

Appendix D. Examples of Required Files

The examples in this Appendix are based on existing or planned PDS archive volumes, and have been modified to reflect the most recent version of the PDS standards.

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D.1 AAREADME.TXT

Each PDS archive volume shall include an “AAREADME.TXT” file that contains an overview of the contents and structure of the volume. An annotated outline is provided here as guidance for compiling this file.

D.1.1 Annotated Outline

- I. PDS TEXT Object (must appear in an attached or detached label)
- II. Volume Title
- III. Contents
 1. Introduction
 - a. Science data content
 - b. Conformance to PDS standards
 - c. Document or institutional references for additional science information
 2. Volume format
 - a. Computer systems that can access the volume
 - b. International standards to which the volume conforms
 3. File formats
 - a. Data record formats
 - b. Specifications for specialized files (e.g., Postscript)
 - c. Description of PDS objects, pointers, etc.
 4. Volume contents
 - a. Directory structure of the volume
 5. Recommended CD-ROM drives (if applicable)
 - a. Driver descriptions and notes for all appropriate computer platforms
 6. Errata (if applicable)
 - a. Known errors, cautionary notes, disclaimers, etc.
 - b. Reference to the ERRATA.TXT file on the volume or online
 7. Contacts
 - a. Names and addresses of people or organizations to contact for questions concerning science data, technical support, data product generation and labelling, etc.

D.1.2 Example

The following is an example of an AAREADME.TXT file used on a PDS archive volume that does not use the logical volume construct. Note that section 3 in the example would need to be updated if logical volumes were present.

```

PDS_VERSION_ID                = PDS3

RECORD_TYPE                    = FIXED_LENGTH
RECORD_BYTES                   = 80
SPACECRAFT_NAME                = MAGELLAN
TARGET_NAME                    = VENUS
OBJECT                         = TEXT
    PUBLICATION_DATE           = 1994-06-01
    NOTE                       = "MAGELLAN LOSAPDR ARCHIVE CD-WO"
END_OBJECT                     = TEXT
END

```

MAGELLAN LOSAPDR ARCHIVE CD-WO

1. Introduction

This CD-WO contains Magellan Cycle 4 LOSAPDR (Line of Sight Acceleration Profile Data Record) products. It also contains documentation which describe the LOSAPDRs. Each LOSAPDR product contains the results from processing of radio tracking data of the Magellan spacecraft. There are 866 LOSAPDRs on this volume.

The LOSAPDR products archived on this volume are the exact products released by the Magellan Project. Supporting documentation and label files conform to the Planetary Data System (PDS) Standards, Version 3.0, Jet Propulsion Laboratory (JPL) document JPL D-7669.

Additional information about the Magellan gravity experiment, including the acquisition, processing, and quality of the LOSAPDR data, can be found in JPL documents that are available from the PDS Geosciences Node, Washington University, St. Louis, MO.

2. Disk Format

The disk has been formatted so that a variety of computer systems (e.g. IBM PC, Macintosh, Sun) may access the data. Specifically, it is formatted according to the ISO 9660 level 1 Interchange Standard. For further information, refer to the ISO 9660 Standard Document: RF# ISO 9660-1988, 15 April 1988.

3. File Formats

Each orbit for which gravity data exists is represented by one LOSAPDR data file. The LOSAPDR is an ASCII file. The data file contains 3 tables: 1) HEADER_TABLE; 2) TIMES_TABLE; and 3) RESULTS_TABLE. The HEADER_TABLE is a single-row multi-column table containing information on initial values, control parameters, and simple calculations required by the program that generates the data files. The TIMES_TABLE is a single column containing exact times bounding spline intervals to the Doppler residuals. The number of rows is variable. The RESULTS_TABLE contains the results from spline fits to Doppler residuals. Each row in the table contains times, Doppler residuals, spacecraft position and velocity information, and inferred spacecraft acceleration. The data files are described by PDS labels embedded at the beginning of the file. Further information on LOSAPDR file formats and contents can also be obtained from the Magellan Software Interface Specification (SIS) document NAV-138. A copy of the document is stored on this disk as file LOSAPDR.TXT in the DOCUMENT directory.

