AD-A031 858 WOODS HOLE OCEANOGRAPHIC INSTITUTION MASS F/G 8/3
A COMPILATION OF MOORED CURRENT DATA AND ASSOCIATED OCEANOGRAPH--ETC(U)
MAY 76 S A TARBELL N00014-66-C-0241
UNCLASSIFIED WHOI-76-40 NL

1 OF 2
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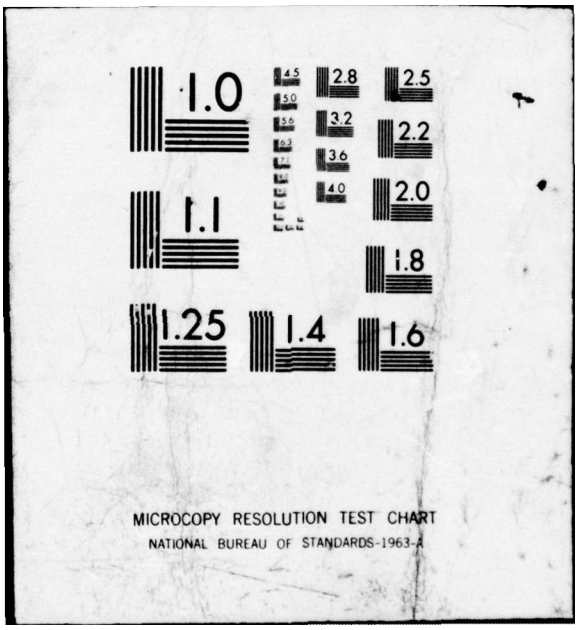
A031 858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4.0
4.5
5.0
5.6
6.3
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1 REPORT NUMBER: WHOI-76-40
2 GOVT ACCESSION NO.:
3 RECIPIENT'S CATALOG NUMBER:

4 TITLE (and Subtitle): A COMPILATION OF MOORED CURRENT DATA AND ASSOCIATED OCEANOGRAPHIC OBSERVATIONS. VOLUME X, (EARLY 1969 MEASUREMENTS).

5 TYPE OF REPORT & PERIOD COVERED: TECHNICAL rept.

6 PERFORMING ORG. REPORT NUMBER:

7 AUTHOR(s): Susan A. Tarbell

8 CONTRACT OR GRANT NUMBER(s): N00014-66-C-0241; N00014-76-C-0197

9 PERFORMING ORGANIZATION NAME AND ADDRESS:
Woods Hole Oceanographic Institution
Woods Hole, Massachusetts 02543

10 PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS:
NR 083-004
NR 083-400

11 CONTROLLING OFFICE NAME AND ADDRESS:
Office of Naval Research
Code 480

12 REPORT DATE: May 1976

13 NUMBER OF PAGES: 131

14 MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office): 120 p.

15 SECURITY CLASS. (of this report): UNCLASSIFIED

15a DECLASSIFICATION/DOWNGRADING SCHEDULE:

16 DISTRIBUTION STATEMENT (of this Report)

Approved for public release;distribution unlimited.

17 DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18 SUPPLEMENTARY NOTES

19 KEY WORDS (Continue on reverse side if necessary and identify by block number)

1. Site D
2. Current Data
3. Moorings

20 ABSTRACT (Continue on reverse side if necessary and identify by block number)

Summaries of wind and current measurements from moored stations gathered by magnetic tape recording current meters and wind recorders in early 1969 are presented also selected hydrostation data from the same areas. Averaged wind and current quantities are presented in computer generated output as basic STATISTICS, SPECTRA diagrams, PROGRESSIVE VECTOR diagrams and EAST-NORTH component plots. The hydrostation data are presented as temperature and salinity values plotted against pressure.

(cont on p. vii)

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WHOI-76-40

A COMPILATION OF MOORED CURRENT DATA AND ASSOCIATED OCEANOGRAPHIC OBSERVATIONS, VOLUME X (EARLY 1969 MEASUREMENTS)

by

Susan A. Tarbell

WOODS HOLE OCEANOGRAPHIC INSTITUTION
Woods Hole, Massachusetts 02543

May 1976

TECHNICAL REPORT

Prepared for the Office of Naval Research under Contracts N00014-66-C-0241; NR 083-004 and N00014-76-C-0197; NR 083-400.

Approved for public release; distribution unlimited.

Approved for Distribution: Valentine Worthington, Chairman
Department of Physical Oceanography

ABSTRACT

Summaries of wind and current observations from moored stations gathered in early 1969 by magnetic tape recording current meters and wind recorders are presented, also selected hydrostation data from the same areas.

Averaged wind and current variables are presented in computer generated output as basic STATISTICS, SPECTRA diagrams, PROGRESSIVE VECTOR diagrams and EAST-NORTH component plots. The hydrostation data are presented as temperature and salinity values plotted against depth.

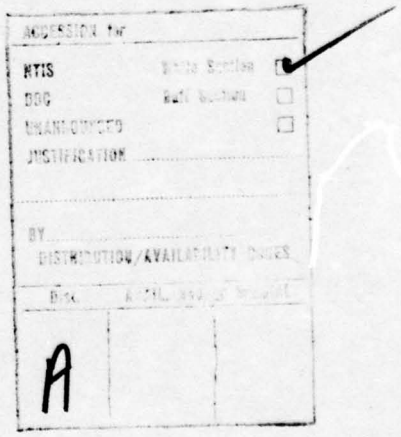


TABLE OF CONTENTS

PREFACE

This volume is the tenth of a series of Data Reports intended to present, in summarized form, measurements collected from moored ocean stations. The following is a list of preceding reports.

Volume 1 - Webster and Fofonoff	Data from mid 1963
Volume 2 - Webster and Fofonoff	Data from XII-'63 to V-'64
Volume 3 - Webster and Fofonoff	Data from mid 1964
Volume 4 - Pollard	Data collected in 1965
Volume 5 - Tarbell and Webster	Data collected in 1966 – AD-730 466
Volume 6 - Tarbell	Data collected in 1967 – AD-782 366
Volume 7 - Chausse and Tarbell	Data collected in 1968
Volume 8 - Pollard and Tarbell	Array data from 1970
Volume 9 - Tarbell, Briscoe and Chausse	IWEX data from 1973 – AD-A022 552

The back-up recovery system designed in 1968 (Berteaux and Heinmiller, 1969, W.H.O.I. Ref. 69-7 (unpublished manuscript) proved its worth in 1969. Tests of wire samples and wire in moorings were continued in 1969. The Gulf Stream went through Site D in April resulting in fish bite damage and a re-evaluation of mooring lines and anchor weights.

ACKNOWLEDGMENTS

Unfortunately it is impossible to acknowledge individually everyone who gave support to the Moored Buoy Program in any given year. Ideas from any source are valuable to a growing project and of course the skills of the project support personnel are invaluable. As the Project expanded, more people became involved and specialization started to divide the group into segments. The basic groups became oriented around Instrumentation, Engineering, Operations, Data Processing and of course, the glue that holds us all together, Science.

The instrumentation group became responsible not only for maintaining the instruments but also for improving them and designing equipment to test them for the various malfunctions seen in the lab and in the data.

The engineers design and test new mooring configurations and components to meet more demanding scientific needs.

The operations personnel are also the sea-going personnel. They set and retrieve the moorings and maintain all the equipment necessary for these operations as well as the individual mooring components.

The data processors decode the data and edit out known problems, then arrange the data into forms used by the scientists to interpret the data.

The scientists devise the experiments that the Buoy Group handles and evaluate the returning data.

It is the splendid cooperation among these groups that makes the Buoy Group successful and this Data Report necessary.

The patience and skill of Audrey Williams, who typed the text and tables for this report and of Ann Whitlatch, who prepared the computer plots, is greatly appreciated.

cont fr p 1473A

Data Location

The data collected in 1969 were gathered from four different sites: the Mediterranean Sea, the Gulf Stream, Site L and Site D. Mooring 289 was set in the Mediterranean at 38° 01'N, 04° 59.9'E; moorings 304 and 305 were Gulf Stream moorings at 36° 23.4'N, 70° 00.2'W and 36° 43'N, 70° 00.3'W respectively. Mooring 314 was set at Site L at 34° 02.7'N, 70° 02'W. The rest of the data were collected from moorings set in the vicinity of Site D, 39° 10'N, 70° 00'W. See figures 1 and 2 for positions of the moorings relative to land.

This report presents data from the first part of 1969 only. See W.H.O.I. Ref. 76-41 (unpublished manuscript) for data from late 1969.

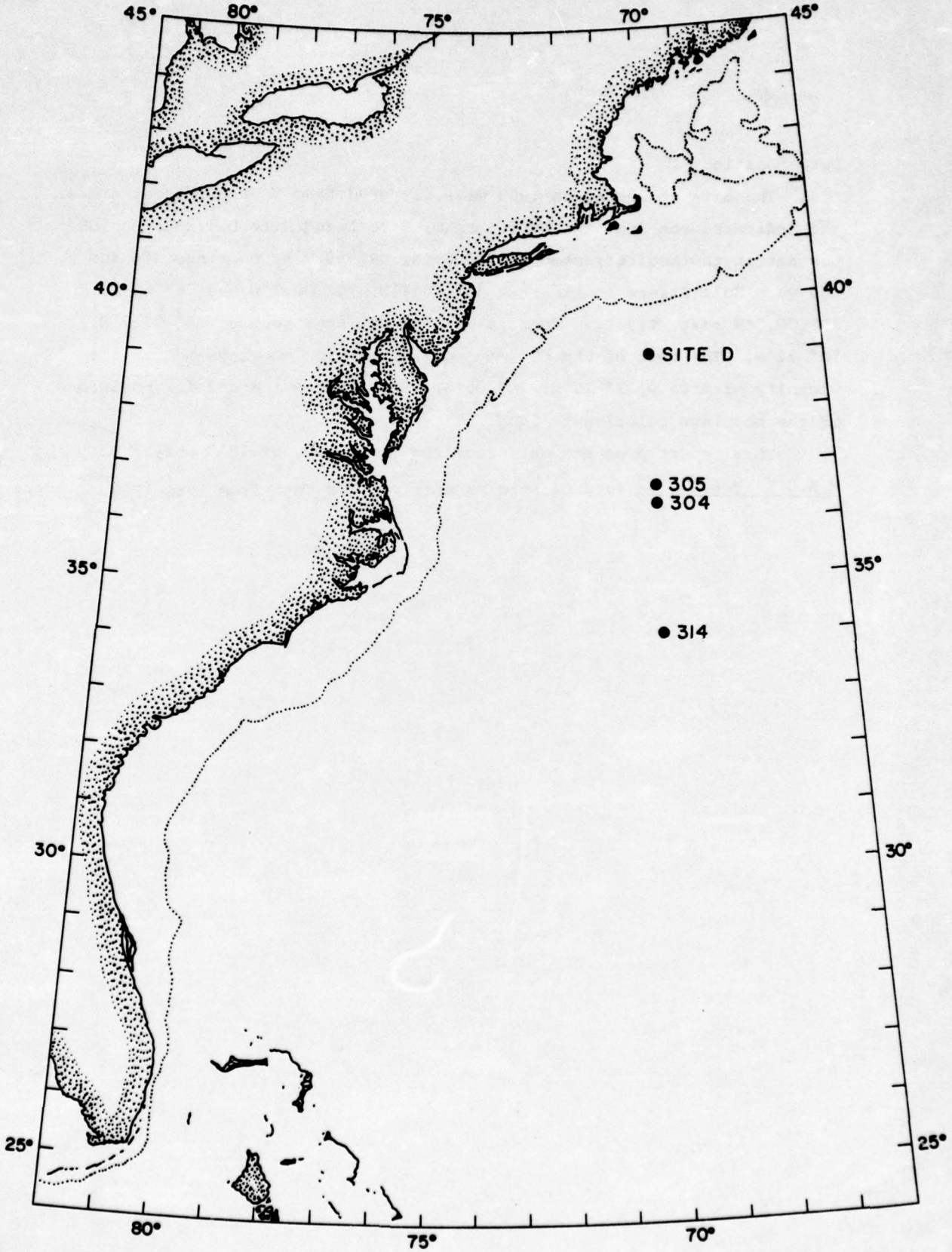


Figure 1 Mooring Sites in N.W. Atlantic

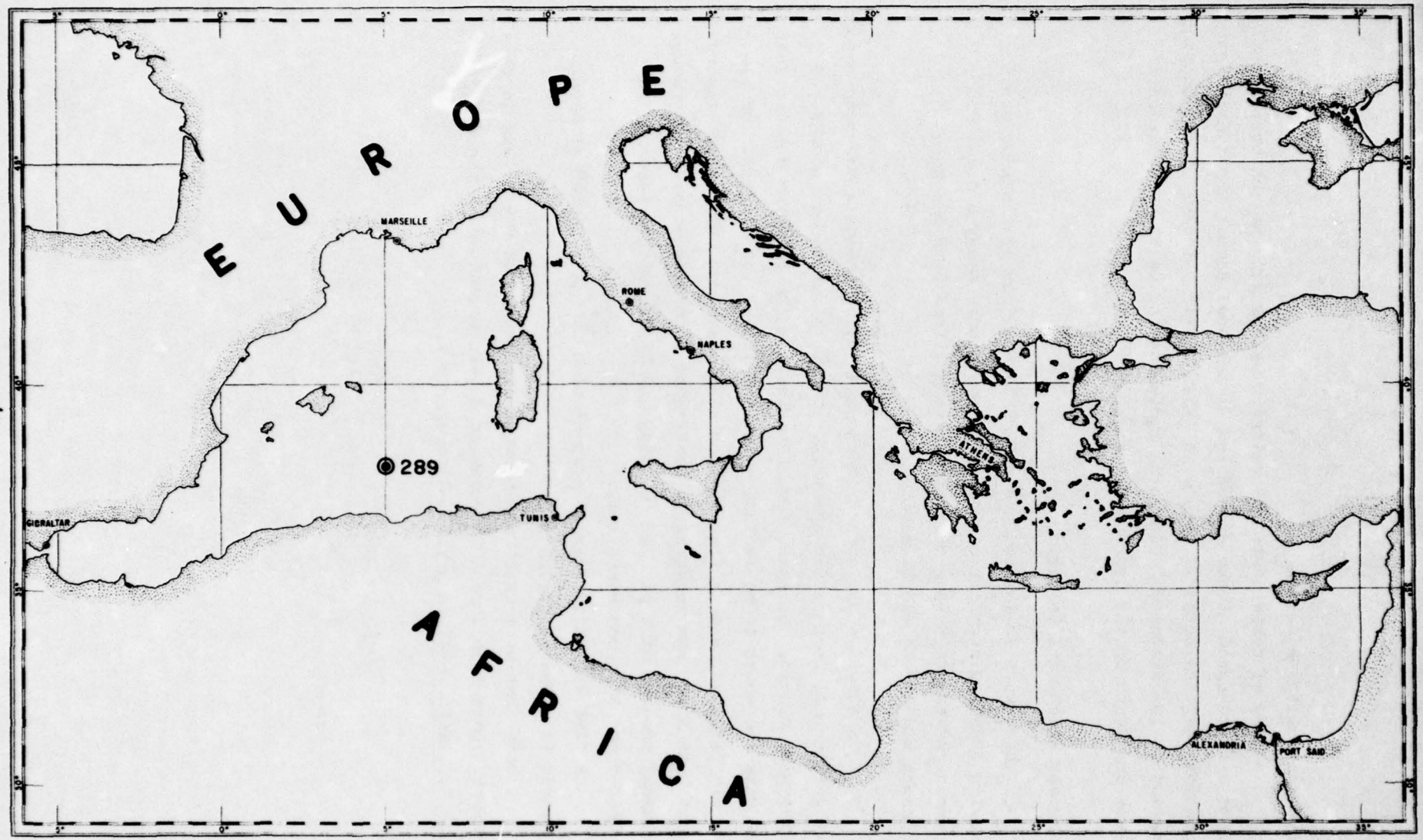


Figure 2 Mooring Site in Mediterranean Sea

Hydrocast Data Selection

Graphs of temperature and salinity values from Nansen bottle readings are presented at the end of the directional data. The hydrographic stations were selected if they were taken within two days of the mooring period in the vicinity. Figure 3A indicates the relative position in time and depth of the hydrocast data.

Current Meter Data Selection

There were 72 instruments set on 35 moorings by the Buoy Group during 1969. Sixty-four of the instruments were Geodyne model 850 current meter and 8 were current meters modified by Woods Hole to measure wind speed and direction.

A data series was chosen if the quality of the data was good enough to permit basic scientific analysis. Thirty-six current records and five wind records met these requirements. Of the rejected data series, 12 were too short to be included; another 11 had various kinds of electronic failures ranging from writing blank tape for one bits to instrument switching from interval to continuous recording mode; 1 instrument flooded because of a pinched 'O' ring and 7 instruments were not recovered and are considered lost.

A TIME vs. DEPTH graphic presentation of the selected 41 data records is shown in figure 3B.

Data that were initiated between January 1 and May 31 are in this report. Data from June 1 to December 31 are presented in the report W.H.O.I. Ref. 76-41 (unpublished manuscript).

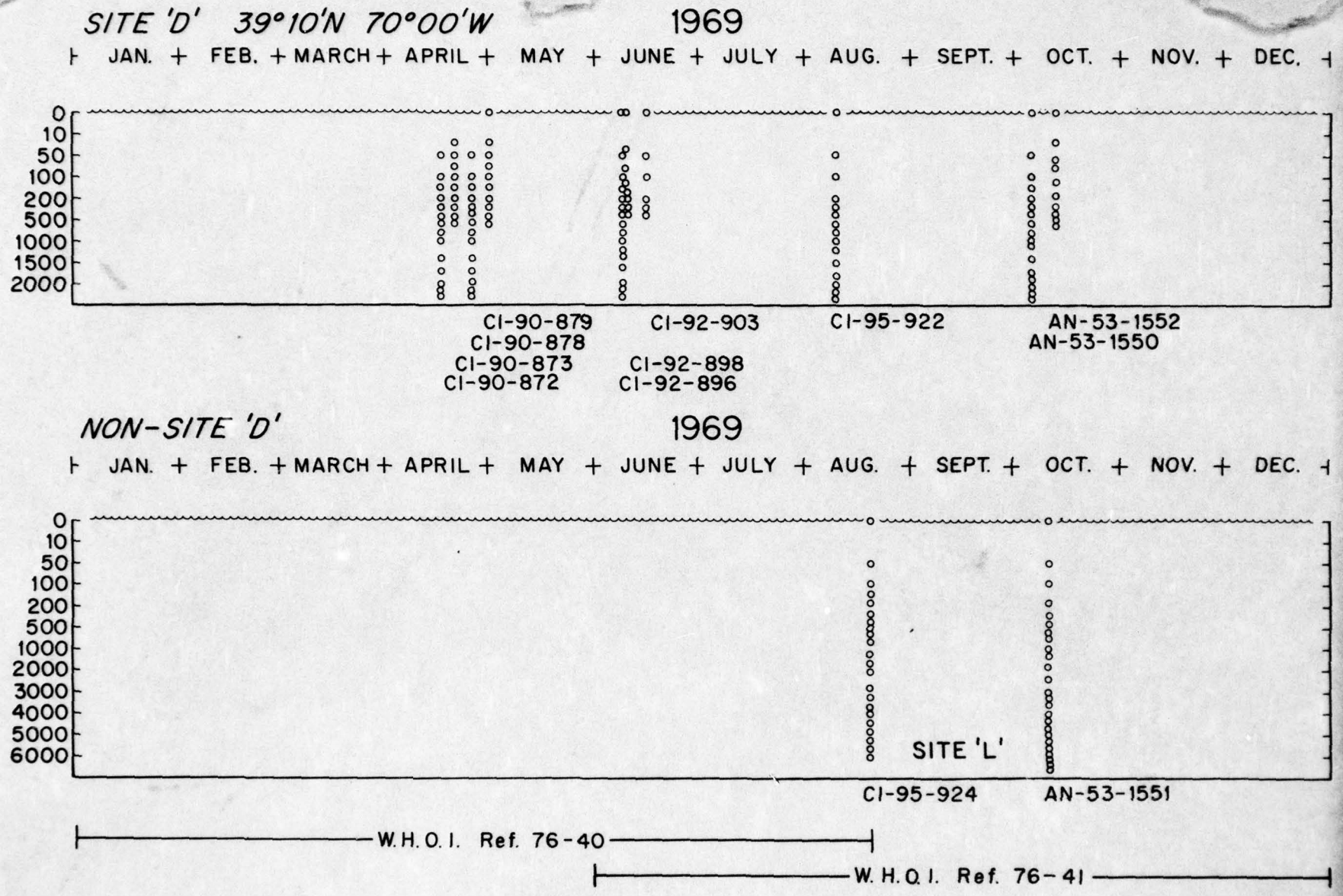


Figure 3A Selected Hydro Stations Collected near Mooring and Plotted According to Date and Sensor Depth

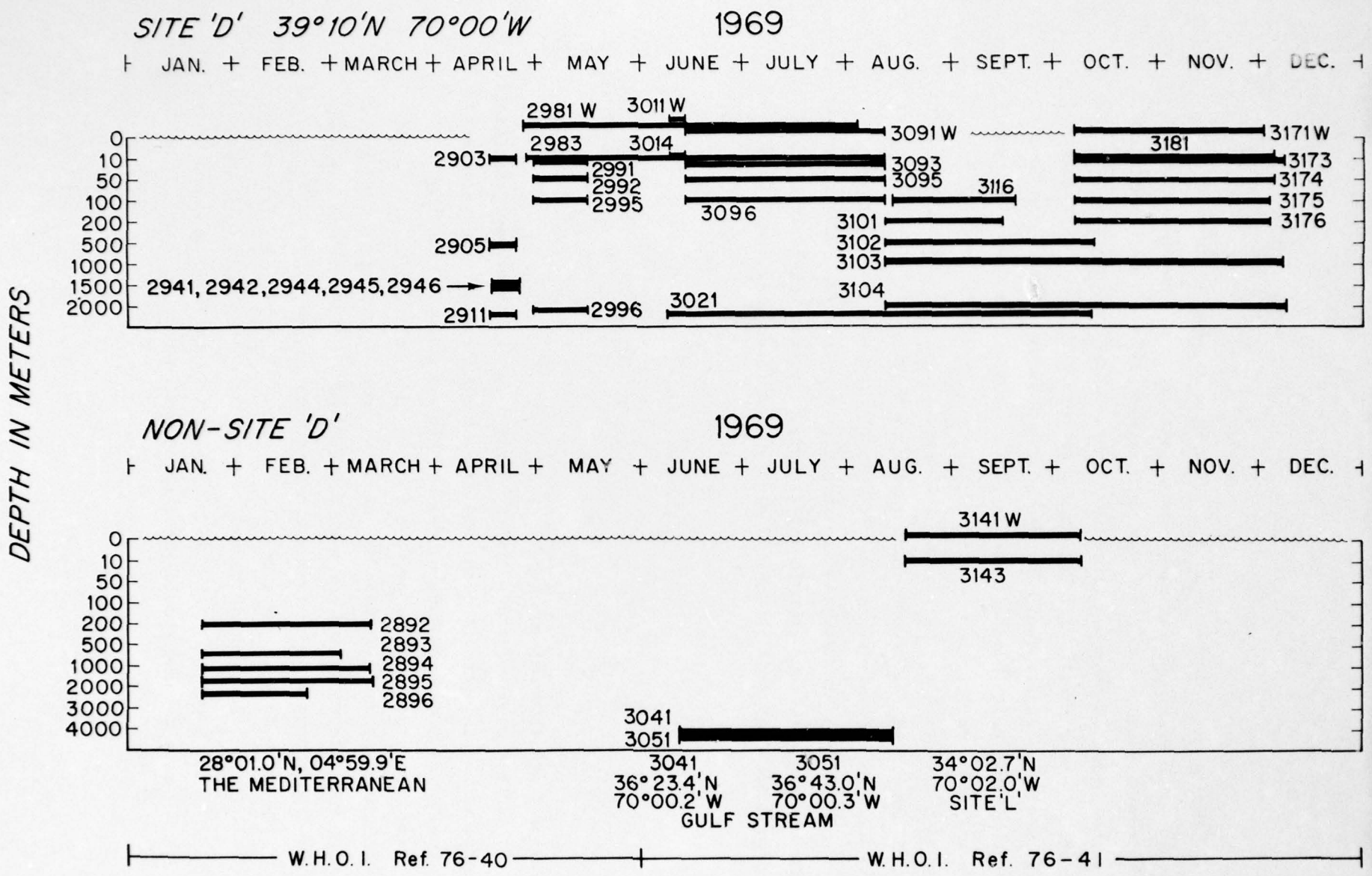


Figure 3B Wind and Current Meter Data Duration Plotted According to Time and Sensor Depth

Clock

During early 1969 the model 850 current meters used two mechanical clocks which were wound up every two minutes by a solenoid, similar to an automobile clock. One of these clocks made 1-hour measurements and the other made 12-hour measurements. The 1-hour clock had a 4 lobe cam on the one-hour shaft which actuated a switch to turn on the recording sequence every 15 minutes. The second clock had a one lobe cam on the 12-hour shaft which also actuated a switch to insert in the data train, a 4 bit instrument number to identify 12-hour record cycles. It also served to re-arm the stop circuit that operates when the tape foil comes up at the end of the second channel of tape to shut off the instrument. The accuracy of these clocks was ±10 seconds per day.

Data times are specified in this report in the following order: year, month, day, hour, minute and second. Therefore 69-IV-16 115712 is April 16, 1969 at 11 hours, 57 minutes and 12 seconds.

Back-up Clock Information

Another time-related activity, first tried in April, puts artificial events at the beginning and the end of each data record. These events, at known real times, provide a check on the accuracy of the clock and in case of a clock problem provide back-up time information with which the accuracy of the time base can be determined. This has proved to be a very valuable procedure for mechanical clock instruments and has also simplified the task of assigning times to data records.

The procedure to place artificial events on tape is as follows:

A) The instrument is turned on and allowed to run for at least two recording intervals with its rotor taped so it cannot move causing a zero rotor speed on tape.

B) During the recording cycles of two succeeding records untape the rotor and spin it to cause a speed spike.

C) Tape the rotor again until just before launch causing more zero rotor speeds.

D) Do not turn either the clock or the recording part of the instrument off between events and launching.

The reverse procedure applies to the recovery of instruments.

The time when the instrument started recording and the times of the rotor spins are recorded according to radio time signals from stations WWV or CHU.

This procedure also is useful with digital clock instruments in cases where the oscillator is correct but the clock word is malfunctioning.

SHEAR TIME

A program called SHEAR TIME was devised to establish best estimates of time for continuous 850 C. M. data. First, provisional linear corrections for the large clock drift rates (minutes per day) were applied, then the intervals between clock switch closures were displayed graphically. The time rate could then be adjusted with as many linear rate changes as needed to smooth the variations in the switch closures. SHEAR TIME was only used on continuous 850 current meter data which used mechanical clocks for a time base.

Data Editing

Data from both the old mechanical clock model 850 and the new crystal clock model 850 are recorded on 1/4" magnetic tape. The data were transcribed onto computer compatible 7-track tape using a PDP-5 computer (manufactured by Digital Equipment Co.). The data were then converted to Maltais format (J. Maltais, 1969) on 9-track magnetic tape.

Once the data are on tape in Maltais format, various types of editing can be done such as replacing values that are obviously bad or removing systematic instrumental errors. After the data have been edited they are vector averaged over each recording interval to give one velocity vector per interval. These vectors are listed in terms of speed and direction. The launch and retrieval transients are truncated and any remaining bad points are deleted and replaced by linearly interpolated values. The result is an evenly spaced time series called the best basic vector averaged series which is used as input for all further processing.

To insure that each data series has a unique identifier, a set of informal guidelines has been established. For example, 2981WL900

298 - The first three digits are the mooring number.

1 - The fourth digit indicates the position of the instrument on the mooring counting from the top down.

W - When present "W" signifies a wind recorder, a "Y" would signify that the data has been read by eye.

L - Indicates that some editing has been done. The amount of editing done can usually be inferred by the position of the letter in the alphabet. If no editing has been done the symbol $ is used.

900 - The averaging interval, 900 seconds. 1H would indicate a 1-hour averaging interval.

Data Presentation

Data from wind and current recording instruments are presented first, followed by a section of selected hydrostation data.

The data from each mooring follow a two-page description of that mooring. The data from each selected series are presented with 1 page of instrument information and 3 pages of data displays.

Mooring Summary

The first page of the mooring summary is a diagram of the mooring. The second page contains general information on the mooring. For more detailed information on the moorings set in 1969 see G. Volkmann, 1970, W.H.O.I. Ref. 70-37 (unpublished manuscript).

The mooring page uses the following:

*	data presented
M.C.M.	magnetic tape recording current meters
M.W.R.	magnetic tape recording wind recorders
Tens.	tensiometer
Tel. Tens.	telemetering tensiometer
D.R.	depth recorder
Temp.	temperature recorder
Volt. Dig.	voltage digitizer
Vib/Ten	tensiometer with accelerometer added to measure vibration
Press. Rec.	pressure recorder

Data Summary

The first page of the data summary lists the main features of the data series collected from that instrument. The type of instrument, the sampling scheme, and the timing of the sampling are listed as are the start and stop times of the useable data. All times are Greenwich Mean Time. If the instrument did not work properly, comments on its behavior and the data quality are written under the comments section. Some standard statistical parameters are calculated for the data and are presented on the bottom of the first page. The formulas used to calculate the statistical parameters and descriptions of the various plots used to present the data on the following three pages are described below.

Histograms

Histograms of speed are plotted. The plots may be thought of as approximations to the probability density functions. The vertical axis labeled "relative frequency per unit cell width" shows the percentage of the total record that occurred within a given interval of the horizontal axis. The area under the curve equals 100%.

Statistics (STATS)

Standard statistical parameters are calculated for data in the time range given at the bottom of the table. If there are n speed and direction values in a sample, and we define $E_i = s_i \sin\Theta_i$, $N_i = s_i \cos\Theta_i$, then for $A = E, N,$ and s,

$$\text{mean, } \bar{A} = \frac{1}{n}\sum_{i=1}^{n} A_i$$

$$\text{variance, } \sigma_A^2 = \frac{1}{n}\sum_{i=1}^{n} A_i^2 - \bar{A}^2$$

$$\text{standard error of the mean} = \frac{\sigma_A}{\sqrt{n}}$$

$$\text{standard deviation} = \sigma_A$$

$$\text{skewness} = \frac{1}{\sigma_A^3}\left[\frac{1}{n}\sum_{i=1}^{n} A_i^3 - \frac{3\bar{A}}{n}\sum_{i=1}^{n} A_i^2 + 2\bar{A}^3\right]$$

$$\text{kurtosis} = \frac{1}{\sigma_A^4}\left[\frac{1}{n}\sum_{i=1}^{n} A_i^4 - \frac{4\bar{A}}{n}\sum_{i=1}^{n} A_i^3 + \frac{\overline{6A}^2}{n}\sum_{i=1}^{n} A_i^2 - 3\bar{A}^4\right]$$

The program also computes "East and North" statistics,

$$\text{covariance, } M = \frac{1}{n}\sum_{i=1}^{n} E_i N_i - \bar{E}\,\bar{N}$$

$$\text{standard deviation of covariance, } \sigma_m = \frac{1}{n}\sum_{i=1}^{n} (E_i N_i)^2 - \overline{E_i N_i}^2$$

$$\text{standard error of covariance} = \frac{\sigma_m}{\sqrt{n}}$$

$$\text{correlation coefficient, } M' = \frac{M}{\sigma_E \sigma_N}.$$

STATS also computes these parameters related to vector quantities: the scalar amplitude of the vector mean, $V_m = \sqrt{\bar{E}^2 + \bar{N}^2}$; vector variance, $V_v^2 = \frac{1}{2}(\sigma_E^2 + \sigma_N^2)$; standard deviation = V_v.

East vs. North Scatterplot

The EAST and NORTH components are plotted against each other to give a pictorial indication of the DIRECTION and SPEED of the velocity vectors. This type plot can be helpful in finding instrument malfunctions and characteristics not easily noticed elsewhere.

Progressive Vector Diagram (PROVEC)

The EAST and NORTH progressive displacements are computed from the SPEED and DIRECTION values of one recording cycle. The plot begins with

an asterisk (*) on a day boundary. All following day boundaries are indicated with a (+). This type of plot accentuates very low frequency events at the expense of higher frequency oscillations which may be hidden by a large amplitude low-frequency current.

Variable vs. Time Plot

This is a diagram of EAST and NORTH components plotted as a function of TIME. The plot is generated from the basic vector averaged series. This type of plot is complementary to the PROGRESSIVE VECTOR diagram since it accentuates higher frequency events such as inertial and tidal oscillations.

Spectra

The program TIMSAN (Time Series Analysis) uses the Fast Fourier Transform algorithm of Singleton (1969) and is restricted to data segments of length N points, where N must contain no prime factor larger than 5, and must be less than 8000 points; data series longer than this must be broken into two or more pieces.

The number of degrees of freedom for the first 40 plotted points is given by $\nu = a\ m\ s$ where m is the number of adjacent frequency bands being averaged as stated in the label, s is the number of independent data pieces being averaged, again as stated in the label, and a should be two for temperature spectra and for Horizontal Kinetic [HKE] spectra for which the EAST and NORTH components seem statistically independent. In the absence of information regarding NORTH-EAST correlation, one should use $a = 2$ to be safe.

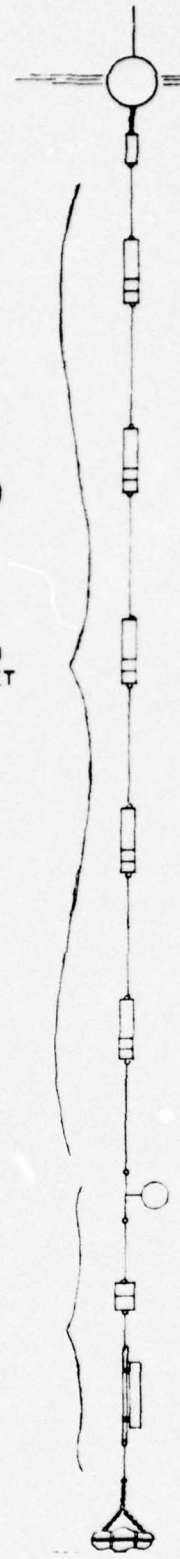
The log-log plot is further averaged during plotting so that more and more points are averaged together as frequency increases. This eliminates the bunching together of points at high frequencies, increases the degrees of freedom of the high frequency estimates, and still permits low-frequency resolution. The averaging algorithm is as follows: counting from the left of the plot, the first 40 plotted points represent data that has been averaged as stated in the label; the data for the next 15 plotted points has been averaged over twice as many frequency bands;

the next 6 over five times as many, the next 40 over ten times as many, the next 15 over twenty times as many, the next 6 over fifty times as many, the next 40 over 100 times as many and so on. In this way, for example, 7900 data points with no averaging indicated in the label would be plotted as only 176 points, and the last 14 estimates would be averaged over 200 basic frequency bands. The m in the formula $\nu = a\ m\ s$ for degrees of freedom is, in this example, 200 times larger at the highest frequencies than at the lowest frequencies.

For $\nu > 30$, the confidence limits for the spectral estimates are given approximately by $(1 - 2/9\nu \pm Z\sqrt{2/9\nu}^{1/3}$ where $Z = 1.28375$ for 80% confidence limits, $Z = 1.645$ for 90%, $Z = 1.96$ for 95% and $Z = 2.5757$ for 99%. In the example above, if the HKE spectral plot label had indicated 2 pieces and averaging over 8 adjacent frequency bands then $\nu = 2 \times 2 \times 8 = 32$ for the lowest 40 frequencies (assuming NORTH and EAST components are highly correlated) and $200 \times 32 = 6400$ for the highest frequencies. The 95% confidence intervals (i.e., 95% of the time one would expect the spectral estimates to vary no more than this much) would be (0.57, 1.55) at low frequencies, and (0.97, 1.03) at high frequencies.

For $\nu \leq 30$, one must obtain confidence intervals from Chi-Squared distribution tables in standard statistical references.

STATION 289



4 FT ORE SPHERE WITH LIGHT AND SPHERE

1 m CHAIN

PRESSURE RECORDER - *2891*

100 m

CURRENT METER - *2892*

500 m

CURRENT METER - *2893*

500 m

1/8" TOW CABLE WITH POLYETHYLENE JACKET

CURRENT METER - *2894*

500 m

CURRENT METER - *2895*

500 m

CURRENT METER - *2896*

400 m

66 m

85 m NYLON WITH 29 GLASS SPHERES SPACED EVENLY APART

ACOUSTIC BEACON

5/8" PLAITED NYLON

10 m

ACOUSTIC RELEASE, AMF

15 m

3 m CHAIN

2 1,500 LB STIMSON ANCHORS

Mooring No. 289

Set 69 (Year) Jan (Month) 22 (Day) — 38° 01.0N (Latitude) — 04° 59.9E (Longitude)

Set by R. Heinmiller Ship R. V. Atlantis II Cruise 49

Retrieved 69 (Year) Mar (Month) 12 (Day)

Retrieved by J. Gifford Ship R. V. Atlantis II Cruise 49

Purpose of Mooring: To investigate vertical distribution of inertial disturbances on the south side of an enclosed basin (the Mediterranean).
Mooring Type: Subsurface

Data Number	Instrument Number	Type	Depth Meters	Comments
2891	T-463	Press. Rec.	123	
2892*	M-209	M.C.M.	211	
2893*	M-205	M.C.M.	713	
2894*	M-206	M.C.M.	1215	
2895*	M-210	M.C.M.	1717	
2896*	M-211	M.C.M.	2219	
Water Depth			2833	

COMMENTS ON MOORING:

Data number 2892

Instrument No.: M-209 **Type:** Magnetic tape current meter

Depth: 211 m **Water depth:** 2833 m

Start time: 69-I-23 001900

Stop time: 69-III-12 101900

Duration: 48d 10h

Sampling scheme: Interval

time between strobes	=	5	seconds
no. of strobes per interval	=	24	
interval time	=	900	seconds

COMMENTS:

The clock information on this data file was extensively edited by Dr. H. Perkins for his thesis. The data presented here have had bad data values removed but not the Perkins time adjustment. Time difference is less than two hours.

