

# Chapter 5. Data Product Labels

PDS data product labels are required for describing the contents and format of each individual data product within a data set. PDS data product labels are written in the Object Description Language (ODL). The PDS has chosen to label the wide variety of data products under archival preparation by implementing a standard set of data object definitions, group definitions, data elements, and standard values for the elements. These data object definitions, data elements, and standard values are defined in the *Planetary Science Data Dictionary* (PSDD). Appendix A of this document provides general descriptions and examples of the use of these data object definitions and data elements for labeling data products.

## 5.1 Format of PDS Labels

### 5.1.1 Labeling methods

In order to identify and describe the organization, content, and format of each data product, PDS requires a distinct data product label for each individual data product file. These distinct product labels may be constructed in one of three ways:

Attached - The PDS data product label is attached at the beginning of the data product file. There is one label attached to each data product file.

Detached - The PDS data product label is detached from the data and resides in a separate file which contains a pointer to the data product file. There is one detached label file for every data product file. The label file should have the same base name as its associated data file, but the extension .LBL .

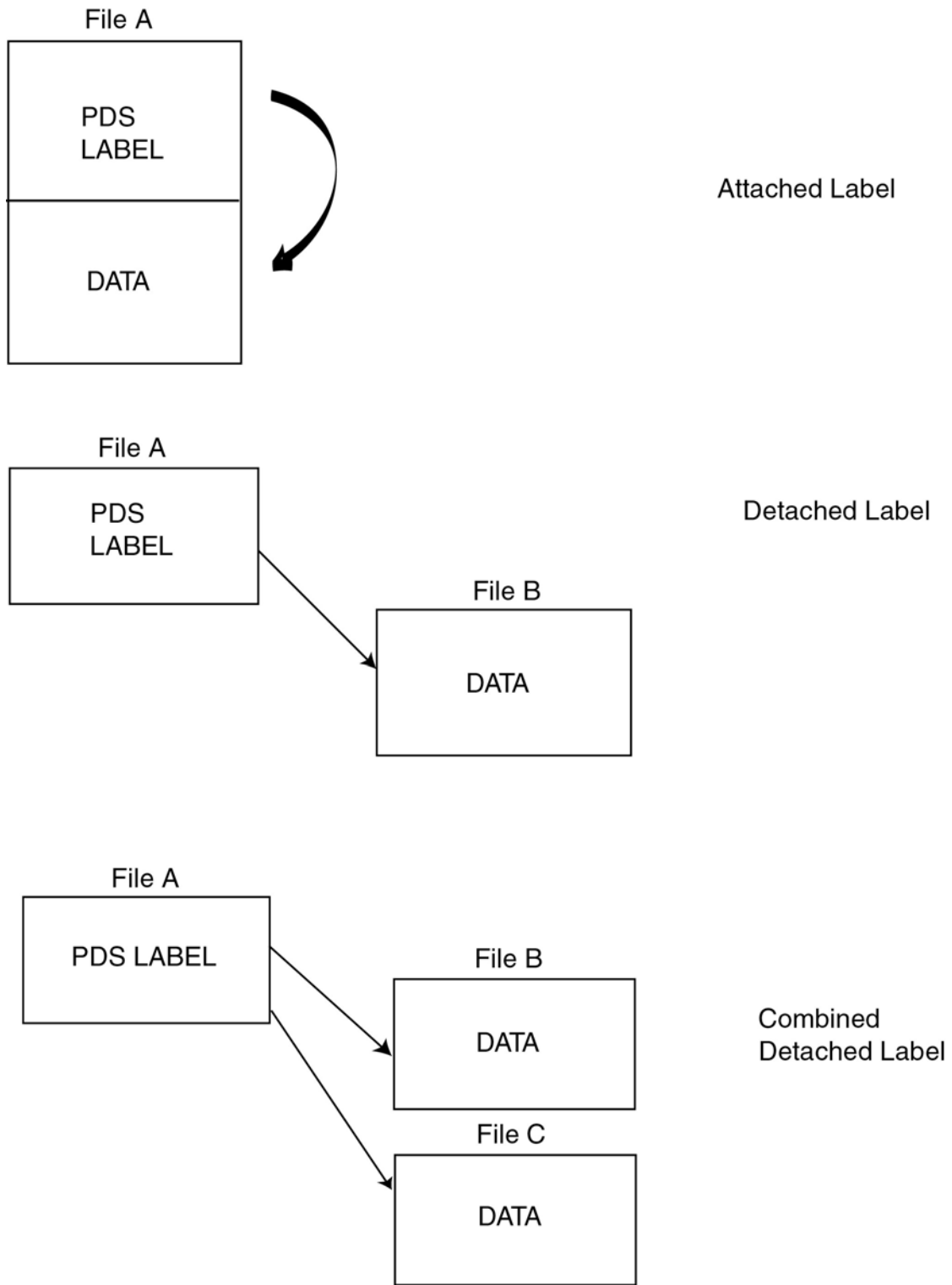
Combined Detached - A single PDS detached data product label file is used to describe the contents of more than one data product file. The combined detached label contains pointers to individual data products.

NOTE: Although all three labeling methods are equally acceptable, the PDS tools do not currently support the Combined Detached label option.

Figure 5.1 illustrates the use of each of these methods for labeling individual data product files.

### 5.1.2 Label format

PDS recommends that labels have stream record format, and line lengths of at most 80 characters (including the CR/LF line terminators) so that the entire label can be seen on a computer screen without horizontal scrolling. The carriage return and line feed (CR/LF) pair is the required line terminator for all PDS labels. (See the *Record Formats* chapter of this document.)



*Figure 5.1 Attached, Detached, and Combined Detached PDS Labels*

All values in a PDS label should be in upper case, except values for descriptive elements (DESCRIPTION, NOTE, etc.). It is also recommended that the equal signs in the labels be aligned for ease of reading.

### **ASCII Character Set**

All values in a PDS label must conform to the standard 7-bit ASCII character set. Labels may include characters in the range of ASCII characters 32 through 127 (decimal), and the record delimiters Line Feed (10 decimal) and Carriage Return (13 decimal).

