
the tool for software designers

PDL/81TM

Introduction and Invocation Guide

(Version 2.0)

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1. Introduction

The PDL/81TM processor is a program design and documentation tool. It operates on many different machines and operating systems including the VAXTM under VMSTM and ULTRIXTM, most other UNIXTM systems, and the IBM PC under PC-DOS.

This manual provides a very brief introduction to the PDL/81 processor. Then, it discusses the invocation of the processor under the various supported operating environments. It should be considered as a supplement to the manuals described in Section 1.8 and should be read in conjunction with them.

1.1 Purpose

PDL/81 is a proven tool for the systematic and reliable design and documentation of software. It provides (1) a simple *language* for expressing designs clearly and unambiguously, and (2) a *processor* for generating high-quality design documents. It is well suited to both high level and detailed designs of software to be implemented in any programming language.

Benefits from using PDL/81 include:

- *software productivity is increased* and the resulting programs are better organized and more reliable;
- *management risk is reduced* since designs can be tested against requirements early in the development cycle;
- *software visibility is higher* so that progress estimates can be more accurately obtained;
- documentation in the form of a PDL/81 design document is *obtained before code is written*;
- a *common, unambiguous medium for communication* of a software design can be used by all the personnel concerned in a project;
- *design complexity metrics* can be automatically computed and displayed; and
- *project requirements* can be automatically tracked and cross-referenced.

PDL/81 processing and layout specifications are controlled by a special language known as the *Format Design Language*. The collection of statements in this language which define the format for a particular kind of document are known as a

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document style. The available document styles are stored in the PDL/81 *style library*.

1.2 Features and Capabilities

PDL/81 is a tool which integrates the capabilities commonly associated with a program design language processor and those of a text processing system.

This integration is accomplished by providing an extensive set of primitive formatting operations and a definitional language which allows a format designer to compose abstract constructs from these primitive operations. As an example, the document style for program designs might contain such concepts as *data segment* and *flow segment* while a style for manuals might contain such concepts as *chapter* and *enumerated list*.

The primitive operations of the Format Design Language allow the format designer a high degree of flexibility in creating document styles. Among the available capabilities are:

- Control over page layout including sheet dimensions and top, bottom, left, and right margins;
- Running text at top and bottom of each page including security banners with document classification and sheet count;
- Definition of primary and secondary keywords for use in program designs;
- Definition of layout and characteristics of all program design segment types and the ability to create new types of segments;
- Case insensitivity for all dictionary searches;
- Ability to include input from alternate files;
- Generation of table of contents and other such tables (e.g., table of figures, table of tables);
- Generation of document indexes in various forms;
- Generation of cross-references to various parts of a design or other document.

The Format Design Language statements which define the processing and layout for a particular kind of document are known as a *document style*. The available document styles are stored in the PDL/81 *style library*.

1.3 The PDL/81 Design Style

The *design* style of PDL/81 is intended for processing design documents. It accepts as input a series of source lines in a language which may be termed *structured English*. The output document can be formatted for printing on a number of different devices using various paper widths. The components of the resulting document are:

1. Cover page: Identifies the document.
2. Table of Contents: Automatically generated from the input.

3. Design Body: Contains the actual design information.
4. Segment Reference Trees: Illustrates, by indented listings, the relationships among the procedural portions of the design.
5. Data Index: Lists the data items declared in the design and shows where each is used.
6. Flow Segment Index: Lists the “procedures” of the design and shows where each is used.
7. Overly Complex Segment Index: Lists segments which have a cyclomatic complexity higher than a predefined maximum.
8. Requirements Index: Lists each requirement reference.
9. Calls-in-Context Report: Lists each procedure or function call together with its definition and flags inconsistent usage.

The *design body* is composed of a number of *segments*. There are four different segment types:

- *Text Segments*: These contain general descriptive text.
- *Data Segments*: These declare the names of data items which are to be collected in the Data Index.
- *Flow Segments*: Each of these represents a *procedure* of the design. Flow segments are automatically formatted based on the use of *keywords*. The standard keywords are:

IF	ELSEIF	ELSE	ENDIF
DO	UNDO	CYCLE	ENDDO
RETURN			

Additional keywords may be added easily. Keywords are highlighted in the design document if the printer is capable of processing the selected highlighting mode. References to other flow segments are automatically detected and indicated.

- *External Segments*: These are used to define *procedures* which are considered to be defined elsewhere than in the design document.

New features with this release of PDL/81 include:

- *Complexity Measurement* – the cyclomatic complexity of flow segments may be measured and reported;
- *Requirements Tracking* – references to project requirements may be attached to segments and reported;
- *Consistency Checking* – a Calls-in-Context report may be generated which groups all references to a particular segment and flags those which appear to be inconsistent; and
- *Combined Code and Design* – both code and design may be contained in the same file and either may be selected for processing as desired.

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1.4 PDL/81 Ada Design Style

The *ada* design style is intended for use when the design or implementation requirements call for the Ada[®] programming language. It has been found to satisfy the needs of a design language based on Ada while maintaining the readability of a PDL/81 design.

The *ada* style differs from the *design* style in several important ways:

- Ada keywords are used and Ada statements are supported.
- Ada statements are automatically completed, where necessary.
- Constructs for Ada tasking and exceptions are added to the usual constructs for structured programs.
- The PDL/81 *flow segment* is replaced by separate segments for *procedures*, *functions*, and *task bodies*.