STATS DATA/ 28920900

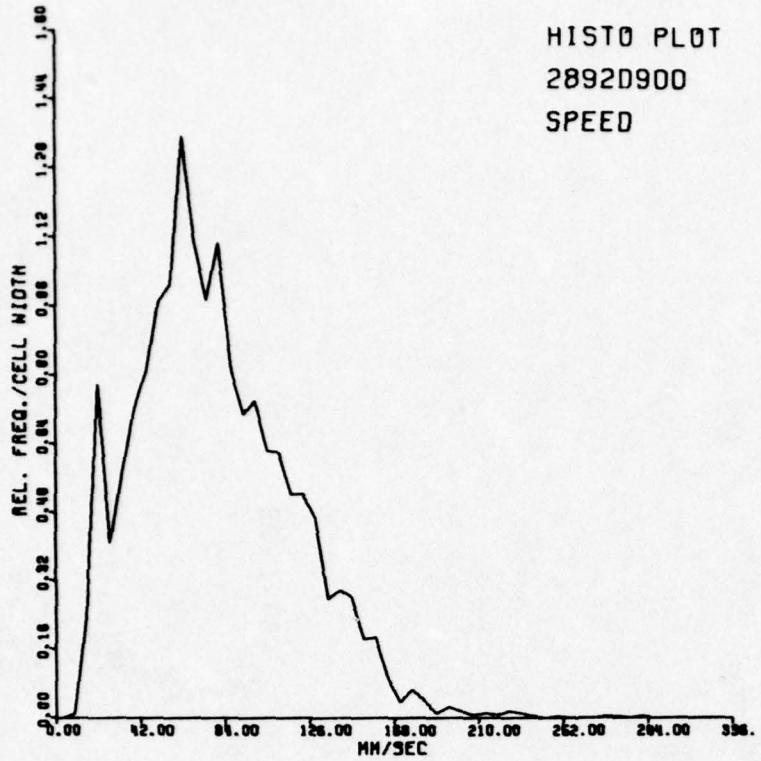
	EAST	NORTH	SPEED	#####	EAST & NORTH	#####
MEAN =	-8.95	20.71	78.66	# COVARIANCE	=	-322.93
STD. ERR. =	.83	.82	.56	# STD. ERR. OF COVARIANCE	=	52.73
VARIANCE =	3164.81	3963.43	1448.73	# STD. DEV. OF COVARIANCE	=	3595.48
STD. DEV. =	56.26	62.96	38.08	# CORRELATION COEFFICIENT	=	-.091
KURTOSIS =	2.42	2.81	3.61	# VECTOR MEAN	=	22.56
SKEWNESS =	-.15	.18	.66	# VECTOR VARIANCE	=	3564.17
				# STD. DEV.	=	59.70

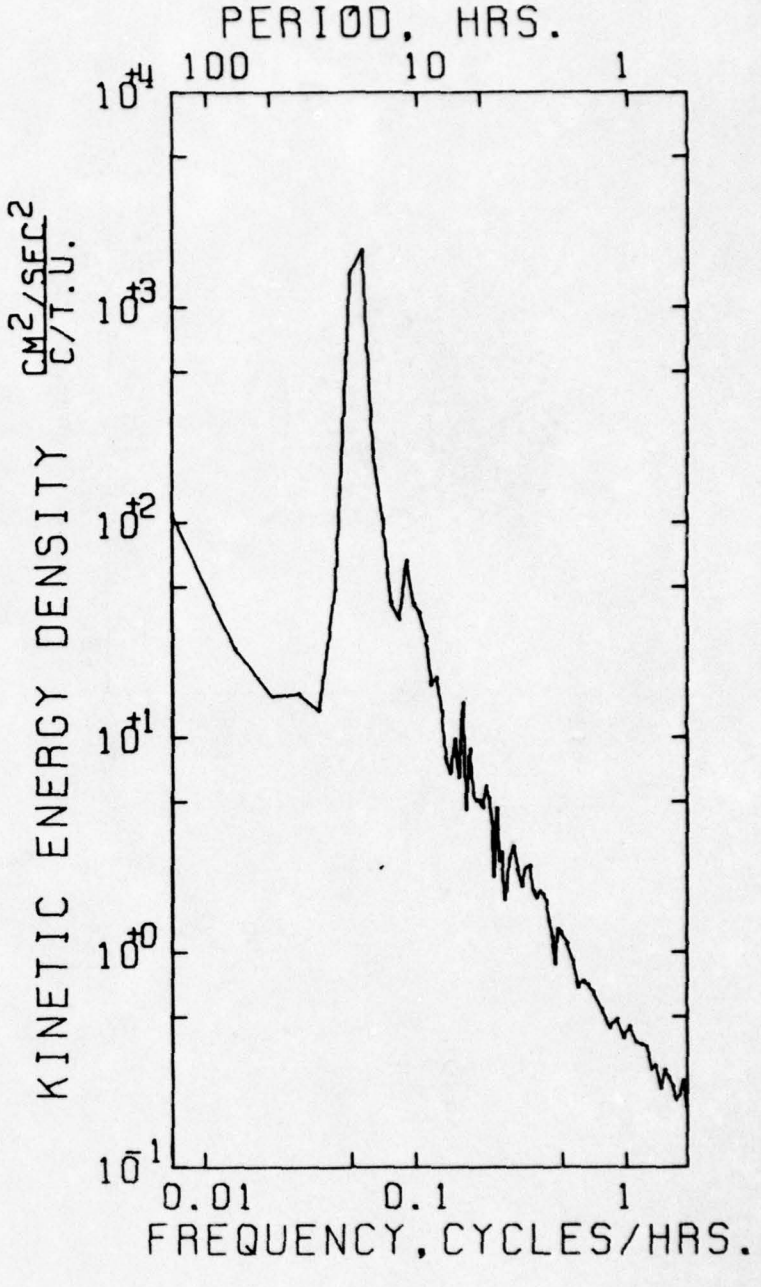
UNITS OF RAW DATA VARIABLES = MM/SEC

SAMPLE SIZE = 4848 POINTS

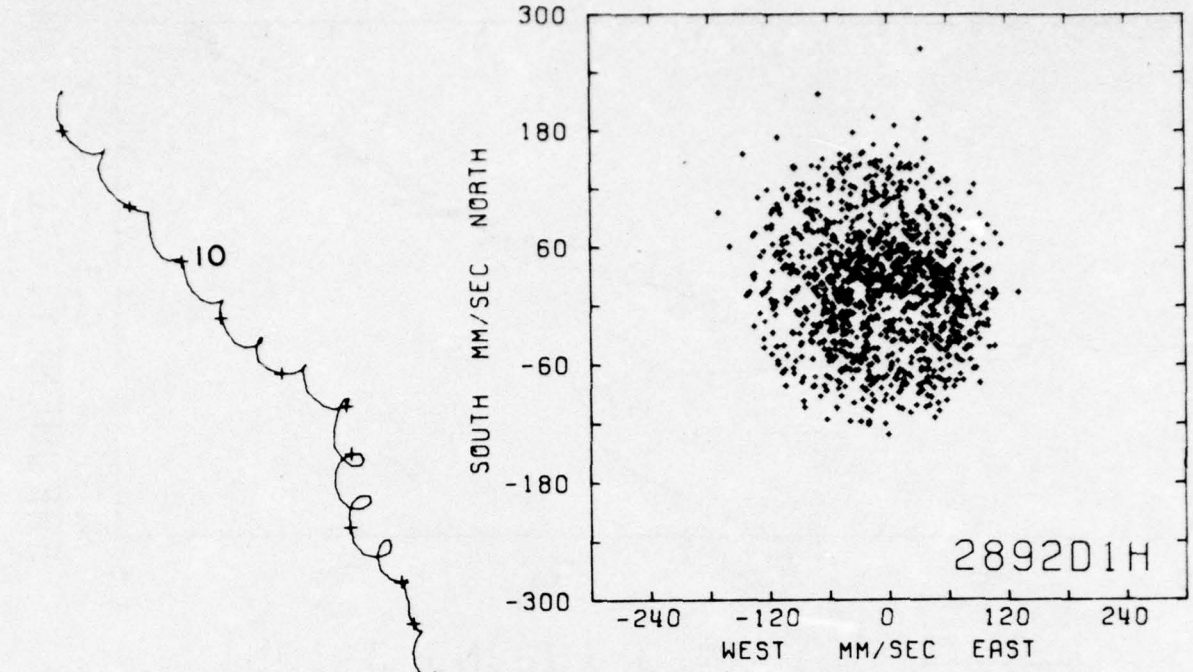
SPANNING RANGE
FROM 69- I -23 00.18.00
TO 69- III-12 10.18.00

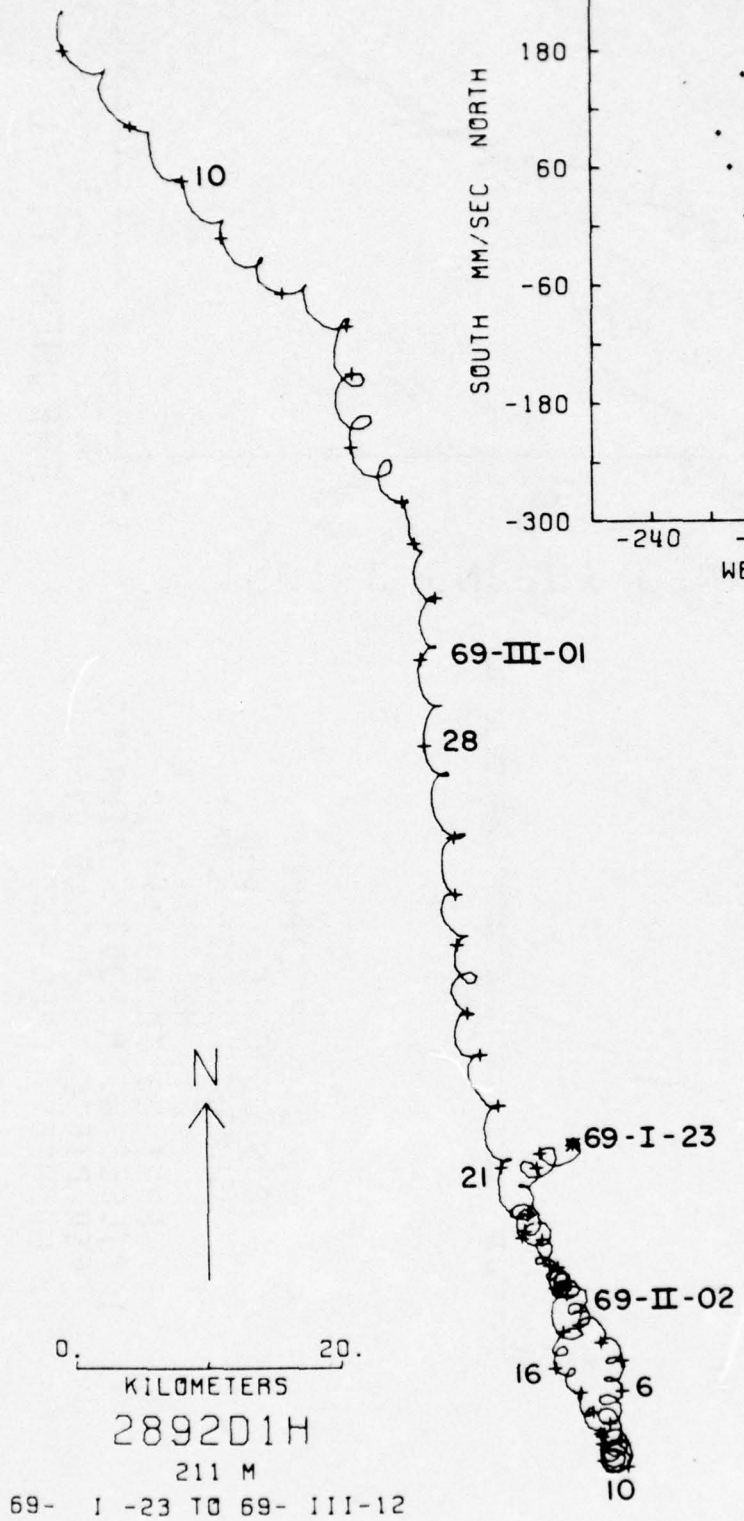
DURATION 48 DAYS 10 H 0 M 0 S





AUTO SPECTRUM
28920900 EAST COMP
28920900 NORTH COMP
211 METERS
69-I-23 TO 69-III-12
1 PIECES WITH 2304 ESTIMATES
PER PIECE. AVERAGED OVER
8 ADJACENT FREQUENCY BANDS


300
180
60
-60
-180
-300
SOUTH MM/SEC NORTH
-240
-120
0
120
240
WEST MM/SEC EAST
2892D1H


10
69-III-01
28
69-I-23
21
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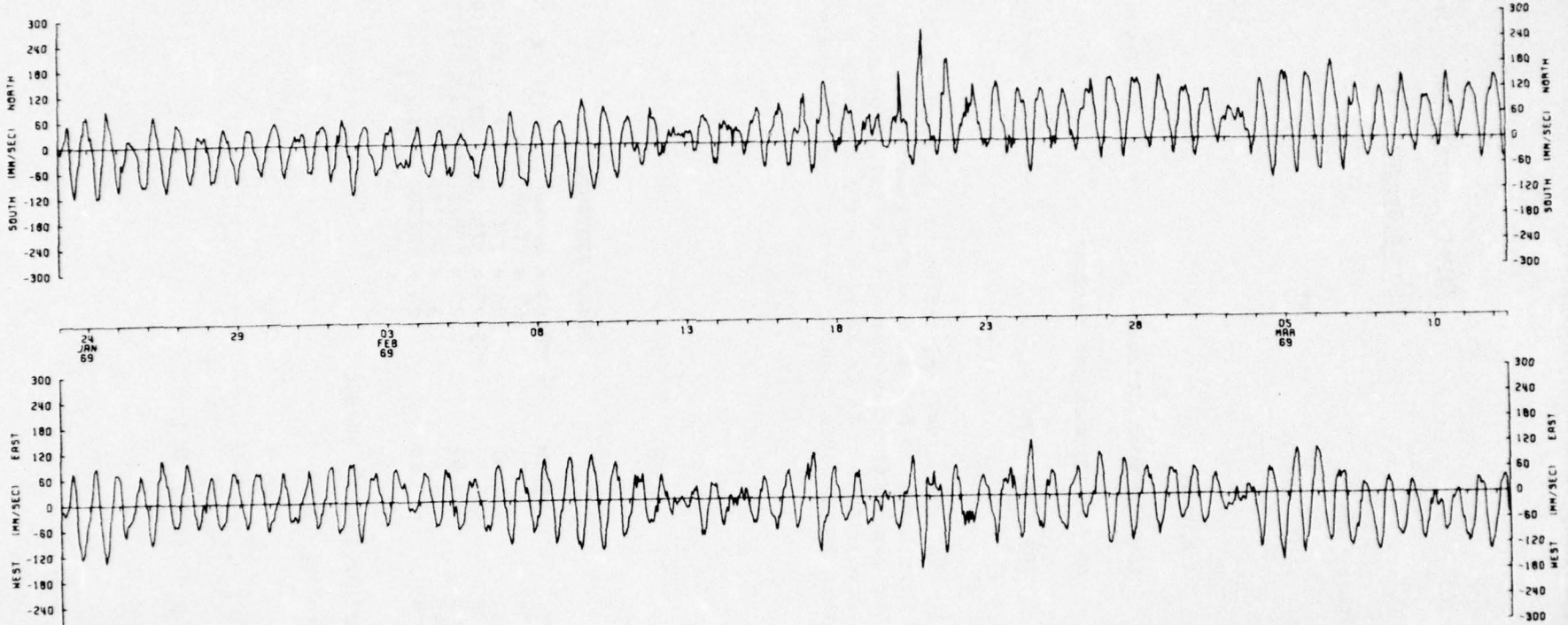
KILOMETERS
2892D1H
211 M
69- I -23 TO 69- III-12



289201H
211 M

Data number 2893

Instrument No.: M-205 **Type:** Magnetic tape current meter

Depth: 713 m **Water depth:** 2833 m

Start time: 69-I-22 225800

Stop time: 69-III-03 174300

Duration: 39d 18h 45m

Sampling scheme: **Interval**

time between strobes	=	5	**seconds**
no. of strobes per interval	=	24	
interval time	=	900	**seconds**

COMMENTS:

This data file was extensively edited by Dr. H. Perkins for his thesis. The data presented here have had bad data values removed but not the Perkins time adjustment. The time difference between the edited data and the collected data is about 8 days. It is as if the collected data had sampled at a rate greater than 900 seconds causing fewer records therefore less time.

STATS DATA/ 28930900

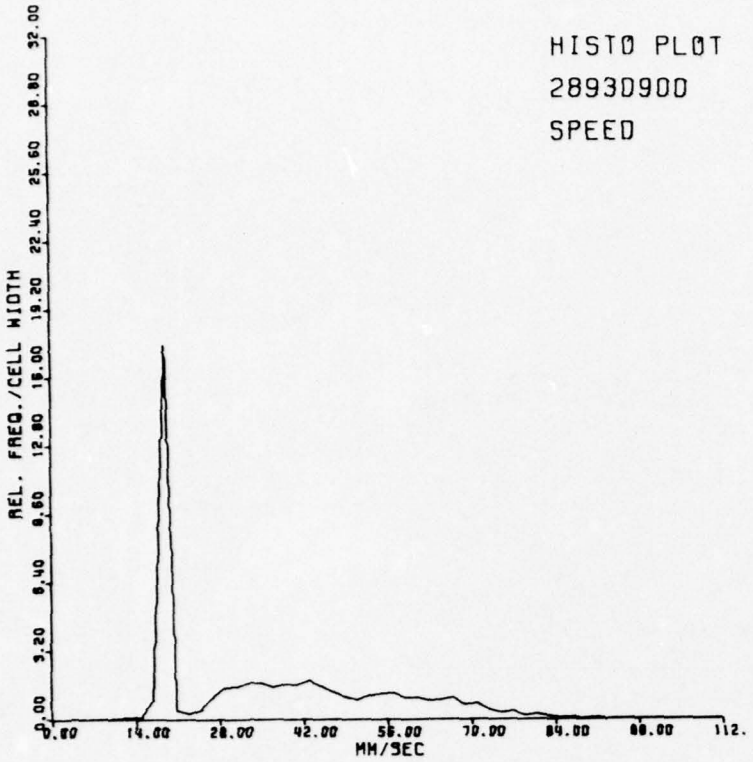
	EAST	NORTH	SPEED			
MEAN =	-14.79	-7.01	35.97	# #####	EAST & NORTH	#####
STD. ERR. =	.43	.41	.30	# COVARIANCE	=	-117.12
VARIANCE =	710.46	648.86	333.27	# STD. ERR. OF COVARIANCE	=	12.79
STD. DEV. =	26.65	25.47	18.26	# STD. DEV. OF COVARIANCE	=	780.61
KURTOSIS =	2.85	9.27	2.31	# CORRELATION COEFFICIENT	=	-.172
SKEWNESS =	.19	-.20	.65	# VECTOR MEAN	=	16.37
				# VECTOR VARIANCE	=	679.66
				# STD. DEV.	=	26.07

UNITS OF RAW DATA VARIABLES = MM/SEC

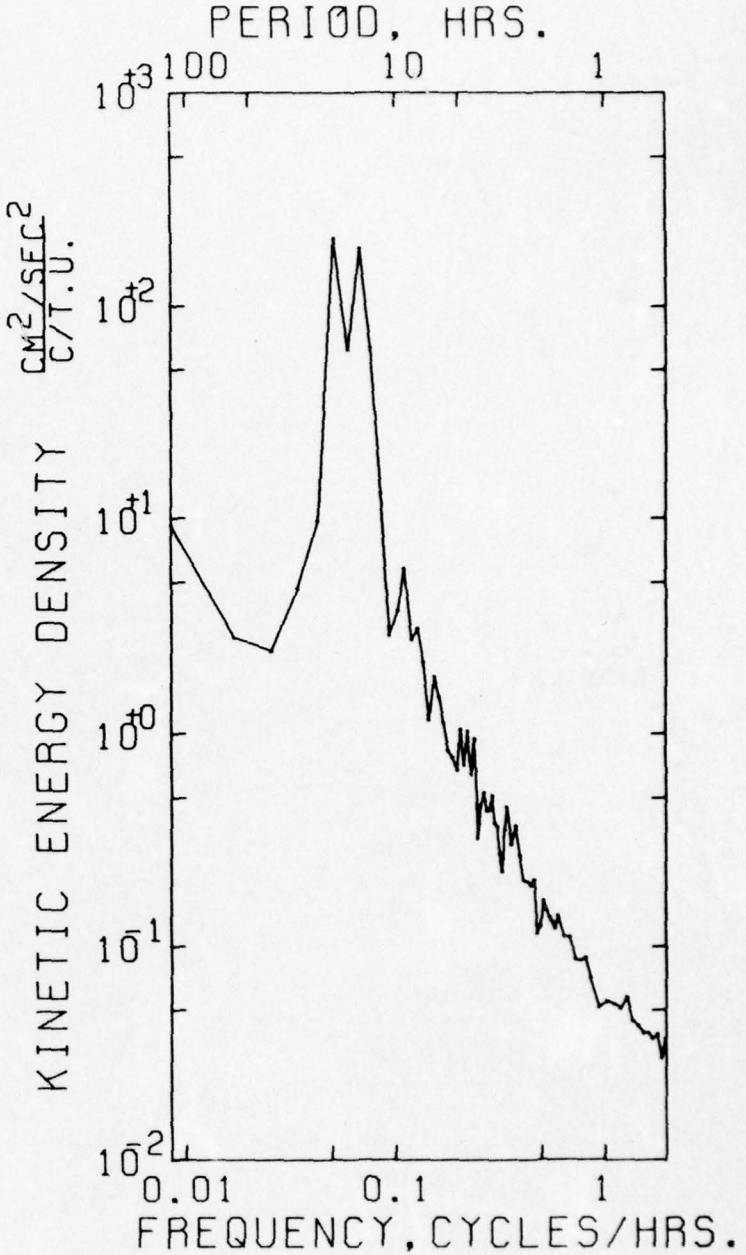
SAMPLE SIZE = 3020 POINTS

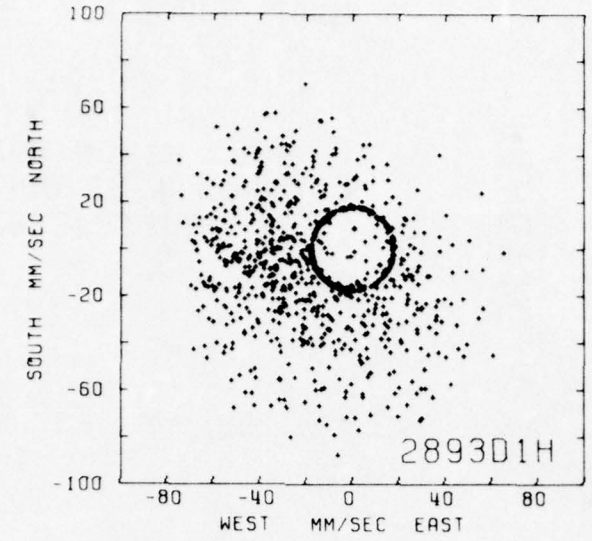
SPANNING RANGE
FROM 69- I -22 22.58.00
TO 69- III-03 17.43.00

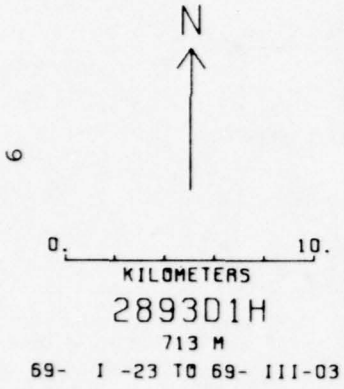
DURATION 39 DAYS 18 H 45 M 0 S

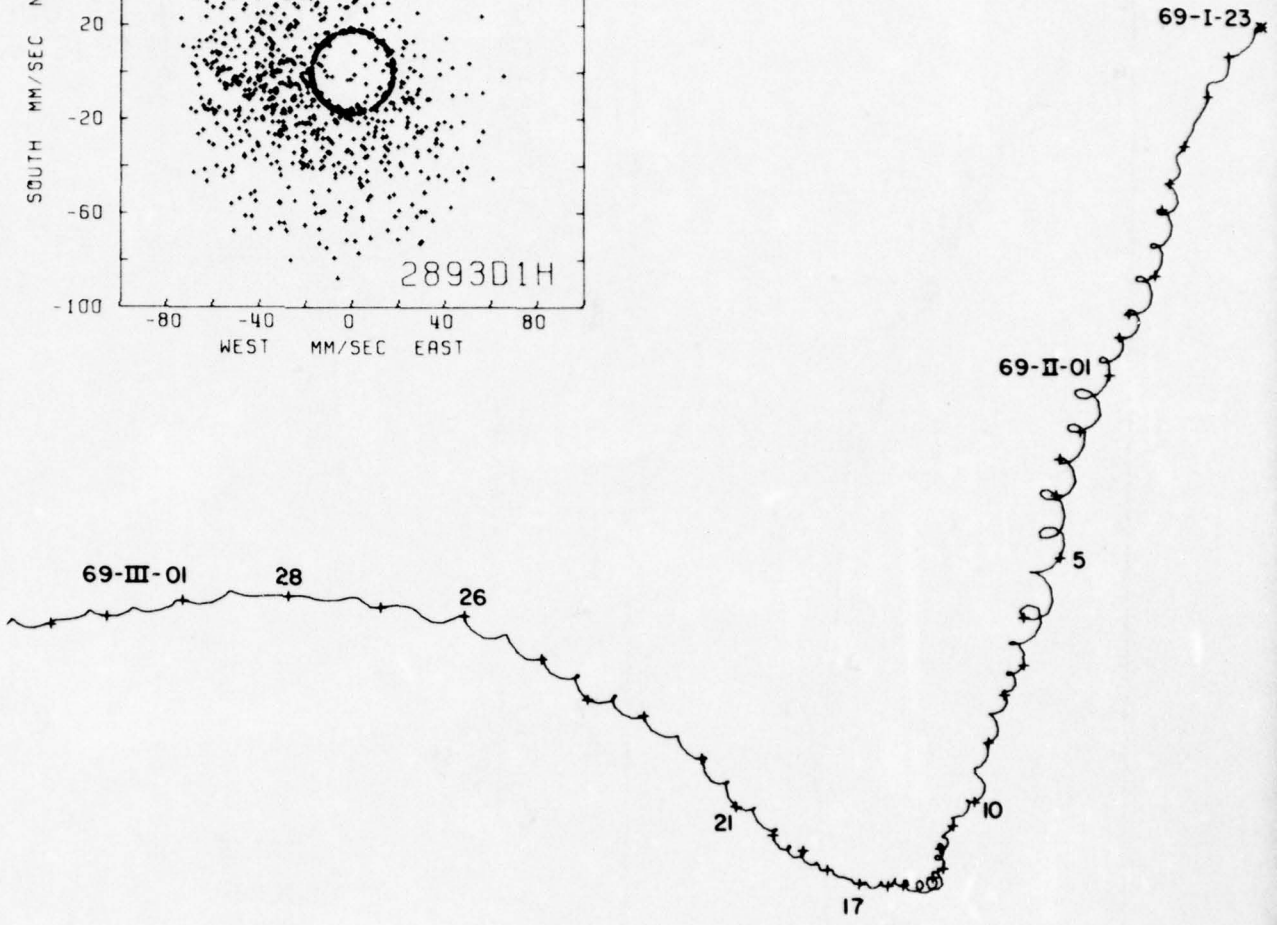


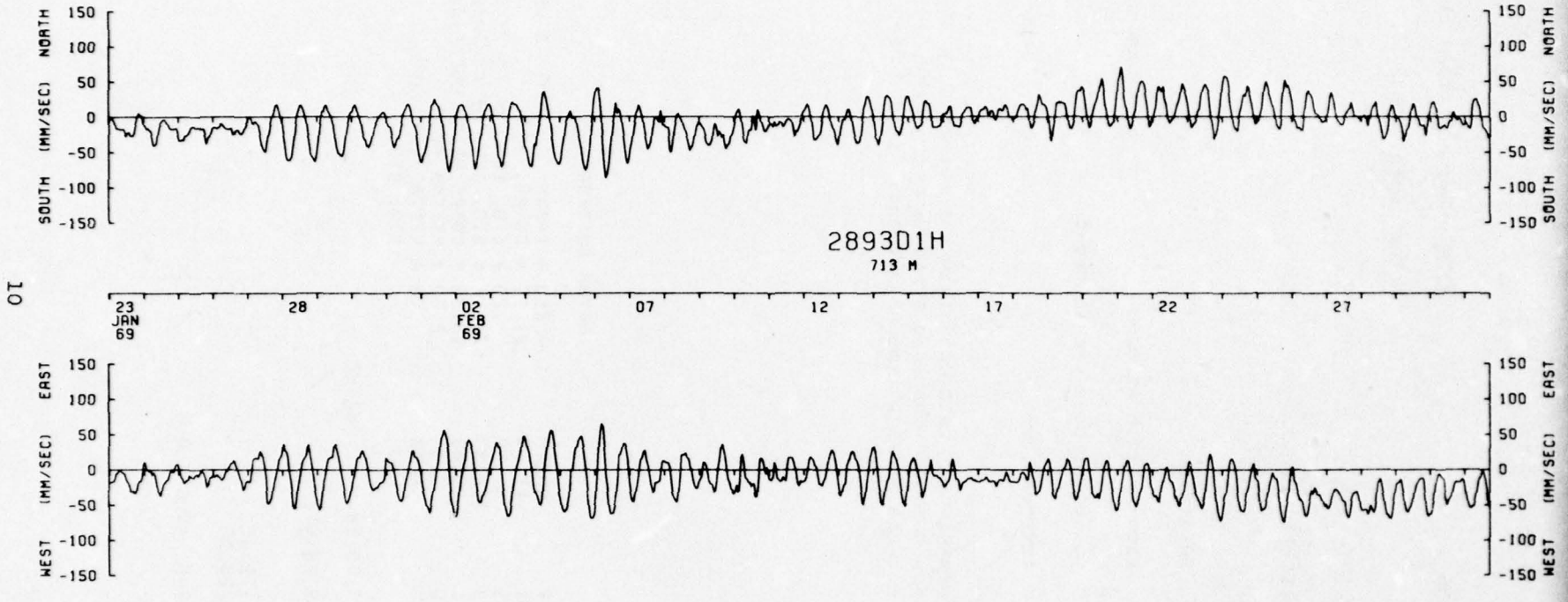
AUTO SPECTRUM
2893D900 EAST COMP
2893D900 NORTH COMP
713 METERS
69-I-22 TO 69-III-03
1 PIECES WITH 1875 ESTIMATES
PER PIECE. AVERAGED OVER
8 ADJACENT FREQUENCY BANDS




100
60
20
-20
-60
-100
SOUTH MM/SEC NORTH
-80
-40
0
40
80
WEST MM/SEC EAST
289D1H


N
0.
10.
KILOMETERS
289D1H
713 M
69- I -23 TO 69- III-03


69-I-23
69-II-01
5
10
17
21
26
28
69-III-01


SOUTH (MM/SEC) NORTH
150
100
50
0
-50
-100
-150
2893D1H
713 M
23
JAN
69
28
02
FEB
69
07
12
17
22
27
WEST (MM/SEC) EAST

Data number 2894

Instrument No.: M-206 **Type:** Magnetic tape current meter

Depth: 1215 m **Water depth:** 2833 m

Start time: 69-I-22 232500

Stop time: 69-III-11 122500

Duration: 47d 13h

Sampling scheme: Interval

time between strobes	=	5	seconds
no. of strobes per interval	=	24	
interval time	=	900	seconds

COMMENTS:

The clock information on this data file was extensively edited by Dr. H. Perkins for his thesis. The data presented here have had bad data values removed but not the Perkins time adjustment. Time difference is less than two hours.

STATS DATA/ 2894F900

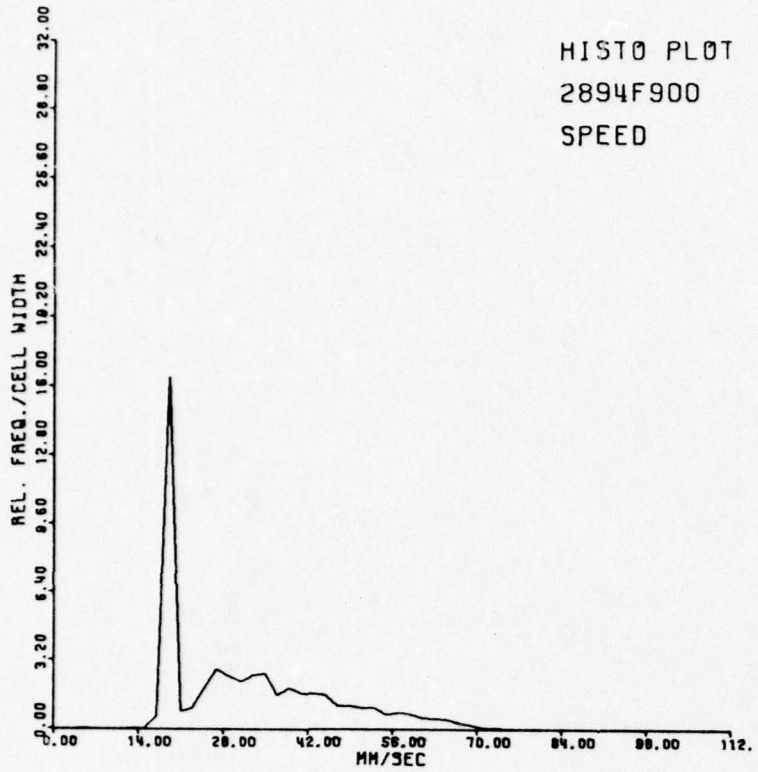
	EAST	NORTH	SPEED	#####	EAST & NORTH	#####
MEAN =	-13.61	-11.26	31.17	# COVARIANCE =		-109.76
STD. ERR. =	.31	.28	.20	# STD. ERR. OF COVARIANCE =		7.31
VARIANCE =	445.70	393.37	178.18	# STD. DEV. OF COVARIANCE =		484.20
STD. DEV. =	21.11	19.83	13.39	# CORRELATION COEFFICIENT =		-.262
KURTOSIS =	2.69	2.81	2.69	# VECTOR MEAN =		17.66
SKEWNESS =	.04	-.06	.78	# VECTOR VARIANCE =		419.54
				# STD. DEV. =		20.48

UNITS OF RAW DATA VARIABLES = MM/SEC

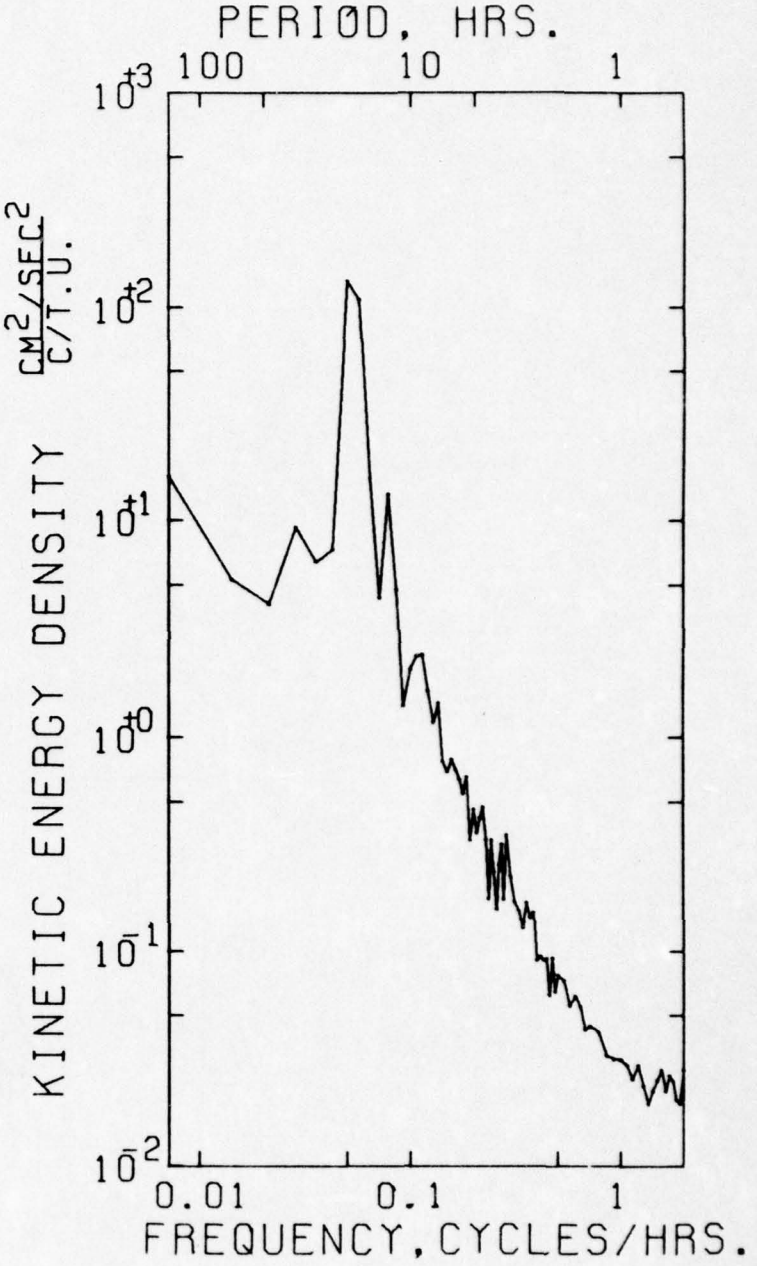
SAMPLE SIZE = 4565 POINTS

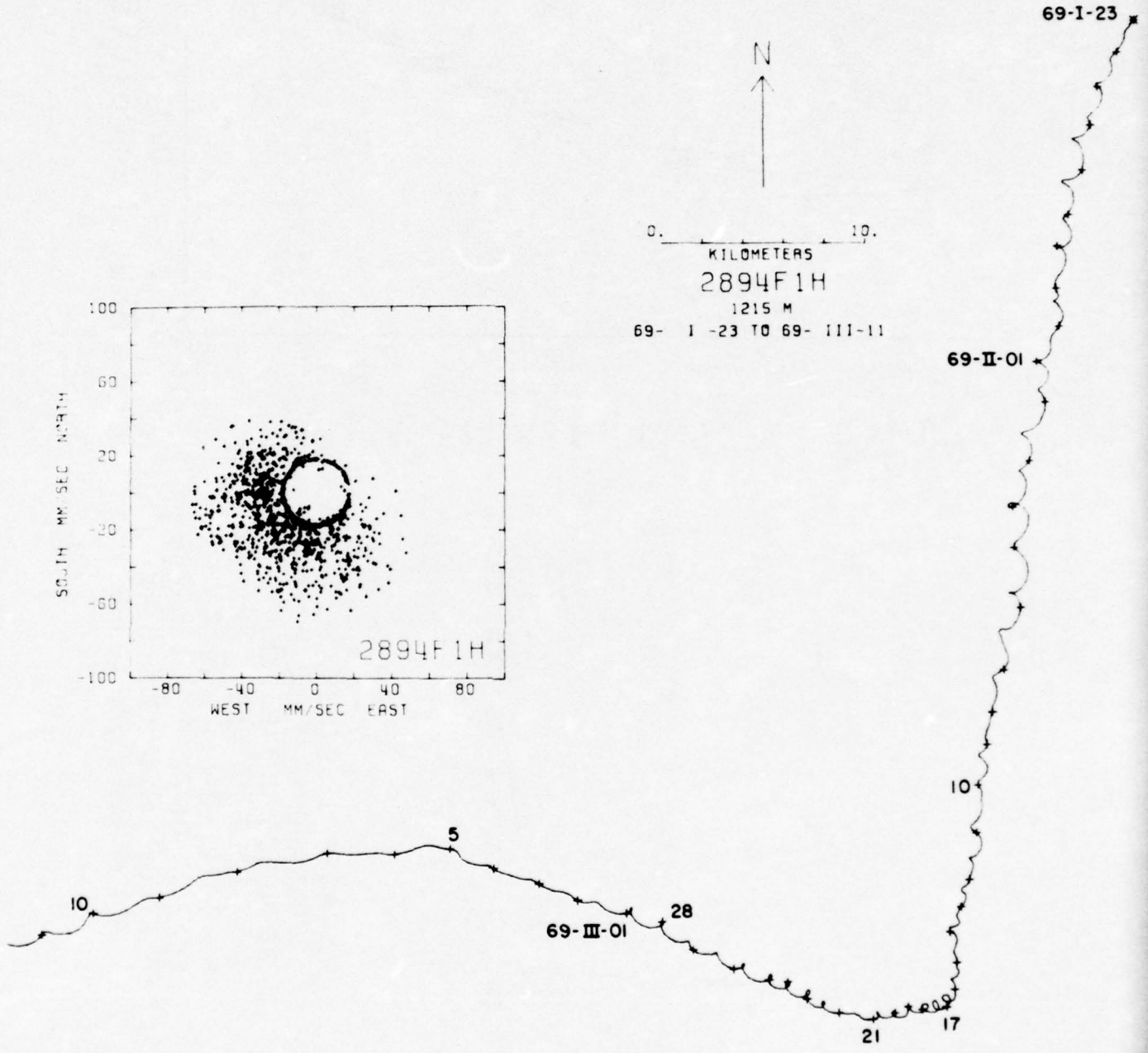
SPANNING RANGE
FROM 69- I -22 23.25.00
TO 69- III-11 12.25.00

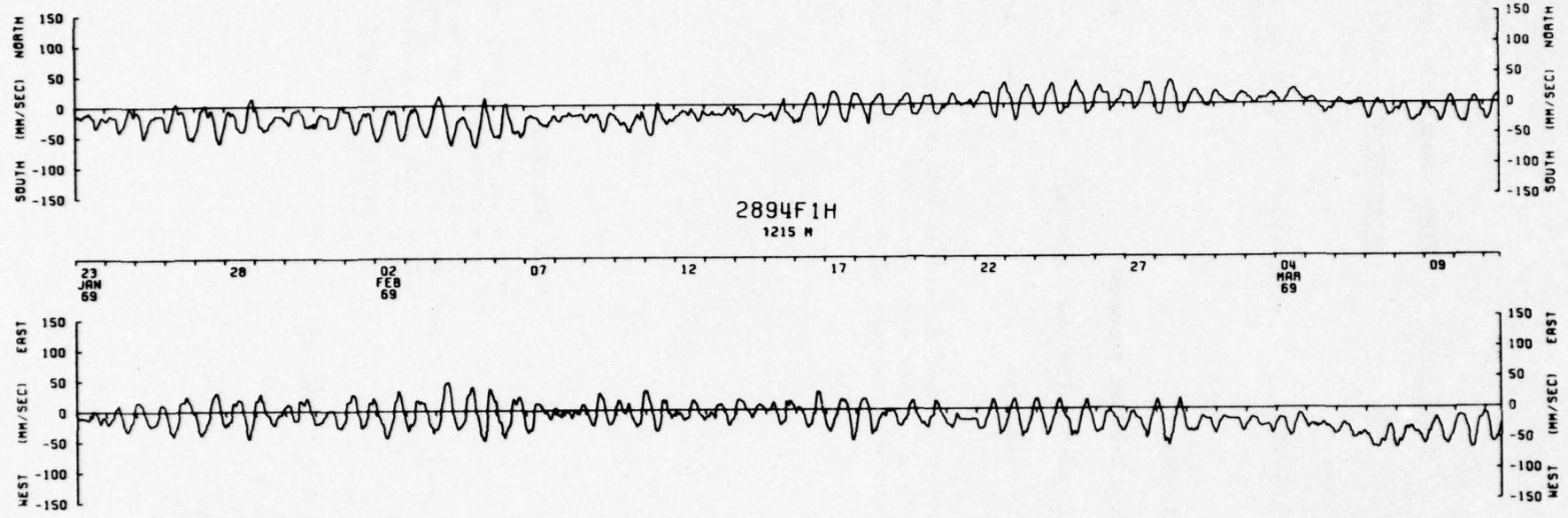
DURATION 47 DAYS 13 H 0 M 0 S



AUTO SPECTRUM
2894F900 EAST COMP
2894F900 NORTH COMP
1215 METERS
69-I-22 TO 69-III-10
1 PIECES WITH 2250 ESTIMATES
PER PIECE. AVERAGED OVER
8 ADJACENT FREQUENCY BANDS




69-I-23
N
0.
10.
KILOMETERS
2894F1H
1215 M
69- I -23 TO 69- III-11
69-II-01
100
60
20
-20
-60
-100
SOUTH MM/SEC NORTH
2894F1H
-80
-40
0
40
80
WEST MM/SEC EAST
10
5
10
69-III-01
28
21
17


SOUTH (MM/SEC) NORTH
150
100
50
0
-50
-100
-150
2894F1H
1215 M
23 JAN 69
28
02 FEB 69
07
12
17
22
27
04 MAR 69
09
WEST (MM/SEC) EAST

Data number 2895

Instrument No.: M-210 **Type:** Magnetic tape current meter

Depth: 1717 m **Water depth:** 2833 m

Start time: 69-I-23 001435

Stop time: 69-III-12 101435

Duration: 48d 10h

Sampling scheme: **Interval**

time between strobes	=	5	**seconds**
no. of strobes per interval	=	24	
interval time	=	900	**seconds**

COMMENTS:

The clock information on this data file was extensively edited by Dr. H. Perkins for his thesis. The data presented here have had bad data values removed but not the Perkins time adjustment. Time difference is less than two hours.

