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**A Compilation of
Observations from
Moored Current Meters**

**Volume XIV
Part B**

**Current, Temperature and Pressure
in the Drake Passage
During Drake 79**

January 1979-January 1980

by

**R. D. Pillsbury
J. S. Bottero
R. E. Still**

Data Report 91

Reference 81-17

December 1981

**National Science Foundation
Grant No. OCE-7823579**

School of Oceanography
Oregon State University
Corvallis OR 97331

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ABSTRACT

Internally recording instruments were installed in the Drake Passage in January 1979 and recovered in January 1980. Additional instruments were installed at this time for the first experiment in the Pilot Ocean Monitoring Experiment. These are to be recovered in March of 1981.

The array consisted of seventy current meters on twenty-four moorings. In addition there were twenty-eight temperature/pressure recorders and four thermistor chains installed on these same moorings. The data were taken at one hour intervals.

In this report, some of the current meter measurements are summarized through pertinent statistics, progressive vector diagrams, real time plots, stick figures, rotary spectra, and conventional power spectra.

Introduction

DRAKE 79 was the major experiment of the International Southern Ocean Studies (ISOS) program. It followed a series of preparatory experiments called FDRAKE, and like them was designed to study circulation and transport processes in the region of the Drake Passage. FDRAKE began in January of 1975 with extensive hydrographic and chemical data collection (Anon., 1976 and Nowlin et al., 1977) supplemented by an array of both short and long term current meter moorings (Pillsbury et al., 1976, 1977). This experiment was continued in January of 1976 (FDRAKE 76) with the collection of additional hydrographic data and the setting of a second long term current meter array by the R/V T. G. THOMPSON. The current meter array was recovered by the R/V MELVILLE in January of 1977 as a part of FDRAKE 77 (Scioremammano et al., 1978). The R/V MELVILLE deployed a cluster array in January 1977 which was recovered on the AGS YELCHO in December 1977. A single mooring, Yelcho, was set at that time and recovered by the R/V MELVILLE in January 1979. The data from the cluster array and the Yelcho mooring are presented in Pillsbury et al., 1980.

DRAKE 79 was designed to study the time and space scales of flow variations near the Drake Passage, and to expand our knowledge of the distribution of water mass properties and their dynamics in this important region of the world's ocean.

In this report a compilation of the data from some of

the DRAKE 79 current meters is presented. The data from the thermistor chains, temperature/pressure recorders, conductivity cells on the Aanderaa meters and remaining current meters will be presented in a data report to be issued by Texas A&M University. The complementary hydrographic data are presented in a report (Worley and Nowlin, 1979). The hydrographic data from the recovery cruise aboard the R/V ATLANTIS II will be in a data report to be issued by Texas A&M University. The pressure measurements made to complement the hydrographic and current meter data will be presented in a report to be issued by the University of Washington.

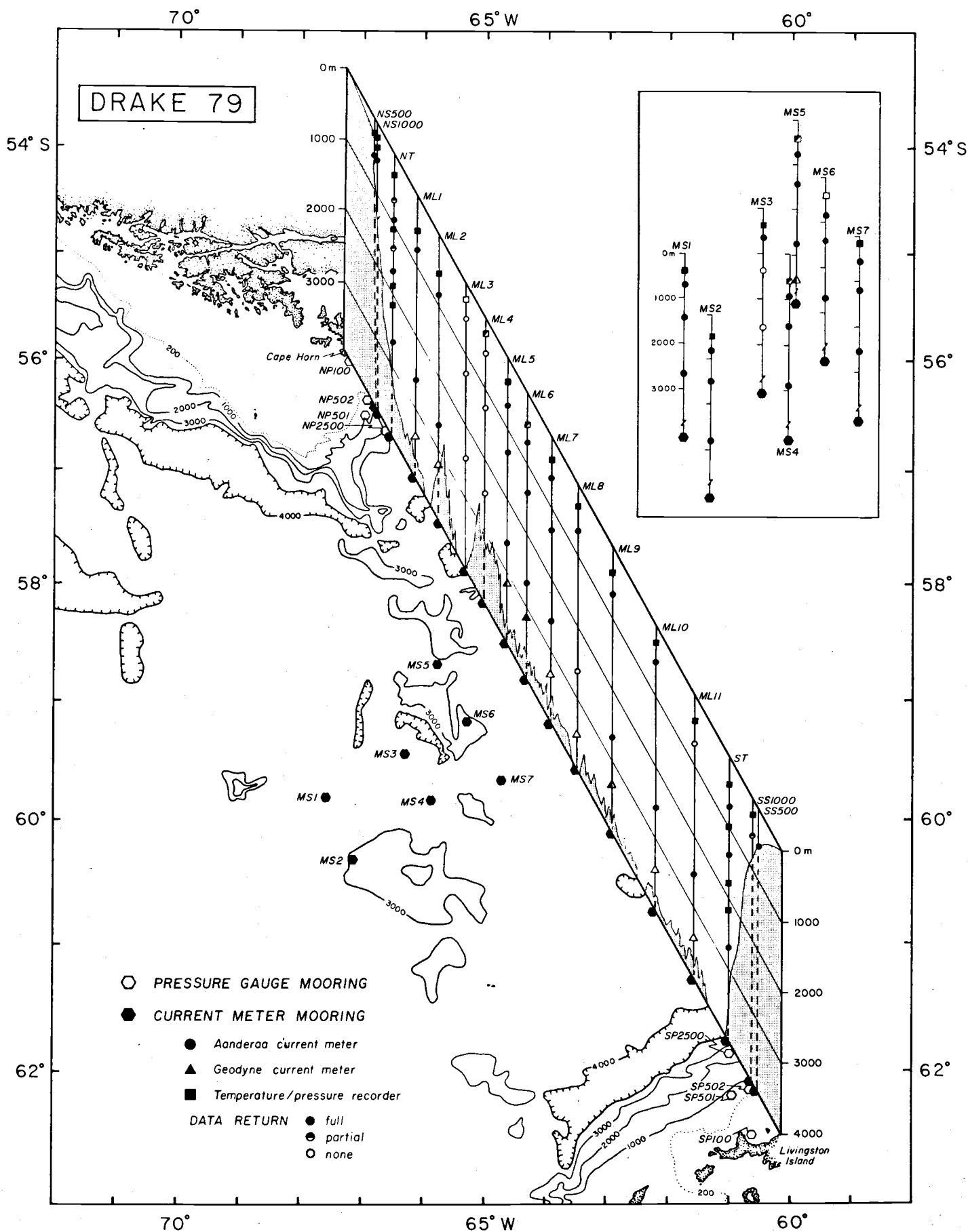
The Current Meter Program

Figure 1 shows the Main Line (ML) array consisting of 48 current meters on 17 moorings; and the Mapping and Statistics (MS) array with 22 current meters on 7 moorings deployed upstream in the Antarctic Circumpolar Current. Figures 2 and 3 show the duration of data for each meter. The data from the ML array are presented in Part A of this report. The data from the MS array are presented in Part B.

The general calibration techniques for the Aanderaa meters used have been previously discussed (Pillsbury et al., 1974, 1980).

All of the current meter moorings were subsurface, taut-wire moorings. Their design followed in large part the Woods Hole Oceanographic Institution intermediate mooring

Figure 1. The configuration of the current meter moorings installed in the Drake Passage in 1979.



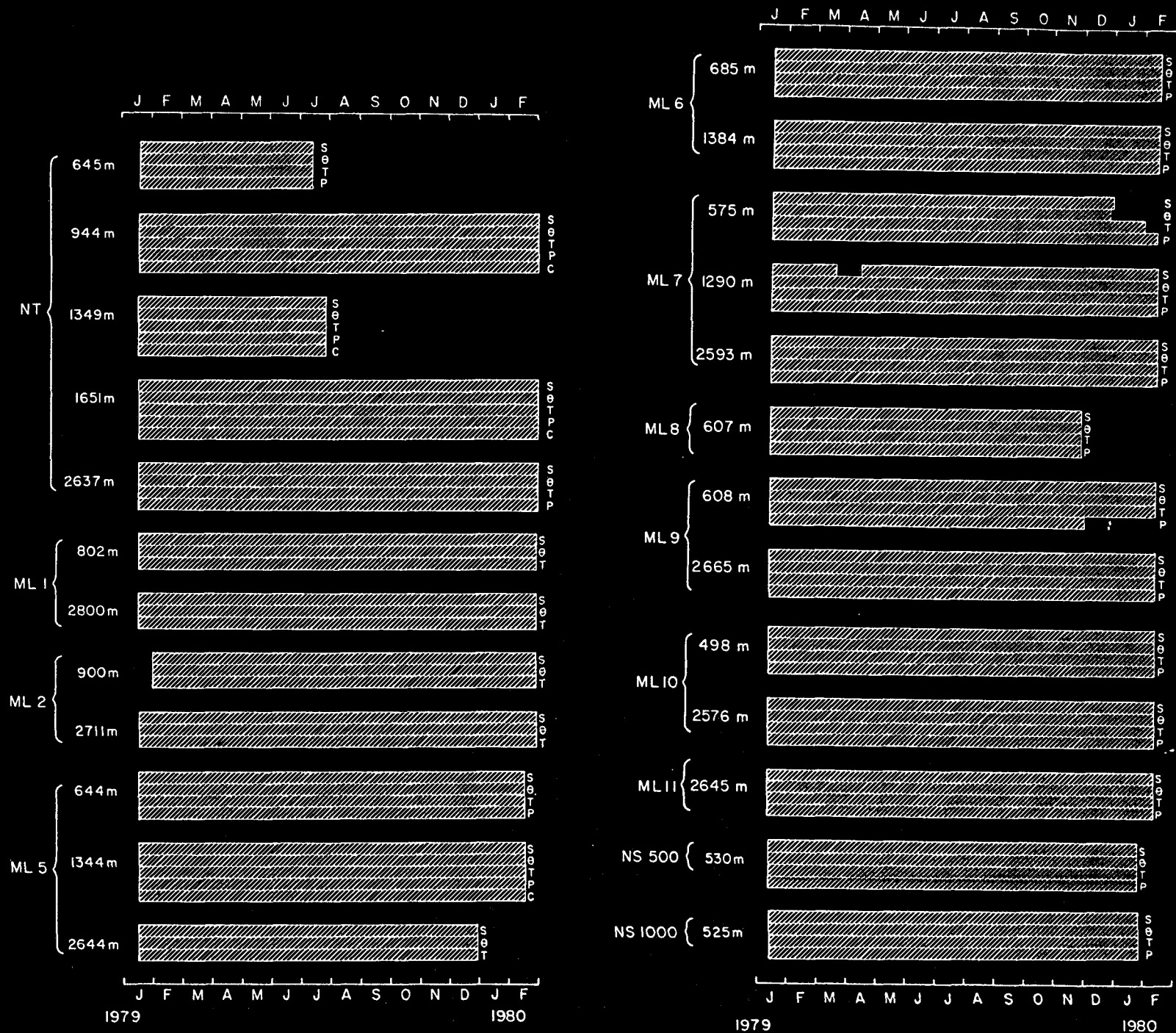


Figure 2. Data recovered from the array.

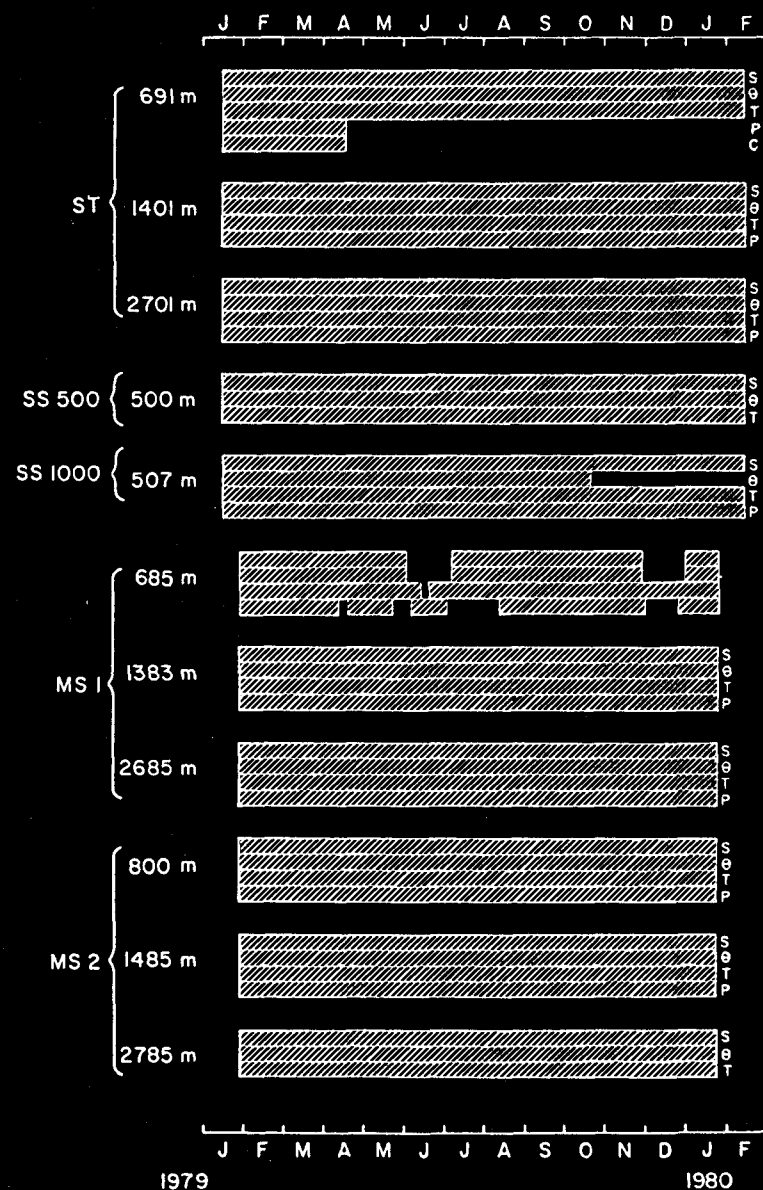
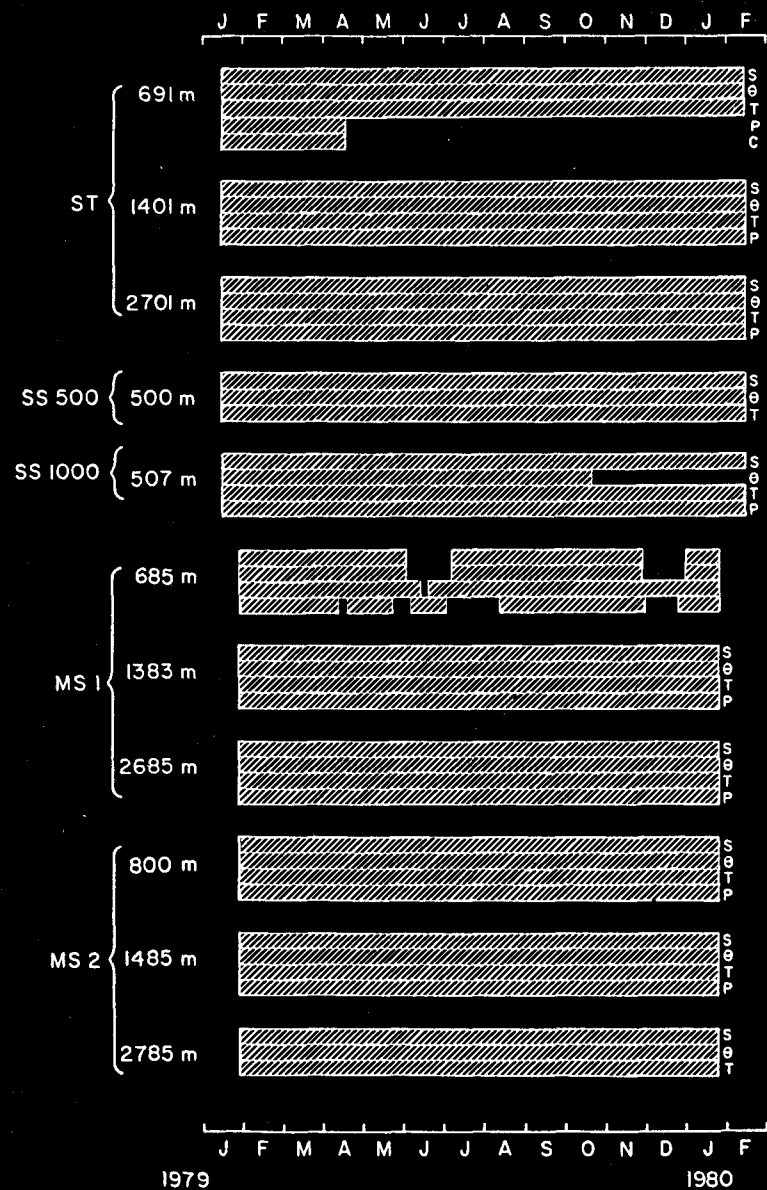


Figure 3. Data recovered from the array.

scheme (Heinmiller and Walden, 1973).

Description of the Processed Data

Data from each installation are presented separately. The header page gives information about the mooring location, instrumentation, data interval and a statement describing the kind of data collected at that point and the quality of the record. For a discussion of the depths assigned to the meters see the appendix.

Each meter has a serial number assigned to it by the manufacturer. Each successive tape recorded by that machine is numbered with the serial number and the tape number. Thus, 485/10 indicates the tenth tape recorded by machine 485.

The table of statistics following the header page gives the arithmetic mean, standard deviation, skewness, kurtosis, maximum value, minimum value and the number of hourly values of the record length for each variable measured. U is the true east-west velocity component and V is the true north-south velocity component.

Progressive vector diagrams, real time plots, stick figure plots, rotary spectra, and conventional power spectra follow the table of statistics. Data were taken every hour. Plots which show each point are too long to be easily included in this report. To reduce the plots and still present the important low frequency fluctuations, the data were filtered with a $60 + 1 + 60$ point, Cosine Lanczos

filter with a half-amplitude at 34.3 hours and a half-power at 40 hours. The data were then resampled at 6 hour intervals. This filter was designed to remove both tidal and inertial oscillations. The conventional power spectra are calculated from unfiltered data.

ACKNOWLEDGMENTS

The funds for the program came from the National Science Foundation grant OCE - 7823579 which is gratefully acknowledged. Appreciation is also expressed to B. Moore, J. Simpkins, E. Seifert and D. Barstow for calibration and preparation of the instruments. Special appreciation to D. Root for his careful and extensive data processing and to G. Pittock who assembled this report.

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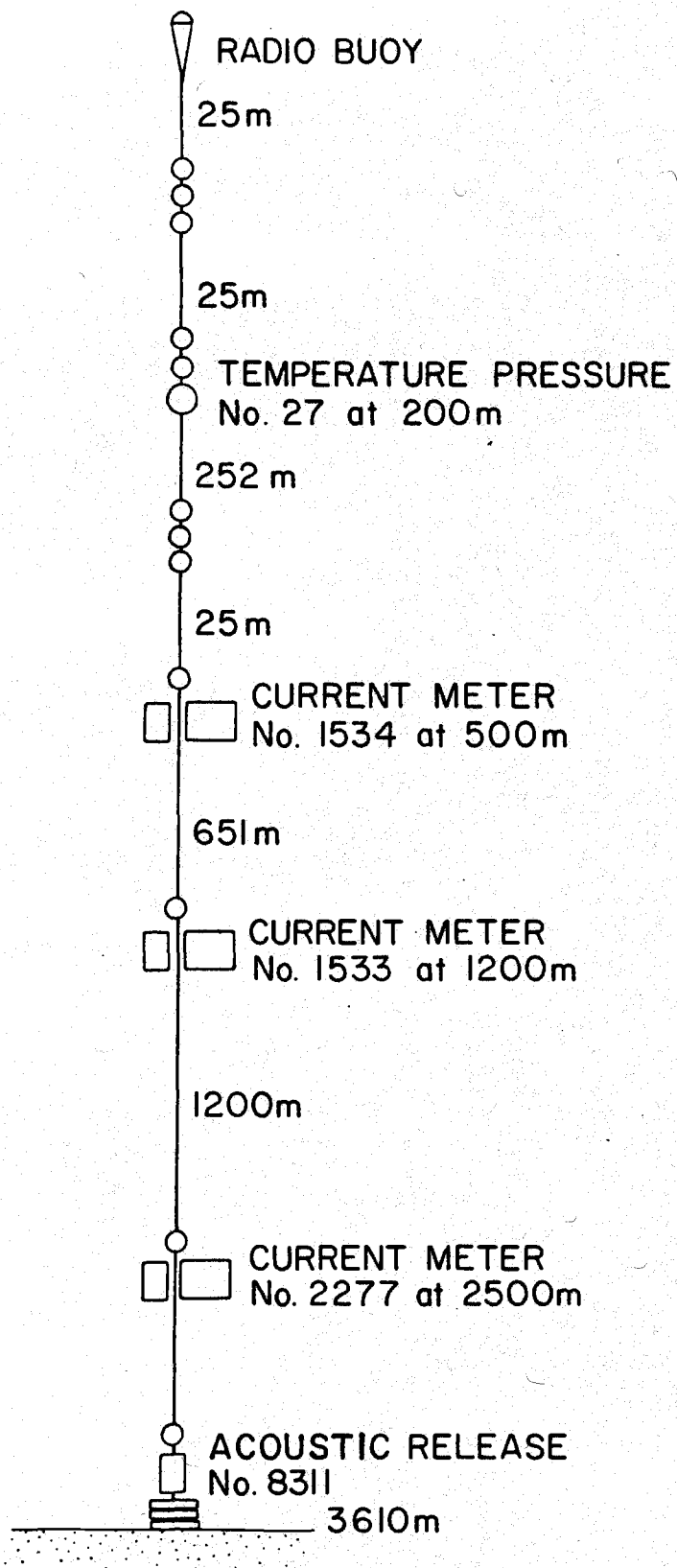
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Worley, S. J. and W. D. Nowlin, Jr. 1979 Oceanographic Data Collected Aboard the R/V MELVILLE During January-February 1979 and AGS YELCHO During April-May 1979 as a part of DRAKE 79. Texas A&M University, Department of Oceanography, College Station, Texas. Reference 79-7-T.

MS - 1



MAPPING / STATISTICS (MS) I

59° 49.3' S

67° 30.5' W

INSTALLED: 29 JANUARY 1979

MS-1

Position: 59°49.3'S, 67°30.5'W
 Depth of Water: 3610 m
 Set at 1148 UCT 29 January '79 by R/V MELVILLE
 Retrieved at 1342 UCT 29 January '80 by R/V ATLANTIS II
 Data Interval: 1402 UCT 29 January '79 to 1402 UCT 21 January '80

Instrumentation

<u>Intended Depth</u>	<u>RCM5 Serial No./Tape No.</u>
500 m	1534/12
1200 m	1533/16
2500 m	2277/14

Instrument 1534 recorded speed, direction, temperature, and pressure once per hour until the instrument was recovered. The record contained sporadic sections, totalling about 10%, where one or more extra bits were set in the data words. Speed, temperature, and pressure were initially corrected by subtracting out these extra bits where they could be identified. In addition, sections of unsalvageable garbage were found. Speed, direction, U, and V have been zeroed in the following intervals: (4 JUL '79 to 11 AUG '79) and (29 NOV '79 to 31 DEC '79). Temperature has been set to zero from (13 JUL '79 to 21 JUL '79) and (27 DEC '79 to 31 DEC '79). Pressure has been set to zero in these intervals:

13 APR '79 - 23 APR '79	28 AUG '79 - 3 SEP '79
23 MAY '79 - 6 JUN '79	6 NOV '79 - 11 NOV '79
4 JUL '79 - 11 AUG '79	29 NOV '79 - 25 DEC '79

Instrument 1533 recorded speed, direction, temperature, and pressure. Direction, temperature, and pressure were recorded once per hour until the instrument was recovered. The following intervals in the speed file were bridged due to an instrument malfunction:

18 MAY '79 - 20 MAY '79	9 AUG '79 - 10 AUG '79
9 JUN '79 - 10 JUN '79	14 JAN '80 - 17 JAN '80

Instrument 2277 recorded speed, direction, temperature, and pressure. Direction, temperature, and pressure were recorded once per hour until the instrument was recovered. The interval from 15 JAN '80 to 16 JAN '80 in the processed speed file was bridged due to a rotor counter malfunction.

MS-1

685 m

	MEAN	S.D.	SKEW	KURT	MIN	MAX	N
S	10.49	5.02	0.52	2.67	0.80	27.20	6913
U	0.87	8.37	-0.36	2.97	-25.70	24.30	6913
V	3.20	7.36	-0.32	3.03	-22.50	25.70	6913
T	2.30	0.07	-0.38	3.20	2.03	2.50	8273
P	688.28	10.40	3.17	15.45	679.40	764.90	6188

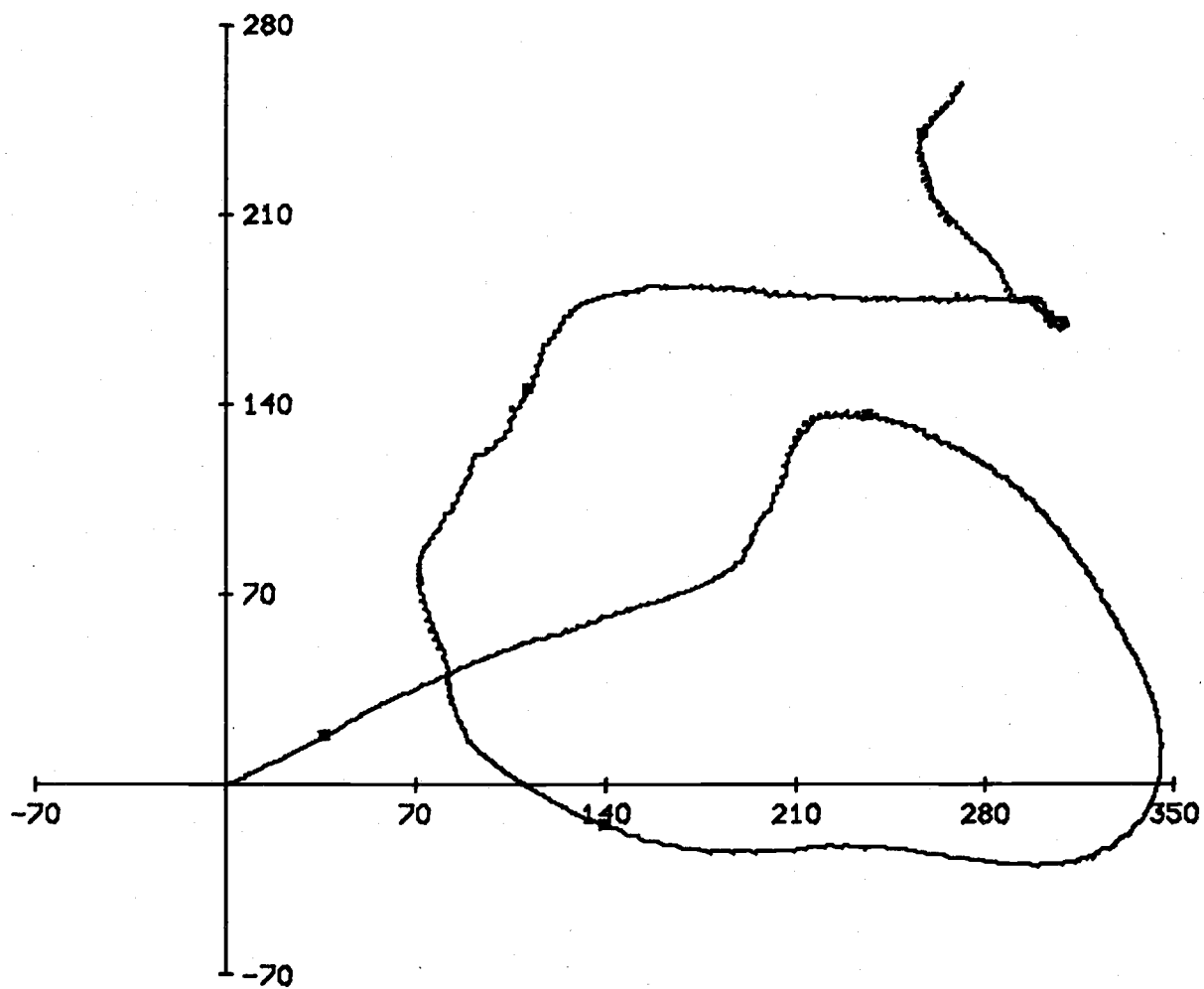
1383 m

S	6.48	3.29	0.84	3.89	0.70	22.30	8565
U	0.62	5.29	-0.38	3.43	-22.30	19.20	8565
V	2.15	4.46	-0.34	3.22	-14.20	18.10	8565
T	1.97	0.06	-0.58	3.31	1.72	2.13	8565
P	1390.26	7.73	3.77	20.64	1383.40	1455.80	8565

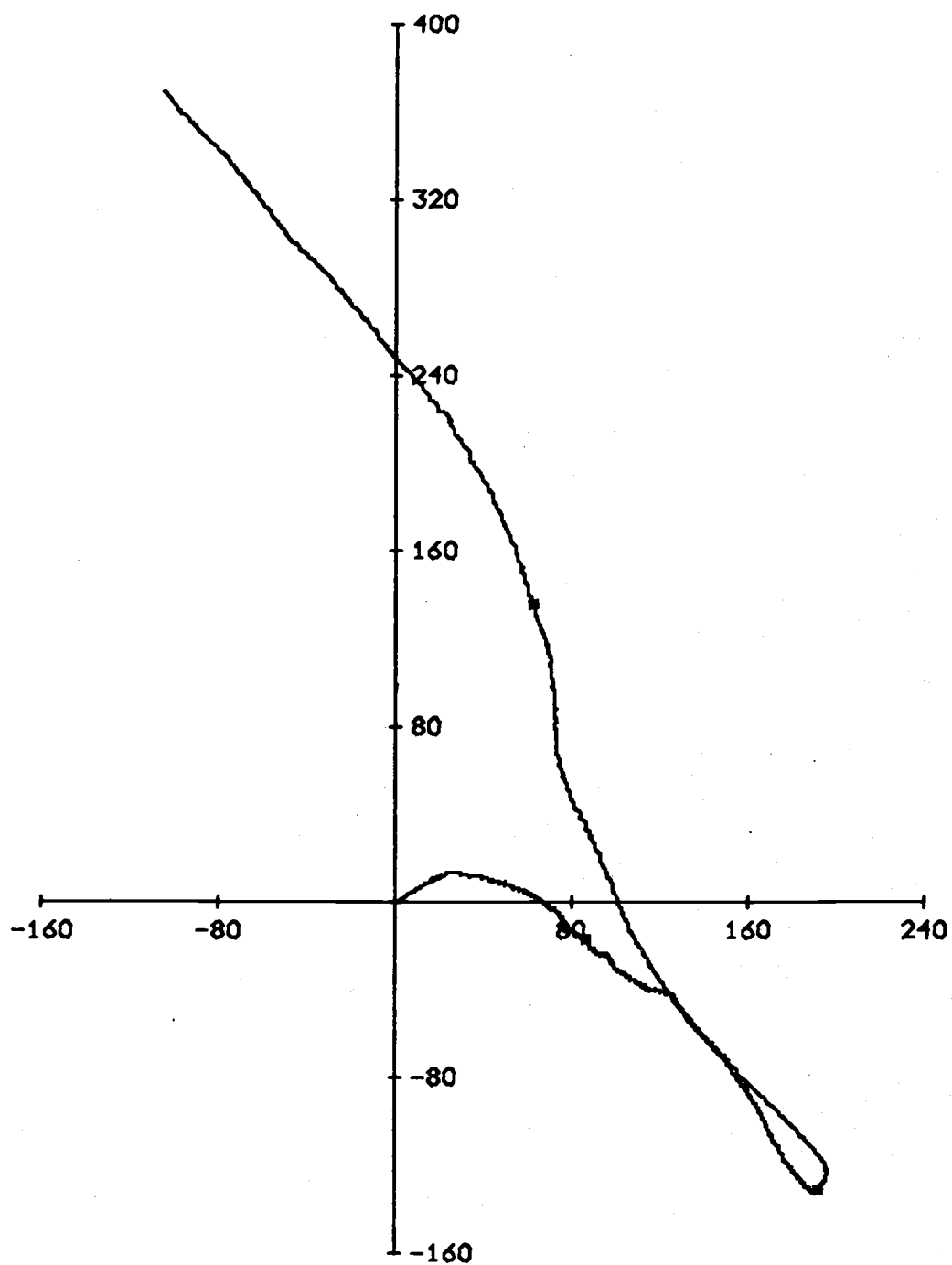
2685 m

S	4.82	2.75	0.74	3.66	0.80	18.00	8569
U	-0.46	4.28	-0.27	3.18	-17.20	15.60	8569
V	0.94	3.37	-0.11	3.44	-13.60	13.70	8569
T	1.09	0.06	-0.20	2.27	0.90	1.27	8569
P	2698.65	2.74	3.95	23.75	2694.50	2724.00	8569

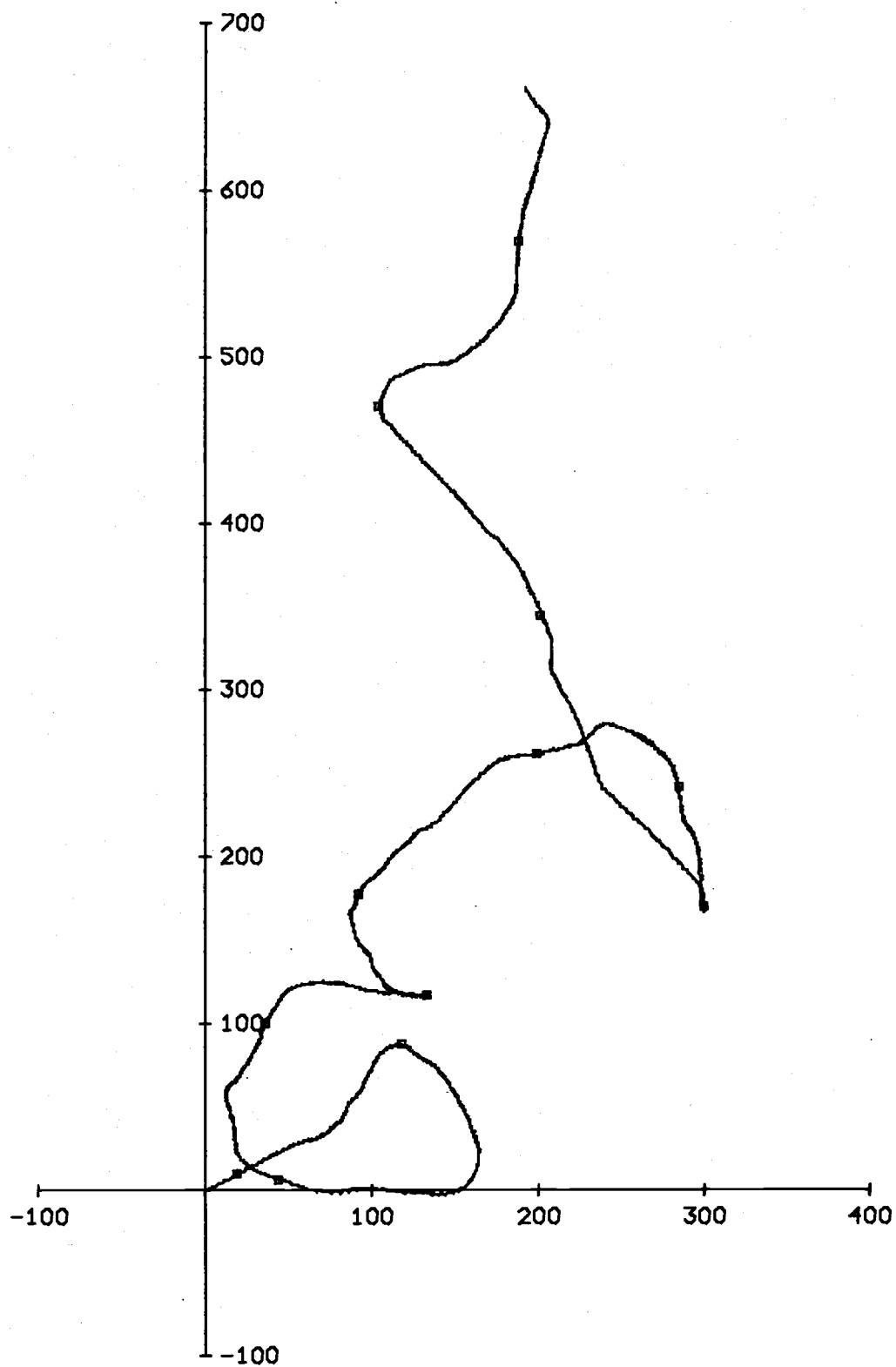
Speed, u, and v are given in cm/sec; temperature in degrees centigrade; pressure in decibars; and conductivity in mmhr/cm.



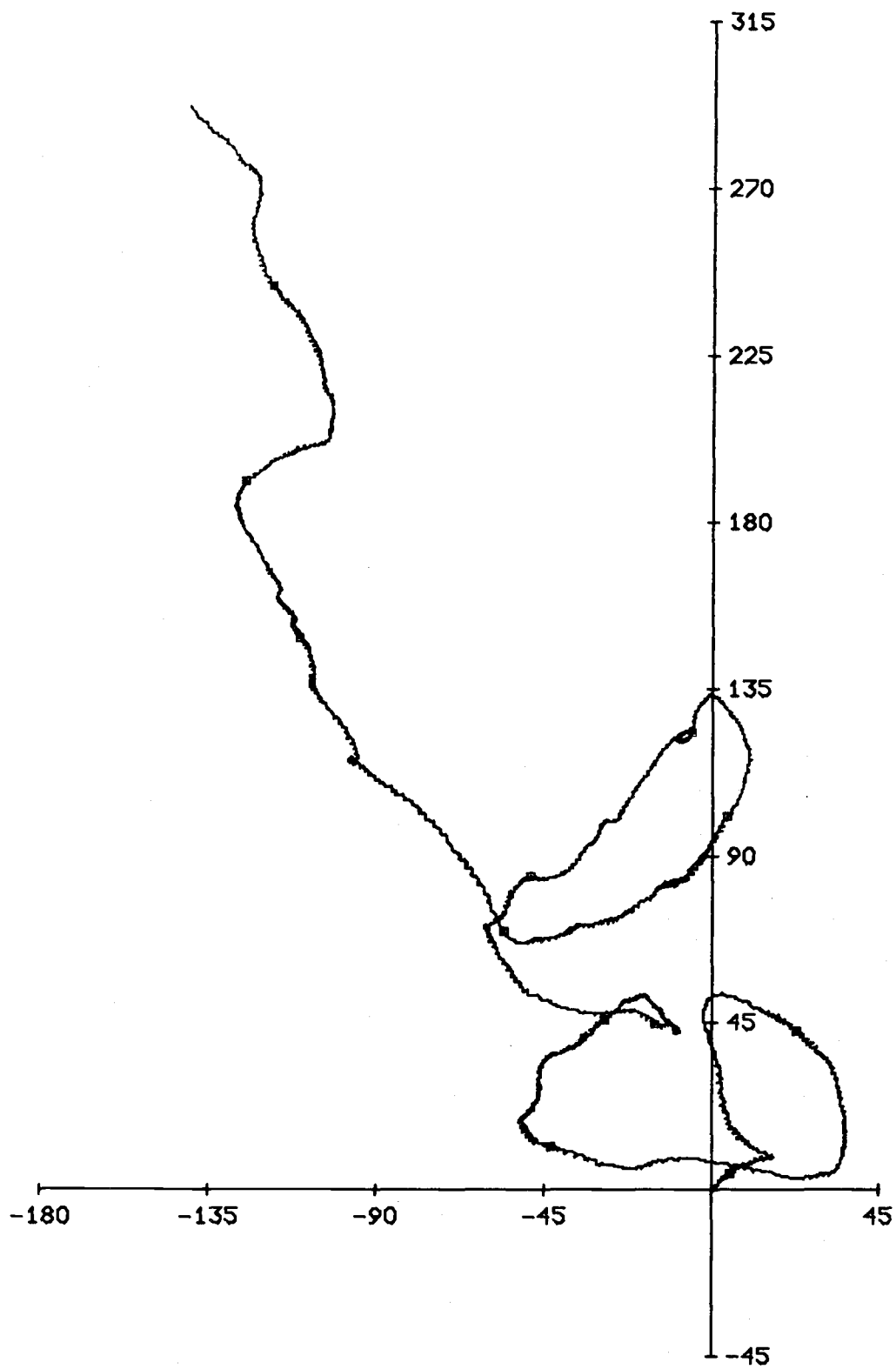
685 M AT STN MS-1. 157.1 DAYS STARTING 1421 29 JAN 79.



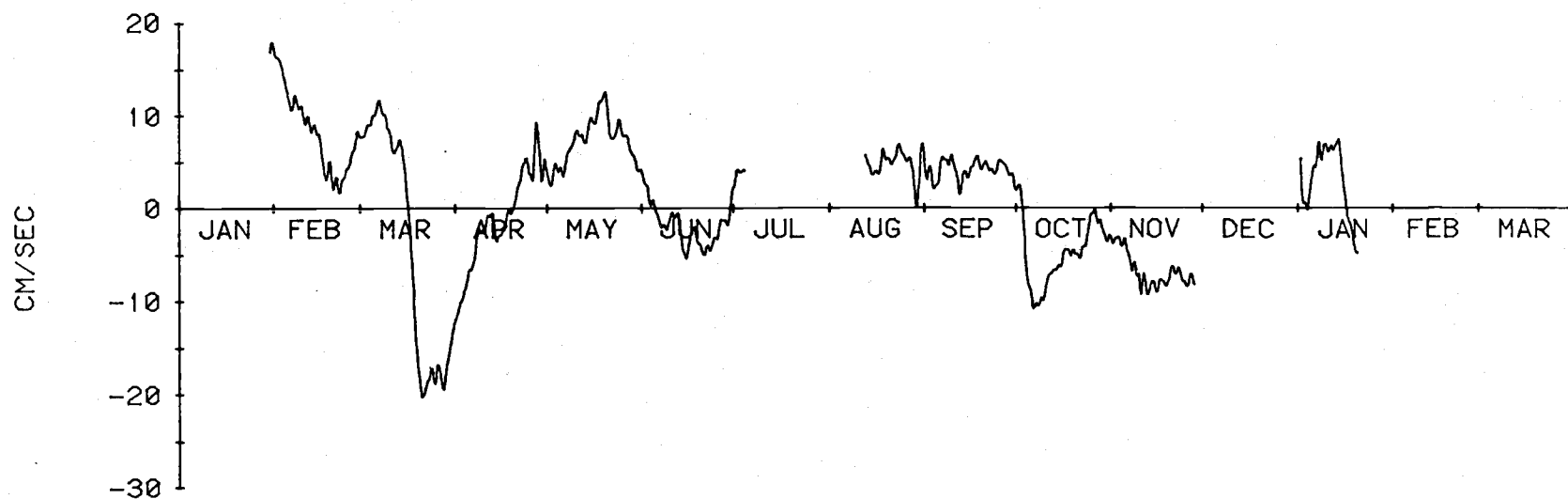
685 M AT STN MS-1. 109.9 DAYS STARTING 1121 11 AUG 79.



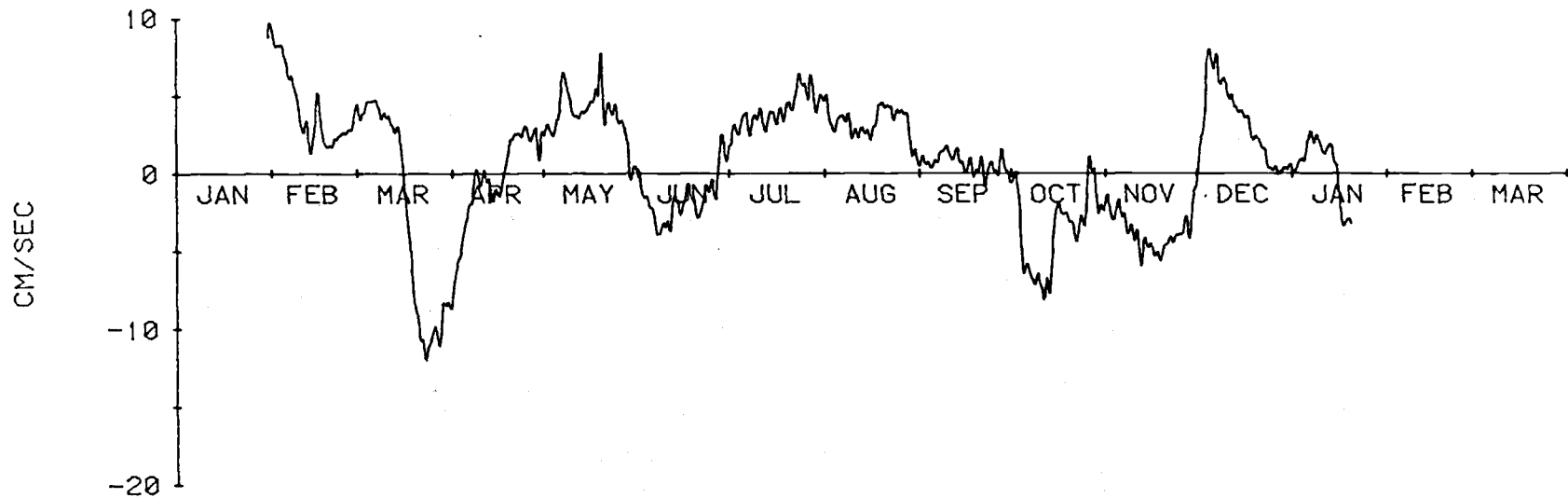
1383 M AT STN MS-1. 356.8 DAYS STARTING 1430 29 JAN 79.



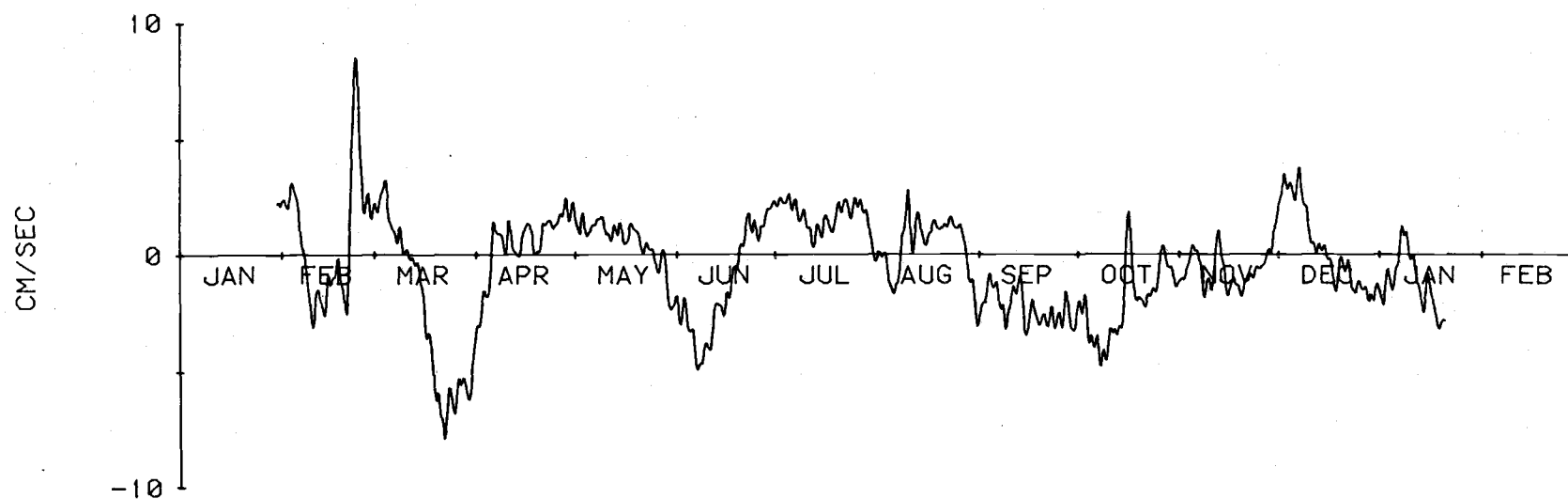
2685 M AT STN MS-1. 357.0 DAYS STARTING 1402 29 JAN 79.



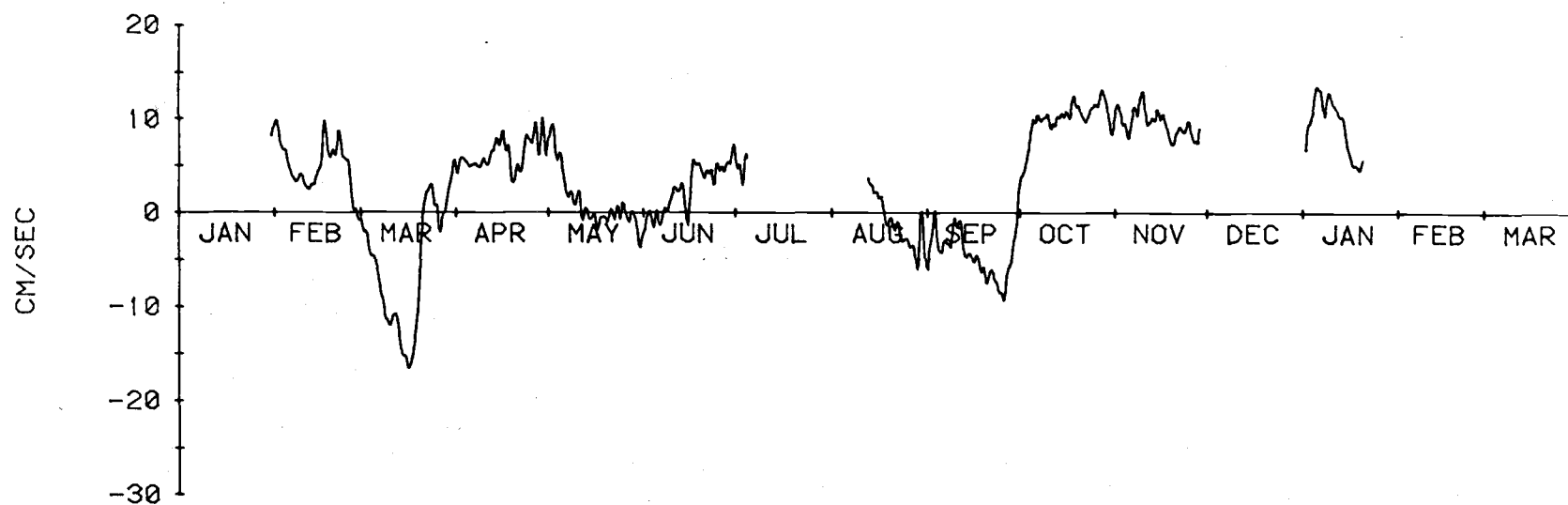
685 METERS AT MS1
LLP FILTERED U COMPONENT



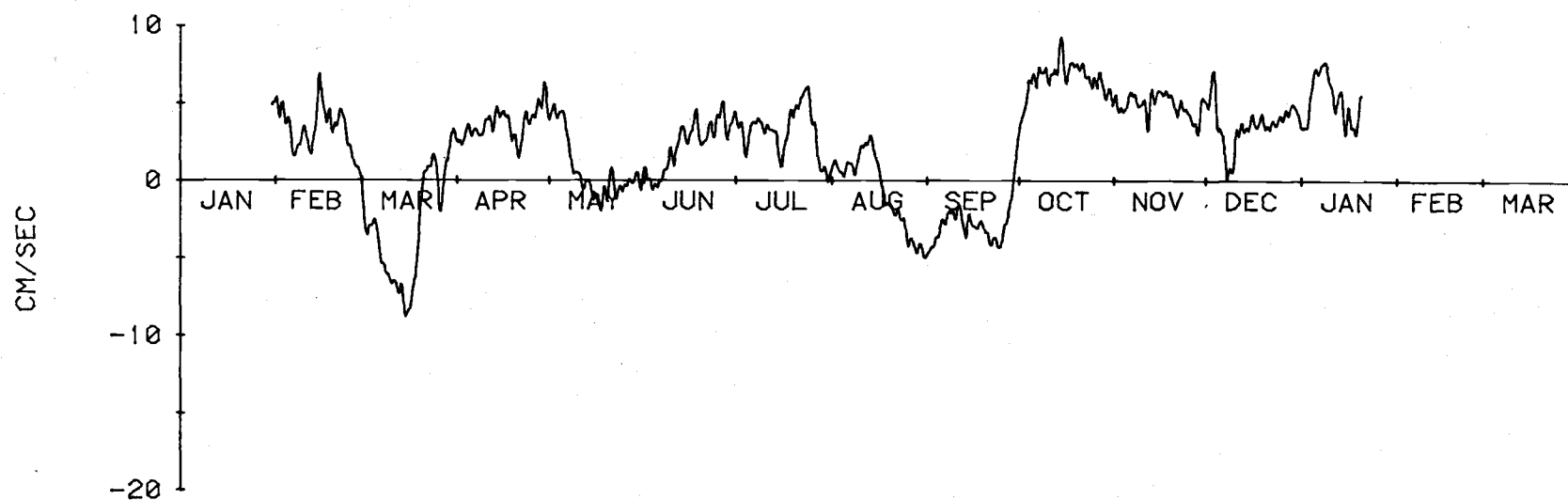
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LLP FILTERED U COMPONENT



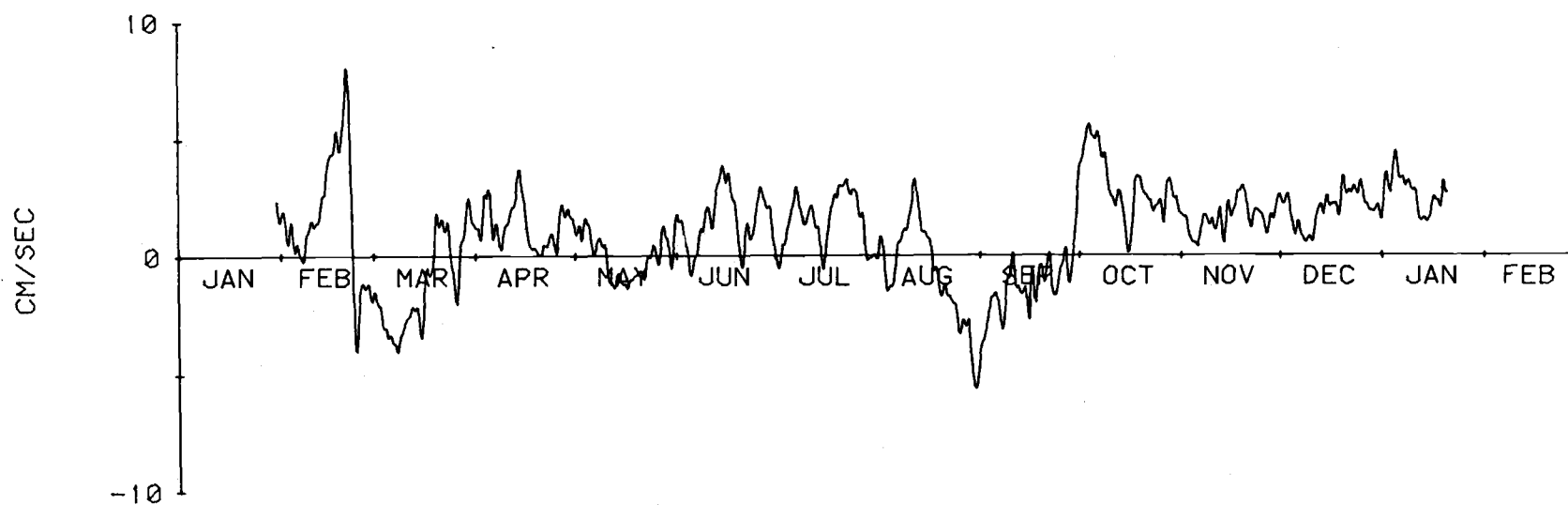
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LLP FILTERED U COMPONENT



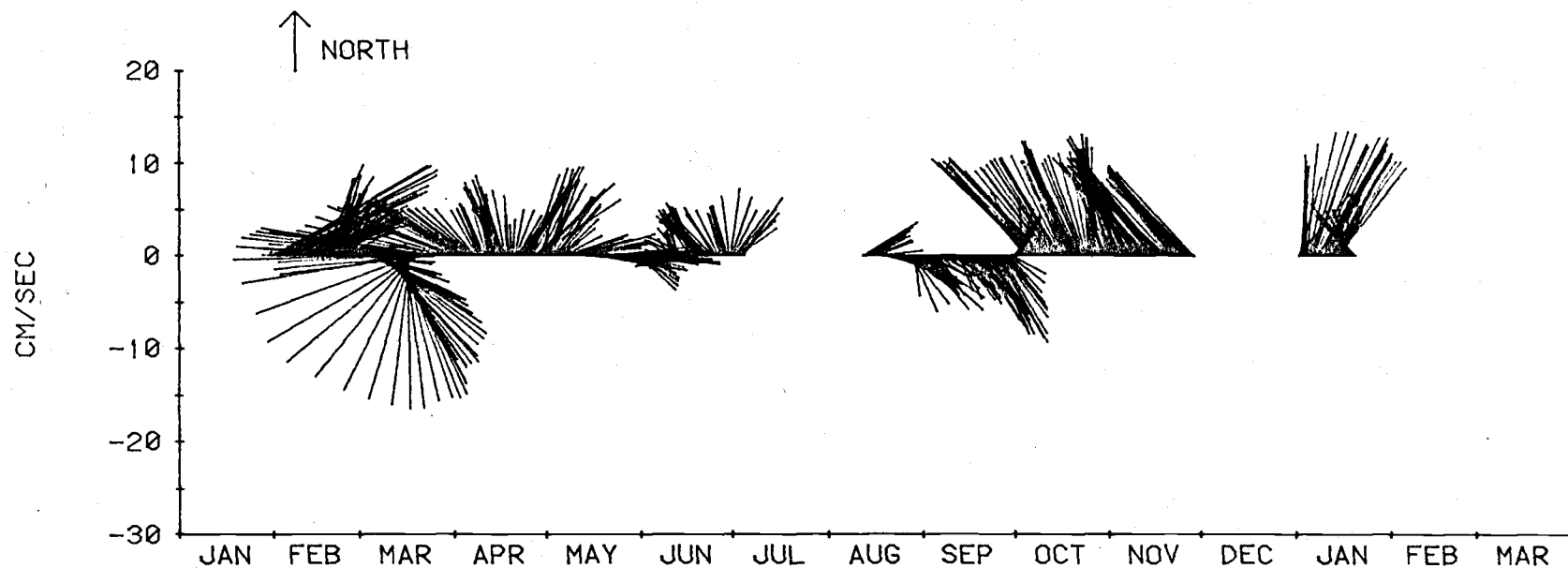
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LLP FILTERED V COMPONENT



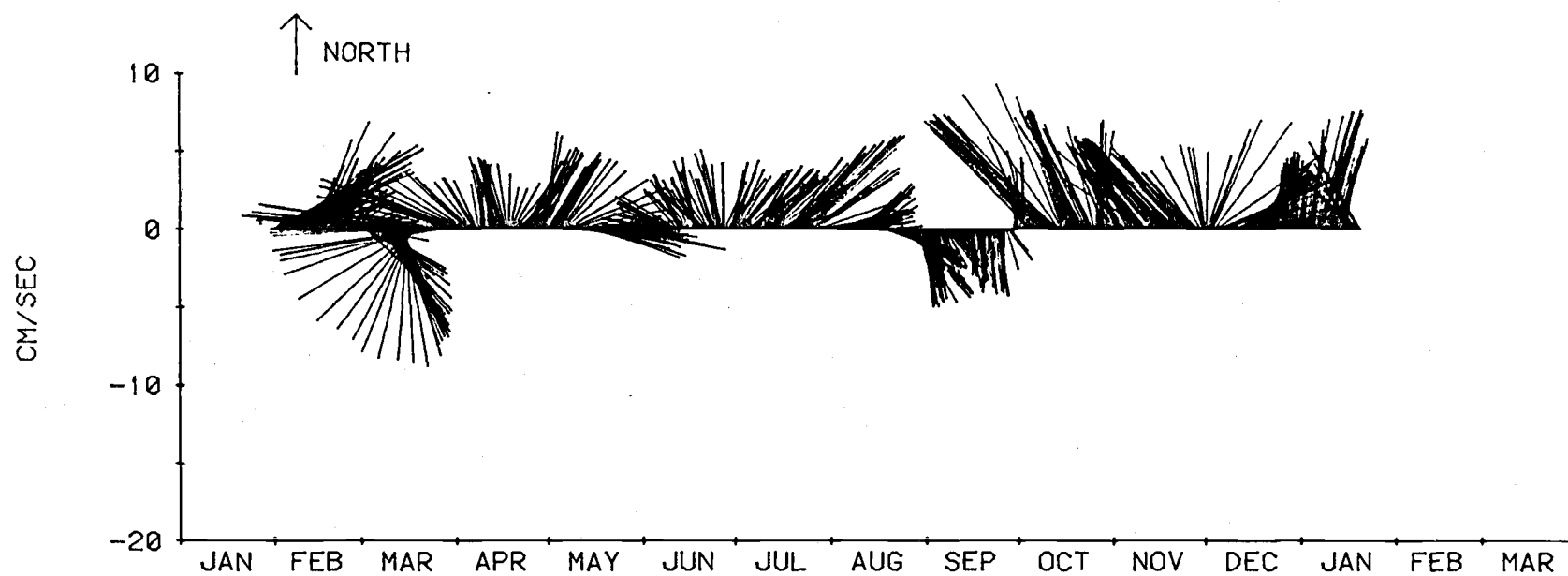
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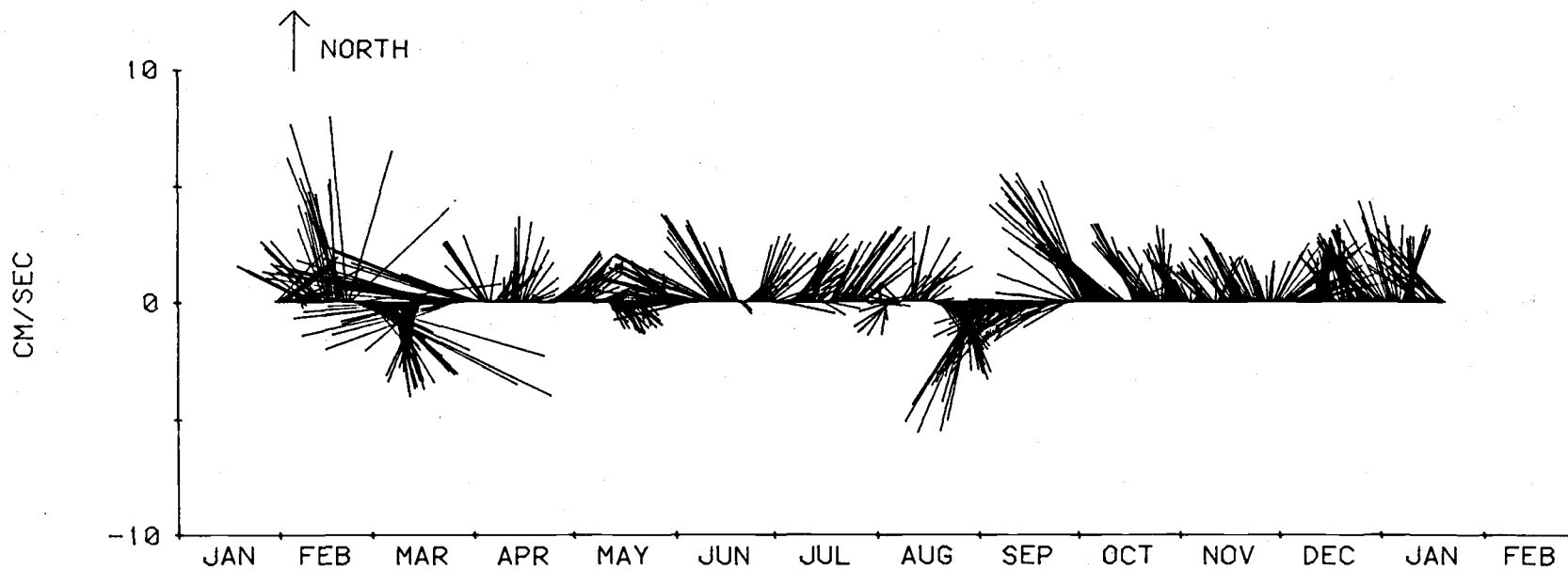
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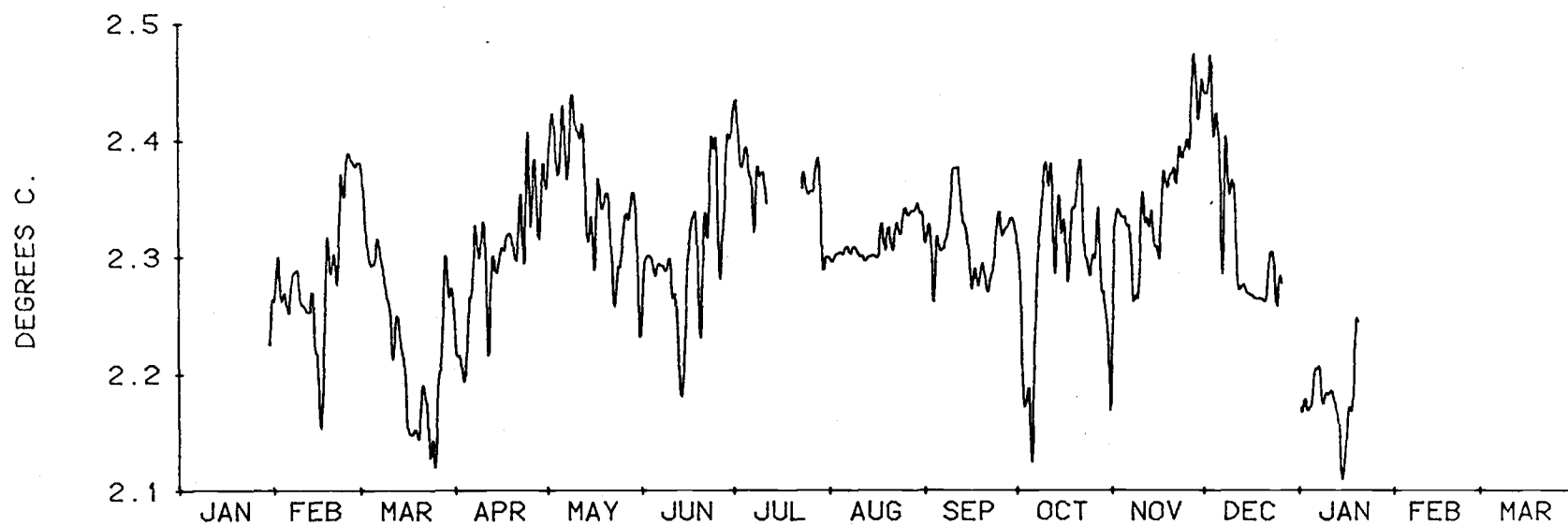
685 METERS AT MS1
LLP FILTERED CURRENT



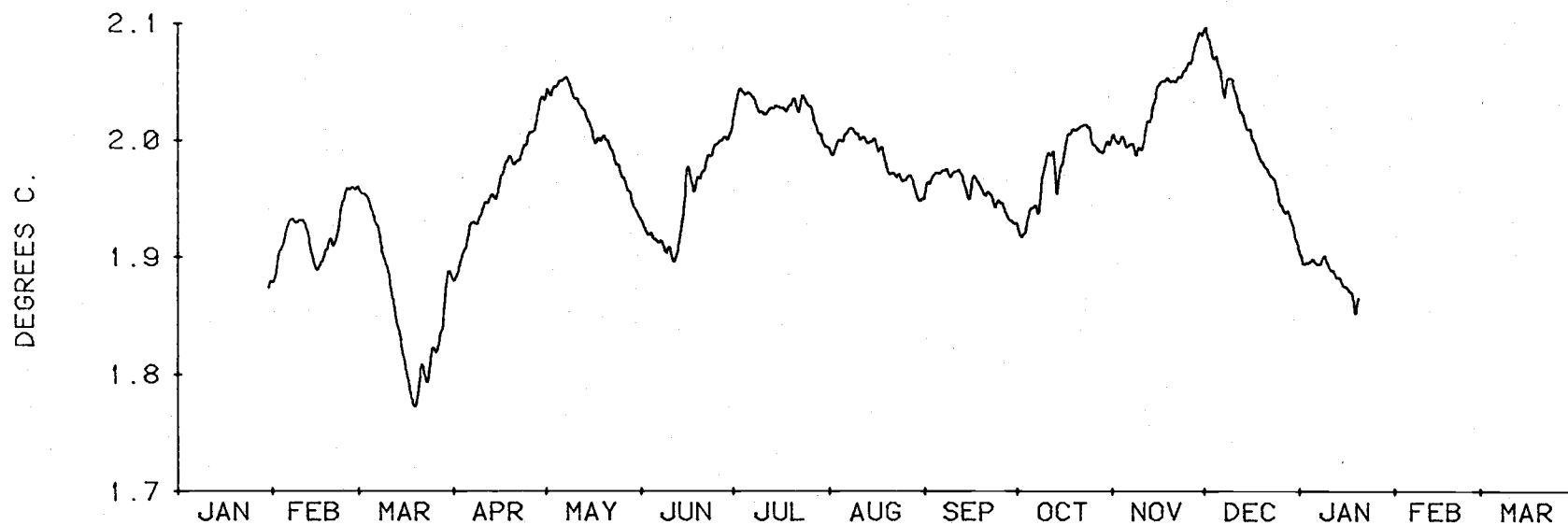
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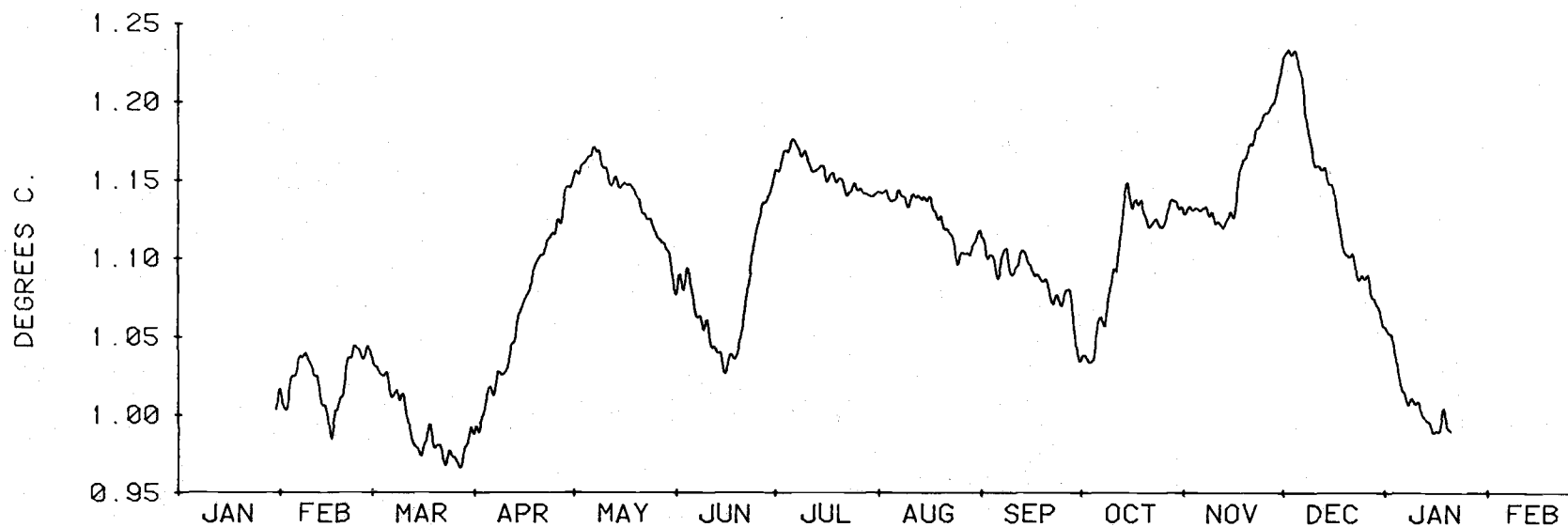
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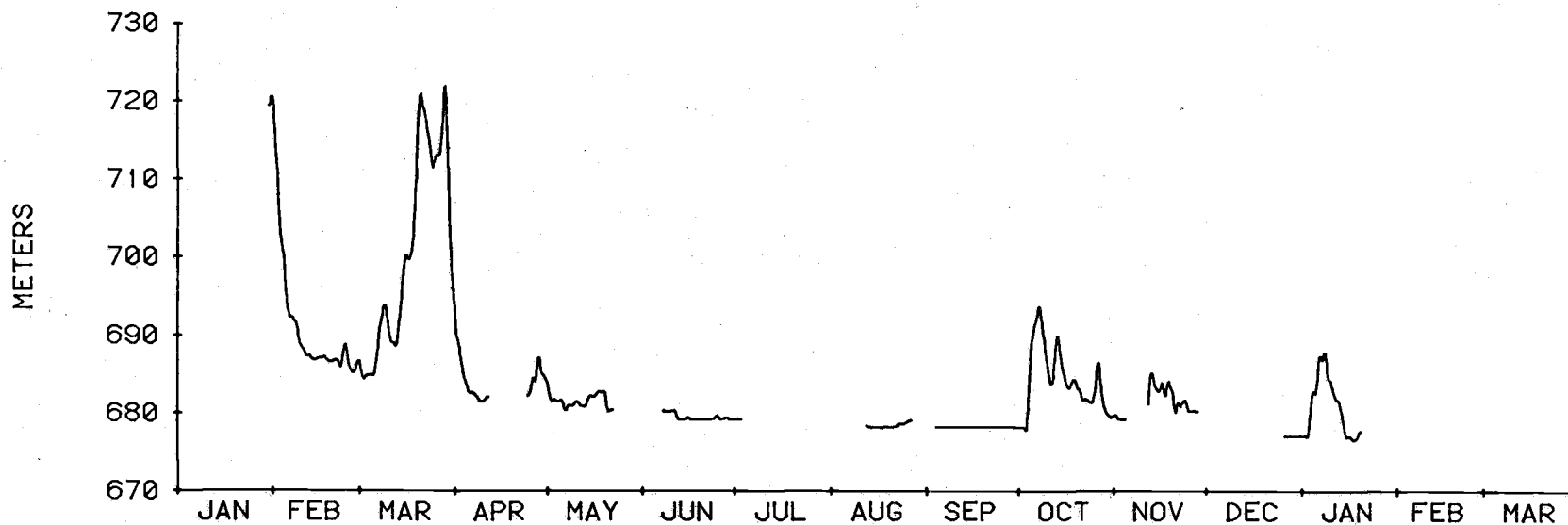
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LLP FILTERED TEMPERATURE



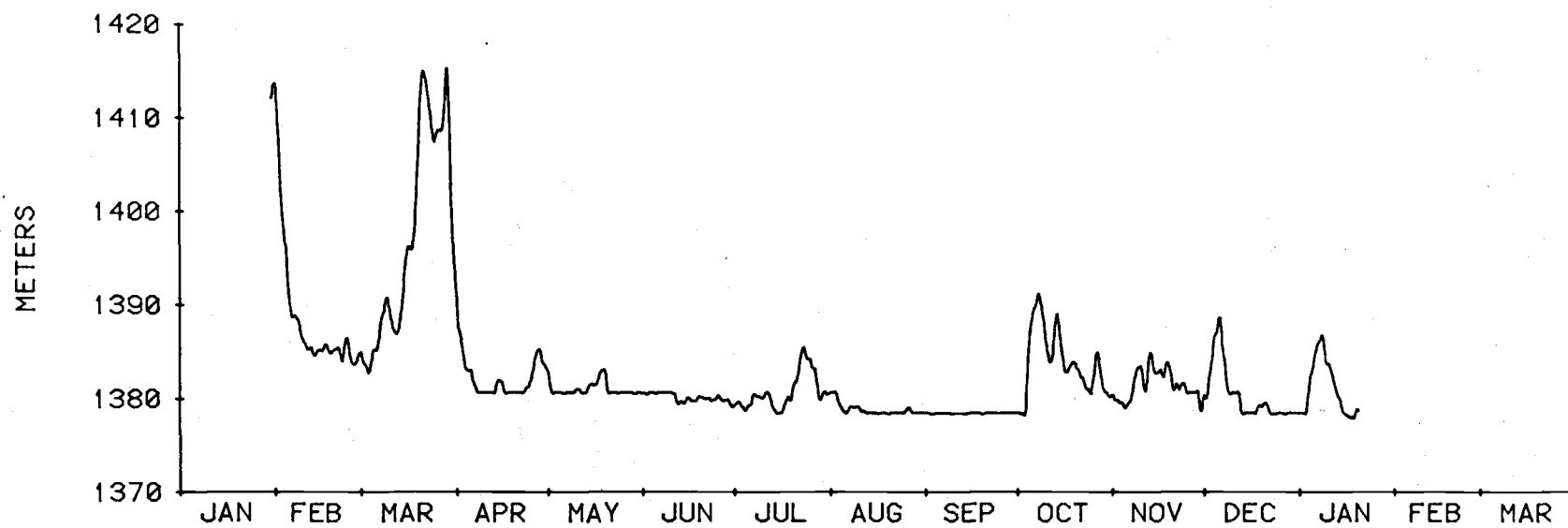
1383 METERS AT MS1
LLP FILTERED TEMPERATURE



