#431

VIKING 1 & 2

METEOROLOGY PRESSURE TAPE
METEOROLOGY WIND/TEMP TAPE
WIND/TEMP CATALOG
SOL   AVERAGE PRESSURE DATA

75-075C-07D,07E,07H&07J

75-083C-07D,07E,07H&07J

VIKING 1 & 2 LANDER

METEOROLOGY WNDTMP TAPE

75-075C-07E & 75-083C-07E

This data set has been restored. Originally there was one
7-track, 800 BPI tape, written in BCD. There is one restored tape
written in ASCII. The original tape was created on an IBM 360
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-005495	DS-005495	DD-031990	1-044	07/19/76 - 09/02/76	VIKING 1
			45-105	09/03/76 - 11/04/76	VIKING 2

VIKING LANDER 1 &2

METEOROLOGY PRESSURE TAPE

75-075C-07D, 75-083C-07D

THIS DATA SET HAS BEEN RESTORED. THERE WAS ORIGINALLY ONE

7-TRACK, 800 BPI TAPE, WRITTEN IN BCD. THERE IS ONE RESTORED

TAPE WRITTEN IN ASCII. THE DR TAPE IS A 3480 CARTRIDGE AND THE

DS TAPE IS 9-TRACK, 6250 BPI. THE ORIGINAL TAPE WAS CREATED ON

AN IBM 360 COMPUTER AND WAS RESTORED ON AN IBM 9021 COMPUTER. THE

DR AND DS NUMBERS ALONG WITH THE CORRESPONDING D NUMBER AND TIME

SPAN IS AS FOLLOWS:

DR#	DS#	DD#	FILES	TIME SPAN	
DR005308	DS005308	D031989	1-44	07/19/76 - 09/03/76	VIK 1
			45-105	09/03/76 - 11/04/76	VIK 2

REQUEST AGENT
CMP

RAND NO.
RD0811

ACQ. AGENT
RWV

VIKING LANDER
(Meteorology Pressure Tape)
75-075C-07D, 75-083C-07D

75-075C-07E, 75-083C-07E
(Meteorology WNDTMP Tape)

The Meteorology Pressure data set consists of one tape. It is even parity, 800 BPI, 7 track, unlabelled, external BCD, with 20 character fixed length records. Blocking factor is 10 records per block. 'D' and 'C' number and time span follow:

D#   C#

D-31989   C-20134

Files 1-44 Viking 1 Lander   07/19/76 - 09/02/76   (75-075C-07D)

Files 45-105 Viking 2 Lander   09/03/76 - 11/04/76   (75-083C-07D)

The WNDTMP data set consists of one tape. Its characteristics are the same as above except the records are 120 characters in length and are unblocked.

D#   C#

D-31990   C-20124

Files 1-44 Viking 1 Lander   07/19/76 - 09/02/76   (75-075C-07E)

Files 45-105 Viking 2 Lander   09/03/76 - 11/04/76   (75-083C-07E)

NOTE: On both tapes, times are given in SOLs (martian days) See attached for zero points and conversion factors.

Viking Lander Sol/Earth-day Conversions

Spacecraft	SOL	Earth Time	Seconds of year
Viking Lander 1	0 0:0:0.00	1976 201 19:39:54.04	17437194.04
Viking Lander 2	0 0:0:0.00	1976 247 12:48:45.07	21386925.07

Note: Sol 0 0:0:0.00 for Viking Lander 2 = Sol 44 11:47:32.94 for Viking Lander 1.

One Sol = 88775.25 seconds or approximately 24.66 terrestrial hours.

Documentation of Viking
Meteorology Pressure Tape.
(Primary mission)

A. **Source** These data are derived from the Intermediate Science
Tapes. The data correspond identically to that inform-
ation contained in the printed Viking Meteorology
Pressure Catalog (VMPC)

The reader is refered to documentation of the VMPC
for methodology used in generating the data.

B. **Tape Contents**

Data for both VL1 and VL2 are contained on this tape
for the primary mission. An end of file mark is
placed at the end of the data for each sol.

The Tape contains 105 files organized as follows:

(1) Files 1 through 44 - data for sol 0 thru 43 for VL1

(2) Files 45 through 105 - data for sol 0 thru 60 for VL2

C. **Tape characteristics.**   6250
~~Odd~~ ~~Even~~ Parity, ~~800~~ BPI, unlabelled, External ~~BCD~~ ASCII, 20
character fixed length records, blocking factor 10
records/block, ~~7~~ track.
9

D. **File Contents.**

Each file contains two type of records.

1) A sol header record to be read as follows:

   READ (5,1) FLAG, ID, ISOL, NG, NR, PMEAN
   1 FORMAT (I2, I1, I4, 2I3, F7.3)

and containing

FLAG	always -9
ID	Viking Lander no.
ISOL	Sol
NG	no. of groups in Sol
NR	no. of pts. rejected
PMEAN	mean pressure of the sol (MB)

2) The data are contained in NG records, each of which
   can be read as follows:

   READ (5,2) FLAG, CLLT, NPTS, PRESS
   2 FORMAT (I2, F8.4, I3, F7.3)

and containing
FLAG	always +9
CLLT	local Lander time of record
NPTS	no. of points comprising group (record)
PRESS	mean pressure of the group (record)

PJR
07/14/78

Documentation for Viking
Meteorology WNDTMP Tape
(Primary Mission)

A. Source.   These data are derived from the Intermediate
Science Tapes. The data are identically that of the
printed Viking Meteorology WNDTMP Catalog.

The reader is referred to documentation of the
Viking Meteorology WNDTMP Catalog for methodology
used in generating data.

B. Tape Contents.

Data for both VL1 and VL2 are contained on this tape
for the primary mission. An end of file mark is
placed at the end of the data for each sol.

The tape contains 105 files organized as follows:

(1) Files 1 through 44 – Data for sols 0 – 43 for VL1
(2) Files 45 through 105 – Data for sols 0 – 60 for VL2

C. Tape Characteristics.

Even Parity, 800 BPI, unlabelled,External BCD, 120
character fixed length records, unblocked, 7-track.