STATS **DATA/ 2895G900**

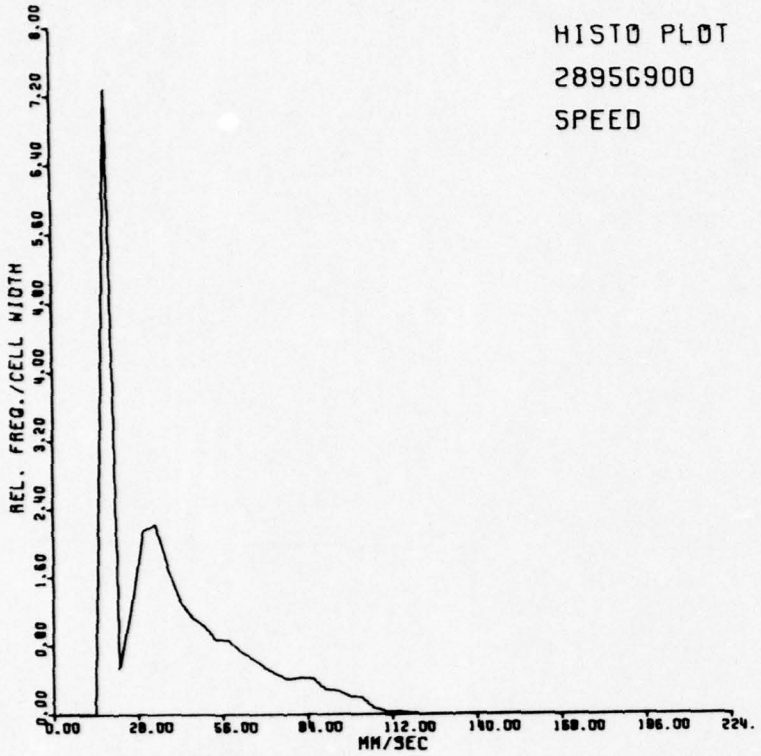
	EAST	NORTH	SPEED	EAST & NORTH	
MEAN =	-15.85	-7.96	39.55	COVARIANCE =	-61.31
STD. ERR. =	.44	.42	.32	STD. ERR. OF COVARIANCE =	15.62
VARIANCE =	909.35	825.12	484.96	STD. DEV. OF COVARIANCE =	1065.18
STD. DEV. =	30.16	28.72	22.02	CORRELATION COEFFICIENT =	-.071
KURTOSIS =	3.59	3.94	3.24	VECTOR MEAN =	17.79
SKEWNESS =	.58	-1.00	1.01	VECTOR VARIANCE =	867.29
				STD. DEV. =	29.45

UNITS OF RAW DATA VARIABLES = MM/SEC

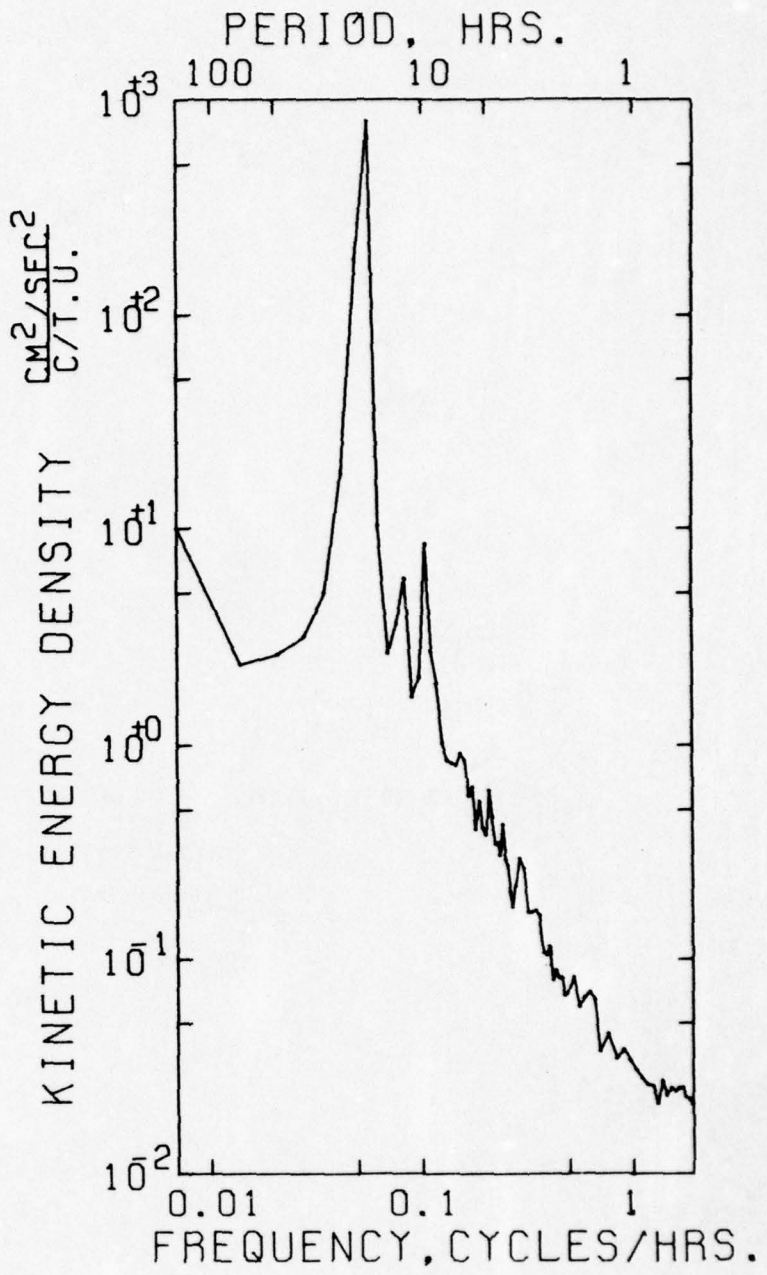
SAMPLE SIZE = 4649 POINTS

SPANNING RANGE
FROM 69- I -23 00.14.35
TO 69- III-12 10.14.35

DURATION 48 DAYS 10 H 0 M 0 S



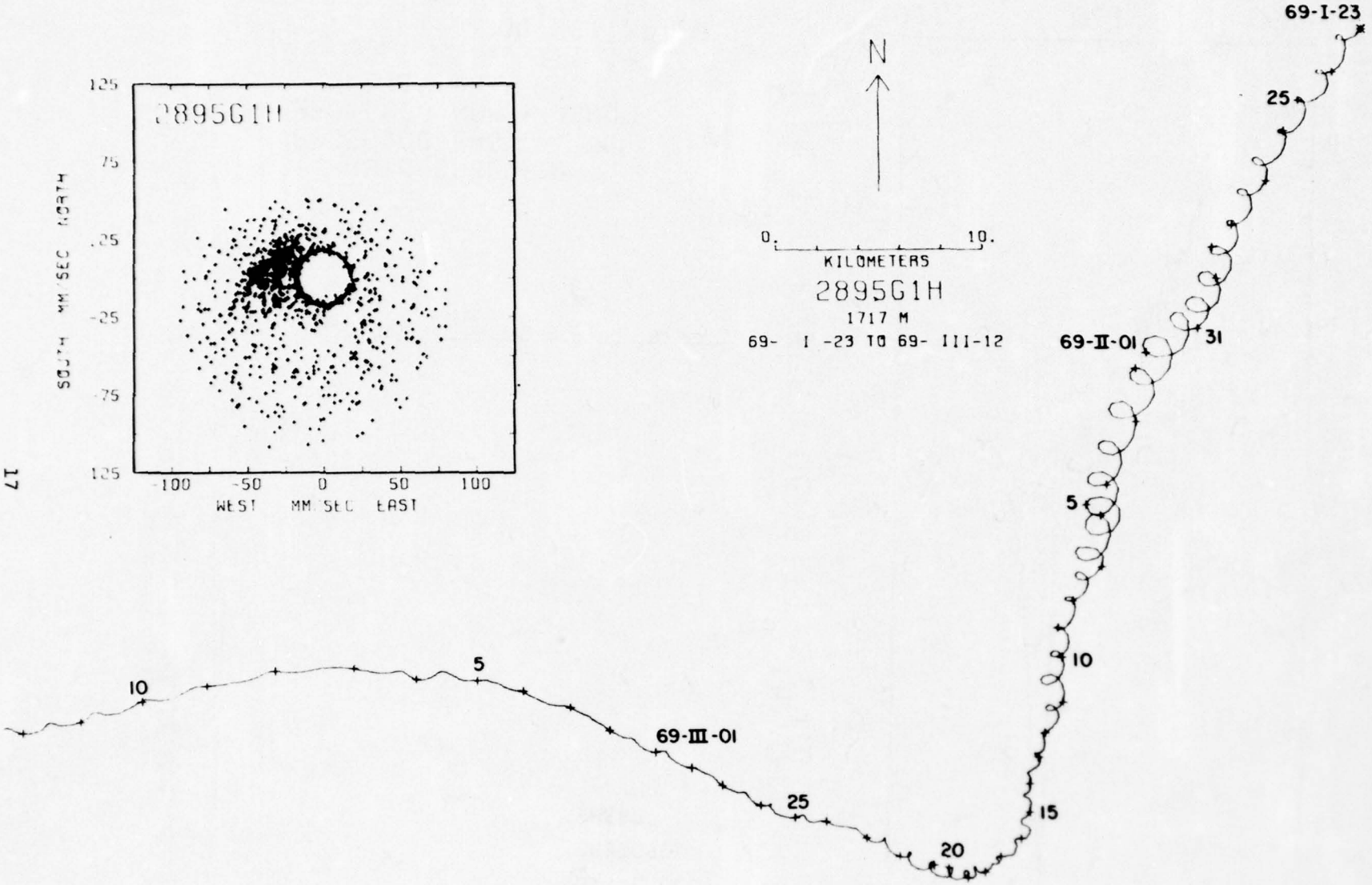
AUTO SPECTRUM
2895G900 EAST COMP
2895G900 NORTH COMP
1717 METERS
69-I-23 TO 69-III-11
1 PIECES WITH 2304 ESTIMATES
PER PIECE. AVERAGED OVER
8 ADJACENT FREQUENCY BANDS

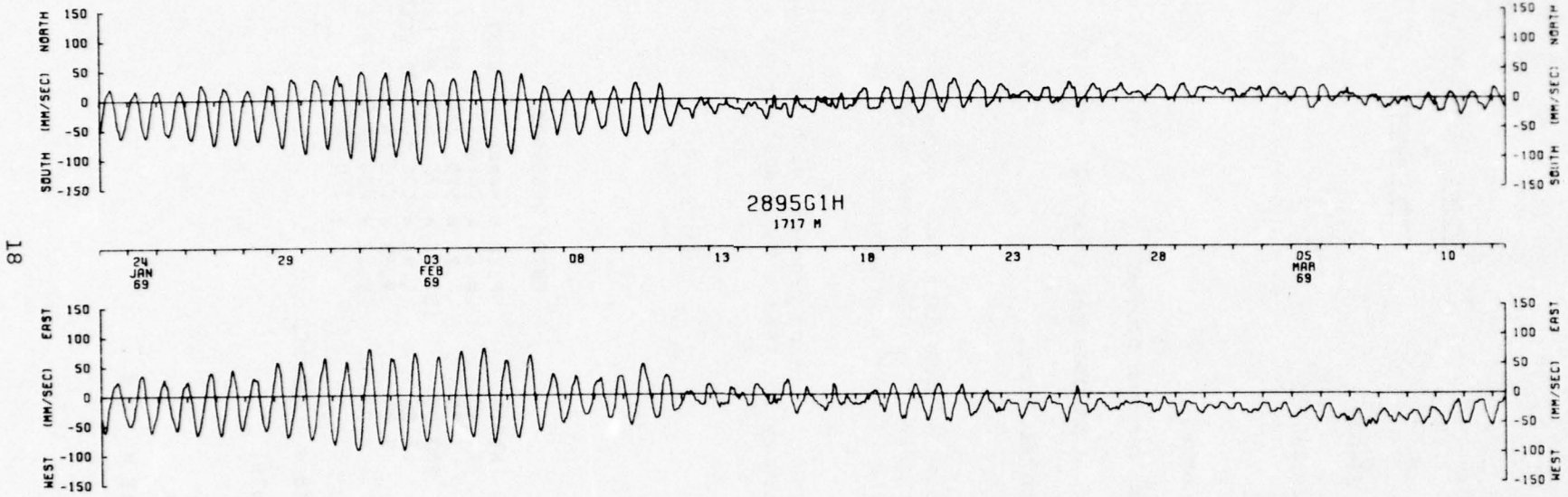


2895G1H
125
75
25
-25
-75
125
-100
-50
0
50
100
SOUTH MM/SEC NORTH
WEST MM/SEC EAST

17

N
0.
10.
KILOMETERS
2895G1H
1717 M
69- I -23 TO 69- III-12


69-I-23
25
69-II-01
31
5
10
15
20
25
69-III-01
5
10


SOUTH (MM/SEC) NORTH
150
100
50
0
-50
-100
-150
2895G1H
1717 M
24 JAN 69
29
03 FEB 69
08
13
18
23
28
05 MAR 69
10
WEST (MM/SEC) EAST

Data number 2896

Instrument No.: M-211 **Type:** Magnetic tape current meter

Depth: 2219 m **Water depth:** 2833 m

Start time: 69-I-22 224800

Stop time: 69-II-22 090300

Duration: 30d 10h 15m

Sampling scheme: **Interval**

time between strobes	=	5	**seconds**
no. of strobes per interval	=	24	
interval time	=	900	**seconds**

COMMENTS:

The clock information on this data file was extensively edited by Dr. H. Perkins for his thesis. The data presented here have had bad data values removed but not the Perkins time adjustment. Time difference is less than two hours.

Compass assembly leaked causing problems with the compass values. Vane follower sticks February 20, 1969. The quality of this data file is very poor.

STATS DATA/ 2896E900

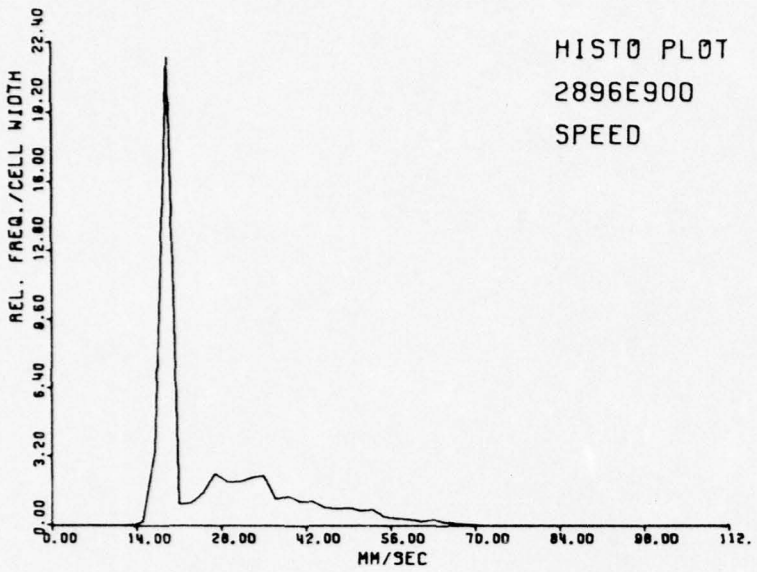
	EAST	NORTH	SPEED	# ***** EAST & NORTH	*****
MEAN =	-6.68	-17.48	26.59	# COVARIANCE =	-8.92
STD. ERR. =	.30	.20	.21	# STD. ERR. OF COVARIANCE =	7.28
VARIANCE =	255.59	232.66	131.32	# STD. DEV. OF COVARIANCE =	394.24
STD. DEV. =	15.99	15.25	11.46	# CORRELATION COEFFICIENT =	-.037
KURTOSIS =	3.17	3.01	3.64	# VECTOR MEAN =	18.71
SKEWNESS =	-.01	-.08	1.22	# VECTOR VARIANCE =	244.13
				# STD. DEV. =	15.62

UNITS OF RAW DATA VARIABLES = MM/SEC

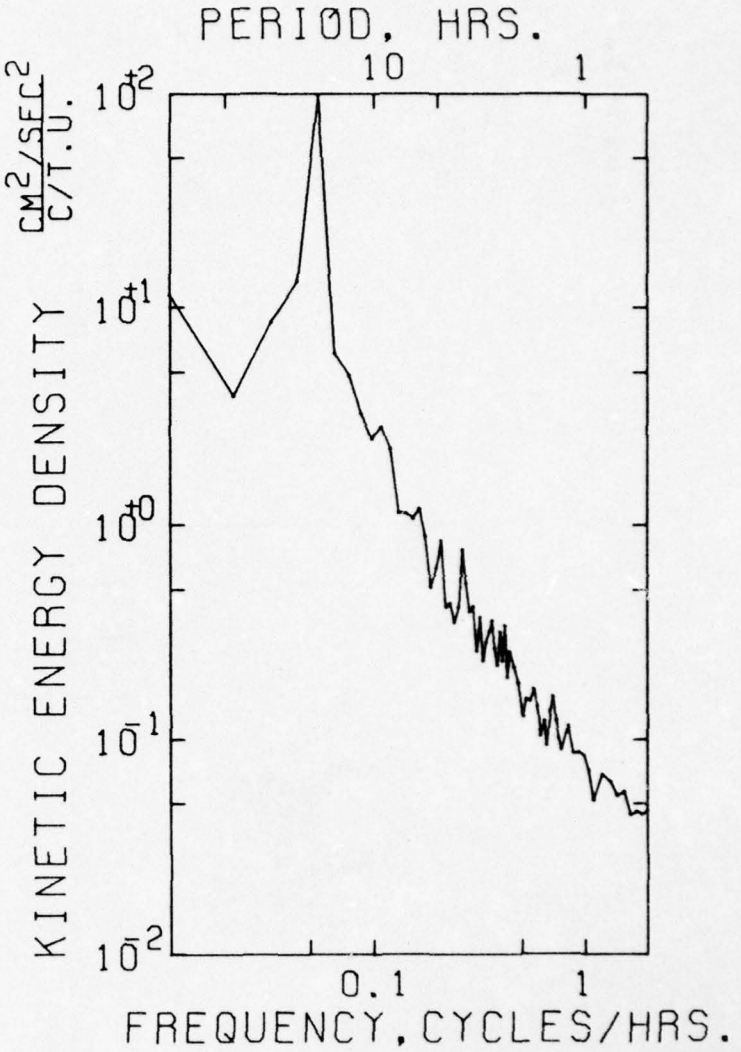
SAMPLE SIZE = 2922 POINTS

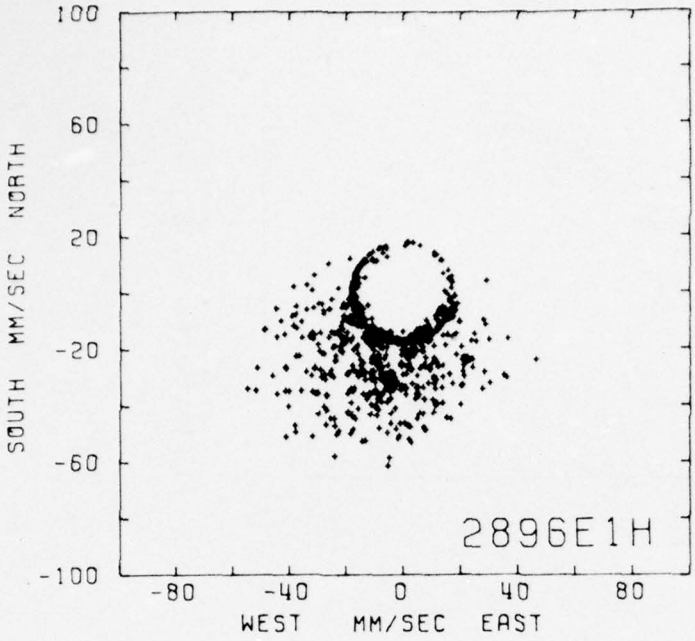
SPANNING RANGE
FROM 69- I -22 22.48.00
TO 69- II -22 09.09.00

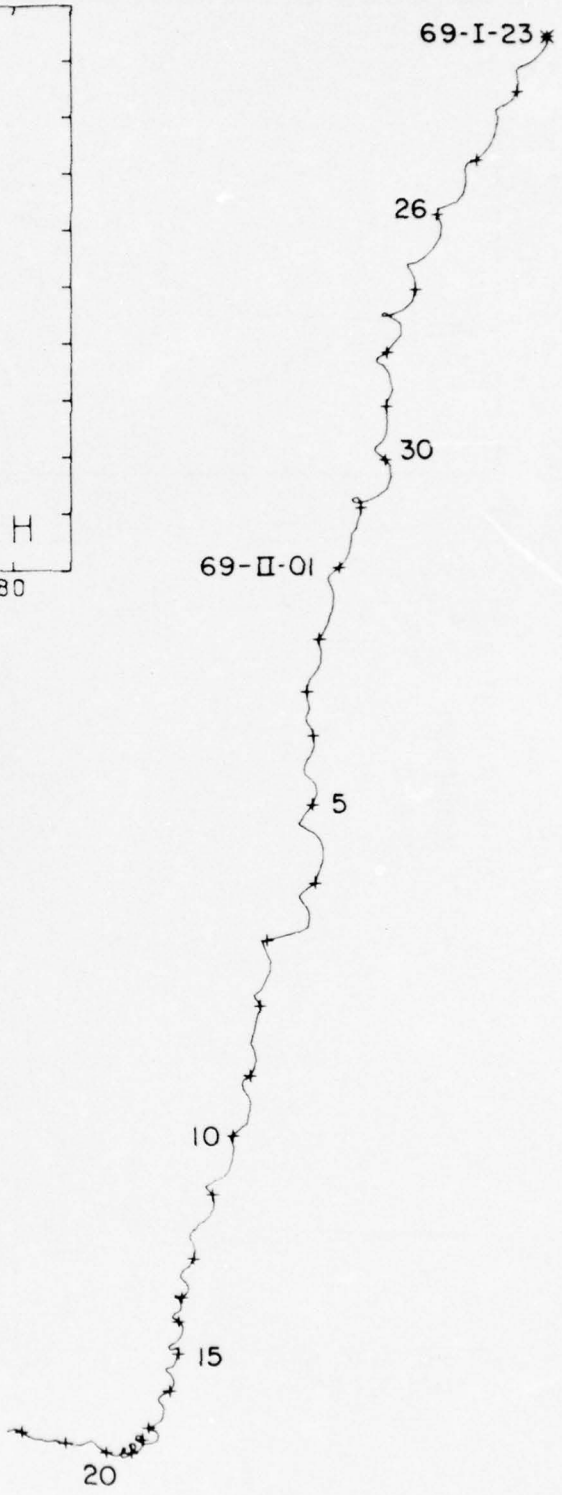
DURATION 30 DAYS 10 H 15 M 0 S

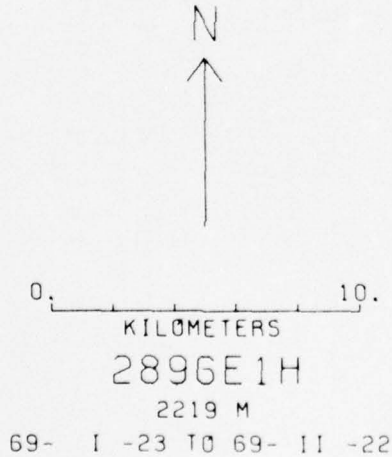


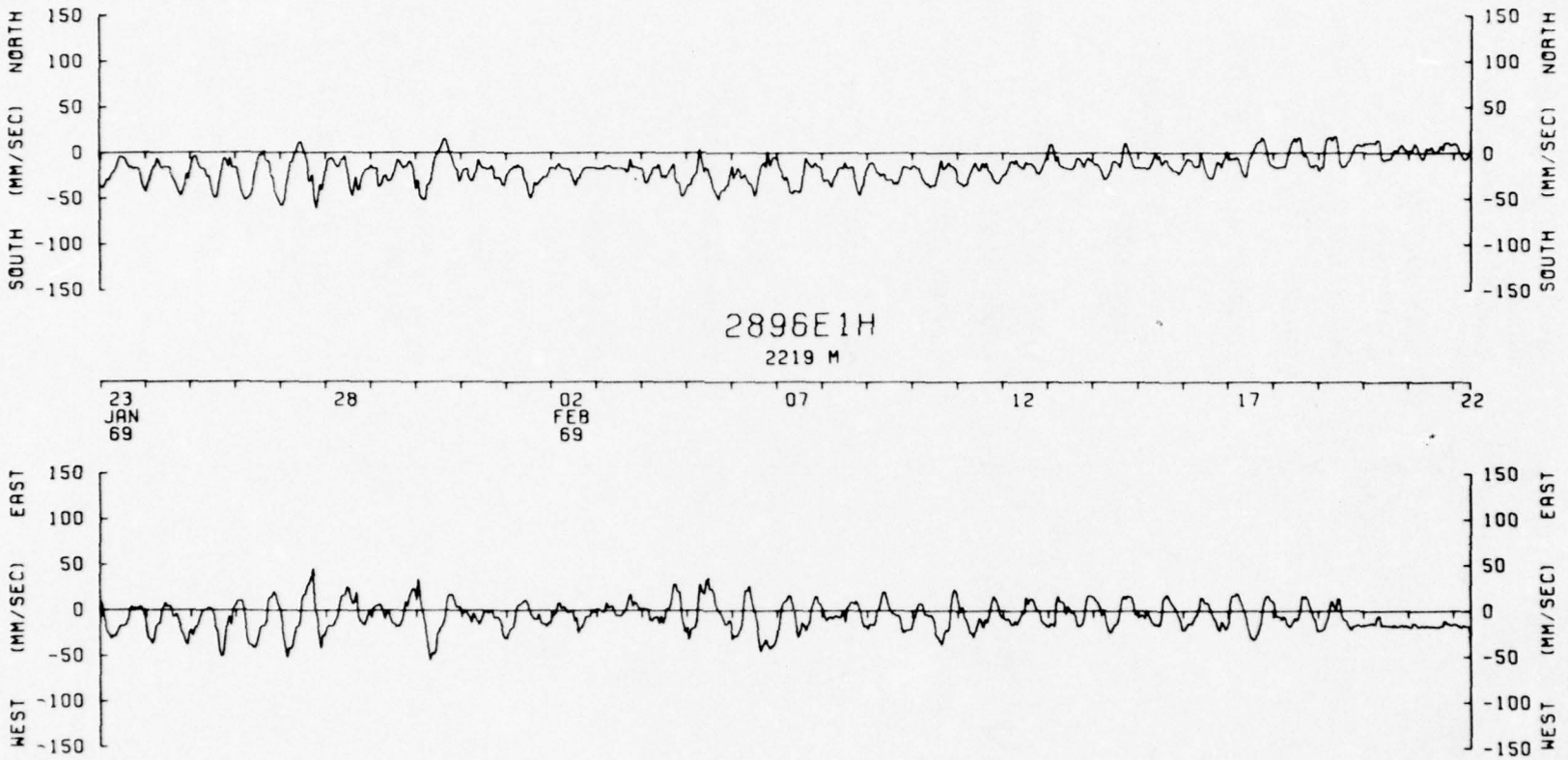
AUTO SPECTRUM
2896E900 EAST COMP
2896E900 NORTH COMP
2219 METERS
69-I-22 TO 69-II-22
1 PIECES WITH 1458 ESTIMATES
PER PIECE. AVERAGED OVER
8 ADJACENT FREQUENCY BANDS



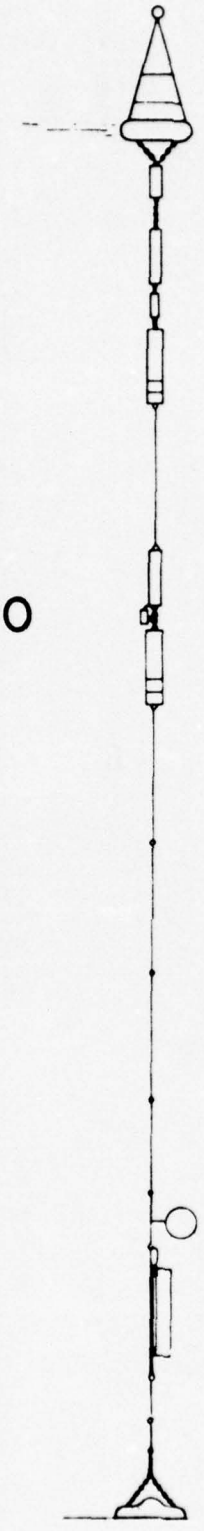

100
60
20
-20
-60
-100
SOUTH MM/SEC NORTH
-80
-40
0
40
80
WEST MM/SEC EAST
2896E1H


69-I-23
26
30
69-II-01
5
10
15
20


N
0.
10.
KILOMETERS
2896E1H
2219 M
69- I -23 TO 69- II -22


SOUTH (MM/SEC) NORTH
150
100
50
0
-50
-100
-150
2896E1H
2219 M
23
JAN
69
28
02
FEB
69
07
12
17
22
WEST (MM/SEC) EAST

STATION 290



LIGHT
RADIO
WIND RECORDER - *2901*

TENSIOMETER
3 m CHAIN

VIB/TENS RECORDER - *2902*

SWIVEL

CURRENT METER - *2903*

500 m 1 x 19 BERGEN
GAC, USED

VIB./TENS RECORDER - *2904*

ACCELEROMETER ON 1 m CHAIN

CURRENT METER - *2905*

500 m SAME BERGEN

500 m SAME BERGEN

500 m 9/16" NYLON

365 m 9/16" NYLON

85 m 5/8" NYLON WITH 28 GLASS SPHERES SPACED 20 m APART

AMF ACOUSTIC RELEASE, TRANSPONDING

35 m 3/4" NYLON

15 m 5/8" NYLON

4,800 LB STIMSON ANCHOR

Mooring No. 290

Set 69 (Year) Apr (Month) 16 (Day) — 39° 10.9N (Latitude) — 70° 02.5W (Longitude)

Set by R. Heinmiller Ship R. V. Chain Cruise 90

Retrieved 69 (Year) Apr (Month) 24 (Day)

Retrieved by R. Heinmiller Ship R. V. Chain Cruise 90

Purpose of Mooring: 1) Launch transient and mooring dynamics measurements.
2) Part of acoustic net with 291 and 293.

Mooring Type: Surface

Data Number	Instrument Number	Type	Depth Meters	Comments
2901	W-101X	M.W.R.	-0-	
2902	Ser. 2	Vib/Ten	10	
2903*	M-151	M.C.M.	16	
2904	Ser. 1	Vib/Ten	518	
2905*	M-198	M.C.M.	521	Rotor out of its bearings at recovery

Water Depth 2682

Hydrographic Stations

R. V. Chain cruise 90 Station 872

R. V. Chain cruise 90 Station 873

R. V. Chain cruise 90 Station 878

COMMENTS ON MOORING:

Canadian vessel "Jean Frances" reported fouling her longlines in mooring on April 23, 1969.

Data number 2903

Instrument No.: M-151

Type: Magnetic tape current meter

Depth: 16 m

Water depth: 2682 m

Start time: 69-IV-16 115712

Stop time: 69-IV-24 160712

Duration: 8d 4h 10m

Sampling scheme: Continuous

one reading every 5 seconds

COMMENTS:

STATS DATA/ 2903A300

	EAST	NORTH	SPEED
MEAN =	442.02	197.92	520.40
STD. ERR. =	5.52	4.27	5.77
VARIANCE =	71802.46	42852.15	78483.55
STD. DEV. =	267.96	207.25	280.17
KURTOSIS =	2.09	3.13	1.85
SKEWNESS =	-.12	.57	.10

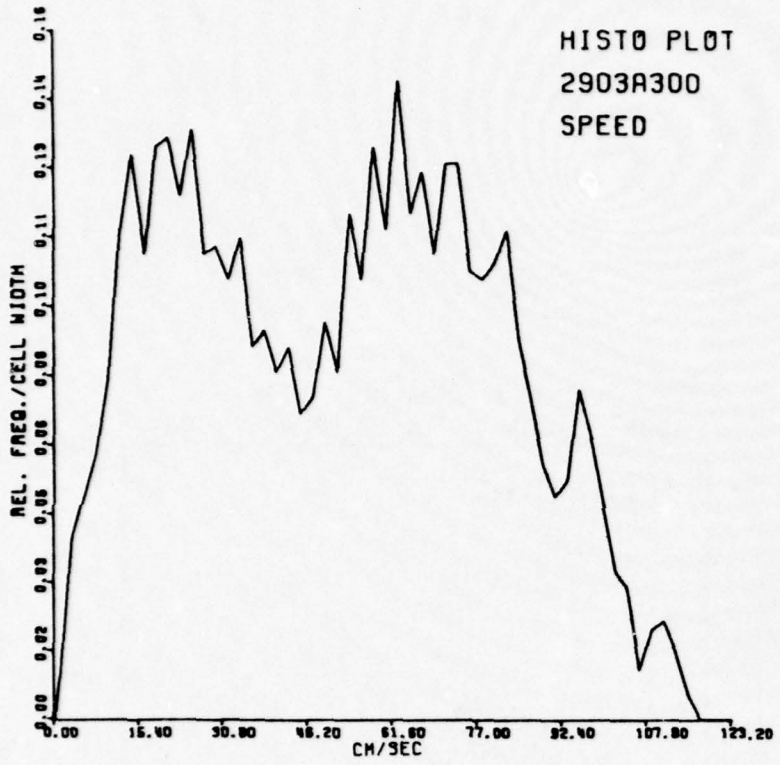
\# ###### EAST & NORTH ######
\# COVARIANCE = 30409.34
\# STD. ERR. OF COVARIANCE = 2880.65
\# STD. DEV. OF COVARIANCE = 139783.17
\# CORRELATION COEFFICIENT = .548
\# VECTOR MEAN = 484.31
\# VECTOR VARIANCE = 57377.30
\# STD. DEV. = 239.54

UNITS OF RAW DATA VARIABLES = MM/SEC

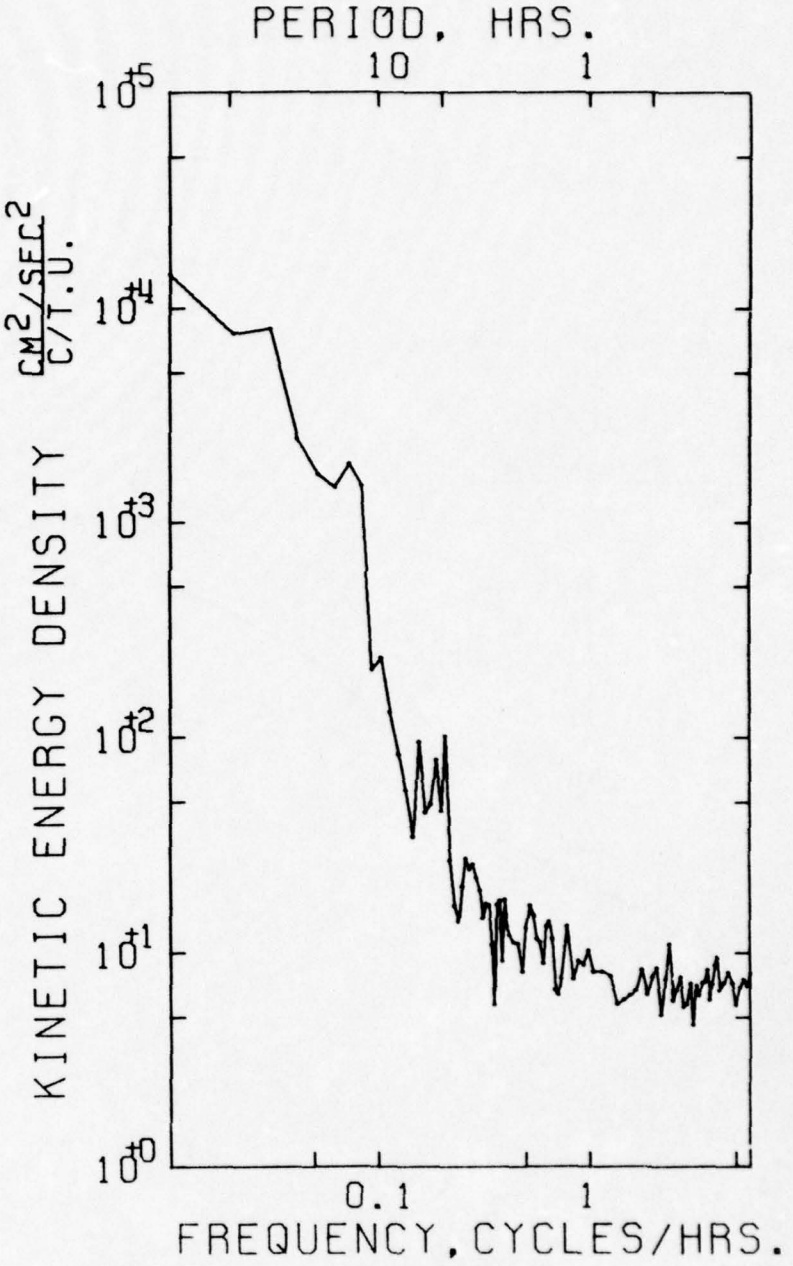
SAMPLE SIZE = 2355 POINTS

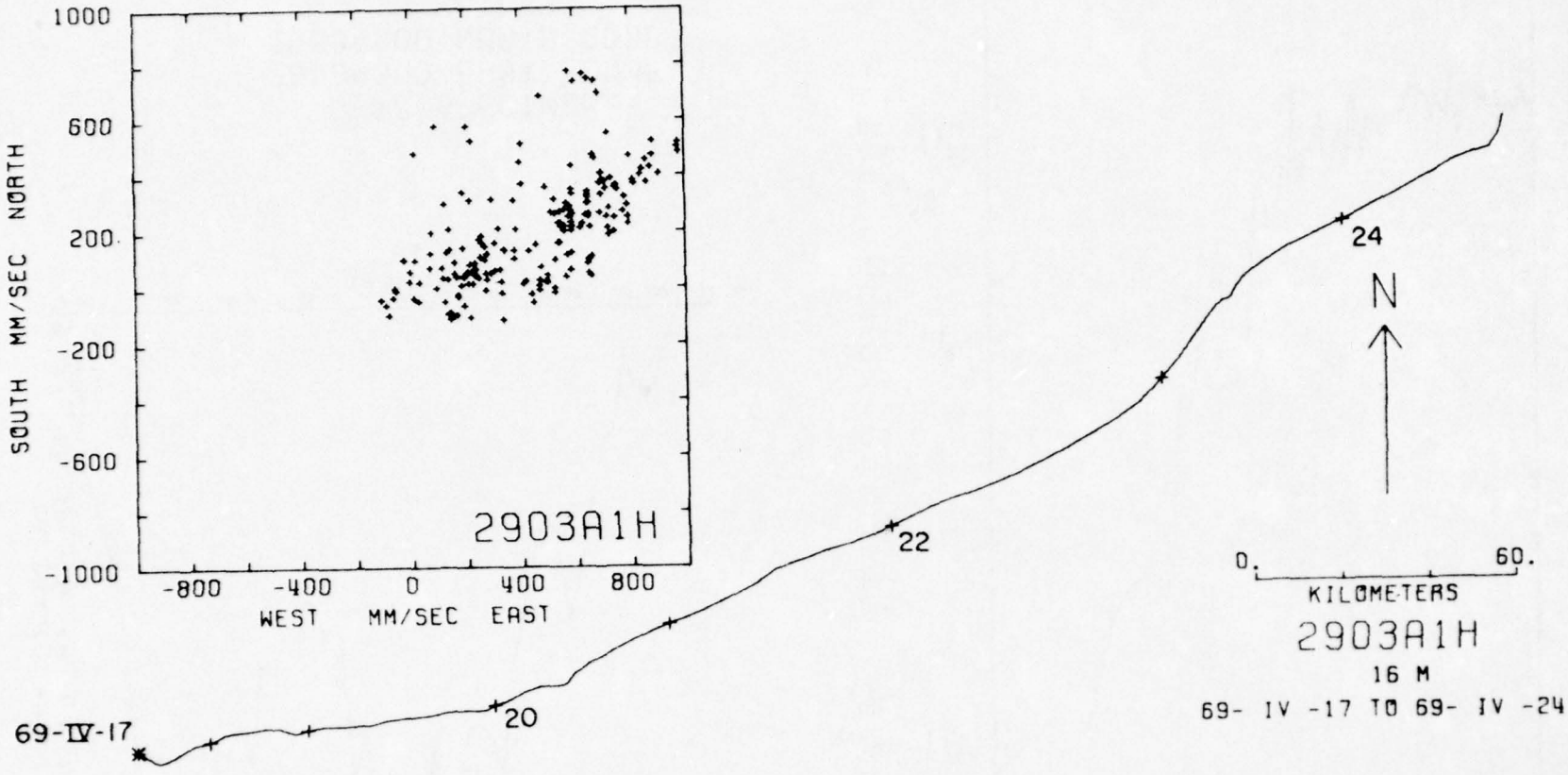
SPANNING RANGE
FROM 69- IV -16 11.57.12
TO 69- IV -24 16.07.12

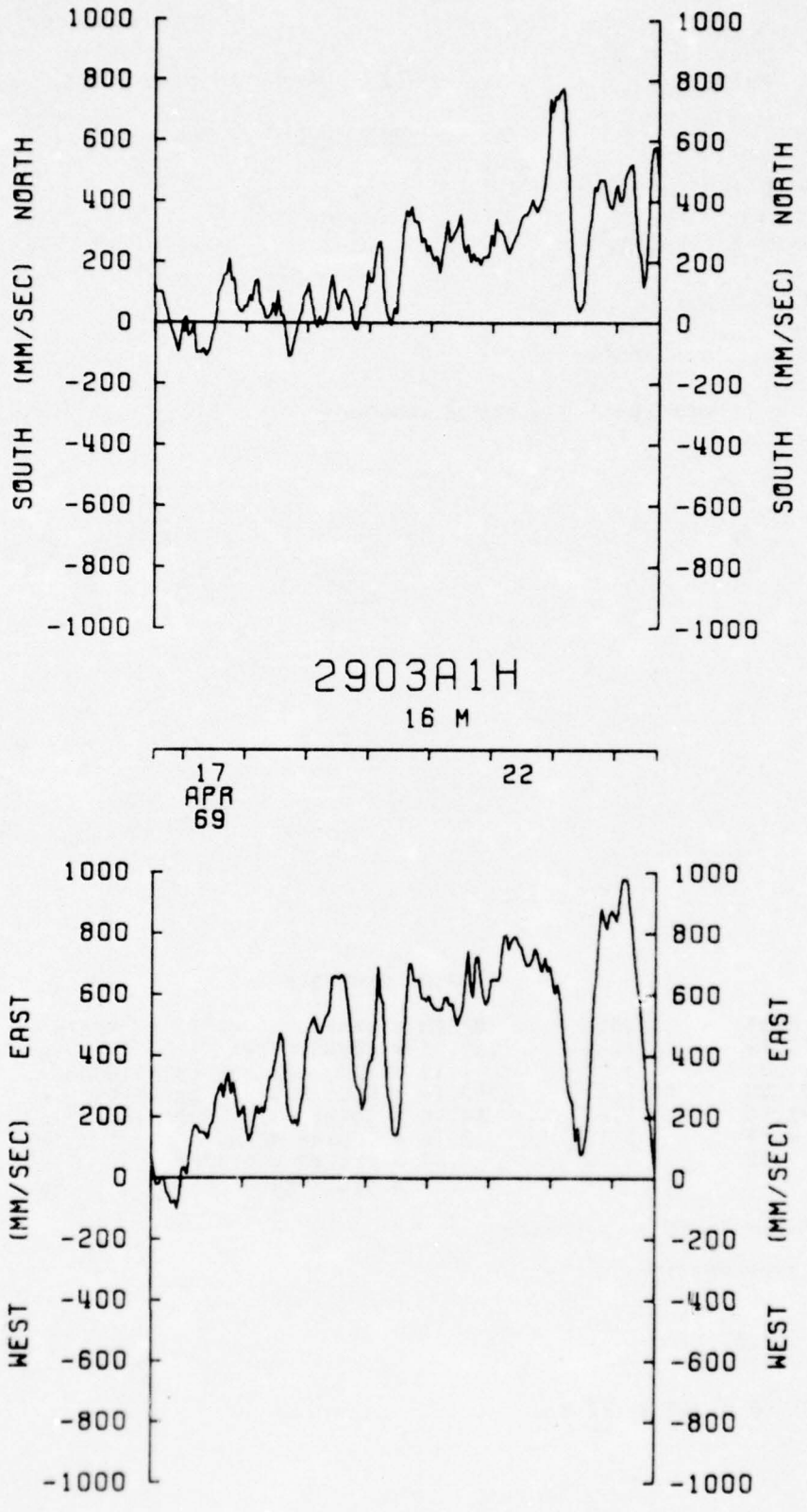
DURATION 8 DAYS 4 H 10 M 0 S



AUTO SPECTRUM
2903A300 EAST COMP
2903A300 NORTH COMP
16 METERS
69-IV-16 TO 69-IV-24
1 PIECES WITH 1152 ESTIMATES
PER PIECE. AVERAGED OVER
2 ADJACENT FREQUENCY BANDS




1000
600
200
-200
-600
-1000
SOUTH MM/SEC NORTH
-800
-400
0
400
800
WEST MM/SEC EAST
2903A1H
69-IV-17
20
22
24
N
0.
60.
KILOMETERS
2903A1H
16 M
69- IV -17 TO 69- IV -24


1000
800
600
400
200
0
-200
-400
-600
-800
-1000
SOUTH (MM/SEC) NORTH
2903A1H
16 M
17
APR
69
22
WEST (MM/SEC) EAST

Data number 2905

Instrument No.: M-198

Type: Magnetic tape current meter

Depth: 521 m

Water depth: 2682 m

Start time: 69-IV-16 130022

Stop time: 69-IV-24 154022

Duration: 8d 2h 40m

Sampling scheme: Continuous

one reading every 5 seconds

COMMENTS:

STATS DATA/ 2905$300

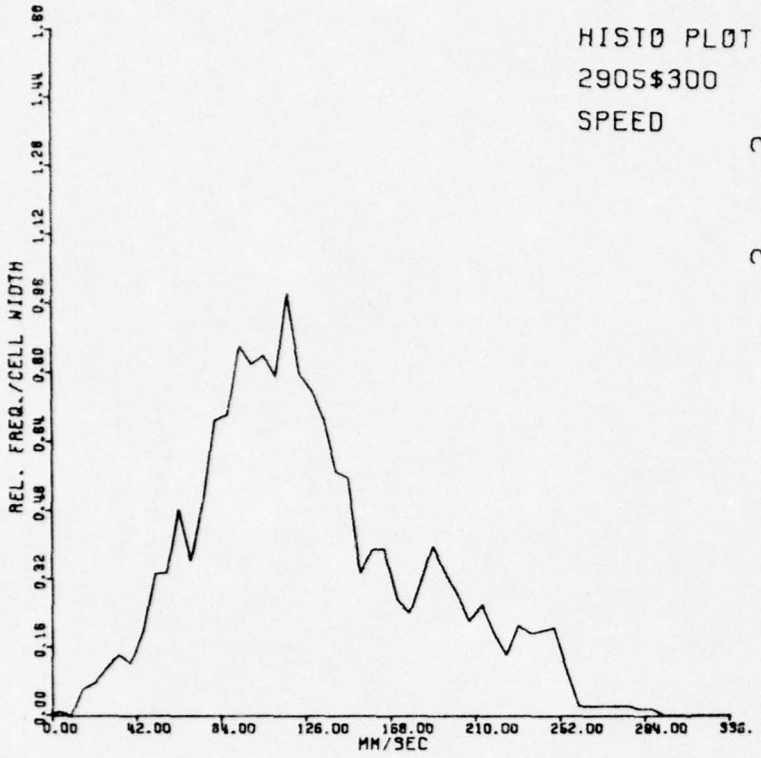
	EAST	NORTH	SPEED			
MEAN =	80.99	73.84	127.71	# ######	EAST & NORTH	######
STD. ERR. =	.86	1.48	1.13	# COVARIANCE	=	321.89
VARIANCE =	2132.48	5118.27	2869.19	# STD. ERR. OF COVARIANCE	=	161.18
STD. DEV. =	46.18	71.55	54.49	# STD. DEV. OF COVARIANCE	=	7792.22
KURTOSIS =	2.93	9.30	2.78	# CORRELATION COEFFICIENT	=	.097
SKEWNESS =	.05	-.02	.53	# VECTOR MEAN	=	109.66
				# VECTOR VARIANCE	=	3625.88
				# STD. DEV.	=	60.22