A new type of segment, the *specification segment*, is added to support the separate specification and definition concepts of the Ada language. Specifications of

- procedures
- functions
- tasks
- task entries
- records
- general data

may be supplied in one or more specification segments.

1.5 PDL/81 Document Language Styles

Several document styles are distributed with PDL/81 to aid in the preparation of various kinds of documentation. These are:

manual a style for formatting manuals and reports

man2167 A style for formatting manuals in the manner required by DoD Standard 2167

letter a style for formatting a letter

memo a style for formatting a memorandum

text a style for formatting general text

Both the *manual* and *man2167* styles support automatic portion marking as specified in DOD 5220.22-M, *Industrial Security Manual for Safeguarding Classified Information*.

1.6 Modification of Document Styles

The document styles distributed with PDL/81 are intended as examples of the types of documents that can be generated. It should be expected that modifications will be needed to at least some of the styles before they can be used in production at specific sites.

Simple modifications can generally be made after an examination of the related data base files and after reading the *PDL/81 Installation Guide*. Extensive modifications, and the development of entirely new styles, will require reference to the *PDL/81 Format Designers' Guide* and the aid of someone who is familiar with macro and text processors.

1.7 Organization of This Manual

This remainder of this manual discusses the invocation of the PDL/81 processor under the UNIX (Chapter 2), VMS (Chapter 3), and PC-DOS (Chapter 4) operating systems. For each operating system, the most common invocation options for the design and document language styles are presented, followed by a detailed description of the full option set. Information common to all operating environments is discussed in Chapter 5.

1.8 Related Publications

Other publications relating to the use of PDL/81 are:

- *PDL/81 Design Language Reference Guide* – a guide to using PDL/81 for program design
- *PDL/81 Ada Design Language Reference Guide* – a guide to using PDL/81 for Ada program design
- *PDL/81 Document Language Reference Guide* – a guide to using PDL/81 for producing various documents such as manuals and reports
- *PDL/81 Software User's Manual for the 2167 Manual Style* – a guide to using the *man2167* document style
- *PDL/81 Automatic Portion Marking Examples* – a sample document showing the results of automatic portion marking
- *PDL/81 Format Designers Guide* – a guide to developing new types of PDL/81 design and document styles
- *PDL/81 Installation Guide* – a guide to installing PDL/81 under the various supported operating systems.

2. Invocation Under UNIX

This chapter discusses invocation of the PDL/81 processor under the UNIX operating system and under operating systems derived from, or patterned after, UNIX.

2.1 Design Style Invocation

This section discusses the method of invoking PDL/81 with the design style under the UNIX operating system. Only the most common invocation options are shown. See Section 2.3 for a complete description.

PDL/81 can be invoked to run the design style by

```
pdl81 [options...] source-file...
```

where the most common invocation options are

- s***style* specifies the name of the style definition in the data base to be used in processing the design. If the **-s** option is not given, a default style will be used. At most installations, the default style will probably be *design*.
- r.po=***offset* specifies a page offset to be used in printing each line of output, where *offset* is a decimal integer giving the number of character positions to indent each line. If the **-r.po** option is not given, a default offset will be used. The default offset will vary from installation to installation depending upon the way printers are normally aligned at the installation.
- d***device* specifies the type of output device which will be used to print the design document, where *device* may be one of the device names shown in Section 5.2. If the **-d** option is not given, a default device (usually *printer*) will be used.
- rpdepth=***depth* specifies a page depth, in number of lines, to be used in place of the page depth implied by the selected output device.

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One or more source files may be specified. If more than one is specified, they will be processed as if they were concatenated to form a single source file.

2.1.1 Processor Output

The design document will be directed to the standard output file. Diagnostic output will be directed to the standard error file.

2.1.2 Invocation Examples

To process the file “test.p” and place the output in file “test.doc”, use

```
pd181 test.p >test.doc
```

To process the same file but spool the output for printing, use

```
pd181 test.p | lpr
```

To process the same file for printing on 8-1/2 by 11 inch paper with a 12 character per inch type font and a 5 character page offset, and place the output in file “test.tmp”, use

```
pd181 -r.po=5 -dpr10n test.p >test.tmp
```

2.2 Document Style Invocation

This section discusses the method of invoking PDL/81 with the various document styles under UNIX. Only the most common invocation options are shown. See Section 2.3 for a complete description.

PDL/81 can be invoked to run the document language styles by

```
pd181 [option...] [source-file]
```

where the various invocation options are

-s*style* specifies the name of the style definition in the data base to be used in processing the design. The names of the style definitions described in this manual are *manual*, *letter*, *memo*, and *text* which are described in Part Three of this manual.

If the **-s** option is not given, a default style will be used. At most installations, the default style will probably be one for processing program designs so the **-s** option is usually required to obtain one of the document language styles. The **-s** option may also be set in the source file as described in Section 5.3.

-r.po=*offset*

specifies a page offset to be used in printing each line of output, where *offset* is a decimal integer giving the number of character positions to indent each line. If the **-r.po** option is not given, a default offset for the selected device will be used. The default offsets will vary from installation to installation depending upon the way printers are normally

aligned.

- ddevice* specifies the type of output device which will be used to print the design document, where *device* may be any of the devices shown in Section 5.2. The full horizontal resolution of the device will be used when expanding spaces during line justification on devices which support variable-width spaces. If the -d option is not given, a default device (usually *printer*) will be used.
- rpdepth=*depth* specifies a page depth, in lines, to be used in place of the page depth implied by the selected output device.

