

PDS Standards Reference

Table of Contents

Chapter 1.	Introduction.....	1-1
1.1	PDS Data Policy.....	1-1
1.2	Purpose	1-1
1.3	Scope	1-1
1.4	Audience.....	1-1
1.5	Document Organization.....	1-2
1.6	Other Reference Documents.....	1-2
1.7	Online Document Availability.....	1-3
Chapter 2.	Cartographic Standards.....	2-1
2.1	Inertial Reference Frame, Time Tags and Units.....	2-1
2.2	Spin Axes and Prime Meridians	2-1
2.3	Reference Coordinates	2-1
2.3.1	Body-Fixed Coordinate Systems	2-3
2.3.1.1	Planetocentric.....	2-3
2.3.1.2	Planetographic.....	2-3
2.4	Rings.....	2-3
2.5	Reference Surface	2-5
2.6	Map Resolution.....	2-5
2.7	References.....	2-5
Chapter 3.	DATA_TYPE Values and Data File Storage Formats.....	3-1
3.1	Data Elements	3-1
3.2	Data Types	3-1
3.3	Binary Integers.....	3-4
3.4	Signed vs. Unsigned Integers.....	3-4
3.5	Floating Point Formats	3-5
3.6	Bit String Data	3-5
3.7	Character Data	3-5
3.8	Format Specifications.....	3-5
3.9	Internal Representations of Data Types	3-6
Chapter 4.	Data Objects and Products	4-1
4.1	Data Product File Configurations	4-2
Chapter 5.	Data Product Labels.....	5-1
5.1	Format of PDS Labels	5-1
5.1.1	Labeling methods	5-1
5.1.2	Label format.....	5-1
5.2	Data Product Label Content.....	5-4
5.2.1	Attached and Detached Labels.....	5-4
5.2.2	Combined Detached Labels	5-4

5.2.3	Minimal Labels	5-6
5.2.3.1	Implicit File Object (Attached and Detached Minimal Label)	5-8
5.2.3.2	Explicit File Object (Detached Minimal Label).....	5-8
5.3	Detailed Label Contents Description	5-8
5.3.1	Label Standards Identifiers.....	5-9
5.3.2	File Characteristic Data Elements.....	5-10
5.3.3	Data Object Pointers.....	5-11
5.3.3.1	Use of Pointers in Attached Labels	5-11
5.3.3.2	Use of Pointers in Detached and Combined Detached Labels.....	5-12
5.3.3.3	Note Concerning Minimal Attached and Detached Labels	5-14
5.3.4	Data Identification Elements	5-14
5.3.4.1	Spacecraft Science Data Products.....	5-15
5.3.4.2	Earthbased Science Data Products	5-15
5.3.4.3	Ancillary Data Products.....	5-15
5.3.5	Descriptive Data Elements	5-16
5.3.6	Data Object Definitions.....	5-16
5.3.7	End Statement	5-17
5.4	Syntax for Element Values	5-17
5.5	Locally-defined Data Elements.....	5-18
5.5.1	Justification for Locally-defined Data Elements	5-18
5.5.2	Identification of Locally-defined Data Elements.....	5-20
5.5.3	Review and Use of Locally defined Data Elements.....	5-20
Chapter 6.	Data Set/Data Set Collection Contents and Naming	6-1
6.1	Data Set Naming and Identification.....	6-2
6.2	Data Set Collection Naming and Identification.....	6-3
6.3	Name and ID Components	6-4
6.3.1	Restrictions on DATA_SET_ID and DATA_SET_COLLECTION_ID	6-4
6.3.2	Standard Acronyms, Abbreviations, and Assignments	6-4
6.4	Examples	6-8
Chapter 7.	Date/Time Format.....	7-1
7.1	Date/Times.....	7-1
7.2	Dates.....	7-2
7.2.1	Conventional Dates	7-2
7.2.2	Native Dates.....	7-2
7.3	Times	7-2
7.3.1	Conventional Times	7-2
7.3.2	Native Times.....	7-3
Chapter 8.	Directory Types and Naming.....	8-1
8.1	Standard Directory Names.....	8-1
8.2	Formation of Directory Names	8-2
8.3	Path Formation Standard	8-4
8.4	Tape Volumes	8-4
8.5	Exceptions to These Standards	8-4

