

MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

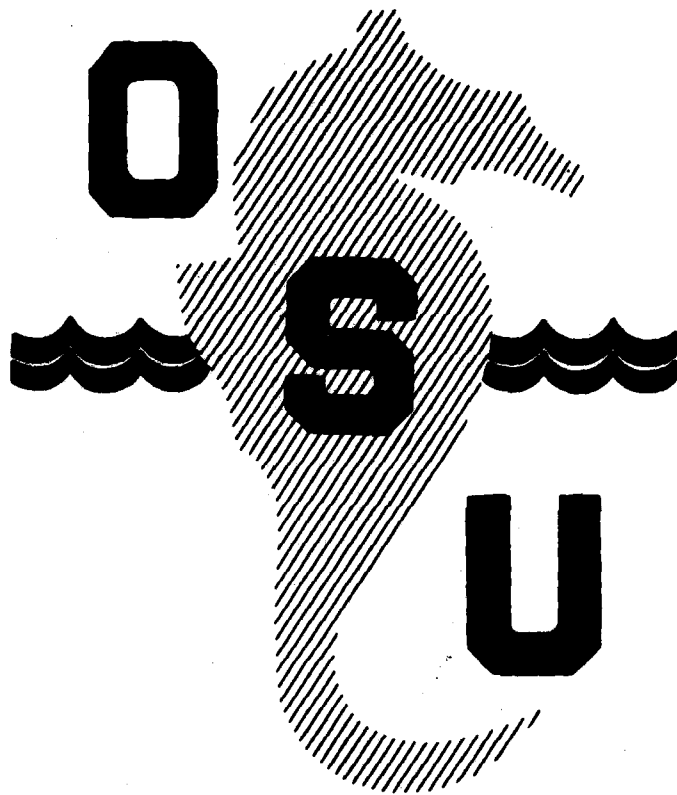
School of

LEVEL II

12
B.S.

OCEANOGRAPHY

AD A092650



DTIC
ELECTE
DEC 08 1980
S D
E

DDC FILE COPY

DISTRIBUTION STATEMENT A
Approved for public release;
Distribution Unlimited

Temperature Microstructure Profiles
From the Sub-Tropical Front

by
T. M. Dillon
and
D. R. Caldwell

Data Report 04 Reference 00-10
September 1980

Reproduction in whole or in part is
permitted for any purpose of the
United States Government

OREGON STATE UNIVERSITY

80 11 28 026

(14) DATA-84, REF-80-16

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER 80-16	2. GOVT ACCESSION NO. AD-A092650	3. RECIPIENT'S CATALOG NUMBER
4. TITLE and Subtitle 6 TEMPERATURE MICROSTRUCTURE PROFILES FROM THE SUB-TROPICAL FRONT.		5. TYPE OF REPORT & PERIOD COVERED 9 Technical rept.
7. AUTHOR(s) 19 T.M./Dillon D.R./Caldwell		8. CONTRACT OR GRANT NUMBER(s) 15 N00014-79-C-0004
9. PERFORMING ORGANIZATION NAME AND ADDRESS School of Oceanography Oregon State University Corvallis, OR 97331		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS NR083-102
11. CONTROLLING OFFICE NAME AND ADDRESS Office of Naval Research Ocean Science & Technology Division Arlington, Virginia 22217		12. REPORT DATE 11 September 1980
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office) 12 131		13. NUMBER OF PAGES
		15. SECURITY CLASS. (of this report) Unclassified
16. DISTRIBUTION STATEMENT (of this Report) EXHIBIT A Approved for public release; Distribution Unlimited		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report) Approved for public release, distribution unlimited		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Sub-tropical front, microstructure, temperature profiles, kinetic energy dissipation rates		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) Preliminary temperature microstructure profiles resulting from the FRONTS experiment in January 1980 are presented. Also included are selected profiles of the kinetic energy dissipation rate estimated by the Batchelor scale technique.		

80 11 28 030

272268

file

TEMPERATURE MICROSTRUCTURE PROFILES
FROM THE SUB-TROPICAL FRONT

by

T.M. Dillon and D.R. Caldwell

School of Oceanography
Oregon State University
Corvallis, Oregon 97331

Accession For	
NTIS GRA&I	<input checked="" type="checkbox"/>
DDC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By _____	
Distribution/	
Availability Codes	
Dist	Available/or special
A	

Approved for public release, distribution unlimited

Reference 80-16
DATA REPORT 84
September, 1980

G. Ross Heath
Dean

ACKNOWLEDGEMENTS

The MSP instruments were constructed by S. Wilcox and J. Cantey. Participating in the cruise were J. Cantey, S. Blood, and R. Moore. S. Blood prepared the analysis software. Special thanks must be given to the officers and crew of the R/V OCEANOGRAPHER. This experiment was funded by the Office of Naval Research.

Table of Contents

	<u>Page</u>
Acknowledgments	
Introduction	1
References	2
Table of Station Locations	3
Map of Frontal Area	4
Weather Observations	5
Temperature Profiles	6
Optical Transmissivity	119
Kinetic Energy Dissipation Estimates	121

INTRODUCTION

This report is a preliminary presentation of temperature microstructure data resulting from the FRONTS experiment in January 1980. During the experiment, four stations were occupied in the sub-tropical front area northeast of Hawaii; in addition, a transect of five stations was run across an active frontal area, and stations far north and far south of the frontal zone were occupied for comparison with the fronts area.

The Microstructure Profiler (MSP) has been described in the literature (Caldwell, Wilcox, and Matsler, 1975; Dillon and Caldwell, 1980a; Caldwell and Dillon, 1980; Dillon and Caldwell, 1980b). Pre- and Post-cruise calibrations of the thermistors agreed within 0.02°C . Two independent thermistors were used on each instrument, and the temperature measured by each agreed to within 0.02°C .

Temperatures were recorded with both a low gain and a high gain in the amplifiers. The low-gain thermistors had a resolution of 4 millidegrees, while the high-gain resolution was variable, and usually set at 0.16 millidegrees. The bulk of this report consists of plots of temperature depth-derivative, low-gain temperature, and high-gain temperature. Often, the high-gain temperature plots reveal much more structure, including small-scale inversions and instabilities, than is apparent in the low-gain temperatures.

Kinetic energy dissipation rates were estimated using the Batchelor scale or cut-off wavenumber technique (Dillon and Caldwell, 1980a; Caldwell and Dillon, 1980; Caldwell, Chriss, Newberger and Dillon, 1981). Selected profiles of the dissipation rate have been plotted in the last section of this report.

The low-gain temperature plots contain the vertical temperature derivative to the left in units of $^{\circ}\text{C}/\text{M}$. The temperature scale is at bottom and the depth in M is on the left. High-gain temperature profiles are limited to water above the seasonal thermocline (usually $\sim 120\text{m}$) because of dynamic range limitations. The points plotted are not averages, but instantaneous realizations which have been decimated so that the density of plotted points is of order 200 points per inch regardless of the vertical scale.

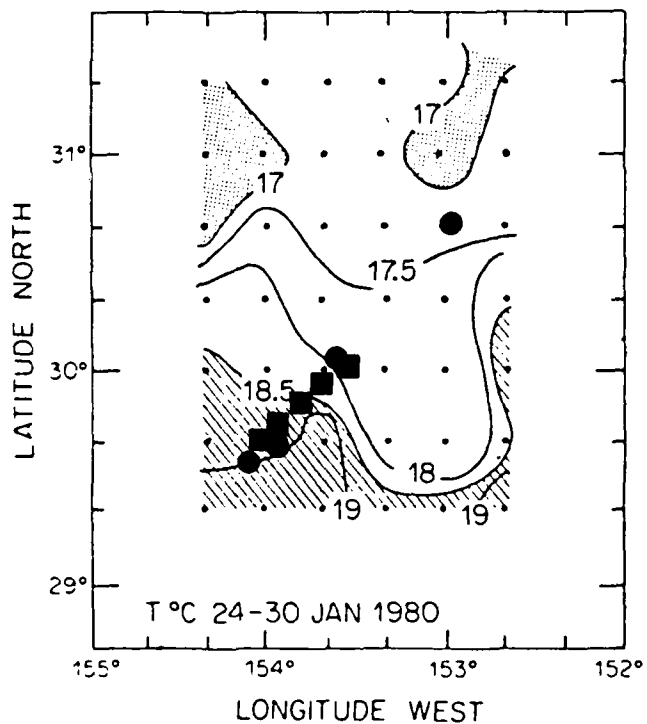
At the southernmost location, Station F8, the optical transmissivity over a 30cm horizontal path length was measured. Examples of the transmissivity profiles here have been plotted on an arbitrary scale, with "dirty" water to the left, and "clean" water to the right. Much less vertical variation was noted for this Station than has been observed at Ocean Station P or off the Oregon coast.

REFERENCES

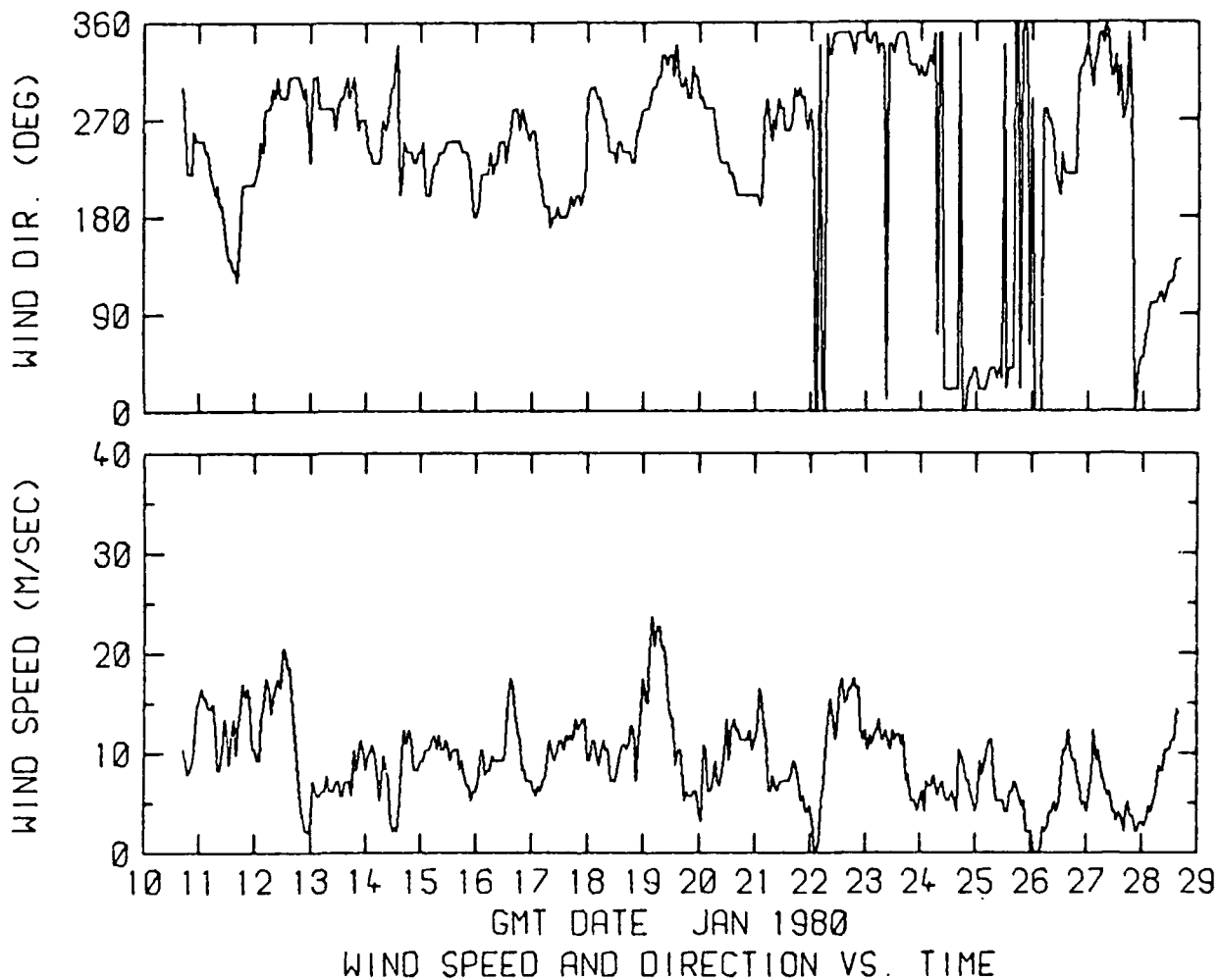
- Caldwell, D.R., S.D. Wilcox, and M. Matsler (1975). A relatively simple freely-falling probe for small-scale temperature gradients. Limnology and Oceanography, 20, pp 1035-1047.
- Caldwell, D.R. and T.M. Dillon (1980). The scaling of temperature gradient spectra. J. Geophys. Res., 85, (C4), pp 1917-1924.
- Caldwell, D.R., T.M. Chriss, P.A. Newberger, T.M. Dillon (1981). The thinness of oceanic temperature gradients. Accepted by J. Geophys. Res.
- Dillon, T.M. and D.R. Caldwell (1980a). The Batchelor spectrum and dissipation in the upper ocean. J. Geophys. Res., 85 (C4), pp 1910-1916.
- Dillon, T.M. and D.R. Caldwell (1980b). High-frequency internal waves at Ocean Station P. J. Geophys. Res., 85 (C6), pp 3277-3284 (1980b).

TABLE 1
 Latitude and Longitude of Microstructure Stations
 Occupied by the NOAA Ship OCEANGORAPHER

<u>Station No.</u>	<u>Latitude-Longitude</u>	<u>Date (Jan 80)/Time (GMT)</u>
F1	33°56'N-150°2'W	15/01:56-15/13:37
F2	31°00'N-153°00'W	23/18:13-24/04:12
F3	30°20.4'N-153°37.3'W	24/18:25-24/23:52
F5 (transect)	30°20.9'N-153°36.2'W	25/18:35-25/19:30
	30°16.1'N-153°42.6'W	25/20:40-25/21:01
	30°10.1'N-152°49.8'W	25/23:00-26/00:02
	30°01.6'N-153°57.2'W	26/00:54-26/02:58
	29°59.5'N-154°00.6'W	26/03:51-26/05:18
F6	29°58.5'N-154°00.3'W	26/18:35-27/00:21
F7	29°52.5'N-154°06.9'W	27/02:12-27/08:13
F8	26°05.8'N-155°45.1'W	28/19:58-29/02:45



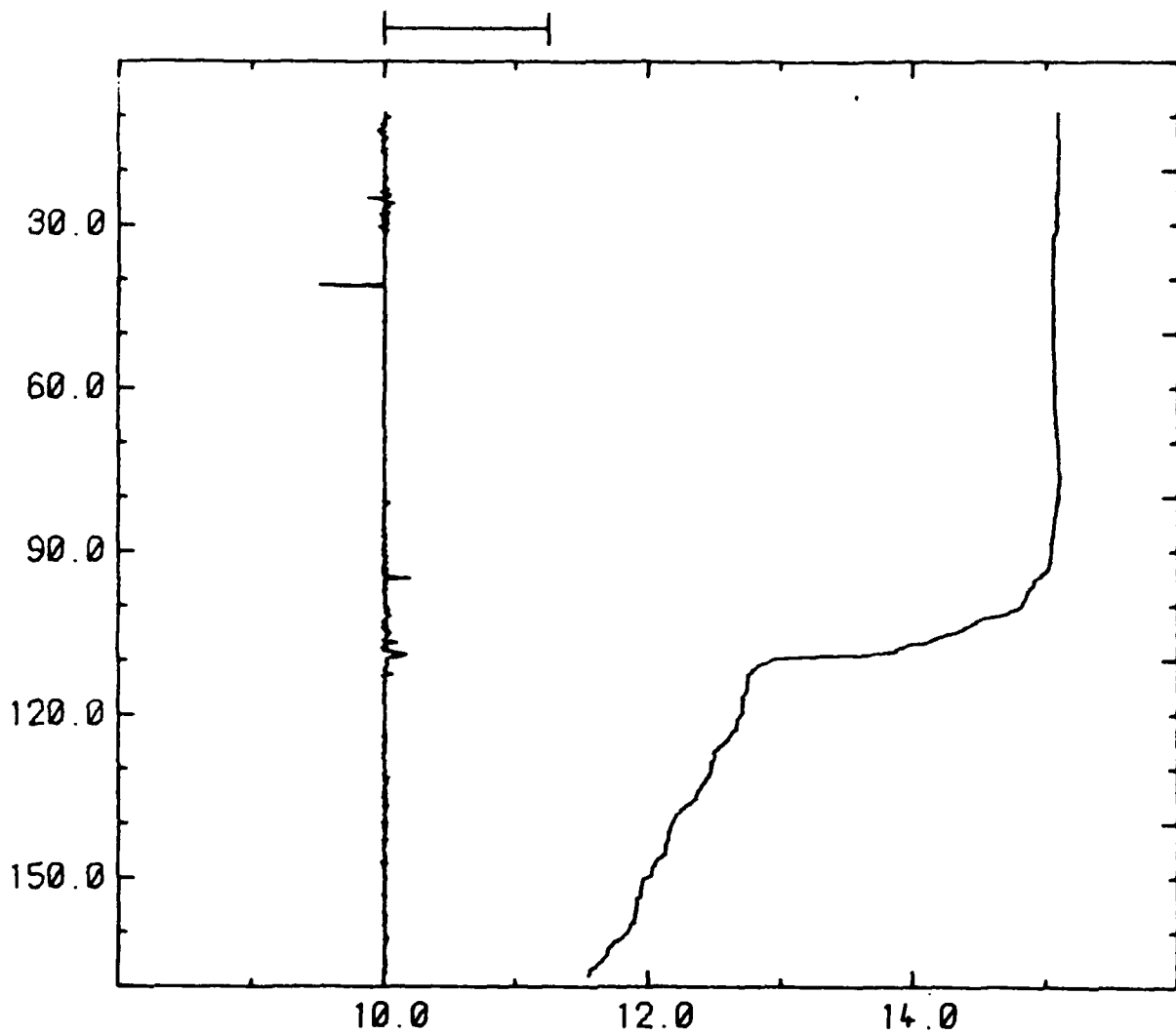
Map of the most intensively studied region, along a line extending to the southwest from 31°N-153°W, overlaid on a preliminary map of sea-surface temperature kindly supplied by Gunnar Roden. Large dark circles are stations occupied for many casts, and large dark squares are transect stations occupied only briefly.



Wind speed and direction as measured aboard the R/V OCEANOGRAPHER during the FRONTS experiment; correction for ship motion has been included. (Plot courtesy of C. Paulson.)

