr>
<tr>
<td>mirrorprint</td>
<td></td>
<td></td>
</tr>
<tr>
<td>pagemargin</td>
<td>‡</td>
<td></td>
</tr>
<tr>
<td>printename</td>
<td>†</td>
<td></td>
</tr>
<tr>
<td>ramsize</td>
<td>†</td>
<td></td>
</tr>
<tr>
<td>revision</td>
<td></td>
<td></td>
</tr>
<tr>
<td>setaccuratescreens</td>
<td>†</td>
<td></td>
</tr>
<tr>
<td>setdefaulttimeouts</td>
<td>†‡</td>
<td></td>
</tr>
<tr>
<td>setdodutosstart</td>
<td>†</td>
<td></td>
</tr>
<tr>
<td>sethardwareiomode</td>
<td>†‡</td>
<td></td>
</tr>
<tr>
<td>setjobtimeout</td>
<td>†</td>
<td></td>
</tr>
<tr>
<td>setpage</td>
<td>†‡</td>
<td></td>
</tr>
<tr>
<td>setpagestackorder</td>
<td>†‡</td>
<td></td>
</tr>
<tr>
<td>setsoftwareiomode</td>
<td>†‡</td>
<td></td>
</tr>
<tr>
<td>setaccuratescreens</td>
<td>†</td>
<td></td>
</tr>
<tr>
<td>setdefaulttimeouts</td>
<td>†‡</td>
<td></td>
</tr>
<tr>
<td>setduplexmode</td>
<td>†</td>
<td></td>
</tr>
<tr>
<td>setjobtimeout</td>
<td>†</td>
<td></td>
</tr>
<tr>
<td>setmargins</td>
<td>†‡</td>
<td></td>
</tr>
<tr>
<td>setpagemargin</td>
<td>†‡</td>
<td></td>
</tr>
<tr>
<td>setprintename</td>
<td>†‡</td>
<td></td>
</tr>
<tr>
<td>setsoftwareiomode</td>
<td>†‡</td>
<td></td>
</tr>
</tbody>
</table>

In the following list, as well as the tables in this chapter, these symbols are used:

† means that this compatibility operator is typically present in all releases up to and including the 2015 PostScript language implementations.

‡ means that this compatibility operator is typically present in all releases up to and including the 2015 PostScript language implementations. However, in the absence of the associated feature, it performs no function aside from its documented effect on the operand stack.

ø means that this compatibility operator is typically present in all releases up to and including the 2015 PostScript imagesetter implementations.

§ means that this compatibility operator requires execution in a system administrator job.

¶ means that this compatibility operator can affect page device parameters.

Operators without a symbol are associated with a particular feature and are defined only if the feature is present in the product.
6.2 Compatibility Operator Descriptions

This section describes the Level 1 compatibility objects present in Level 2 PostScript interpreters. The majority of these Level 1 objects are operators in `statusdict`. Other dictionaries may also contain compatibility objects (for example, `letter` in `userdict`). Compatibility objects need not always be operators (for example, the `waittimeout` integer in `statusdict`).

There is a Level 2 method of performing most Level 1 compatibility operations. For the following compatibility operators, there is currently no PostScript language Level 2 equivalent:

<table>
<thead>
<tr>
<th>Level 1 Operator</th>
<th>Level 2 Equivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>checkpassword</code></td>
<td><code>checkscreen</code></td>
</tr>
<tr>
<td><code>checkscreen</code></td>
<td><code>checkscreen</code></td>
</tr>
<tr>
<td><code>emulate</code></td>
<td><code>firstside</code></td>
</tr>
<tr>
<td><code>emulate</code></td>
<td><code>newsheet</code></td>
</tr>
<tr>
<td><code>sccinteractive</code></td>
<td><code>setpapertray</code></td>
</tr>
<tr>
<td><code>sccinteractiv</code></td>
<td><code>setsccinteractive</code></td>
</tr>
<tr>
<td><code>setuserdiskpercent</code></td>
<td><code>userdiskpercent</code></td>
</tr>
</tbody>
</table>

The remaining compatibility objects are described below in terms of Level 2 operations. This not only provides the most accurate description of the compatibility operation but also indicates the correct Level 2 method of carrying out the operation.

Because many of the compatibility operations originally dealt with product-specific behavior, the semantics of some operations in Level 1 varied from one product to another. Defining compatibility operations in terms of product-independent Level 2 operations corrects this problem at the cost of sometimes providing an imperfect emulation of the Level 1 operation.
Some Level 1 operations are no longer relevant for PostScript language Level 2 programs. In these cases, the compatibility operations may be implemented as no-ops that allow the PostScript language Level 1 program containing them to continue without generating errors. An example of such an operator is \texttt{setscinteractive}.

### 6.2.1 Error Behavior

In general, the behavior for error conditions is different between the Level 1 compatibility operation and the corresponding Level 2 method. This is to provide error behavior that is as similar to Level 1 error behavior as possible. As an example, a Level 1 paper tray operation such as \texttt{lettertray} may generate a \texttt{rangecheck} while the corresponding Level 2 operation will generate a \texttt{configurationerror} or will perform other actions under the control of Policies in the page device dictionary.

### 6.2.2 Using a Password to Change Persistent Values

In Level 1, many of the operations that changed persistent values could only be executed from jobs that had “exited the server” (this action required a password). If such an operation was executed without exiting the server an \texttt{invalidaccess} error resulted.

In Level 2, the notion of exiting the server has been replaced by the concept of an unencapsulated job (see section 3.7.7 of the PostScript Language Reference Manual, Second Edition). An unencapsulated job is entered by executing the Level 2 operator, \texttt{startjob}, or the Level 1 operator, \texttt{exitserver}. These operators require a password to be presented. The password must be equal to the value of either the \texttt{StartJobPassword} or the \texttt{SystemParamsPassword} system parameter. If the password is equal to the value of \texttt{StartJobPassword}, an ordinary unencapsulated job is started (see section 3.7.7 of the PostScript Language Reference Manual, Second Edition). If the password is equal to the value of \texttt{SystemParamsPassword}, a system administrator job is started. (If the \texttt{SystemParamsPassword} is a zero-length string or has never been set, every unencapsulated job is a system administrator job.)

Many compatibility operators change system or device parameters. Such operators use the Level 2 \texttt{setsystemparams} or \texttt{setdevparams} operators to emulate the Level 1 functionality. Those operators ordinarily require a \texttt{Password} parameter to be presented on each execution. This requirement is relaxed during a system administrator job, but not during an ordinary unencapsulated job. Since the compatibility operators do not present a password, this means they can be successfully executed only during a system administrator job. Executing them during an ordinary unencapsulated job (or any encapsulated job) will cause an \texttt{invalidaccess} error.
Compatibility operators that affect page device parameters save their persistent values only if they are executed from an unencapsulated job. In encapsulated jobs the values set by these compatibility operators will obey the normal save-restore rules and are not saved to persistent storage.

*Note* The compatibility objects are present in Level 2 printers for compatibility purposes only and their use in PostScript language Level 2 programs is strongly discouraged.

**statusdict Compatibility Operators**

- **a3tray**
  - See section 6.2.5, “Paper Tray Operations.”

- **a4tray**
  - See section 6.2.5, “Paper Tray Operations.”

- **accuratescreens**
  - See section 6.2.8, “Imagesetter Compatibility Operators Found in Statusdict.”

- **appletalktype**
  - Returns a string with the same value as the `LocalTalkType` device parameter in the `%LocalTalk%` parameter set and the `EtherTalkType` parameter in the `%EtherTalk%` parameter set. Redefining `appletalktype` will cause the `LocalTalkType` parameter to change as well as the `EtherTalkType` parameter. Similarly, changes to the `EtherTalkType` or the `LocalTalkType` parameter will change the string returned by the `appletalktype` operator.

  The compatibility operator `appletalktype` is present only if either the `%LocalTalk%` or `%EtherTalk%` device name is present.

  **Errors:** stackoverflow

- **b5tray**
  - See section 6.2.5, “Paper Tray Operations.”

- **buildtime**
  - Returns an integer with the same value as the system parameter `BuildTime`.

  **Errors:** stackoverflow
byteorder† – byteorder bool

Returns a boolean with the same value as the system parameter ByteOrder.

Errors: stackoverflow

checkpassword† int checkpassword bool
string checkpassword bool

Checks whether string or int (int is converted to a string) is a valid password for either SystemParamsPassword or StartJobPassword. If valid, true is returned, otherwise false is returned. If either password is not set, then true will be returned. A returned value of true indicates that string or int is a valid argument to startjob and exitserver. There is no PostScript language Level 2 equivalent for checkpassword.

Errors: stackunderflow, typecheck

checkscreenø See section 6.2.8, “Imagesetter Compatibility Operators Found in Statusdict.”

defaulttimeouts‡ – defaulttimeouts job manualseed wait

Returns the values of the system parameters JobTimeout and WaitTimeout and the page device parameter ManualFeedTimeout for job, wait, and manualseed respectively. defaulttimeouts always returns three values, even if the corresponding system parameters are not present (zeros are returned in this case).

Errors: stackoverflow

diskonline – diskonline bool

Returns true if and only if a writeable disk device is mounted. This is determined by searching all device parameter sets named %disk*%, where * represents zero or more additional characters in the name. If the Writeable parameter is true for any of the sets searched, bool is set to true; otherwise, it is set to false. Note that a disk parameter set with Writeable true need not have an initialized file system.