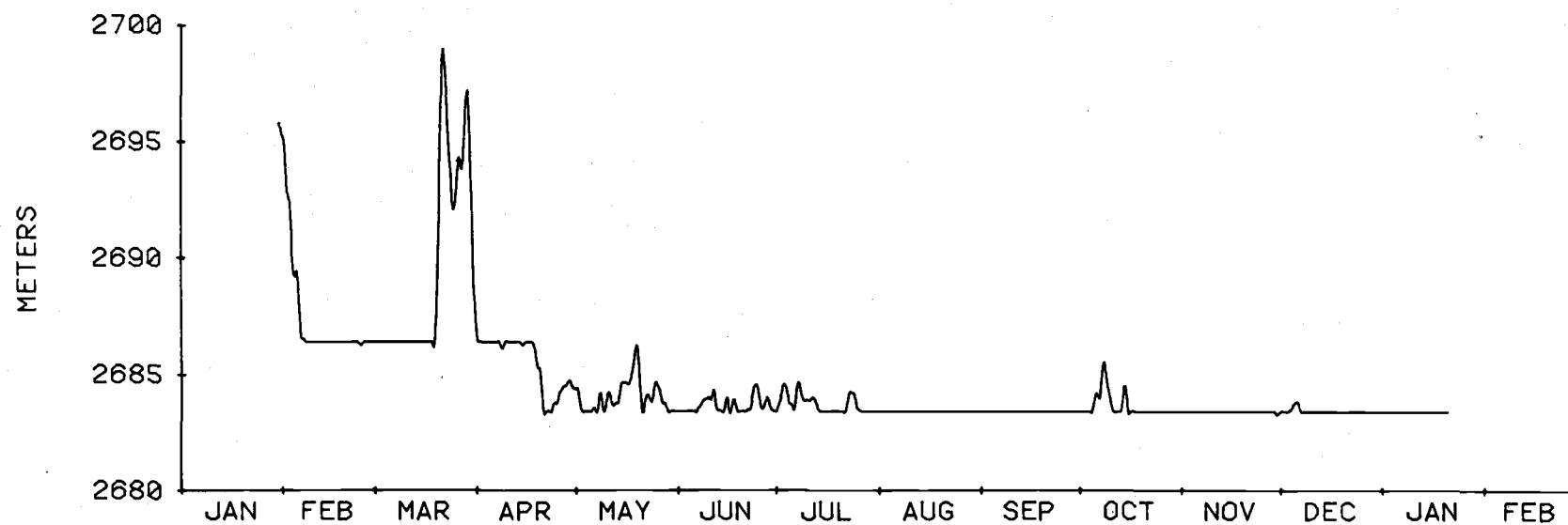
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685 METERS AT MS1
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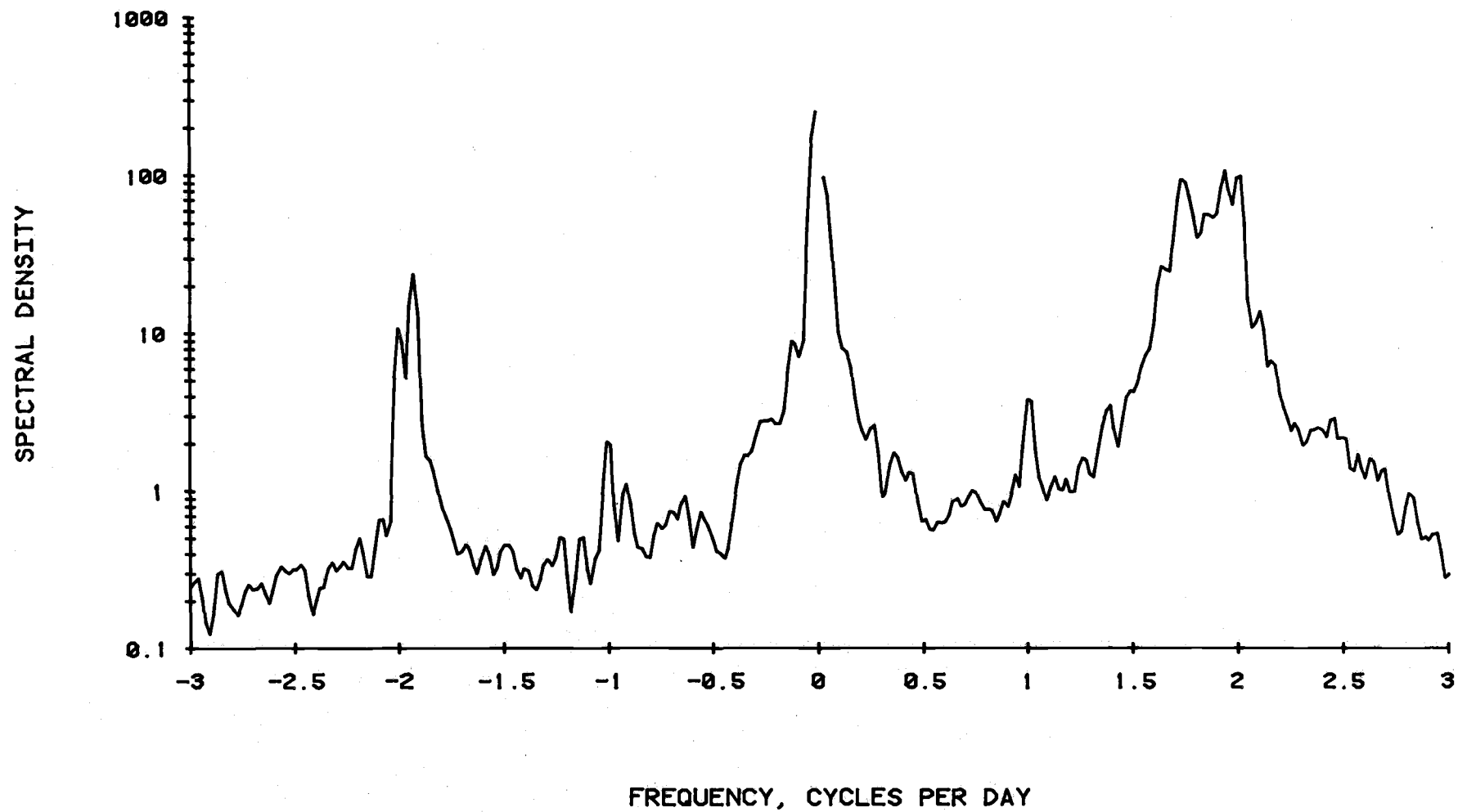


1383 METERS AT MS1
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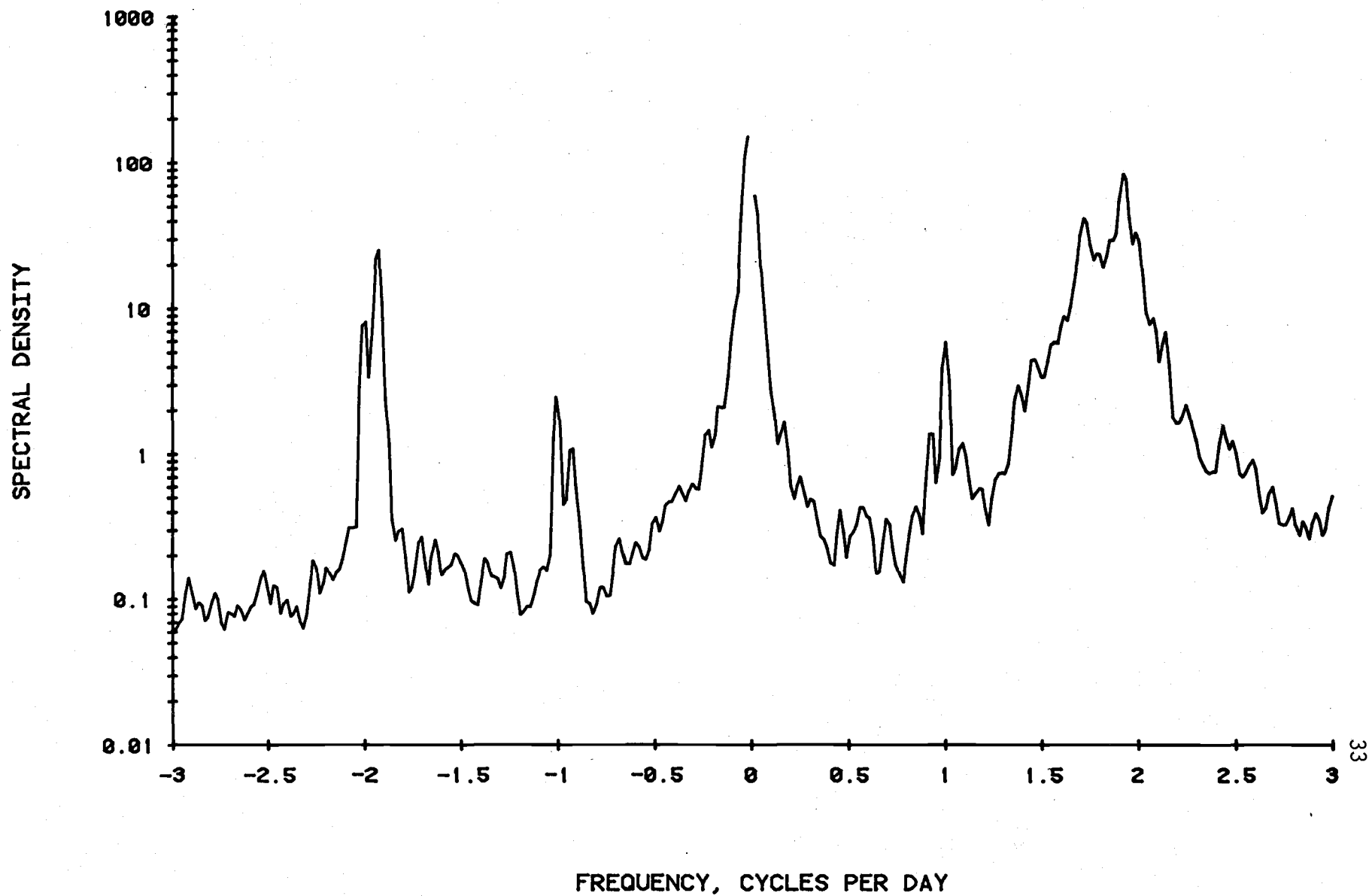


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LLP FILTERED PRESSURE

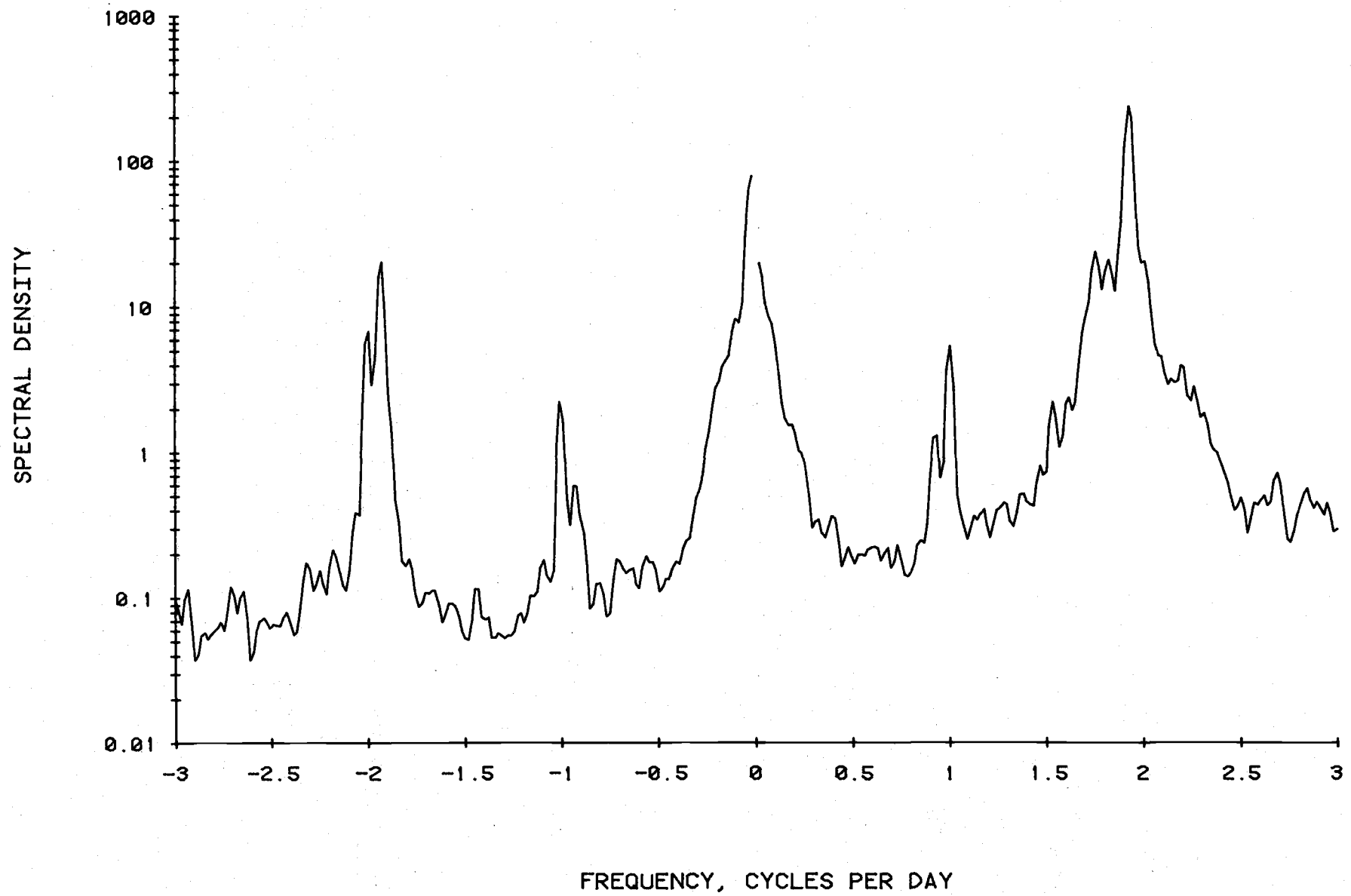
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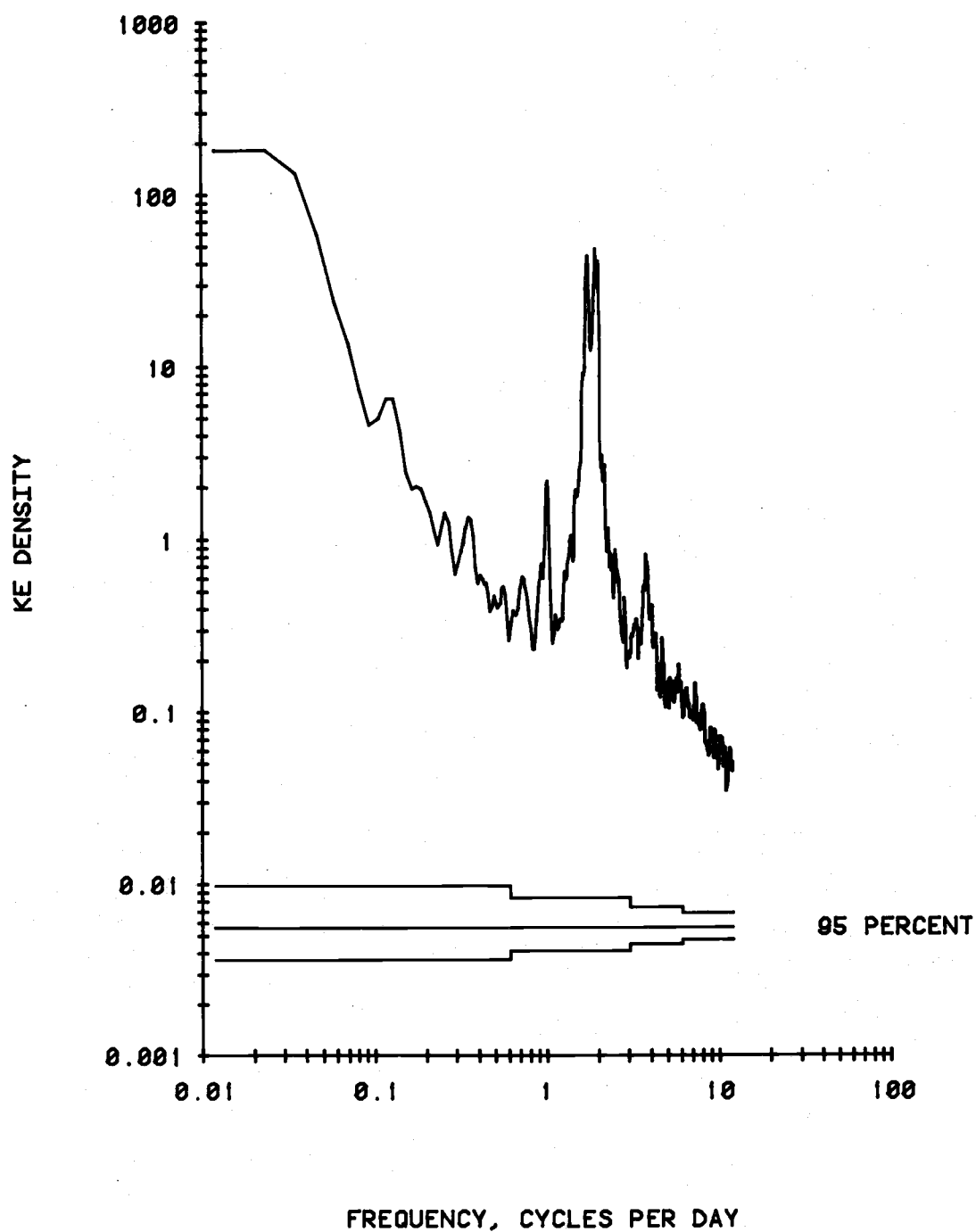
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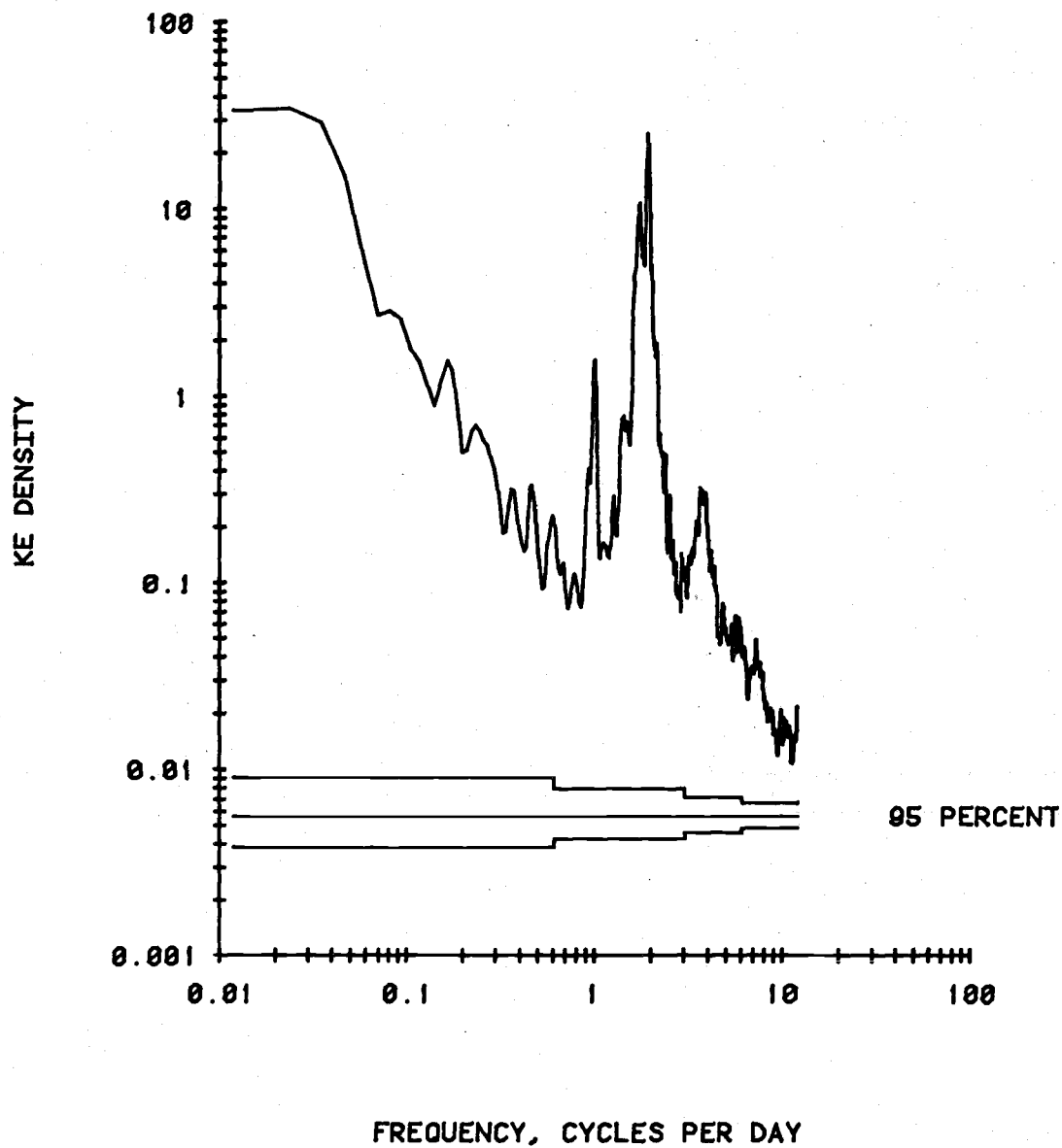
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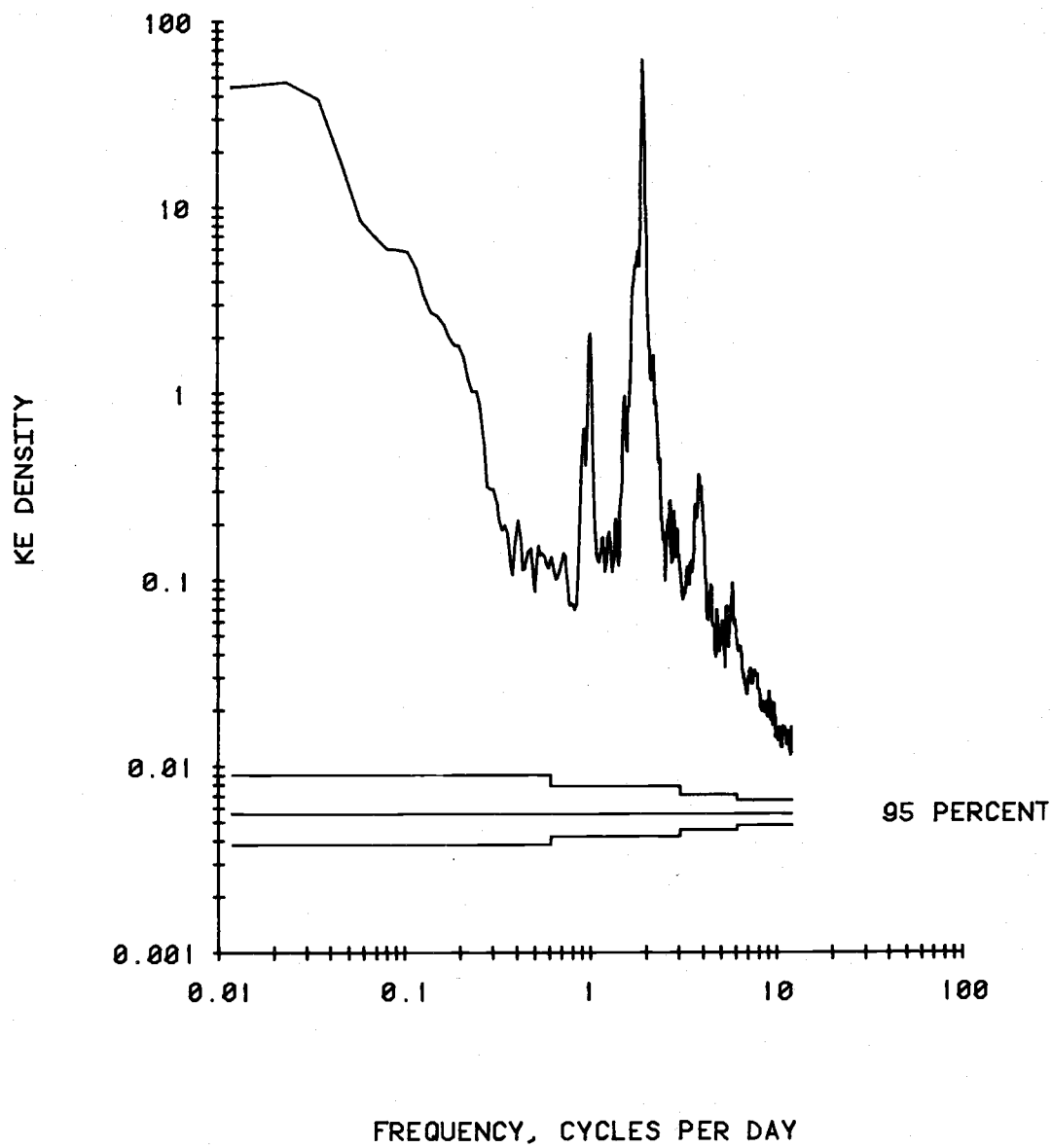
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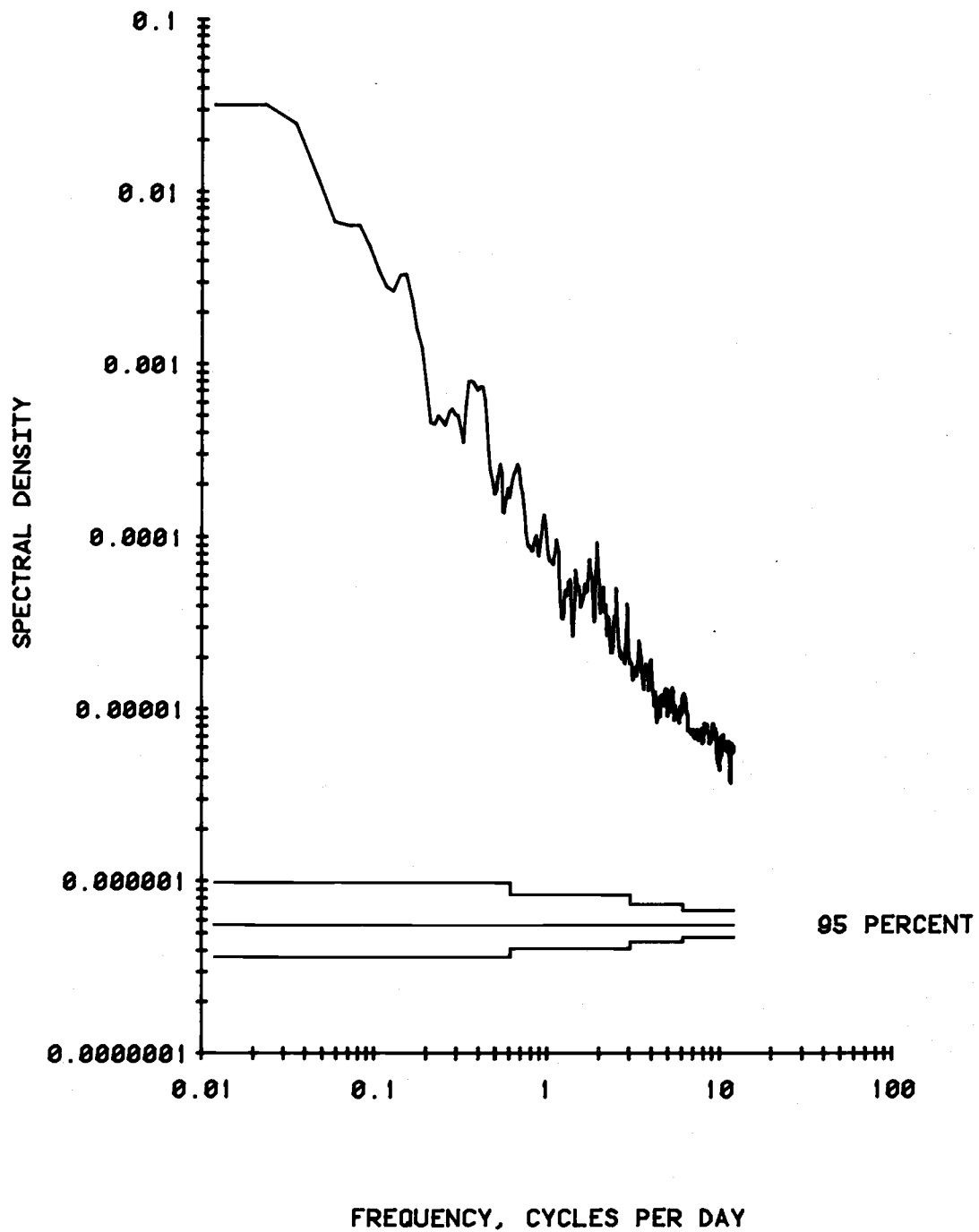
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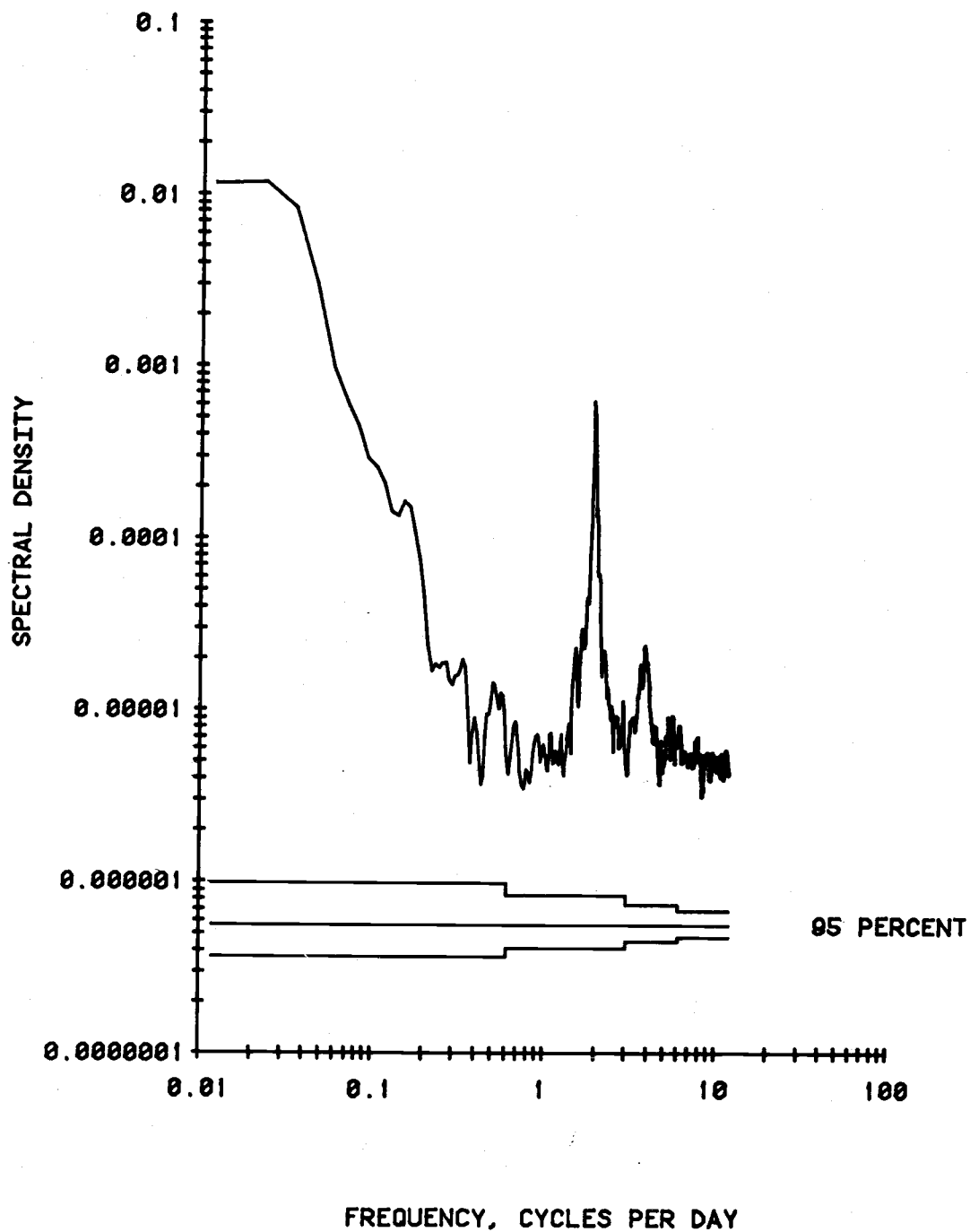
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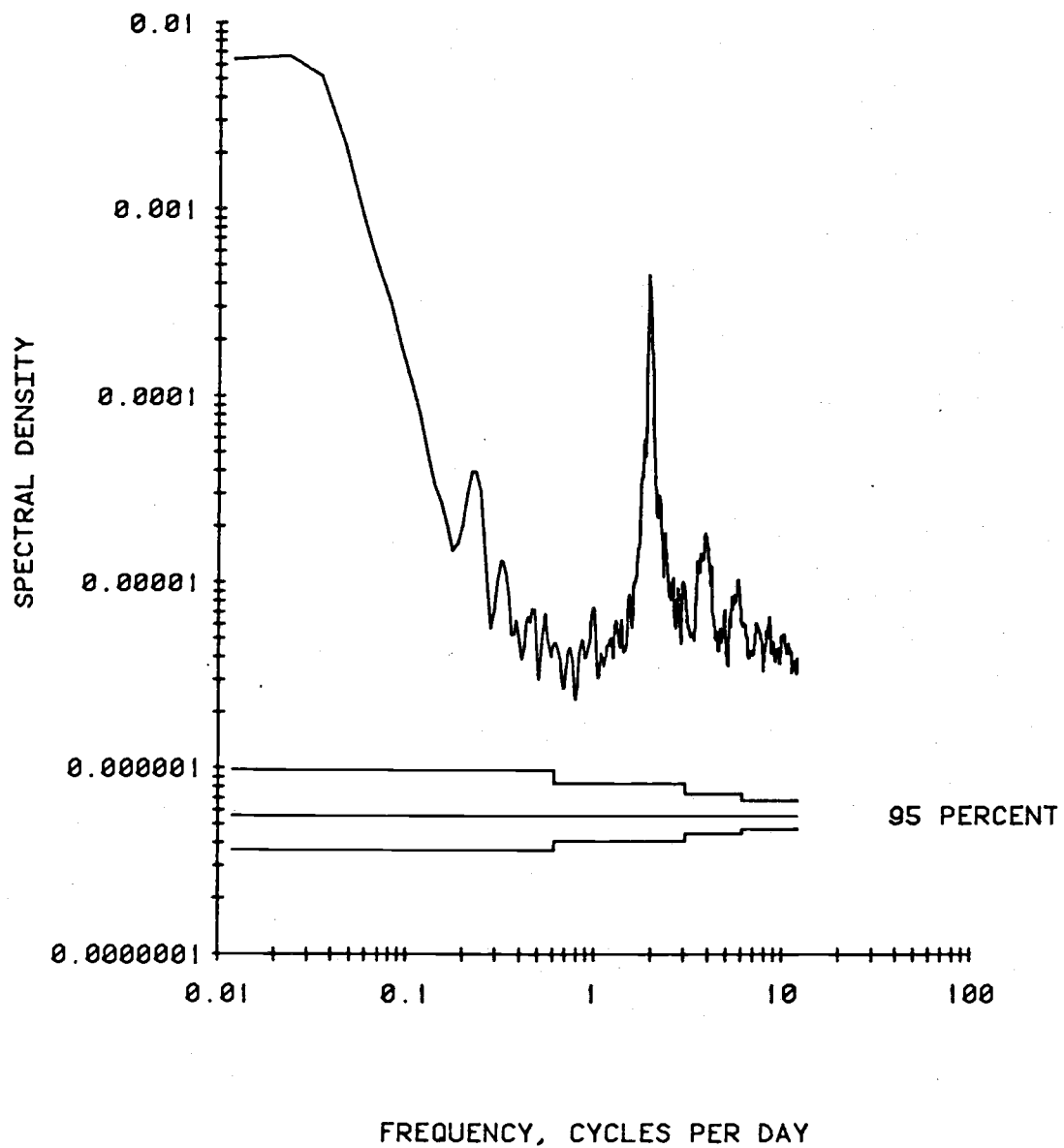
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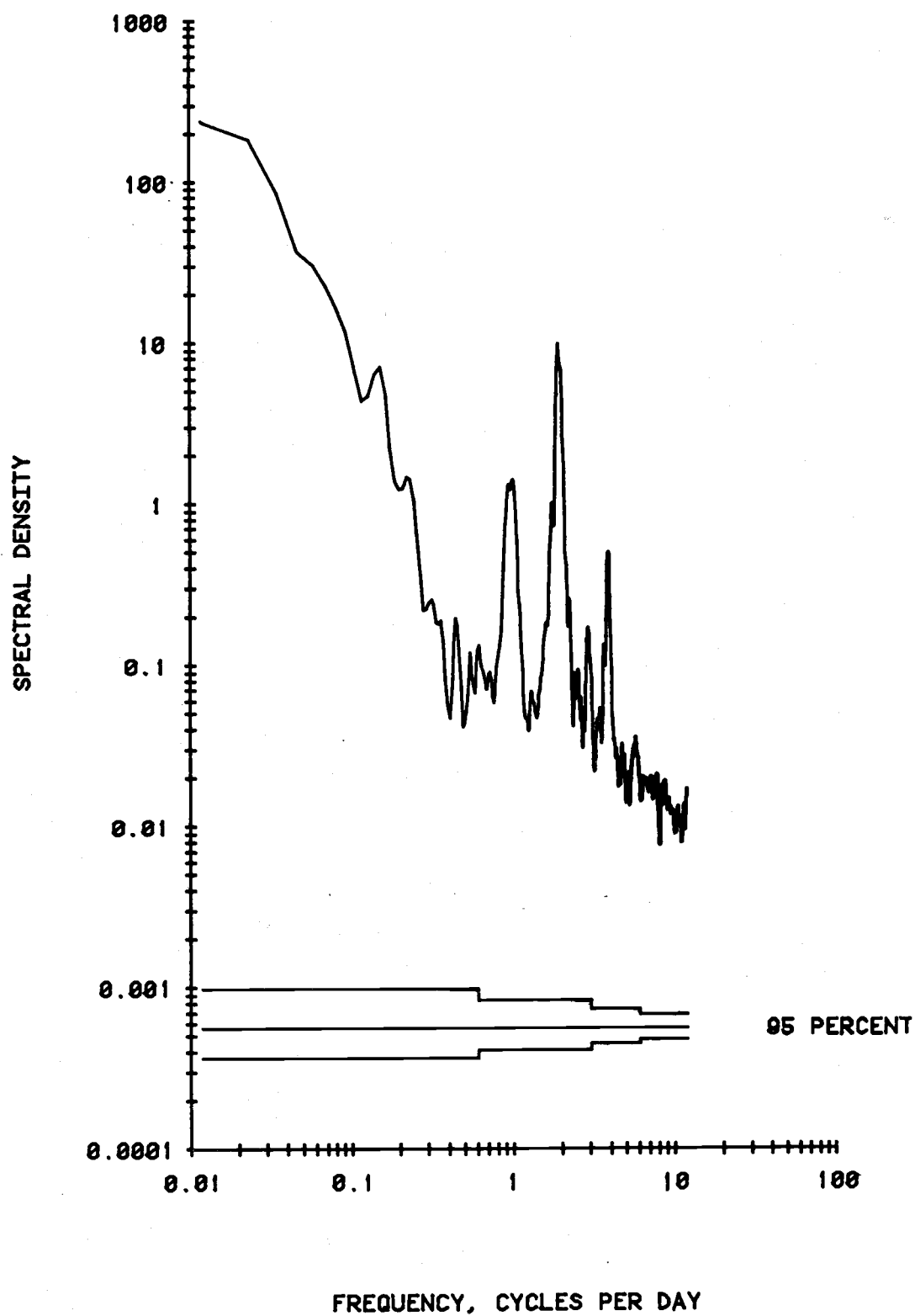
UNFILTERED TEMPERATURE. 1383 METERS AT MS-1



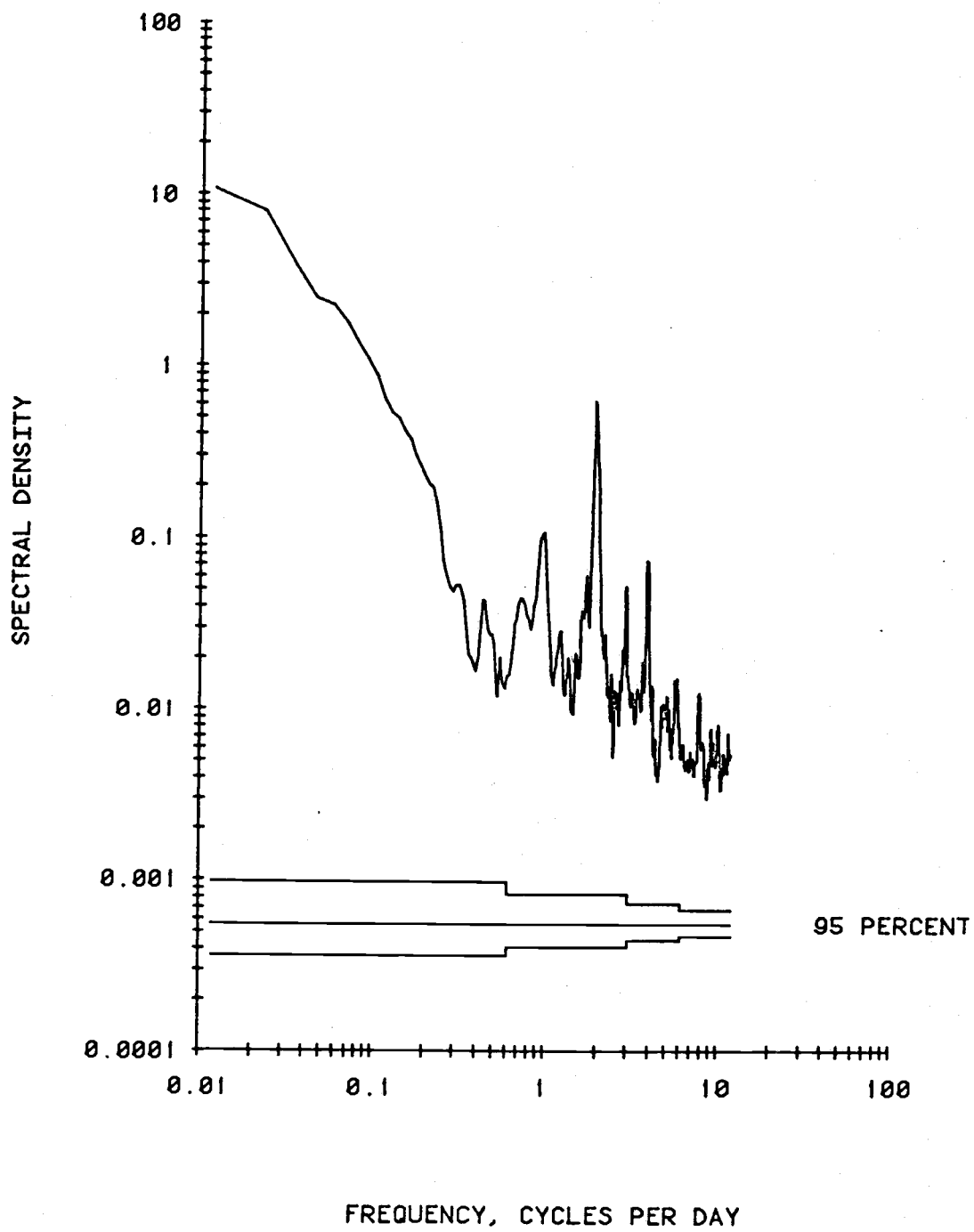
UNFILTERED TEMPERATURE, 2685 METERS AT MS-1



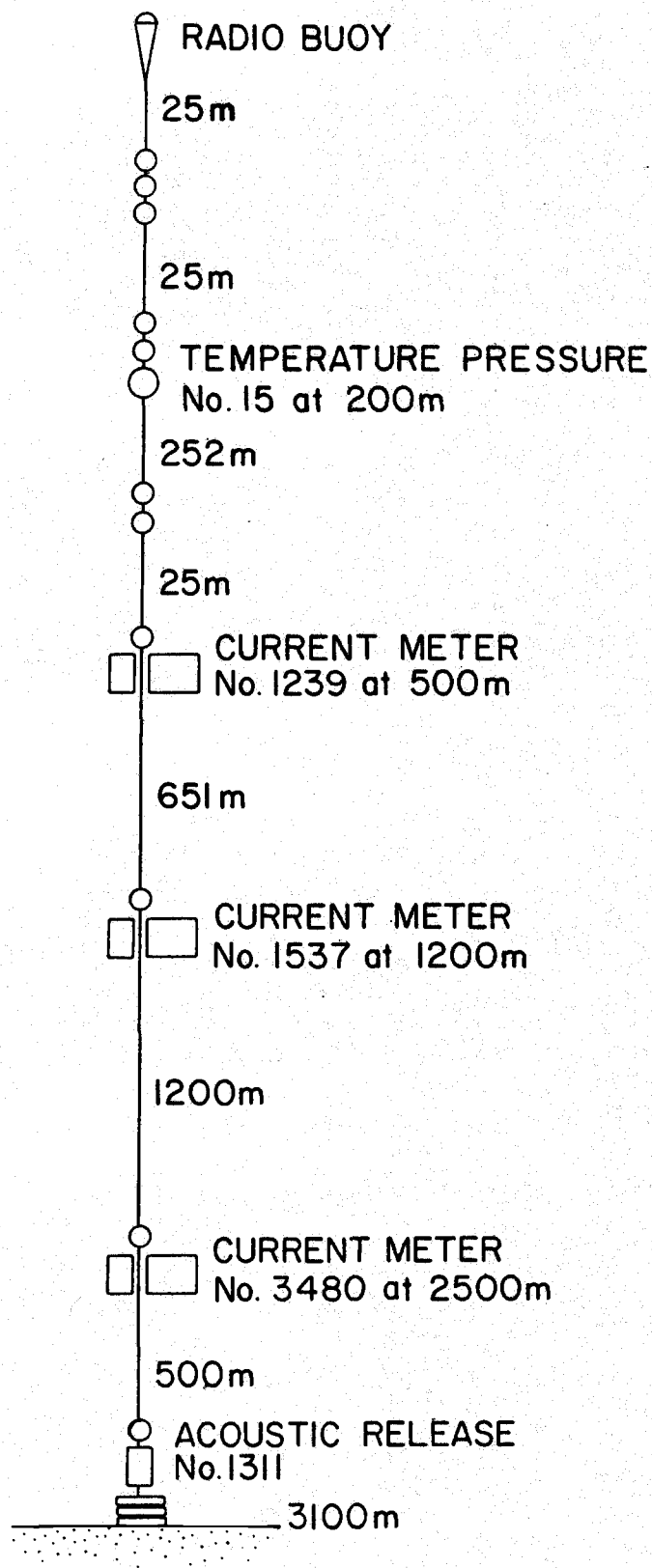
UNFILTERED PRESSURE. 1383 METERS AT MS-1



UNFILTERED PRESSURE. 2685 METERS AT MS-1



MS - 2



MAPPING / STATISTICS (MS) 2

60° 19.4' S

67° 09.3' W

INSTALLED: 29 JANUARY 1979

MS-2

Position: 60°19.4'S, 67°09.3'W
Depth of Water: 3100 m
Set at 1952 UCT 29 January '79 by R/V MELVILLE
Retrieved at 0504 UCT 21 January '79 by R/V ATLANTIS II
Data Interval: 2011 UCT 29 January '79 to 0602 UCT 21 January '80

Instrumentation

<u>Intended Depth</u>	<u>RCM5 Serial No./Tape No.</u>
500 m	1239/12
1200 m	1537/16
2500 m	3480/6

Instrument 1239 recorded speed, direction, temperature, and pressure once per hour until the instrument was recovered.

Instrument 1537 recorded speed, direction, temperature, and pressure once per hour until the instrument was recovered.

Instrument 3480 recorded speed, direction, and temperature once per hour until the instrument was recovered.

MS-2

800 m

	MEAN	S.D.	SKEW	KURT	MIN	MAX	N
S	10.14	4.98	0.51	2.99	0.70	32.10	8555
U	0.19	6.92	-0.14	2.73	-26.50	22.20	8555
V	5.72	6.84	-0.31	3.65	-20.60	30.30	8555
T	2.21	0.07	-0.23	2.99	1.97	2.39	8555
P	803.93	6.09	2.80	14.30	798.80	852.90	8555

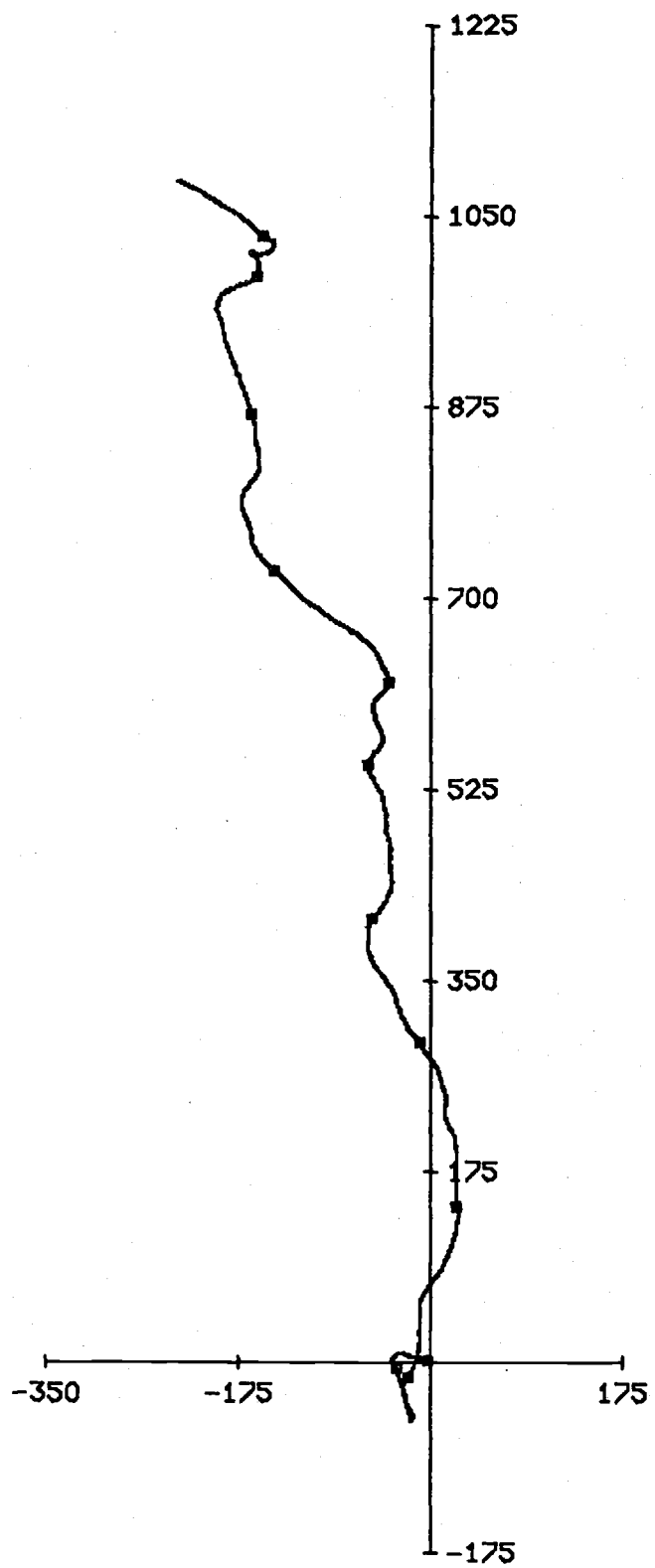
1485 m

S	5.57	3.39	0.50	2.80	0.80	18.40	8557
U	-0.75	3.81	-0.04	3.44	-16.60	13.90	8557
V	3.51	3.89	-0.05	4.22	-17.10	17.80	8557
T	1.84	0.07	-0.00	2.51	1.66	2.04	8557
P	1493.37	4.36	3.15	16.17	1488.60	1528.10	8557

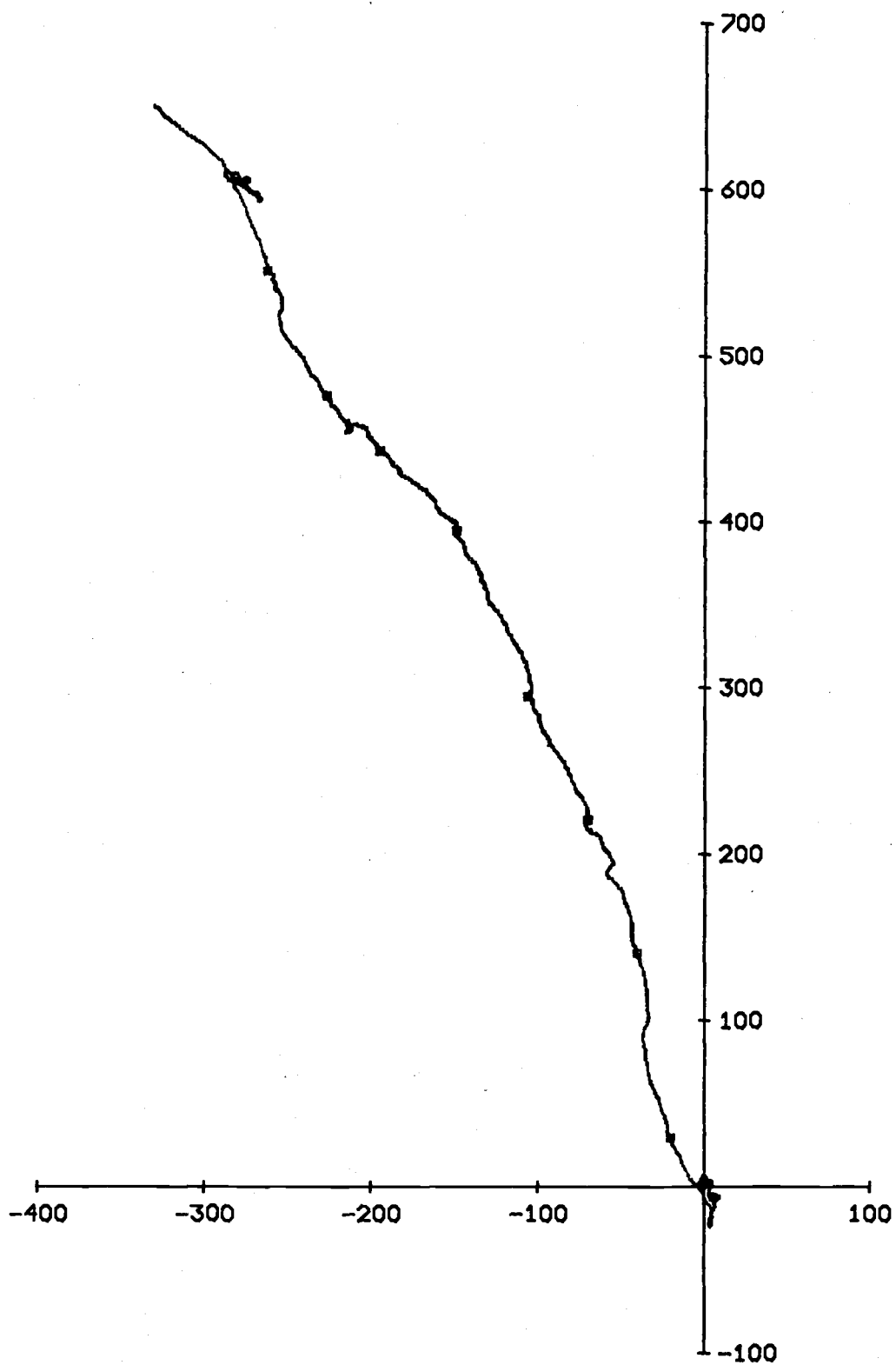
2785 m

S	4.74	2.55	0.75	4.04	0.80	18.70	8556
U	-1.08	3.39	0.24	3.25	-17.10	11.10	8556
V	2.11	3.45	0.16	3.66	-9.90	18.60	8556
T	0.93	0.07	0.20	2.26	0.76	1.12	8556

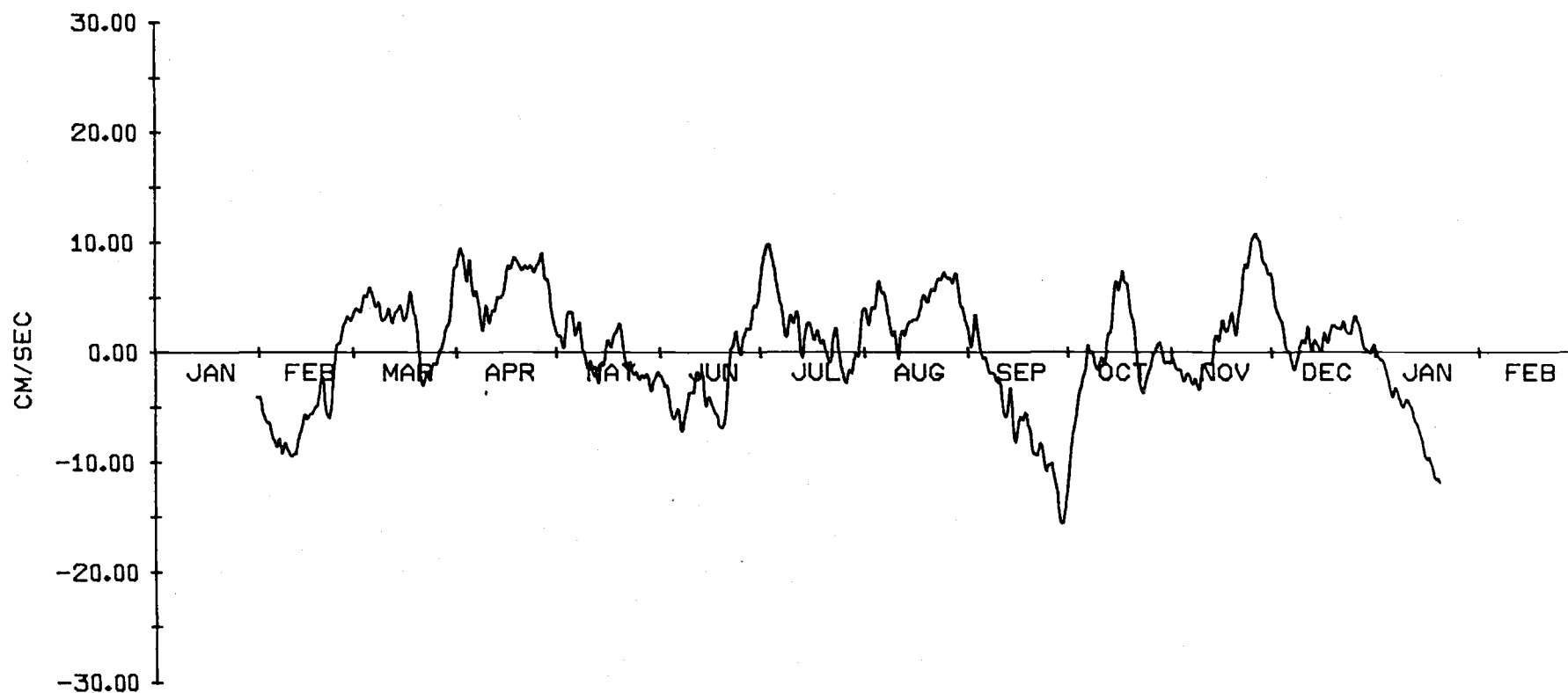
Speed, u, and v are given in cm/sec; temperature in degrees centigrade; pressure in decibars; and conductivity in mmhr/cm.



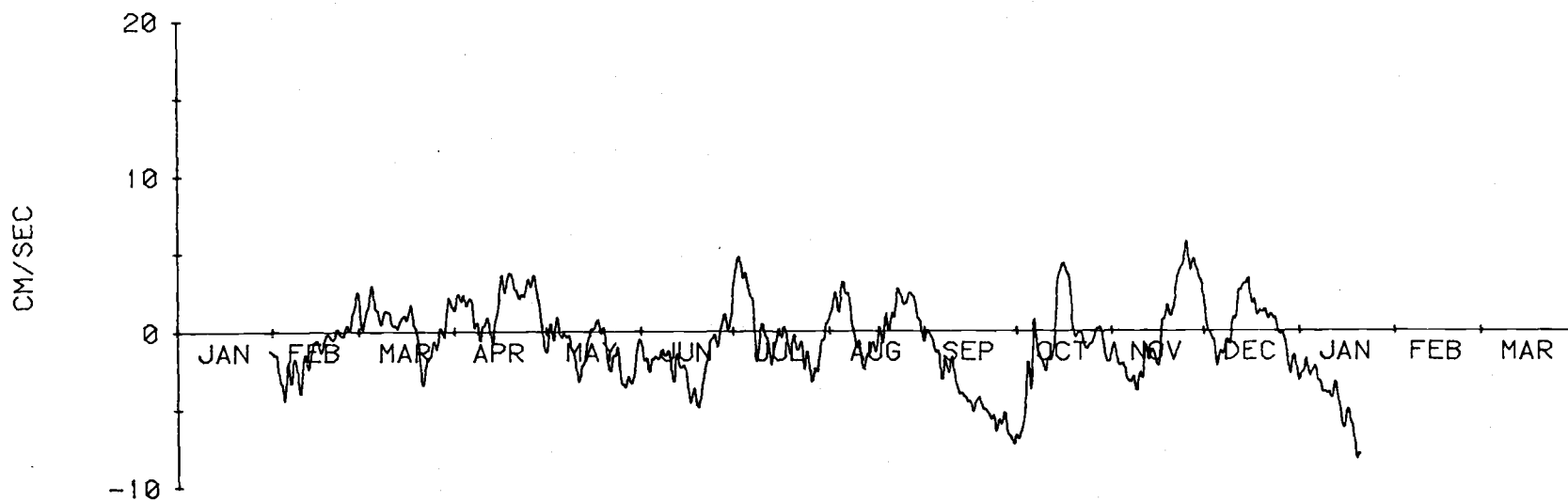
1485 M AT STN MS-2. 356.5 DAYS STARTING 2018 29 JAN 79.



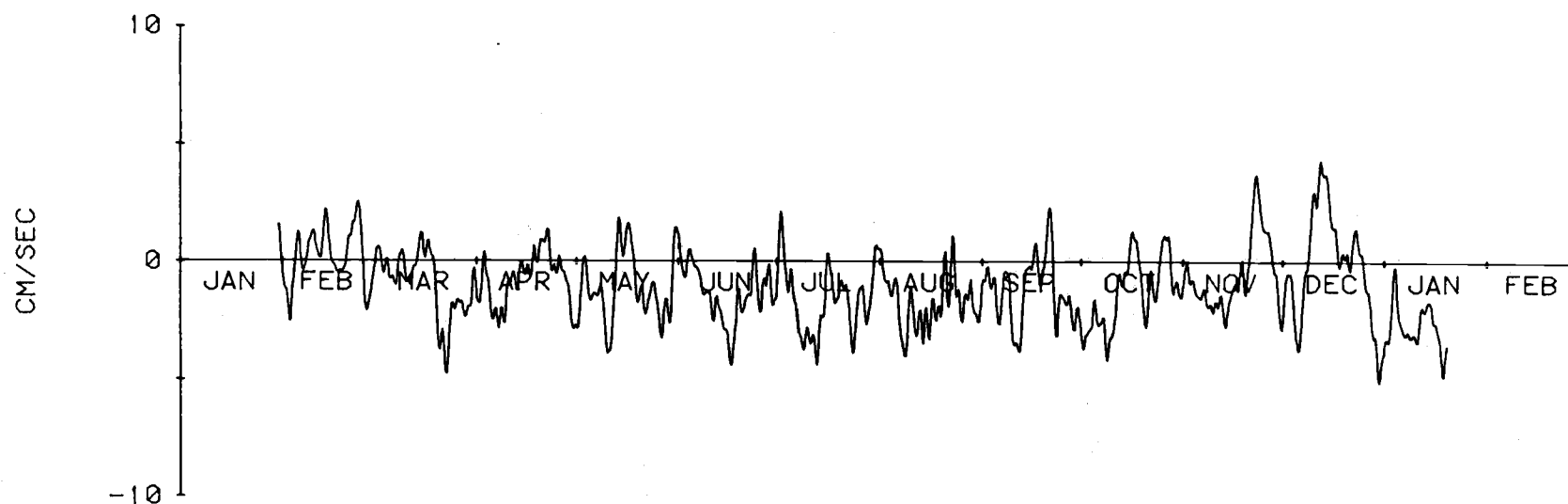
2785 M AT STN MS-2. 356.5 DAYS STARTING 2011 29 JAN 79.



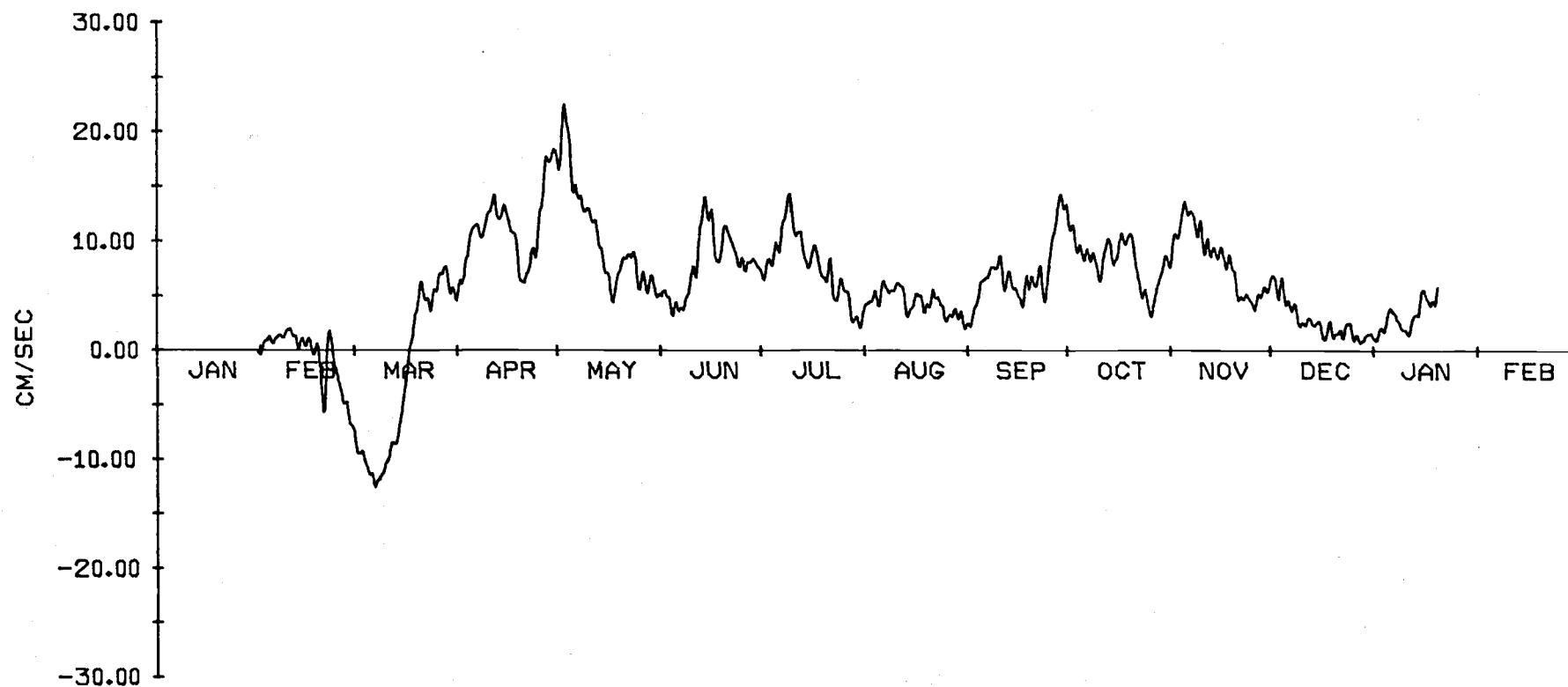
800 METERS AT MS-2.
LLP FILTERED U COMPONENT



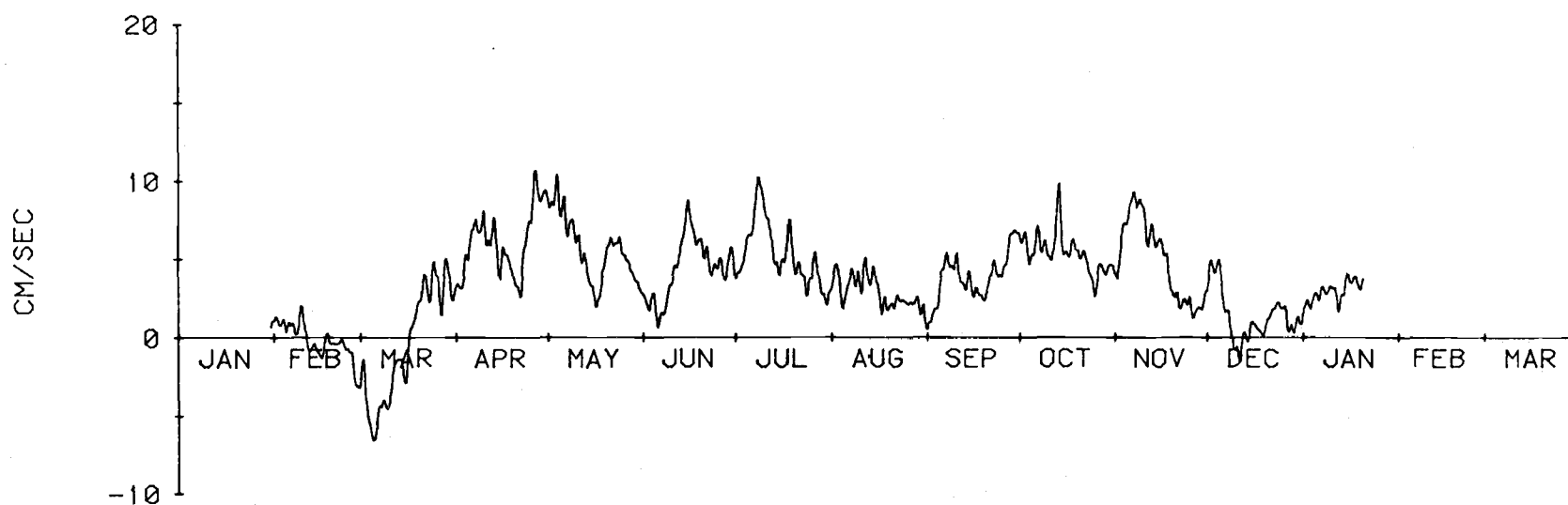
1485 METERS AT MS-2
LLP FILTERED U COMPONENT



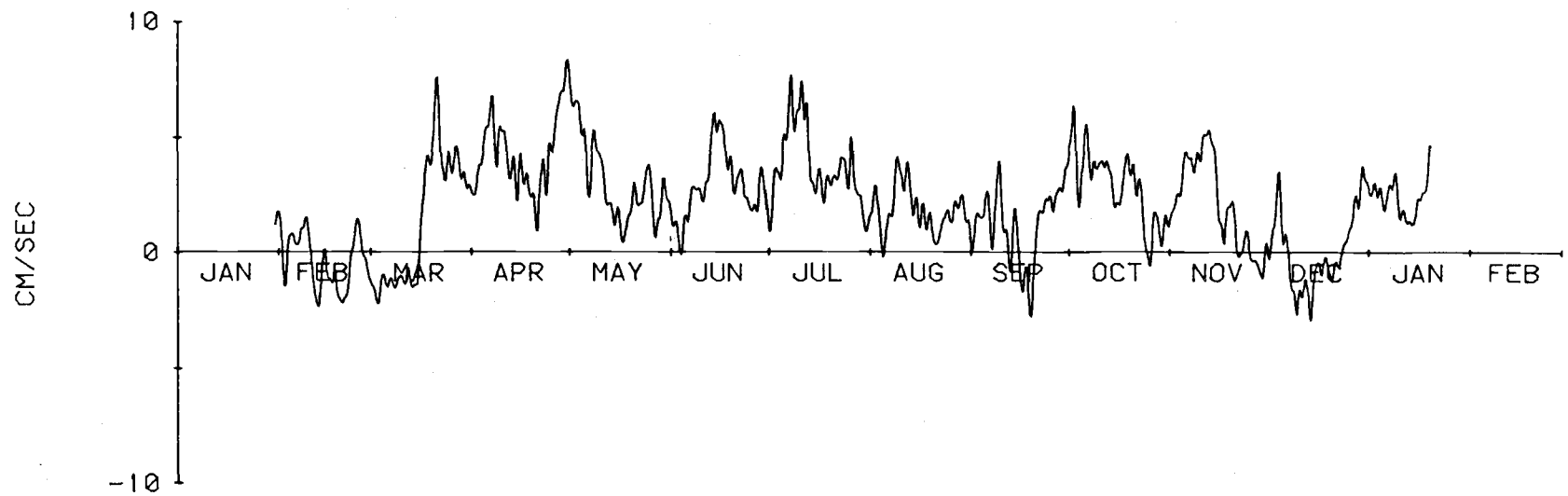
2785 METERS AT MS-2
LLP FILTERED U COMPONENT



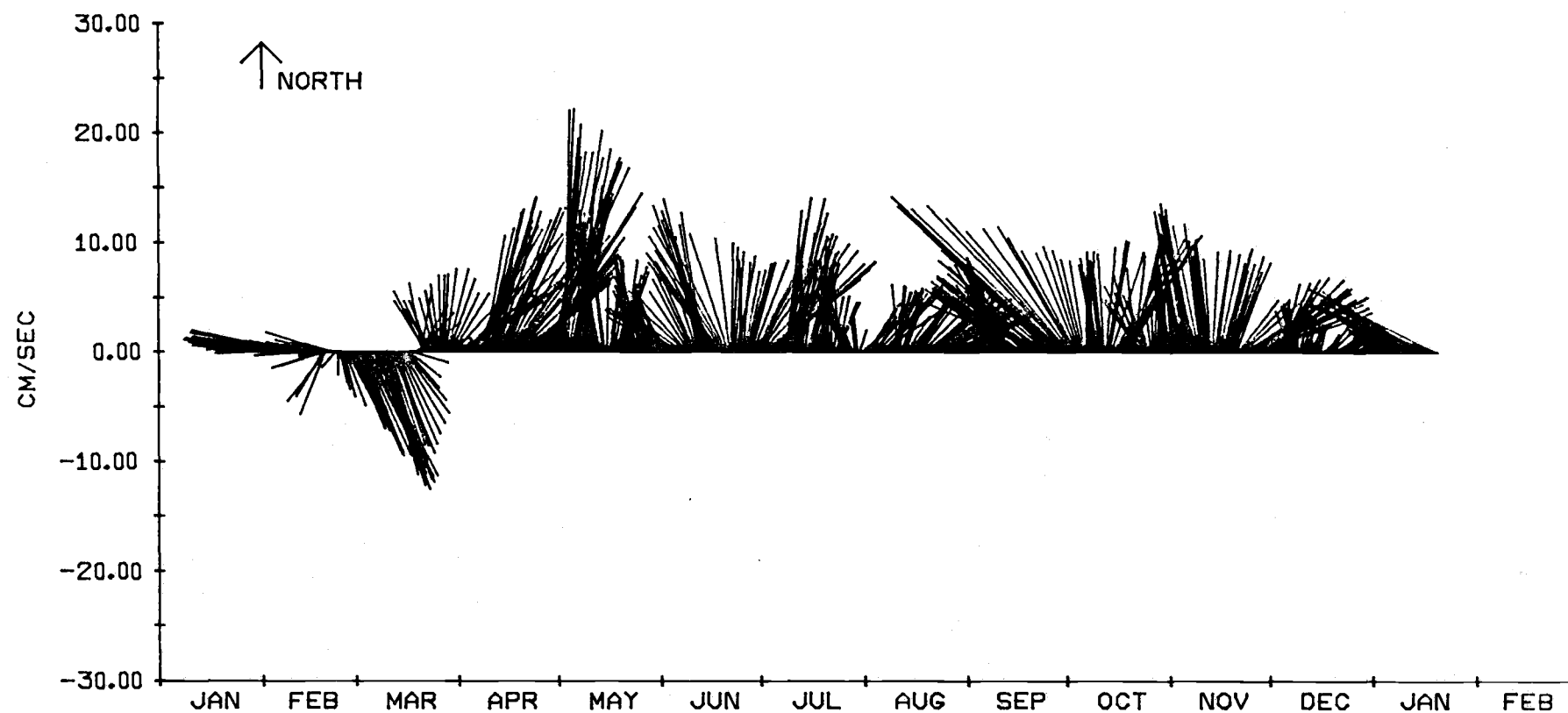
800 METERS AT MS-2.
LLP FILTERED V COMPONENT



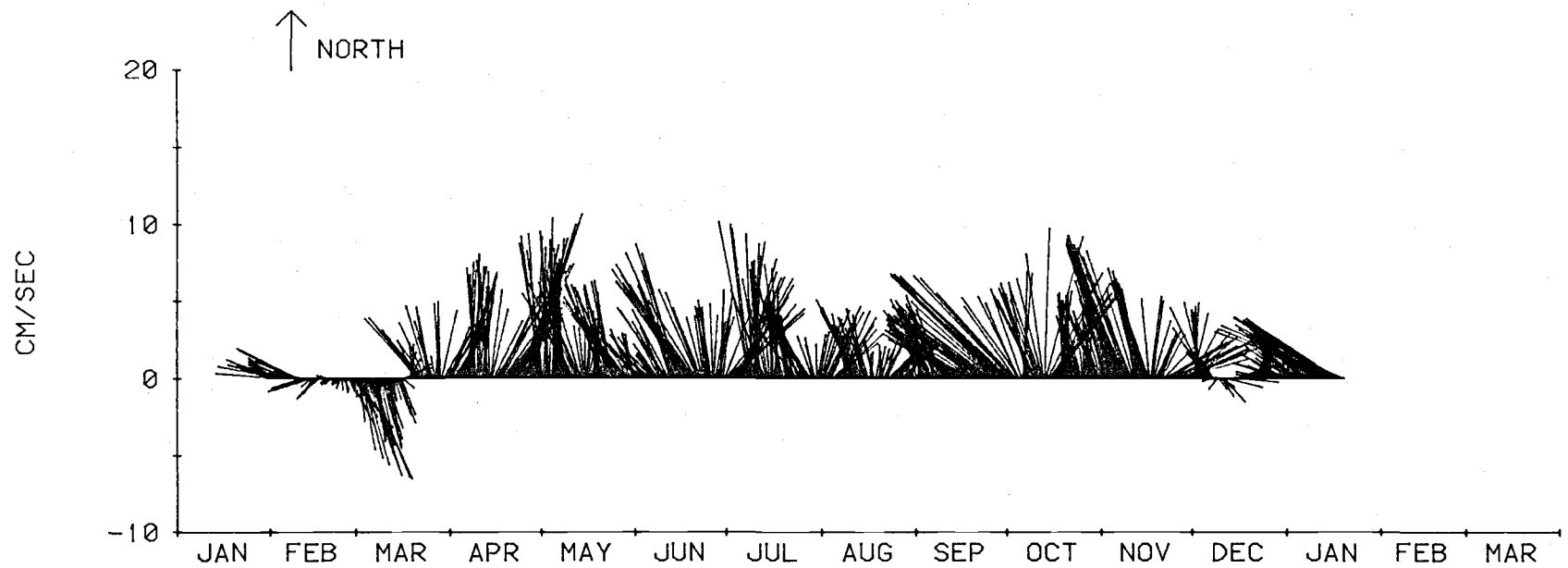
1485 METERS AT MS-2
LLP FILTERED V COMPONENT