The remaining 7-bit ASCII characters (1-9, 11, 12, and 14-31 decimal, which includes the horizontal and vertical tab and form feed characters) are not permitted in PDS labels. Note that the 8-bit characters 128 through 255 (decimal) are not used in the PDS as the interpretation of these characters varies by operating system, computer platform, and font selected. Specifically, extended-set characters with diacritical marks are not to be used as they are interpreted differently by different applications.

### **Label Padding**

When a fixed length data file has an attached label, the label is padded with space characters (ASCII 32 decimal) in one of the following ways:

1) Spaces are added after the label's END <CR><LF> statement and before the data so that the total of the label (in bytes) is an integral multiple of the record length of the data. In this case, LABEL\_RECORDS is calculated by dividing the total padded length of the label section, in bytes, by the stated value of RECORD\_BYTES.

### ***Example***

In the example below, the label portion of the file is  $7 \times 324 = 2268$  bytes in length, including blank fill between the END<CR><LF> statement and the first byte of data. The actual data portion of the file starts at record 8 (i.e., the 1st byte of the 8th record starts at byte  $(7 \times 324)+1 = 2269$ )

```

RECORD_TYPE           = FIXED_LENGTH<CR><LF>
RECORD_BYTES          = 324<CR><LF>
FILE_RECORDS          = 334<CR><LF>
LABEL_RECORDS         = 7<CR><LF>

^IMAGE                = 8<CR><LF>

END<CR><LF>
....blank fill....
data
```

2) Each line in the label may be padded with space characters so that each line in the label has the same record length as the data file. In this case, the label line length may exceed the recommended 80 characters; LABEL\_RECORDS is the number of physical records in the label section of the file.

**Example**

In the example below, the label portion of the file is  $80 \times 85 = 6800$  bytes in length. Each line in the label portion of the file is 85 bytes long, the same length as each data record. Notice the blank space between the actual values in the label and the line delimiters. In the example, the label is 80 lines long (i.e., 80 records long) and the data begin at record 81. Note that the label is padded so that <CR><LF> are in bytes 84 and 85.

```

RECORD_TYPE           = FIXED_LENGTH   <CR><LF>
RECORD_BYTES          = 85             <CR><LF>
FILE_RECORDS          = 300            <CR><LF>
LABEL_RECORDS         = 80             <CR><LF>
...
^TABLE                = 81             <CR><LF>
END                   <CR><LF>
Data

```

**5.2 Data Product Label Content****5.2.1 Attached and Detached Labels**

PDS data product labels have a general structure that is used for all attached and detached labels, except for data products described by minimal labels. (Minimal labels are described in Section 5.2.3.)

- LABEL STANDARDS identifier
- FILE CHARACTERISTIC data elements
- DATA OBJECT pointers
- IDENTIFICATION data elements
- DESCRIPTIVE data elements
- DATA OBJECT DEFINITIONS
- END statement

Figure 5.2 provides an example of how this general structure appears in an attached or detached label for a data product file containing multiple data objects.

**5.2.2 Combined Detached Labels**

For the Combined Detached label option, the general label structure is modified slightly to reference each individual file within its own FILE object explicitly. In addition, identification and descriptive data elements that apply to all of the files can be located before the FILE objects.

PDS LABEL		
PDS_VERSION_ID	=	• LABEL STANDARDS IDENTIFIERS
DD_VERSION_ID	=	
LABEL_REVISION_NOTE	=	
/* FILE_CHARACTERISTICS */		• FILE CHARACTERISTICS DATA ELEMENTS
RECORD_TYPE	=	
RECORD_BYTES	=	
FILE_RECORDS	=	
LABEL_RECORDS	=	
/* POINTERS TO DATA OBJECTS */		• DATA OBJECT POINTERS (primary, secondary)
^IMAGE	=	
^HISTOGRAM	=	
/* IDENTIFICATION DATA ELEMENTS */		• IDENTIFICATION DATA ELEMENTS
DATA_SET_ID	=	
PRODUCT_ID	=	
SPACECRAFT_NAME	=	
INSTRUMENT_NAME	=	
TARGET_NAME	=	
START_TIME	=	
STOP_TIME	=	
.		
PRODUCT_CREATION_TIME	=	
/* DESCRIPTIVE DATA ELEMENTS */		• DESCRIPTIVE DATA ELEMENTS
FILTER_NAME	=	
OFFSET_MODE_ID	=	
.		
.		
.		
/* DATA OBJECT DEFINITIONS */		• DATA OBJECT DEFINITIONS (primary, secondary)
OBJECT	= IMAGE	
.		
.		
END_OBJECT	= IMAGE	
OBJECT	= HISTOGRAM	
.		
.		
END_OBJECT	= HISTOGRAM	
END		• END STATEMENT

*Figure 5.2 PDS Attached / Detached Label Structure*

- LABEL STANDARDS identifiers
- IDENTIFICATION data elements that apply to all referenced data files
- DESCRIPTIVE data elements that apply to all referenced data files
- OBJECT=FILE statement (Repeats for each data product file)
  - FILE CHARACTERISTIC data elements
  - DATA OBJECT pointers
  - IDENTIFICATION data elements
  - DESCRIPTIVE data elements
  - DATA OBJECT DEFINITION
- END\_OBJECT=FILE statement
- END statement

Figure 5.3 provides an example of how this general structure appears in a combined detached label that describes more than one data product file.

### 5.2.3 Minimal Labels

Use of the minimal label option is only allowed when the format of the data cannot be supported by any PDS data object structure other than the FILE object.

For minimal labels the required use of data objects is waived. A minimal label does not require any explicit PDS data object definitions or pointers to data objects. This applies to both attached and detached labels.

Minimal labels must satisfy the following requirements:

- (1) Provide the ability to locate the data associated with the label.

- 1a. Attached labels

Since data objects and pointers are not required in the minimal label, by definition the data follow immediately after the label.