TAPE F1A FILE 1
UNIT 5.79

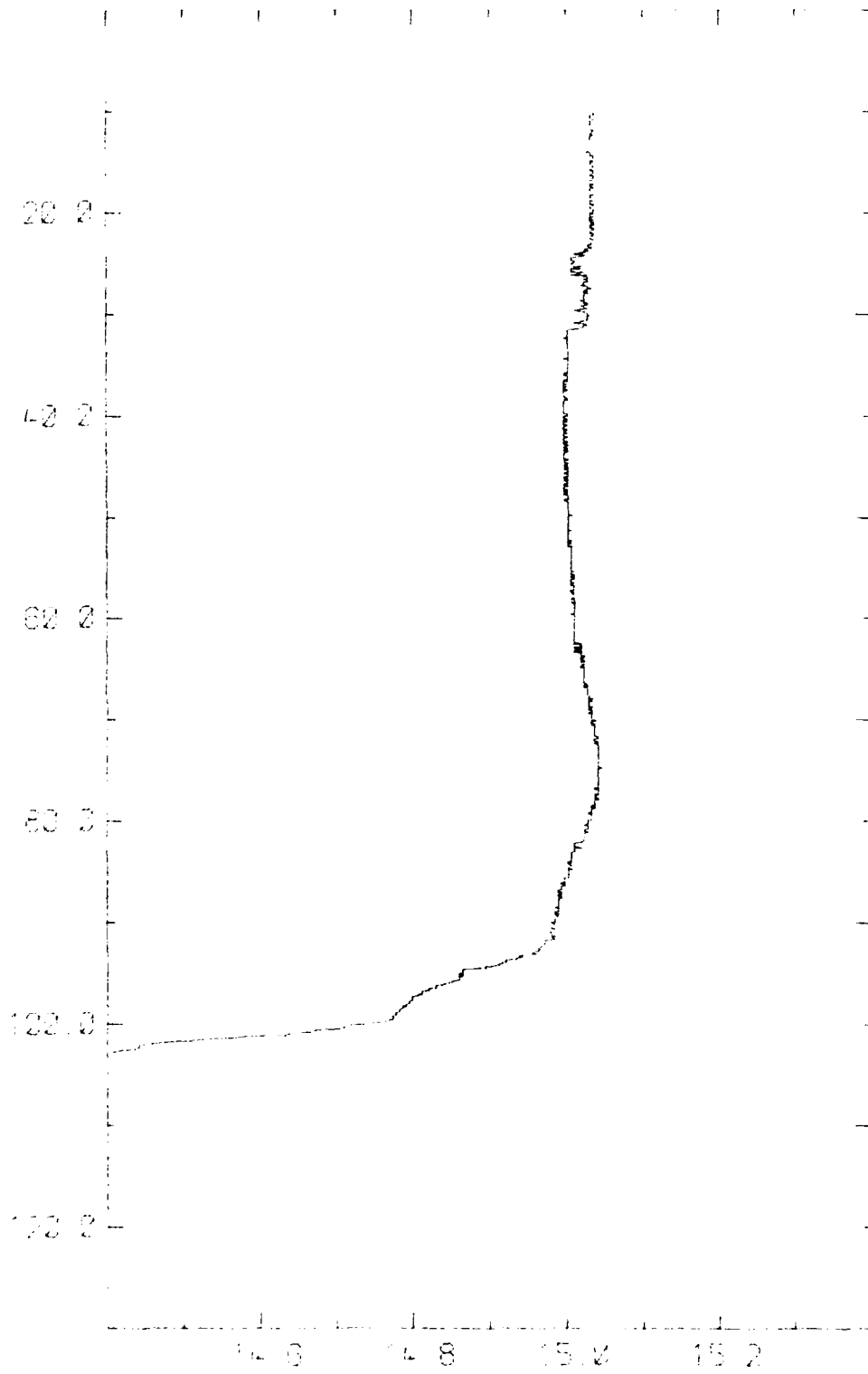
10.0 DEG/M



DATE 1/15/80
TIME 0444 GMT

TAPPE F 141 FILE 1
UNIT 5 03

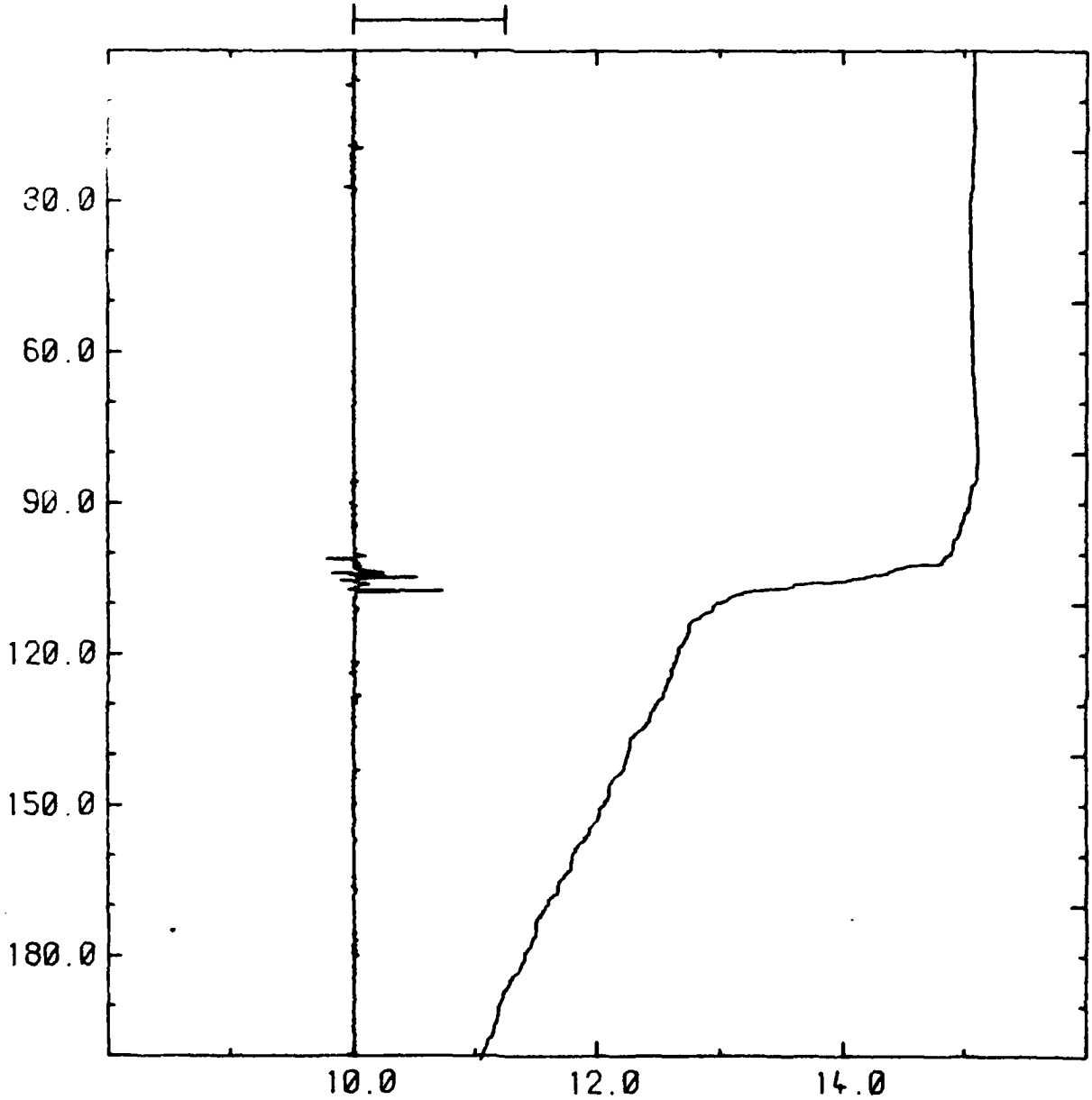
7



DATE 1/15/80
TIME 2444 GMT

TAPE F1A FILE 2
UNIT 5.79

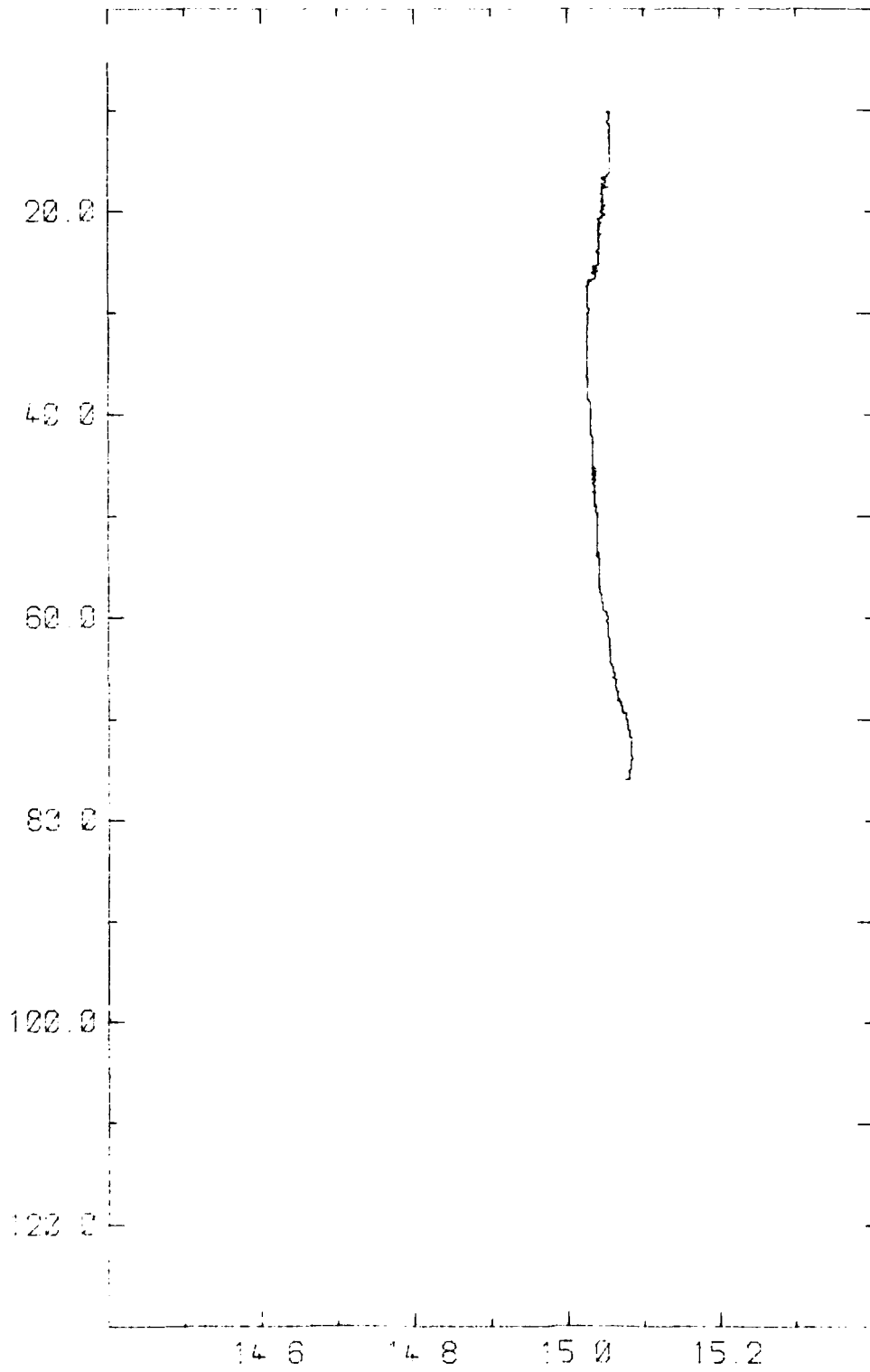
10.0 DEG/M



DATE 1/15/80
TIME 0516 GMT

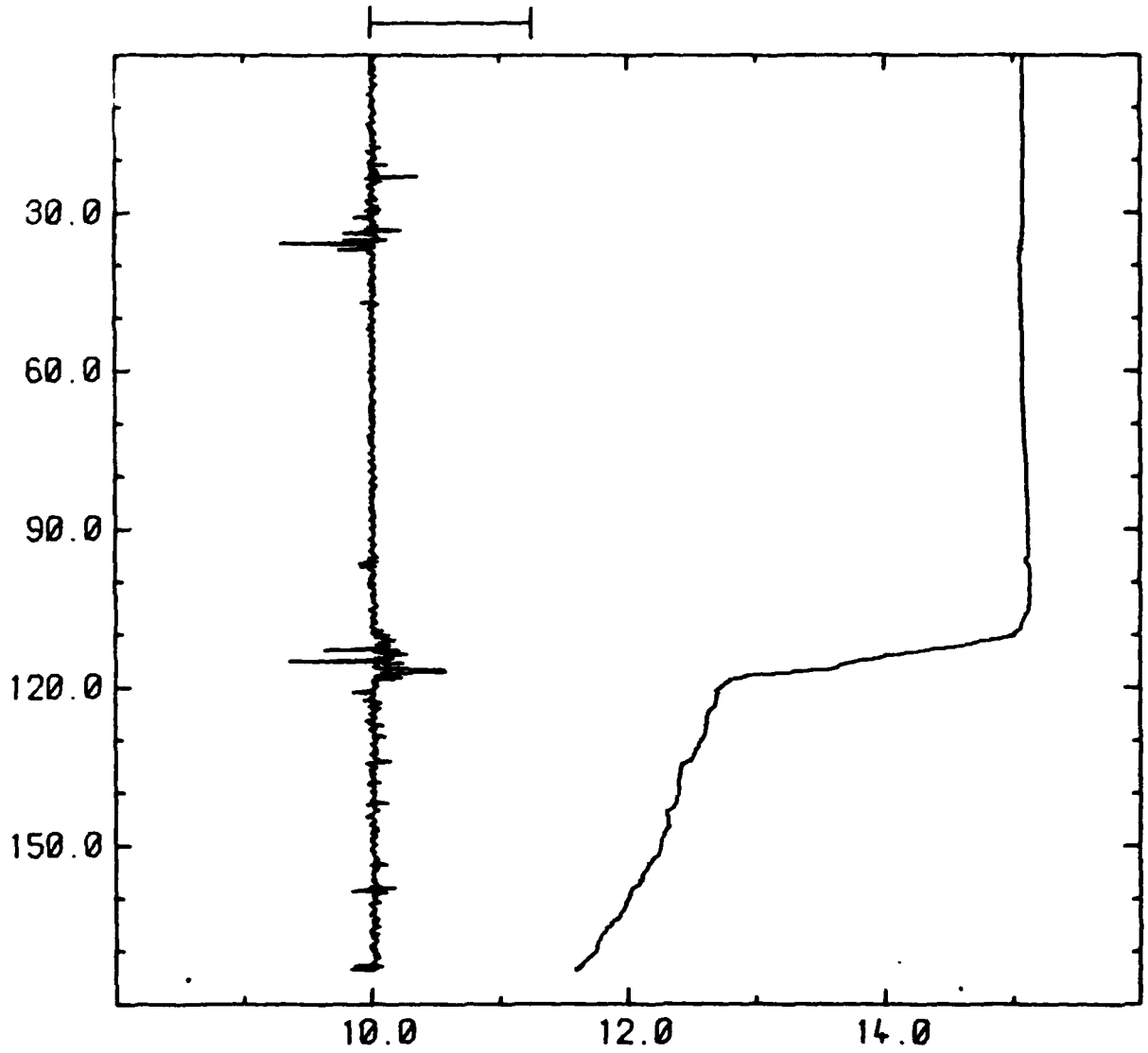
TAPE F1A FILE 2
UNIT 5.79

9

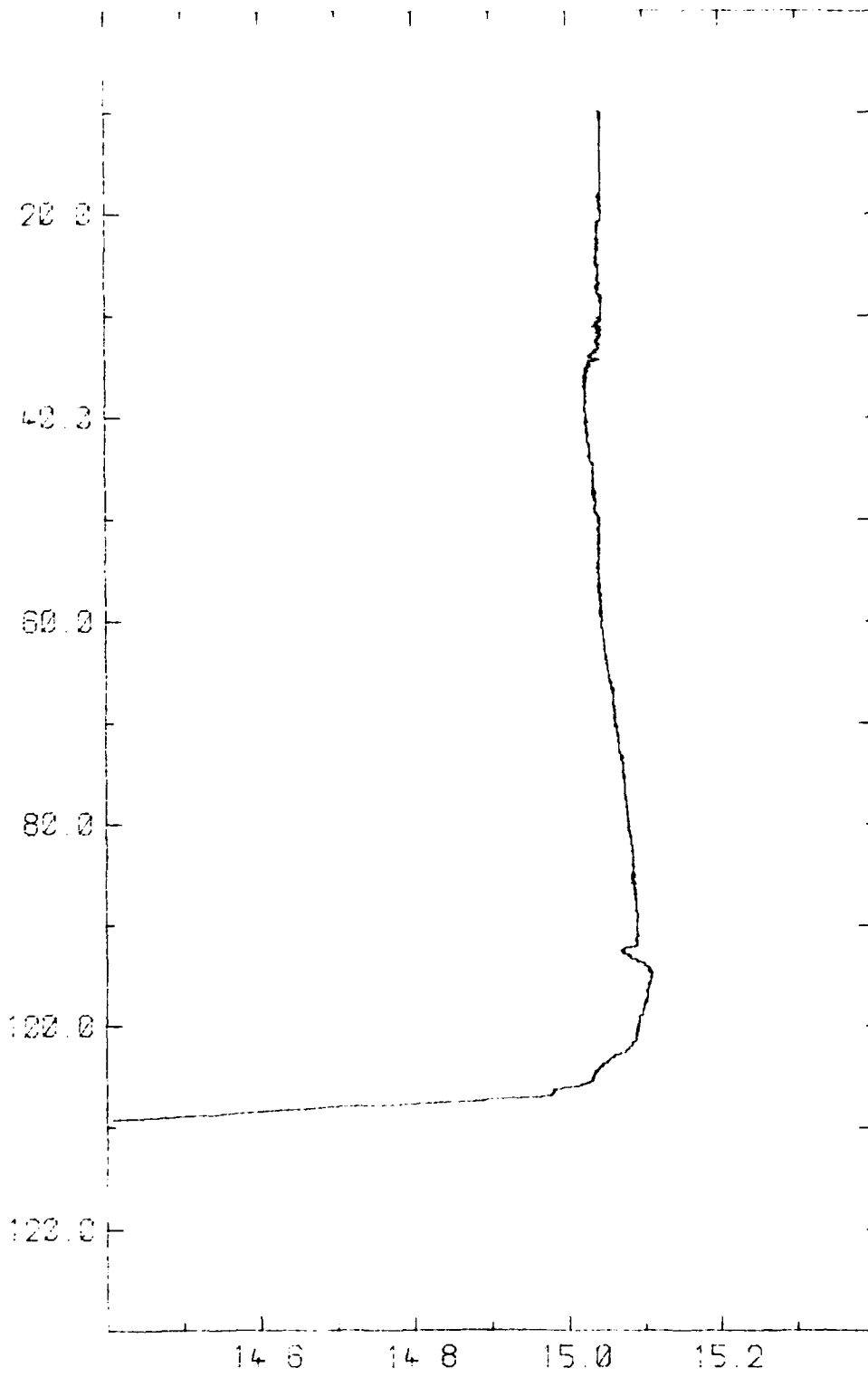


DATE 1/15/82
TIME 0516 GMT

TAPE F1B FILE 1
UNIT 5.79
3.0 DEG/M



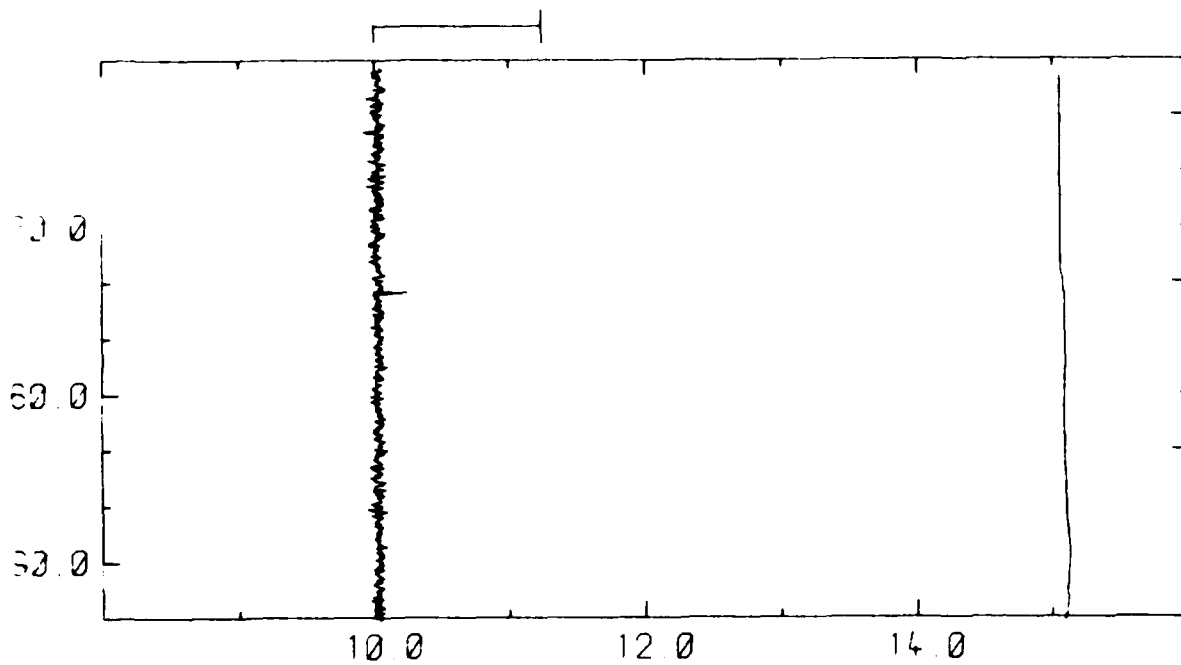
DATE 1/15/80
TIME 0559 GMT



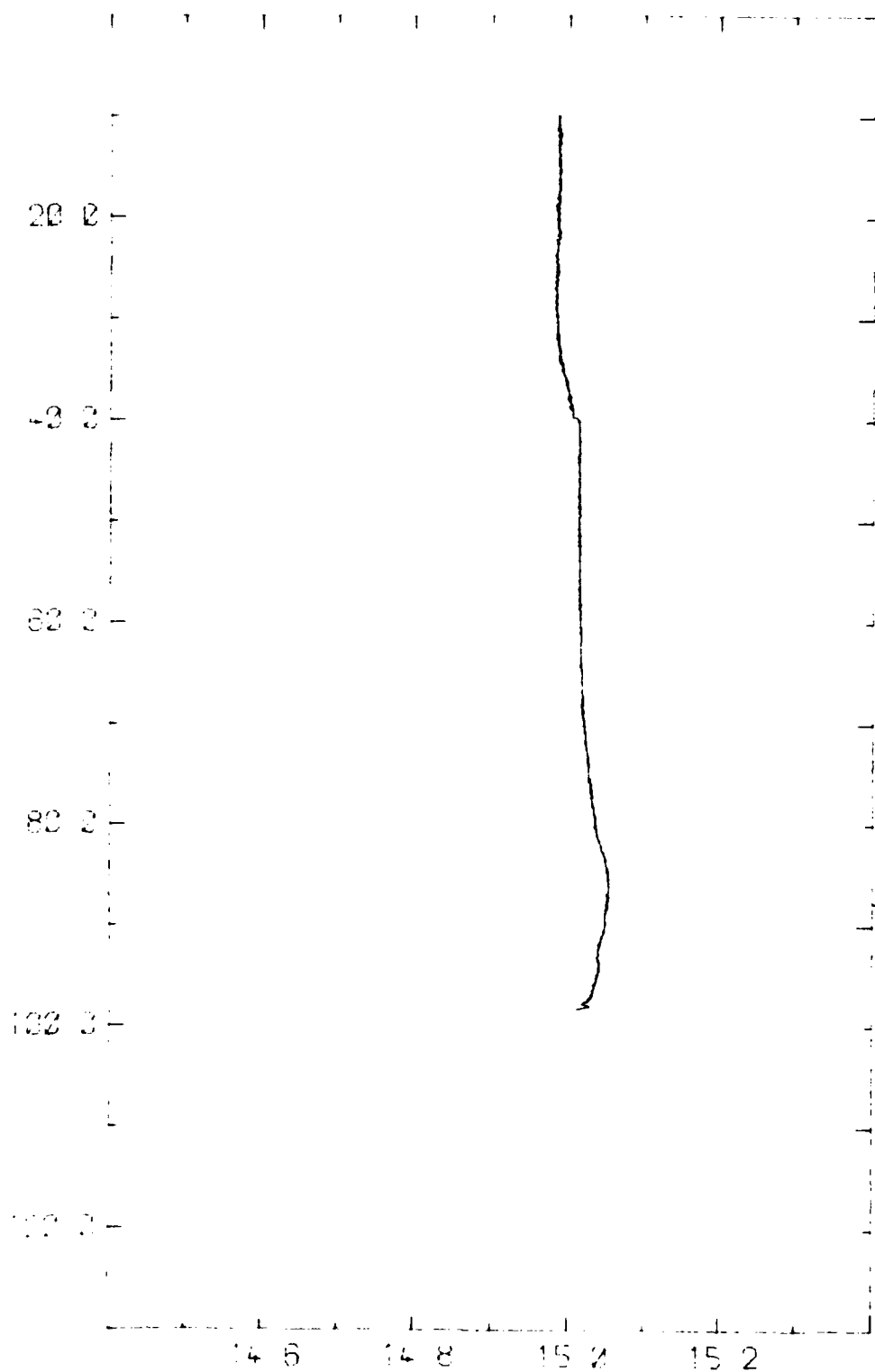
DATE 1/15/80
TIME 0553 GMT

TAPE F18 FILE 2
UNIT 2 79

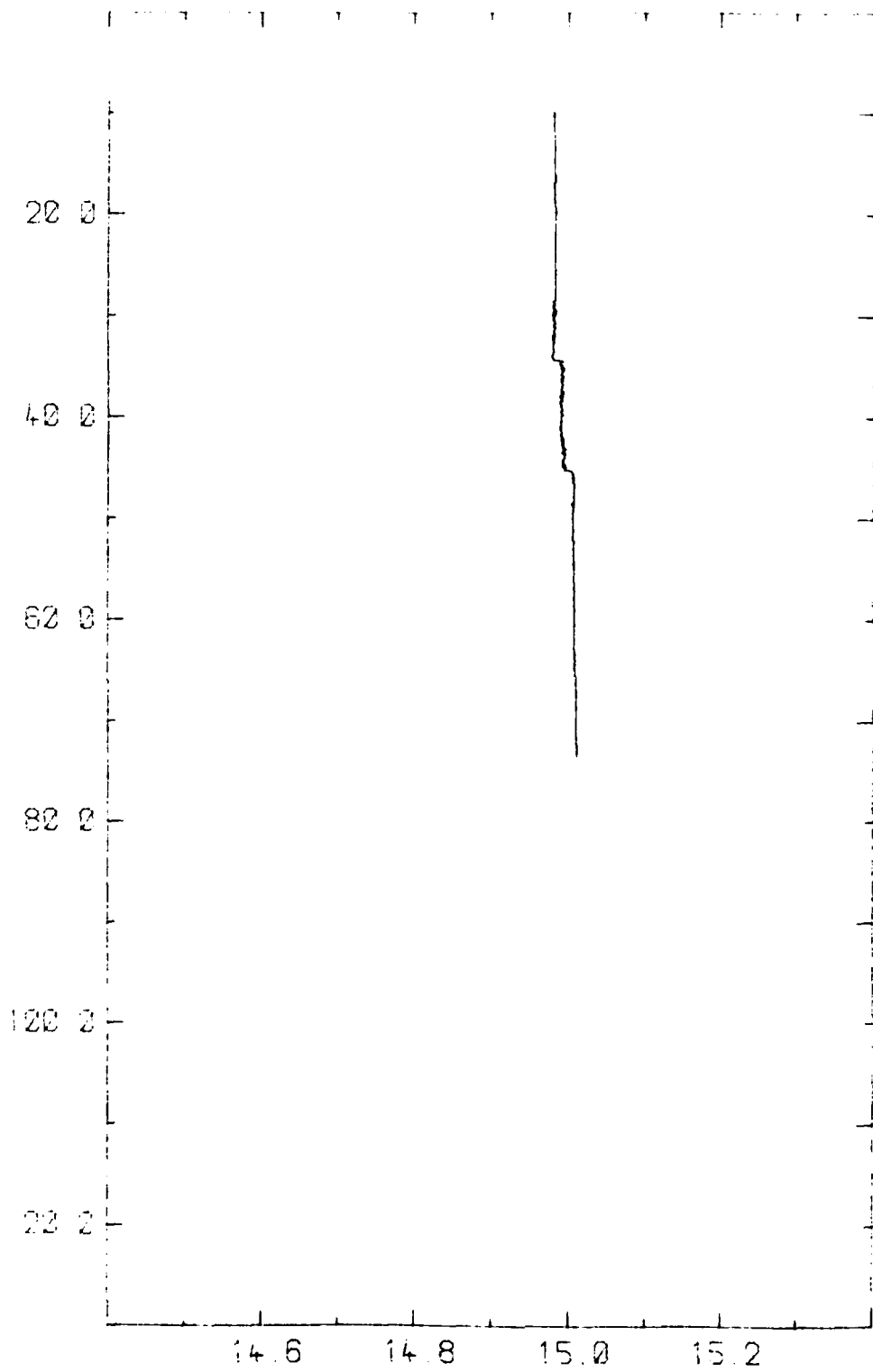
3 0 DEG/M



DATE 1/15/83
TIME 0648 GMT



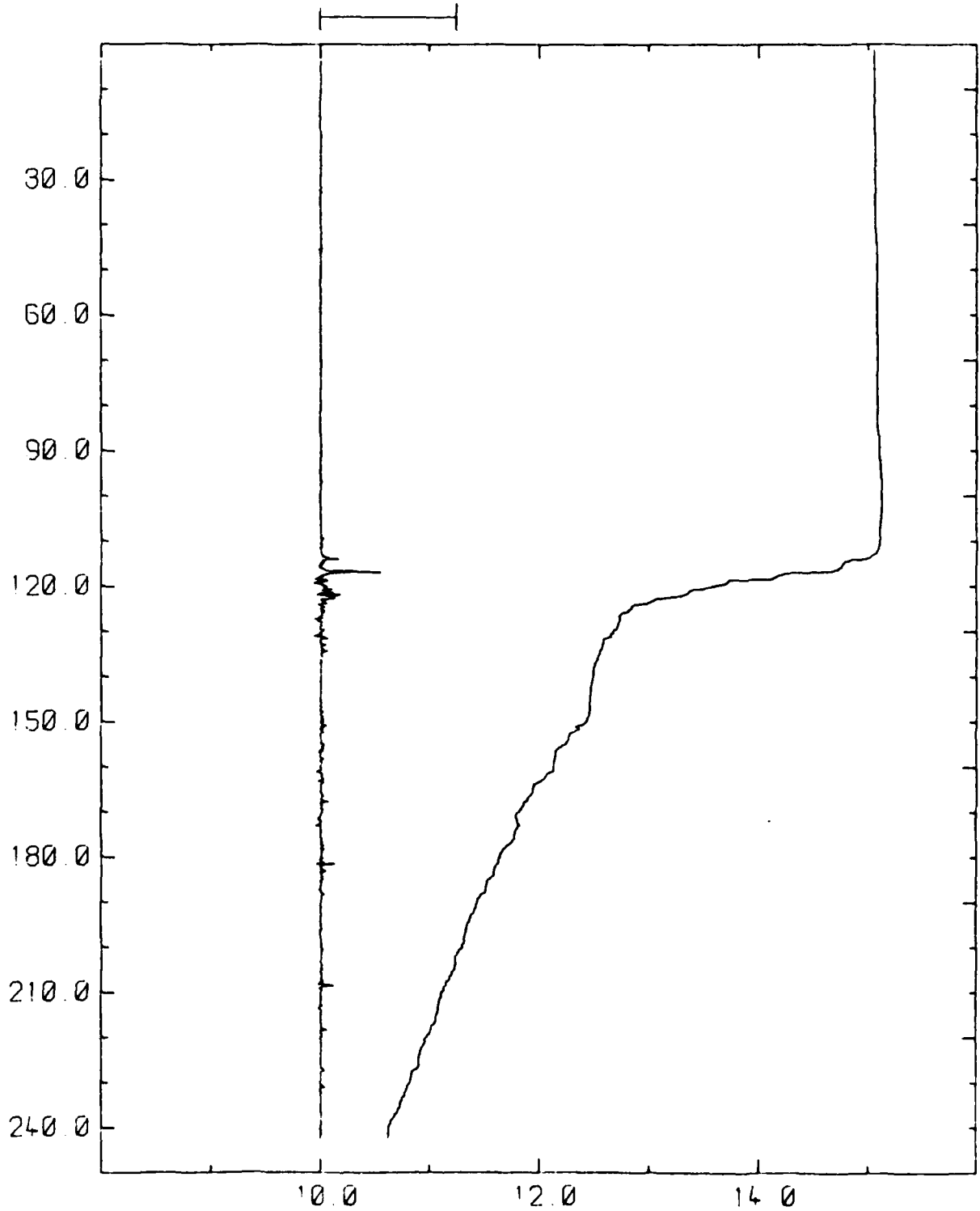
DATE 1/15/82
TIME 0648 GMT



DATE 1/15/80
TIME 0736 GMT

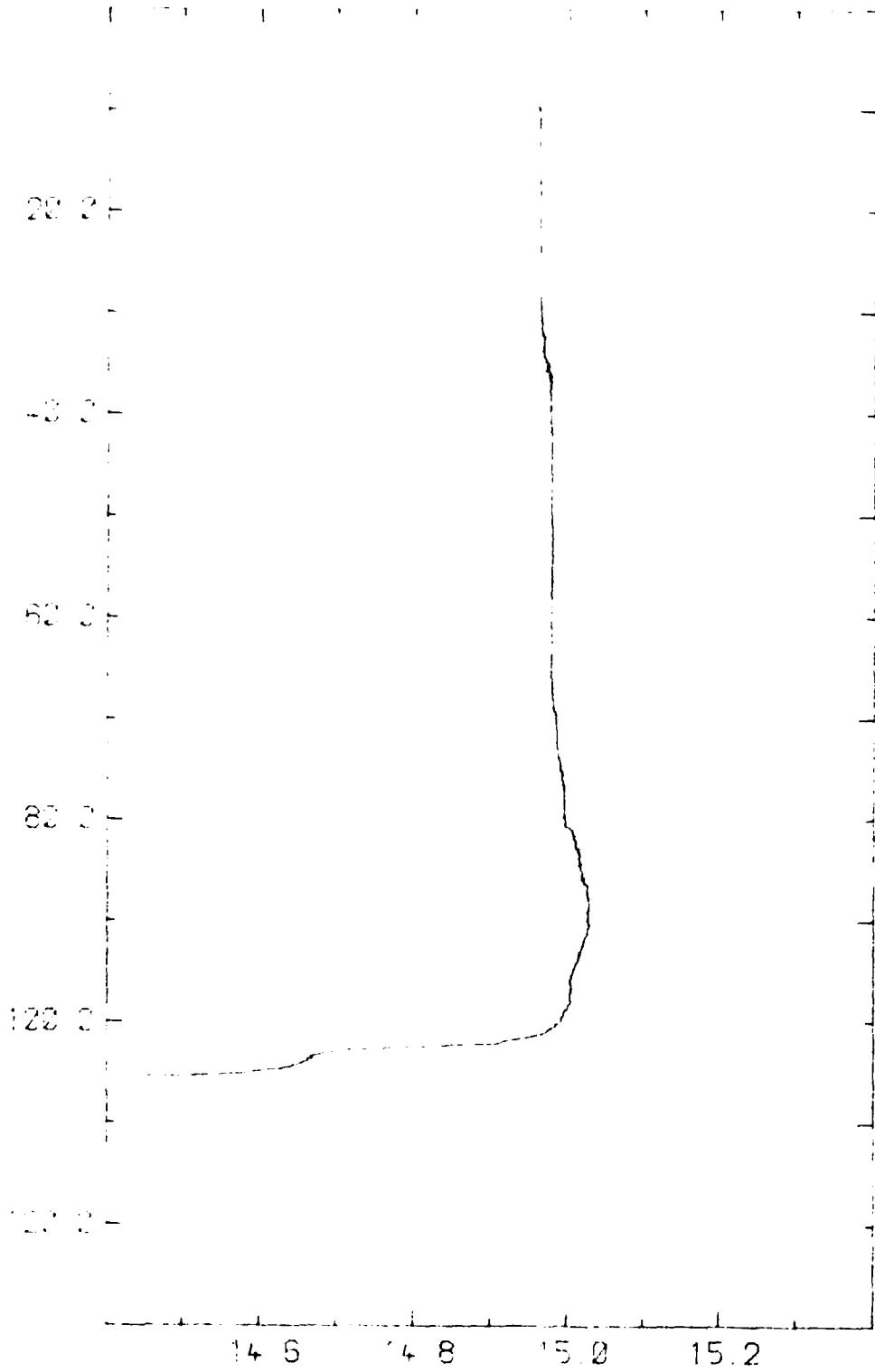
TAPE F1C FILE 2
UNIT 5.79

10.0 DEG/M



DATE 1/15/80
TIME 0803 GMT

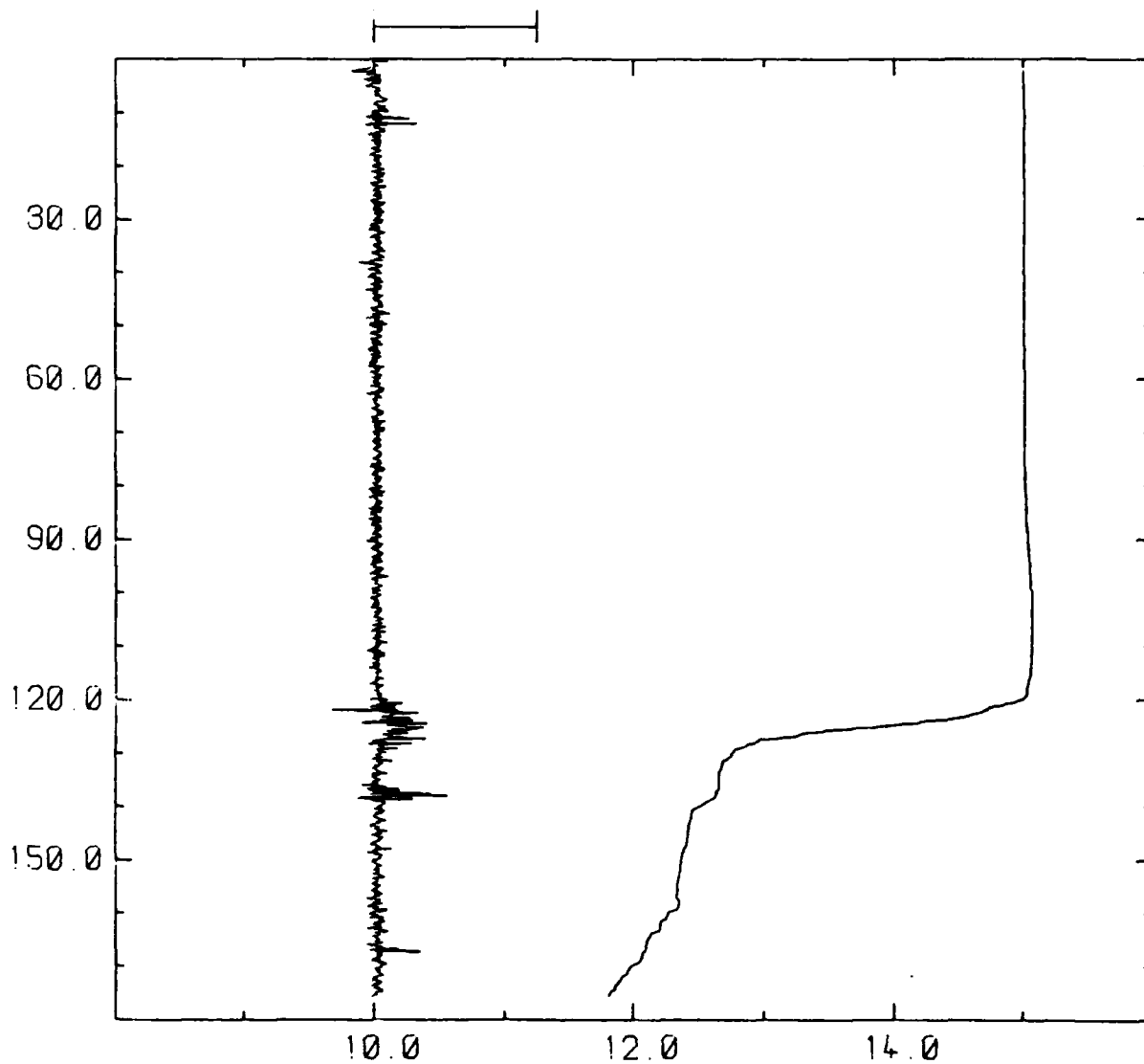
TAPE #10
UNIT 5



DATE 1/15/80
TIME 0823 GMT

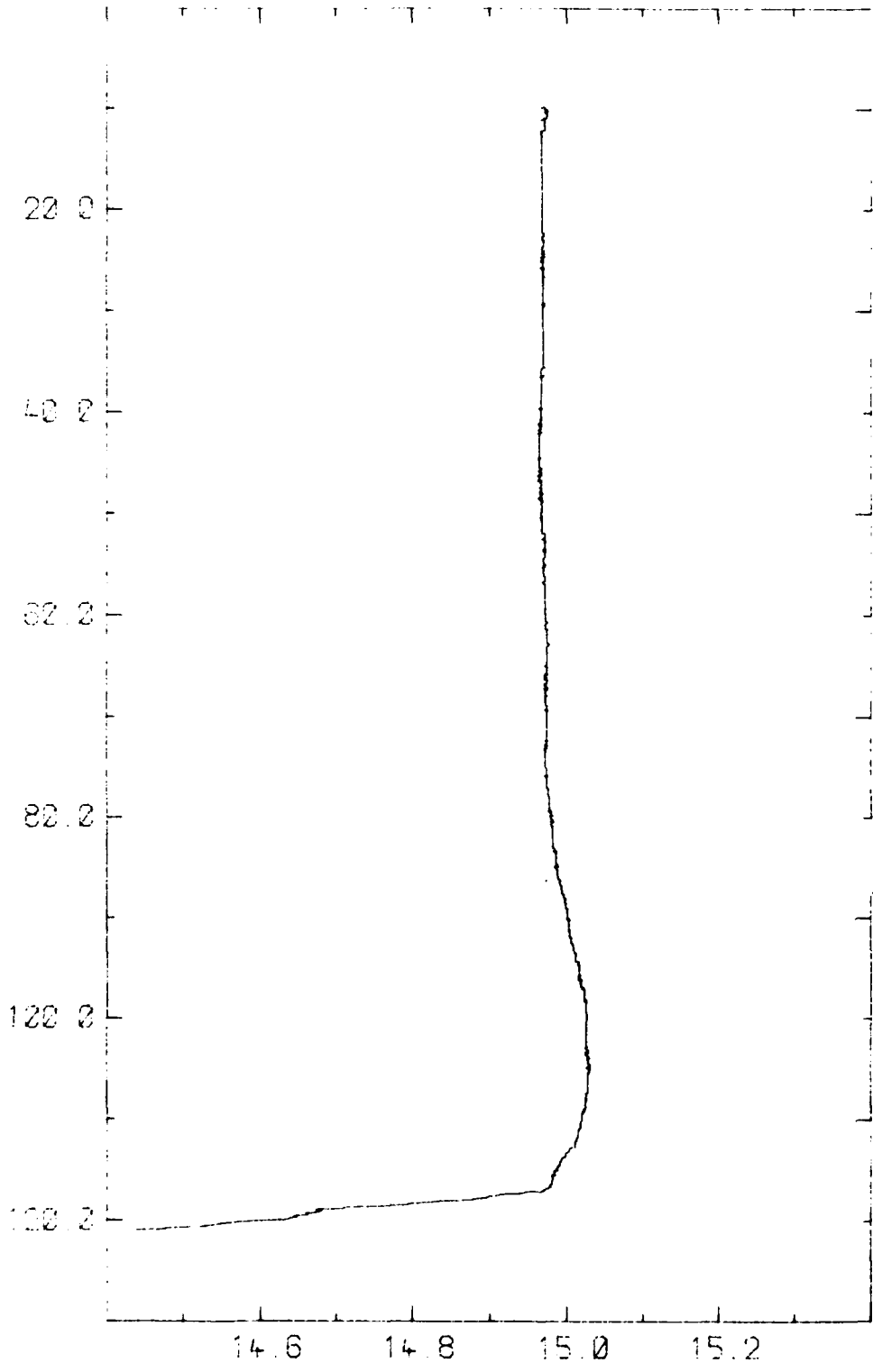
TAPE FIC FILE 3
UNIT 2.79

3.0 DEG/M



DATE 1/15/80
TIME 0840 GMT

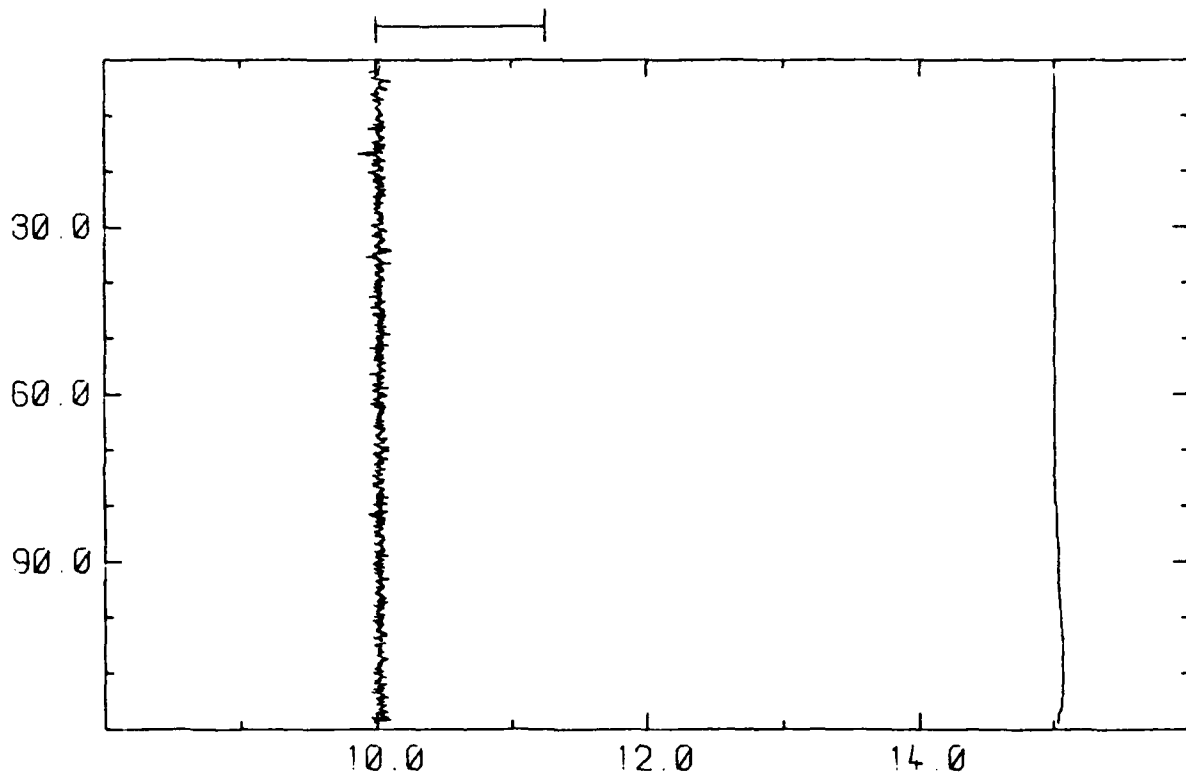
TAPE F1C FILE 3
UNIT 2.79



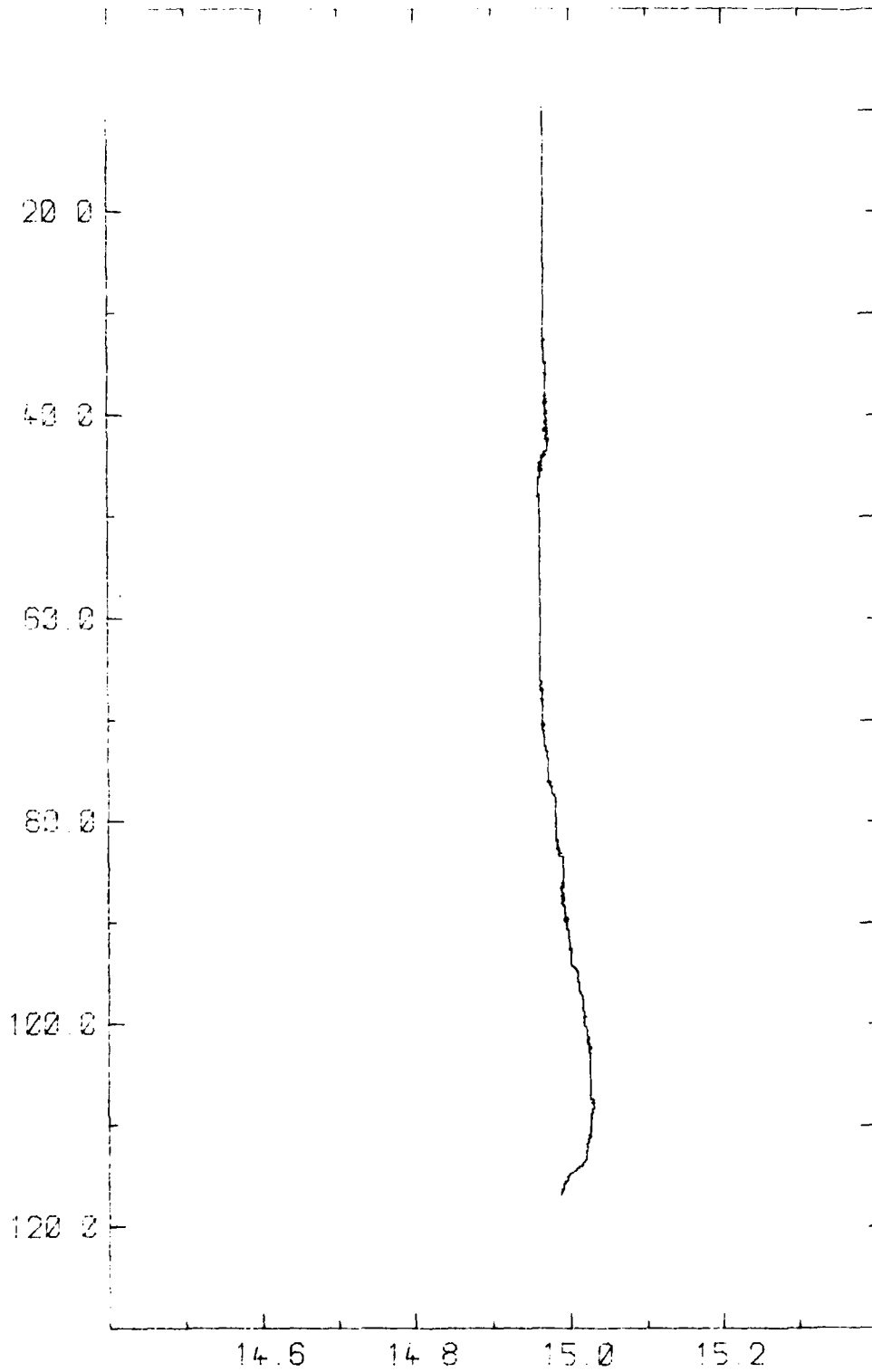
DATE 1/15/80
TIME 0840 GMT

TAPE F10 FILE 1
UNIT 2.79

3.0 DEG/M



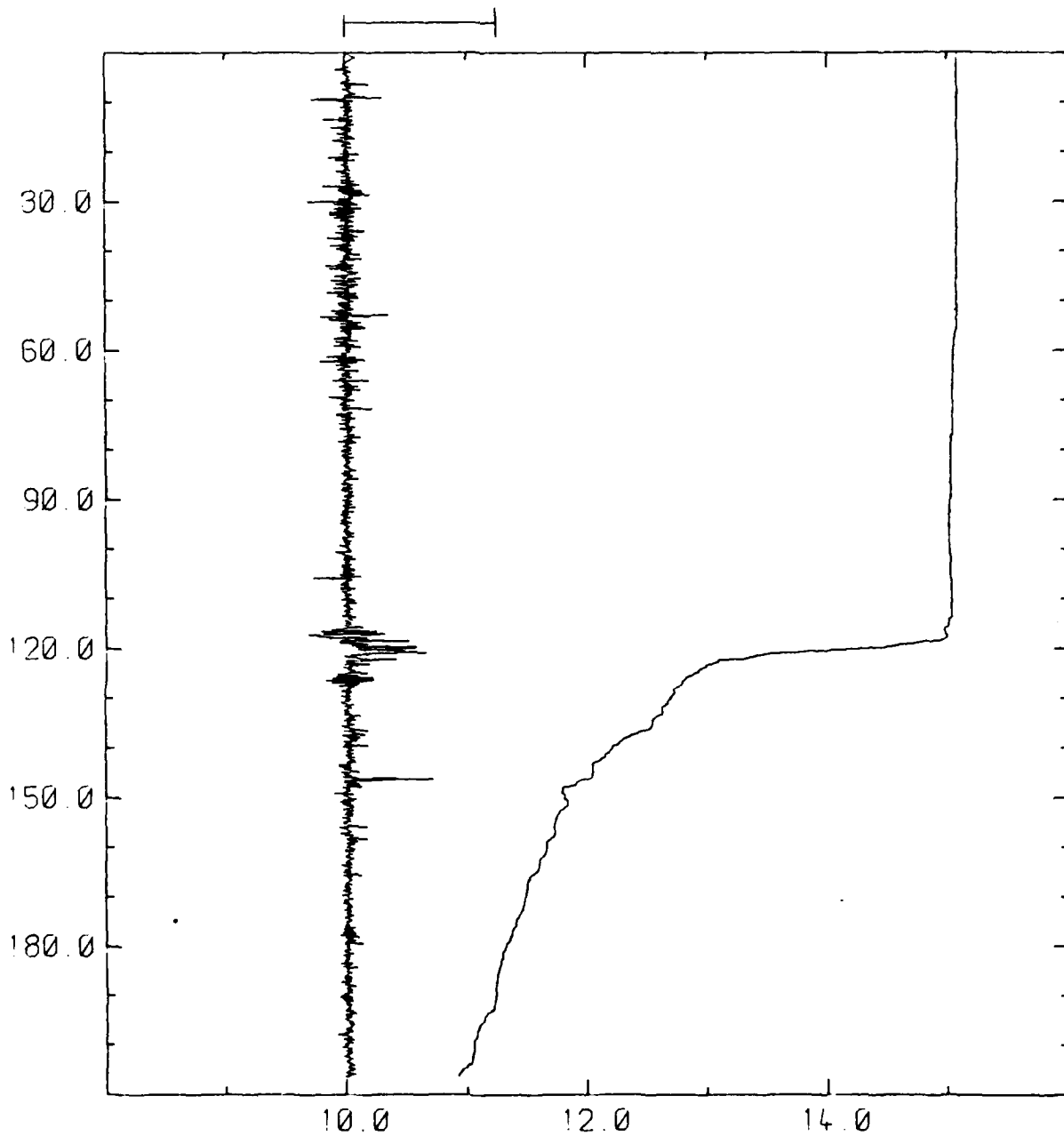
DATE 1/15/80
TIME 0909 GMT



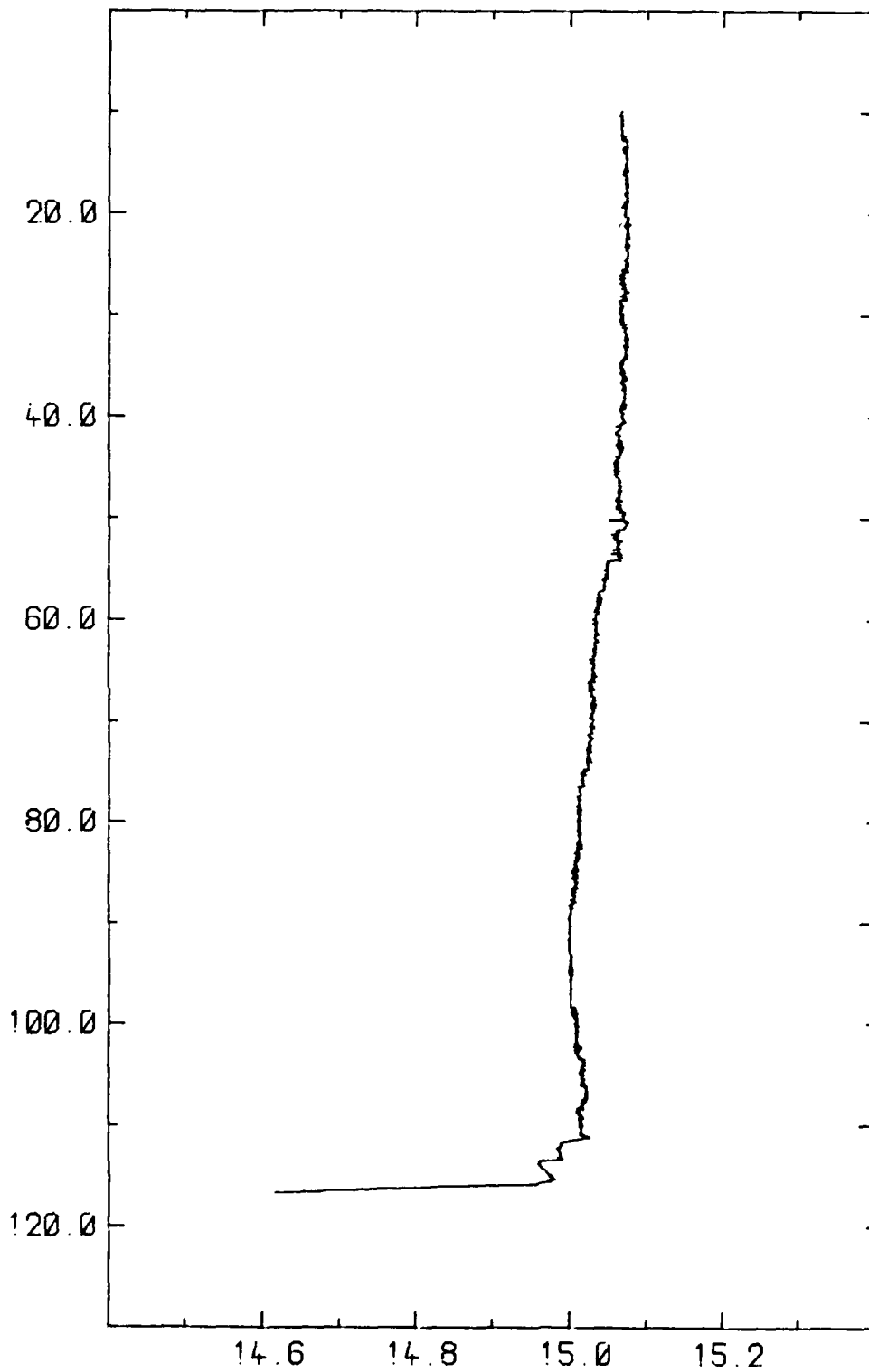
DATE 1/15/80
TIME 0909 GMT

TAPE F1F FILE 2
UNIT 2.79

3.0 DEG/M



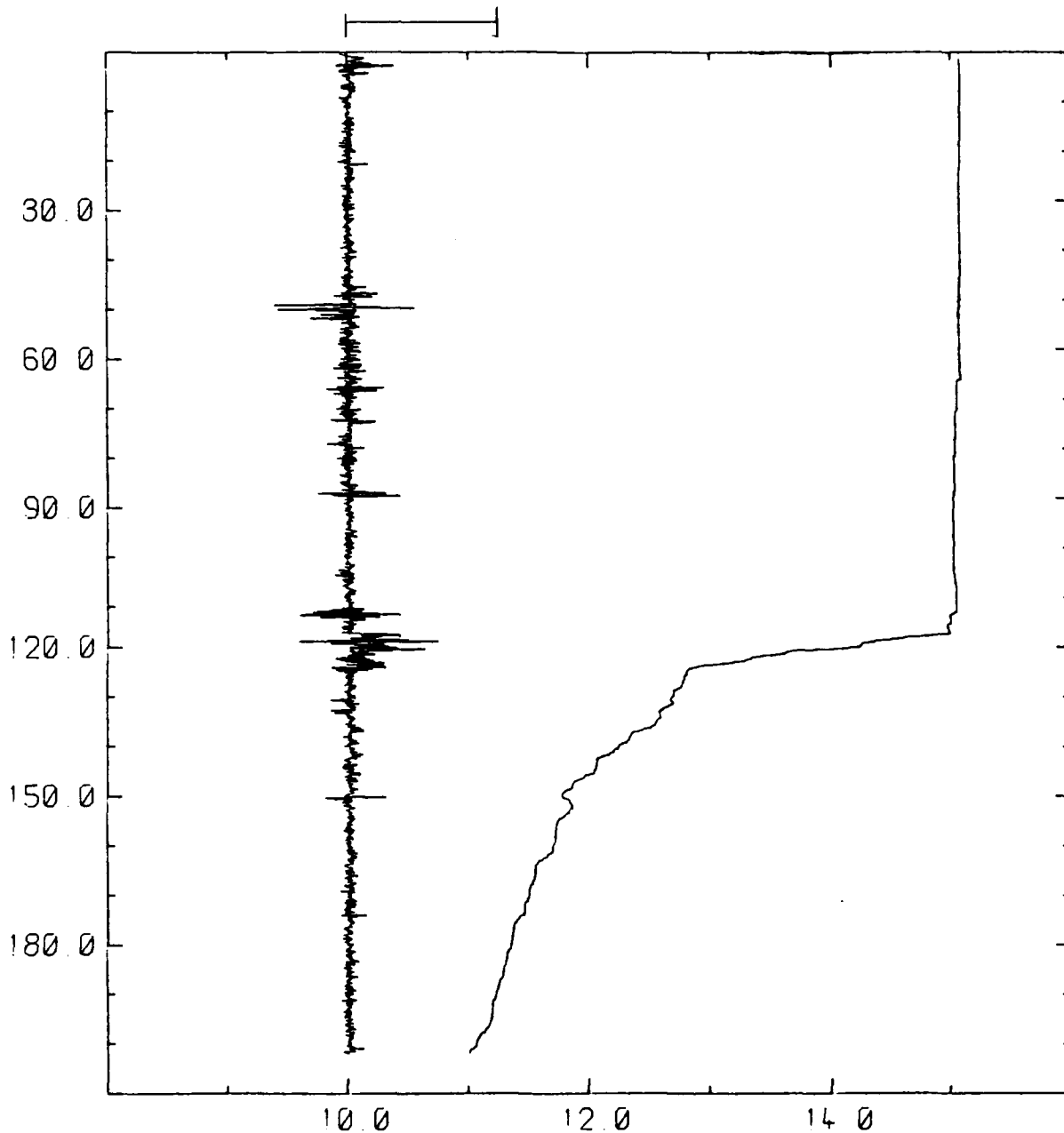