Errors: stackoverflow
**diskstatus**  –  **diskstatus free total**

Returns the number of disk pages (a page is 1024 characters) free and the total number of pages available on all writeable disk devices. This is determined by searching all device parameter sets named %disk*% that have a **Writable** parameter set to **true**. The * represents zero or more additional characters in the name. **free** is the sum of the **Free** parameters from all such parameter sets and **total** is the sum of the **LogicalSize** parameters from all such parameter sets.

**Errors:**  
**stackoverflow**

**dostartpage**  –  **dostartpage bool**

Returns the value of the system parameter **DoStartPage**.

The system parameter **DoStartPage** must be present for the compatibility operator **dostartpage** to be present.

**Errors:**  
**stackoverflow**

**dosysstart**  –  **dosysstart bool**

Returns **false** if and only if the value of the system parameter **StartupMode** is **0**.

The system parameter **StartupMode** must be present for the compatibility operator **dosysstart** to be present.

**Errors:**  
**stackoverflow**

**duplexmode**  See section 6.2.6, “Page Duplex Compatibility Operators.”

**emulate**  
*input-stream emulation-name emulate*  –  
or  
*input-stream params-dict emulation-name emulate*  –

Causes the PostScript interpreter to yield control, and the emulator named by **emulation-name** to start processing. The **emulate** operator is present in **statusdict**, and only in products that have one or more emulators co-resident with the PostScript interpreter. The exact semantics of the emulators are product-dependent, and may be different in different products even though the emulation name may be the same. The specifics of each product’s
emulators (if any) are documented in the product *Addendum*. In most co-resident emulations, the command sequence ESC-DEL-0 can be used to make the emulator yield control back to the PostScript interpreter; however, the PostScript language context will generally have been lost.

The allowed values of `emulation-name` may be found in the implicit resource category **Emulator**. An illegal `emulation-name` will cause a **rangecheck** error.

A **params-dict** argument is optional. If the named emulator does not need parameters and a `params-dict` is provided, the dictionary will be ignored. If the named emulator requires parameters and no `params-dict` is provided, then product-dependent defaults will be used if possible. Currently, no emulators require parameters.

The **input-stream** is a file object which becomes the input source for the emulator. The **input-stream** specified must be appropriate to the product-dependent emulator, as defined in the product *Addendum*. An illegal **inputstream** will cause an **invalidaccess** error.

**Errors:** invalidaccess, rangecheck, stackoverflow, stackunderflow

**firstside** See section 6.2.6, “Page Duplex Compatibility Operators.”

**hardwareiomode** – **hardwareiomode int**

Returns an **int** which indicates the current communication channel whose corresponding device parameter set **Enabled** boolean is **true**. It will always return the channel indicated by **CurlInputDevice** if that channel is on and enabled and one of the ones listed below. Otherwise, the smallest such int is returned. If none in the list are on and enabled, 0 is returned. The interpretation of **int** is:

<table>
<thead>
<tr>
<th>int</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>%Serial%</td>
</tr>
<tr>
<td>1</td>
<td>%Parallel%</td>
</tr>
<tr>
<td>2</td>
<td>%LocalTalk%</td>
</tr>
<tr>
<td>3</td>
<td>%SerialB%</td>
</tr>
</tbody>
</table>

The **Serial**, **Parallel**, **SerialB**, or **LocalTalk** device parameter set must be present for the compatibility operator **hardwareiomode** to be present.

**Errors:** stackoverflow
initializedisk $pages\ action\ initializedisk$ –

Initializes each writeable disk, setting the disk device parameters LogicalSize and InitializeAction to the value of $pages$ and $action + 1$, respectively.

Errors: invalidaccess, ioerror, rangecheck, stackunderflow, typecheck

jobname † – jobname string

A string with the same value as the user parameter JobName. Redefining either jobname or the user parameter JobName redefines the other to the same value.

The user parameter JobName must be present for the compatibility operator jobname to be present.

Errors: stackoverflow

jobtimeout † – jobtimeout int

Returns the value of the user parameter JobTimeout.

Errors: stackoverflow

ledgertray$ See section 6.2.5, “Paper Tray Operations.”

legaltray$ See section 6.2.5, “Paper Tray Operations.”

lettertray†$ See section 6.2.5, “Paper Tray Operations.”

manualfeed – manualfeed bool

A boolean that works in conjunction with the page device parameter ManualFeed to determine whether a page is fed manually. If either manualfeed or ManualFeed is true at the time of a showpage or copypage then that page will be fed manually; otherwise, the page will not be fed manually.
The values of `ManualFeed` and `manualfeed` are determined independently. That is, setting the `manualfeed` boolean or setting the `pagedevice` parameter, `ManualFeed`, does not affect the value of the other.

The `manualfeed` key is present in `statusdict` if and only if the page device parameter `ManualFeed` is defined for the product. The initial value of `manualfeed` at power-on is `false`.

**Errors:** stackoverflow

---

```markdown
**manufeedtimeout** – *manufeedtimeout* *int*
```

An integer that works in conjunction with the page device parameter `ManualFeedTimeout` to determine the `manualfeed` time-out for any given page. By default, `manufeedtimeout` is not defined in `statusdict` and in that case the value of the page device parameter `ManualFeedTimeout` is used to determine the time-out value. If a job has defined `manufeedtimeout` to be an integer value in `statusdict` then this value will be used instead of `ManualFeedTimeout` for the time-out value.

The values of `ManualFeedTimeout` and `manufeedtimeout` are determined independently. That is, setting the `manufeedtimeout` integer or setting the page device parameter `ManualFeedTimeout` does not affect the value of the other.

**Errors:** stackoverflow

---

```markdown
**margins**‡ – *margins* *top left*
```

Returns the x and y components of the page device parameter `Margins` as `left` and `top`, respectively.

**Errors:** stackoverflow

---

```markdown
**mirrorprint** – *mirrorprint* *boolean*
```

Returns the value of the page device parameter `MirrorPrint`.

**Errors:** None.
newsheet  See section 6.2.6, “Page Duplex Compatibility Operators.”

pagecount‡  –  pagecount int

Returns the value of the system parameter PageCount.

Errors:  stackoverflow

pagemargin®  See section 6.2.8, “Imagesetter Compatibility Operators Found in Statusdict.”

pageparams®  See section 6.2.8, “Imagesetter Compatibility Operators Found in Statusdict.”

pagestackorder  –  pagestackorder bool

Returns the logical complement of the page device OutputFaceUp boolean parameter. For example, if OutputFaceUp is true, bool will be false.

The page device parameter OutputFaceUp must be present for the compatibility operator pagestackorder to be present.

Errors:  stackoverflow

printername†  string printername substring

Stores the value of the system parameter PrinterName in string and returns a string object designating the substring actually used.

Errors:  rangecheck, stackunderflow, typecheck

processcolors  –  processcolors int

Returns the number of device process color components in the current page device (1 for black, 3 for RGB or CMY, or 4 for CMYK). This compatibility operator is only present for devices capable of color printing (which have more than one process color to print). Its absence indicates a monochrome-only device (1 process color).

Errors:  stackoverflow
**product**† – **product** *string*

A string in *statusdict* initialized to the value of the string **product** in *systemdict*.

Errors:  stackoverflow

**ramsize** – **ramsize** *int*

Returns the number of bytes of RAM available to the product. Refer to the **RamSize** system parameter.

Errors:  stackoverflow

**realformat**† – **realformat** *string*

A string with the same value as the system parameter **RealFormat**.

Errors:  stackoverflow

**resolution** – **resolution** *bitsperinch*

Returns the first component of the **HWResolution** array for the current output device.

Errors:  stackoverflow

**revision**† – **revision** *int*

An integer with the same value as the system parameter **Revision**.

Errors:  stackoverflow
**sccbatch**  See section 6.2.3, “SCC Operations.”

**sccinteractive** ‡  See section 6.2.3, “SCC Operations.”

**setaccuratescreens** ⁰  See section 6.2.8, “Imagesetter Compatibility Operators Found in Statusdict.”

**setdefaulttimeouts** ¹§¶ job manualfeed wait setdefaulttimeouts –

This compatibility operator sets the system parameters JobTimeout and WaitTimeout to job and wait respectively, and sets the page device parameter ManualFeedTimeout to manualfeed. setdefaulttimeouts always takes three values, even if the corresponding system or page device parameters are not present.

Errors: invalidaccess, rangecheck, stackunderflow, typecheck

**setdostartpage** ⁸  bool setdostartpage –

This compatibility operator sets the system parameter DoStartPage to the value of bool.

The system parameter DoStartPage must be present for the compatibility operator setdostartpage to be present.

Errors: invalidaccess, stackunderflow, typecheck

**setdosysstart** ⁸  bool setdosysstart –

This compatibility operator sets the system parameter StartupMode according to the value of bool. StartupMode is set to 1 if bool is true and set to 0 if bool is false.

The system parameter StartupMode must be present for the compatibility operator setdosysstart to be present.