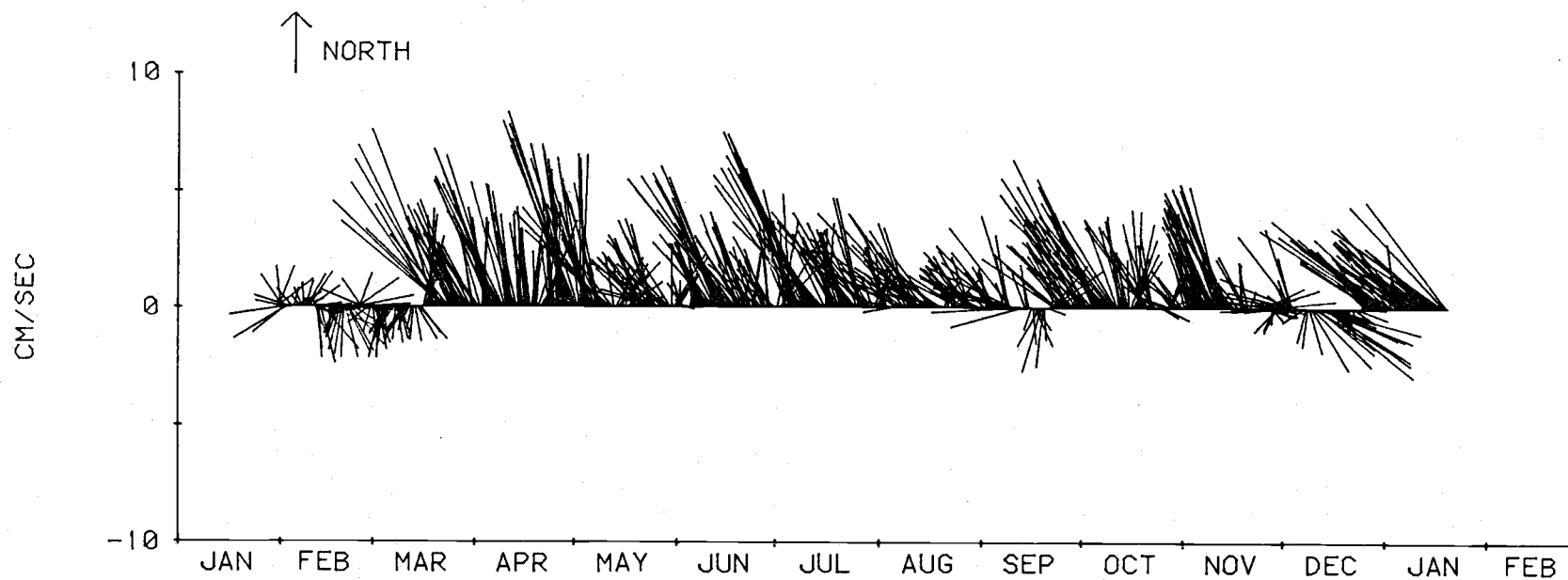
2785 METERS AT MS-2
LLP FILTERED V COMPONENT



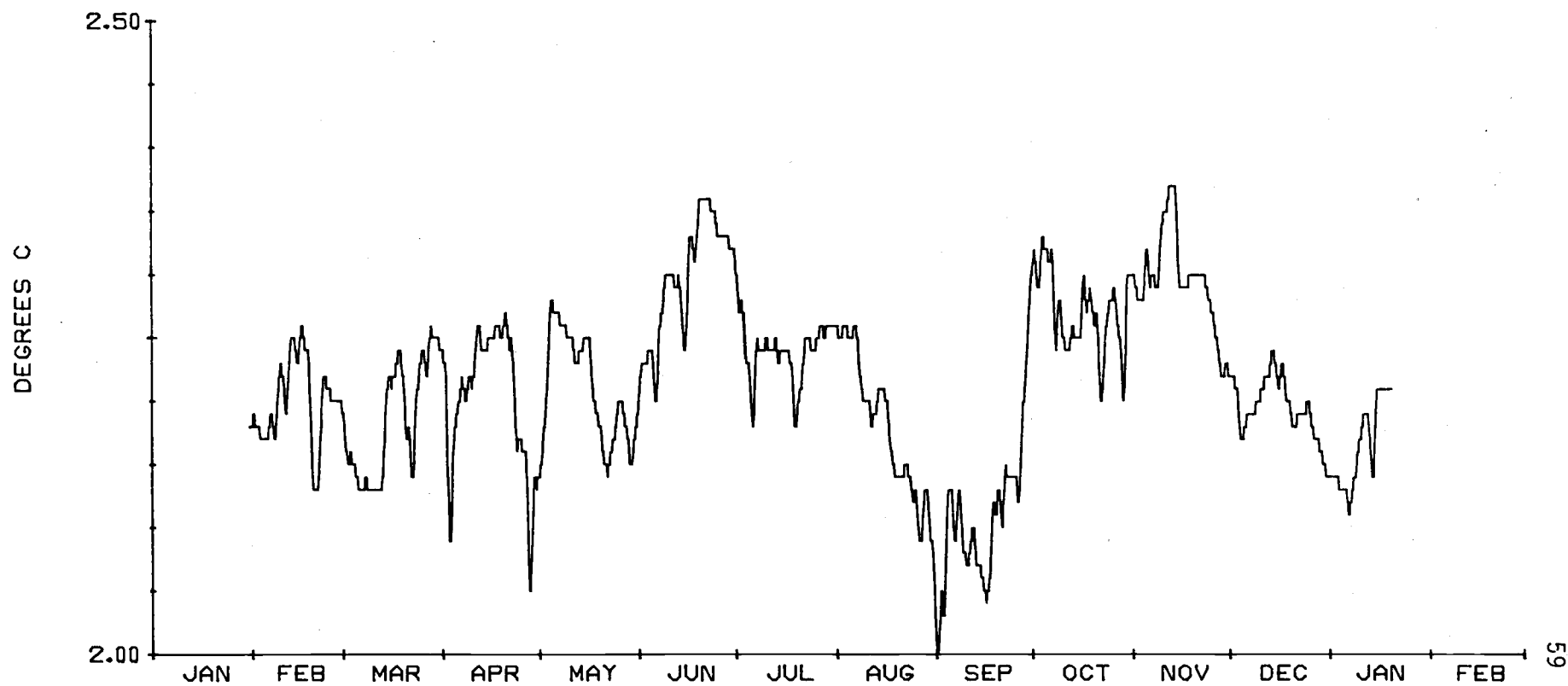
800 METERS AT MS-2.
LLP FILTERED CURRENT



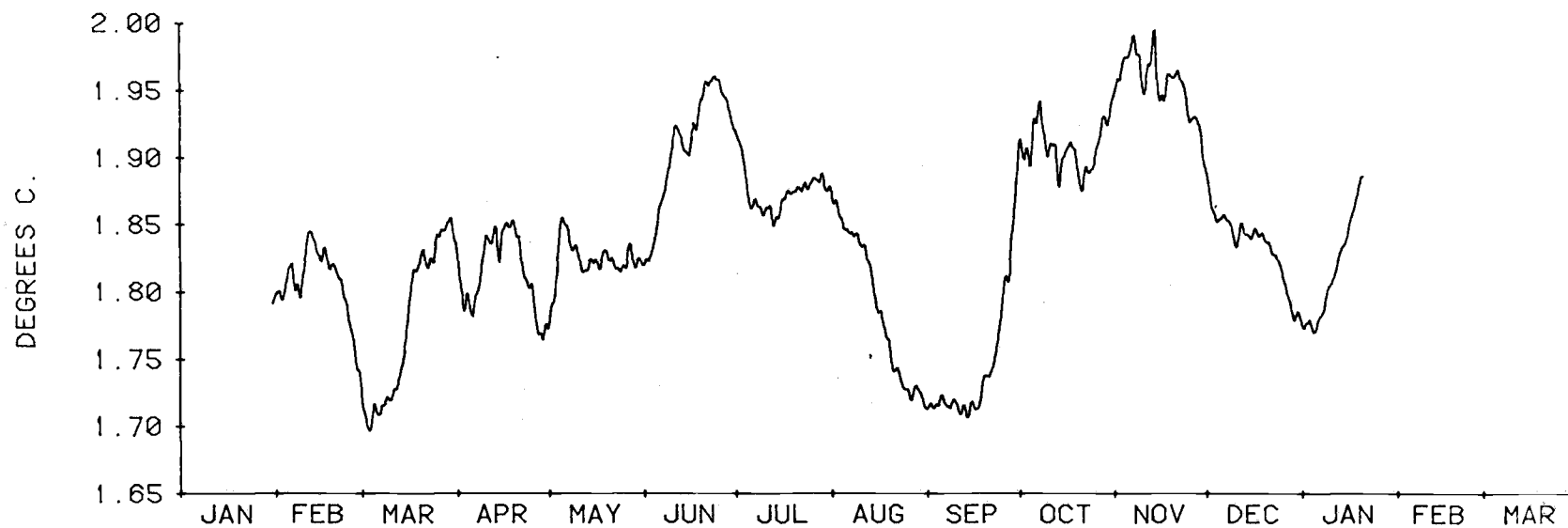
1485 METERS AT MS-2
LLP FILTERED CURRENT



2785 METERS AT MS-2
LLP FILTERED CURRENT



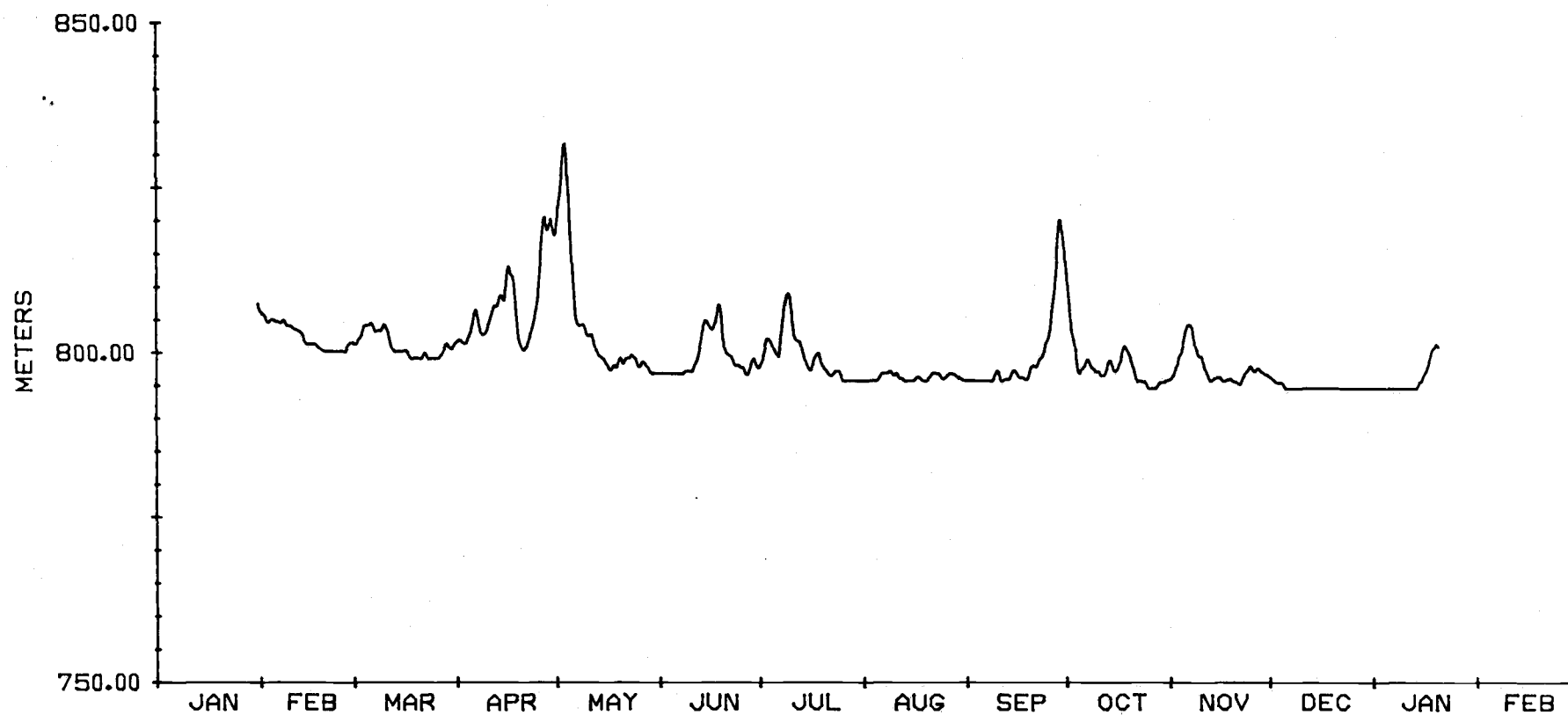
800 METERS AT MS-2.
LLP FILTERED TEMPERATURE



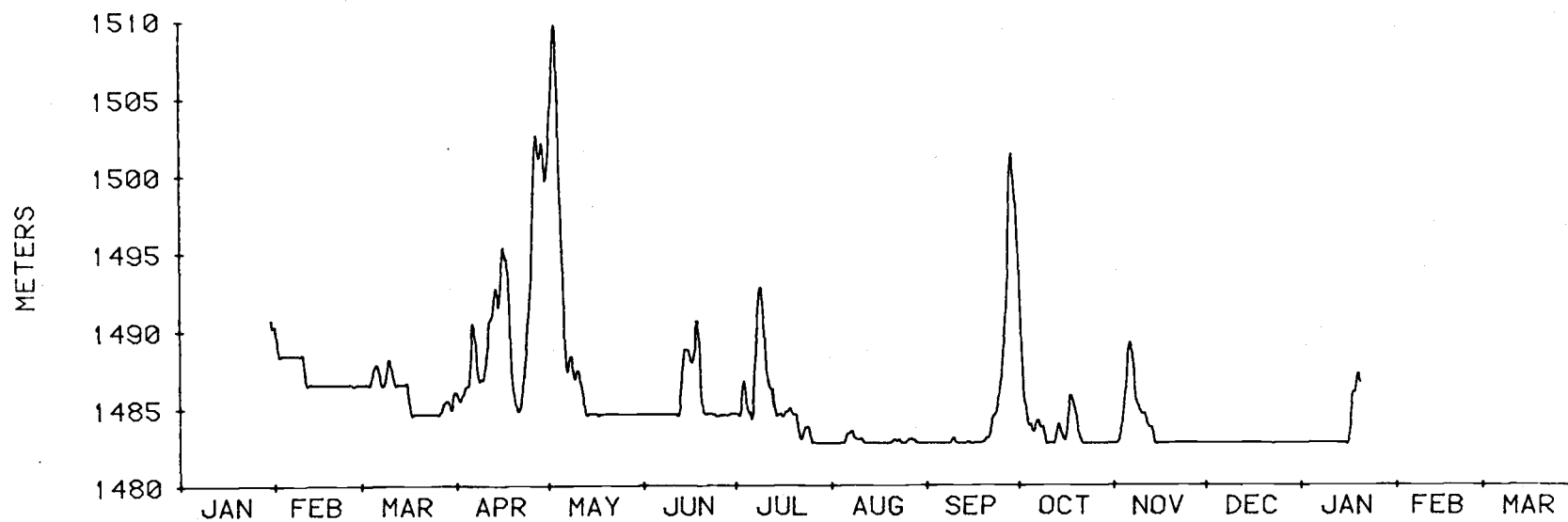
1485 METERS AT MS-2
LLP FILTERED TEMPERATURE



2785 METERS AT MS-2
LLP FILTERED TEMPERATURE

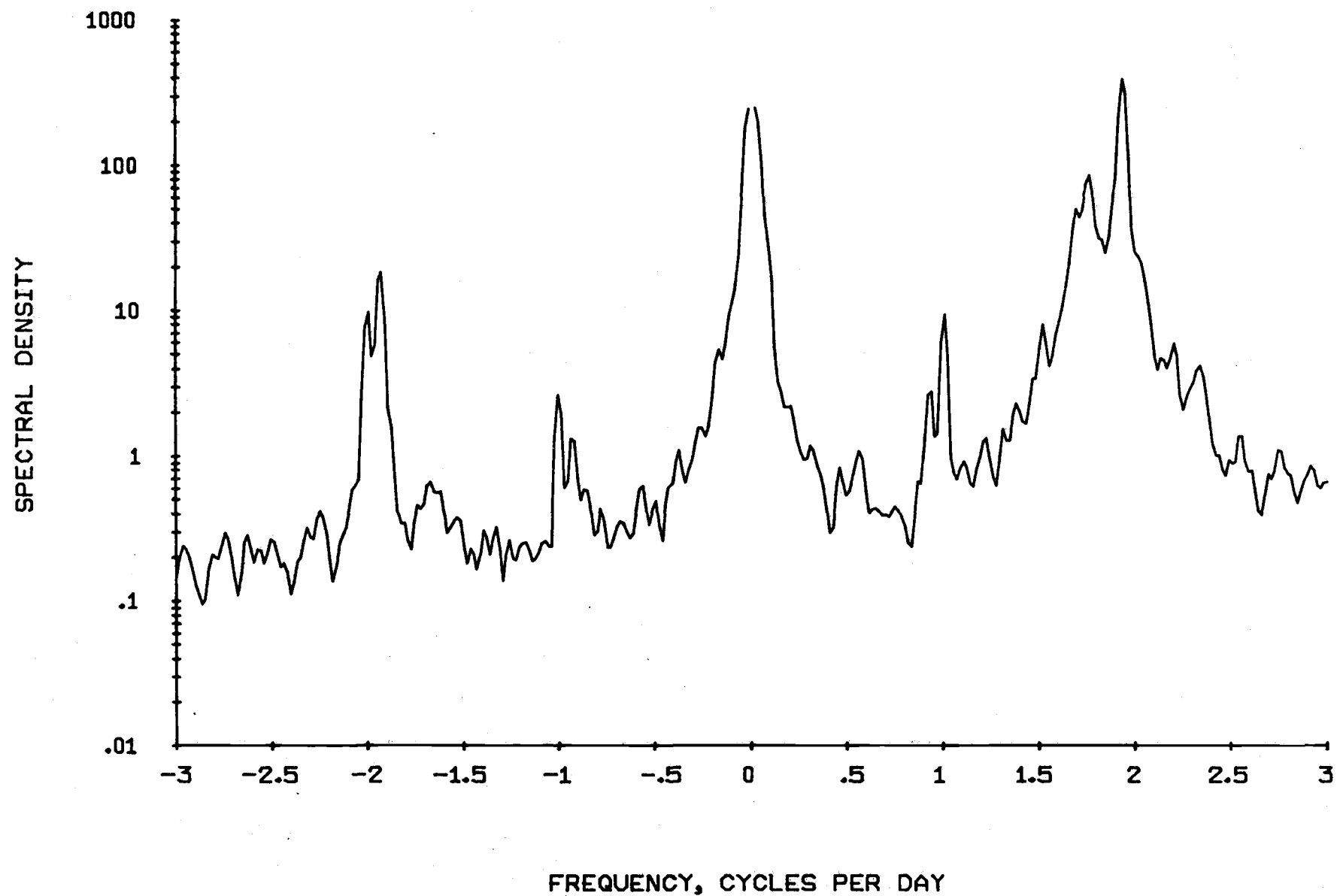


800 METERS AT MS-2.
LLP FILTERED PRESSURE

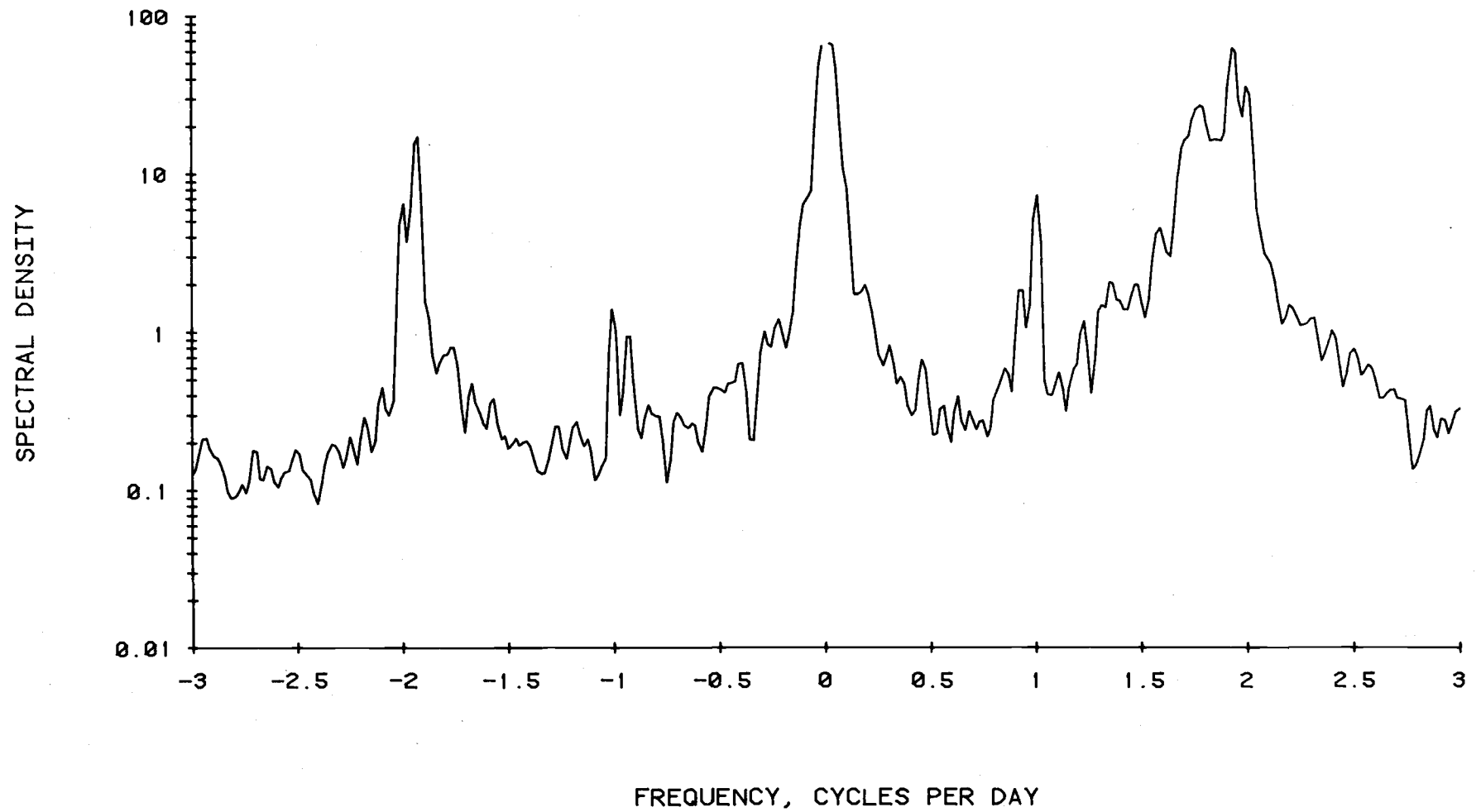


1485 METERS AT MS-2
LLP FILTERED PRESSURE

UNFILTERED CURRENT. 800 METERS AT MS-2.

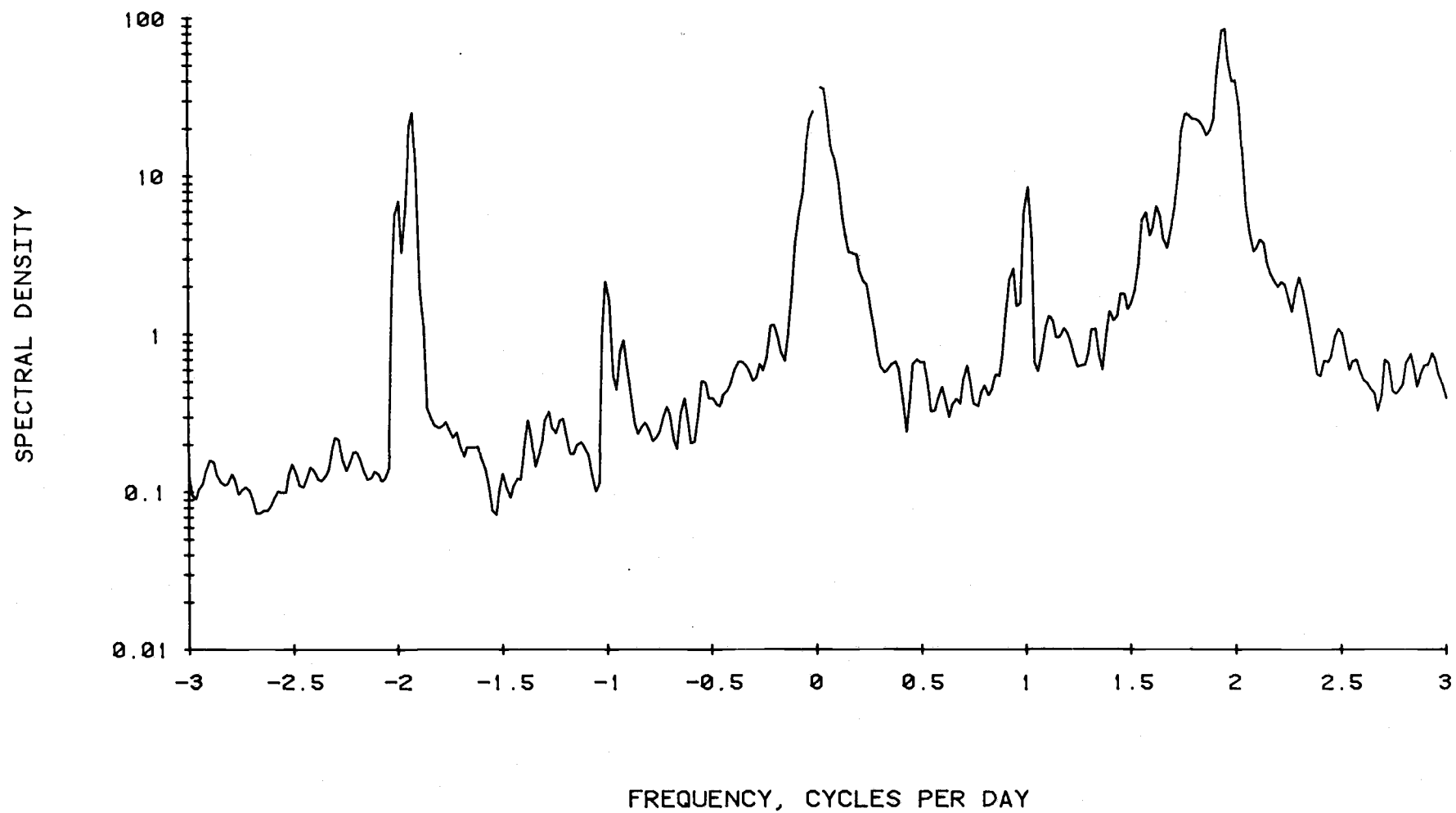


UNFILTERED CURRENT. 1485 METERS AT MS-2

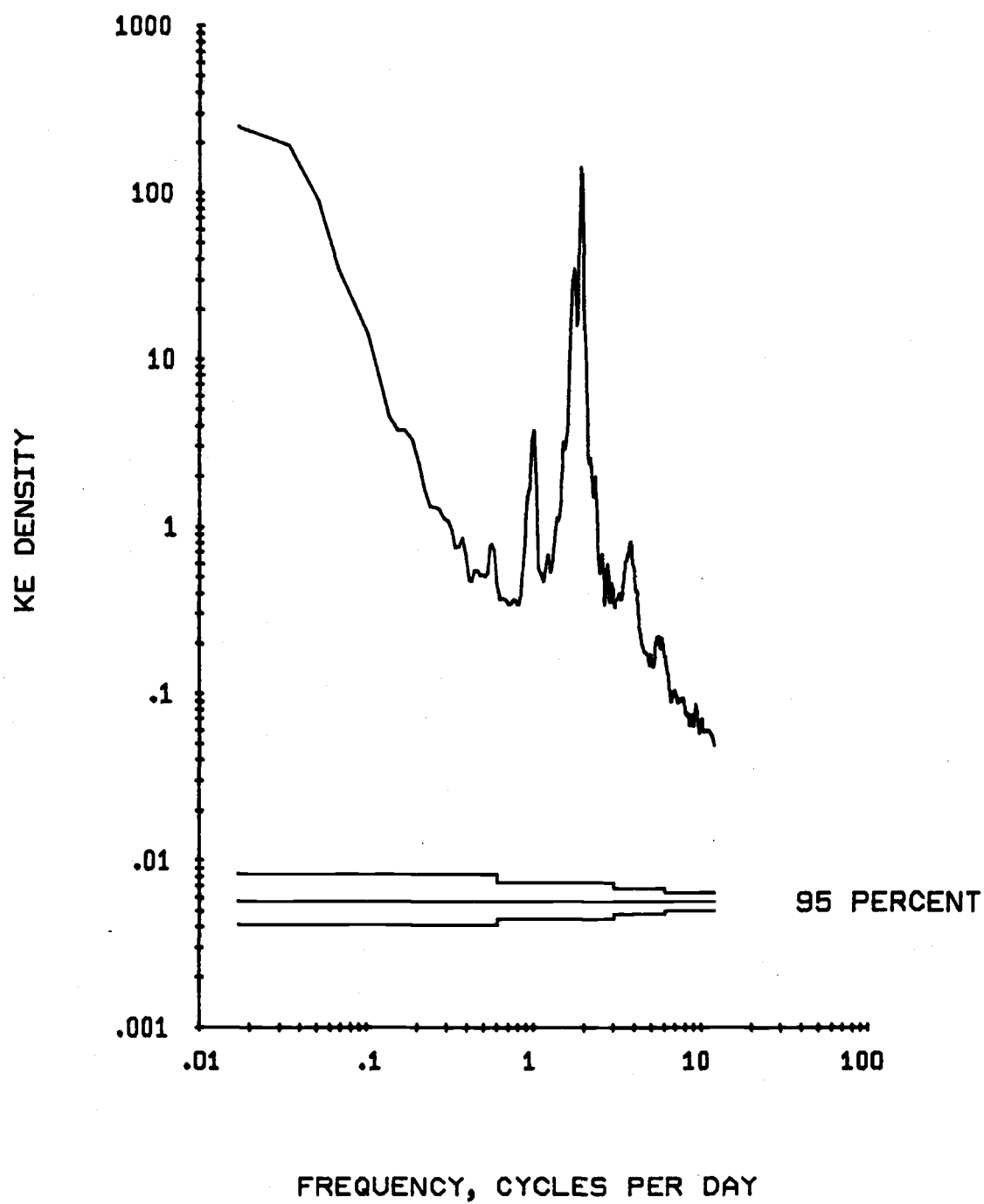


UNFILTERED CURRENT. 2785 METERS AT MS-2

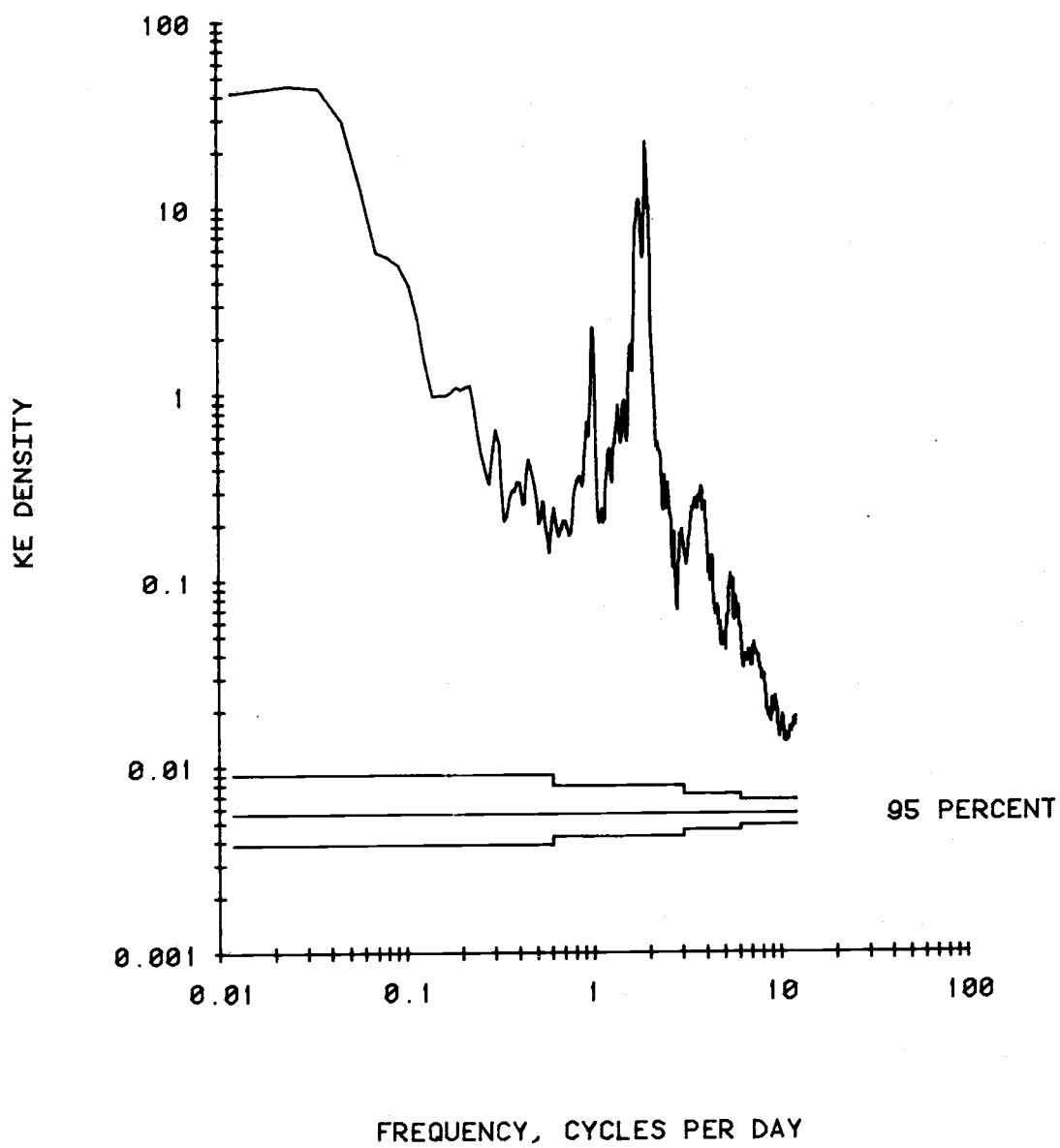
99



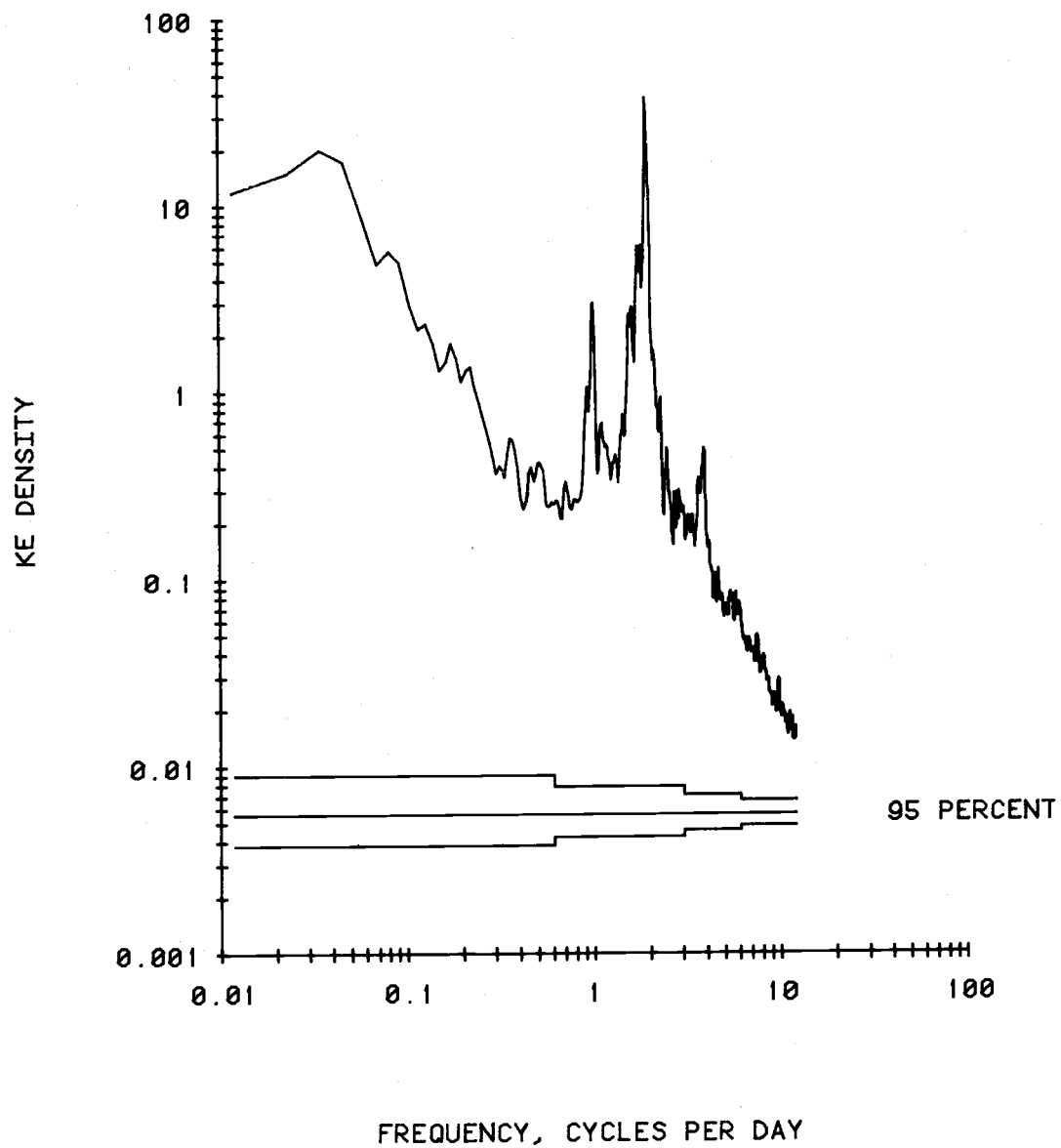
UNFILTERED CURRENT. 800 METERS AT MS-2.



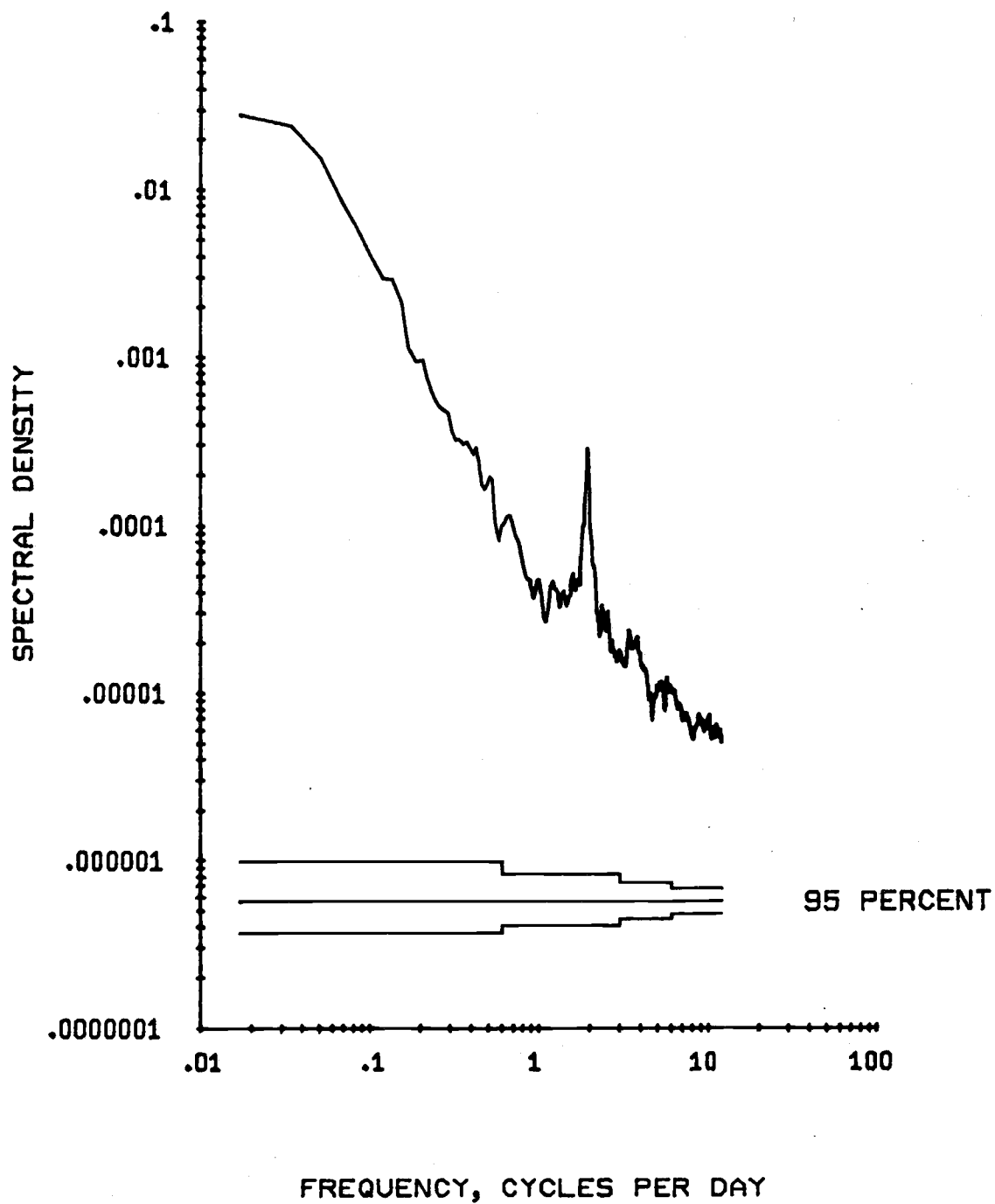
UNFILTERED CURRENT. 1485 METERS AT MS-2



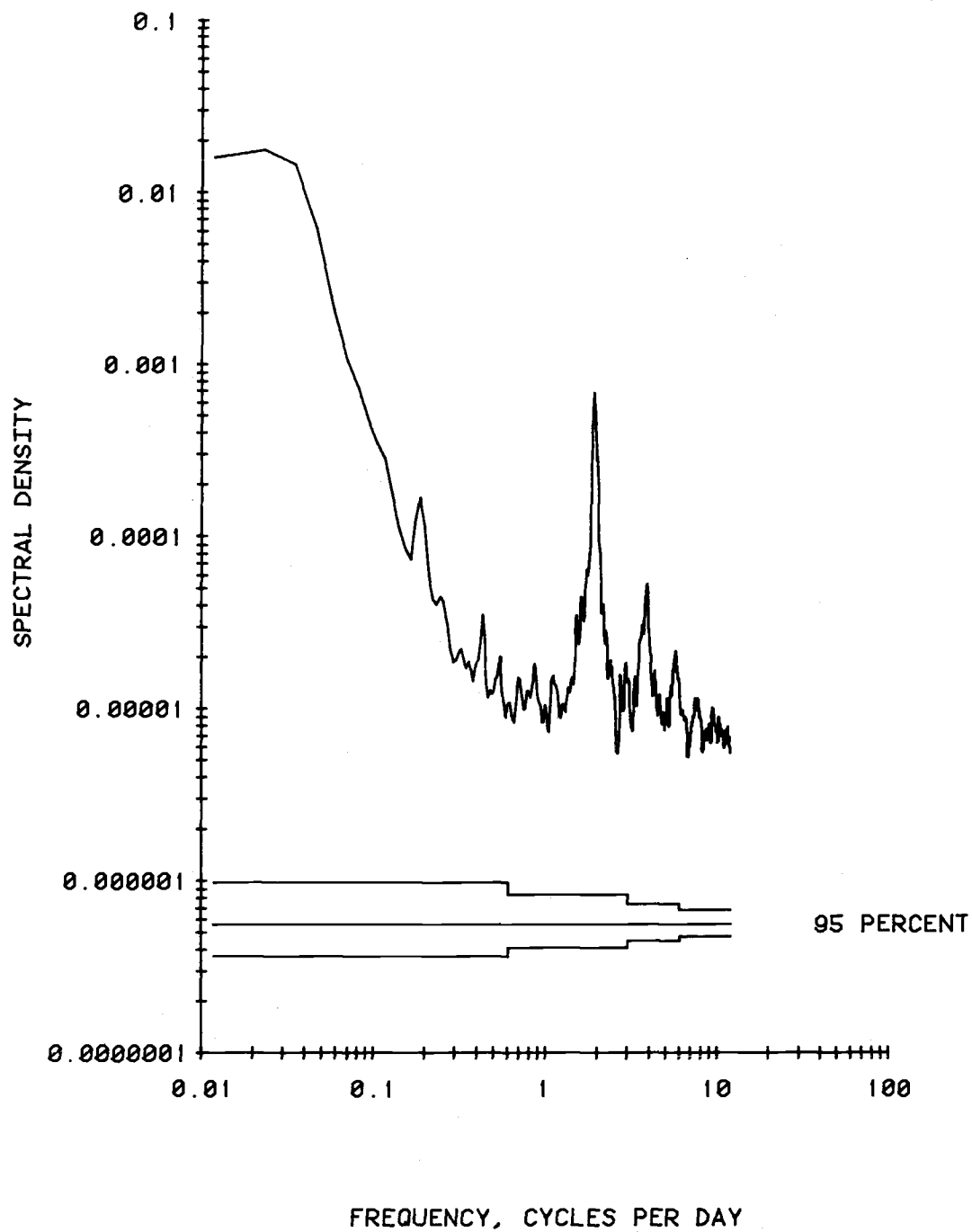
UNFILTERED CURRENT. 2785 METERS AT MS-2



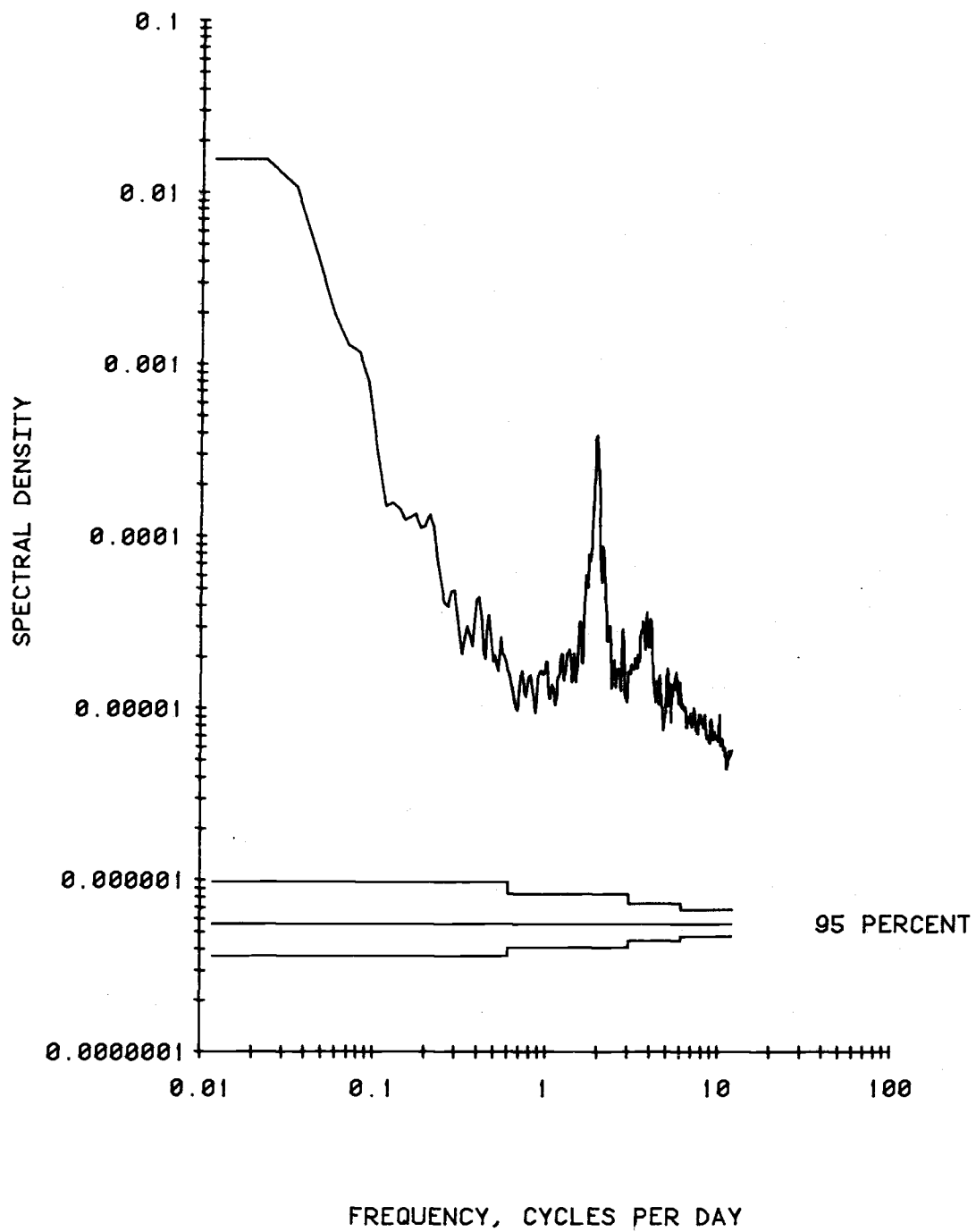
UNFILTERED TEMPERATURE. 800 METERS AT MS-2.

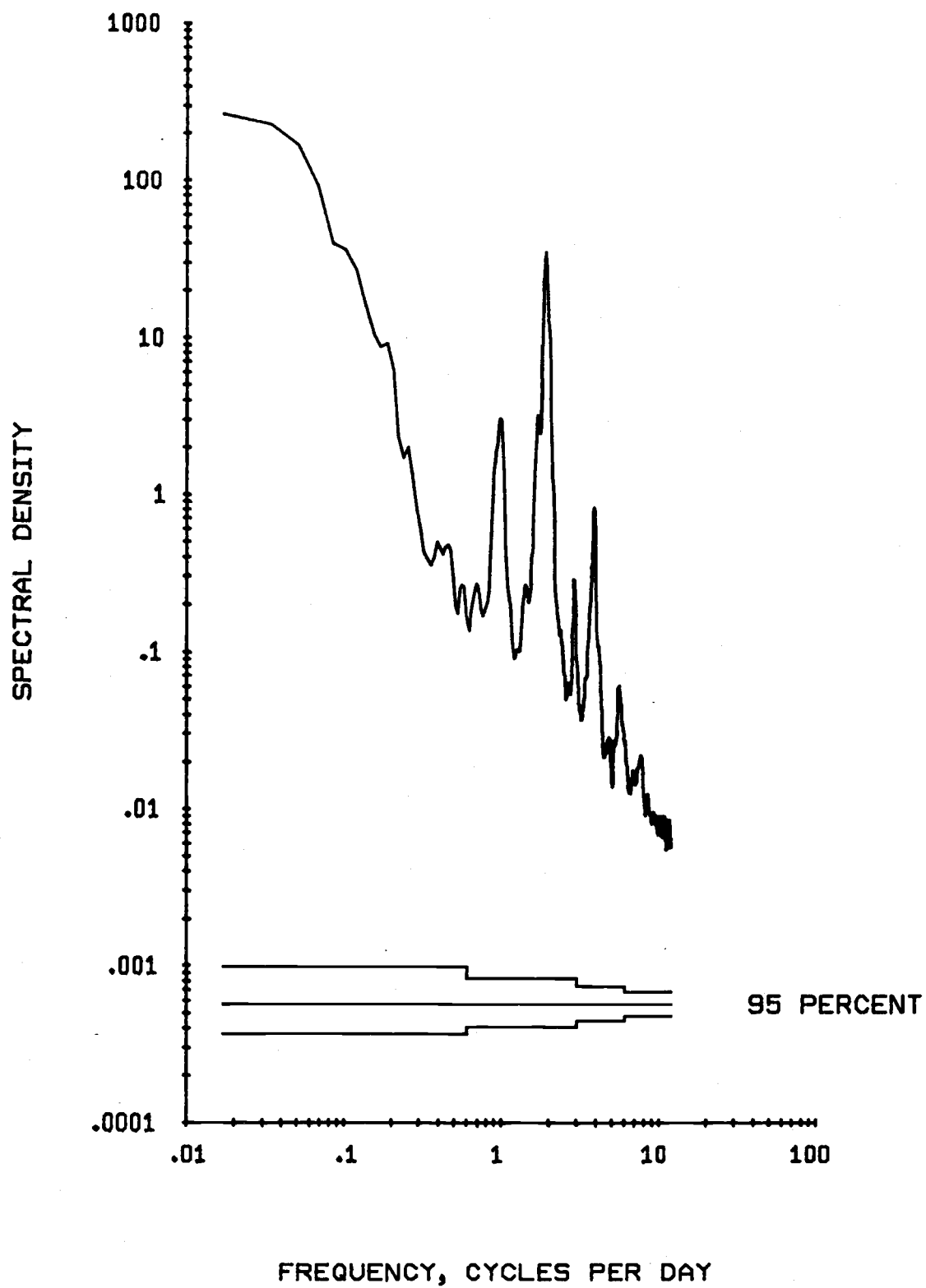


UNFILTERED TEMPERATURE. 1485 METERS AT MS-2

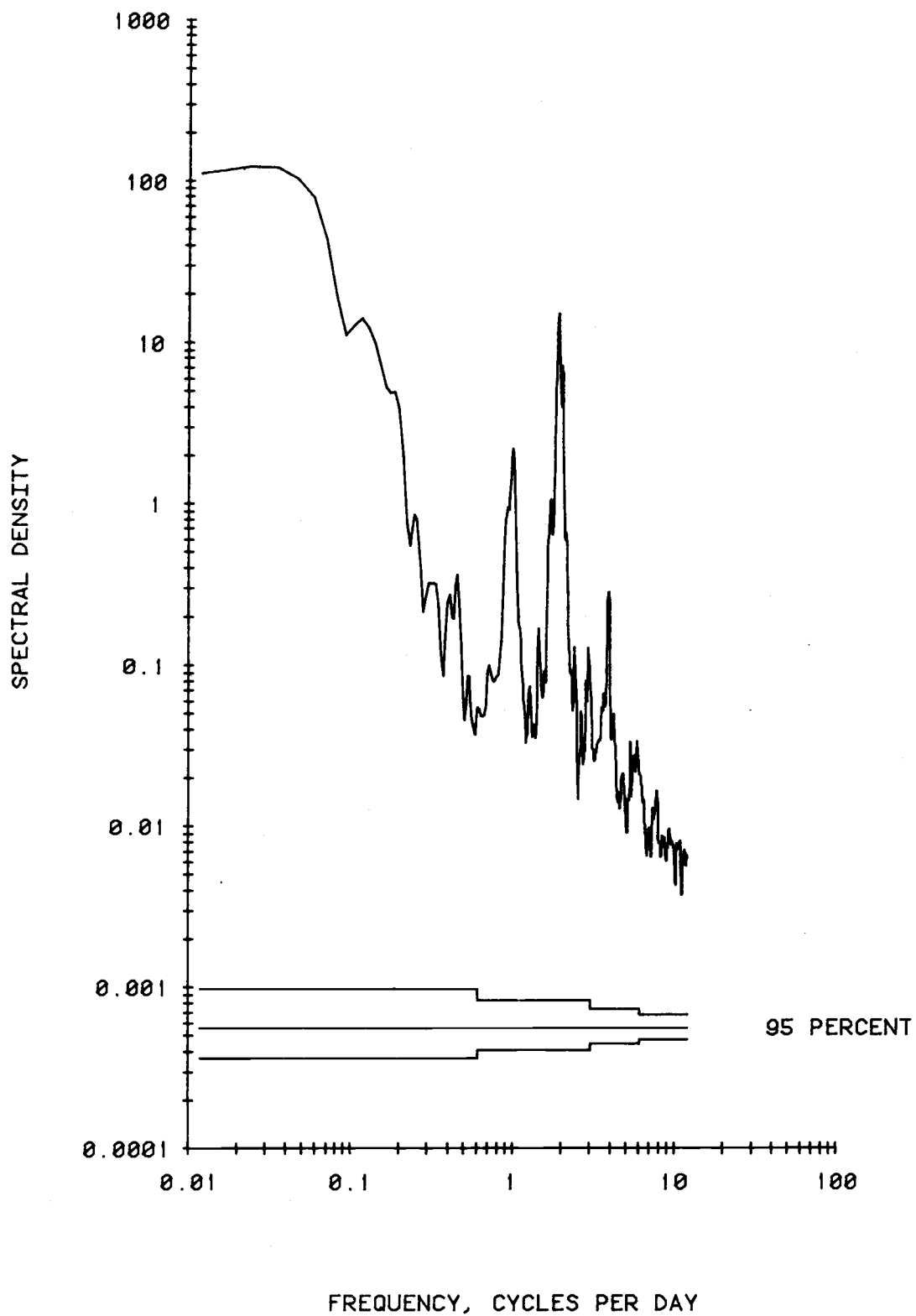


UNFILTERED TEMPERATURE. 2785 METERS AT MS-2

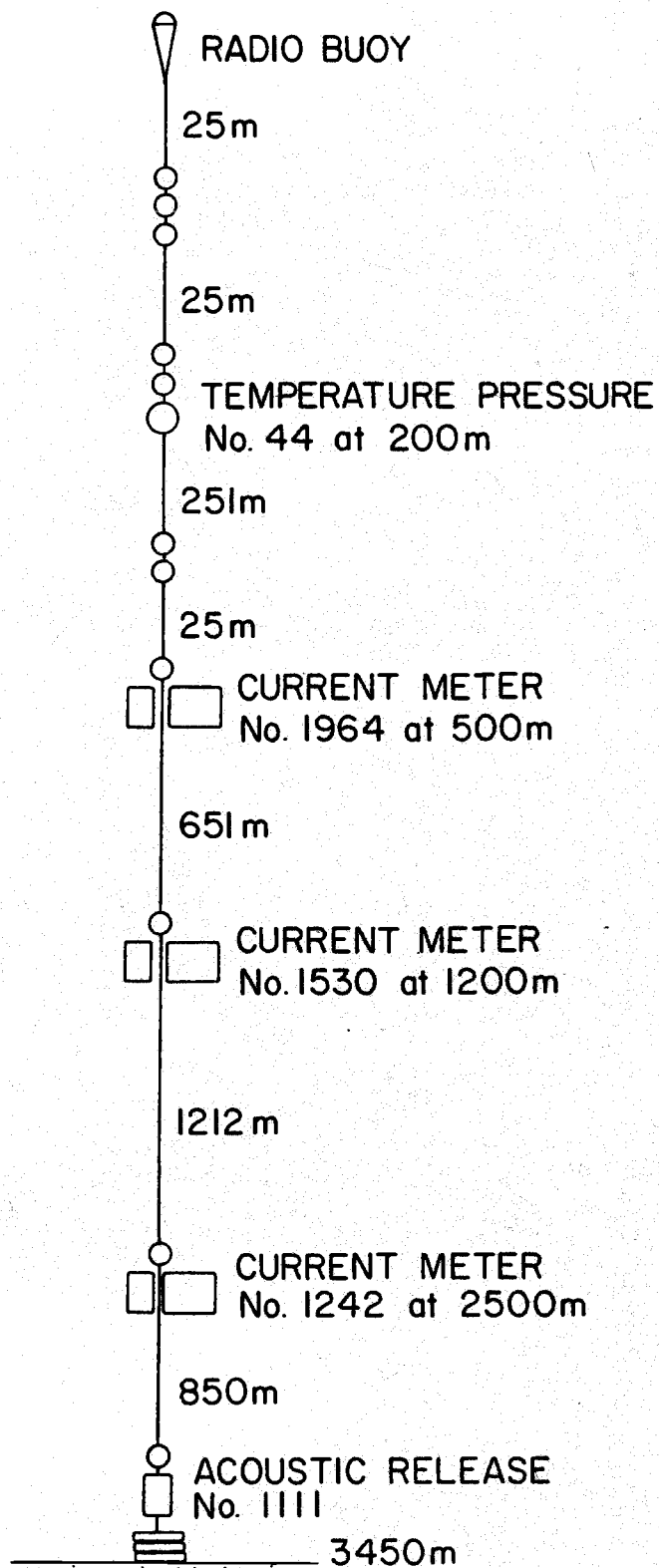




UNFILTERED PRESSURE. 1485 METERS AT MS-2



MS - 3



MAPPING/STATISTICS (MS)3

59° 26.5' S

66° 15.8' W

INSTALLED: 29 JANUARY 1979

MS-3

Position: 59°26.5'S, 66°15.8'W
Depth of Water: 3450 m
Set at 0441 UCT 29 January '79 by R/V MELVILLE
Retrieved at 0840 UCT 23 January '79 by R/V ATLANTIS II
Data Interval: 0713 UCT 29 January '79 to 0513 UCT 23 January '80

Instrumentation

<u>Intended Depth</u>	<u>RCM5 Serial No./Tape No.</u>
500 m	1964/14
1200 m	1530/
2500 m	1242/

Instrument 1964 recorded speed, direction, temperature, and pressure once per hour until the instrument was recovered.

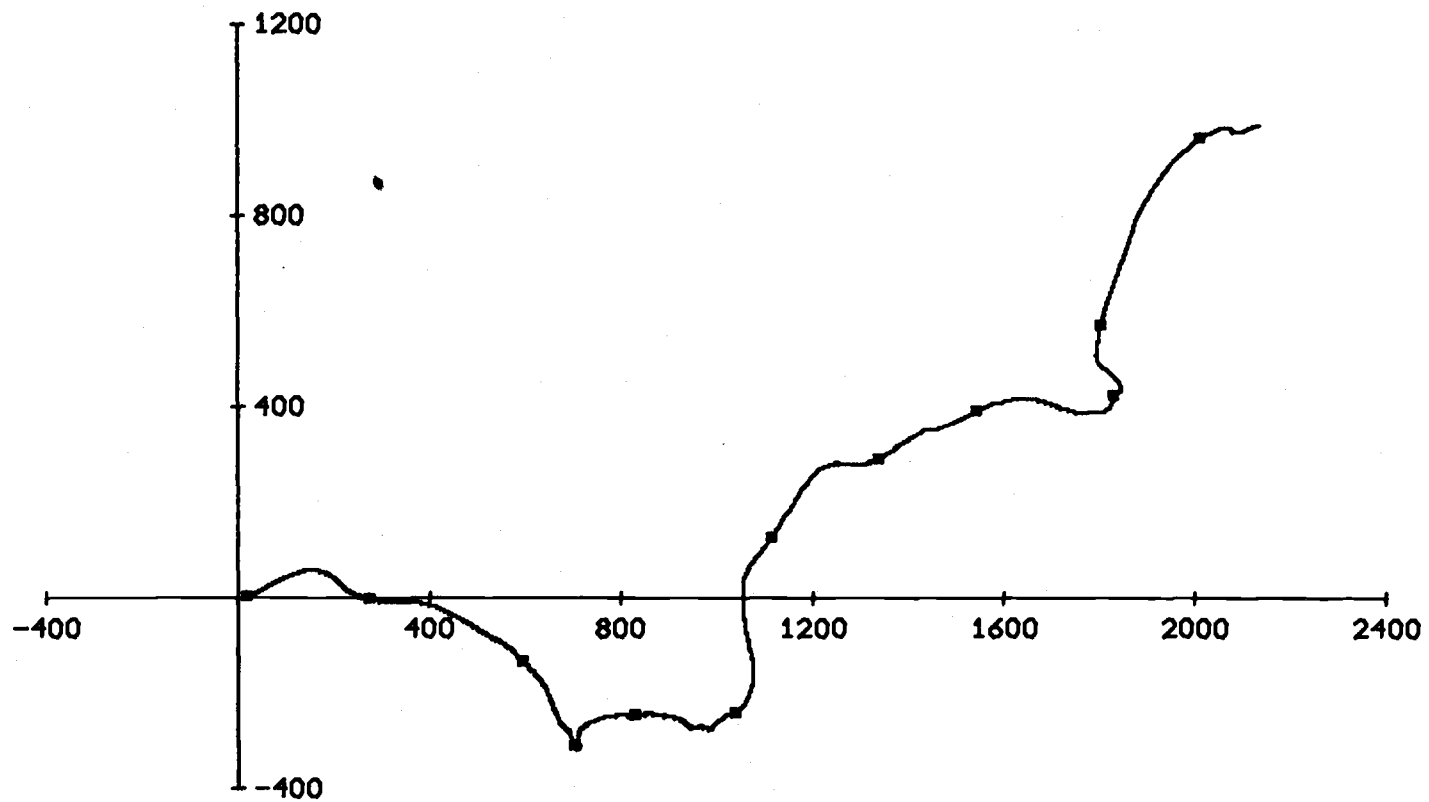
Instruments 1530 and 1242 were not recovered.

MS-3

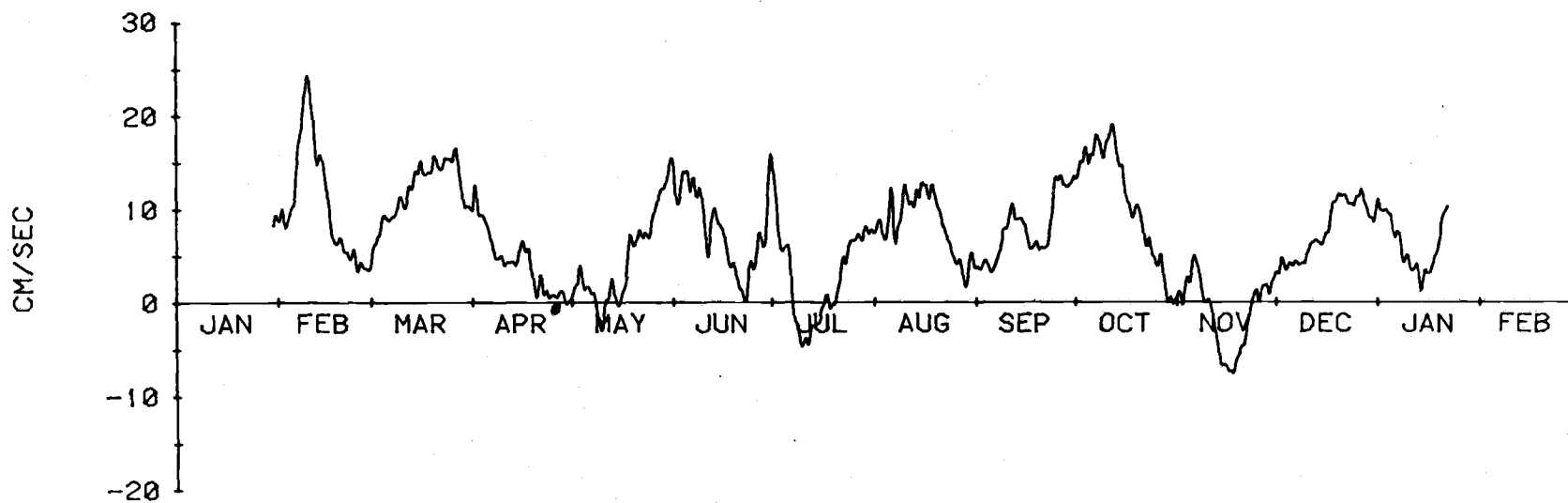
645 m

	MEAN	S.D.	SKEW	KURT	MIN	MAX	N
S	11.91	6.15	0.43	2.55	0.70	32.80	8615
U	6.88	7.18	0.02	3.22	-20.80	32.00	8615
V	3.19	8.40	0.22	2.95	-24.40	32.10	8616
T	2.33	0.08	0.13	3.62	2.04	2.63	8615
P	648.08	13.81	2.63	11.43	637.60	739.00	8615

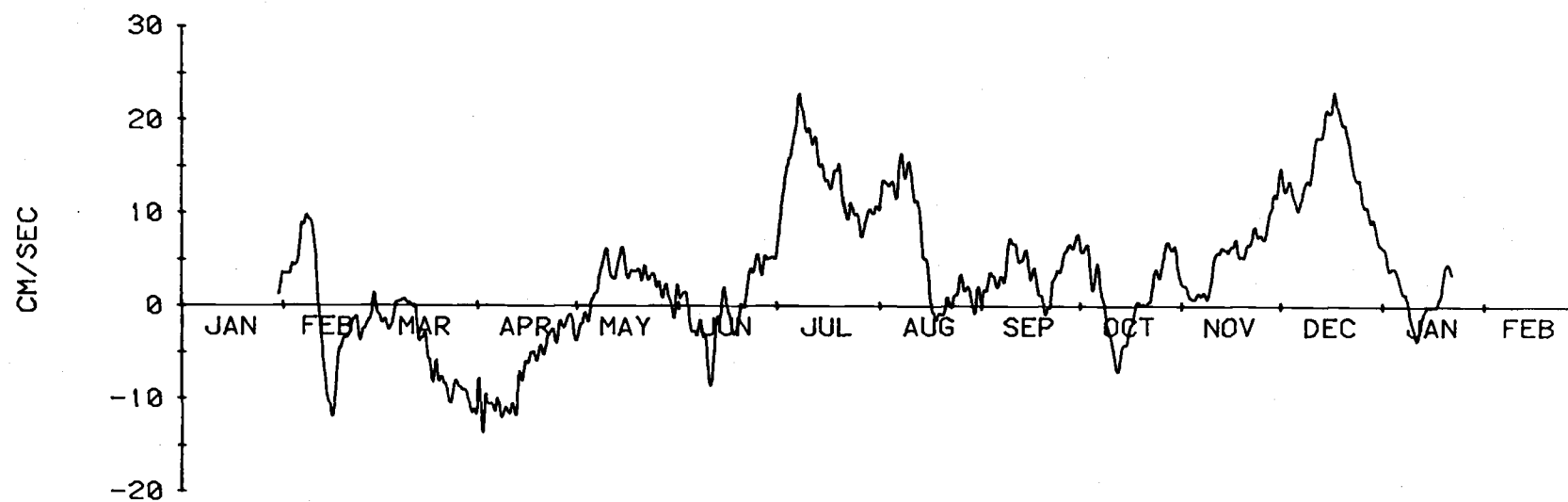
Speed, u, and v are given in cm/sec; temperature in degrees centigrade; pressure in decibars; and conductivity in mmhr/cm.



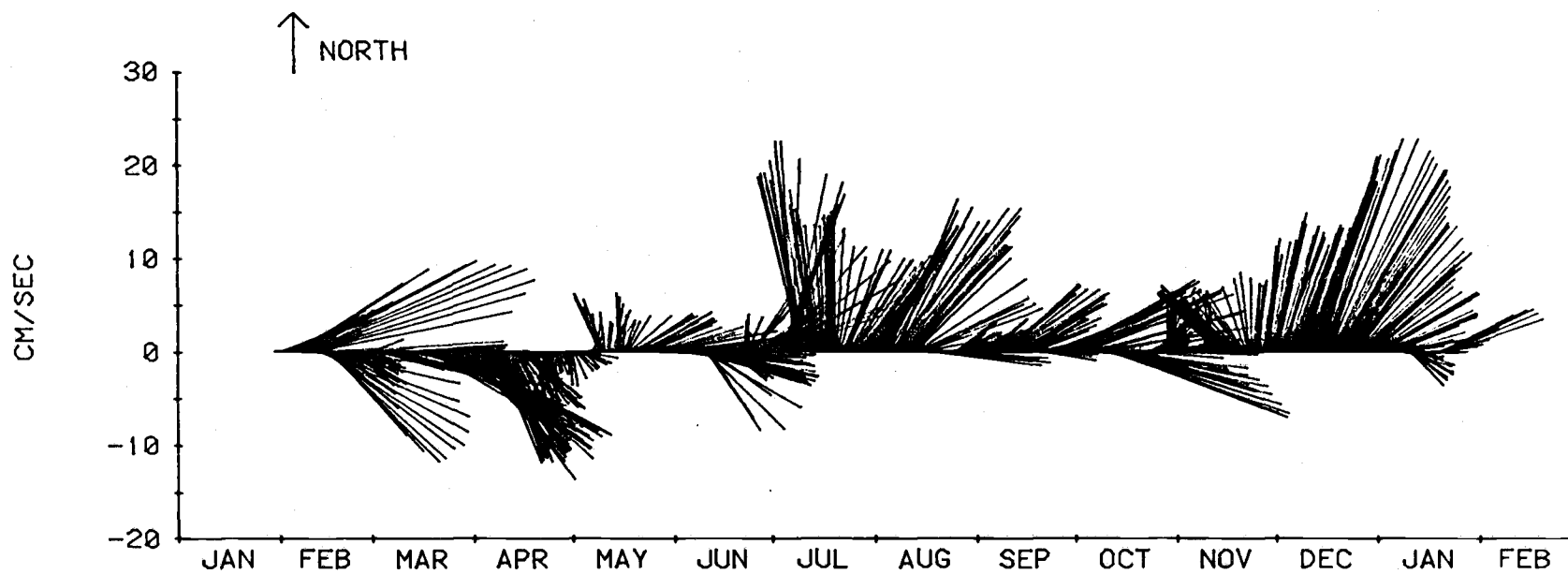
645 M AT STN MS-3. 358.9 DAYS STARTING 0713 29 JAN 79.