All document files and detached label files contain 80-byte fixed-length records, with a carriage return character (ASCII 13) in the 79th byte and a line feed character (ASCII 10) in the 80th byte. This allows the files to be read by the MacOS, DOS, Unix, and VMS operating systems. All tabular files are also described by PDS labels, either embedded at the beginning of the file or detached. If detached, the PDS label file has the same name as the data file it describes, with the extension .LBL; for example, the file INDEX.TAB is accompanied by the detached label file INDEX.LBL in the same directory.

Tabular files are formatted so that they may be read directly into many database management systems on various computers. All fields are separated by commas, and character fields are enclosed in double quotation marks ("). Character fields are left justified, and numeric fields are right justified. The "start byte" and "bytes" values listed in the labels do not include the commas between fields or the quotation marks surrounding character fields. The

records are of fixed length, and the last two bytes of each record contain the ASCII carriage return and line feed characters. This allows a table to be treated as a fixed length record file on computers that support this file type and as a normal text file on other computers.

A PostScript file, REPORT.PS, is included on this volume. This PostScript document is a validation report that lists all LOSAPDRs, and gives specific information, comments, and the status of each data file after a quality check and validation at the PDS Geophysics Subnode. The document is described by the detached label file, REPORT.LBL. The document can also be viewed by a Display PostScript program and can be printed out from a PostScript printer. The ASCII text version of the PostScript file is REPORT.ASC.

PDS labels are object-oriented. The object to which the label refers (e.g., IMAGE, TABLE, etc.) is denoted by a statement of the form:

```
^object = location
```

in which the carat character (^, also called a pointer in this context) indicates that the object starts at the given location. In an attached label, the location is an integer representing the starting record number of the object (the first record in the file is record 1). In a detached label, the location denotes the name of the file containing the object, along with the starting record or byte number. For example:

```
^TABLE = "INDEX.TAB"
```

indicates that the TABLE object points to the file INDEX.TAB .

Pointers to data objects are always required to be located in the same directory as the label file, so the file INDEX.TAB in this example is located in the same directory as the detached label file.

Other types of pointer statements can also be found on this volume. To resolve the pointer statement, first look in the same directory as the file containing the pointer statement. If the pointer is still unresolved, look in the following top level directory:

```
^ STRUCTURE - LABEL directory
^ CATALOG - CATALOG directory
^DATA_SET_MAP_PROJECTION - CATALOG directory
^DESCRIPTION - DOCUMENT directory.
```

Below is a list of the possible formats for the ^object keyword.

```
^object = n
^object = n<BYTES>
^object = "filename.ext"
^object = ("filename.ext",n)
^object = ("filename.ext",n<BYTES>)
```

where

```
n          is the starting record or byte number of the object,
           counting from the beginning of the file (record 1,
           byte 1)
<BYTES>   indicates that the number given is in units of bytes
filename   is the upper-case file name
ext        is the upper-case file extension
```

4. CD-ROM Contents

The files on this CD-ROM are organized in one top-level directory with several subdirectories. The following table shows the structure and content of these directories. In the table, directory names are enclosed in square brackets ([]), upper-case letters indicate an actual directory or file name, and lower-case letters indicate the general form of a set of directory or file names.