Errors: invalidaccess, stackunderflow, typecheck
**sethardwareiomode** int sethardwareiomode

Opens specified channel(s) for communications and closes all other channels. The variable int specifies which communication channel(s) should be opened by setting the **On** and **Enabled** device parameters to **true**. All other channels will be explicitly closed by setting the **On** and **Enabled** parameter to **false**. The interpretation of int is:

<table>
<thead>
<tr>
<th>int</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Open %Serial% and %SerialB%. Close all others.</td>
</tr>
<tr>
<td>1</td>
<td>Open %Parallel%. Close all others.</td>
</tr>
<tr>
<td>2</td>
<td>Open %LocalTalk% and %EtherTalk% (if both exist). Close all others. Open %LocalTalk% (if only %LocalTalk% exists). Close all others. Open %EtherTalk% (if only %EtherTalk% exists). Close all others.</td>
</tr>
<tr>
<td>3</td>
<td>Open %Serial% and %SerialB%. Close all others.</td>
</tr>
</tbody>
</table>

**Errors:** invalidaccess, rangecheck, stackunderflow, typecheck

**setjobtimeout** int setjobtimeout –

This compatibility operator sets the user parameter **JobTimeout** to the value of int.

The user parameter **JobTimeout** must be present for the compatibility operator **setjobtimeout** to be present.

**Errors:** stackunderflow, typecheck

**setmargins** top left setmargins –

This compatibility operator sets the page device **Margins** parameter to [left top].

The page device parameter **Margins** must be present for the compatibility operator **setmargins** to be present.

**Errors:** invalidaccess, rangecheck, stackunderflow, typecheck
**setmirrorprint**

*boolean setmirrorprint —*

Creates a new page device with the parameter `MirrorPrint` set to *boolean*.

**Errors:** `stackunderflow, typecheck`

**setpage**

See section 6.2.8, “Imagesetter Compatibility Operators Found in Statusdict.”

**setpagemargin**

See section 6.2.8, “Imagesetter Compatibility Operators Found in Statusdict.”

**setpageparams**

See section 6.2.8, “Imagesetter Compatibility Operators Found in Statusdict.”

**setpagestackorder**

*bool setpagestackorder —*

This compatibility operator sets the page device `OutputFaceUp` parameter to the logical complement of `bool`. For example, if `bool` is `true` `OutputFaceUp` is set to `false`.

The page device parameter `OutputFaceUp` must be present for the compatibility operator `setpagestackorder` to be present.

**Errors:** `invalidaccess, stackunderflow, typecheck`

**setprintername**

*string setprintername —*

This compatibility operator sets the system parameter `PrinterName` to the value of `string`.

The system parameter `PrinterName` must be present for the compatibility operator `setprintername` to be present.

**Errors:** `invalidaccess, limitcheck, stackunderflow, typecheck`
**setresolution**<sup>§</sup> *bitsperinch setresolution* –

Creates a new page device with the parameter `HWResolution` set to `[bitsperinch bitsperinch]`.

**Errors:** rangecheck, stackunderflow, typecheck

**sccbatch**

See section 6.2.3, “SCC Operations.”

**sccinteractive**<sup>‡</sup>

See section 6.2.3, “SCC Operations.”

**setsoftwareiomode**<sup>‡§</sup> *int setsoftwareiomode* –

This compatibility operator sets the values of the `Interpreter`, and if appropriate, `Protocol` device parameters for the current communications device parameter set (as indicated by the system parameter `CurInputDevice`). The meaning of `int` is:

<table>
<thead>
<tr>
<th>int</th>
<th>Interpreter value</th>
<th>Protocol value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>/PostScript</td>
<td>/Normal</td>
</tr>
<tr>
<td>1</td>
<td>/ProprinterXL</td>
<td>/Raw</td>
</tr>
<tr>
<td>2</td>
<td>/Diablo630</td>
<td>/Raw</td>
</tr>
<tr>
<td>3</td>
<td><strong>Reserved.</strong></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>/HP7475A</td>
<td>/Raw</td>
</tr>
<tr>
<td>5</td>
<td>/LaserJetIIP</td>
<td>/Raw</td>
</tr>
<tr>
<td></td>
<td>(If the LaserJet IIP emulator is present in the product.)</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>/LaserJetIII</td>
<td>/Raw</td>
</tr>
<tr>
<td></td>
<td>(If the LaserJet III emulator is present in the product.)</td>
<td></td>
</tr>
<tr>
<td>100</td>
<td>/PostScript</td>
<td>/Binary</td>
</tr>
</tbody>
</table>

*Note: A product will probably never have both the LaserJet IIP and LaserJet III emulators installed. If a product does have both emulators installed, passing a value of 5 to `setsoftwareiomode` will select only LaserJet IIP.*

**Errors:** invalidaccess, rangecheck, stackunderflow, typecheck
settumble

See section 6.2.6, “Page Duplex Compatibility Operators.”

setuserdiskpercent

\[ \text{int setuserdiskpercent} \]

Pops \textit{int} off the stack. This operator is essentially a no-operation instruction.

Errors: invalidaccess, rangecheck, stackunderflow, typecheck

softwareiomode

\[ \text{ – softwareiomode int} \]

Returns \textit{int} which indicates (see \texttt{setsoftwareiomode}) the interpretation mode for the current communications device (as indicated by the system parameter \texttt{CurlInputDevice}).

Note: If the \textit{Interpreter} is not one of the values that can be set via \texttt{setsoftwareiomode}, \texttt{softwareiomode} will return -1.

Errors: stackoverflow

userdiskpercent

\[ \text{ – userdiskpercent int} \]

Returns the value 0. This operator is essentially a no-operation instruction.

Errors: stackoverflow

waittimeout

\[ \text{ – waittimeout int} \]

Is an integer with the same value as the user parameter \textit{WaitTimeout}. Redefining either \texttt{waittimeout} or the user parameter \textit{WaitTimeout} redefines the other to the same value.

The user parameter \textit{WaitTimeout} must be present for the compatibility operator \texttt{waittimeout} to be present.

Errors: stackoverflow
6.2.3 SCC Operations

The SCC (Serial Communications Controller) operators use a byte options argument (an integer parameter with values in the range 0 – 255) that holds an encoding of four SCC parameters: stop bits, data bits, flow control and parity. The byte is encoded as described in the following tables (bit positions 7 – 0 with 7 the high bit and 0 the low bit):

**Table 6.1  Stop bits**

<table>
<thead>
<tr>
<th>Position 7</th>
<th>Stop bits</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1 stop bit.</td>
</tr>
<tr>
<td>1</td>
<td>2 stop bits.</td>
</tr>
</tbody>
</table>

**Table 6.2  Data bits**

<table>
<thead>
<tr>
<th>Positions 6 and 5</th>
<th>Data bits</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Standard.</td>
</tr>
<tr>
<td>1</td>
<td>7 bits.</td>
</tr>
<tr>
<td>2</td>
<td>8 bits.</td>
</tr>
</tbody>
</table>

**Table 6.3  Flow control**

<table>
<thead>
<tr>
<th>positions 4, 3 and 2</th>
<th>Flow control</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Xon/Xoff.</td>
</tr>
<tr>
<td>1</td>
<td>Dtr.</td>
</tr>
<tr>
<td>2</td>
<td>Etx/Ack.</td>
</tr>
</tbody>
</table>

**Table 6.4  Parity**

<table>
<thead>
<tr>
<th>Positions 1 and 0</th>
<th>Parity</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Space.</td>
</tr>
<tr>
<td>1</td>
<td>Odd.</td>
</tr>
<tr>
<td>2</td>
<td>Even.</td>
</tr>
<tr>
<td>3</td>
<td>Mark.</td>
</tr>
</tbody>
</table>

See section 6.2.5, “Paper Tray Operations.”
In Level 1, the data bits and parity interacted in a non-orthogonal manner to produce a table of possible choices for data and parity that included many common desired methods of sending data. The “standard” data bits setting was only present for backward compatibility purposes with earlier versions of the SCC operators. In particular, a standard data bit setting could always be achieved with either a 7- or 8-bit data setting. In Level 2, there are analogous entries as above for the %Serial% and %SerialB% device parameter sets.

The mapping between Level 1 stop bits and flow control and Level 2 %Serial% device parameters StopBits and FlowControl, respectively, is straightforward and obvious. It is not possible to provide such a one to one correspondence between the Level 1 notion of data bits and parity and the Level 2 %Serial% device parameters DataBits and Parity. Tables 6.5 and 6.6 show the conversion between Level 1 data bits and parity and Level 2 DataBits and Parity. Notice that in going from DataBits and Parity to data bits and parity, standard parity is never used.