If no source file is specified, the standard input file will be used as the source file.

2.2.1 Processor Output

The formatted document will be directed to the standard output file. Diagnostic output will be directed to the standard error file.

If the document contains *tags*, an *auxiliary file* will also be output for later use when the document is processed through PDL/81 again. The name of this file is formed by replacing the extension, if any, in the source file name with an extension of “.a”.

2.2.2 Invocation Examples

To process the file “test.p” as a manual and place the output in file “test.doc”, use

```
pd181 -smanual test.p >test.doc
```

To process the same file but spool the output for printing, use

```
pd181 -smanual test.p | lpr
```

To process the same file for printing on a Diablo 1620 printer with a 12-pitch type font and a 12-character page offset, and place the output in file “test.tmp”, use

```
pd181 -smanual -r.po=12 -ddiablo12 test.p >test.tmp
```

2.3 Detailed Invocation Procedures

This section discusses detailed invocation procedures under UNIX. PDL/81 is invoked by:

```
pd181 [options...] [source-file]
```

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2.3.1 Normal Invocation Options

The options used in normal invocations of PDL/81 are:

- bpath** specify the path name of the directory containing the design format data base. If this option is not given, the installed default path given in Section 2.3.5 will be used. The given (or default) path will be prepended to any data base file name needed by the processor so the trailing "/" is required.
- sstyle** specify the particular formatting style to be used. If this option is not given, the style name "default" will be used. The actual file containing the definition of the style is formed by prepending the data base path to the style name. Thus, in the absence of both the -b and -s options, the style used will be the one in the file */usr/lib/pdl81/default*.
- ufile** specify the path name of the file containing the formatting style definition. If this option is used, it overrides the file name formed by use of the -b and -s options.
- ddevice** specify the name of the device type to be used to print the output of the processor. Actually, the choice and interpretation of device names is completely arbitrary. After the definition file has been processed, the function *\$dev-device* (*\$dev-default*, if the -d option is not given) will be invoked. If no such function has been defined, the file *device.d* is read from the data base directory. Thus, the format designer may define various functions which set options (e.g., page dimensions, character widths) to handle different device types.
- Dpath** specify the path to the device description directory. If this is not specified, the path given by the -b option will be used. If neither -b nor -D are given, the default data base path will be used.
- w** request that the processor pause before beginning the printing of each page of output. A message will be displayed on the standard error file for each pause. Printing will be resumed on receipt of a newline from the standard input file. Thus, the -w option should normally not be used when the standard output is directed to the controlling terminal. If an end of file is read from the standard input during a pause, the effect of the -w and -p options will be cancelled.
- p** request that the processor pause after displaying each error message. Processing may be resumed as described for the -w option above.
- rname[=value]** predefine the named number register to have the given value. The value, if present, must be an unsigned decimal integer constant. If the value (and the equal sign) are absent, the number register will be given the value "one". When a number register has been defined with the -r option, the first attempt to assign it a value with the *nr* function will be ignored. Thus, the -r option may be used to override value assignments made in the style definition file.
- vname[=text]** predefine the named string to have the given text as its value. When a string has been defined with the -v option, the first attempt to redefine it with the *ds* function will be ignored. Thus, the -v option may be used to override string definitions made in the style definition file.

- olist* specify a list of pages to be printed. The list consists of a sequence of numbers or ranges separated by commas. A range consists of two numbers separated by a colon. Before the formatting of each output page body, but after any page header processing, the contents of the “.page” built-in number register is compared against each number specified (or implied) in the list. If it is found, the page will be printed. If the -o option is to be used, it is the responsibility of the format designer to assure that the “.page” number register contains the proper page number. If the -o option is not present, the entire output document will be printed.
- tpath* specify the path name of the directory to be used for temporary files. The given (or default) path will be prepended to any temporary file name needed by the processor so a trailing “/” is required. If this option is not given, temporary files will be created in a standard place as described in Section 2.3.6.
- y cause PDL/81 to print an identification message and exit.
- z suppress test for the existence of the source files.
- Ifile* redirect the standard input to *file*.
- Ofile* redirect the standard output to *file*.
- Efile* redirect the standard error to *file*.

2.3.2 Invocation Options Used During Debugging

The following special options may be useful during debugging of the processor or of a set of definitions:

- Q terminate processing on the first reference to an undefined function.
- T turn trace mode on at the start of processing.
- L display the offending input line on the standard error file prior to displaying an error message. It is quite likely that the displayed line will have been “decompiled” from an internal encoded form and, thus, may be only an approximation of the actual input line.
- K do not delete any undeleted temporary files which remain at the time that PDL/81 exits.

2.3.3 Use of Multiple Options

One or more options may be present in a single argument providing that any option which takes a value must be the last option in the argument. Thus, specifying pausing before error messages, a device (printer), and a style (test) could be given as

```
pdl81 -pstest -dprinter
```

or as

```
pdl81 -p -stest -dprinter
```

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2.3.4 Processor Input and Output

If the source-file argument is present, the argument will be returned as the value of the *source* primitive. If the source-file argument is missing, the value of the *source* primitive will be null. Formatted output is directed to the standard output file. Diagnostic output is directed to the standard error file.

2.3.5 Specifying the Style Library Location

By default, the PDL/81 processor assumes that prefixing “/usr/lib/pdl81/” to a file name will locate that file in the style library. This may be changed by use of the “-b” invocation option as described in Section 2.3.1.