D. File Contents. Each file contains the data for one sol. Two types
of records are contained on each file. Module
header records followed by data records for the module.

Either record may be read with the following kind of
statement:

```
READ (5,1) (FLAG, (I(N), N=1, 16), (F(N), N=1, 10))
1 FORMAT(I1, 16I4, F7.4, 9F5.1, 3X)
```

The contents of FLAG, Integer array I, and real
array F will vary depending on the type of record
specified by FLAG.

The contents of I and F are specified in the table
below. The reader is again referred to various
sections of Documentation of the printed WNDTMP
Catalog (referred to in parentheses).

FLAG	MODULE HEADER 2	DATA RECORD 3
I(1)	MODNO	IRECD
I(2)	MYRG	BR
I(3)	MDOYG	MAXV
I(4)	MHRG	MINV
I(5)	MNNG	MAXD
I(6)	LPOR	MIND
I(7)	LSOLR	CR
I(8)	LHRR	MAXTA
I(9)	LMNR	MINTA
I(10)	IDQI	DR
I(11)	IVHC	MAXRST
I(12)		MINRST
I(13)		KPTY
I(14)		KFLAG
I(15)		MIS
I(16)		SR
F(1)	SECMG	HOURS
F(2)	SECLR	SPEED
F(3)	RRATE	SIGV
F(4)		ANGLE
F(5)		SIGD
F(6)		AVTA
F(7)		SIGTA
F(8)		AVRST
F(9)		SIGRST
F(10)		AVPT

CONTENTS OF MODULE HEADER RECORD
Reference to written WNDTMP documentation

MODNO – Module number   (§IV(A))

MYRG   – ⎞
MDOYG – ⎟
MHRG   – ⎬   Module start time   (§ IV(B))
MNNG   – ⎠

LEPOR – Lander epoch

LSOLR – sol number   (§ III(B))

LITRR – Module start time (hours) (LLT)   (ADDENDUM 2)

LMNR – Module start time (min)   (LLT)   (ADDENDUM 2)

IDQI – data quality indicator   (§ IV(E))

IVHC – Lander number   (§ III(A))

SECNG – module start time   (LLT)   (ADDENDUM 2)

RRATE – sample interval   (IV(D))

CONTENT OF DATA RECORD

IRECD - record number   (§V(A))

BR - 1 if value deleted from wind speed, 0 otherwise   (§ V(C))

MAXV - Maximum wind speed

MINV - Minimum wind speed
                                                                               (§V(C) and (D))
MAXD - Maximum wind angle

MIND - Minimum wind angle

CR - 1 if value deleted from thermocouple temp., 0 otherwise

MAXTA - Maximum thermocouple temp.   (§V. (E))

MINTA - Minimum thermocouple temp.

DR - 1 if value deleted from reference sensor temp., 0 otherwise

MAXRST - Maximum reference sensor temp.   (§V.(F))

MINRST - Minimum reference sensor temp.

KPTY - sum of all parity flags   (§V.H)

KFLAG - sum of all flags   (§V.(F))

MIS - sum of all missings values (max. 16)   (§V.(J))

SR - 1 if vector mean direction is from Lander, 0 otherwise   (§V.(D))

HOURS - average time   (§V.(B))

SPEED - average wind speed

SIGV - standard deviation of wind speed   (§V.(C) and (D))

ANGLE - vector mean wind direction

SIGD - standard deviation of vector mean wind direction

AVTA - average thermocouple temp.

SIGTA - standard deviation of thermocouple temp.   (§V.(E))

AVRST - average reference sensor temp.

SIGRST - standard deviation of reference sensor temp.   (§V.(F))

AVPT - average platinum resistence temp.   (§V.(G))

VIKING 1 AND 2 LANDER

WIND AND TEMPERATURE CATALOG

75-075C-07H

75-083C-07H

This data set catalog consists of 1 Viking 1 Lander and 1 Viking 2 Lander tape. The tapes are 1600 BPI, ASCII formatted, and 9 track. The Viking 1 tape has 689 files and the Viking 2 tape has 726 files. The 'D' and 'C' numbers and time spans are as follows.

75-075C-07H   VIKING 1

D#	C#	Files	Time Span
D-43281	C-21698	689	7/20/76-9/14/78

75-083C-07H   VIKING 2

| D-43282 | C-21699 | 726 | 9/4/76-12/5/78 |

Department of Meteorology   The Florida State University
Tallahassee, Florida 32306

February 3, 1981

National Space Science Data Center
Code 601.5, attn: Ralph Post
Goddard Space Flight Center
Greenbelt, Md. 20771

Gentlemen:

I am sending you separately two magnetic tapes of Viking
meteorological data for, respectively, landers 1 and 2. The
data are means and statistics for each "record" of observation
of wind and temperature. At lander 1, 765 sols* of data are
processed and recorded. At lander 2 it is 800 sols.*

These tapes are to be included in the data record of the Viking
Meteorology Team and made available to anyone wishing these
data.

I enclose a copy of the documentation for these tapes.

Please note that there are two labels on each tape identifying
and explaining the contents. I recommend that you duplicate
these labels for any copies of these tapes that you generate.

Sincerely,

Seymour L. Hess
Professor and Chairman

SLH:vw

cc: Dr. Henry Brinton, SL-4
     Mr. James Tillman

* VIKING 1 LANDER ACTUALLY HAS 689 SOLS OF RECORDED DATA
  VIKING 2 LANDER HAS 726 SOL OF RECORDED DATA

Documentation for Viking Wind and Temperature
Tape Catalog

I.   Source: all the numerical information is read from or
     calculated from the Intermediate Science Tapes (IST)
     produced by the 1108 computers at JPL. The contents of
     these tapes are the same as is printed out by the pro-
     gram SANMET on the page labeled WNDTMP, with the addi-
     tion of the reading of the platinum resistance thermo-
     meter, derived from the page labeled DATA 6. Thus these
     data can be found in detail on the microfiche of the
     SANMET output.

II. Tape Contents: tapes labeled DWT contain wind and tem-
     perature data from Viking Lander I. Tapes labeled FWT
     contain similar data from Viking Lander II. The basic
     data presented are certain means and statistics for a
     "record" of observations, consisting usually of 16 sam-
     ples. Missing data could cause a "record" to have less
     than 16 samples and it is possible for there to be as
     many as 17 samples. "Records" were gathered in groups
     called modules that share certain timing characteristics.