UNITS OF RAW DATA VARIABLES = MM/SEC

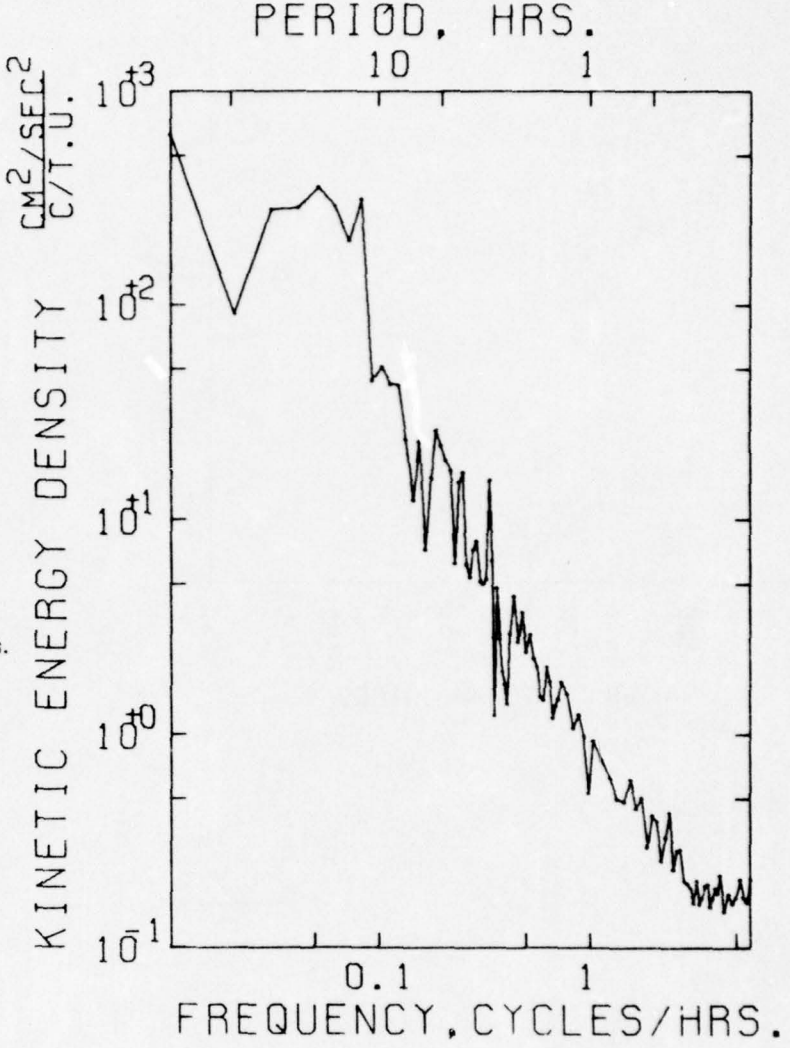
SAMPLE SIZE = 2337 POINTS

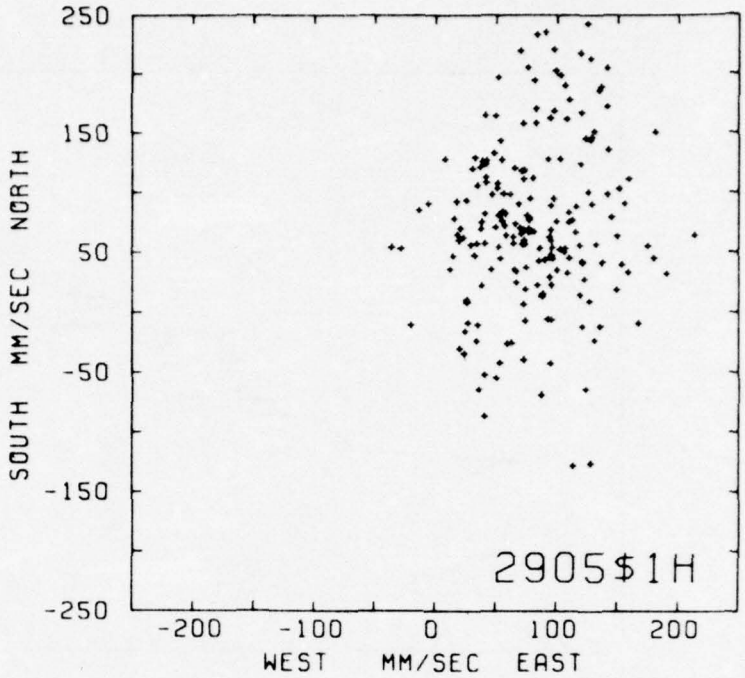
SPANNING RANGE
FROM 69- IV -16 13.00.22
TO 69- IV -24 15.40.22

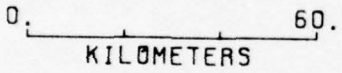
DURATION 8 DAYS 2 H 40 M 0 S



AUTO SPECTRUM
2905$300 EAST COMP
2905$300 NORTH COMP
521 METERS
69-IV-16 TO 69-IV-24
1 PIECES WITH 1152 ESTIMATES
PER PIECE. AVERAGED OVER
2 ADJACENT FREQUENCY BANDS



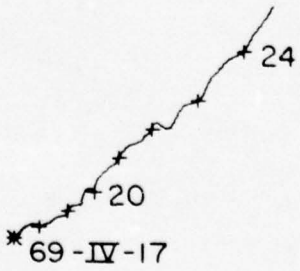


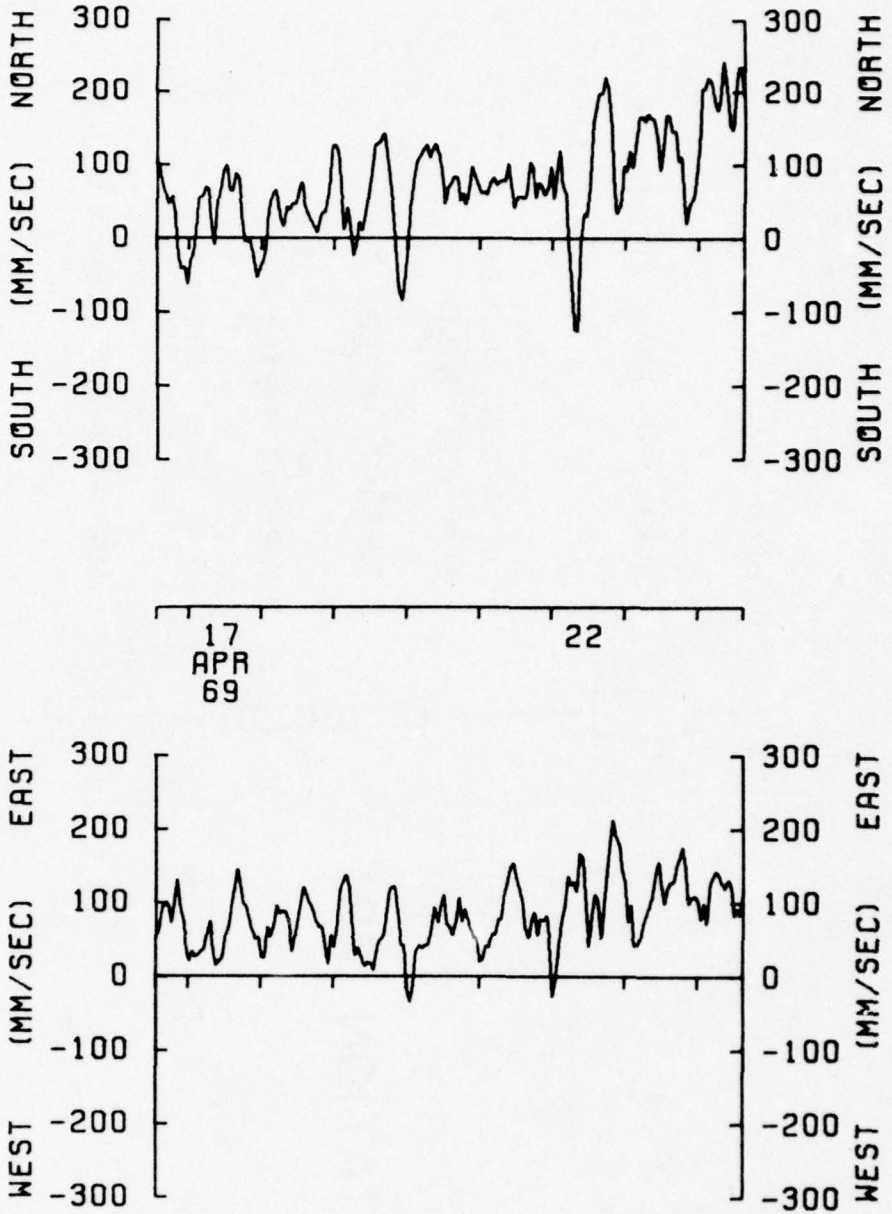


2905$1H

521 M

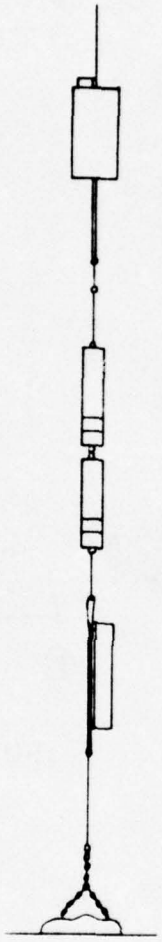
69- IV -17 TO 69- IV -24




SOUTH (MM/SEC) NORTH
300
200
100
0
-100
-200
-300
17
APR
69
22
WEST (MM/SEC) EAST

2905$1H
521 M

STATION 291



RADIO

SYNTACTIC FOAM FLOAT

1 m NYLON (TAPED)
10 m 9/16" NYLON

CURRENT METER - *2911*

CURRENT METER - *2912*

10 m 9/16" NYLON

AMF RELASE, TRANSPONDING

85 m 9/16" NYLON

2 m CHAIN

800 LB. STIMSON ANCHOR

Mooring No. 291

Set 69 Apr 16 (Year Month Day) 39° 08.7N (Latitude) 70° 02.5W (Longitude)

Set by R. Heinmiller Ship R. V. Chain Cruise 90

Retrieved 69 Apr 24 (Year Month Day)

Retrieved by R. Heinmiller Ship R. V. Chain Cruise 90

Purpose of Mooring: 1) Test of new syntactic foam float. 2) Part of acoustic net with 290 and 293. 3) Investigation of sampling intervals on deep stations
Mooring Type: Subsurface.

Data Number	Instrument Number	Type	Depth Meters	Comments
2911*	M-209	M.C.M.	2581	
2912	M-211	M.C.M.	2583	Electrical problems with rotor

Water depth 2682

Hydrographic Stations

R. V. Chain cruise 90 Station 872

R. V. Chain cruise 90 Station 873

R. V. Chain cruise 90 Station 878

COMMENTS ON MOORING:

Data number 2911

Instrument No.: M-209 Type: Magnetic tape current meter

Depth: 2581 m Water depth: 2682 m

Start time: 69-IV-16 165533

Stop time: 69-IV-24 144033

Duration: 7d 21h 45m

Sampling scheme: Continuous

one reading every 5 seconds

COMMENTS:

STATS DATA/ 29110900

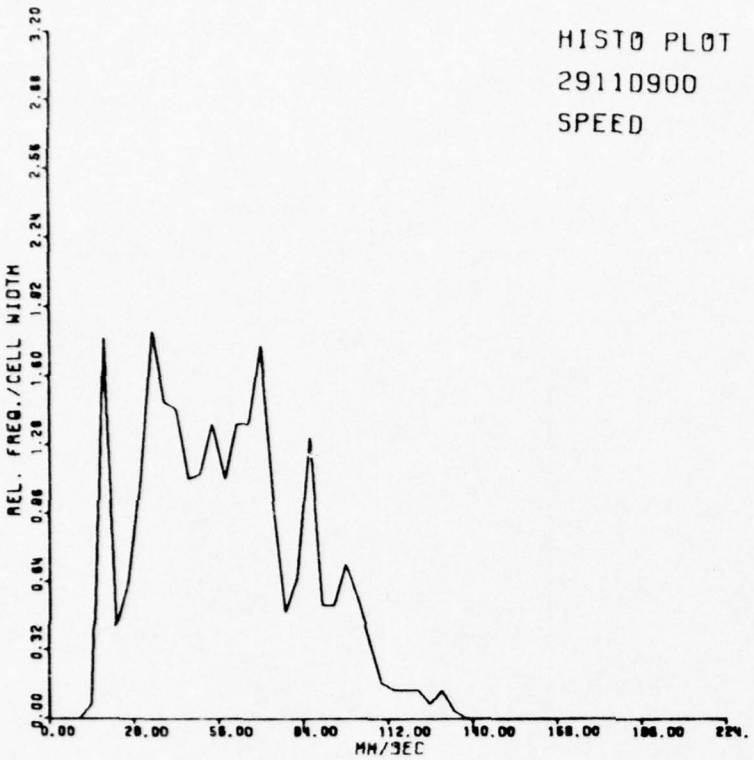
	EAST	NORTH	SPEED		EAST & NORTH	
MEAN =	-39.18	29.24	57.82	# COVARIANCE =		-25.96
STD. ERR. =	1.18	.86	.84	# STD. ERR. OF COVARIANCE =		54.56
VARIANCE =	1063.64	561.75	672.23	# STD. DEV. OF COVARIANCE =		1504.23
STD. DEV. =	32.61	23.70	25.93	# CORRELATION COEFFICIENT =		-.034
KURTOSIS =	2.16	2.78	2.51	# VECTOR MEAN =		48.89
SKEWNESS =	-.33	-.47	.40	# VECTOR VARIANCE =		812.70
				# STD. DEV. =		28.51

UNITS OF RAW DATA VARIABLES = MM/SEC

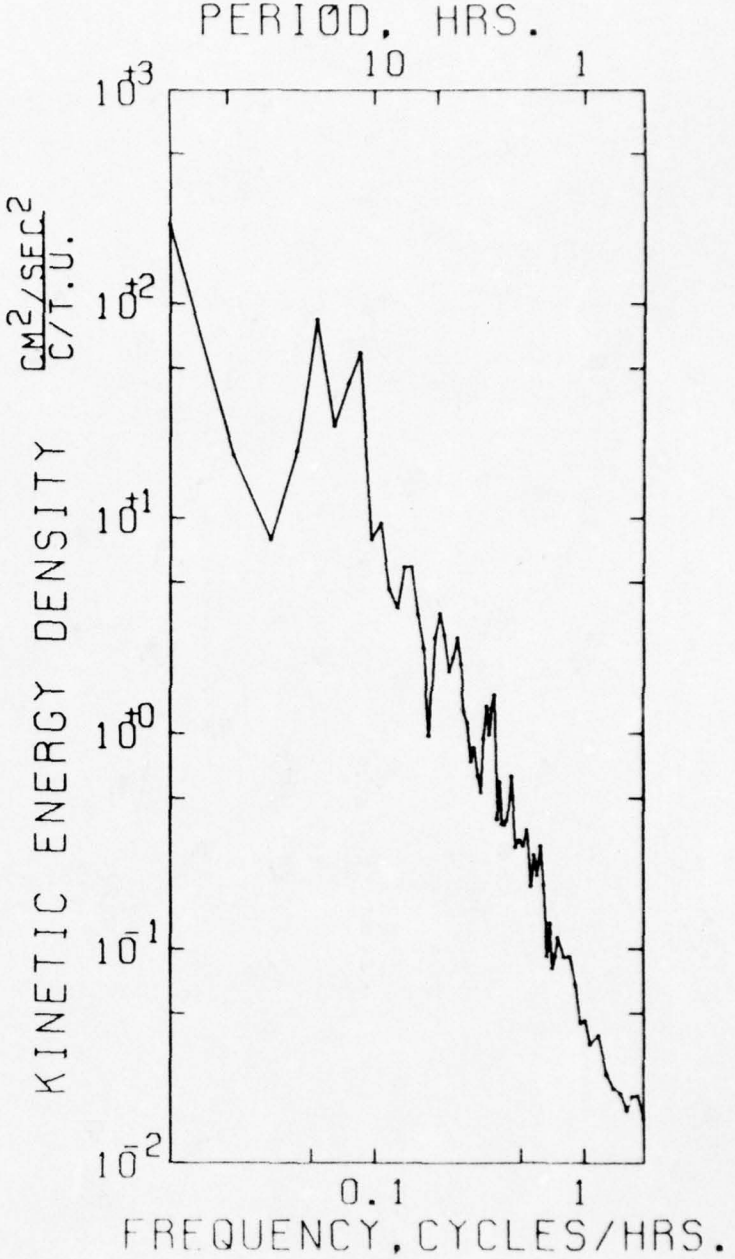
SAMPLE SIZE = 760 POINTS

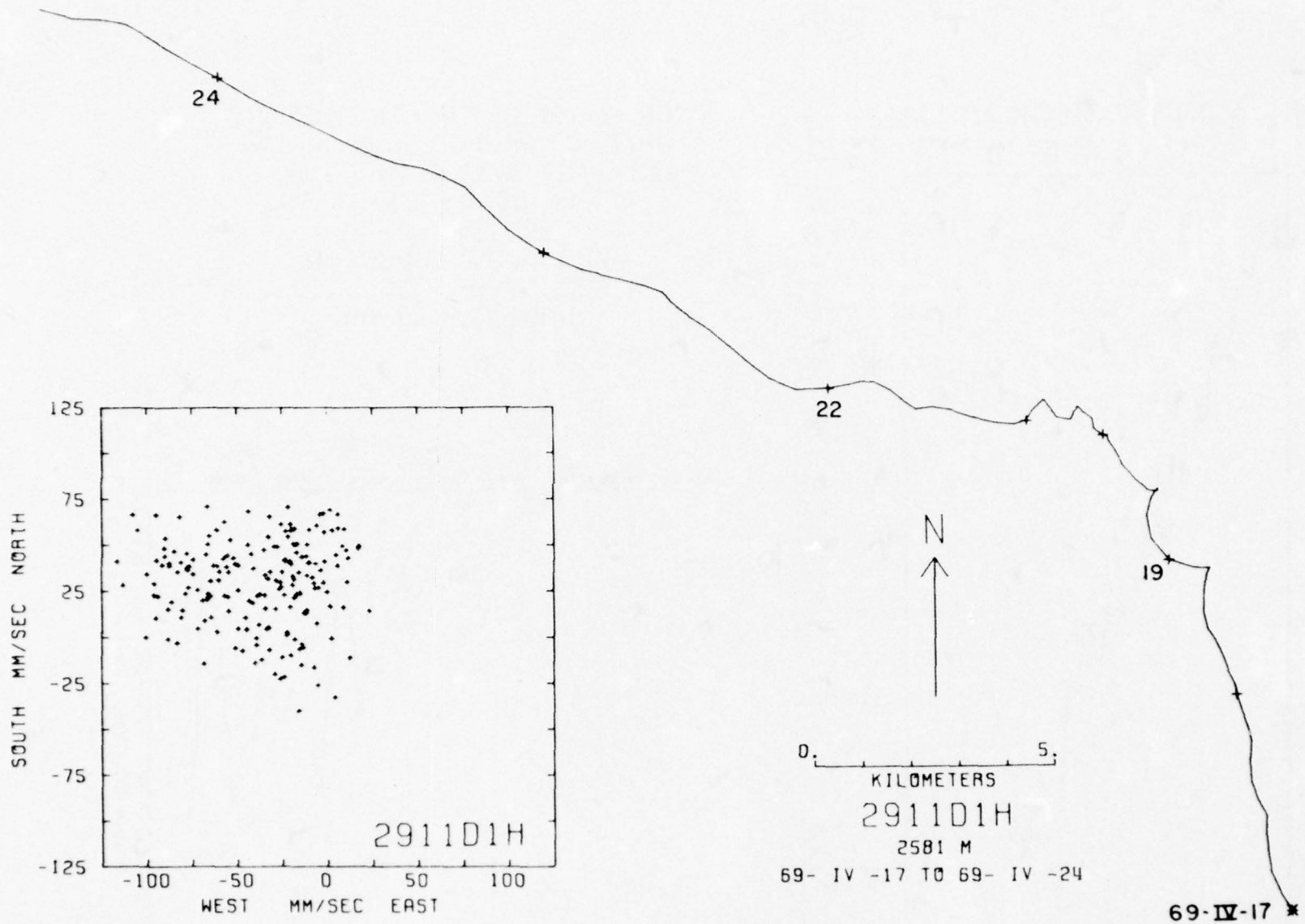
SPANNING RANGE
FROM 69- IV -16 16.55.33
TO 69- IV -24 14.40.33

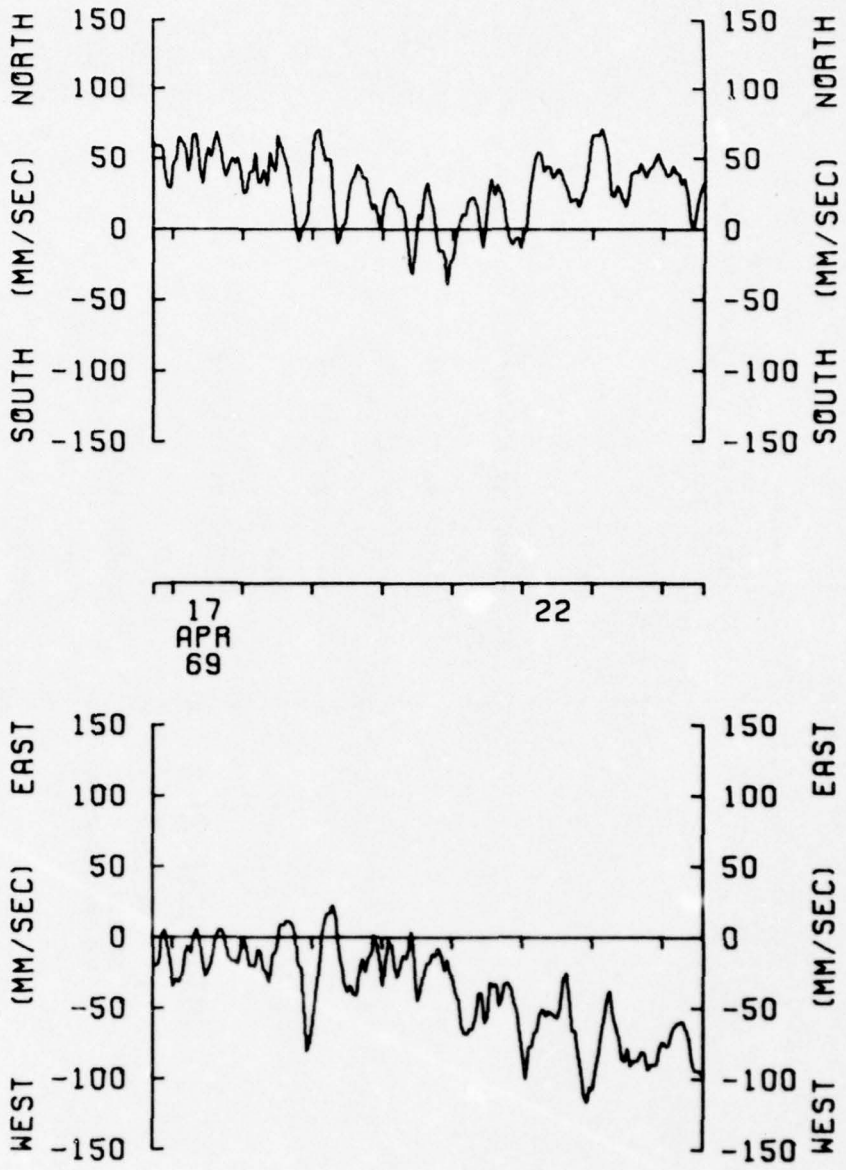
DURATION 7 DAYS 21 H 45 M 0 S



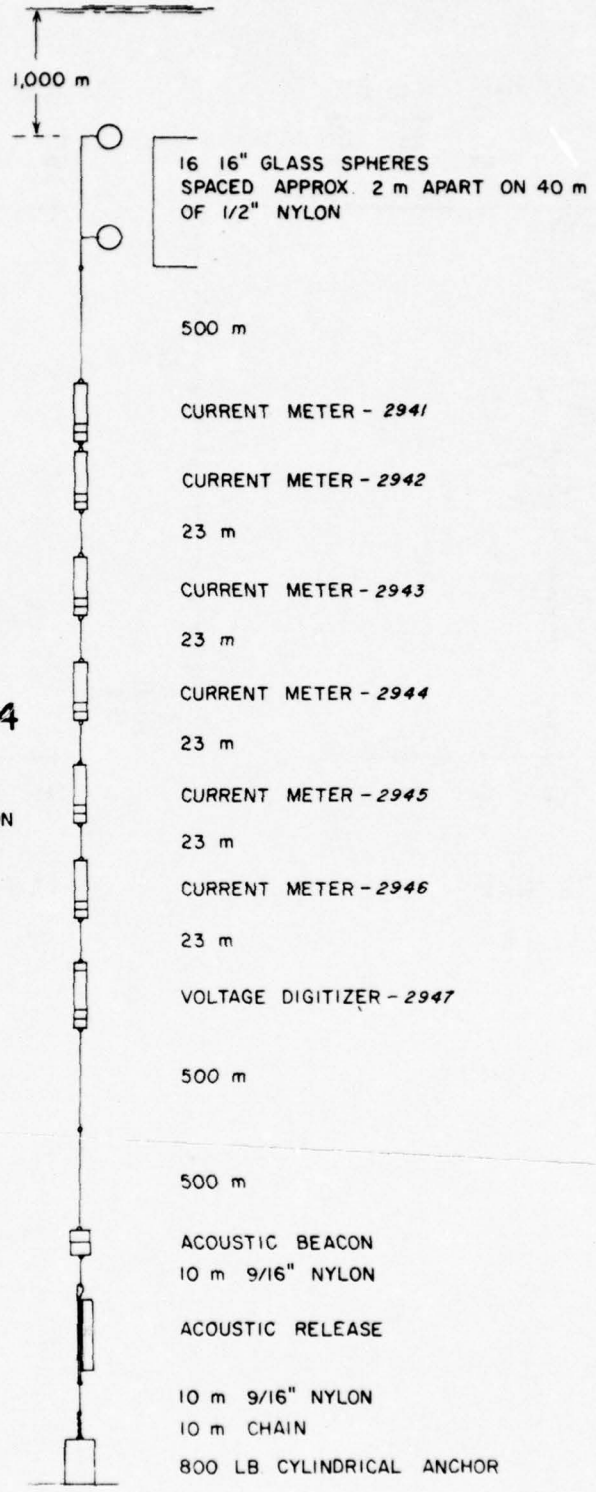
AUTO SPECTRUM
29110900 EAST COMP
29110900 NORTH COMP
2581 METERS
69-IV-16 TO 69-IV-24
1 PIECES WITH 375 ESTIMATES
PER PIECE. AVERAGED OVER
2 ADJACENT FREQUENCY BANDS




24
22
19
69-IV-17
N
0.
5.
KILOMETERS
2911D1H
2581 M
69- IV -17 TO 69- IV -24
125
75
25
-25
-75
-125
SOUTH MM/SEC NORTH
-100
-50
0
50
100
WEST MM/SEC EAST
2911D1H



2911D1H
2581 M



STATION 294

ALL LINE ABOVE
BEACON
1/2" BRAIDED NYLON

Mooring No. 294

Set 69 (Year) Apr (Month) 17 (Day) — 39° 10.3N (Latitude) — 70° 00.0W (Longitude)

Set by R. Heinmiller — Ship R. V. Chain — Cruise 90

Retrieved 69 (Year) Apr (Month) 26 (Day)

Retrieved by R. Heinmiller — Ship R. V. Chain — Cruise 90

Purpose of Mooring: 1) Shear measurements.
2) Electromagnetic transport measurements.

Mooring Type: Subsurface

Data Number	Instrument Number	Type	Depth Meters	Comments
2941*	M-142	M.C.M.	1512	
2942*	M-122	M.C.M.	1514	
2943	M-204	M.C.M.	1541	Bad CRT-1 board
2944*	M-159	M.C.M.	1564	
2945*	M-127	M.C.M.	1598	
2946*	M-170	M.C.M.	1614	
2947	N/A	Volt. Dig.	1641	No useable rotor, voltage data no good.
Water depth			2674	

Hydrographic Stations

R. V. Chain cruise 90 Station 872

R. V. Chain cruise 90 Station 873

R. V. Chain cruise 90 Station 878

COMMENTS ON MOORING:

Mooring was set anchor first.

Data number 2941

Instrument No.: M-142 **Type:** Magnetic tape current meter

Depth: 1512 m **Water depth:** 2674 m

Start time: 69-IV-17 223700

Stop time: 69-IV-26 110700

Duration: 8d 12h 30m

Sampling scheme: **Interval**

time between strobes = 5.27 **seconds**

no. of strobes per interval = 23

interval time = 900 *seconds*

COMMENTS:

STATS DATA/ 29418900

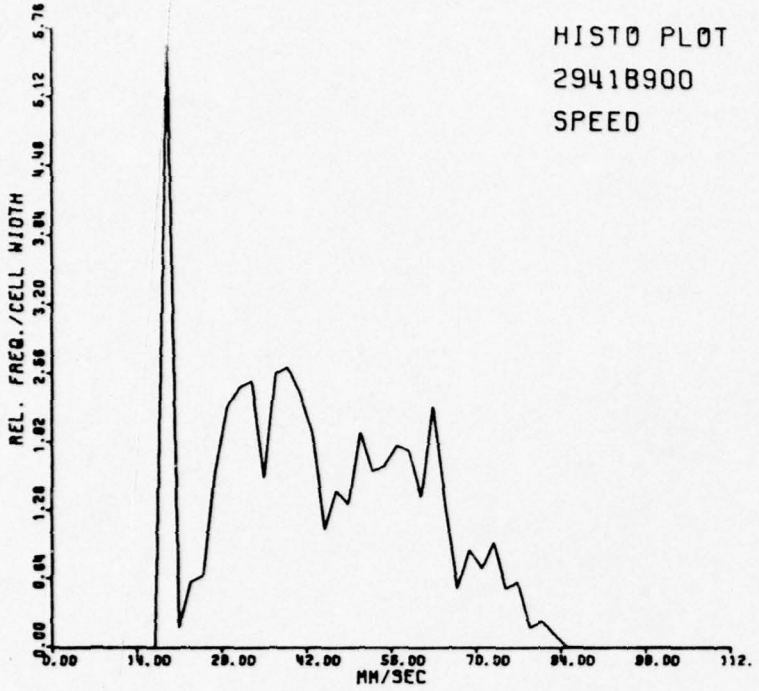
	EAST	NORTH	SPEED	######	EAST & NORTH	######
MEAN =	-33.86	18.19	43.51	# COVARIANCE =		-44.51
STD. ERR. =	.59	.66	.57	# STD. ERR. OF COVARIANCE =		29.58
VARIANCE =	287.08	381.55	289.67	# STD. DEV. OF COVARIANCE =		846.83
STD. DEV. =	16.94	19.01	18.42	# CORRELATION COEFFICIENT =		-.138
KURTOSIS =	2.74	2.71	2.12	# VECTOR MEAN =		38.92
SKEWNESS =	.25	-.16	.19	# VECTOR VARIANCE =		924.91
				# STD. DEV. =		18.01

UNITS OF RAW DATA VARIABLES = MM/SEC

SAMPLE SIZE = 819 POINTS

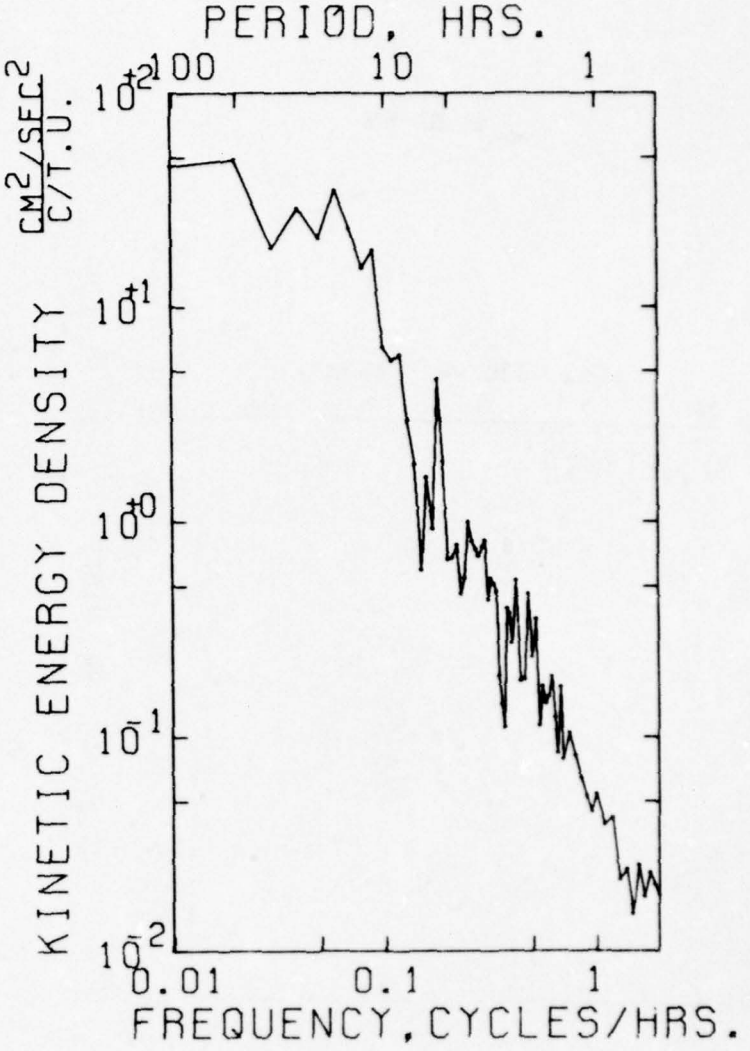
SPANNING RANGE
FROM 69- IV -17 22.37.00
TO 69- IV -26 11.07.00

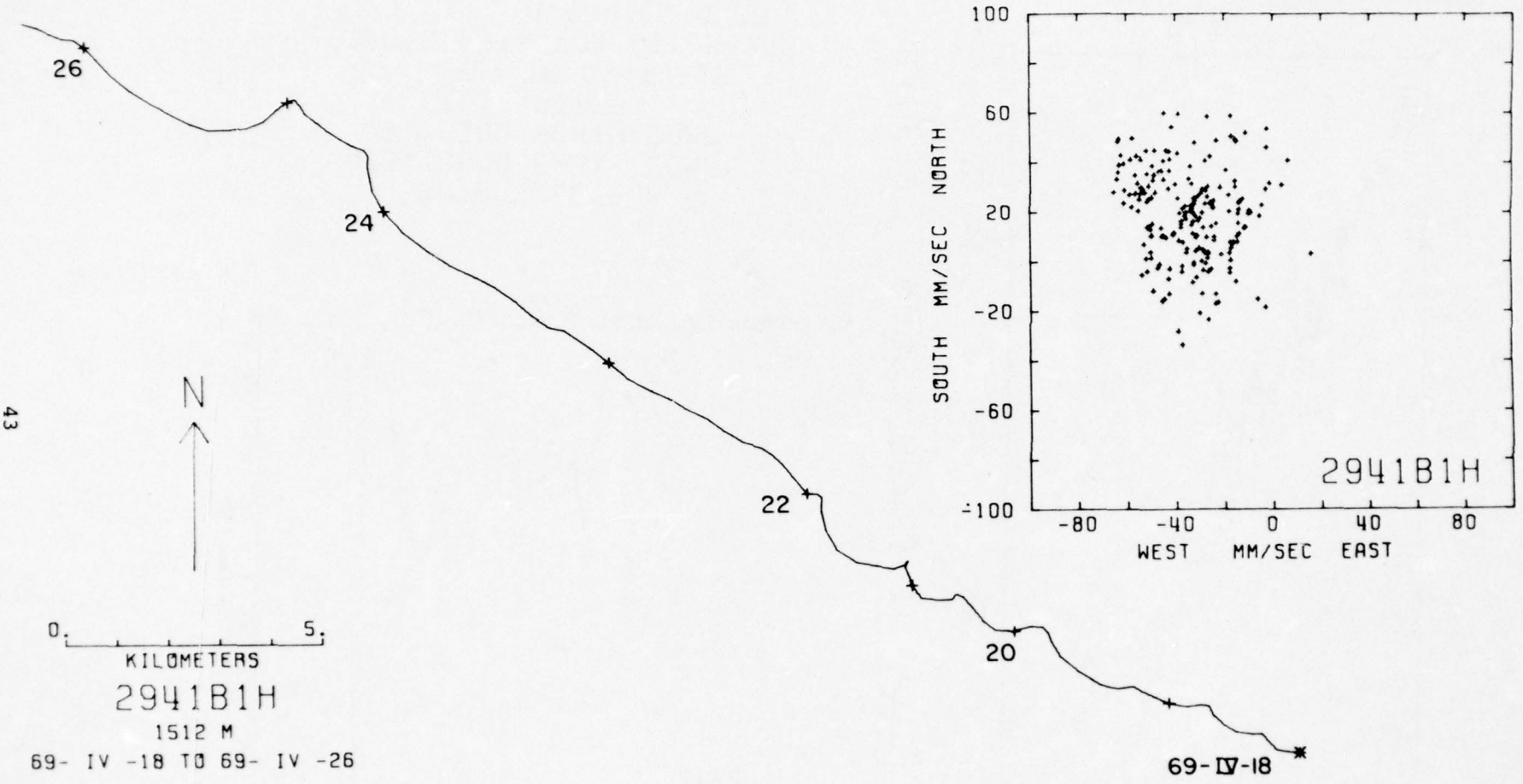
DURATION 8 DAYS 12 H 30 M 0 S

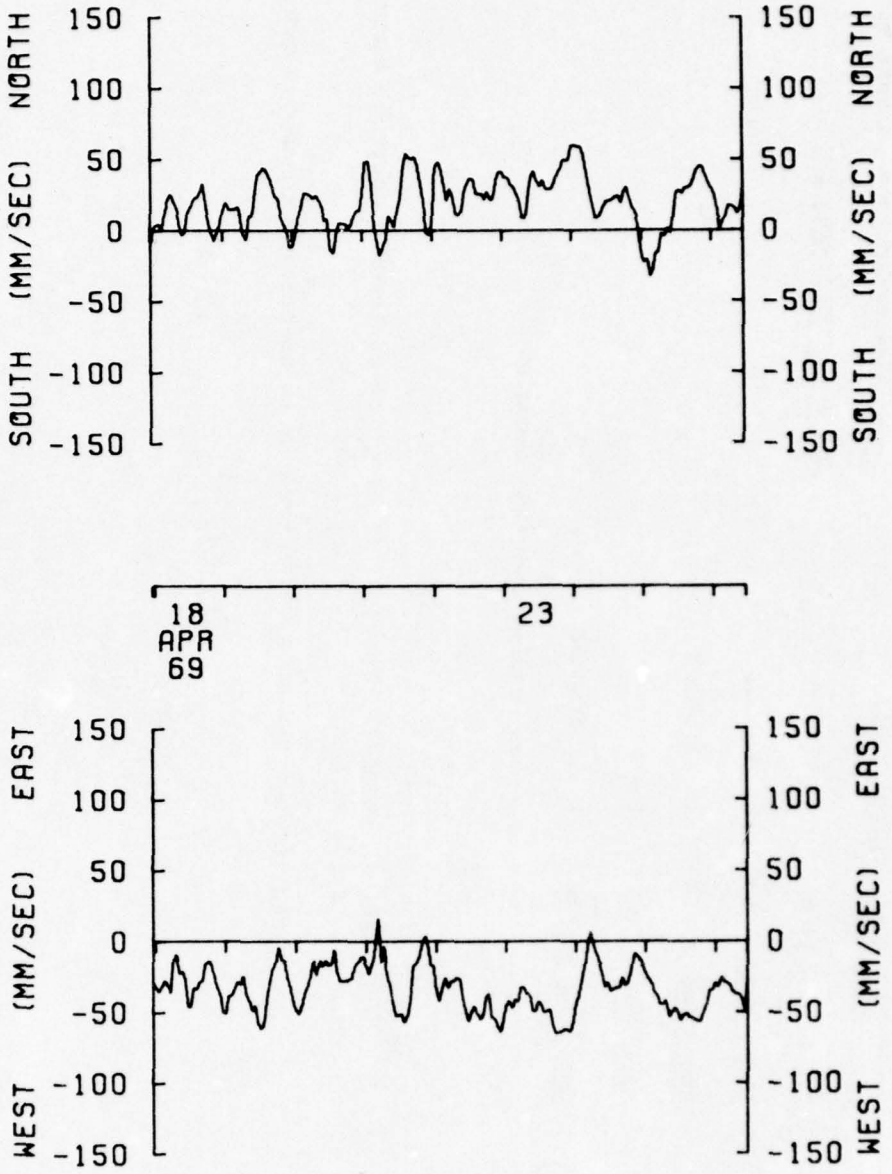


HISTO PLOT
29418900
SPEED

AUTO SPECTRUM
2941B900 EAST COMP
2941B900 NORTH COMP
1512 METERS
69-IV-17 TO 69-IV-26
1 PIECES WITH 405 ESTIMATES
PER PIECE. AVERAGED OVER
2 ADJACENT FREQUENCY BANDS




26
24
22
20
69-IV-18
N
0.
5.
KILOMETERS
2941B1H
1512 M
69- IV -18 TO 69- IV -26
100
60
20
-20
-60
-100
SOUTH MM/SEC NORTH
-80
-40
0
40
80
WEST MM/SEC EAST
2941B1H



2941B1H
1512 M

Data number 2942

Instrument No.: M-122

Type: Magnetic tape current meter

Depth: 1514 m

Water depth: 2674 m

Start time: 69-IV-17 205002

Stop time: 69-IV-25 033002

Duration: 7d 6h 40m

Sampling scheme: Continuous

one reading every 5 seconds

COMMENTS:

Time base is suspect. There is an error of at least 3 hours 51 minutes in the 12 hour clock.

Processed through the SHEAR TIME program in an attempt to smooth out the time base.