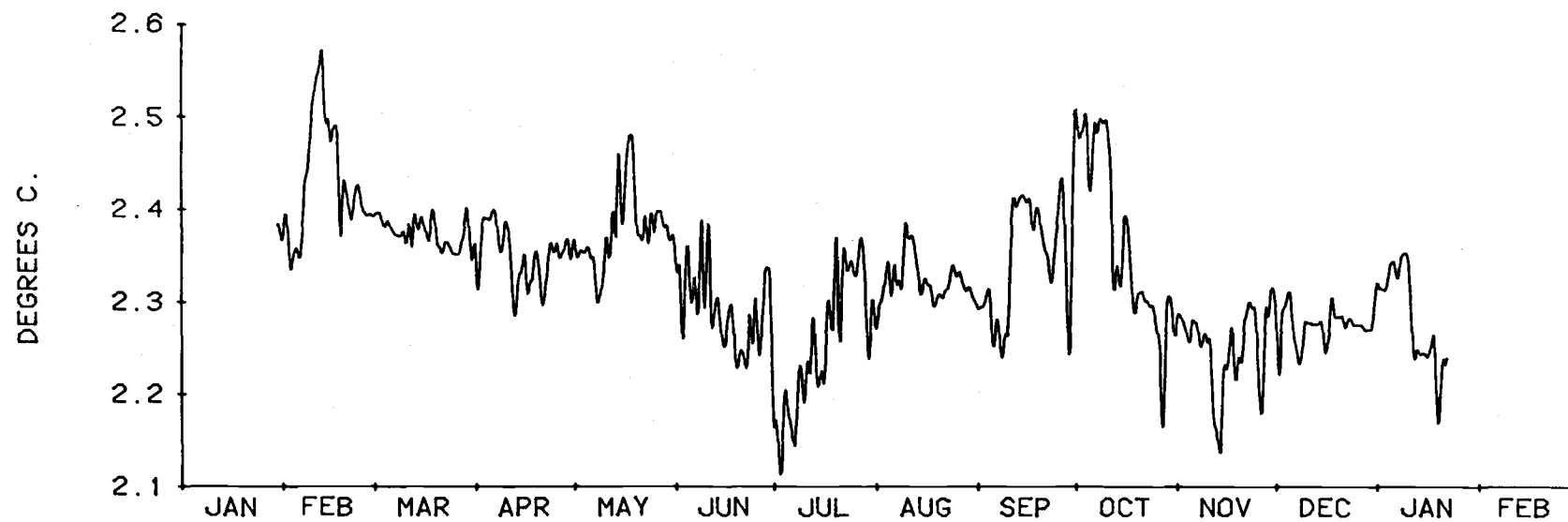
645 METERS AT MS-3
LLP FILTERED U COMPONENT



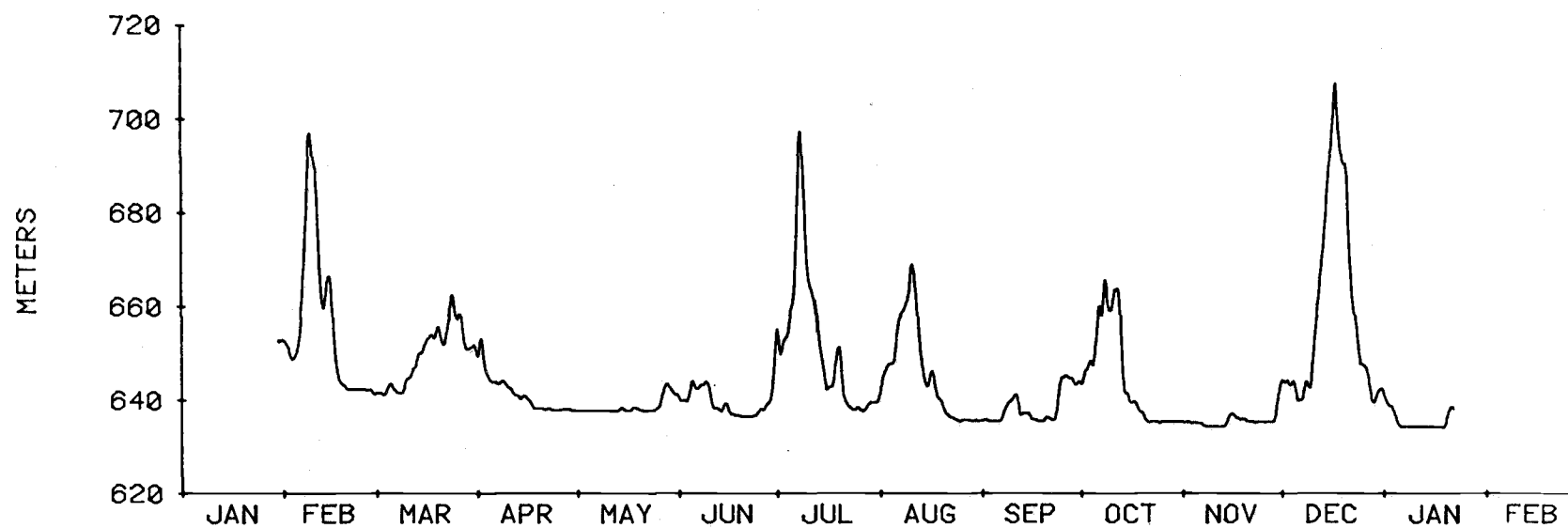
645 METERS AT MS-3
LLP FILTERED V COMPONENT



645 METERS AT MS-3
LLP FILTERED CURRENT

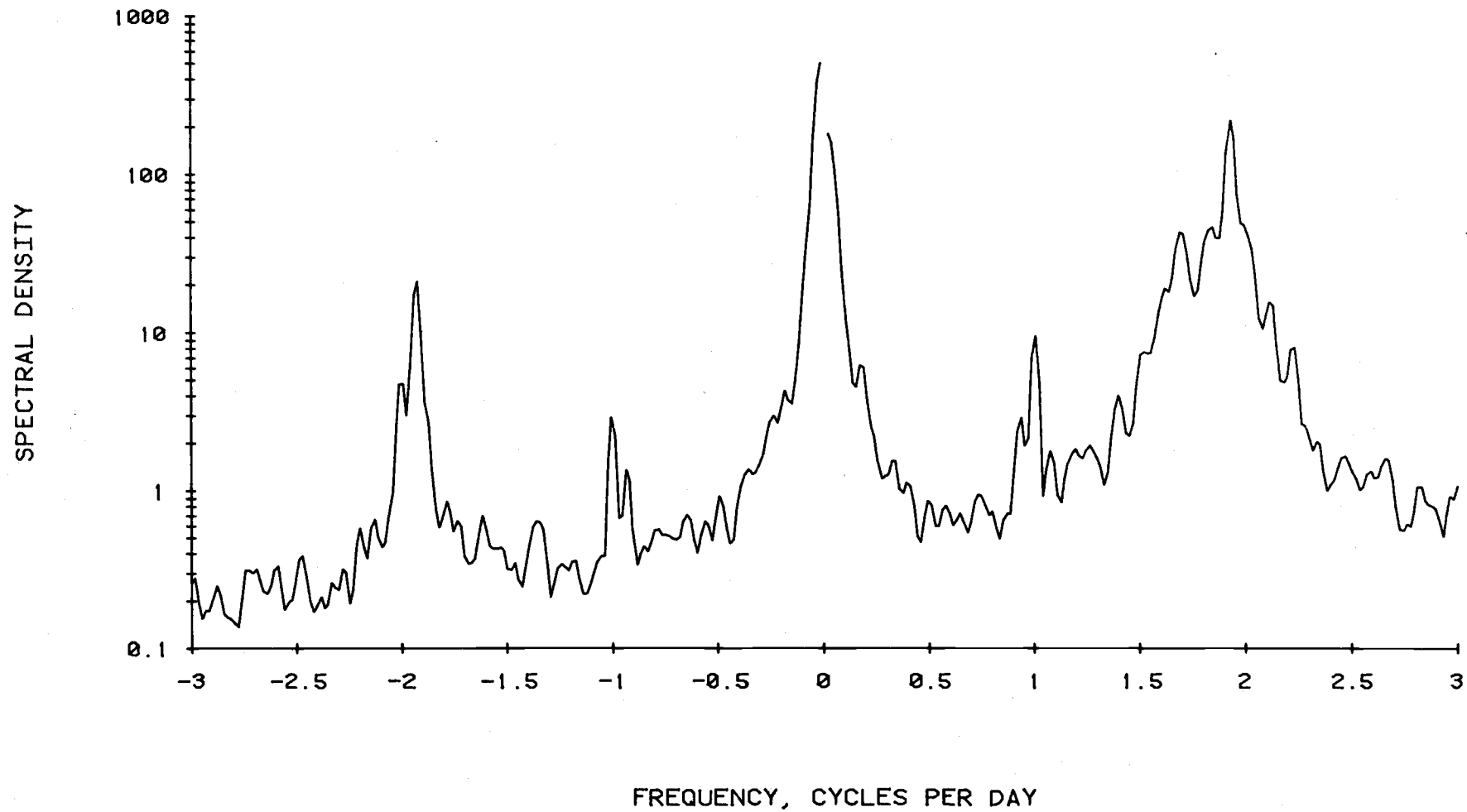


645 METERS AT MS-3
LLP FILTERED TEMPERATURE

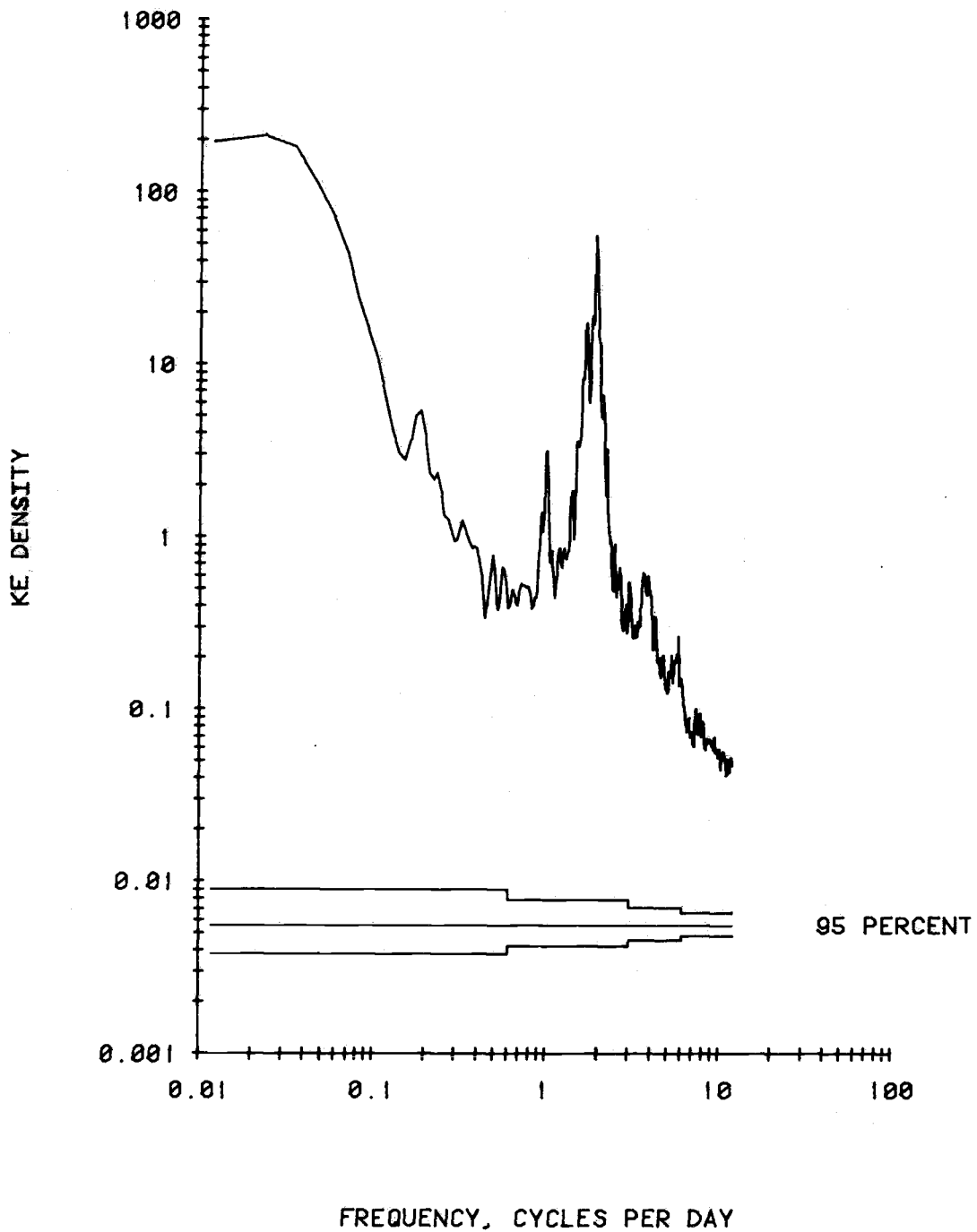


645 METERS AT MS-3
LLP FILTERED PRESSURE

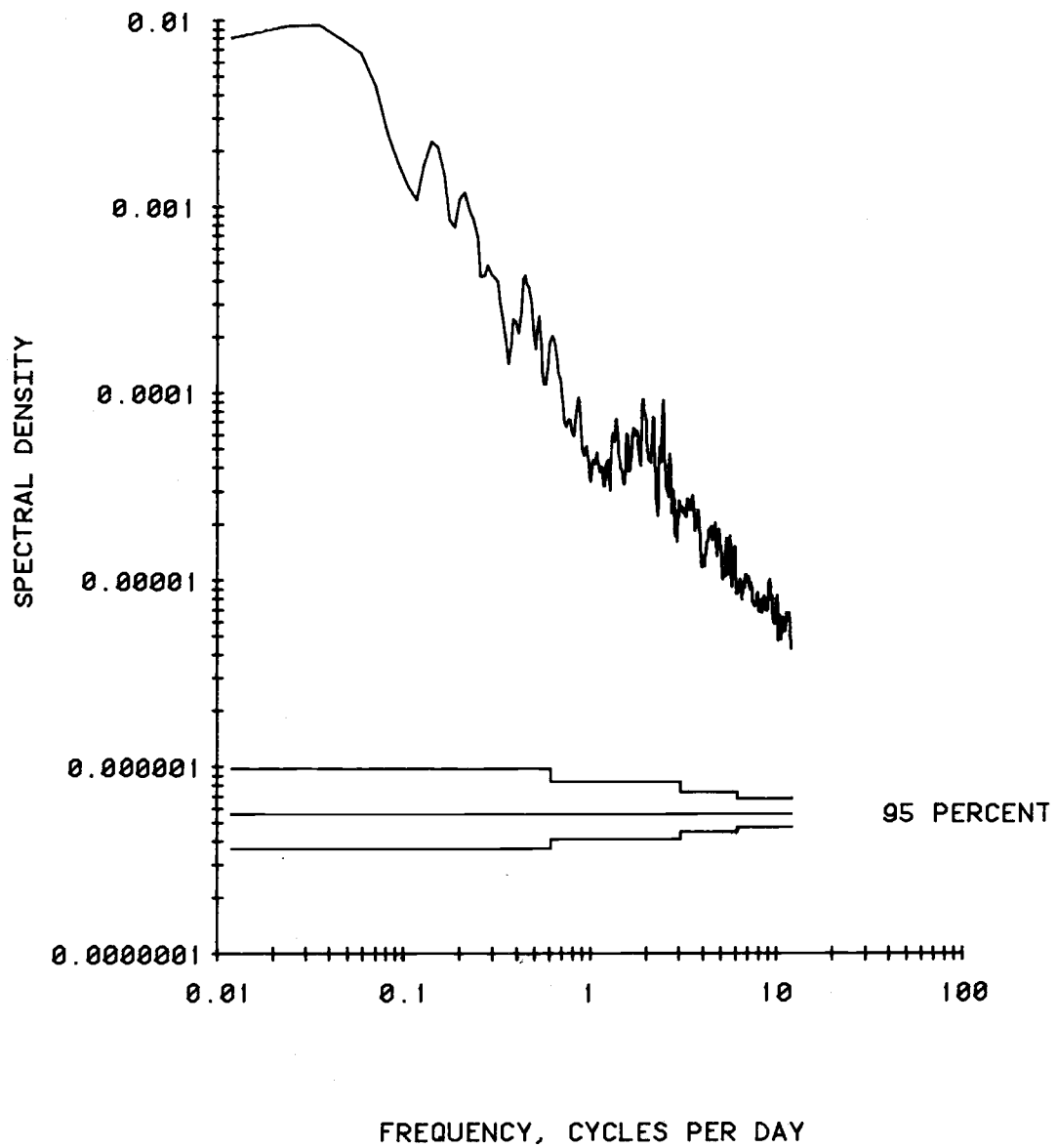
UNFILTERED CURRENT. 645 METERS AT MS-3

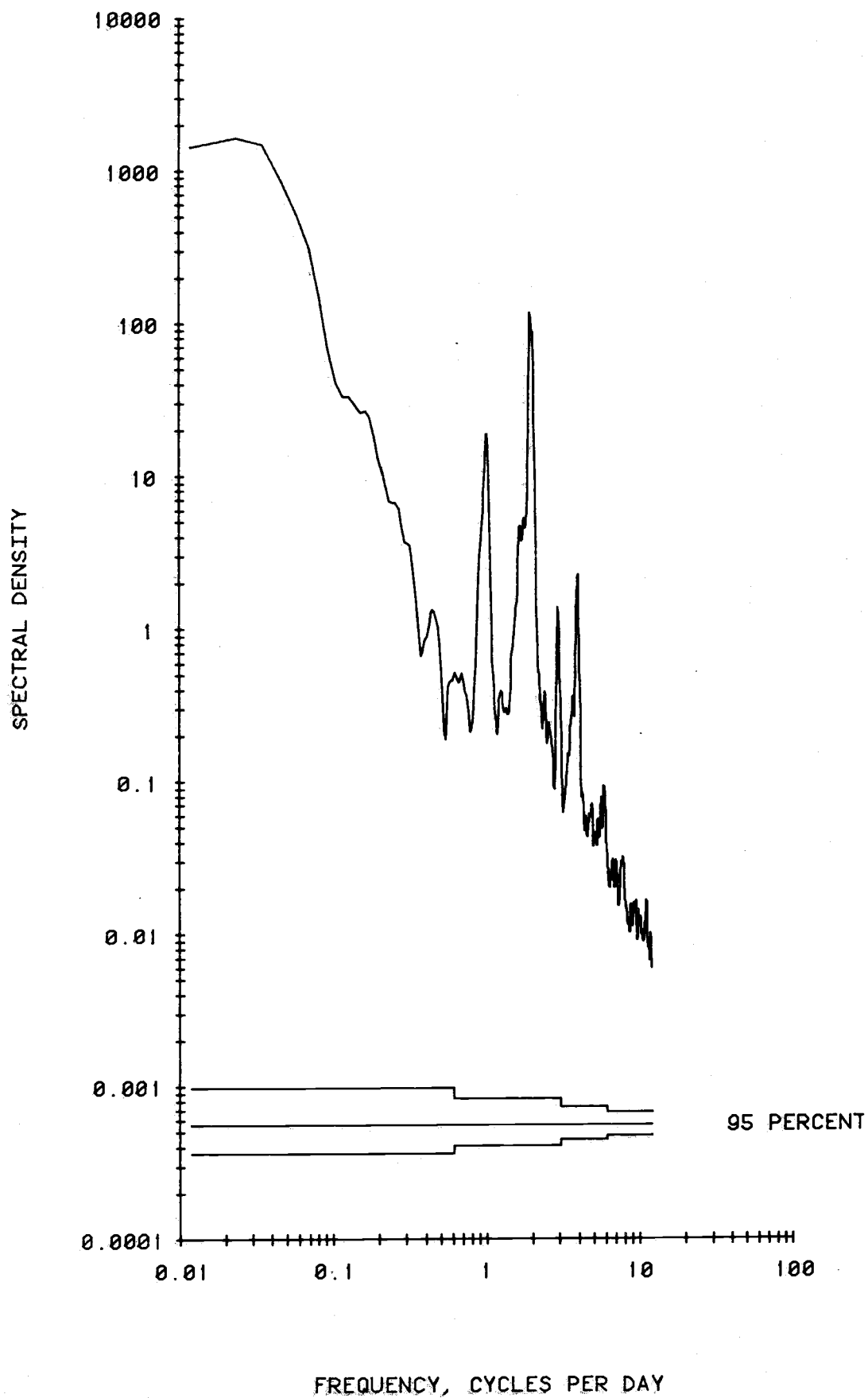


UNFILTERED CURRENT. 645 METERS AT MS-3

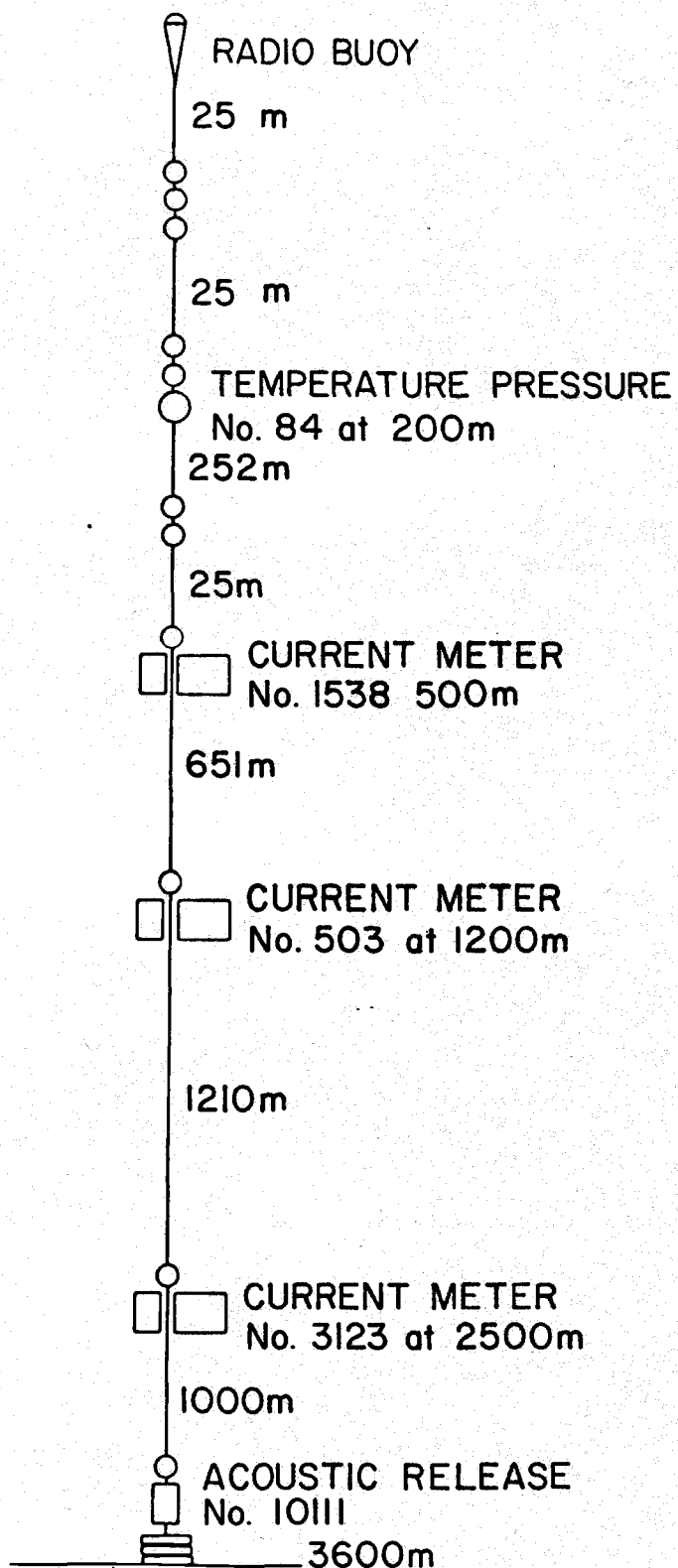


UNFILTERED TEMPERATURE. 645 METERS AT MS-3





MS - 4



MAPPING/STATISTICS (MS) 4

59° 56.9' S

65° 49.9' W

INSTALLED: 28 JANUARY 1979

MS-4

Position: 59°56.9'S, 65°49.9'W
Depth of Water: 3600 m
Set at 2308 UCT 28 January '79 by R/V MELVILLE
Retrieved at 1140 UCT 22 January '80 by R/V ATLANTIS II
Data Interval: 0110 UCT 29 January '79 to 1119 UCT 22 January '80

Instrumentation

<u>Intended Depth</u>	<u>RCM5 Serial No./Tape No.</u>
500 m	1538/11
1200 m	503/46
2500 m	3123/11

Instrument 1538 recorded speed, direction, temperature, and pressure once per hour. Processed speed, U, and V have been set to zero from 0819 6 JUN '79 to 1919 14 OCT '79 due to a rotor counter malfunction. Pressure went off scale (1023) as soon as the mooring was installed and remained so until recovery. The nominal depth of 500 meters was used for labeling listings and plots. The actual depth as determined from hydro data was about 1072 meters.

Instrument 503 failed.

Instrument 3123 recorded speed, direction, and temperature once per hour until the instrument was recovered. The nominal depth of 2500 meters was used for labeling listings and plots. The actual depth as determined by temperature comparison with hydro data was about 2975 meters.

MS-4

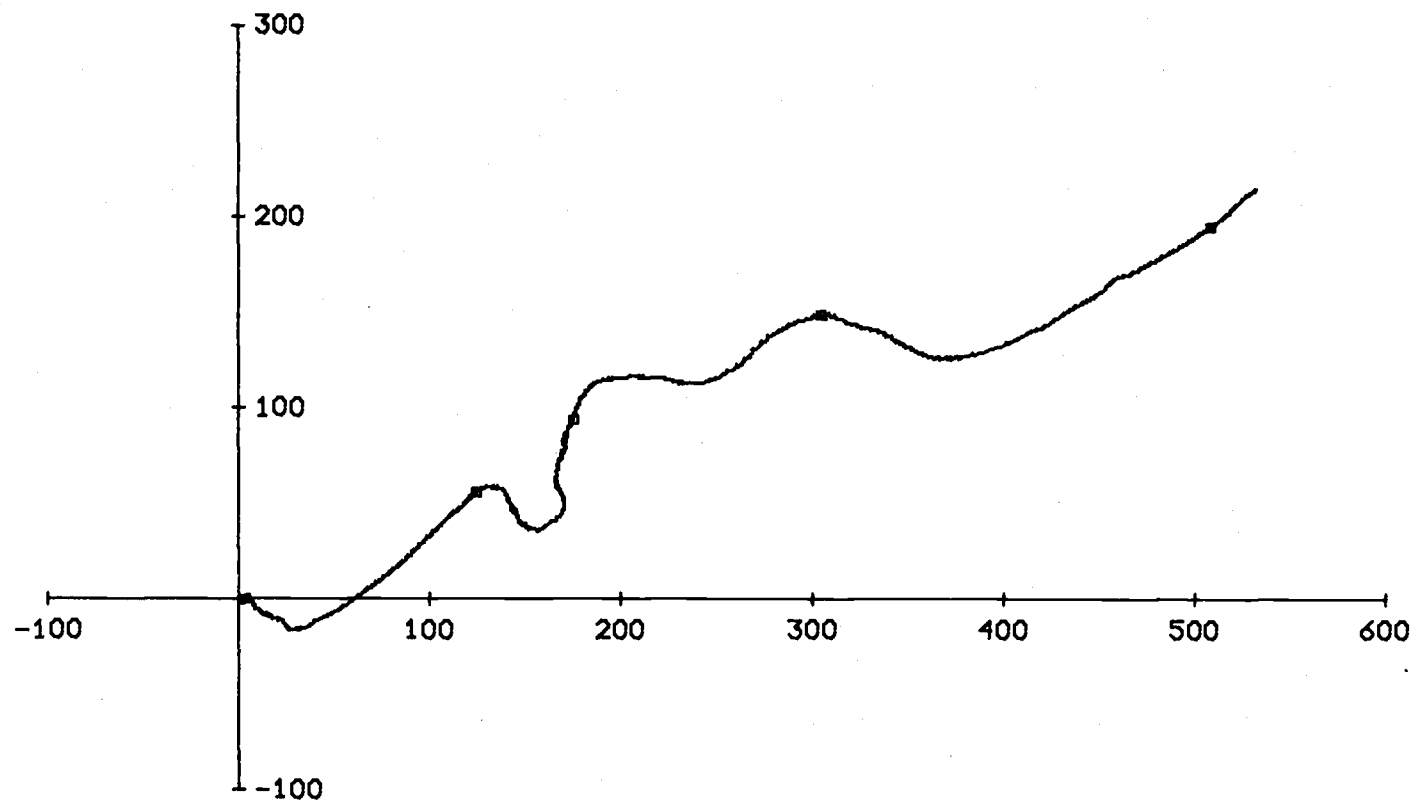
500 m

	MEAN	S.D.	SKEW	KURT	MIN	MAX	N
S	7.06	4.52	0.77	3.91	0.80	29.90	5399
U	2.10	5.35	0.26	3.59	-20.70	23.10	5399
V	3.60	4.93	0.37	3.55	-12.20	27.80	5399
T	1.96	0.08	0.29	2.41	1.77	2.19	8603

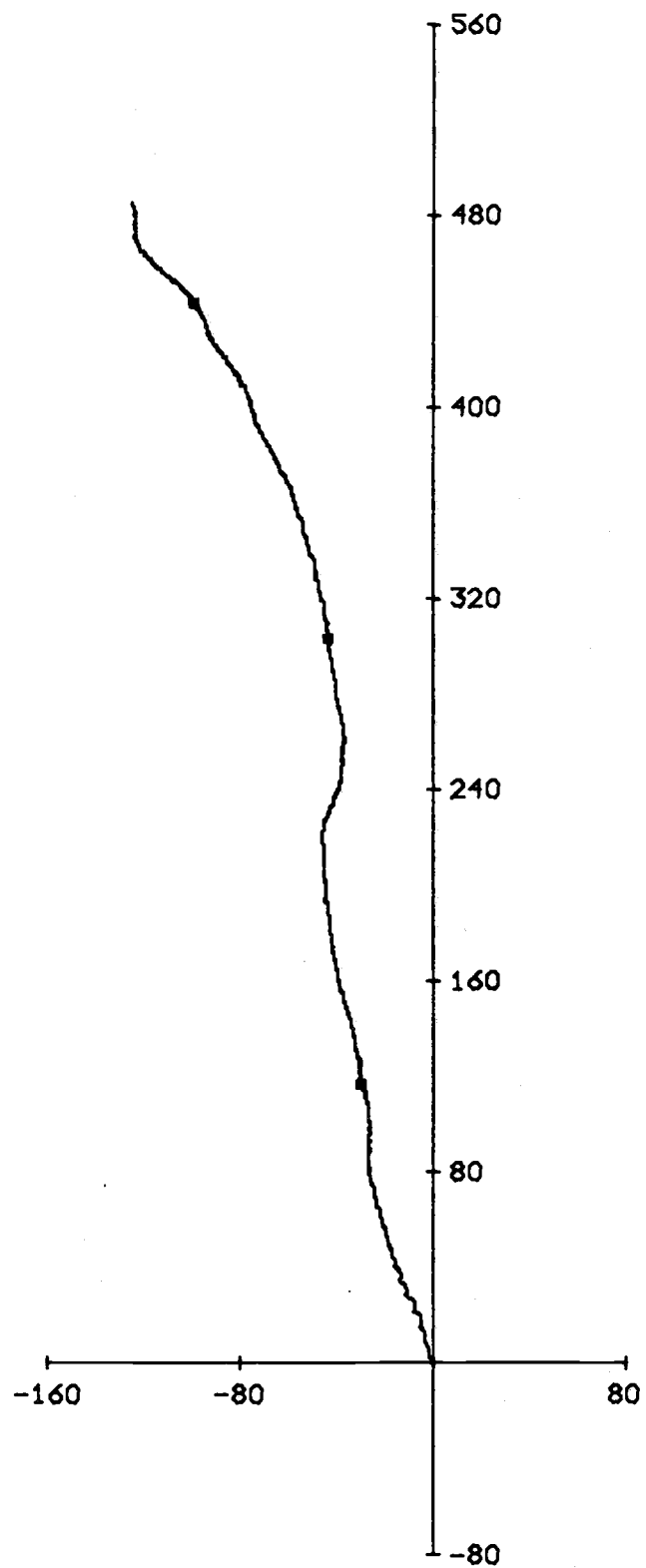
2500 m

S	5.19	2.85	0.65	3.39	0.80	19.00	8603
U	0.49	2.69	-0.04	3.18	-9.30	11.10	8603
V	3.44	3.96	-0.18	3.35	-13.90	18.20	8603
T	0.72	0.05	0.34	2.99	0.58	0.91	8603

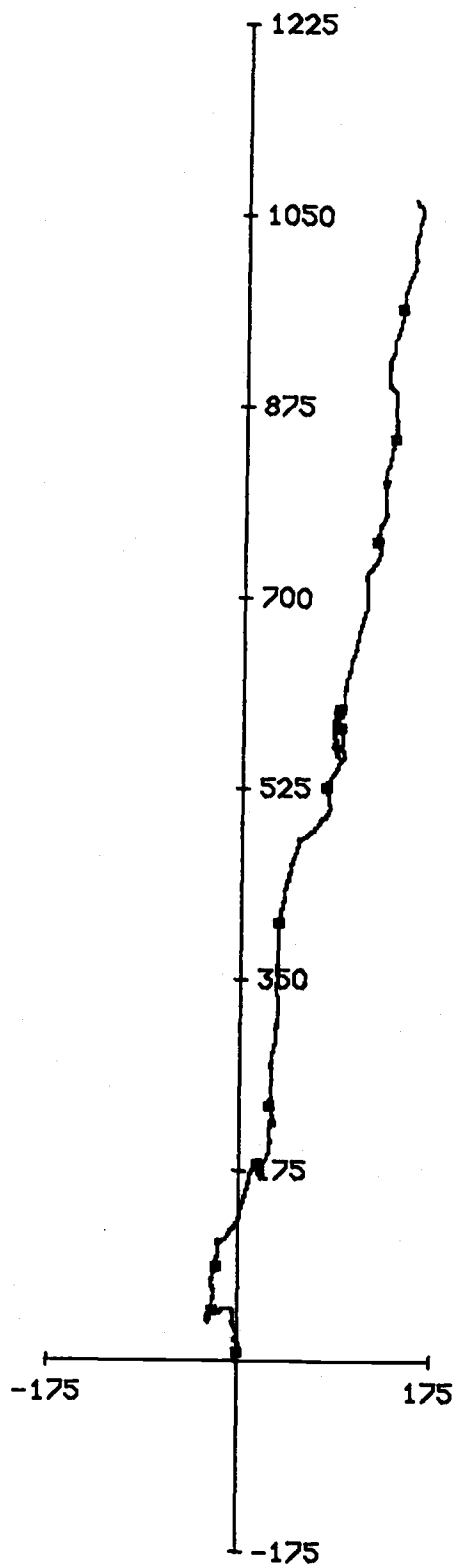
Speed, u, and v are given in cm/sec; temperature in degrees centigrade; pressure in decibars; and conductivity in mmhr/cm.



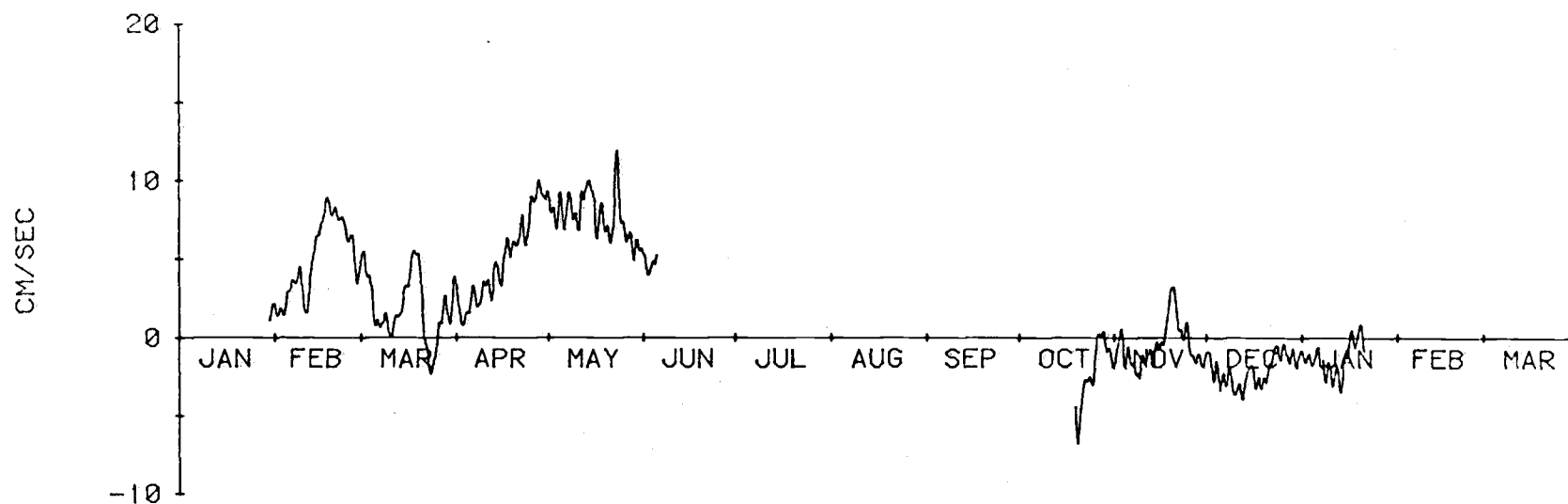
500 M AT STN MS-4. 128.3 DAYS STARTING 0119 29 JAN 79.



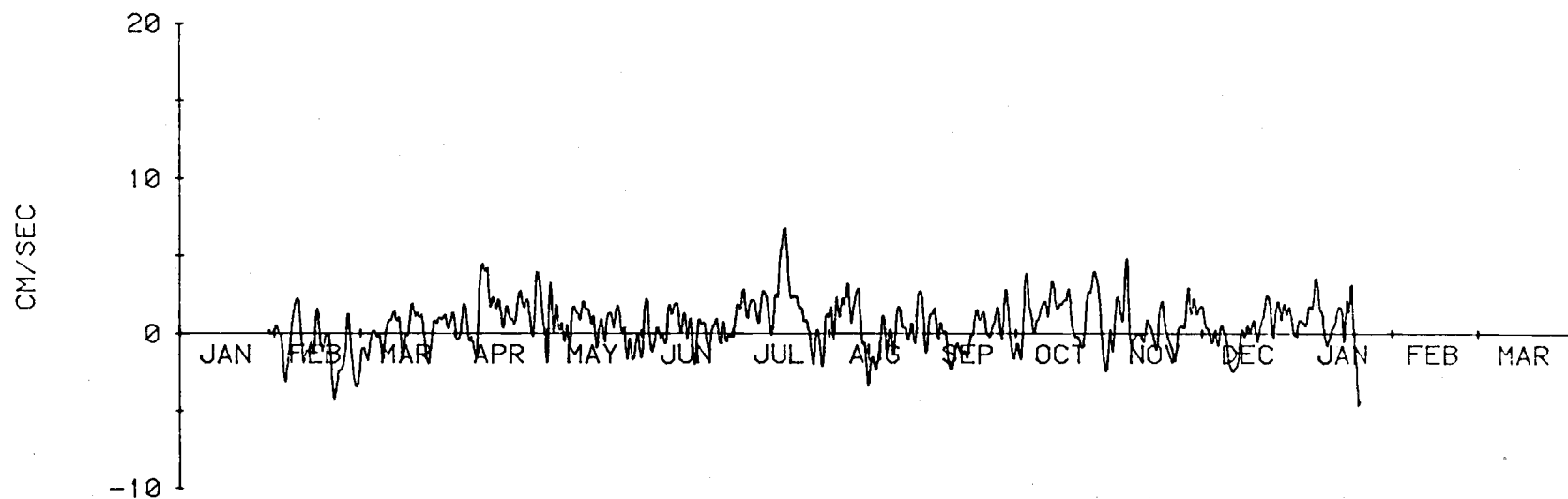
500 M AT STN MS-4, 96.6 DAYS STARTING 2019 17 OCT 79.



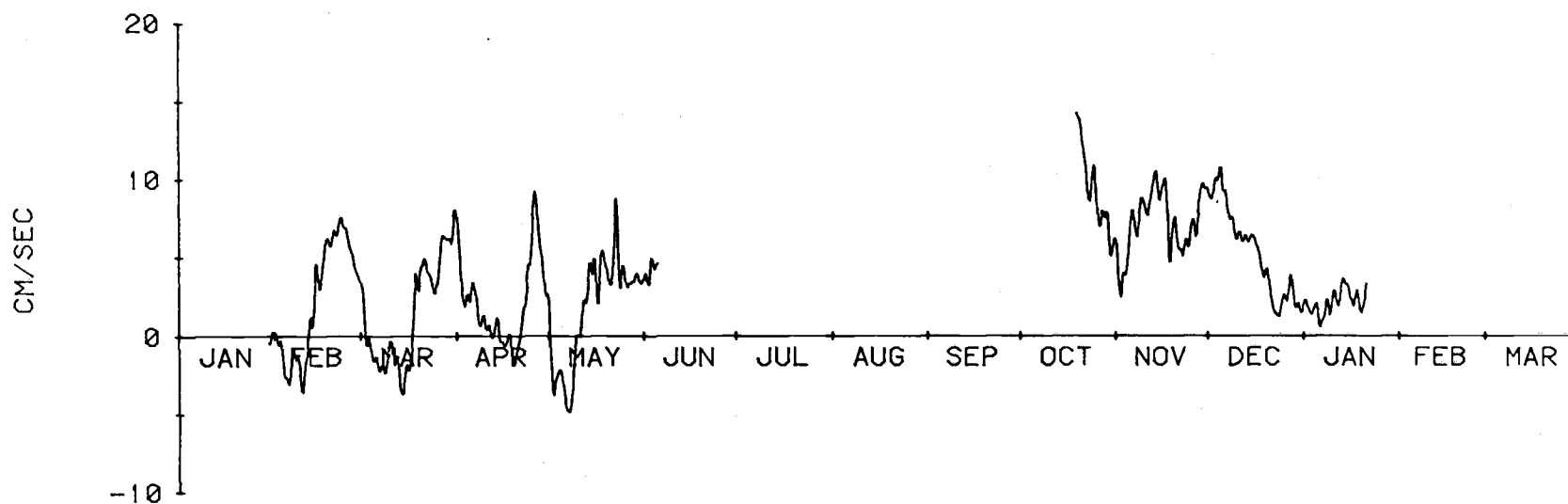
2500 M AT STN MS-4. 358.4 DAYS STARTING 0110 29 JAN 79.



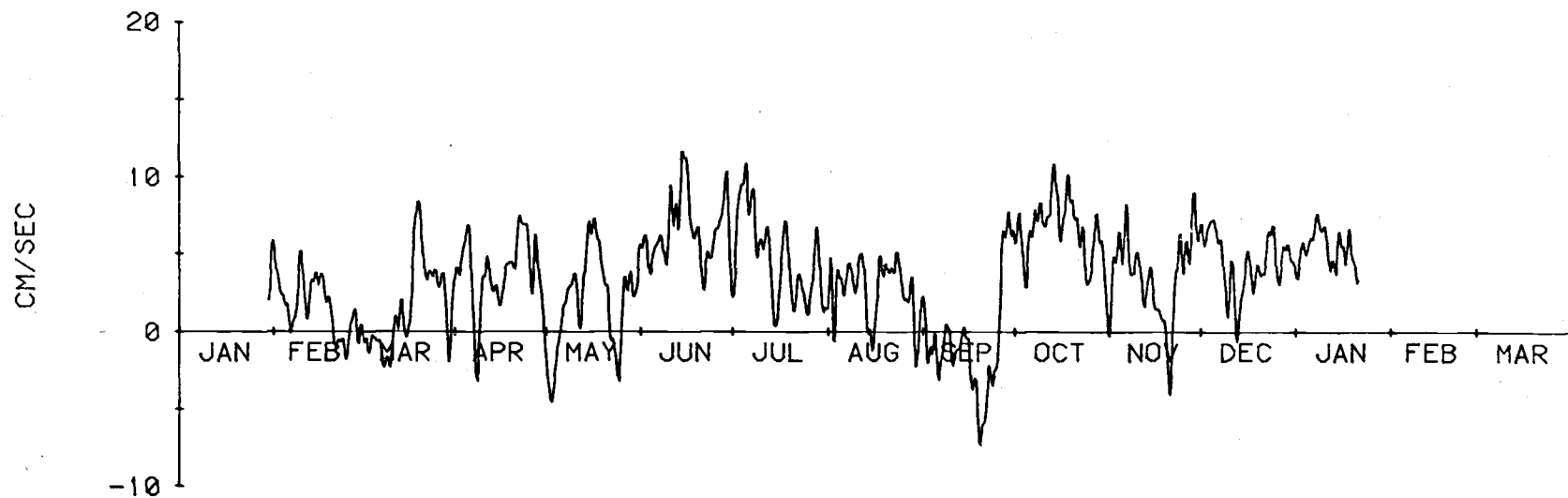
500 METERS AT MS4
LLP FILTERED U COMPONENT



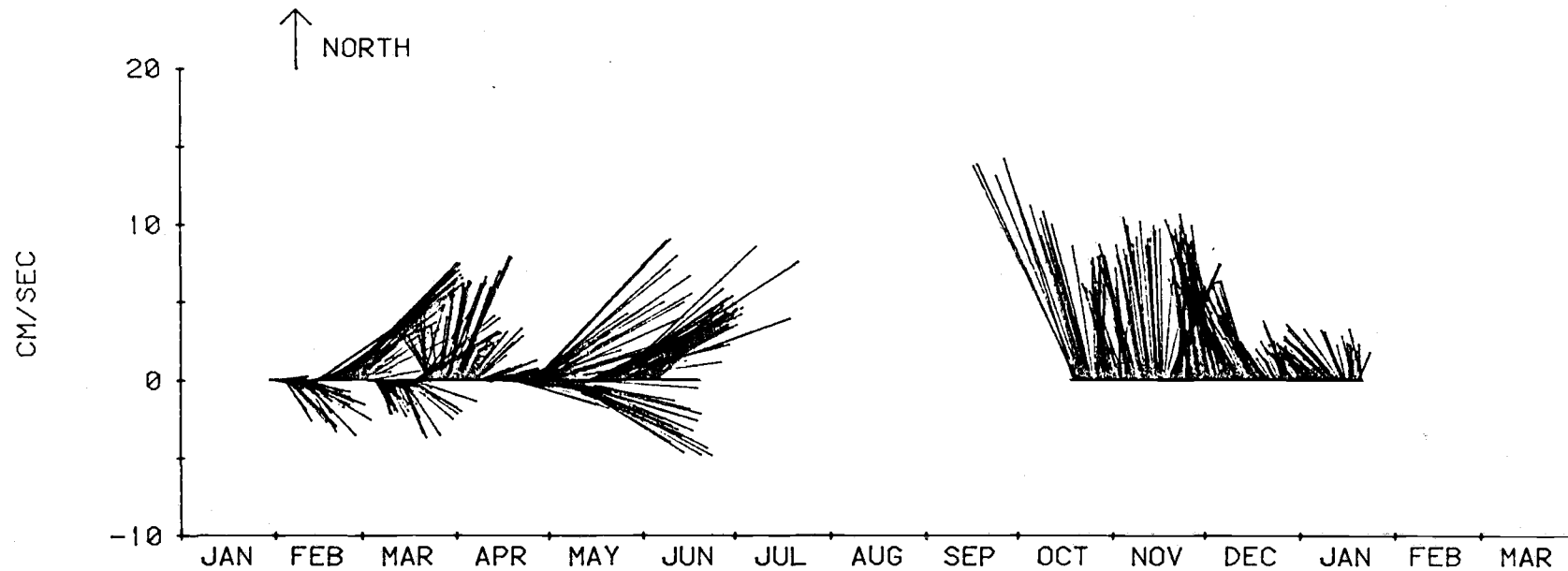
2500 METERS AT MS4
LLP FILTERED U COMPONENT



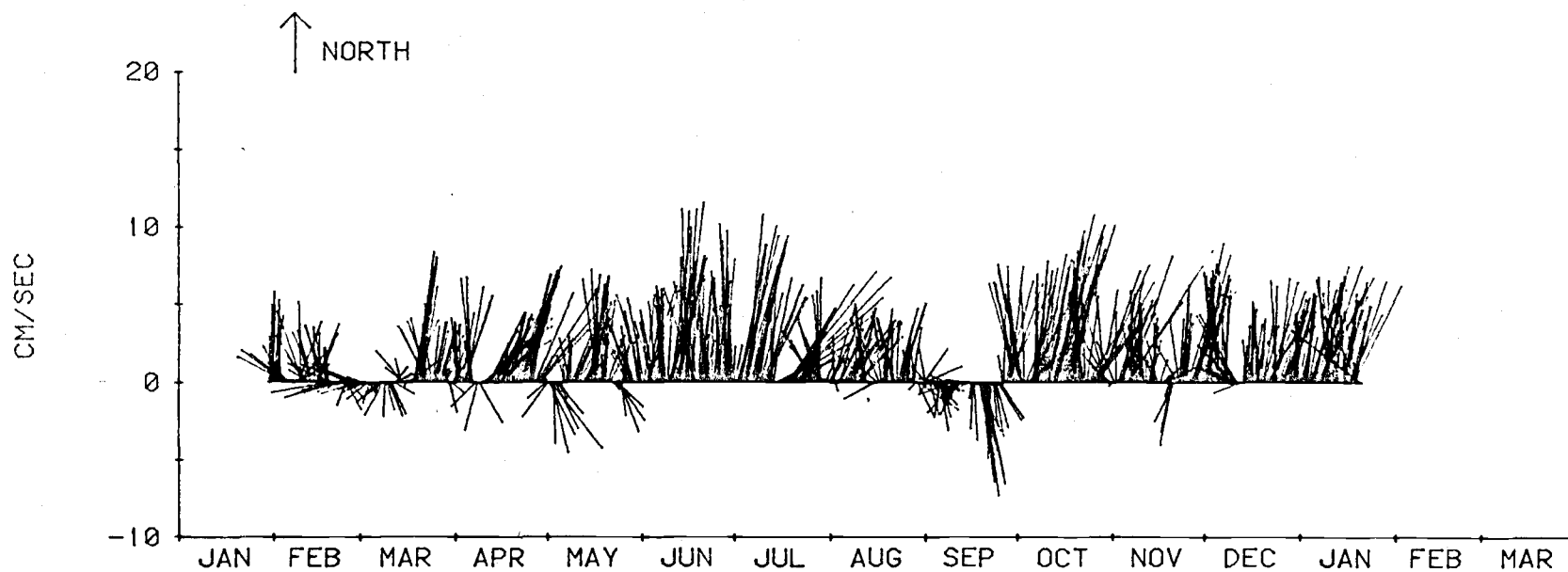
500 METERS AT MS4
LLP FILTERED V COMPONENT



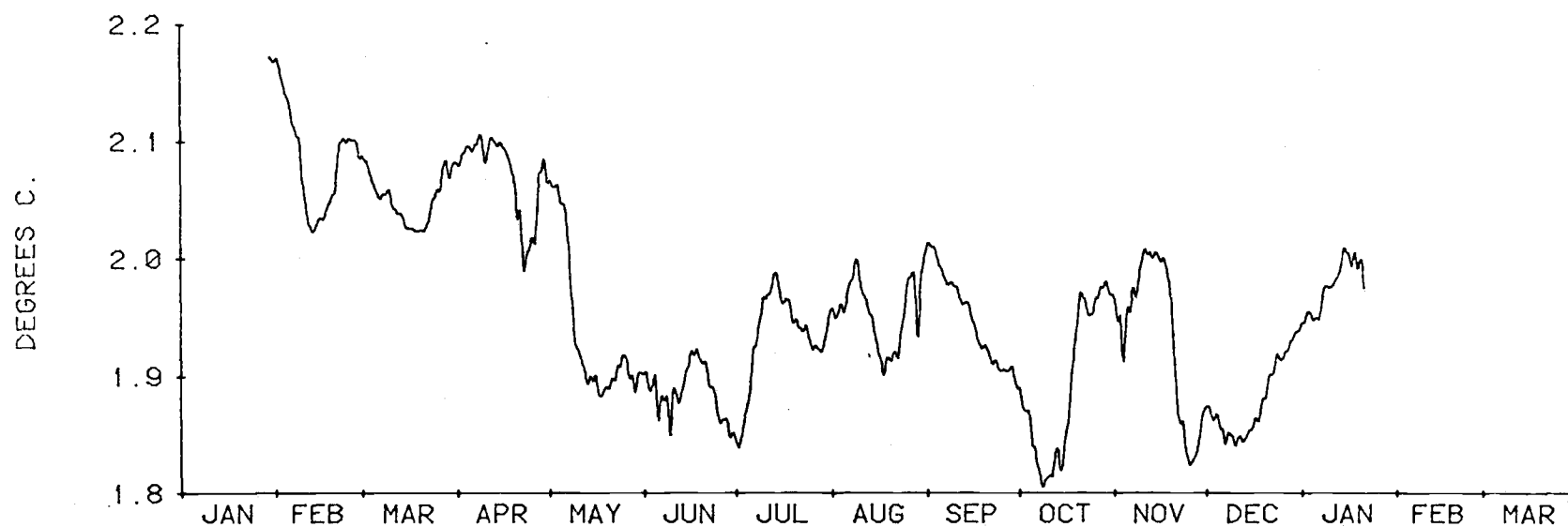
2500 METERS AT MS4
LLP FILTERED V COMPONENT



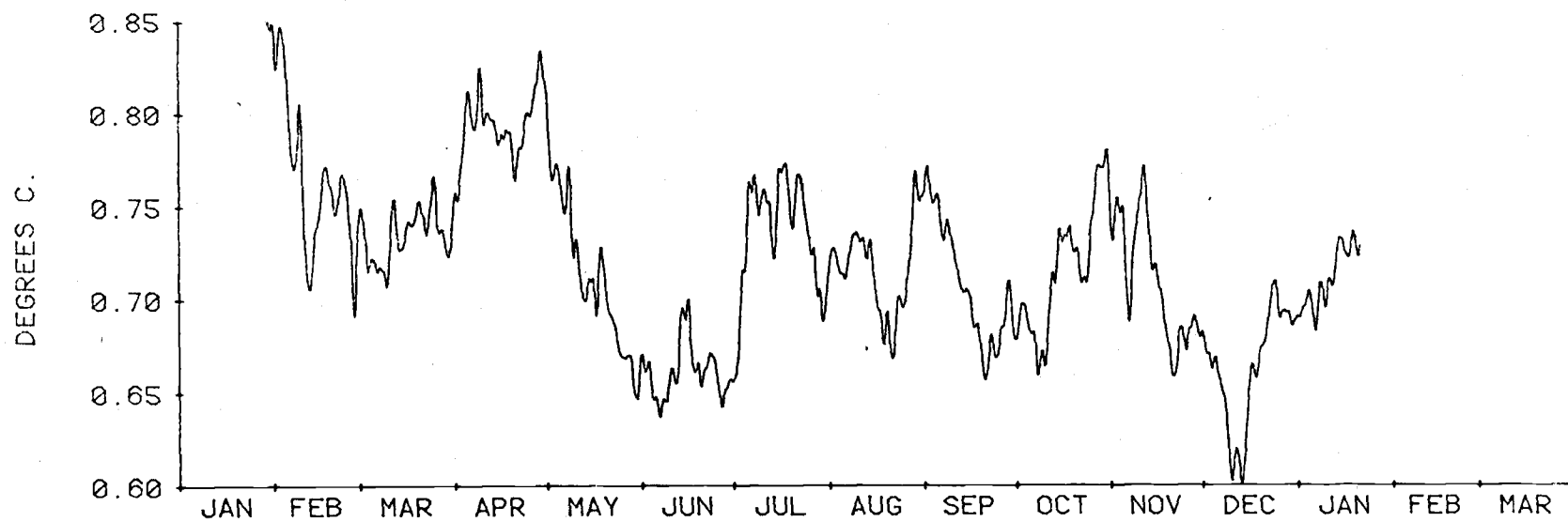
500 METERS AT MS4
LLP FILTERED CURRENT



2500 METERS AT MS4
LLP FILTERED CURRENT



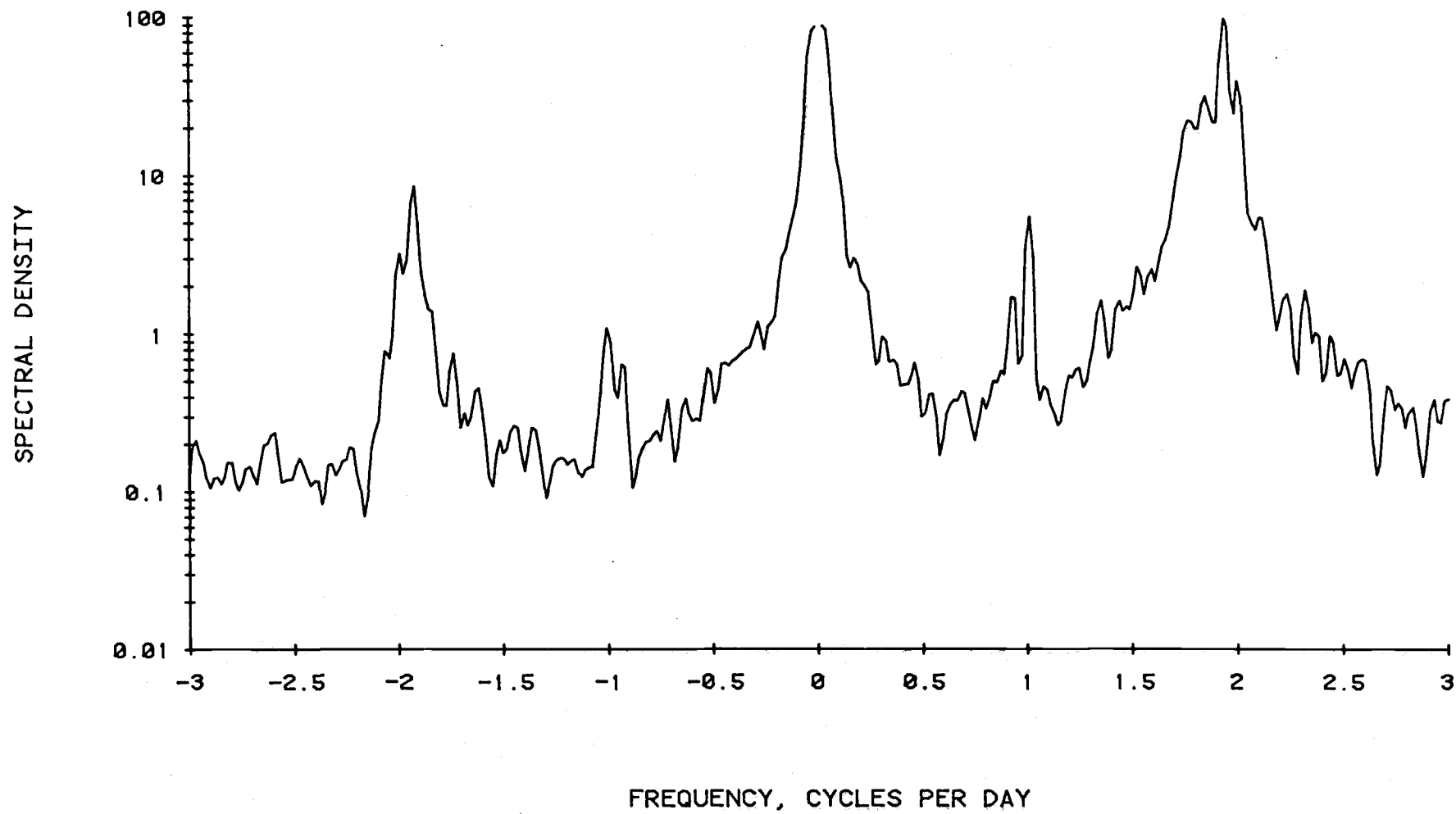
500 METERS AT MS4
LLP FILTERED TEMPERATURE



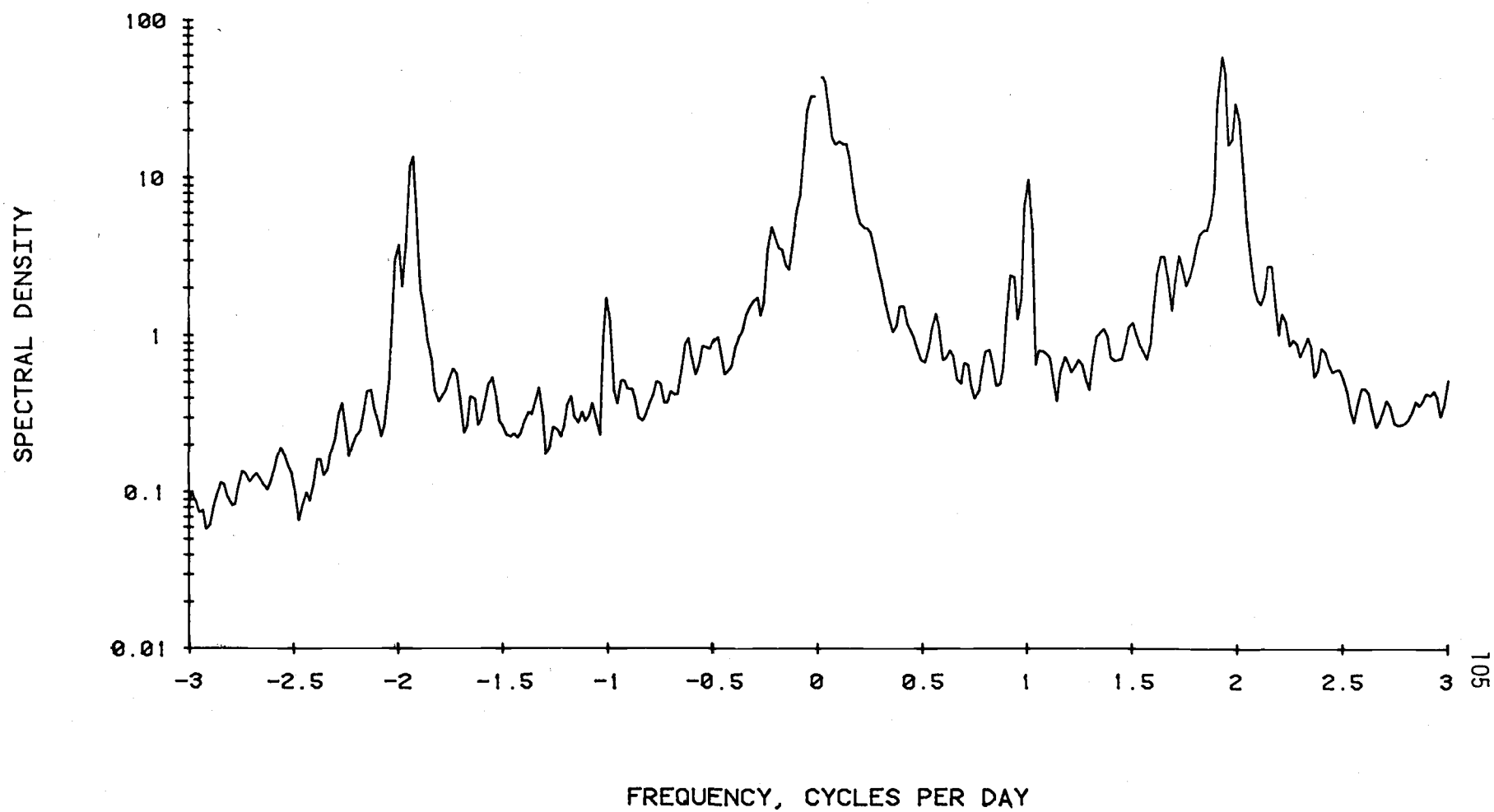
2500 METERS AT MS4
LLP FILTERED TEMPERATURE

UNFILTERED CURRENT.

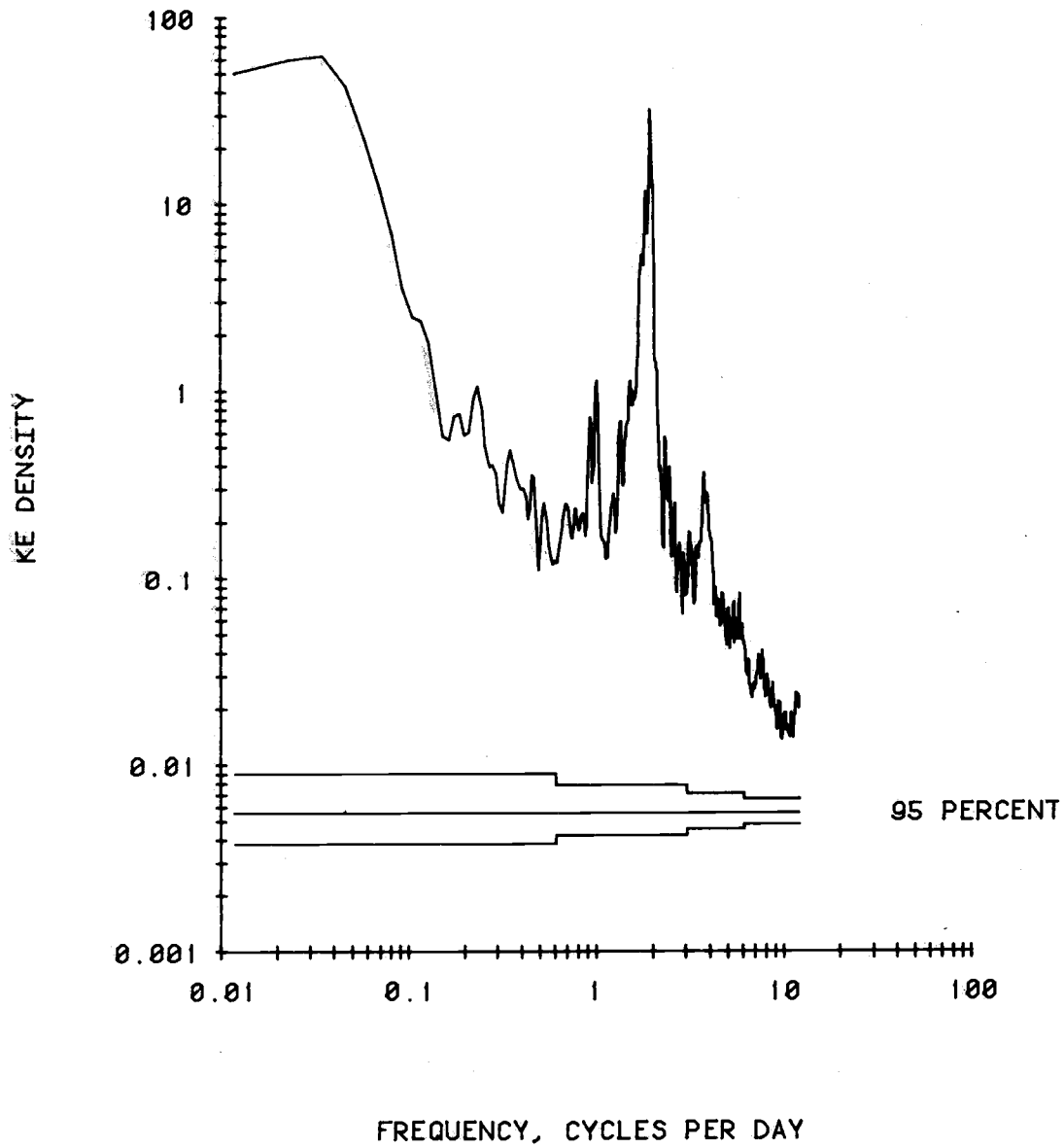
500 METERS AT MS-4



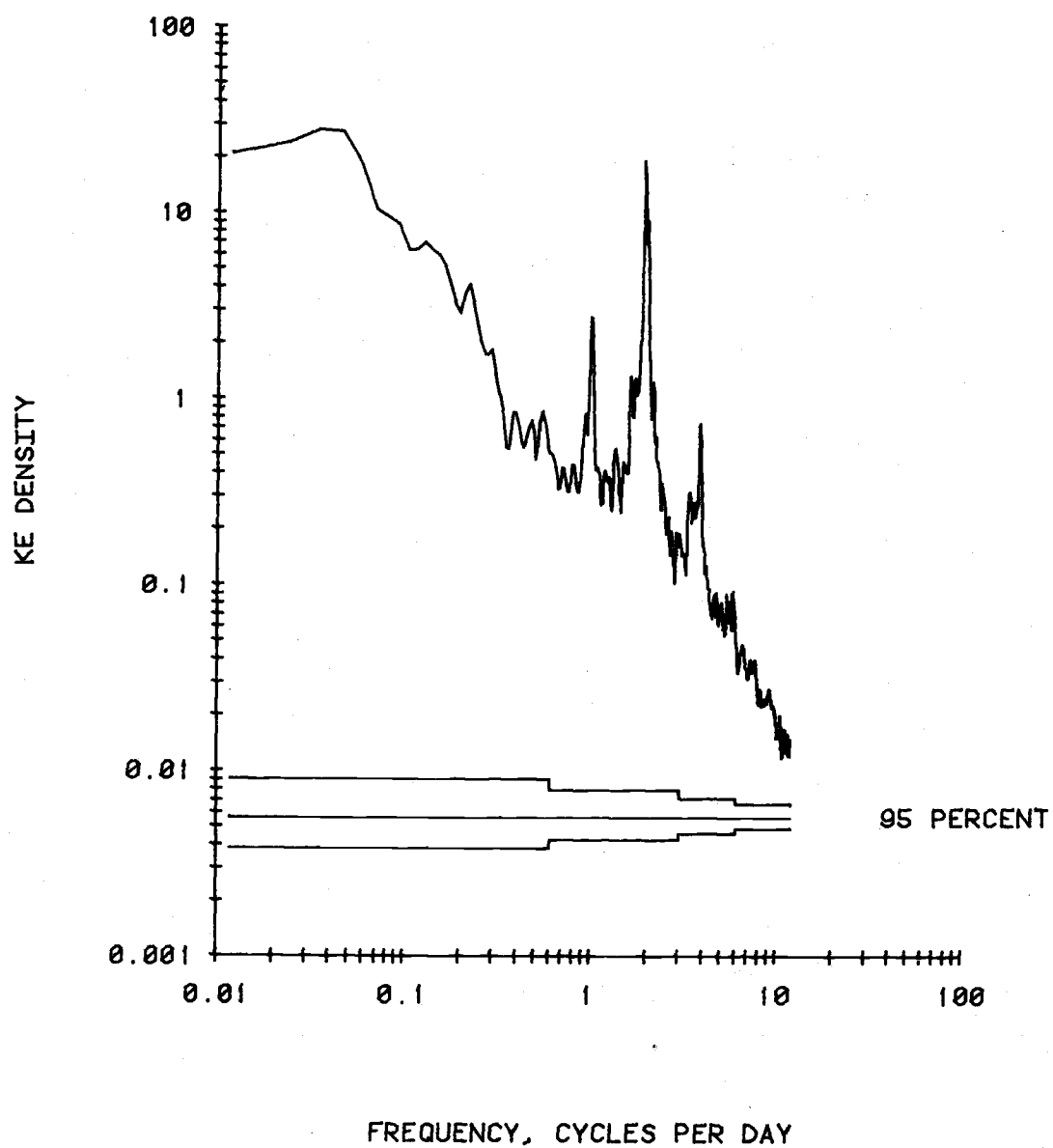
UNFILTERED CURRENT. 2500 METERS AT MS-4



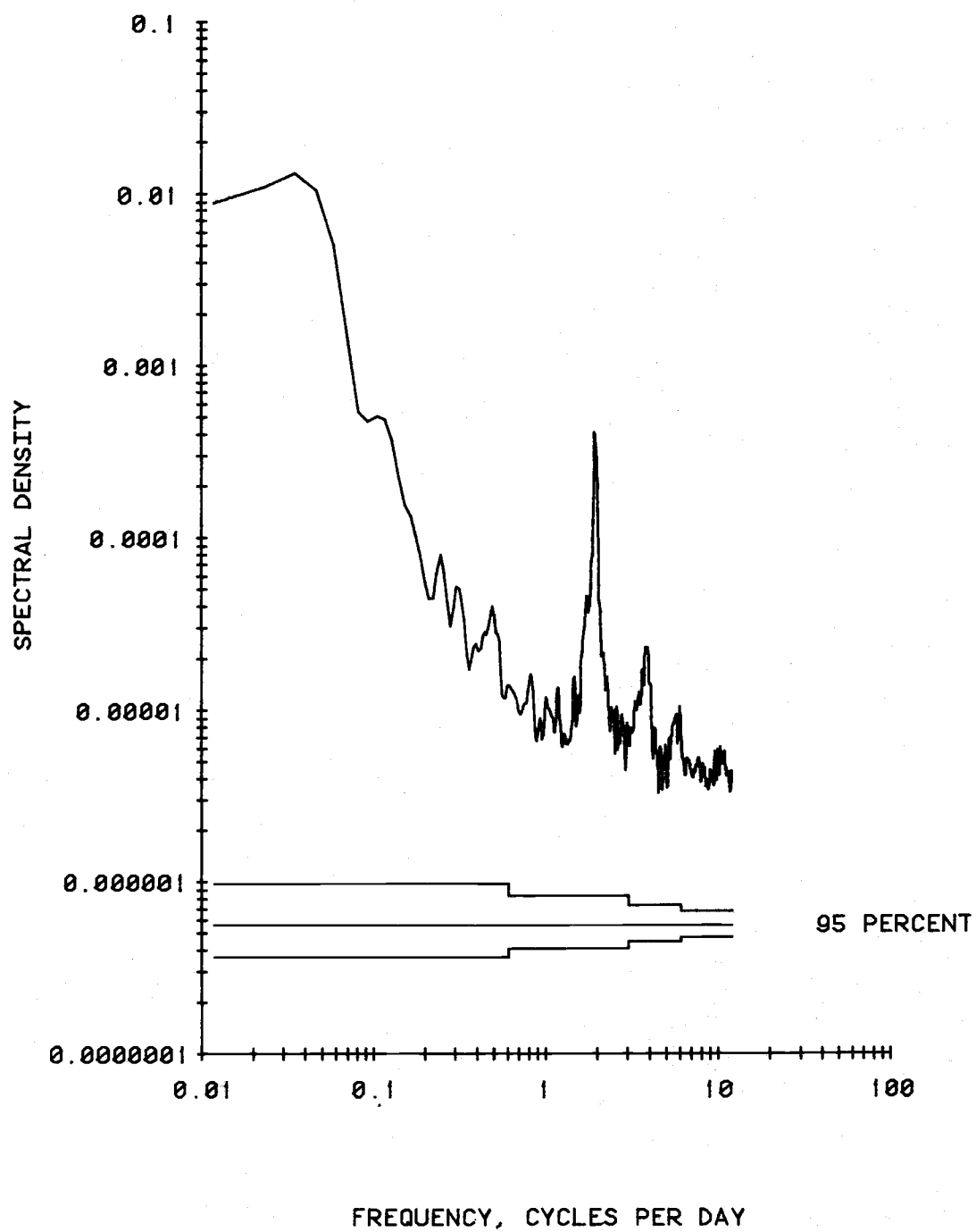
UNFILTERED CURRENT. 500 METERS AT MS-4



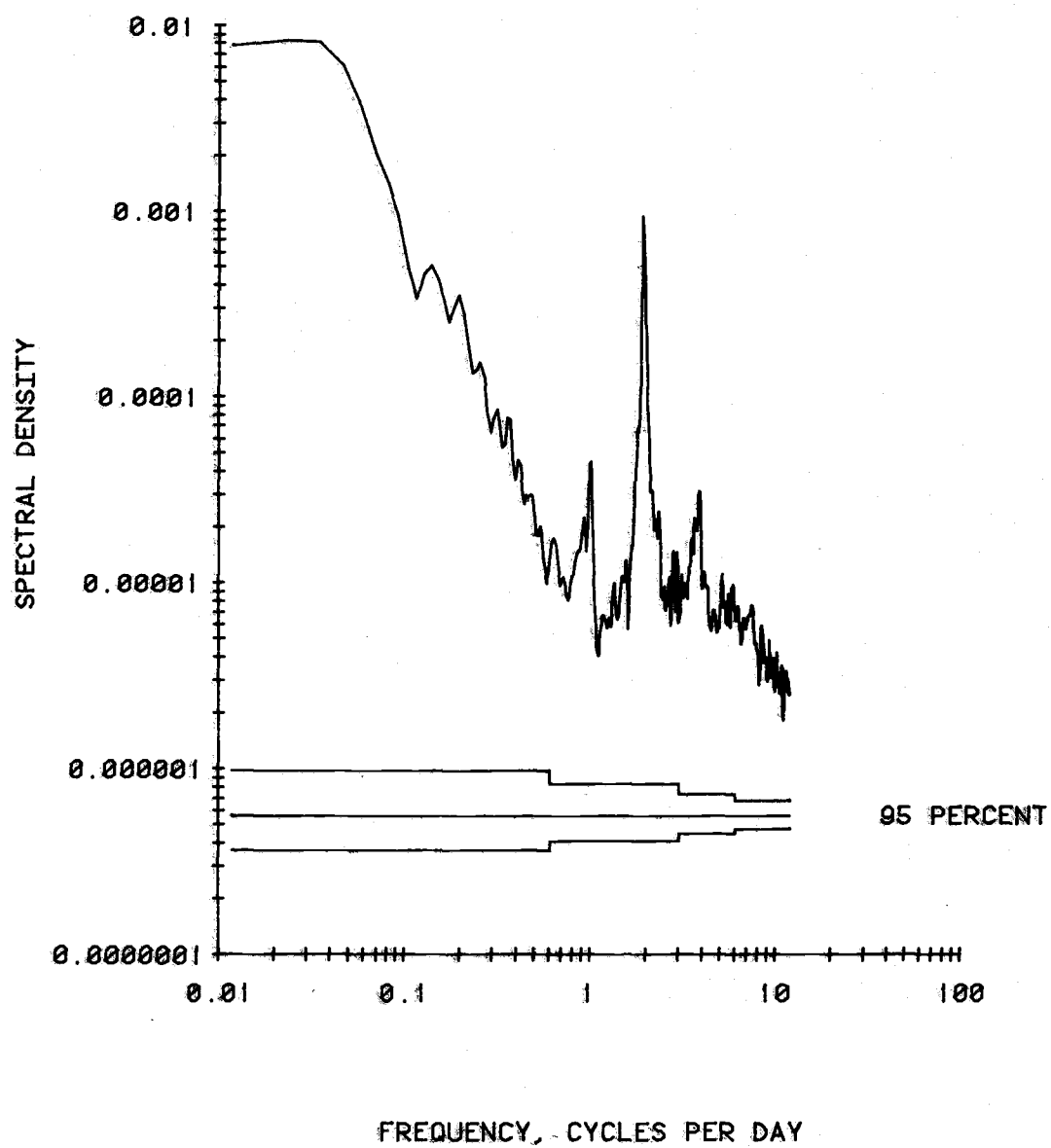
UNFILTERED CURRENT. 2500 METERS AT MS-4



UNFILTERED TEMPERATURE. 500 METERS AT MS-4

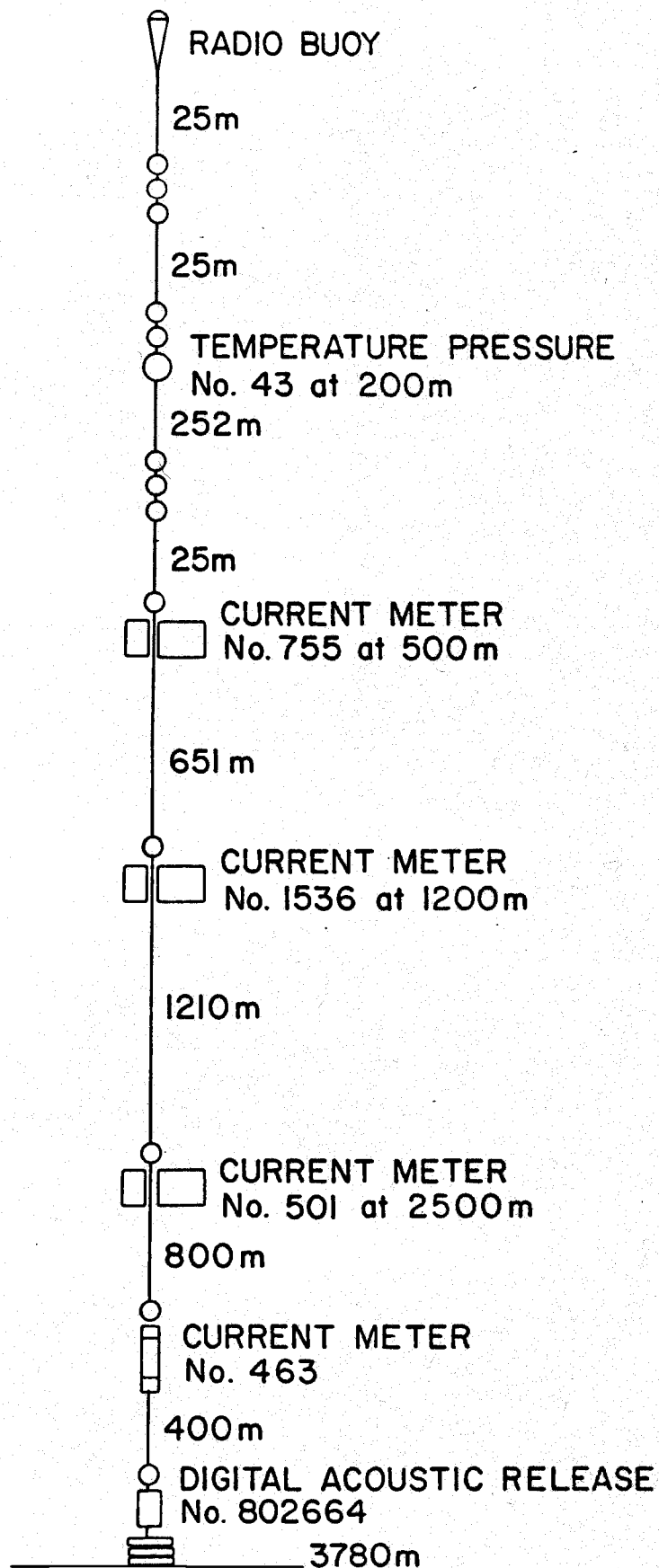


UNFILTERED TEMPERATURE. 2500 METERS AT MS-4



MS - 5

MAPPING / STATISTICS (MS) 5
58° 41.5' S
65° 46.8' W
INSTALLED: 28 JANUARY 1979



MS-5

Position: 58°41.5'S, 65°46.8'W
Depth of Water: 3780 m
Set at 0628 UCT 28 January '79 by R/V MELVILLE
Retrieved at 0913 UCT 20 February '80 by R/V ATLANTIS II
Data Interval: 0804 UCT 28 January '79 to 0838 UCT 20 February '80

InstrumentationIntended DepthRCM5 Serial No./Tape No.

500 m	755/31
1200 m	1536/13
2500 m	501/48

Instrument 755 recorded speed, direction, temperature, and pressure once per hour until the instrument was recovered.