An environment symbol may also be used to specify the location. If present, the processor will use the value of the “PDL81LIB” to locate the data base library. For example, executing the UNIX Bourne Shell command

```
PDL81LIB=$HOME/PLIB/
```

will cause PDL/81 to look for data base files in subdirectory PLIB in the user’s home directory. An assignment such as this could be placed in the a user’s “.profile” file.

2.3.6 Specifying the Directory for Temporary Files

By default, the PDL/81 processor creates temporaries in the current directory. This may be changed by use of the “-t” invocation option as described in Section 2.3.1.

An environment symbol may also be used to specify the location. If present, the processor will use the value of the “PDL81TMP” to locate the directory for temporary files. For example, executing the UNIX Bourne Shell command

```
PDL81TMP=/usr/tmp/
```

will cause PDL/81 to place its temporary files in the /usr/tmp directory. An assignment such as this could be placed in a user’s “.profile” file. file.

3. Invocation Under VMS

This chapter discusses invocation of the PDL/81 processor under the VMS operating system.

3.1 Design Style Invocation

This section discusses the method of invoking PDL/81 with the design style under VMS. Only the most common invocation options are shown. See Section 3.3 for a complete description.

```
PDL81 file-spec[,...]  
  
Command Qualifiers:           Defaults:  
/DEVICE=device-type           /DEVICE=PR10  
/[NO]LOG[=file-spec]         /LOG  
/[NO]OUTPUT[=file-spec]      /OUTPUT  
/REGISTER=(option[,...])  
/STYLE=style-name            /STYLE=DESIGN
```

3.1.1 Prompt

```
File(s):           file-spec[,...]
```

3.1.2 Command Parameters

file-spec[,...]

Specifies one or more source files to be processed by the PDL/81 design style. The default file type is PDL. Wild card characters may be used in the file specifications. If more than one file is specified, they will be processed as if they were concatenated to form a single source file.

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3.1.3 Command Qualifiers

The common command qualifiers are:

/DEVICE=device-type

Specifies the type of device which will be used to print the design document. The complete list of supported device types is given in Section 5.2. The default is **/DEVICE=PR10** which selects a 10 character per inch printer using wide paper.

/LOG[=file-spec]

/NOLOG Specifies the file to contain any error or progress messages output from PDL/81. The default file type is LOG. The default file name is the name of the first input file. If the file specification is not given, log output will be directed to **SY\$ERROR**. Note that **/NOLOG** means that no log output, including error messages, will be displayed.

/OUTPUT[=file-spec]

/NOOUTPUT

Specifies whether or not an output file containing the design document is to be produced. The default is **/OUTPUT**. If a file specification is not given, the output file will have the same name as the first (or only) source file and a file type of LIS. If a file specification is given, the default file type is LIS.

/REGISTER=(option[,...])

Specifies initial values for one or more PDL/81 number registers. Each option has the form

`register-name=value`

where *value* is a decimal integer constant. The more commonly used registers are

.po Specifies a page offset to be used in printing each line of output. The supplied value gives the number of character positions to indent each line. If this option is not given, a default offset will be used. The default offset varies from installation to installation depending on how printers are normally aligned.

pdepth Specifies a page depth to be used, in number of lines, to be used in place of the page depth implied by the selected output device.

/STYLE=style-name

Specifies the name of the style definition in the data base to be used in processing the design. The name of the standard style definition for designs is **DESIGN**. If the **/STYLE** qualifier is not given, a default style name of **DESIGN** will be used.

3.1.4 Examples

Some examples of invoking PDL/81 to process designs are:

1. \$ PDL81 TEST

This command will process the file TEST.PDL using the standard design style DESIGN and device PR10 and place the formatted design document in the file TEST.LIS.

2. \$ PDL81/DEVICE=PR10N TEST

This command will perform the same processing as Example 1 but will format the output for printing on device PR10N which is a 10 character per inch printer with narrow paper.

3. \$ PDL81/OUTPUT=TEMP/DEVICE=PR10N START,MIDDLE,END

This command will process the files START.PDL, MIDDLE.PDL, and END.PDL as if they were concatenated and will place the output in file TEMP.LIS. The output will be formatted for printing on device type PR10N.

4. \$ PDL81/OUTPUT=TEMP/DEVICE=PR10N START+MIDDLE+END

This command will have exactly the same effect as the command of Example 3.

5. \$ PDL81/REGISTER=.PO=7 DES22.P

This command will process the source file DES22.P and place the output into DES22.LIS. A page offset of 7 characters will be used.

6. \$ PDL81/REGISTER=(.PO=7,PDEPTH=55) DES22.P

This command will have the same effect as the previous example, except that a page depth of 55 lines will be used.

3.2 Document Style Invocation

This section discusses the method of invoking PDL/81 with the various document styles under VMS. Only the most common invocation options are shown. See Section 3.3 for a complete description.

```
PDL81 file-spec
```

```
Command Qualifiers:
```

```
/DEVICE=device-type  
/[NO]LOG[=file-spec]  
/[NO]OUTPUT[=file-spec]  
/REGISTER=(option[,...])  
/STYLE=style-name
```

```
Defaults:
```

```
/DEVICE=PR10  
/LOG  
/OUTPUT  
/STYLE=DESIGN
```

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3.2.1 Prompt

File(s): file-spec

3.2.2 Command Parameters

file-spec

Specifies the source file to be processed by one of the PDL/81 document styles. The default file type is PDL. Wild card characters may be used in the file specification but, if more than one file is generated, only the first one will be processed.