**Table 6.5 Options byte to device parameters conversion**

<table>
<thead>
<tr>
<th>data bits &amp; parity —&gt; DataBits &amp; Parity</th>
</tr>
</thead>
<tbody>
<tr>
<td>standard space</td>
</tr>
<tr>
<td>standard mark</td>
</tr>
<tr>
<td>standard odd</td>
</tr>
<tr>
<td>standard even</td>
</tr>
<tr>
<td>7 bits space</td>
</tr>
<tr>
<td>7 bits mark</td>
</tr>
<tr>
<td>7 bits odd</td>
</tr>
<tr>
<td>7 bits even</td>
</tr>
<tr>
<td>8 bits space</td>
</tr>
<tr>
<td>8 bits mark</td>
</tr>
<tr>
<td>8 bits odd</td>
</tr>
<tr>
<td>8 bits even</td>
</tr>
</tbody>
</table>

**Table 6.6 Device parameters to options byte conversion**

<table>
<thead>
<tr>
<th>DataBits &amp; Parity —&gt; data bits &amp; parity</th>
</tr>
</thead>
<tbody>
<tr>
<td>7 bits /none</td>
</tr>
<tr>
<td>7 bits /space</td>
</tr>
<tr>
<td>7 bits /mark</td>
</tr>
</tbody>
</table>
These tables are defined to provide the best compatibility with Level 1 behavior. In several cases, no correct choice is possible. For example, in Level 1 there was no support for 7 data bits with no parity (that is, the total number of data and parity bits is 7). The Level 2 setting of 7 bits /None is imperfectly mapped to 7 bits mark. Most serial hardware does not support 8-bit mark or space and for this reason these values are never generated in mapping from Level 1 to Level 2. In fact, in Level 1, 8 bits mark and space actually provided the equivalent of the Level 2 8 bits /None capability.

### SCC Compatibility Operators

**sccbatch channel sccbatch baud options**

Returns the serial communications device parameter settings. The values are from either the \%SerialB\_NV% (if channel equals 9) or the \%Serial\_NV% (if channel equals 25) parameter set. The value of options is encoded as described above and the values for data bits and parity are determined by Table 6.6. The values for baud, stop bits, and flow control are determined from the corresponding settings for the **Baud**, **StopBits** and **FlowControl** \%Serial\% device parameters, respectively.

*Note: If the FlowControl parameter is set to /DtrLow, sccbatch will return 1 in bit position 4, 3 and 2. If the FlowControl parameter is set to something other than /XonXoff, /Dtr, /DtrLow or /EtxAck, sccbatch will return 0 in bit position 4, 3 and 2.*

The \%Serial\_NV% or \%SerialB\_NV% device parameter set must be present for the compatibility operator **sccbatch** to be present.

**Errors:** rangecheck, stackoverflow, stackunderflow, typecheck
**sccinteractive** †  
*channel sccinteractive baud options*

Pops the input argument off the stack and pushes 0 0 on the stack. This operator is essentially a no-operation instruction.

**Errors:** invalidaccess, rangecheck, stackoverflow, stackunderflow, typecheck

**setsccbatch** §  
*channel baud options setsccbatch –*

This compatibility operator sets the communications device parameters for serial communications. Either the %SerialB_NV% (if channel equals 9) or the %Serial_NV% (if channel equals 25) settings are affected. The following device parameters are affected by baud and options: Baud, StopBits, DataBits, FlowControl, Parity, and CheckParity. Baud, StopBits, and FlowControl are set according to the corresponding values for baud, stop bits and flow control in the options argument. DataBits and Parity are set based on Table 6.6 above. CheckParity is set according to the new Parity setting:

- **true** if the setting is /Odd or /Even.
- **false** if the setting is /Space or /Mark.
- Not changed if the setting is /None (parity checking is not done if Parity is /None independent of the setting of CheckParity).

The %Serial_NV% or %SerialB_NV% device parameter set must be present for the compatibility operator setsccbatch to be present.

**Errors:** invalidaccess, rangecheck, stackunderflow, typecheck

**setsccinteractive** §§  
*channel baud options setsccinteractive –*

Pops the three input arguments off the stack. This operator is essentially a no-operation instruction.

**Errors:** invalidaccess, rangecheck, stackunderflow, typecheck
6.2.4 Paper Size Operations

All the operators in this section are in `userdict`. Each operator executes `setpagedevice` to request a specific paper size. The only difference among these operations is the size of paper requested and the `ImagingBBox`. The “*small” operators specify a non-null `ImagingBBox` while other operators specify a null `ImagingBBox`. These operators use the specified size as indicated below as a page device `PageSize` parameter. In addition, all these operators set the `PageSize Policy` to 7, which guarantees that the imaging area established is the requested size regardless of the medium’s actual size and turns off the normal PostScript language Level 2 media matching mechanism. (For a detailed description of `PageSize Policy` 7 see Table 2.2 on page 14.) The only error that is generated is a `limitcheck` caused by insufficient memory for the requested imaging area. In Table 6.7, default units (1/72 inch) are used as the units for the `PageSize` and `ImagingBBox`.

Table 6.7 Paper size compatibility operators (in userdict)

<table>
<thead>
<tr>
<th>Operator</th>
<th>PageSize</th>
<th>ImagingBBox</th>
</tr>
</thead>
<tbody>
<tr>
<td>letter ‡¶</td>
<td>[612 792]</td>
<td>null</td>
</tr>
<tr>
<td>lettersmall¶</td>
<td>[612 792]</td>
<td>[25 25 587 767]</td>
</tr>
<tr>
<td>legal ‡¶</td>
<td>[612 1008]</td>
<td>null</td>
</tr>
<tr>
<td>ledger ¶</td>
<td>[1224 792]</td>
<td>null</td>
</tr>
<tr>
<td>11x17¶</td>
<td>[792 1224]</td>
<td>null</td>
</tr>
<tr>
<td>a4 ¶</td>
<td>[595 842]</td>
<td>null</td>
</tr>
<tr>
<td>a3 ¶</td>
<td>[842 1191]</td>
<td>null</td>
</tr>
<tr>
<td>a4small¶</td>
<td>[595 842]</td>
<td>[25 25 570 817]</td>
</tr>
<tr>
<td>b5 ¶</td>
<td>[516 729] or [499 709]</td>
<td>null</td>
</tr>
<tr>
<td>note ¶</td>
<td>[width height]</td>
<td>[25 25 width-25 height-25]</td>
</tr>
</tbody>
</table>

The `note` compatibility operator will be present only if the size `[width height]` is an element of the `PageSize` array in some instance of the `OutputDevice` resource category.

The `letter` and `lettersmall` compatibility operators will be present only if the size `[612 792]` is an element of the `PageSize` array in some instance of the `OutputDevice` resource category.

The `legal` compatibility operator will be present only if the size `[612 1008]` is an element of the `PageSize` array in some instance of the `OutputDevice` resource category.
The \texttt{a4} and \texttt{a4small} compatibility operators will be present only if the size [595 842] is an element of the \texttt{PageSize} array in some instance of the \texttt{OutputDevice} resource category.

The \texttt{b5} compatibility operator will be present only if the size [516 729] or the size [499 709] is an element of the \texttt{PageSize} array in some instance of the \texttt{OutputDevice} resource category.

### 6.2.5 Paper Tray Operations

All of the operators in this section are in \texttt{statusdict}. Each operator executes \texttt{setpagedevice} to request a tray containing a specific paper size. The only difference among these operations is the size of paper requested. The \texttt{PageSize} requested is the same as for the corresponding page size operator discussed in the previous section and the \texttt{ImagingBBox} requested is always null. These operators use the specified size as indicated in Table 6.8 as a page device \texttt{PageSize} parameter.

All of these operators set the \texttt{PageSize Policy} to 0, which guarantees that a \texttt{configurationerror} is generated if a tray containing the requested paper size is not present. The implementation of the compatibility operators convert any such \texttt{configurationerror} to a \texttt{rangecheck} for compatibility with PostScript language Level 1 implementations. Also, a \texttt{limitcheck} error can occur because of insufficient memory for the requested imaging area.

\begin{table}[h]
\centering
\small
\begin{tabular}{lll}
\hline
\textbf{Operator} & \textbf{PageSize} & \textbf{ImagingBBox} \\
\hline
lettertray$^\dagger$ & [612 792] & null \\
legaltray$^\ddagger$ & [612 1008] & null \\
ledgertray$^\ddagger$ & [1224 792] & null \\
a3tray$^\ddagger$ & [842 1191] & null \\
a4tray$^\ddagger$ & [595 842] & null \\
b5tray$^\ddagger$ & [516 729] or [499 709] & null \\
11x17tray$^\ddagger$ & [792 1224] & null \\
\hline
\end{tabular}
\caption{Paper tray compatibility operators}
\end{table}

The \texttt{lettertray} compatibility operator will be present only if the size [612 792] is an element of the \texttt{PageSize} array in some instance of the \texttt{OutputDevice} resource category.

The \texttt{legaltray} compatibility operator will be present only if the size [612 1008] is an element of the \texttt{PageSize} array in some instance of the \texttt{OutputDevice} resource category.
The \texttt{a4tray} compatibility operator will be present only if the size \[595 842\] is an element of the \texttt{PageSize} array in some instance of the \texttt{OutputDevice} resource category.

The \texttt{b5tray} compatibility operator will be present only if the size \[516 729\] or the size \[499 709\] is an element of the \texttt{PageSize} array in some instance of the \texttt{OutputDevice} resource category.

\section*{6.2.6 Page Duplex Compatibility Operators}

All compatibility objects described below are defined in \texttt{statusdict} unless otherwise specified.

\textbf{Page Duplex Compatibility Operators}

\begin{description}
\item[\texttt{duplexmode}] \texttt{bool}
\end{description}

Returns the value of the page device parameter \texttt{Duplex}.

The page device parameter \texttt{Duplex} must be present for the compatibility operator \texttt{duplexmode} to be present.

\textbf{Errors:} \texttt{stackoverflow}

\begin{description}
\item[\texttt{firstside}] \texttt{bool}
\end{description}

Returns \texttt{true} if the current page is a front side, \texttt{false} if the current page is a back side.