III. Tape Characteristics: nine track, 1600 BPI, unlabeled,
     ASCII, 120 character fixed length lines, blocked to 3600
     characters per record. An end-of-file mark separates in-
     dividual sols and a double end-of-file mark denotes the
     end of a tape.

IV. File Contents: each file contains the data for one sol.*
     Two types of lines are contained on each file: Module
     header lines followed by data lines for the module.

     Either line may be read with the following kind of state-
     ment:

     READ (5,1) (FLAG, (I(N), N=1, 16), (F(N), N=1, 10))
     1 FORMAT (I1, 16I4, F7.4, 9F5.1, 3X)

     The contents of FLAG, Integer array I, and real array F
     will vary depending on the type of record specified by
     FLAG.

     The contents of I and F are specified in the table below
     and the meaning of each item is given in section V.

* VIKING 1 LANDER - ACTUALLY HAS 689 SOLS GIVEN THAT EACH FILE CONTAINS THE
  DATA FOR ONE SOL AND VIKING 2 HAS 726 SOLS GIVEN THE SAME INFORMATION.

	MODULE HEADER	DATA LINE
FLAG	2	3
I(1)	MODNO	IRECD
I(2)	MYRG	BR
I(3)	MDOYG	MAXV
I(4)	MHRG	MINV
I(5)	MMNG	MAXD
I(6)	LEPOR	MIND
I(7)	LSOLR	CR
I(8)	LHRR	MAXTA
I(9)	LMNR	MINTA
I(10)	IDQI	DR
I(11)	IVHC	MAXRST
I(12)	(blank)	MINRST
I(13)	(blank)	KPTY
I(14)	(blank)	KFLAG
I(15)	(blank)	MIS
I(16)	(blank)	SR
F(1)	SECMG	HOURS
F(2)	SECLR	SPEED
F(3)	RRATE	SIGV
F(4)	(blank)	ANGLE
F(5)	(blank)	SIGD
F(6)	(blank)	AVTA
F(7)	(blank)	SIGTA
F(8)	(blank)	AVRST
F(9)	(blank)	SIGRST
F(10)	(blank)	AVPT

V. Information provided:

MODNO - module number.

MYRG, MDOYG, MHRG, MMNG - GMT start time for a module consisting of year, day of year, hour and minute. Seconds are given later by SECMG.

LEPOR, LSOLR, LHRR, LMNR - start time of the module in local martian lander time. LEPOR is a lander epoch, normally blank, but available to avoid confusion if the number of sols exceeds 1000. The others here are sol, hour and minute. Seconds are given later by SECLR.

IDQI - data quality indicator. 4 means no adverse quality indicators while 1 means several adverse quality indicators were detected.

IVHC - lander from which the data derives (1 or 2).

SECMG – GMT seconds for the start of the module.

SECLR – local-lander-time seconds for start of the module.

RRATE – time in seconds between samples

IRECD – the record number within a module

BR – this is 0 if no sample of wind speed has been deleted and is 1 if any deletions occurred in the "record." A sample of wind speed is deleted if it lies more than 3 standard deviations away from the arithmetic mean speed for the "record."

MAXV, MINV – the highest and lowest wind speeds expressed as deci-meters-per-second above/below the vector mean wind speed for the "record."

MAXD, MIND – the amount in deci-degrees by which the wind direction departs from the vector mean direction for the "record" for the two samples that have the maximum departures on either side of that mean.

CR – this is 0 if no sample of thermocouple temperature has been deleted and is 1 if any deletions have occurred in the "record." A temperature is deleted if it lies more than 3 standard deviations away from the mean for the "record."

MAXTA, MINTA – the amount in deci-degrees-Kelvin by which the maximum/minimum temperatures in the record are above/below the mean thermocouple temperature.

DR, MAXRST, MINRST – the same for reference sensor temperature as CR, MAXTA, MINTA for thermocouple temperature

KPTY – this gives information on a certain class of parity errors detected by SANMET. The WNDTMP output contains a column called PARITY which is 0 if no errors were detected and is 1 if either of the two following errors was found in the sample: P1 – parity errors in the 5-bit ID and somewhere in the remaining 11 bits; P3 – a parity error in the 10 bits of measurement information or in the parity bit itself. KPTY is the sum over all the samples in the record of the digits recorded under PARITY in WNDTMP. Thus, if KPTY is non-zero, that indicates the number of the defined parity errors detected in the record. To trace these it is necessary to examine the detailed SANMET output. If KPTY is zero, none of the defined parity errors was detected in the record.

KFLAG – this gives information on whether SANMET has rejected one or more measurement points and substituted a smoother value. The WNDTMP output contains a column called FLAG which is 0 if no smoothing occurred and is 1 if any smoothing took place for that sample. KFLAG is the sum over all the samples in the "record" of the

digits recorded under FLAG in WNDTMP. Thus, if KFLAG is non-zero, that indicates the number of smoothing substitutions found in the "record." To trace these it is necessary to examine the detailed SANMET output. If KFLAG is zero, no substitutions were made in the "record."

MIS - this gives the number of missing samples in the "record." It can range from 15 (only 1 sample acquired) to -1 (a 17th sample was acquired).

SR - this gives an indication of possible unrepresentativeness of the data because of flow from the lander body towards the meteorology sensors. SR=1 when flow is from the lander to the sensors, i.e., the vector mean wind direction for the "record" lies between 246° and 332° for VL-1, and between 126° and 212° for VL-2.

HOURS - this is the mean local lander time of the "record" in hours. It is calculated from the start time of the "record," the number of samples in the "record," and the sample interval. All time tags issued for meteorology on the landers are truncated, but the truncation is partially compensated in SANMET. The maximum error in this column is 0.0015 hours.

SPEED - the vector mean wind speed in meters per second, for the "record." It is derived from the columns labeled VQD and ANGPLT in WNDTMP.

SIGV - the arithmetic standard deviation of wind speeds in the "record" in meters per second derived from column VQD in the SANMET output.