FILE	CONTENTS
Top-level directory	
- AAREADME.TXT	The file you are reading.
- ERRATA.TXT	Description of known anomalies and errors present on this volume.
- VOLDESC.CAT	A description of the contents of this CD-

		ROM volume in a format readable by both humans and computers.
-	[CATALOG]	A directory containing information about the LOSAPDR dataset.
	- CATALOG.CAT	PDS catalog objects. Mission, spacecraft and instrument descriptions.
	- CATINFO.TXT	Description of files in the CATALOG directory.
	- DATASET.CAT	PDS dataset catalog object. A description of the dataset, parameters, processing, data coverage and quality.
-	[DATA]	A directory containing LOSAPDR data files.
	- [mmmmnnnn]	Directories containing LOSAPDR data files for orbits between 'mmmm' and 'nnnn'.
	- L0mmmm.001	LOSAPDR file for orbit number 'mmmm'.
-	[DOCUMENT]	A directory containing document files relating to this disk.
	- DOCINFO.TXT	Description of files in the DOCUMENT directory.
	- LOSAPDR.TXT	A machine readable version of the LOSAPDR SIS document describing the format and content of the data files.
	- REPORT.ASC	ASCII text version of REPORT.PS.
	- REPORT.LBL	A PDS detached label describing REPORT.ASC & REPORT.PS.
	- REPORT.PS	A PostScript document that gives specific information about each LOSAPDR after a quality check and validation.
-	[INDEX]	A directory containing index files relating to this disk.
	- INDEX.LBL	A PDS detached label describing INDEX.TAB.
	- INDEX.TAB	Tabular summary of data files.
	- INDXINFO.TXT	Description of files in the INDEX directory.

5. Recommended CD-ROM Drives and Driver Software

VAX/VMS

Drive: Digital Equipment Corporation (DEC) RRD40 or RRD50. Driver: DEC VFS CD-ROM driver V4.7 or V5.2 and up.

Note: The driver software may be obtained from Jason Hyon at JPL. It is necessary to use this driver to access Extended Attribute Records (XARs) on a CD-ROM.

VAX/Ultrix

Drive: DEC RRD40 or RRD50. Driver: Supplied with Ultrix 3.1.

Note: Internet users can obtain a copy of the "cdio" software package via anonymous ftp from the "space.mit.edu" server in the file named "src/cdio.shar". Contact Dr. Peter Ford at Massachusetts Institute of Technology for details (617-253-6485 or pgf@space.mit.edu).

IBM PC

Drive: Toshiba, Hitachi, Sony, or compatible. Driver: Microsoft MSCDEX version 2.2.

Note: The latest version of MSCDEX (released in February 1990) is generally available. Contact Jason Hyon for assistance in locating a copy.

Apple Macintosh

Drive: Apple CD SC (Sony) or Toshiba. Driver: Apple CD-ROM driver.

Note: The Toshiba drive requires a separate driver, which may be obtained from Toshiba.

Sun Micro (SunOS 4.0.x and earlier)

Drive: Delta Microsystems SS-660 (Sony). Driver: Delta Microsystems driver or SUN sr.o Driver.

Note: For questions concerning this driver, contact Denis Down at Delta Microsystems, 415-449-6881.

Sun Micro (SunOS 4.0.x and later)

Drive: Sun Microsystems. Driver: SunOS sr.o driver.

Note: A patch must be made to SunOS before the Sun driver can access any CD-ROM files containing Extended Attribute Records. A copy of this patch is available to Internet users via anonymous ftp from the "space.mit.edu" server in the file named "src/SunOS.4.x.CD-ROM.patch".

6. Errata and Disclaimer

A cumulative list of anomalies and errors is maintained in the file ERRATA.TXT at the root directory of this volume.

Although considerable care has gone into making this volume, errors are both possible and likely. Users of the data are advised to exercise the same caution as they would when dealing with any other unknown data set.

Reports of errors or difficulties would be appreciated. Please contact one of the persons listed herein.