DATE 1/15/80
TIME 1421 GMT



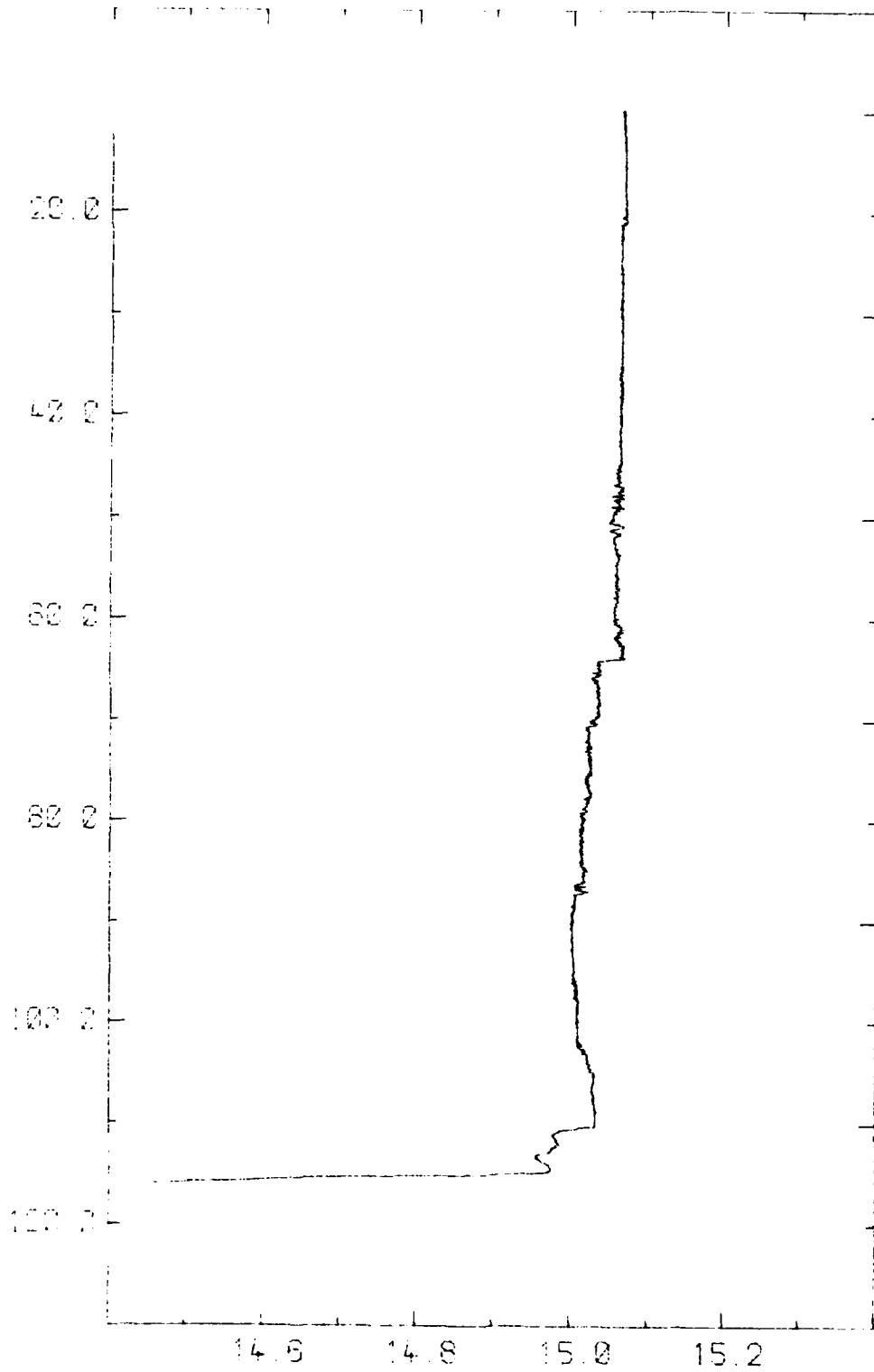
DATE 1/15/80
TIME 1421 GMT

TAPE FIG FILE 1
UNIT 2 79

3.0 DEG/M



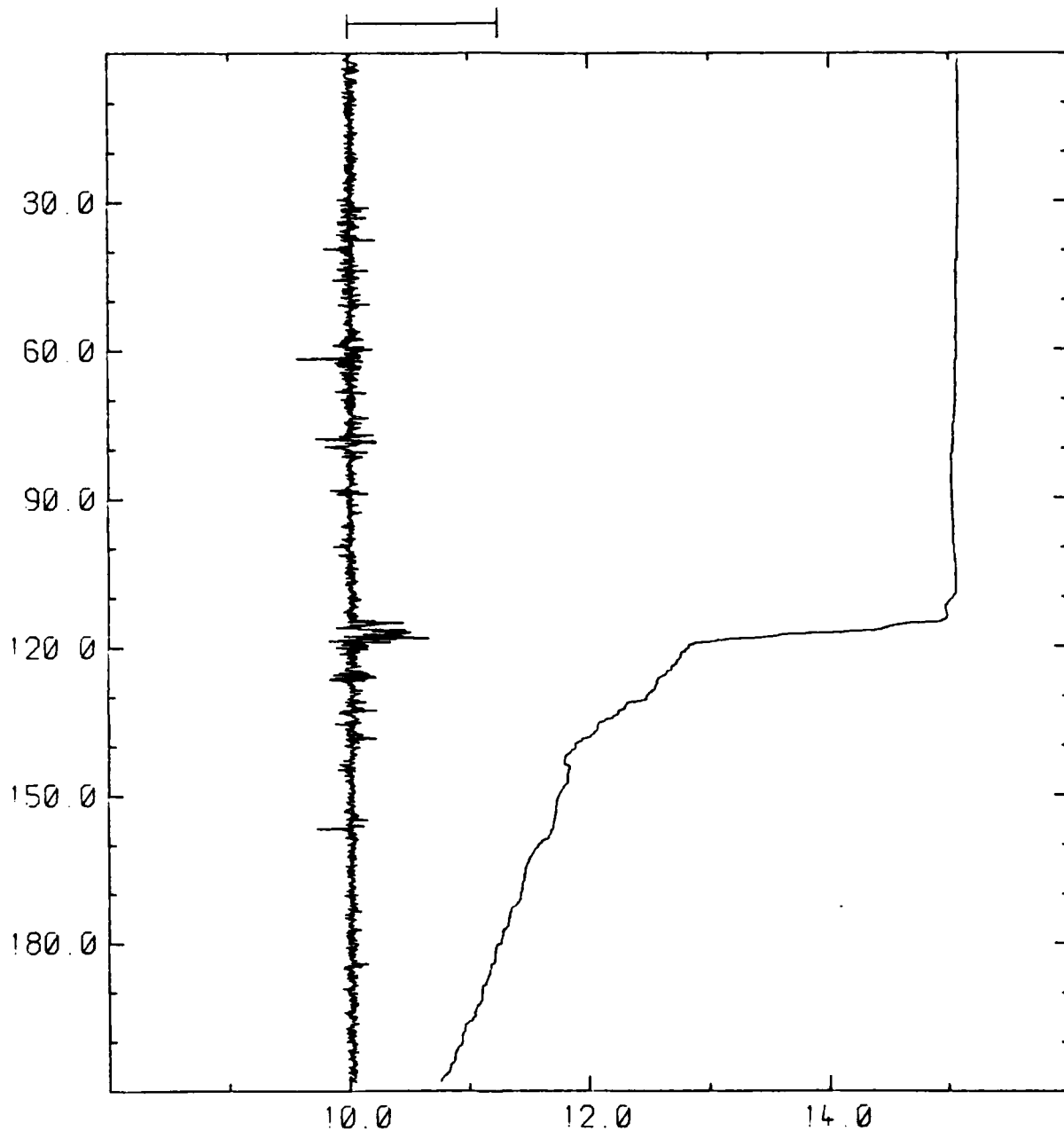
DATE 1/15/80
TIME 1522 GMT



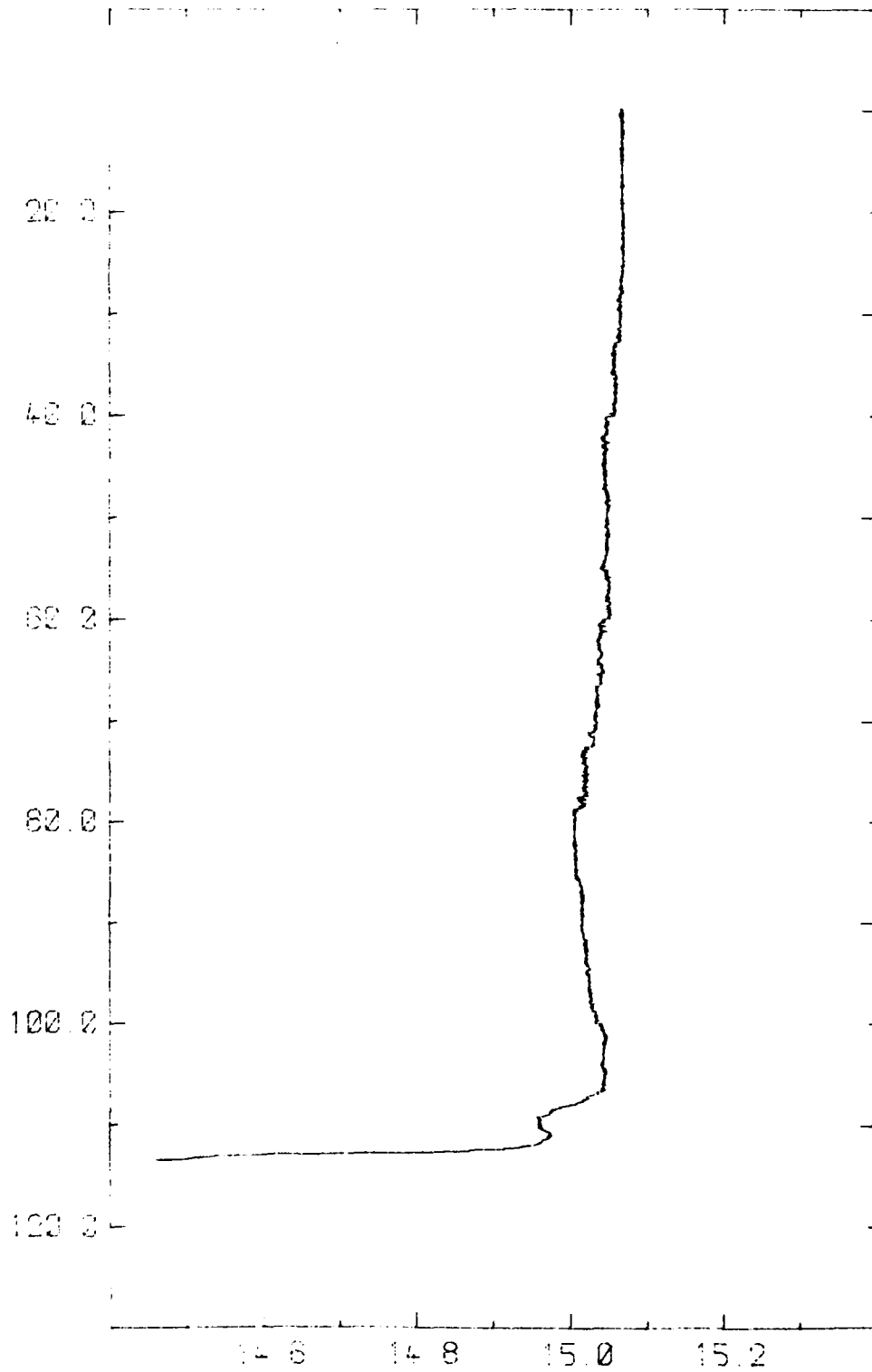
DATE 1/15/80
TIME 1522 GMT

TAPE F1H FILE 1
UNIT 2.79

3.0 DEG/M



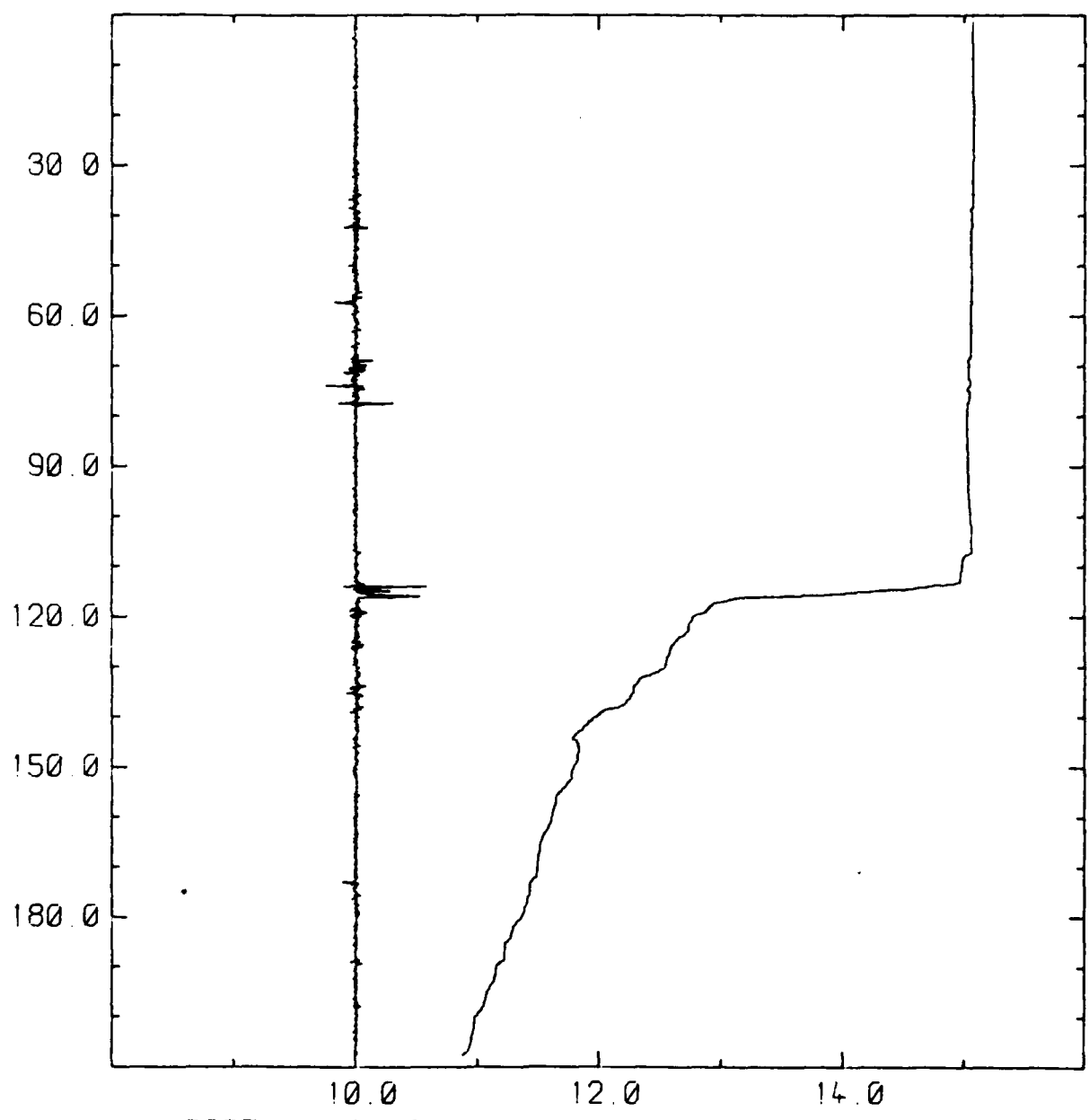
DATE 1/15/80
TIME 1605 GMT



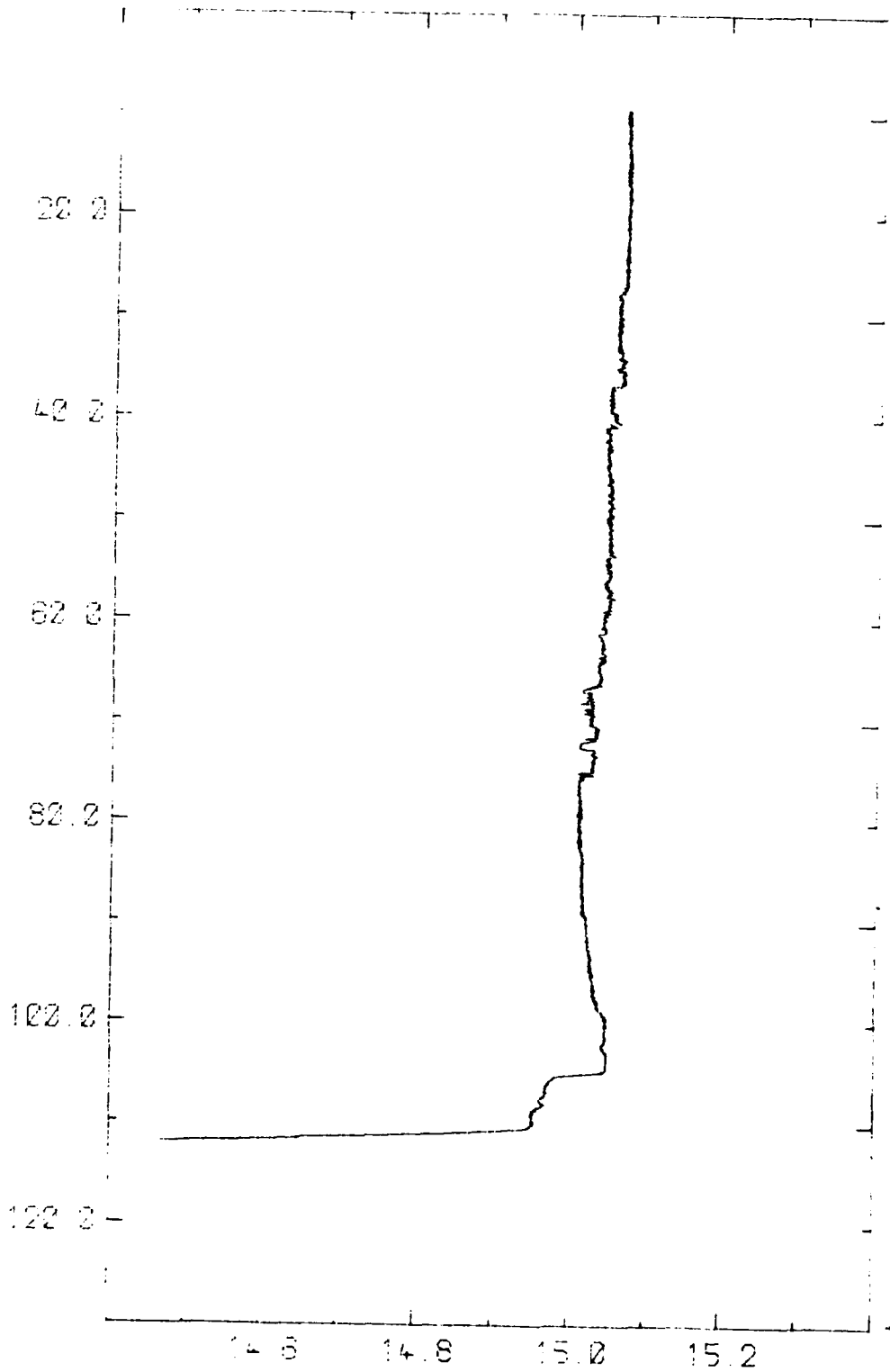
DATE 1/15/80
TIME 1605 GMT

TAPE F11 FILE 1
UNIT 2.79

10.0 DEG/M



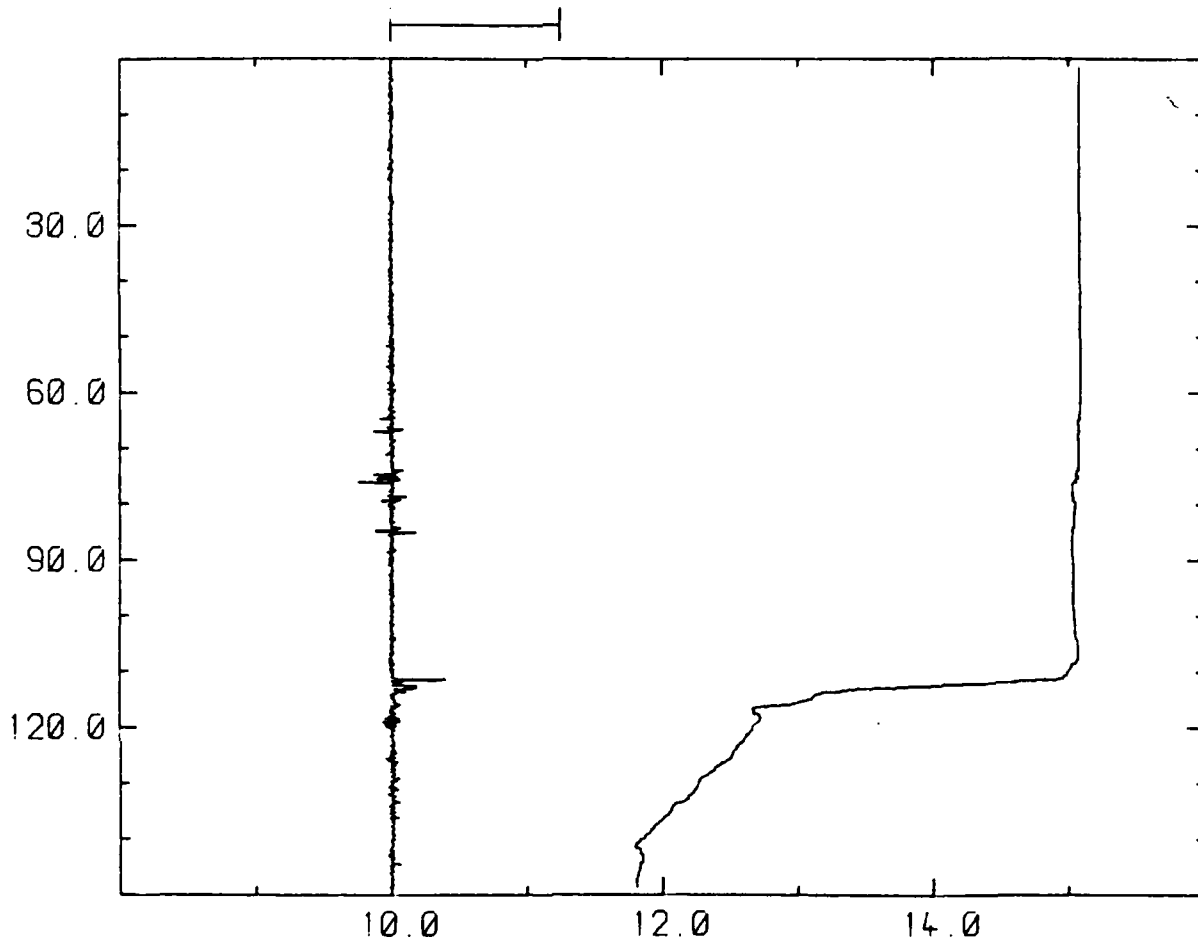
DATE 1/15/80
TIME 1645 GMT



DATE 1/15/80
TIME 1645 GMT

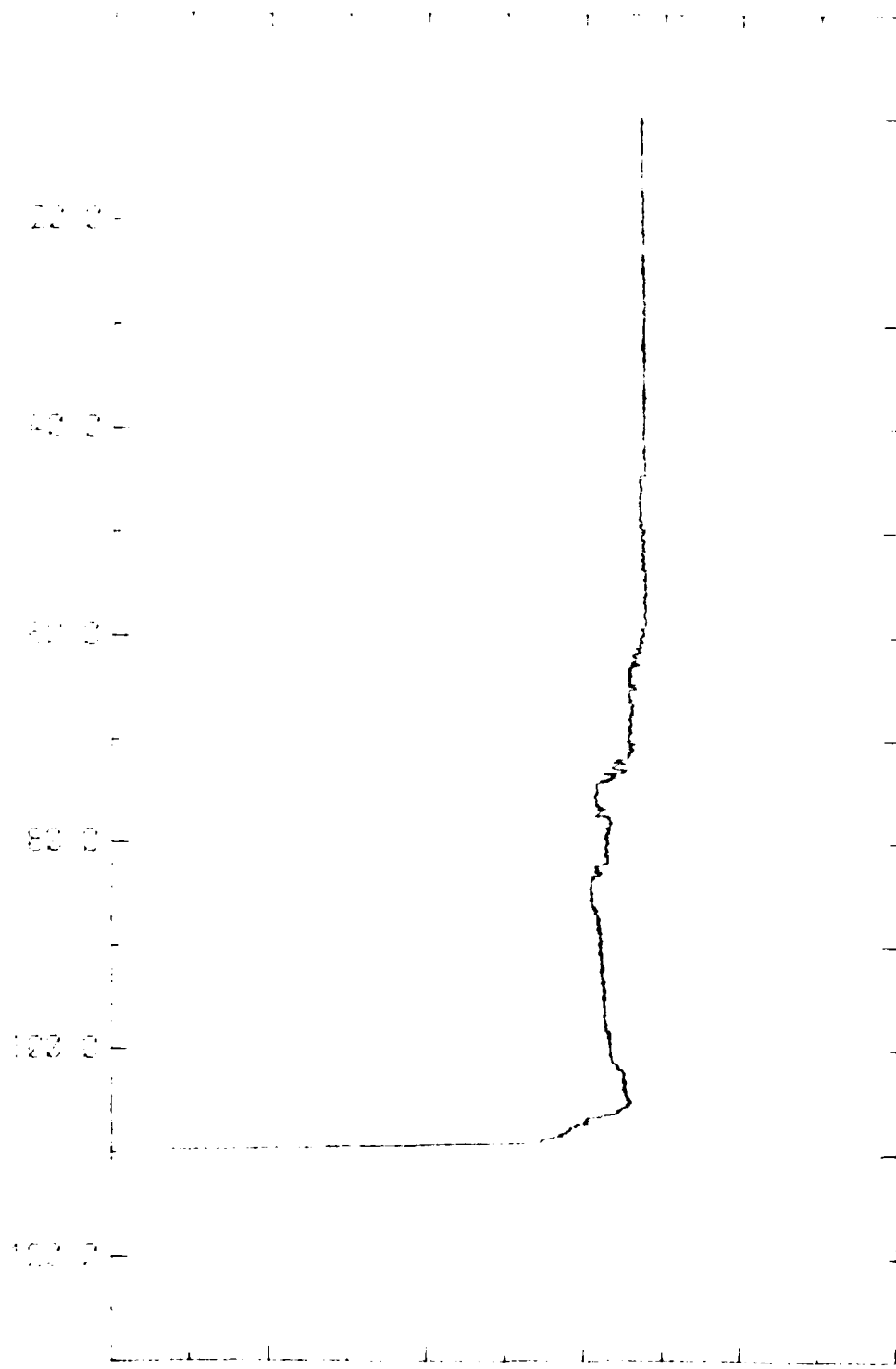
TAPE FIJ FILE 1
UNIT 2.79

10.0 DEG/M



DATE 1/15/80
TIME 1723 GMT

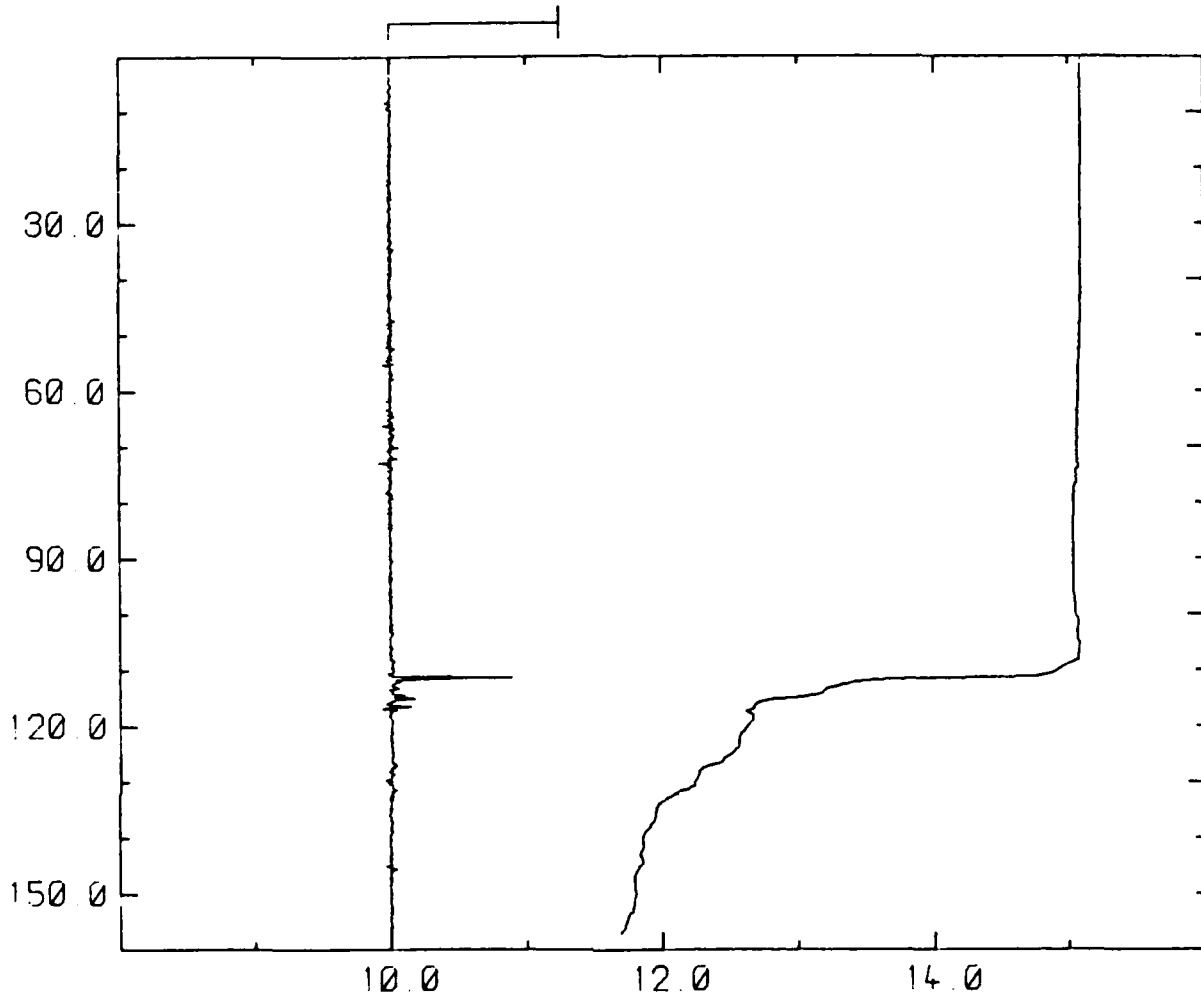
UNIT 2-73



14 0 14 8 15 4 15 2
DATE 1.15/62
TIME 1723 GMT

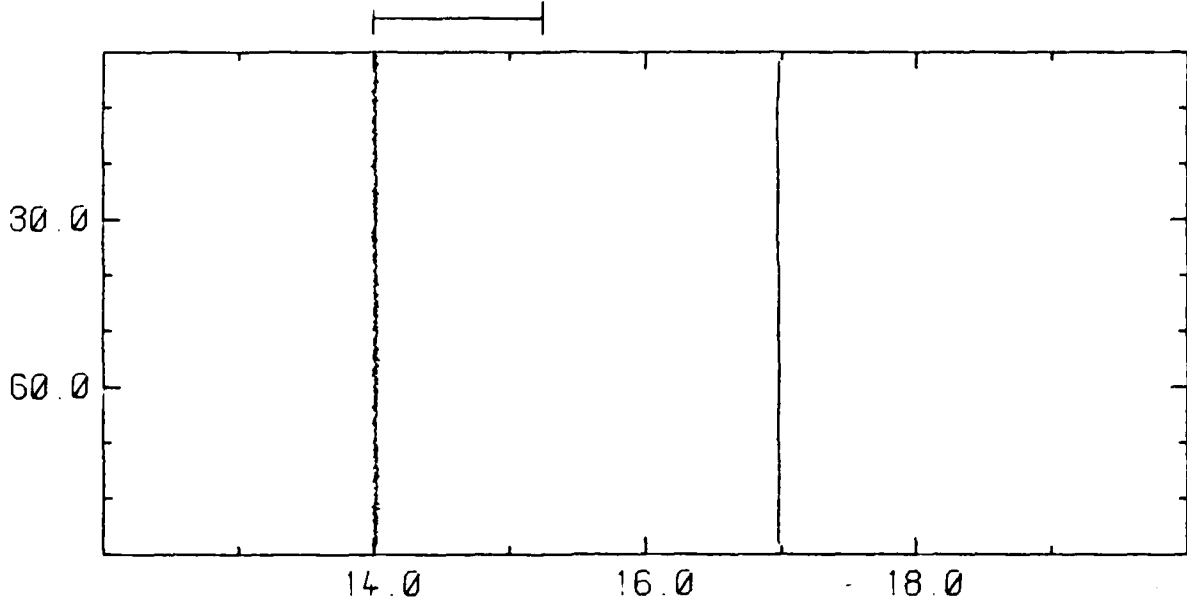
TAPE F1J FILE 3
UNIT 2.79

10.0 DEG/M



DATE 1/15/80
TIME 1948 GMT

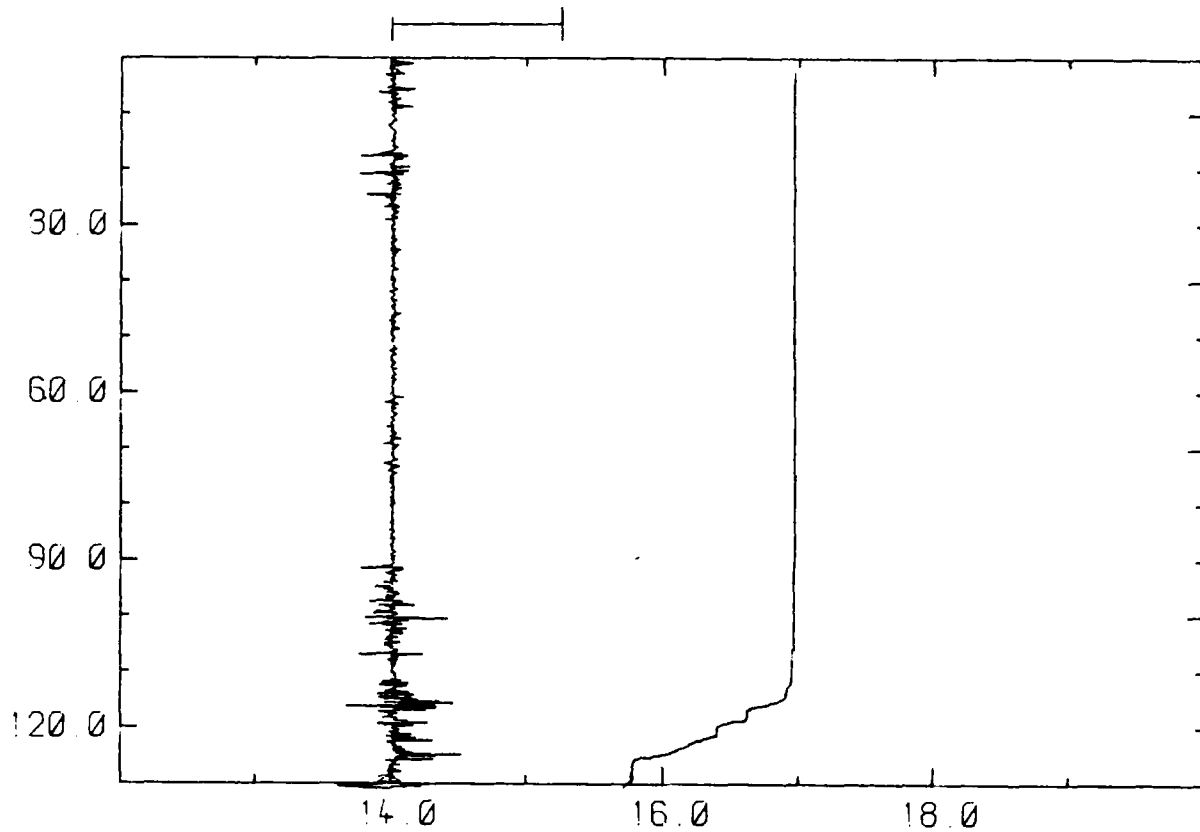
TAPE F2A FILE 1
UNIT 1.79
3.0 DEG/M



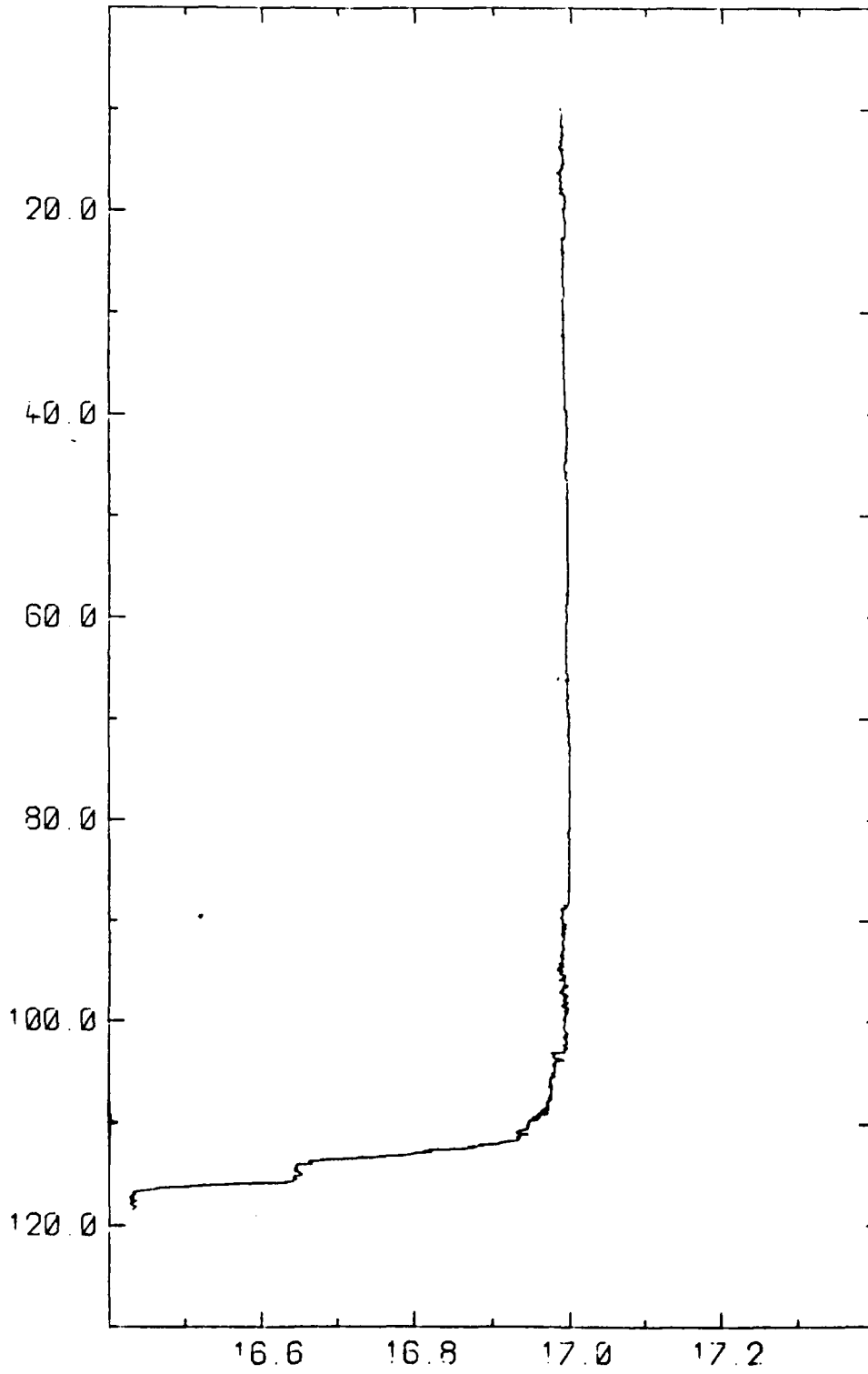
DATE 1/23/80
TIME 1914 GMT

TAPE F2A FILE 2
UNIT 1.79

3.0 DEG/M



DATE 1/23/80
TIME 1932 GMT

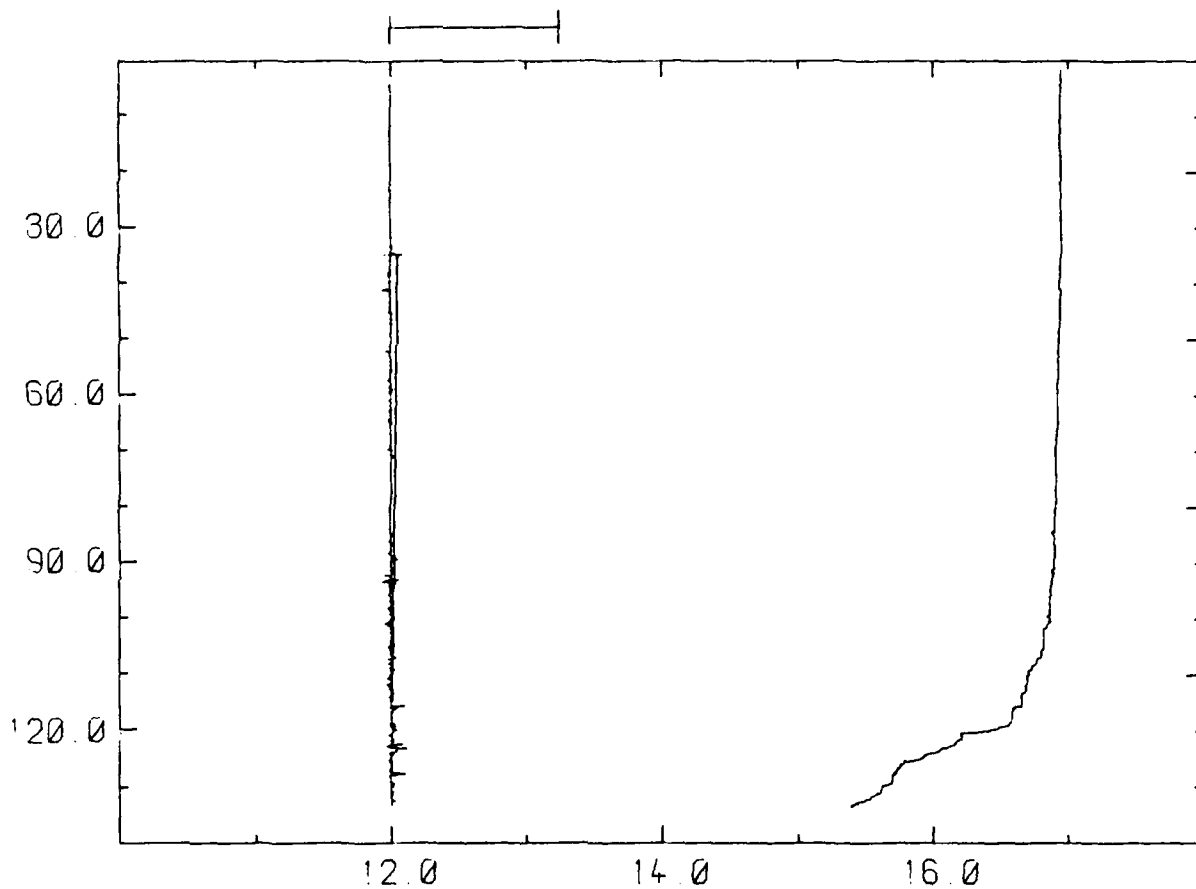


DATE 1/23/80
TIME 1932 GMT

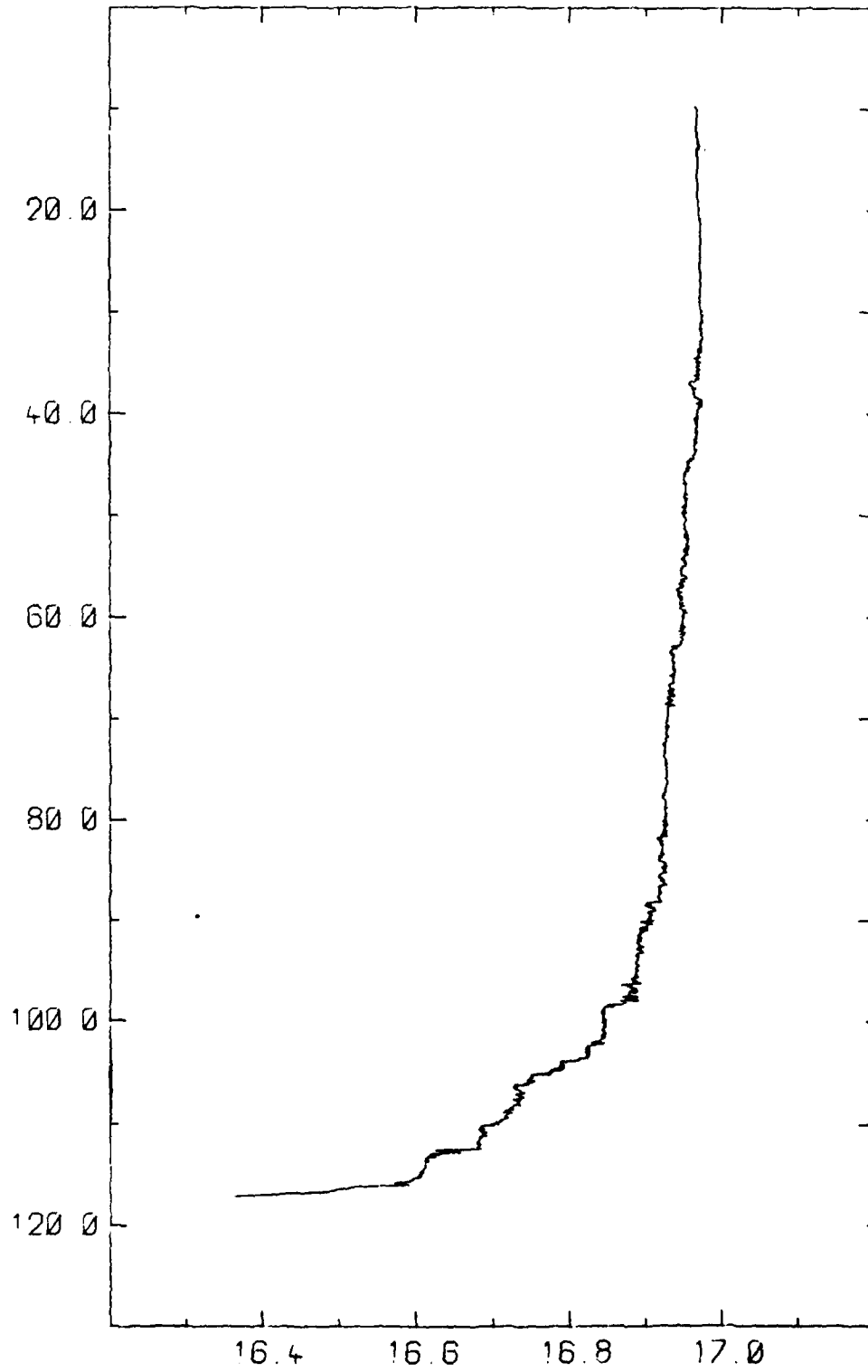
TAPE F2A FILE 4
UNIT 1 79

35

30.0 DEG/M



DATE 1/23/80
TIME 2024 GMT

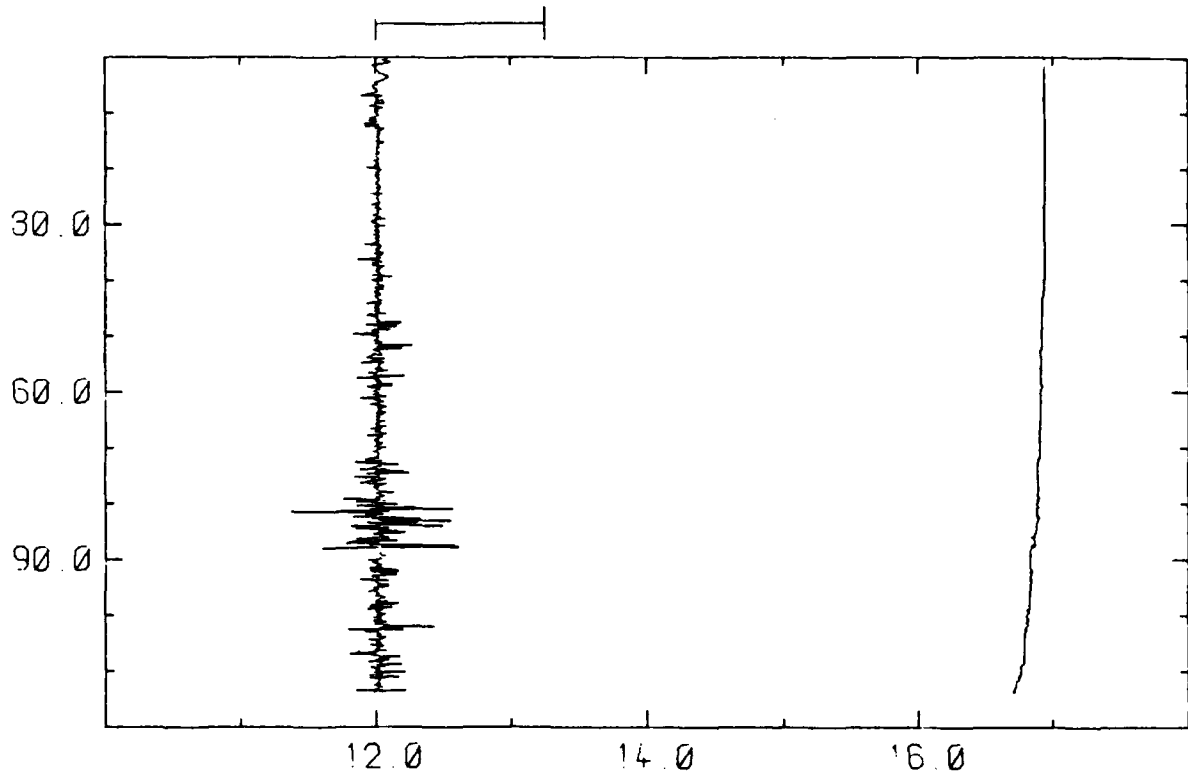


DATE 1/23/80
TIME 2024 GMT

TAPE F2B FILE 1
UNIT 1.79

37

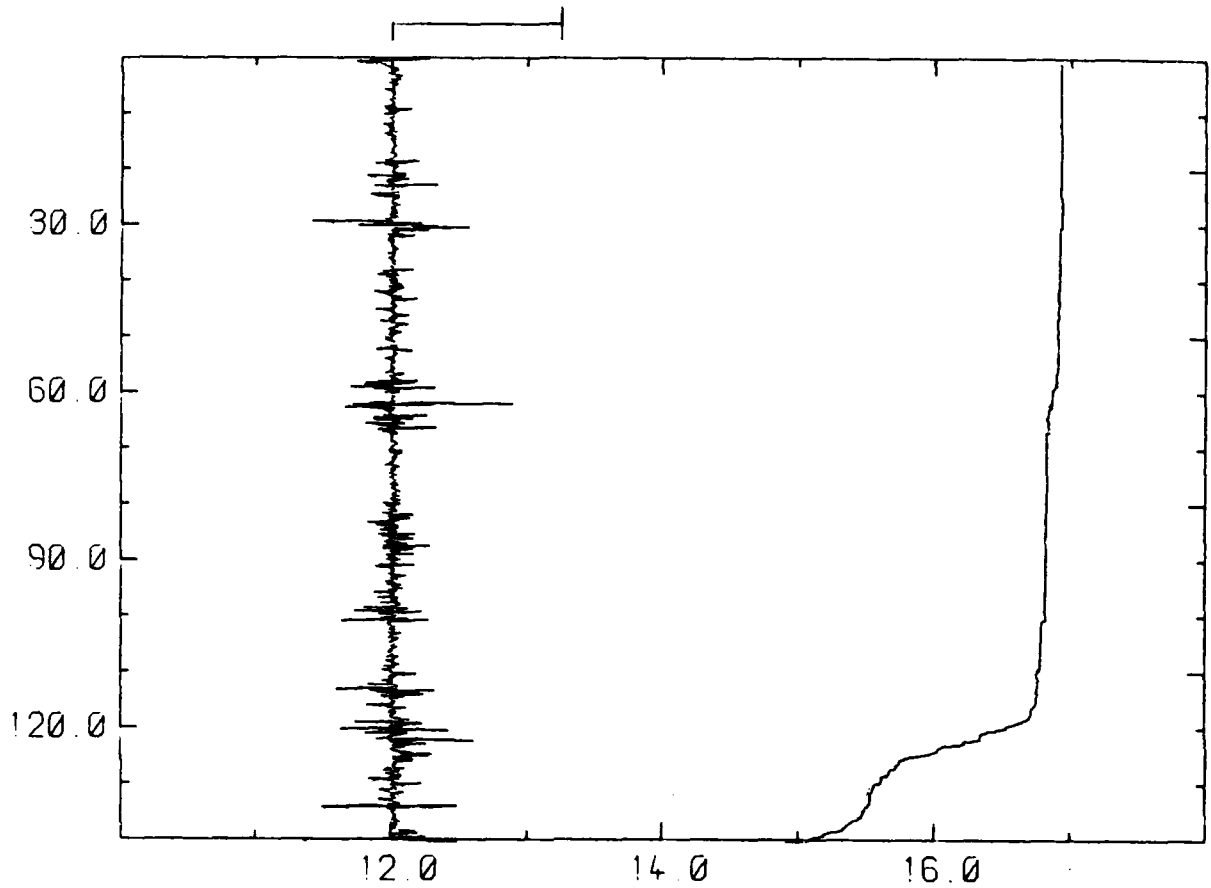
3.0 DEG/M



DATE 1/23/80
TIME 2053 GMT

TAPE F2B FILE 2
UNIT 1.79

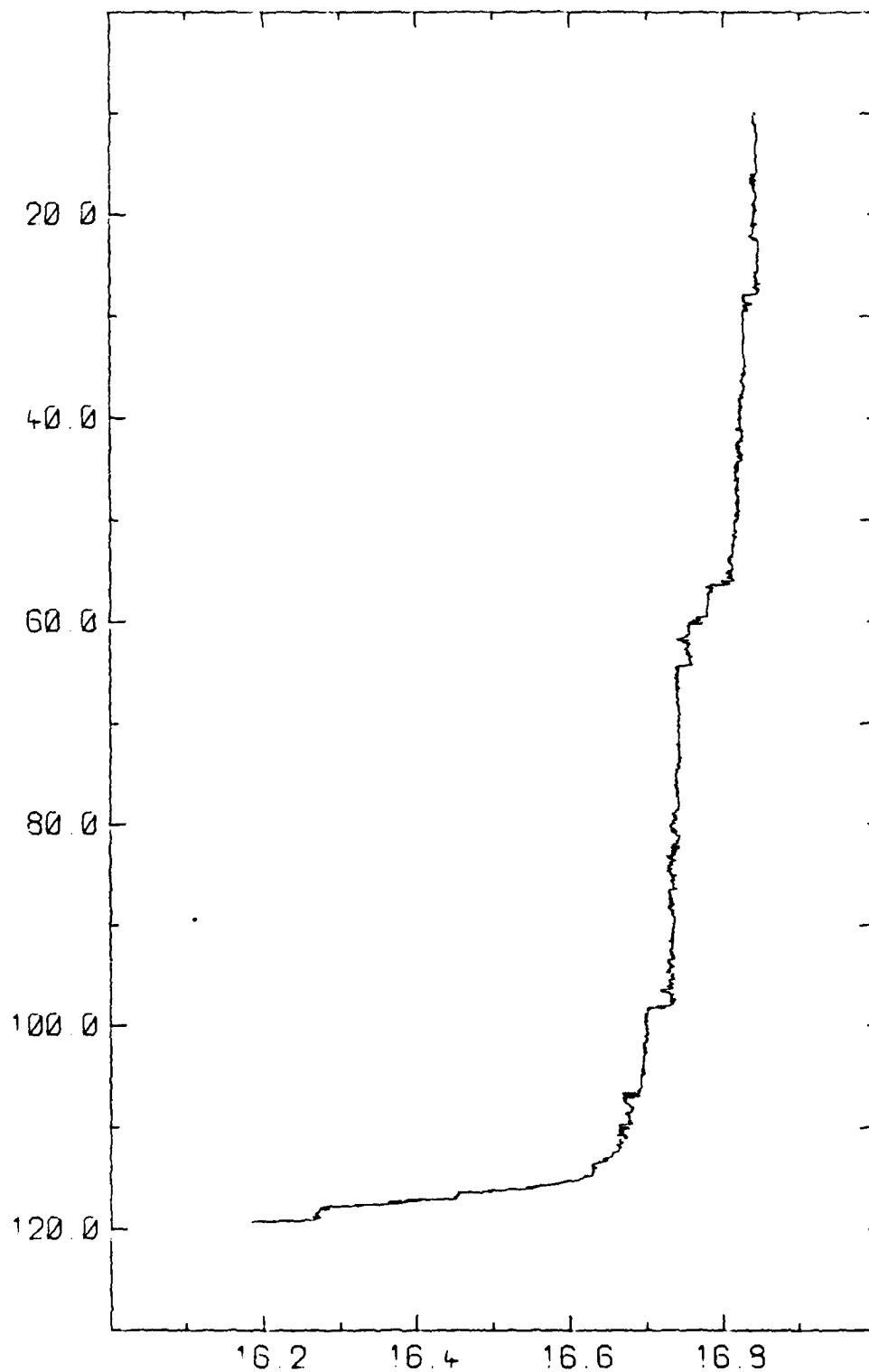