ANGLE - all wind directions are given in the usual meteorological style where a wind from the north is 0° and one from the east is 90°. ANGLE is the vector mean wind direction for the "record" in degrees. It is derived from the columns labeled VQD and ANGPLT in WNDTMP. If any sample has been rejected because the speed was outside of the 3 standard deviation range, that sample is omitted in all the results for wind direction also.

SIGD - standard deviation of wind direction from the vector mean wind direction in the "record," in degrees.

AVTA, SIGTA - arithmetic mean thermocouple temperature for the "record" and standard deviation of that temperature for the "record." Both in degrees Kelvin.

AVRST, SIGRST - the same for reference sensor temperature as AVTA and SIGTA for thermocouple temperature.

AVPT - the mean for the record of the values from the platinum resistance thermometer in the boom housing, in degrees Kelvin. It is derived from the column labeled PTT in DATA 6. Statistics for this parameter are in the DATA 6 output, they are not on these tapes. These data have not been screened for samples with an excessive departure from the mean.

VI. Hardware failures: The thermocouple temperature system on VL-1 has functioned well and these temperatures are generally superior to the reference sensor temperatures. On VL-2 the thermocouple temperature system developed a fault on the launch pad. In that lander the reference sensor temperatures are generally superior.

On VL-1 an open circuit developed in the wind measuring system early in the mission. Therefore, no wind data is reported on the DWT tapes from sol 43 on. To avoid confusion, the following recognizable entries are placed on the tapes in lieu of the real data:

SIGD	-9.	MAXV	-9
SIGV	-9.	MINV	-9
SPEED	-9.	MAXD	-9
ANGLE	-9.	MIND	-9

BR blank (i.e. IH___)

VIKING LANDER 1 & 2

SOL AVERAGE PRESSURE DATA

75-075C-07J (VIKING 1)

75-083C-07J (VIKING 2)

This data set consists of 1 magnetic tape. It is 1600 BPI, ASCII, 9 track, with 4 files of data. The tape was created on a PRIME 9950 computer. File 1 contains data for Viking Lander 1. File 2 contains data for Viking lander 2. Files 3 and 4 are duplicates of files 1 and 2 respectively. The times are given in SOL's or Martian days. Each SOL is 24.66 hours long.

The D and C numbers and time spans are as follows:

D#	C#	Time Span	
D-64312	C-24278	07/20/76 - 11/12/82	VIKING 1
		09/04/76 - 07/21/79	VIKING 2

UNIVERSITY OF WASHINGTON
SEATTLE, WASHINGTON 98195

Department of Atmospheric Sciences, AK-40

September 25, 1985

Mrs. Carolyn Ng
National Space Science Data Center
Code 601
NASA/Goddard Space Flight Center
Greenbelt, MD 20771

Dear Mrs. Ng:

Enclosed you will find the revised tape and document for the Viking Landers 1 and 2 daily avearge atmospheric pressure statistics. The document has been updated to include a description of the plots as well as the numeric data. We are supplying a complete new set of documents as well as a tape, which should replace the earlier test versions.

The microfiche of the plots should be changed to add after Principal Investigator:

> James E. Tillman, Director
> Viking Computer Facility
> Department of Atmospheric Sciences
> University of Washington, AK-40
> Seattle, WA 98195

As to the sets of products, I suggest that we use only two categories. The first would include the microfiche of the plots, the printed data and the descriptive document. The second product would include the first as well as the tape. Although this might waste a few sheets of microfiche in instances where machine readable format is desired, it would provide the ability to check computer retrieval against the hard copy.

We are providing both Lander 1 and 2 data in response to all inquiries for this pressure data for convenience since it is a small data volume. Descriptive information for these data include:

> Spacecraft: Viking Landers 1 and 2
> Investigator: James E. Tillman
> Experiment Name: Viking Lander Meteorology Experiment
> Time Span of Data: Lander 1   20 July 1976 to 13 Nov 1982
>   Lander 2   4 Sept 1976 to 18 Aug 1979
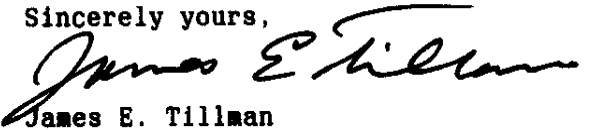
Please feel free to contact Neal Johnson or me if additional information is required, at (206)543-0500 or 543-4586. We would be happy to entertain suggestions which would make this product more useful.

To aid us in comparing archived data with our future data sets, could you please send copies of the Hess tapes 75-075C-07D and 75-083C-07D, 75-075C-07E and 75-083C-07E in either 800 or 1600 density, 9 track.

Also, would you please return two copies of the complete microfiche products.

Thank you for your assistance.

Sincerely yours,

James E. Tillman
Director
Viking Computer Facility

JETNG
cc: J. Boyce, NASA HQ
     H. Brinton, NASA HQ

INTRODUCTION

This document describes summary pressure data from the Viking Lander Meteorology Experiment throughout the mission from the Revision 2.0 pressure data files. These data consist of statistical functions and supporting measurements presented on a sol by sol basis for Viking Lander 1, the Thomas Mutch Memorial Station, and Viking Lander 2 for the complete mission. On a typical sol, pressure is periodically sampled with intervals between samples of 30 to 90 minutes. The results are presented in the form of averages of functions over a sol as well as supporting information. The data are provided on tape, on microfiche and on plots. The parameters as well as the format of the data are described in the following sections while papers describing the experiment and some of the analyses are contained in the bibliography.

PARAMETER DESCRIPTION

The parameters provided for each sol are:

Flags

Sol number

Average pressure

Length of maximum time gap

Minimum pressure

Pressure range

Standard deviation

Starting and ending times of large gaps

Bit error rate <if fiche available at U.W.>

A short description of each parameter is given below and greater detail will be included in future documents.

