



#506

HELIOS-1
74-097A-03A

HELIOS-2
76-003A-03A

8-SEC. AVG. SPECT. DEN.

8 CHAN 6.8-1470

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 This inventory information is now no longer maintained in the DSCs, but is now managed in the inventory part of the NSSDC information system.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

HELIOS-A

8-S AVG SPECT DEN 8 CHAN 6.8-1470

74-097A-03A SPHE-00177

This data set has been restored. There were originally nine 9-track, 1600 BPI tapes written in Binary. There are three restored tapes. The DR tapes are 3480 cartridges and the DS tapes are 9-track, 6250 BPI. The original tapes were created on an IBM 360 computer and the restored tapes were created on an IBM 9021 computer. The DR and DS numbers along with the corresponding D numbers are as follows:

| DR# | DS# | D# | FILES | TIME SPAN |
|----------|----------|---------|-------|---------------------|
| ----- | ----- | ----- | ----- | ----- |
| DR004591 | DS004591 | D045032 | 1 | 12/10/74 - 12/24/74 |
| | | D045033 | 2 | 12/23/74 - 01/03/75 |
| | | D045034 | 3 | 01/03/75 - 01/15/75 |
| DR004592 | DS004592 | D045035 | 1 | 01/15/75 - 01/28/75 |
| | | D045036 | 2 | 01/27/75 - 02/13/75 |
| | | D045037 | 3 | 02/13/75 - 02/28/75 |
| DR004593 | DS004593 | D045038 | 1 | 02/25/75 - 03/15/75 |
| | | D045039 | 2 | 03/15/75 - 07/19/75 |
| | | D045040 | 3 | 07/19/75 - 09/20/75 |

HELIOS-B

8-S AVG SPT DEN 8 CHAN 6.8-1470HZ

76-003A-03A SPHE-00358

This data set has been restored. There were originally nine 9-track, 1600 BPI tapes written in Binary. There are three restored tapes. The DR tapes are 3480 cartridges and the DS tapes are 9-track, 6250 BPI. The original tapes were created on a PDP11 computer and the restored tapes were created on an IBM 9021 computer. The DR and DS numbers along with the corresponding D numbers are as follows:

| DR# | DS# | D# | FILES | TIME SPAN |
|----------|----------|---------|-------|-------------------------|
| ----- | ----- | ----- | ----- | ----- |
| DR004549 | DS004549 | D045483 | 1 | 01/15/76 - 01/27/76 |
| | | D045484 | 2 | 01/27/76 - 02/08/76 |
| | | D045485 | 3 | 02/08/76 - 02/20/76 |
| DR004550 | DS004550 | D045486 | 1 | 02/20/76 - 03/02/76 (a) |
| | | D045487 | 2 | 03/02/76 - 03/14/76 |
| | | D045488 | 3 | 03/14/76 - 03/28/76 |
| DR004551 | DS004551 | D045489 | 1 | 03/28/76 - 04/12/76 |
| | | D045490 | 2 | 04/12/76 - 04/26/76 |
| | | D045491 | 3 | 04/26/76 - 11/21/76 |

(a) D045486: Read errors occurred in records 12727 & 12728 of file 1.

REQ. AGENT
GLS

RAND NO.
V0098

ACQ. AGENT
HKH

HELIOS 1

8-SEC AVG SPECT DEN 8 CHAN 6.8-1470

74-097A-03A

Data sheets
say PDP

This data set catalog contains 9 magnetic tapes. They are 9 track, 1600 BPI, BINARY and each tape has one file. The first record in a tape is a header-record. The next record is a day label. Additional day labels precede every change of day on a tape. The other records are science data records. The following list contains D numbers, C numbers and time spans of each tape.