\textit{Note: This compatibility operator is sometimes found on products that do not support duplex printing. On these products, \texttt{firstside} may be used to generate output that is intended to be copied using a duplex copier.}

\textbf{Errors:} \texttt{stackoverflow}

\begin{description}
\item[\texttt{newsheet}] \texttt{--}
\end{description}

If \texttt{Duplex} is \texttt{true} and the current page is a back-side, causes this page to be printed as is (perhaps blank) and sets up a clean printing environment for the next page. Otherwise, executing \texttt{newsheet} has no effect.

The page device parameter \texttt{Duplex} must be present for the compatibility operator \texttt{newsheet} to be present.
Errors: None.

**setduplexmode**

bool setduplexmode –

This compatibility operator sets the page device parameter *Duplex* to *bool*.

The page device parameter *Duplex* must be present for the compatibility operator *setduplexmode* to be present.

Errors: stackunderflow, typecheck

**settumble**

bool settumble –

This compatibility operator sets the page device parameter *Tumble* to *bool*.

The page device parameter *Duplex* must be present for the compatibility operator *settumble* to be present.

Errors: stackunderflow, typecheck

**tumble**

– tumble bool

Returns the value of the page device parameter *Tumble*.

The page device parameter *Duplex* must be present for the compatibility operator *tumble* to be present.

Errors: stackoverflow
6.2.7 Device Compatibility Operators

All device compatibility operators described below are defined in systemdict. The device operators aid in the management of any given file system.

Device compatibility operators

Operdevdismount string devdismount –

This compatibility operator sets the device parameter Mounted to false within the parameter set corresponding to the device specified by string. It is necessary for the device to be mounted before it can be dismounted. Trying to dismount a device that is not mounted will have no effect. Some devices cannot be dismounted. Trying to dismount these will also have no effect.

In PostScript language Level 2, you can dismount from any save level if the SystemParamsPassword is not set. If it is set, devdismount will raise an invalidaccess error unless executed within a unencapsulated system administrator job.

Errors: invalidaccess, stackunderflow, undefinedfilename

devforall proc scratch devforall –

devforall enumerates all known storage devices.

For each storage device, devforall copies its name into the supplied scratch string, pushes a string object that is the substring of scratch that was actually used, and calls proc. devforall does not return any results of its own, but proc may do so.

Note: Some of the storage devices enumerated by devforall correspond to communication channels. These will have a HasNames value equal to false.

Errors: invalidaccess, rangecheck, stackoverflow, stackunderflow, typecheck, undefined
**devformat** †§ `string pages format devformat -`

This compatibility operator sets the **LogicalSize** device parameter of the parameter set corresponding to the device specified by `string` to the value specified by `pages`. It then sets the **InitializeAction**, in the same parameter set, to the value of `format + 1`. Refer to the **InitializeAction** and **LogicalSize** file system device parameters for complete details.

**Errors:** invalidaccess, limitcheck, rangecheck, stackunderflow, typecheck, undefined, undefinedfilename

**devmount** †§ `string devmount bool`

This compatibility operator sets to **true** the **Mounted** device parameter boolean of the parameter set corresponding to the device specified by `string`. It then returns the resulting value of **Mounted** by reading it from the same parameter set. **True** indicates that the device was successfully mounted or was already mounted. **False** indicates that the device cannot be mounted at this time.

In PostScript language Level 2, you can mount from any save level if the **SystemParamsPassword** is not set. If it is set, **devmount** will raise an **invalidaccess** error unless executed within a unencapsulated system administrator job.

**Errors:** invalidaccess, stackunderflow, undefinedfilename

**devstatus** † `string devstatus false` (if device not found)

`string devstatus searchable writeable hasNames mounted removable searchOrder freePages size true` (if device found)

Takes a `%disk%` device name identified by `string` from the stack. If the device name is unknown, `false` will be left on the stack only. If the device name is found, it pushes various file system attributes for the device. The attributes are **searchable**, **writeable**, **hasNames**, **mounted**, **removable**, **searchOrder**, **freePages**, and **size**.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>searchable</td>
<td>The <strong>searchable</strong> attribute corresponds to the <strong>Searchable</strong> device parameter and is a boolean which indicates that the device will be searched when looking for a file with no device name prefix in its name.</td>
</tr>
</tbody>
</table>
writeable  The writeable attribute corresponds to the Writeable device parameter and indicates whether files on this device can be written.

hasNames  The hasNames attribute corresponds to the HasNames device parameter and is a boolean which indicates whether the device supports named files.

mounted  The mounted boolean (Mounted device parameter) indicates whether the device is mounted.

removable  The removable boolean (Removable device parameter) indicates whether the media within the device can be removed.

searchOrder  The searchOrder attribute (SearchOrder device parameter) indicates the priority at which the device participates when searching for a file in operations in which no device has been specified.

freePages  The freePages boolean (Free device parameter) indicates the amount of free space (in pages).

size  The size attribute (LogicalSize device parameter) indicates the current size of the PostScript software file system (in pages).

*Note: In Level 1, a “page” had a file system specific size (typically 1024).*

For a complete description of each of the device parameters mentioned above, refer to section 3.5.3.

**Errors:** stackunderflow

### 6.2.8 Imagesetter Compatibility Operators Found in Statusdict

**accuratescreens⁰**  – accuratescreens boolean

Returns the value of the user parameter AccurateScreens. A value of true means that accurate screening is enabled.

**Errors:** stackoverflow

**checkscreens⁰**  freq angle checkscreen actualfreq actualangle moirelength

Returns the actual screen frequency and angle that would be used if setscreen was called. The moirelength is the distance in inches where the deviation from the requested dot pattern would reach a fixed fraction of a cell...
size, and is thus a measure of how accurate the actual screen would approximate the requested screen. Note that this operator does not affect the current screen.

Errors: stackoverflow

\texttt{pagemargin \^} \texttt{x} \quad – \texttt{pagemargin \^} \texttt{x}

Returns the x value (measured in device units) of the page device parameter \texttt{PageOffset}.

Errors: stackoverflow

\texttt{pageparams \^} \texttt{width height margin orientation} \quad – \texttt{pageparams \^} \texttt{width height margin orientation}

Suppose that the value of the page device parameter \texttt{PageSize} is \([x \ y]\) and that \texttt{PageOffset} is \([X \ Y]\). Then \texttt{pageparams} returns values, depending on the value of the page device parameter \texttt{Orientation}, as indicated in the following table:

<table>
<thead>
<tr>
<th>Orientation</th>
<th>width</th>
<th>height</th>
<th>margin</th>
<th>orientation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>\texttt{y}</td>
<td>\texttt{x}</td>
<td>\texttt{X}</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>\texttt{x}</td>
<td>\texttt{y}</td>
<td>\texttt{X}</td>
<td>1</td>
</tr>
<tr>
<td>2*</td>
<td>\texttt{y}</td>
<td>\texttt{x}</td>
<td>\texttt{X}</td>
<td>0</td>
</tr>
<tr>
<td>3*</td>
<td>\texttt{x}</td>
<td>\texttt{y}</td>
<td>\texttt{X}</td>
<td>1</td>
</tr>
</tbody>
</table>

\*These orientations are not applicable. These were not supported in Level 1 imagesetters.

Errors: none

\texttt{setaccuratescreens \^} \texttt{boolean setaccuratescreens} \quad –

Sets the user parameter \texttt{AccurateScreens} to have the value \texttt{boolean}.

Errors: stackunderflow, invalidaccess, typecheck
setpage \(\omega\) \hspace{1em} width \ height \ orientation \ setpage –

Creates a new page device with the parameter PageSize set to [width height] and Orientation to orientation.

Errors: limitcheck, rangecheck, stackunderflow, typecheck

setpagemargin \(\omega\) \hspace{1em} margin \ setpagemargin –

Creates a new page device with the parameter PageOffset set to [margin 0].

Errors: rangecheck, stackunderflow, typecheck

setpageparams \(\omega\) \hspace{1em} width \ height \ margin \ orientation \ setpageparams –

Creates a new page device with the parameter PageSize set to [width height], the x value of PageOffset set to margin, and Orientation set to orientation.

Errors: limitcheck, rangecheck, stackunderflow, typecheck, undefinedresult
Changes Since Earlier Versions

A.1 Changes since Version 2014, March 10, 1994

The following is a brief list of changes made to the PostScript Language Reference Manual Supplement since March 10, 1994. These changes were incorporated into the 2015 release.

- There is new support for CRD selection based on rendering intent. See the new page device key `PageDeviceName` found on page 10. See section 5.4 on page 166 for complete details on CRD selection. There are 3 new ProcSets associated with CRD selection. They are `GetPageDeviceName`, `GetHalftoneName`, and `GetSubstituteCRD`. See Table 4.1 on page 151.

- There is a better description of the `PageSize` matching rules found on page 10.

- The new `/Interpreter` key `/PCL` has been added to the list for LaserJet 4 emulation. See page 64. There is a new device parameter set called `%PCL%`. See page 125.

- The new key `PrinterControl` has been added to all device parameters sets of type `/Communications`. See page 66.

- The `%Parallel%` parameter set has new values for the `Handshake` key. There are also 2 new keys: `nAckPulseWidth` and `nStrobeExpectedPulseWidth`. See page 72.