- 1b. Detached Labels

Both the implicit and explicit use of the FILE object are supported. The FILE\_NAME keyword is required in the explicit FILE object, or in the label itself if no FILE object is included.

- (2) Provide the ability to locate a description of the format/content of the data. One of the following must be provided in the minimal label:

- 2a. ^DESCRIPTION = "<filename>"

This is a pointer to a file containing a detailed description of the data format, which may be located in the same directory as the data or in the DOCUMENT subdirectory.

PDS LABEL

PDS_VERSION_ID	=	<ul style="list-style-type: none"> <li>• LABEL STANDARDS IDENTIFIERS</li> </ul>
DD_VERSION_ID	=	
LABEL_REVISION_NOTE	=	
DATA_SET_ID	=	<ul style="list-style-type: none"> <li>• IDENTIFICATION &amp; DESCRIPTIVE DATA ELEMENTS for all files</li> </ul>
PRODUCT_ID	=	
SPACECRAFT_ID	=	
INSTRUMENT_NAME	=	
TARGET_NAME	=	
PRODUCT_CREATION_TIME	=	
OBJECT	= FILE	<p>For detached FILE A:</p> <ul style="list-style-type: none"> <li>• FILE CHARACTERISTICS DATA ELEMENTS</li> <li>• DATA OBJECT POINTERS</li> <li>• IDENTIFICATION / DESCRIPTIVE DATA ELEMENTS</li> <li>• DATA OBJECT DEFINITIONS</li> </ul> <p>For detached FILE B:</p> <ul style="list-style-type: none"> <li>• FILE CHARACTERISTICS DATA ELEMENTS</li> <li>• DATA OBJECT POINTERS</li> <li>• IDENTIFICATION / DESCRIPTIVE DATA ELEMENTS</li> <li>• DATA OBJECT DEFINITIONS</li> </ul>
RECORD_TYPE	=	
.		
.		
FILE_RECORDS	=	
^TIME_SERIES	= "FILEA"	
START_TIME	=	
STOP_TIME	=	
OBJECT	= TIME_SERIES	
.		
.		
END_OBJECT	= TIME_SERIES	
END_OBJECT	= FILE	
OBJECT	= FILE	
RECORD_TYPE	=	
.		
.		
FILE_RECORDS	=	
^TIME_SERIES	= "FILEB"	
START_TIME	=	
STOP_TIME	=	
OBJECT	= TIME_SERIES	
.		
.		
END_OBJECT	= TIME_SERIES	
END_OBJECT	= FILE	
END		<ul style="list-style-type: none"> <li>• END STATEMENT</li> </ul>

*Figure 5.3 PDS Combined / Detached PDS Label Structure*

- 2b. DESCRIPTION = “<text appears here>”  
This is either a detailed description of the data file, its format, data types, and use, or it is a reference to a document available externally, e.g., a Software Interface Specification (SIS) or similar document.

(3) When minimal labels are used, DATA\_OBJECT\_TYPE = FILE should be used in the DATA\_SET catalog file

### 5.2.3.1 Implicit File Object (Attached and Detached Minimal Label)

The general structure for minimal labels with implicit file objects is as follows:

- LABEL STANDARDS identifiers
- FILE CHARACTERISTIC data elements
- IDENTIFICATION data elements
- DESCRIPTIVE data elements
- END statement

### 5.2.3.2 Explicit File Object (Detached Minimal Label)

The general structure for minimal labels with explicit file objects is as follows:

- LABEL STANDARDS identifiers
- IDENTIFICATION data elements
- DESCRIPTIVE data elements
- OBJECT=FILE statement
  - FILE CHARACTERISTIC data elements
- END\_OBJECT=FILE
- END statements

Figure 5.4 provides an example of how this general structure appears in a detached minimal label. In this example, an implicit FILE object is used.

## 5.3 Detailed Label Contents Description

This section describes the detailed requirements for the content of PDS labels. The subsections describe label standards identifiers, file characteristic data elements, data object pointers, identification data elements, descriptive data elements, data object definitions, and the END statement.



PDS LABEL		
PDS_VERSION_ID	=	• LABEL STANDARDS IDENTIFIERS
DD_VERSION_ID	=	
LABEL_REVISION_NOTE	=	
/* FILE_CHARACTERISTICS */		
RECORD_TYPE	=	• FILE CHARACTERISTICS DATA ELEMENTS
RECORD_BYTES	=	
FILE_NAME	=	
FILE_RECORDS	=	
LABEL_RECORDS	=	
/* IDENTIFICATION DATA ELEMENTS */		
DATA_SET_ID	=	• IDENTIFICATION DATA ELEMENTS
PRODUCT_ID	=	
SPACECRAFT_NAME	=	
INSTRUMENT_NAME	=	
TARGET_NAME	=	
START_TIME	=	
STOP_TIME	=	
.		
.		
PRODUCT_CREATION_TIME	=	
/* DESCRIPTIVE DATA ELEMENTS */		
FILTER_NAME	=	• DESCRIPTIVE DATA ELEMENTS
OFFSET_MODE_ID	=	
^DESCRIPTION	=	
.		
.		
.		
END		• END STATEMENT

*Figure 5.4 PDS Detached Minimal Label Structure*

### 5.3.1 Label Standards Identifiers

Each PDS label must begin with the PDS\_VERSION\_ID data element. This element identifies the published version of the Standards to which the label adheres, for purposes of both validation as well as software development and support. For labels adhering to the standards described in this document (the *PDS Standards Reference*, Version 3.4), the appropriate value is “PDS3”:

```
PDS_VERSION_ID = PDS3
```

The PDS does not require Standard Formatted Data Unit (SFDU) labels on individual products, but they may be desired for conformance with specific project or other agency requirements. When SFDU labels are provided on a PDS data product, the SFDU label must *precede* the PDS\_VERSION\_ID keyword, thus:

```
CCSD.... [optional SFDU label]
PDS_VERSION_ID
DD_VERSION_ID
LABEL_REVISION_NOTE
```

SFDU labels in PDS products must follow the format standards described in *SFDU Usage* chapter in this document.