3.2.3 Command Qualifiers

The common command qualifiers are:

/DEVICE=device-type

Specifies the type of device which will be used to print the design document. The complete list of supported device types is given in Section 5.2. The full horizontal resolution of the device will be used when expanding spaces during line justification on devices which support variable-width spaces. The default is /DEVICE=PR10 which selects a 10 character per inch printer using wide paper.

/LOG[=file-spec]

/NOLOG Specifies the file to contain any error or progress messages output from PDL/81. The default file type is LOG. The default file name is the name of the first input file. If the file specification is not given, log output will be directed to SYS\$ERROR. Note that /NOLOG means that no log output, including error messages, will be displayed.

/OUTPUT[=file-spec]

/NOOUTPUT

Specifies whether or not an output file containing the formatted document is to be produced. The default is /OUTPUT. If a file specification is not given, the output file will have the same name as the source file and a file type of LIS. If a file specification is given, the default file type is LIS.

/REGISTER=(option[,...])

Specifies initial values for one or more PDL/81 number registers. Each option has the form

register-name=value

where *value* is a decimal integer constant. The more commonly used registers are

.po Specifies a page offset to be used in printing each line of output. The supplied value gives the number of character positions to indent each line. If this option is not given, a default offset will be used. The default offset varies from installation to installation depending on how printers are normally aligned.

pdepth Specifies a page depth to be used, in number of lines, to be used in place of the page depth implied by the selected output device.

/STYLE=style-name

Specifies the name of the style definition in the data base to be used in processing the document. The names of the standard document styles are “manual”, “letter”, “memo”, and “text” which are described in Part Three of this manual.

If the /STYLE qualifier is not given, a default of DESIGN will be used. The DESIGN style is used for processing program designs. Thus, an explicit /STYLE qualifier is needed to use one of the document styles.

The name of the style may also be specified in the source file as described in Section 5.3.

3.2.4 Examples

Some examples of using PDL/81 to process documents are:

1. \$ PDL81/STYLE=MANUAL TEST

This command will process the file TEST.PDL using the MANUAL style and device PR10 and place the formatted design document in the file TEST.LIS.

2. \$ PDL81/STYLE=MANUAL/DEVICE=HP12 TEST

This command will perform the same processing as Example 1 but will format the output for printing on device HP12 which is an HP Laserjet printer at 12 characters per inch.

3. \$ PDL81/STYLE=LETTER/REGISTER=.PO=7 MYLET.P

This command will process the source file MYLET.P and place the output into MYLET.LIS. A page offset of 7 characters will be used.

4. \$ PDL81/STYLE=LETTER/REGISTER=(.PO=7,PDEPTH=55) MYLET.P

This command will have the same effect as the previous example, except that a page depth of 55 lines will be used.

3.3 Detailed Invocation Procedures

This section discusses detailed invocation procedures under VMS. PDL/81 is invoked by

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```
PDL81  file-spec[,...]
```

Command Qualifiers:	Defaults:
/DEVICE=device-type	/DEVICE=PR10
/LIBRARY=dir-spec	
/[NO]LOG[=file-spec]	/LOG
/[NO]OUTPUT[=file-spec]	/OUTPUT
/PAGES=(page-spec[,...])	
/[NO]PAUSE	/NOPAUSE
/REGISTER=(option[,...])	
/STRING=(option[,...])	
/STYLE=style-name	/STYLE=DESIGN
/USE=file-spec	
/VERSION	
/[NO]WAIT	/NOWAIT

Debugging Command Qualifiers:	Defaults:
/DPATH=dir-spec	
/[NO]ELIST	/NOELIST
/[NO]KEEP	/NOKEEP
/[NO]QUIT	/NOQUIT
/TPATH=dir-spec	/TPATH=SYS\$LOGIN:
/[NO]TRACE	/NOTRACE

3.3.1 Prompt