Instrument 1536 recorded speed, direction, temperature, and pressure once per hour until the instrument was recovered.

Instrument 501 recorded speed, direction, temperature, and pressure once per hour until the instrument was recovered. The pressure sensor failed in two sections of this record: 1014 28 JAN '79 to 2014 4 FEB '79 and 0414 23FEB '79 to 1014 24 FEB '79.

MS-5

752 m

	MEAN	S.D.	SKEW	KURT	MIN	MAX	N
S	13.48	7.19	0.27	2.37	0.70	34.80	9312
U	7.23	8.96	-0.00	2.53	-23.50	31.30	9312
V	0.58	10.02	-0.16	2.94	-32.70	30.80	9312
T	2.40	0.18	0.82	2.93	2.09	2.98	9312
P	755.74	35.99	1.96	7.38	725.70	962.60	9312

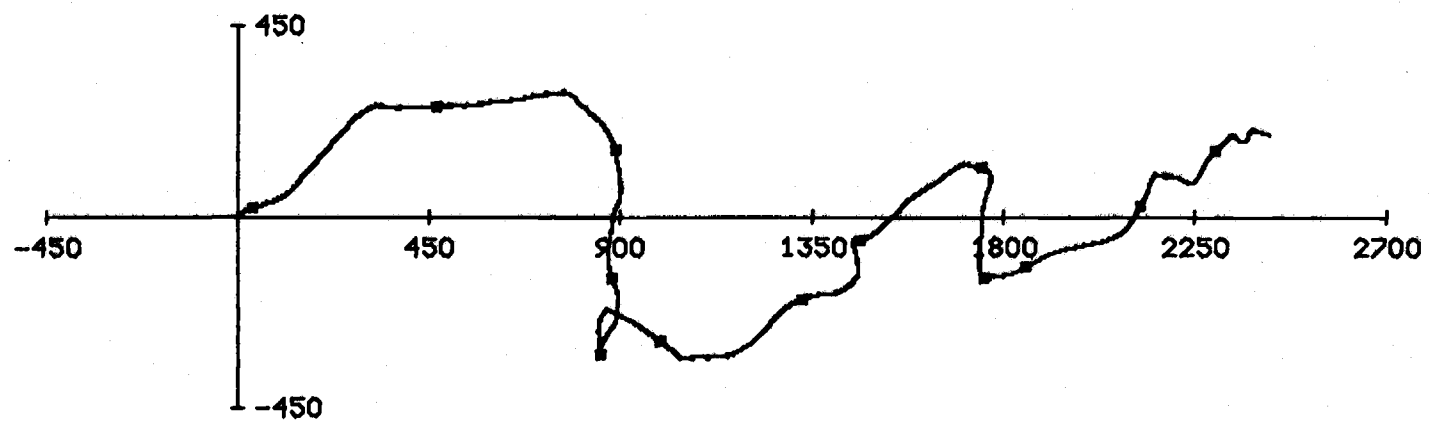
1460 m

S	8.37	4.18	0.62	3.31	0.80	26.80	9313
U	5.27	5.57	-0.03	3.04	-16.40	26.80	9313
V	-1.02	5.25	-0.05	3.20	-24.70	17.30	9313
T	2.01	0.13	0.12	2.08	1.70	2.30	9313
P	1468.02	31.57	2.01	7.78	1442.00	1655.10	9313

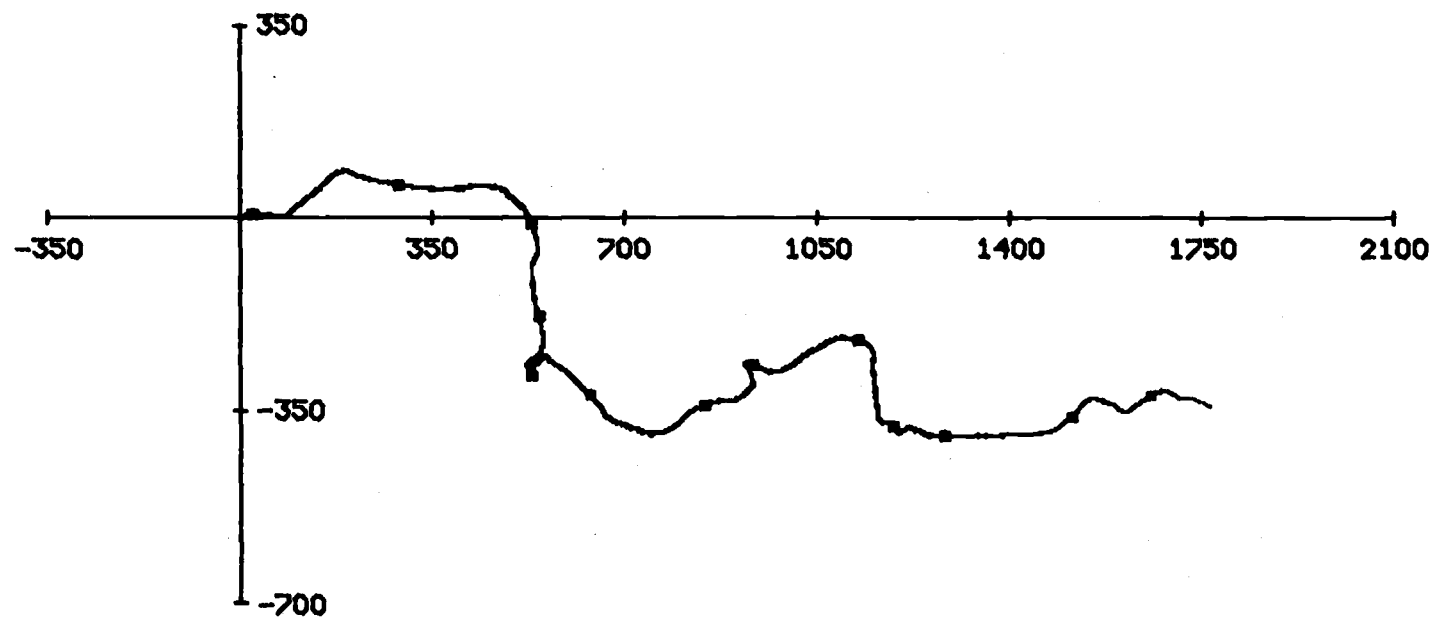
2752 m

S	11.90	6.72	0.45	2.63	0.70	37.70	9311
U	6.68	5.78	0.18	2.77	-16.50	28.40	9311
V	-8.36	6.22	-0.44	2.83	-30.00	8.30	9311
T	1.10	0.15	0.53	2.43	0.79	1.59	9311
P	2766.47	17.20	1.62	5.27	2750.60	2856.30	9829

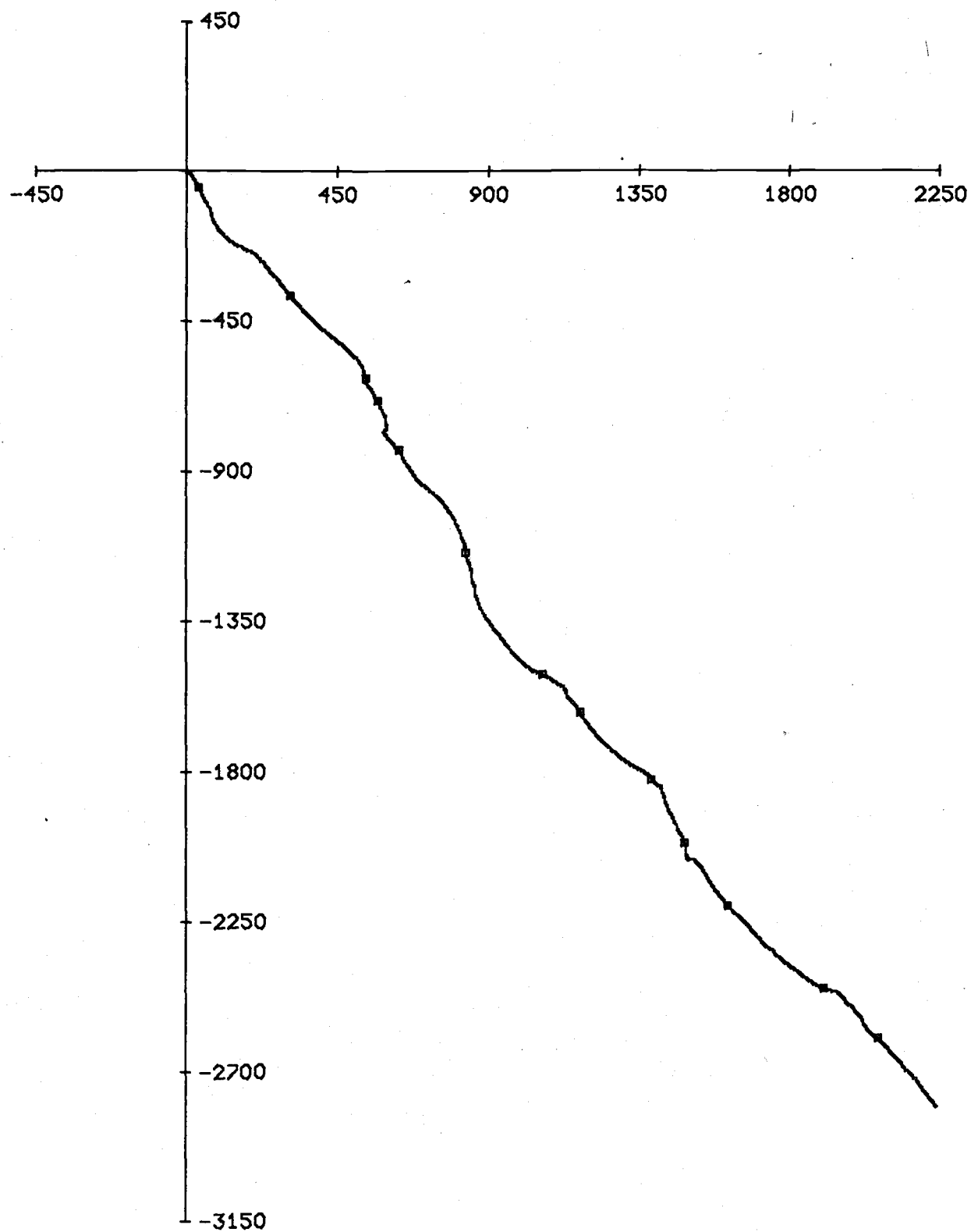
Speed, u, and v are given in cm/sec; temperature in degrees centigrade; pressure in decibars; and conductivity in mmhr/cm.



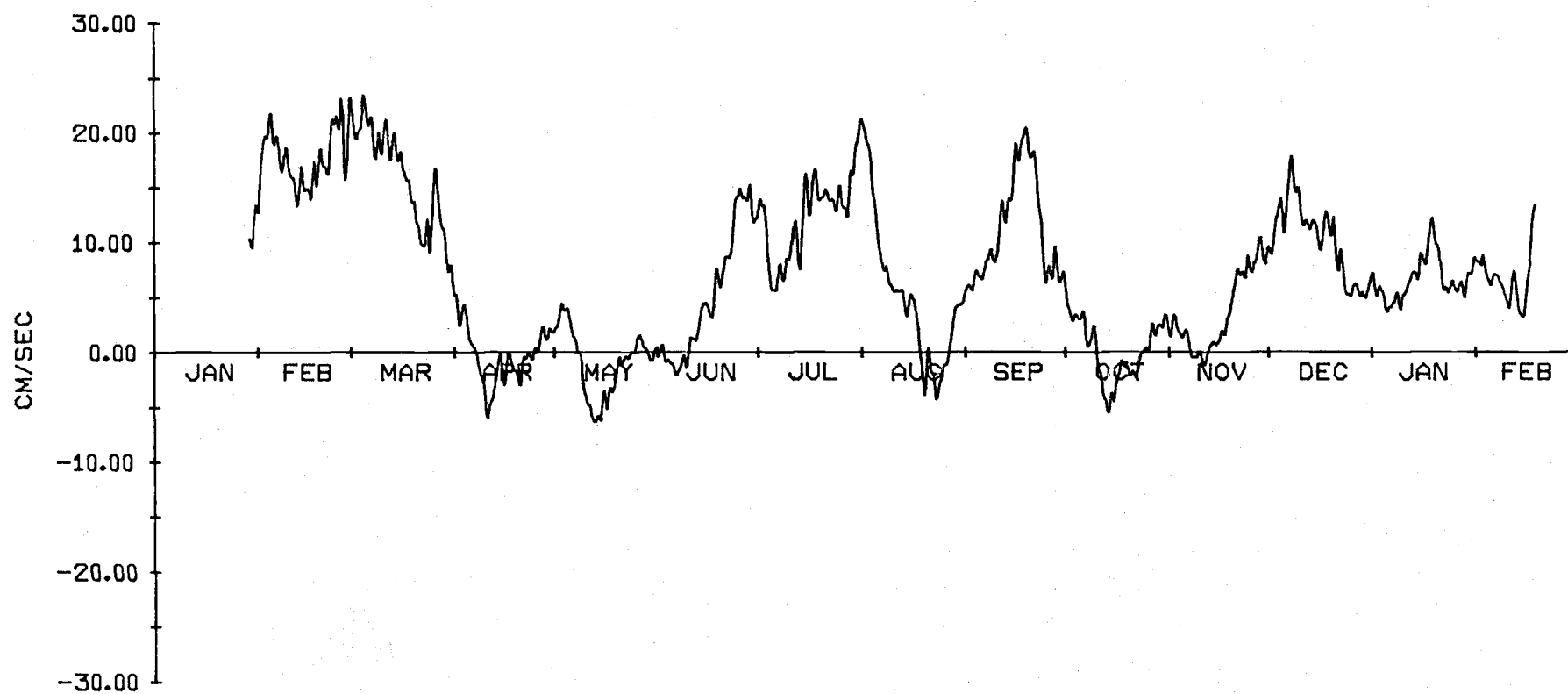
752 M AT STN MS-5. 388 DAYS STARTING 928 28 JAN 79.



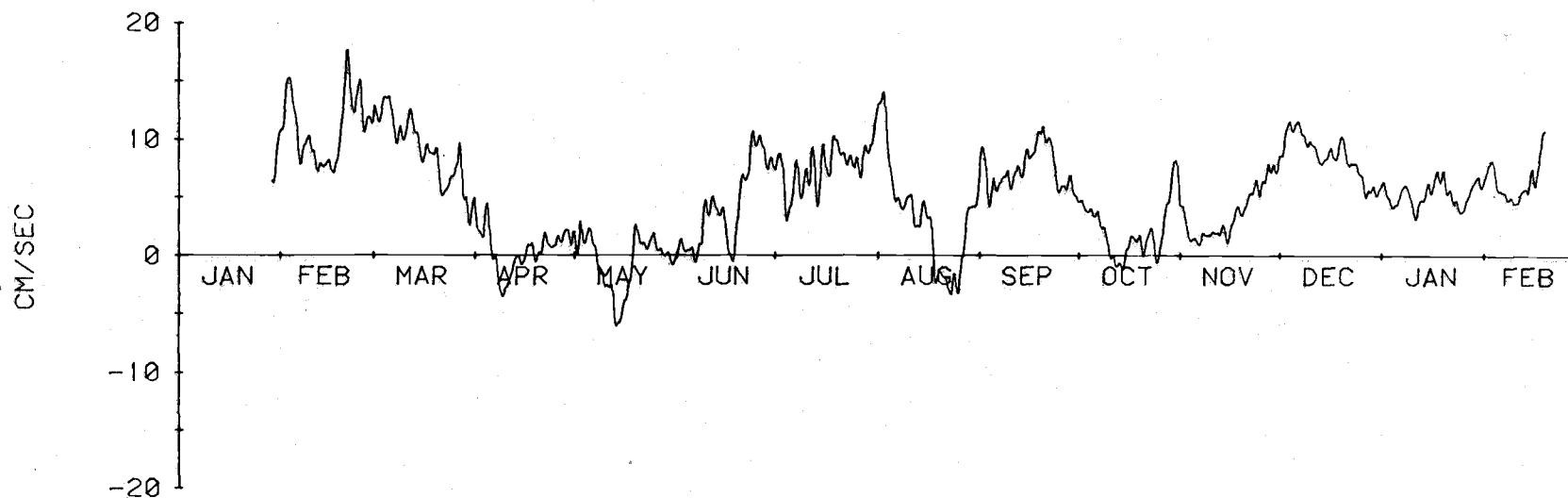
1460 M AT STN MS-5. 388.0 DAYS STARTING 0804 28 JAN 79.



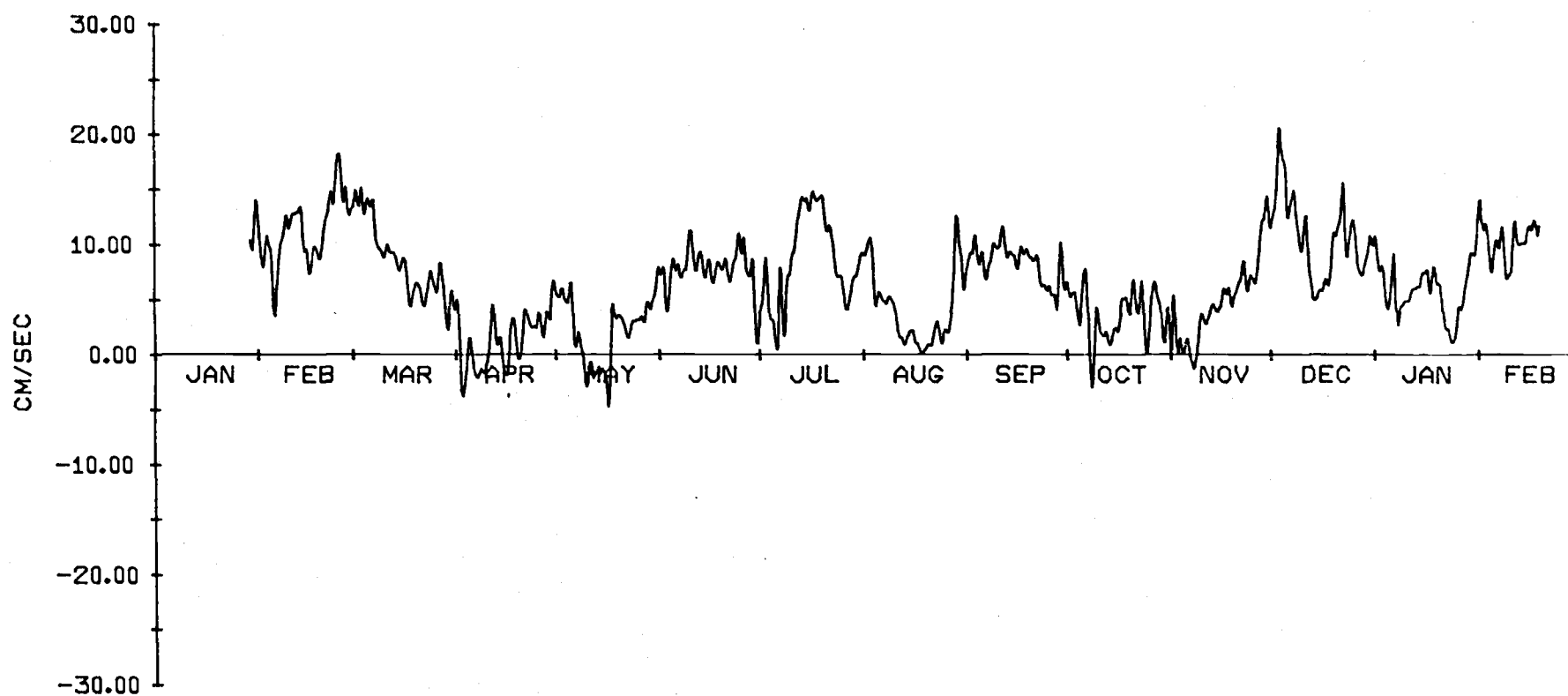
2752 M AT STN MS-5. 387.9 DAYS STARTING 1014 28 JAN 79.



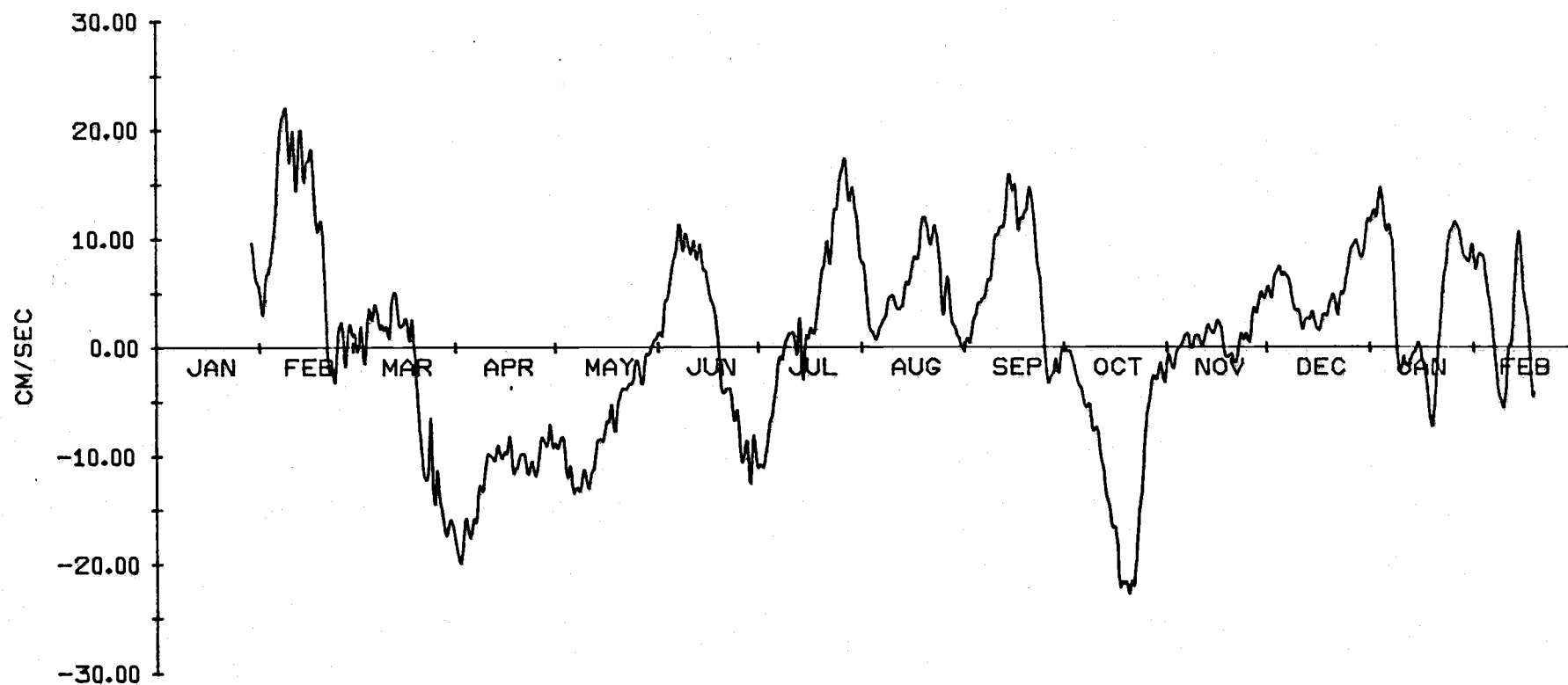
752 METERS AT MS-5.
LLP FILTERED U COMPONENT



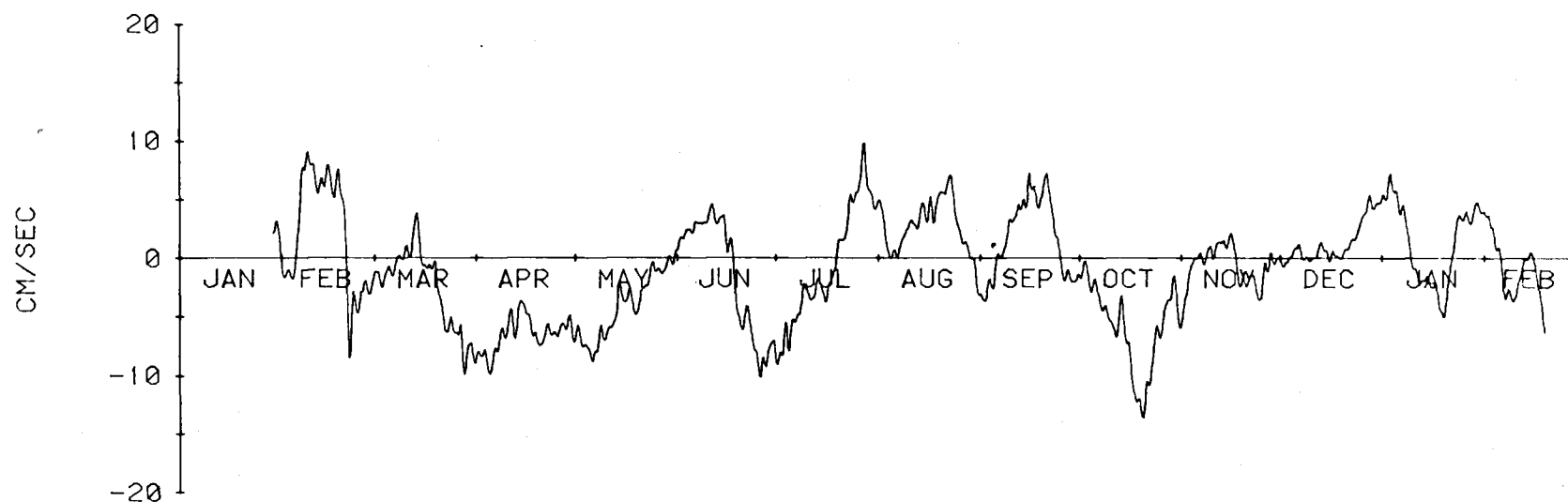
1460 METERS AT MS-5
LLP FILTERED U COMPONENT



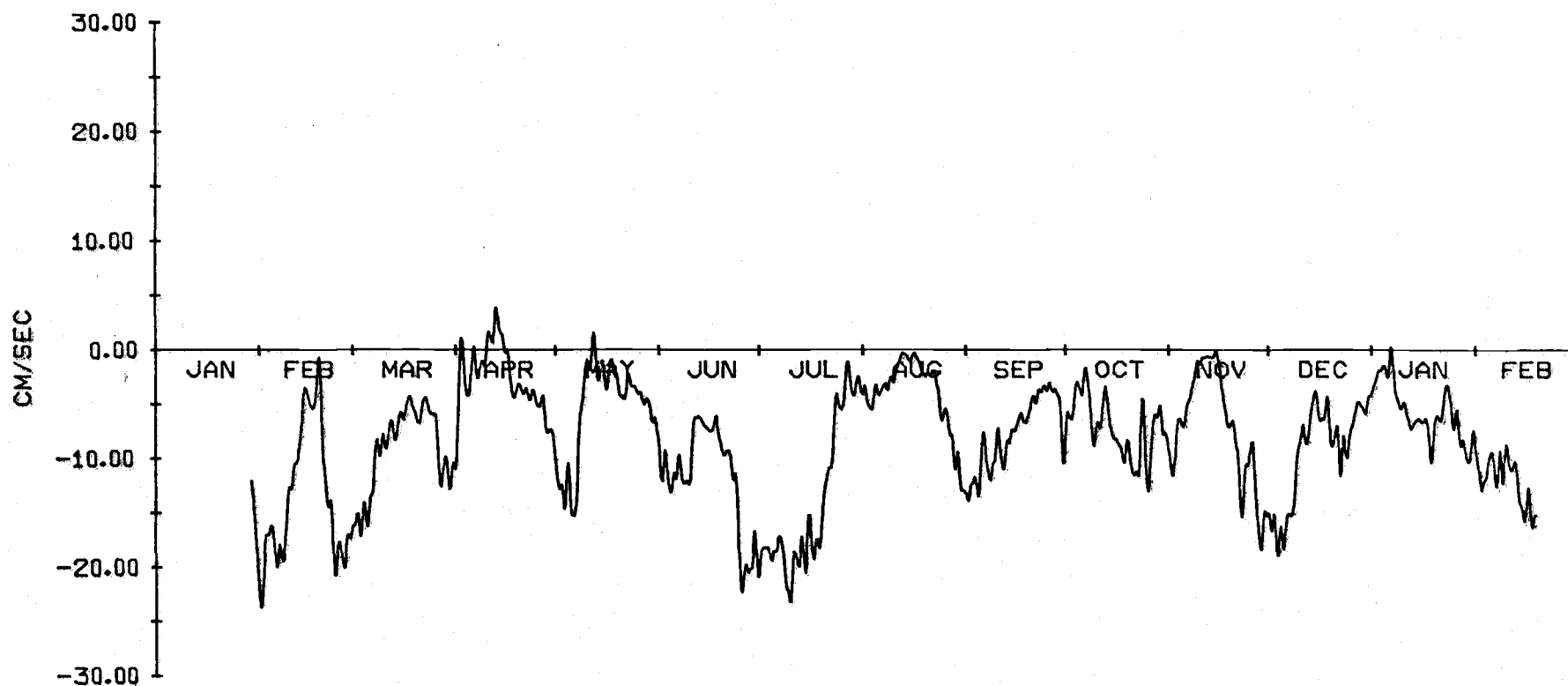
2752 METERS AT MS-5.
LLP FILTERED U COMPONENT



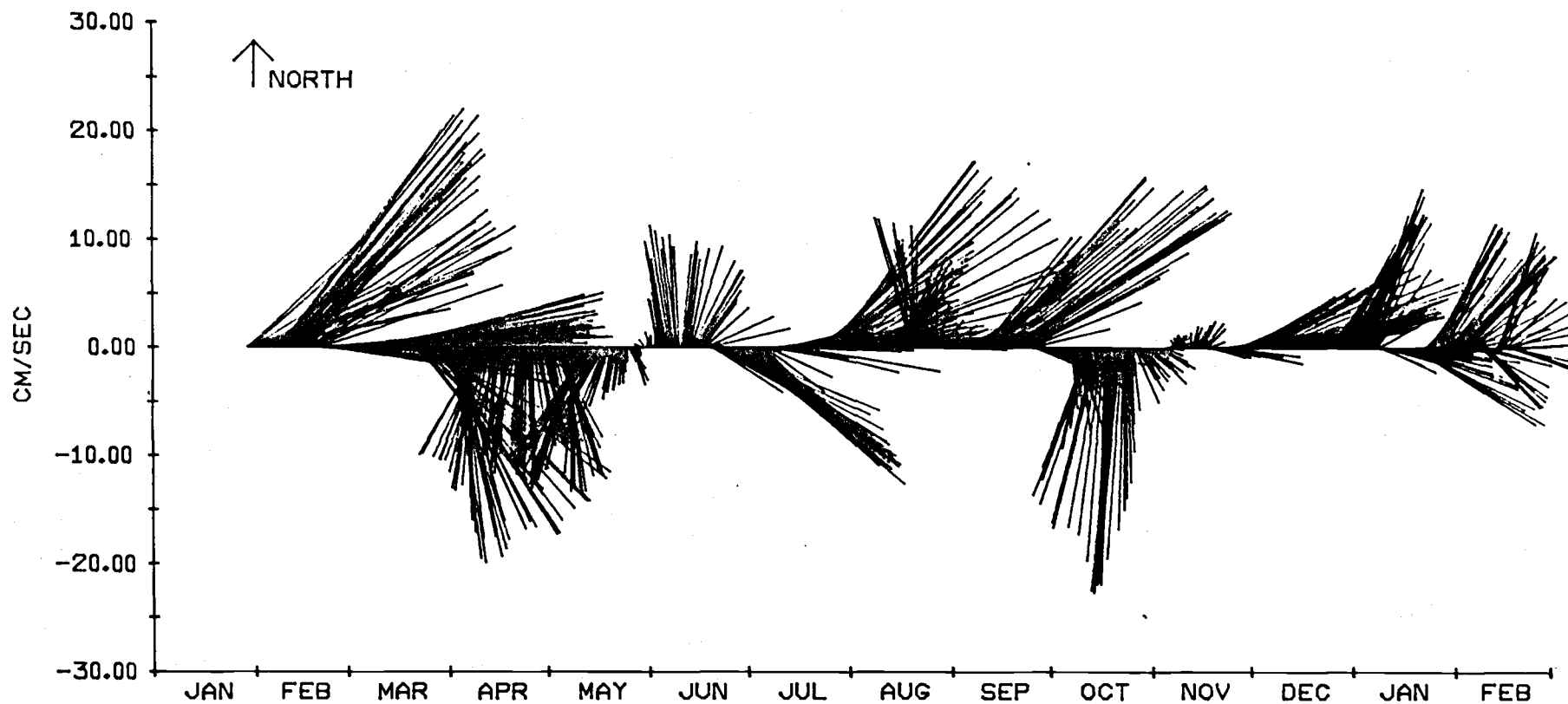
752 METERS AT MS-5.
LLP-FILTERED V COMPONENT



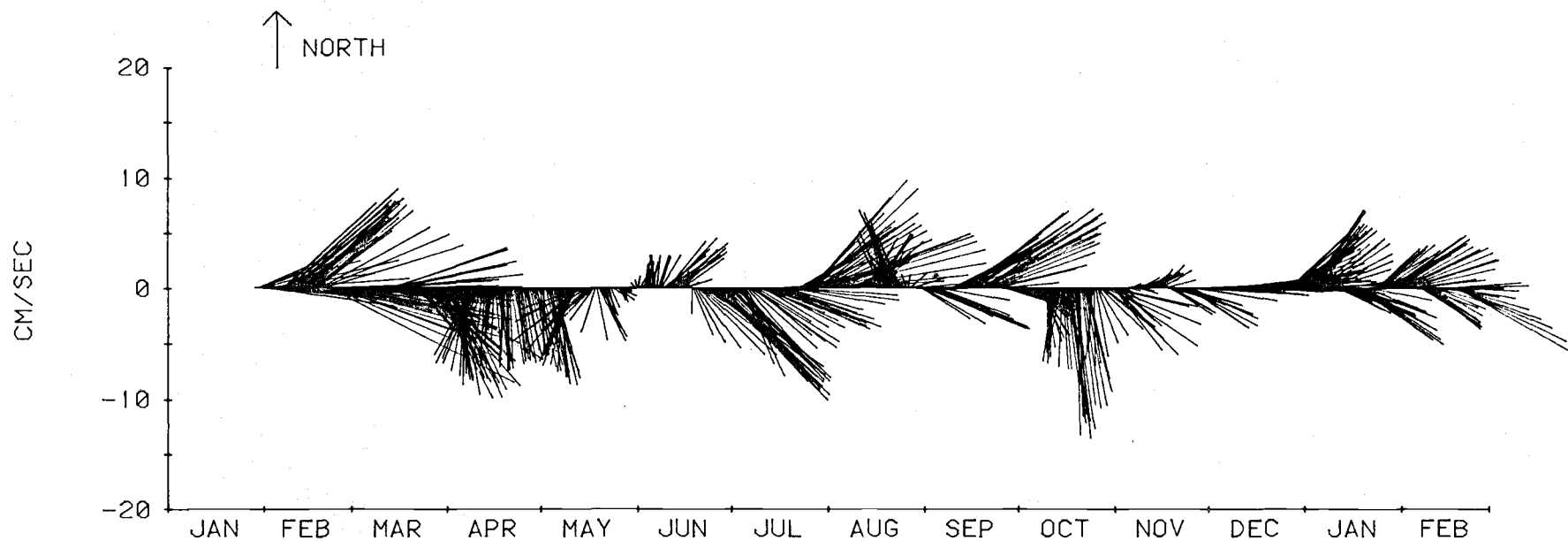
1460 METERS AT MS-5
LLP FILTERED V COMPONENT



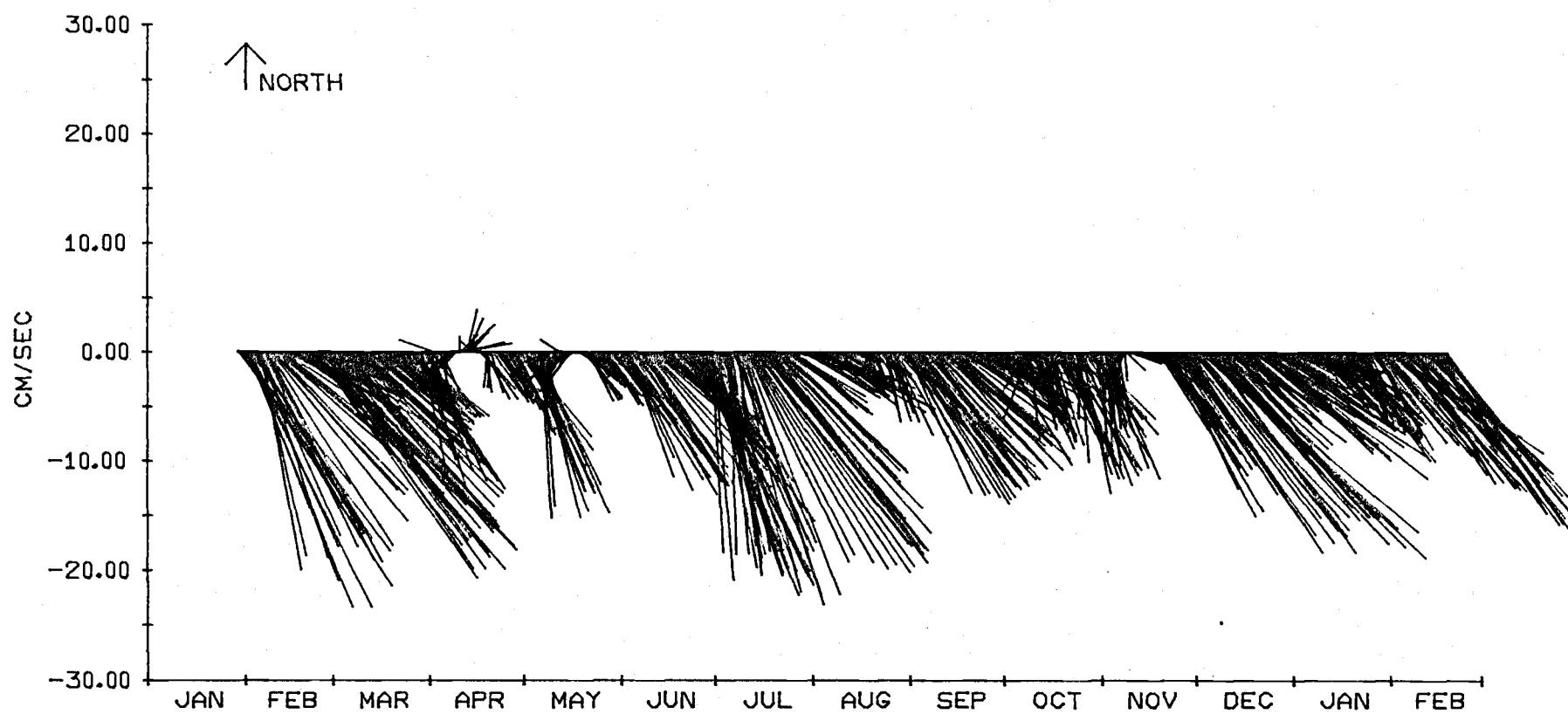
2752 METERS AT MS-5.
LLP FILTERED V COMPONENT



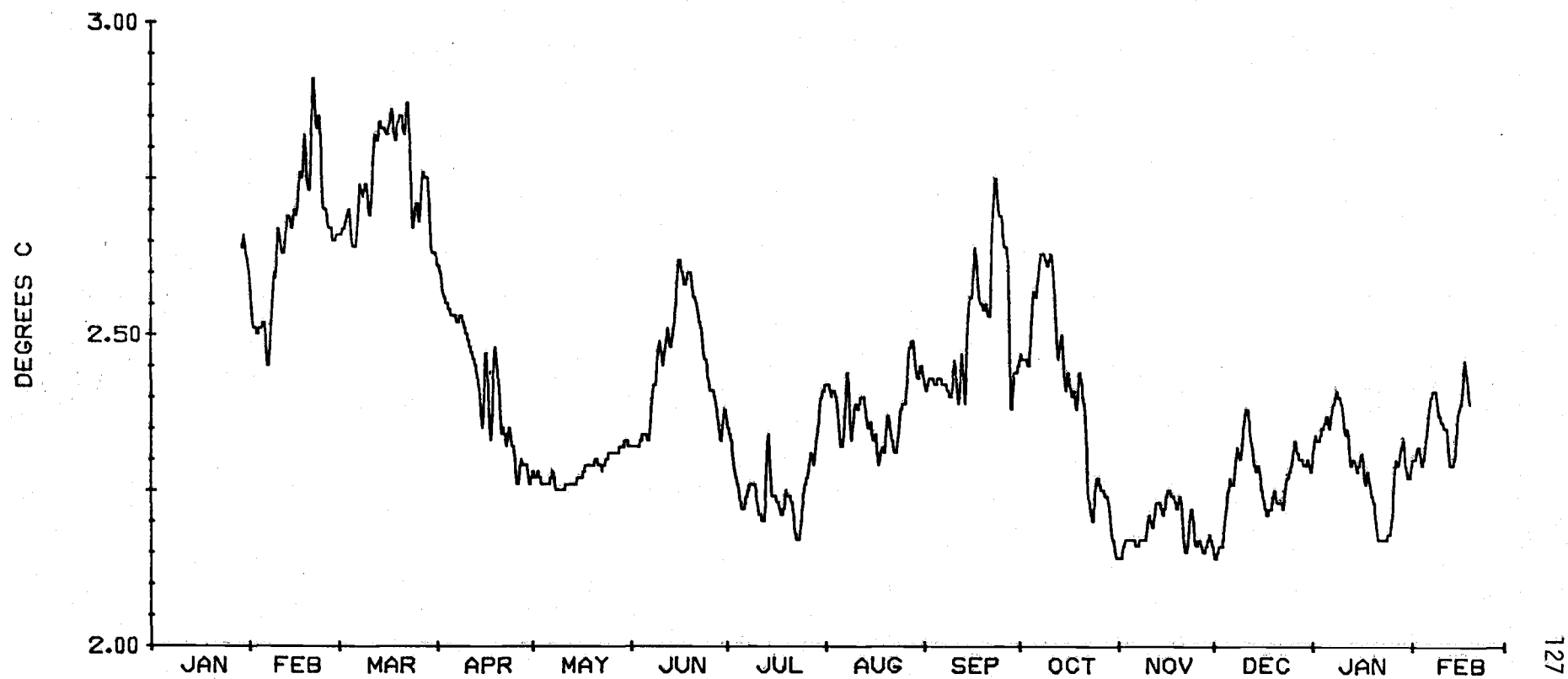
752 METERS AT MS-5.
LLP FILTERED CURRENT



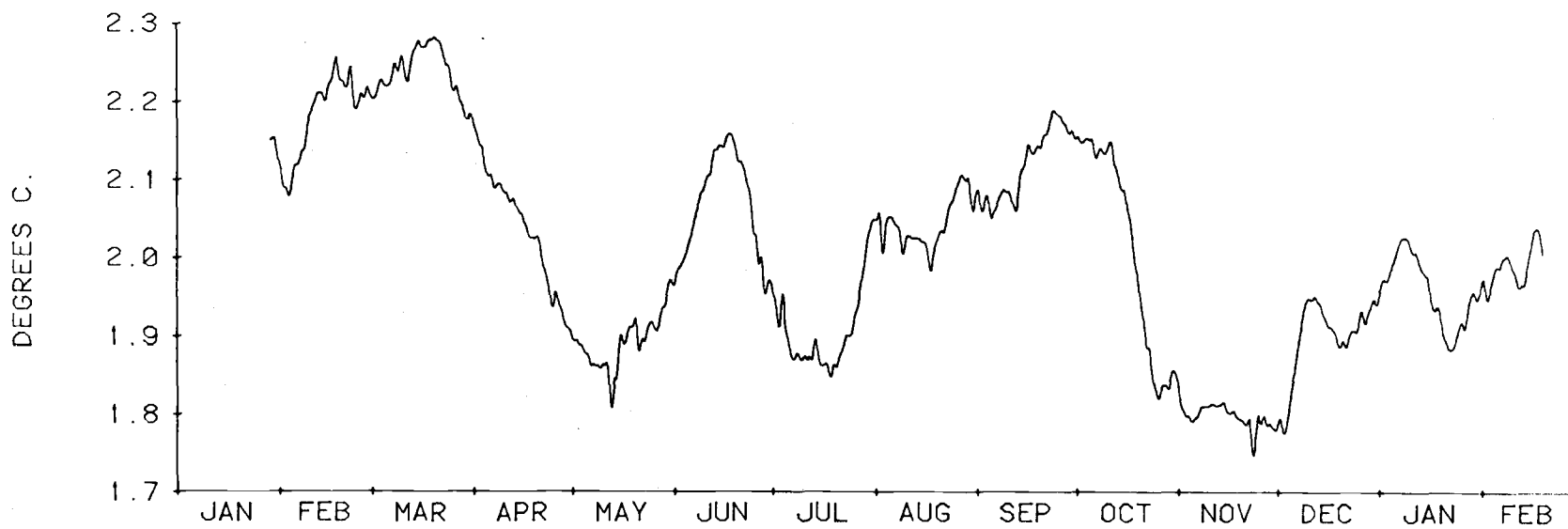
1460 METERS AT MS-5
LLP FILTERED CURRENT



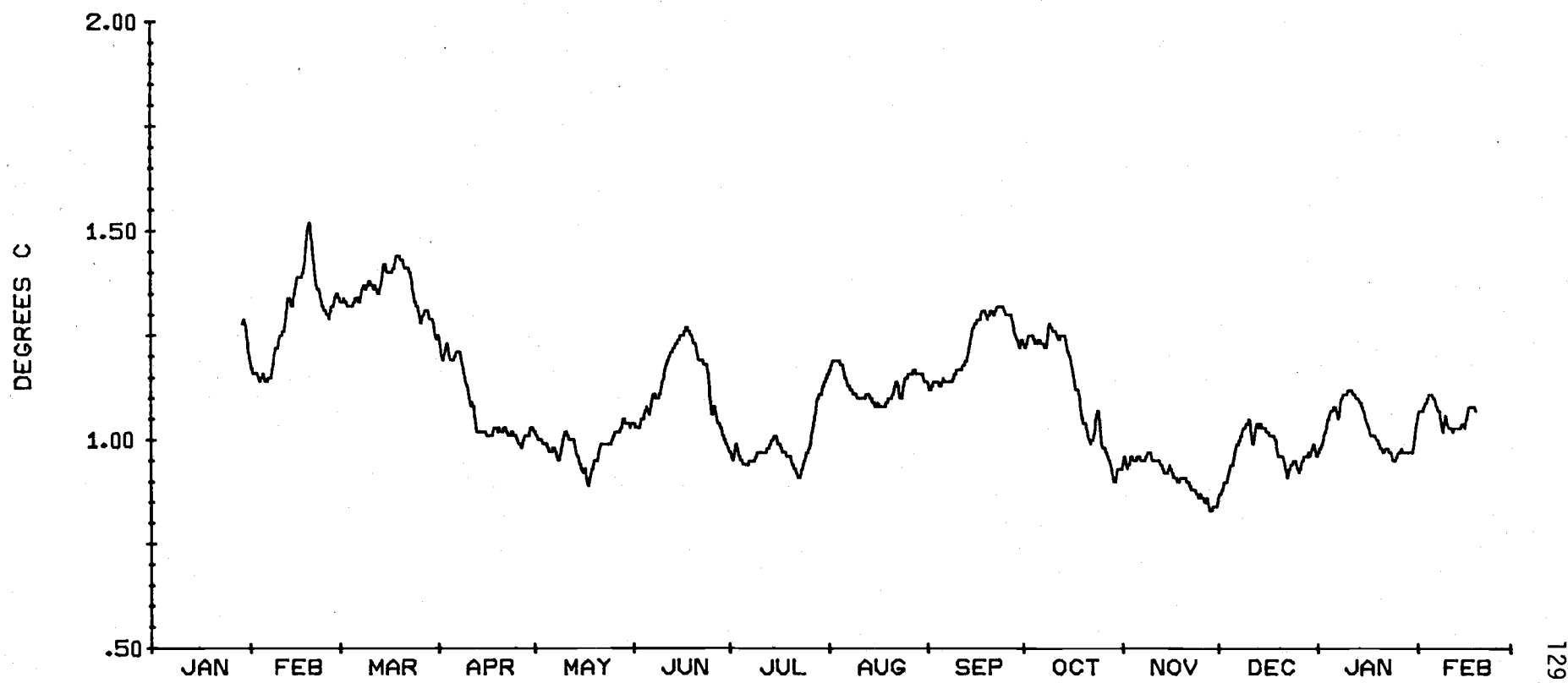
2752 METERS AT MS-5.
LLP FILTERED CURRENT



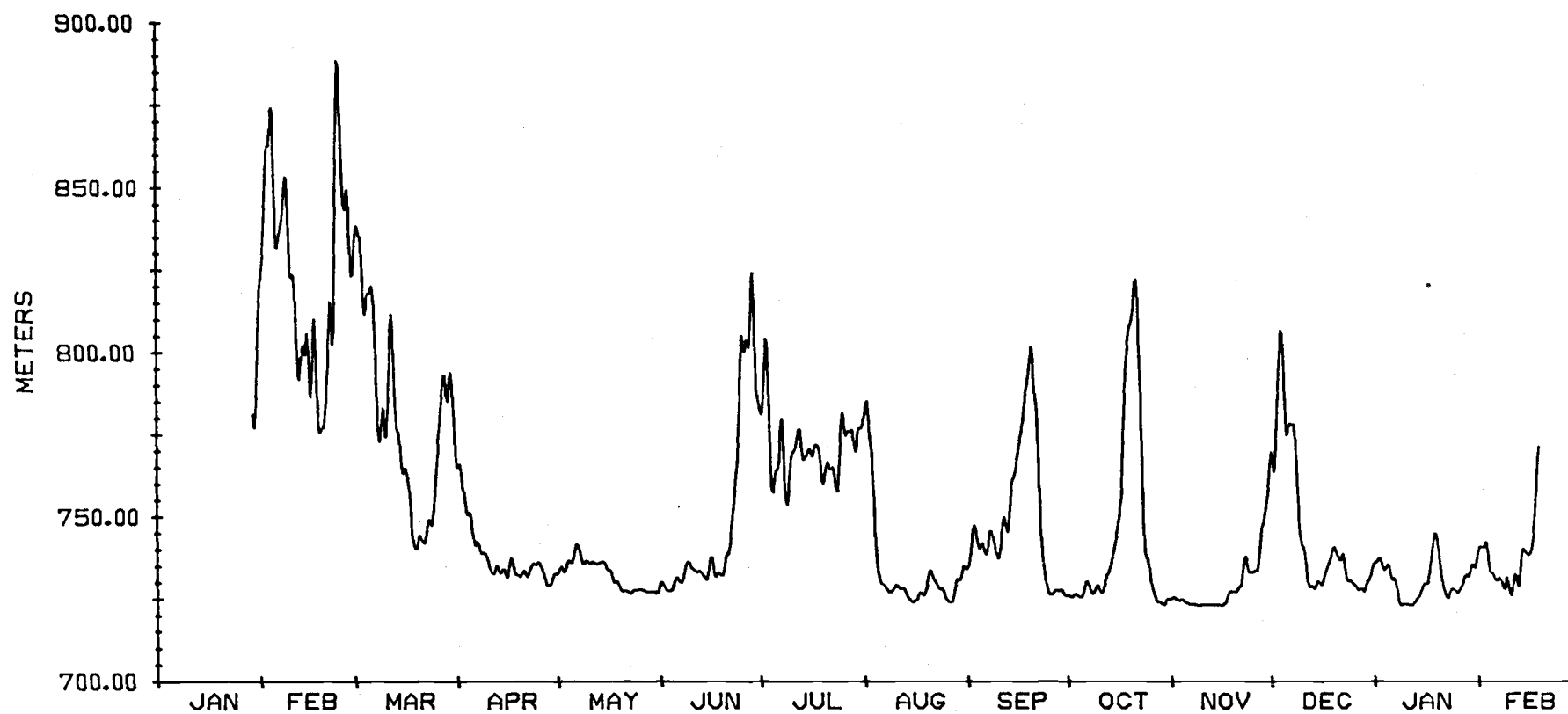
752 METERS AT MS-5.
LLP FILTERED TEMPERATURE



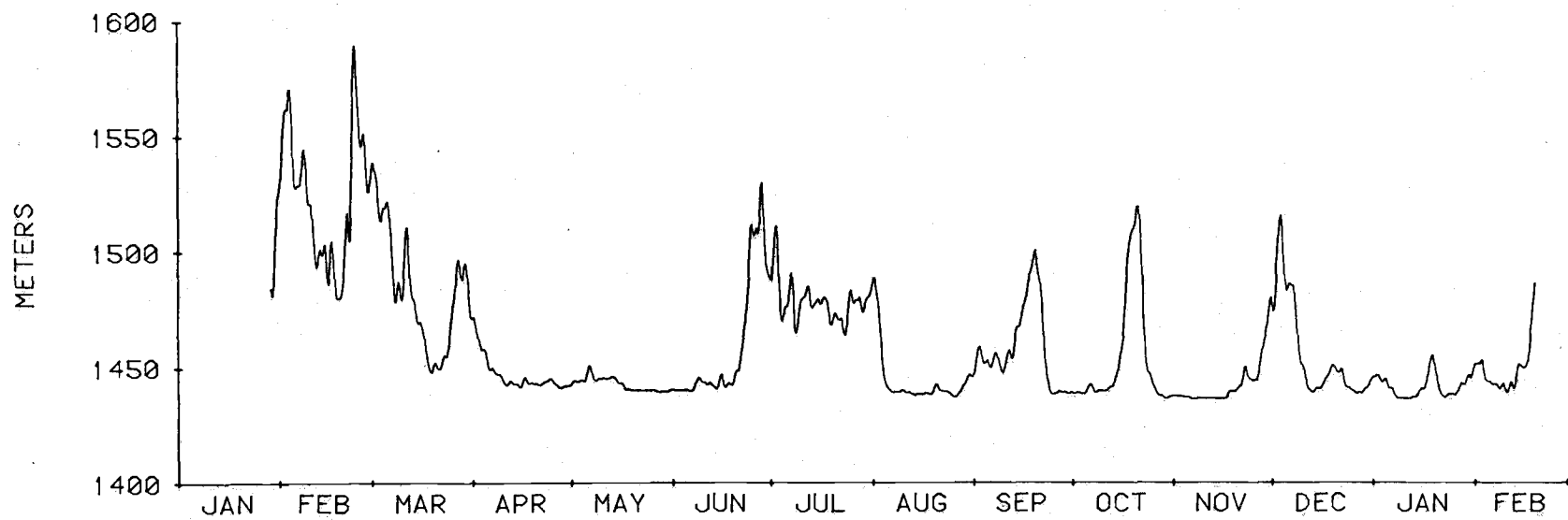
1460 METERS AT MS-5
LLP FILTERED TEMPERATURE



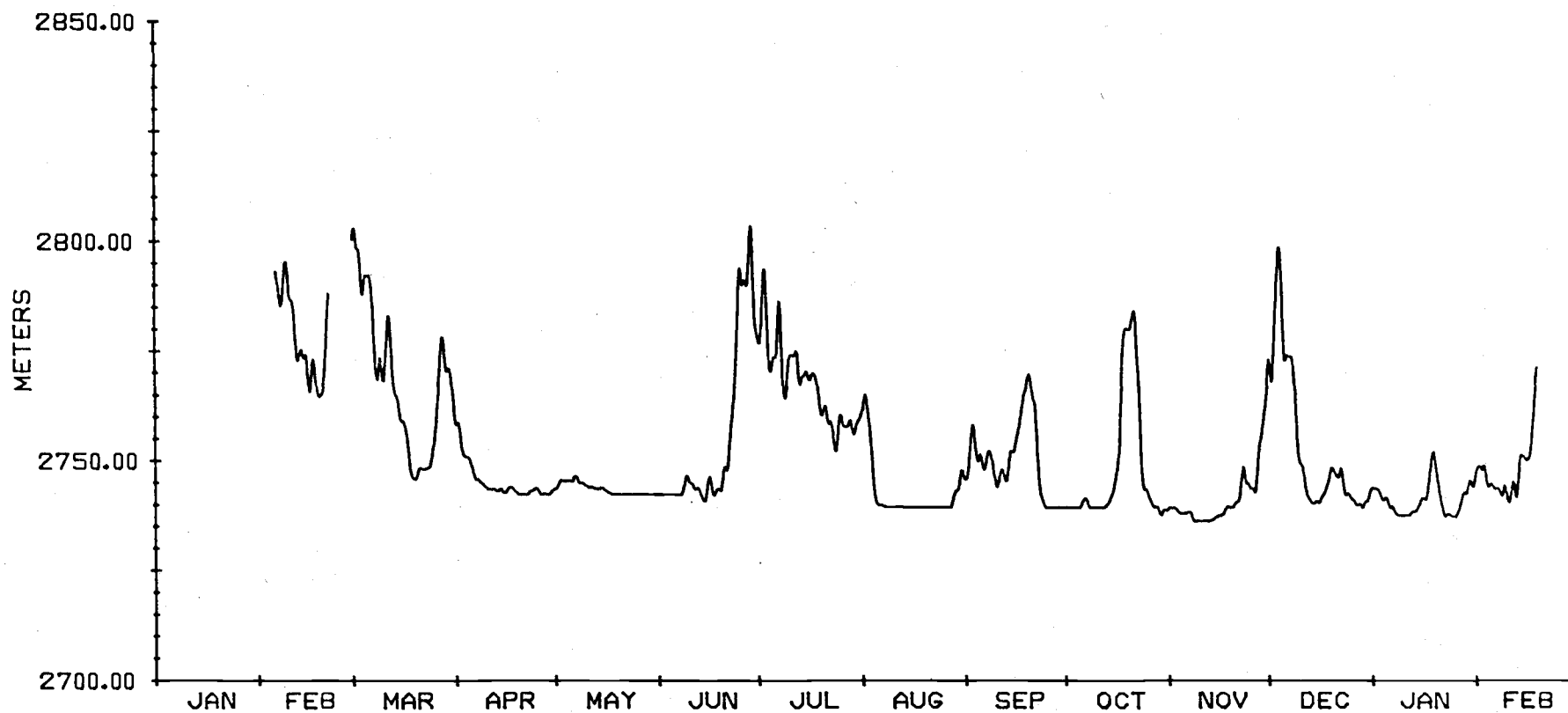
2752 METERS AT MS-5.
LLP FILTERED TEMPERATURE



752 METERS AT MS-5.
LLP FILTERED PRESSURE

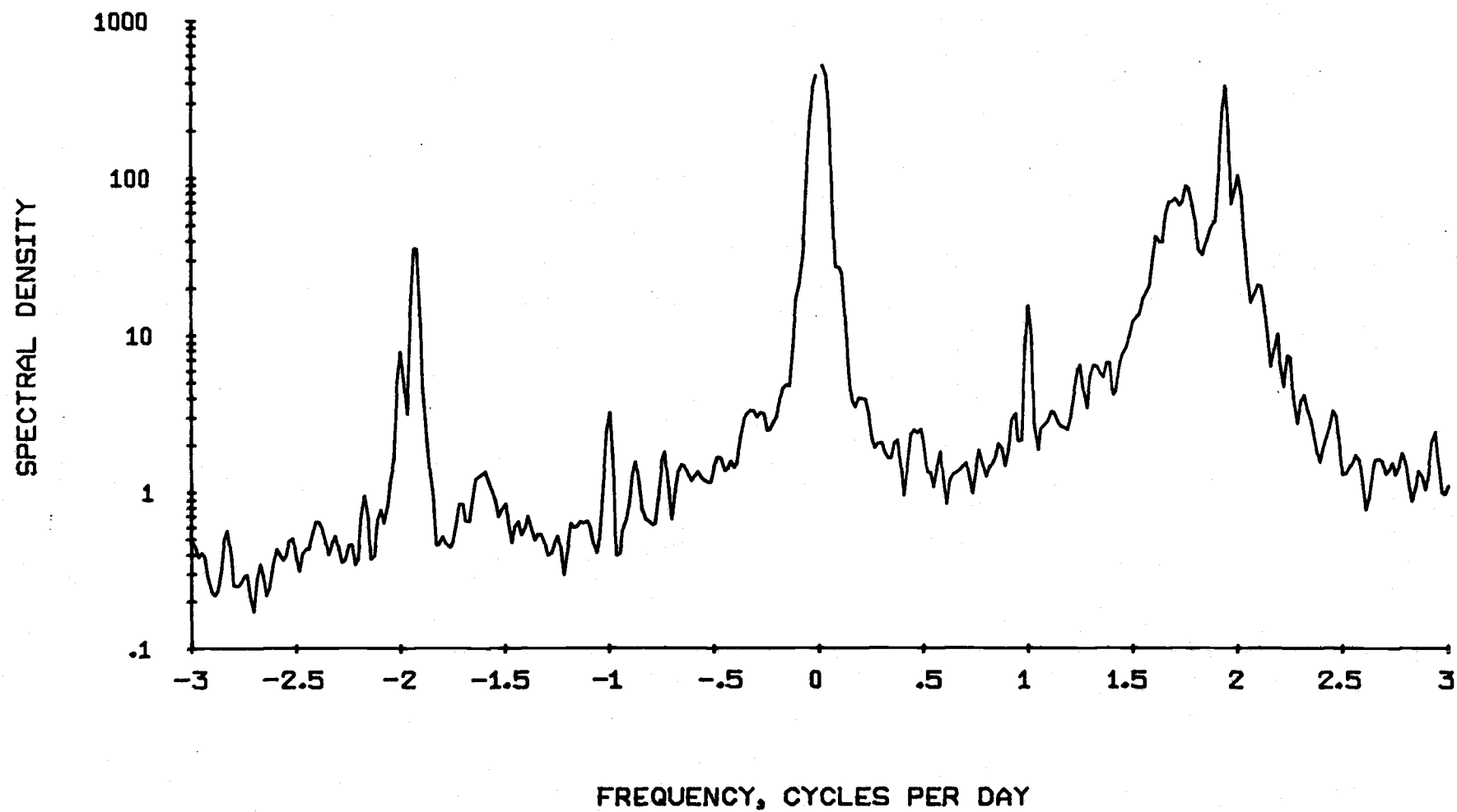


1460 METERS AT MS-5
LLP FILTERED PRESSURE

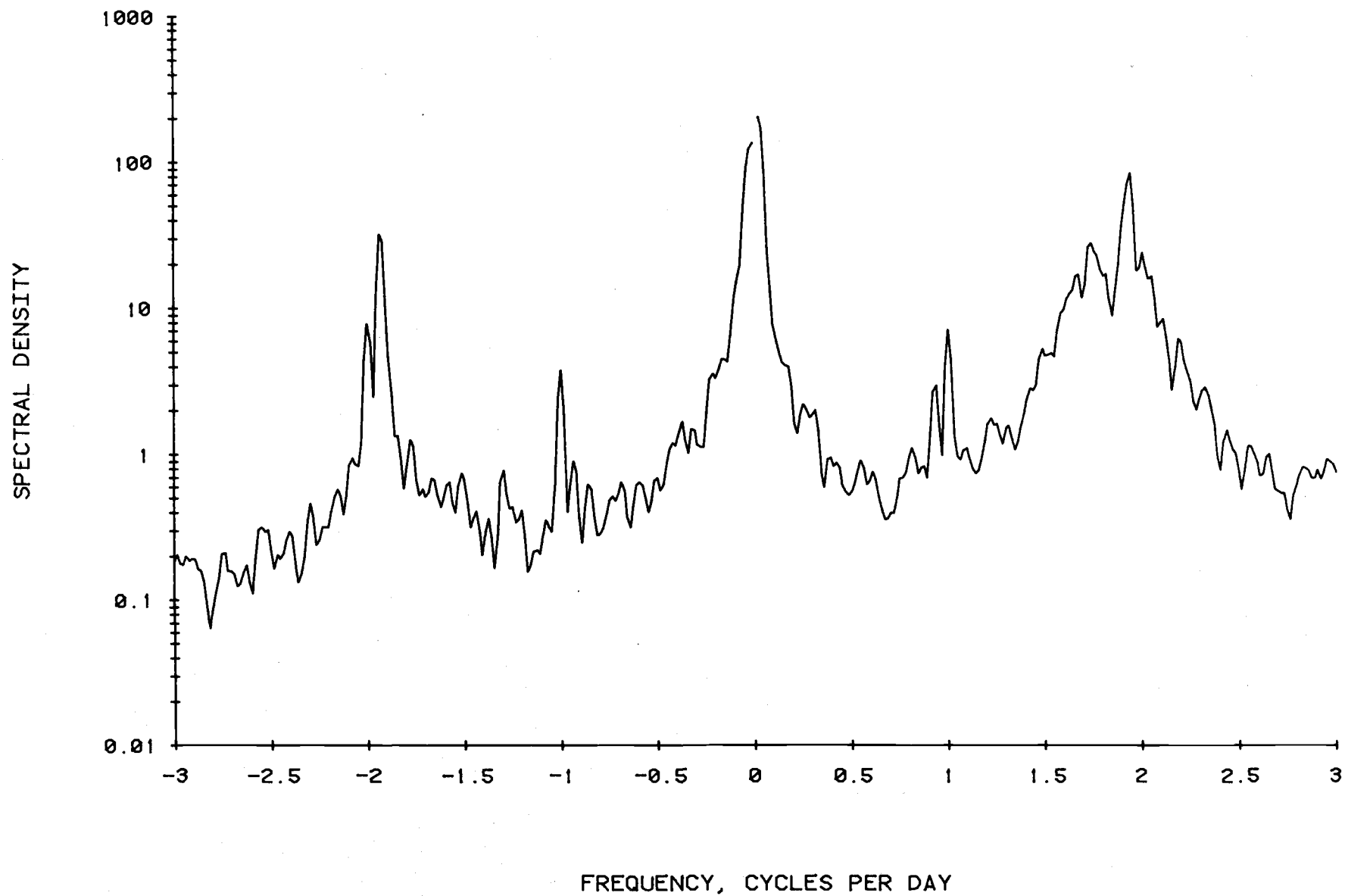


2752 METERS AT MS-5.
LLP FILTERED PRESSURE

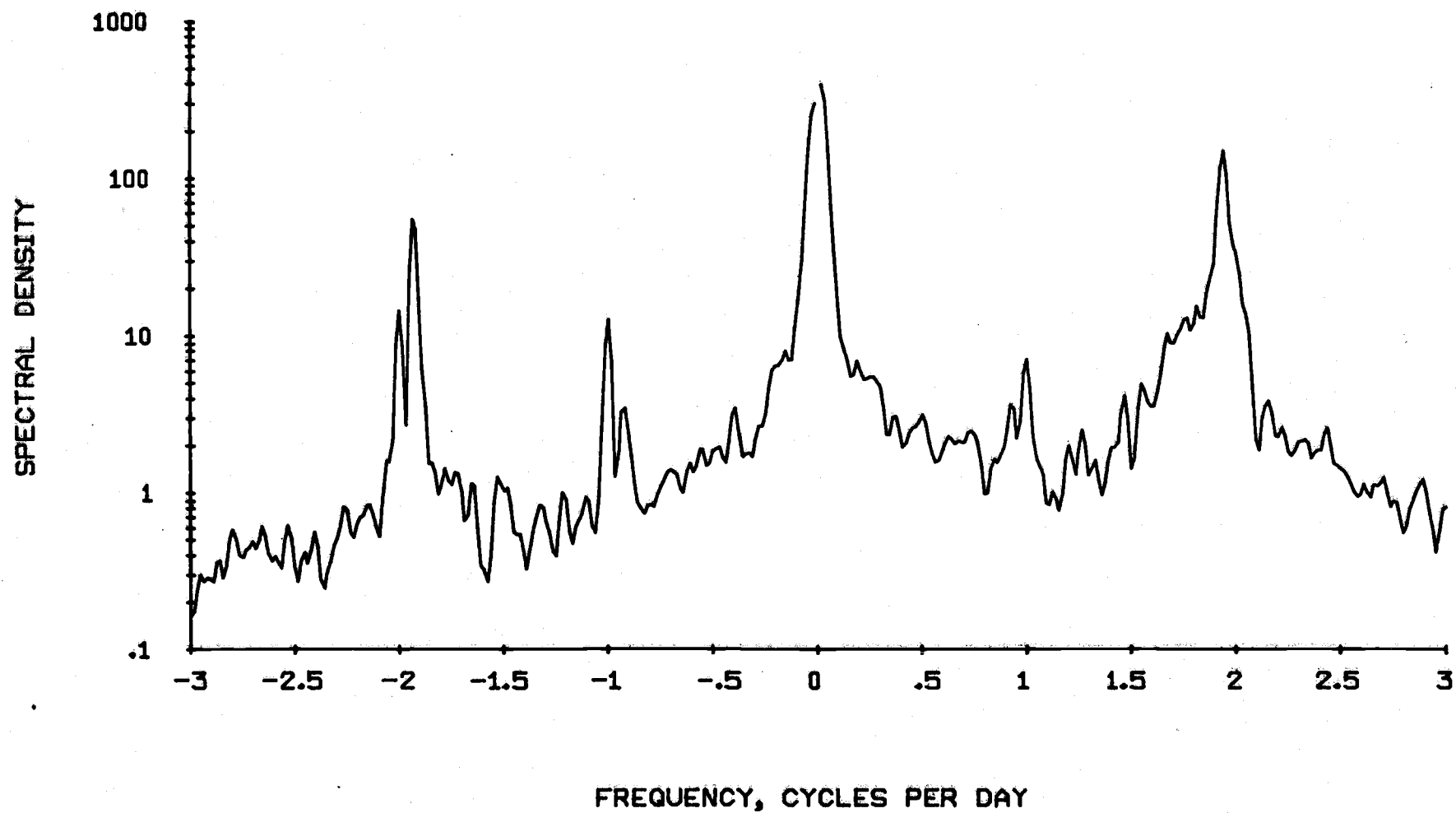
UNFILTERED CURRENT. 752 METERS AT MS-5.



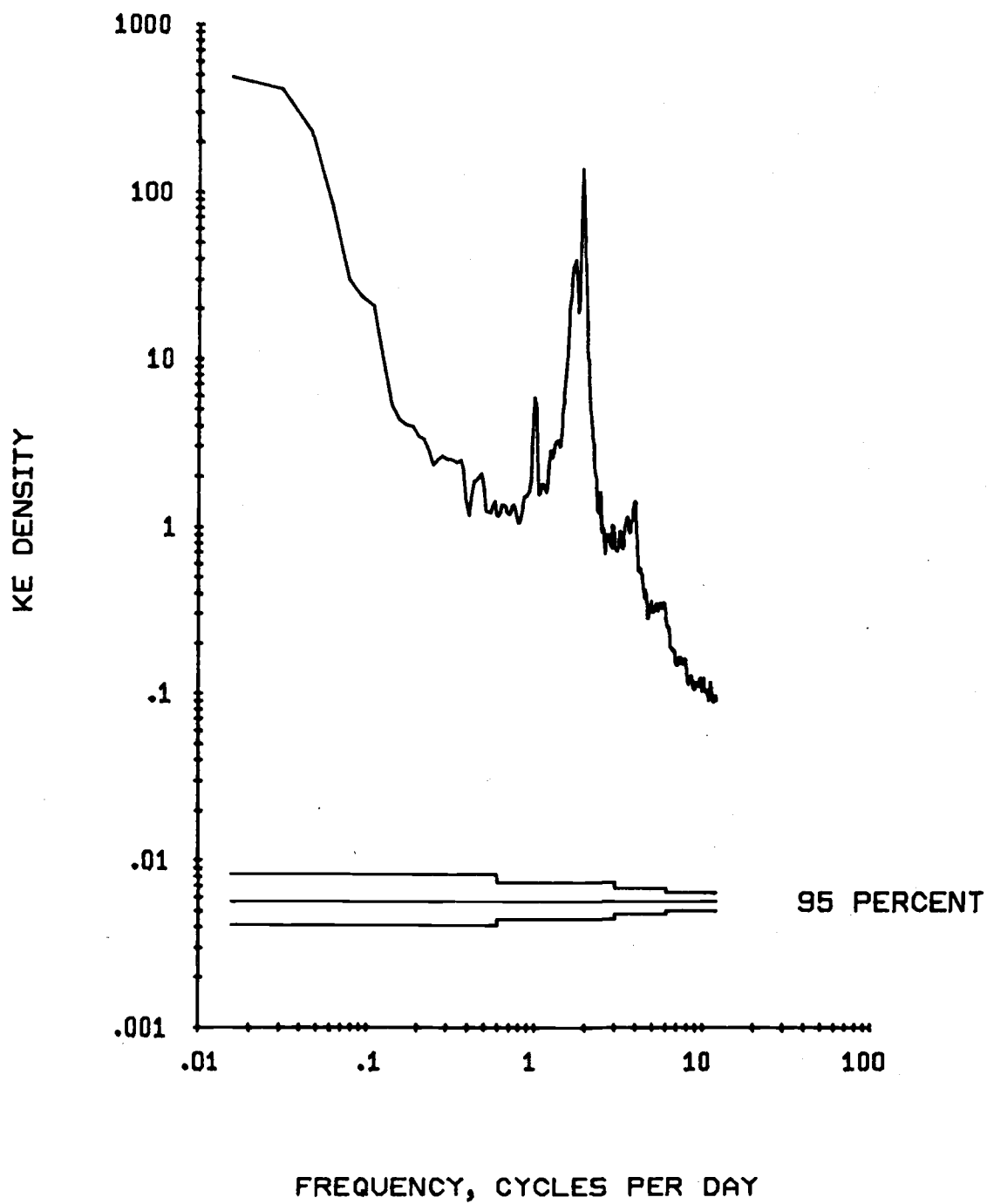
UNFILTERED CURRENT. 1460 METERS AT MS-5



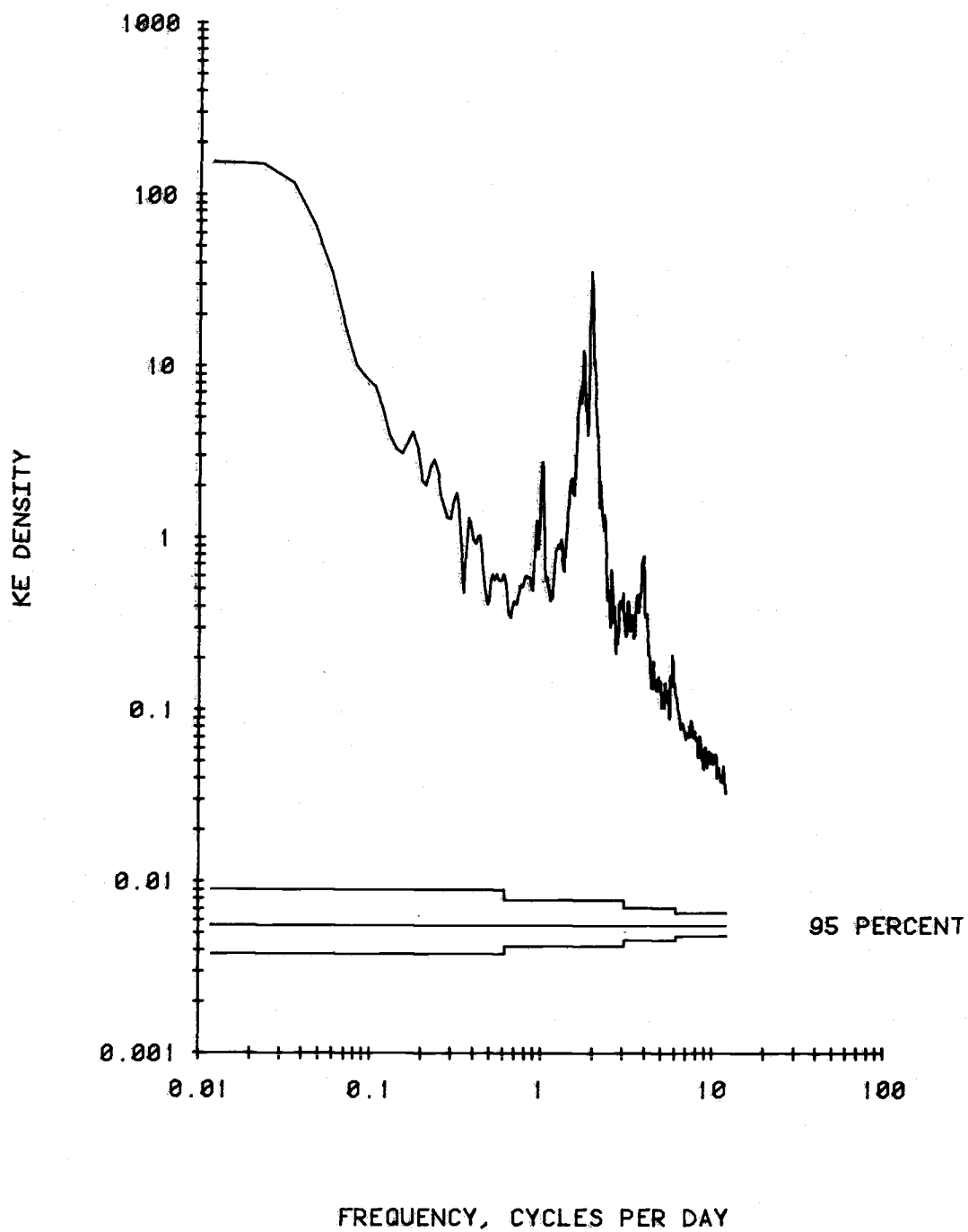
UNFILTERED CURRENT. 2752 METERS AT MS-5.