- The `%EtherTalk%` parameter set has had the key `NodeID` added to it. See page 80.

- There is a new parameter set called `%TokenTalk%`. See page 81.

- Also for token ring, the new parameter set `%TokenRingPhysical%` has been added. See page 108.
• There is a new device parameter set called %Console%. See page 121. There is a new resource category called Localization which enumerates the possible natural languages that the console can be used with. See page 157.

• There are 2 new resource categories PDL and ControlLanguage which give information about language interpreted by the product. See page 158.

• In 2015, support for the new CID font format is present. See page 172 on page 172.

• Support for the new halftone type 10 has been added. See page 162

A.2 Changes since Version 2013, March 31, 1993

The following is a brief list of changes made to the PostScript Language Reference Manual Supplement since March 31, 1993. These changes were incorporated into the 2014 release.

• The default value has been added to the HostJobID key on page 24.

• The PageCount parameter on page 51 has an improved description.

• Section 3.5 (page 53) contains a new note to support the removal of the word “typically” from Tables 3.4 to 3.35.

• The description of DelayedOutputClose on page 62 explains better the parameter’s function.

• A description of the Bus key has been added to Table 3.7. See page 75.

• The GatewayAddress parameter has been updated to explain its reliance on the IPAddressDynamic parameter value. See page 101.

• The Removable parameter (page 113) is described in more detail.

• Descriptions of the new page device keys DeferredMediaSelection, ImageShift, and MediaPosition have been added to Table 2.1 on page 6. Also the InsertSheet and PageOffset descriptions are improved.

• 2.1, “Details Dictionaries” on page 15 describes better what happens if the Type key for a details dictionary is wrong or missing.

• The DialCallee parameter in the FaxOptions has the comma character better explained (page 23). Also in FaxOptions, there are 2 new keys. They are HostJobID (page 24) and RecipientLanguage (page 26). Also the description for RecipientName and RecipientPhone has been improved.
• 2.2.5, “CoverSheet, Confirmation, and PageCaption Procedures,” has a new improved description.

• 2.4.3, “undefined Errors” explains that undefined is a possible error from setpagedevice.

• Two new imagesetter system parameters have been added to Table 3.2 on page 45. The new parameters CurBufferType (on page 45) and MinBandBuffers (page 51) are found in this table.

• The semantics of the PageCount system parameter have changed. See page 51.

• The new communication device parameter DelayedOutputClose is described on page 62. This parameter exists in almost all parameter sets of type /Communications.

• The description of the detection of protocol when using /AutoSelect has been clarified (page 64).

• The Novell SPX/IPX Node address syntax has been modified since the 2013 Supplement. Refer to Table 3.11 on page 84.

• The %AppSocket% parameter set has a new parameter called ControlPortNumber (page 87).

• Several new Novell device parameter sets are described. They are %RemotePrinter% (page 92), %PrintServer% (page 93), %SPX% (page 104), and %IPX% (page 105).

• The description for the TrapHost parameter in the %SNMP% set has changed. See page 96.

• The parameter set %UDP% (page 100) has been added to the family of TCP/IP related parameter sets.

• The description of the various parameters in the %IP% set has been rewritten. See Table 3.21 on page 100.

• The Name parameter in the %EthernetPhysical% set is read-only (page 107).

• The %Fax% parameter set has 2 new keys called LocalLanguage (page 133) and Group3Adjustment (page 132).

• 3.6.4, “Administrative Resources” has a new subsection called “Job Queues which describes the new capability in 2014 of displaying fax job queues.
• 3.6.5, “Translations Dictionaries in the FaxDefaultProcs ProcSet” is new.

• Table 4.4, Description of keys present in an instance of the category OutputDevice on page 156 has had `ProcessColorModel` added to it.

• Table 4.5 on page 157 lists `/WorldModem` as a possible `Fax` instance value.

• There are several new instances listed in the `IODevice` resource category. The list includes `%RemotePrinter%`, `%PrintServer%`, `%UDP%`, `%SPX%`, and `%IPX%`. Each has the corresponding _NV and _Pending set names.

• There are other minor corrections throughout.

A.3 Changes since Version 2012, November 25, 1992

The following is a brief list of changes made to the PostScript Language Reference Manual Supplement since November 25, 1992. These changes were incorporated into the 2013 release.

• The new page device key `PageOffset` has been added to chapter 2.

• Section 3.5.2 has been reorganized to describe device parameter sets associated with both network and point-to-point communications. Several new parameter sets are described which have been defined to support the use of the TCP/IP protocol over Ethernet. The new parameter sets include `%LPR%`, `%AppSocket%`, `%Telnet%`, `%SNMP%`, `%SysLog%`, `%TCP%`, `%IP%`, and `%EthernetPhysical%`.

• In 3.5.3, “File System Parameters” there is a subsection called, “Disk, Cartridge and Rom Parameter Tables” that now additionally describes the `%rom%` device parameter set.

• The LaserJet III emulator has several additional device parameters that had not previously been documented. Refer to Table 3.34 on page 125.

• The HP7475A emulator and the Diablo630 emulator device parameter sets both have a `Type` key which had previously not been documented. Refer to Table 3.36 and Table 3.37 on page 130. Also the Diablo630 has a `Pitch` key which had previously not been documented.

• Chapter 4 has been rewritten. Some resource instances had previously been missing. 4.5, “Accessing Product Hardware Options Information” describes the `HWOptions` resource instance found on some products. The `IODevice` resource category lists new instances for `%LPR%`, `%AppSocket%`, `%Telnet%`, `%SNMP%`, `%SysLog%`, `%TCP%`, `%IP%`, and `%EthernetPhysical%` which are some new TCP/IP and Ethernet related device parameter sets.
• 2013 PostScript products can optionally contain support for font Type 42. The Type 42 font format is a TrueType font with a PostScript wrapper to make it conform to the PostScript font model. TrueType is a font format originally developed by Apple Computer. Refer to section 5.3, “Type 42 Font Dictionary.”

• Various compatibility operators typically found on imagesetters and roll fed media devices have been added to chapter 6. The list includes accuratescreens, checkscreen, mirrorprint, pagemargin, pageparams, resolution, setaccuratescreens, setpage, setpagemargin, setpageparams, and setresolution.

A.4 Changes since Version 2011, January 24, 1992

The following is a brief list of changes made to the PostScript Language Reference Manual Supplement since January 24, 1992. These changes were incorporated into the 2012 release.

• A new chapter has been added, titled “Other Extensions to PostScript Level 2.” This chapter has a description of the new Type 6 halftone dictionary.

• Corrections have been made throughout the document. In addition, the text has been expanded in many places to provide more context for the reader.

• The new page device parameters introduced in 2012 are DeviceRenderingInfo, FaxOptions, ProcessColorModel, SeparationColorNames, and SeparationOrder.

• The Fax feature is described in detail in sections 2.2 and 3.6.

• Section 3.1 and 3.2 now give the reader better context when thinking about unencapsulated jobs and passwords.

• There is a new user parameter introduced in 2012 called AccurateScreens.

• There are several new system parameters introduced in 2012. They are CurStoredFontCache, CurStoredScreenCache, MaxHWRenderingBuffer, MaxImageBuffer, MaxStoredFontCache, and MaxStoredScreenCache.

• There are several new device parameter sets. The list includes %ScsiComm%, %os%, %Scsi%, %Engine%, %LaserJetIII%, %Fax%, and %Calendar%. 
• The **Interpreter** key in all of the device parameter sets of type
/Communications can now be set to **LaserJet III** for PCL5 emulation. **EpsonFX850** is also a new choice.

• The **Interpreter** key in all of the device parameter sets of type
/Communications can be set to /AutoSelect. When set to /AutoSelect, automatic and seamless switching between the available interpreters and emulators is enabled.

• In the %Serial% device parameter set, a new **FlowControl** choice is available called /XonXoff2.

• A new **Protocol** choice has been added for serial and parallel parameter sets called /TBCP.

• The new key **Filtering** has been added to the %LocalTalk% set.

• The new keys **Handshake** and **OutputDevice** have been added to the %Parallel% set.

• The device parameter sets of type /FileSystem have been changed to support removable media. A new key named **BlockSize** has been added. The %disk% parameter sets have the new keys **Bus** and **Interleave**.

• The new implicit resource category **HWOptions** has been added. There are some implicit **ProcSets** for fax called **FaxOps** and **FaxAdminOps**. Also, **HalftoneType** can be set to 6.