3.0 DEG/M



DATE 1/23/80
TIME 2118 GMT

TAPE F2B FILE 2
UNIT 1.79

39

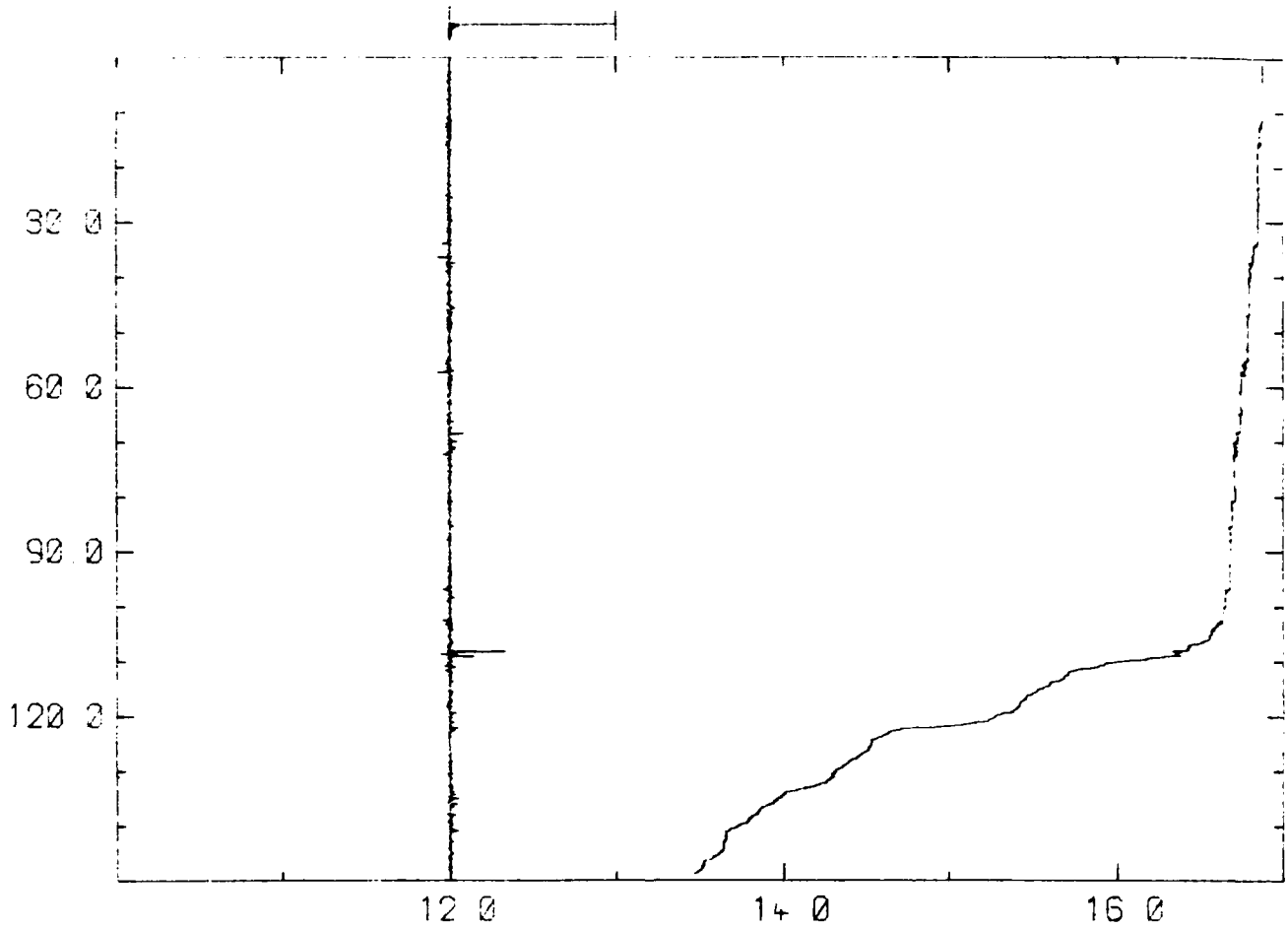


DATE 1/23/80
TIME 2118 GMT

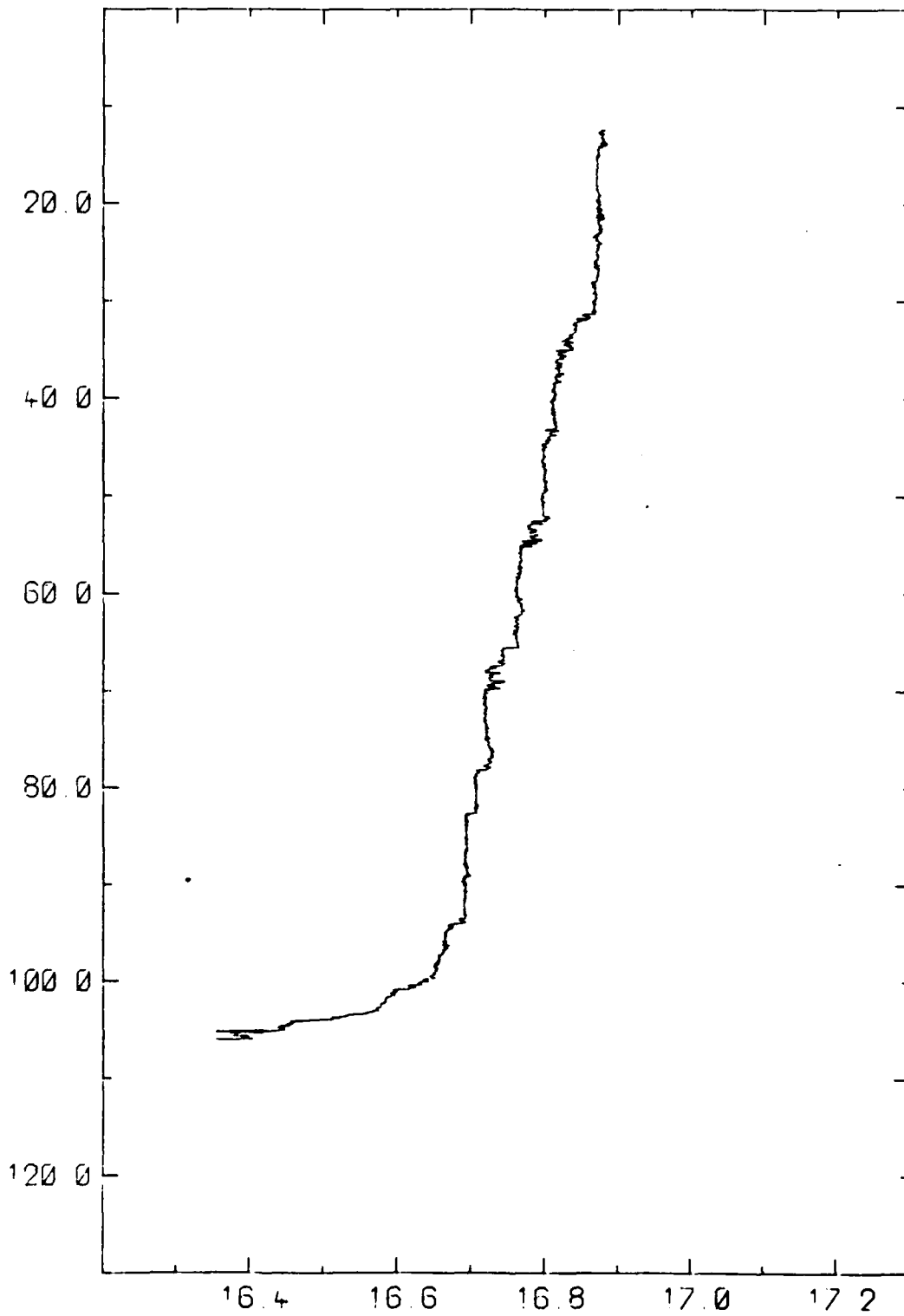
TAPE F20
UNIT 2.79

FILE 2

32 0 DEG. M



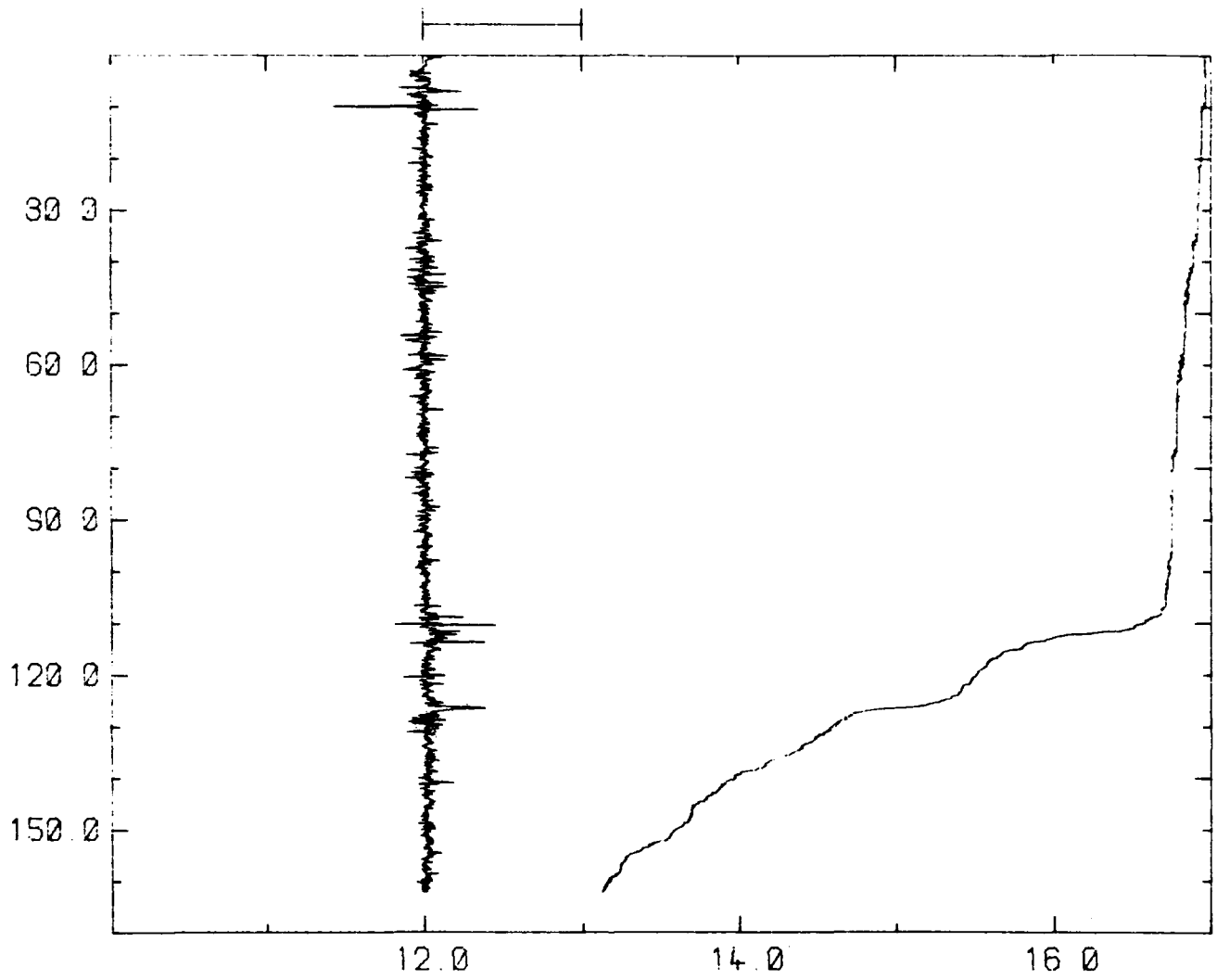
DATE 1/23/80
TIME 2227 GMT



DATE 1/23/80
TIME 2227 GMT

TAPE F2C FILE 3
UNIT 2.79

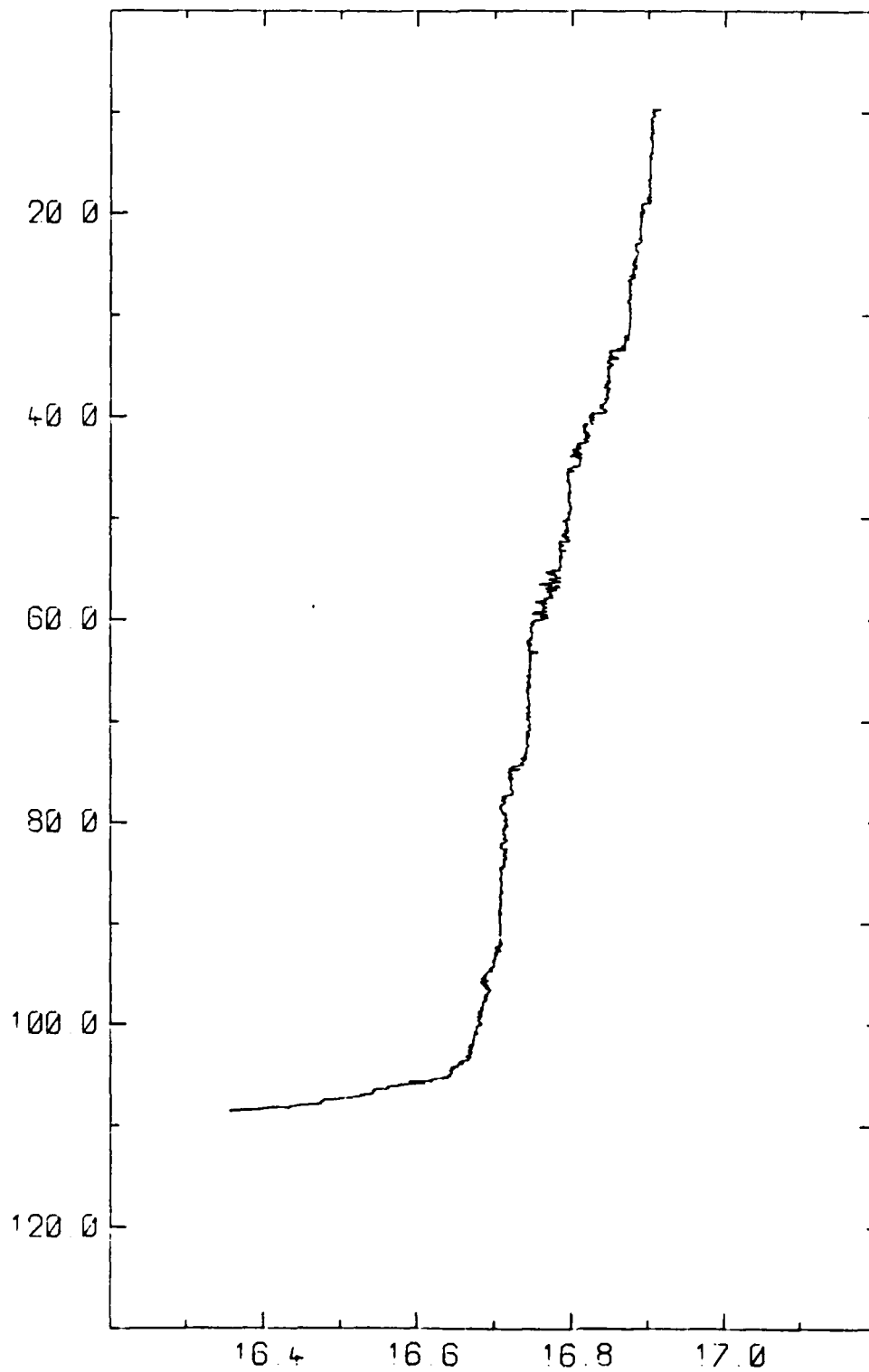
3.0 DEG/M



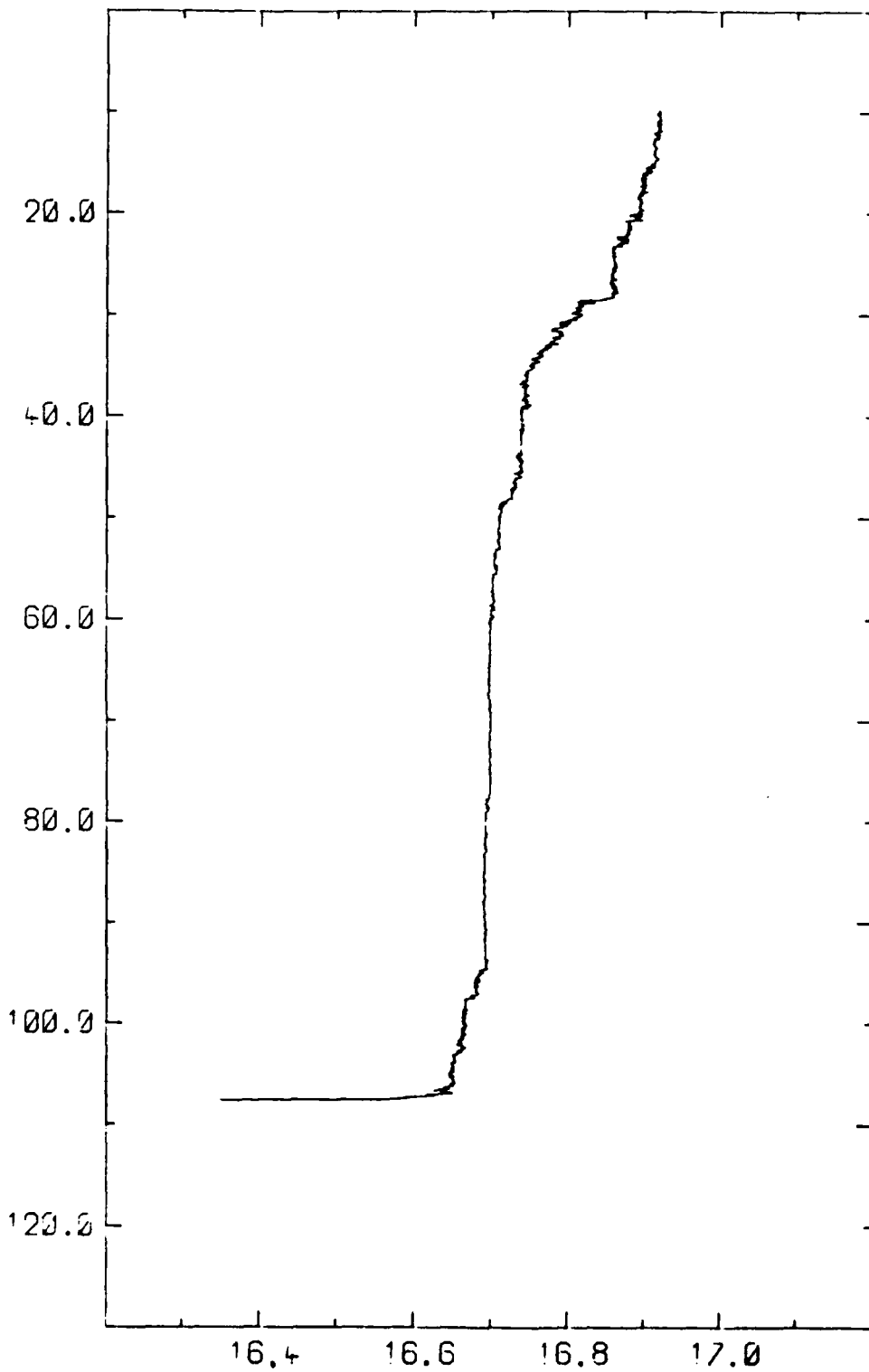
DATE 1/23/80
TIME 2253 GMT

TAPE F2C FILE 3
UNIT 2.79

43



DATE 1/23/80
TIME 2253 GMT

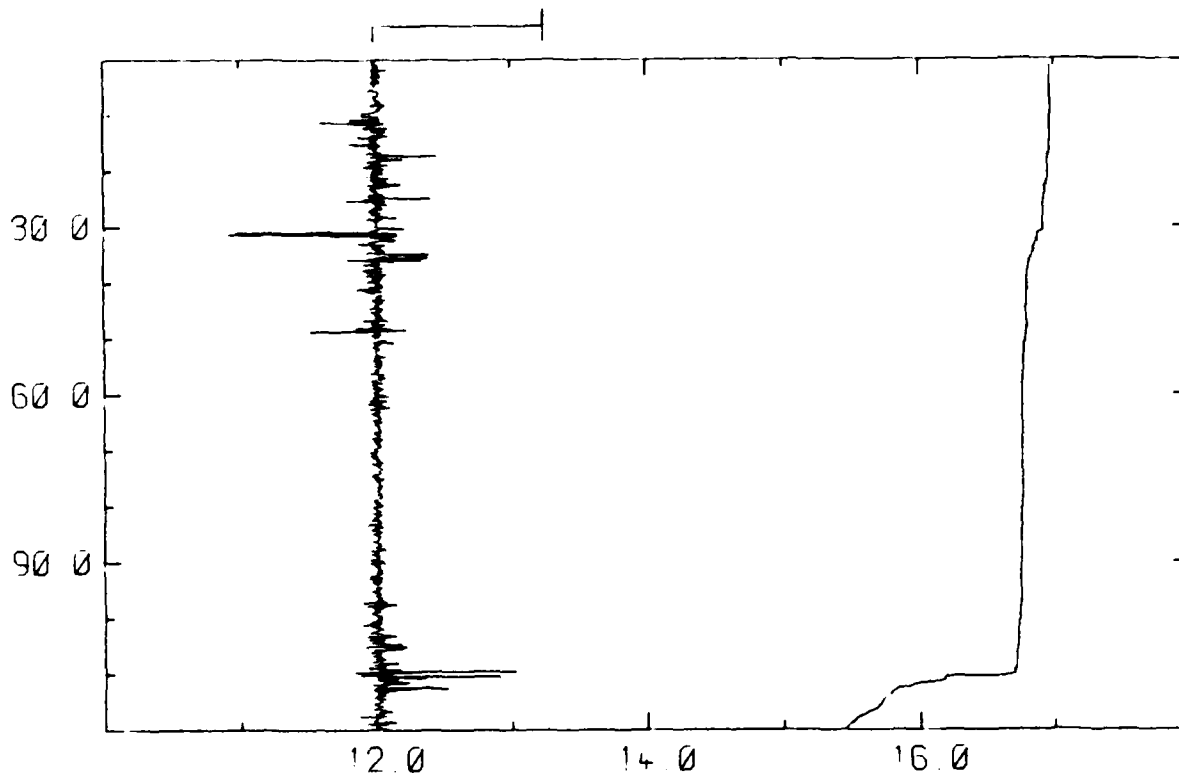


DATE 1/23/80
TIME 2340 GMT

TAPE F20 FILE 1
UNIT 2 /9

45

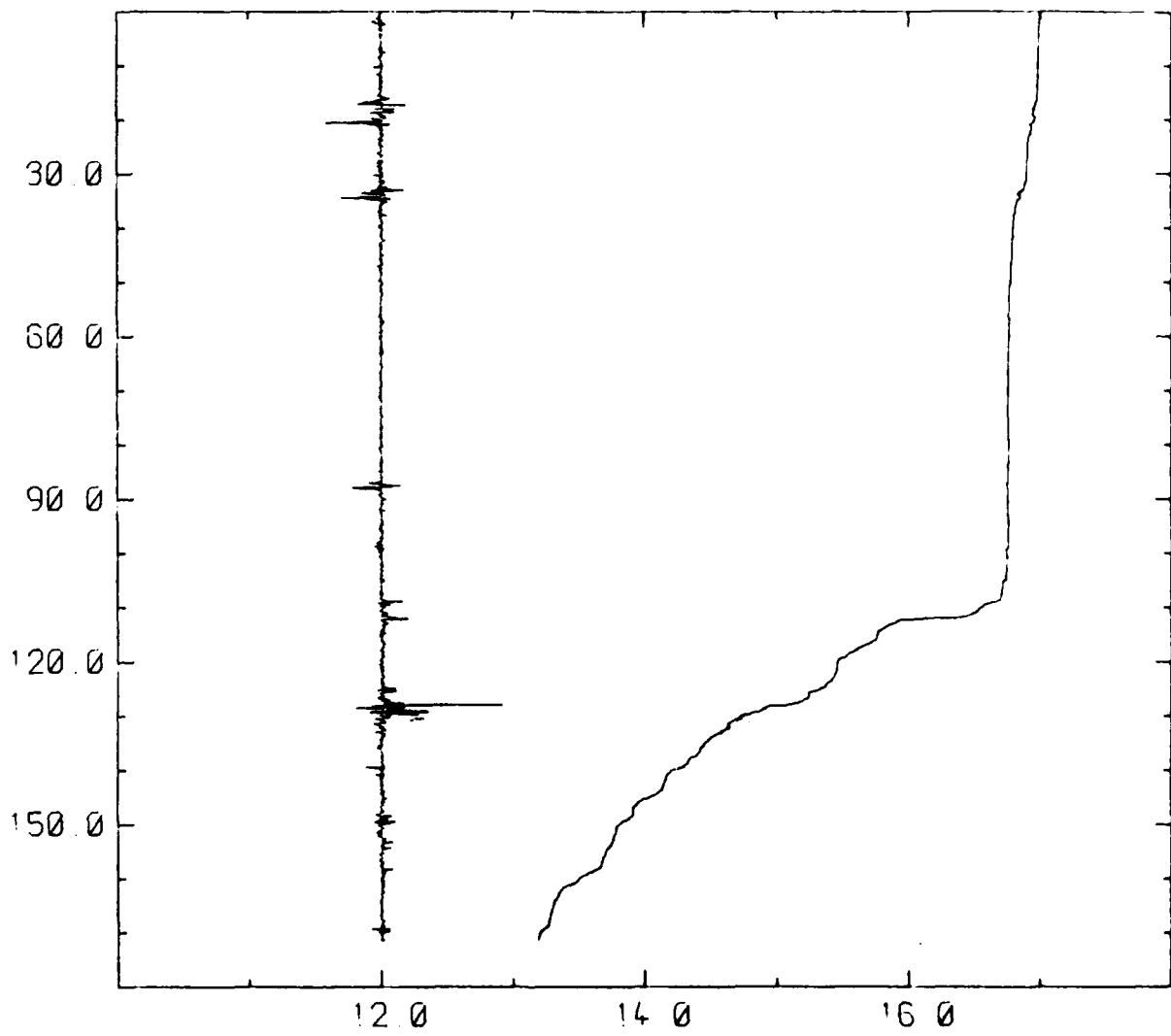
3 0 DEG/M



DATE 1/23/80
TIME 2340 GMT

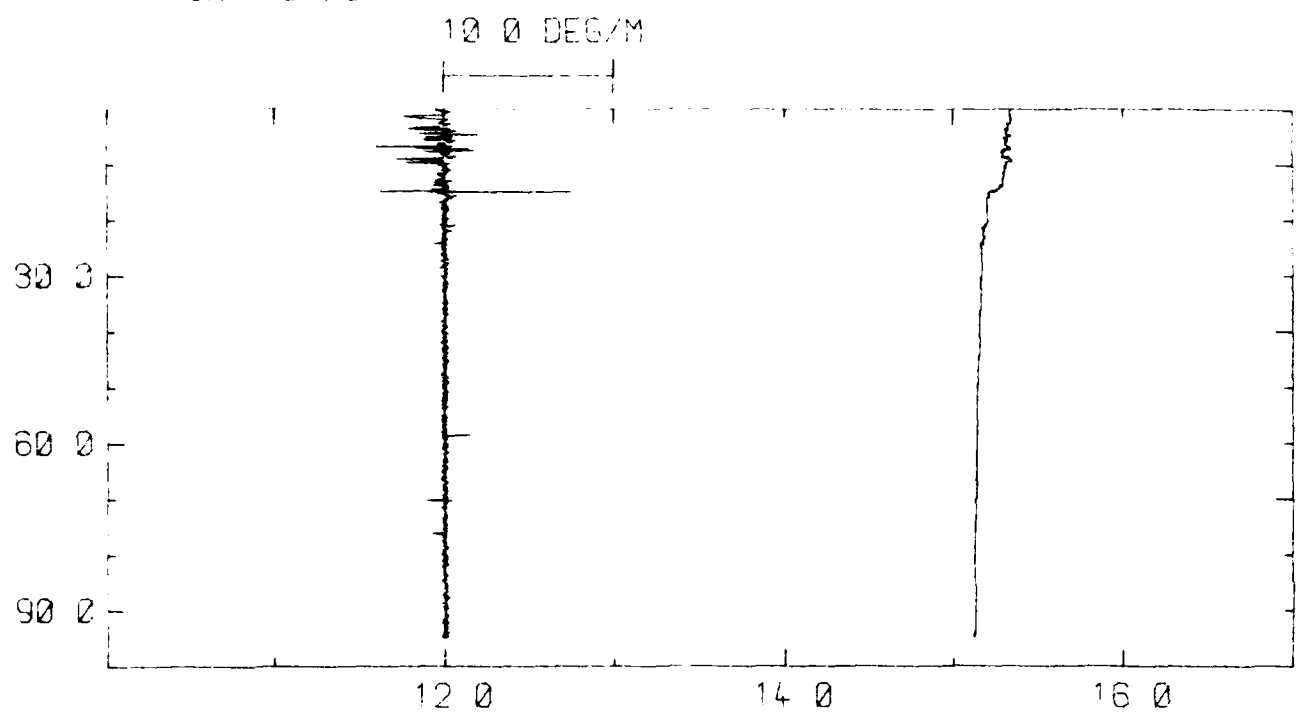
TAPE F20 FILE 2
UNIT 2.79

10 0 DEG/M



DATE 1/24/80
TIME 0045 GMT

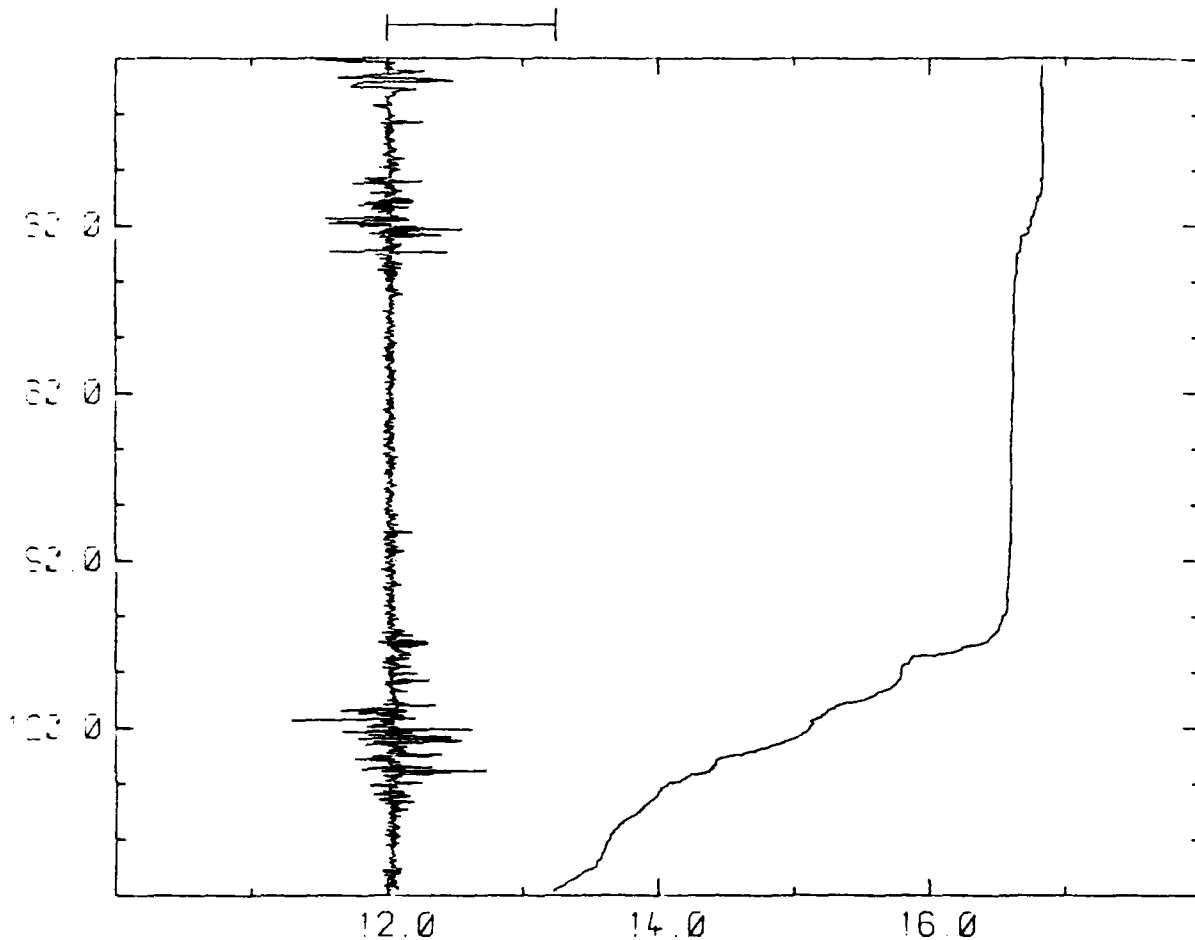
TAPE F2E FILE 2
UNIT 2 79



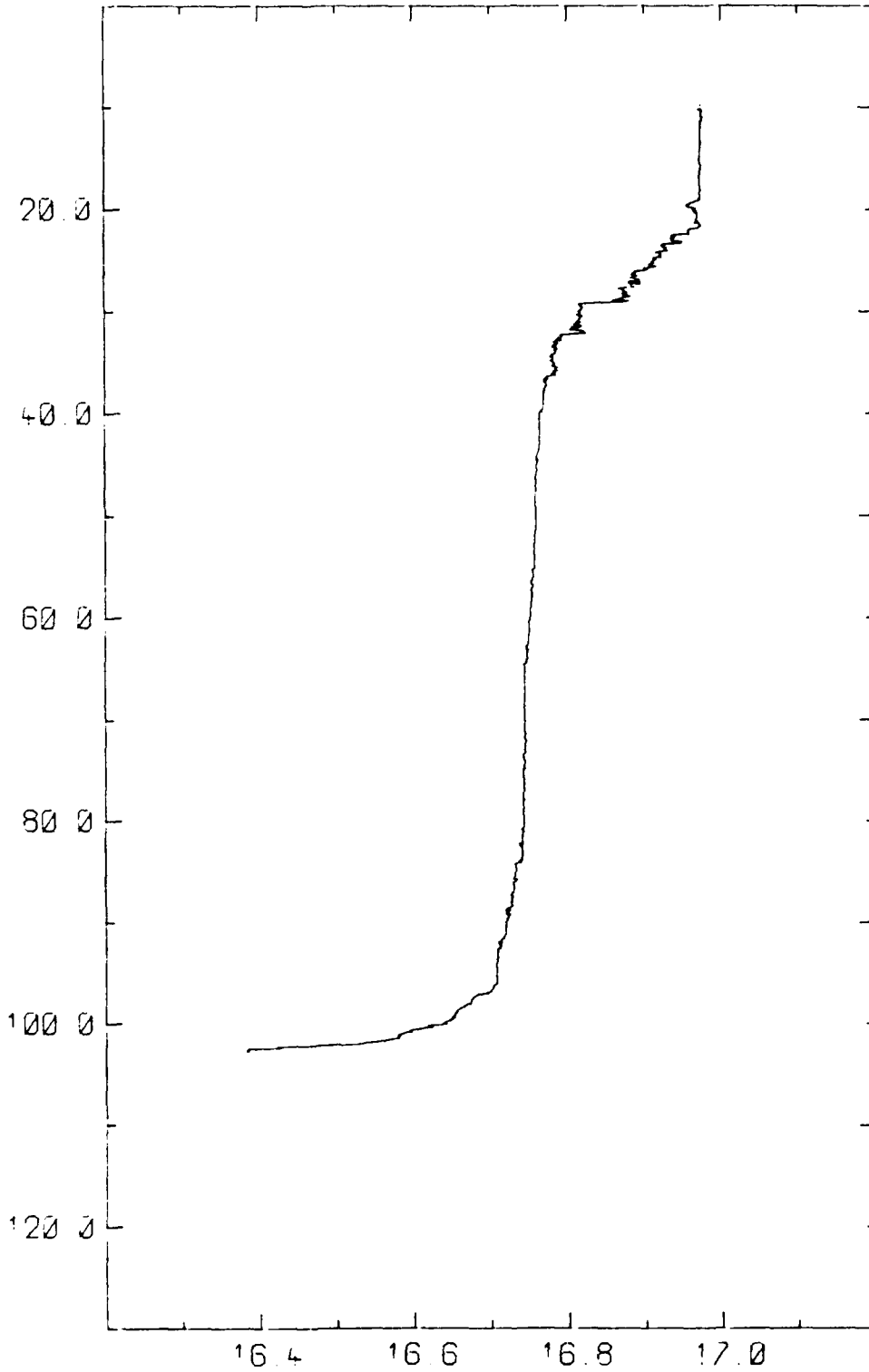
DATE 1/24/80
TIME 0215 GMT

TAPE F2F FILE 2
UNIT 2.79

3.0 DEG/M



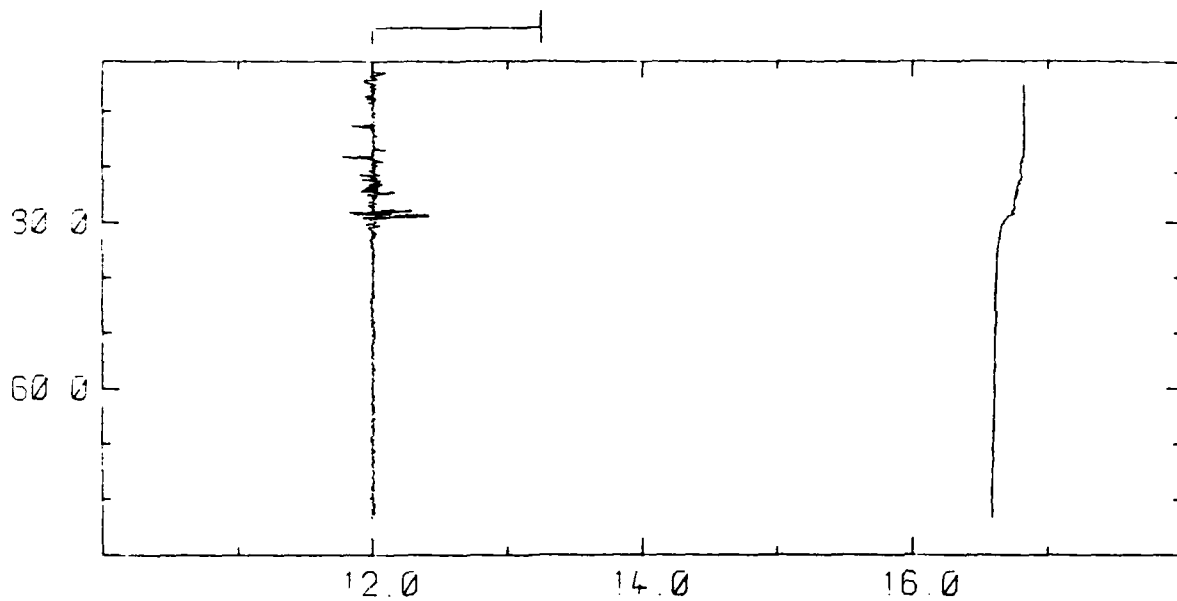
DATE 1/24/80
TIME 0255 GMT



DATE 1/24/80
TIME 0255 GMT

TAPE F2F FILE 3
UNIT 2.79

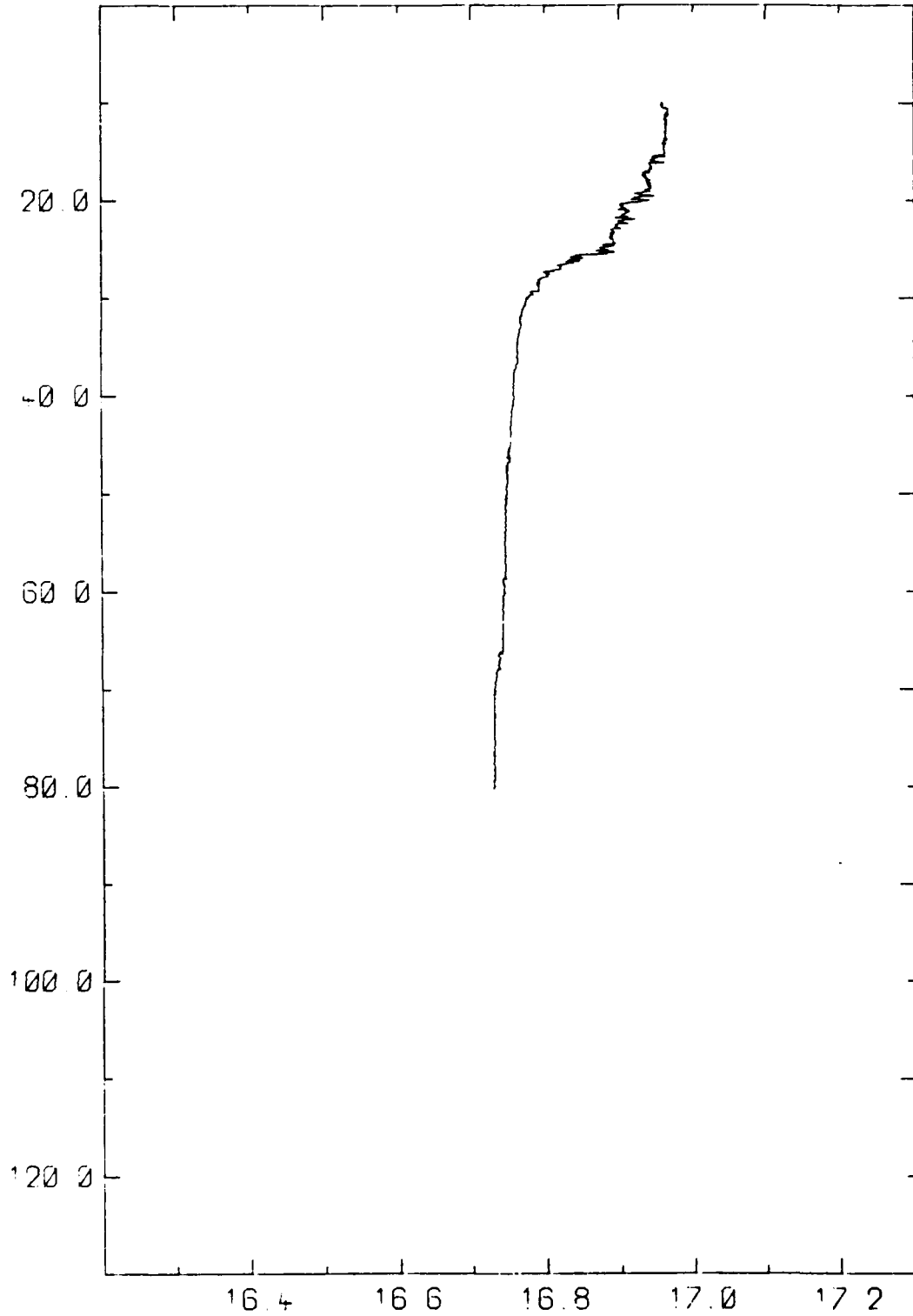
10.0 DEG/M



DATE 1/24/80
TIME 0327 GMT

TAPE F2F FILE 3
UNIT 2.79

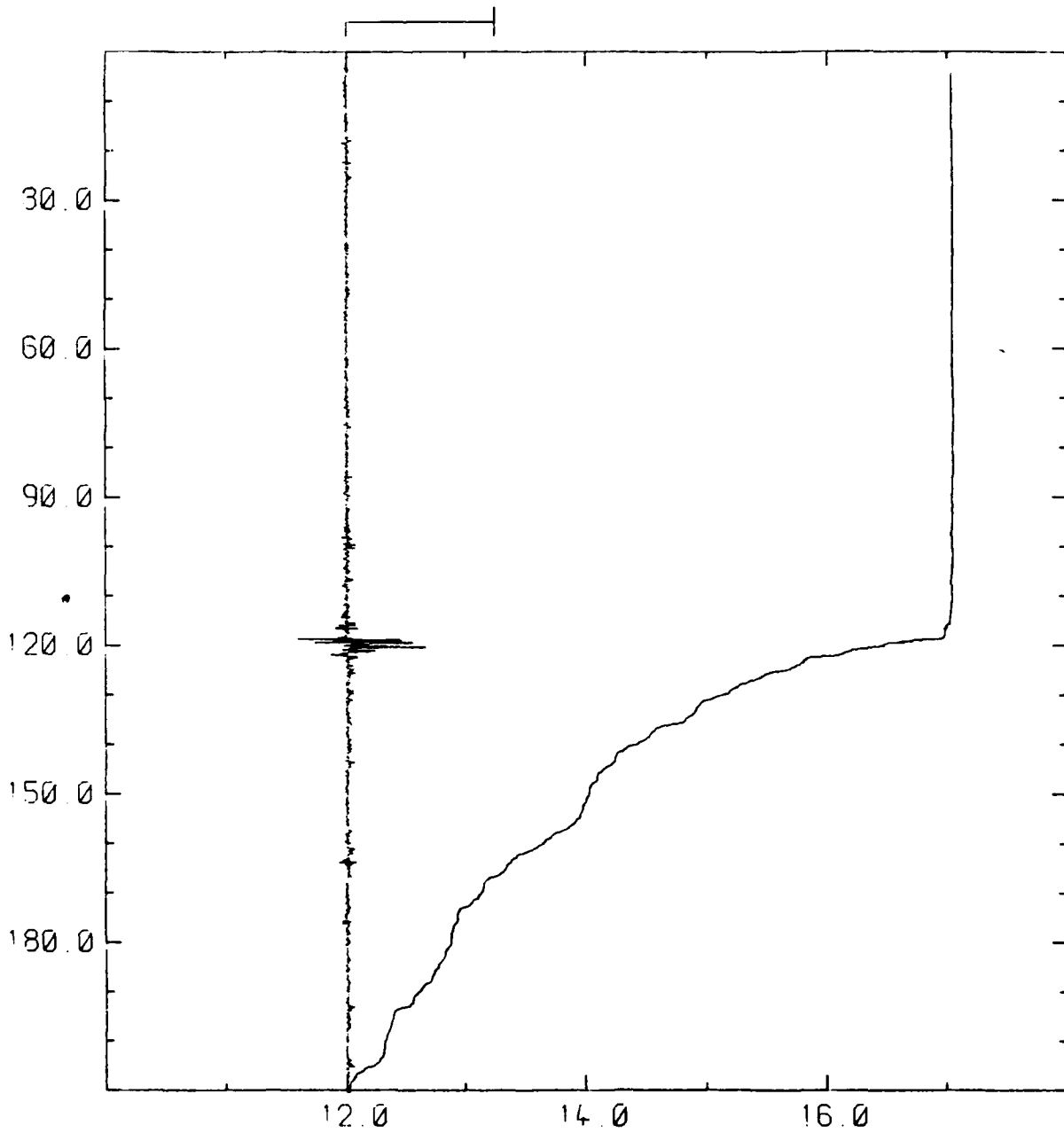
51



DATE 1/24/80
TIME 0327 GMT

TAPE F3A FILE 1
UNIT 2.79

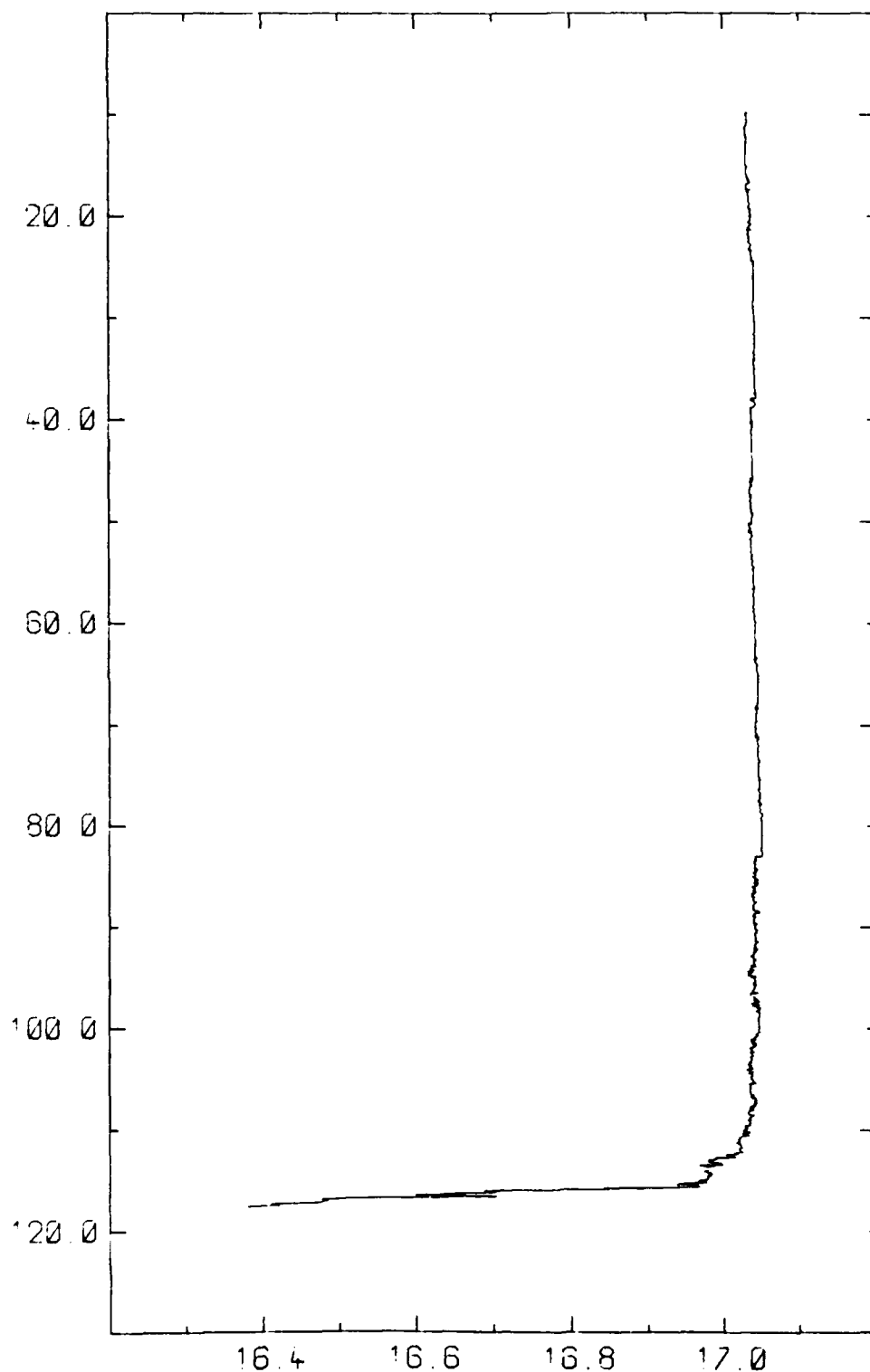
10.0 DEG/M



DATE 1/24/80
TIME 1903 GMT

TAPE F3A FILE 1
UNIT 2 79

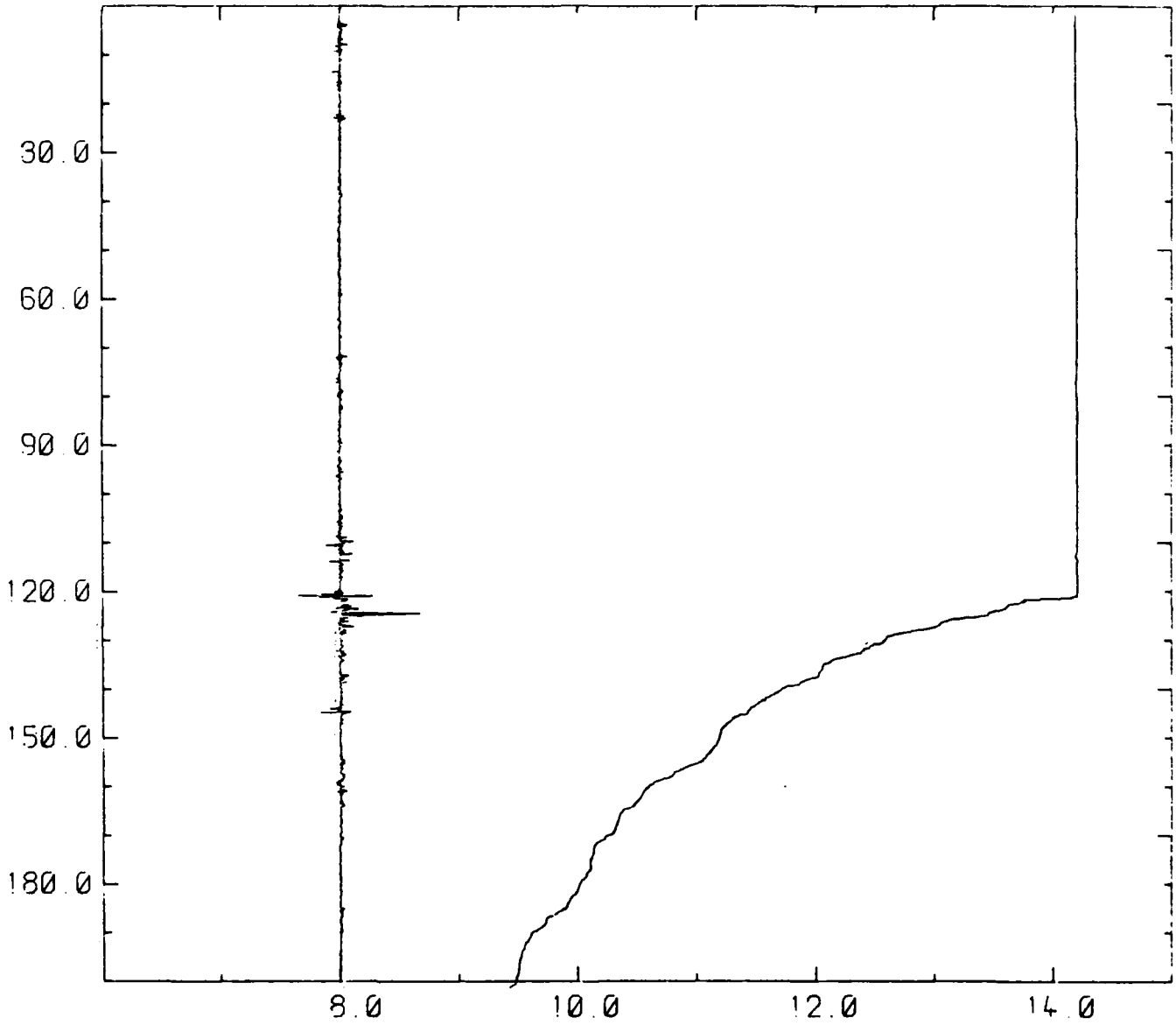
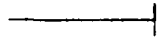
53