STATS

DATA/ 2942G600

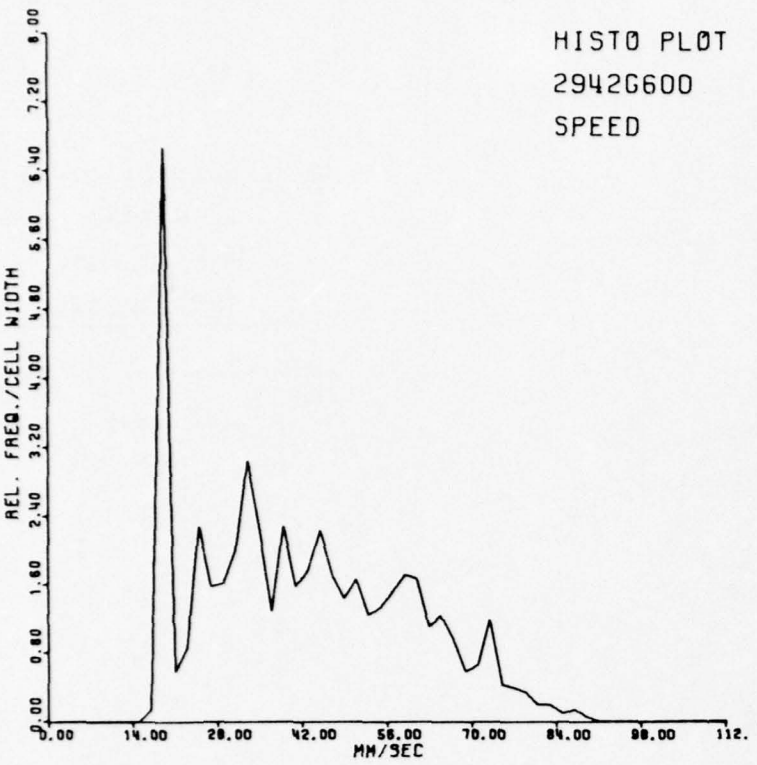
	EAST	NORTH	SPEED		EAST & NORTH	
MEAN =	-35.23	13.02	41.89	COVARIANCE =		-85.85
STD. ERR. =	.55	.55	.53	STD. ERR. OF COVARIANCE =		23.24
VARIANCE =	322.83	316.08	285.43	STD. DEV. OF COVARIANCE =		752.64
STD. DEV. =	17.97	17.78	17.19	CORRELATION COEFFICIENT =		-.269
KURTOSIS =	2.82	2.44	2.21	VECTOR MEAN =		37.56
SKEWNESS =	-.19	-.08	.35	VECTOR VARIANCE =		319.48
				STD. DEV. =		17.87

UNITS OF RAW DATA VARIABLES = MM/SEC

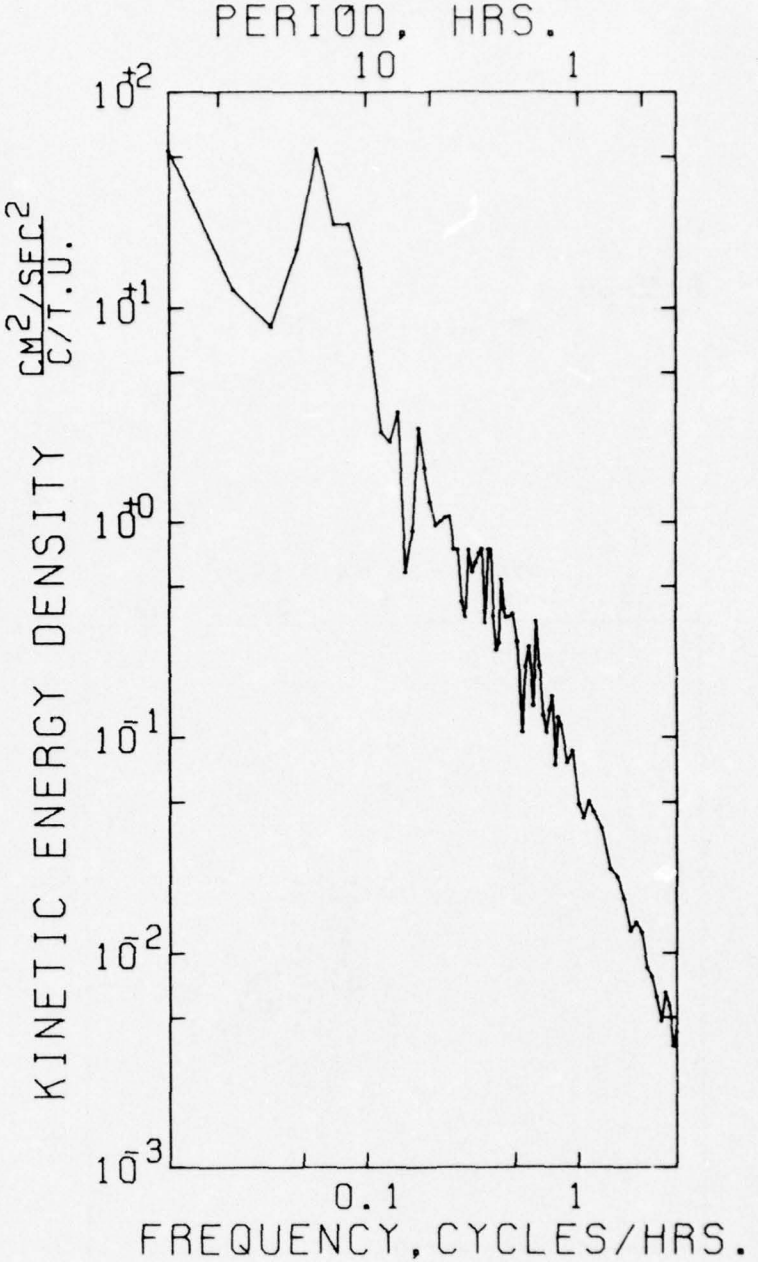
SAMPLE SIZE = 1049 POINTS

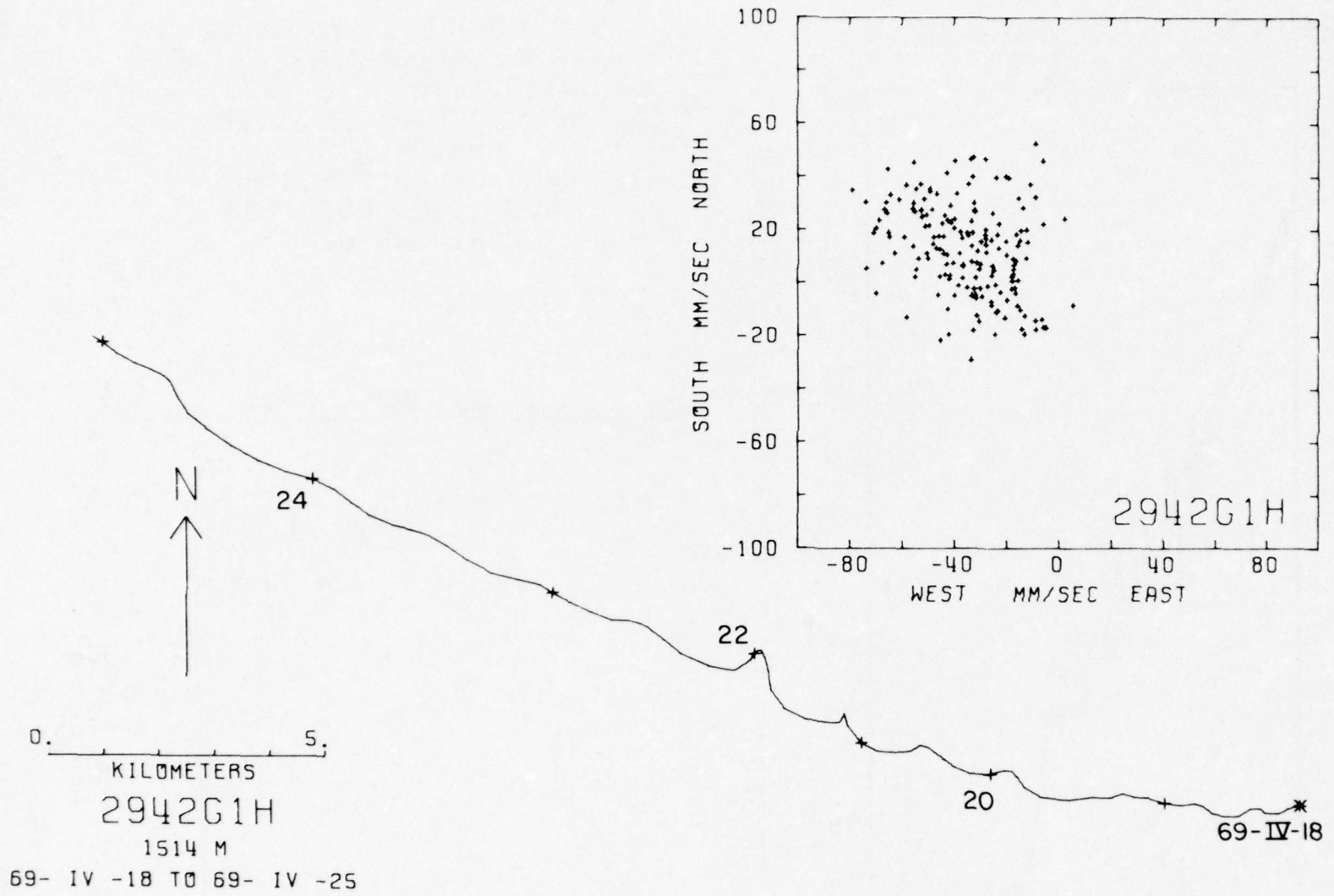
SPANNING RANGE
FROM 69- IV -17 20.50.02
TO 69- IV -25 03.30.02

DURATION 7 DAYS 6 H 40 M 0 S



AUTO SPECTRUM
2942G600 EAST COMP
2942G600 NORTH COMP
1514 METERS
69-IV-17 TO 69-IV-24
1 PIECES WITH 512 ESTIMATES
PER PIECE. AVERAGED OVER
2 ADJACENT FREQUENCY BANDS




100
60
20
-20
-60
-100
SOUTH MM/SEC NORTH
-80
-40
0
40
80
WEST MM/SEC EAST
2942G1H
N
24
22
20
69-IV-18
0.
5.
KILOMETERS
2942G1H
1514 M
69- IV -18 TO 69- IV -25

SOUTH (MM/SEC) NORTH
150
100
50
0
-50
-100
-150
NORTH (MM/SEC) SOUTH
18
APR
69
23
WEST (MM/SEC) EAST
EAST (MM/SEC) WEST
29426 1H
1514 M

Data number 2944

Instrument No.: M-159

Type: Magnetic tape current meter

Depth: 1564 m

Water depth: 2674 m

Start time: 69-IV-17 205001

Stop time: 69-IV-26 043001

Duration: 8d 7h 40m

Sampling scheme: Continuous

one reading every 5 seconds

COMMENTS:
Mechanical clock was 4 minutes off.

STATS DATA/ 2944$600

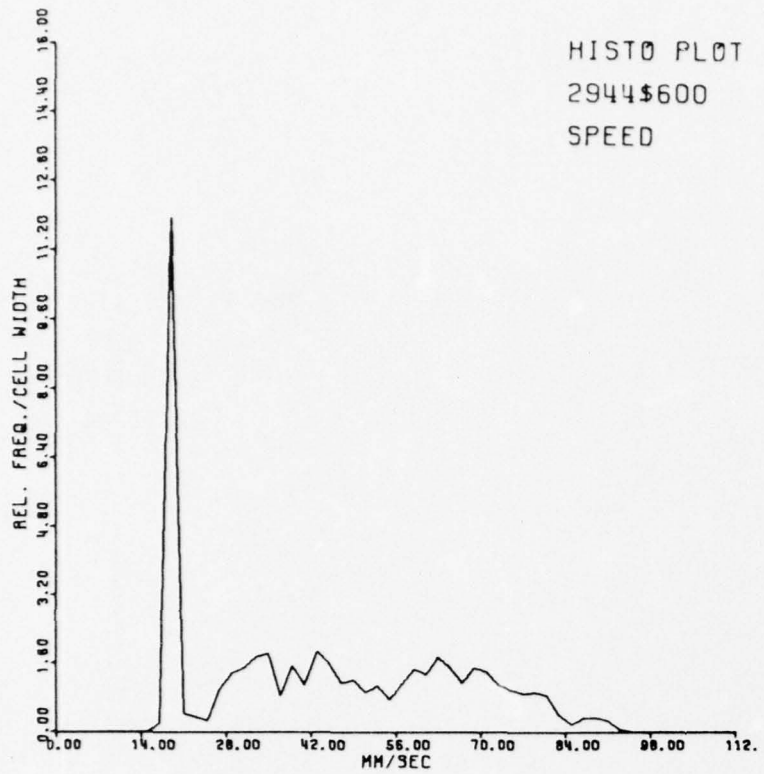
	EAST	NORTH	SPEED			EAST & NORTH	
MEAN =	-34.22	22.44	44.18	*	****** COVARIANCE	=	-121.47
STD. ERR. =	.57	.53	.61	*	STD. ERR. OF COVARIANCE	=	27.69
VARIANCE =	383.29	334.87	450.03	*	STD. DEV. OF COVARIANCE	=	958.85
STD. DEV. =	19.63	18.30	21.21	*	CORRELATION COEFFICIENT	=	-.935
KURTOSIS =	2.18	2.62	1.83	*	VECTOR MEAN	=	40.99
SKEWNESS =	-.36	.09	.25	*	VECTOR VARIANCE	=	984.08
				*	STD. DEV.	=	19.08

UNITS OF RAW DATA VARIABLES = MM/SEC

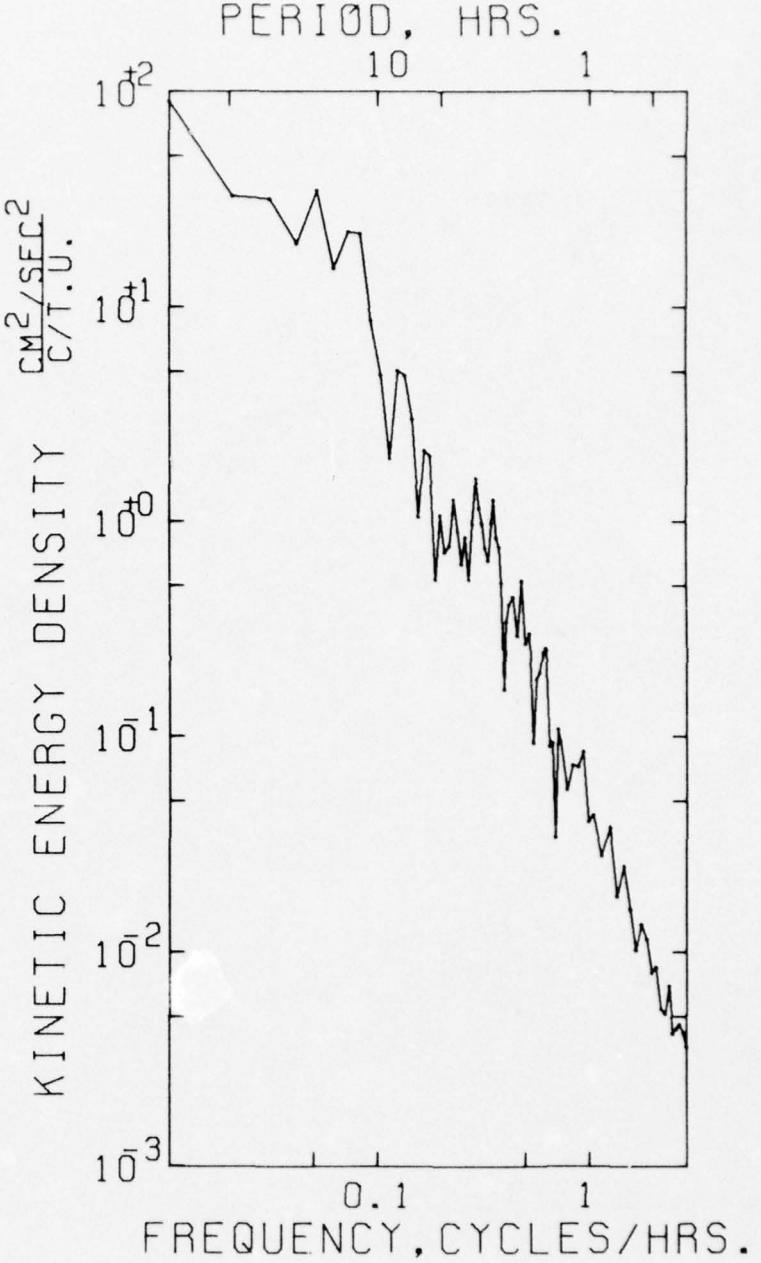
SAMPLE SIZE = 1199 POINTS

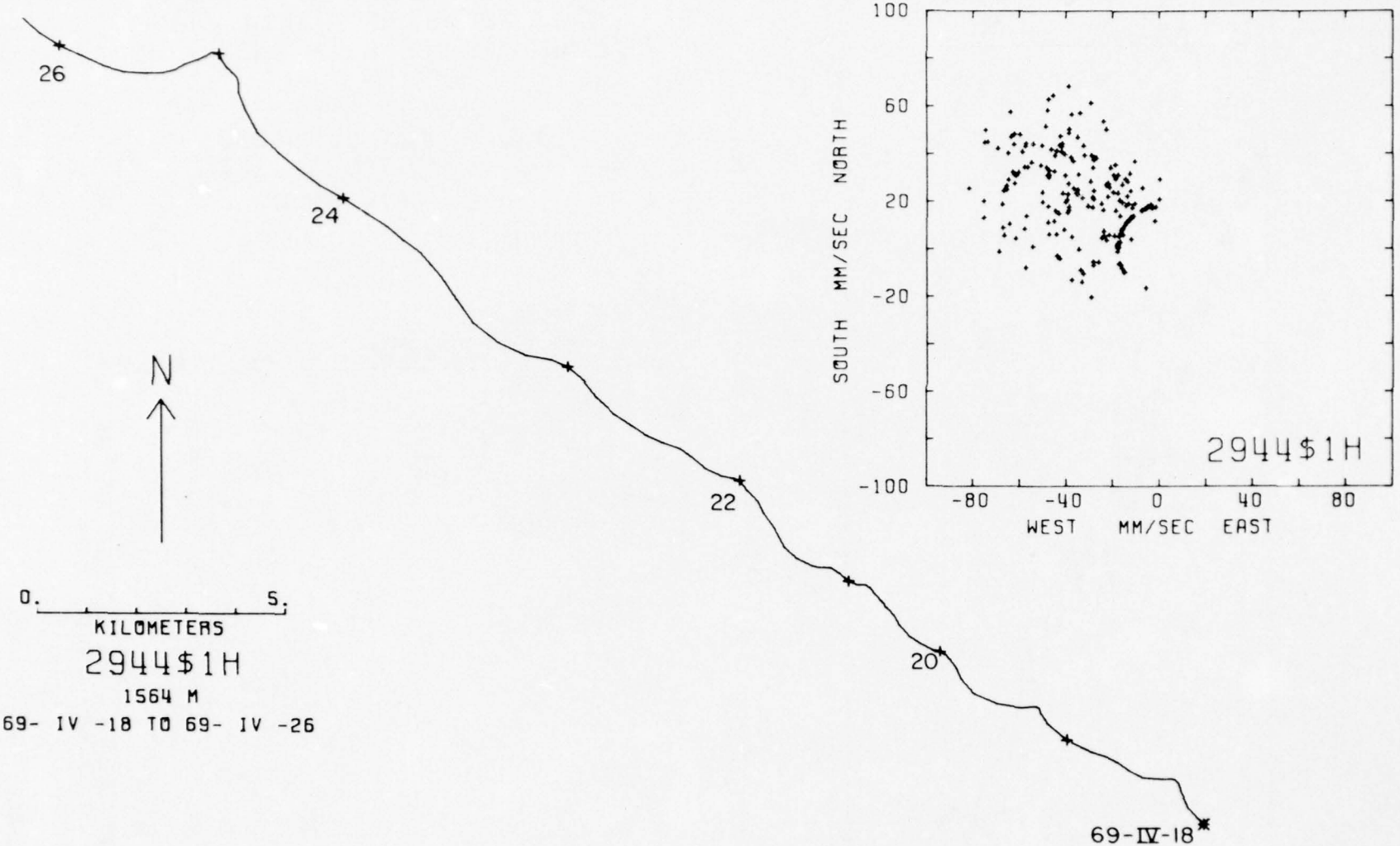
SPANNING RANGE
FROM 69- IV -17 20.50.01
TO 69- IV -26 04.30.01

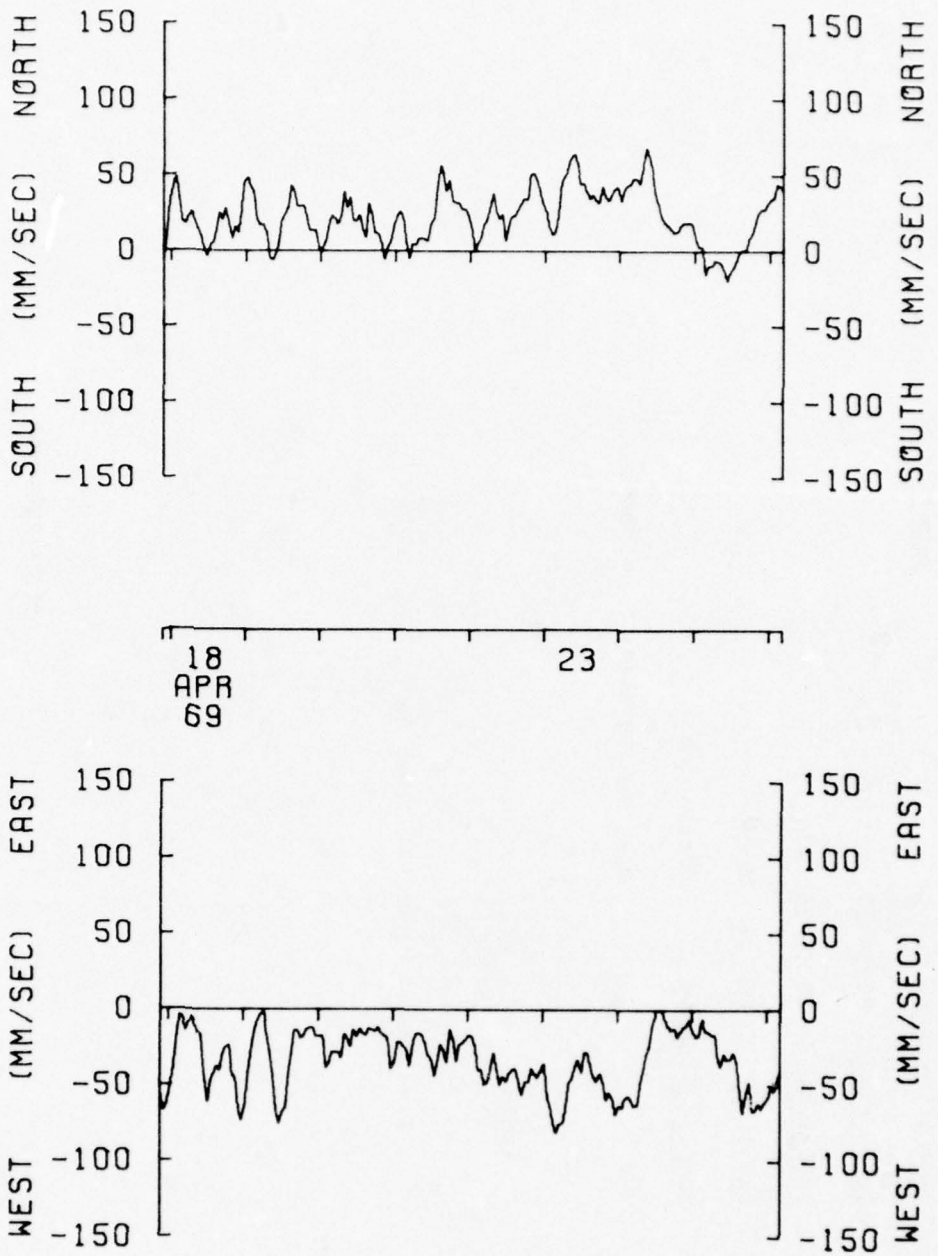
DURATION 8 DAYS 7 H 40 M 0 S



AUTO SPECTRUM
2944$600 EAST COMP
2944$600 NORTH COMP
1564 METERS
69-IV-17 TO 69-IV-25
1 PIECES WITH 576 ESTIMATES
PER PIECE. AVERAGED OVER
2 ADJACENT FREQUENCY BANDS




26
24
22
20
69-IV-18
N
0.
S.
KILOMETERS
2944$1H
1564 M
69- IV -18 TO 69- IV -26
100
60
20
-20
-60
-100
SOUTH MM/SEC NORTH
-80
-40
0
40
80
WEST MM/SEC EAST
2944$1H



2944$1H
1564 M

Data number 2945

Instrument No.: M-127 Type: Magnetic tape current meter

Depth: 1598 m Water depth: 2674 m

Start time: 69-IV-17 204206

Stop time: 69-IV-25 230706

Duration: 8d 2h 25m

Sampling scheme: Continuous

one reading every 5 seconds

COMMENTS:

Time base suspect last two days.

STATS DATA/ 2945C300

	EAST	NORTH	SPEED
MEAN =	-35.95	24.00	47.05
STD. ERR. =	.44	.41	.46
VARIANCE =	453.48	389.18	487.65
STD. DEV. =	21.30	18.73	22.31
KURTOSIS =	2.93	2.72	2.45
SKEWNESS =	-.42	-.03	.43

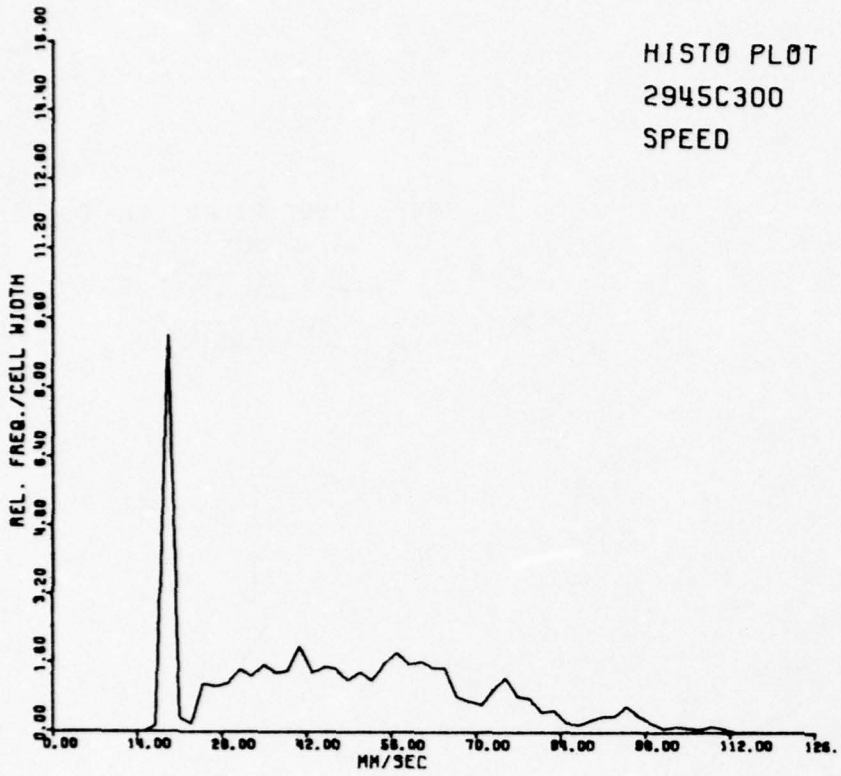
***** EAST & NORTH *****	
COVARIANCE =	-151.57
STD. ERR. OF COVARIANCE =	23.26
STD. DEV. OF COVARIANCE =	1123.68
CORRELATION COEFFICIENT =	-.361
VECTOR MEAN =	43.23
VECTOR VARIANCE =	421.33
STD. DEV. =	20.53

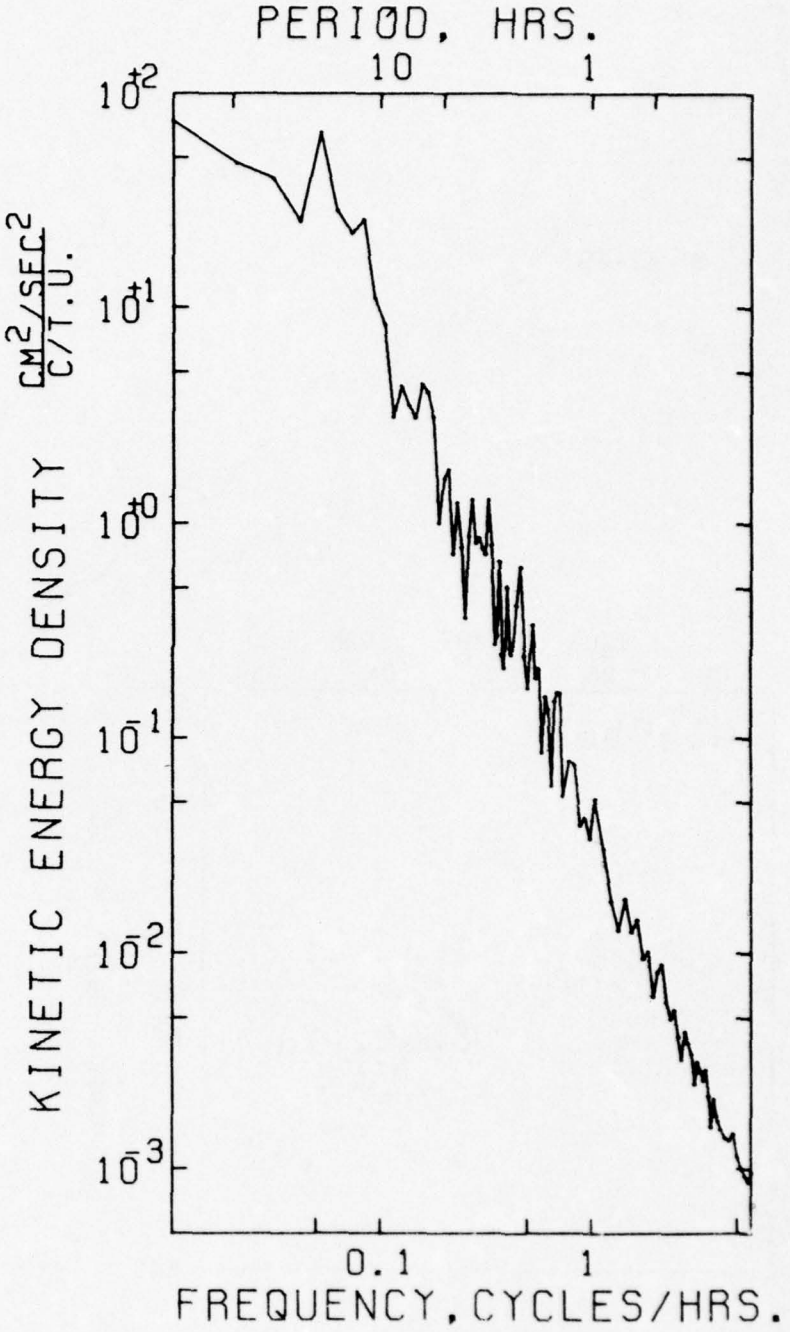
UNITS OF RAW DATA VARIABLES = MM/SEC

SAMPLE SIZE = 2334 POINTS

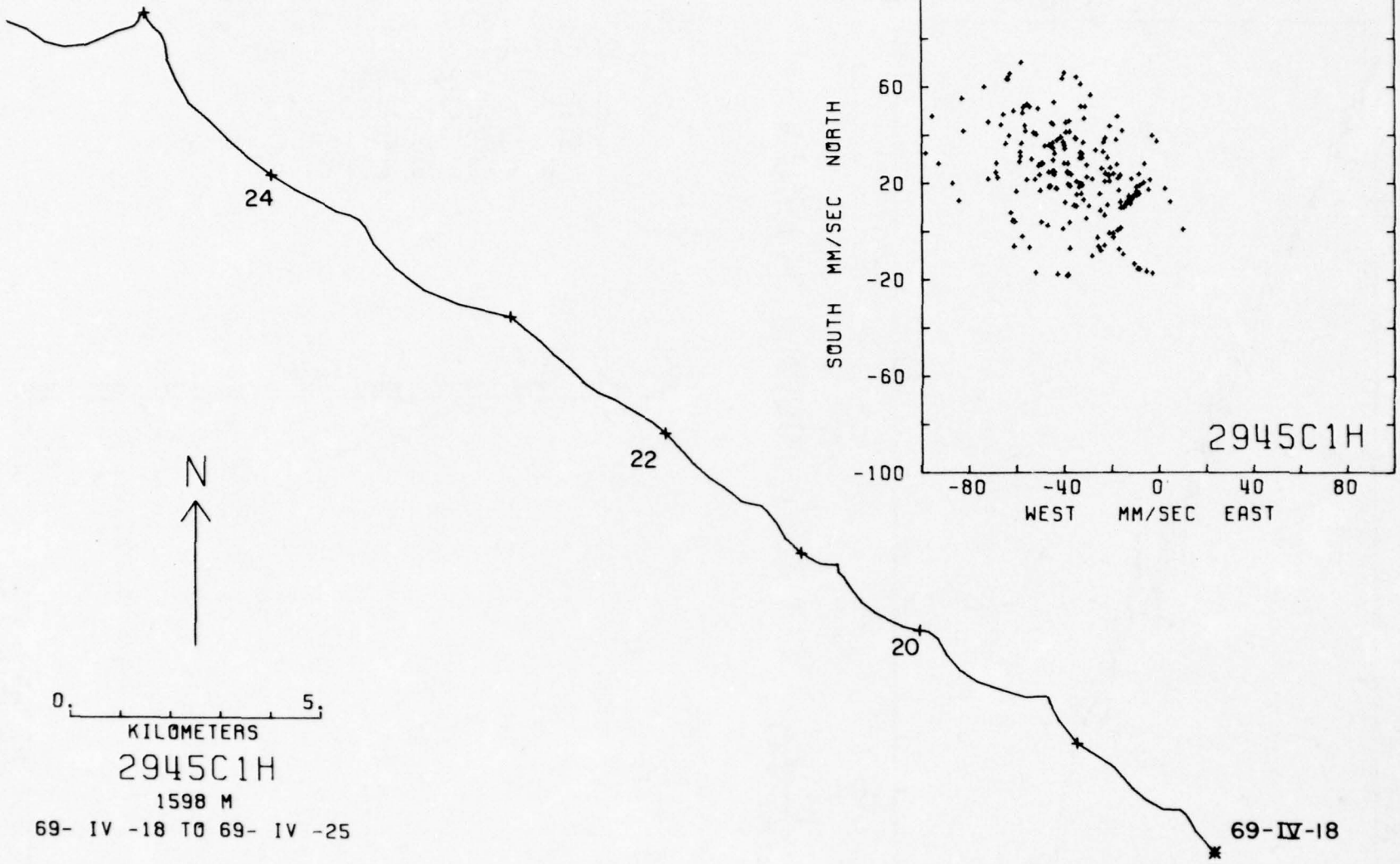
SPANNING RANGE
FROM 69- IV -17 20.42.06
TO 69- IV -25 23.07.06

DURATION 8 DAYS 2 H 25 M 0 S

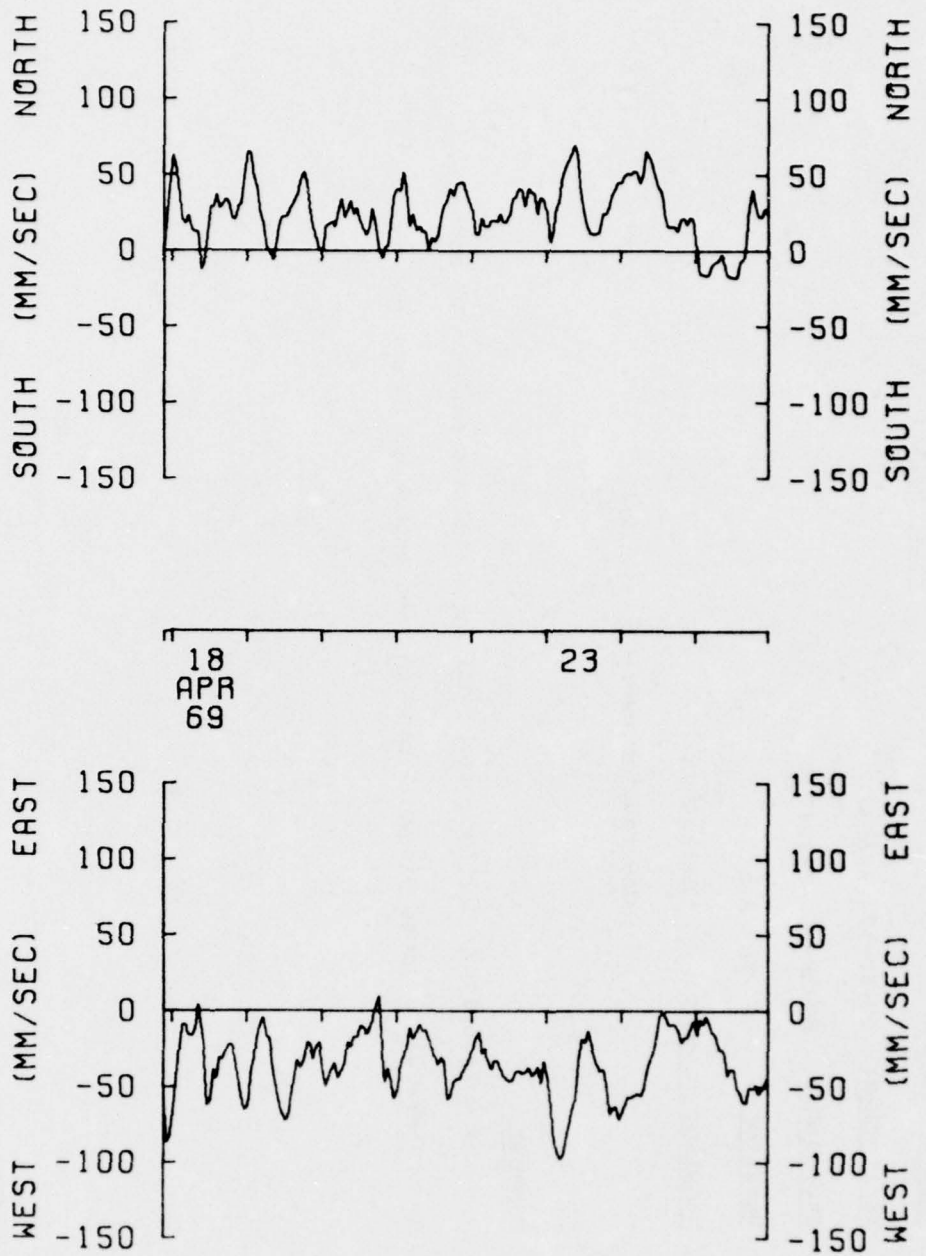




AUTO SPECTRUM
2945C300 EAST COMP
2945C300 NORTH COMP
1598 METERS
69-IV-17 TO 69-IV-25
1 PIECES WITH 1152 ESTIMATES
PER PIECE. AVERAGED OVER
2 ADJACENT FREQUENCY BANDS


24
22
20
69-IV-18
N
0.
5.
KILOMETERS
2945C1H
1598 M
69- IV -18 TO 69- IV -25

100
60
20
-20
-60
-100
SOUTH MM/SEC NORTH
-80
-40
0
40
80
WEST MM/SEC EAST
2945C1H



2945C1H
1598 M

Data number 2946

Instrument No.: M-170 Type: Magnetic tape current meter

Depth: 1614 m Water depth: 2674 m

Start time: 69-IV-17 204547

Stop time: 69-IV-26 021047

Duration: 8d 5h 25m

Sampling scheme: Continuous

one reading every 5 seconds

COMMENTS:

Vane is sticky. 12-hour clock off by at least 6 minutes 47 seconds.

There was a loose piece of tape in vane cage upon recovery.

STATS DATA/ 29460900

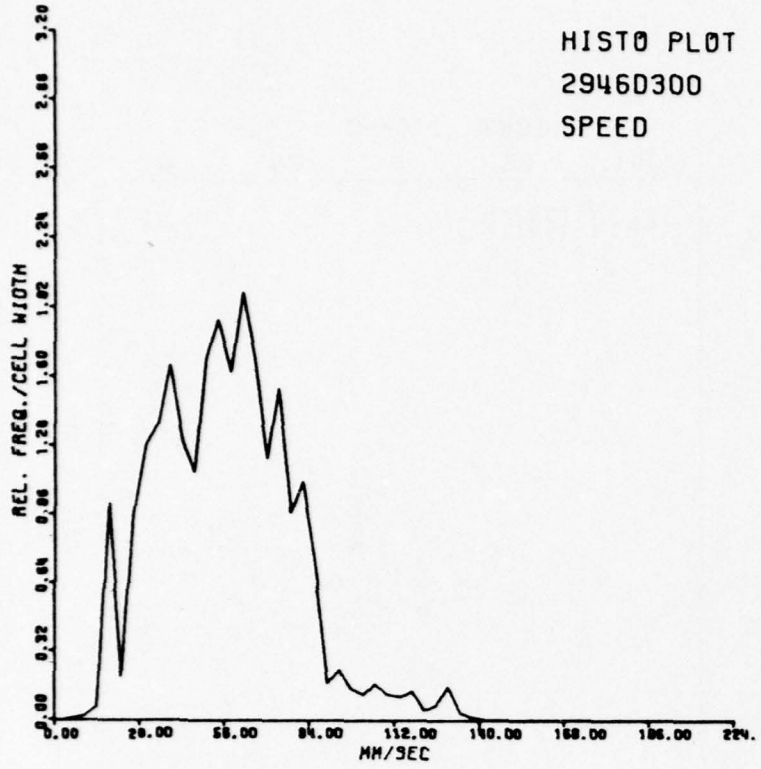
	EAST	NORTH	SPEED		EAST & NORTH	
MEAN =	-37.42	27.88	55.89	COVARIANCE =		61.87
STD. ERR. =	.64	.45	.46	STD. ERR. OF COVARIANCE =		30.20
VARIANCE =	969.07	489.77	485.60	STD. DEV. OF COVARIANCE =		1470.15
STD. DEV. =	31.13	21.89	22.26	CORRELATION COEFFICIENT =		.090
KURTOSIS =	3.71	2.46	3.53	VECTOR MEAN =		46.67
SKEWNESS =	.35	-.23	.58	VECTOR VARIANCE =		726.42
				STD. DEV. =		26.95

UNITS OF RAW DATA VARIABLES = MM/SEC

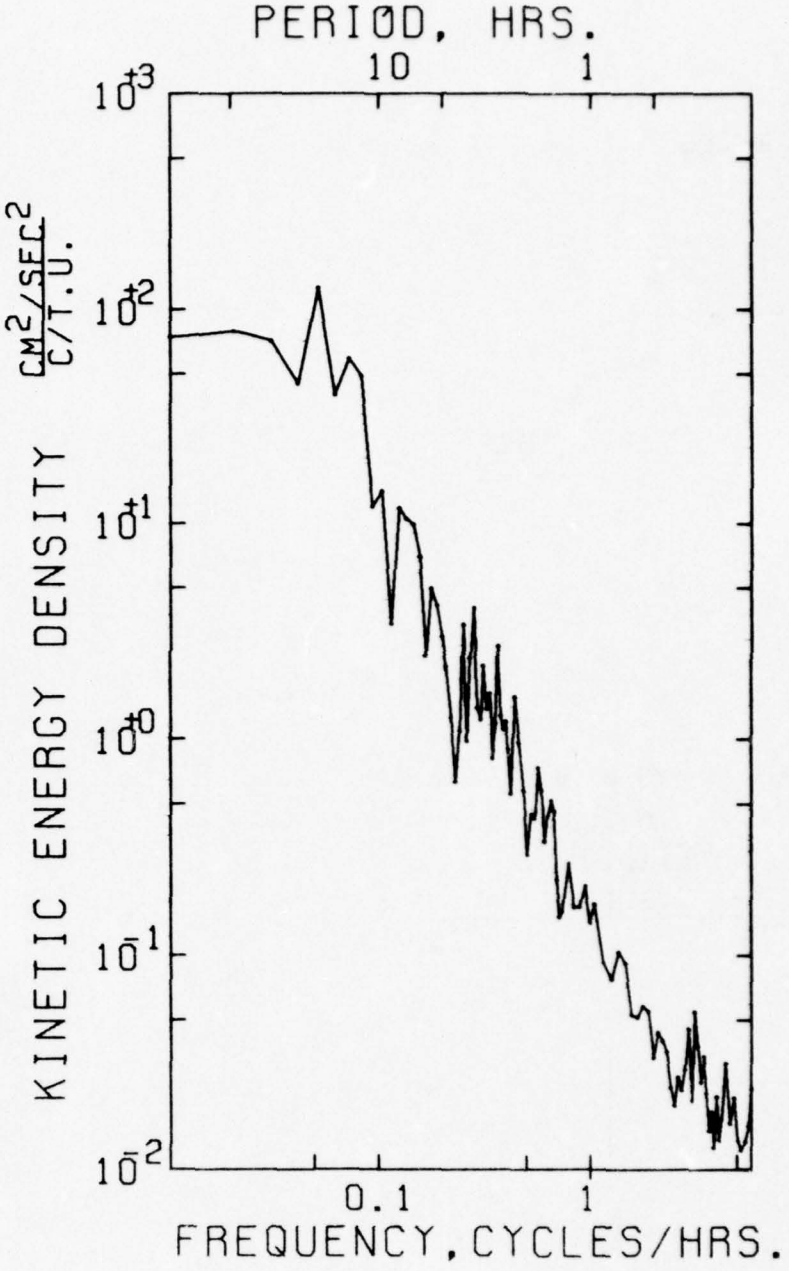
SAMPLE SIZE = 2370 POINTS

SPANNING RANGE
FROM 69- IV -17 20.45.47
TO 69- IV -26 02.10.47

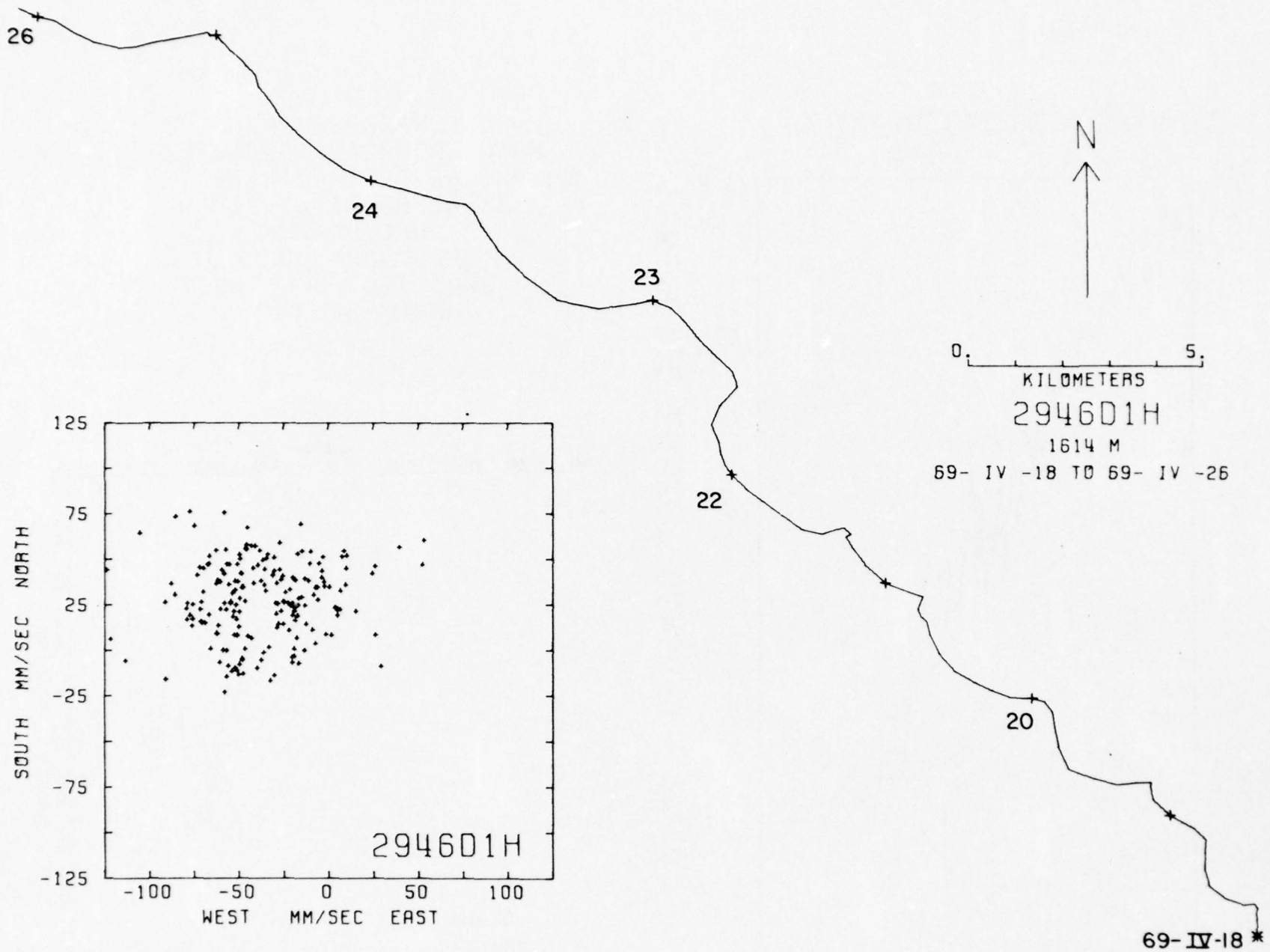
DURATION 8 DAYS 5 H 25 M 0 S

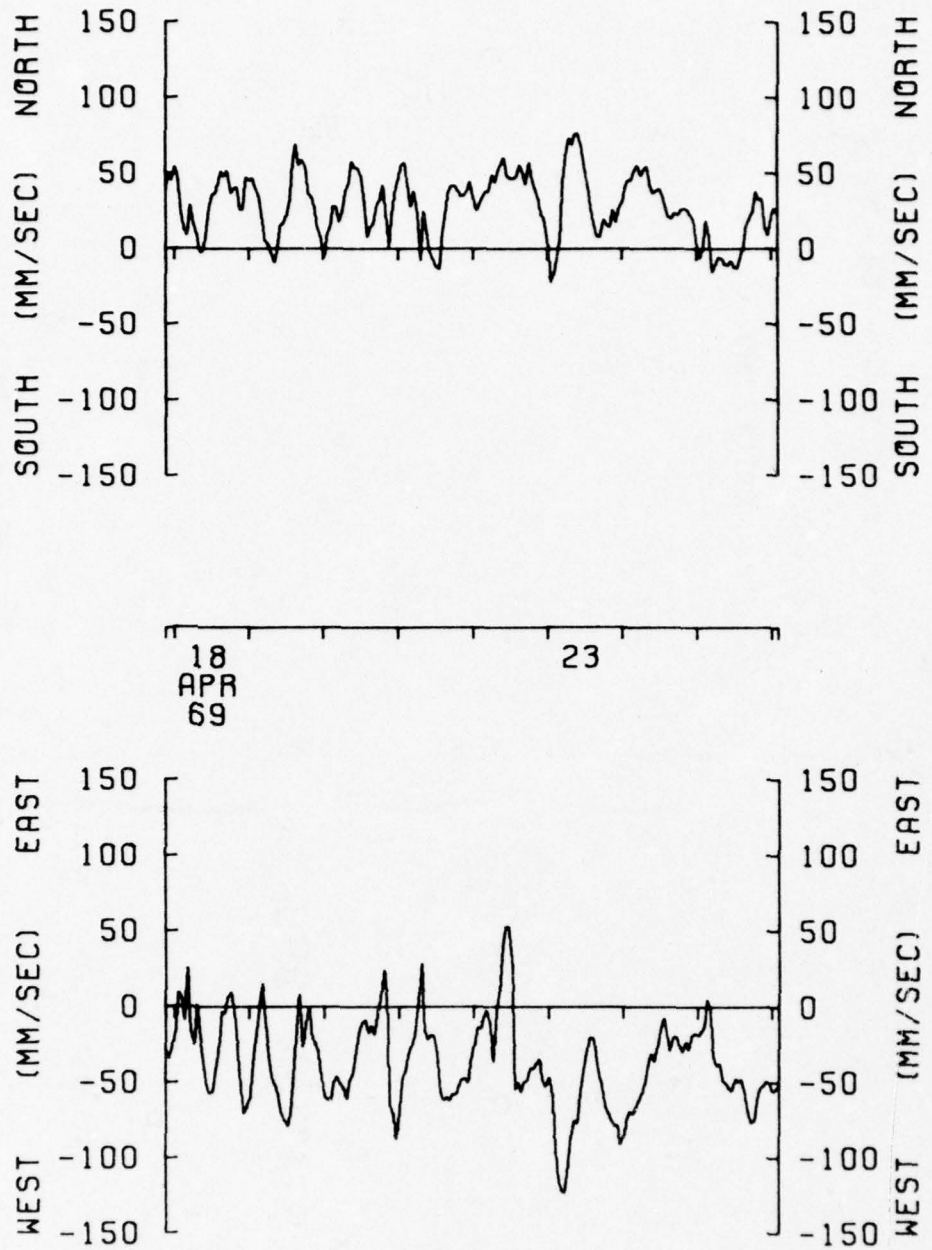


HISTO PLOT
29460300
SPEED



AUTO SPECTRUM
29460300 EAST COMP
29460300 NORTH COMP
1614 METERS
69-IV-17 TO 69-IV-25
1 PIECES WITH 1152 ESTIMATES
PER PIECE. AVERAGED OVER
2 ADJACENT FREQUENCY BANDS