• In the compatibility chapter, **processcolors** has been added.
A

a3 179, 198
a3tray 178, 181, 199
a4 179, 198, 199
a4small 179, 198, 199
a4tray 178, 181, 199, 200
a5tray 178, 181, 199, 200
AbsoluteColorimetric 168
AccurateScreens 42
ActivityReport 131
Address 81
AdvanceDistance 5
AdvanceMedia 5
appletalktype 78, 79, 83, 178, 181
ashow 174
AutoLF 130
AutoSelect 64, 65, 70, 71

B

b5 198, 199
Baud 67, 196, 197
BeginPage 5
Binary 64, 65
Bind 6
BindDetails 6
BlockSize 110, 114
BoldFontName 130
Booklet 6
BookletDetails 6
BootDelay 118
BroadcastAddress 100, 101
BSizeStandard 120
BuildTime 45, 181
buildtime 178, 181
Bus 75, 110
ByteOrder 44, 182
byteorder 178, 182

C

calendar device parameters
Day 137
Hour 137
Minute 137
Month 137
Running 138
Second 138
Year 138
CallCount 139
CalleeID 29
CalleePhone 21, 26, 27
CallerID 21, 144
CallerPhone 21
CallLength 29, 141
Calls 139
Calls dictionary entries
CallLength 141
CoverPagesSent 141
ErrorArray 141
ErrorIndex 141
FaxKind 141
Pages 141
PagesSent 142
TimeSent 142
CartridgeID 114
CartridgeType 114
Category 48, 155
CharSet 122
CheckParity 67, 119, 197
checkpassword 178, 179, 182
Checksum 100, 105
CID Font Format 172
CIDFont 151
Clock 157
CMap 151
Collate 5
ColorRendering 48, 152
MaxLJMemory  127, 129
PaperSize  127
Pitch  130
RegFontName  130
TopMargin  128
Type  125, 128, 129, 130
VMI  128
WaitTimeout  128, 129
Enabled  63, 64, 65, 68, 71, 72, 76, 77, 79, 82, 85, 88, 91, 92, 93, 184, 190
Encoding  48, 152
EndPage  5
Envelopes
orientation in user space  34
EpsonFX850  64
ErrorArray  29, 140, 141, 143, 144
ErrorCorrect  24
ErrorIndex  29, 140, 141, 143, 144
EthernetAddress  79, 105, 107
EtherTalkType  79
EtherTalkZone  80
ExitJamRecovery  7
exitserver  39, 52, 180, 182
Fax
fax page device  18
fax parameters
  CalleeID  29
  CalleePhone  21, 26, 27
  CallerID  21
  CallerPhone  21
  CallLength  29
  Confirmation  21, 28
  Copies  22, 30, 31, 32
  CoverNote  22
  CoverSheet  21, 22, 23, 27, 28, 29, 30, 31
  CoverSheetOnly  23, 32
  CurrentPageNo  29
  DefaultCoversOn  32
  DialCallee  19, 21, 23, 26, 27
  ErrorArray  29
  ErrorCorrect  24
  ErrorIndex  29
  FaxOptions  7, 18, 20, 22, 23, 28, 30, 31, 134, 140
  FaxType  24, 31, 131
  HostJobID  24
  IncludesFinalPage  29
  InitialPage  29
  LimitPage  29
  MailingTime  24
  MaxRetries  25, 132
  nPages  32
  NumberOfCalls  30
  PageCaption  21, 25, 28, 29, 30, 31
  PagesSent  30
  PostScriptPassword  19, 20, 26, 31
  ProcInfo  26
  RecipientID  26
  RecipientLanguage  26
  RecipientMailStop  26
  RecipientName  26, 27, 31
  RecipientOrg  26
  RecipientPhone  27, 31
  Regarding  27
  RetryInterval  27, 132
  RevertToRaster  19, 20, 27, 31, 134
  SenderID  27
  SenderMailStop  27
  SenderName  27
  SenderOrg  27
  SenderPhone  27
  SendPostScript  30
TimeSent  30
  TrimWhite  28, 31
FaxAdminOps  24, 28, 134, 138, 142
FaxDefaultProcs  28, 145
FaxKind  141
FaxOps ProcSet  19
FaxOptions  7, 18, 20, 22, 23, 28, 30, 31, 134, 140
faxsendps operator  19, 20, 21, 26, 27, 30, 134, 135
FaxType  24, 31, 131
file system device  3
Filter  153
Filtering  77, 80, 82, 85, 88, 92, 94
findcolorrendering  167
findresource operator  138
firstNonblank  133
firstside  178, 179, 184, 200
FlowControl  68, 195, 196, 197
FMapType  154
Fold  7
FoldDetails  7
Font  47, 151
FontFixed  125, 128
FontHeight  126, 128
FontItalic  126, 128
FontPitch  126, 128
FontResourceDir  47
FontSymbolSet  126, 128
FontType  154
FontTypeface  127, 129
FontWeight  127, 129
Form  48, 152
FormType  154
Free  110, 115, 183, 204
GatewayAdress  101
Generic  155
GenericResourceDir  47, 48
GenericResourcePathSep  48
GetHalftoneName  170
GetPageDeviceName  170
GetSubstituteCRD  170
glyphshow  173
Group3Adjustment  132
Halftone  48, 152
halftone dictionary
  type 6 161, 162
HalftoneType 154, 162, 165
hardwareiomode 178, 184
HasNames 64, 73, 76, 77, 80, 82, 85, 88, 91, 92, 94, 109, 110, 115, 117, 204
Height 162, 165
highres 133
host 3
HostJobID 24, 143
Hour 137
HP7475A 64
HWOptions 153, 156, 157
HWRResolution 5, 9, 156
  instance of OutputDevice resource
category 156
I
IBM PC 64
ID 21, 27, 133
ImageShift 7
ImageType 154
ImagingBBox 5, 198, 199
IncludesFinalPage 29
InitializeAction 111, 112, 115, 117, 185, 203
initializedisk 178, 185
InitialPage 29
InitiatorID 119
InputAttributes 8, 18
InsertSheet 8
Install 5
Interleave 111, 112
Interpreter 64, 65, 69, 71, 73, 76, 78, 80, 82, 85, 89, 91, 93, 94, 124, 192
invalidaccess 37, 180, 202, 203
IODevice 153
ioerror 67
IPAddress 101, 102, 103
IPAddressDynamic 100, 101, 102, 103
K
Kind 144
L
Landscape 127, 129
Language 123
LanguageFamily 159
LanguageLevel 159
LanguageVersion 159
LaserJetIII 64
LaserJetIIP 64
lastNonBlank 133
ledger 179, 198
ledgertray 178, 185, 199
legal 179, 198
legaltray 178, 185, 199
letter 179, 198
lettersmall 179, 198
lettertray 178, 185, 199
LicenseID 49
limitcheck 198, 199
LimitPage 29
LinesPerInch 129
LineWrap 127
Localization 153
LocalLanguage 26, 133
LocalTalkType 78, 181
LogHost 97
LogicalSize 111, 112, 115, 183, 185, 203, 204
LoginPassword 94
LogPriority 98
M
MailingTime 24, 144
ManualFeed 5, 129, 185
manualfeed 178, 185
ManualFeedTimeout 9, 182, 186
manualfeedtimeout 178, 186
ManualSize 156
  instance of OutputDevice resource
category 156
Margins 9, 186, 190
margins 178, 186
MaxDictStack 41
MaxDisplayList 44
MaxExecStack 41
MaxFaxBuffer 133
MaxFontCache 44
MaxFormItem 41
MaxFormCache 44
MaxFormItem 41
MaxHWRenderingBuffer 49
MaxImageBuffer 49
MaxLJMemory 127, 129
MaxLocalVM 41
MaxOpStack 41
MaxOutlineCache 44
MaxPatternCache 44
MaxPatternItem 41
MaxRasterMemory 45, 49
MaxRetries 25, 132
MaxScreenItem 41
MaxScreenStorage 44
MaxSourceList 50
MaxUPathCache 44
MaxUPathItem 41
MediaColor 5
MediaPosition 9
MediaType 5
MediaWeight 5
MinBandBuffers 51
MinFontCompress 41
Minute 137
job dictionary entries
  CallCount 139
  Calls 139
  DialCallee 140
MirrorPrint 5
Month 137
Mounted 110, 112, 113, 114, 115, 117, 136, 202, 203, 204

N
Name 107, 108
NegativePrint 5
NetworkAddress 105
NetworkMask 101, 102
newsheet 178, 179, 187, 200
node address 84
NodeID 78, 80, 83
nPages 32
nRows 133
NumberOfCalls 30
NumCopies 5

O
On 63, 65, 69, 74, 76, 78, 81, 83, 86, 89, 91, 93, 94, 99, 100, 103, 104, 105, 107, 109, 190
Orientation 5
OutputAttributes 5, 18
OutputDevice 9, 18, 74, 153, 155, 198, 199, 200
OutputDevice resource category
instances of
HWResolution 156
ManualSize 156
PageSize 156
ProcessColorModel 156
OutputFaceUp 5, 187, 191
OutputPage 10
OutputType 5