The DD\_VERSION\_ID element identifies the version of the PDS Data Dictionary to which a label complies. Current PDS practice is to identify a Data Dictionary version with the identifier used for the PDS catalog build in which it resides, e.g., pdscat1r47, pdscat1r48, and so on. This keyword will use the upper case representation of the catalog identifier, e.g., PDSCAT1R47, PDSCAT1R48, etc.

The LABEL\_REVISION\_NOTE element is a free form, unlimited-length character string providing information regarding the revision status and authorship of a PDS label. It should include at least the latest revision date and the author of the current version, but may include a complete editing history. This element is required in all catalog labels.

### *Example*

```
PDS_VERSION_ID           = PDS3
DD_VERSION_ID           = PDSCAT1R52
LABEL_REVISION_NOTE     = "1999-08-01, Anne Raugh (SBN), initial
release;"
RECORD_TYPE             = FIXED_LENGTH
RECORD_BYTES           = 80
```

## 5.3.2 File Characteristic Data Elements

PDS data product labels contain data element information that describes important attributes of the physical structure of a data product file. The PDS file characteristic data elements are:

```
RECORD_TYPE
RECORD_BYTES
FILE_RECORDS
LABEL_RECORDS
```

The RECORD\_TYPE data element identifies the record characteristics of the data product file. A complete discussion of the RECORD\_TYPE data element and its use in describing data products produced on various platforms is provided in the *Record Formats* chapter in this document. The RECORD\_BYTES data element identifies the number of bytes in each physical record in the data product file. The FILE\_RECORDS data element identifies the number of physical records in the file. The LABEL\_RECORDS data element identifies the number of physical records that

make up the PDS product label.

Not all of these data elements are required in every data product label. Table 5.1 lists the required (Req) and optional (Opt) file characteristic data elements for a variety of data products and labeling methods for both attached (Att) and detached (Det) labels. Where (max) is specified, the value indicates the maximum size of any physical record in the file.

**Table 5.1: File Characteristic Data Element Requirements**

Labeling Method	Att	Det	Att	Det	Att	Det	Att	Det
RECORD_TYPE	FIXED_LENGTH		VARIABLE_LENGTH		STREAM		UNDEFINED	
RECORD_BYTES	Req	Req	Rmax	Rmax	Omax	-	-	-
FILE_RECORDS	Req	Req	Req	Req	Opt	Opt	-	-
LABEL_RECORDS	Req	-	Req	-	Opt	-	-	-

*Note:* The FILE\_NAME keyword is required in detached minimal labels.

### 5.3.3 Data Object Pointers

“Data objects” are the actual data for which the structure and attributes are defined in a PDS label. Each data product file contains one or more data objects. The PDS uses a pointer within the product labels to identify the file locations for all objects in a data product.

#### *Example*

```
^TABLE = "DATA.DAT"
^TABLE = ("DATA.DAT", 10 <BYTES>)
```

#### 5.3.3.1 Use of Pointers in Attached Labels

Data object pointers are required in labels with one exception: attached labels that refer to only a single object. In the absence of a pointer, the data object is assumed to start in the next physical record after the PDS product label area. This is commonly the case with ASCII text files described by a TEXT object and ASCII SPICE files described by a SPICE\_KERNEL object. The top two illustrations in Figure 5.5 show example files that do not require data object pointers.

Object pointers are required for all data objects, even when multiple data objects are stored in a single data product file. Data object pointers in attached labels take one of two forms:

```
^<object_identifier> = nnn
```

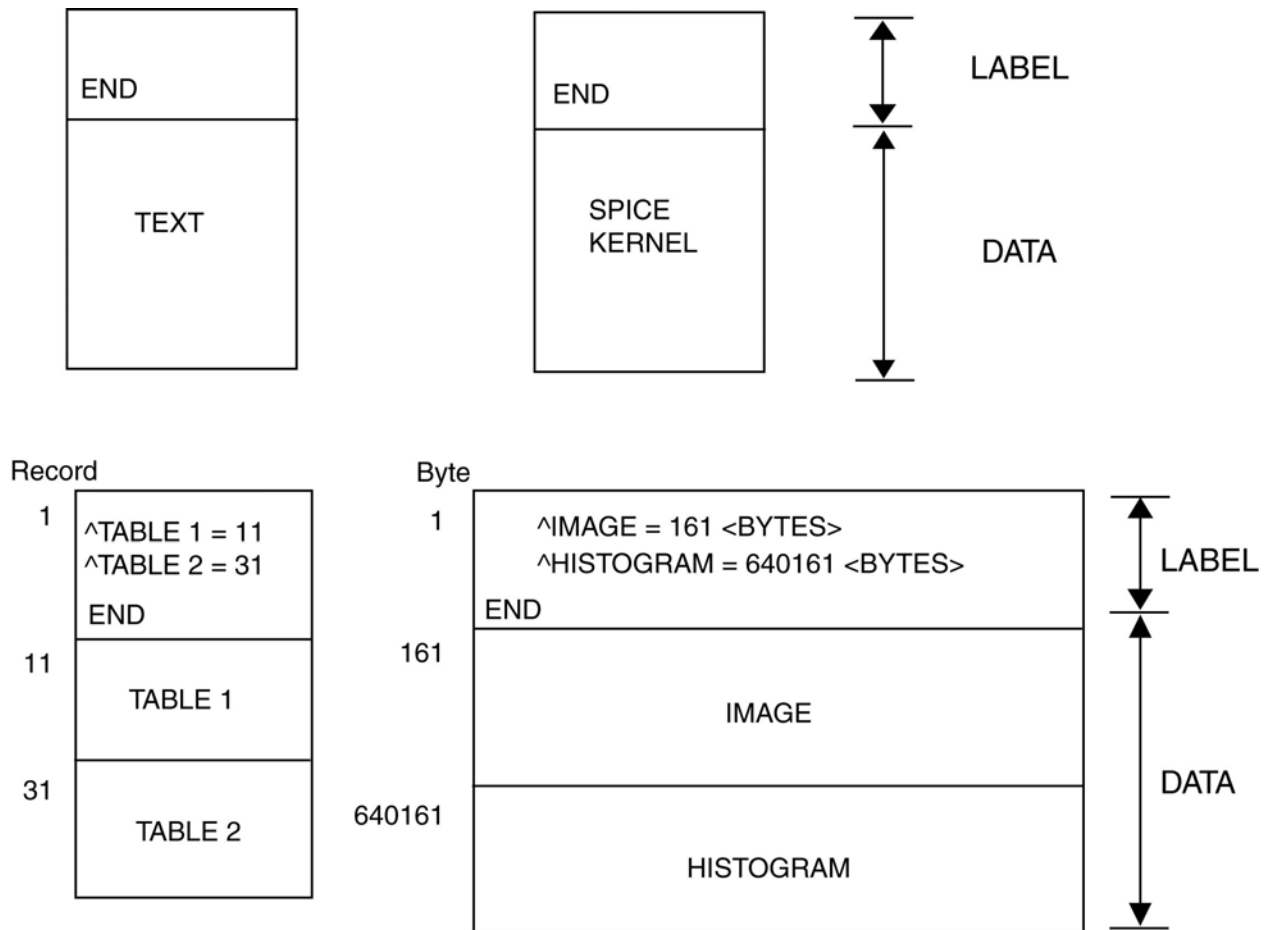
where nnn represents the starting record number within the file (first record is numbered 1),  
Or,