7. Whom to Contact for Information

For questions concerning this volume set, data products and documentation:

Jim Alexopoulos
Washington University Dept. of Earth and Planetary Sciences
1 Brookings Drive
Campus Box 1169
St. Louis, MO 63130
314-935-5365

Electronic mail address: Internet: jim@wuzzy.wustl.edu

For questions about how to read the CD-ROM:

Jason J. Hyon
Jet Propulsion Laboratory
California Institute of Technology
4800 Oak Grove Drive MS 525-3610
Pasadena, CA 91109
818-306-6054

Electronic mail addresses:

Internet: jhyon@jplpds.jpl.nasa.gov
NASAmail: JHYON
NSI: JPLPDS::JHYON X.400:
(ID:JHYON,PRMD:NASAMAIL,ADMD:TELEMAIL,C:USA)

For questions concerning the generation of LOSAPDR products:

William L. Sjogren
Magellan Gravity Principal Investigator
Jet Propulsion Laboratory
California Institute of Technology
4800 Oak Grove Drive MS 301-150
Pasadena, CA 91109 818-354-4868

Electronic mail address:
Internet: wls@nomad.jpl.nasa.gov

For questions concerning LOSAPDR data:

William L. Sjogren
Jet Propulsion Laboratory Pasadena, CA

Dr. Roger J. Phillips
Washington University Dept. of Earth and Planetary Sciences
1 Brookings Dr. Campus Box 1169
St. Louis, MO 63130 314-935-6356

Electronic mail address: Internet: phillips@wustite.wustl.edu

For questions concerning LOSAPDR labels:

Dr. Richard Simpson
Stanford University
Durand Bldg. Room 232
Stanford, CA 94305-4055
415-723-3525

Electronic mail address: Internet: rsimpson@magellan.stanford.edu

This disk was produced by Jim Alexopoulos.

D.2 INDXINFO.TXT

Each PDS archive volume shall include an "INDXINFO.TXT" file in the INDEX subdirectory that contains an overview of the contents and structure of the index table or tables on the volume as well as usage notes. An example is provided here as guidance for compiling this file.

D.2.1 Example

```
CCSD3ZF0000100000001NJPL3IF0PDSX00000001
PDS_VERSION_ID                = PDS3

RECORD_TYPE                    = STREAM
OBJECT                          = TEXT
NOTE                           = "Notes on using the image index tables."
PUBLICATION_DATE               = 1990-12-20
END_OBJECT                     = TEXT
END
```

NOTES ON USING THE IMAGE INDEX TABLES

These notes describe the contents and format of the two image index tables on this CD-ROM, INDEX.TAB and CUMINDEX.TAB.

The image index table (INDEX.TAB) contains one record for each image file on this Viking Orbiter CD-ROM. The cumulative image index table (CUMINDEX.TAB) contains one record for each image file on all the Viking Orbiter CD-ROMs published so far. The following description applies to both of these tables.

The image index tables are formatted so that they may be read directly into many database management systems on various computers.

All fields are separated by commas, and character fields are enclosed in double quotation marks ("). Each record contains 512 bytes of ASCII character data (1 character = 1 byte). Bytes 511 and 512 contain the ASCII carriage return and line feed characters. This allows the table to be treated as a fixed length record file on computers that support this file type and as a normal text file on other computers. The structure and content of the image index tables are described in the file VOLINFO.TXT located in the DOCUMENT directory. The files INDEX.LBL and CUMINDEX.LBL contain labels for INDEX.TAB and CUMINDEX.TAB coded in the Object Description Language (ODL), providing a formal description of the index table structure.

Users of most commercial database management systems should be able to use the list below to define the names and characteristics of each field and then to load the tables into their systems using a delimited ASCII text input format. If necessary the specific column start positions and lengths can be used to load the data.

For personal computer users, DBASE III DBF structures are also provided in the files INDEX.DBF and CUMINDEX.DBF. These files can be used to load the INDEX.TAB or CUMINDEX.TAB files into DBASE III or IV with the following commands:

```
USE INDEX
APPEND FROM INDEX.TAB DELIMITED

USE CUMINDEX
APPEND FROM CUMINDEX.TAB DELIMITED
```

Once the table is loaded into DBASE III, it can generally be automatically loaded into other data managers or spreadsheets that provide search and retrieval capabilities.