26
24
23
22
20
69- IV -18
N
0
5
KILOMETERS
2946D1H
1614 M
69- IV -18 TO 69- IV -26
125
75
25
-25
-75
-125
SOUTH MM/SEC NORTH
-100
-50
0
50
100
WEST MM/SEC EAST
2946D1H



294601H
1614 M

STATION 298

LIGHT
RADIO
WIND RECORDER - *2981*

TELEMETERING TENSIOMETER - *2982*

SWIVEL

10 m CHAIN

CURRENT METER - *2983*

500 m

5/16" 3 x 19 U.S. STEEL WIRE

500 m

500 m

497 m

407 m

5/8" NYLON

30 m

TENSIOMETER - *2984*

85 5/8" NYLON WITH 29 GLASS SPHERES PLACED 2 m APART

ACOUSTIC BEACON

2 m

ACOUSTIC RELEASE, AMF

15 m

5 m CHAIN

STIMSON ANCHOR

DANFORTH ANCHOR
ON 3 m CHAIN

Mooring No. 298

Set 69 (Year) Apr (Month) 26 (Day) — 39° 09.1N (Latitude) — 69° 59.0W (Longitude)

Set by R. Heinmiller — Ship R. V. Chain — Cruise 90

Retrieved 69 (Year) Aug (Month) 12 (Day)

Retrieved by R. Heinmiller — Ship R. V. Chain — Cruise 95

Purpose of Mooring: Four-month wire test

Mooring Type: Surface

Data Number	Instrument Number	Type	Depth Meters	Comments
2981*	W-125X	M.W.R.	0	
2982	1013	Tel. Tens.	2	
2983*	M-205	M.C.M.	14	
2984	1019	Tens.	2566	
Water depth			2675	

Hydrographic Stations

R. V. Chain cruise 90 Station 879

R. V. Chain cruise 95 Station 922

COMMENTS ON MOORING:

Data number 2981

Instrument No.: W-125X **Type:** Magnetic tape wind recorder

Depth: -0- **Water depth:** 2675 m

Start time: 69-IV-27 014500

Stop time: 69-VIII-03 234500

Duration: 98d 22h

Sampling scheme: **Interval**

time between strobes = 5 **seconds**

no. of strobes per interval = 24

interval time = 1800 **seconds**

COMMENTS:

Record truncated at August 2, 1969 because of bad anemometer. Wind direction follows ocean current conventions to facilitate comparisons; add 180° to direction for meteorological data.

STATS DATA/ 2981WL1800

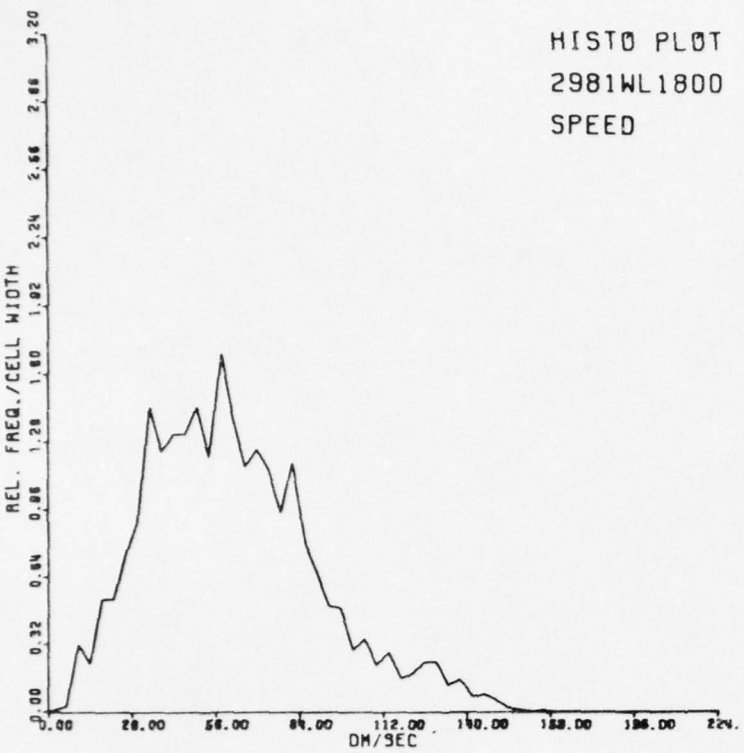
	EAST	NORTH	SPEED	EAST & NORTH	
MEAN =	10.93	7.68	61.53	* COVARIANCE =	881.16
STD. ERR. =	.63	.73	.41	* STD. ERR. OF COVARIANCE =	30.78
VARIANCE =	1804.08	2516.15	812.71	* STD. DEV. OF COVARIANCE =	2121.78
STD. DEV. =	43.64	50.16	28.51	* CORRELATION COEFFICIENT =	.403
KURTOSIS =	2.98	2.29	9.20	* VECTOR MEAN =	13.96
SKEWNESS =	.09	-.06	.64	* VECTOR VARIANCE =	2210.12
				* STD. DEV. =	47.01

UNITS OF RAW DATA VARIABLES = CM/SEC

SAMPLE SIZE = 4749 POINTS

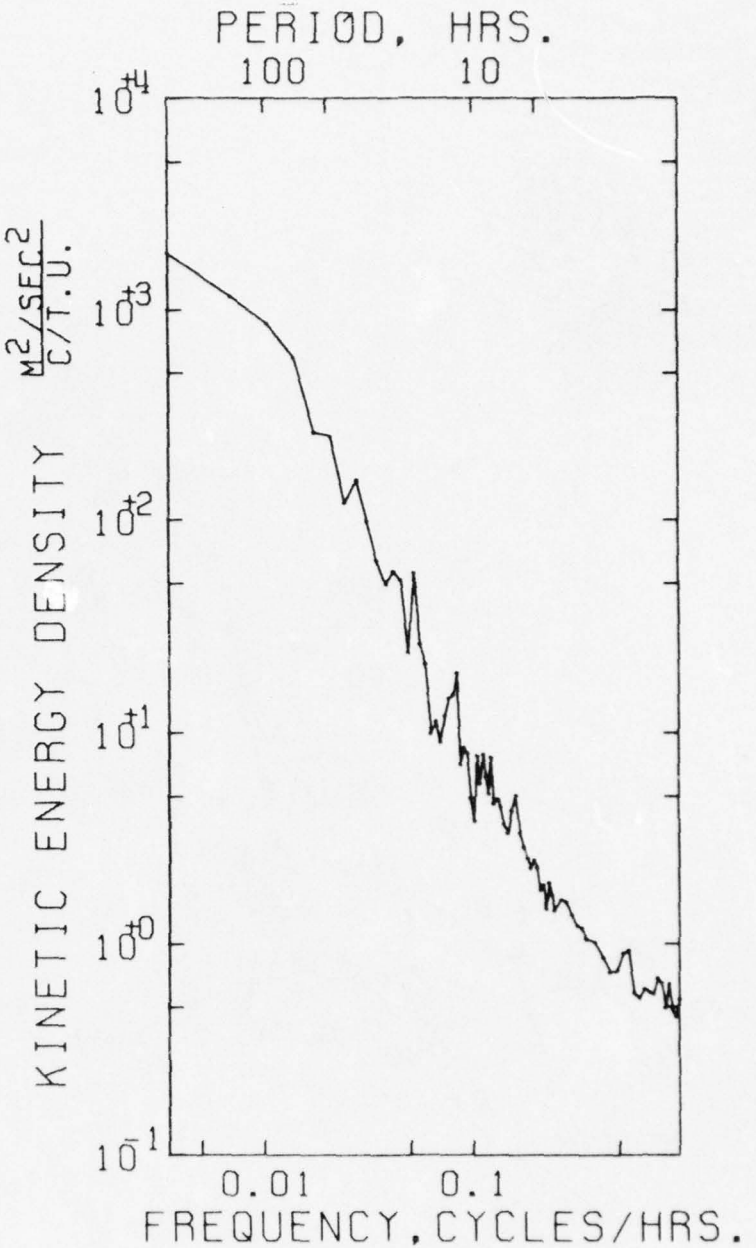
SPANNING RANGE
FROM 69- IV -27 01.45.00
TO 68-VIII-03 23.45.00

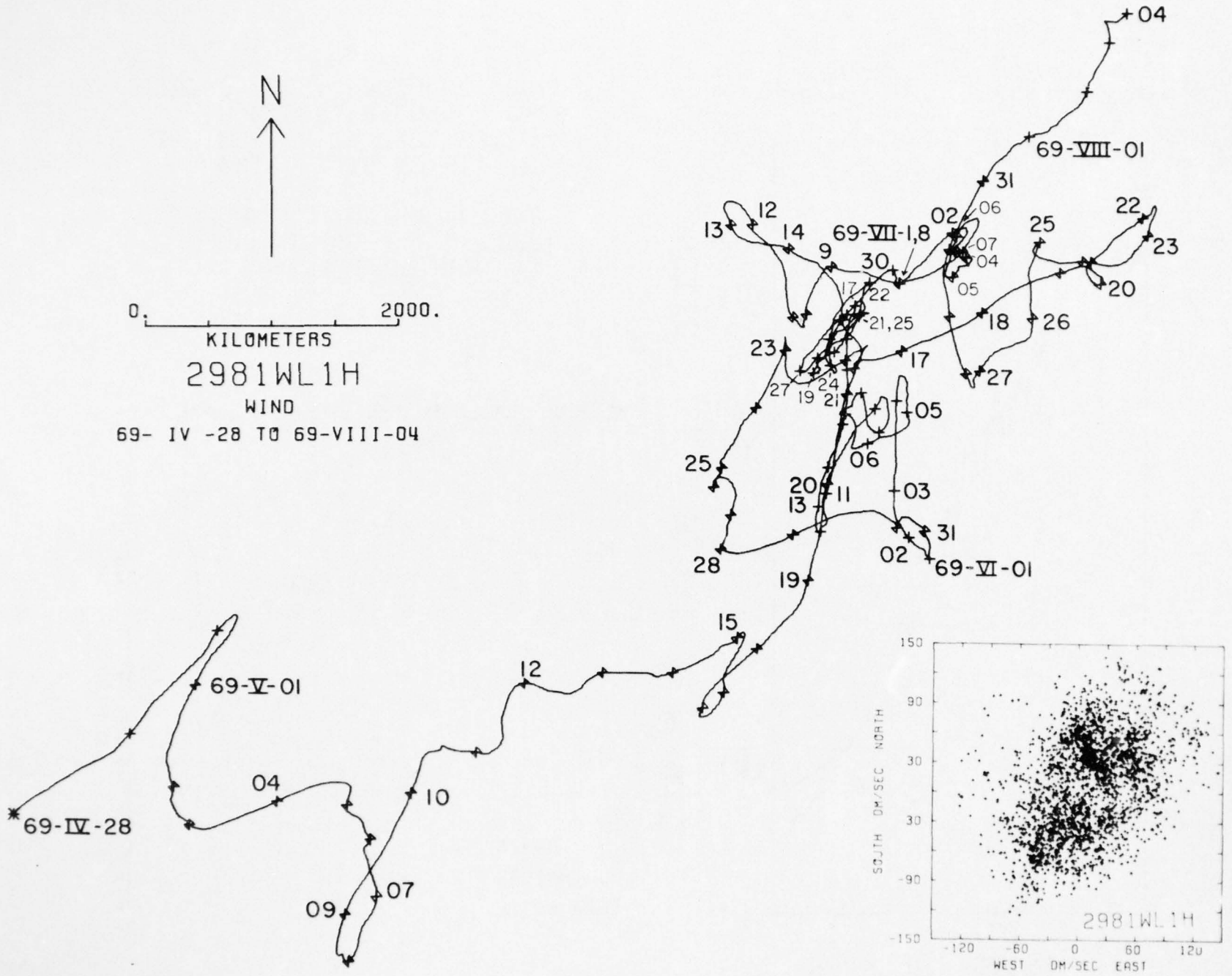
DURATION 98 DAYS 22 H 0 M 0 S

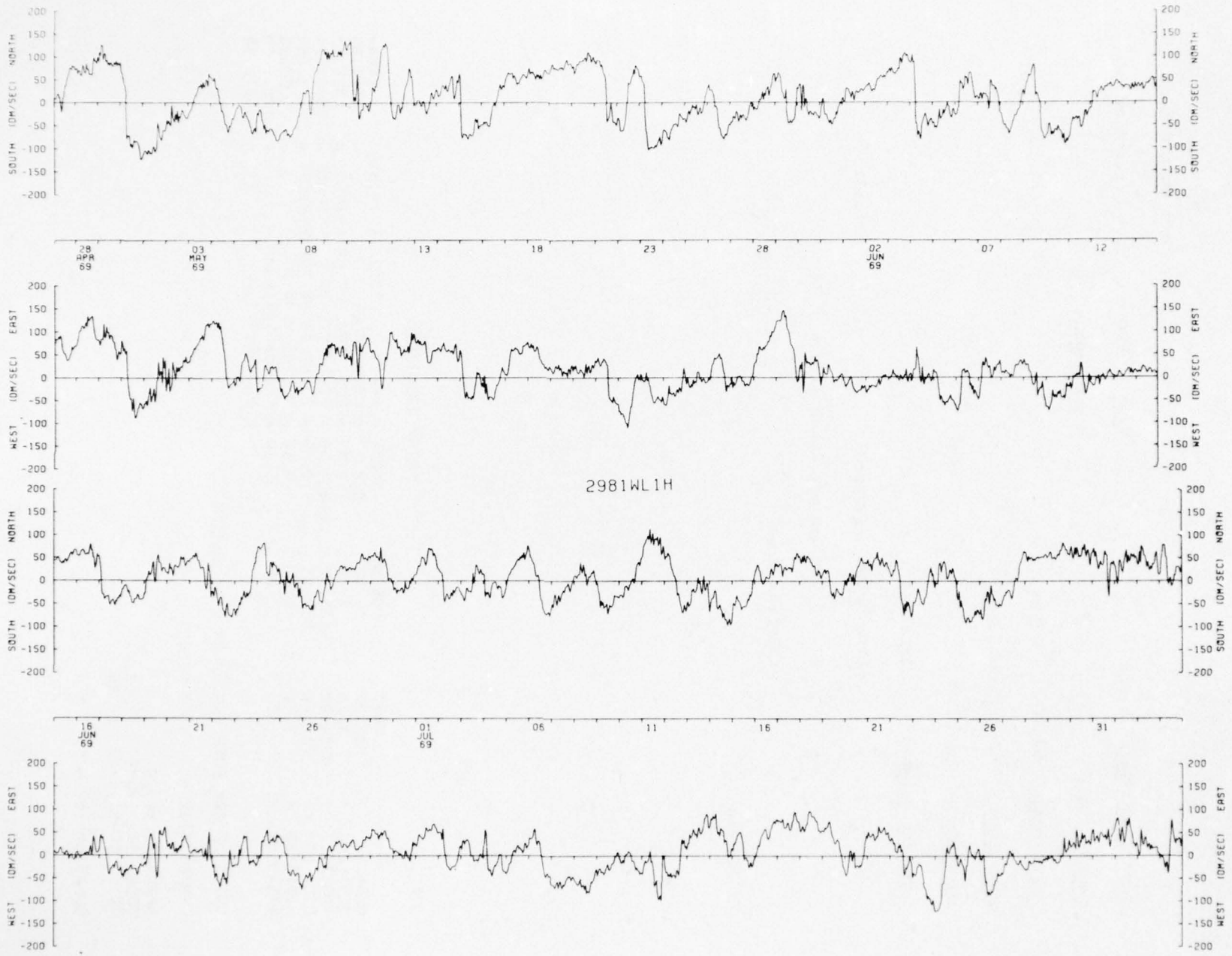


AUTO SPECTRUM
2981WL1800 EAST COMP
2981WL1800 NORTH COMP

69-IV-27 TO 69-VIII-01
1 PIECES WITH 2304 ESTIMATES
PER PIECE. AVERAGED OVER
8 ADJACENT FREQUENCY BANDS




N
0.
2000.
KILOMETERS
2981WL1H
WIND
69- IV -28 TO 69-VIII-04
69-IV-28
69-V-01
69-VI-01
69-VII-1,8
69-VIII-01
SOUTH DM/SEC NORTH
WEST DM/SEC EAST
2981WL1H


2981WL1H
SOUTH (DM/SEC) NORTH
WEST (DM/SEC) EAST
200
150
100
50
0
-50
-100
-150
-200
28 APR 69
03 MAY 69
08
13
18
23
28
02 JUN 69
07
12
16 JUN 69
21
26
01 JUL 69
06
11
16
21
26
31

Data number 2983

Instrument No.: M-205 Type: Magnetic tape current meter

Depth: 14 m Water depth: 2675 m

Start time: 69-IV-27 034507

Stop time: 69-VIII-12 114507

Duration: 107d 8h

Sampling scheme: Interval

time between strobes = 5 seconds

no. of strobes per interval = 24

interval time = 1800 seconds

COMMENTS:

STATS DATA/ 2983E1800

	EAST	NORTH	SPEED	****** EAST & NORTH ******
MEAN =	-25.02	61.49	328.37	* COVARIANCE = 6768.84
STD. ERR. =	3.25	4.28	2.97	* STD. ERR. OF COVARIANCE = 1325.53
VARIANCE =	54284.66	94537.74	45400.70	* STD. DEV. OF COVARIANCE = 85152.24
STD. DEV. =	232.99	307.47	213.07	* CORRELATION COEFFICIENT = .084
KURTOSIS =	3.41	3.70	4.19	* VECTOR MEAN = 66.38
SKEWNESS =	.20	.06	1.12	* VECTOR VARIANCE = 74411.20
				* STD. DEV. = 272.78

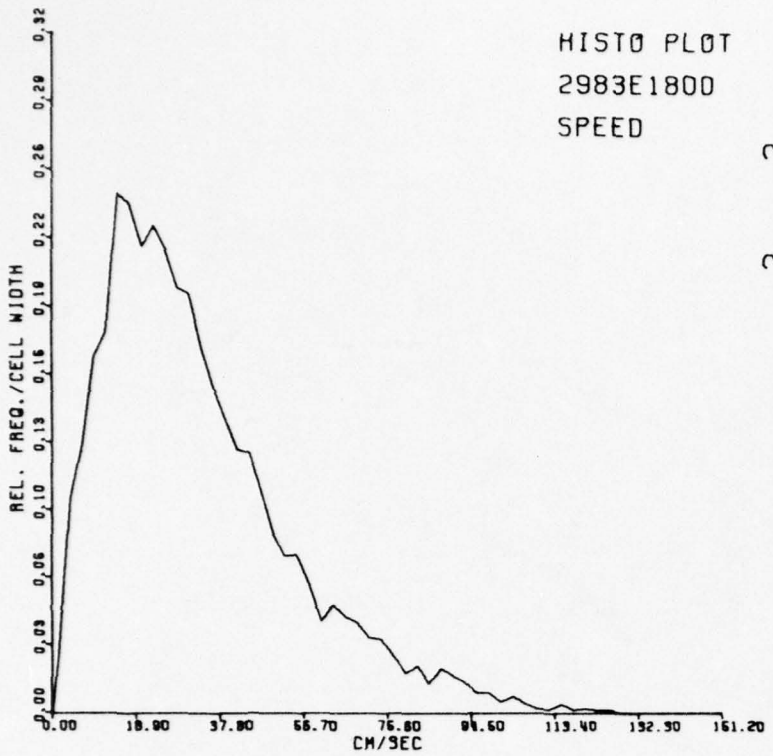
UNITS OF RAW DATA VARIABLES = MM/SEC

SAMPLE SIZE = 5153 POINTS

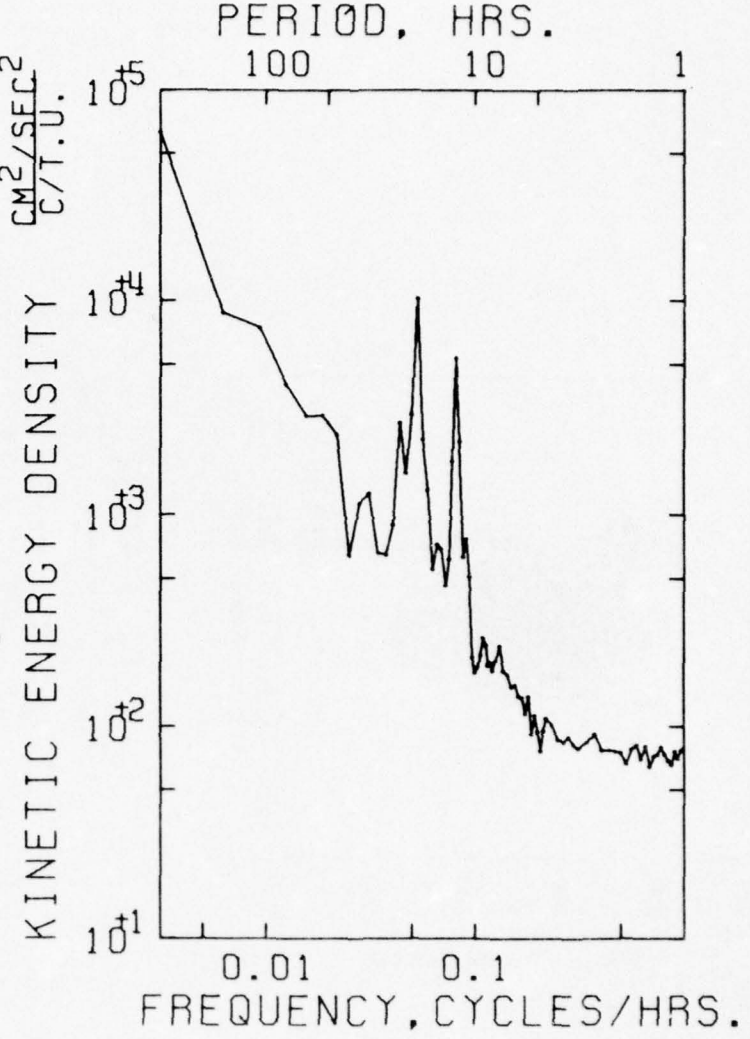
SPANNING RANGE
FROM 69- IV -27 03.45.07
TO 69-VIII-12 11.45.07

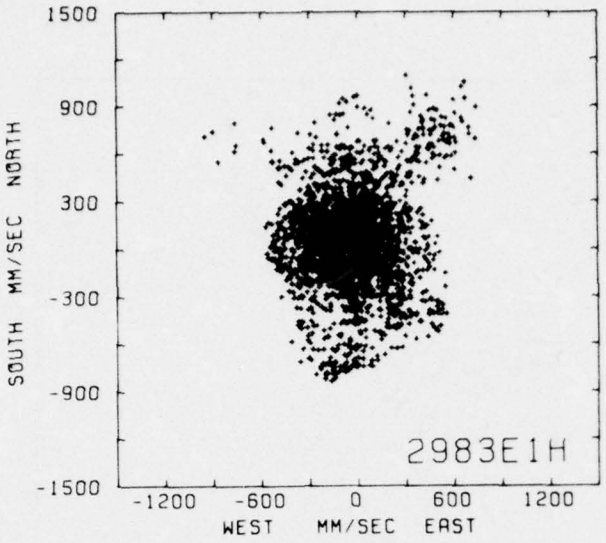
DURATION 107 DAYS 8 H 0 M 0 S

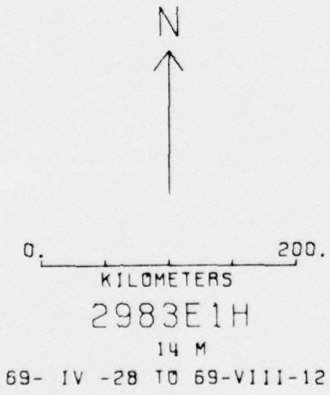
HISTO PLOT
2983E1800
SPEED

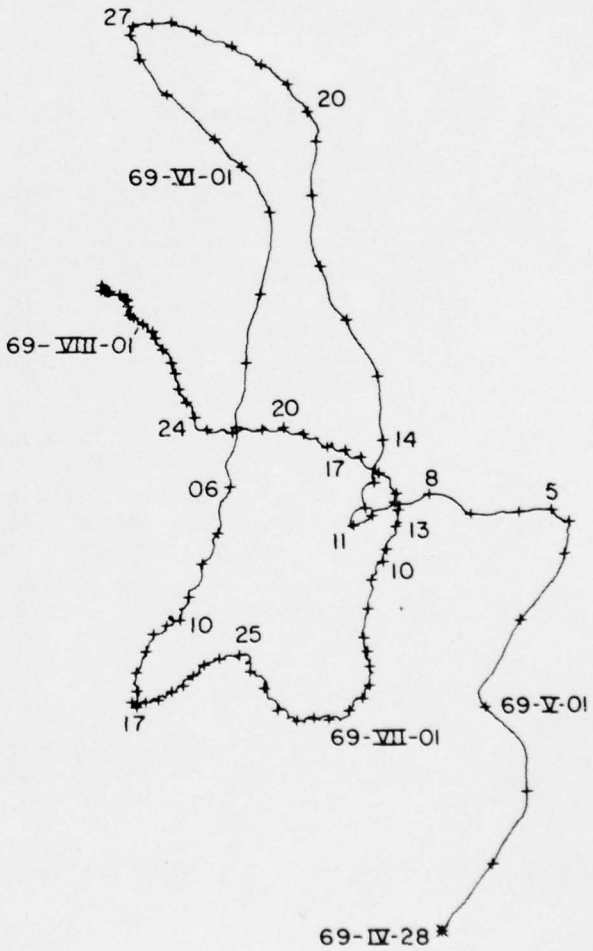


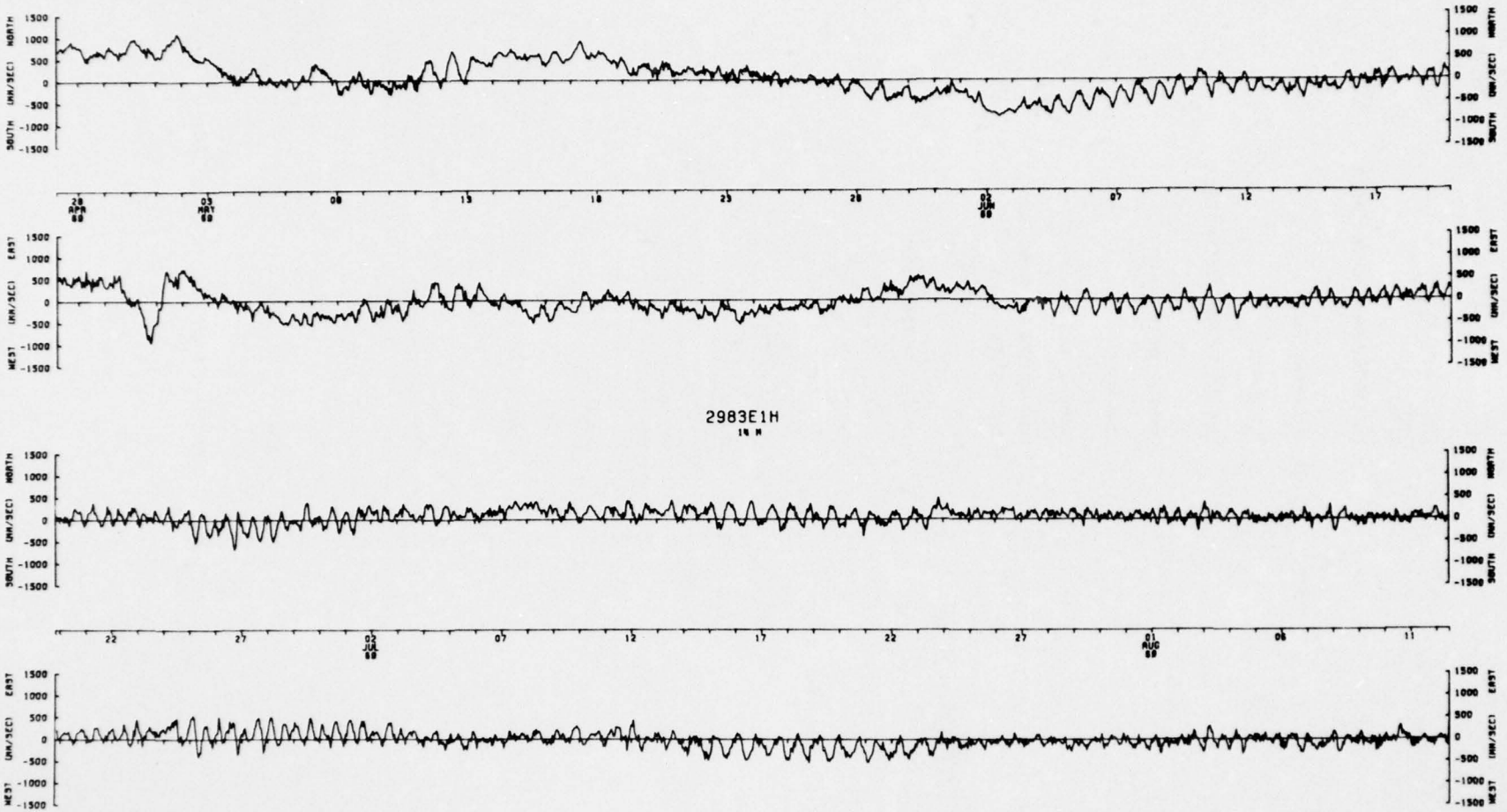
AUTO SPECTRUM
2983E1800 EAST COMP
2983E1800 NORTH COMP
14 METERS
69-IV-27 TO 69-VIII-11
1 PIECES WITH 2560 ESTIMATES
PER PIECE. AVERAGED OVER
8 ADJACENT FREQUENCY BANDS




1500
900
300
-300
-900
-1500
SOUTH MM/SEC NORTH
2983E1H
-1200
-600
0
600
1200
WEST MM/SEC EAST

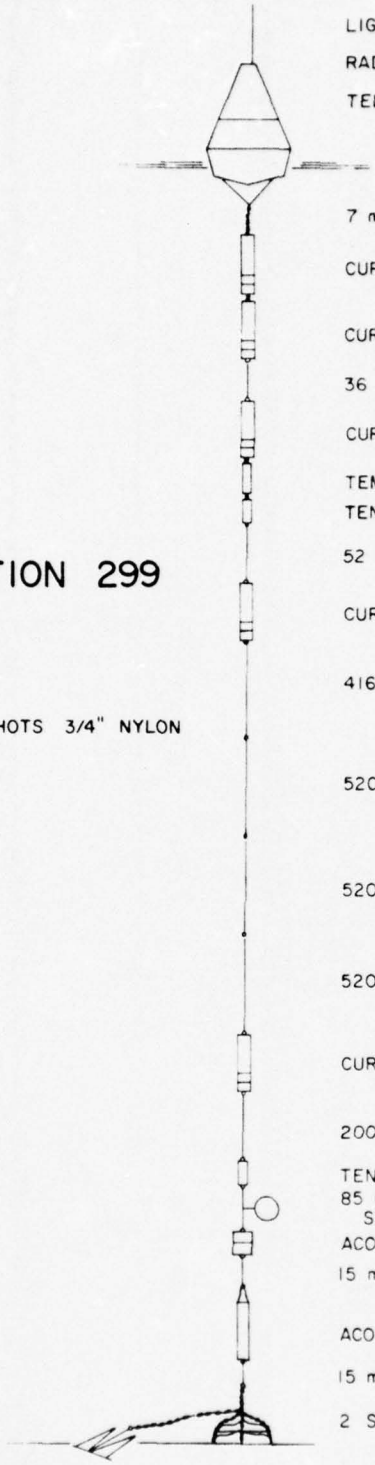

N
0.
200.
KILOMETERS
2983E1H
14 M
69- IV -28 TO 69-VIII-12


27
20
69-VI-01
69-VIII-01
24
20
14
17
8
5
06
13
11
10
10
25
17
69-VII-01
69-V-01
69-IV-28


2983E1H
SOUTH (NM/SEC) NORTH
WEST (NM/SEC) EAST
1500
1000
500
0
-500
-1000
-1500
28 APR 89
03 MAY 89
08
13
18
23
28
02 JUN 89
07
12
17
22
27
02 JUL 89
07
12
17
22
27
01 AUG 89
06
11

STATION 299

ALL SHOTS 3/4" NYLON



LIGHT

RADIO

TELEMETERING WIND RECORDER

JUMBO FLOAT

7 m CHAIN

CURRENT METER, TELEMETERING

CURRENT METER - *2991*

36 m NYLON

CURRENT METER - *2992*

TEMPERATURE RECORDER - *2993*

TENSIOMETER - *2994*

52 m

CURRENT METER - *2995*

416 m

520 m

520 m

520 m

CURRENT METER - *2996*

200 m

TENSIOMETER - *2997*

85 m 3/4" NYLON WITH 20 GLASS SPHERES SPACED 2 m APART

ACOUSTIC BEACON

15 m

ACOUSTIC RELEASE, ORE

15 m

2 STIMSON ANCHORS, PIGGY-BACKED

DANFORTH ANCHOR ON 3 m CHAIN

Mooring No. 299

Set 69 Apr 29 (Year Month Day) 39° 09.0N (Latitude) 70° 03.6W (Longitude)

Set by R. Heinmiller Ship R. V. Chain Cruise 90

Retrieved 69 May 15 (Year Month Day)

Retrieved by J. Barrett Ship R. V. Chain Cruise 91

Purpose of Mooring: Two-month test of Jumbo telemetry on new 3/4" nylon, combined with the long-term scientific measurement series.

Mooring Type: Surface with Jumbo float.

Data Number	Instrument Number	Type	Depth Meters	Comments
2991*	M-203	M.C.M.	13	
2992*	M-214	M.C.M.	51	
2993	T 452	Temp. Rec.	52	
2994	1016	Tens.	53	
2995*	M-213	M.C.M.	107	
2996*	M-210	M.C.M.	2372	
2997	1014	Tens.	2572	

Water depth 2696

Hydrographic Station

R/V Chain cruise 90 Station 879

COMMENTS ON MOORING:

April 29 the Jumbo float went into the water upside down breaking the main crane on the R. V. Chain.

Telemetry inoperative.

May 9 telemetry repaired by Walden and Collins on the Captain Bill IV.

May 12 R. V. Chain reports Jumbo not on station.

May 15 Mooring recovered complete except for 40 meters of glass ball section which had been cut and the ends tangled together. Only 2 glass balls recovered.

Counter in release indicates it fired on May 6 between 11:00 and 11:30. Possibly by submarines operating in the area.

Data number 2991

Instrument No.: M-203 Type: Magnetic tape current meter

Depth: 13 m Water depth: 2696 m

Start time: 69-IV-29 191630

Stop time: 69-V-15 100130

Duration: 15d 14h 45m

Sampling scheme: Interval

time between strobes = 5 seconds

no. of strobes per interval = 24

interval time = 900 seconds

COMMENTS:

Compass channel #2 is off when compass channel #1 is off; when channel #1 is on channel #2 looks O. K.