^<object\_identifier> = nnn <BYTES>

where nnn represents the starting byte location within the file (first byte is numbered 1).

See Chapter 12, *Object Description Language (ODL) Specification and Usage*, and Chapter 14, *Pointer Usage*, in this document for a complete description of pointer syntax.

The bottom two illustrations in Figure 5.5 show the use of required data object pointers for attached label products containing multiple data objects.



*Figure 5.5 Data Object Pointers-Attached Labels*

### 5.3.3.2 Use of Pointers in Detached and Combined Detached Labels

When the PDS data product label is a detached or a combined detached label, data object pointers are required for all data objects referenced.

The syntax for these data object pointers takes one of three forms:

- (1) *^object\_identifier* = "filename"
- (2) *^object\_identifier* = ("filename", nnn)
- (3) *^object\_identifier* = ("filename", nnn <BYTES>)

With respect to the above three cases:

- (a) These object pointers reference either byte or record locations in data files that are detached, or separate from, the label file.
- (b) "Filename" is the name of the detached data file. File names must be in uppercase characters.
- (c) When no offset is specified, the first record is assumed.
- (d) Records and bytes are numbered from 1.

In the first case, the data object is located at the beginning of the referenced file. In the second case, the data object begins with the nnn<sup>th</sup> physical record from the beginning of the referenced file. In the third case, the data object begins with the nnn<sup>th</sup> byte from the beginning of the referenced file.

### **Examples**

```

^IMAGE                = ( "DATA.IMG" )
^ENGINEERING_TABLE   = ( "DATA.DAT", 10 )
^TABLE                = ( "DATA.TAB", 10 <BYTES> )

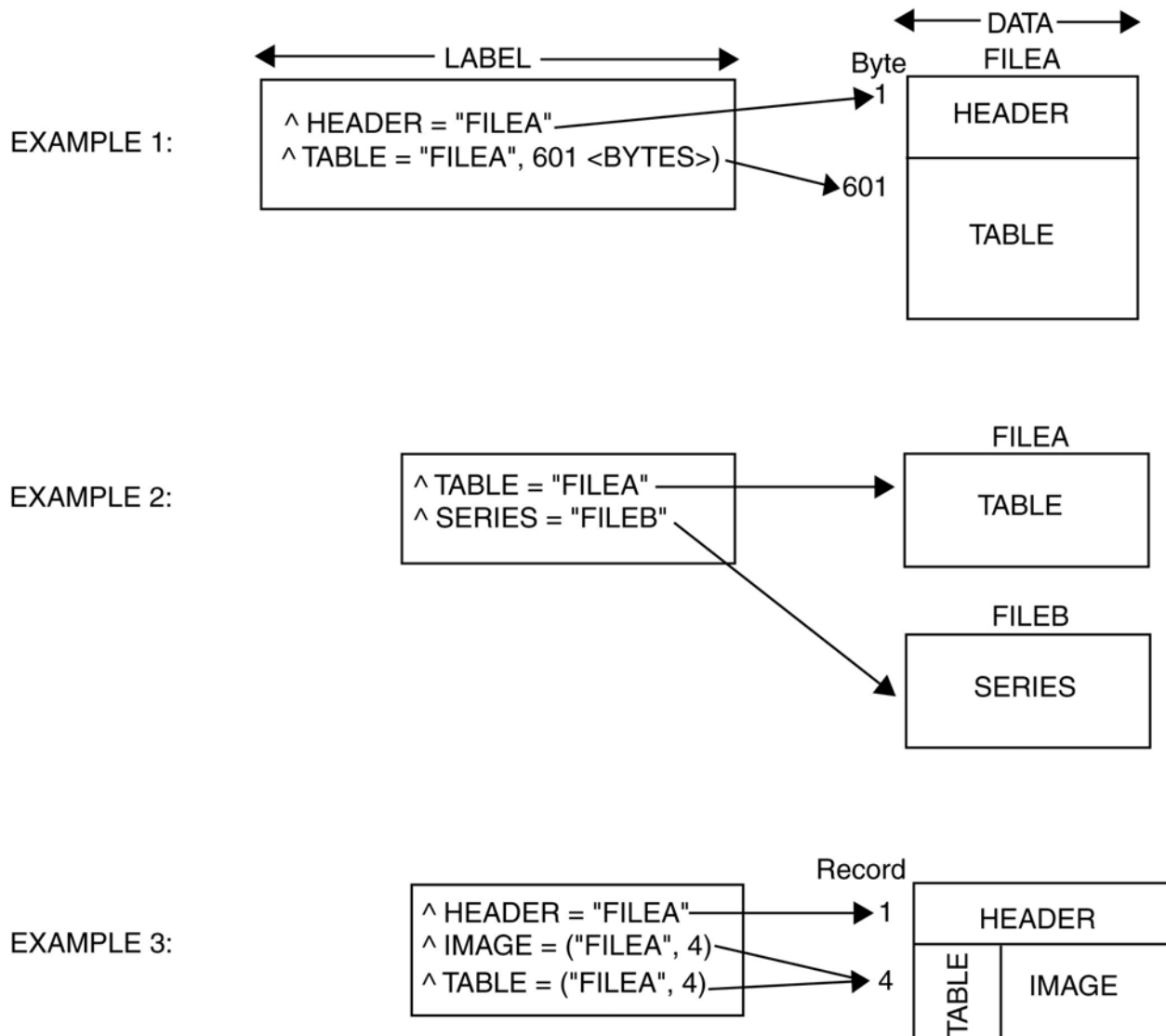
```