D.3 SOFTINFO.TXT

Each PDS archive volume that contains software (in the SOFTWARE subdirectory) shall include a "SOFTINFO.TXT" file. This file contains a description of the software and usage information. An outline and example are provided here as guidance for compiling this file.

D.3.1 Outline

- I. PDS TEXT Object (must appear in an attached or detached label)
- II. Contents
 1. Introduction
 2. Software Description

A brief description of software included on the volume. This can be broken down into separate sections for each type of software. This should indicate where the software and its documentation reside in the software hierarchy, as well as describe any known limitations or problems.
 3. Software Directory Structure (optional)
 4. Software License Information and Disclaimers (if appropriate)

D.3.2 Example

```

PDS_VERSION_ID          = PDS3

RECORD_TYPE              = FIXED_LENGTH
RECORD_BYTES            = 80
OBJECT                  = TEXT
INTERCHANGE_FORMAT      = ASCII
PUBLICATION_DATE        = 1994-10-01
NOTE                    = "Description of software provided with the
                          Clementine CD-ROM set"

END_OBJECT              = TEXT
END
  
```

Clementine Software

1. Introduction

This directory contains software that provides display and processing capabilities for the Clementine data archived on this CD-ROM set.

2. Software Description

2.1. Decompression Software

The PCDOS, MACSYS7 and SUNOS subdirectories all contain software which can be used to decompress the Clementine raw images. CLEMDCMP will decompress the raw image and output it into one of four formats:

- 1) decompressed PDS labeled file which contains PDS labels, the histogram object, and an

- image object, either the browse image or the full image
- 2) decompressed image file, no labels
- 3) a decompressed image in the GIF format
- 4) a decompressed image in the TIFF format

The source code is provided in the SRC subdirectory, of each platform subdirectory. Instructions on how to install and run the software is in the file CLEMDCMP.TXT in the DOC subdirectory, of each platform subdirectory.

Because the image decompression program, CLEMDCMP, requires a Discrete Cosine Transform (DCT) it may take several minutes to decompress an image on hardware platforms with slow processors. For example, in tests on a Macintosh IIci, the decompression takes approximately 4 minutes. CLEMDCMP has been tested on hardware platforms with processors, such as an Intel 486DX2/66-Mhz, and the decompression takes just several seconds.

2.2. Display Software

CLIMDISP in the PCDOS/BIN subdirectory is an image display and processing program. It can be used to display Clementine uncompressed images and histograms. See CLIMDISP.TXT in the PCDOS/DOC subdirectory for instructions on how to install and run the program.

Note: CLIMDISP currently can not create GIF formatted files for the Clementine images. Additionally, it can not read the version of GIF files created by the Clementine Decompression (CLEMDCMP) program which is also included on the Clementine EDR Archive CD-ROMs. If you wish to display Clementine images with CLIMDISP, generate a PDS format image file when decompressing with CLEMDCMP.

A special version of NIH Image, found in the MACSYS7/BIN subdirectory, will display PDS decompressed Clementine images. This program is stored in a Stuffit file which is in BinHex format. See IMAGE.TXT in the DOC subdirectory for instructions on how to install and run the program.

The Clementine EDR image files use the PDS label constructs RECORD_TYPE = "UNK", and ^IMAGE = xxxxx <BYTES> to define the structure of the file. This form of the labels is not supported by the current versions of IMDISP and IMAGE4PDS that are widely distributed by the PDS. To read Clementine decompressed formatted files use the version of IMAGE and CLIMDISP programs that are supplied on this CD-ROM. The Clementine versions CLIMDISP and IMAGE have been tested only on the Clementine data products. No attempt has been made to determine if the Clementine program versions will work on any other PDS data product.

XV is a shareware program for displaying images. XV was written by John Bradley of the University of Pennsylvania. It is in a compressed tar file in the SUNOS/SRC subdirectory. See XV.TXT in the SUNOS/DOC subdirectory for instructions on how to decompress and untar this file. XV will not display PDS labeled files, but will display TIF and GIF formatted files.

