#446

VIKING LANDER 1 & 2

RANGE AND DOPPLER DATA

75-075C-11B

75-083C-11B

Table of Contents

1. Introduction

2. Errata/Change Log

3. LINKS TO RELEVANT INFORMATION IN THE ONLINE NSSDC INFORMATION SYSTEM

4. Catalog Materials

    a. Associated Documents

    b. Core Catalog Materials

---

1. INTRODUCTION:

The documentation for this data set was originally on paper, kept in NSSDC's Data Set Catalogs (DSCs). The paper documentation in the Data Set Catalogs have been made into digital images, and then collected into a single PDF file for each Data Set Catalog. The inventory information in these DSCs is current as of July 1, 2004. This inventory information is now no longer maintained in the DSCs, but is now managed in the inventory part of the NSSDC information system. The information existing in the DSCs is now not needed for locating the data files, but we did not remove that inventory information.

The offline tape datasets have now been migrated from the original magnetic tape to Archival Information Packages (AIP's).

A prior restoration may have been done on data sets, if a requestor of this data set has questions; they should send an inquiry to the request office to see if additional information exists.

2. ERRATA/CHANGE LOG:

NOTE: Changes are made in a text box, and will show up that way when displayed on screen with a PDF reader.

When printing, special settings may be required to make the text box appear on the printed output.

Version	Date	Person	Page	Description of Change
01				
02				

3 LINKS TO RELEVANT INFORMATION IN THE ONLINE NSSDC INFORMATION SYSTEM:

http://nssdc.gsfc.nasa.gov/nmc/

[NOTE: This link will take you to the main page of the NSSDC Master Catalog. There you will be able to perform searches to find additional information]

4. CATALOG MATERIALS:

a. Associated Documents To find associated documents you will need to know the document ID number and then click here.
http://nssdcftp.gsfc.nasa.gov/miscellaneous/documents/

b. Core Catalog Materials

VIKING 1 LANDER

RANGE + DOPPLER DATA

75-075C-11B PSPA-00015

This data set has been restored. Originally there was one 7-track, 800 BPI tape, written in Binary. There is one restored tape. The original tape was created on an IBM 1108 computer and was restored on an IBM 9021 computer. The DR tape is a 3480 cartridge and the DS tape is 9-track, 6250 BPI. The DR and DS number along with their corresponding D number and time span is as follows:

DR#	DS#	DD#	FILES	TIME SPAN
DR-005494	DS-005494	DD-033813	1	07/20/76 - 01/28/77

VIKING 2 LANDER

RANGE + DOPPLER DATA

75-083C-11B PSPA-00250

THIS DATA SET HAS BEEN RESTORED. ORIGINALLY IT CONTAINED ONE 7-TRACK, 800 BPI TAPE WRITTEN IN BINARY. THERE IS ONE RESTORED TAPE. THE DR TAPE IS A 3480 CARTRIDGE AND THE DS TAPE IS 9-TRACK, 6250 BPI. THE ORIGINAL TAPE WAS CREATED ON AN UNIVAC 1108 COMPUTER AND WAS RESTORED ON AN IBM 9021 COMPUTER. THE DR AND DS NUMBER ALONG WITH THE CORRESPONDING D NUMBER AND TIME SPAN IS AS FOLLOWS:

DR#	DS#	D#	FILES	TIME SPAN
DR005506	DS005506	D033814	1	09/05/76 - 01/29/77

REQ. AGENT	RAND NO.	ACQ. AGENT
VJP	RC9153	RWP

VIKING LANDER 1 + 2

RANGE AND DOPPLER DATA

75-075C-11B

75-083C-11B

This data set catalog consists of 1 Viking 1 and 1 Viking 2 data tapes. The tapes are 7 track, 800 BPI, Binary, with 1 file of data each. The tapes were created on a UNIVAC 1108 computer. Time spans are not found on the tapes, but were given to us by the experimenter.