```
File(s):      file-spec[,...]
```

3.3.2 Command Parameters

file-spec[,...]

Specifies one or more source files to be processed by PDL/81. The default file type is PDL. Wild card characters may be used in the file specification.

The name of the first (or only) source file will be returned as the value of the *source* primitive (see Part Three of this manual).

Of the distributed style files, only the DESIGN style can actually process more than one source file.

3.3.3 Normal Command Qualifiers

The command qualifiers used in normal invocation of PDL/81 are:

/DEVICE=device-type

Specifies the name of the device type to be used to print the output of the processor. Actually, the choice and interpretation of device names is completely arbitrary. After the definition file has been processed, the function \$dev-device will be invoked. If no such function has been defined, the file *device.D* is read from the data base directory. Thus, the format designer may define various functions which set options

(e.g., page dimensions, character widths) to handle different device types.

The default is /DEVICE=PR10 which is intended to select a 10 character per inch printer using wide paper.

A complete list of standard device types is provided in Section 5.2.

/LIBRARY=dir-spec

Specifies the directory which contains the PDL/81 design format data base. This data base contains the style and device type files. If the logical name PDL81\$LIB is defined, its translation becomes the default library directory. If the logical name is not defined, the default library directory is SYS\$SYSROOT:[SYSLIB.PDL81].

/LOG[=file-spec]

/NOLOG Specifies the file to contain any error or progress messages output from PDL/81. The default file type is LOG. The default file name is the name of the first input file. If the file specification is not given, log output will be directed to SYS\$ERROR.

Note that /NOLOG means that no log output, including error messages, will be displayed.

/OUTPUT[=file-spec]

/NOOUTPUT

Specifies whether or not an output file containing the formatted document is to be produced. The default is /OUTPUT.

If a file specification is not given, the output file will have the same name as the first (or only) source file and a file type of LIS. If a file specification is given, the default file type is LIS.

/PAGES=(page-spec,...)

Specifies that only certain pages are to be placed in the output file. Each page-spec consists of either a decimal integer or two decimal integers separated by a colon.

Before the formatting of each output page body, but after any page header processing, the contents of the ".page" built-in number register (see Part Three of this manual). is compared against each number specified (or implied) in the list. If it is found, the page will be printed. If the /PAGES qualifier is to be used, it is the responsibility of the format designer to assure that the ".page" number register contains the proper page number.

If the /PAGES qualifier is not present, the entire document will be printed.

/PAUSE

/NOPAUSE

Specifies that the PDL/81 processor is to pause after displaying each error message. Processing may be resumed by pressing <RETURN>. If a ^Z is pressed, processing will be resumed and the /PAUSE and /WAIT qualifiers will be cancelled.

/REGISTER=(option,...)

Specifies initial values for one or more PDL/81 number registers. Each option has the form

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register-name[=value]

where *value* is an unsigned decimal integer constant. If the equal sign and value are absent, the number register will be given the value of “one”. When a number register is defined with the /REGISTER qualifier, the first attempt to assign it a value with the *nr* function will be ignored. Thus, the /REGISTER qualifier may be used to override value assignments made in the style definition file.

/STRING=(option[,...])

Specifies initial values for one or more PDL/81 named strings. Each option has the form

string-name[=value]

where *value* is the text to be assigned to the string. If the equal sign and value are absent, the string will be given a null value. When a string is defined with the /STRING qualifier, the first attempt to assign it a value with the *ds* function will be ignored. Thus, the /STRING qualifier may be used to override value assignments made in the style definition file.

/STYLE=style-name

Specifies the particular formatting style to be used. The default name is DESIGN. The actual file containing the definition of the style is located by prepending the data base path (see the /LIBRARY qualifier) to the style name.

A complete list of standard PDL/81 styles is shown in Section 5.1.

/USE=file-spec

Specifies the complete name of the file to be used as the PDL/81 style file. If this qualifier is used, it overrides the file name formed from the /LIBRARY and /STYLE qualifiers.

/VERSION

Causes PDL/81 to print an identification message and exit.

/WAIT

/NOWAIT Specifies that PDL/81 is to pause just before placing each new output page into the output file. A message will be displayed on the log file for each pause. Processing may be resumed by pressing <RETURN>. If a ^Z is pressed, processing will be resumed and the /PAUSE and /WAIT qualifiers will be cancelled.

3.3.4 Command Qualifiers for Debugging

The command qualifiers used when debugging the PDL/81 processor or a particular style are:

/DPATH=dir-spec

Specifies the directory containing PDL/81 device descriptions. The default directory is that specified (or defaulted) by the /LIBRARY qualifier.

/ELIST

/NOELIST

Specifies that the offending input line is to be displayed on the log file prior to displaying an error message. It is quite likely that the dis-

played line will have been “decompiled” from an internal encoded form and, thus, may be only an approximation of the actual input line. The default is /NOELIST.

/KEEP
/NOKEEP

Specifies that any PDL/81 temporary files which remain at the end of processing are not to be deleted. The default is /NOKEEP which causes the files to be deleted.

/QUIT

/NOQUIT Specifies that PDL/81 is to terminate processing on the first reference to an undefined FDL function. The default is /NOQUIT. Most PDL/81 styles will not function correctly if /QUIT is given.

/TPATH=dir-spec

Specifies the directory to be used by PDL/81 for creating temporary files. The default is SYS\$LOGIN:.

/TRACE

/NOTRACE

Specifies that PDL/81 is to start operation in trace mode. The default is /NOTRACE.

4. Invocation Under PC-DOS

This chapter discusses invocation of the PDL/81 processor under the PC-DOS operating system.

4.1 Design Style Invocation

This section discusses the method of invoking PDL/81 with the design style under the PC-DOS operating system. Only the most common invocation options are shown. See Section 4.3 for a complete description.

PDL/81 can be invoked to run the design style by

```
pdl81 [options...] source-file...
```

where the most common invocation options are

- sstyle** specifies the name of the style definition in the data base to be used in processing the design. The name of the style definition described in this manual is *design*. If the **-s** option is not given, a default style will be used. At most installations, the default style will probably be *design*.
- r.po=offset** specifies a page offset to be used in printing each line of output, where *offset* is a decimal integer giving the number of character positions to indent each line. If the **-r.po** option is not given, a default offset will be used. The default offset will vary from installation to installation depending upon the way printers are normally aligned at the installation.
- ddevice** specifies the type of output device which will be used to print the design document, where *device* may be one of the device names shown in Section 5.2. If the **-d** option is not given, a default device (usually *printer*) will be used.
- rpdepth=depth** specifies a page depth, in number of lines, to be used in place of the page depth implied by the selected output device.

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One or more source files may be specified. If more than one is specified, they will be processed as if they were concatenated to form a single source file.

4.1.1 Processor Output

The design document will be directed to the standard output file. Diagnostic output will be directed to the standard error file.

4.1.2 Invocation Examples

To process the file "test.p" and place the output in file "test.doc", use