STATS DATA/ 2991G900

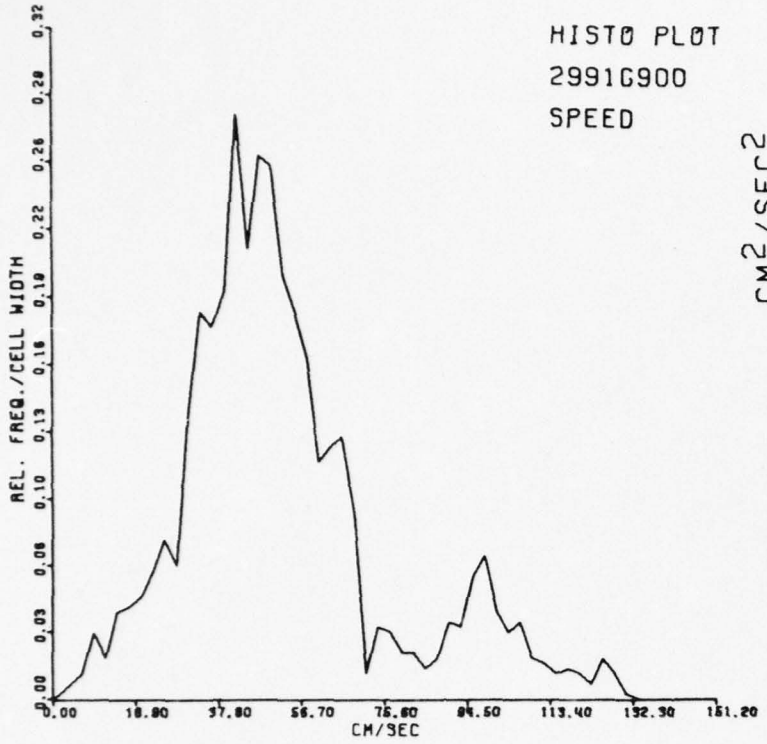
	EAST	NORTH	SPEED			
MEAN =	-10.61	208.83	527.73	* *****	EAST & NORTH	*****
STD. ERR. =	9.76	9.94	6.13	* COVARIANCE	=	4989.63
VARIANCE =	142986.45	148229.08	56443.82	* STD. ERR. OF COVARIANCE	=	4535.82
STD. DEV. =	378.14	385.01	237.58	* STD. DEV. OF COVARIANCE	=	175671.74
KURTOSIS =	1.81	2.83	3.87	* CORRELATION COEFFICIENT	=	.034
SKEWNESS =	.11	.21	.97	* VECTOR MEAN	=	209.10
				* VECTOR VARIANCE	=	145807.77
				* STD. DEV.	=	381.59

UNITS OF RAW DATA VARIABLES = MM/SEC

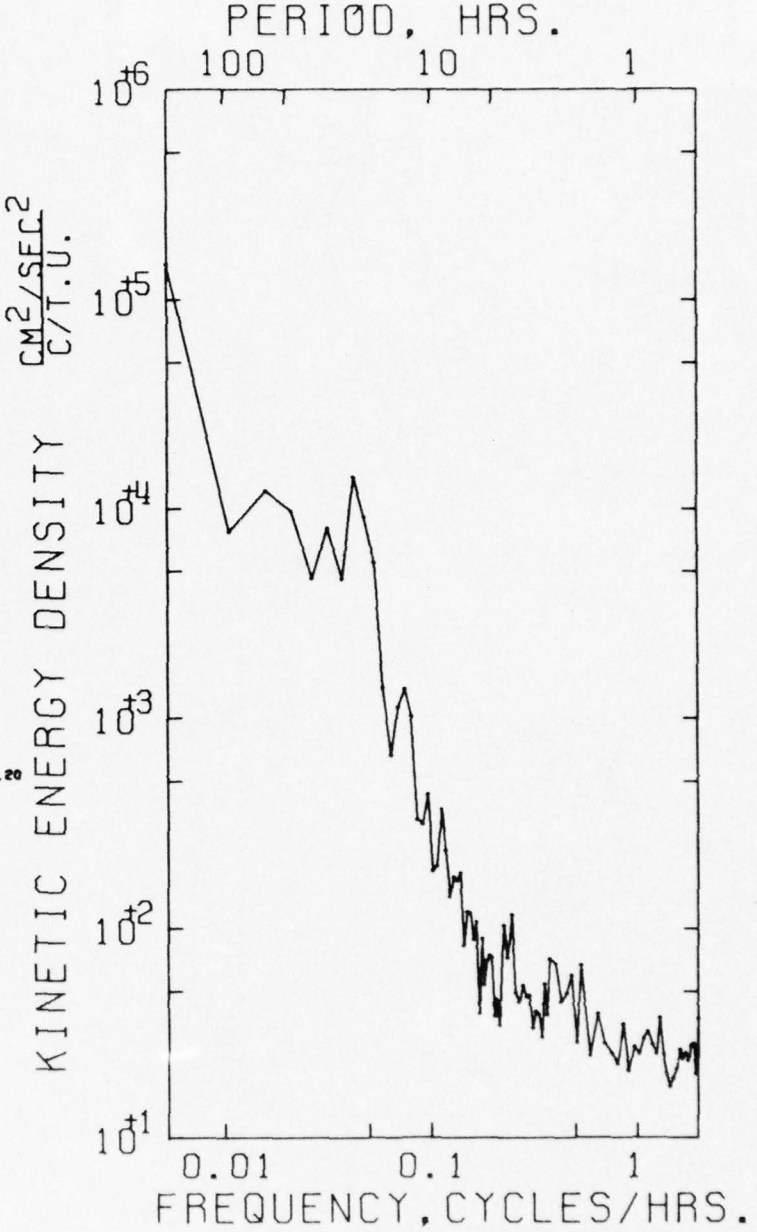
SAMPLE SIZE = 1500 POINTS

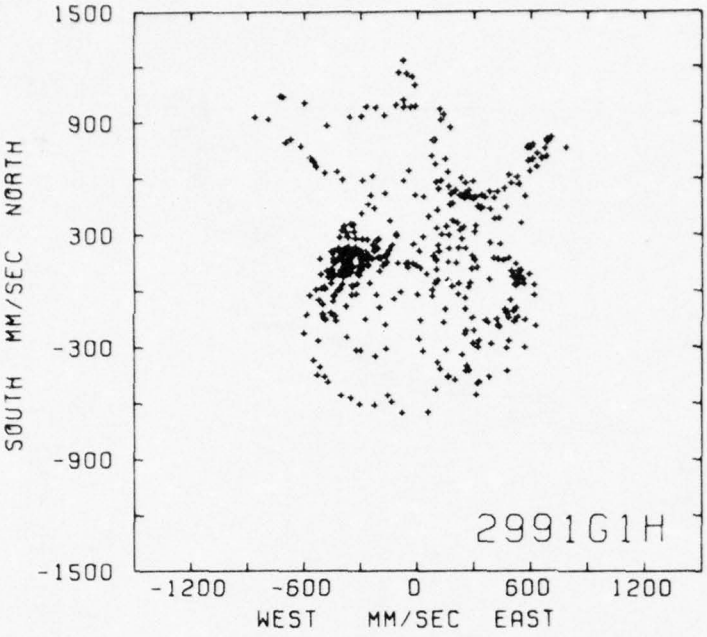
SPANNING RANGE
FROM 69- IV -29 19.16.30
TO 69- V -15 10.01.30

DURATION 15 DAYS 14 H 45 M 0 S



AUTO SPECTRUM
2991G900 EAST COMP
2991G900 NORTH COMP
13 METERS
69-IV-29 TO 69-V-15
1 PIECES WITH 750 ESTIMATES
PER PIECE. AVERAGED OVER
2 ADJACENT FREQUENCY BANDS





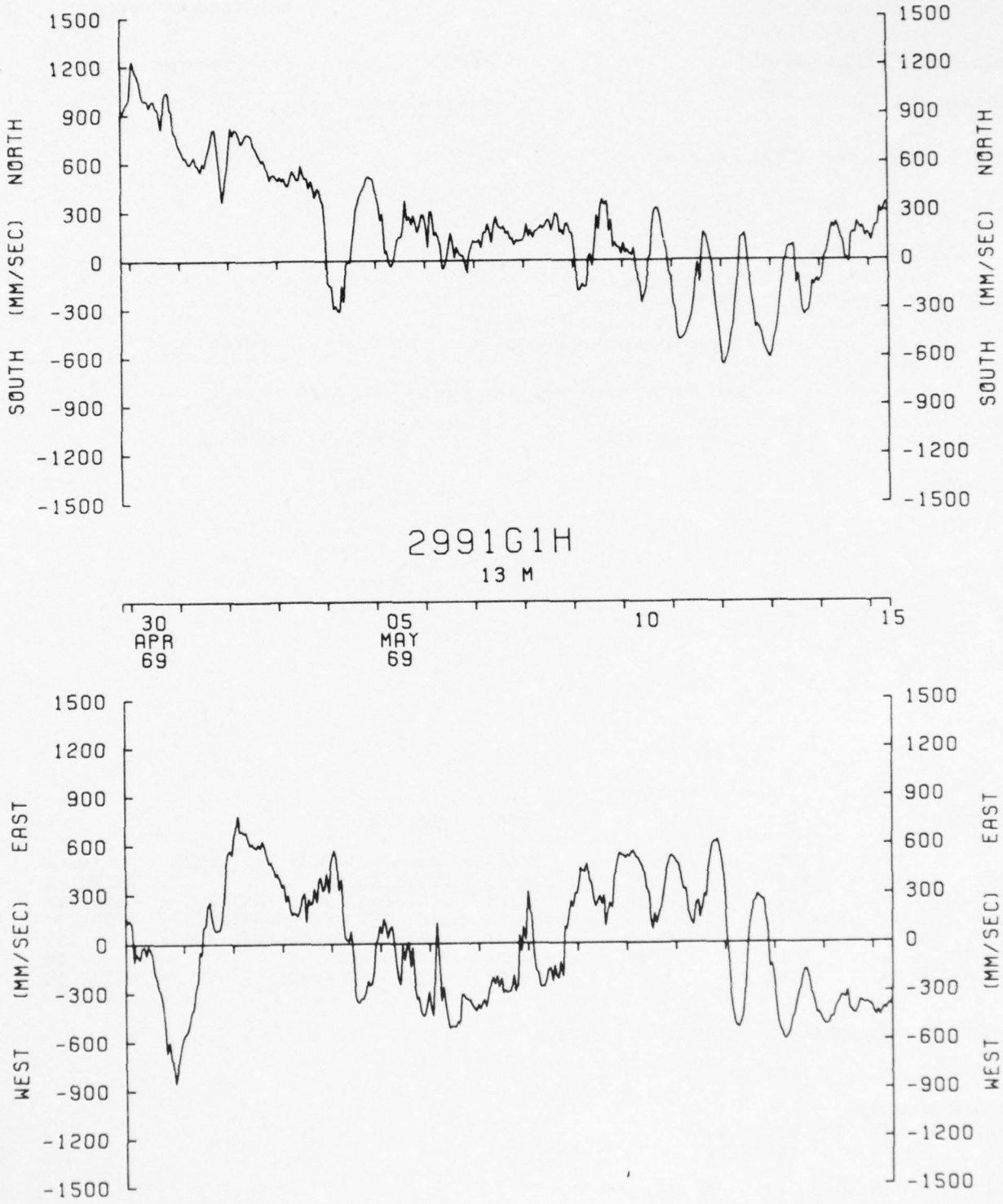
0. 60.

KILOMETERS

2991G1H

13 M

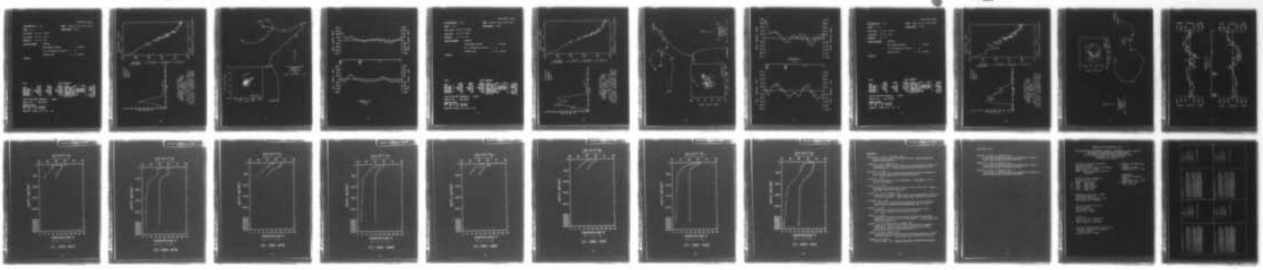
69- IV -30 TO 69- V -15


1500
1200
900
600
300
0
-300
-600
-900
-1200
-1500
SOUTH (MM/SEC) NORTH
2991G1H
13 M
30
APR
69
05
MAY
69
10
15
WEST (MM/SEC) EAST

AD-A031 858 WOODS HOLE OCEANOGRAPHIC INSTITUTION MASS F/G 8/3
A COMPILATION OF MOORED CURRENT DATA AND ASSOCIATED OCEANOGRAPH--ETC(U)
MAY 76 S A TARBELL N00014-66-C-0241

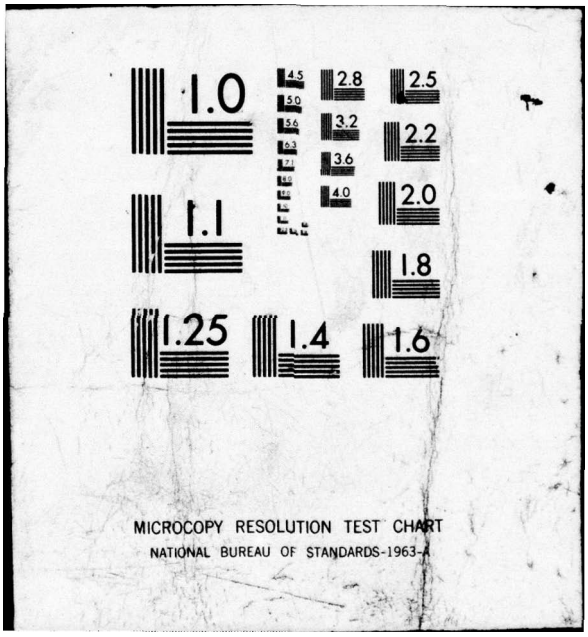
UNCLASSIFIED WHOI-76-40 NL

2 OF 2
AD
A031 858



END

DATE
FILMED
12-76


1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0
4.5
5.0
5.6
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

Data number 2992

Instrument No.: M-214 **Type:** Magnetic tape current meter

Depth: 51 m **Water depth:** 2696 m

Start time: 69-IV-29 202040

Stop time: 69-V-15 100540

Duration: 15d 13h 45m

Sampling scheme: Interval

time between strobes = 5 seconds

no. of strobes per interval = 24

interval time = 900 seconds

COMMENTS:

STATS DATA/ 2992C900

	EAST	NORTH	SPEED
MEAN =	-52.97	101.80	318.36
STD. ERR. =	6.01	7.20	5.38
VARIANCE =	54097.70	77504.97	43376.86
STD. DEV. =	232.46	278.40	208.27
KURTOSIS =	9.07	4.65	4.93
SKEWNESS =	.85	1.21	1.59

\# ##### EAST & NORTH #####

\# COVARIANCE = 21551.26

\# STD. ERR. OF COVARIANCE = 1889.53

\# STD. DEV. OF COVARIANCE = 76851.37

\# CORRELATION COEFFICIENT = .333

\# VECTOR MEAN = 114.85

\# VECTOR VARIANCE = 85771.34

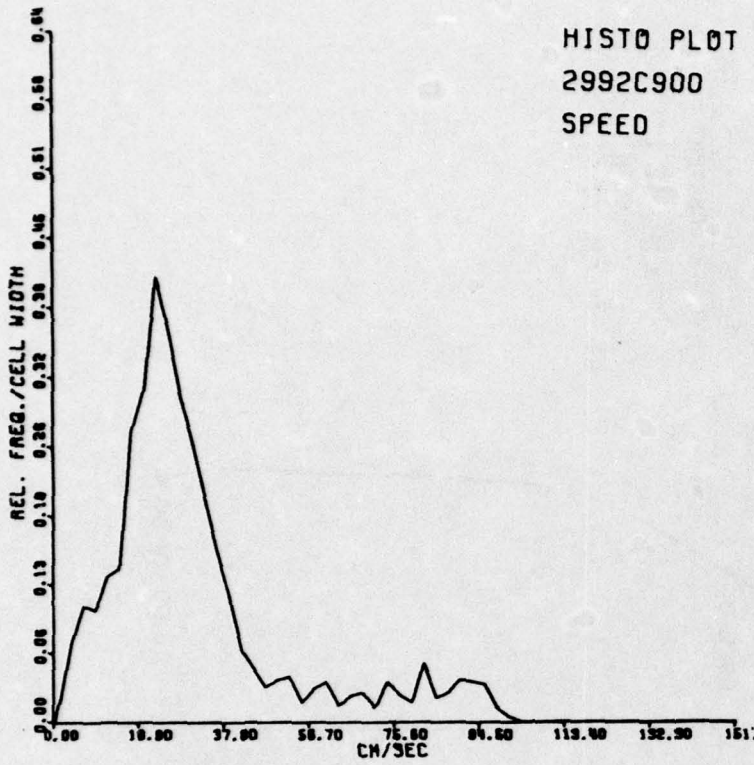
\# STD. DEV. = 256.46

UNITS OF RAW DATA VARIABLES = MM/SEC

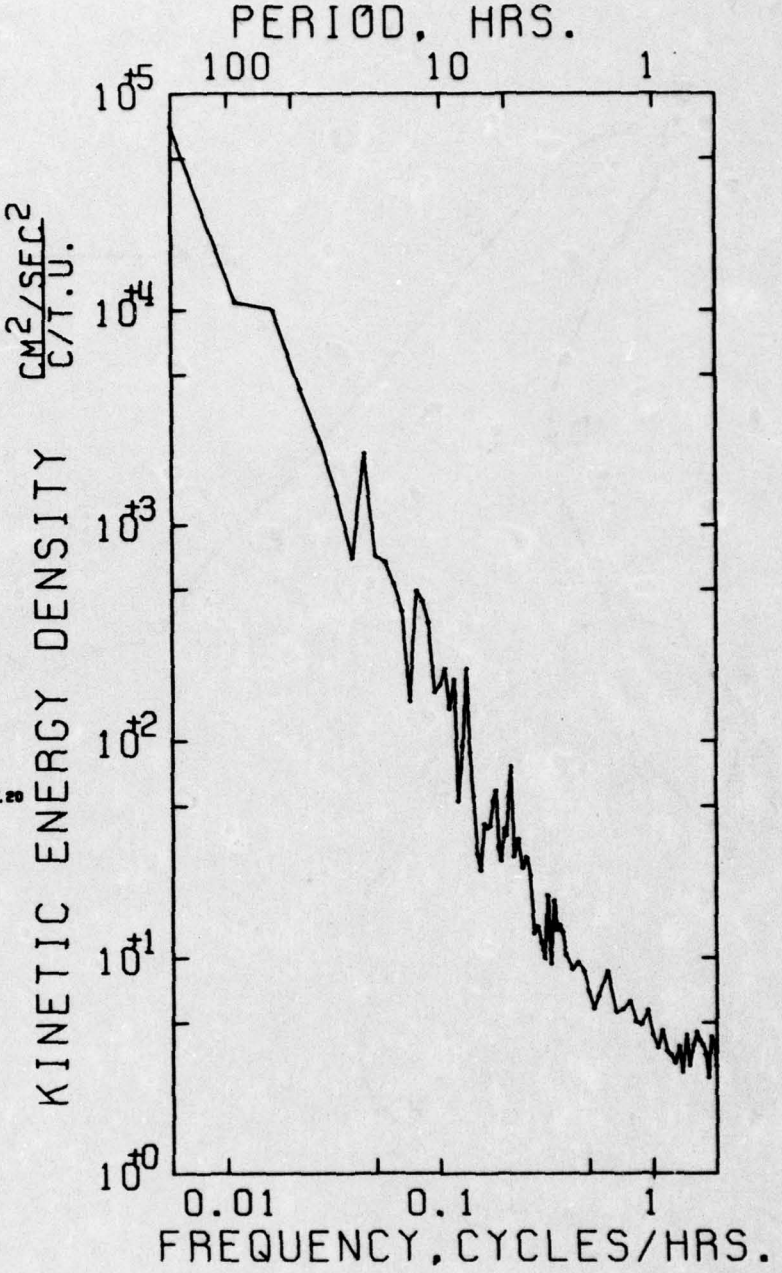
SAMPLE SIZE = 1496 POINTS

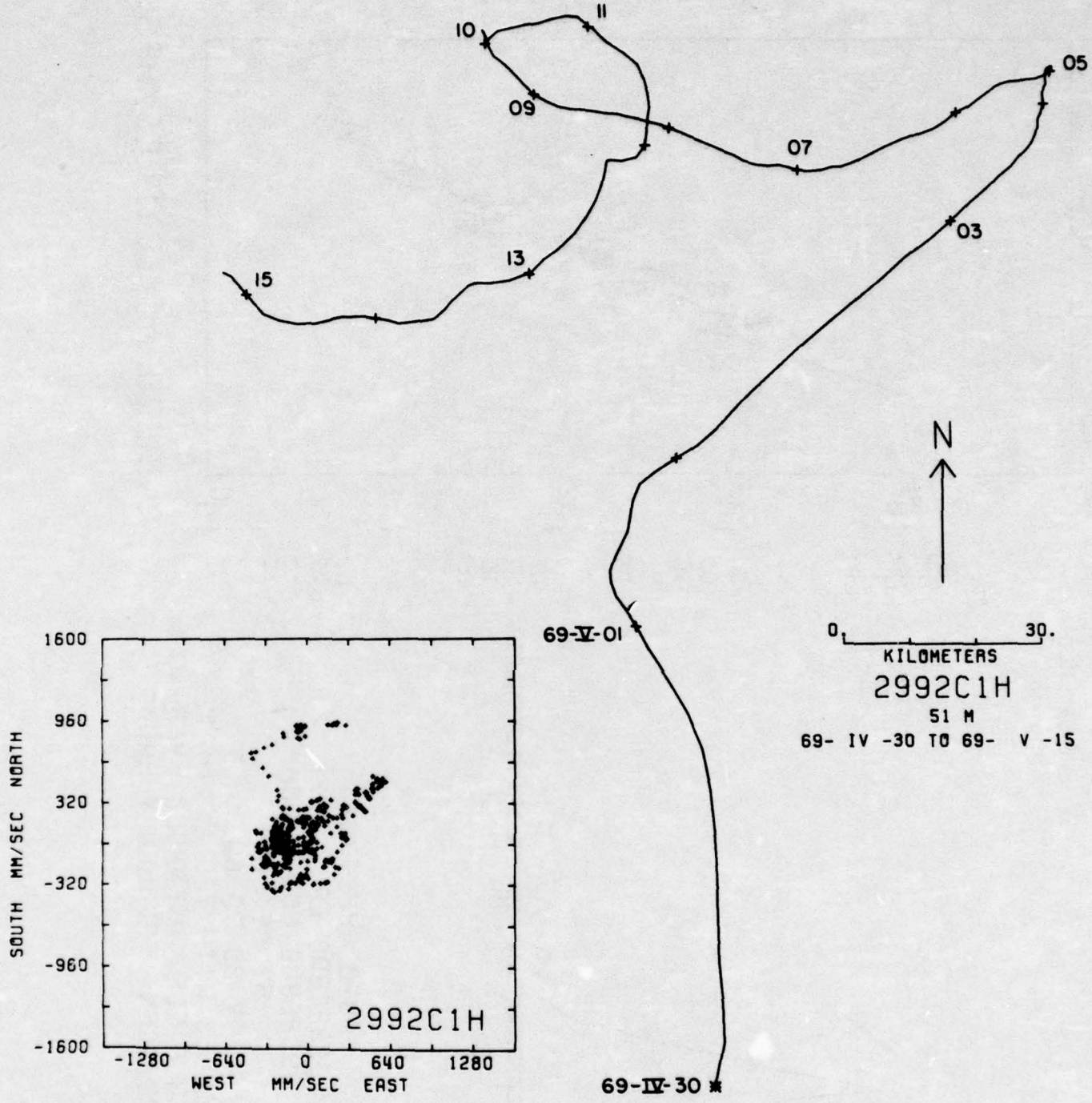
SPANNING RANGE
FROM 69- IV -29 20.20.40
TO 69- V -15 10.05.40

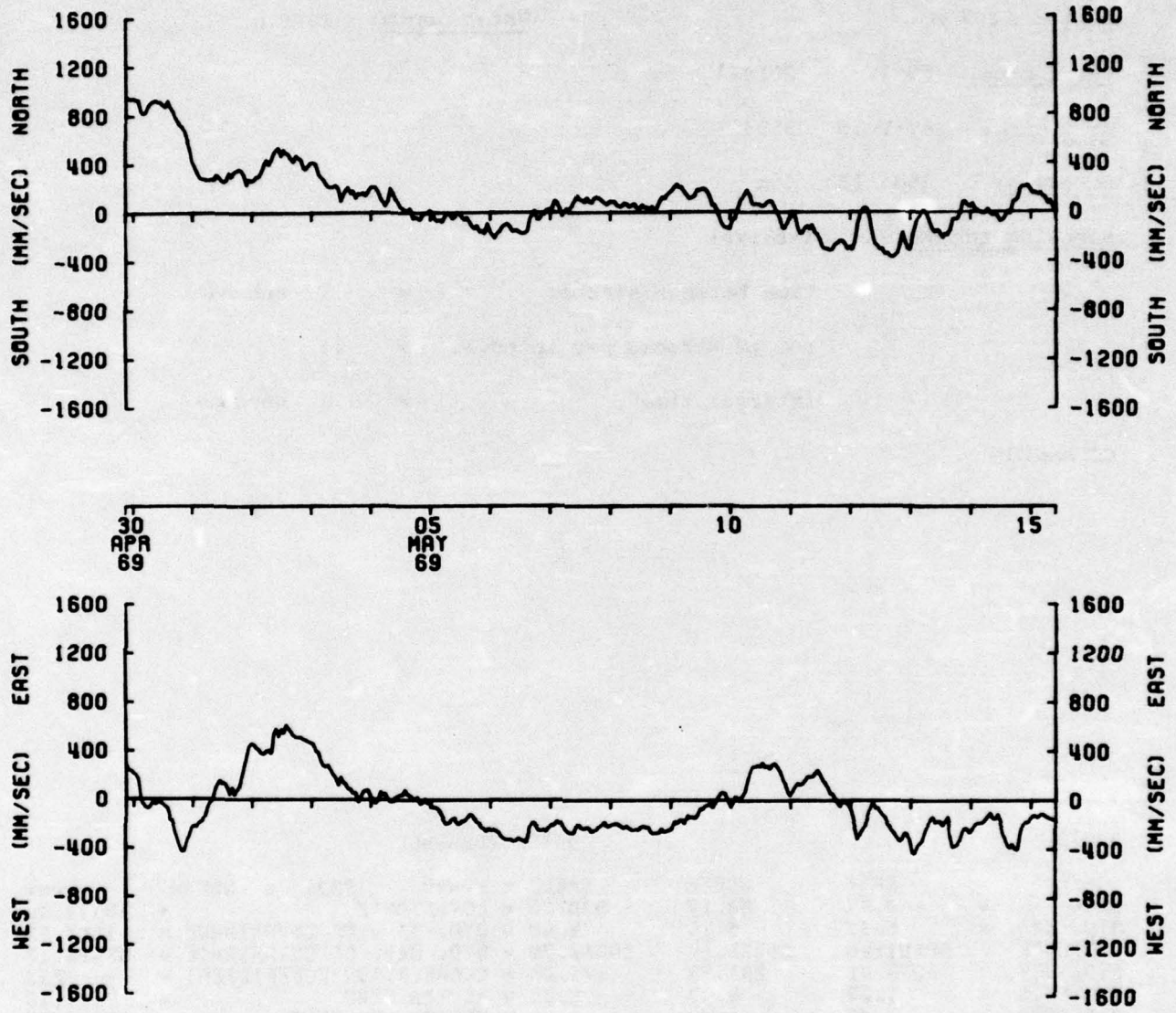
DURATION 15 DAYS 13 H 45 M 0 S



AUTO SPECTRUM
2992C900 EAST COMP
2992C900 NORTH COMP
51 METERS
69-IV-29 TO 69-V-15
1 PIECES WITH 729 ESTIMATES
PER PIECE. AVERAGED OVER
2 ADJACENT FREQUENCY BANDS




10
11
09
05
07
03
13
15
N
69-V-01
69-IV-30
0
30.
KILOMETERS
2992C1H
51 M
69- IV -30 TO 69- V -15
1600
960
320
-320
-960
-1600
SOUTH MM/SEC NORTH
-1280
-640
0
640
1280
WEST MM/SEC EAST
2992C1H


1600
1200
800
400
0
-400
-800
-1200
-1600
SOUTH (MM/SEC) NORTH
30
APR
69
05
MAY
69
10
15
WEST (MM/SEC) EAST

2992C1H
51 M

Data number 2995

Instrument No.: M-213 **Type:** Magnetic tape current meter

Depth: 107 m **Water depth:** 2696 m

Start time: 69-IV-29 201440

Stop time: 69-V-15 095940

Duration: 15d 13h 45m

Sampling scheme: Interval

time between strobes = 5 seconds

no. of strobes per interval = 24

interval time = 900 seconds

COMMENTS:

STATS DATA/ 29958900

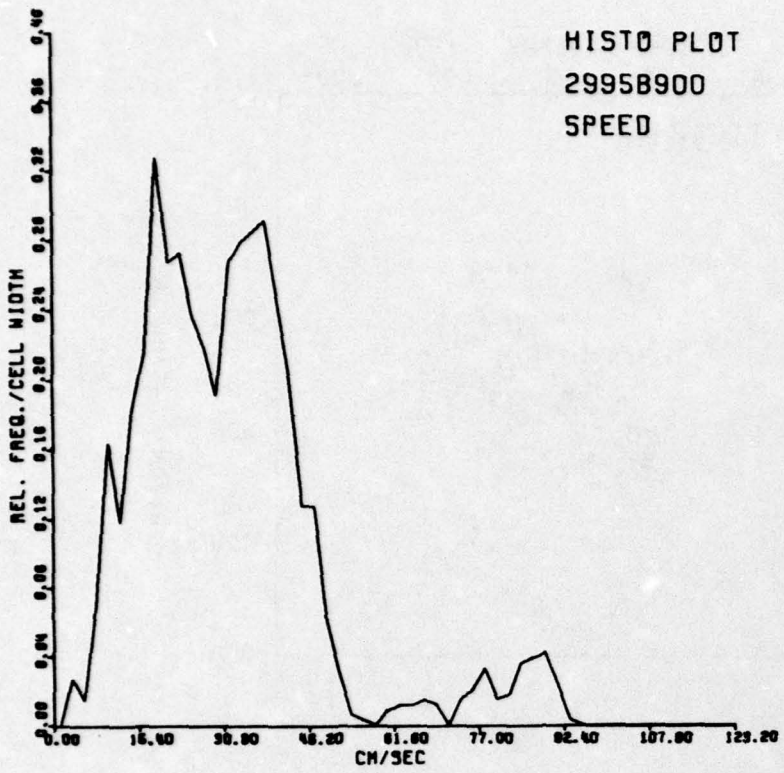
	EAST	NORTH	SPEED			EAST & NORTH	
MEAN =	-60.64	99.17	920.00	=	COVARIANCE	=	13772.09
STD. ERR. =	5.83	6.76	4.42	=	STD. ERR. OF COVARIANCE	=	1383.89
VARIANCE =	50901.40	68408.14	29268.76	=	STD. DEV. OF COVARIANCE	=	53526.17
STD. DEV. =	225.61	261.55	171.08	=	CORRELATION COEFFICIENT	=	.233
KURTOSIS =	1.97	4.47	5.54	=	VECTOR MEAN	=	111.16
SKEWNESS =	.28	.94	1.40	=	VECTOR VARIANCE	=	59854.77
				=	STD. DEV.	=	244.24

UNITS OF RAW DATA VARIABLES = MM/SEC

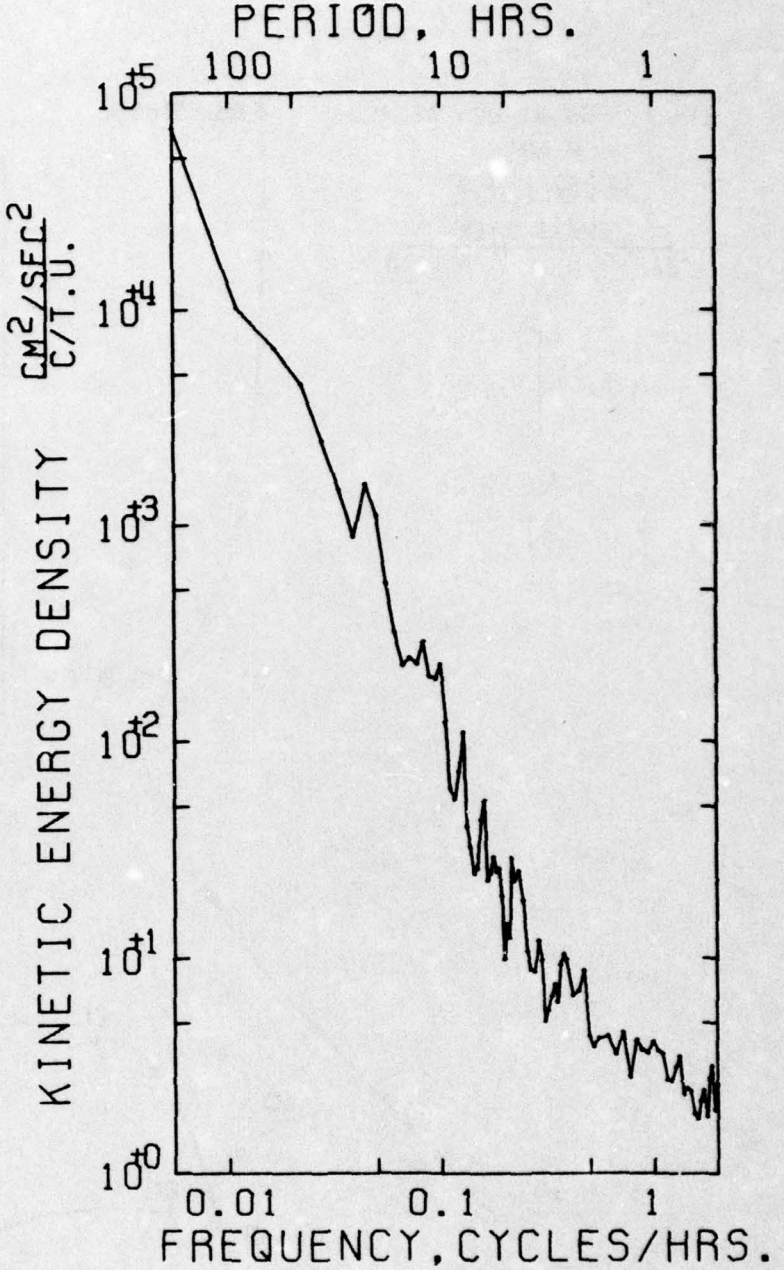
SAMPLE SIZE = 1496 POINTS

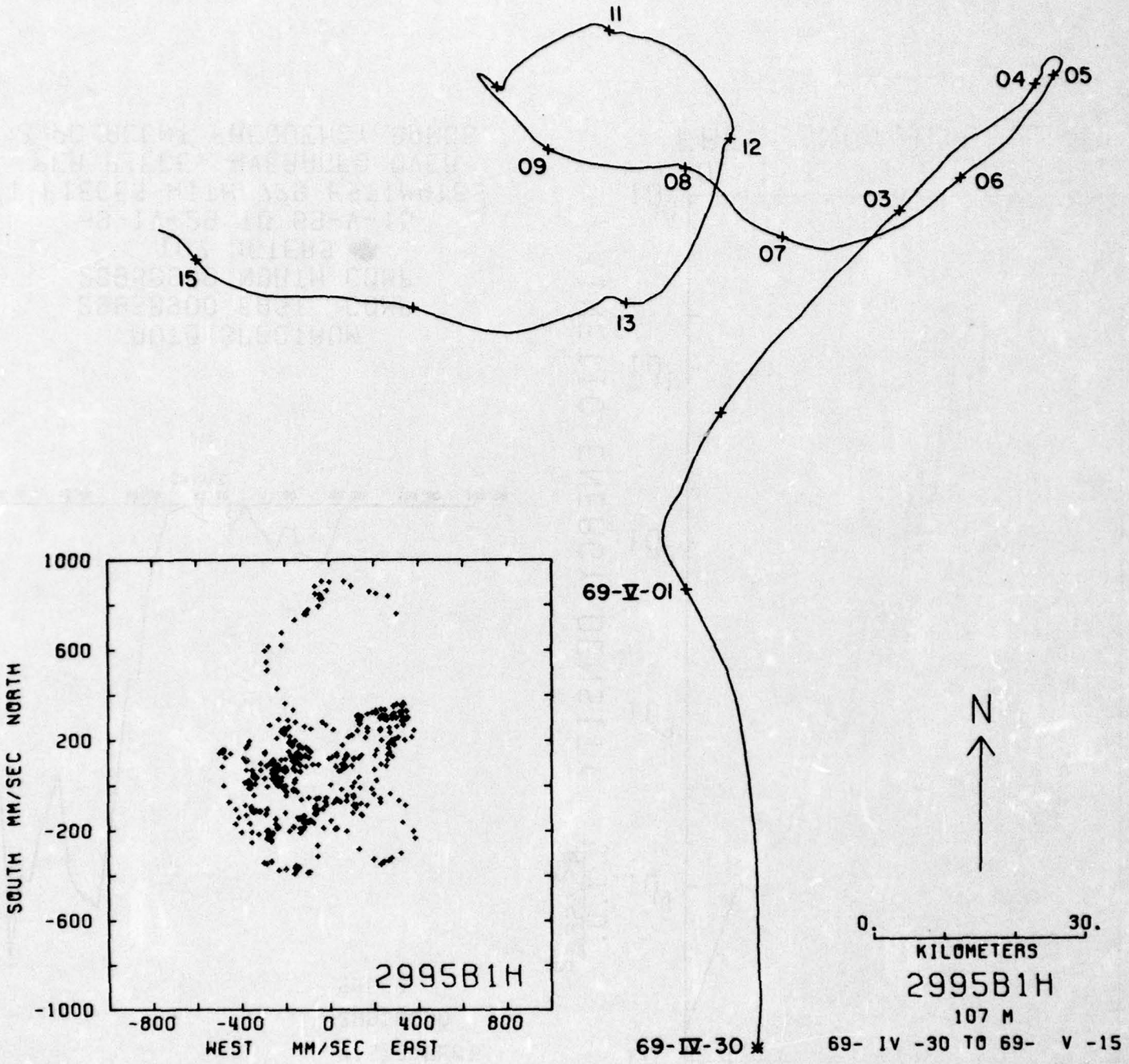
SPANNING RANGE
FROM 69- IV -29 20.14.40
TO 69- V -15 09.59.40

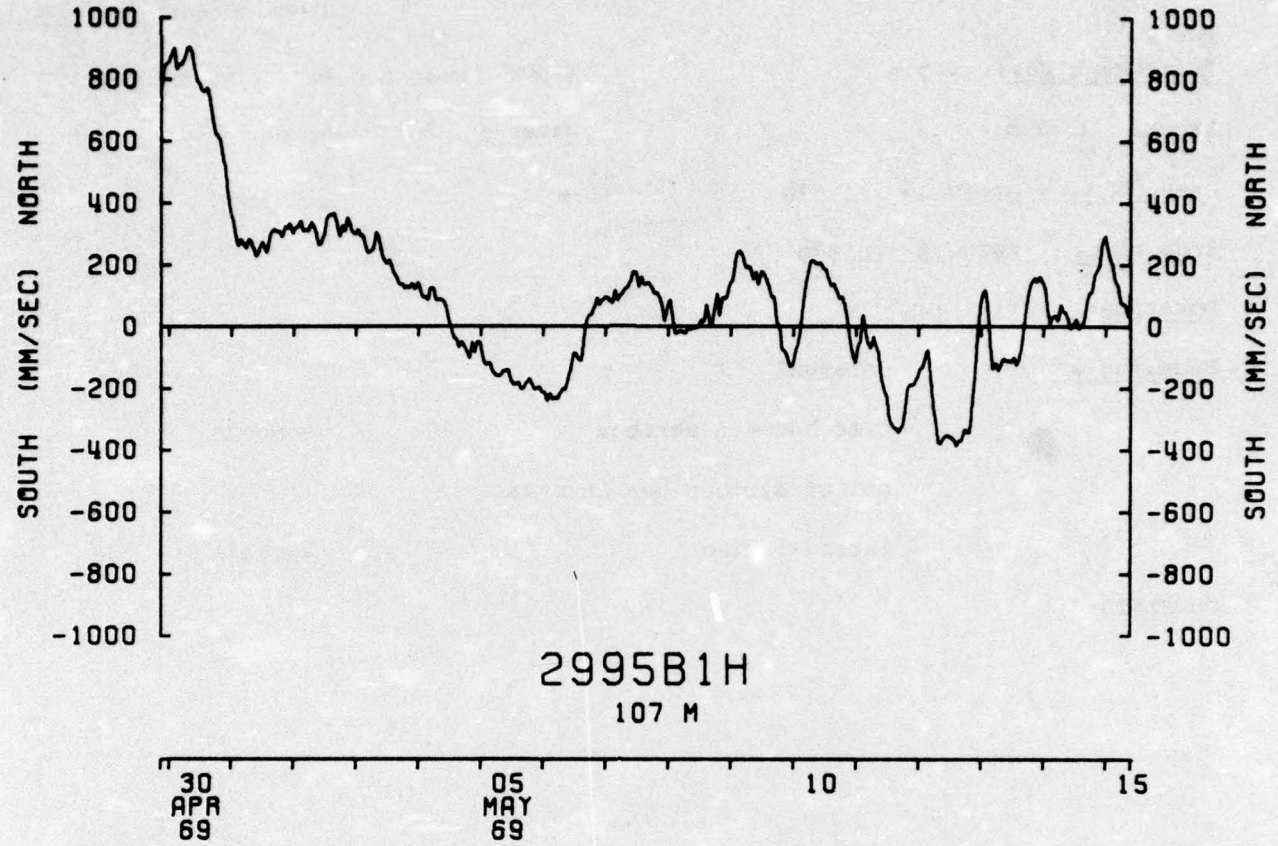
DURATION 15 DAYS 13 H 45 M 0 S

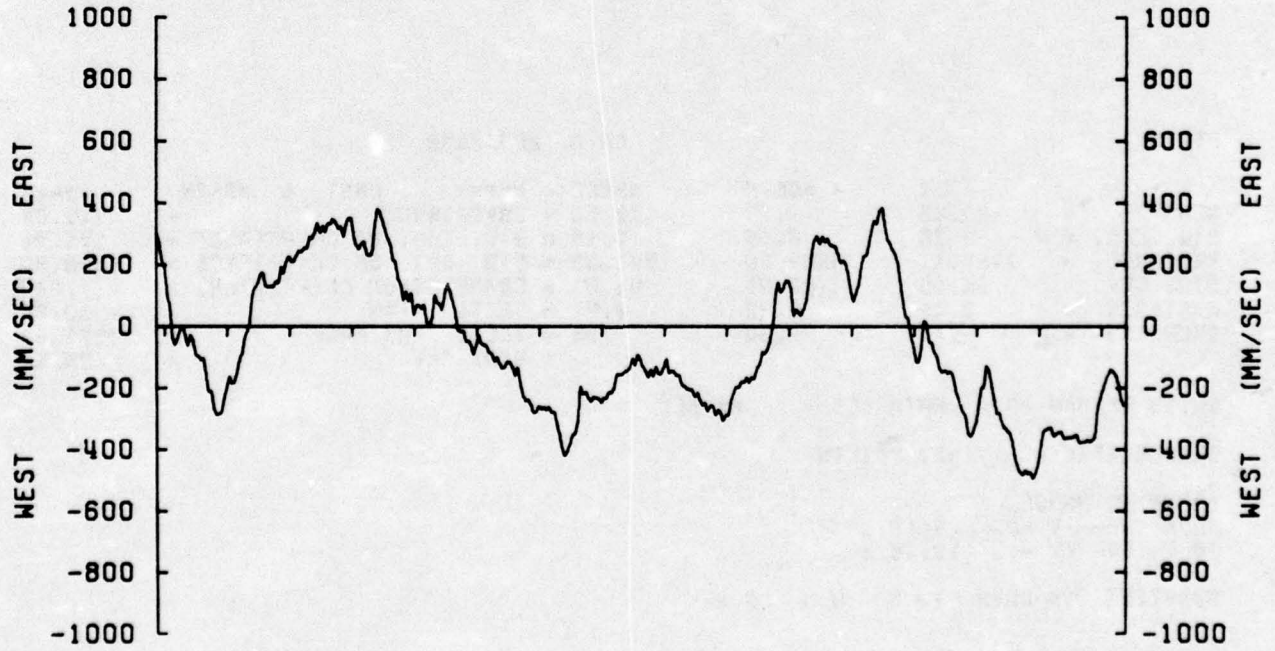


AUTO SPECTRUM
2995B900 EAST COMP
2995B900 NORTH COMP
107 METERS
69-IV-29 TO 69-V-15
1 PIECES WITH 729 ESTIMATES
PER PIECE. AVERAGED OVER
2 ADJACENT FREQUENCY BANDS




11
04
05
12
09
08
06
03
07
15
13
69-V-01
69-IV-30
1000
600
200
-200
-600
-1000
SOUTH MM/SEC NORTH
-800
-400
0
400
800
WEST MM/SEC EAST
2995B1H
N
0.
30.
KILOMETERS
2995B1H
107 M
69- IV -30 TO 69- V -15


1000
800
600
400
200
0
-200
-400
-600
-800
-1000
SOUTH (MM/SEC) NORTH
2995B1H
107 M
30
APR
69
05
MAY
69
10
15


1000
800
600
400
200
0
-200
-400
-600
-800
-1000
WEST (MM/SEC) EAST

Data number 2996

Instrument No.: M-210 **Type:** Magnetic tape current meter

Depth: 2372 m **Water depth:** 2696 m

Start time: 69-IV-29 201830

Stop time: 69-V-15 101830

Duration: 15d 14h

Sampling scheme: Interval

time between strobes = 5 seconds

no. of strobes per interval = 24

interval time = 900 seconds

COMMENTS:

STATS DATA/ 2996F900

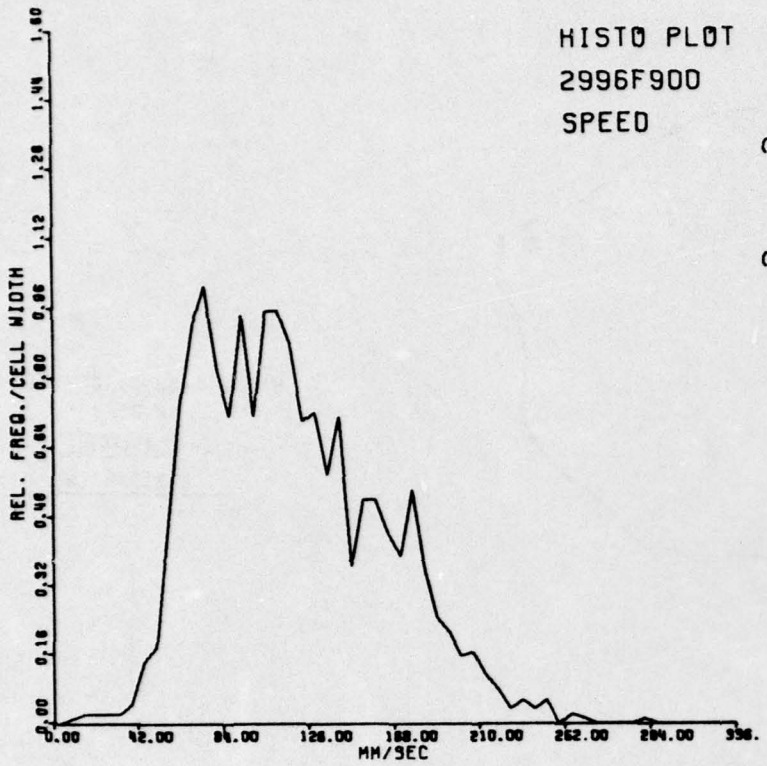
	EAST	NORTH	SPEED	******	EAST & NORTH	******
MEAN =	-30.23	.77	118.85	* COVARIANCE	=	715.02
STD. ERR. =	2.20	2.15	1.13	* STD. ERR. OF COVARIANCE	=	175.71
VARIANCE =	7754.11	6887.96	1901.89	* STD. DEV. OF COVARIANCE	=	8798.30
STD. DEV. =	88.06	82.99	43.61	* CORRELATION COEFFICIENT	=	.098
KURTOSIS =	2.41	2.42	2.81	* VECTOR MEAN	=	30.24
SKEWNESS =	.20	-.30	.53	* VECTOR VARIANCE	=	7921.04
				* STD. DEV.	=	85.56