DATA FORMAT

The order of the data for tape and microfiche are:

This document

Header for Lander 1

50 sols of data on one page or tape record

50 sols of data on each of the subsequent pages or tape records

Repetition of this structure until the end of Lander 1 data

End of file for tape or similar logical separator

This document repeated

Header for Lander 2

50 sols of data on one page or tape record

50 sols of data on each of the subsequent pages or tape records

Repetition of this structure until the end of Lander 2 data

End of file or similar data separator

For the medium of magnetic tape, the above data structure is repeated for redundancy

End of file for tape or similar logical separator

End of file for tape or similar logical separator

Data and text are written in 80 character lines with each page or tape record containing 55 lines.

The following sections provide descriptions of the parameters and their relation to the original data set. A more complete description will be provided with the publication of the point by point data set.

EDITING

Prior to inclusion in the data set, each measurement was subjected to a series of screening criteria designed to eliminate spurious points. Subsequent to the screening, the data were plotted and examined for meteorological consistency. Obviously bad points were removed and some questionable points also were removed. In some instances where the communications from Mars to Earth were moderately noisy, some sols probably have data with errors on the order of 0.088 to 0.176 millibars. After editing out the obvious spikes, the data were retained since they provide valuable daily average pressure estimates and they can be identified by their association with the highest bit error rates. At the present time, bit error rates have not been computed for part of the Lander 1 data. However, this parameter will be generated for the remaining data when the wind data are processed from the raw spacecraft data.

FLAGS (cols. 1-2)

Flags are provided to warn the user of potential biases in some or all of the statistics for a given sol. The character found in column 1 of each line indicates whether the entire line is data or text. A "C" or "F" in column 1 indicates the entire line contains only text. Any other character in column

1 indicates the presence of data on that line. The presence of a blank in column 1 indicates that the data for that sol has no interior gaps of 3 hours or more, and that the cross-midnight gaps at the start and end of that sol are less than 4 hours. The only other valid characters in column 1, a "." or a "I", are used in combination with a character in column 2. A ".I" in columns 1 and 2 signifies that the data from that sol contained at least one interior time gap of 3 hours or greater. A ".C" in columns 1 and 2 indicates that the data from that sol contained a cross-midnight gap of at least 4 hours at the start or end of that sol. A "IC" in columns 1 and 2 indicates that the data for that sol contained at least one interior time gap of 3 hours or greater, and a cross-midnight gap of at least 4 hours at the start or end of that sol. If gaps of greater than three hours are found during the sol, the time of the gap should be considered along with the presence of global or local dust storms in determining the validity of the data. For example, if there are significant dust storms, indicated by the continued sol to sol standard deviation of 0.15 millibars or greater, then the sol statistics would be especially sensitive to data loss in the late afternoon when the variation is most rapid. In these instances the MAXIMUM TIME GAP and the TIME GAP columns should be examined. In some instances, the point by point data for the sol should be examined to determine the reliability of the statistics or should be used instead of these data.

SOL (cols. 5-8)

One entry is provided for each sol regardless of whether any data were received for the sol. A Martian sol is 88775.25 seconds long or approximately 24.66 terrestrial hours. A line is provided for sol 0 for format consistency and to indicate that there are data for this sol which are available in the point by point data set. The line for sol 0 date has the "C" flag in column 1.

SOL MEAN PRESSURE (cols. 13-17)

The SOL MEAN PRESSURE is a time weighted daily average pressure with certain assumptions regarding gaps longer than three hours. Depending on the location of the gaps and their length, missing data are either filled in by interpolation or extrapolation or are excluded from the time weighted statistics. For gaps greater than four hours spanning midnight, interpolation is not used. Although interpolation is used for all intervals wholely within a sol, gaps longer than three hours can cause noticeable errors if the gap falls during the time of the diurnal pressure minimum for sols with strong diurnal variations especially during heavy atmospheric dust loading. Such instances can be excluded from analyses by using the information contained in the flags or the time gap parameters. Details of the interpolation or extrapolation will be presented in future documents.

The pressure transducers were produced by the Tavis Corporation and were calibrated to aproximately 0.01 to 0.02 millibars accuracy over the ranges of Martian atmospheric pressure variation. Calibrations to accuracies greater than allowed by the digitizing system were accomplished by test support instrumentation. Repeatability from year to year of the daily average pressure indicates that they have remained stable to significantly better than 0.04 millibars throughout the mission, possibly maintaining stabilities on the order of 0.01 millibars.

The pressure measurements were digitized into 255 approximately equal increments giving a basic pressure quantization interval of 0.087 to 0.088 millibars, depending on the lander and measured pressure. Thus, averages of the pressure would underestimate the true pressure by approximately 0.044 millibars. This is due to the fact that all pressures within the 0.088 millibar range would be registered as the lower bound of the interval even though half would generally be 0.044 millibars or more greater than the indicated value. To compensate for this, 0.044 millibars has been added to each individual pressure value which is reflected in all subsequent "recalibrated" data and all derivative products such as these "daily average" data.

Pressure data were converted from digitized to scientific units by Mission Operations software rather than Viking Meteorology Science Team software. In this operational software, the instrumental calibration was approximated by a piecewise linear approximation. The digital number 140, in the 0-255 DN range, was left out of the calibration table, producing maximum errors of 0.05 and 0.008 millibars for landers 1 and 2 respectively at pressures of 9.8 millibars. The errors in pressure decrease linearly to zero at pressures of 8.0 and 11.48 millibars for lander 1. The errors in lander 2 pressure decrease linearly to zero at pressures of 8.0 and 11.6 millibars. Pressure values previously submitted to NSSDC contain these errors. In producing the current data, corrections were made for the missing calibration point for each lander while recomputing the correct value for each pressure datum that was subsequently averaged.

For approximately the first 16 sols of Lander 1 operation, the wrong calibration constants were used in reducing the pressure data by the mission operations software. These errors are contained in the previously released NSSDC data and have been corrected prior to the calculation of these data.

MAXIMUM TIME GAP (cols. 23-27)

The MAXIMUM TIME GAP parameter provides an indication of the continuity of sampling during the sol and consequently, how well the statistics represent the true sol averages. For example, if several hours of data are missing around 17:00 local time especially during one of the intense dust storms, the pressure range and minimum probably will be in error by up to several tenths of a millibar.