DATE 1/24/80
TIME 1903 GMT

TAPE F3B FILE 1
UNIT 5.79

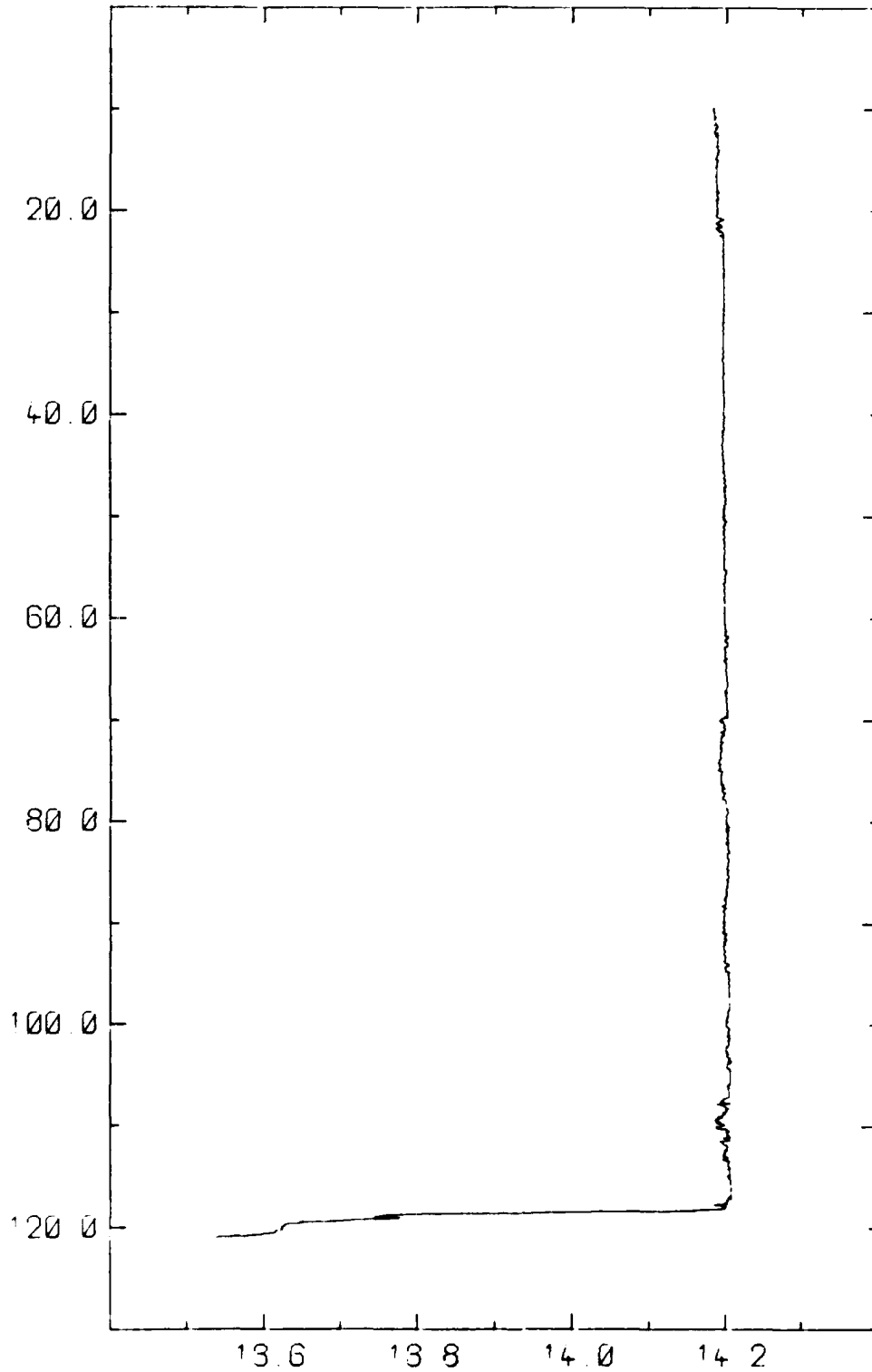
10.0 DEG/M



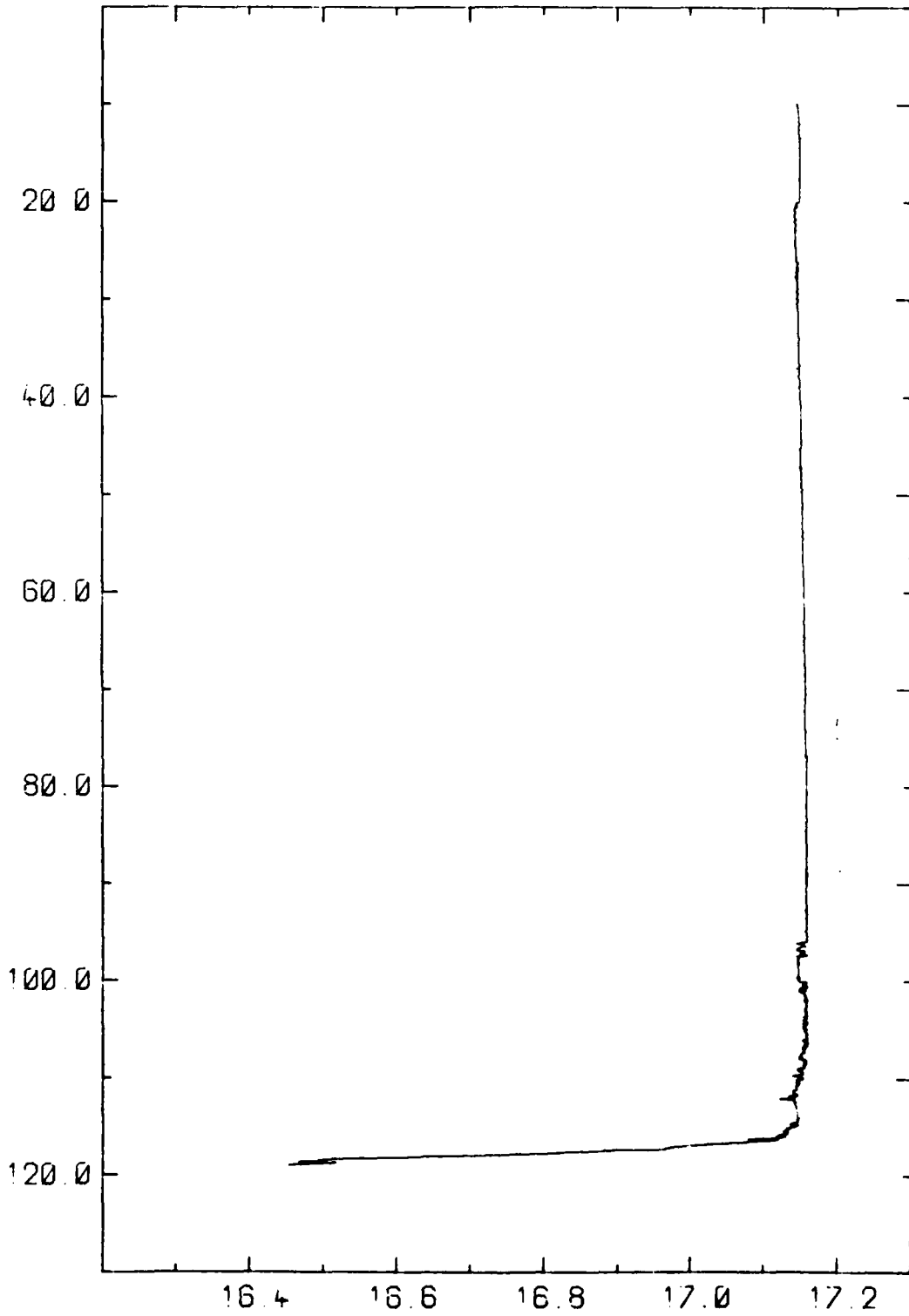
DATE 1/24/80
TIME 1949 GMT

TAPE F3B FILE 1
UNIT 5 79

55



DATE 1/24/80
TIME 1949 GMT

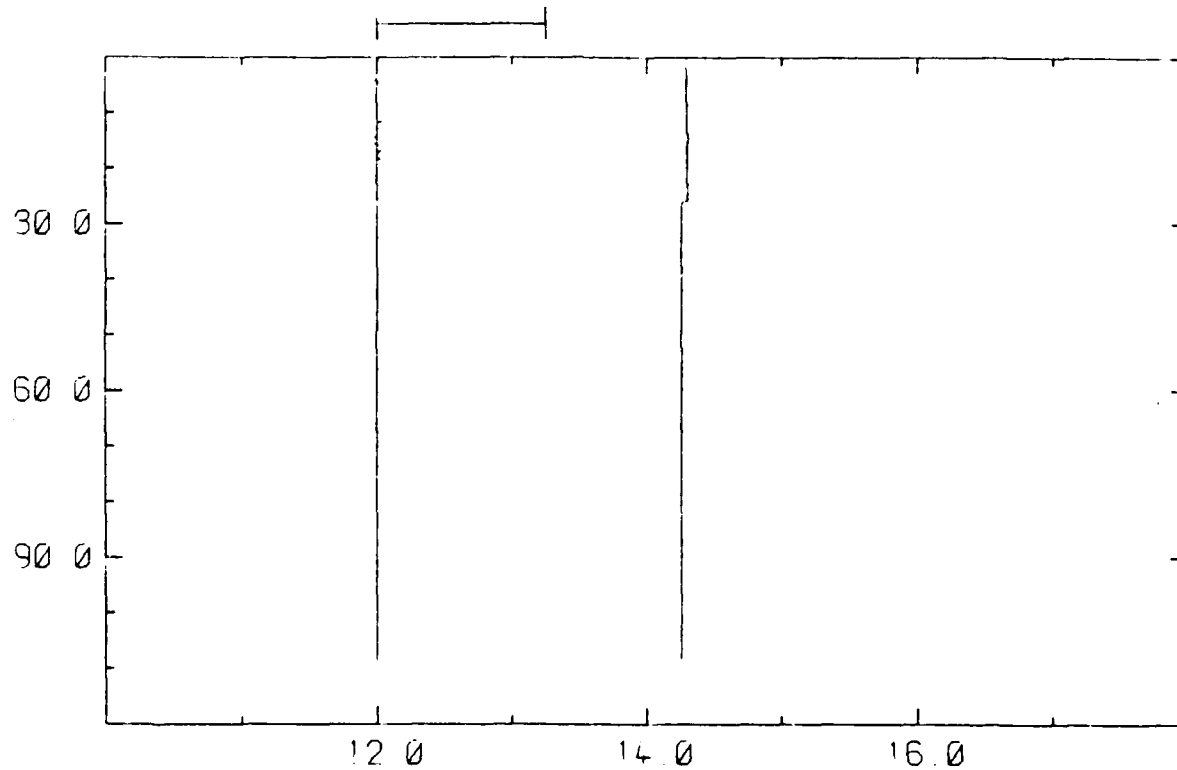


DATE 1/24/80
TIME 2059 GMT

TAPE F30 FILE 2
UNIT 5 79

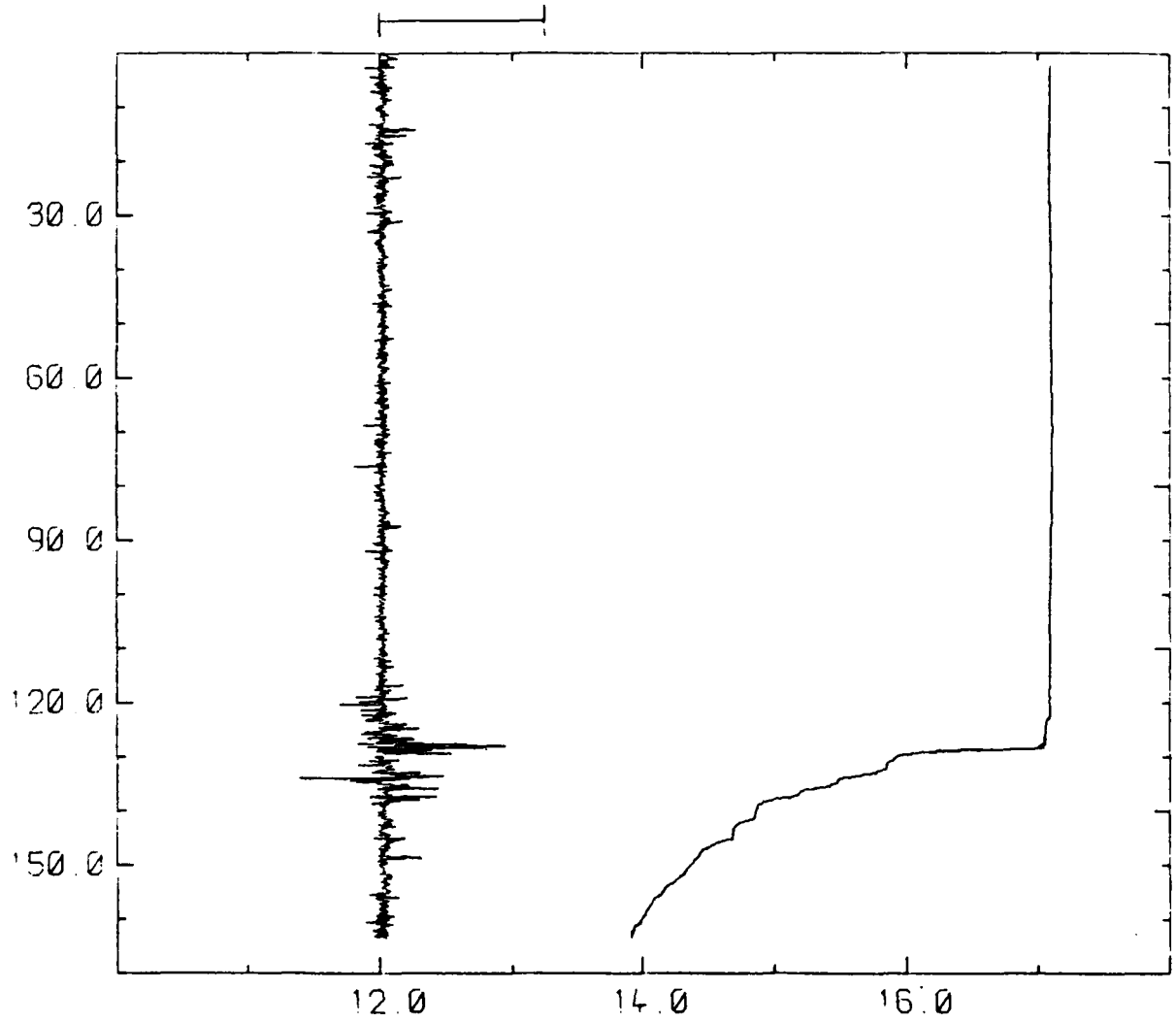
57

'00 0 DEG/M



DATE 1/24/80
TIME 2136 GMT

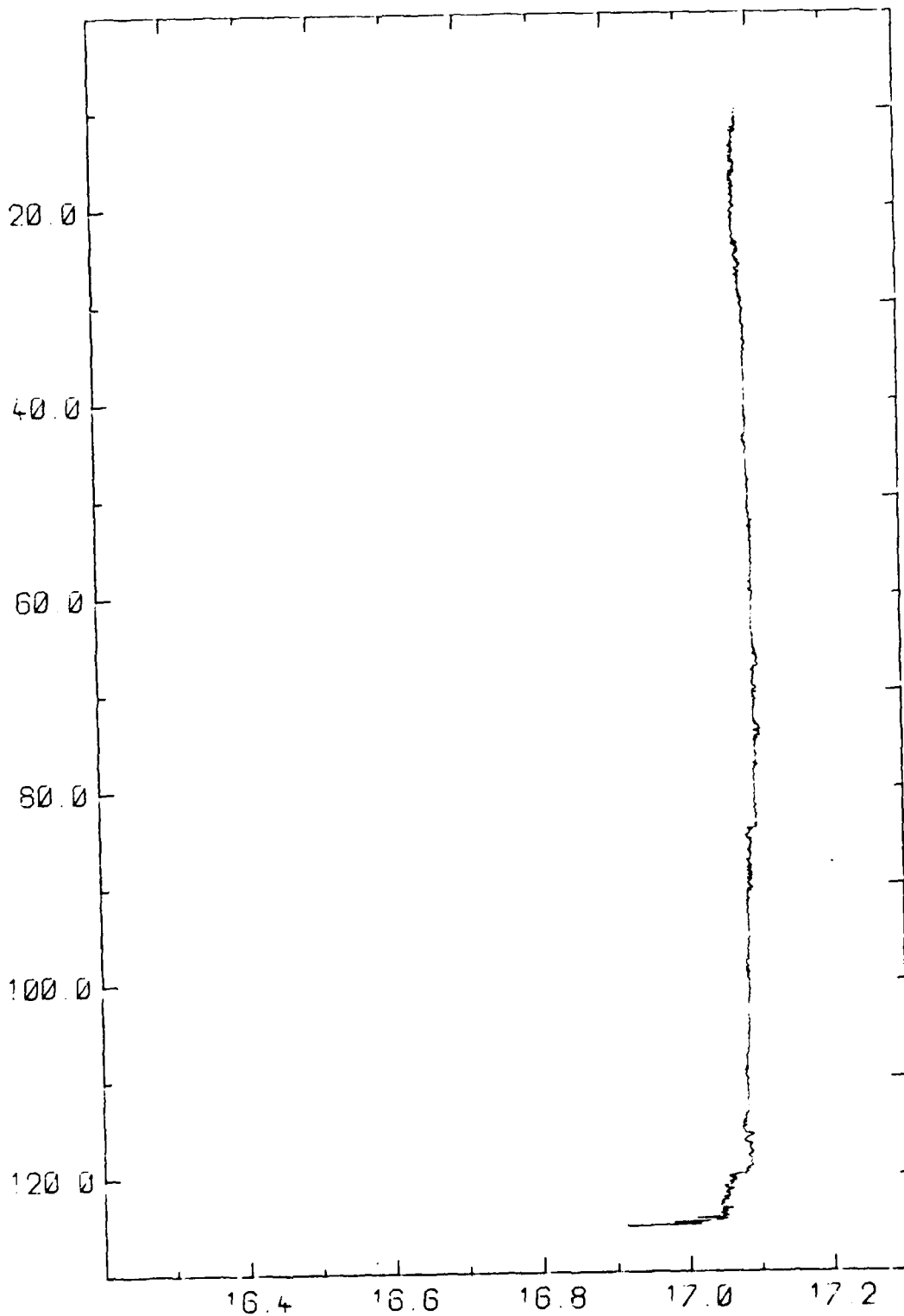
TAPE F3D FILE 2
UNIT 2.79
3.0 DEG/M



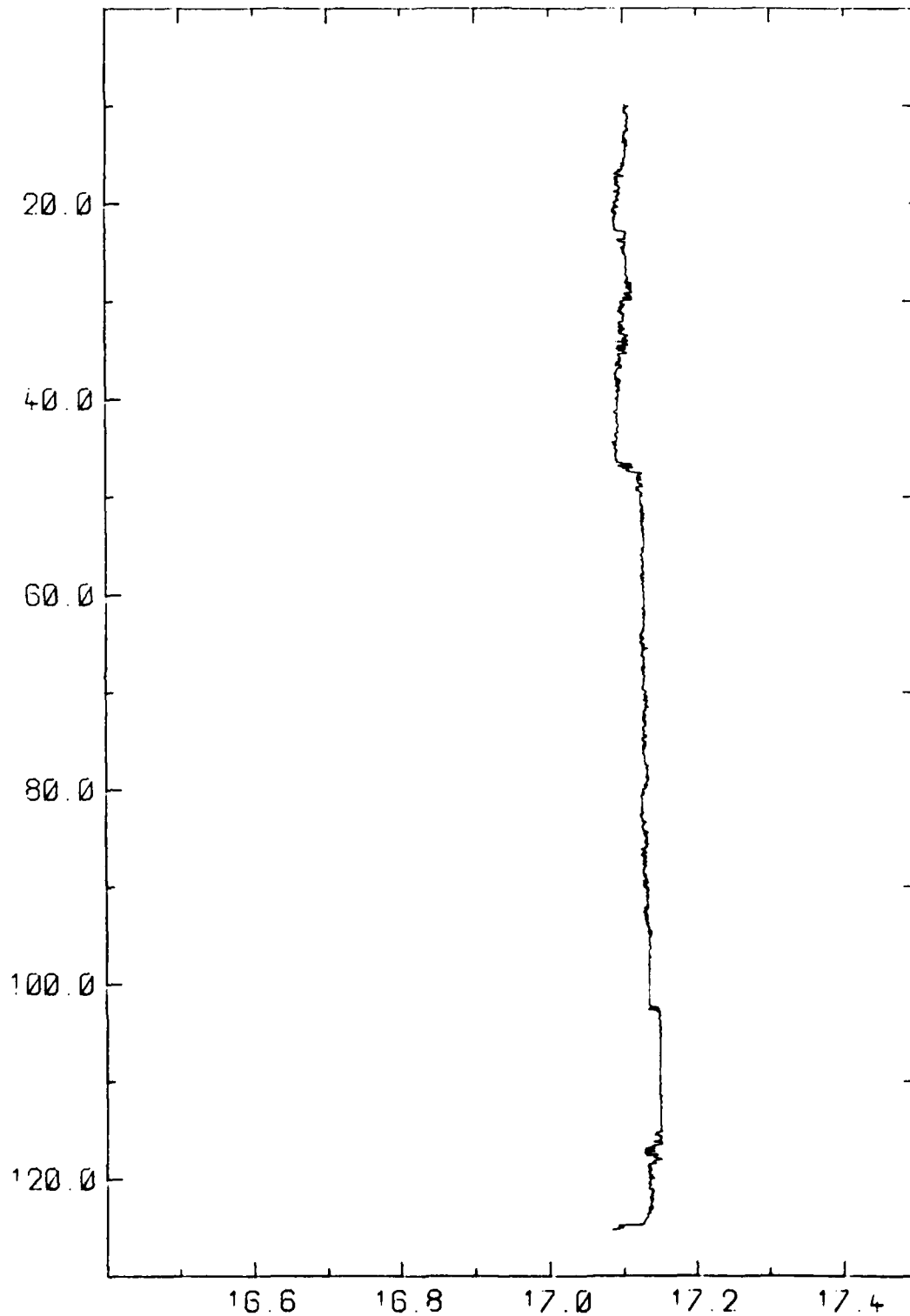
DATE 1/24/80
TIME 2251 GMT

TAPE F30 FILE 2
UNIT 2.79

59



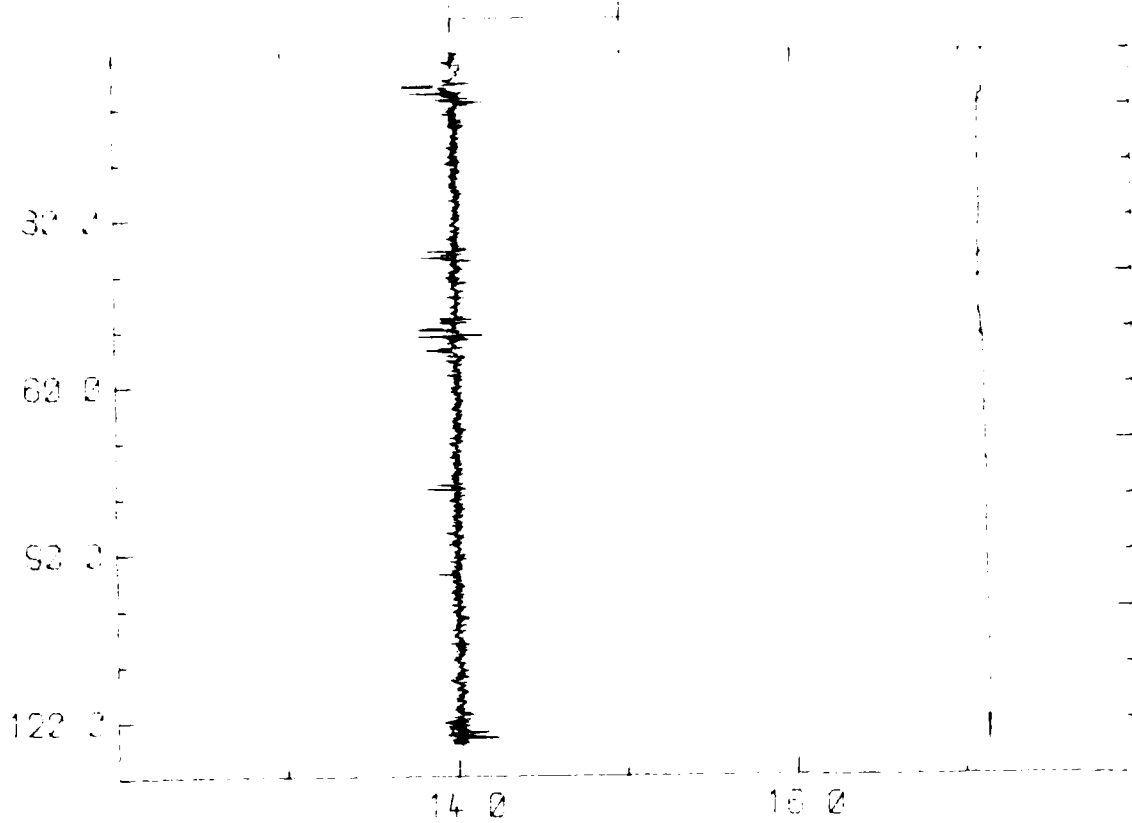
DATE 1/24/80
TIME 2251 GMT



DATE 1/24/80
TIME 2317 GMT

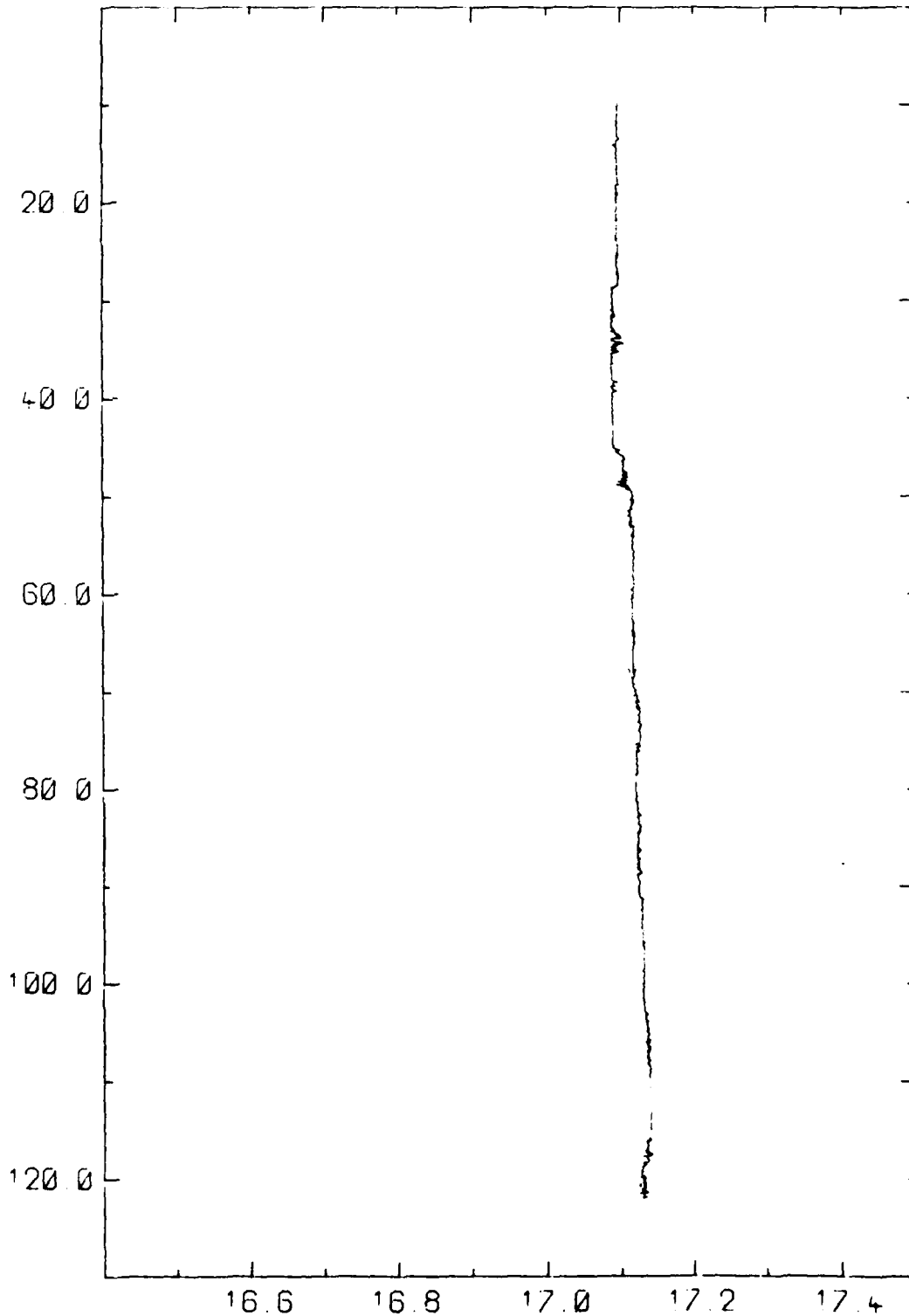
TRAC 934 FILE 2
ON 1 2 1980

3.2 DEG M



DATE 1/24/80
TIME 2352 GMT

TAPE F3E FILE 2
UNIT 2.79

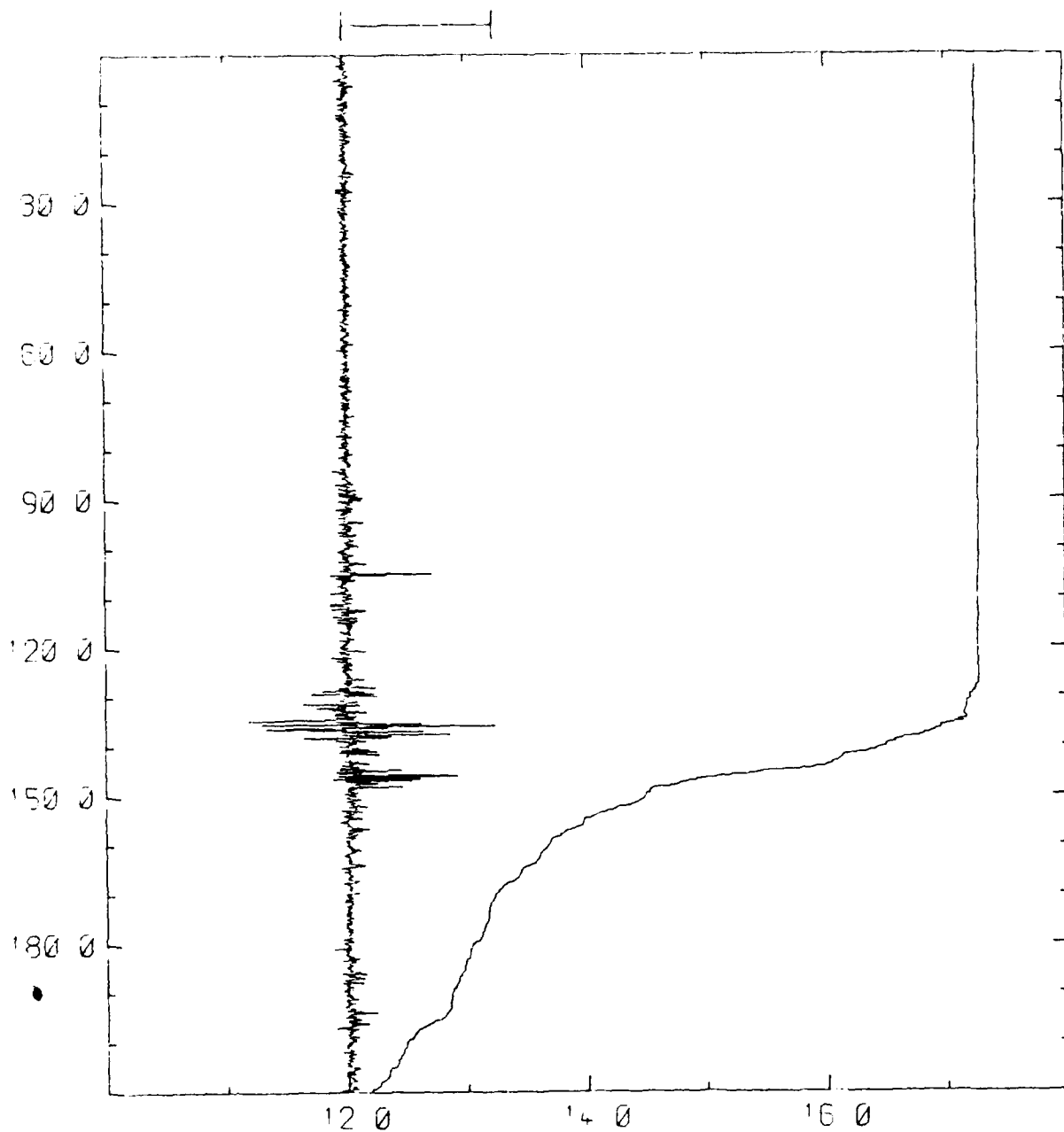


DATE 1/24/80
TIME 2352 GMT

TAPE F5A FILE 1

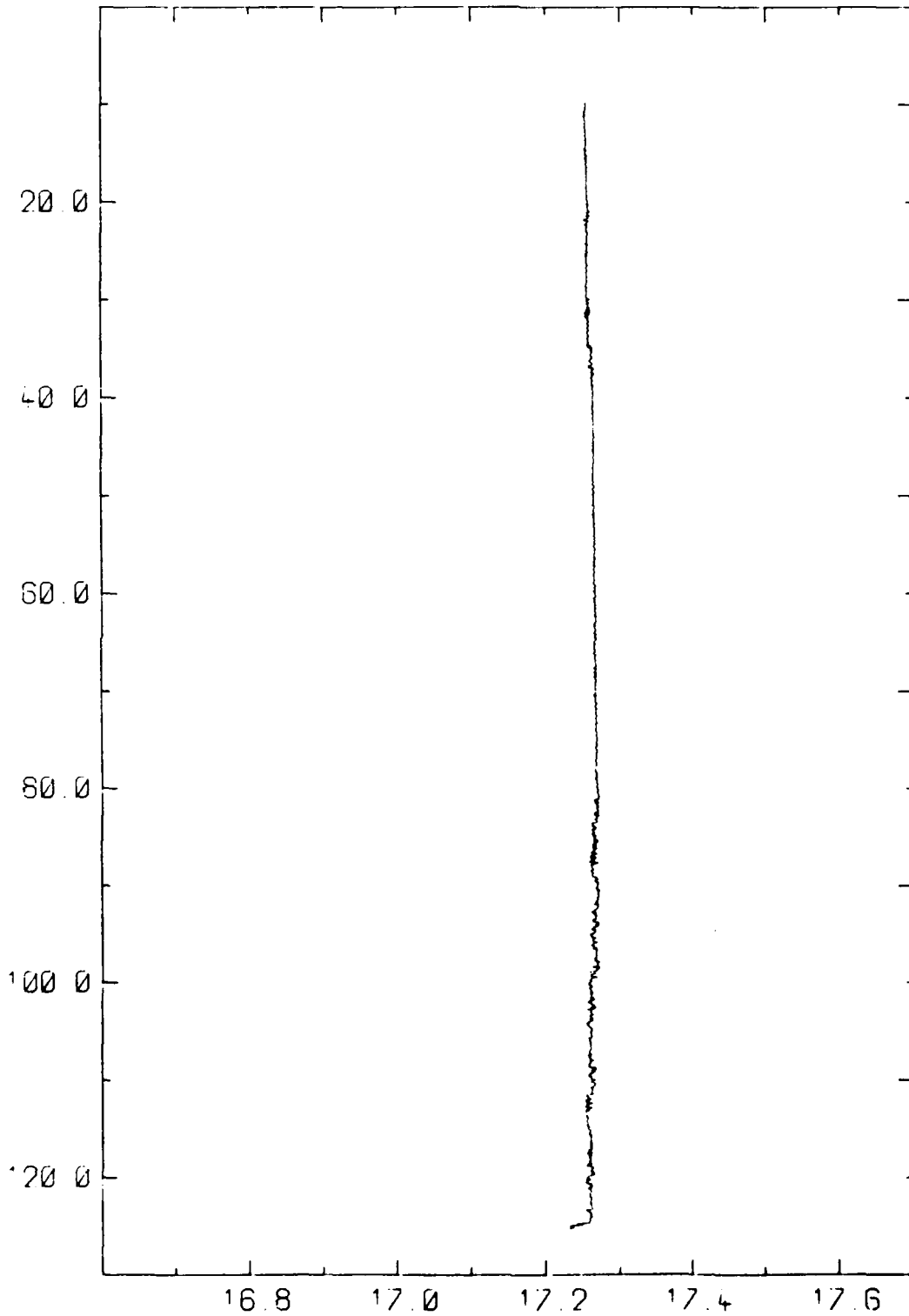
UNIT 2 79

3 0 DEG/M



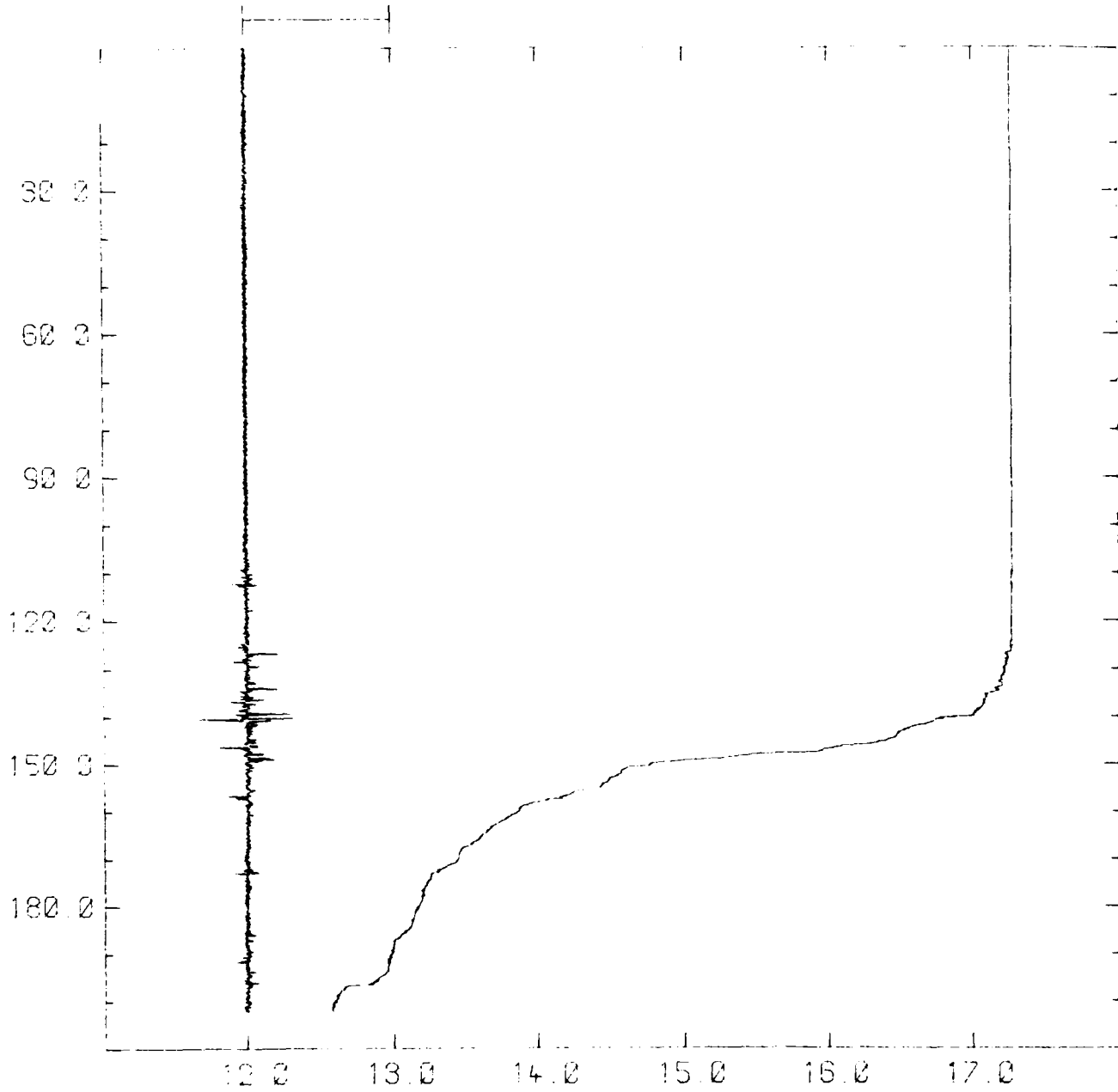
DATE 1/25/80

TIME 1825 GMT



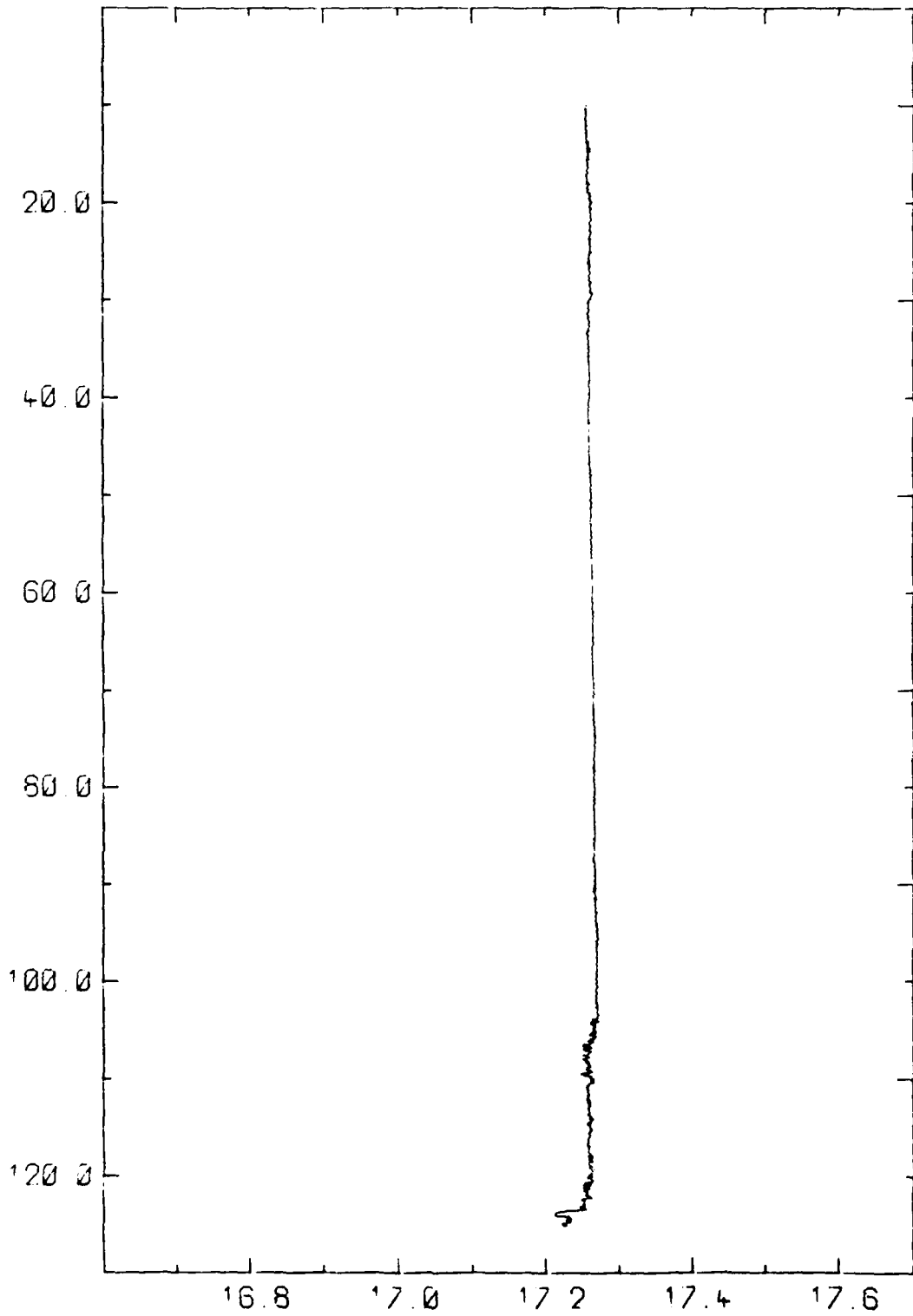
DATE 1/25/80
TIME 1825 GMT

TAPE H5A FILE 2
UNIT 2.79
10.0 DEC/M



DATE 1/25/80
TIME 1835 GMT

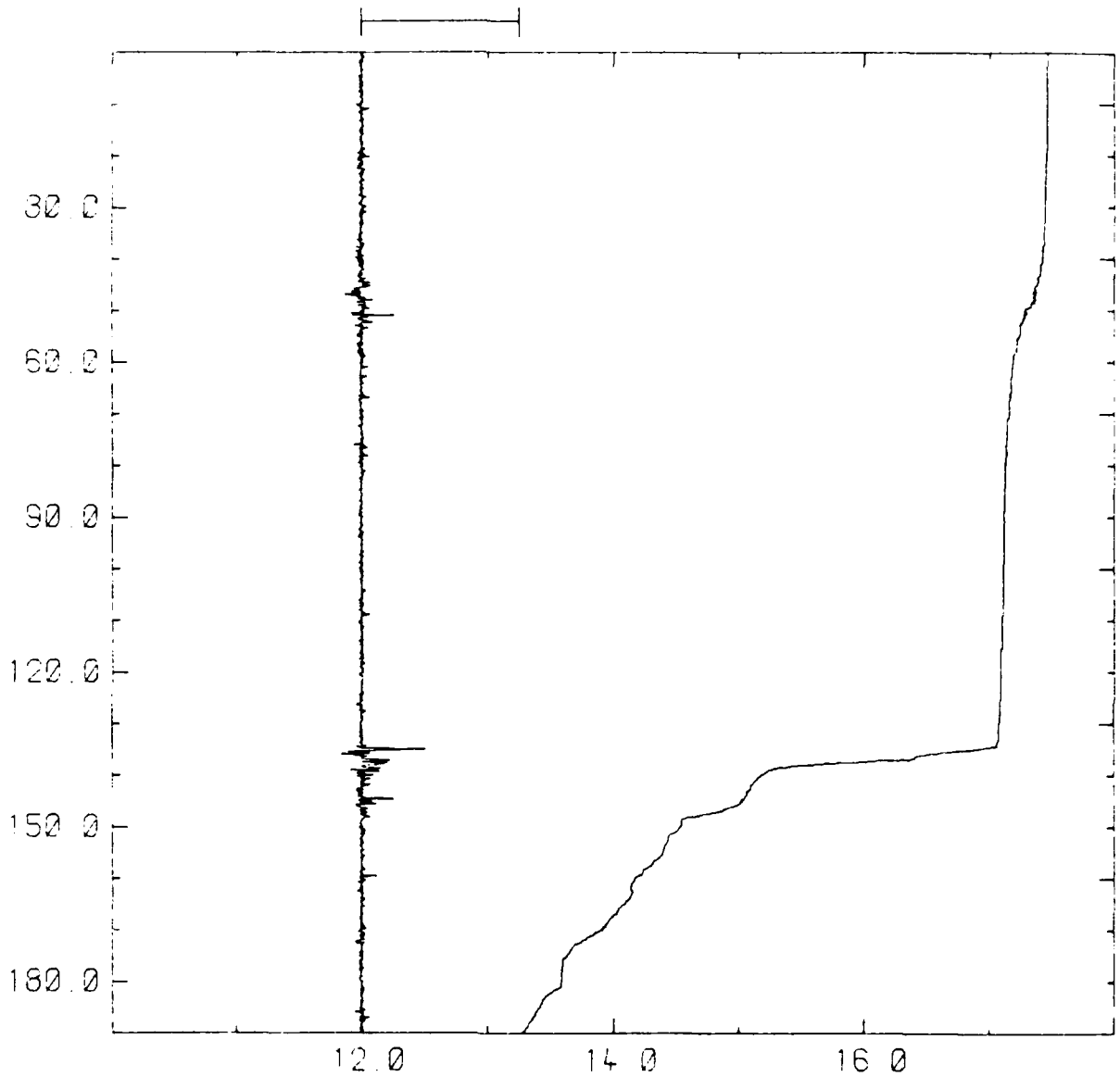
TAPE FSA FILE 2
UNIT 2.79



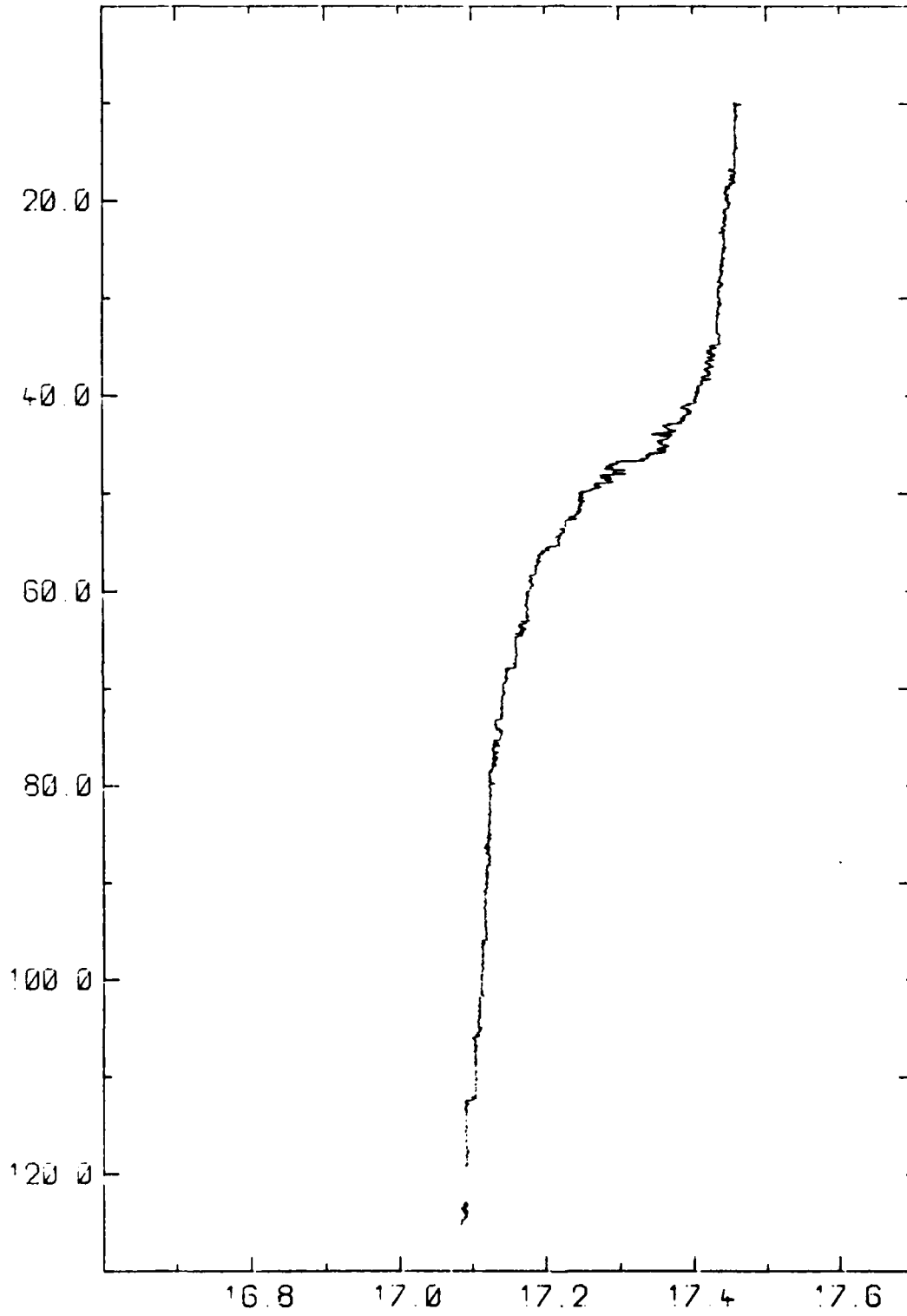
DATE 1/25/60
TIME 1905 GMT

TAPE F5B FILE 1
UNIT 2 79