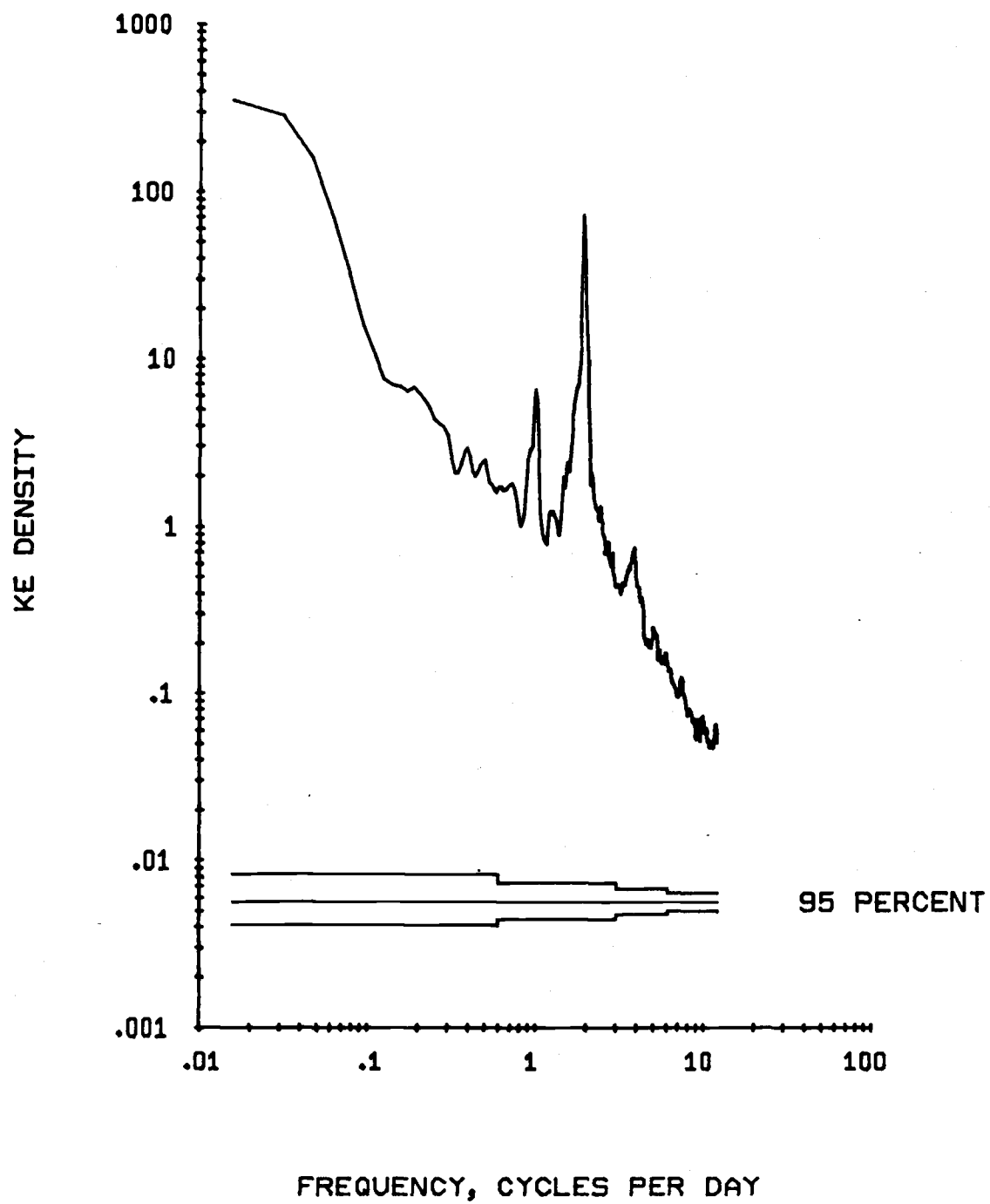
UNFILTERED CURRENT. 752 METERS AT MS-5.



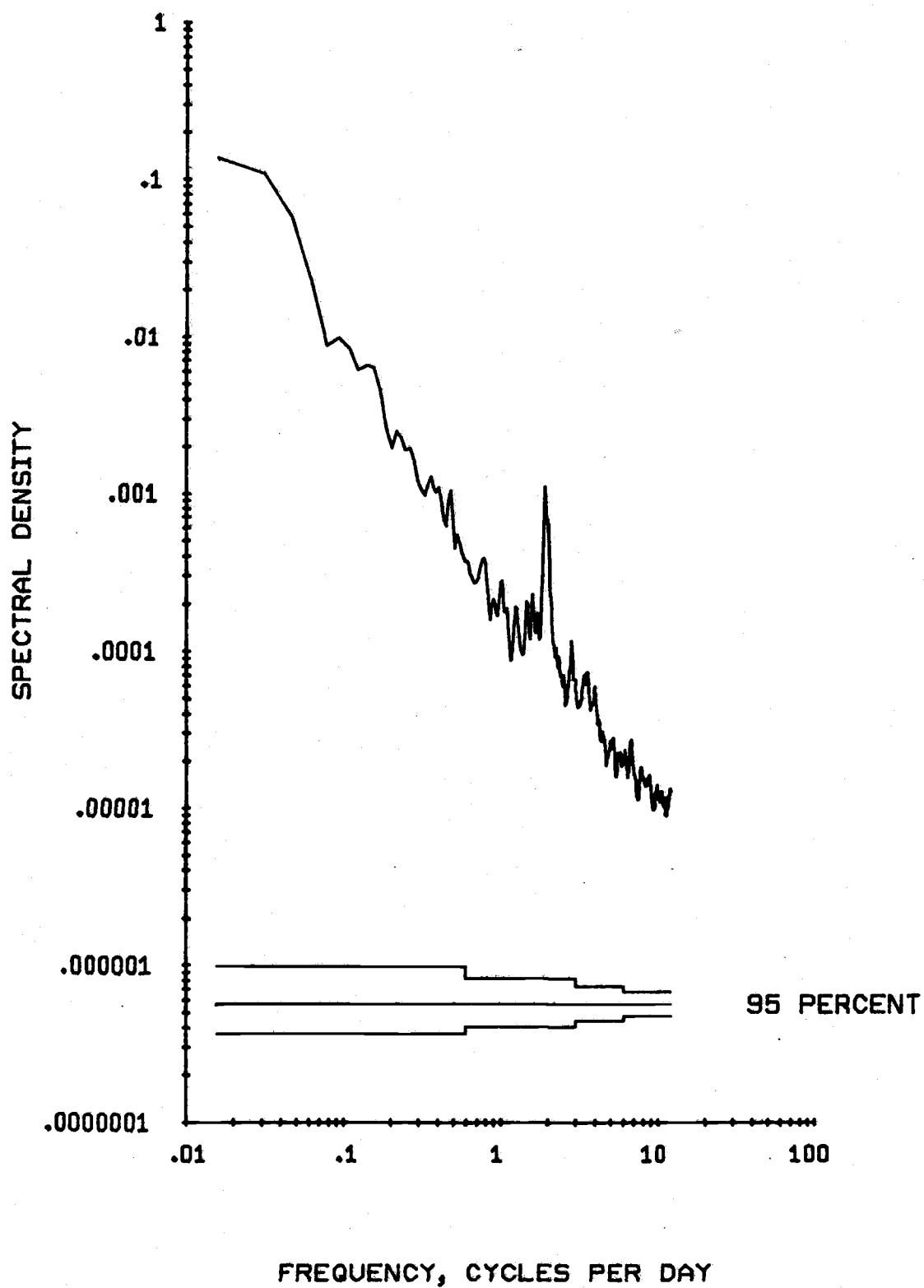
UNFILTERED CURRENT. 1460 METERS AT MS-5



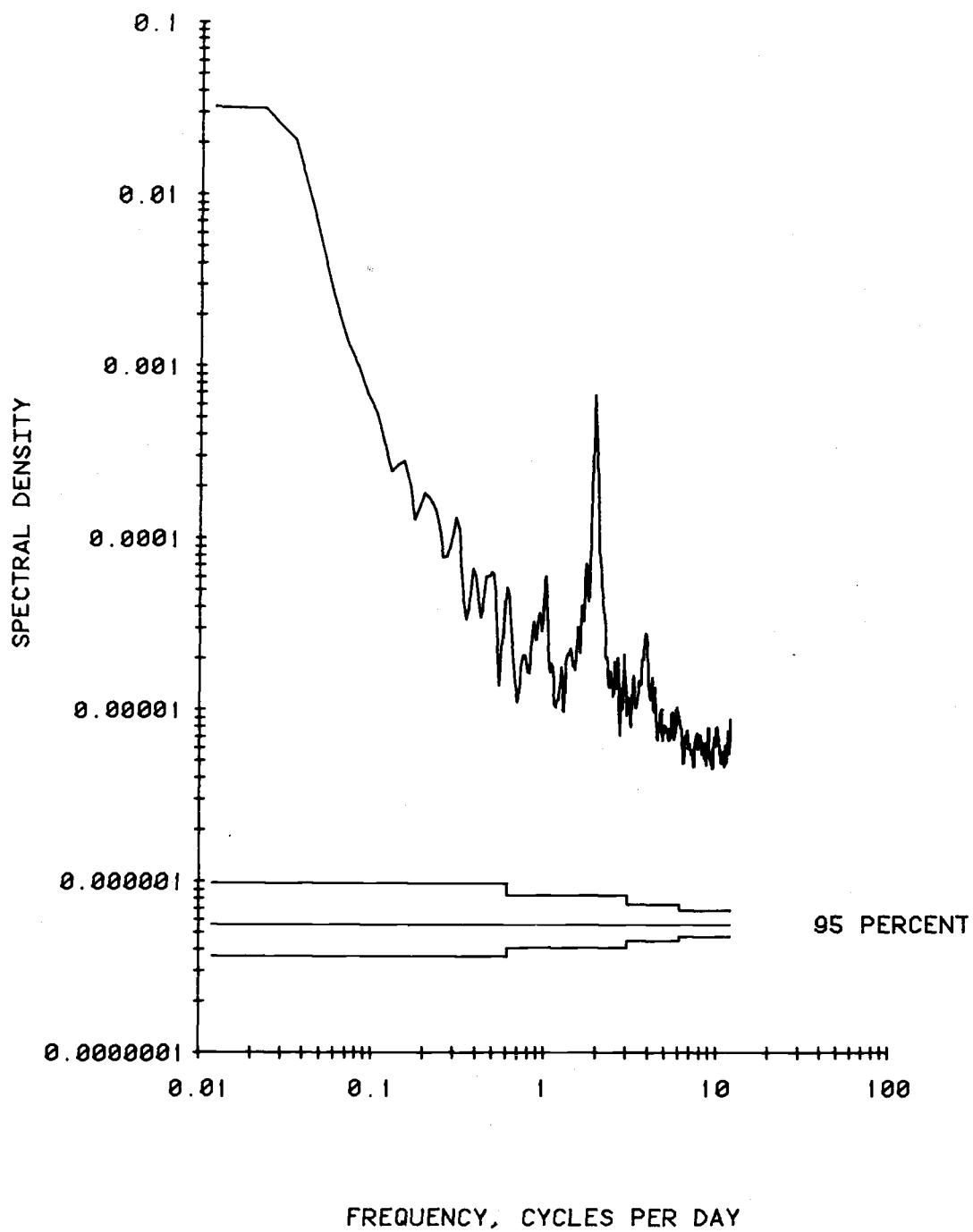
UNFILTERED CURRENT. 2752 METERS AT MS-5.



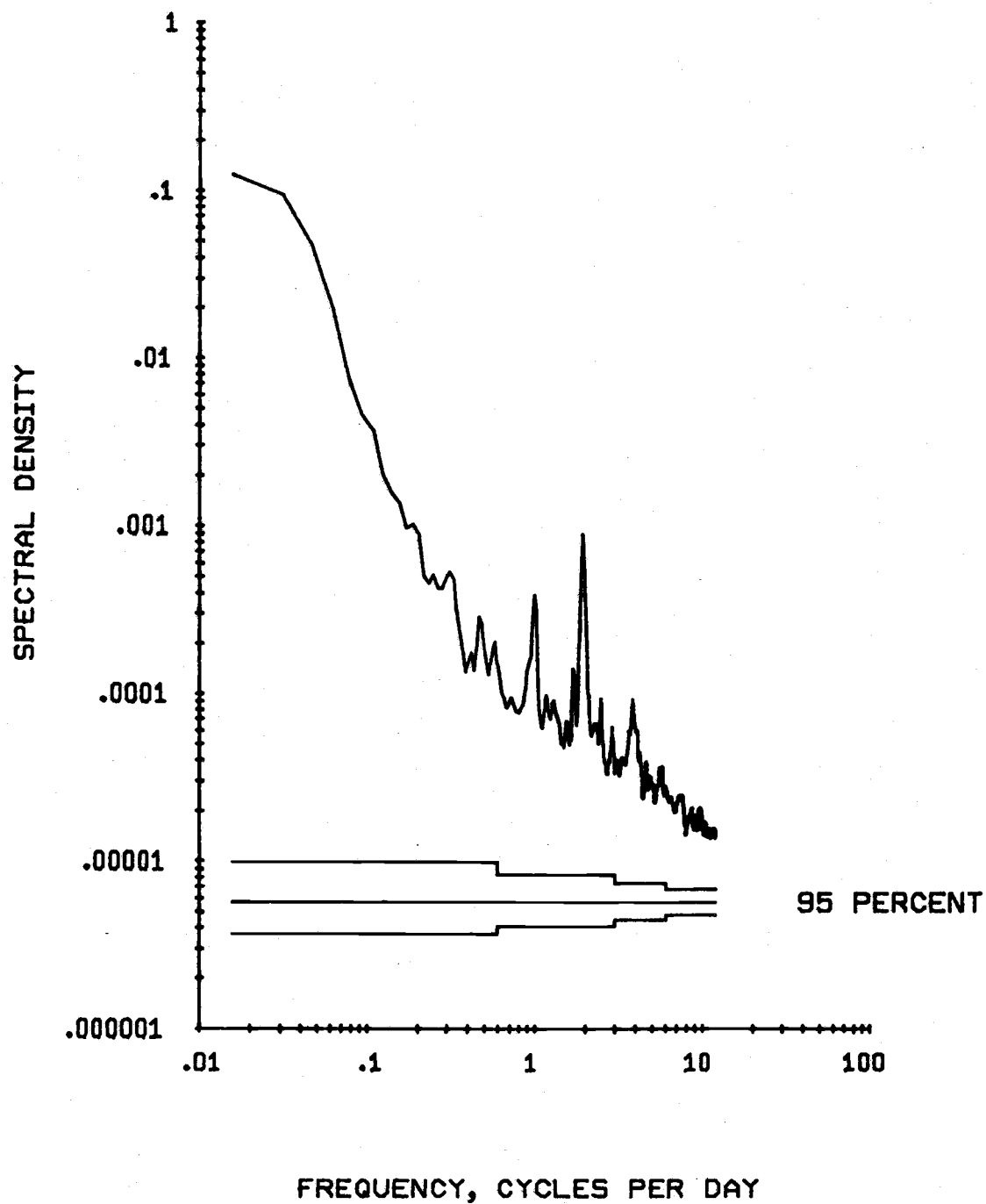
UNFILTERED TEMPERATURE. 752 METERS AT MS-5.



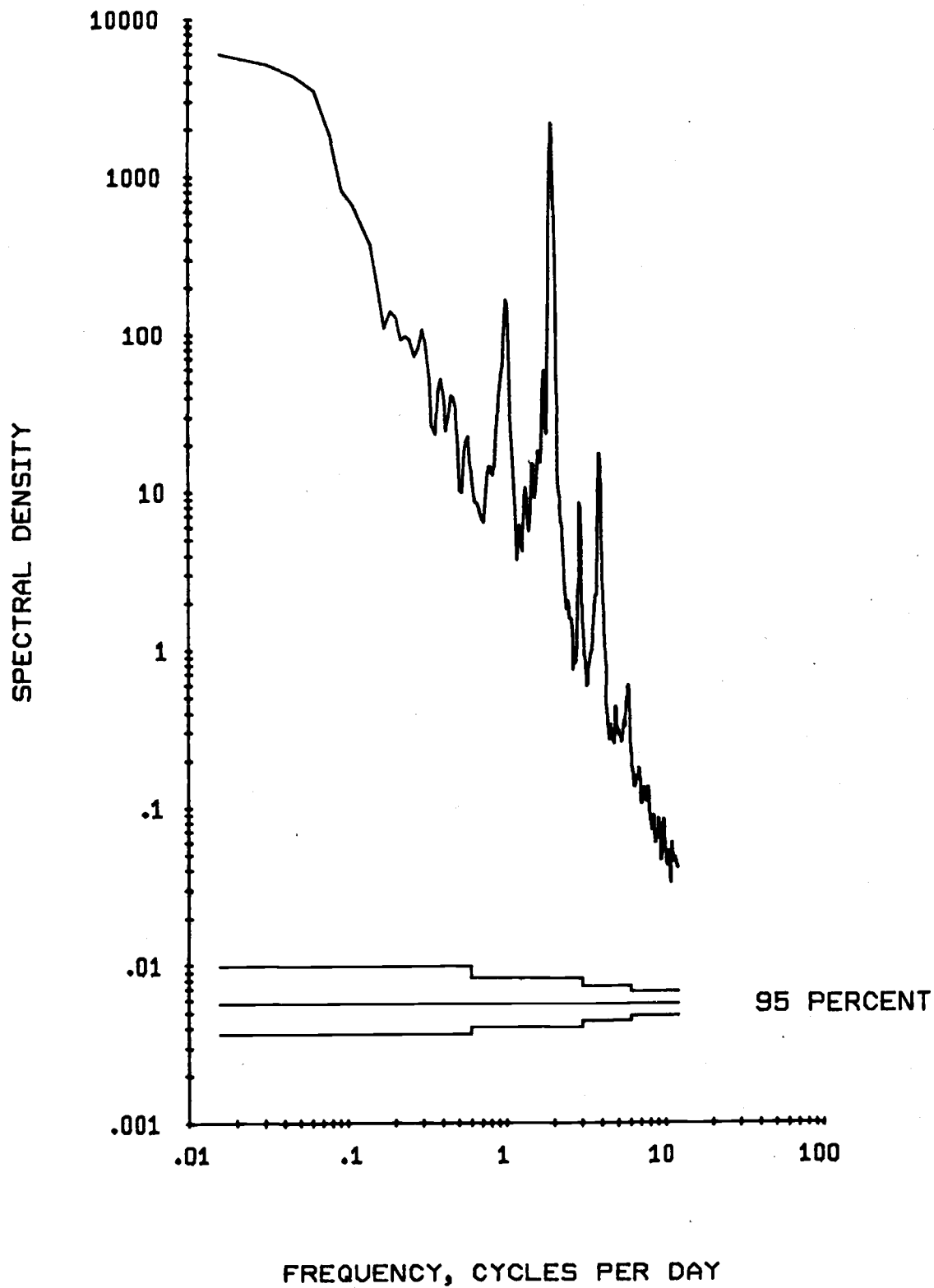
UNFILTERED TEMPERATURE. 1460 METERS AT MS-5



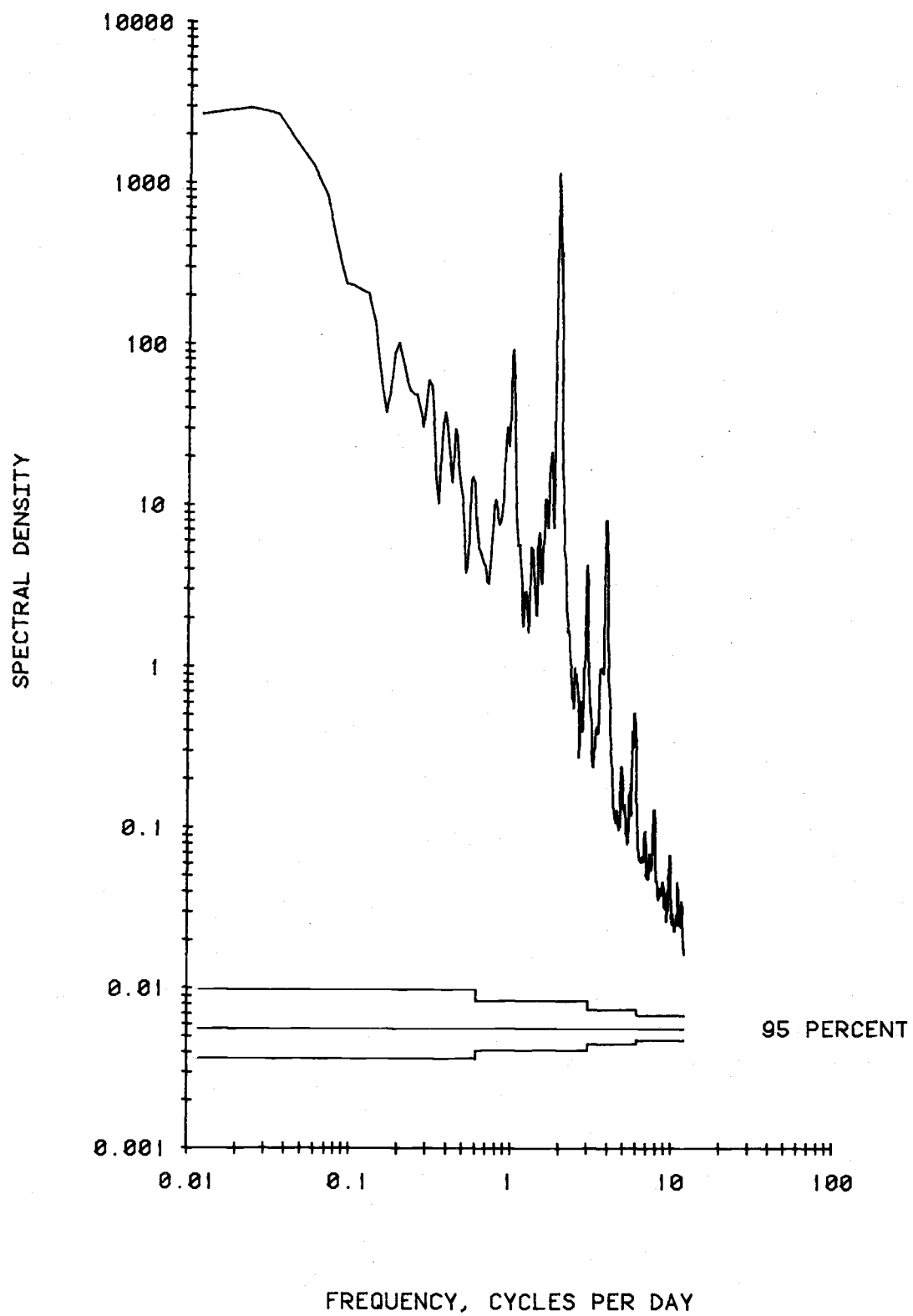
UNFILTERED TEMPERATURE. 2752 METERS AT MS-5.



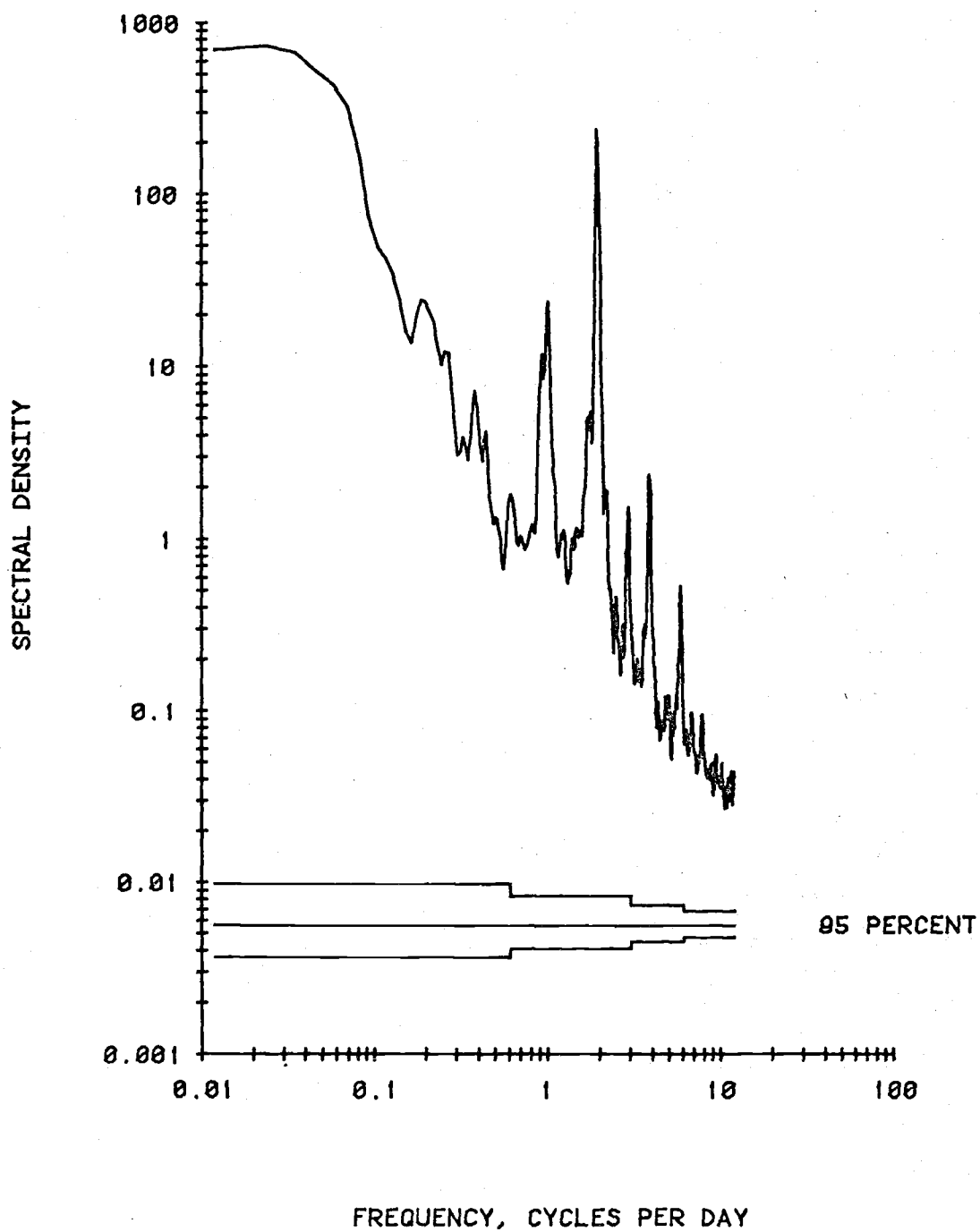
UNFILTERED PRESSURE. 752 M AT MS-5.



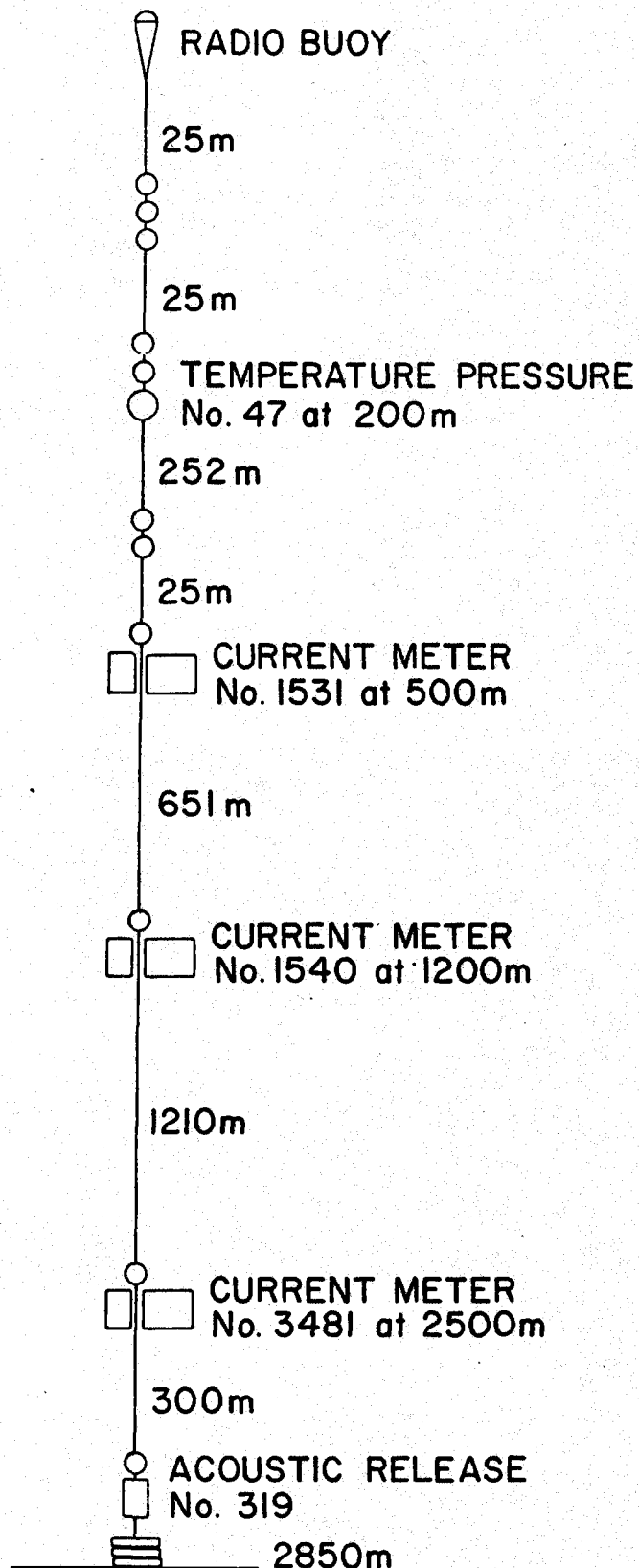
UNFILTERED PRESSURE. 1460 METERS AT MS-5



UNFILTERED PRESSURE. 2752 METERS AT MS-5.



MS - 6



MAPPING / STATISTICS (MS) 6

59° 10.7' S

65° 15.0' W

INSTALLED: 28 JANUARY 1979

MS-6

Position: 59°10.7'S, 65°15.0'W
Depth of Water: 2850 m
Set at 1230 UCT 28 January '79 by R/V MELVILLE
Retrieved at 1704 UCT 28 January '80 by R/V ATLANTIS II
Data Interval: 1428 UCT 28 January '79 to 1828 UCT 24 January '80

Instrumentation

<u>Intended Depth</u>	<u>RCM5 Serial No./Tape No.</u>
500 m	1531/10
1200 m	1540/15
2500 m	3481/6

Instrument 1531 recorded speed, direction, temperature, and pressure once per hour until the instrument was recovered. Large parts of the pressure record are suspicious due to small rapid oscillations of the bit count. Only the worst errors were corrected before filtering.

Instrument 1540 recorded speed, direction, temperature, and pressure once per hour until the instrument was recovered.

Instrument 3481 recorded speed, direction, temperature, and pressure once per hour until the instrument was recovered.

MS-6

814 m

	MEAN	S.D.	SKEW	KURT	MIN	MAX	N
S	13.60	6.23	0.28	2.61	0.80	34.30	8667
U	7.86	6.68	0.26	3.29	-21.70	31.00	8667
V	7.64	7.69	-0.27	2.66	-18.00	29.50	8667
T	2.26	0.13	-0.26	2.41	1.93	2.56	8667
P	818.45	22.77	2.23	8.58	799.60	965.20	8667

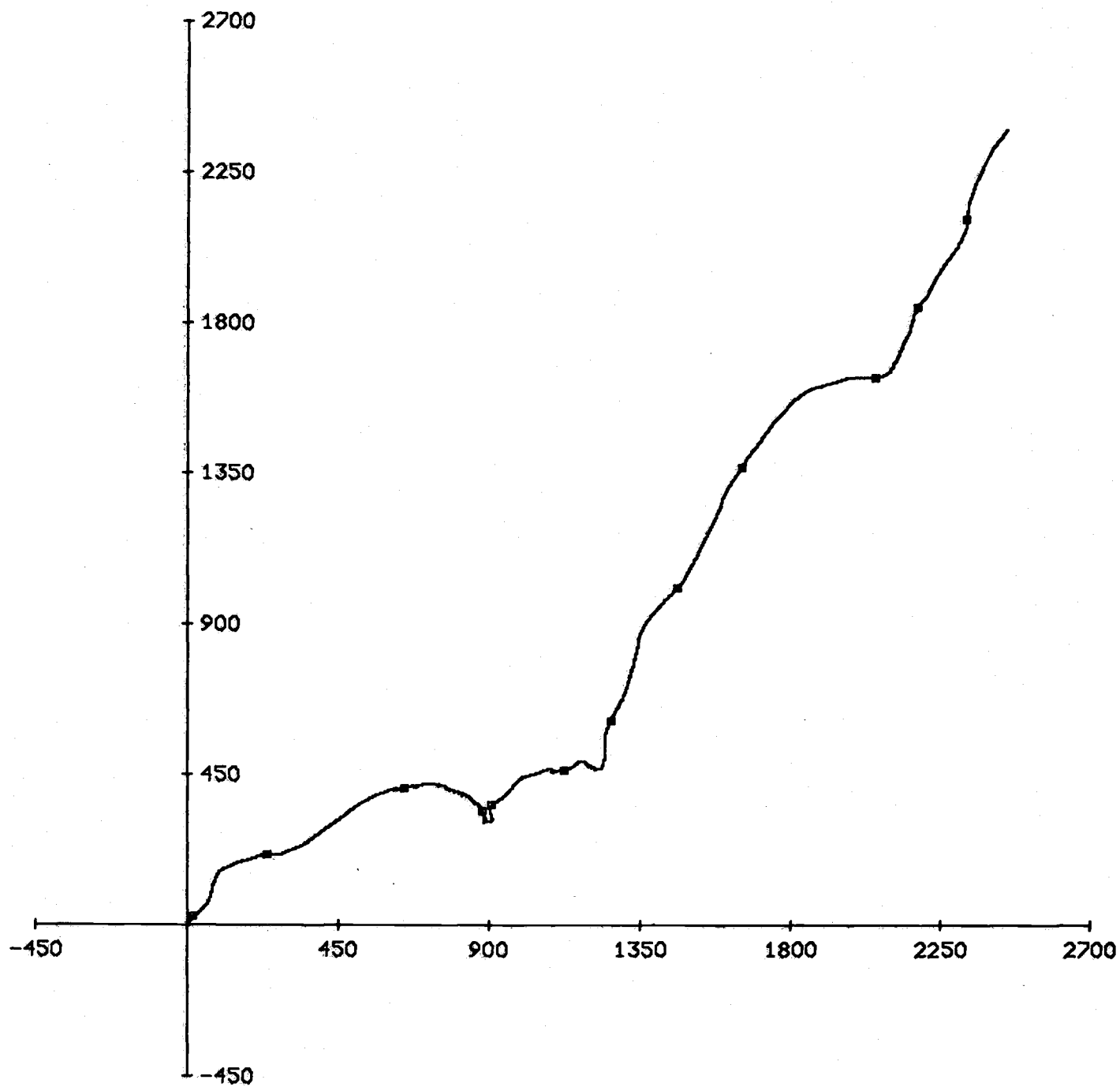
1409 m

S	9.38	4.47	0.54	3.21	0.80	30.10	8669
U	4.85	5.33	0.18	3.29	-18.50	25.80	8669
V	4.72	5.81	-0.25	3.24	-17.90	29.90	8669
T	1.91	0.16	-0.50	2.34	1.47	2.19	8669
P	1416.21	18.49	2.11	7.97	1397.80	1531.90	8669

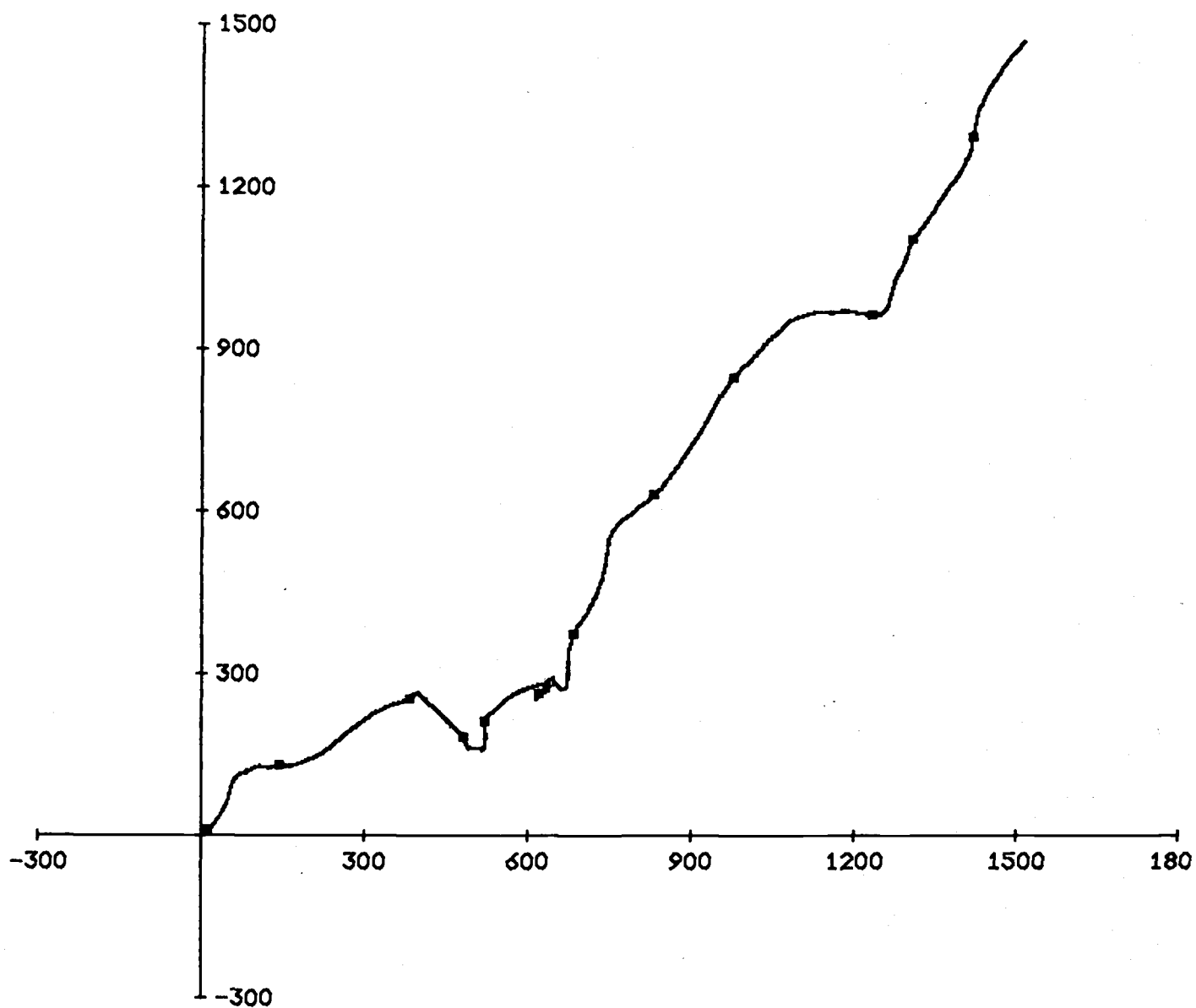
2709 m

S	6.30	3.41	0.53	3.11	0.80	21.20	8666
U	1.49	3.96	-0.09	3.12	-12.50	17.90	8666
V	3.08	4.89	-0.20	3.05	-17.60	19.40	8666
T	0.99	0.16	0.03	2.23	0.67	1.38	8666

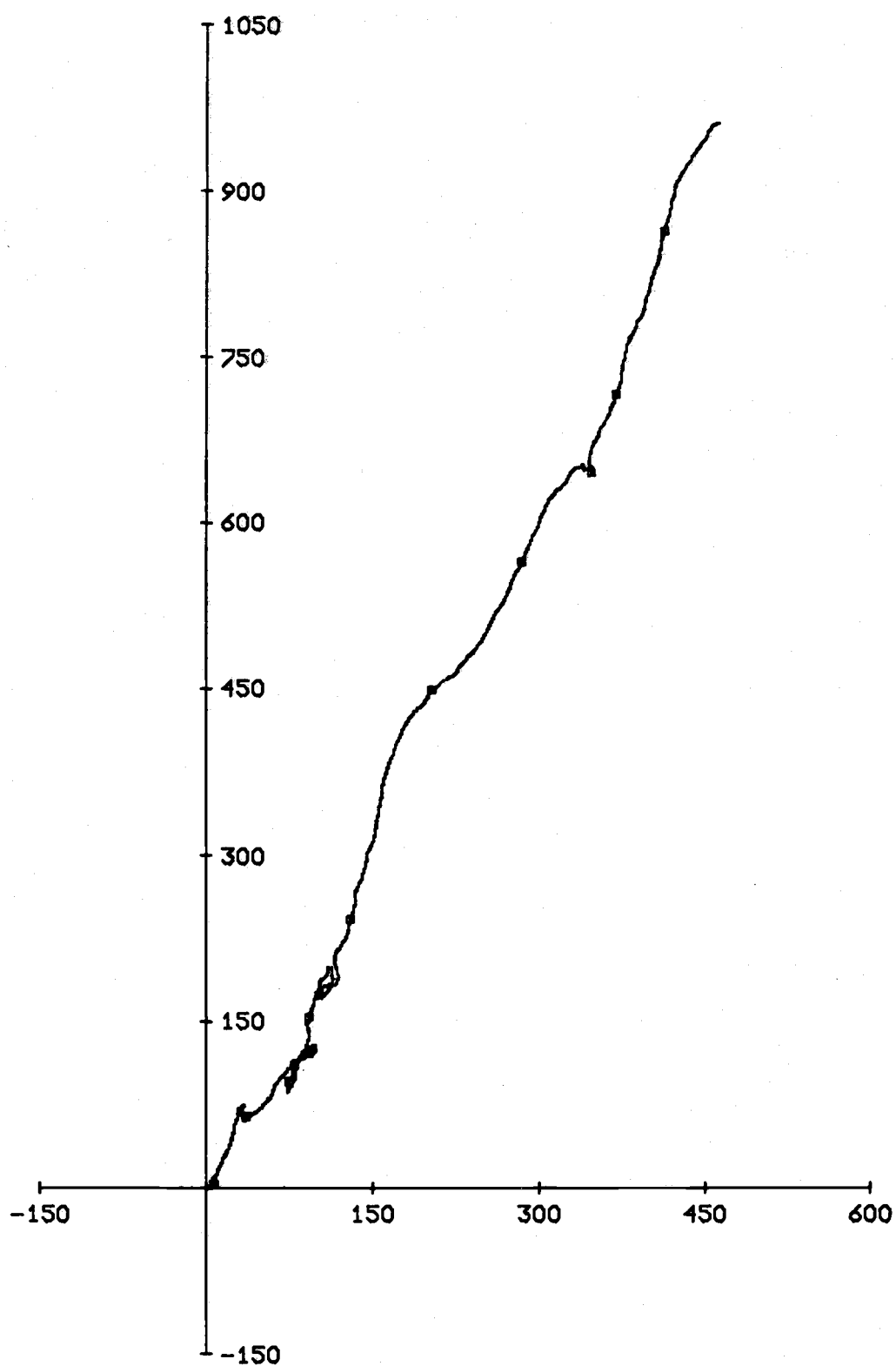
Speed, u, and v are given in cm/sec; temperature in degrees centigrade; pressure in decibars; and conductivity in mmhr/cm.



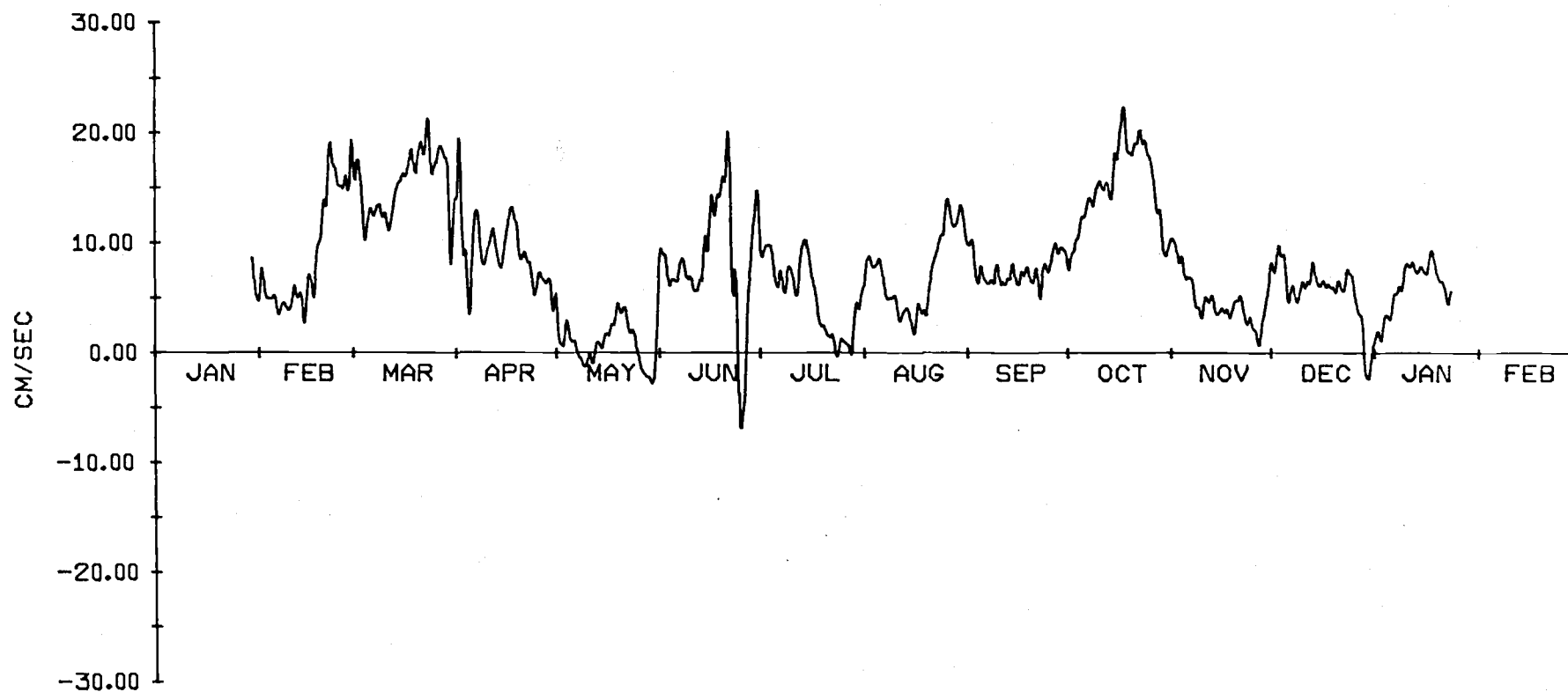
814 M AT STN MS-6. 361.1 DAYS STARTING 1514 28 JAN 79.



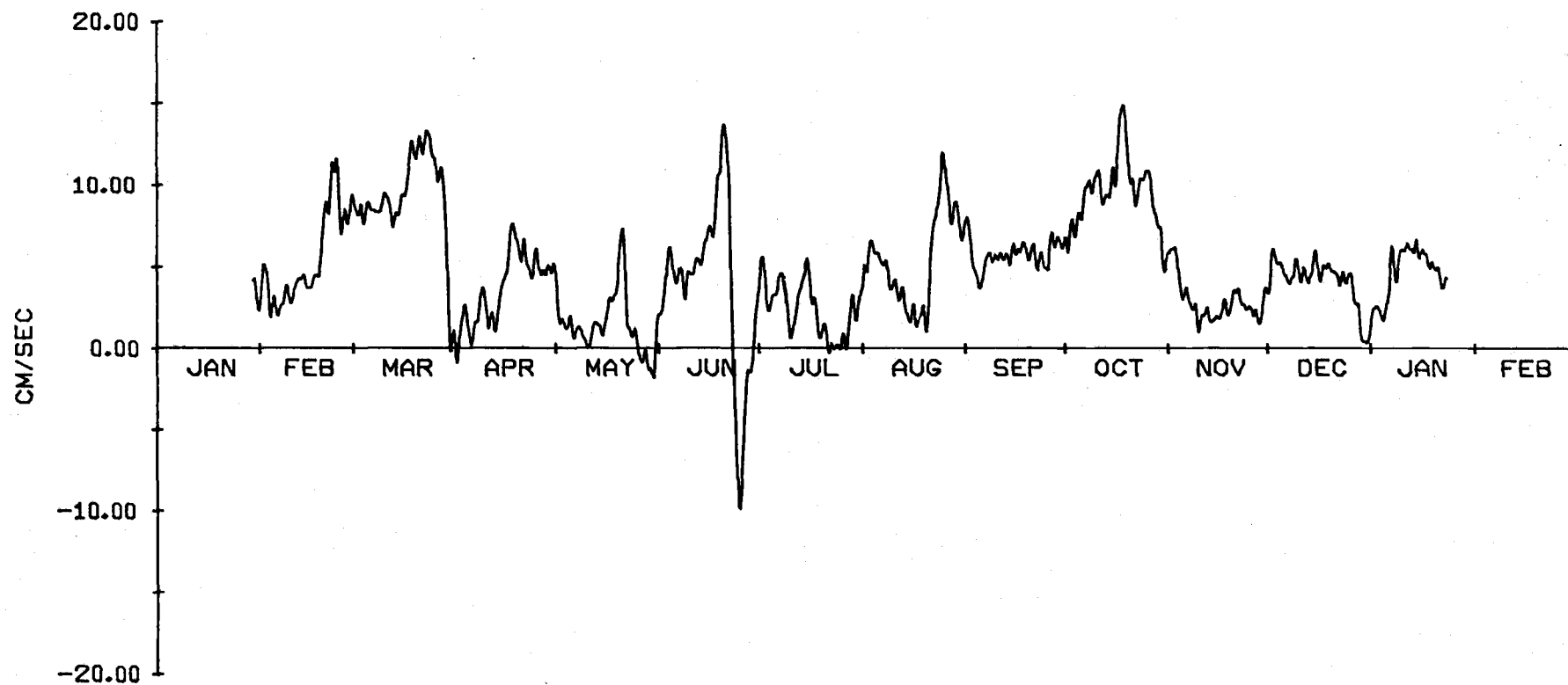
1409 M AT STN MS-6. 361.2 DAYS STARTING 1428 28 JAN 79.



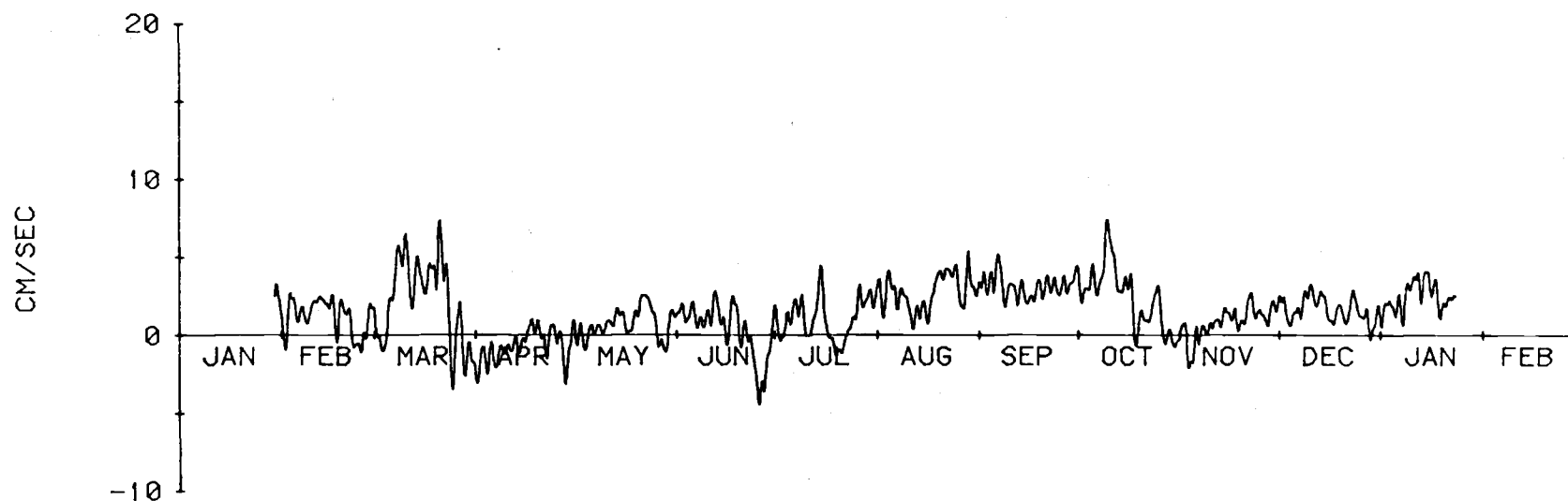
2709 M AT STN MS-6. 361.0 DAYS STARTING 1432 28 JAN 79.



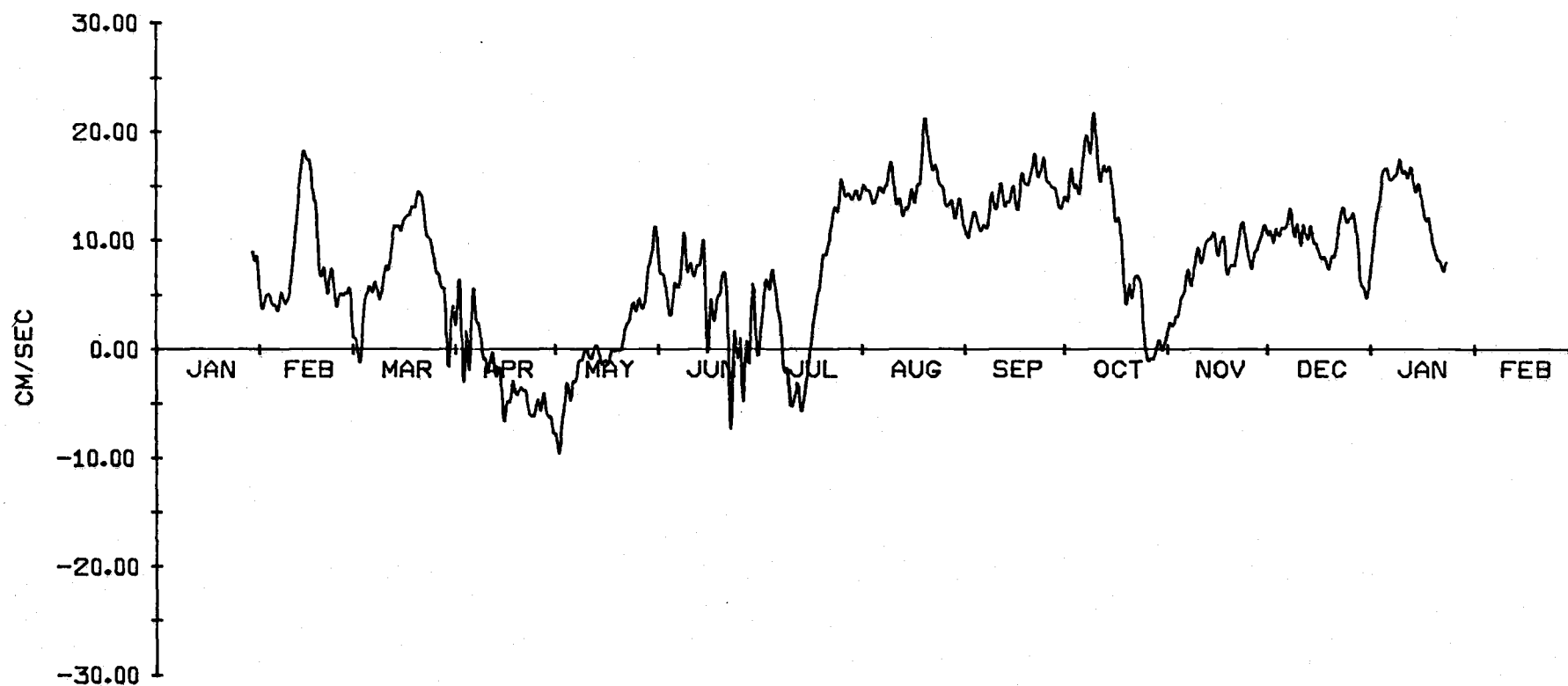
814 METERS AT MS-6.
LLP FILTERED U COMPONENT



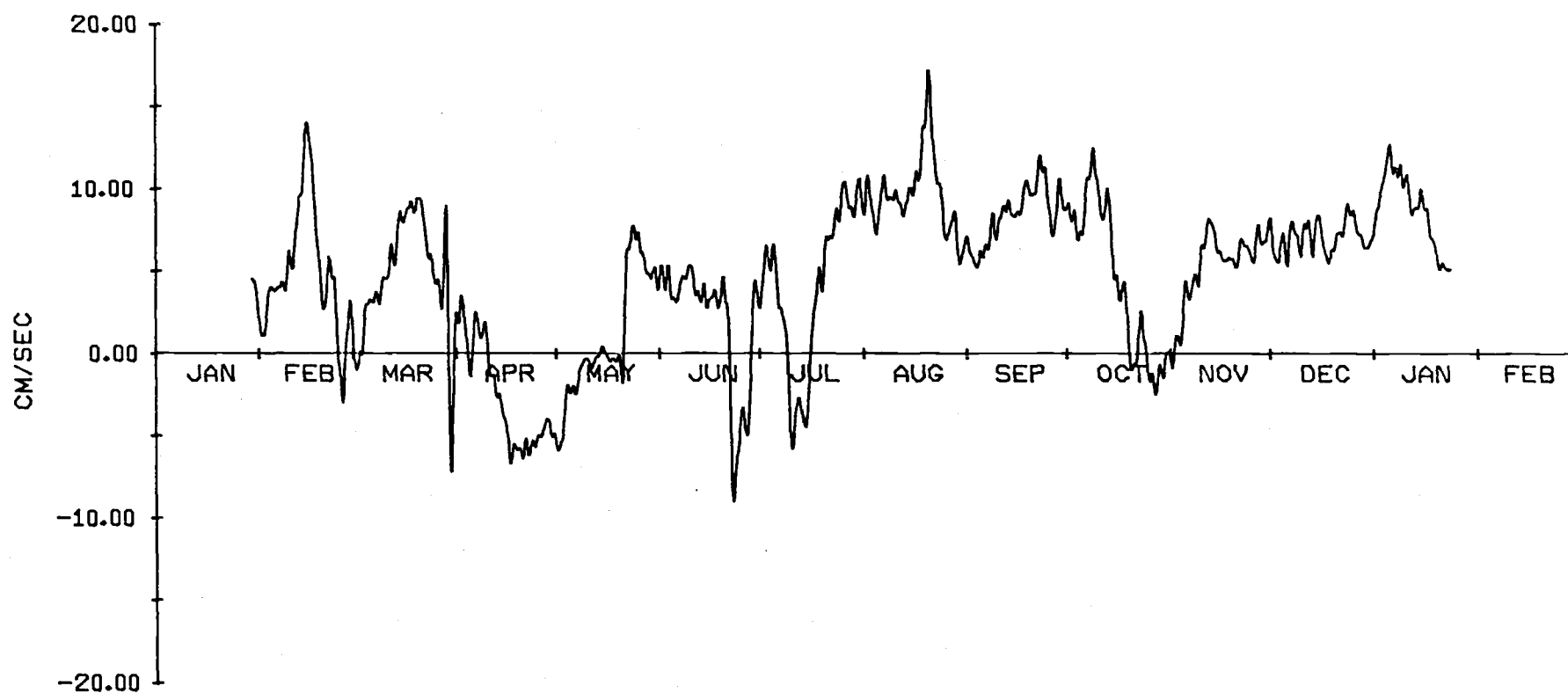
1409 METERS AT MS-6.
LLP FILTERED U COMPONENT



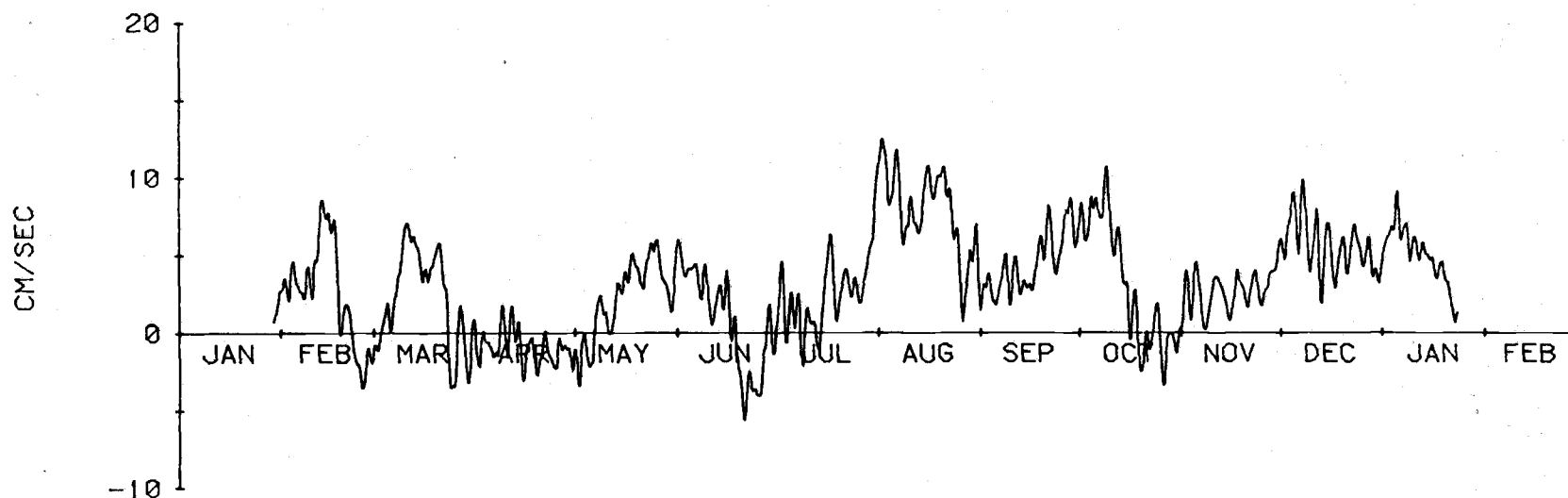
2709 METERS AT MS-6
LLP FILTERED U COMPONENT



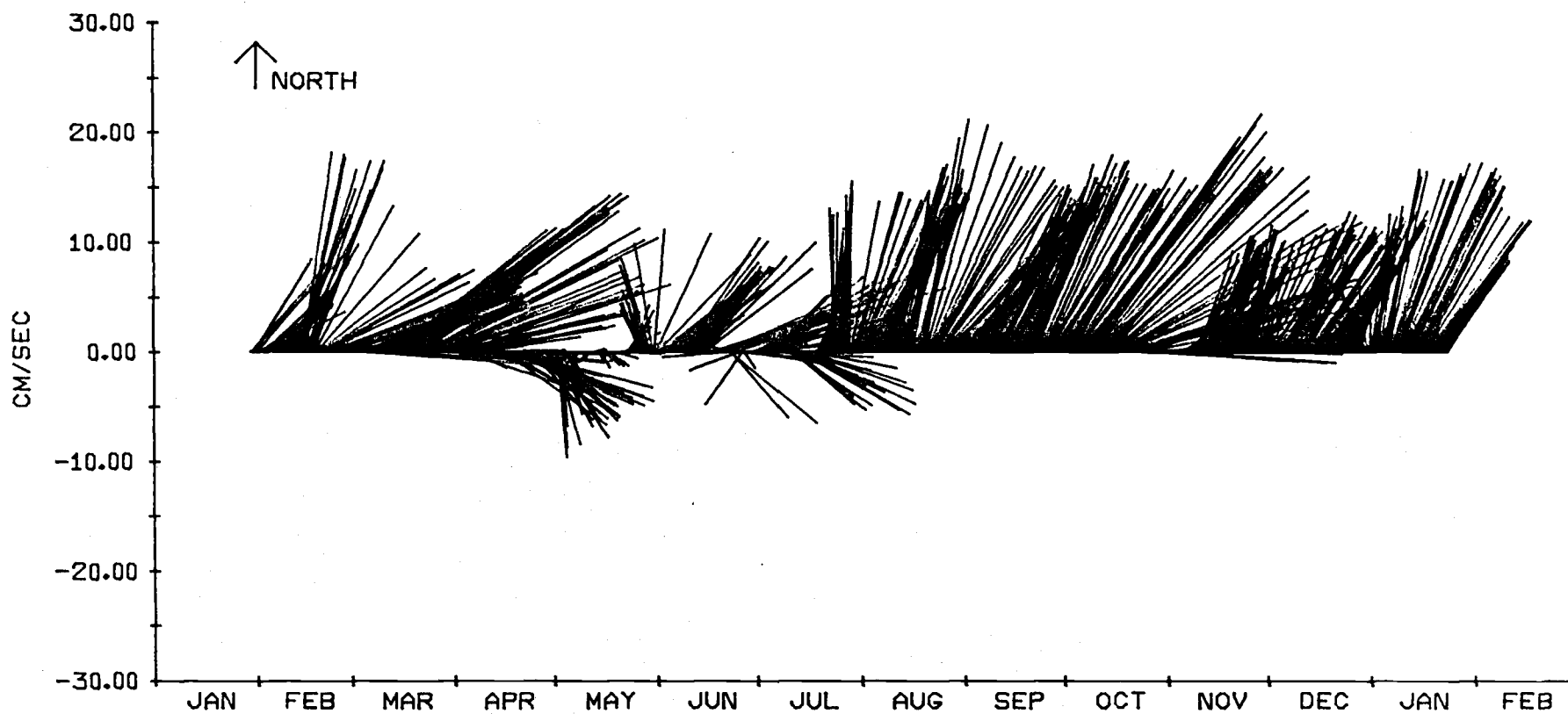
814 METERS AT MS-6.
LLP FILTERED V COMPONENT



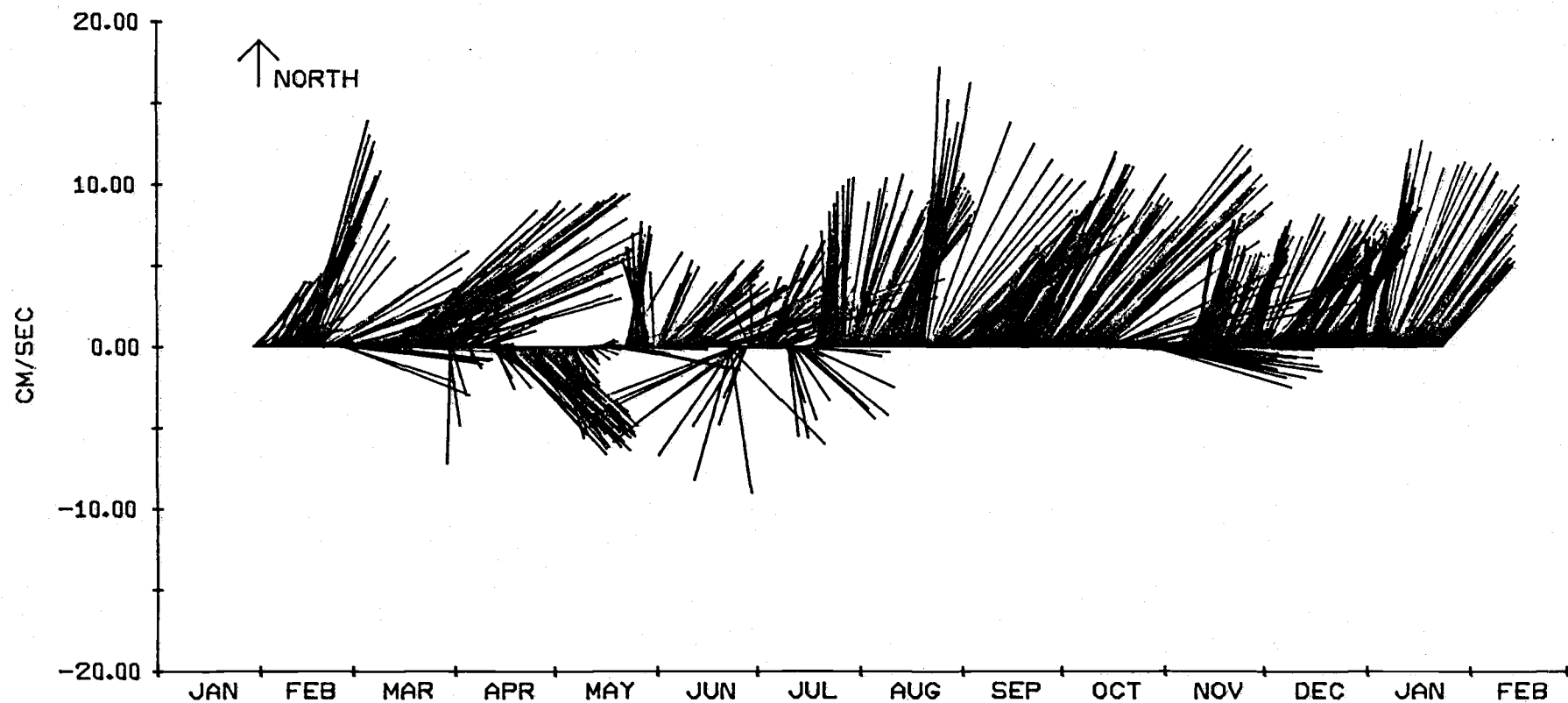
1409 METERS AT MS-6.
LLP FILTERED V COMPONENT



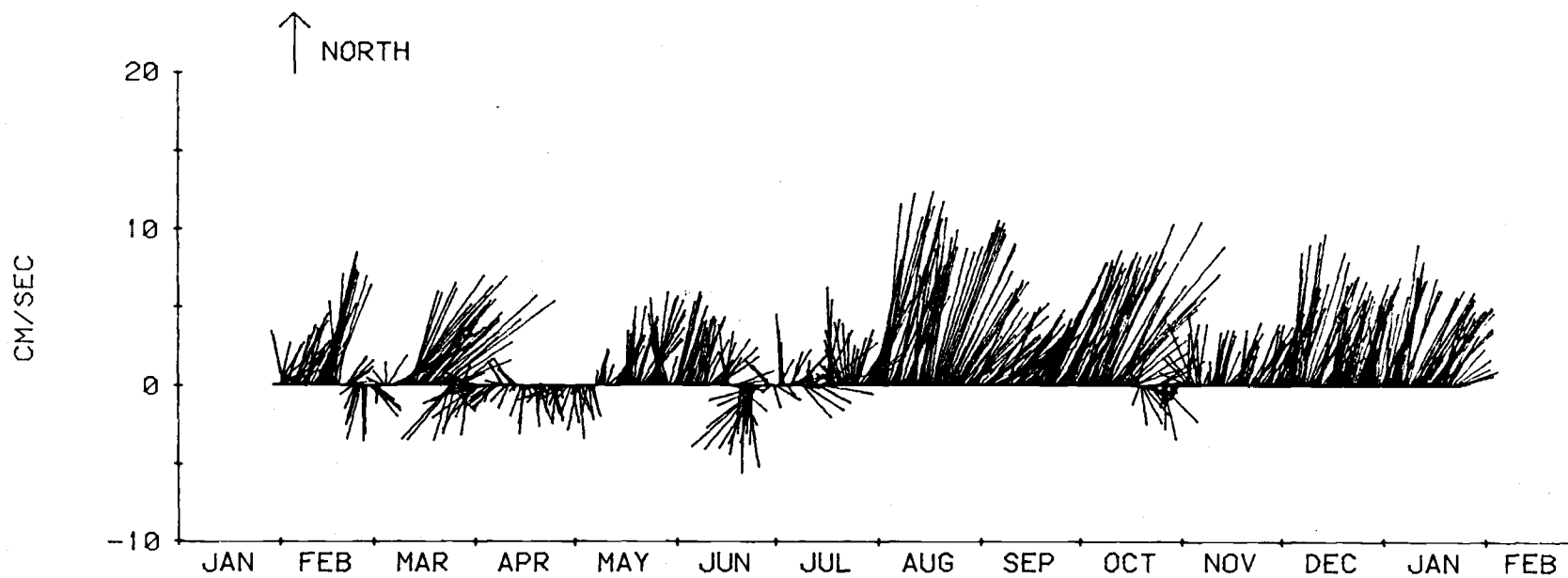
2709 METERS AT MS-6
LLP FILTERED V COMPONENT



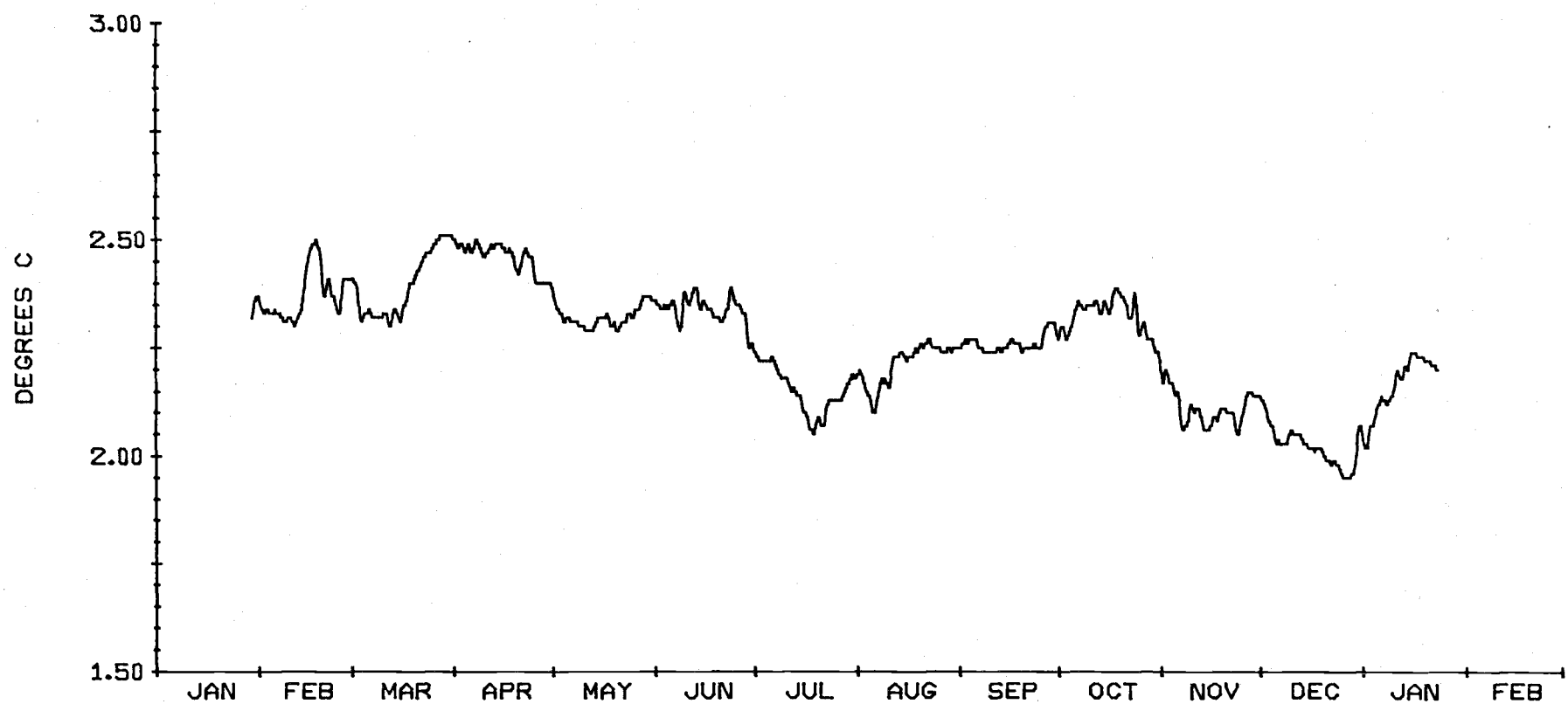
814 METERS AT MS-6.
LLP FILTERED CURRENT



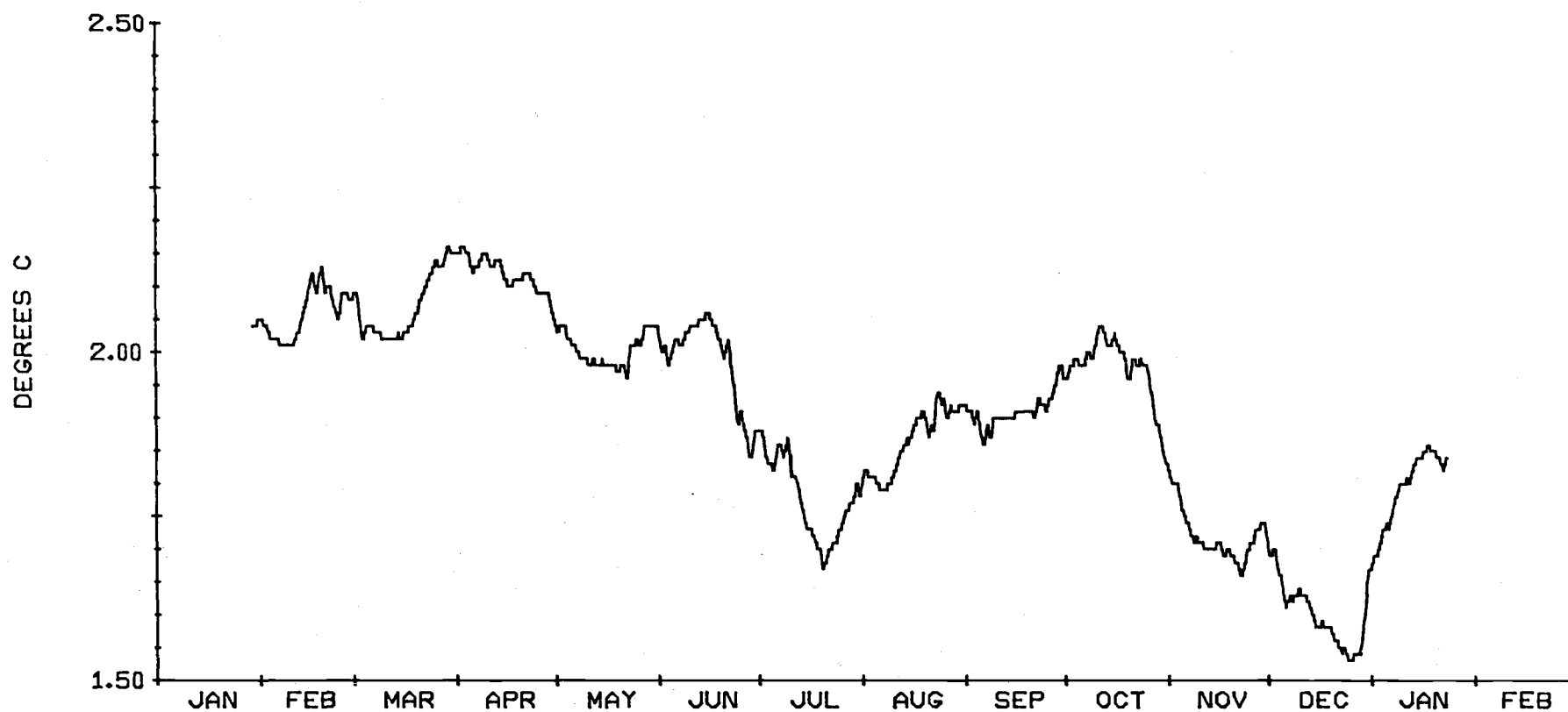
1409 METERS AT MS-6.
LLP FILTERED CURRENT