MINIMUM PRESSURE (cols. 30-34)

The MIN. PRES. is the minimum pressure observed during the sol. Due to the quantization of the analog to digital converter, it changes by approximately 0.088 milibar increments.

RANGE (cols. 37-41)

The RANGE is the difference between the maximum and the minimum pressure for the sol. While it can indicate the magnitude of diurnal tidal harmonics, it also is significantly influenced by large sol to sol synoptic pressure variations.

STANDARD DEVIATION (cols. 44-49)

The STANDARD DEVIATION is computed as a time-weighted standard deviation around the daily average pressure. Although it is a better indicator of the atmospheric tides due to solar heating of dust than is the RANGE, especially at Lander 1, it also is significantly influenced by synoptic systems.

TIME GAP (cols. (from 54-61)-(to 64-71))

The time gap gives the starting and ending times of the longest interval without data during the sol. Since the atmospheric tides generally produce more rapid variations during late afternoon than other times of the sol, especially during intense dust storms, it helps to indicate the degree to which the daily average statistics approximate those of a continuously sampled sol.

BIT ERROR RATE (cols. 73-79)

The BIT ERROR RATE is an indicator of the reliability of the Spacecraft to Earth communications which is calculated from data in each Viking Meteorology Instrument frame. Due to system design, a portion of the data transmitted with each frame consists of all 1's, providing the ability to calculate the error rate for each frame. Although the VMIS and the pressure data are contained in different formats, sampled at different times and, in some instances, averaged over different portions of the sol, the bit error rate does provide a useful indication of the data quality. For Lander 2, they have been calculated for the complete mission while for Lander 1, they are currently available for only approximately one third of the mission. However, they will be available for the complete mission and at that time an updated version of this product will be made available. Values below 0.001 provide fairly good data while values below 0.0001 provide almost error free measurements with the exception of short bursts. Due to the extensive automated and manual editing, it is quite unlikely that individual pressure spikes greater than 0.176 millibars are included in the data and even 0.176 spikes are infrequent except in certain instances. In these instances, sols with high bit error rates are fairly noisy on the level of 0.088 to 0.176 millibars. These have been included to provide continuity of the daily average pressure values and the standard deviations and ranges for these sols should be viewed with caution.

This is the corrected format of the summary table. Lines that have
been changed are shown with ===> in staring in column 1.

SUMMARY OF FORMAT

The table below lists the format of the pressure data. Giving the starting
and ending columns where the actual data can appear and what type of data
will be found in the given columns.

                              TABLE   1
                              ****

           cols.   var. name   var. type   var. format
           *****   *********   *********   ***********
           1-2   FLAGS   CHAR   A2
           5-8   SOL   INT   I4
===>   12-17   MEAN PRES.   REAL   F6.3
===>   23-27   MX. TIME GAP   REAL   F5.2
           30-34   MIN. PRES.   REAL   F5.3
           37-41   PRES. RANGE   REAL   F5.3
           44-49   STD. DEV.   REAL   F6.4
           54-61   TIME GAP (FROM) INT   3(I2,1X)
           64-71   TIME GAP (TO)   INT   3(I2,1X)
           73-79   BIT ERR. RATE   REAL   F7.6

PLOTS

Plots of the daily average pressure and the standard deviation around the
daily average have been generated to assist in the selection   of
meteorological features and the interpretation of the numeric results.   Data
are presented in 100 sol blocks, and both landers are illustrated on the same
plot. The timeline on the abscissa is indicated in Lander 1 sols. Note that
the first Lander 2 data begin on sol 44, the delay of Lander 2's landing
relative to Lander 1.

On the printouts and tape, time is given in with respect to local Lander time
at each Landers. Midnight of Sol 0 at Lander 2, the end of the first day,
was sol 0 24:39:35.25, GMT time 1976 day 248 13:28:20.32 and corresponds to
Lander 1 sol 45 12: 7: 0.03, the same GMT time. Both the lower and the
upper panel of the plot use the same time line.

On each 100 sol plot, the first point is plotted at local noon for sol XX00
while the last point is at local noon for sol XX99. The lower panel presents
the daily average pressure values while the upper panel illustrates the
standard deviation. The standard deviation provides a crude indication of
the presence of dust generated tides and synoptic activity at Lander 1 while
at Lander 2 it is generally indicative of synoptic activity.   In all
instances, the data are plotted with a maximum time gap of 6.0 hours, i.e.,
the sols with time gaps longer than 6.0 hours are excluded from the plotted
data. Plots are generated for Lander 1 sols 0 through 2300 and the last data
were received on sol 2,245.

The following illustrates the corrected format with a small portion of an
actual data file. In the format descriptor shown below each 'a' represents
one character in a character field, each 'i' represents one character in an
integer field and each 'f' represents one character in a floating point number field.

FLAG	VL-1	SOL-MEAN	MAXIMUM	MIN.	RANGE	STANDARD		TIME GAP		BIT
C	SOL	PRESSURE	TIME GAP	PRES.		DEVIATION	FROM		TO	ERR RATE
C										

```
             1         2         3         4         5         6         7         8
 123456789 123456789 123456789 123456789 123456789 123456789 123456789 123456789 123456789
 |  |       |          |      |      |     |        |         |      |
aa iiii   ffffff    fffff  fffff  fffff  ffffff    ii ii ii  ii ii ii fffffff

C     0    7.624     18.01  7.534  0.255  0.0637    0: 0: 0  18: 0:49 .000000
      1    7.629      2.28  7.534  0.169  0.0687                       .00003
```

OTHER PRODUCTS

In the near future, the complete recalibrated pressure data set will be released along with documentation and plots. Subsequent to these products, wind and temperature data sets will be released as well as a compact summary of the data.