10.3 DEG/M



DATE 1/25/80
TIME 2040 GMT

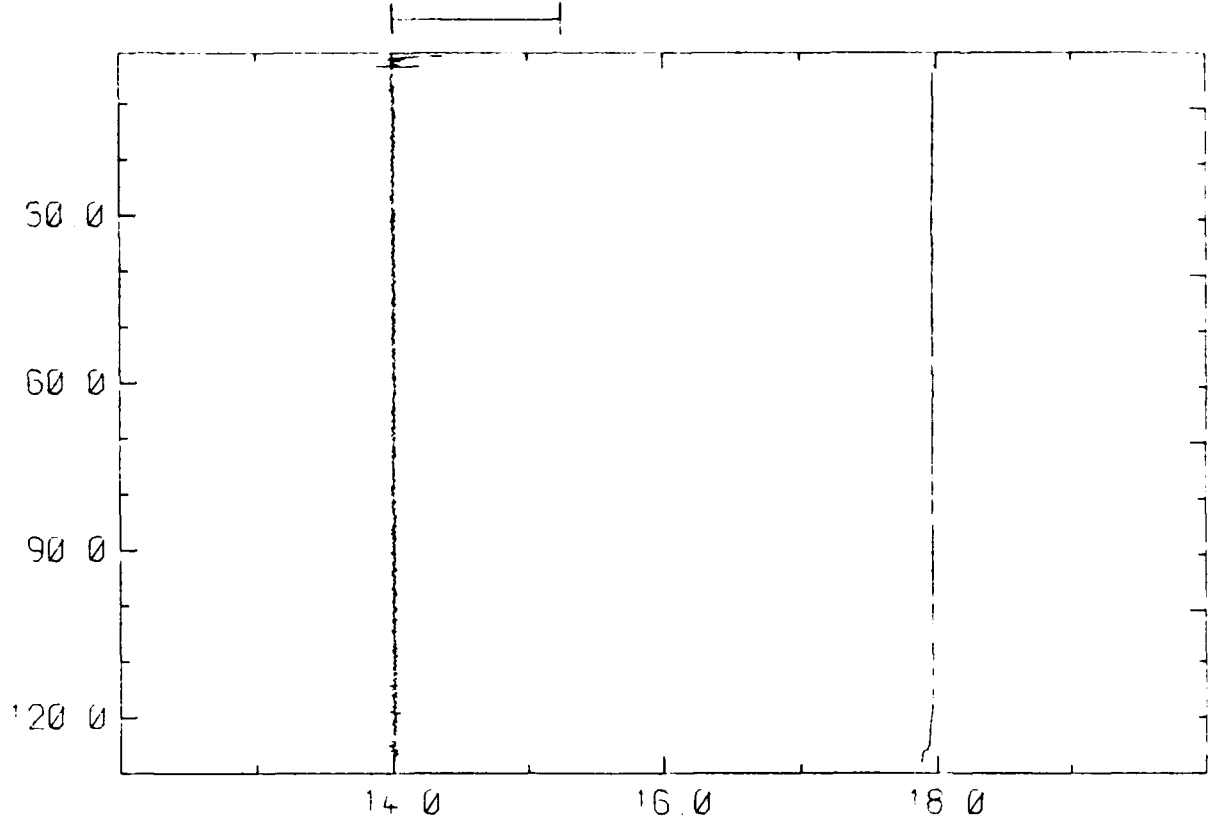


DATE 1/25/80
TIME 2040 GMT

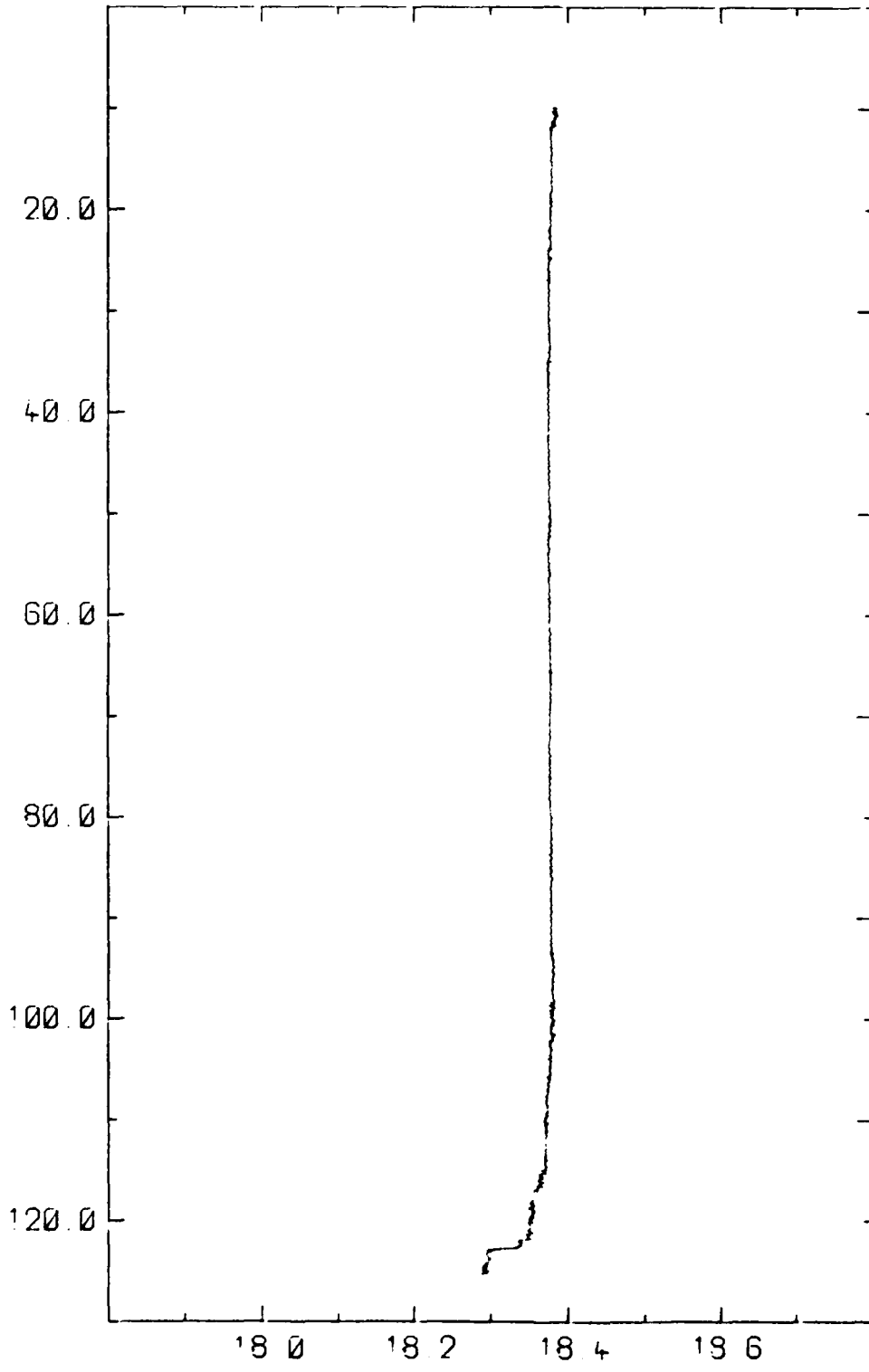
TAPE F5B FILE 2
UNIT 0.79

69

10 0 DEG/M



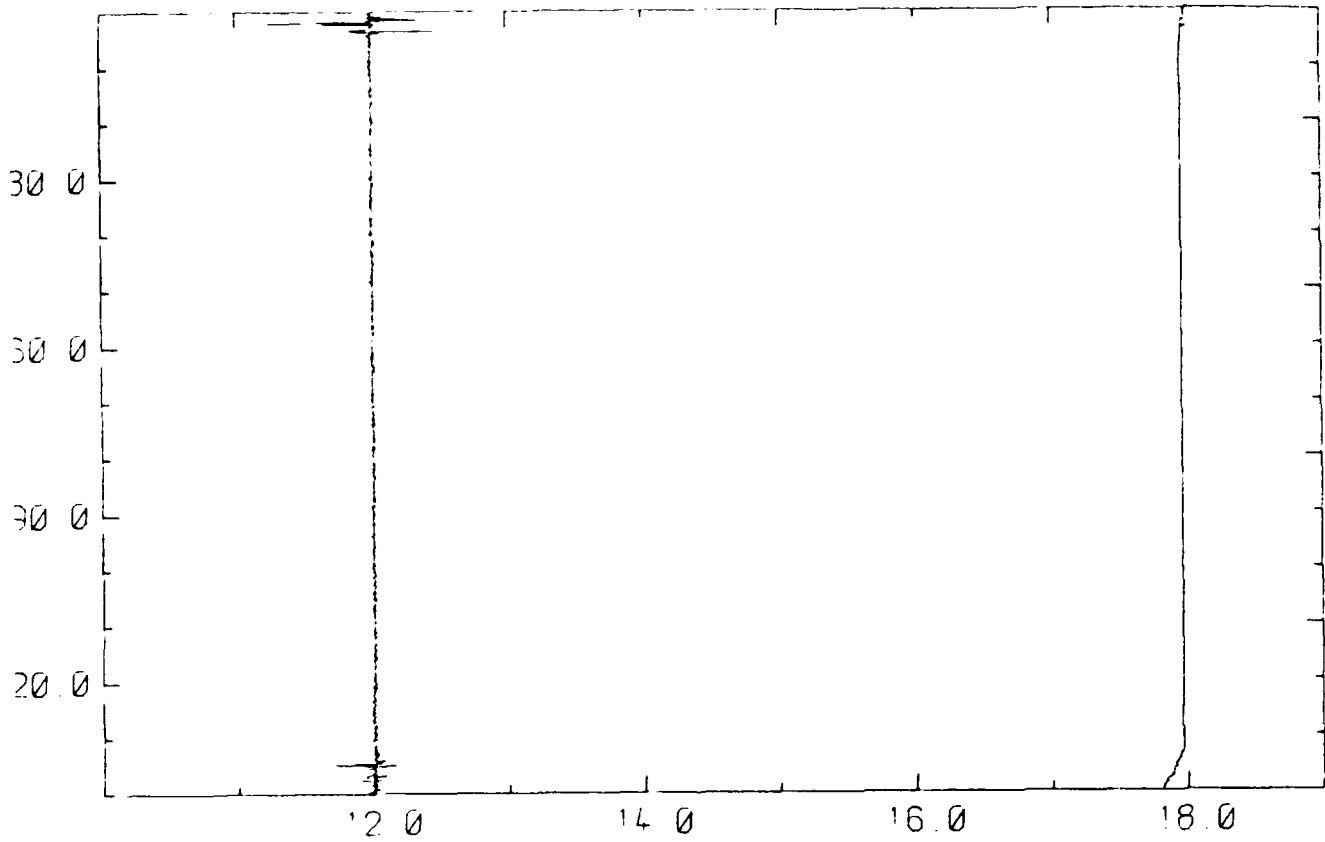
DATE 1/25/80
TIME 2110 GMT



DATE 1/25/80
TIME 2110 GMT

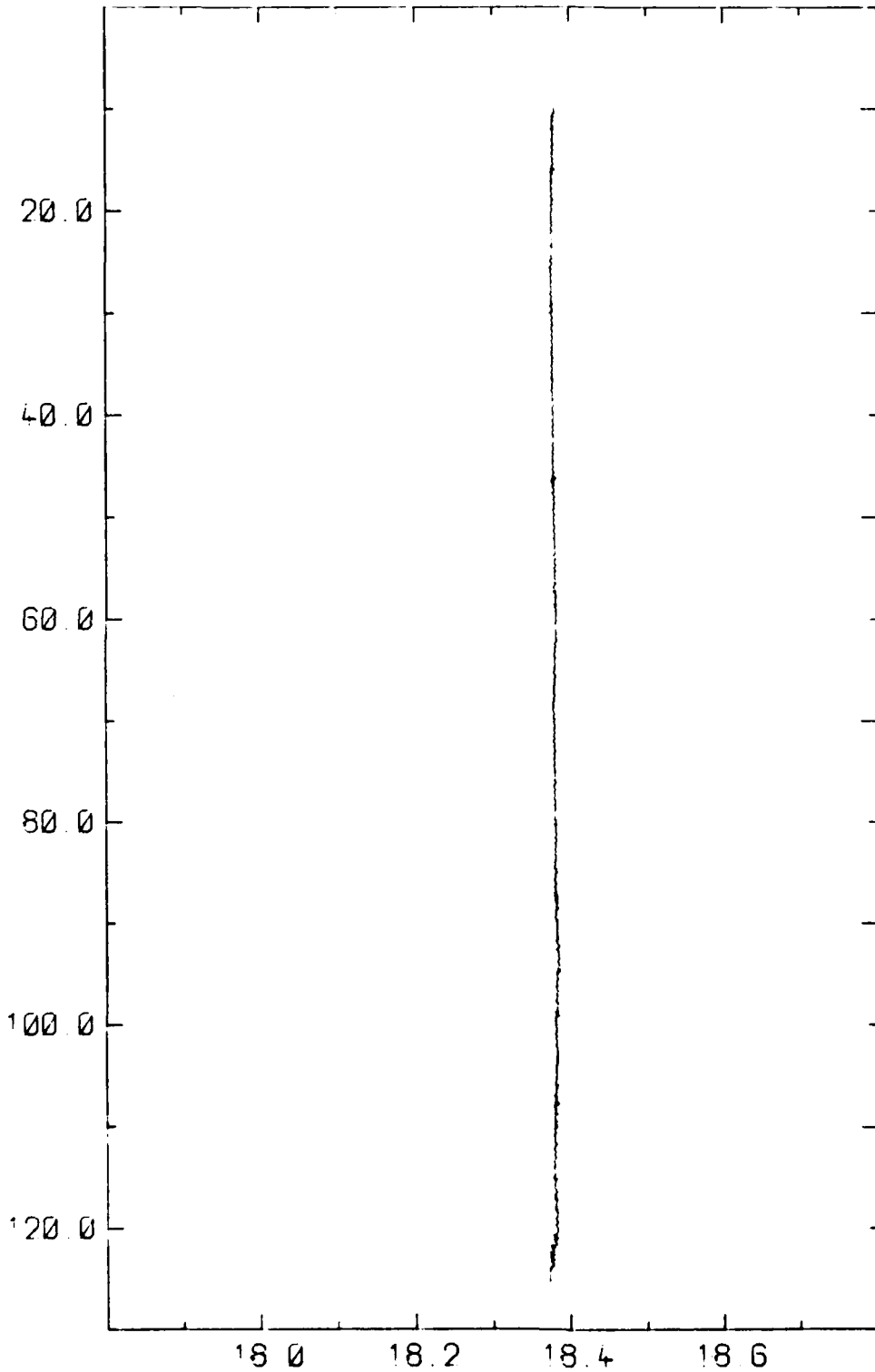
TAPE F50 FILE 1
UNIT 2 79

0 0 DEG/M



DATE 1/25/80
TIME 2247 GMT

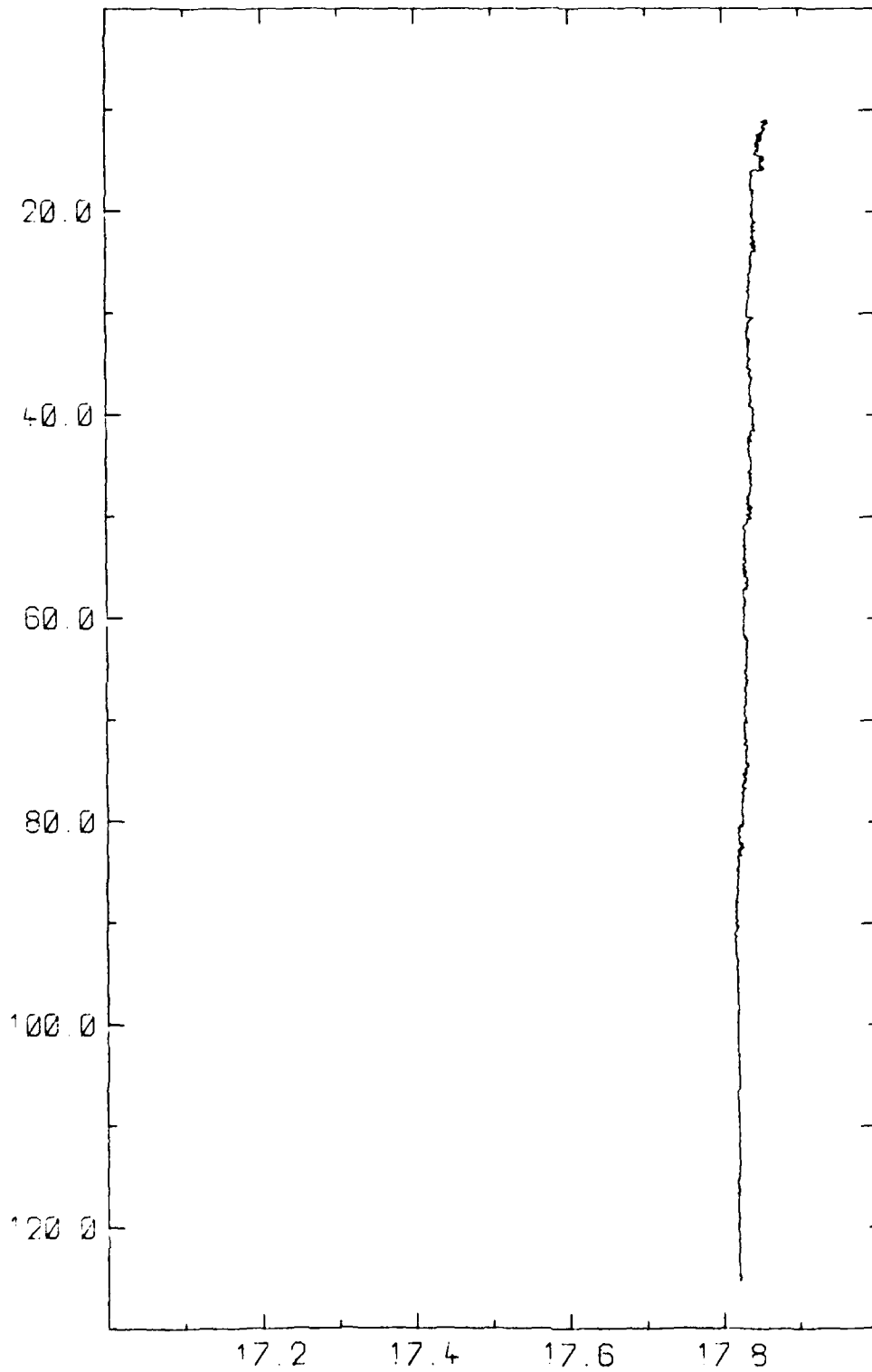
TAPE F50 FILE 1
UNIT 2.79



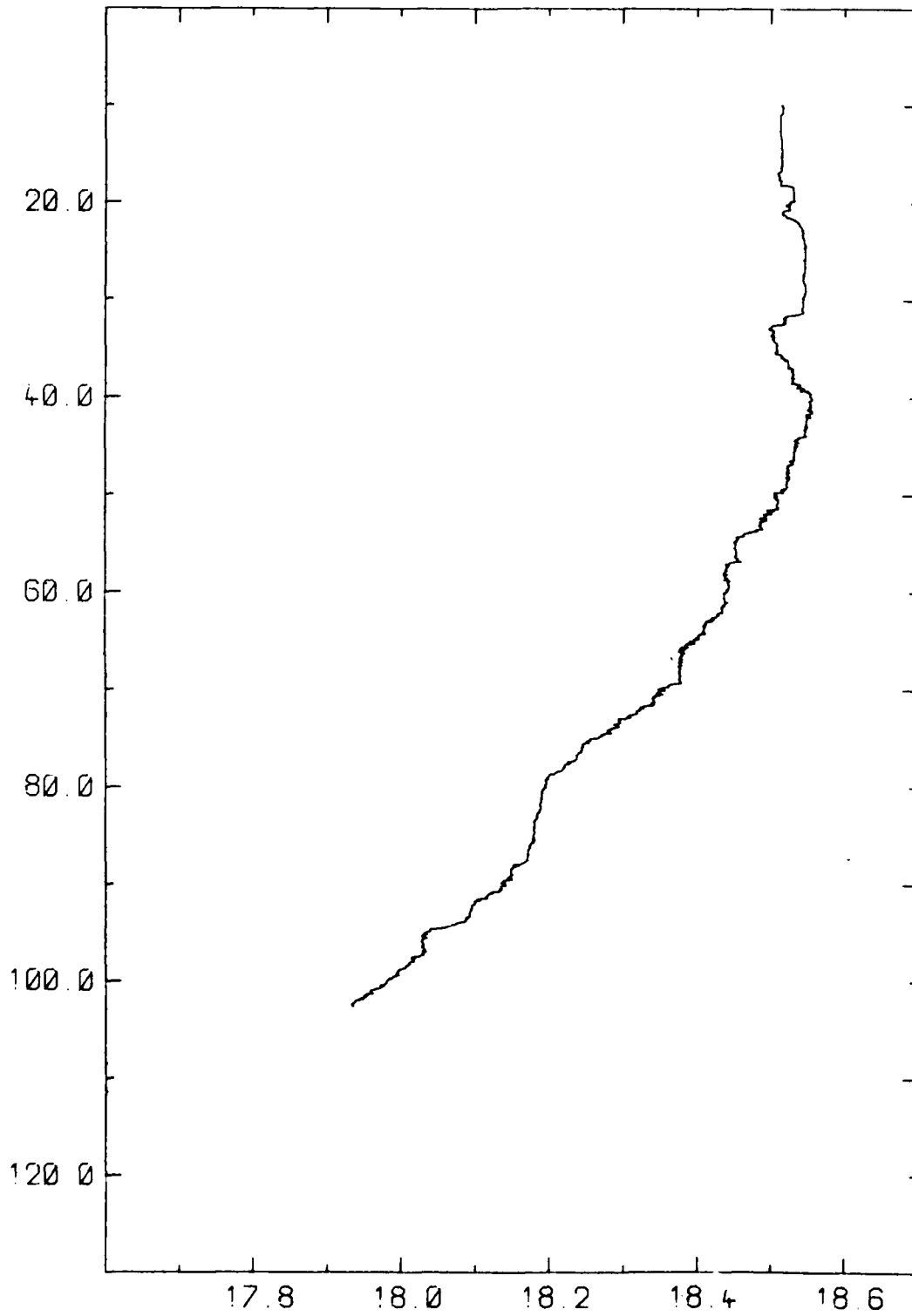
DATE 1/25/80
TIME 2247 GMT

TAPE F5C FILE 3
UNIT 2.79

73



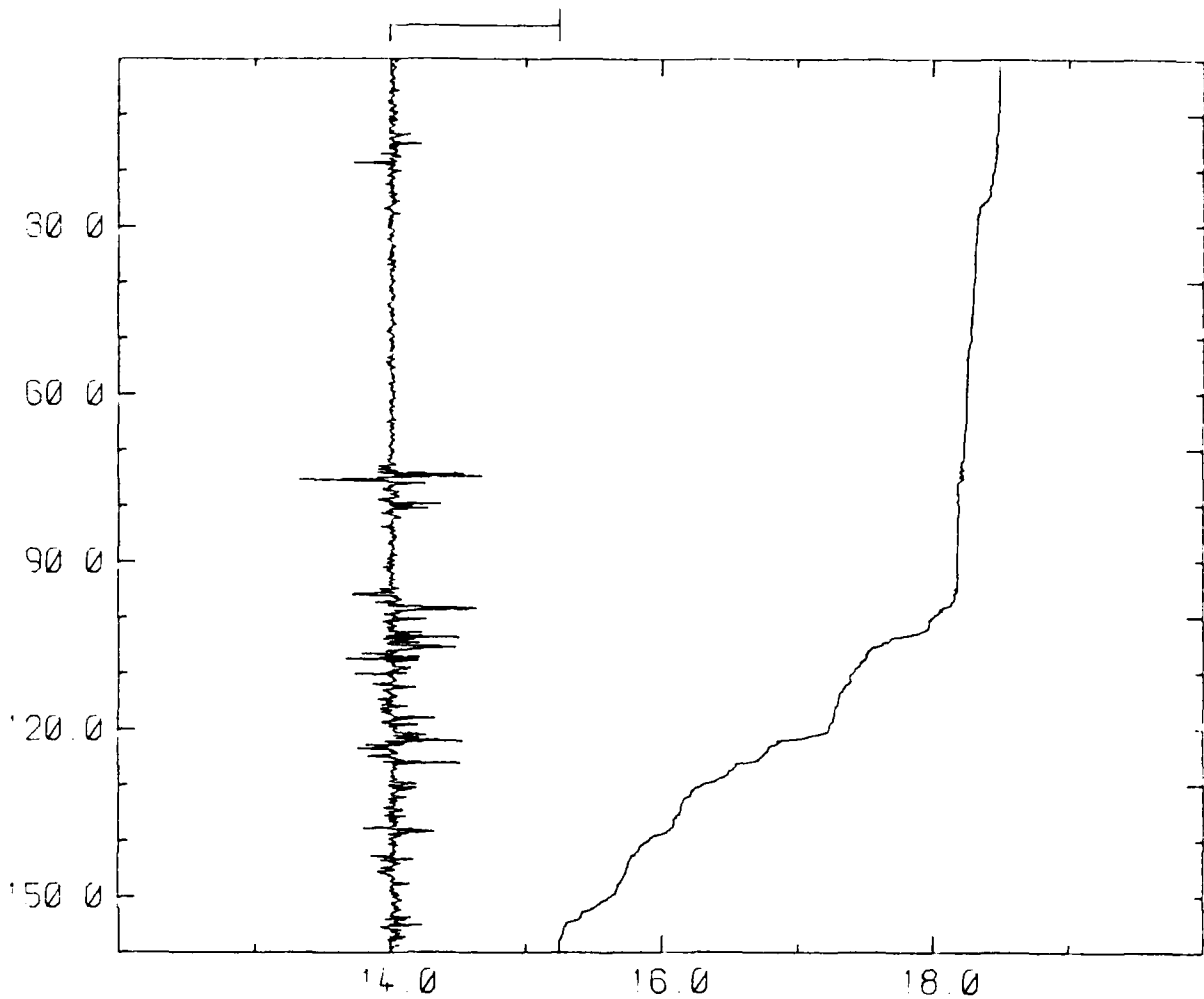
DATE 1/26/80
TIME 0054 GMT



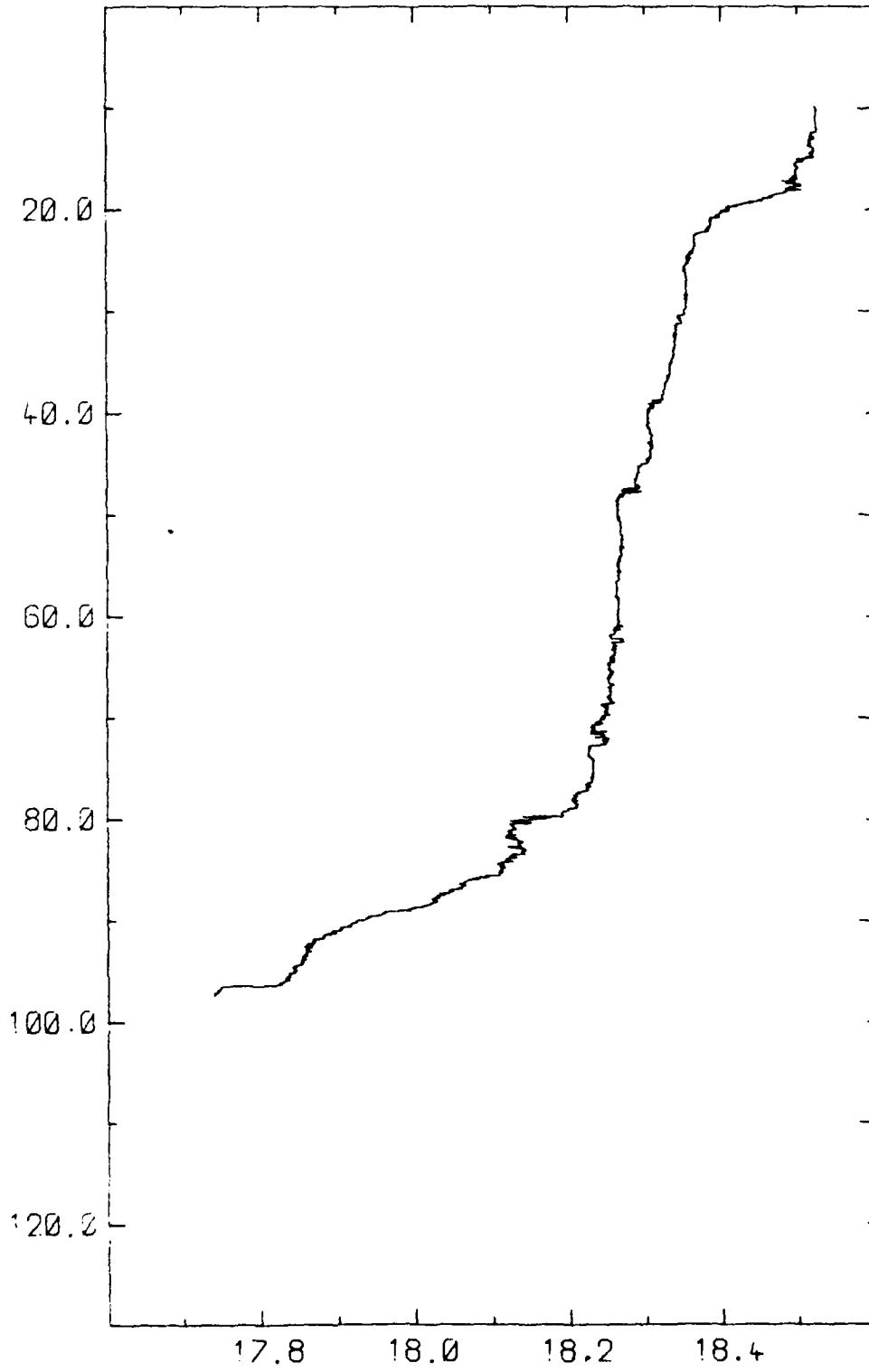
DATE 1/26/80
TIME 0551 GMT

TAPE FOR FILE 4
UNIT 2.79

3 0 DEG/M



DATE 1/26/80
TIME 2035 GMT

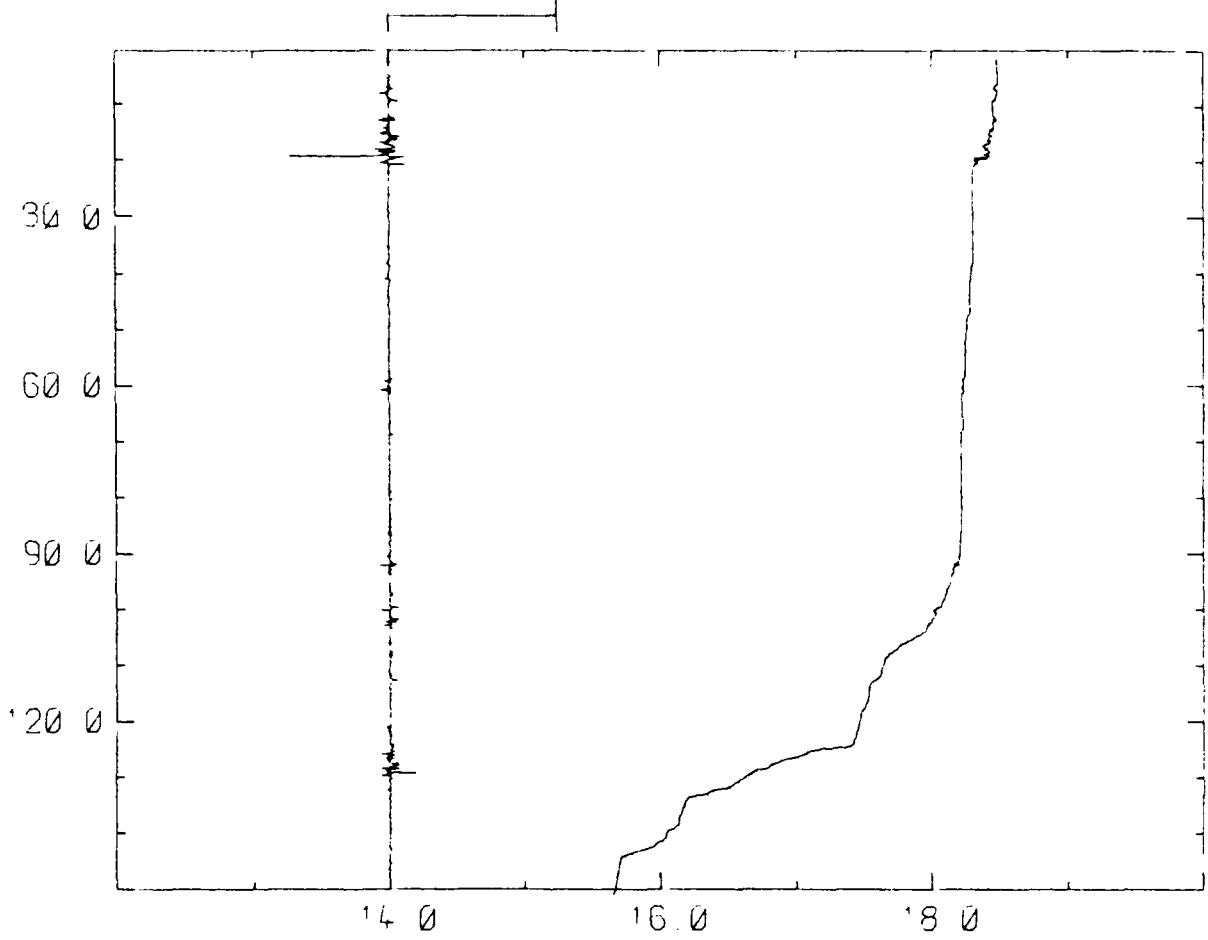


DATE 1/26/80
TIME 2102 GMT

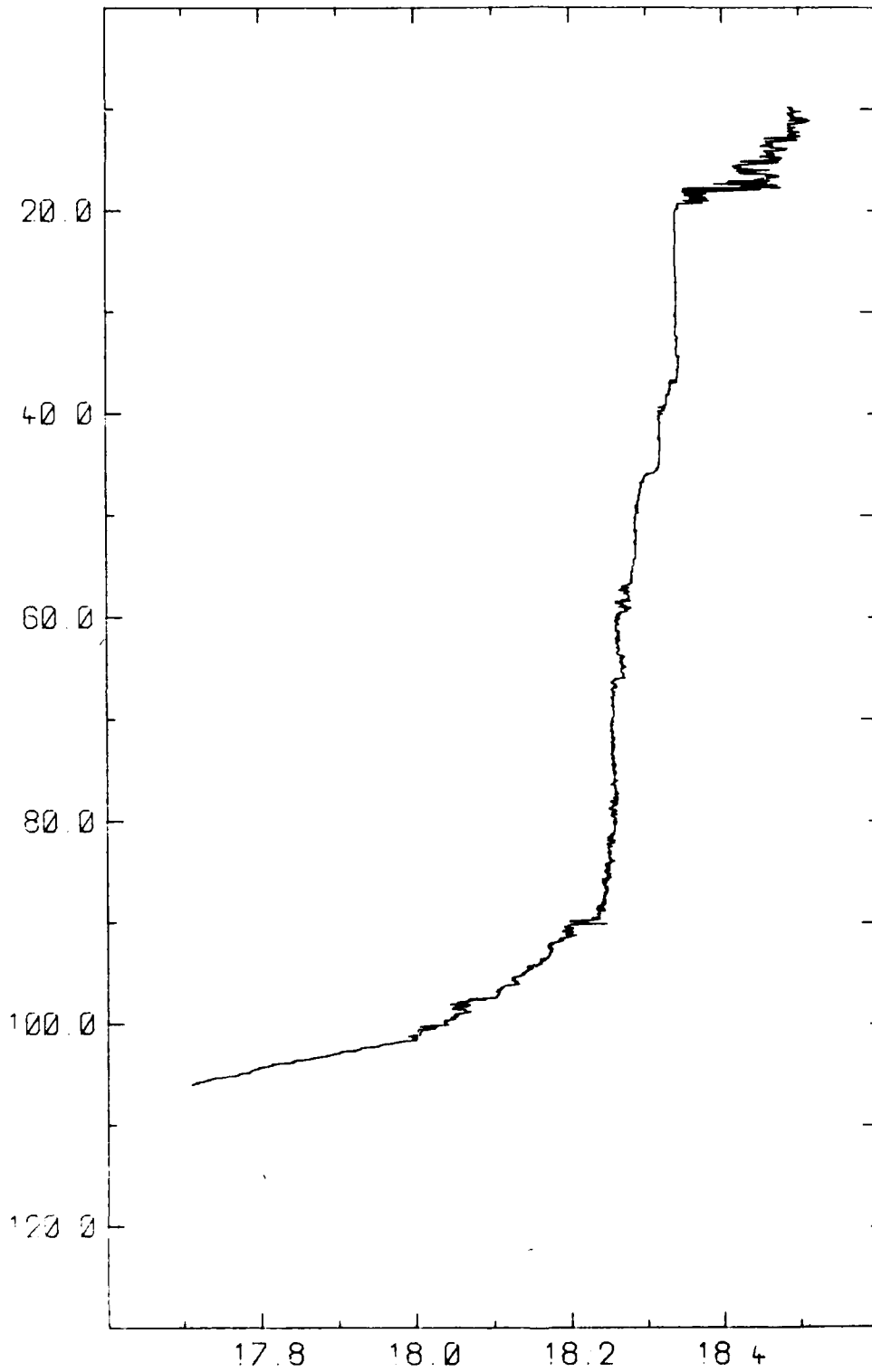
TAPE F60 FILE 1
UNIT 2 79

77

30 0 DEG/M



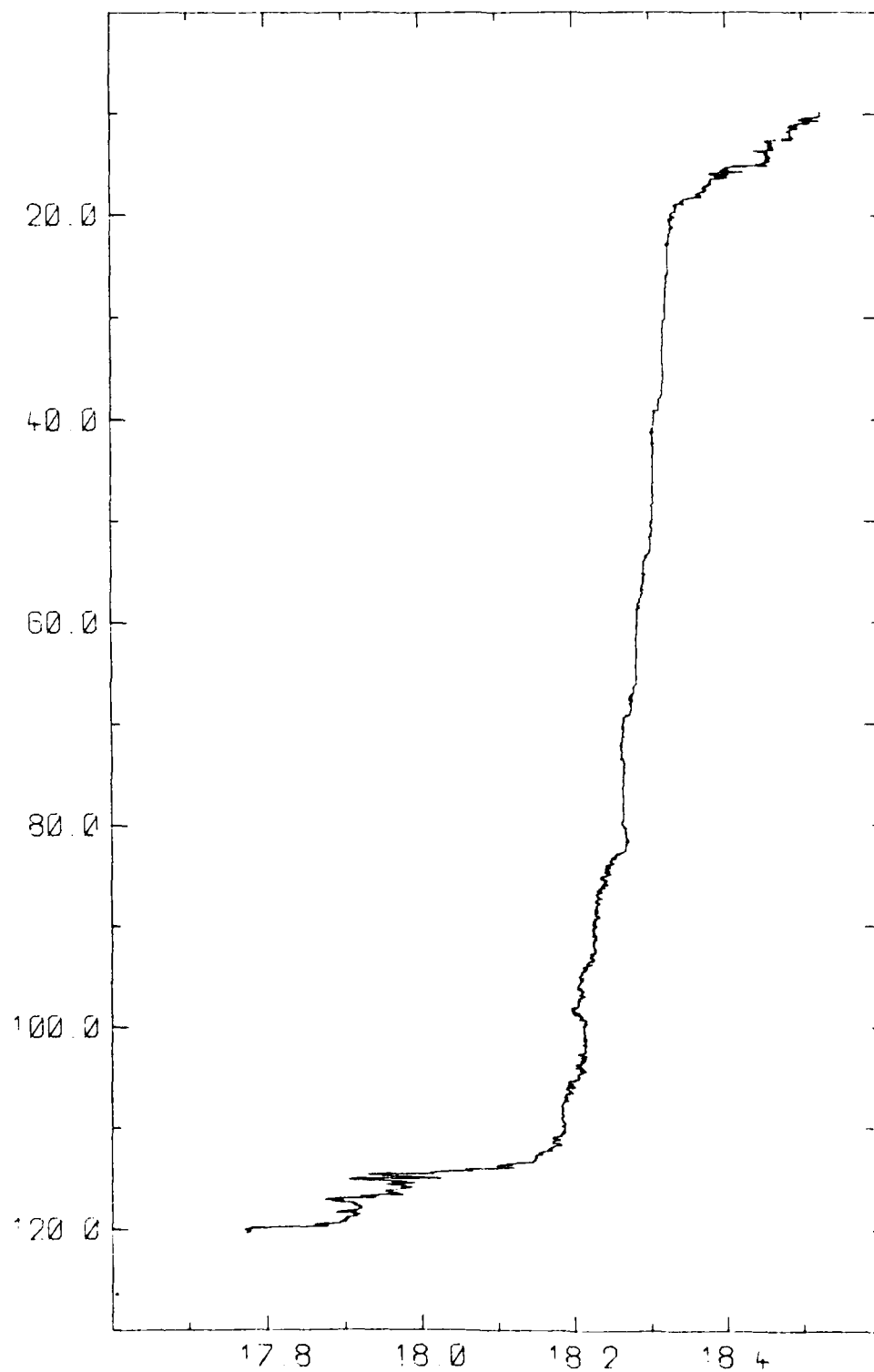
DATE 1/26/80
TIME 2140 GMT



DATE 1/26/80
TIME 2140 GMT

TAPE F6C FILE 3
UNIT 2.79

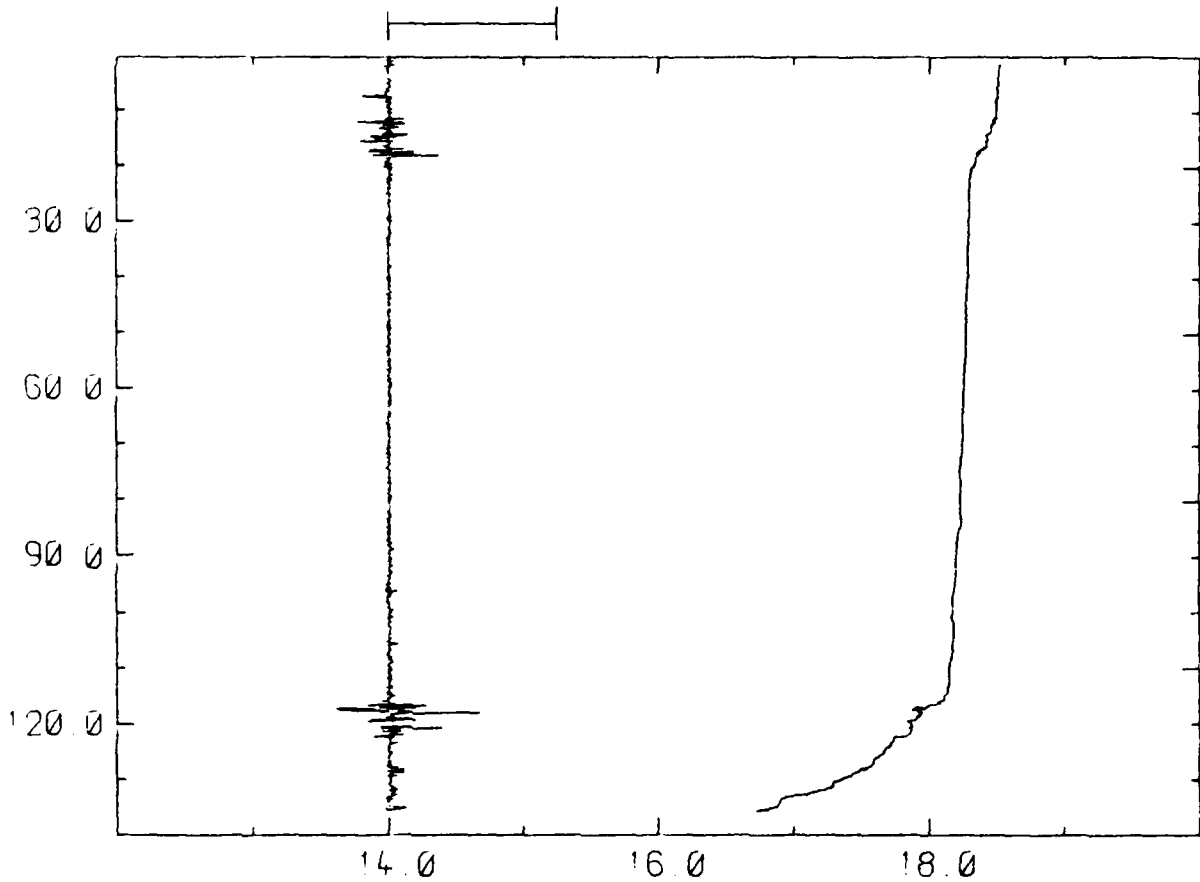
79



DATE 1/26/80
TIME 2303 GMT

TAPE F6C FILE 3
UNIT 2.79

10.0 DEG/M

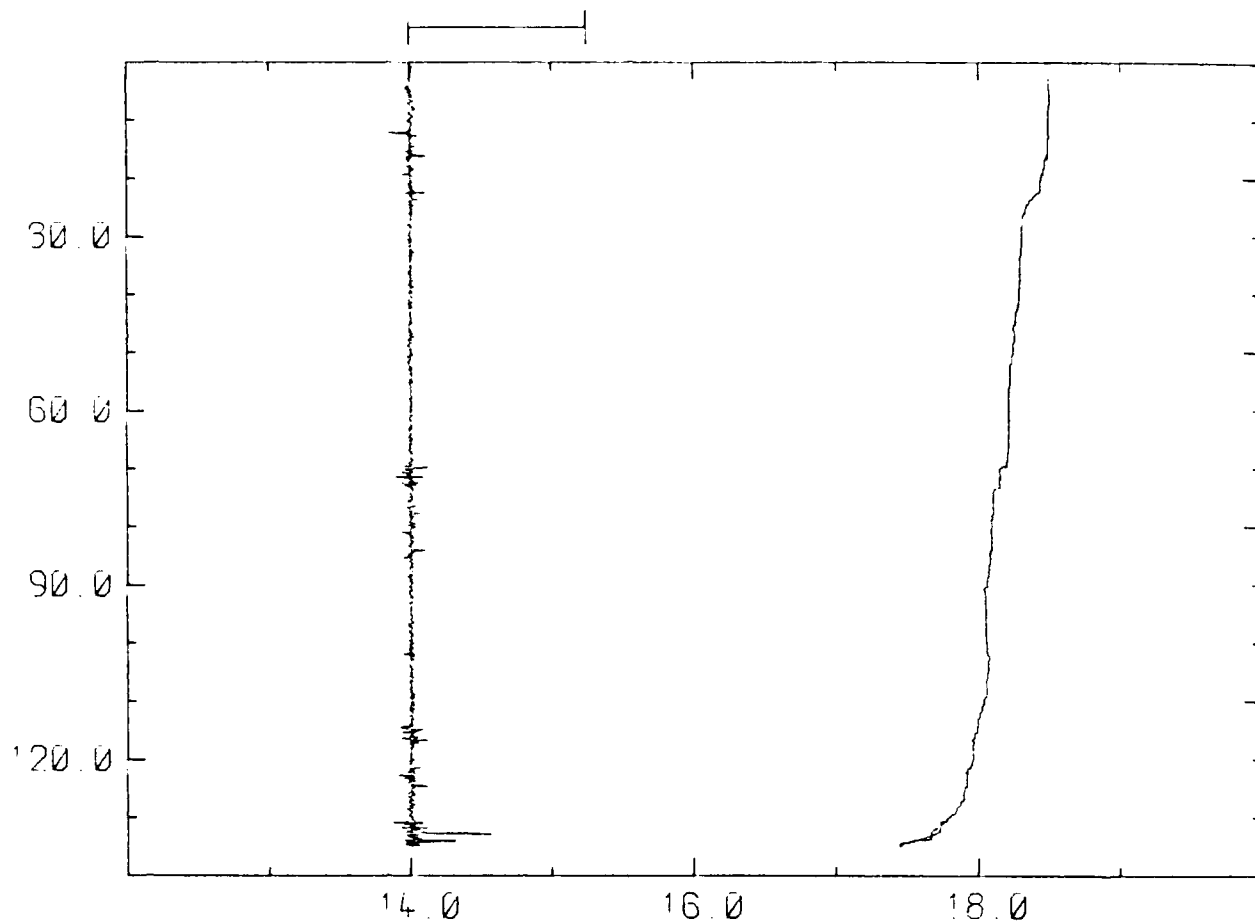


DATE 1/26/80
TIME 2303 GMT

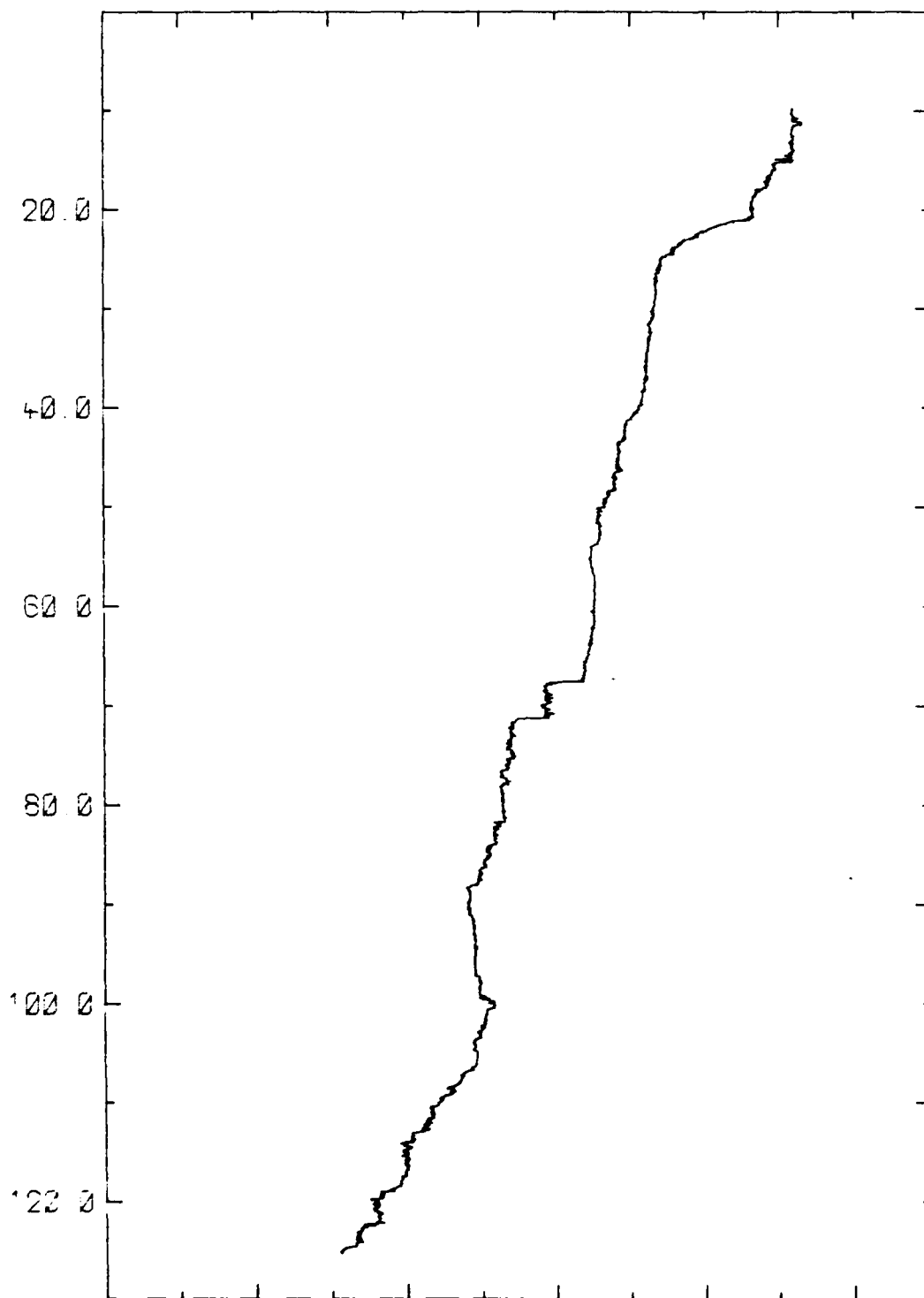
TAPE F60 FILE 1
UNIT 2.79

81

10.0 DEG/M



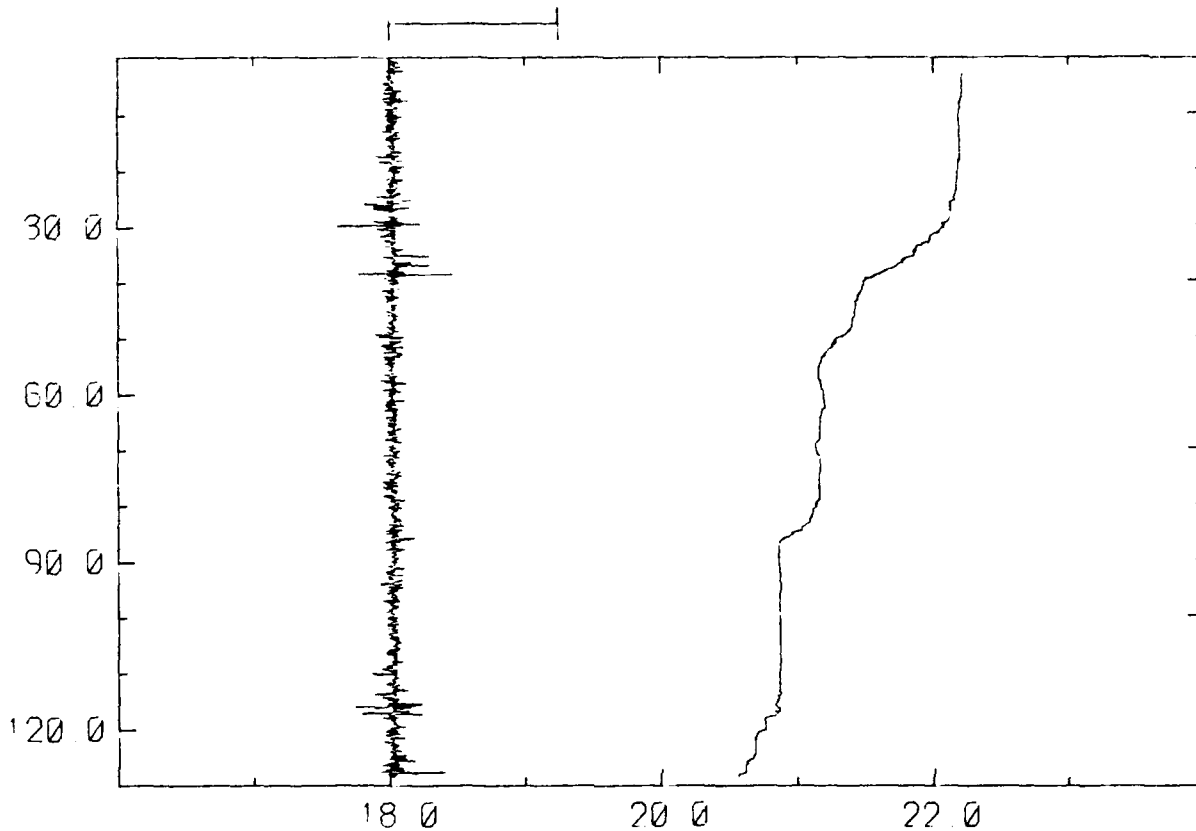