Figure 5.6 contains several examples of data object pointer usage for data product files with detached or combined detached labels. The top example shows a data product consisting of a HEADER data object and a TABLE data object together in a single file. The detached label for this product includes pointers for both data objects, with the TABLE object starting at byte 601 of file A. The middle example illustrates a combined detached label for a data product contained in two data objects, each in a separate file. A separate pointer is provided for each data object. The bottom example shows a detached label for a data product containing multiple data objects.

The third example shows a complex data file structure. The HEADER object comes first in the data file and, as the pointer ("^HEADER") shows, it requires no explicit offset (record 1 is assumed). Two parallel objects, a TABLE and an IMAGE, then follow the header. For this section of the file, each record contains one row of the TABLE followed by one line of the IMAGE. In the TABLE object description, the bytes of the IMAGE are accounted for as ROW\_SUFFIX\_BYTES; in the IMAGE object description, the bytes of the TABLE object are accounted for as LINE\_PREFIX\_BYTES. Both objects start in the same record, and therefore have the same offset (4). See the IMAGE and TABLE object descriptions for more information on prefix and suffix bytes. Had this data file been organized sequentially (so that, for example, the HEADER was followed by the TABLE, which in turn was followed by the IMAGE), then each object would have had its own offset.

### 5.3.3.3 Note Concerning Minimal Attached and Detached Labels

Data object pointers do not exist in minimal labels. In these cases the format of the data is usually fully described in a separate file or document.



*Figure 5.6 Data Object Pointers – Detached & Combined Labels*

### 5.3.4 Data Identification Elements

The data identification elements provide additional information about a data product that can be used to relate the product to other data products from the same data set or data set collection. The minimum set of identification elements required by the PDS standards (see the following subsections) is sufficient to populate a high-level database like, for example, the PDS central catalog. In addition, data preparers will choose additional identification elements from the *Planetary Science Data Dictionary* (PSDD) to support present and future cataloging and search operations.

NOTE: When a data preparer desires a new element for a data product label - one not yet recorded in the PSDD - it can be proposed for addition to the dictionary. Contact a PDS Data Engineer for assistance.

### 5.3.4.1 Spacecraft Science Data Products

The following data identification elements must be included in product labels for all spacecraft science data products:

DATA\_SET\_ID  
 PRODUCT\_ID  
 INSTRUMENT\_HOST\_NAME  
 INSTRUMENT\_NAME  
 TARGET\_NAME  
 START\_TIME  
 STOP\_TIME  
 SPACECRAFT\_CLOCK\_START\_COUNT  
 SPACECRAFT\_CLOCK\_STOP\_COUNT  
 PRODUCT\_CREATION\_TIME

### 5.3.4.2 Earthbased Science Data Products

The following data identification elements must be included in product labels for all Earth-based science data products:

DATA\_SET\_ID  
 PRODUCT\_ID  
 INSTRUMENT\_HOST\_NAME  
 INSTRUMENT\_NAME  
 TARGET\_NAME  
 START\_TIME  
 STOP\_TIME  
 PRODUCT\_CREATION\_TIME

### 5.3.4.3 Ancillary Data Products

The following data identification elements must be included in product labels for all ancillary data products. Ancillary products may be more general in nature, supporting a wide variety of instruments for a particular mission. For example, SPICE data sets, general engineering data sets, and uplink data are considered ancillary data products.

DATA\_SET\_ID  
 PRODUCT\_ID  
 PRODUCT\_CREATION\_TIME

The following identification elements are highly recommended, and should be included in ancillary data products whenever they apply:

INSTRUMENT\_HOST\_NAME  
 INSTRUMENT\_NAME  
 TARGET\_NAME  
 START\_TIME

```

STOP_TIME
SPACECRAFT_CLOCK_START_COUNT
SPACECRAFT_CLOCK_STOP_COUNT

```

### 5.3.5 Descriptive Data Elements

In addition to the data identification elements required for various types of data, PDS strongly recommends including additional data elements related to specific types of data. These descriptive elements should include any elements needed to interpret or process the data objects or which would be needed to catalog the data product to support potential search criteria at the product level.

Recommendations for descriptive data elements to be included come from the PDS mission interface personnel as well as the data producer's own suggestions. These additional data elements are selected from the *Planetary Science Data Dictionary*.

NOTE: When a data element is needed for a data product label, but is not yet recorded in the PSDD, it may be proposed for addition to the dictionary. Contact a PDS data engineer for assistance in submitting new data elements for inclusion in the PSDD.

Pointers are sometimes used in a PDS label to provide a shorthand method for referencing either a set of descriptive data elements (e.g., ^DESCRIPTION) or a long descriptive text passage relevant to several data product labels.

### 5.3.6 Data Object Definitions

The PDS requires a separate data object definition within the product label for each object in the product, to describe the structure and associated attributes of each constituent object. Each object definition, whether for a primary or a secondary object, must have a corresponding object pointer as described in Section 5.3.3.