| <u>D#</u> | <u>C#</u> | <u>TIME SPAN</u> |
|-----------|-----------|---------------------|
| D-45032 | C-21766 | 12/10/74 - 12/24/74 |
| D-45033 | C-21767 | 12/23/74 - 01/03/75 |
| D-45034 | C-21768 | 01/03/75 - 01/15/74 |
| D-45035 | C-21769 | 01/15/75 - 01/28/75 |
| D-45036 | C-21770 | 01/27/75 - 02/13/75 |
| D-45037 | C-21771 | 02/13/75 - 02/28/79 |
| D-45038 | C-21772 | 02/25/75 - 03/15/75 |
| D-45039 | C-21773 | 03/15/75 - 07/19/75 |
| D-45040 | C-21774 | 07/19/75 - 09/20/75 |

REQ. AGENT
GLS
DAD

RAND #
V0098
V0210

ACQ. AGENT
HKH
RWP

Rec?
HELIOS-2

8-~~5~~ AVG. SPECT DENSITY 8 6.8-1470 DATA

76-003A-03A

This data set catalog contains 9 magnetic tapes. They are 9 track, 1600 BPI, BINARY and each tape has one file. The first record in a tape is a header-record. The next record is a day label. Additional day labels precede every change of day on a tape. The other records are science data records. The following list contains D and C numbers and time spans of each tape.

| <u>D#</u> | <u>C#</u> | <u>TIME SPAN</u> |
|-----------|-----------|---------------------|
| D-45483 | C-23392 | 01/15/76 - 01/27/76 |
| D-45484 | C-23393 | 01/27/76 - 02/08/76 |
| D-45485 | C-23394 | 02/08/76 - 02/20/76 |
| D-45486 | C-23395 | 02/20/76 - 03/02/76 |
| D-45487 | C-23396 | 03/02/76 - 03/14/76 |
| D-45488 | C-23397 | 03/14/76 - 03/28/76 |
| D-45489 | C-23398 | 03/28/76 - 04/12/76 |
| D-45490 | C-23399 | 04/12/76 - 04/26/76 |
| D-45491 | C-23400 | 04/26/76 - 11/21/76 |

Description of Average Tapes of Experiment-4 Data of He-1
and -2 (Search-Coil Magnetometer Experiment)

A) Structure of Tapes

- 1) 9 track, 6250 ~~1600~~ BPI, binary
- 2) Files: one tape includes one file
- 3) Records: they have variable length. The maximal length is 800 words. The first record in a tape is a header-record. The next record is a day label. Additional day labels precede every change of day in a tape. The other records are science data records. In average tapes two types of science data records are possible:

Mean value records (Mean)
peak value records (Max)

The time sequence is as follows:

Mean (T1), Max (T1), Mean (T1 + 0.5 × Tstep),
Mean (T1 + 2 × Tstep), Max (T1 + 2 × Tstep),
Mean (T1 + 1.5 × Tstep),
a.s.o.

with: T1 - any start time

Tstep - time intervall for one Max

4) words:

The wordlength is 16 bits.

The content of records is counted in words.

For detailed description of words in a record see
'E4 adr Tape Records' (enc.)

character representation : 8-bit Ascii code

bits 1-8 first character

bits 9-16 second character

integer representation: 1 word, two's complement
real representation: 2 words
bit 1: sign
bits 2-10: exponent (biased+256)
bits 11-32: positive fraction
long representation: 4 words
bits 1-10: same as real
bits 11-64: positive fraction

B) Science Data Records:

- 1) Data processing: For detailed description of the search-coil magnetometer experiment (E4) see Neubauer et al. (1977), Dehmel et al. (1975).

The experiment consists of 3 orthogonal search-coil sensors with Z-axis parallel to the spin-axis and the X- and Y-axis in the equatorial plane.

The Z-component and one of the X- or Y-component is processed by a spectrum analyser. It consists of 8 band-pass filters spaced logarithmically in frequency.

| frequency range [Hz] | center freq. [Hz] | channels |
|-------------------------|----------------------|----------|
| 4.7 - 10 | 6.8 | X1, Z1 |
| 10 - 22 | 14.7 | X2, Z2 |
| 22 - 47 | 31.6 | X3, Z3 |
| 47 - 100 | 68 | X4, Z4 |
| 100 - 220 | 147 | X5, Z5 |
| 220 - 470 | 316 | X6, Z6 |
| 470 - 1000 | 681 | X7, Z7 |
| 1000 - 2200 | 1470 | X8, Z8 |

(or instead of X : Y)

A set of X1, Z1, , X8, Z8 is called a vector.