DATE 1/26/80
TIME 2334 GMT



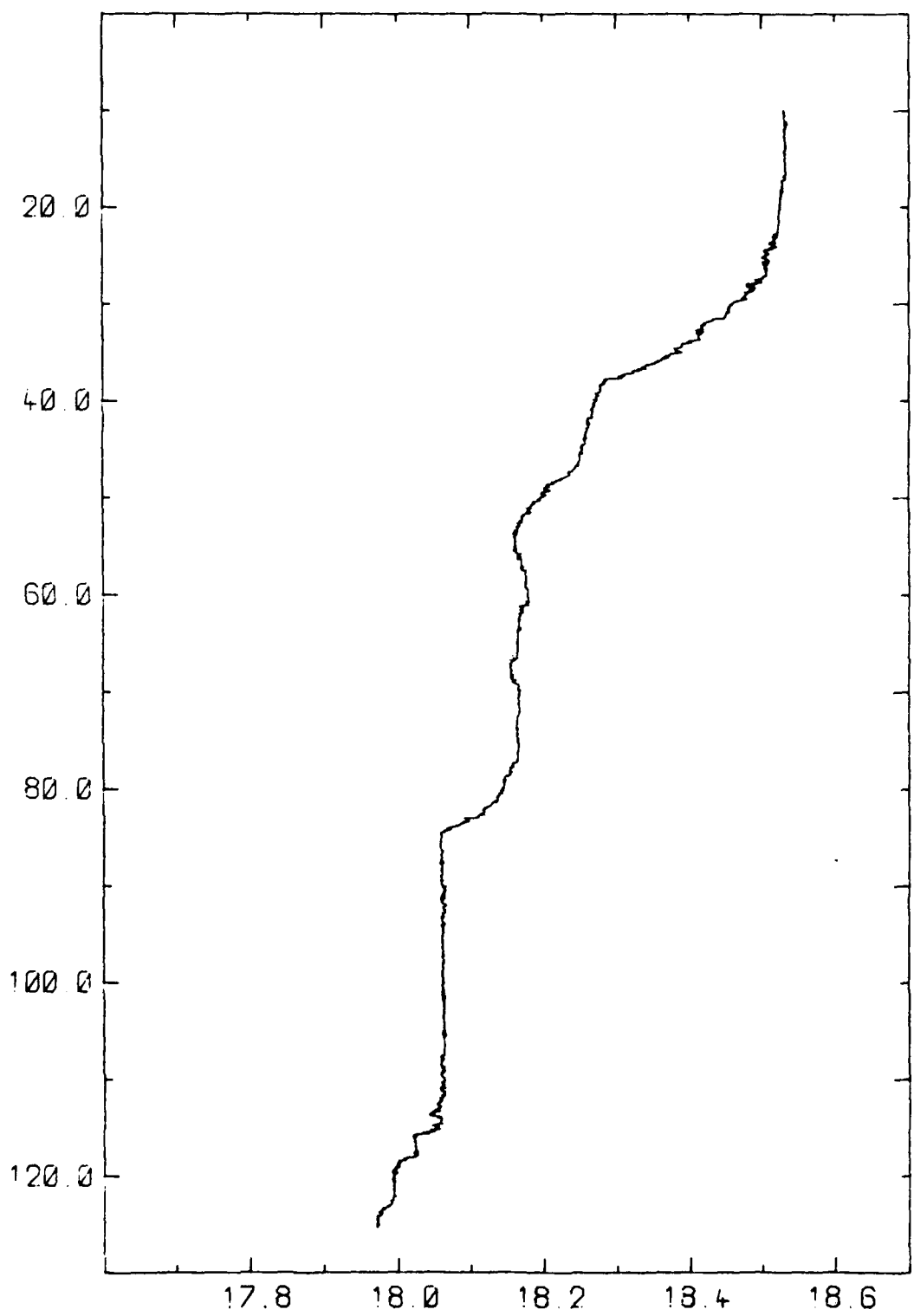
DATE 1/26/80
TIME 2334 GMT

TAPE F60 FILE 2
UNIT 2 79

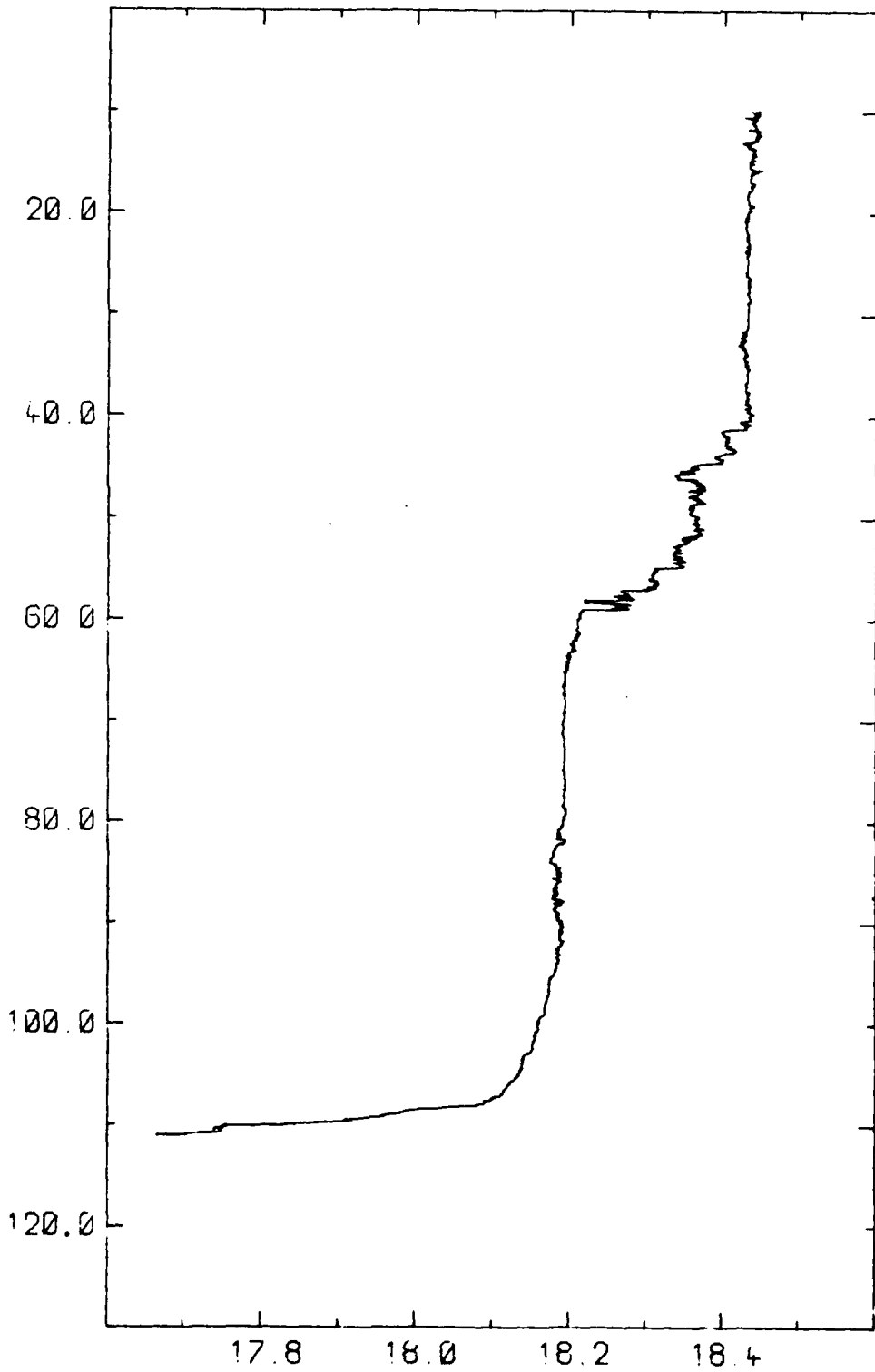
3 0 DEG/M



DATE 1/27/80
TIME 0021 GMT



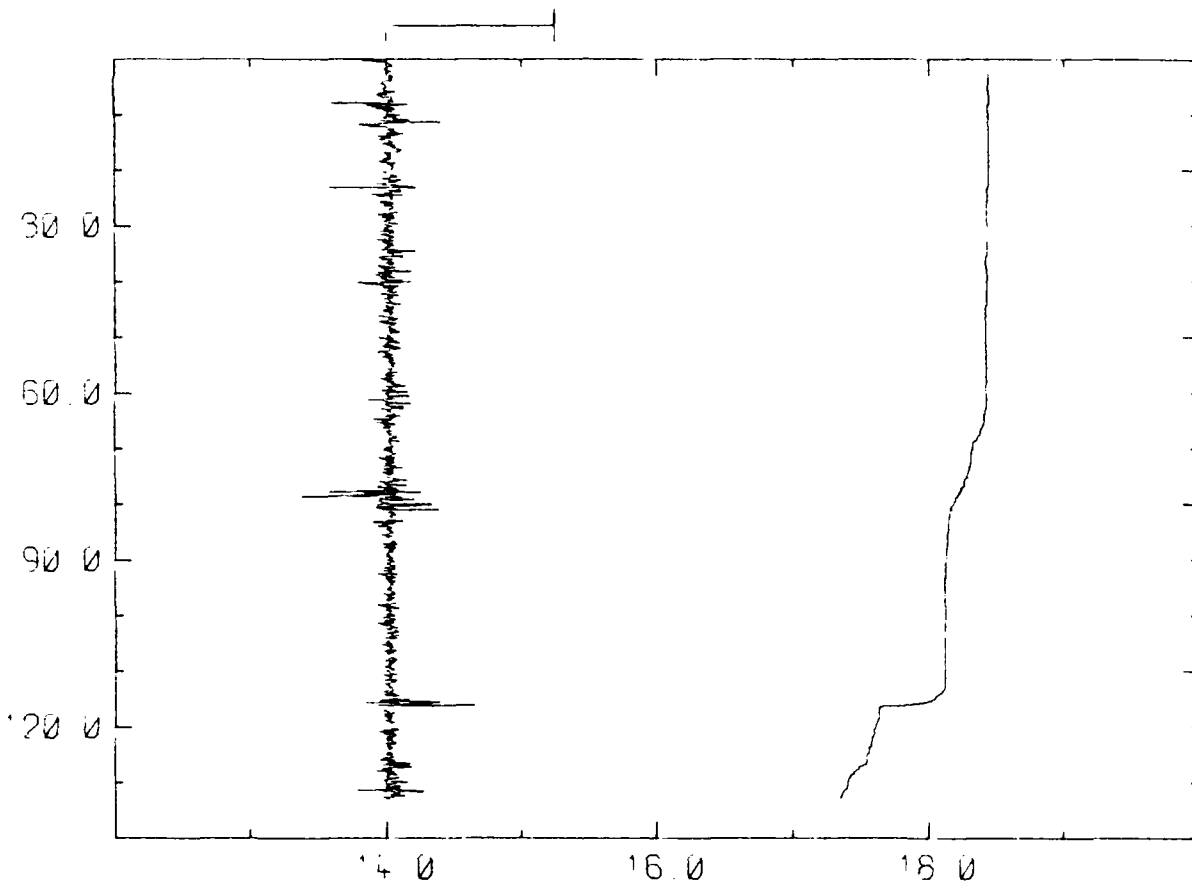
DATE 1/27/80
TIME 0021 GMT



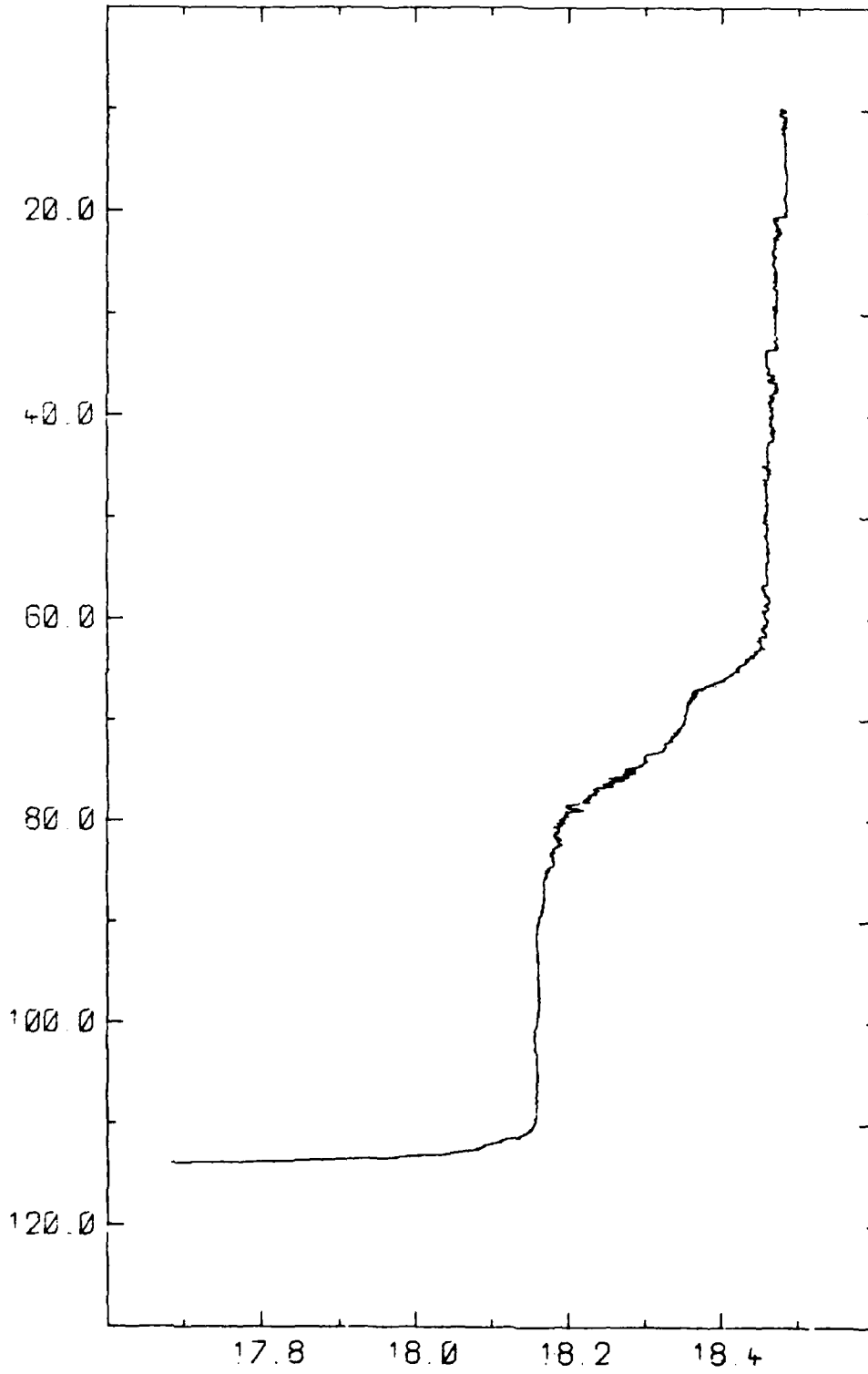
DATE 1/27/80
TIME 0212 GMT

TAPE F7A FILE 2
UNIT 2 79

3 0 DEG/M

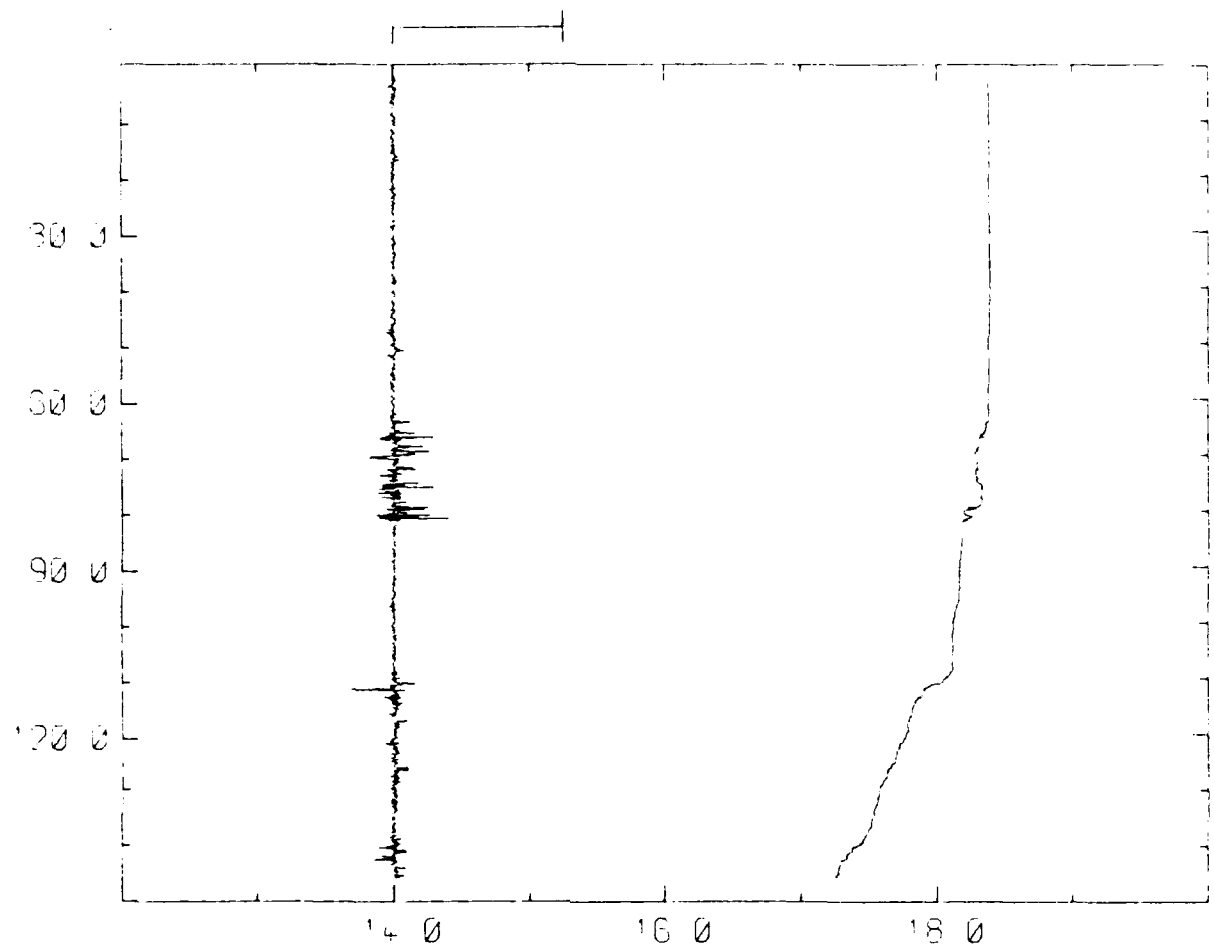


DATE 1/27/80
TIME 0239 GMT

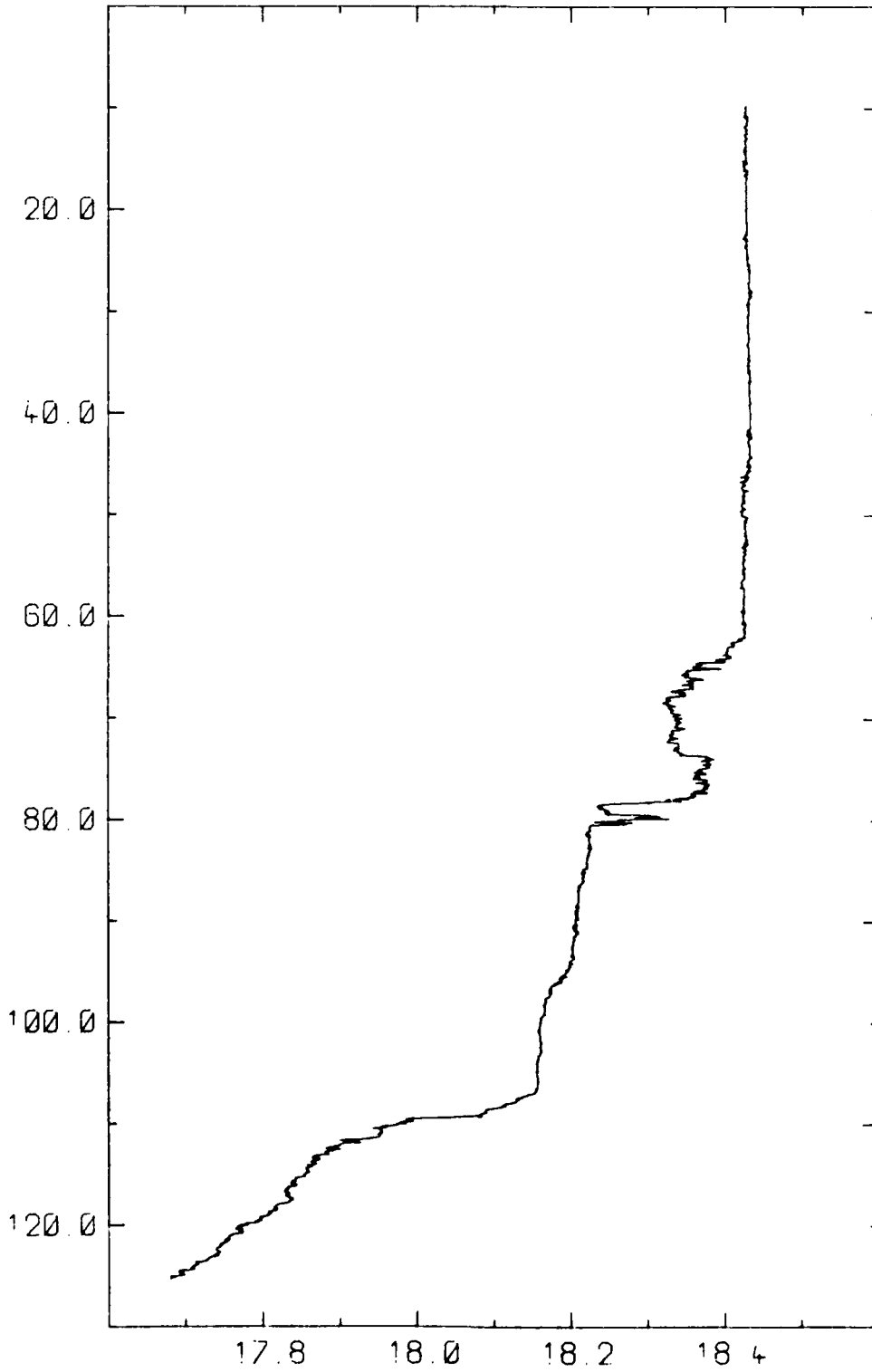


DATE 1/27/80
TIME 0239 GMT

TAPE F7B FILE 1
UNIT 2 79
10 0 DEG/M



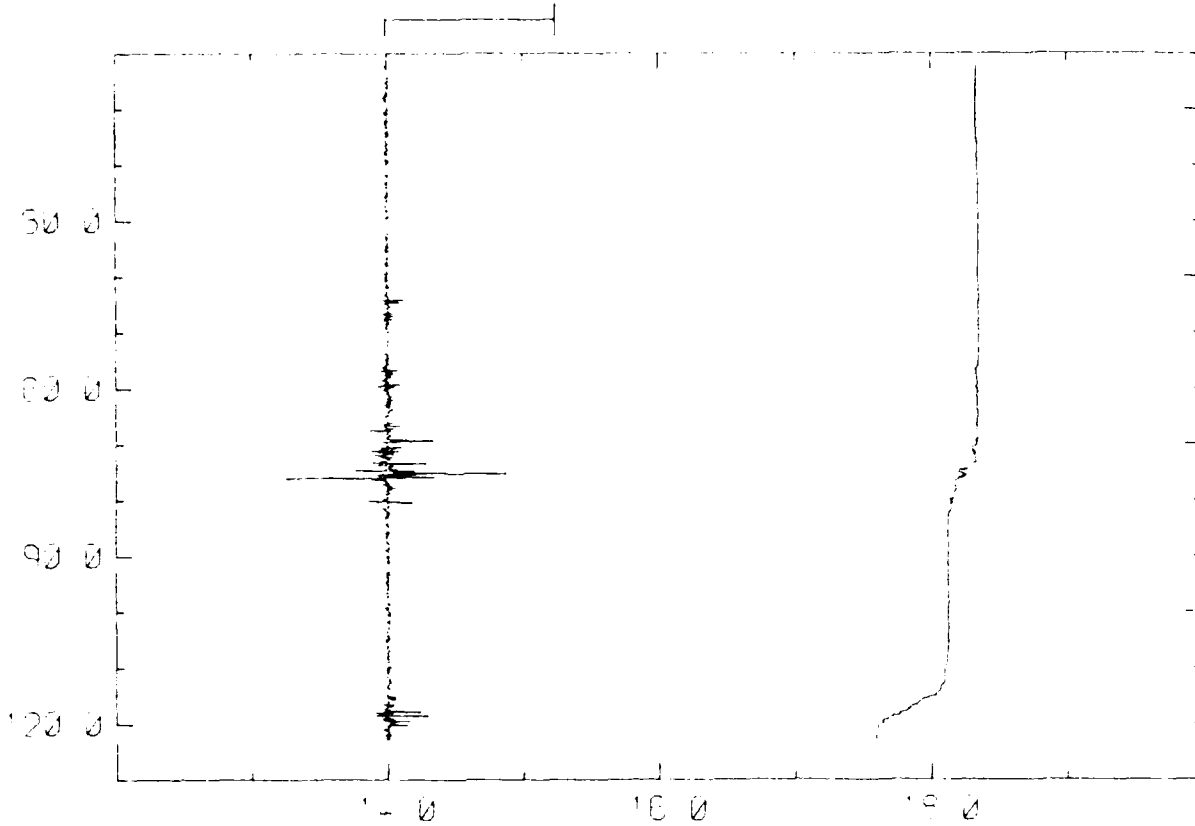
DATE 1/27/80
TIME 0403 GMT



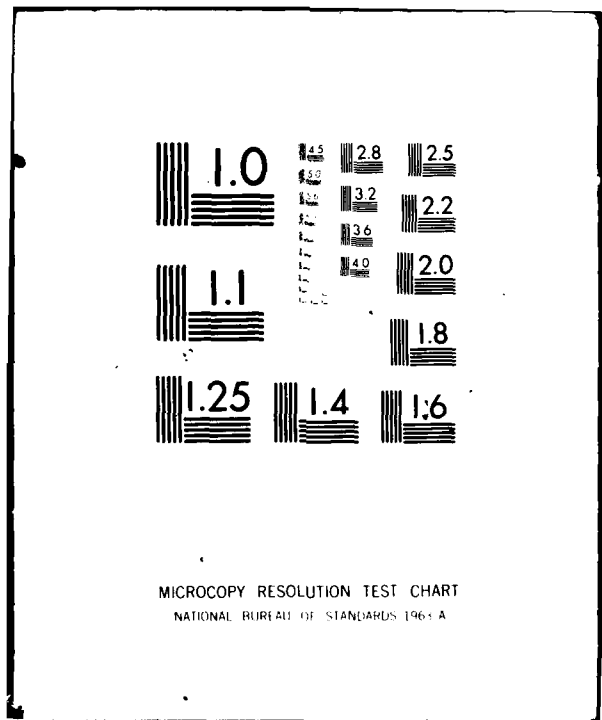
DATE 1/27/80
TIME 0403 GMT

TAPE FILE FILE 2
UNIT 2 79

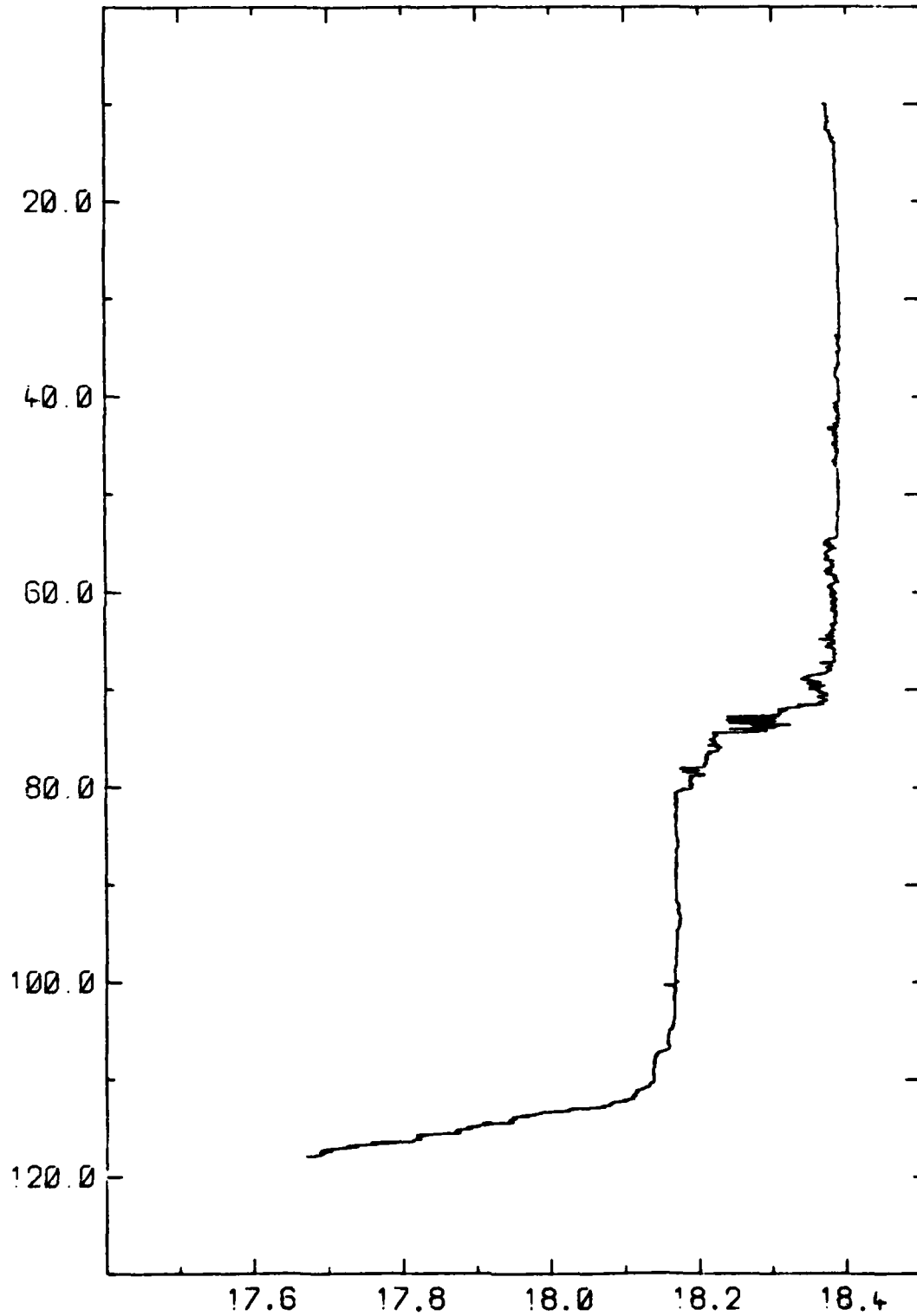
100 DEG/M



DATE 1/27/80
TIME 0-55 GMT



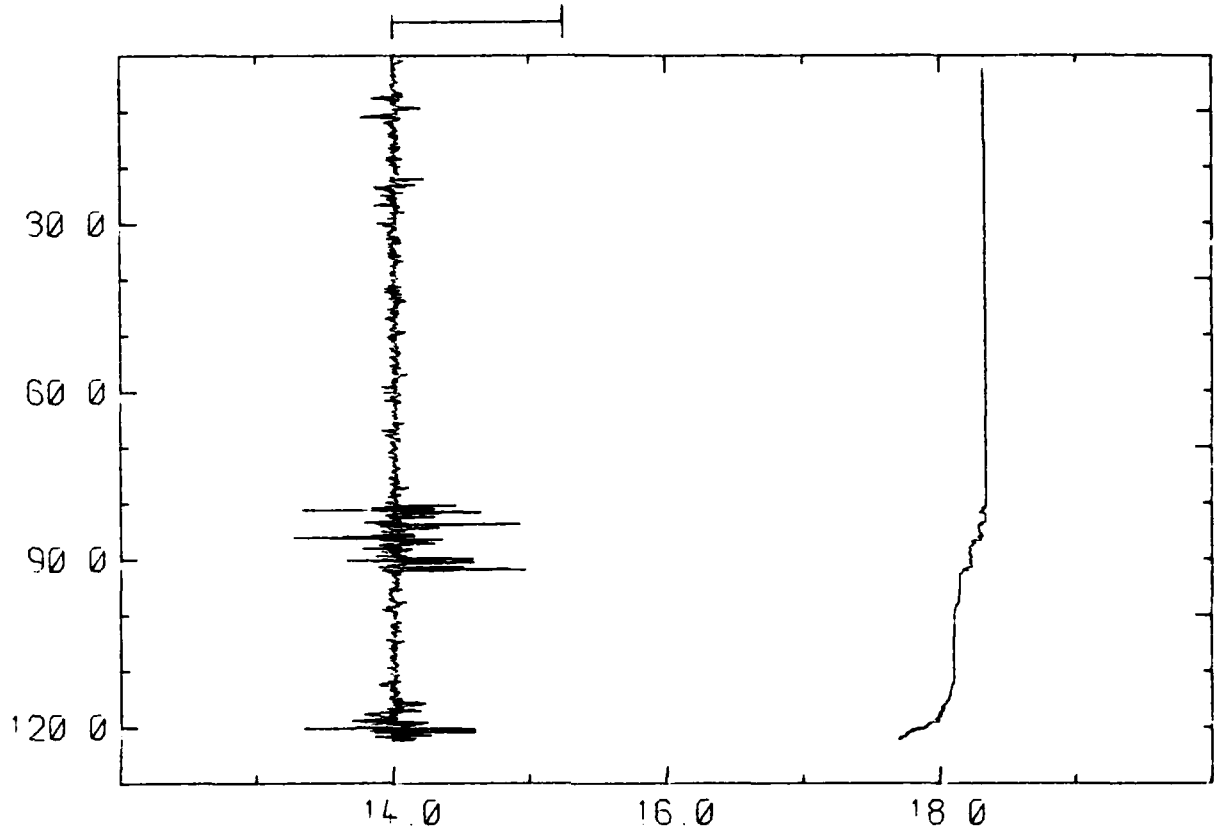
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963-A



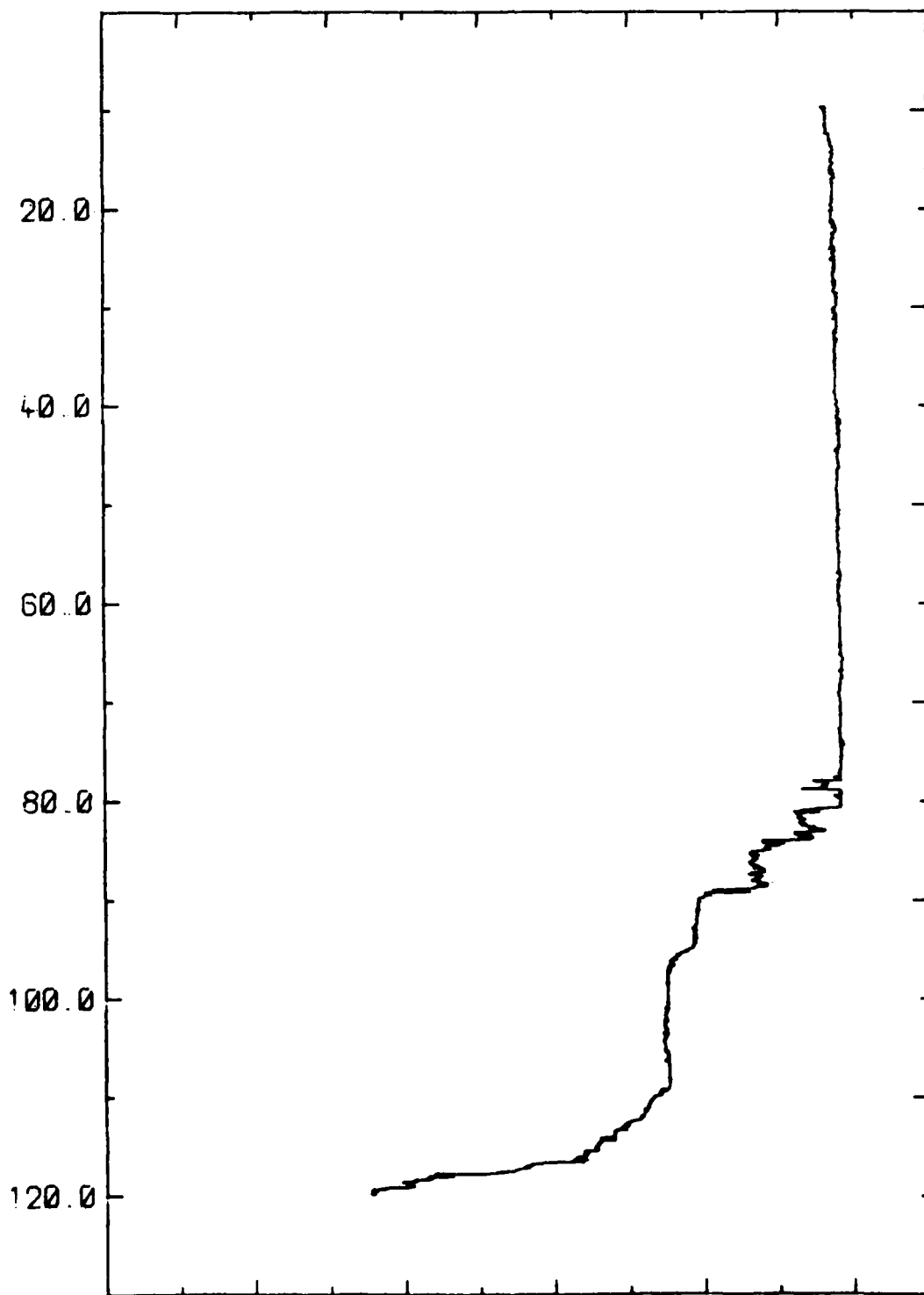
DATE 1/27/80
TIME 0455 GMT

TAPE F7C FILE 1
UNIT 2.79

3.0 DEG/M



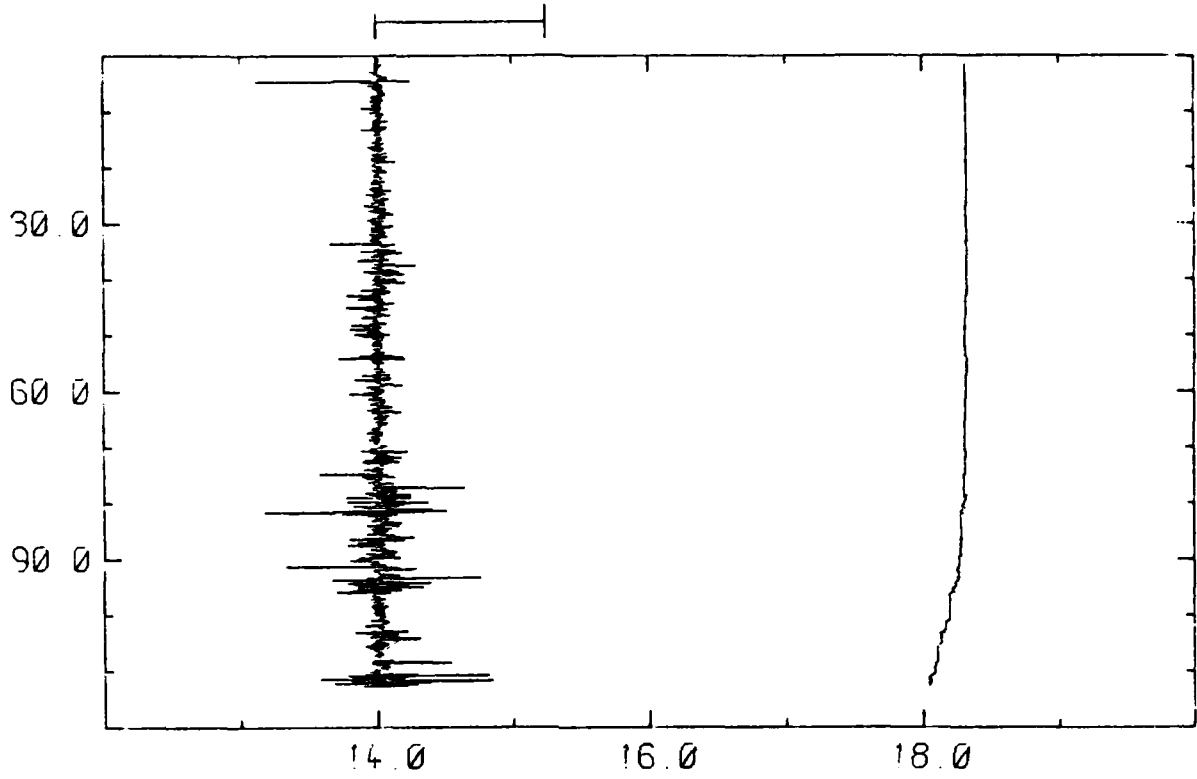
DATE 1/27/80
TIME 0529 GMT



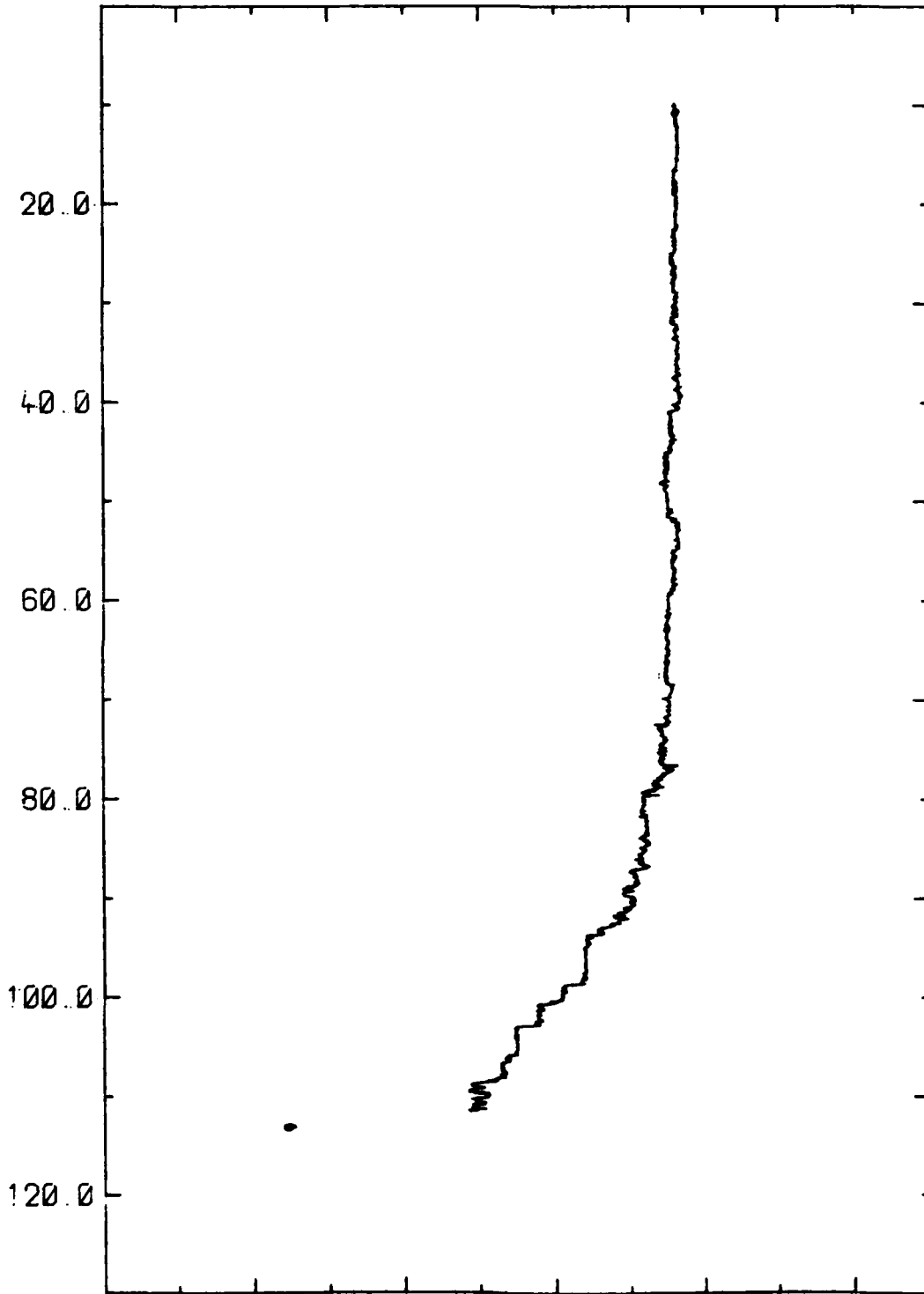
DATE 1/27/80
TIME 0429 GMT

TAPE F7C FILE 2
UNIT 2.79

3.0 DEG/M



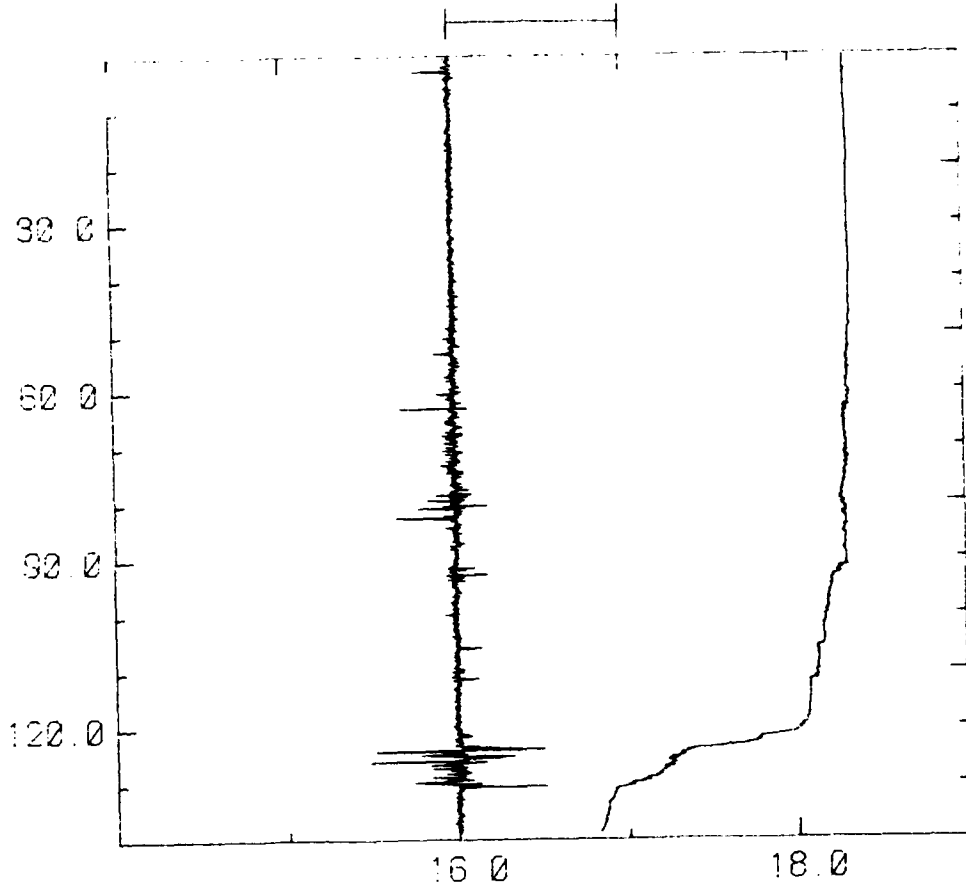
DATE 1/27/80
TIME 0549 GMT



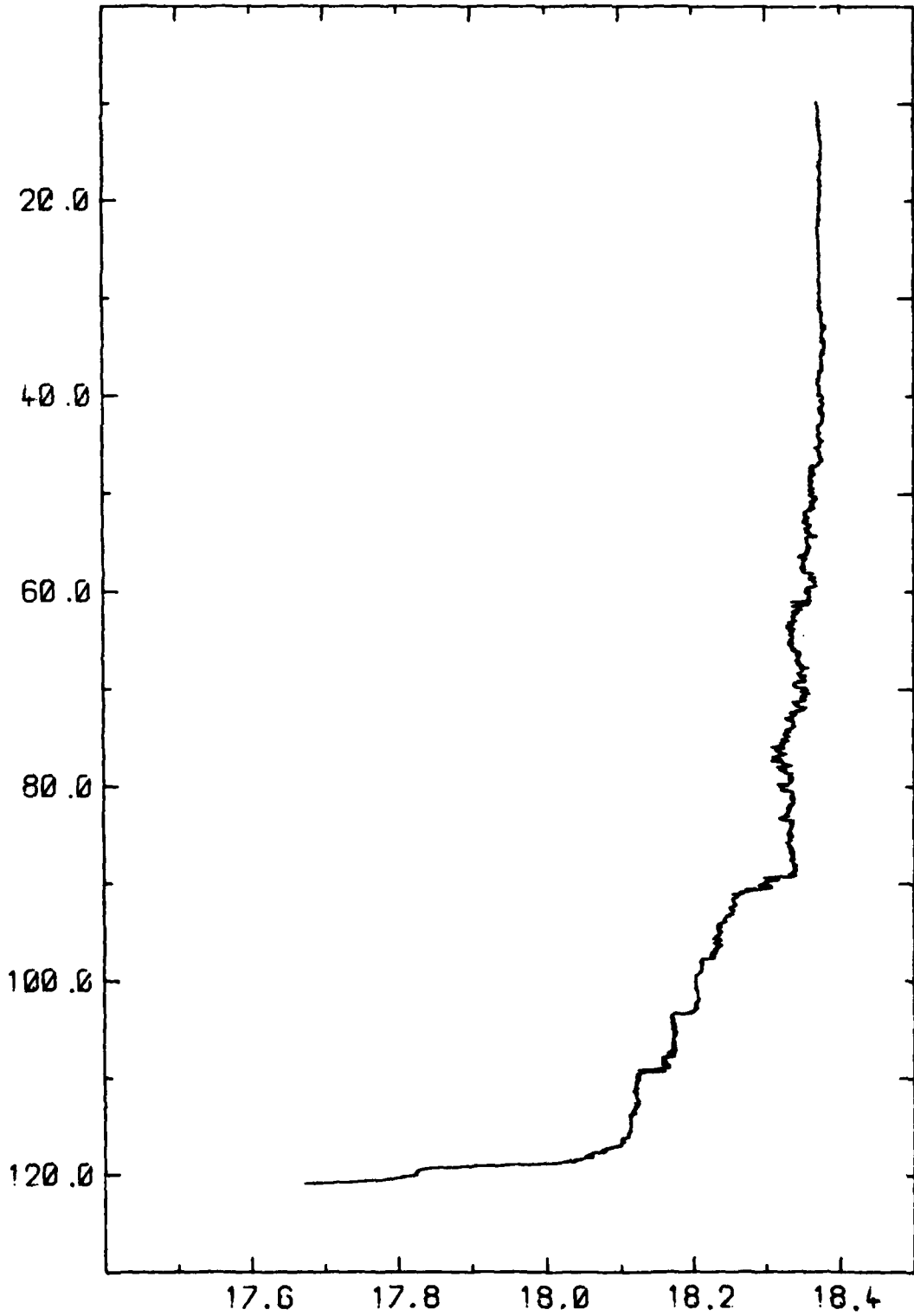
17.8 18.0 18.2 18.4 18.6
DATE 1/27/80
TIME 0449 GMT