Chapter 9.	Documents	9-1
9.1	PDS Objects for Documents	9-2
9.1.1	TEXT Objects	9-2
9.1.2	DOCUMENT Objects	9-2
9.2	Document Format Details.....	9-3
9.2.1	Flat ASCII Text.....	9-3
9.2.2	ASCII Text Containing Markup Language	9-4
9.2.2.1	Hyper-Text Markup Language (HTML) Files.....	9-4
9.2.2.2	Location of Files.....	9-4
9.2.2.3	Discouraged HTML 3.2 Capabilities	9-4
9.2.3	Non-ASCII Formats	9-5
9.2.4	Validation	9-5
9.3	Examples	9-5
9.3.1	Simple Example of Attached label (Plain ASCII Text)	9-5
9.3.2	Complex Example of Detached Label (Two Document Versions)	9-5
9.3.3	Complex Example of Detached Label (Documents Plus Graphics)	9-6
Chapter 10.	File Specification and Naming	10-1
10.1	File Specification Standards	10-1
10.1.1	ISO 9660 Level 1 Specification.....	10-2
10.1.2	ISO 9660 Level 2 Specification.....	10-2
10.2	Reserved Directory Names, File Names and Extensions	10-2
10.2.1	Reserved Directory Names	10-3
10.2.2	Reserved File Names.....	10-3
10.2.3	Reserved Extensions.....	10-3
10.3	Guidelines for Naming Sequential Files.....	10-5
Chapter 11.	Media Formats for Data Submission and Archive.....	11-1
11.1	CD-ROM Recommendations.....	11-1
11.1.1	Use of Variant Formats	11-1
11.1.2	Premastering Recommendation	11-2
11.2	DVD Recommendations.....	11-2
11.2.1	Use of Variant Formats	11-2
11.2.2	Premastering Recommendation	11-2
11.2.3	Recommended DVD Formats.....	11-2
11.3	Packaging Software Files on a CD or DVD	11-2
11.4	Software Packaging Under Previous Versions of the Standard.....	11-2
Chapter 12.	Object Description Language Specification and Usage	12-1
12.1	About the ODL Specification	12-1
12.1.1	Implementing ODL	12-2
12.1.1.1	Language Subsets	12-2
12.1.1.2	Language Supersets	12-2
12.1.1.3	PDS Implementation of PVL-Specific Extensions	12-2
12.1.2	Notation	12-3

12.2	Character Set.....	12-3
12.2.1	ODL Character Set - Letters	12-4
12.2.2	ODL Character Set - Digits	12-4
12.2.3	ODL Character Set - Special Characters	12-4
12.2.4	ODL Character Set - Spacing Characters	12-5
12.2.5	ODL Character Set - Format Effectors.....	12-5
12.2.6	ODL Character Set - Control Characters.....	12-6
12.3	Lexical Elements.....	12-6
12.3.1	Numbers.....	12-6
12.3.1.1	Integer Numbers in Decimal Notation.....	12-6
12.3.1.2	Integer Numbers in Based Notation	12-7
12.3.1.3	Real Numbers.....	12-7
12.3.2	Dates and Times.....	12-8
12.3.2.1	Date and Time Values	12-8
12.3.2.2	Implementation of Dates and Times.....	12-9
12.3.2.3	PDS Implementation of Dates and Times.....	12-9
12.3.2.4	Dates	12-9
12.3.2.5	Times	12-9
12.3.2.5.1	Combining Date and Time.....	12-10
12.3.3	Strings.....	12-10
12.3.3.1	Text Strings.....	12-11
12.3.3.2	Symbol Strings.....	12-11
12.3.4	Identifiers.....	12-11
12.3.4.1	Reserved Identifiers.....	12-12
12.3.5	Special Characters.....	12-12
12.4	Statements.....	12-12
12.4.1	Lines and Records	12-13
12.4.2	Attribute Assignment Statement.....	12-14
12.4.3	Pointer Statement	12-15
12.4.4	OBJECT Statement	12-15
12.4.4.1	Implementation of OBJECT Statements	12-16
12.4.5	GROUP Statement	12-16
12.4.5.1	Implementation of GROUP Statements	12-17
12.4.5.2	PDS Usage of GROUP	12-17
12.5	Values	12-17
12.5.1	Numeric Values.....	12-18
12.5.2	Units Expressions.....	12-18
12.5.2.1	Implementation of Numeric Values	12-18
12.5.3	Text String Values.....	12-19
12.5.3.1	Implementation of String Values	12-19
12.5.3.1.1	PDS Text String Formatting Conventions	12-20
12.5.4	Symbolic Literal Values	12-20
12.5.4.1	Implementation of Symbolic Literal Values.....	12-21
12.5.4.2	PDS Convention for Symbolic Literal Values	12-21
12.5.5	Sequences	12-21
12.5.6	Sets	12-22