Mean vaules:

The filter outputs are squared and averaged by a digital mean-value-computer on board of Helios. The time intervalls are:

1.125, 2.25, 4.5, 18, 36, 72, 144, 288,
576, 1152 seconds depending on the operational
mode of the S/C telemetry system.

Peak values:

For the same time interval the peak reading from each filter output is transmitted in addition to the mean values. The peak values are scaled such that for a monochromatic signal they are above the mean values by a factor of $\sqrt{2}$. No peak values exist for distribution mode 0.

8sec average tapes:

The data records consist of experimental output voltages with respect to an amplification factor. For average intervals less than 4.5 seconds the mean values are compressed to 8-sec-averages.

2) Time information:

The number of days is counted from the day of year at launch.

He 1: launched December 10, 1974
number of day: 344

He 2: launched January 15, 1976
number of day: 15

Attention: No reset of day number was made when the year changes.

The fraction of day is the current time of that day.

e.g.: He-1, February 1, 1975 at 12.00

number of days: 397

fraction of days: 0.5

The number and fraction of day provide the event time of the first vector in a data record. The vector step time is the time between two vectors in fraction of day.

3) Conversion of data:

To convert the sensor output voltages into spectral densities measured in $\gamma/\sqrt{\text{Hz}}$ ($= \text{nT} \cdot \sqrt{\text{sec}}$) one has to apply a conversion factor $\text{conv}(f)$ and the amplification factor Amp to each channel.

Amp is 10. throughout the missions of He1 and 2.

| $\text{conv}(f)$ | channel X,Y,Z |
|----------------------|---------------|
| $2.07 \cdot 10^{-6}$ | 8 |
| $6.58 \cdot 10^{-6}$ | 7 |
| $2.11 \cdot 10^{-5}$ | 6 |
| $6.65 \cdot 10^{-5}$ | 5 |
| $2.11 \cdot 10^{-4}$ | 4 |
| $6.60 \cdot 10^{-4}$ | 3 |
| $2.09 \cdot 10^{-3}$ | 2 |
| $6.59 \cdot 10^{-3}$ | 1 |

e.g.: Value of sensor 2, 1st vector, channel 8

value $[\gamma/\sqrt{\text{Hz}}] = \text{real}(\text{word } 87,88) \times \text{conv}(8)/\text{Amp}$

4) Noise:

There are some rare cases showing only background noise in all frequency channels. But in most of the time channel 1 and 2 (frequency 4.7 - 22 Hz) show signals well above the noise levels.

The occurrence of signals above the noise decrease with increasing frequency and increase with approach to the sun.

Lit.: Neubauer, F.M., Beinroth, H.J., Barnstorf, H., Dehmel, G.:
Initial results from the Helios-1 search-coil magnetometer
experiment. J.Geophys.Res., 42, 599-614, 1977.

Dehmel, G., Neubauer, F.M., Lukoschus, D., Wawretzko, J.,
Lammers, E.: Das Induktionsspulen-Magnetometer-Experiment
(E4). Raumfahrtforschung, 19, 241-244, 1975.

1. TAPE HEADER

=====

| WORDNUMBER | TYPE | CONTENT |
|------------|-----------|--|
| 1 | INTEGER | 100 LABEL |
| 2 | INTEGER | LENGTH OF RECORD IN WORDS |
| 3 | CHARACTER | "**** E4ADR TAPE HEADER/HELIOS A ****" |
| | | "**** E4ADR TAPE HEADER/HELIOS B ****" |
| 21 | INTEGER | NUMBER OF TAPE |
| 22 | INTEGER | NUMBER OF SERIES |
| 23 | INTEGER | YEAR OF GENERATION |
| 24 | INTEGER | MONTH " |
| 25 | INTEGER | DAY " |
| 26 | INTEGER | HOUR " |
| 27 | INTEGER | MINUTE " |
| 28 | INTEGER | MAX. LENGTH OF DATA RECORD IN WORDS |
| 29 | INTEGER | OUTPUT DEVICE |
| 30 | INTEGER | RPI |
| 31 | INTEGER | AVERAGE TIME OF TAPE IN SECONDS |
| 32-60 | | FREE |