Object definitions are of the form:

```

OBJECT          = aaa      where aaa is the name of the data object
...
END_OBJECT     = aaa

```

The PDS has designed a set of standard data object definitions to be used for labeling products. Among these standard objects are those designed to describe structures commonly used for scientific data storage. Appendix A provides the complete set of PDS object definition requirements, along with examples of product labels.

Pointers are sometimes used in a PDS label to provide a shorthand method for including a standard set of sub-objects referenced in several data product labels. For example, a pointer called “^STRUCTURE” is often used to include a set of COLUMN sub-objects for a TABLE structure used in many labels of the same data set.



### 5.3.7 End Statement

The END statement ends a PDS label. Where required by an outside agency, the END statement may be followed by one or more SFDU labels.

The PDS does not require SFDU labels on individual products, but they may be required to conform with specific project or other agency requirements. If SFDUs are provided on a data product, they must follow the standards described in the *SFDU Usage* chapter in this document. In some, but not all cases, another SFDU label is required after the PDS END statement to provide “end label” and sometimes “start data” information.

## 5.4 Syntax for Element Values

The values of keywords must be expressed in a manner appropriate to the type of the keyword. Data types for element values are specified in the element definitions contained in the PSDD. The syntax rules for expressing these values in PDS labels are discussed in detail in Section 12.3 of Chapter 12: *Object Description Language Specification and Usage*. A brief summary is provided here for reference.

### Character Strings

Character strings are enclosed in double quotes unless they consist entirely of uppercase letter, number, and/or underscore ( \_ ) characters.

#### *Examples*

NAME	= FILTER	Correct
NAME	= "FILTER WAVELENGTH"	Correct
NAME	= FILTER_WAVELENGTH	Correct
NAME	= FILTER WAVELENGTH	<i>Incorrect</i>

### Integers

Integer values must be presented as a string of digits, optionally preceded by a sign. Specifically, no comma or point should be used to group digits. Values that are to be interpreted as integers must not be enclosed in quotation marks of any kind.

#### *Examples*

ITEMS	= 12	Correct
REQUIRED_STORAGE_BYTES	= 43364	Correct
ITEMS	= "12"	<i>Incorrect</i>
REQUIRED_STORAGE_BYTES	= 43,364	<i>Incorrect</i>

### Floating-Point Numbers

Real data values may be expressed as either floating-point numbers with a decimal point or in scientific notation with an exponent. Scientific notation is formatted in the standard manner for program I/O, using the letter “E” as an exponentiation operator. Values that are to be interpreted as real numbers must not be enclosed in quotation marks of any kind.

#### *Examples*

TELESCOPE_LATITUDE	= 33.476	Correct
TELESCOPE_LATITUDE	= 3.3476E+01	Correct
TELESCOPE_LATITUDE	= "33.476"	<i>Incorrect</i>
TELESCOPE_LATITUDE	= 3.3476 x 10^01	<i>Incorrect</i>

### Dates and Times

Date and time values must be in the PDS standard date/time format: *YYYY-MM-DDThh:mm:ss.sss*. Date and time values must never be enclosed in quotes of any kind.

#### *Examples*

START_TIME	= 1990-08-01T23:59:59	Correct
START_TIME	= "1990-08-01T23:59:59"	<i>Incorrect</i>

## 5.5 Locally-defined Data Elements

The PSDD contains a large set of common (global) data elements (keywords) and small sets of locally-defined data elements. The set of common data elements are available for use in any label. Locally-defined data elements may only be used in data product labels.

### 5.5.1 Justification for Locally-defined Data Elements

There are two justifications for when a locally-defined keyword can be created:

- the scope of use is limited / local to a small set of data products within a single mission or campaign, or is so specific that only a very few data providers would make use of the locally-defined data element (keyword).

Examples of data elements in the PSDD having limited scope:

#### **MAXIMUM B1950 RING LONGITUDE [PDS-RINGS]**

The maximum\_B1950\_ring\_longitude element specifies the maximum inertial longitude within a ring area relative to the B1950 prime meridian, rather than to the J2000 prime meridian. The prime meridian is the ascending node of the planet's invariable plane on the Earth's mean equator of B1950. Longitudes are measured in the direction of orbital motion

along the planet's invariable plane to the ring's ascending node, and thence along the ring plane. Note: For areas that cross the prime meridian, the maximum ring longitude will have a value less than the minimum ring longitude.

### **INSTRUMENT FORMATTED DESC [PDS-CN]**

The `instrument_formatted_desc` element contains the formatted instrument descriptions. These descriptions represent the information collected for the PDS Version 1.0 instrument model and were created by extracting instrument information from several tables in the catalog data base.

These descriptions represent an archive since the tables have been eliminated as part of the catalog streamlining task.

### **DATA SET LOCAL ID [PDS-SBN]**

The `DATA_SET_LOCAL_ID` element provides a short (of order 3 characters) acronym used as the local ID of a data set (Example value: IGLC). It may also appear as the first element of file names from a particular `DATA_SET` (Example value:IGLCINDX.LBL).

- b) the common instance, and any other local instances, currently defined in the PSDD are inadequate in some descriptive capacity:
- the data element definition is too restrictive or inappropriate
  - the length of the keyword-value is too short
  - different types of units

A possible scenario for the above could be that the Cassini mission wants to use the `DATA_QUALITY_ID` keyword.

### **DATA QUALITY ID [PSDD] - CHAR(3)**

The `data_quality_id` element provides a numeric key which identifies the quality of data available for a particular time period. The `data_quality_id` scheme is unique to a given instrument and is described by the associated `data_quality_desc` element.

But, the Cassini mission wants to re-use the data element in a way that is different from the instance(s) currently defined in the PSDD.

### **DATA QUALITY ID [CASSINI] - CHAR(50)**

The `data_quality_id` element provides a short acronym or identifier of the qualitative state in which the data resided when the data was generated by the instrument team. The `data_quality_id` is unique to the Cassini mission and is described by the associated `data_quality_desc` element.

### 5.5.2 Identification of Locally-defined Data Elements

Locally-defined instances of data elements (keywords) are identified in data product labels as:

<namespace>:<keyword\_name>

where <namespace> is the unique namespace to which the keyword is designated.