12.5.6.1	PDS Restrictions on Sets	12-22
12.6	ODL Summary.....	12-22
12.7	Differences Between ODL Versions.....	12-24
12.7.1	Differences from ODL Version 1	12-24
12.7.1.1	Ranges.....	12-25
12.7.1.1.1	Delimiters in Sequences and Sets.....	12-25
12.7.1.1.2	Exponentiation Operator in Units Expressions	12-25
12.7.2	Differences from ODL Version 0	12-25
12.7.2.1	Date-Time Format	12-25
12.7.3	ODL/PVL Usage.....	12-26
Chapter 13.	PDS Objects / Groups	13-1
13.1	Generic and Specific Data Object Definitions.....	13-1
13.1.1	Primitive Objects.....	13-2
13.2	Generic and Specific Data Group Definitions	13-3
13.2.1	Implementation of Group Statements.....	13-4
Chapter 14.	Pointer Usage.....	14-1
14.1	Types of Pointers	14-1
14.1.1	Data Location Pointers (Data Object Pointers).....	14-1
14.1.2	Include Pointers.....	14-1
14.1.3	Related Information Pointers (Description Pointers)	14-2
14.2	Rules for Resolving Pointers	14-3
Chapter 15.	Record Formats.....	15-1
15.1	FIXED_LENGTH Records	15-1
15.2	STREAM Records	15-2
15.3	VARIABLE_LENGTH Records	15-2
15.4	UNDEFINED Records	15-3
Chapter 16.	SFDU Usage.....	16-1
16.1	The ZI SFDU Organization	16-2
16.2	The ZKI SFDU Organization	16-5
16.3	Examples	16-7
16.4	Exceptions to this Standard	16-8
Chapter 17.	Usage of N/A, UNK and NULL.....	17-1
17.1	Interpretation of N/A, UNK, and NULL	17-1
17.1.1	N/A	17-1
17.1.2	UNK	17-1
17.1.3	NULL	17-1
17.2	Implementation Recommendations for N/A, UNK, and NULL.....	17-2
Chapter 18.	Units of Measurement.....	18-1
18.1	SI Units.....	18-1

Chapter 19.	Volume Organization and Naming.....	19-1
19.1	Volume Set Types	19-1
19.2	Volume Organization Guidelines.....	19-7
19.3	Description of Directory Contents and Organization.....	19-7
19.3.1	ROOT Directory Files	19-8
19.3.2	Required Subdirectories	19-8
19.3.2.1	CATALOG Subdirectory.....	19-8
19.3.2.2	Data Subdirectory	19-9
19.3.2.3	INDEX Subdirectory	19-10
19.3.3	Optional Subdirectories	19-11
19.3.3.1	CALIBRATION Subdirectory.....	19-11
19.3.3.2	DOCUMENT Subdirectory	19-12
19.3.3.3	EXTRAS Subdirectory	19-13
19.3.3.4	GAZETTER Subdirectory	19-14
19.3.3.5	GEOMETRY Subdirectory.....	19-14
19.3.3.6	LABEL Subdirectory.....	19-14
19.3.3.7	SOFTWARE Subdirectory	19-15
19.4	Volume Naming.....	19-17
19.4.1	Volume ID	19-17
19.5	Volume Set Naming	19-18
19.5.1	Volume Set ID	19-18
19.6	Logical Volume Naming	19-19
19.7	Exceptions to This Standard	19-19
Appendix A.	PDS Data Object Definitions.....	A-1
A.1	ALIAS	A-3
A.2	ARRAY (Primitive Data Object).....	A-4
A.3	BIT_COLUMN.....	A-8
A.4	BIT ELEMENT (Primitive Data Object)	A-11
A.5	CATALOG	A-12
A.6	COLLECTION (Primitive Data Object)	A-15
A.7	COLUMN	A-16
A.8	CONTAINER	A-20
A.9	DATA_PRODUCER	A-27
A.10	DATA_SUPPLIER	A-29
A.11	DIRECTORY	A-31
A.12	DOCUMENT	A-33
A.13	ELEMENT (Primitive Data Object)	A-36
A.14	FIELD.....	A-38
A.15	FILE	A-41
A.16	GAZETTEER_TABLE	A-45
A.17	HEADER.....	A-55
A.18	HISTOGRAM.....	A-57
A.19	HISTORY	A-60
A.20	IMAGE	A-64

A.21	INDEX_TABLE	A-69
A.22	PALETTE	A-74
A.23	QUBE	A-77
A.24	SERIES	A-85
A.25	SPECTRAL_QUBE	A-90
A.26	SPECTRUM	A-109
A.27	SPICE KERNEL	A-112
A.28	SPREADSHEET	A-115
A.29	TABLE	A-120
A.30	TEXT	A-141
A.31	VOLUME	A-143