```
pd181 test.p >test.doc
```

To process the same file for printing on 8-1/2 by 11 inch paper with a 12 character per inch type font and a 5 character page offset, and place the output in file "test.tmp", use

```
pd181 -r.po=5 -dpr10n test.p >test.tmp
```

4.2 Document Style Invocation

This section discusses the method of invoking PDL/81 with the various document styles under the PC-DOS operating system. Only the most common invocation options are shown. See Section 4.3 for a complete description.

PDL/81 can be invoked to run the document language styles by

```
pd181 [option...] [source-file]
```

where the various invocation options are

-sstyle specifies the name of the style definition in the data base to be used in processing the design. The names of the style definitions described in this manual are *manual*, *letter*, *memo*, and *text* which are described in in Part Three of this manual.

If the -s option is not given, a default style will be used. At most installations, the default style will probably be one for processing program designs so the -s option is usually required to obtain one of the document language styles. The -s option may also be set in the source file as described in Section 5.3.

-r.po=offset specifies a page offset to be used in printing each line of output, where *offset* is a decimal integer giving the number of character positions to indent each line. If the -r.po option is not given, a default offset for the selected device will be used. The default offsets will vary from installation to installation depending upon the way printers are normally aligned.

-ddevice specifies the type of output device which will be used to print the design document, where *device* may be any of the devices shown in Section 5.2. The full horizontal resolution of the device will be used when

expanding spaces during line justification on devices which support variable-width spaces. If the `-d` option is not given, a default device (usually *printer*) will be used.

`-rpdepth=depth`
specifies a page depth, in lines, to be used in place of the page depth implied by the selected output device.

If no source file is specified, the standard input file will be used as the source file.

4.2.1 Processor Output

The formatted document will be directed to the standard output file. Diagnostic output will be directed to the standard error file.

If the document contains *tags*, an *auxiliary file* will also be output for later use when the document is processed through PDL/81 again. The name of this file is formed by replacing the extension, if any, in the source file name with an extension of ".a".

4.2.2 Invocation Examples

To process the file "test.p" as a manual and place the output in file "test.doc", use

```
pd181 -smanual test.p >test.doc
```

To process the same file for printing on a Diablo 1620 printer with a 12-pitch type font and a 12-character page offset, and place the output in file "test.tmp", use

```
pd181 -smanual -r.po=12 -ddiablo12 test.p >test.tmp
```

4.3 Detailed Invocation Procedures

This section discusses detailed invocation procedures under PC-DOS. PDL/81 is invoked by:

```
pd181 [options...] [source-file]
```

4.3.1 Normal Invocation Options

The options used in normal invocations of PDL/81 are:

- `-bpath` specify the path name of the directory containing the design format data base. If this option is not given, the installed default path given in Section 4.3.5 will be used. The given (or default) path will be prepended to any data base file name needed by the processor so a trailing "\" is required.
- `-sstyle` specify the particular formatting style to be used. If this option is not given, the style name "default" will be used. The actual file containing the definition of the style is formed by prepending the data base path to the style name. Thus, in the absence of both the `-b` and `-s` options, the style used will be the one in the file `\pd181lib\default`.

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- ufile** specify the path name of the file containing the formatting style definition. If this option is used, it overrides the file name formed by use of the **-b** and **-s** options.
- ddevice** specify the name of the device type to be used to print the output of the processor. Actually, the choice and interpretation of device names is completely arbitrary. After the definition file has been processed, the function `$dev-device` (`$dev-default`, if the **-d** option is not given) will be invoked. If no such function has been defined, the file `device.d` is read from the data base directory. Thus, the format designer may define various functions which set options (e.g., page dimensions, character widths) to handle different device types.
- Dpath** specify the path to the device description directory. If this is not specified, the path given by the **-b** option will be used. If neither **-b** nor **-D** are given, the default data base path will be used.
- w** request that the processor pause before beginning the printing of each page of output. A message will be displayed on the standard error file for each pause. Printing will be resumed on receipt of a newline from the standard input file. Thus, the **-w** option should normally not be used when the standard output is directed to the controlling terminal. If an end of file is read from the standard input during a pause, the effect of the **-w** and **-p** options will be cancelled.
- p** request that the processor pause after displaying each error message. Processing may be resumed as described for the **-w** option above.
- rname[=value]**
predefine the named number register to have the given value. The value, if present, must be an unsigned decimal integer constant. If the value (and the equal sign) are absent, the number register will be given the value "one". When a number register has been defined with the **-r** option, the first attempt to assign it a value with the `nr` function will be ignored. Thus, the **-r** option may be used to override value assignments made in the style definition file.
- vname[=text]**
predefine the named string to have the given text as its value. When a string has been defined with the **-v** option, the first attempt to redefine it with the `ds` function will be ignored. Thus, the **-v** option may be used to override string definitions made in the style definition file.
- olist** specify a list of pages to be printed. The list consists of a sequence of numbers or ranges separated by commas. A range consists of two numbers separated by a colon. Before the formatting of each output page body, but after any page header processing, the contents of the ".page" built-in number register is compared against each number specified (or implied) in the list. If it is found, the page will be printed. If the **-o** option is to be used, it is the responsibility of the format designer to assure that the ".page" number register contains the proper page number. If the **-o** option is not present, the entire output document will be printed.
- tpath** specify the path name of the directory to be used for temporary files. The given (or default) path will be prepended to any temporary file name needed by the processor so a trailing "\" is required. If this option is not given, temporary files will be created in a standard place as described in Section 4.3.6.

- y cause PDL/81 to print an identification message and exit.
- z suppress test for the existence of the source files.
- I*file* redirect the standard input to *file*.
- O*file* redirect the standard output to *file*.
- E*file* redirect the standard error to *file*.

4.3.2 Invocation Options Used During Debugging

The following special options may be useful during debugging of the processor or of a set of definitions:

- Q terminate processing on the first reference to an undefined function.
- T turn trace mode on at the start of processing.
- L display the offending input line on the standard error file prior to displaying an error message. It is quite likely that the displayed line will have been “decompiled” from an internal encoded form and, thus, may be only an approximation of the actual input line.
- K do not delete any undeleted temporary files which remain at the time that PDL/81 exits.

4.3.3 Use of Multiple Options

One or more options may be present in a single argument providing that any option which takes a value must be the last option in the argument. Thus, specifying pausing before error messages, a device (printer), and a style (test) could be given as