Time spans are as follows:

Viking Lander 1

D#	C#	TIME SPAN
D-33813	C-20571	6/20/76 - 1/28/77

Viking Lander 2

D-33814	C-20586	9/05/76 - 1/29/77

National Aeronautics and
Space Administration

Langley Research Center
Hampton, Virginia
23665

NASA

Reply to Attn of: 401B/Mayo

JAN 13 1978

TO: Goddard Space Flight Center
Attn: 601/Dr. Robert W. Vostreys

FROM: Aero-Space Technologist, Atmospheric Sciences Br., AESD

SUBJECT: The Viking Radio Science Metric Tracking Data Records for Landers I and II

In accordance with Dr. William Michael's letter to you dated December 1, 1977, the Viking Radio Science Metric Tracking Data Records for Landers I and II during the period from July 20, 1976, to January 29, 1977, are shipped under separate cover. These data records consist of two magnetic tape data files, two sets of IBM cards listing the range hardware delay calibration data, and the data formats.

The Viking Lander I (S/C 26) data tape file (labeled PD 1040) contains 187 sols (Martian days) of range and Doppler data. The Viking Lander II (S/C 29) tape (PD 0042) contains 144 sols of range and Doppler data. These tapes were generated by the Jet Propulsion Laboratory in UNIVAC 1108 format.

The two sets of IBM cards, one set for each Lander, contain the ranging delay calibrations for the time span of the data tape files. The calibrations are given for the combined effect of the signal delays due to both the tracking station's equipment and the spacecraft transponder. The sources of the calibrations are JPL Interoffice Memo 3395-77-051 dated March 10, 1977, and Interoffice Memo 3395-77-052 dated March 11, 1977, by Miles Sue to Joe Brenkle. In the published results of the Radio Science Team analyses, charged particle calibration adjustments were not made to the Doppler data and, thus, no Doppler calibrations are included.

The Lander range calibrations for the effects of charged particles along the signal path are obtained by interpolating the Viking Orbiter range charged particle calibrations at the Lander ranging times. The Orbiter charged particle calibrations are determined using its dual frequency S-X ranging data.

The results of analyses of the data on the tapes are presented in the Radio Science section of the Special Viking Edition of the Journal of Geophysical Research, Vol. 82, No. 28, September 30, 1977, pages 4293-4340. Additional information on the tracking system, data types, range calibrations, and spacecraft transponder is contained in the references of these Radio Science articles. Reprints of the articles are not yet available.

After copying, please return the magnetic tapes to me.

Alton P. Mayo

Alton P. Mayo
2537

6 Enclosures (under separate cover):
2 Tapes
2 Card Decks
Tape Format
Card Format

APPENDIX C

OD FILE FORMAT

GROUP RECORD WORD TYPE CONTENT

C.1 FILE IDENTIFICATION GROUP

C.1.1 Header Record

WORD	TYPE	CONTENTS	
1	I	11	Size (in SP words) of each logical record in para C.1.2.
2	I	4	Identifies content of para. C.1.2 records as Fieldata.
3	I	1	Indicates group does not end with a trailer record.
4	I	101	File ID group indicator.
5	I	0	Not used.

C.1.2 One Record Which Identifies The File

1	I	10	The number of integral words in the record.
2-4	Fieldata	"SPACECRAFT ID=xx " where xx is the spacecraft number input by the user in the OD-FILE statement.	
5-9	Fieldata	"Y, M, D, H, M=xx, xx, xx, xx, xx, 1108" where the x's represent the time the file was written.	
10-11	Fieldata	" ODE=xxxxxx" where x denotes the version of ODE that created the file.	

C.2 USER LABEL GROUP

C.2.1 Header Record

1	I	15	Size (in SP words) of each logical record in para. C.2.2.
2	I	4	Identifies content of para. C.2.2 records as Fieldata.

3	I	0	Indicates group ends with a trailer.
4	I	103	Label group indicator
5	I	0	Not used

C.2.2 Zero or More Records of Fieldata Descriptive Text

These would be input to the ODE by the user via the OD-FILE statement. The text would include any comments the user would have concerning the circumstances under which the file was created.

1	I	14	The number of integral words in the record.
2-15	Fieldata	84	Fieldata characters taken from the LABEL parameter of the OD-FILE statement.

3. Group Trailer

1	I	1
2	Fieldata	Six BCD zeros

C.3 ORBIT DATA SUMMARY GROUP

C.3.1 Header Record

1	I	9	Size (in SP words) of each logical record in para. C.3.2.
2	I	2	Identifies content of para. C.3.2 records as DPFP.
3	I	0	Indicates group ends with a trailer.
4	I	105	Orbit data summary group indicator.
5	I	0	Not used.