The XV software, for image display on a sun/unix environment, is not able to read the Clementine PDS labeled files. If you intend to use XV as the display system for the Clementine data products, output GIF or TIFF images with the CLEMDCMP program.

2.3. SPICE Software

Included on one of the ancillary disks associated with this volume set is the Navigation and Ancillary Information Facility (NAIF) Toolkit and some additional NAIF software. The major component of the NAIF Toolkit is the SPICE Library (SPICELIB), a collection of portable ANSI FORTRAN 77 subroutines. Some of these subroutines are used to read the SPICE kernel files containing Clementine ancillary data, such as spacecraft position, spacecraft attitude, instrument orientation and target body size, shape and orientation. Other SPICELIB subroutines may be used to compute typical observation geometry parameters--such as range, lighting angles, and LAT/LON of camera optic axis intercept on the target body. Several utility programs and SPICELIB demonstration programs are also included in the Toolkit. Versions of this software tested on many popular platforms are provided, as are instructions for porting the code to additional platforms. The FORTRAN subroutines can be called from a user's own application program, whether written in FORTRAN or C, or possibly yet another language. Consult your compiler's Reference Manual for instructions. One of the NAIF programs included in this software collection is PICGEO (for Picture Geometry). It was used to compute all of the geometric parameters appearing in the image labels and index tables. It is included so that users may clearly see the algorithms used in computing these quantities, and so that recalculation of image label geometry parameters using revised algorithms, or adding additional parameters, can be easily achieved.

2.4. Miscellaneous Image Processing Software

MSHELL is an interactive command line and menu driven Image and Signal processing language, developed by ACT Corp., which runs under the Microsoft Windows 3.x or Microsoft NT. MSHELL provides powerful scientific image and signal visualization and processing. A number of custom features were added to the MSHELL Image/Signal Processing Environment to support the Clementine Program. This software is included on one of the ancillary disks associated with this volume set, and will be under a subdirectory of the PCDOS directory.

3. Software Directory Hierarchy

The SOFTWARE subdirectories are based on hardware platforms. Under each platform subdirectory, the executables are in the BIN subdirectory, the source is in the SRC subdirectory and documentation on each program is in the DOC subdirectory. Each DOC subdirectory contains a file, SWINV.CAT which is part of the PDS Software Inventory describing software available within the Planetary Science Community. The contents of the SOFTWARE directory are shown below.

```
[SOFTWARE]
-SOFTINFO.TXT

-[PCDOS]
  -[BIN]
    -CLEMDCMP.EXE
    -CLIMDISP.EXE
    -CLIMDISP.HLP
  -[SRC]
    -CLEMDCMP.C
    -PDS.C
    -BITSTRM.C
    -DECOMP.C
    -HUFFMAN.C
    -WRITEGIF.C
    -PDS.H
    -JPEG_C.H
    -CLEMDCMP.MAK
  -[DOC]
    -CLEMDCMP.TXT
    -CLIMDISP.TXT
    -SWINV.CAT

-[MACSYS7]
  -[BIN]
    -CLEMDEXE.HQX
    -IMAGE.HQX
  -[SRC]
    -CLEMSRC.HQX
  -[DOC]
    -CLEMDCMP.TXT
    -IMAGE.TXT
    -SWINV.CAT

-[SUNOS]
  -[BIN]
    -CLEMDEXE.TZU
  -[SRC]
    -CLEMSRC.TZU
    -XV3A.TZ
```

```
|  
|-[DOC]  
|  
| -CLEMDCMP.TXT  
| -XV.TXT  
| -SWINV.CAT
```

D.4 VOLDESC.CAT

This file contains the VOLUME object, which provides a high-level description of the contents of an archive volume.

The VOLDESC.CAT file must be present at the root level of the archive volume. If the archive volume contains logical volumes, then a VOLDESC.CAT file must be present at the root level of each logical volume. See Section A.28 for more information on using the VOLUME object and for examples of the VOLDESC.CAT file.

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