```
pdl81 -pstest -dprinter
```

or as

```
pdl81 -p -stest -dprinter
```

4.3.4 Processor Input and Output

If the source-file argument is present, the argument will be returned as the value of the *source* primitive. If the source-file argument is missing, the value of the *source* primitive will be null. Formatted output is directed to the standard output file. Diagnostic output is directed to the standard error file.

4.3.5 Specifying the Data Base Library Location

By default, the PDL/81 processor assumes that prefixing “\PDL81LIB\” to a file name will locate that file in the data base library. Thus, the library directory is assumed to be located in the root directory of the PC-DOS default disk. This may be changed by use of the “-b” invocation option as described in Section 4.3.1.

An environment symbol may also be used to specify the location. If present, the processor will use the value of the “PDL81LIB” to locate the data base library. For example, executing the PC-DOS command

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```
SET PDL81LIB=C:\TEST\PLIB\
```

will cause PDL/81 to look for data base files in subdirectory PLIB in directory TEST on device C. An assignment such as this could be placed in the AUTOEXEC.BAT file.

4.3.6 Specifying the Directory for Temporary Files

By default, the PDL/81 processor creates temporaries in the current directory. This may be changed by use of the “-t” invocation option as described in Section 4.3.1.

An environment symbol may also be used to specify the location. If present, the processor will use the value of the “PDL81TMP” to locate the directory for temporary files. For example, executing the PC-DOS command

```
SET PDL81TMP=B:\TMP\
```

will cause PDL/81 to place its temporary files in directory TMP on device B. An assignment such as this could be placed in the AUTOEXEC.BAT file.

5. Common Topics

This chapter discusses various invocation topics that are common to all versions of the PDL/81 processor. These include the distributed styles and device descriptions and how to supply some of the invocation options in a source file.

5.1 Standard PDL/81 Styles

The standard styles distributed with the PDL/81 processor are:

design	style for PDL/81 design language
ada	style for Ada designs
letter	style to format a business letter
manual	style to format a manual or report
memo	style to format a memorandum
text	style to format general text

5.2 Standard PDL/81 Device Types

The standard device types distributed with the PDL/81 processor are:

hp10	an HP Laserjet printer at 10 characters per inch on 8.5 by 11 inch paper
hp12	an HP Laserjet printer at 12 characters per inch on 8.5 by 11 inch paper using the 9288G (Legal Elite) font cartridge
diablo10	a Diablo 1620 printer operating at 10 characters per inch on 8.5 by 11 inch paper
diablo12	a Diablo 1620 printer operating at 12 characters per inch on 8.5 by 11 inch paper
diablo	a generic Diablo 1620 printer (distributed to be the same as "diablo12")
pr10	a normal printer operating at 10 characters per inch on 14 by 11 inch paper for designs and 8.5 by 11 inch paper for documents

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pr10n	a normal printer operating at 10 characters per inch on 8.5 by 11 inch paper for both designs and documents
pr12	a normal printer operating at 12 characters per inch on 8.5 by 11 inch paper for both designs and documents
pr16	a normal printer operating at 16 (or similar) characters per inch on 8.5 by 11 inch paper for both designs and documents (useful for printing wide designs on narrow paper and for printing drafts of documents to be later printed at 12 characters per inch)
printer	a generic printer device (distributed to be the same as “pr10”)

5.3 Specifying Styles and Devices in the Source

The values of the UNIX and PC-DOS `-s`, `-u`, and `-d` options (the VMS `/STYLE`, `/USE`, and `/DEVICE` qualifiers) may be given in the source. To set one or more of these, the *first* source line must have the form

```
?*- option [...]
```

where “?” is the *command character* of the style which will be used to process the source. For the design style, the command character is a “%”; for the letter, manual, memo, and text styles, the command character is a “.”.

Each option must be preceded by one or more spaces or tabs. The possible options are:

- `-sstyle` where *style* is the style name to use. This is equivalent to the VMS `/STYLE=style` qualifier.
- `-ufile-spec` where *file-spec* is the file specification of the style file. This is equivalent to the VMS `/USE=file-spec` qualifier.
- `-ddevice` where *device* is the device type to use. This is equivalent to the VMS `/DEVICE=device` qualifier.

CAUTION

The option letters “s”, “u”, and “d” MUST be entered in lower case.

As an example,

```
.*- -smanual -dhp12
```

as the first line of a source file is equivalent to invoking PDL/81 as

```
pd181 -smanual -dhp16
```

under UNIX or DOS and as

```
pd181 /style=manual /device=hp16
```

under VMS. It specifies that the manual style will be used with the hp16 device.

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