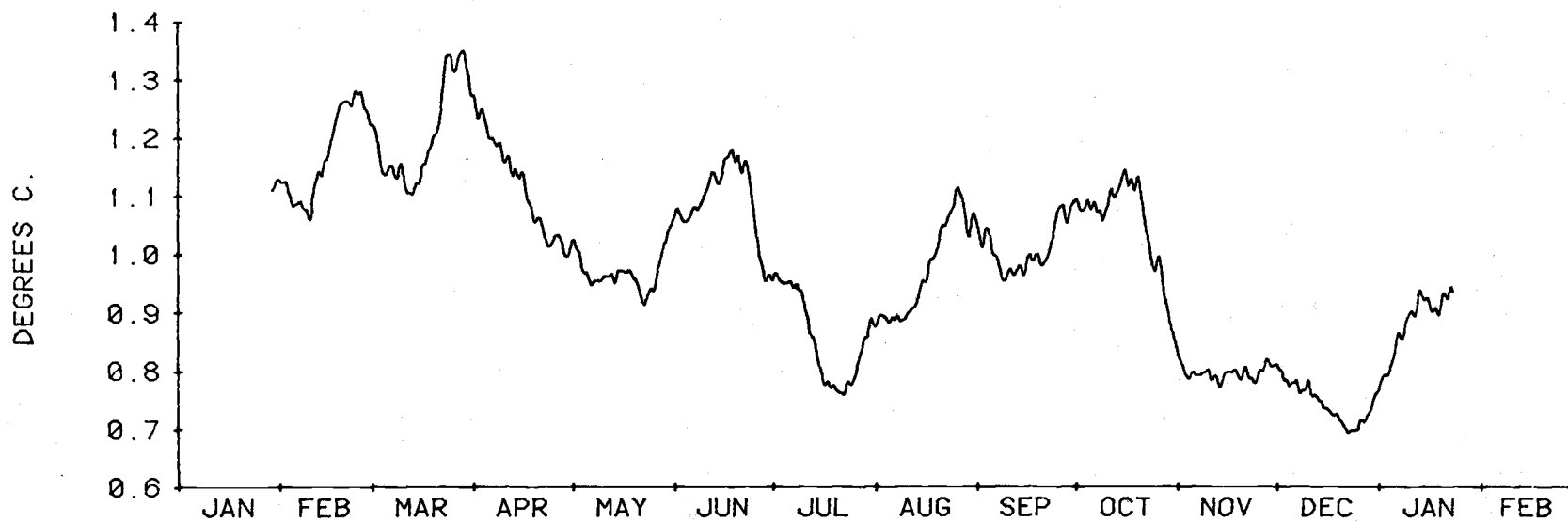
2709 METERS AT MS-6
LLP FILTERED CURRENT



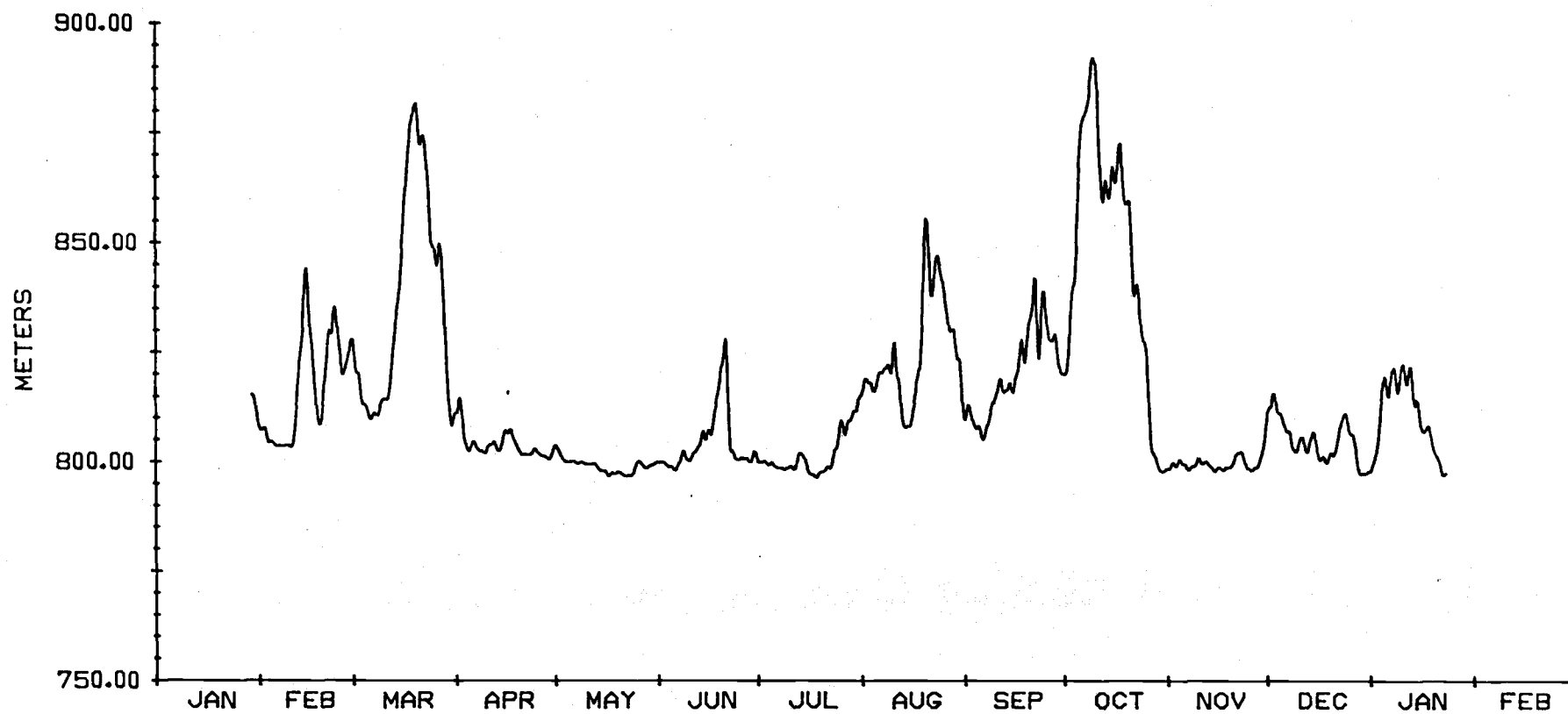
814 METERS AT MS-6.
LLP FILTERED TEMPERATURE



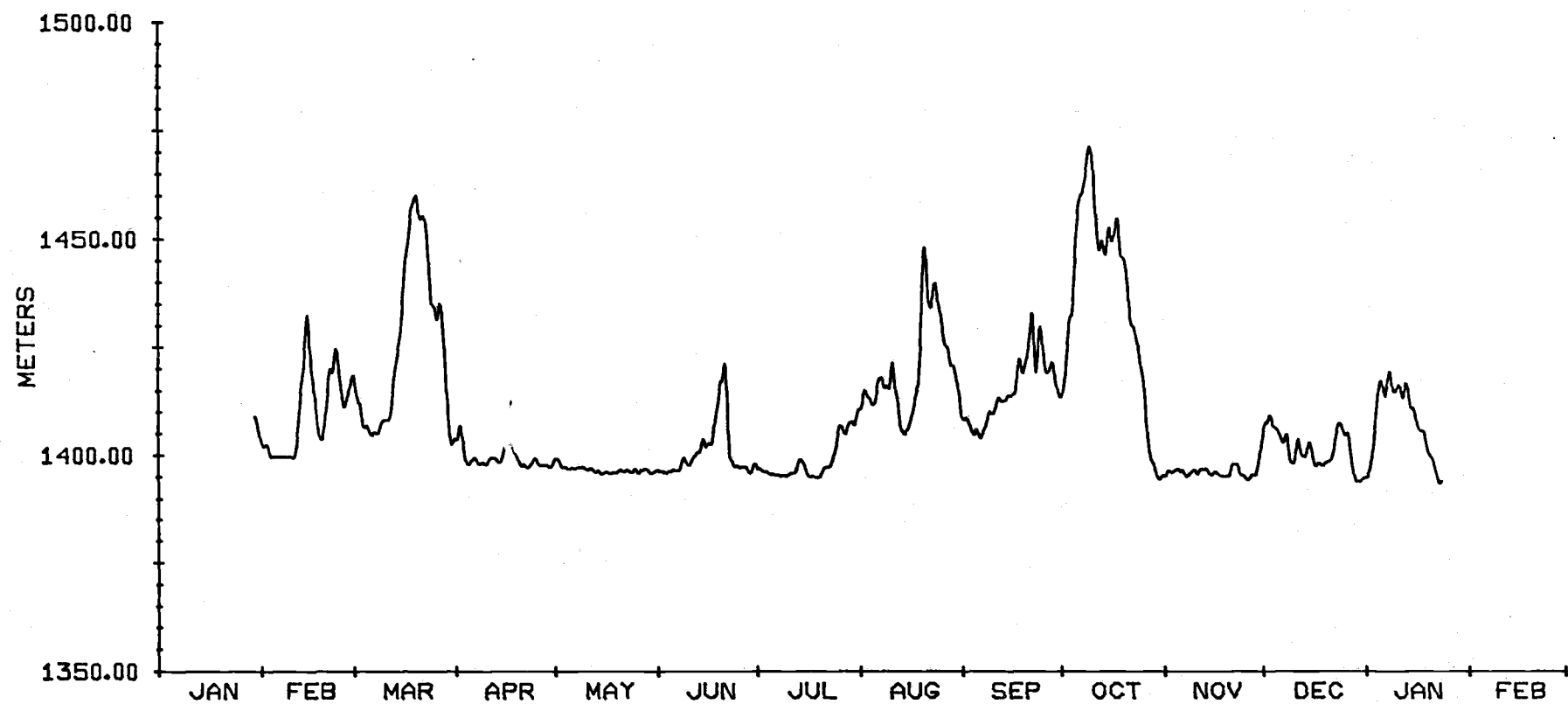
1409 METERS AT MS-6.
LLP FILTERED TEMPERATURE



2709 METERS AT MS-6
LLP FILTERED TEMPERATURE



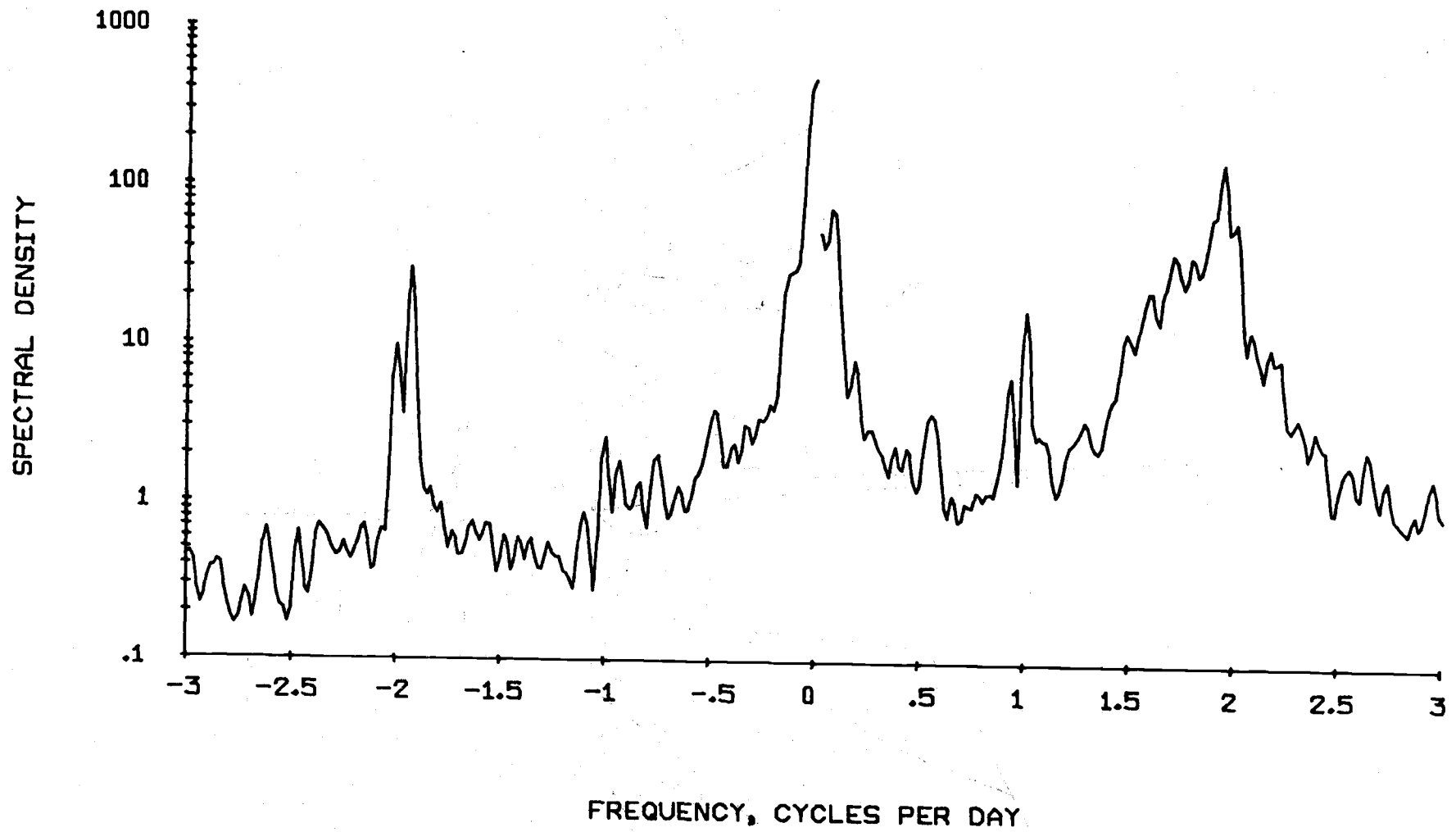
814 METERS AT MS-6.
LLP FILTERED PRESSURE



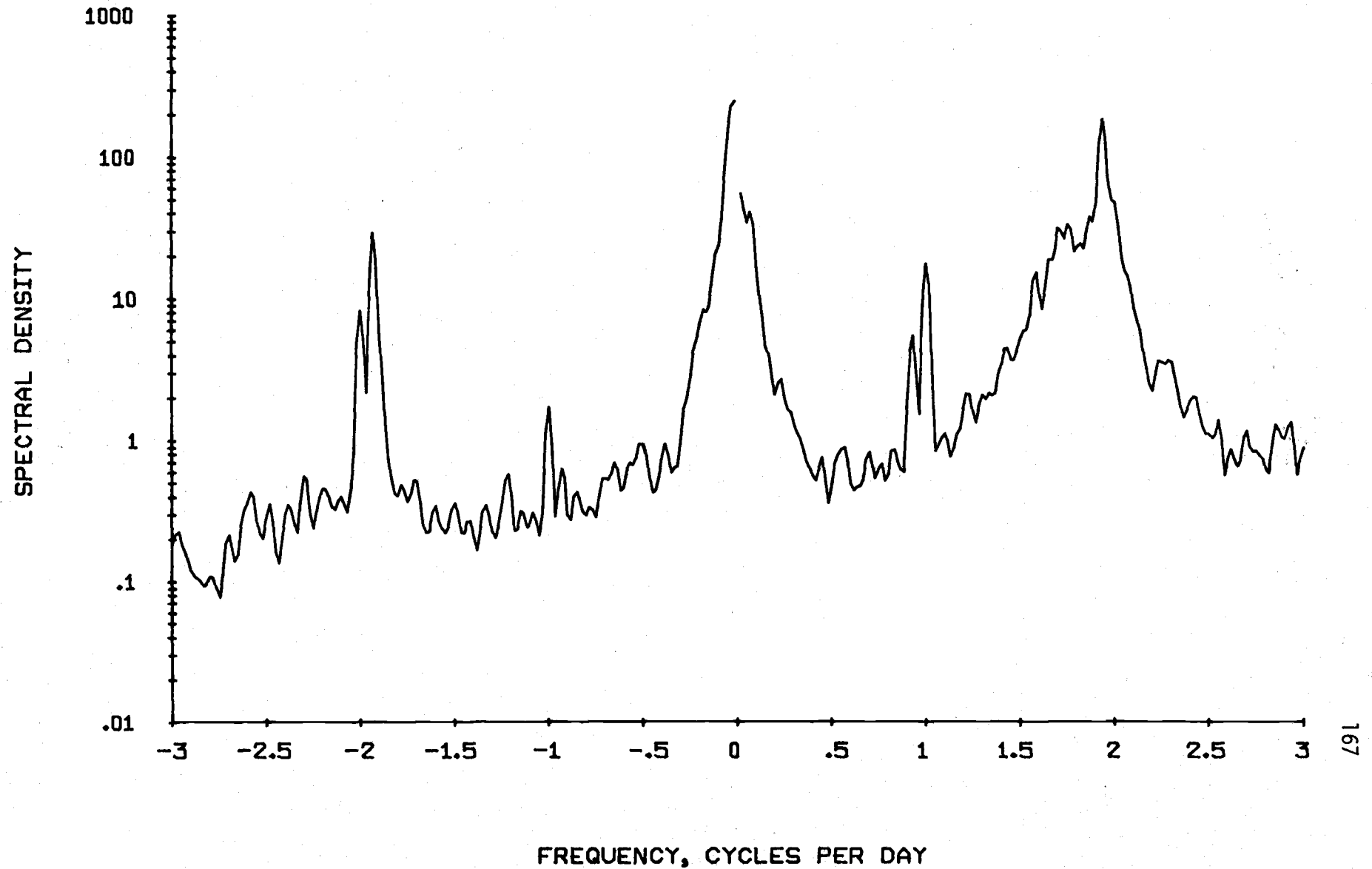
1409 METERS AT MS-6.
LLP FILTERED PRESSURE

UNFILTERED CURRENT. 814 METERS AT MS-6.

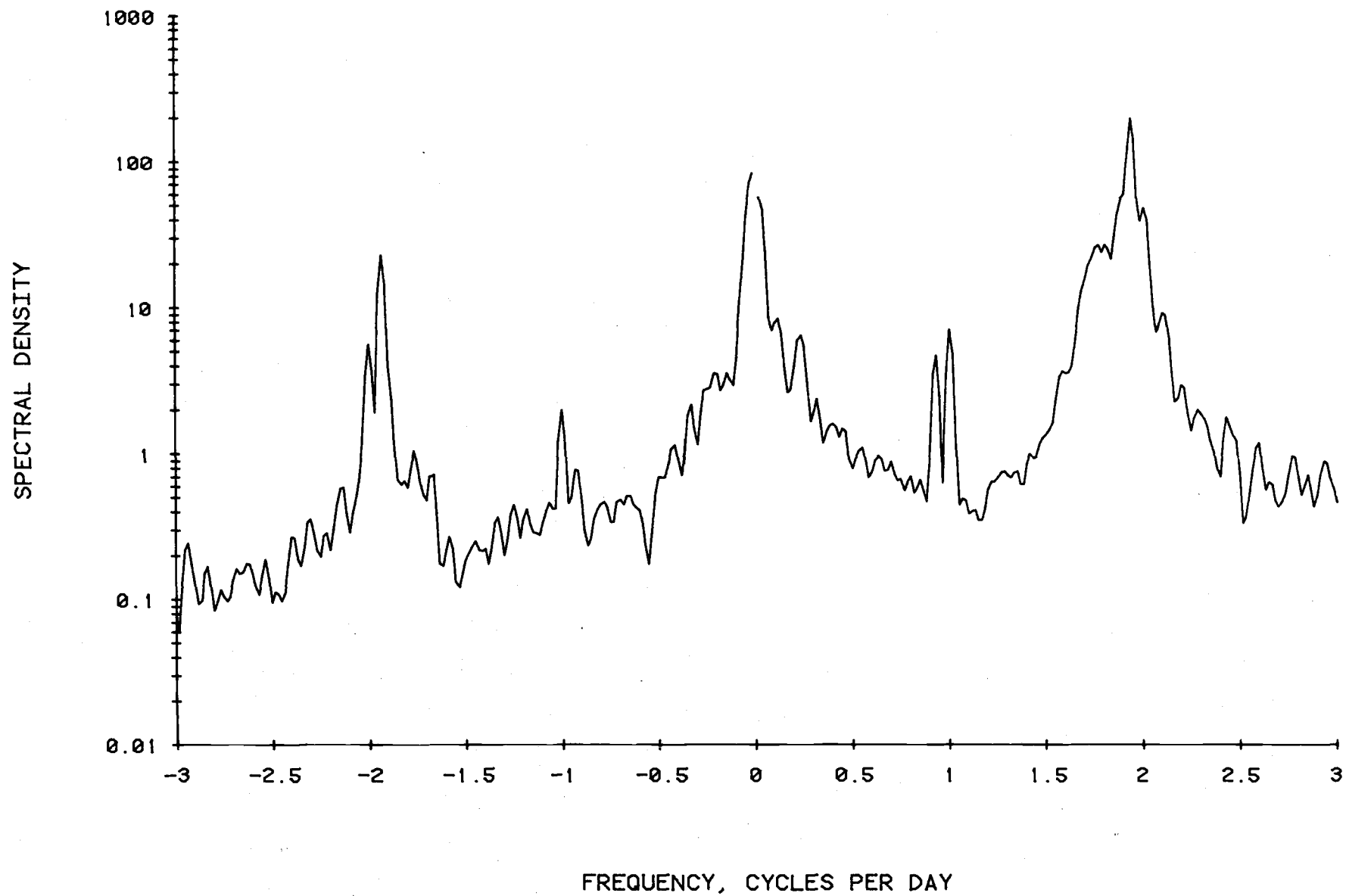
166



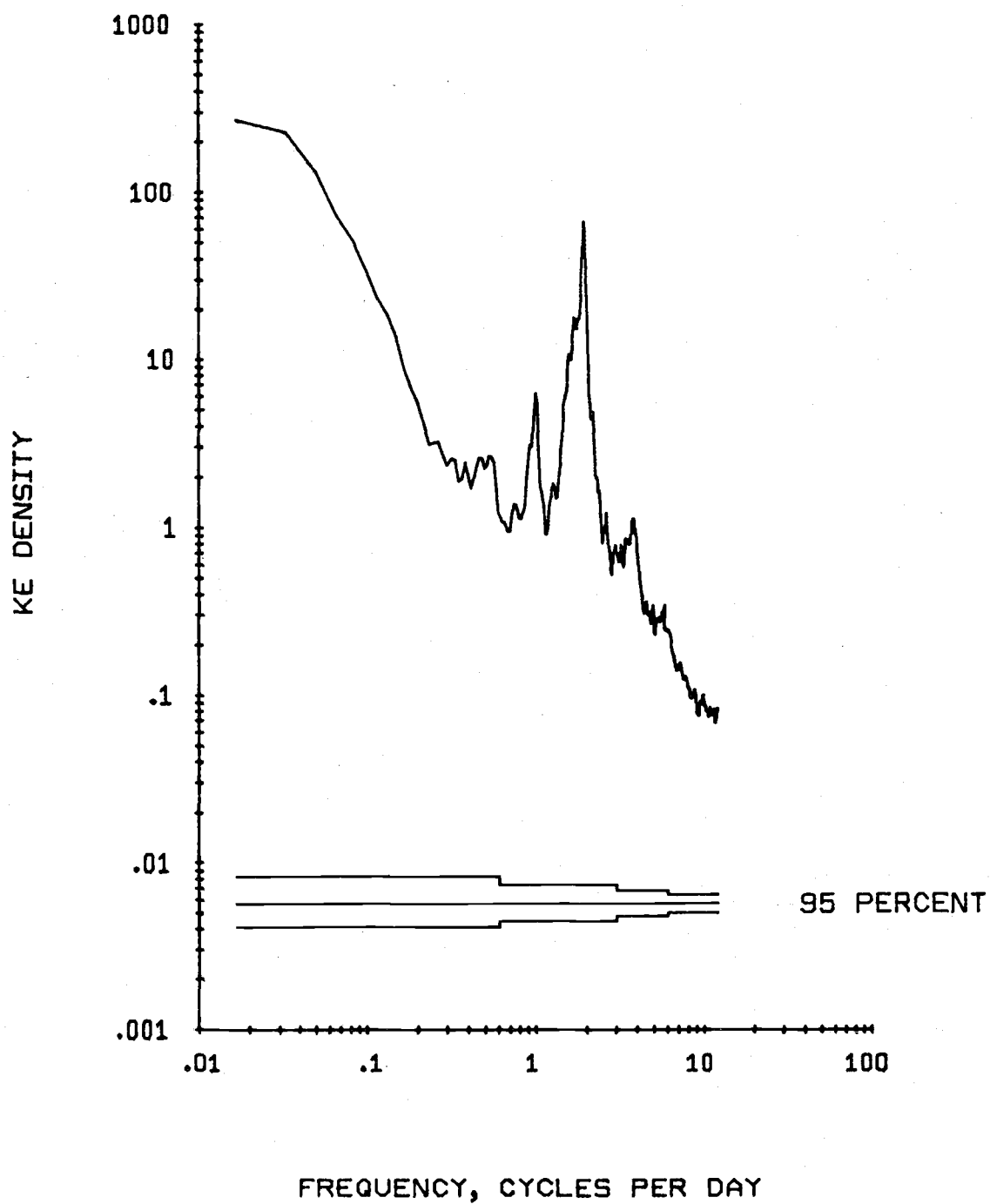
UNFILTERED CURRENT. 1409 METERS AT MS-6.



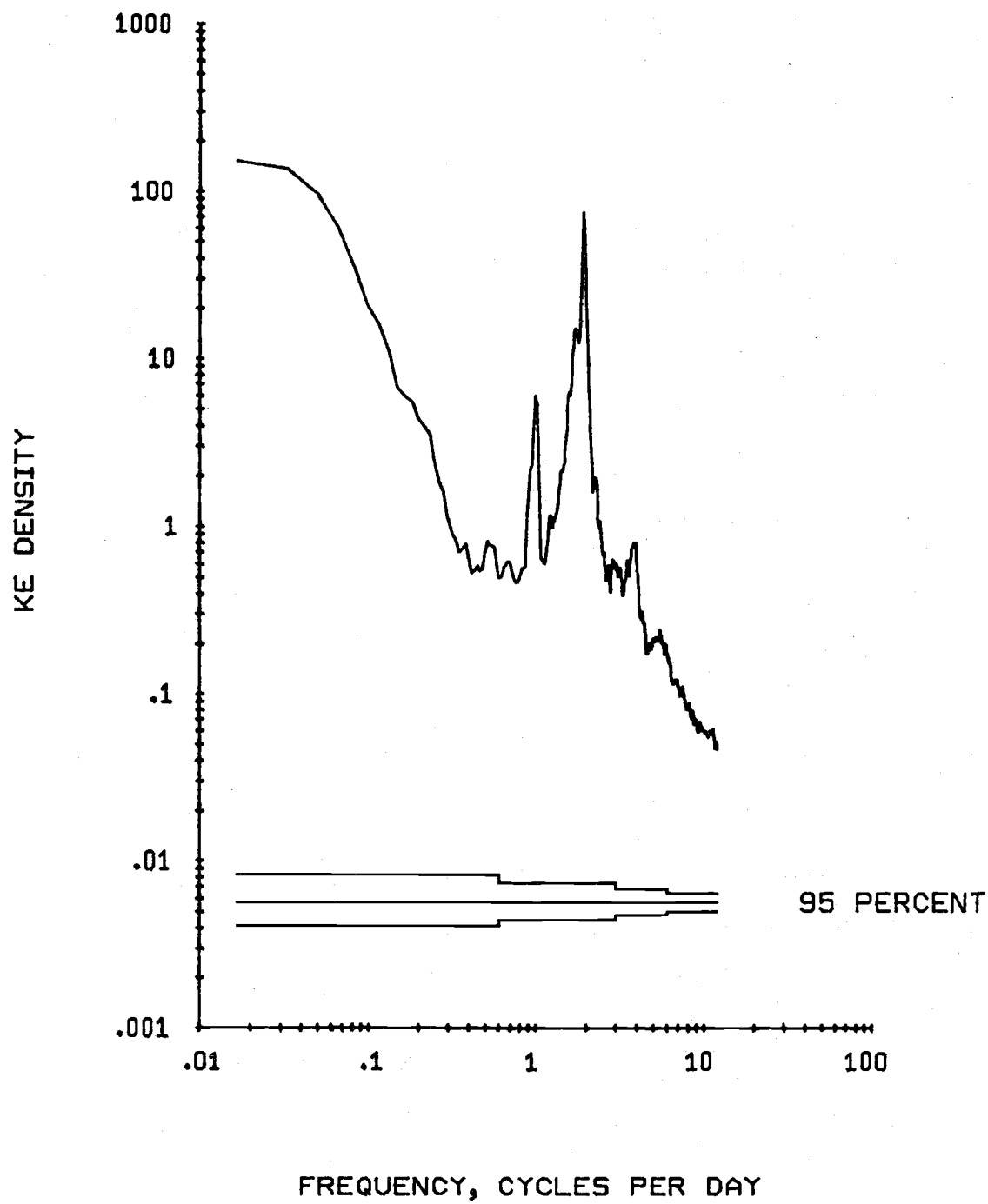
UNFILTERED CURRENT. 2709 METERS AT MS-6



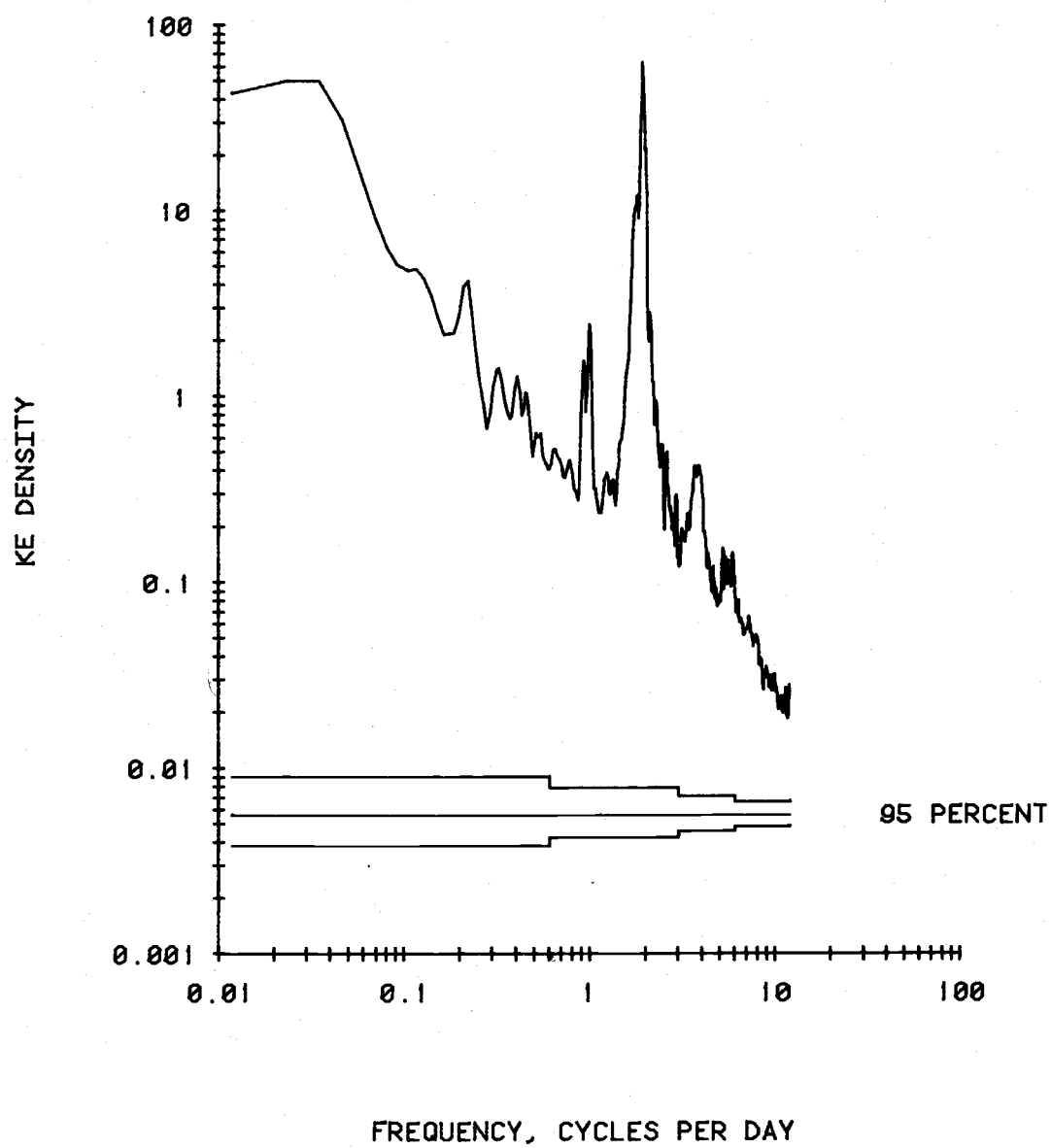
UNFILTERED CURRENT. 814 METERS AT MS-6.



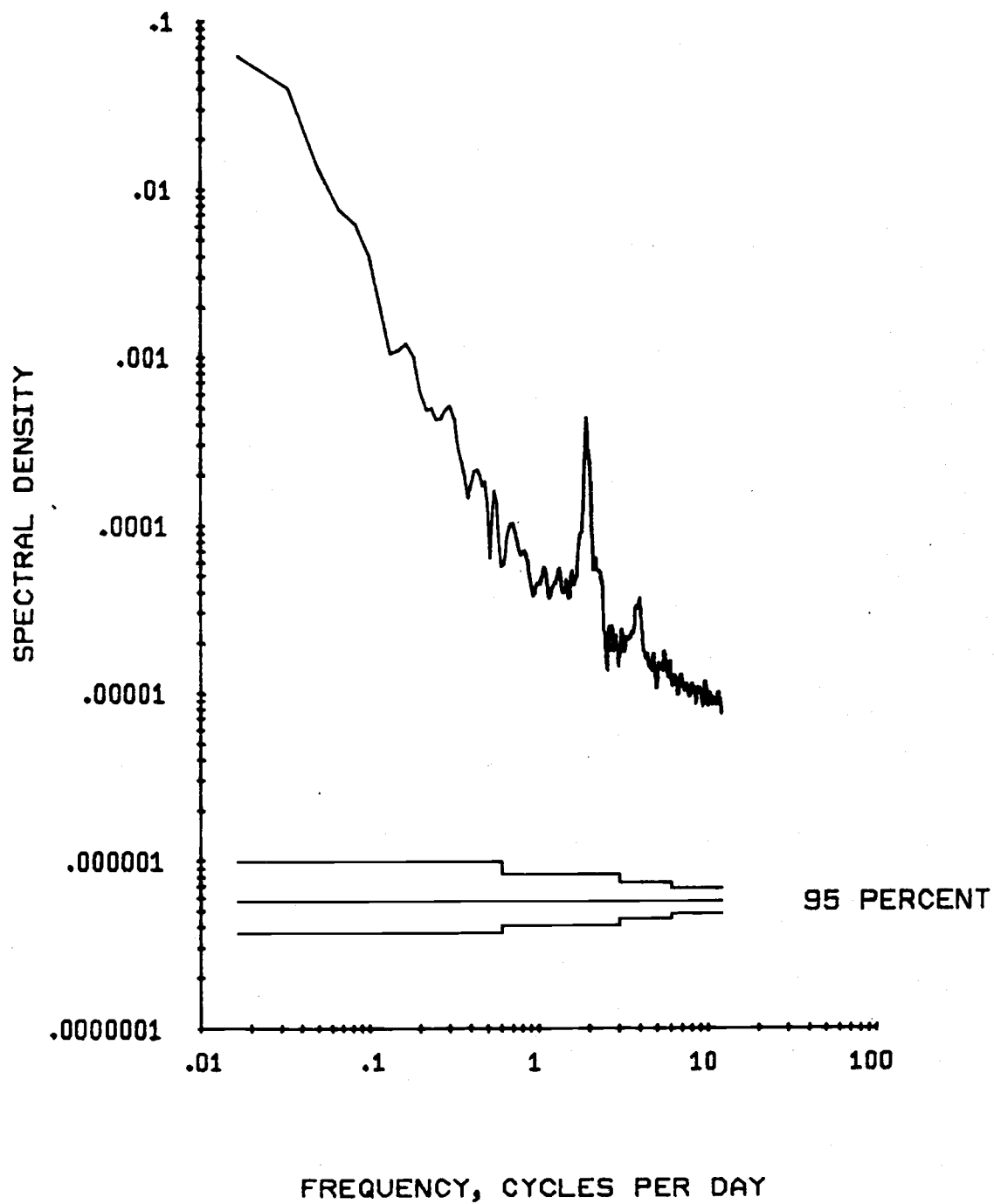
UNFILTERED CURRENT. 1409 METERS AT MS-6.



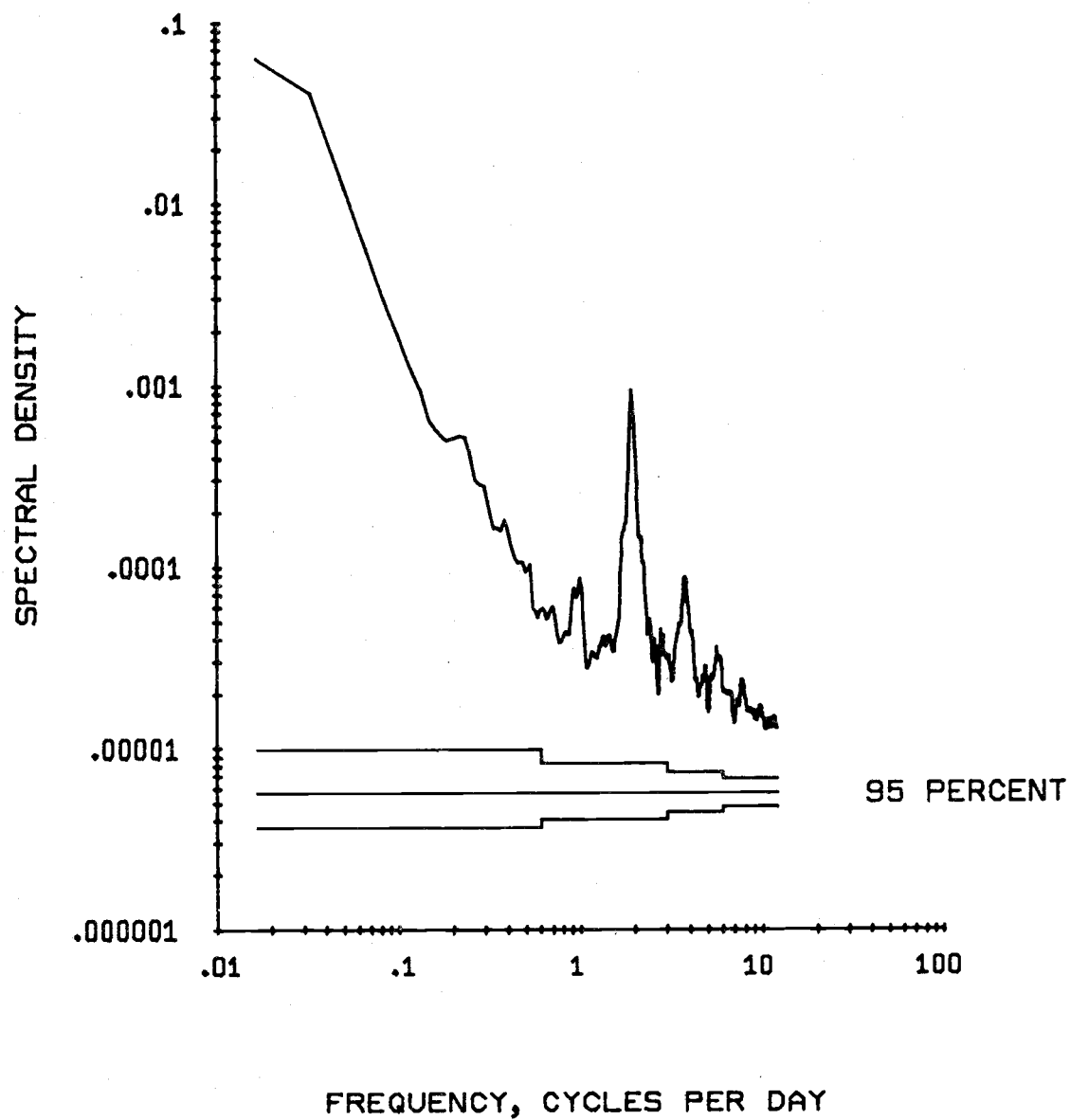
UNFILTERED CURRENT. 2709 METERS AT MS-6



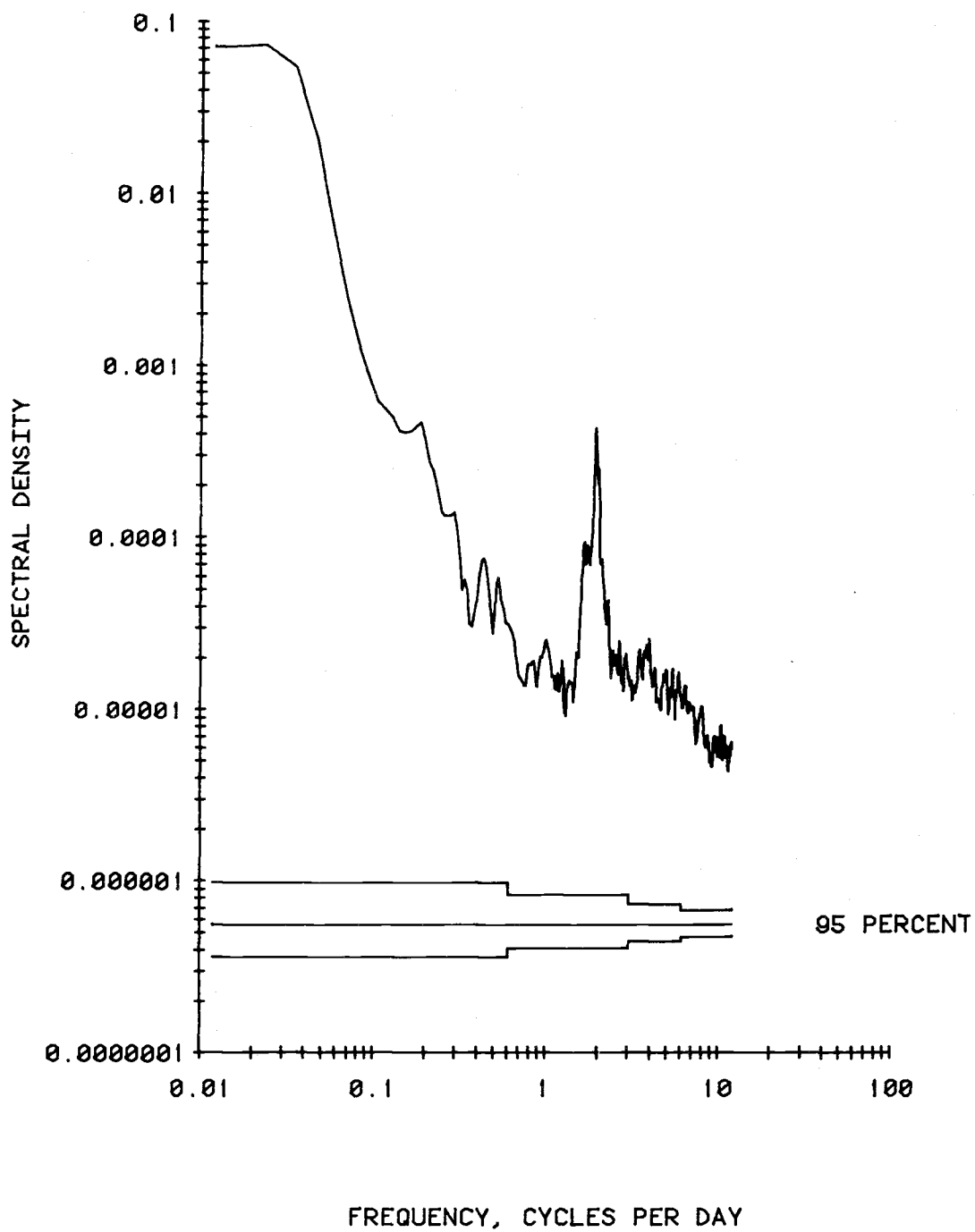
UNFILTERED TEMPERATURE. 814 METERS AT MS-6.



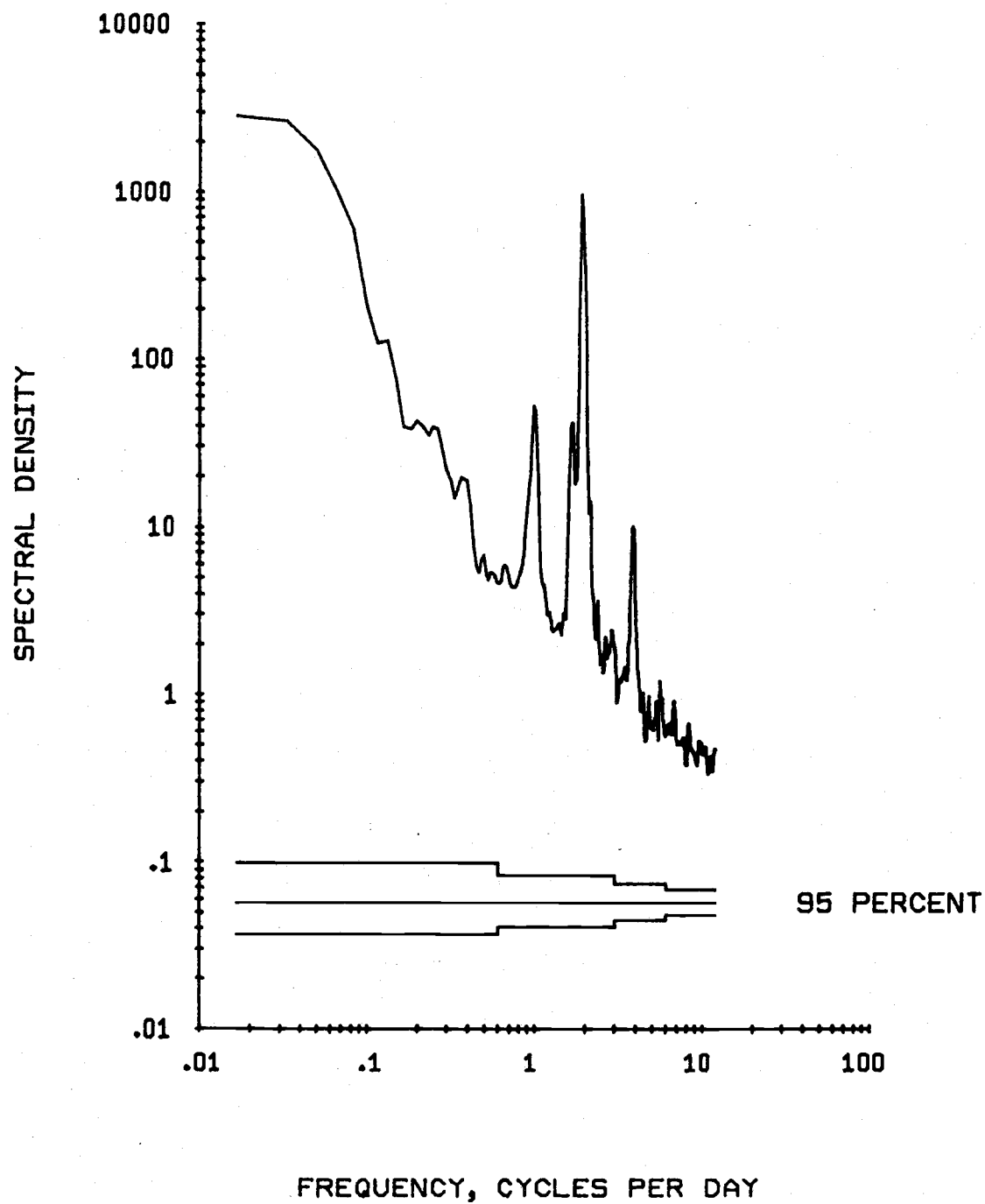
UNFILTERED TEMPERATURE. 1409 METERS AT MS-6.



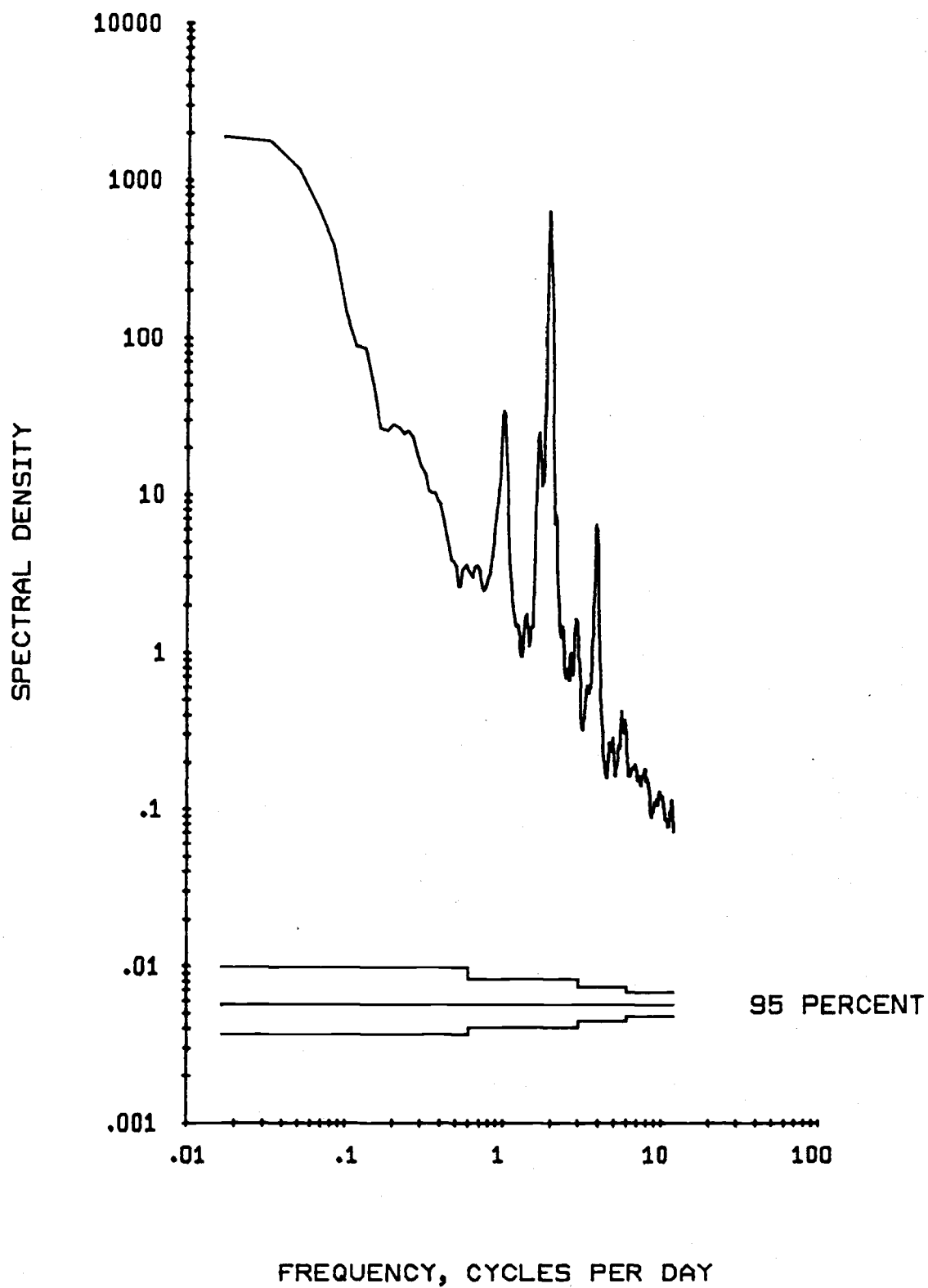
UNFILTERED TEMPERATURE. 2709 METERS AT MS-6



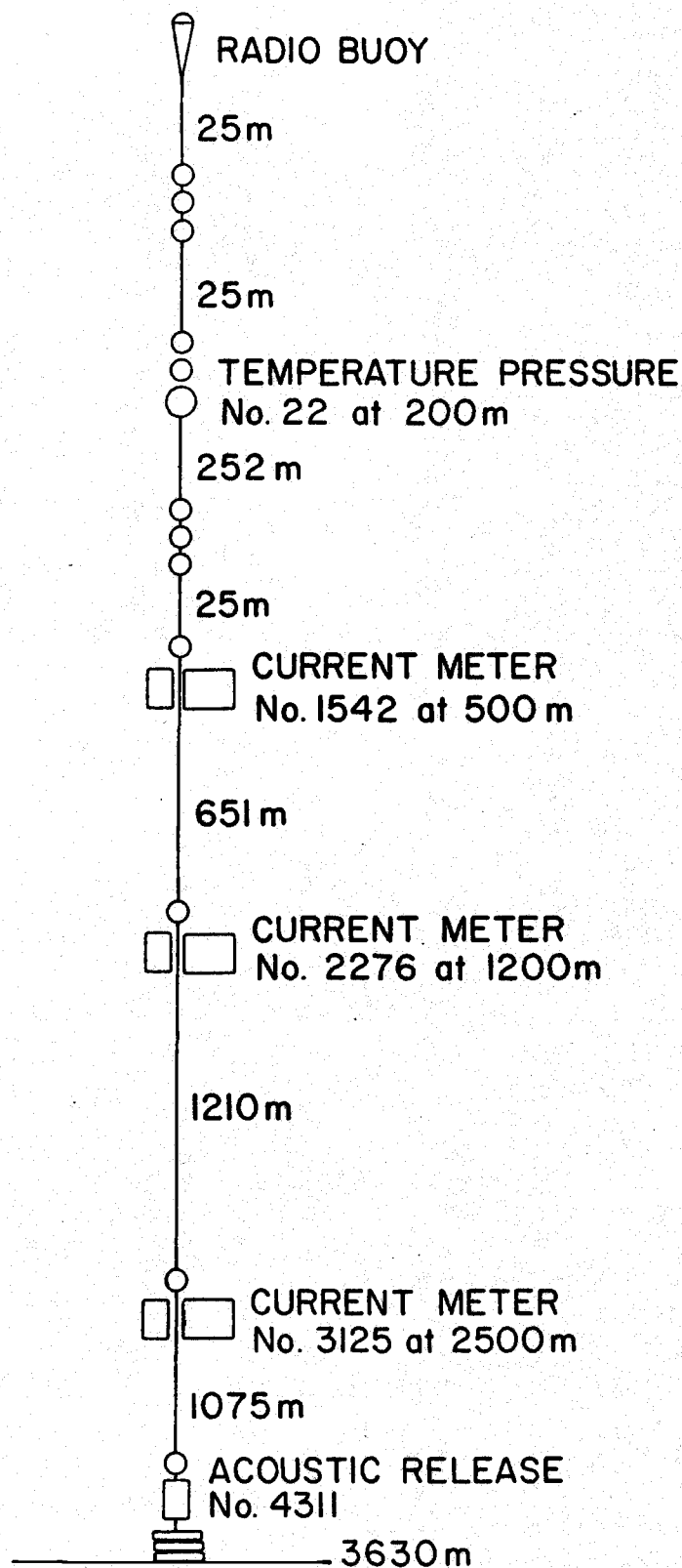
UNFILTERED PRESSURE. 814 M AT MS-6.



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MS - 7



MAPPING / STATISTICS (MS) 7

59° 38.8' S
64° 40.5' W

INSTALLED: 28 JANUARY 1979

MS-7

Position: 59°38.8'S, 64°40.5'W
Depth of Water: 3630 m
Set at 1740 UCT 28 January '79 by R/V MELVILLE
Retrieved at 0722 UCT 24 January '80 by R/V ATLANTIS II
Data Interval: 1937 UCT 28 January '79 to 1004 UCT 24 January '80

Instrumentation

<u>Intended Depth</u>	<u>RCM5 Serial No./Tape No.</u>
500 m	1542/11
1200 m	2276/11
2500 m	3125/13

Instrument 1542 recorded speed, direction, temperature, and pressure once per hour until the instrument was recovered.

Instrument 2276 recorded speed, direction, temperature, pressure and conductivity once per hour until the instrument was recovered. A portion of the speed record (1104 UCT 16 APR to 0704 UCT 25 APR '79) was bridged due to instrument malfunction.

Instrument 3125 recorded speed, direction, and temperature once per hour until 2337 UCT 5 November '79.

MS-7

540 m

	MEAN	S.D.	SKEW	KURT	MIN	MAX	N
S	14.43	7.42	0.42	2.35	0.80	38.90	8653
U	7.59	8.51	0.25	2.73	-21.60	35.80	8563
V	9.48	6.58	0.08	3.01	-12.70	31.90	8653
T	2.12	0.12	0.88	2.80	1.81	2.45	8653
P	543.09	38.08	1.64	5.40	511.00	738.90	8653

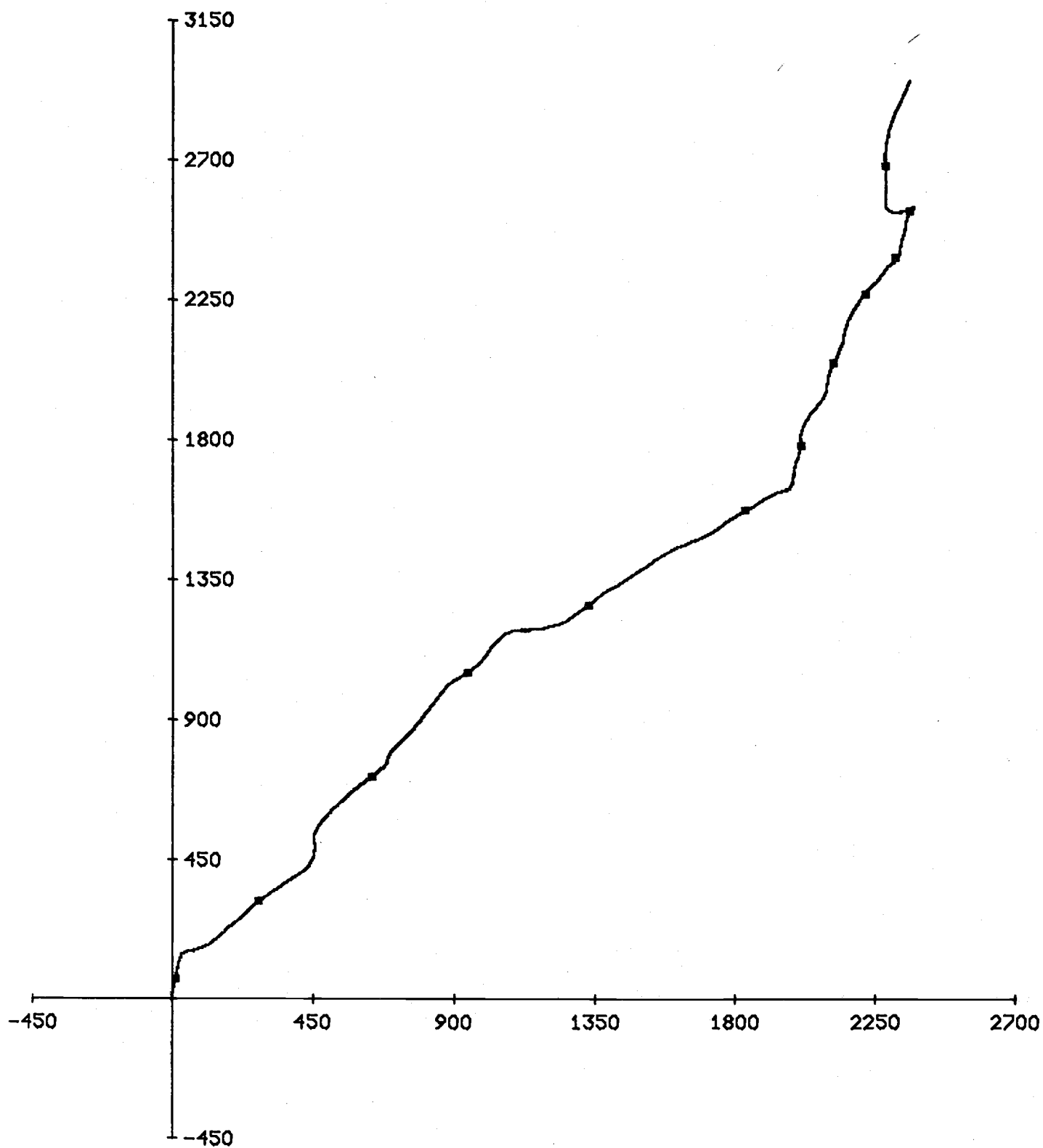
1224 m

S	9.21	4.67	0.41	2.54	0.80	24.40	8655
U	4.86	5.62	-0.03	2.80	-14.90	23.60	8655
V	5.83	4.17	0.37	3.22	-6.40	21.70	8655
T	1.77	0.13	0.65	2.31	1.52	2.13	8655
P	1230.14	31.76	1.77	5.78	1205.90	1392.90	8655
C	31.01	0.11	0.41	1.90	30.82	31.28	8655

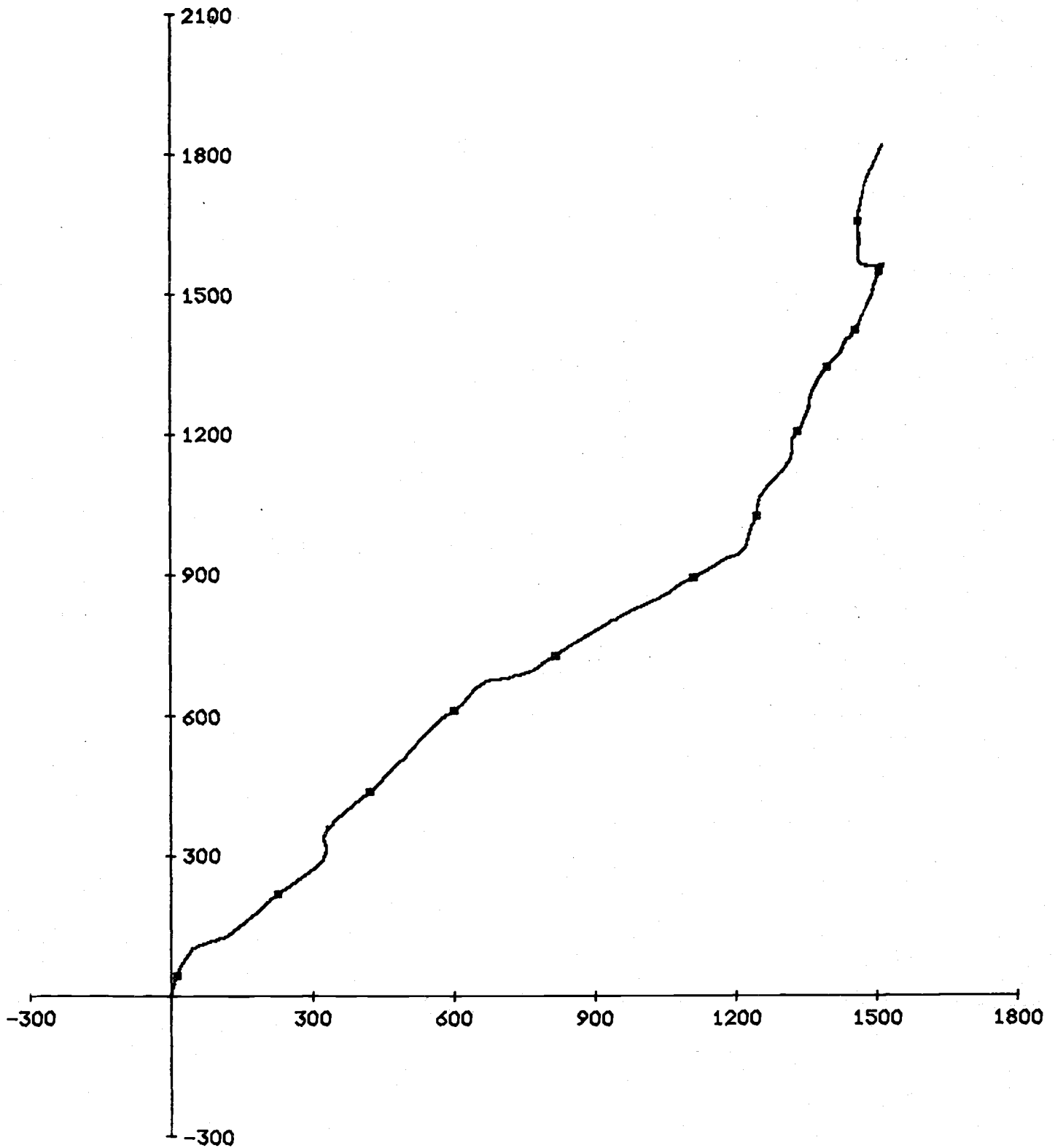
2524 m

S	5.21	3.77	0.65	2.86	0.80	20.40	6749
U	3.38	4.09	0.37	3.13	-11.00	18.20	6749
V	2.17	2.92	0.18	4.28	-10.10	15.40	6749
T	0.90	0.11	0.22	2.16	0.55	1.16	6749

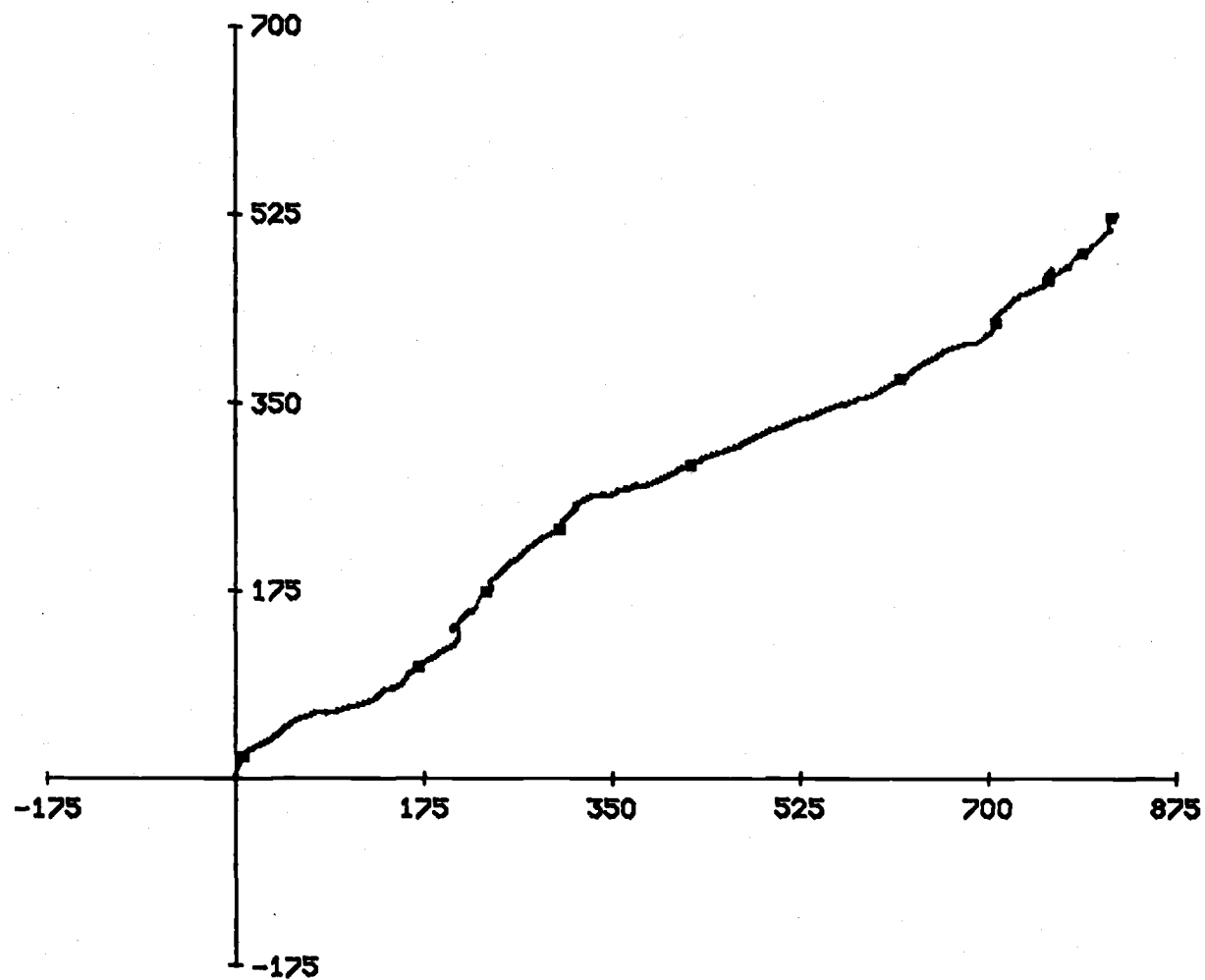
Speed, u, and v are given in cm/sec; temperature in degrees centigrade; pressure in decibars; and conductivity in mmhr/cm.



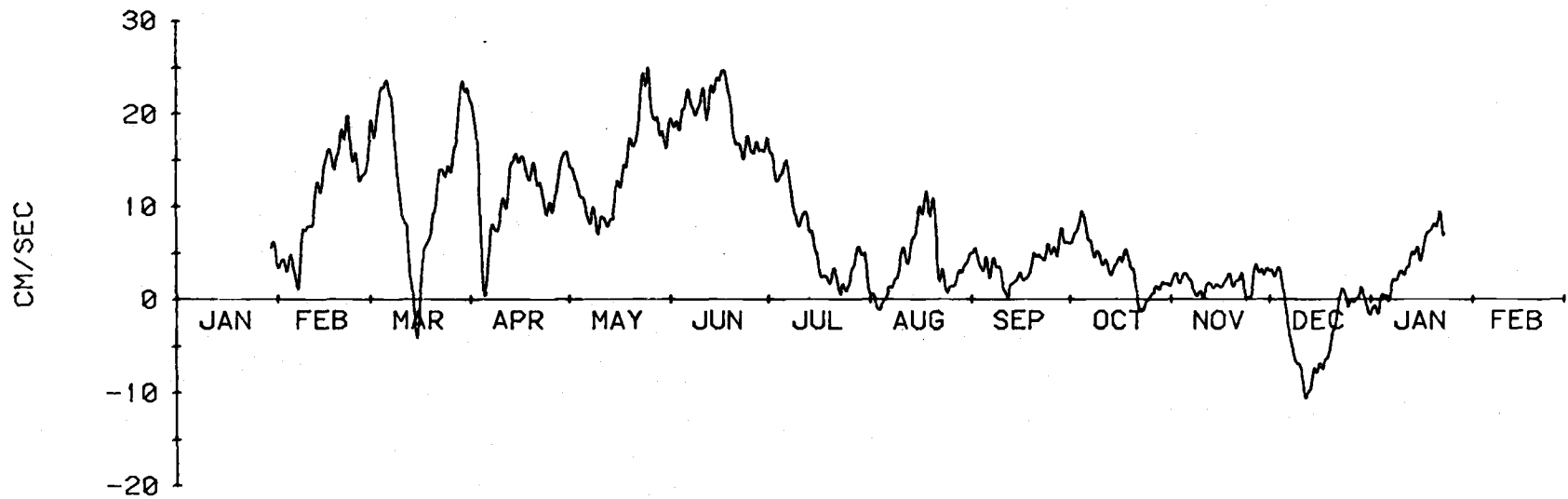
540 M AT STN MS-7. 360.5 DAYS STARTING 2120 28 JAN 79.



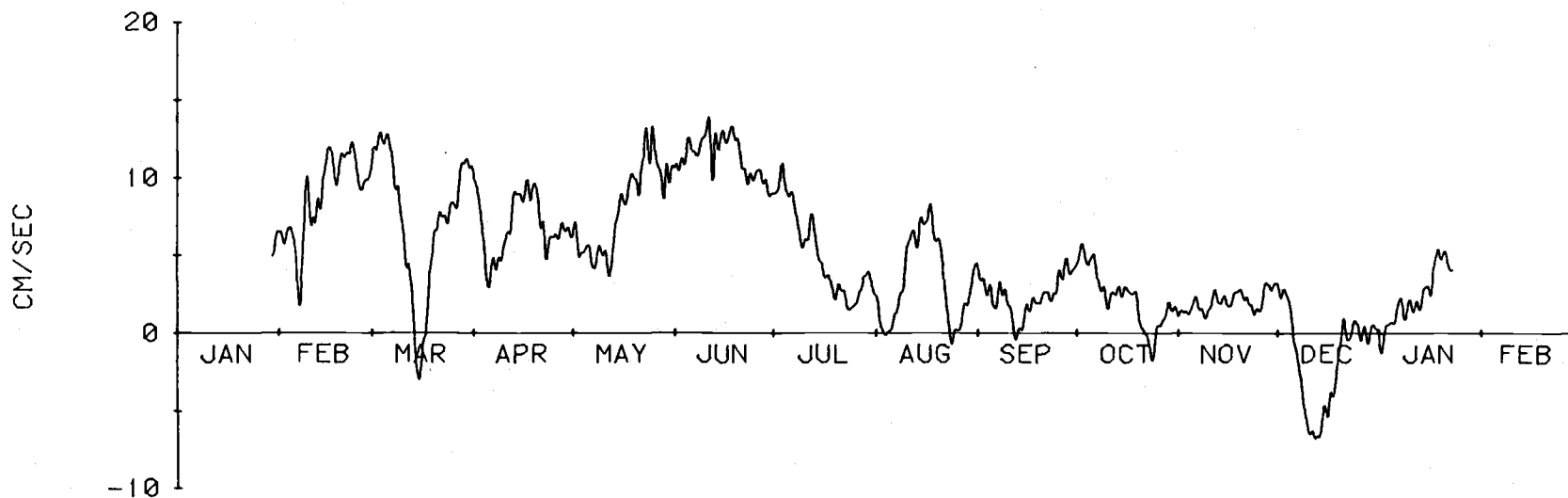
1224 M AT STN MS-7. 360.6 DAYS STARTING 2004 28 JAN 79.



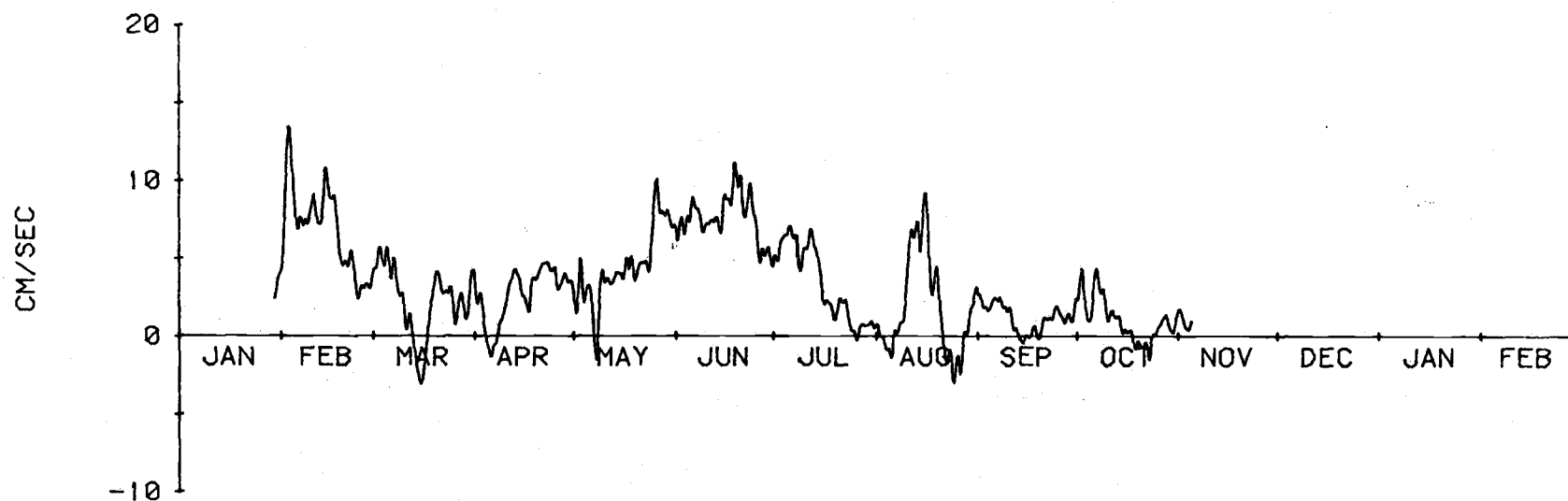
2524 M AT STN MS-7. 281.2 DAYS STARTING 1937 28 JAN 79.