2. DAY LABEL

=====

| | | |
|---|-----------|--------------------------------|
| 1 | INTEGER | 99 LABEL |
| 2 | INTEGER | 12 - LENGTH OF RECORD IN WORDS |
| 3 | INTEGER | NUMBER OF DAYS SINCE LAUNCH |
| 4 | CHARACTER | "****DAY LABEL****" |

3. SCIENCE DATA

=====

| | | |
|-------|---------|-------------------------------------|
| 1 | INTEGER | 11 - MEANVALUES |
| | | 12 - MAXIMALVALUES |
| | | 13 - WAVEFORMVALUES |
| 2 | INTEGER | LENGTH OF RECORDS IN WORDS |
| 3 | INTEGER | NUMBER OF DAYS SINCE LAUNCH |
| 4-7 | LONG | FRACTION OF DAY (DECIMAL) |
| 8-9 | | FREE |
| 10 | INTEGER | NUMBER OF VECTORS IN RECORD |
| 11 | | FREE |
| 12 | INTEGER | FORMAT |
| 13 | INTEGER | BIT RATE |
| 14 | INTEGER | DISTRIBUTION MODE |
| 15-18 | LONG | VECTOR STEP TIME IN FRACTION OF DAY |
| 19-21 | | FREE |

| | | | | |
|----|-------|---------|----|-------------------------------------|
| 58 | 22 | INTEGER | 90 | - HELIOS 1 |
| 59 | | | 91 | - HELIOS 2 |
| 60 | 23-24 | REAL | | ECLIPT. LAT. OF SPIN AXIS (RAD) |
| 61 | 25,26 | REAL | | ECLIPT. LONG. OF SPIN AXIS (RAD) |
| 62 | 27,28 | | | FREE |
| 63 | 29-30 | REAL | | ECLIPT. LONG. OF HELIOS POS. (RAD) |
| 64 | 31-32 | REAL | | DISTANCE FROM SUN (AU) |
| 65 | 33-34 | REAL | | FREE |
| 66 | 35,36 | | | HELIOGRAPH. LAT. OF HEL. POS. (RAD) |
| 67 | 37,38 | REAL | | ANGLE HELIOS-SUN-EARTH (RAD) |
| 68 | 39,40 | | | FREE |
| 69 | 41,42 | REAL | | SAMPLING RATE IN ORIG. DATA |
| 70 | | | | (ONLY AVERAGE TAPES) |
| 71 | 43-46 | LONG | | VECTOR STEP TIME " " |
| 72 | | | | (ONLY AVERAGE TAPES) |
| 73 | 47-66 | | | FREE |
| 74 | 67-70 | LONG | | TRIP LIGHT TIME IN FRACTION OF DAY |
| 75 | 71-74 | LONG | | SPIN PERIOD IN FRACTION OF DAY |
| 76 | 74-80 | | | FREE |

DATA PART OF REC

| | | | | |
|----|--------|---------|------|----------------------------------|
| 81 | 81 | INTEGER | 0 | - GOOD QUALITY |
| 82 | | | 1-7- | BAD QUALITY |
| 83 | 82 | INTEGER | 0 | - Y - SENSOR |
| 84 | | | 1 | - X - SENSOR |
| 85 | 83 | INTEGER | | AMPLIFICATION FACTOR |
| 86 | | | | (0 - .4, 1 - .08 |
| 87 | | | | 2 - 10., 3 - 2.) |
| 88 | 84 | INTEGER | | FACTOR, ONLY IN AVERAGE TAPES |
| 89 | 85-86 | REAL | | SAMPLING RATE (IN AVERAGE TAPES |
| 90 | | | | NUMBER OF GOOD VECTORS FOUND |
| 91 | | | | IN THIS AVERAGE INTERVALL, |
| 92 | | | | SEE WORD 41,42) |
| 93 | 87-118 | REAL | | 16 WORDS, 8X,8Z,7X,7Z,....,1X,1Z |
| 94 | | | | FOR MEAN VALUES |
| 95 | 87-102 | INTEGER | | 16 WORDS, 8X,8Z,7X,7Z,....,1X,1Z |
| 96 | | | | FOR MAXIMAL VALUES |