P
page device 3
page device parameters
  AdvanceDistance 5
  AdvanceMedia 5
  BeginPage 5
  Bind 6
  BindDetails 6
  Booklet 6
  BookletDetails 6
  Collate 5
  CutMedia 5
  DeferredMediaSelection 6, 9
  DeviceRenderingInfo 7
  Duplex 5, 200, 201
  EndPage 5
  ExitJamRecovery 7
  FaxOptions 7
  Fold 7
  FoldDetails 7
  HWResolution 5, 9
  ImageShift 7
  ImagingBBox 5, 198, 199
  InputAttributes 8, 18
  InsertSheet 8
  Install 5
  Jog 5
  Laminate 9
  ManualFeed 5, 185
  ManualFeedTimeout 9, 182, 186, 189
  Margins 9, 186, 190
  MediaColor 5
  MediaPosition 9
  MediaType 5
  MediaWeight 5
  MirrorPrint 5
  NegativePrint 5
  NumCopies 5
  Orientation 5
  OutputAttributes 5, 18
  OutputDevice 9, 18
  OutputFaceUp 5, 187, 191
  OutputPage 10
  OutputType 5
  PageDeviceName 10
  PageOffset 10
  PageSize 5, 10, 14, 34, 198, 199, 200
  PageSize Policy 0 199
  PageSize Policy 7 198
  PageSize policy 7 14
  PagesSent 30, 142
  pagesstackorder 178, 187
  PaperSize 127
  parameters 1
  Parity 67, 69, 195, 197
  Password 180
  Pattern 48, 152
  PatternType 154
  PCL 64, 69, 73, 76, 78, 80, 82, 85, 89, 91, 93, 94
  PDL 153, 158
  PDL resource category
    LanguageFamily 159
    LanguageLevel 159
    LanguageVersion 159
    Selector 159
    Perceptual 169
    Physical 103, 106
    PhysicalSize 112, 113, 115
    Pitch 130
    PixelBurst 157
    Policies 5
    Poll 119
    PostRenderingEnhance 10
    PostRenderingEnhanceDetails 11
    PostScript 64
    PostScript interpreter 3
    PostScript language product 3
    PostScript Level 2 resources 2
    PostScriptPassword 19, 20, 26, 31, 134
    PreRenderingEnhance 11
    PreRenderingEnhanceDetails 11

218  Index
Index 219

PrinterControl 66, 70, 75, 76, 78, 81, 83, 86, 89, 91, 93, 94
PrinterName 21, 51, 78, 79, 83, 187, 191
printername 178, 187
PrintHost 86, 89
printscreen 64
PrivateHost 95
ProcessColorModel 11, 156
PrinterName 21, 51, 78, 79, 83, 187, 191
printername 178, 187
PrintHost 86, 89
printscreen 64
PrivateHost 95
ProcessColorModel 11, 156
instance of OutputDevice resource category 156
processors 178, 187
ProcInfo 26
ProcSet 48, 152
product 178, 188
ProprinterXL 64, 69, 73, 76, 78, 80, 82, 85, 89, 91, 93, 94
Protocol 64, 65, 68, 70, 71, 75, 192
ProtocolVersion 135

R

RamSize 52
ramsize 178, 188
rangecheck 36, 138, 180, 199
Raw 64, 65
RealFormat 44, 188
realformat 178, 188
receivejobsforall 143, 144
ReceivePostScript 19, 134, 135
ReceiveWindowSize 86, 89, 99, 104
Recipient 145
RecipientID 26
RecipientLanguage 26
RecipientMailStop 26
RecipientOrg 26, 27, 31, 140
RecipientPhone 27, 31, 140
Regarding 27
RegFontName 130
related publications 3
RelativeColorimetric 169
Removable 113, 116, 117, 204
reportjoblist 139
resources
  Category 48, 155
  CIDFont 151
  CMap 151
  ColorRendering 48, 152
  ColorRenderingType 154
  ColorSpace 48, 152
  ColorSpaceFamily 153
  ControlLanguage 153
  Emulator 153, 184
  Encoding 48, 152
  FAXAdminOps 134, 138, 142
  Filter 153
  FMapType 154
  Font 47, 151
  FontType 154
  Form 48, 152
  FormType 154
  Generic 48, 155
  Halftone 48, 152
  HalftoneType 154
  HWOptions 153
  ImageType 154
  IDevice 53, 153
  Localization 153
  OutputDevice 153, 198, 199, 200
  Pattern 48, 152
  PatternType 154
  PDL 153
  ProcSet 48, 152
  RetriesLeft 144
  RetriesTried 144
  RetryInterval 27, 132
  returnjoblist 139
  RevertToRaster 19, 20, 27, 31, 134
  Revision 52, 188
  revision 178, 188
  Rings 135
  Running 138

S

Saturation 169
scchatch 178, 196
scinteractive 178, 189, 192, 197
Searchable 113, 116, 117, 203
SearchOrder 113, 116, 118, 204
Second 138
Selector 159
SenderID 27
SenderMailStop 27
SenderName 27, 140
Senders 27, 141
SenderPhone 27
SendPostScript 30
SendWindowSize 87, 90, 99
SeparationColorNames 12
SeparationOrder 12
Separations 5
ServiceEnable 135
setcolorsreen 42
setdefaulttimeouts 178
setdevparams operator 2, 39, 52, 53, 54, 64, 71, 110, 114, 124, 130, 180
setdostartpage 178
setdosysstart 178, 189
setduplexmode 178, 201
sethalftone operator 161
sethardwareiomode 178, 190
setjobtimeout 178, 190
setmargins 178
setpagedevice operator 2, 8, 9, 14, 18, 21, 27, 135, 177, 198, 199
setpagestackorder 178
setpapertray 179
setprinatername 178, 191
setresolution 192
setsccbatch 178, 197
setsccinteractive 178, 197
setsoftwareiomode 178, 192
setsystemparams operator 2, 39, 44, 47, 52, 180
settumble 179, 193, 201
setuserdiskpercent 179, 193
setuserparams operator 2, 39
show 174
showpage operator 21, 23
Signature 13
SlipSheet 13
softwareiomode 179, 193
Speaker 136
Speed 109
Staple 13
StapleDetails 13
startjob 39, 52, 180, 182
StartJobPassword 39, 40, 52, 180, 182
StartupMode 52, 183, 189
Status 143, 144
statusdict dictionary 177, 183, 199, 200
compatibility operators in 178
StatusPortNumber 90
StopBits 71, 195, 196, 197
StorageDevice 133, 136
stringwidth 174
strm 133
SysContact 96
Index

SysLocation 96
SysName 96

system parameters

BuildTime 45, 181
ByteOrder 44, 182
CurBufferType 45
CurDisplayList 44
CurFontCache 44
CurFormCache 44
CurInputDevice 192, 193
CurOutlineCache 44
CurOutputDevice 45
CurPatternCache 44
CurScreenStorage 44
CurSourceList 46
CurStoredFontCache 46
CurStoredScreenCache 46
CurUPathCache 44
DoStartPage 46, 183, 189
FactoryDefaults 40, 46
FatalErrorAddress 47
FontResourceDir 47
GenericResourceDir 47, 48
GenericResourcePathSep 48
JobTimeout 49, 182, 189
LicenseID 49
MaxDiskFontCache 49
MaxDisplayList 44
MaxFontCache 44
MaxFormCache 44
MaxHWRenderingBuffer 49
MaxImageBuffer 49
MaxOutlineCache 44
MaxPatternCache 44
MaxRasterMemory 49
MaxScreenStorage 44
MaxSourceList 40
MaxStoredFontCache 50
MaxStoredScreenCache 50
CurPathCache 44
MinBandBuffers 51
PageCount 47, 51, 187
Password 180
PrinterName 51, 78, 79, 83, 187, 191
RamSize 52
RealFormat 44, 188
Revision 52, 188
StartJobPassword 39, 52, 180, 182
StartupMode 52, 183, 189

SystemParamsPassword 39, 40, 52, 134, 180, 182, 202, 203
ValidNV 53
WaitTimeout 53, 182, 189

systemdict dictionary 202
compatibility operators in 179
SystemParamsPassword 39, 40, 52, 134, 180, 182, 202, 203

TargetID 119
TBCP 64, 65
ter 85
Thresholds 162, 165
Time 144, 145
TimeBegan 141
timeout 42
TimeSent 30, 142
TimeToStandby 121
TODClock 157
TokenTalkType 83
TopMargin 128
TotalPages 141
TotalPagesSent 141
TransferFunction 162
TransmitEncapsulation 104, 106
transmitjobsforall 24, 142, 143
TrapHost 96
TraySwitch 14
Trim 14
TrimWhite 28, 31
tryphone 142
tryphone operator 142
Tumble 5, 201
tumble 179, 193, 201
Type 55, 75, 76, 79, 81, 83, 87, 90, 92, 93, 95, 97, 98, 99, 100, 104, 105, 106, 107, 109, 114, 116, 118, 120, 121, 124, 125, 128, 129, 130, 136
entry in a Details dictionary 16
Type 10 Halftone Dictionary 162
Type 6 Halftone Dictionary 161
type 6 halftone dictionary 161, 162
entries

HalftoneType 162, 165
Height 162, 165
Thresholds 162, 165
TransferFunction 162
Width 162

ValidNV 53

Type1Coprocessor 157
typecheck 35
typecheck error 19

undefined 37

user parameters

AccurateScreens 42
JobName 42, 185
JobTimeout 42, 185, 190
MaxDictStack 41
MaxExecStack 41
MaxFontItem 41
MaxFormItem 41
MaxLocalVM 41
MaxPatternItem 41
MaxScreenItem 41
MaxUPathItem 41
MinFontCompress 41
VMReclaim 41
VMThreshold 41
WaitTimeout 42, 193
userdict dictionary 198
compatibility operators in 179
userdiskpercent 179, 193
USModem 157

Validation 53
VM 128
VMReclaim 41
VMThreshold 41

WaitForDialTone 136
WaitTimeout 42, 53, 128, 129, 182, 189, 193
waittimeout 179, 193
Width 162
WorldModem 157
Writeable 114, 116, 118, 136, 182, 183, 204

Year 138
Ysquare 165
Z

Zone 84