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ACKNOWLEDGEMENTS

$EXE LIST BS

INPUT PARAMETERS ARE: BC FL=1=1

  TAPE NO. 1   FILE NO. 1
  RECORD 1   LENGTH 200
-91 0 7 1 7.711 9 18.0140 4 7.619 9 18.9260 4 7.619 9 20.0815 3 7.705 9 21.5321 4 7.70
-9 9 22.9826 4 7.792 9 23.6217 2 7.705 9 24.4335 4 7.836>

  TAPE NO. 1   FILE NO. 1
  RECORD 1   LENGTH 200
-91 0 7 1 7.711 9 18.0140 4 7.619 9 18.9260 4 7.619 9 20.0815 3 7.705 9 21.5321 4 7.70
5 9 22.9826 4 7.792 9 23.6217 2 7.705 9 24.4335 4 7.836>

***** JOB DONE.
$AVF IN 45
$EXE LIST BS

INPUT PARAMETERS ARE: BC FL=1=1

  TAPE NO. 1   FILE NO. 1
  RECORD 1   LENGTH 200
-92 1 21 3 7.767 9 1.2126 4 7.819 9 2.6632 4 7.819 9 4.1136 3 7.819 9 5.3361 1 7.73
2 9 5.5615 4 7.819 9 7.0149 4 7.732 9 8.4756 6 7.732 9 9.7160 6 7.7
32

  TAPE NO. 1   FILE NO. 1
  RECORD 3   LENGTH 200
9 22.9713 4 7.819 9 24.4218 4 7.819

***** JOB DONE.
$AVF IN 43
$EXE LIST BS

INPUT PARAMETERS ARE: BC SR=1=2

  TAPE NO. 1   FILE NO. 1
  RECORD 1   LENGTH 200
-91 14 0 7.125 9 1.6025 13 7.194 9 3.9361 12 7.109 9 9.2592 12 7.194 9 11.1258 12 7.19
4 9 12.9925 12 7.109 9 13.6103 5 7.109 9 13.7944 5 7.109 9 13.9599 6 7.109 9 14.1282 10 7.1
09

  TAPE NO. 1   FILE NO. 1
  RECORD 2   LENGTH 200
9 14.8592 12 7.109 9 16.9292 12 7.024 9 19.2603 15 7.024 9 21.5958 12 7.159 9 23.9292 12 7.19
4

***** JOB DONE.
$AVF IN 44
$EXE LIST BS

INPUT PARAMETERS ARE: BC SR=1=1

  TAPE NO. 1   FILE NO. 1
  RECORD 1   LENGTH 200
-92 0 6 13 7.750 9 11.4275 2 7.819 9 12.3489 2 7.601 9 12.7017 1 7.732 9 17.0817 1 7.73
2 9 18.5265 1 7.819 9 24.4218 4 7.819

***** JOB DONE.
$AVF IN 104

INPUT PARAMETERS ARE: BC SR=1=2

TAPE NO. 1   FILE NO. 1
RECORD 1   LENGTH 2=0
-92 60 79   2   7.455 9   7.469 9   .4722   1   7.469 9   .7625   1   7.469 9   1.0505   3   7.46
9 9   1.3428   1   7.469 9   1.6328   1   7.469 9   1.9231   1   7.469 9   2.2131   1   7.469 9   2.5033   1   7.4
69

TAPE NO. 1   FILE NO. 1
RECORD 2   LENGTH 200
4 9   2.7931   1   7.469 9   3.0833   1   7.469 9   3.3733   1   7.469 9   3.6636   1   7.447 9   3.9536   1   7.40
4 9   4.2439   1   7.404 9   4.5339   1   7.426 9   4.8242   1   7.426 9   5.1139   1   7.447 9   5.4042   1   7.4
69

***** JOB DONE.
$WEO LPS

$NOP
$NOP ****** LIST OF 1ST AND LAST REC. ON 1ST FILE OF GAIL 1 ********
$EXE TPLIST BS

INPUT PARAMETERS ARE: AS FL=1=1

TAPE NO. 1   FILE NO. 1
RECORD 1   LENGTH 3600

TAPE NO. 1   FILE NO. 1
RECORD 3   LENGTH 3600

D-64312

Viking Lander 1
7/20/76 - 11/12/82

Viking Lander 2
9/4/76 - 7/21/79

1 sol = 24.66 hours.

Sol 0 is beginning point for data.

All printed document file on 8½ × 11" pages

$ASS IN TA1
$NOP
$NOP
$NOP
$NOP ************ DAVE *********
$EXEC TPLIST BS

INPUT PARAMETERS ARE: AS AL 4 1 1

TAPE NO. 1   FILE NO. 1
RECORD 1   LENGTH 4400

ATMOSPHERIC PRESSURE STATISTICS

from the SURFACE of MARS:

the Vik
ing Meteorology Experiment

James E. Tillman

Viking Meteorology Science Team

V1

and

Director

VIKING COMPUT
ER FACILITY

and

William R. Guest

Department of Atmospheric Science
University of Washington

s

Seattle, Washington

98195

Daily Average Pressure

Revision 2.2   85/08/12

TAPE NO. 1   FILE NO. 1
RECORD 2   LENGTH 4400
INTRODUCTION

pressure data from the Viking Lander Meteorology Experiment throughout the mission from th