Appendix B.	Complete PDS Catalog Object Set.....	B-1
B.1	DATA_SET	B-4
B.2	DATA_SET_COLL_ASSOC_DATA_SETS	B-11
B.3	DATA_SET_COLLECTION_REF_INFO	B-12
B.4	DATA_SET_COLLECTION	B-13
B.5	DATA_SET_COLLECTION_INFO	B-16
B.6	DATA_SET_HOST	B-18
B.7	DATA_SET_INFORMATION	B-19
B.8	DATA_SET_MAP_PROJECTION	B-22
B.9	DATA_SET_MAP_PROJECTION_INFO	B-25
B.10	DATA_SET_MISSION	B-27
B.11	DATA_SET_REFERENCE_INFORMATION	B-28
B.12	DATA_SET_TARGET	B-29
B.13	DS_MAP_PROJECTION_REF_INFO	B-30
B.14	IMAGE_MAP_PROJECTION	B-31
B.15	INSTRUMENT	B-36
B.16	INSTRUMENT_HOST	B-41
B.17	INSTRUMENT_HOST_INFORMATION	B-43
B.18	INSTRUMENT_HOST_REFERENCE_INFO	B-44
B.19	INSTRUMENT_INFORMATION	B-45
B.20	INSTRUMENT_REFERENCE_INFO	B-48
B.21	INVENTORY	B-49
B.22	INVENTORY_DATA_SET_INFO	B-51
B.23	INVENTORY_NODE_MEDIA_INFO	B-52
B.24	MISSION	B-53
B.25	MISSION_HOST	B-59
B.26	MISSION_INFORMATION	B-60
B.27	MISSION_REFERENCE_INFORMATION	B-62
B.28	MISSION_TARGET	B-63
B.29	PERSONNEL	B-64
B.30	PERSONNEL_ELECTRONIC_MAIL	B-66
B.31	PERSONNEL_INFORMATION	B-67
B.32	REFERENCE	B-68
B.33	SOFTWARE	B-75

B.34	SOFTWARE_INFORMATION	B-77
B.35	SOFTWARE_ONLINE.....	B-78
B.36	SOFTWARE_PURPOSE	B-79
B.37	TARGET	B-80
B.38	TARGET_INFORMATION.....	B-82
B.39	TARGET_REFERENCE_INFORMATION.....	B-83
Appendix C. Internal Representation of Data Types		C-1
C.1	MSB_INTEGER	C-2
C.2	MSB_UNSIGNED_INTEGER.....	C-4
C.3	LSB_INTEGER	C-6
C.4	LSB_UNSIGNED_INTEGER.....	C-8
C.5	IEEE_REAL	C-10
C.6	IEEE_COMPLEX.....	C-13
C.7	PC_REAL	C-14
C.8	PC_COMPLEX.....	C-17
C.9	VAX_REAL, VAXG_REAL	C-18
C.10	VAX_COMPLEX, VAXG_COMPLEX.....	C-22
C.11	MSB_BIT_STRING.....	C-23
C.12	LSB_BIT_STRING.....	C-25
Appendix D. Examples of Required Files		D-1
D.1	AAREADME.TXT	D-2
D.2	INDXINFO.TXT.....	D-8
D.3	SOFTINFO.TXT.....	D-9
D.4	VOLDESC.CAT	D-13
Appendix E. NAIF TOOLKIT DIRECTORY STRUCTURE		E-1
E.1	NAIF Directory	E-2
E.2	TOOLKIT Directory	E-3
E.3	Using the NAIF Toolkit.....	E-12
E.4	NAIF's File Naming Conventions.....	E-13
Appendix F. Acronyms.....		F-1
Appendix G. SAVED Data.....		G-1
G.1	Safekeeping Process and Procedures	G-1
G.2	Safekeeping Standards	G-1
Appendix H. PDS Data Group Definitions.....		H-1
H.1	BAND_BIN	H-3
H.2	BAND_SUFFIX	H-4
H.3	LINE_SUFFIX	H-5
H.4	PARAMETERS	H-6

H.5	SAMPLE_SUFFIX	H-7
Appendix I. Data Compression Formats		I-1
I.1	CLEM-JPEG	I-3
I.2	HUFFMAN FIRST DIFFERENCE	I-4
I.3	JPEG 2000	I-5
I.4	PREVIOUS PIXEL	I-10
I.5	RUN LENGTH	I-11
I.6	ZIP	I-12

(This page intentionally left blank.)