C.3.2 A Record For Each Data-Type That Exists For Each Station

1	I	4	Number of DPFP words in the record
2	DPFP	1.0000000bc00eeffD+16 where b ≤ 1 = S-band, 2 = X-band, 3 = L-band, 4 = LS-band	

c = tracking network indicator (see Orbit Data Group)

ee = receiving station number

ff = data-type indicator (see Orbit Data Group)

3	DPFP	Number of points	
4	DPFP	Time of earliest point	Seconds after January 1, 1950 0:0:0.0
5	DPFP	Time of latest point	

C.3.3 Group Trailer

1	I	1
2	DPFP	0.0D+0

C.4 ORBIT DATA IDENTIFIER GROUP

C.4.1 Header Record

1	I	6	Size (in SP words) of each logical record in para. C.4.2.
2	I	4	Identifies content of para. C.4.2 records as BCD.
3	I	1	Indicates group does not end with a trailer record.
4	I	107	Orbit data identifier group indicator.
5	I	0	Not used.

C.4.2 One Record Which Identifies The Various Fields and Their Positions Within the Orbit Data Record

1	I	5	Number of integral words in the record.
2-6	BCD	(TIMTAG, IDWORD, OBSVBL, FREQCY, PASSID).	

C.5 ORBIT DATA GROUP

C.5.1 Header Record

1	I	241	Size (in SP words) of largest logical record in para. C.5.2.

2	I	2	Identifies content of para. C.5.2 records as DPFP.
3	I	0	Indicates group ends with a trailer.
4	I	109	Orbit data group indicator.
5	I	0	Not used.

C.5.2 A Series of Records (possibly void):

1	I	M	The number of double precision words of data in the record. M = 120 except possibly for the last record in which M = R*5 where R is the number of logical records within the record.
2 to 2M+1	I	M/5 logical records	A logical record is as defined below.

Orbit Data Logical Record

Words	Mode	Contents
1, 2	DPFP	Time of observation; seconds after January 1, 1950 0:0:0.0
3, 4	DPFP	1.aaaaaaabcddeeffD+16 where aaaaaaa = doppler compression time in hundredths of seconds for doppler data = 0 for DRVID = ranging components for range data = 0 for angle data

Words	Mode	Contents
		b = radio band indicator. 0 or 1 = S, 2 = X, 3 = L, 4 = LS
		c = tracking network indicator. 1 = DSN, 2 = MSFN, 3 = ETR
		dd = transmitting station number
		ee = receiving station number
		ff = data-type indicator 11 = one-way doppler (F1) 12 = two-way doppler (F2) 13 = three-way doppler (F3) 14 = three-way coherent doppler (F3C) 24 = DTAU 25 = DMU 26 = DPLOP 27 = DPLOP2 28 = DMU2 31 = ETR range (ETR) 32 = MARK 1 range (MARK1) 33 = MARK 1A range (MARK1A) 34 = Tau range (TAU) 35 = Mu range (MU) 36 = PLOP 37 = PLOP2 38 = MU2 51 = azimuth (AZ) 52 = elevation (EL) 53 = hour angle (HA) 54 = declination (DEC) 55 = X30 (X30) 56 = Y30 (Y30) 57 = X85 (X85) 58 = Y85 (Y85)
5, 6	DPFP	One of the following i) doppler observable ii) DRVID observable iii) range observable iv) angle observable
7, 8	DPFP	Reference frequency for doppler, DRVID and range data, 0 for angle data, where reference frequency is defined as the frequency of the i) Transponder if doppler ground mode is one-way

Words	Mode	Contents
		ii) Transmitter if doppler ground mode is two-way, three-way or three-way coherent. Reference frequency is taken at light corrected time of data point.
9, 10	DPFP	1.aaaabD+16 where aaaa = Pass identification b = Split pass identification

The logical data records are ordered in increasing order of time/net/station/data type/band.

C.5.3 Group Trailer

1	I	1
2, 3	D	0

C.6 CONTROL STATEMENT GROUP

C.6.1 Header Record

1	I	15	Size (in SP words) of each logical record in para. C.6.2.
2	I	4	Identifies content of para. C.6.2 records as Fieldata.
3	I	0	Indicates group ends with a trailer.
4	I	111	ODE control statement group indicator.
5	I	0	Not used.