This document describes summary
pressure data from the Viking Lander Meteorology Experiment throughout the mission from th etc.

```
9.ED.KF.REV2.0           C   <BINSCR>WRG.TEMP>VL1.PRES-IST>SOL.0400-0499.ED.KF.REV2.0
C   <BINSCR>WRG.TEMP>VL1.PRES-IST>SOL.0500-0599.ED.KF.REV2.0   C
1.PRES-IST>SOL.0600-0699.ED.KF.REV2.0   C   <BINSCR>WRG.TEMP>VL
1.PRES-IST>SOL.0700-0799.ED.KF.REV2.0   C   <BINSCR>WRG.TEMP>VL1.MULT.SOURCE.BLOCK
S>SOL.0800-0899.ED.KF.REV2.0   C   <BINSCR>WRG.TEMP>VL1.MULT.SOURCE.BLOCKS>SOL.0900-0999.ED.
WRG.REV2.0   C   <BINSCR>WRG.TEMP>VL1.MULT.SOURCE.BLOCKS>SOL.1000-1099.ED.WRG.REV2.0
C   <BINSCR>WRG.TEMP>VL1.MULT.SOURCE.BLOCKS>SOL.1100-1199.ED.WRG.REV2.0   C   <BINSCR>WRG.TEM
P>VL1.MULT.SOURCE.BLOCKS>SOL.1200-1299.ED.WRG.REV2.0   C   <BINSCR>WRG.TEMP>VL1.MULT.SOURCE.B
LOCKS>SOL.1300-1399.ED.WRG.REV2.0   C   <BINSCR>WRG.TEMP>VL1.MULT.SOURCE.BLOCKS>SOL.1400-1499
.ED.WRG.REV2.0   C   <BINSCR>WRG.TEMP>VL1.MULT.SOURCE.BLOCKS>SOL.1500-1599.ED.WRG.REV2.0   C   <BINSCR>WRG
.TEMP>VL1.MULT.SOURCE.BLOCKS>SOL.1600-1699.ED.WRG.REV2.0   C   <BINSCR>WRG.TEMP>VL1.MULT.SOUR
CE.BLOCKS>SOL.1700-1799.ED.WRG.REV2.0   C   <BINSCR>WRG.TEMP>VL1.MULT.SOURCE.BLOCKS>SOL.1800-1899.ED.WRG.REV2.0   C   <BINSCR>WRG.TEMP>VL1.MULT.SOURCE.BLOCKS>SOL.1900-
1999.ED.WRG.REV2.0   C   <BINSCR>WRG.TEMP>VL1.MULT.SOURCE.BLOCKS>SOL.2000-2099.ED.WRG.REV2.0   C   <BINSCR
>WRG.TEMP>VL1.MULT.SOURCE.BLOCKS>SOL.2100-2199.ED.WRG.REV2.0   C   <BINSCR>WRG.TEMP>VL1.MULT.SOURCE.BLOCKS>SOL.2200-2299.ED.WRG.REV2.0
```

```
TAPE NO. 1            FILE NO. 1
RECORD 11            LENGTH 4400
C        PRESSURE DATA AT VIKING LANDER 1

NGE  STANDARD   TIME GAP   BIT   C   SOL   PRESSURE   FLAG VL-1   SOL-MEAN   MAXIMUM   MIN.   RA
 M   TO   ERR   RATEC                            PRESSURE   TIME GAP   PRES.    DEVIATION   FRO
 C   L O
```

(Data values, partial)

```
29   2.28   7.534   18.01   7.624   0:  0:  0   18:  0:49   .000000   L1   7.6
     0.255  0.0818   7.534  0.0687   .00003   7.581   7.449   2.28   7.449
.000000                .000000                .000000  .I      6
7.564   4.06  7.449   7.564            7.554   2.06  7
.449  0.169  0.0684   0.255          8  7.544   2.61  7.449  0.169  0.0731
.000000                              .00003          .00003   1
1   7.498              7.509   9  7.514   2.28  7.364  2.28  2.9
0   7.364  0.255  0.0713  2.28  7.364  0.0738  7.364  2.28  7.364  0.170  0.
0703                 .000000  13  2.08  7.473  2.08  7.482
16   7.450              7.462  14  7.473  7.412   17  7.436
3.95  7.279  0.255  0.0750  2.90  7.364  0.0710  7.364  2.90  7.279  0.255
0.0693                              18                 .00005
     .00004  .I   20   19  7.408  2.27  7.279  0.255  0.0628
3.54  7.392  0.170   3.36  4.01  7.279  7.398  4.49:52  8:50:11  .00005
.I   21   7.279  0.170  0.0608   .0001   23   22   7.372
44:26  24:39:35  .000000  24  7.351  4.92  7.279  3.78  7.279  0
.170  0.0612  25  7.351  7.279  0.170  0.0630   19:
003   26   2.61  7.194  0.0581   .00009   28   27   7.
316  2.89  7.194   2.61  0.170   .0001  7.305  4.85  7.194  1.55  7.19
.0001  7.286  7.194  0.170  0.0669  0.170
     2:21:31  7:12:17  .00006  29  3.63  7.194  7.308  0.170  0.0632
.0001  30  2.40  7.275  0.0627  .00003  .C   33   32
0.0693  3.68  7.109  0.0737  4:19:9  7:59:59  2.90
7.251  3.95  7.109  0.255  7.233  .000000  IC  2.90
7.109  0.255  0.0658  3:57:6  .00007  35  34  0.255  0.060
0:  0:  0   2.60  7.109  0.170  7.235  0.170  0.0664
```

(handwritten annotations: "Data" (circled), "etc.", "etc.")

```
37   NO FICHE    2236    1.03  7.789  0.971  0.2602    NO FICHE    2238    NO FICHE    22
06   7.874  0.797  8.216   2.31  7.789  0.882  0.2445    8.236  1.03  7.874  0.882  8.250  1.
.2498                    NO FICHE    2240    NO FICHE    2239  1.03  7.874  0.797  0.2401      0
          NO FICHE    2241    8.338  1.03  7.959  0.801    8.268  1.03  7.959  0.801  0.2376    NO FICHE
     2242   8.395   1.03  7.959  0.801  0.2419                    2243   8.361
     1.03  7.959  0.801  0.2361    NO FICHE.C   2245    NO FICHE    2244   1.03  7.959  0.80
   1   0.2378  NO FICHEC              8.533    11.35  8.223  0.626  0.2079   13:18:
  47   24:39:35  NO FICHEC    2245 is the last sol at Lander 1 for which daily
   C   Sol 2245 is the last sol at Lander 1 for which daily
ssure can be formed.                        C              C      average pre

                                     Sol 2245 = day 2306

TAPE NO.  1         FILE NO.  2
RECORD  1           LENGTH  4400


                    ATMOSPHERIC PRESSURE STATISTICS
                     from the SURFACE of MARS:                    the Vik


ing Meteorology Experiment

                         James E. Tillman

                                                                 V1

king Meteorology Science Team              and


                                Department of Atmospheric Science
                              University of Washington

s                        Seattle, Washington

                           Director                        VIKING COMPUT

ER FACILITY

                 and

        William R. Guest

                                         Daily Average Pressure

   98195


Revision 2.2                            85/08/12


TAPE NO.  1         FILE NO.  2
RECORD  2           LENGTH  4400
INTRODUCTION

pressure  data  from  the  Viking  Lander  Meteorology Experiment  throughout  the  mission  from  th

   This  document  describes  summary
```