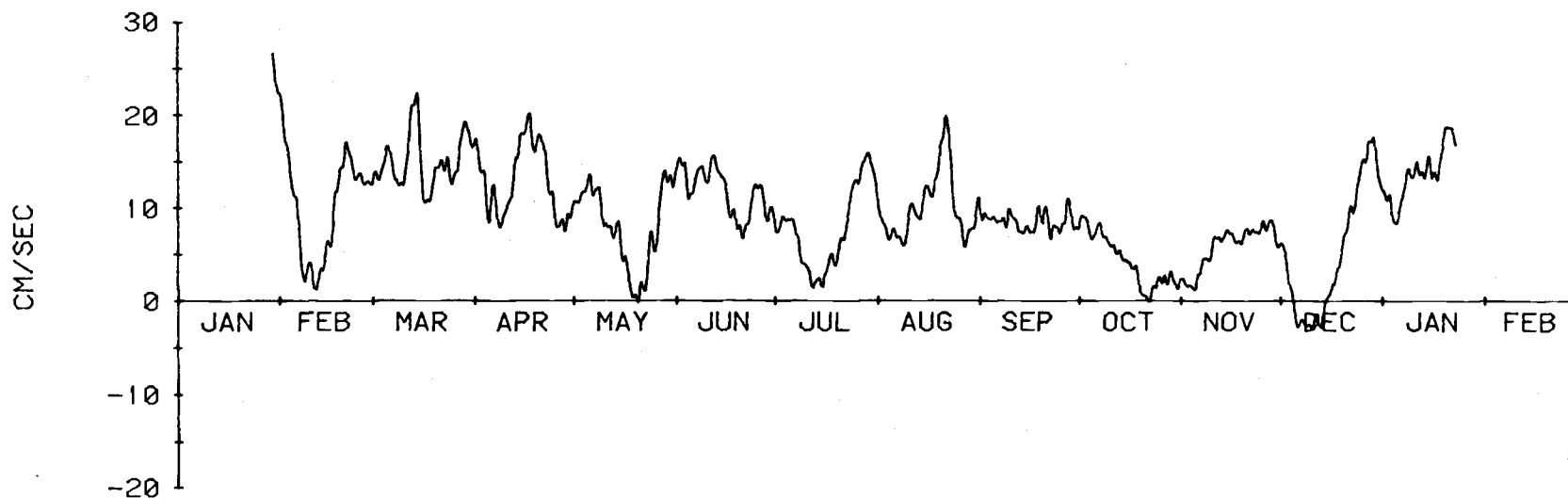
540 METERS AT MS-7
LLP FILTERED U COMPONENT



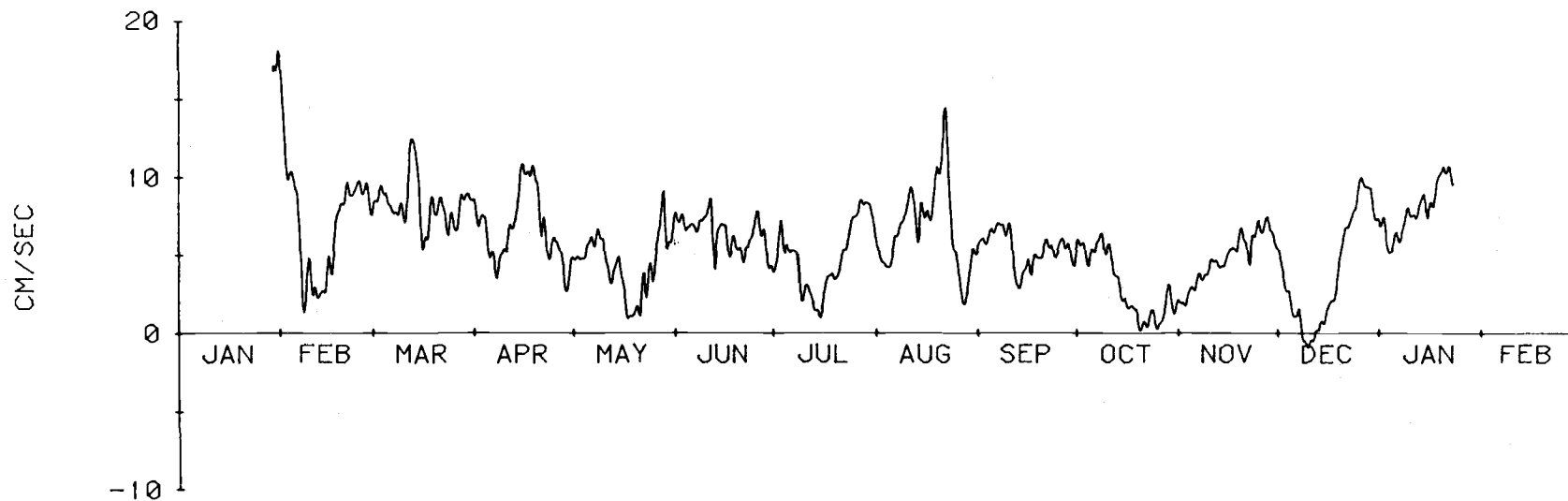
1224 METERS AT MS-7
LLP FILTERED U COMPONENT



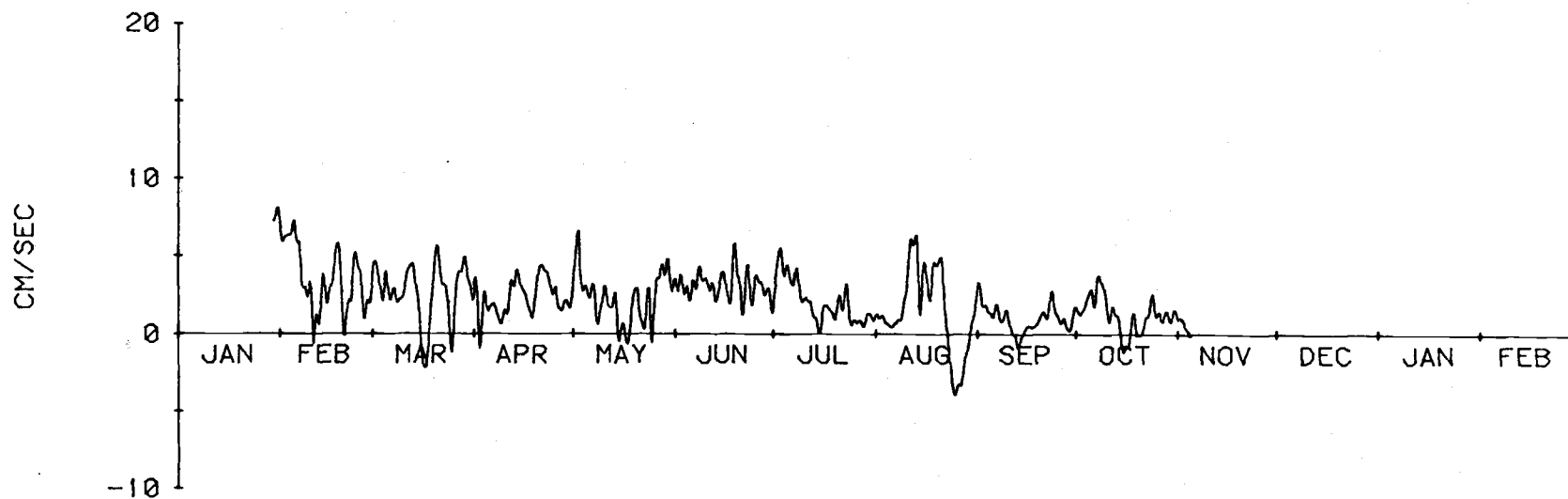
2524 METERS AT MS-7
LLP FILTERED U COMPONENT



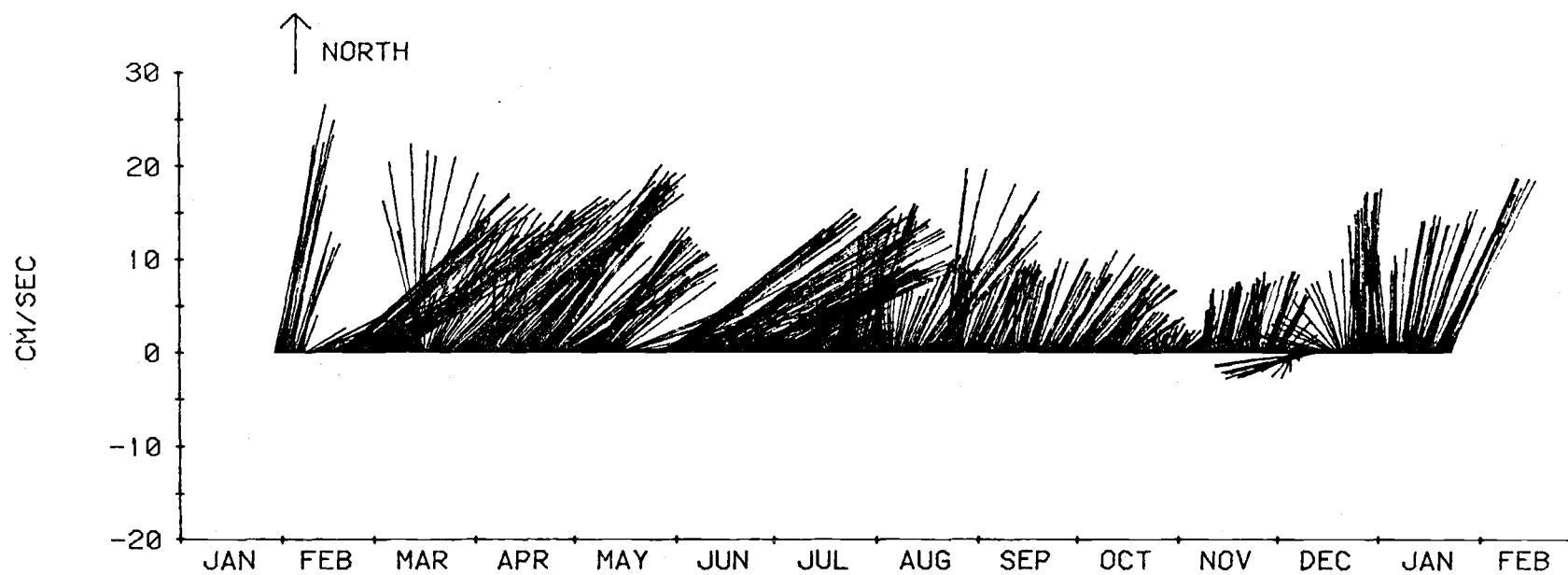
540 METERS AT MS-7
LLP FILTERED V COMPONENT



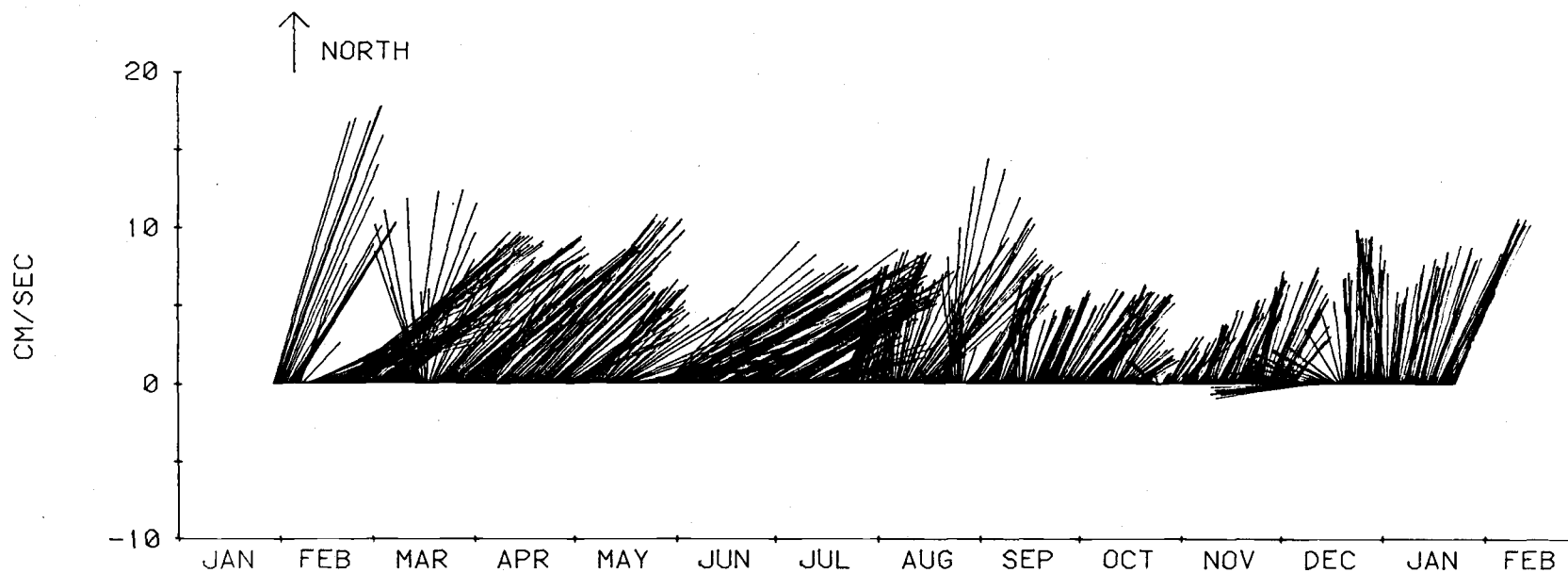
1224 METERS AT MS-7
LLP FILTERED V COMPONENT



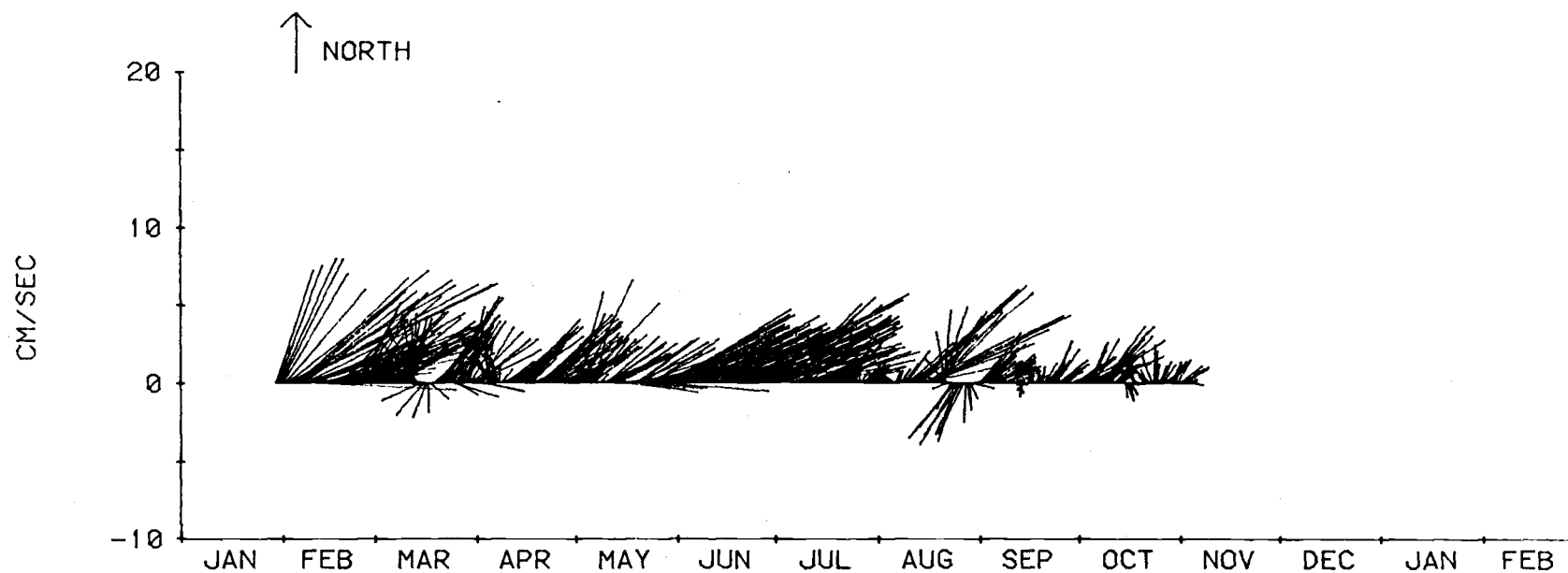
2524 METERS AT MS-7
LLP FILTERED V COMPONENT



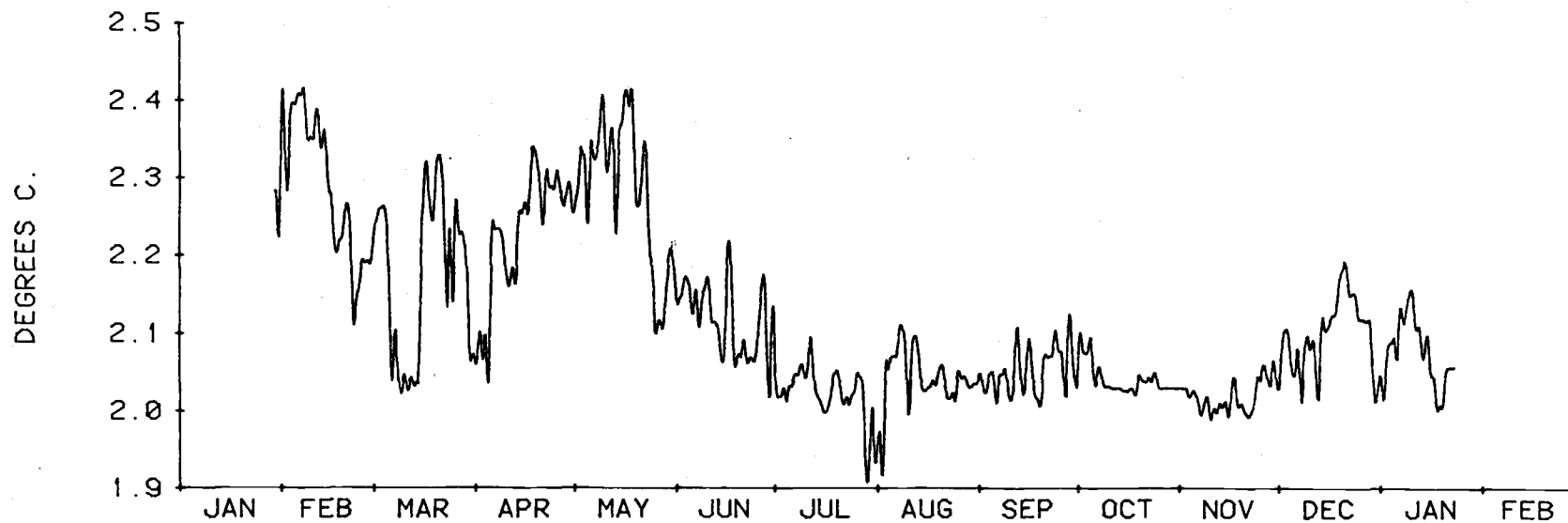
540 METERS AT MS-7
LLP FILTERED CURRENT



1224 METERS AT MS-7
LLP FILTERED CURRENT



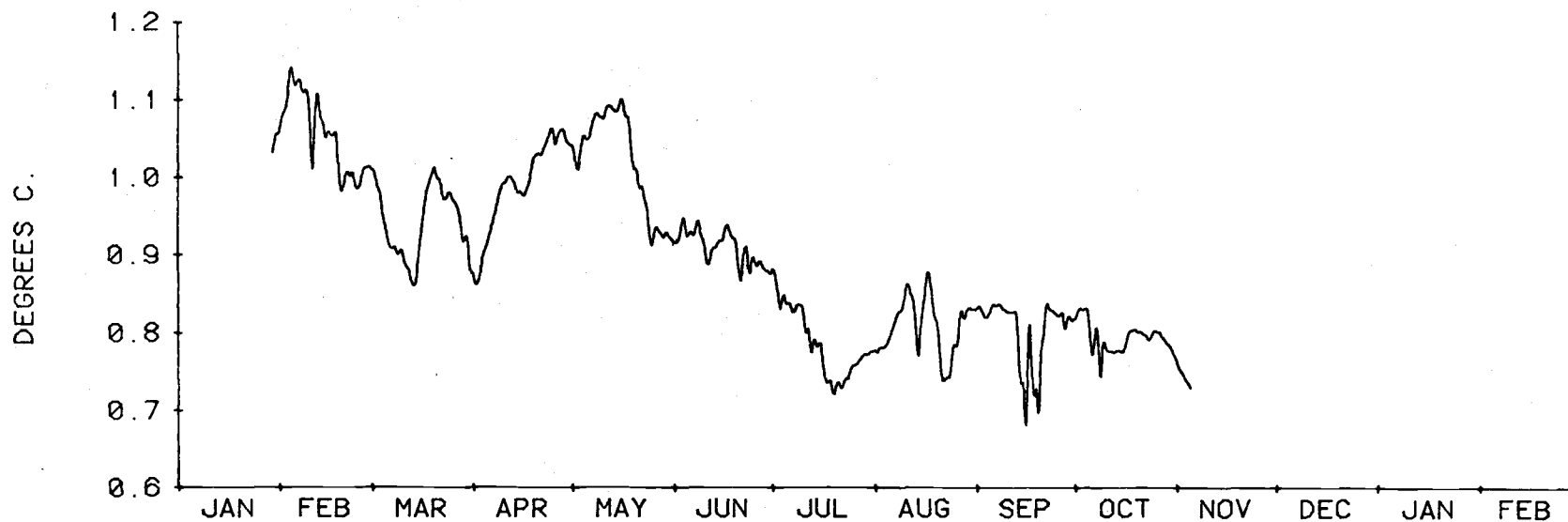
2524 METERS AT MS-7
LLP FILTERED CURRENT



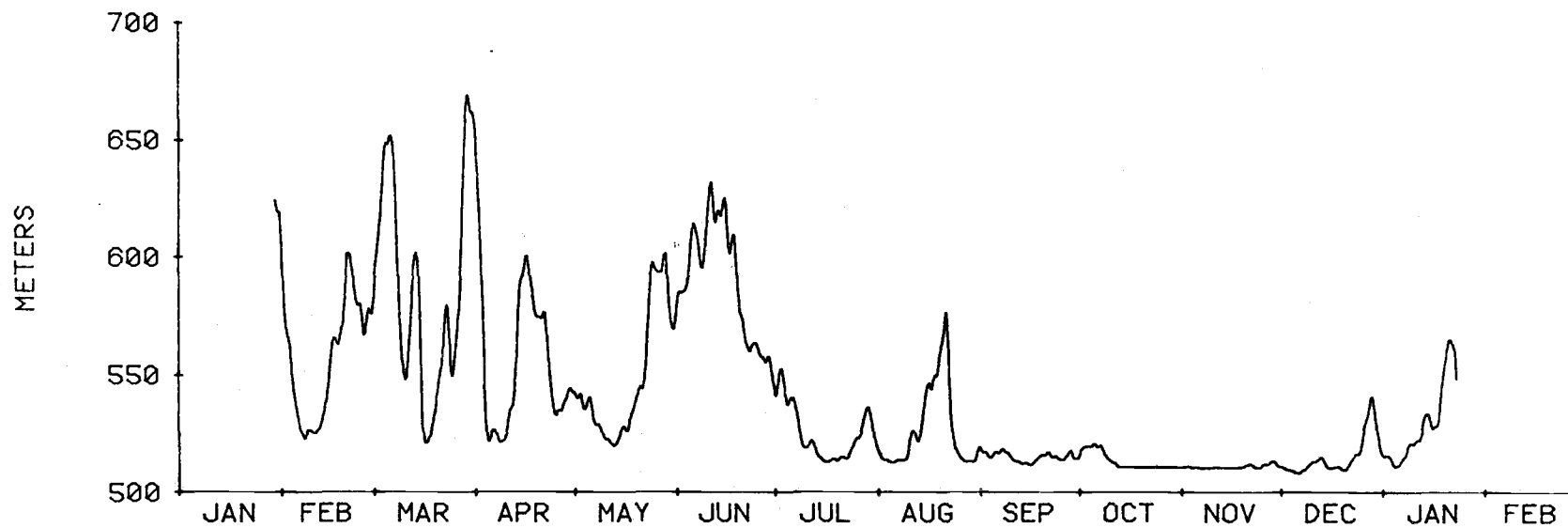
540 METERS AT MS-7
LLP FILTERED TEMPERATURE



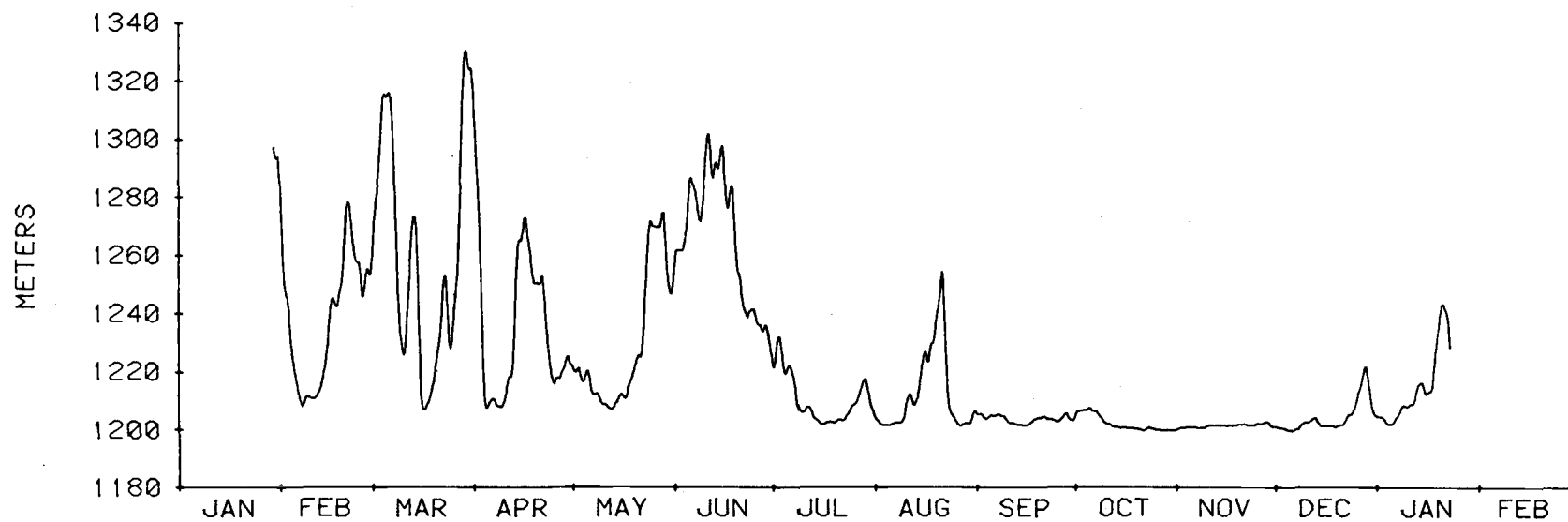
1224 METERS AT MS-7
LLP FILTERED TEMPERATURE



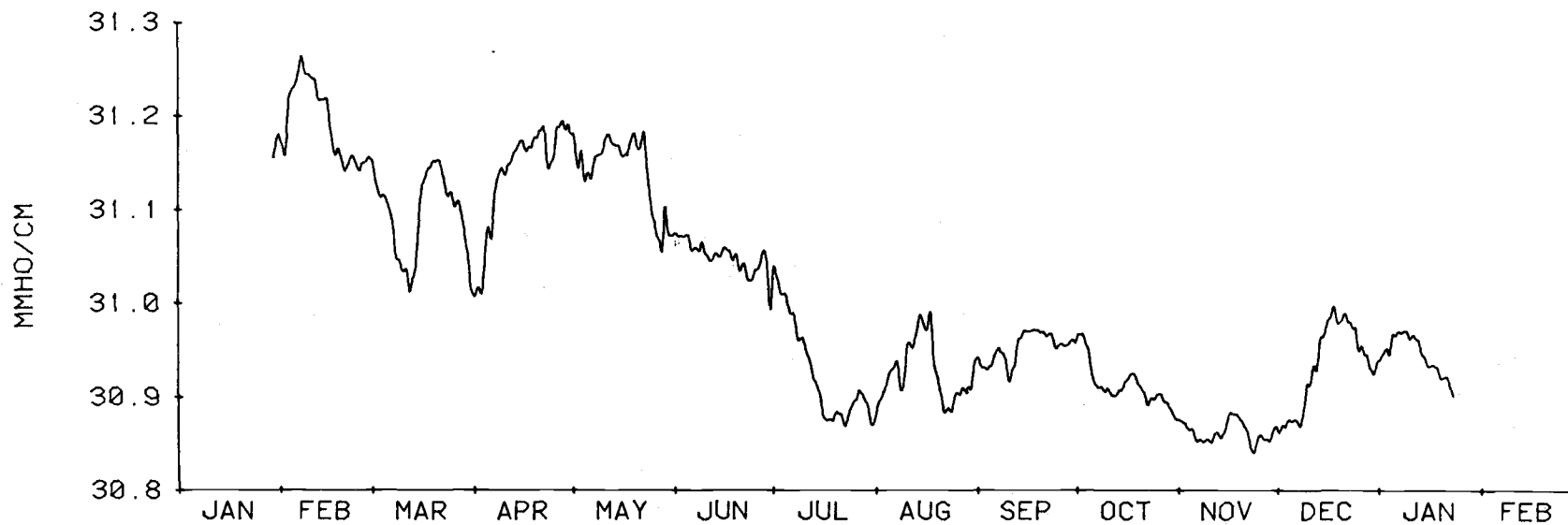
2524 METERS AT MS-7
LLP FILTERED TEMPERATURE



540 METERS AT MS-7
LLP FILTERED PRESSURE

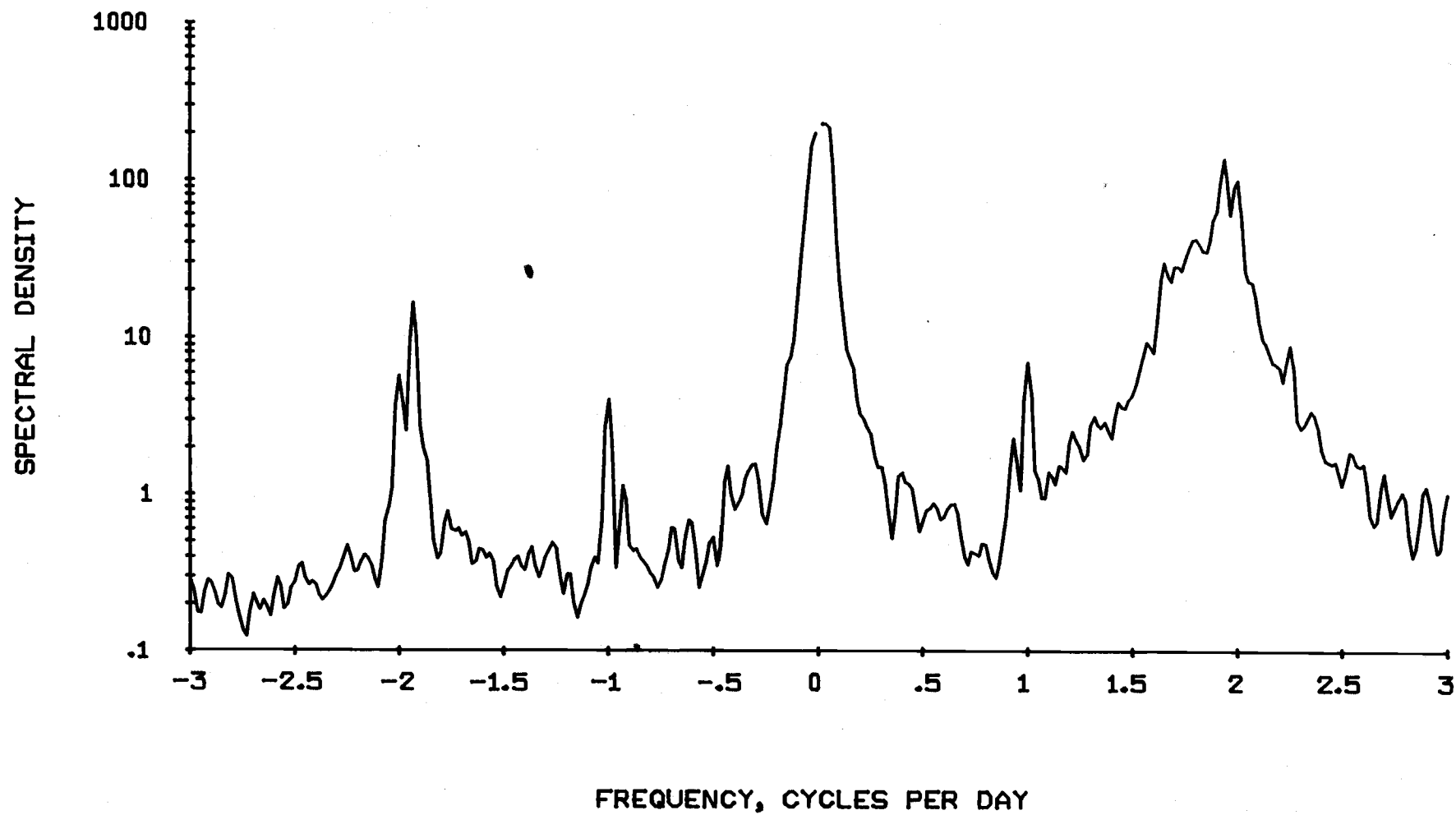


1224 METERS AT MS-7
LLP FILTERED PRESSURE

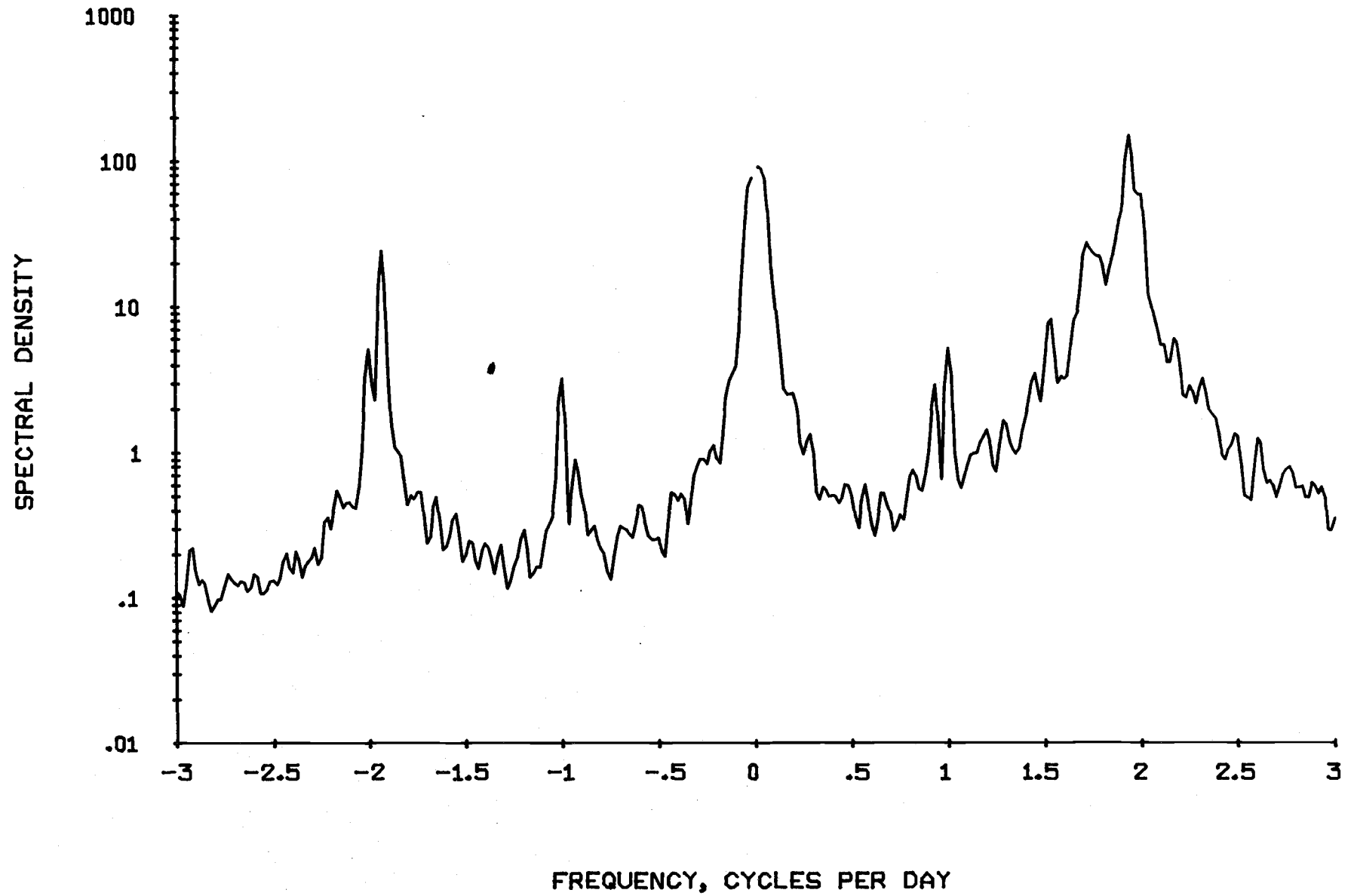


1224 METERS AT MS-7
LLP FILTERED CONDUCTIVITY

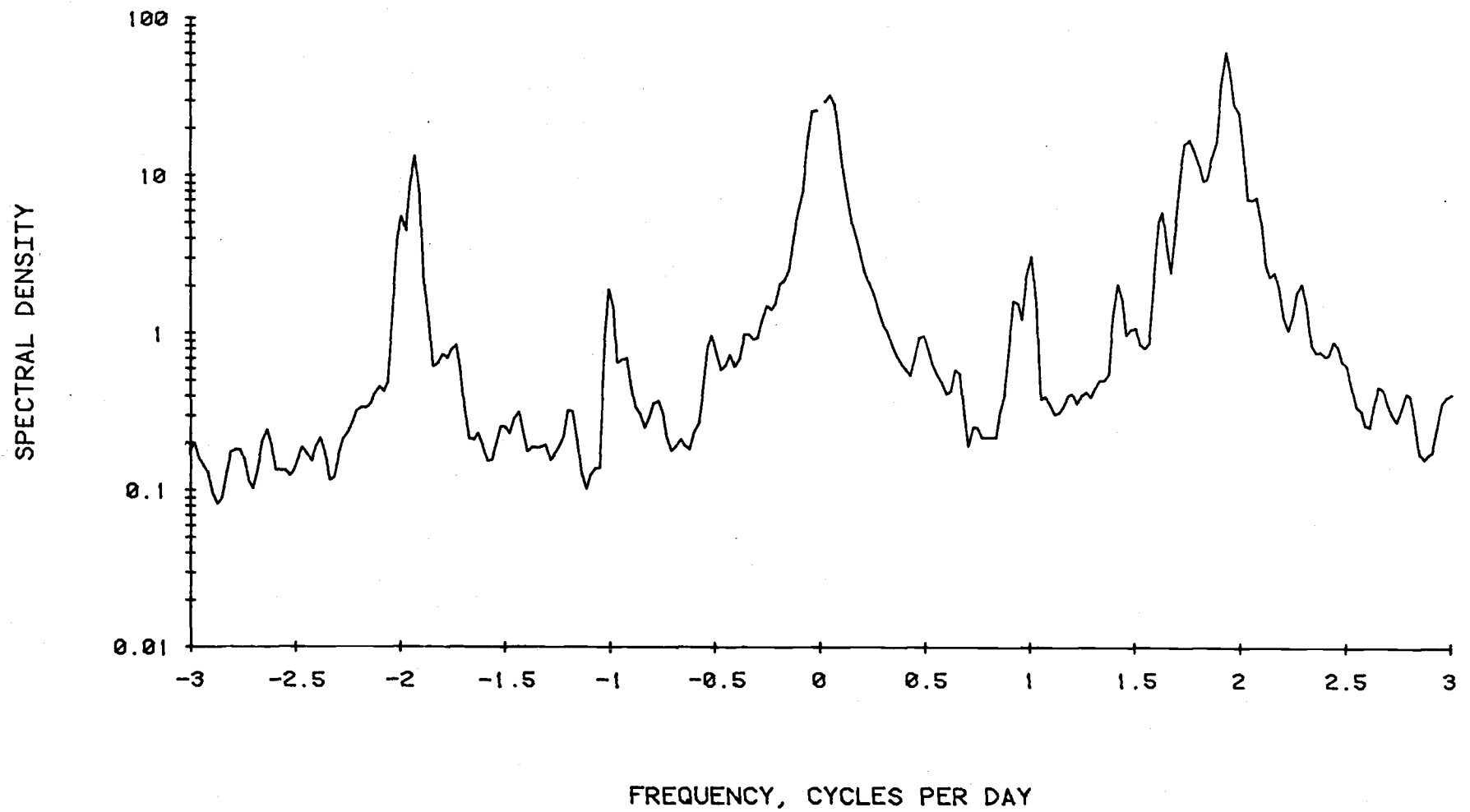
UNFILTERED CURRENT. 540 METERS AT MS-7.



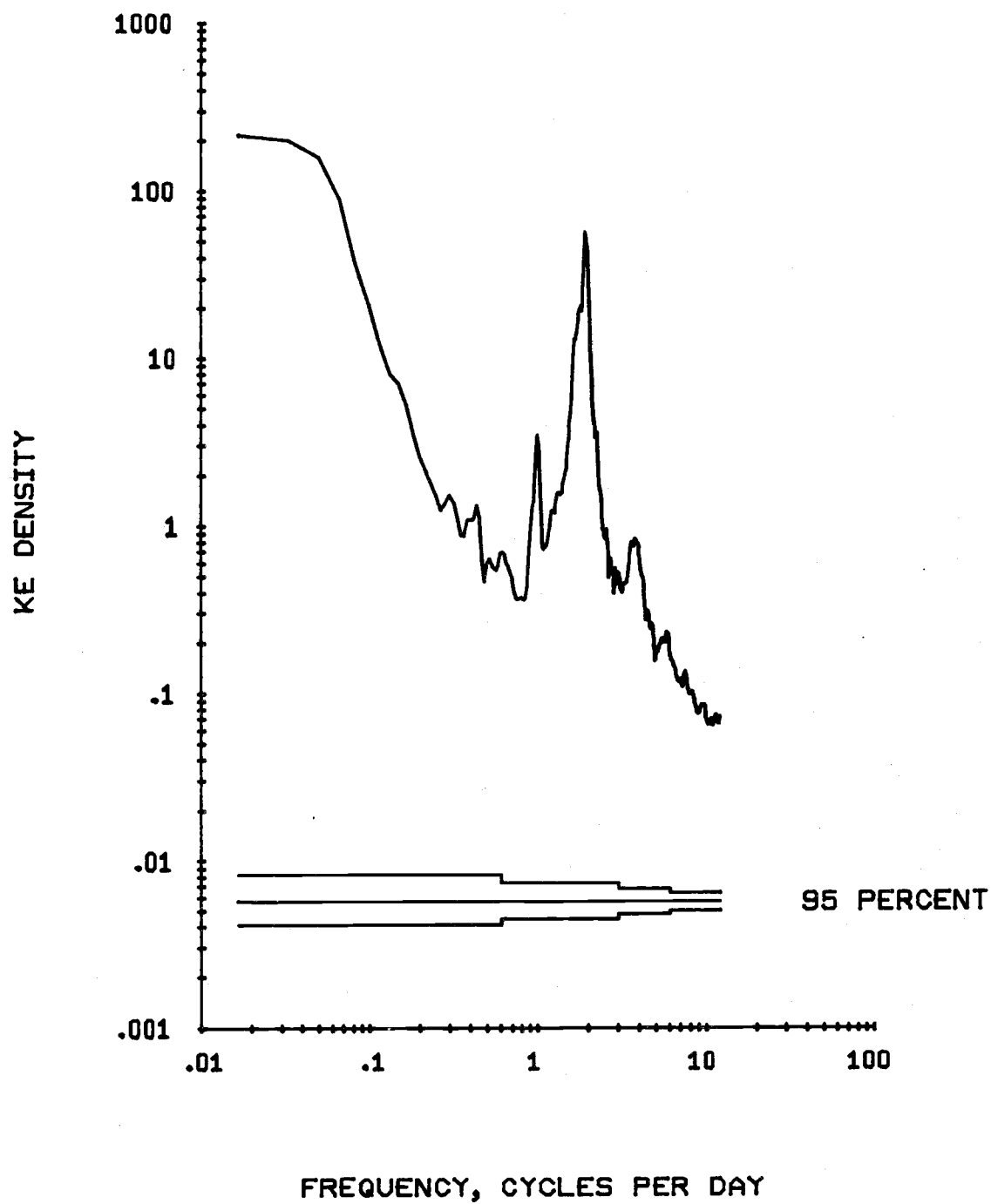
UNFILTERED CURRENT. 1224 METERS AT MS-7.



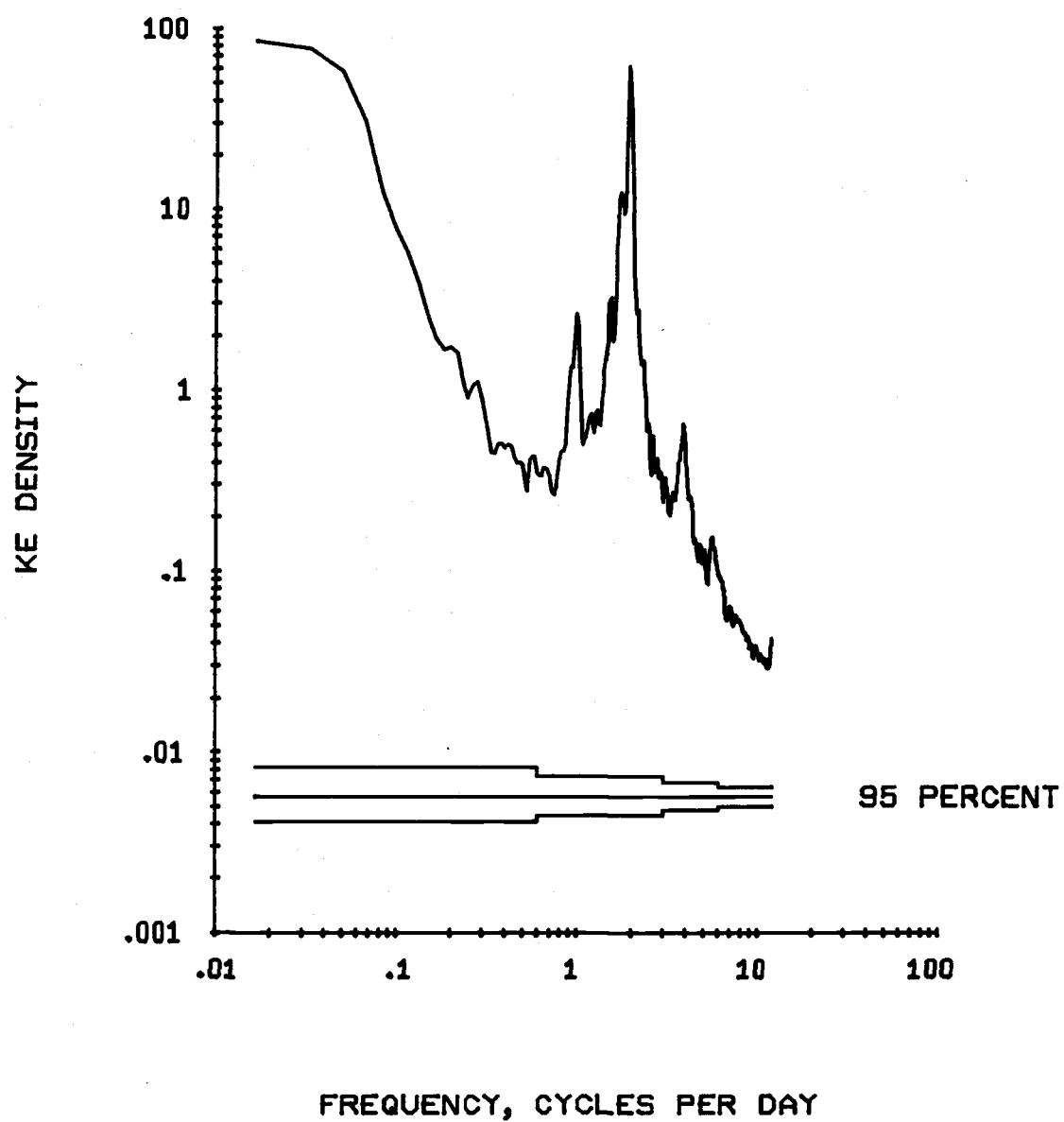
UNFILTERED CURRENT. 2524 METERS AT MS-7



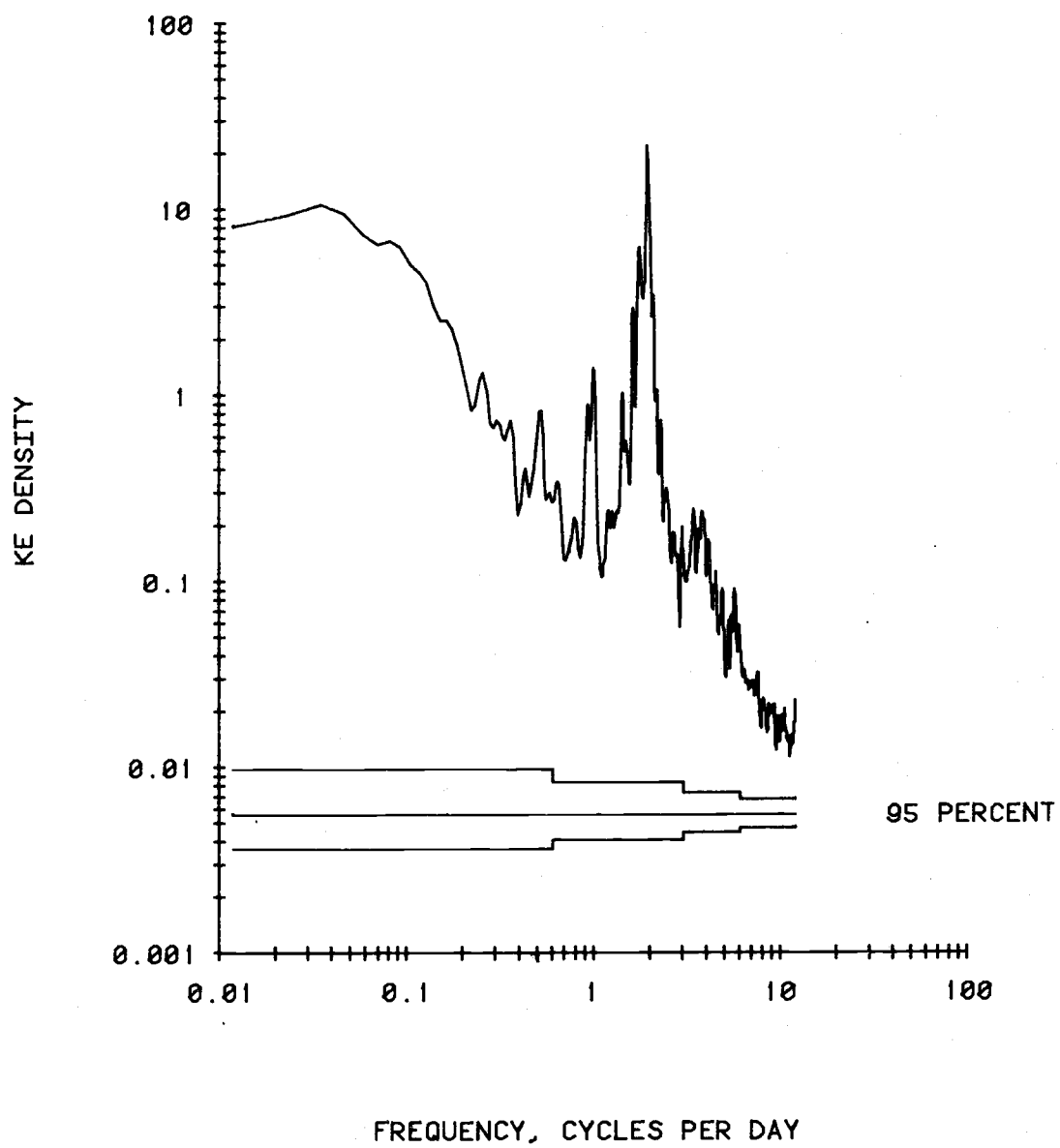
UNFILTERED CURRENT. 540 METERS AT MS-7.



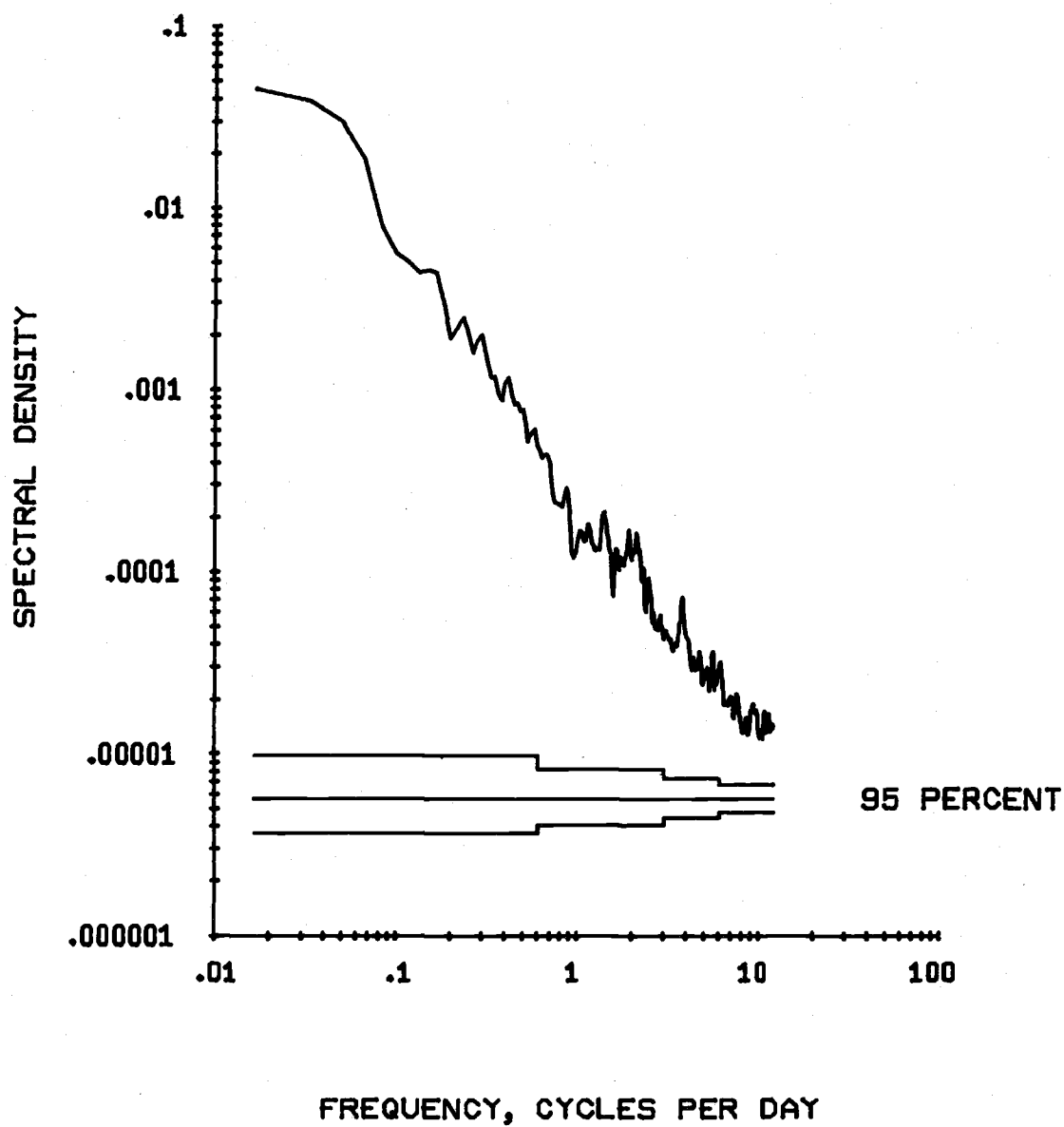
UNFILTERED CURRENT. 1224 METERS AT MS-7.



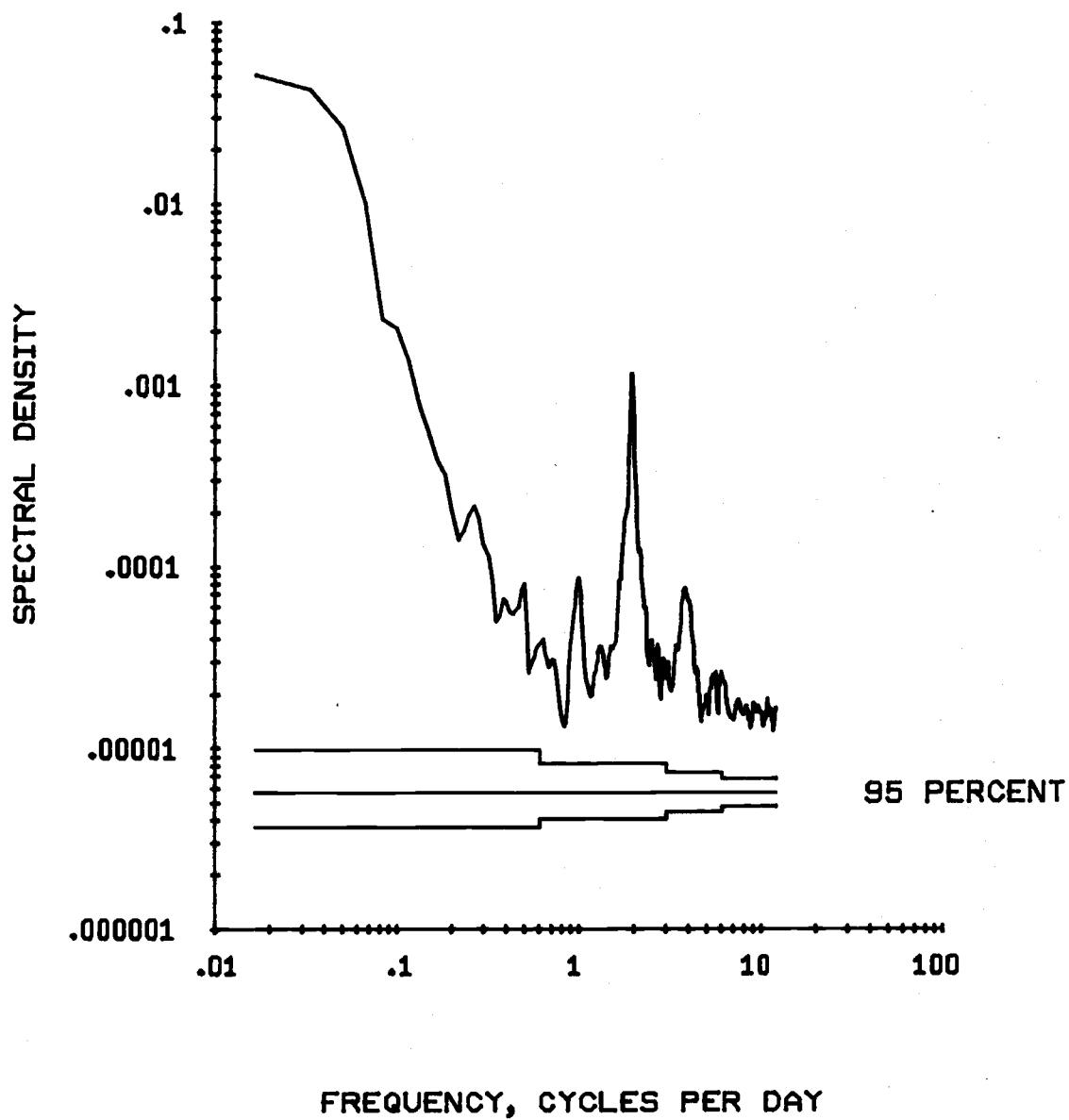
UNFILTERED CURRENT. 2524 METERS AT MS-7



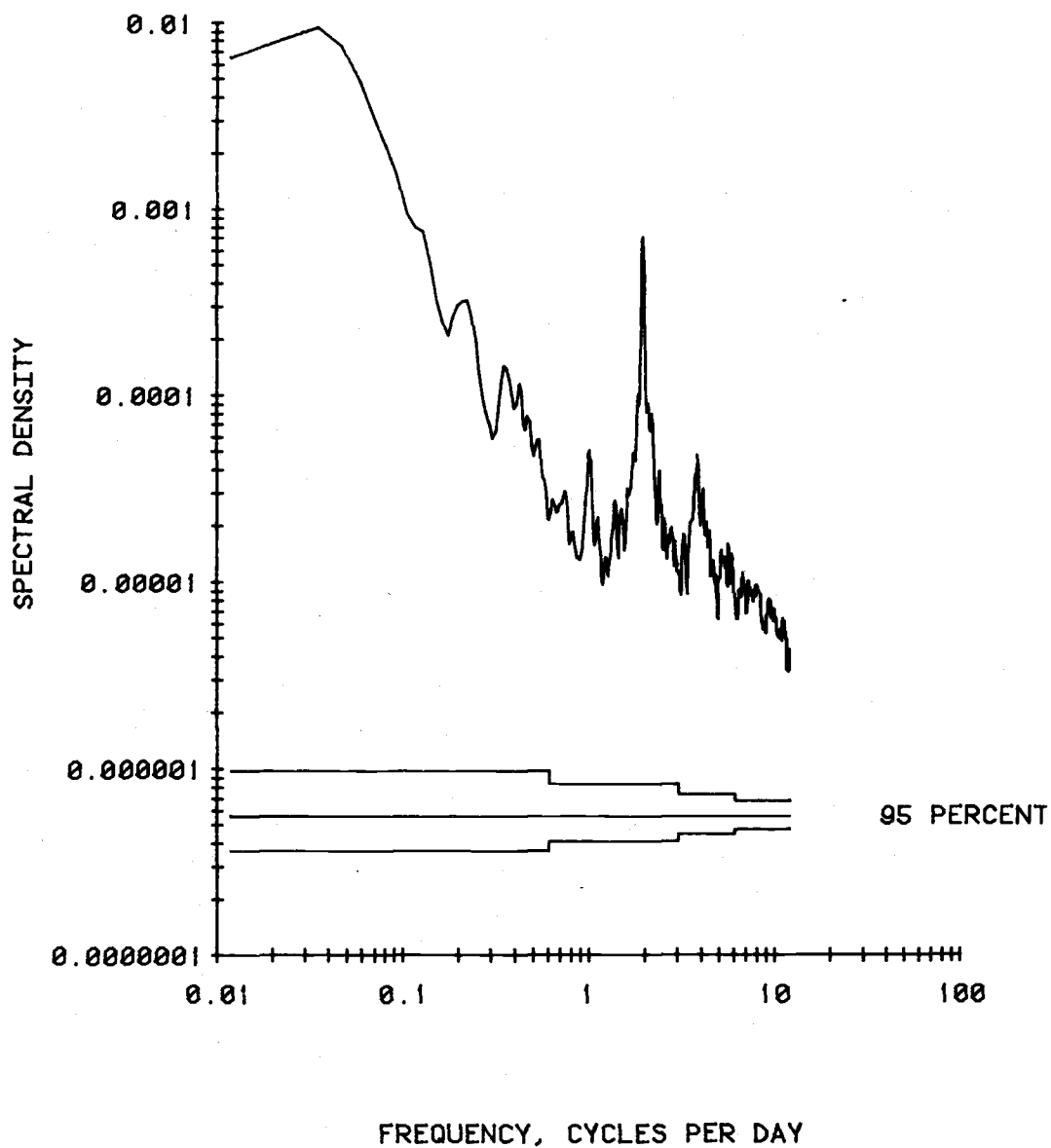
UNFILTERED TEMPERATURE. 540 M AT MS-7.



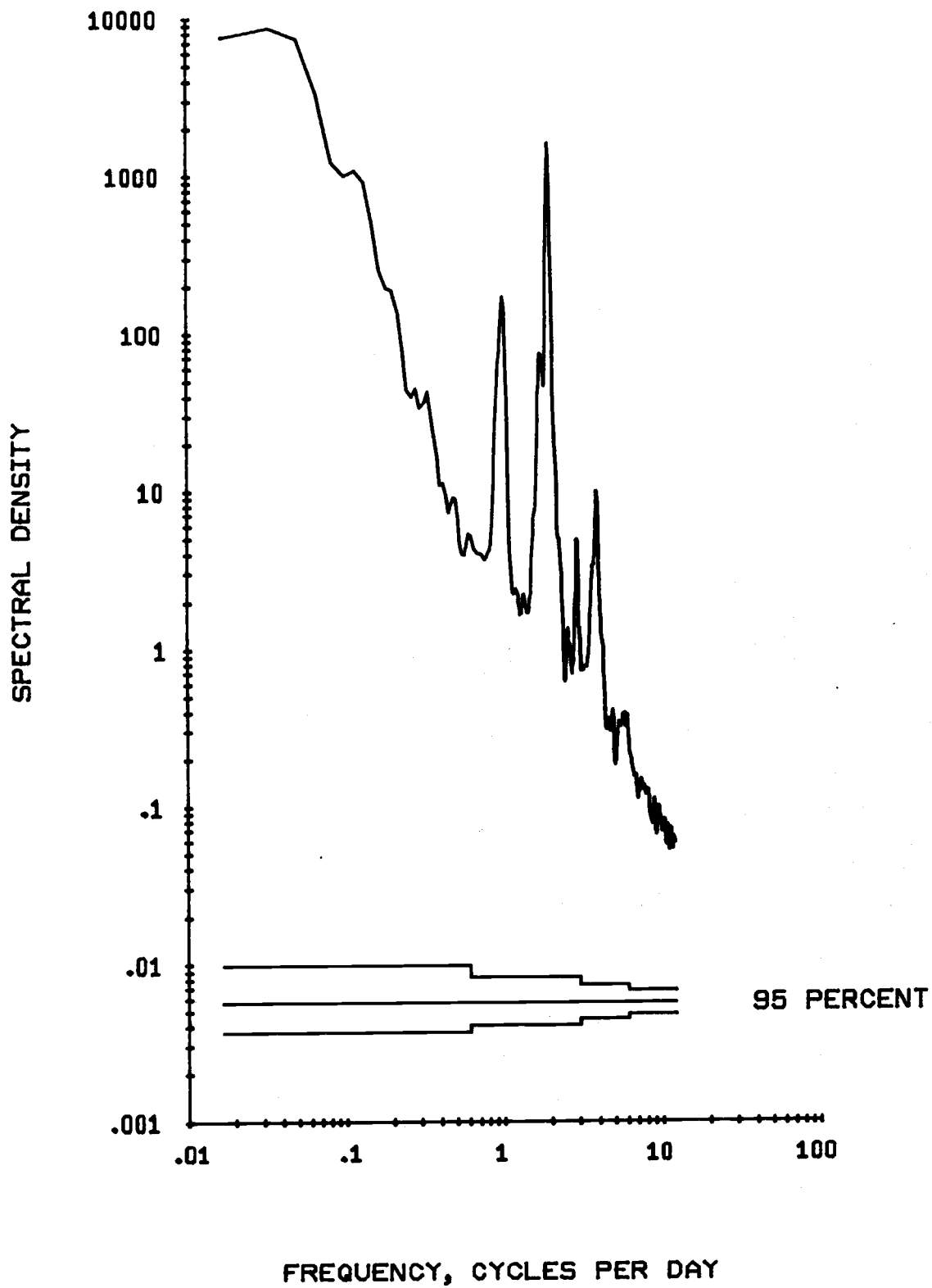
UNFILTERED TEMPERATURE. 1224 M AT MS-7.



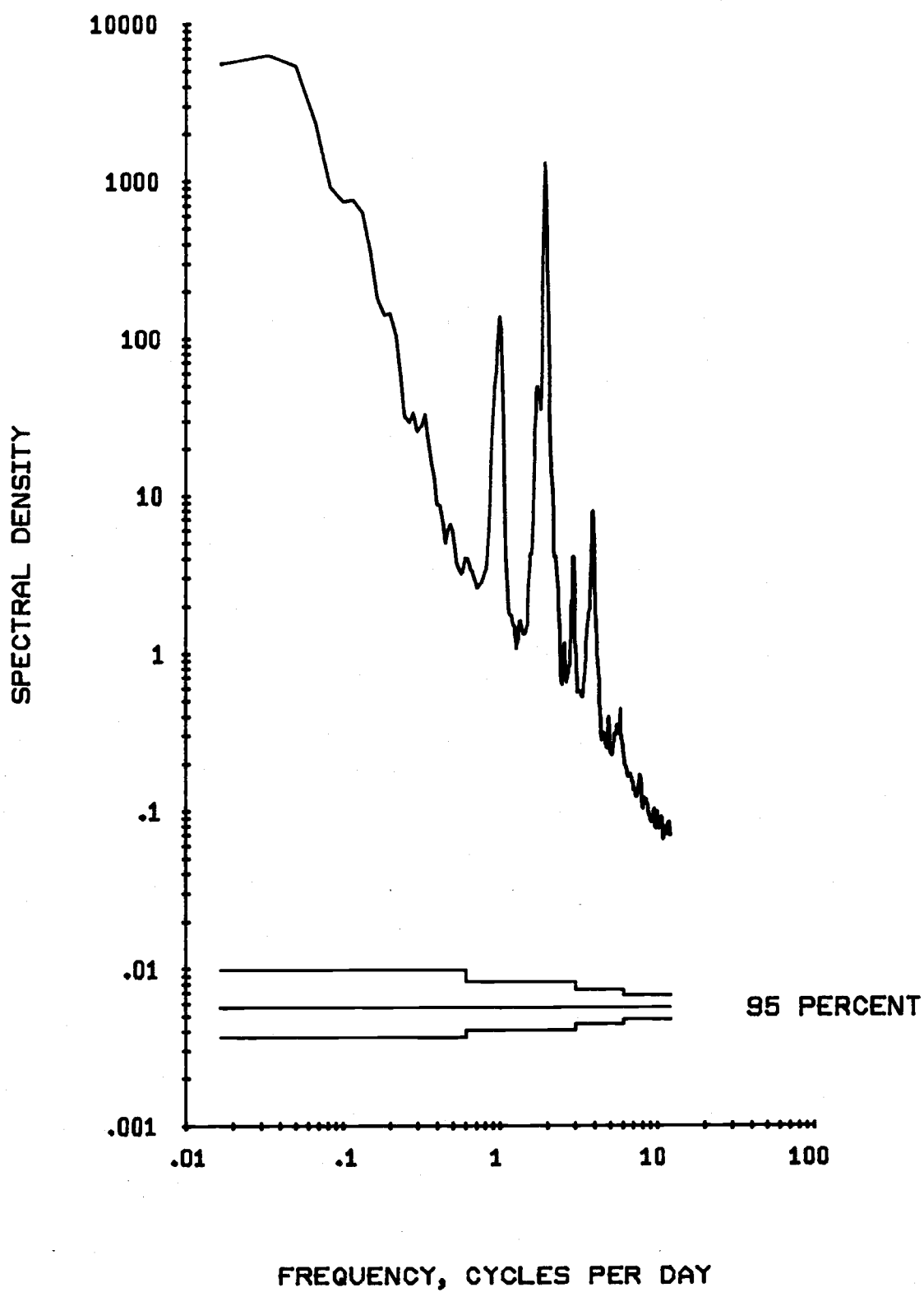
UNFILTERED TEMPERATURE. 2524 METERS AT MS-7



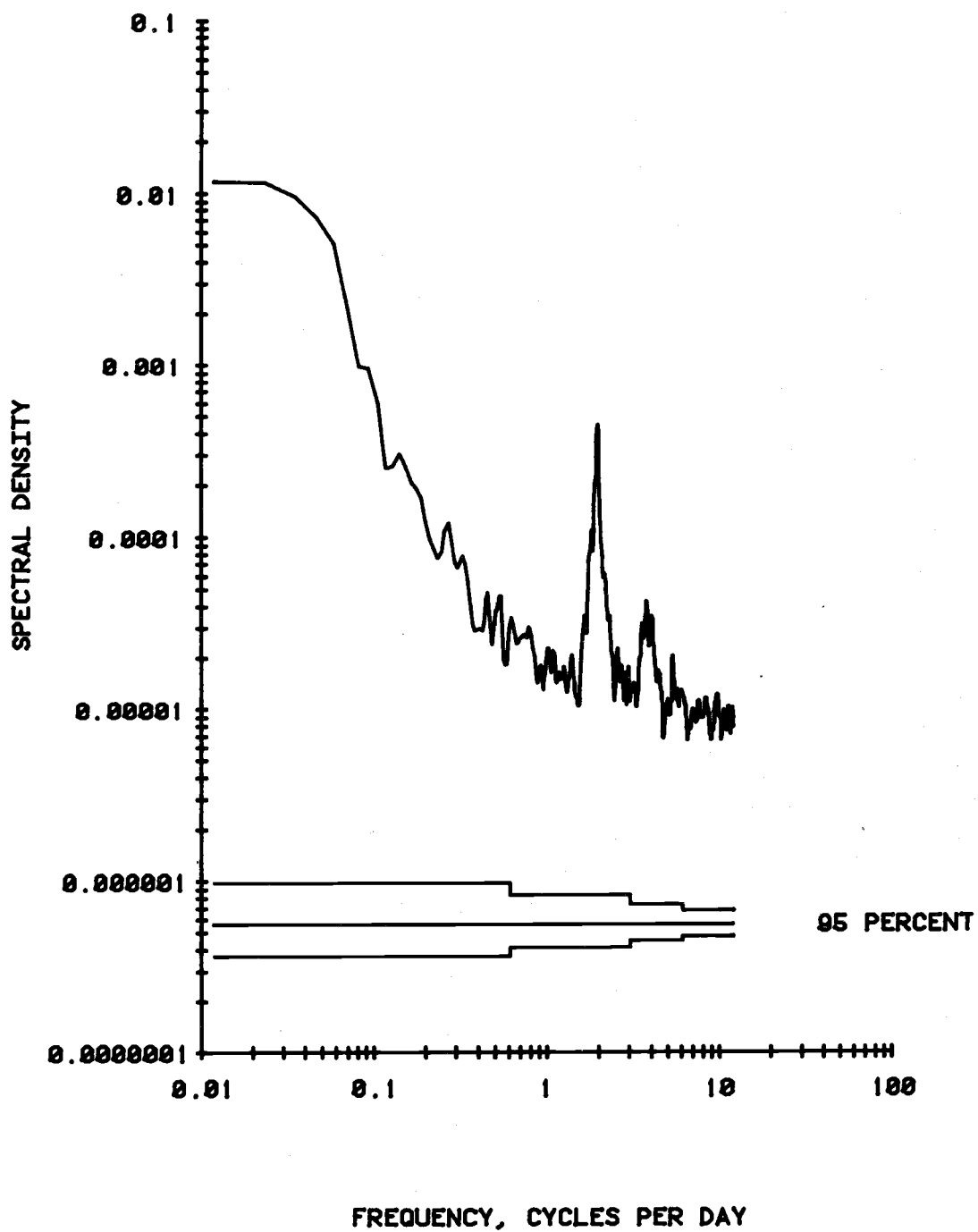
UNFILTERED PRESSURE. 540 M AT MS-7.



UNFILTERED PRESSURE. 1224 M AT MS-7.



UNFILTERED CONDUCTIVITY. 1224 METERS AT MS-7.



APPENDIX

The depths of the instruments that were used in previous FDRAKE experiments were assigned in two ways. In the earlier experiments none of the meters were equipped with pressure sensors, and the depth was assigned using the best estimate of the bottom depth and the mooring component lengths. In later experiments the addition of pressure sensors to some of the meters allowed the depths to be based on pressure data. At no time in the series of experiments, including DRAKE 79 were all of the meters equipped with pressure sensors.

In the present report almost all of the instrument depths are based either directly or indirectly on pressure data. Some of the current meters contained on-board pressure sensors which allowed direct estimation of instrument depth. The depths of other meters were estimated by extrapolating upward or downward from pressure sensors elsewhere on the mooring. The depths given here are average depths obtained by averaging over the record length, and reflect depth variations caused by mooring blow-over.

Depth was calculated from pressure using the formula:

$$z(m) = 0.99481 p \text{ (decibars)}$$

which assumes an ocean of constant density equal to 1.025 g cm^{-3} . It has been pointed out that this shallow-water formula overestimates depth in the deep ocean. A better estimate is given by using a formula obtained from Professor

J. L. Reid at Scripps (T. Whitworth, personal communication):

$$z(m) = (0.992446)P - (2.28717 \times 10^{-6})P^2 + (2.08213 \times 10^{-11})P^3$$

It is based on a world ocean average density profile.

Investigators at Texas A & M noted discrepancies between the depths calculated with our simple formula and those obtained from T/P recorders on the same moorings. The following table summarizes the findings of TAMU (W. D. Nowlin, Jr. and T. Whitworth, III, personal communication) and is our best estimate of the actual meter depths. These depths are calculated using Reid's formula. Employing actual density data obtained in the Drake Passage rather than Reid's formula makes a meter or two change from these depths.

Mooring	Instrument	Design depth meters	Pressure minimum decibars	Depth minimum meters	Difference meters
ML-8	T/P	200	245	243	43
	CM	500	550	545	45
ML-9	T/P	200	327	324	124
	CM	500	598	592	92
	CM	2500	2678	2641	141
	GEODYNE ANCHOR	3200 3665			
ML-10	T/P	200	187	186	-14
	CM	500	478	474	-26
	CM	2500	2574	2540	40
	ANCHOR	3700			
ML-11	T/P	200	323	320	120
	CM	2500	2635	2600	100
	ANCHOR	3780			
ST	T/P	200	389	386	186
	CM	500	688	682	182
	T/P	800	987	977	177
	CM	1200	1403	1388	188
	T/P	1600	1807	1786	186
	T/P	2000			
	CM	2500	2714	2677	177
	ANCHOR	3070			
SS-1000	T/P	200	203	201	1
	CM	500	508	504	4
	ANCHOR	995			
MS-1	T/P	200	375	372	172
	CM	500	685	679	179
	CM	1200	1386	1371	171
	CM	2500	2697	2660	160
	ANCHOR	3610			
MS-2	T/P	200	498	494	294
	CM	500	798	791	291
	CM	1200	1489	1371	171
	CM	2500	2697	2660	160
	ANCHOR	3000			
MS-3	T/P	200	329	326	126
	CM	500	638	632	132
	ANCHOR	3450			

Mooring	Instrument	Design depth meters	Pressure minimum decibars	Depth minimum meters	Difference meters
<hr/>					
MS-5	T/P	200	423	419	219
	CM	500	727	720	220
	CM	1200	1444	1428	228
	CM	2500	2750	2712	212
	GEODYNE	3300			
	ANCHOR	3780			
MS-6	T/P	200	408	405	205
	CM	500	801	793	293
	CM	1200	1401	1386	186
	CM	2500			
	ANCHOR	2580			
MS-7	T/P	200	205	203	3
	CM	500	513	509	9
	CM	1200	1206	1194	-6
	CM	2500			
	ANCHOR	3630			

Mooring	Instrument	Design depth meters	Pressure minimum decibars	Depth minimum meters	Difference meters
<hr/>					
NS500	T/P	200	197	195	-5
	CM	500	532	527	27
	ANCHOR	578			
NS1000	T/P	200	223	221	21
	T/P	350	370	366	16
	CM	500	527	522	22
	ANCHOR	1000			
NT	T/P	200	261	259	59
	CM	500	597	591	91
	CM	800	910	901	100
	T/P	900	997	987	87
	CM	1200	1328	1313	113
	CM	1500	1635	1616	116
	T/P	1750	1885	1862	112
	T/P	2000			
	CM	2500	2641	2605	105
	ANCHOR	?			
ML-1	T/P	200	184	183	-17
	CM	500			
	CM	2500	2557	2523	23
	ANCHOR	3830			
ML-2	T/P	200	278	275	75
	CM	500	571	565	65
	CM	2500	2568	2534	34
	ANCHOR	3680			
ML-5	T/P	200	303	300	100
	CM	500	613	607	107
	CM	1200	1323	1309	109
	ANCHOR	3630			
ML-6	T/P	200	327	324	124
	CM	500	625	619	119
	CM	1200	1338	1324	124
	CM	2500	2664	2628	128
	ANCHOR	3835			
ML-7	T/P	200	194	192	-8
	CM	500	507	503	3
	CM	1200	1234	1221	21
	CM	2500	2577	2542	42
	ANCHOR	3815			