UNITS OF RAW DATA VARIABLES = MM/SEC

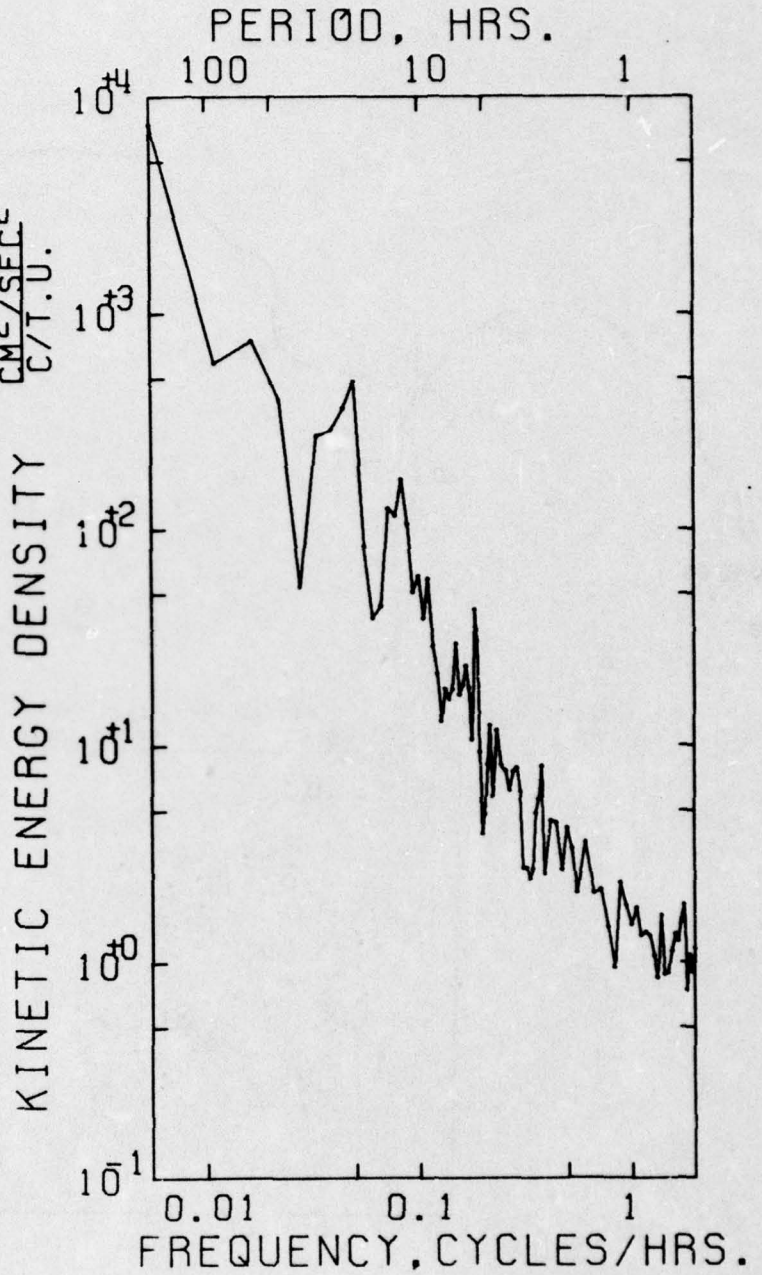
SAMPLE SIZE = 1497 POINTS

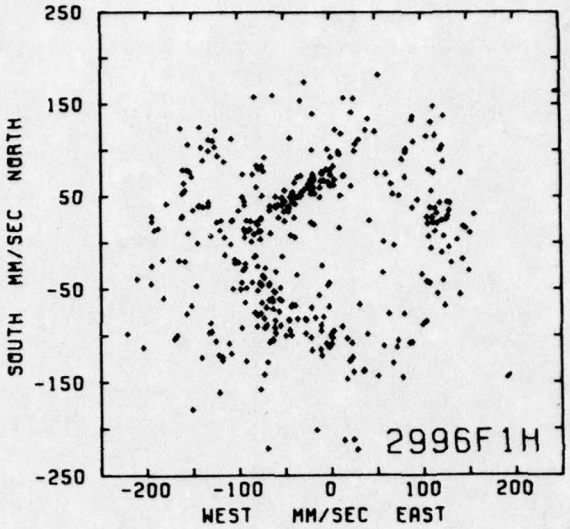
SPANNING RANGE
FROM 69- IV -29 20.18.30
TO 69- V -15 10.18.30

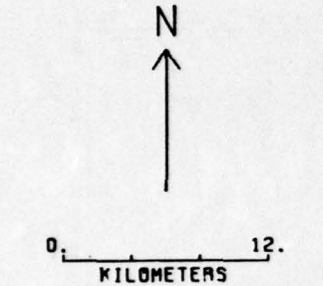
DURATION 15 DAYS 14 H 0 M 0 S



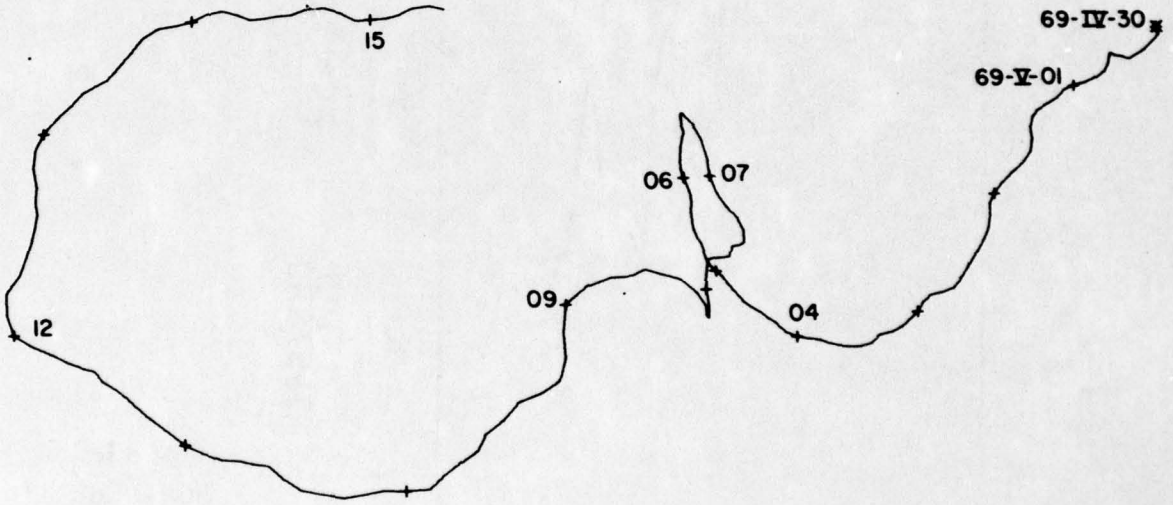
AUTO SPECTRUM
2996F900 EAST COMP
2996F900 NORTH COMP
2372 METERS
69-IV-29 TO 69-V-15
1 PIECES WITH 729 ESTIMATES
PER PIECE. AVERAGED OVER
2 ADJACENT FREQUENCY BANDS

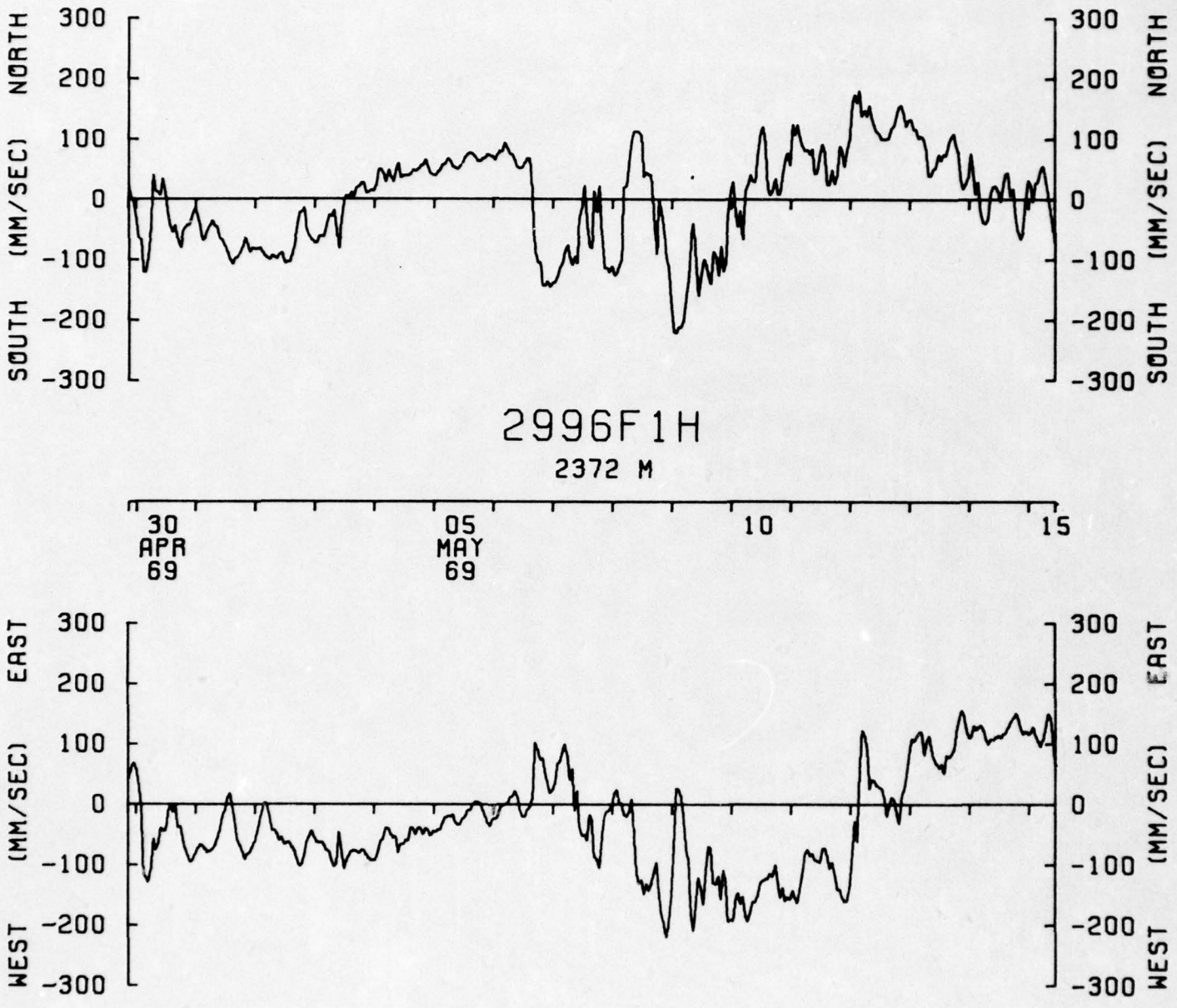




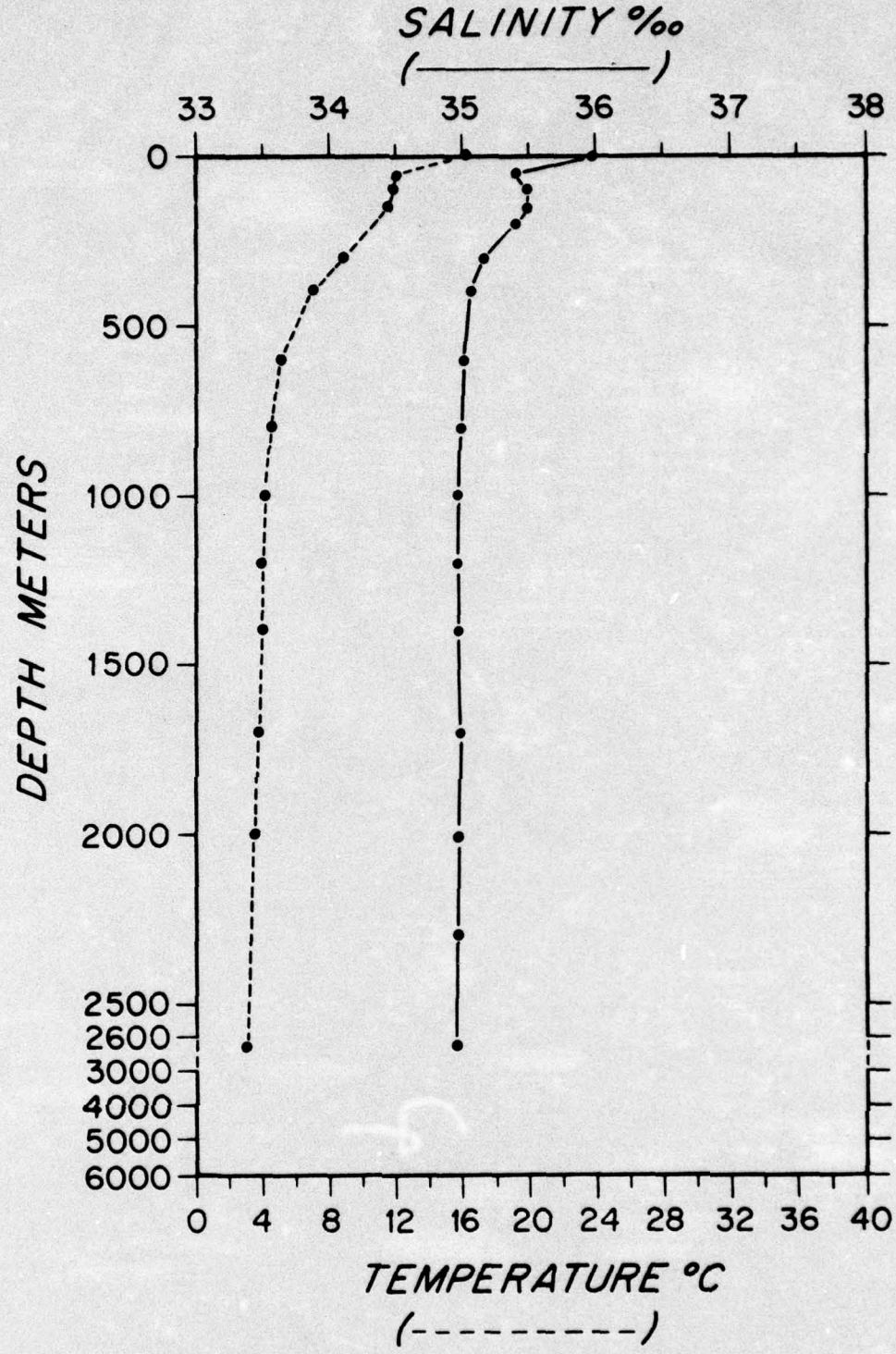


2996F1H
2372 M
69- IV -30 TO 69- V -15

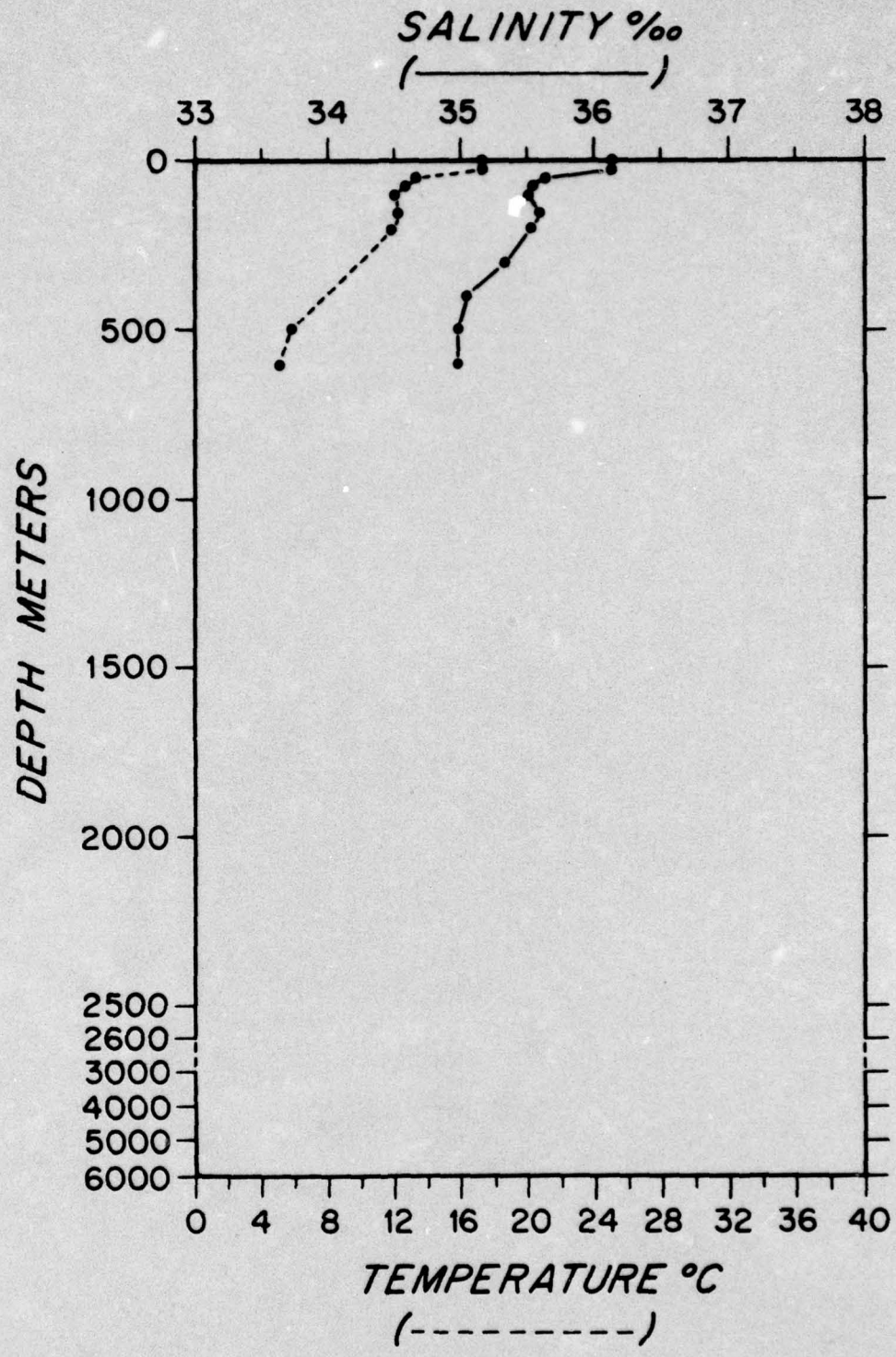



300
200
100
0
-100
-200
-300
SOUTH (MM/SEC) NORTH
2996F1H
2372 M
30
APR
69
05
MAY
69
10
15
WEST (MM/SEC) EAST

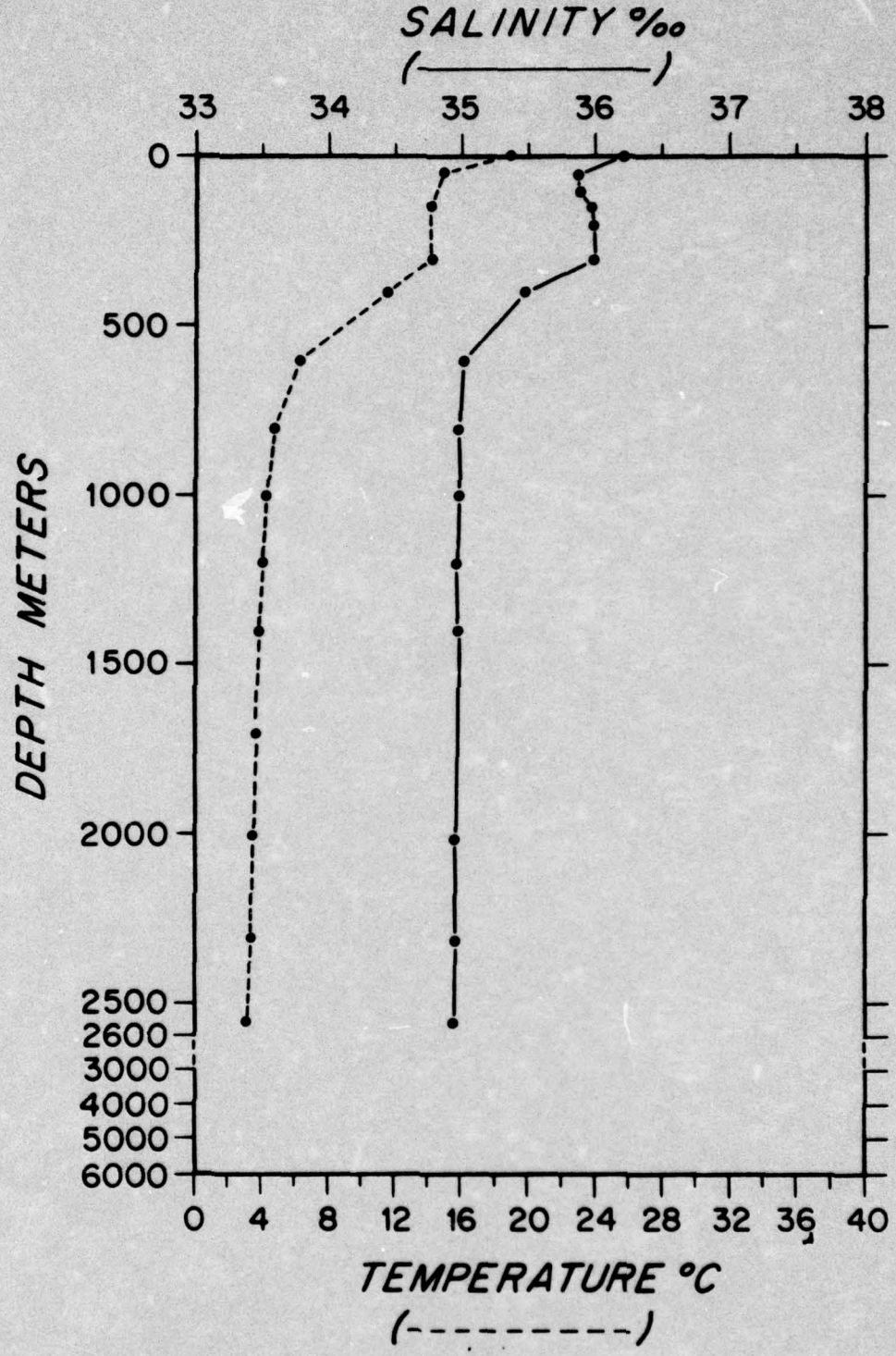
Hydrostation Data



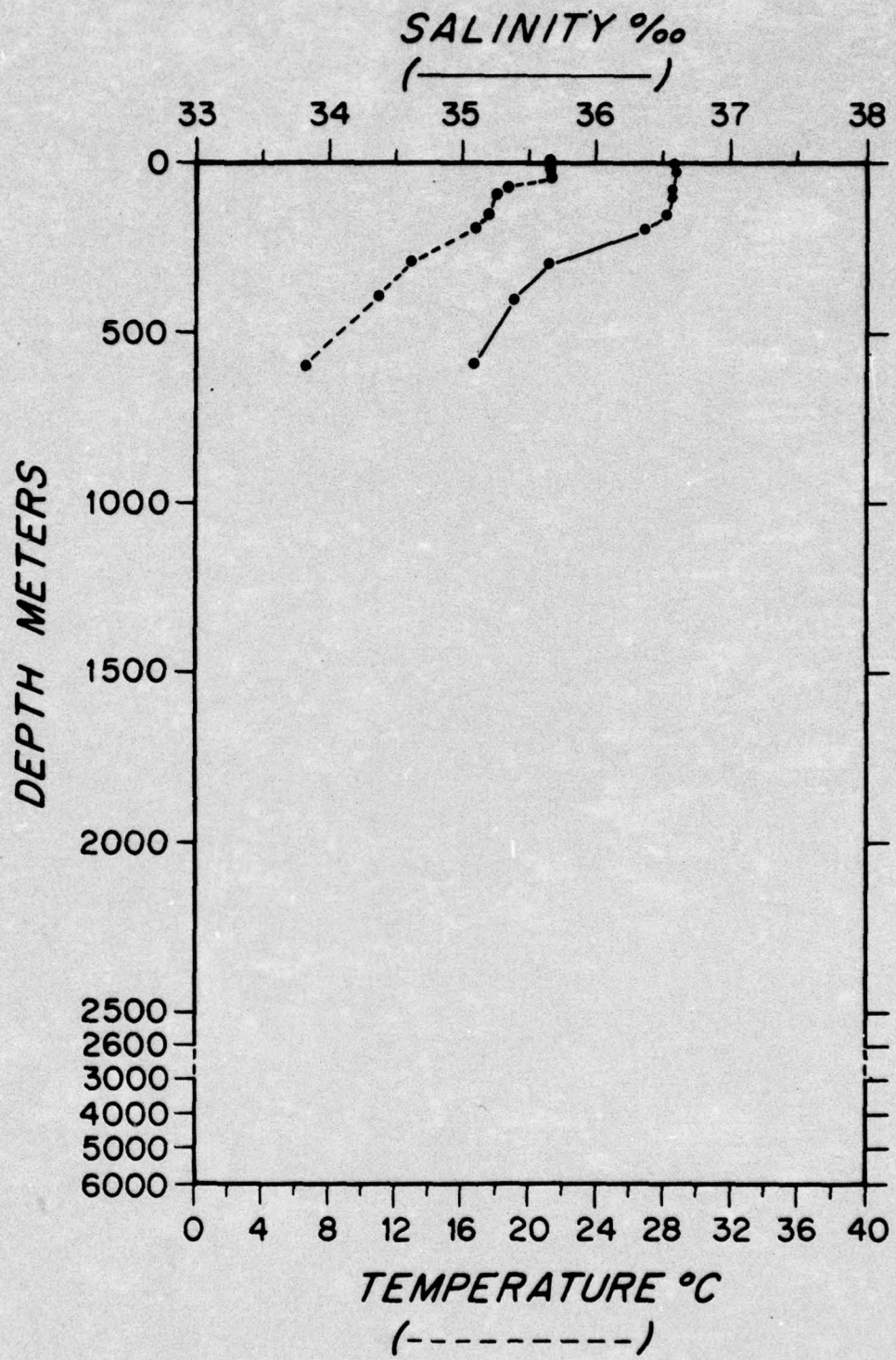
CI-090-872



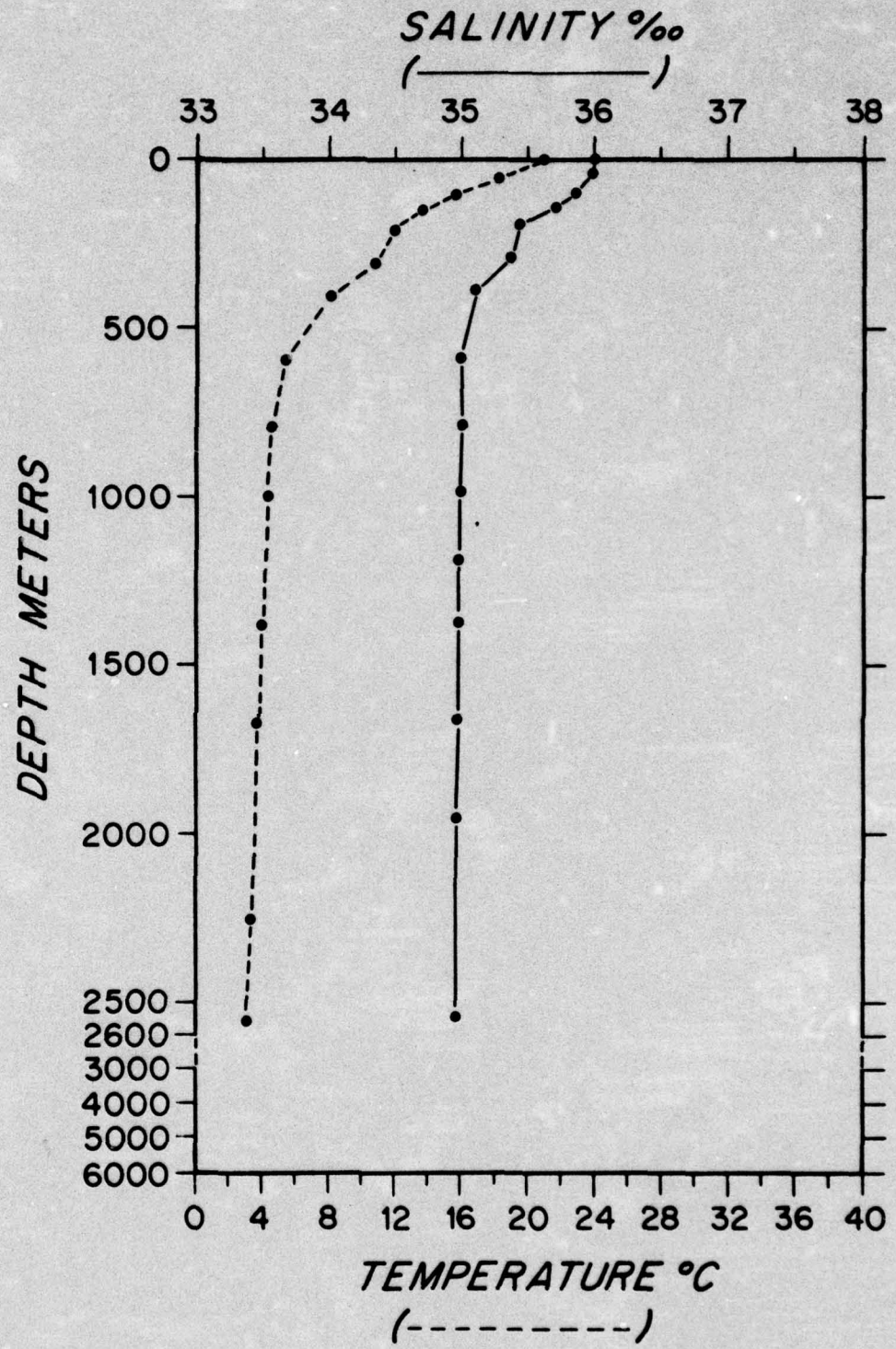
CI-090-873



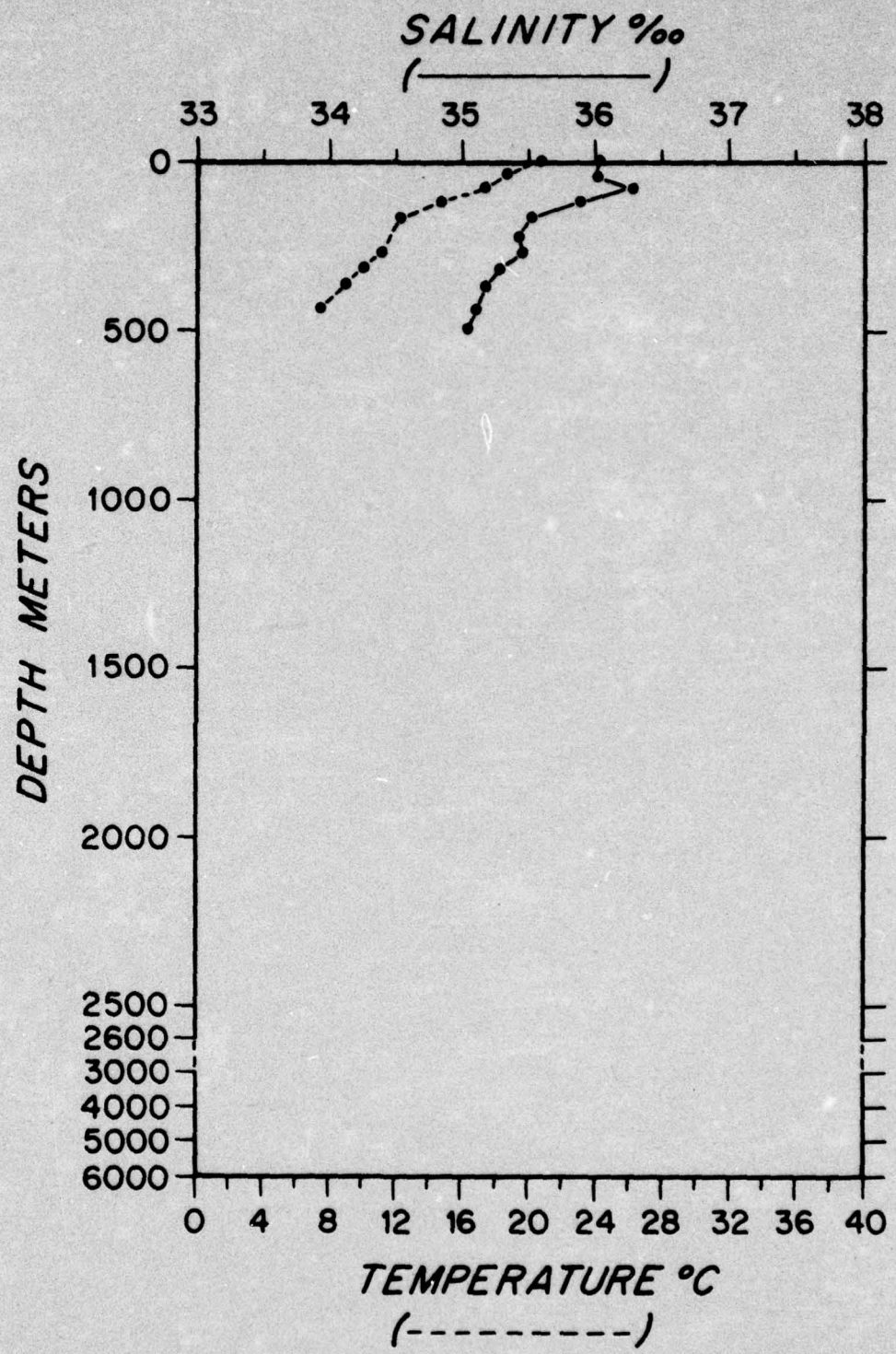
CI-090-878


SALINITY ‰
(————)
33
34
35
36
37
38
0
500
1000
1500
2000
2500
2600
3000
4000
5000
6000
DEPTH METERS
0
4
8
12
16
20
24
28
32
36
40
TEMPERATURE °C
(- - - - - - - - -)

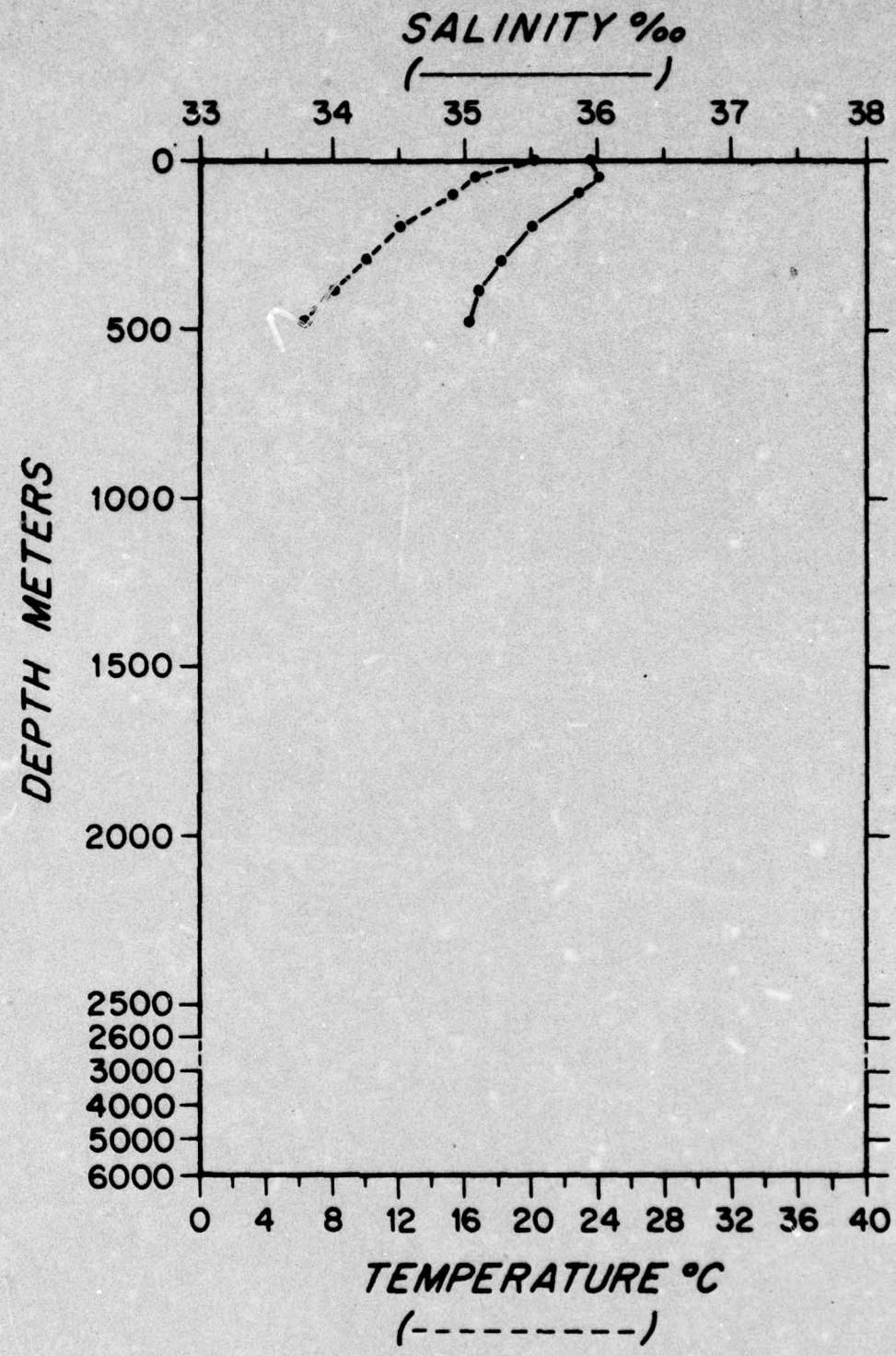
CI-090-879



CI-092-896



CI-092-898



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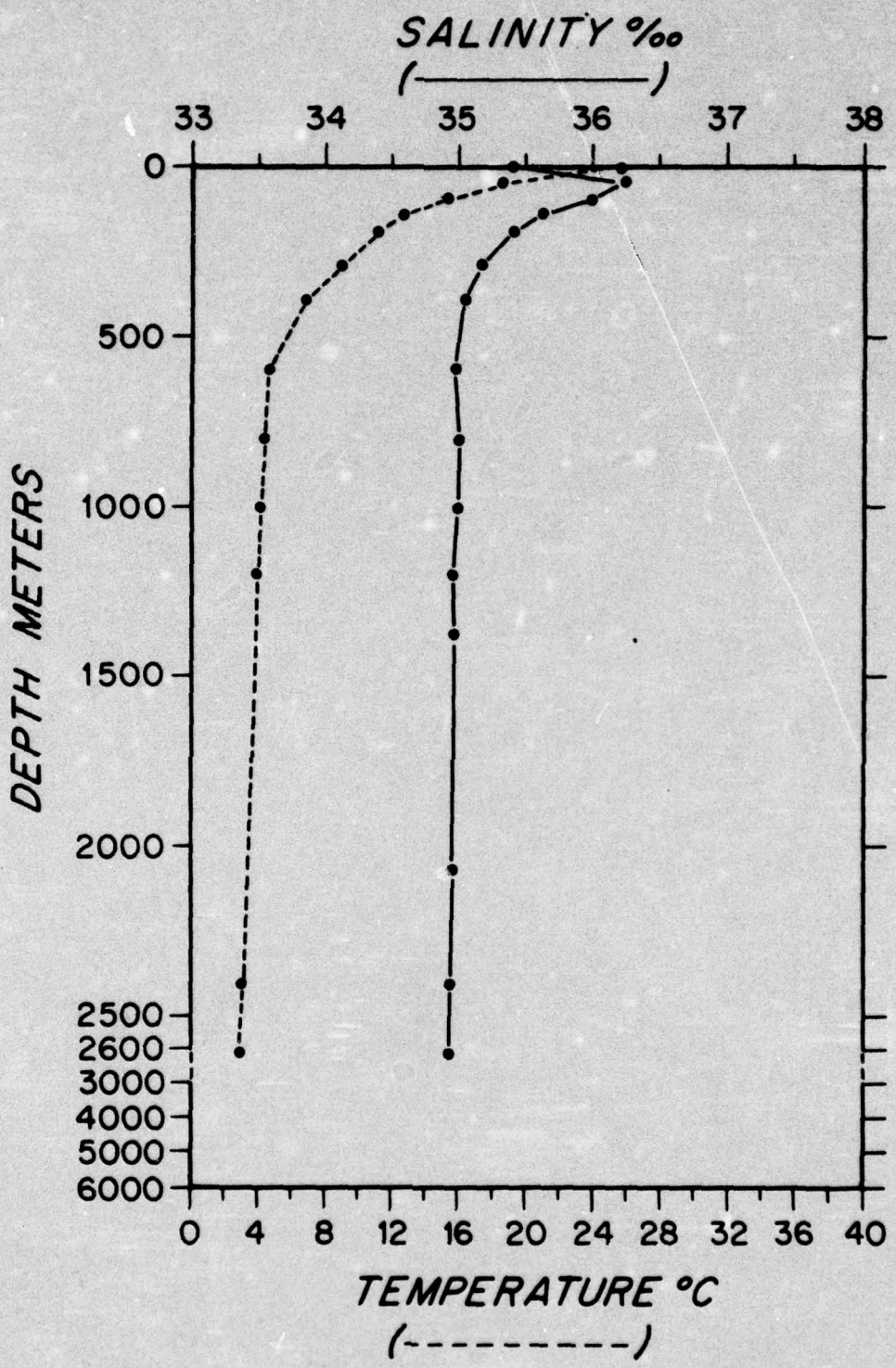
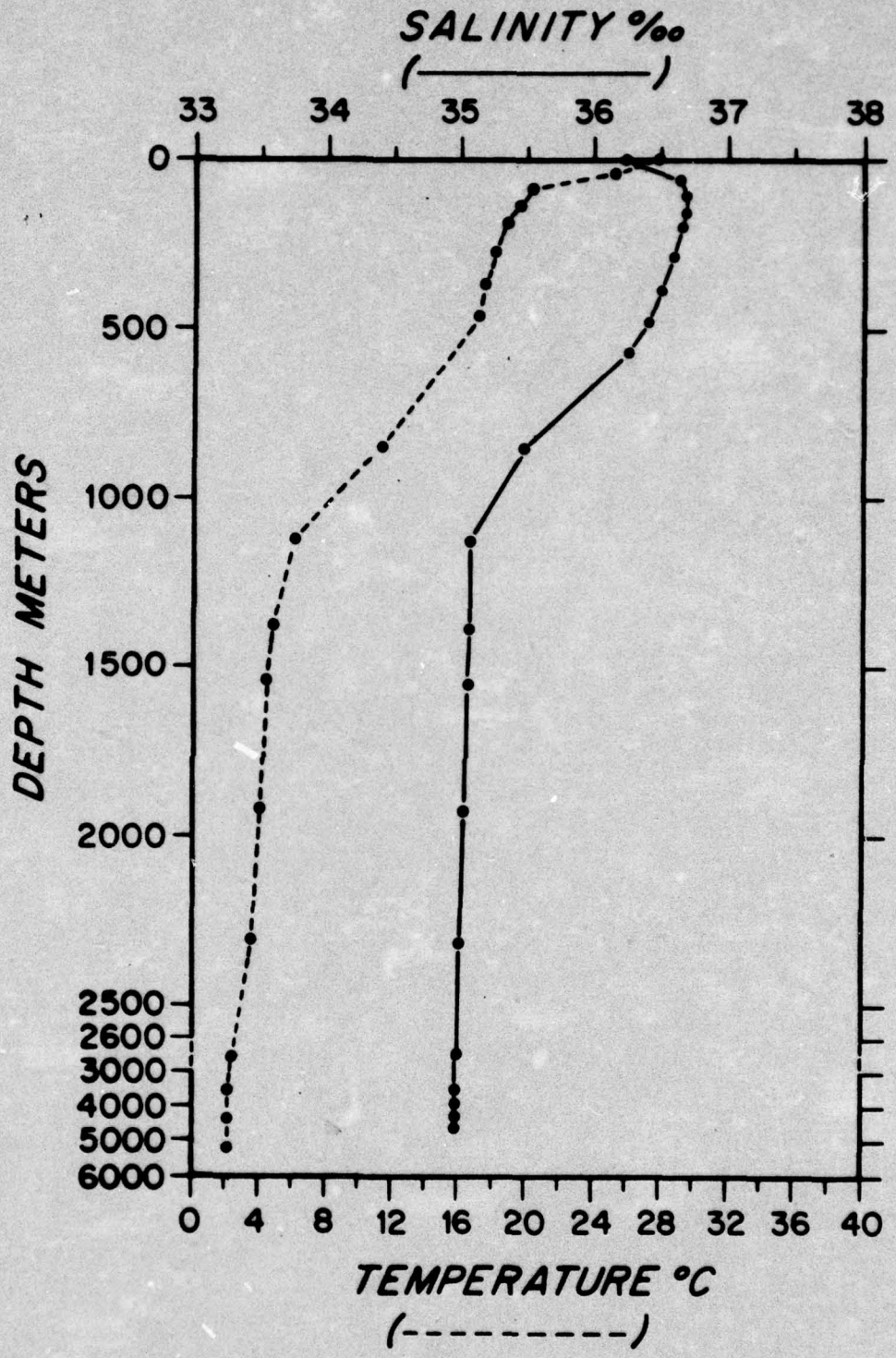


CI - 095 - 922



CI- 095 - 924

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Summaries of wind and current measurements from moored stations gathered by magnetic tape recording current meters and wind recorders in early 1969 are presented also selected hydrostation data from the same areas.

Averaged wind and current quantities are presented in computer generated output as basic STATISTICS, SPECTRA diagrams, PROGRESSIVE VECTOR diagrams and EAST-NORTH component plots. The hydrostation data are presented as temperature and salinity values plotted against pressure.

1. Site D
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3. Moorings

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