C.6.2 BCD Card/Line Images of All the ODE Control Statements

1	I	14	The number of integral words in a record.
2-15	Fieldata	14 words of card/line image (84 Fieldata characters).	

C.6.3 Group Trailer

1	I	1
2	Fieldata	Six Fieldata zeros

C.7 FILE CLOSE GROUP

C.7.1 Header Record

1	I	1
2	I	5
3	I	0
4	I	0
5	I	0

C.7.2 End of File Mark

The entire OD file is written and read with non-formatted (binary) read and write FORTRAN V statements. The data within each record are ordered and typed as specified above; the various file groups are also ordered A, B, C, D, E, F and G.

DUMP OF D033814 Time Span Given by Experimenter

Viking 2 9/5/76 - 1/29/

RECORD 1 OF FILE 1
LENGTH = 168 BYTES

```
  1(    1)   000005010001  000000000013  000000000004  000000000001  000000000145  000000000000  000000000165  000005010001
  9(   49)   000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000
 17(   97)   000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000
 25(  145)   000000000000  000000000000  000000000000  000000000000
```

DUMP OF TAPE X-398

TIME SPAN GIVEN by Experimenter

D-33813
Viking 1
6/20/76 - 1/28/77

INPUT TAPE X-398 ON MS5
DATA INPUT 07 NF 1 SR 1 1 10

FILE	1 RECORD	1 LENGTH	168BYTES					
(0)	000005010001	000000000013	000000000004	000000000001	000000000145	000000000000	000000000165	000005010001
(48)	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000
(96)	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000
(144)	000000000000	000000000000	000000000000	000000000000				

FILE	1 RECORD	2 LENGTH	168BYTES					
(0)	000013010001	000000000012	302506101210	270613310516	114462660505	365622561156	155622446767	566062566063
(48)	566261566360	055661616070	050524111244	106075610505	264521637321	000013010001	000000000000	000000000000
(96)	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000
(144)	000000000000	000000000000	000000000000	000000000000				

FILE	1 RECORD	3 LENGTH	168BYTES					
(0)	000005010001	000000000010	000000000004	000000000000	000000000146	000000000000	000000000162	000005010001
(48)	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000
(96)	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000
(144)	000000000000	000000000000	000000000000	000000000000				

FILE	1 RECORD	4 LENGTH	168BYTES					
(0)	000010010001	000000000007	311110310505	606260626767	606060606060	241110242505	066075610505	616061676765
(48)	616160606060	711122526045	000010010001	000000000000	000000000000	000000000000	000000000000	000000000000
(96)	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000
(144)	000000000000	000000000000	000000000000	000000000000				

FILE	1 RECORD	5 LENGTH	168BYTES					
(0)	000002010001	000000000001	606060606060	606060606061	000002010001	000000000000	000000000000	000000000000
(48)	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000
(96)	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000
(144)	000000000000	000000000000	000000000000	000000000000				

FILE	1 RECORD	6 LENGTH	168BYTES					
(0)	000005010001	000000000017	000000000004	000000000000	000000000147	000000000000	000000000172	000005010001
(48)	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000
(96)	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000
(144)	000000000000	000000000000	000000000000	000000000000				

FILE	1 RECORD	7 LENGTH	168BYTES					
(0)	000017010001	000000000016	102712063112	110524230505	365622561156	155622446767	566062566063	566171566570
(48)	055661616070	050505050505	050505050505	050505050505	050505050505	050505050505	050505050505	050505050505
(96)	045605373313	000017010001	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000
(144)	000000000000	000000000000	000000000000	000000000000				

FILE	1 RECORD	8 LENGTH	168BYTES					
(0)	000017010001	000000000016	102712063112	110524230505	365622561156	155622446767	566062566063	566166566164
(48)	055661616070	050505050505	050505050505	050505050505	050505050505	050505050505	050505050505	050505050505
(96)	045602372707	000017010001	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000
(144)	000000000000	000000000000	000000000000	000000000000				