REPETITIONS FOR N MORE VECTORS AS SPECIFIED IN WORD 10

100 *****

LINES = 60
POLLI = TRUE (I.E. BATCH = FALSE)
REAR = TRUE (I.E. FRONT = FALSE)
DELTA = 1
CURRENT DEPTH = 0, THE DEPTH LIMIT = 10
RIGHT = 72
LENGTH = 72
LONG = TRUE (I.E. SHORT = FALSE)
TIMEI = 50
TOTAL NUMBER OF CURRENT LINES = 100
FROM = 1
LEFT = 1
FIXED = TRUE (I.E. VARIABLE = FALSE)
SIZEI = 0
DISPLAY = TRUE (I.E. QUIET = FALSE)
FORMAT=DEFAULT
NO TABS USED
FILES:

WORK: K0641640
KEEP:
TEXT: E4FORMAT.GBEIN.E4
JOIN:

THU, MAR 5, 1981, 4:40 PM

III

DAY
344

RECORD 2 OF FILE 1
LENGTH = 24 BYTES

0063000C 01582A2A 2A2A4441 59204C41 42454C2A 2A2A2A2A

12/10/74 - 12/28/74

I

)

"

III

DUMP OF TAPE GOUTA

D-45032

12/10/74 - 12/24/74

INPUT TAPE GOUTA ON MT4
DATA INPUT H9 FL 1 2 STOP

| FILE | 1 | RECORD | 1 | LENGTH | 120BYTES | | | | | | |
|-------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|--|
| (0) | 0064003C | 2A2A2A2A | 20453441 | 44522054 | 41504520 | 48454144 | 45522F48 | 454C494F | 53204120 | 2A2A2A2A | |
| (40) | 00010001 | 07BB0007 | 0002000A | 002F0264 | 000C0640 | 00080000 | 00000000 | 00000000 | 00000000 | 00000000 | |
| (80) | 00000000 | 00000000 | 00000000 | 00000000 | 00000000 | 00000000 | 00000000 | 00000000 | 00000000 | 00000000 | |

| FILE | 1 | RECORD | 2 | LENGTH | 24BYTES | | | | | |
|------|----------|----------|----------|----------|----------|----------|--|--|--|--|
| (0) | 0063000C | 01582A2A | 2A2A4441 | 59204C41 | 42454C2A | 2A2A2A2A | | | | |

E0J STOP REQUESTED IN FILE 1

E0J DUMP STOPPED AFTER FILE 1 # OF PERMANENT READ ERRORS 0

START TIME 10/22/81 20:54:04 STOP TIME 10/22/81 20:54:31

~~XXXX~~

DUMP OF TAPE GOUTI

07/19/75 - 09/20/75

D-45040

INPUT TAPE GOUTI ON MT4
DATA INPUT H9 FL 1 2 STOP

| FILE | 1 RECORD | 1 LENGTH | 120BYTES |
|-------|----------|----------|---|
| (0) | 0064003C | 2A2A2A2A | 20453441 44522054 41504520 48454144 45522F48 454C494F 53204120 2A2A2A2A |
| (40) | 07BD0007 | 07BB0007 | 0005000A 000A0264 10680640 00080000 00000000 00000000 00000000 00000000 |
| (80) | 00000000 | 00000000 | 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 |

| FILE | 1 RECORD | 565 2 LENGTH | 24BYTES |
|------|----------|--------------|-------------------------------------|
| (0) | 0063000C | DAY 2A2A | 2A2A4441 59204C41 42454C2A 2A2A2A2A |

EOJ STOP REQUESTED IN FILE 1

EOJ DUMP STOPPED AFTER FILE 1 # OF PERMANENT READ ERRORS 0

START TIME 10/24/81 10:25:15 STOP TIME 10/24/81 10:25:32

FORM 14113