<keyword\_name> is the name of the keyword being included in the data product label.

If there are multiple instances of a keyword, then the specific instance of use is identified as follows:

Example:

```
TARGET_NAME = "EARTH"           (namespace = PSDD)
CASSINI:TARGET_NAME = "EARTH"   (namespace = CASSINI)
VOYAGER:TARGET_NAME = "MARS"    (namespace = VOYAGER)
```

In the above example, the PSDD contains three separate instances of the TARGET\_NAME keyword:

- a) the common (PSDD) instance which the PDS defined and which the PDS community at large agreed upon.
- b) the CASSINI instance which the Cassini project defined.
- c) the VOYAGER instance which the Voyager project defined.

### 5.5.3 Review and Use of Locally-defined Data Elements

The following are recommendations on the review and use of locally defined keywords:

1. The custodian of a namespace is to be a PDS node; or the entity to which the PDS node delegates authority (e.g., mission); or other agencies in a cooperative agreement with NASA and working with the PDS (e.g., ESA).
2. The custodian has initial responsibility for NAMESPACE and all locally defined elements which use the NAMESPACE.
3. The responsibility for NAMESPACE may be transferred if agreeable to the custodian and the receiving party.
4. The responsibility for locally defined elements may be transferred if agreeable to the custodian and the receiving party.

5. Custodians (e.g., missions/campaigns) being phased out are expected to transfer all responsibilities to a continuing party (i.e., there is always a responsible party actively engaged in overseeing the use of the NAMESPACE and locally defined elements which use the NAMESPACE).
6. Control authority (responsible party) has absolute authority over element definitions.
7. A non-originating user who reuses a locally defined keyword must conform to interpretations of the control authority, including retroactive adjustments (i.e., the user of a locally defined keyword is at risk that the control authority may alter one or more of the keyword attributes; such as the definition, without notifying outside users of the change).
8. PDS recommends that non-originating users "clone" elements into a new local dictionary rather than reusing them (e.g., CASSINI:DATA\_QUALITY\_ID would become MER:DATA\_QUALITY\_ID if reused by the MER mission). This is because non-originating users are at risk that the keyword may be altered by the control authority and the control authority does not have an obligation to notify anyone of the change.
9. 'Promoting' locally defined keywords to full PSDD standing is not permitted (i.e., locally defined keywords remain locally defined throughout the life of the keyword). A locally defined keyword may be proposed independently for use in the global PSDD by submitting the keyword element definition for the full PSDD approval process.
10. Locally defined keywords should not take on a scope outside of the originating mission/campaign.

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- data elements
  - data identification, 5-14
  - descriptive, 5-16
  - file characteristics, 5-10
  - locally defined, 5-18
  - proposing new, 5-15
  - required and optional, 5-11
  - standards identifiers, 5-9
  - syntax
    - summary, 5-17
- data identification data elements, 5-14
- data identification elements
  - required for ancillary data, 5-15
  - required for Earth-based data, 5-15
  - required for spacecraft data, 5-15
- data objects
  - definition of, 5-11
  - object definitions, 5-16
  - standard data objects, 5-16
- data products
  - labels, 5-1
- DD\_VERSION\_ID, 5-10
- descriptive data elements, 5-16
- END statement, 5-17
- file characteristics data elements, 5-10
- FILE object
  - explicit, 5-8
  - implicit, 5-8
- FILE\_NAME, 5-11
- FILE\_RECORDS, 5-10
- Label**
  - structure
    - combined detached example, 5-7, 5-8
- LABEL\_RECORDS, 5-10
- LABEL\_REVISION\_NOTE, 5-10
- labeling methods, 5-1
  - attached, 5-1
  - case, 5-3
  - combined detached, 5-1
  - detached, 5-1
  - example, 5-1
  - line lengths, 5-1, 5-3
- labels, 5-1
  - and SFDU labels, 5-10, 5-17

- attached, 5-1
- case, 5-3
- combined detached, 5-1, 5-4, 5-5
- descriptive text pointers, 5-16
- detached, 5-1
- END statement, 5-17
- FILE object
  - explicit, 5-8
  - implicit, 5-8
- format, 5-1, 5-3
  - character set, 5-3
- line lengths, 5-1, 5-3
- minimal, 5-6, 5-8
- Object Description Language (ODL), 5-1
- object pointers, 5-11
  - attached label examples, 5-12
  - detached label examples, 5-13
- padding, 5-3
- pointers
  - to data objects, 5-11
  - to descriptive text, 5-16
  - to structure files, 5-16
- standard data objects, 5-16
- standards identifiers, 5-9
- structure
  - attached and detached, 5-4
  - attached/detached example, 5-5
  - combined detached, 5-4, 5-5
  - minimal, 5-8
  - minimal example***, 5-9
  - structure pointers, 5-16
- local data dictionaries, 5-18
- locally defined data elements, 5-18
  - control authority, 5-20
  - custodians, 5-20
  - examples, 5-18
  - identification of, 5-20
  - justification for, 5-18
  - namespace, 5-20
  - review and use, 5-20
  - scope of use, 5-18
- minimal label, 5-6, 5-8
- minimal labels, 5-14
- Namespace
  - see locally defined data elements, 5-20
- object definitions



- format, 5-16
- Object Description Language (ODL), 5-1
- object pointers, 5-11
  - attached label examples, 5-12
  - formats, 5-11
  - syntax, 5-13
- PDS\_VERSION\_ID, 5-9
- Planetary Science Data Dictionary
  - identifying the version in a label, 5-10
  - local data dictionaries, 5-18
- Planetary Science Data Dictionary* (PSDD), 5-1, 5-14, 5-16
- pointers
  - structure pointers, 5-16
  - to descriptive text, 5-16
- RECORD\_BYTES, 5-10
- RECORD\_TYPE, 5-10
- Standard Formatted Data Unit (SFDU), 5-10, 5-17
- standards identifier data elements, 5-9