FILE	1 RECORD	9 LENGTH	168BYTES					
(0)	000017010001	000000000016	102712063112	110524230505	365622561156	155622446767	566062566061	566263566060
(48)	055661616070	050505050505	050505050505	050505050505	050505050505	050505050505	050505050505	050505050505
(96)	045677372601	000017010001	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000
(144)	000000000000	000000000000	000000000000	000000000000				

FILE	1 RECORD	10 LENGTH	168BYTES					
(0)	000017010001	000000000016	102712063112	110524230505	365622561156	155622446767	566061566270	566261566163
(48)	055661616070	050505050505	050505050505	050505050505	050505050505	050505050505	050505050505	050505050505
(96)	045674373113	000017010001	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000
(144)	000000000000	000000000000	000000000000	000000000000				

D 33814

```
//GO.SYSPRINT DD SYSOUT=&OUT,DCB=(RECFM=VBA,LRECL=137,BLKSIZE=&BLKSIZE),   00000290
IEF653I SUBSTITUTION JCL - SYSOUT=A,DCB=(RECFM=VBA,LRECL=137,BLKSIZE=7265),
XX              SPACE=(CYL,(0,1)),UNIT=(DISK,3)                          00000300
XXSYSUDUMP DD SYSOUT=A,SPACE=(CYL,(0,6))                                 00000310
//GO.FT08F001 DD UNIT=7TRACK,DISP=(OLD,KEEP),LABEL=(01,BLP,,IN),
//          DCB=(BLKSIZE=32500,RECFM=U,DEN=2),
//                VOL=SER=JJ0022
//GO.DATAS DD *
//
IEF236I ALLOC. FOR YZRWPJB1 GO
IEF237I 333    ALLOCATED TO PGM=*.DD
IEF237I 232    ALLOCATED TO FT05F001
IEF237I 333    ALLOCATED TO FT06F001
IEF237I 333    ALLOCATED TO FT07F001
IEF237I 237    ALLOCATED TO SYSPRINT
IEF237I 232    ALLOCATED TO SYSPRINT
IEF237I 333    ALLOCATED TO SYSPRINT
IEF237I 333    ALLOCATED TO SYSUDUMP
IEF237I 000    ALLOCATED TO FT08F001
```

(Time span given by experimenter) Viking -2 9/05/76 - 1/29/77

RECORD 1 OF FILE 1
LENGTH = 168 BYTES

```
  1(   1)  000005010001  000000000013  000000000004  000000000001  000000000145  000000000000  000000000165  000005010001
  9(  49)  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000
 17(  97)  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000
 25( 145)  000000000000  000000000000  000000000000  000000000000
```

RECORD 2 OF FILE 1
LENGTH = 168 BYTES

```
  1(   1)  000013010001  000000000012  302506101210  270613310516  114462710505  365622561156  155622446767  566062666071
  9(  49)  566061566466  055661616070  050524111244  106075610505  264321667435  000013010001  000000000000  000000000000
 17(  97)  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000
 25( 145)  000000000000  000000000000  000000000000  000000000000
```

RECORD 1006 OF FILE 1
LENGTH = 168 BYTES

```
  1(   1)  770077300000  403200400000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000
  9(  49)  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000
 17(  97)  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000
 25( 145)  000000000000  000000000000  000000000000  000000000000
```

RECORD 1007 OF FILE 1
LENGTH = 32000 BYTES

```
  1(   1)  774037777777  777777777777  777777777777  777777777777  777777777777  777777777777  777777777777  777777777777
  9(  49)  777777777777  777777777777  777777777777  777777777777  777777777777  777777777777  777777777777  777777777777
 17(  97)  777777777777  777777777777  777777777777  777777777777  777777777777  777777777777  777777777777  777777777777
 25( 145)  777777777777  777777777777  777777777777  777777777777  777777777777  777777777777  777777777777  777777777777
 33( 193)  777777777777  777777777777  777777777777  777777777777  777777777777  777777777777  777777777777  777777777777
 41( 241)  777777777777  777777777777  777777777777  777777777777  777777777777  777777777777  777777777777  777777777777
 49( 289)  777777777777  777777777777  777777777777  777777777777  777777777777  777777777777  777777777777  777777777777
 57( 337)  777777777777  777777777777  777777777777  777777777777  777777777777  777777777777  777777777777  777777777777
 65( 385)  777777777777  777777777777  777777777777  777777777777  777777777777  777777777777  777777777777  777777777777
```