TAPE F7C FILE 5
UNIT 2.79

10 0 DEG/M



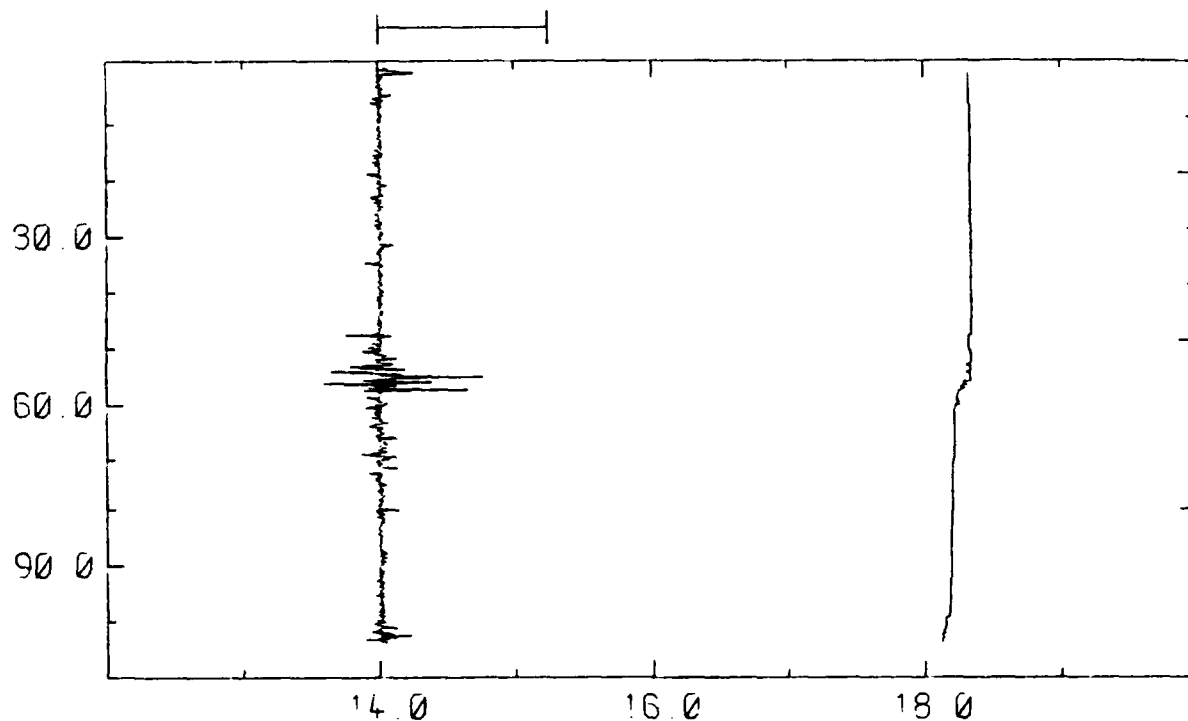
DATE 1/27/80
TIME 0616 GMT



DATE 1/27/80
TIME 0616 GMT

TAPE F7D FILE 1
UNIT 7 79

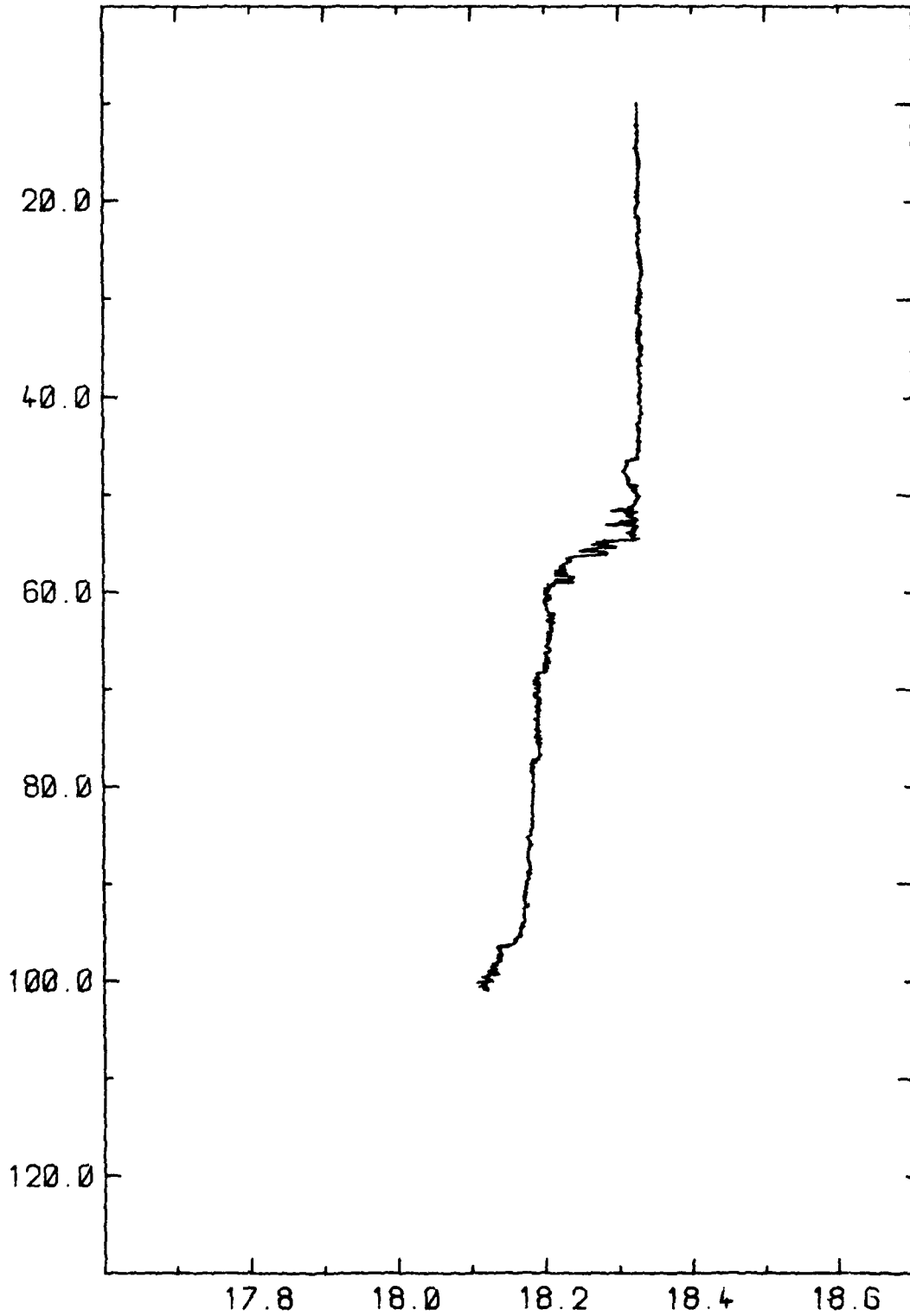
3.0 DEG/M



DATE 1/27/80
TIME 0743 GMT

100

TAPE F70 FILE 1
UNIT 7.79

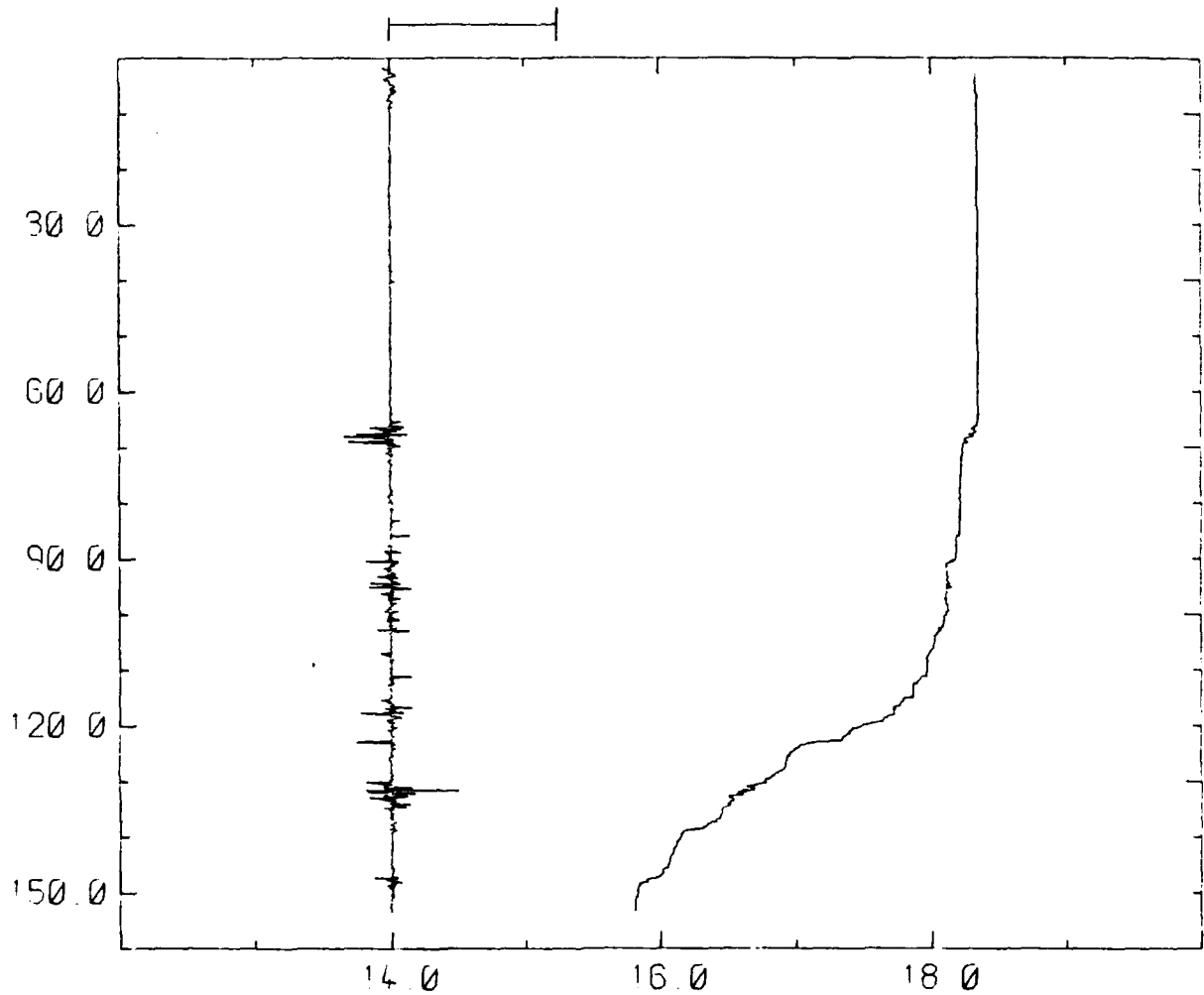


DATE 1/27/80
TIME 0743 GMT

TAPE F7D FILE 2
UNIT 7.79

101

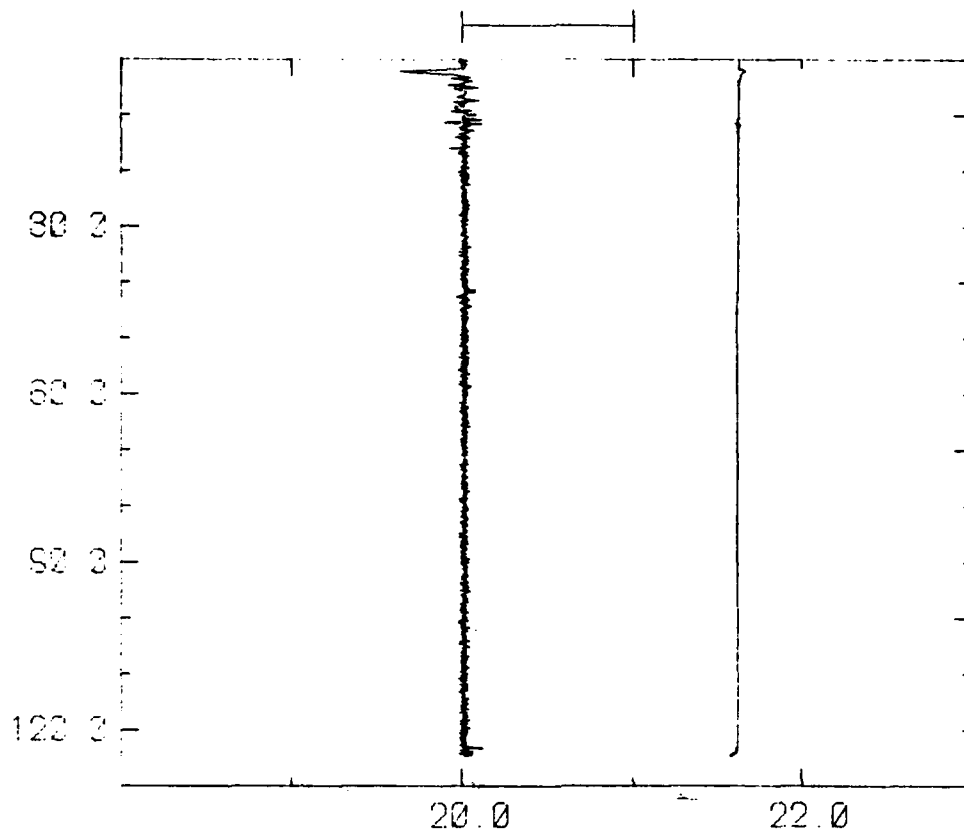
10.0 DEG/M



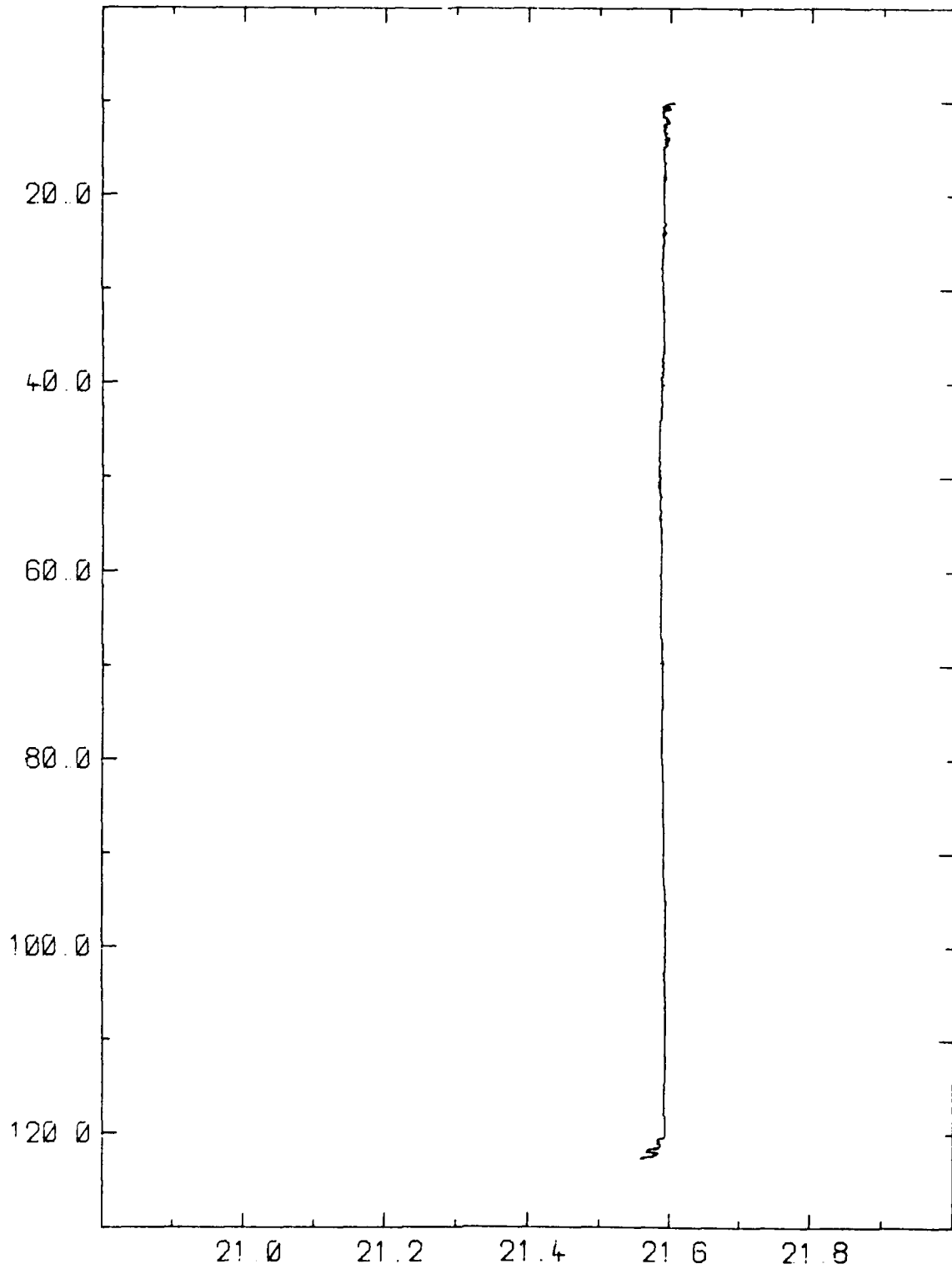
DATE 1/27/80
TIME 0758 GMT

TAPE F8A FILE 5
UNIT 7.79

3.0 DEG/M

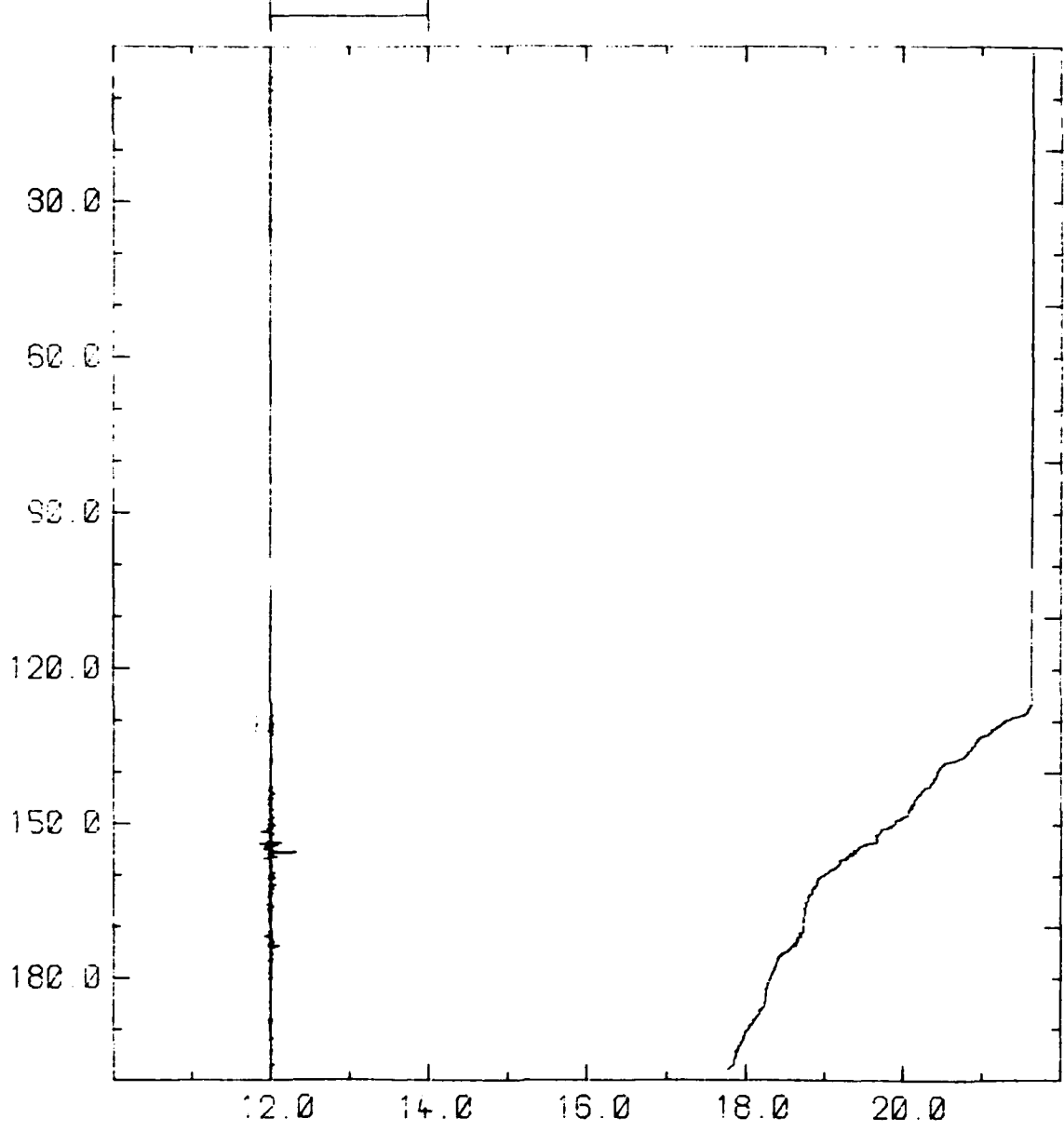


DATE 1/28/80
TIME 2118 GMT



DATE 1/28/80
TIME 2118 GMT

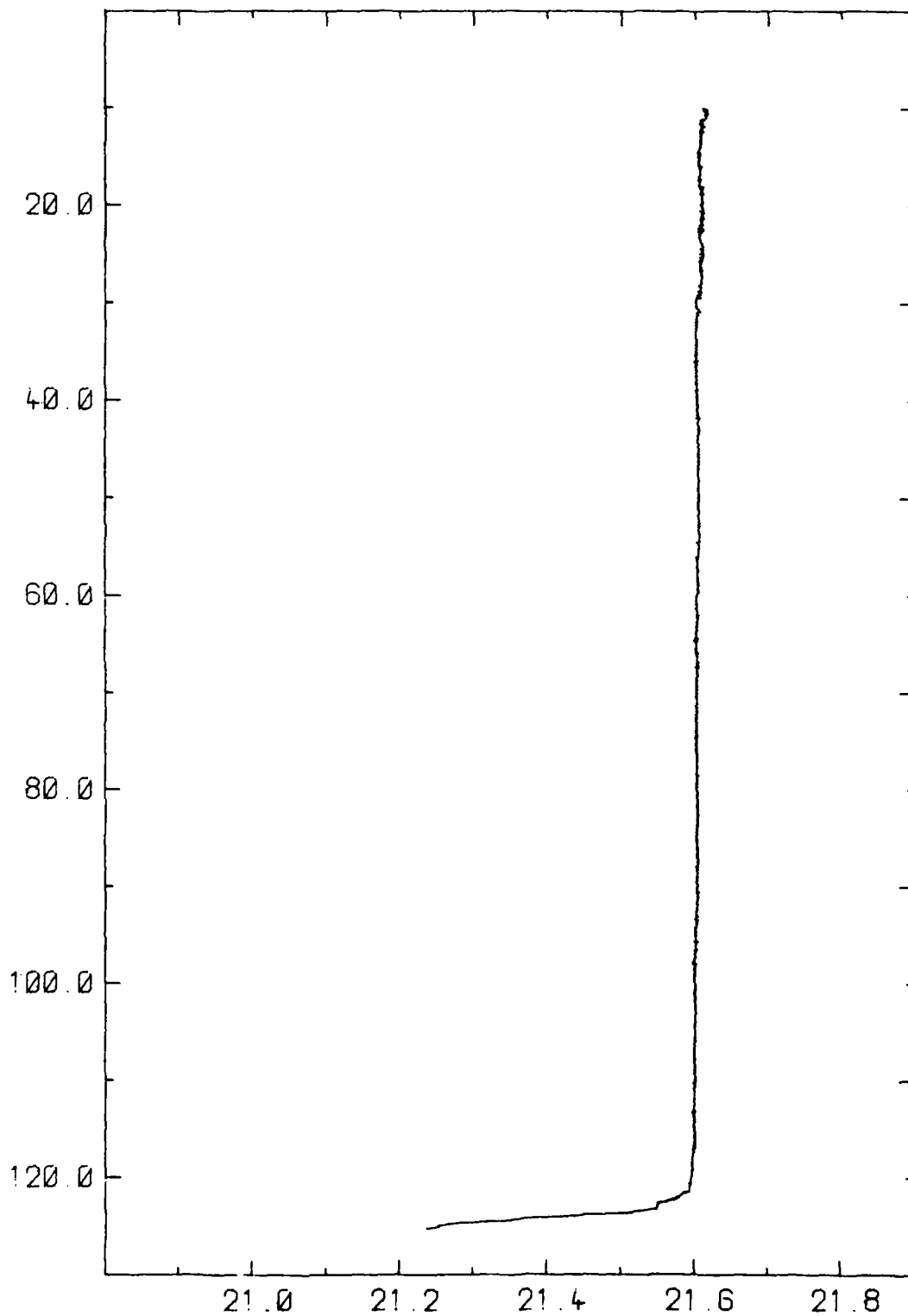
TAPE F8A FILE 6
UNIT 7.79
30.0 DEG/M



DATE 1/28/80
TIME 2147 GMT

TAPE F8A FILE 6
UNIT 7.79

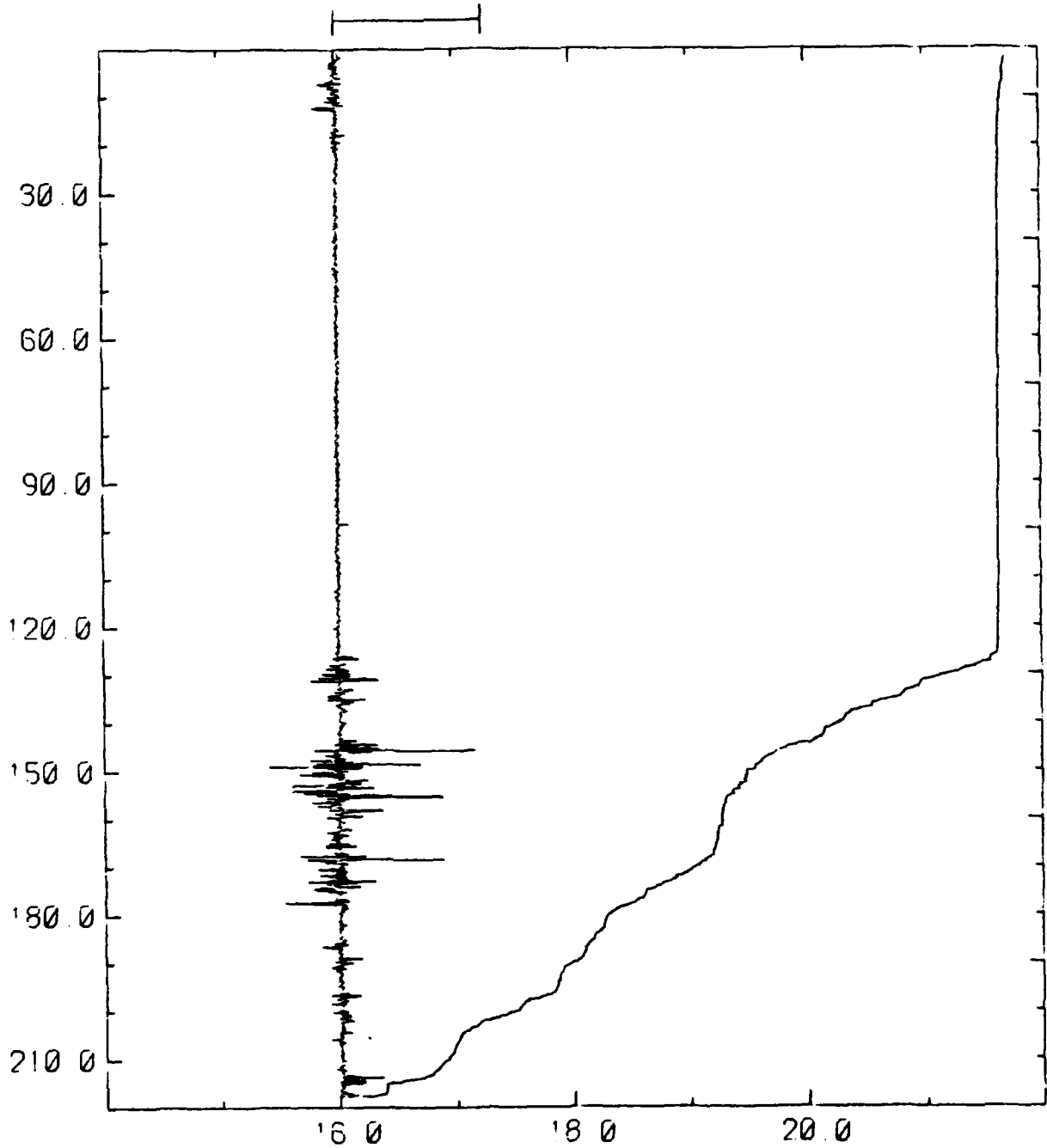
105



DATE 1/28/80
TIME 2147 GMT

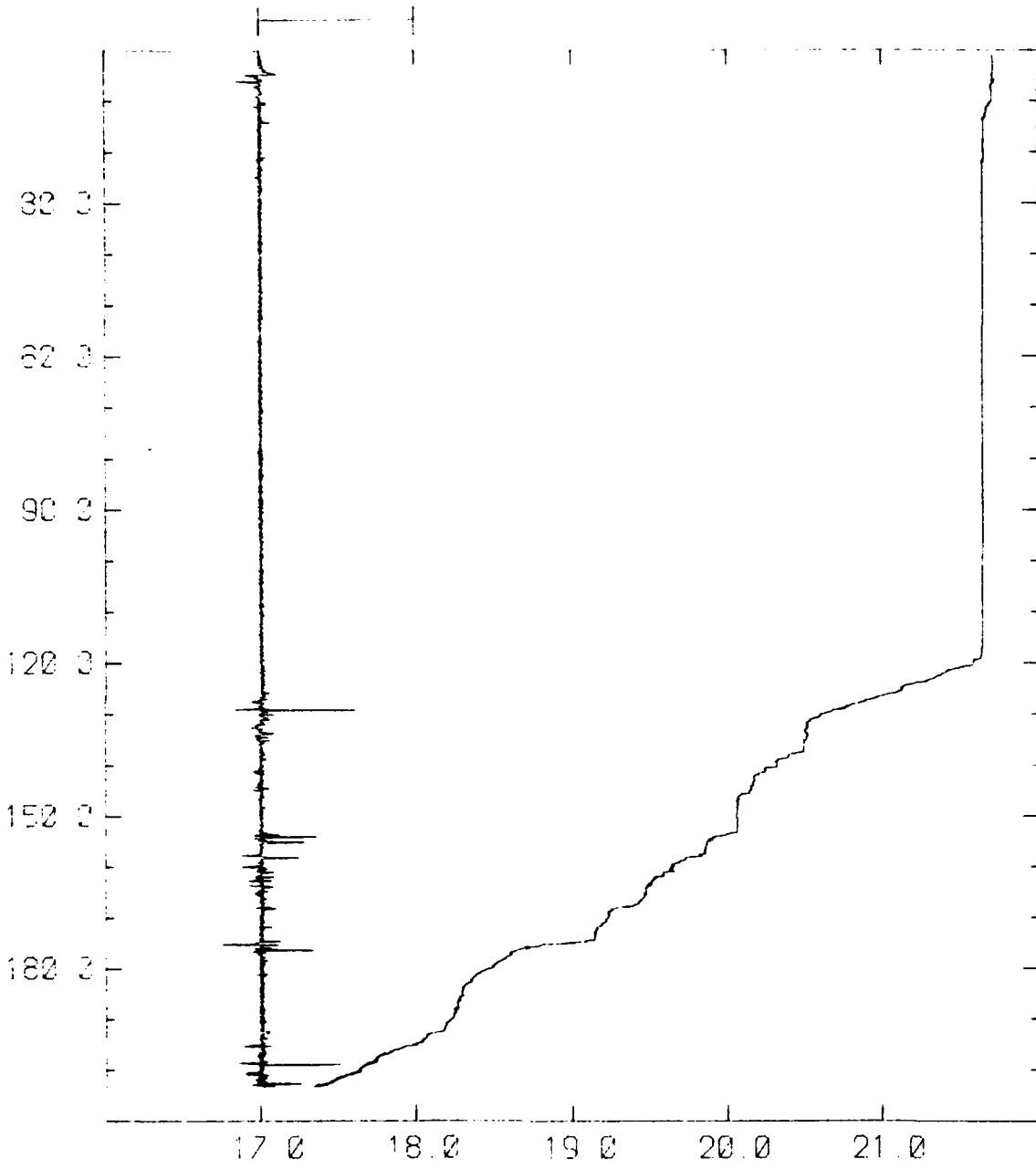
TAPE F8B FILE 1
UNIT 7.79

3.0 DEG/M

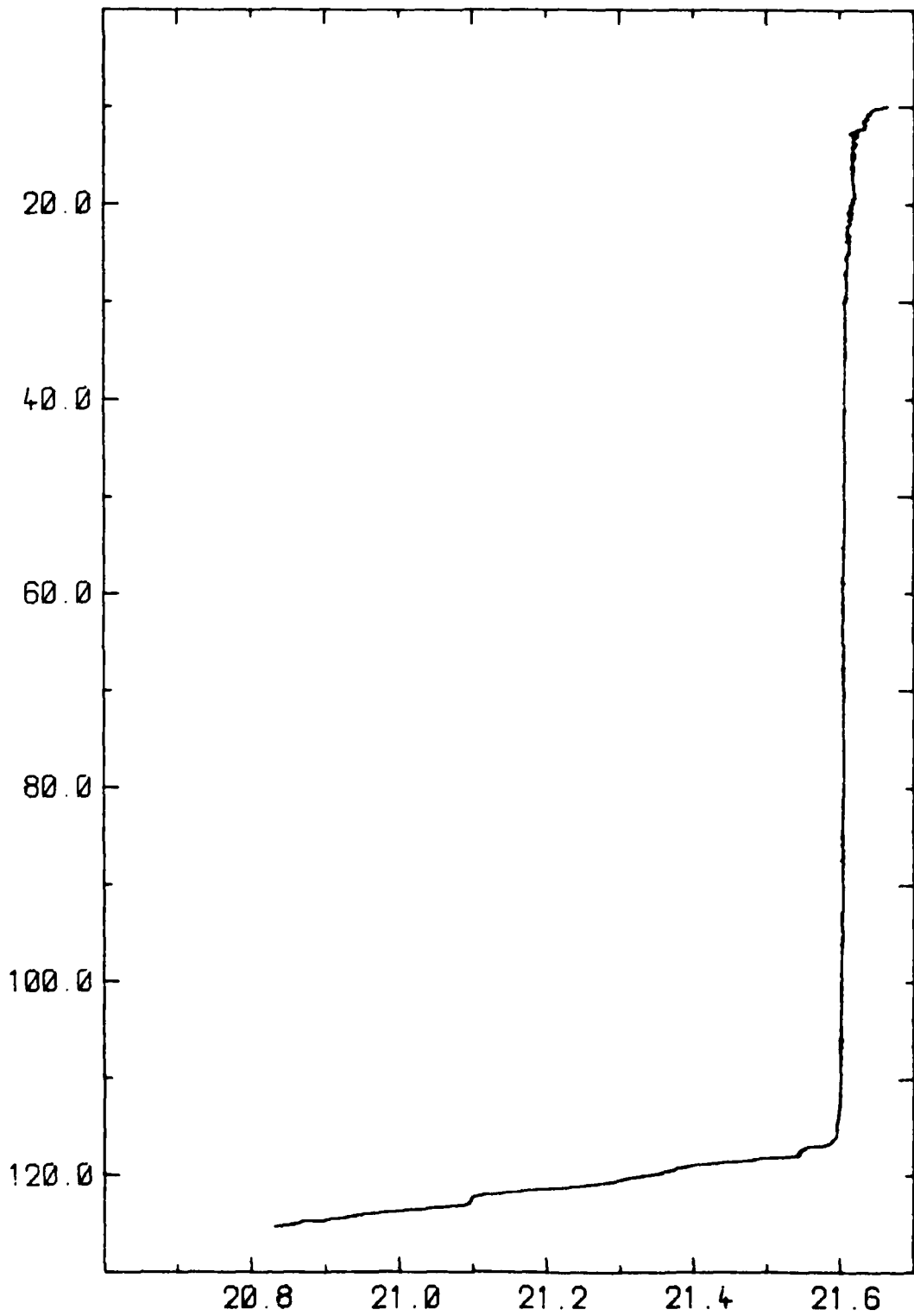


DATE 1/28/80
TIME 2236 GMT

TAPE F8B FILE 2
UNIT 7.79
10 0 DES.M



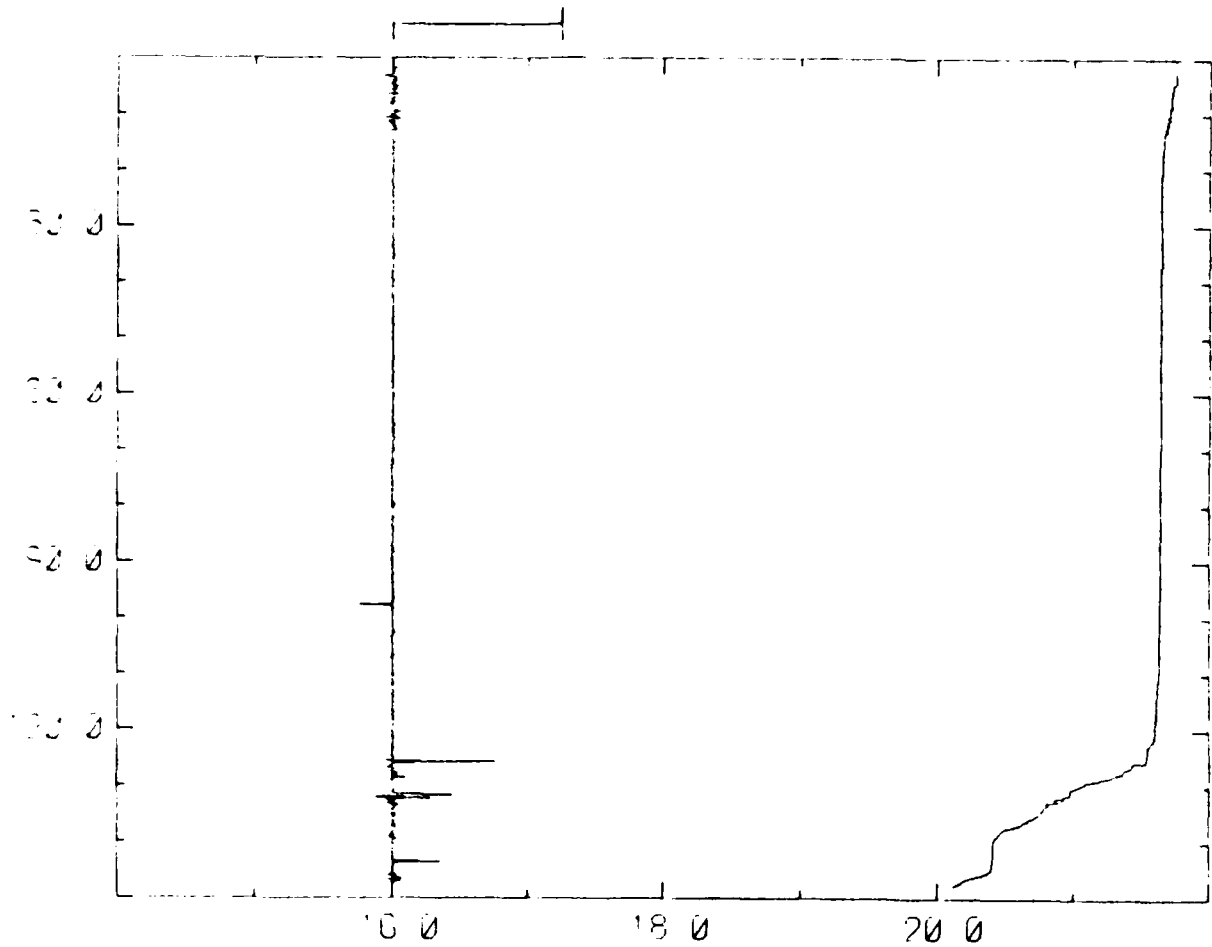
DATE 1/28/80
TIME 2312 GMT



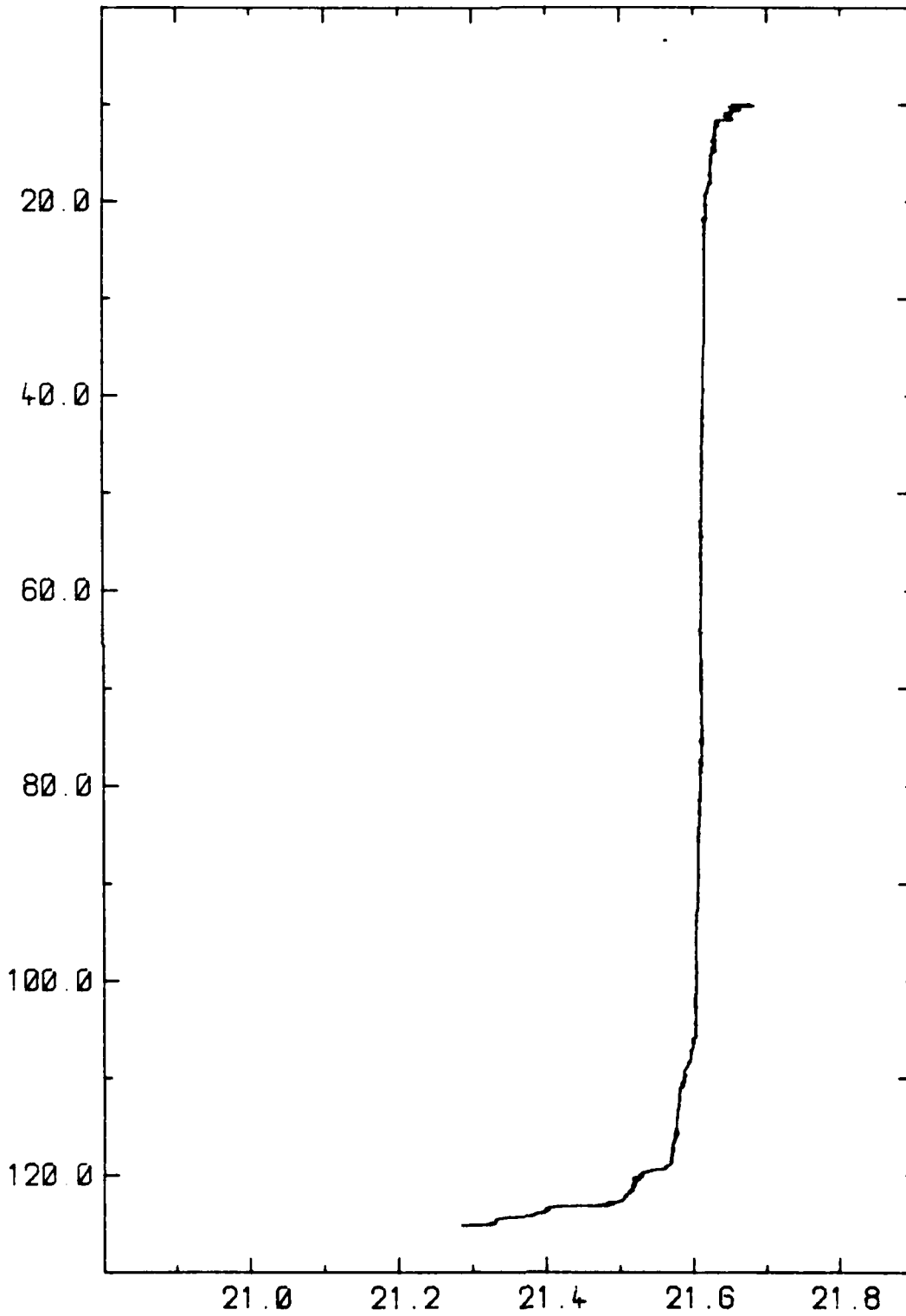
DATE 1/28/80
TIME 2312 GMT

TAPE F80 FILE 1
UNIT 7 79

0 0 DEG/M

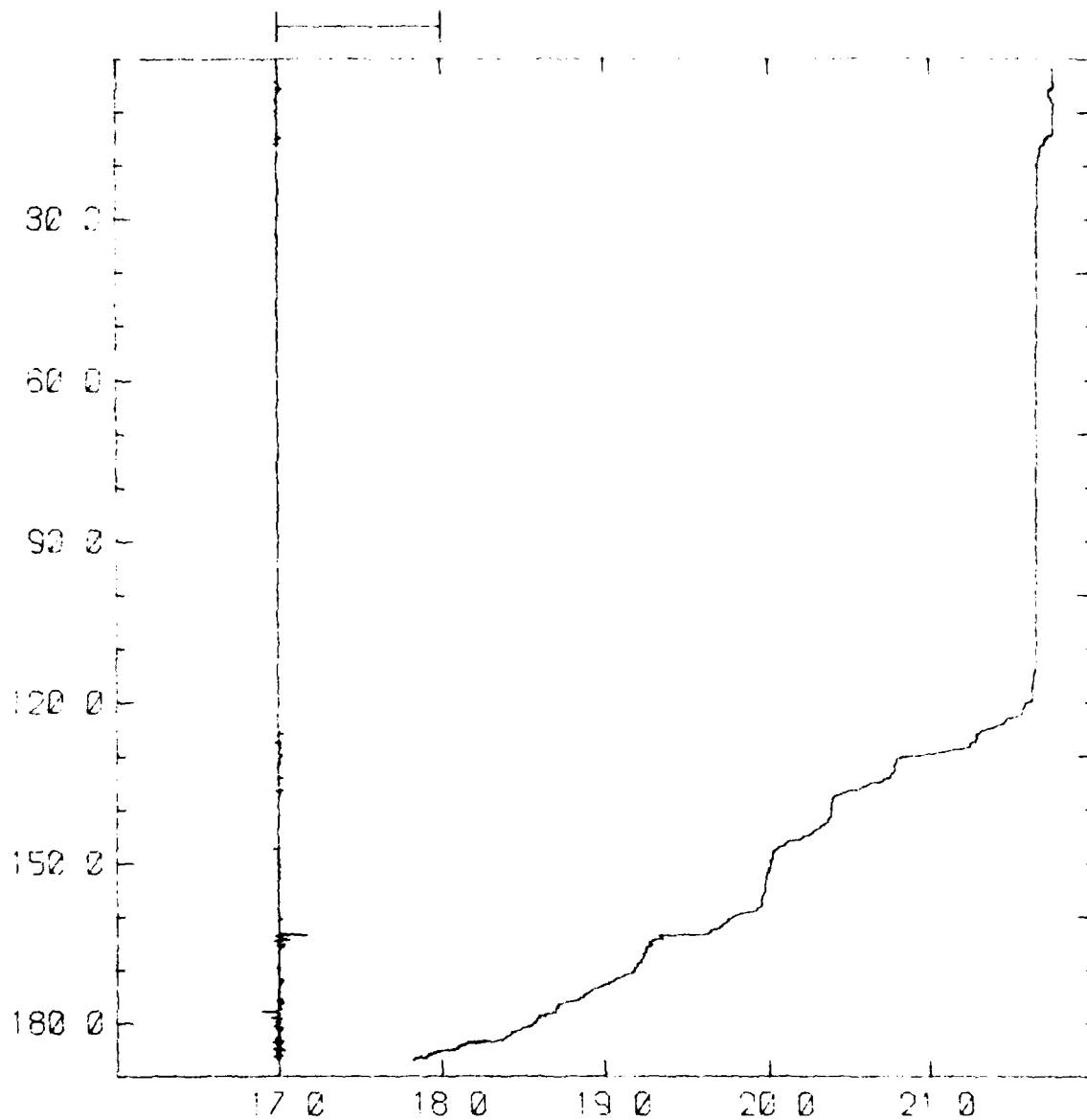


DATE 1/28/80
TIME 2346 GMT



DATE 1/28/80
TIME 2346 GMT

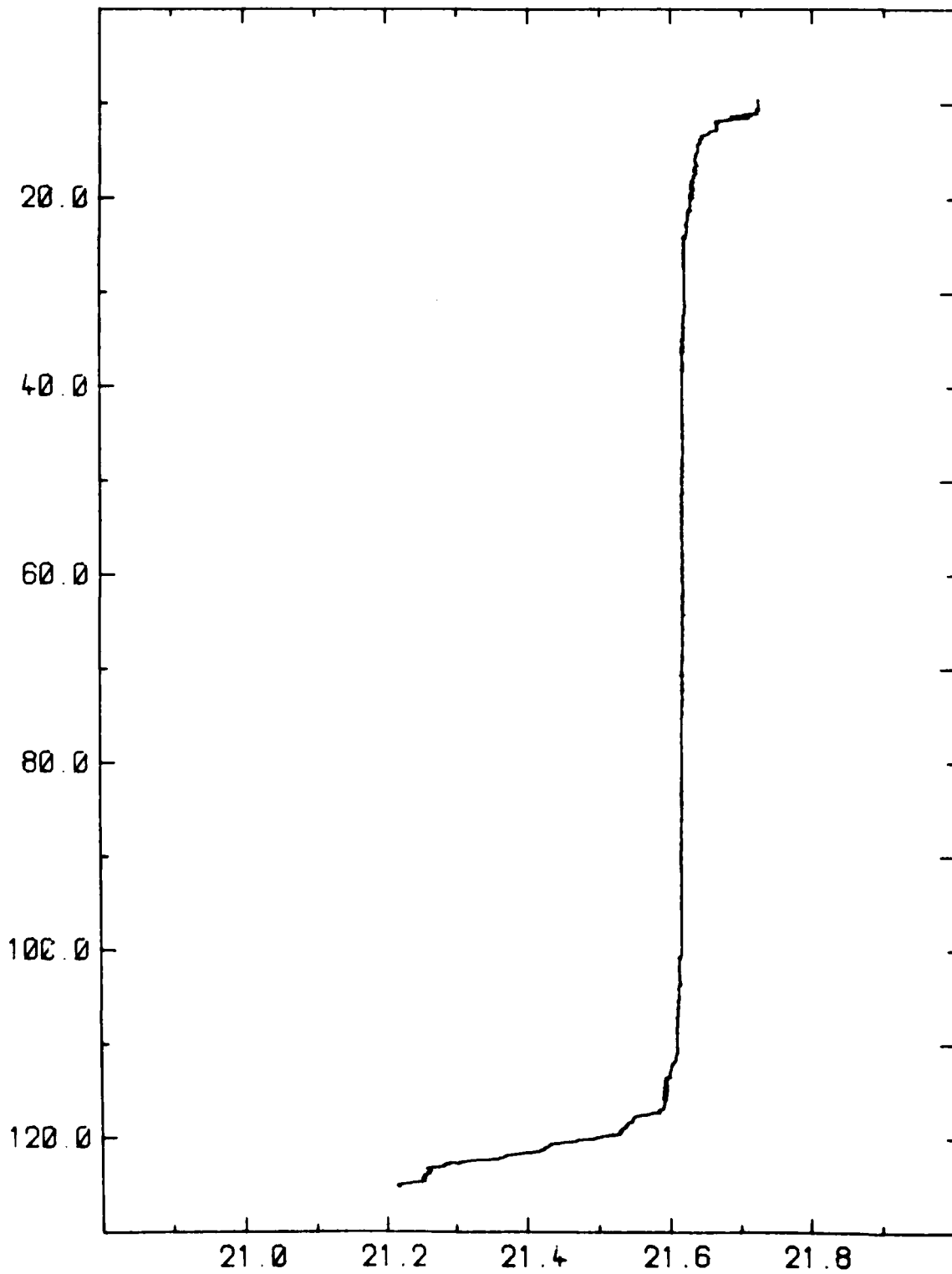
TAPE F80 FILE 2
UNIT 7 79
30.0 DEG/M



DATE 1/28/80
TIME 0019 GMT

112

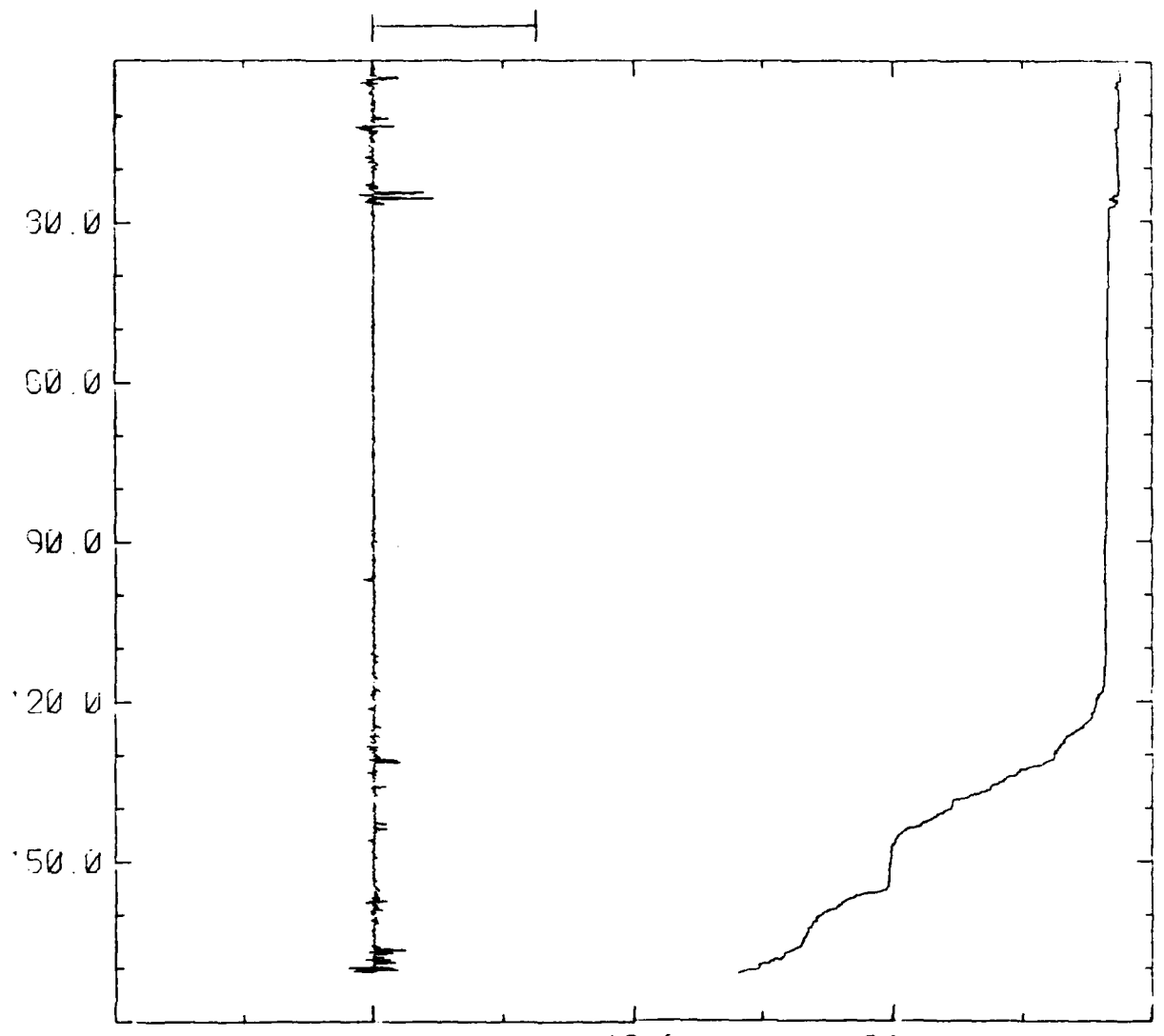
TAPE F8C FILE 2
UNIT 7.79



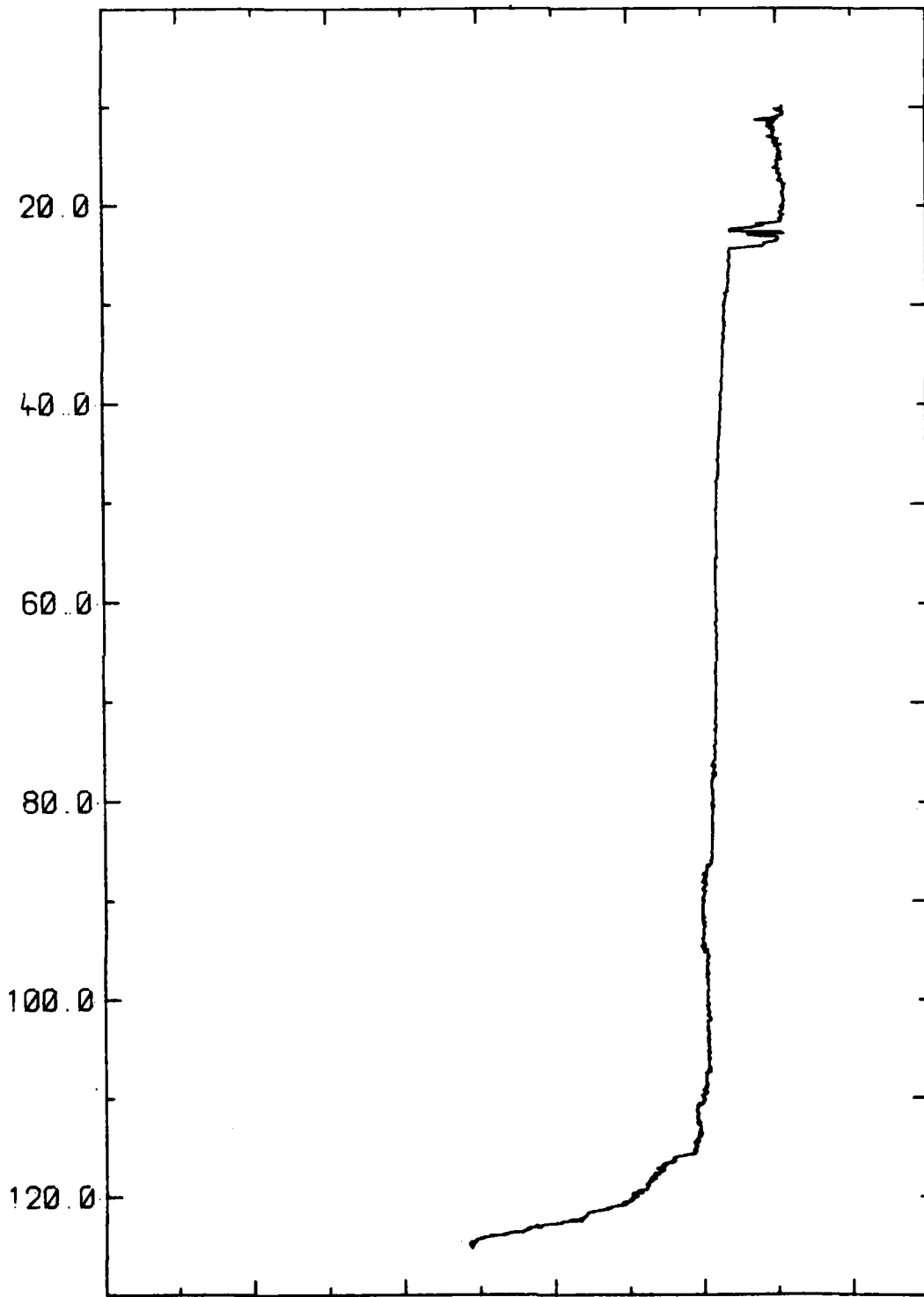
DATE 1/29/80
TIME 0019 GMT

TAPE F80 FILE 1
UNIT 7.79

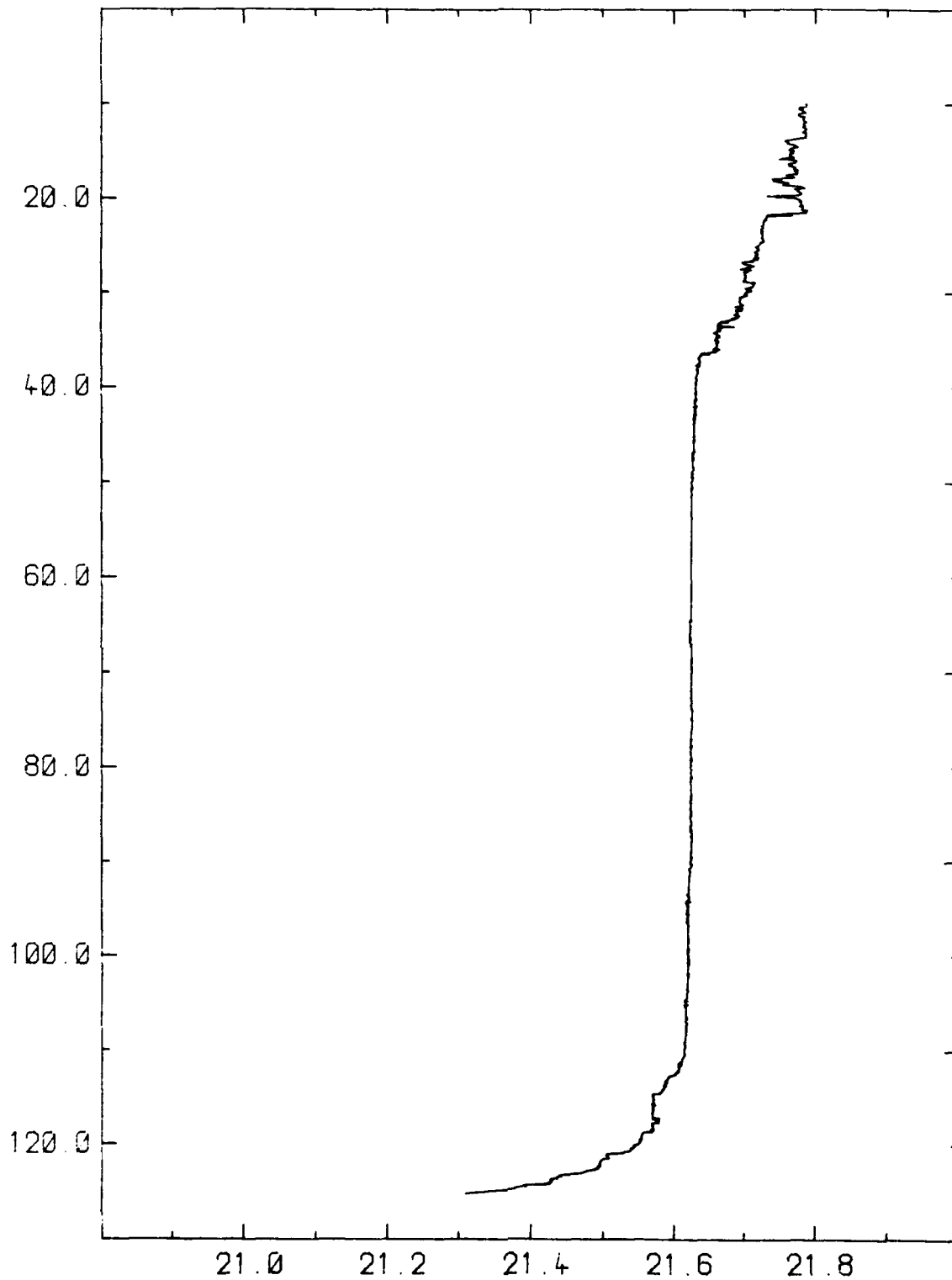
10.0 DEG/M



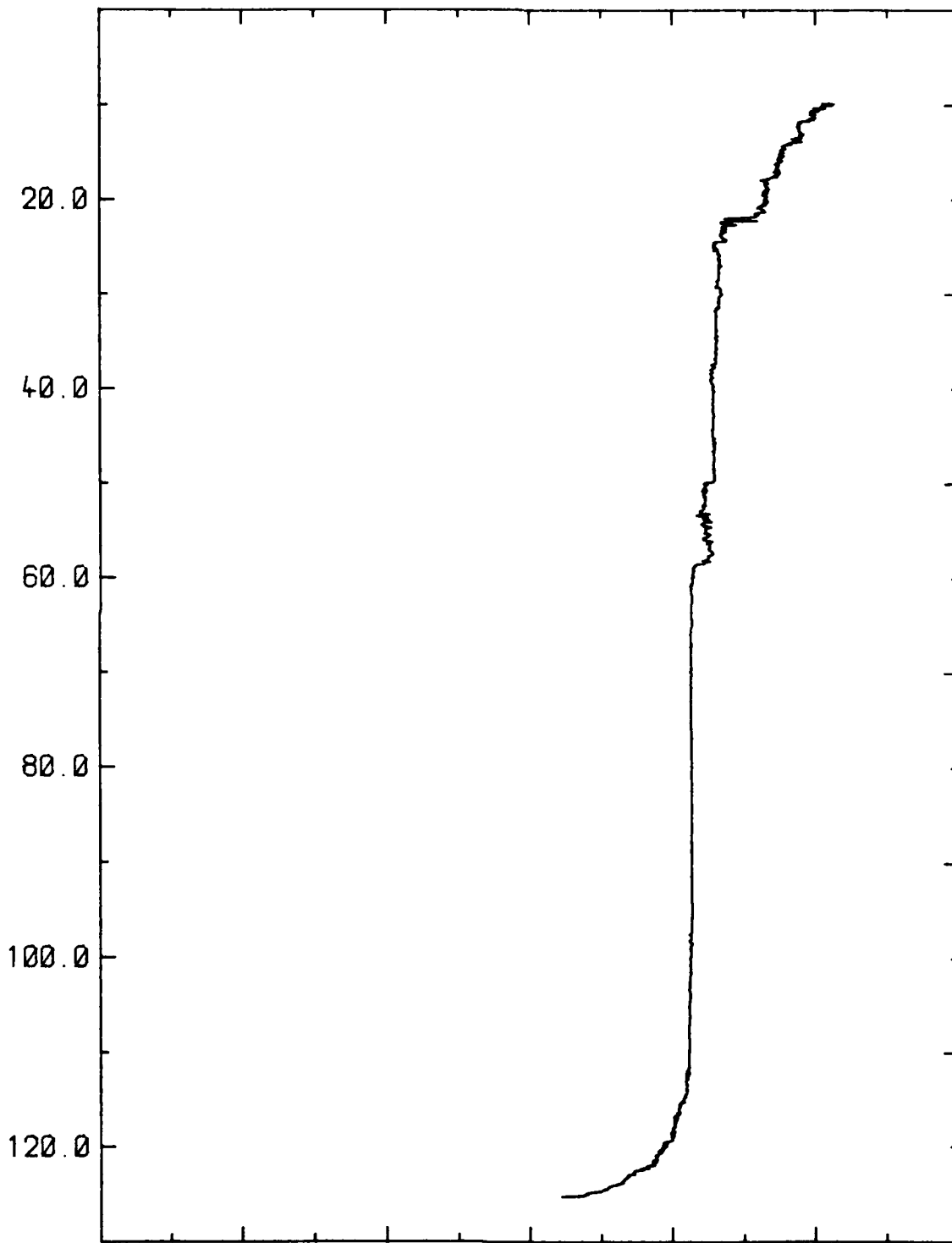
DATE 1/29/80
TIME 0055 GMT



21.0 21.2 21.4 21.6 21.8
DATE 1/29/80
TIME 0055 GMT



DATE 1/29/80
TIME 0135 GMT

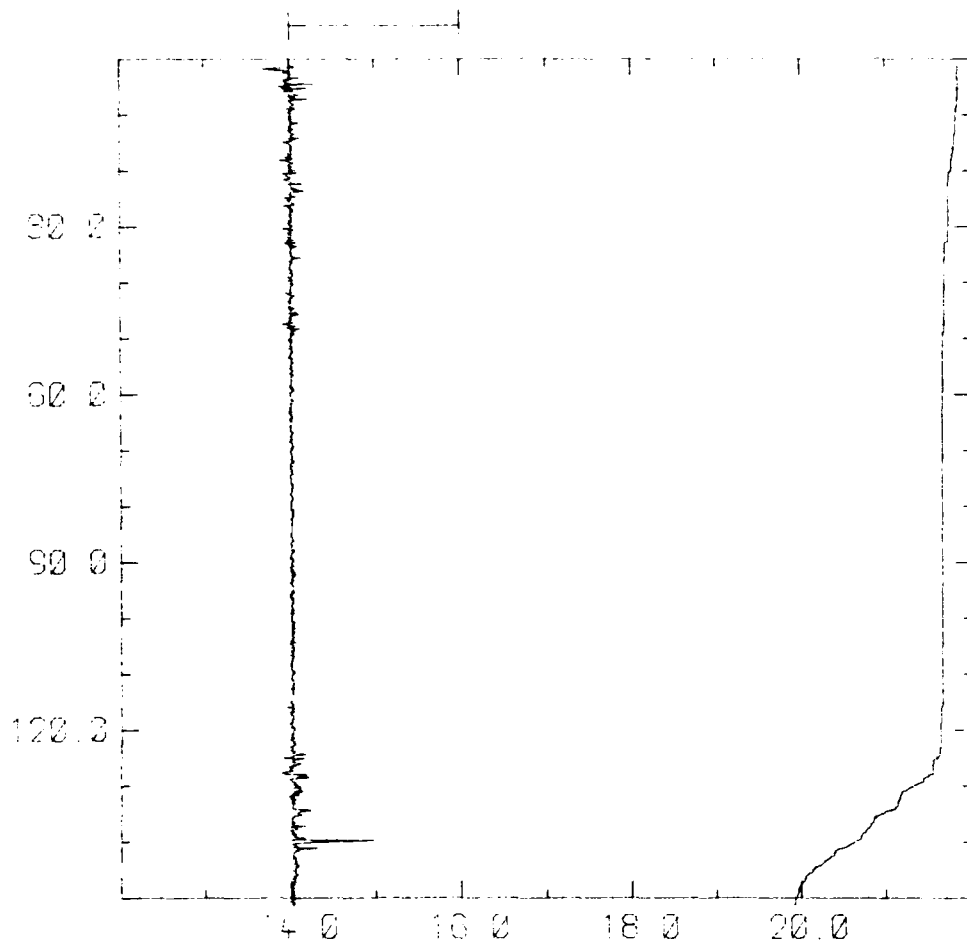


DATE 1/29/80
TIME 0209 GMT

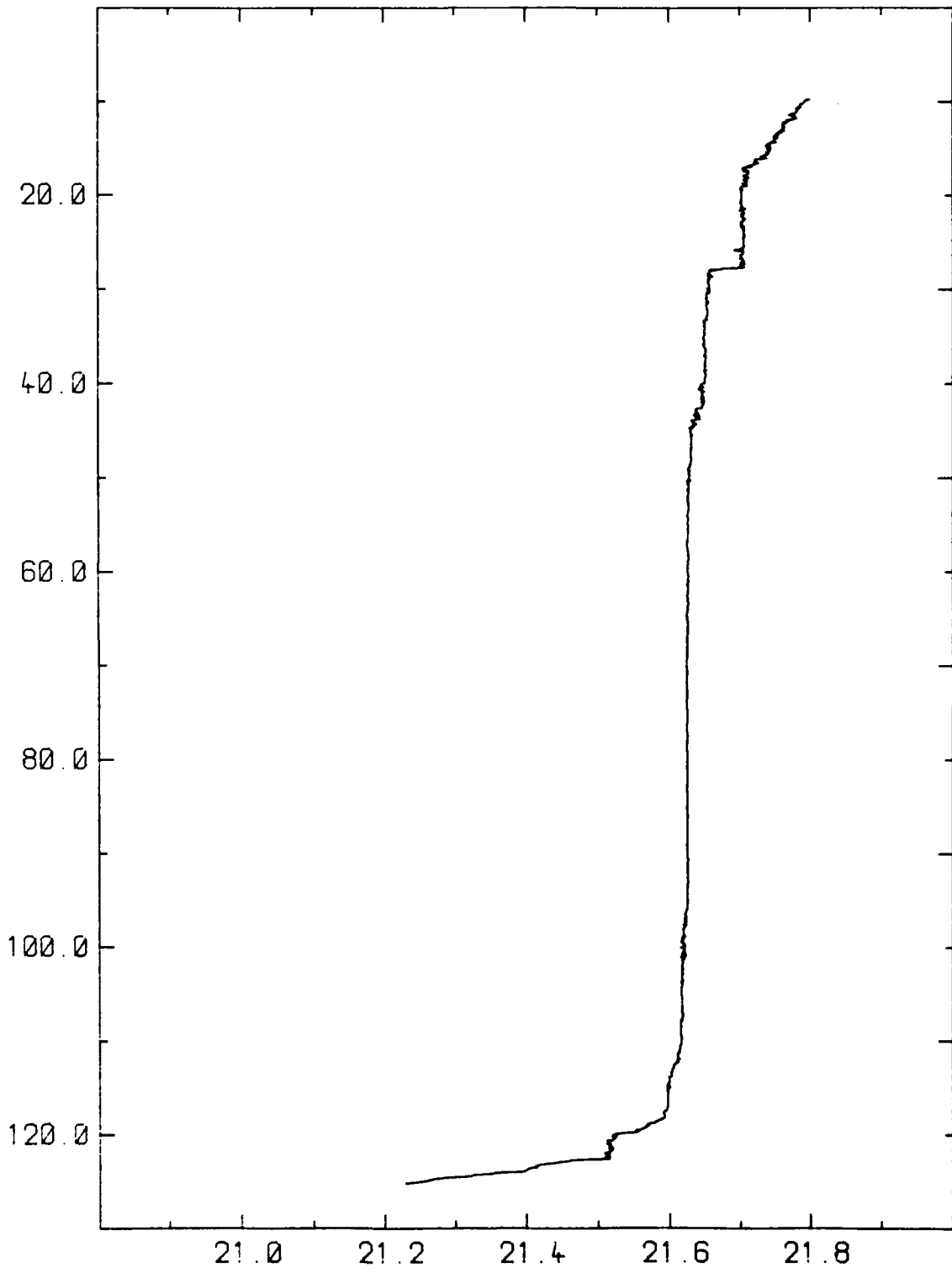
TAPE P8E FILE 2

UNIT 7 79

S P DEG/M



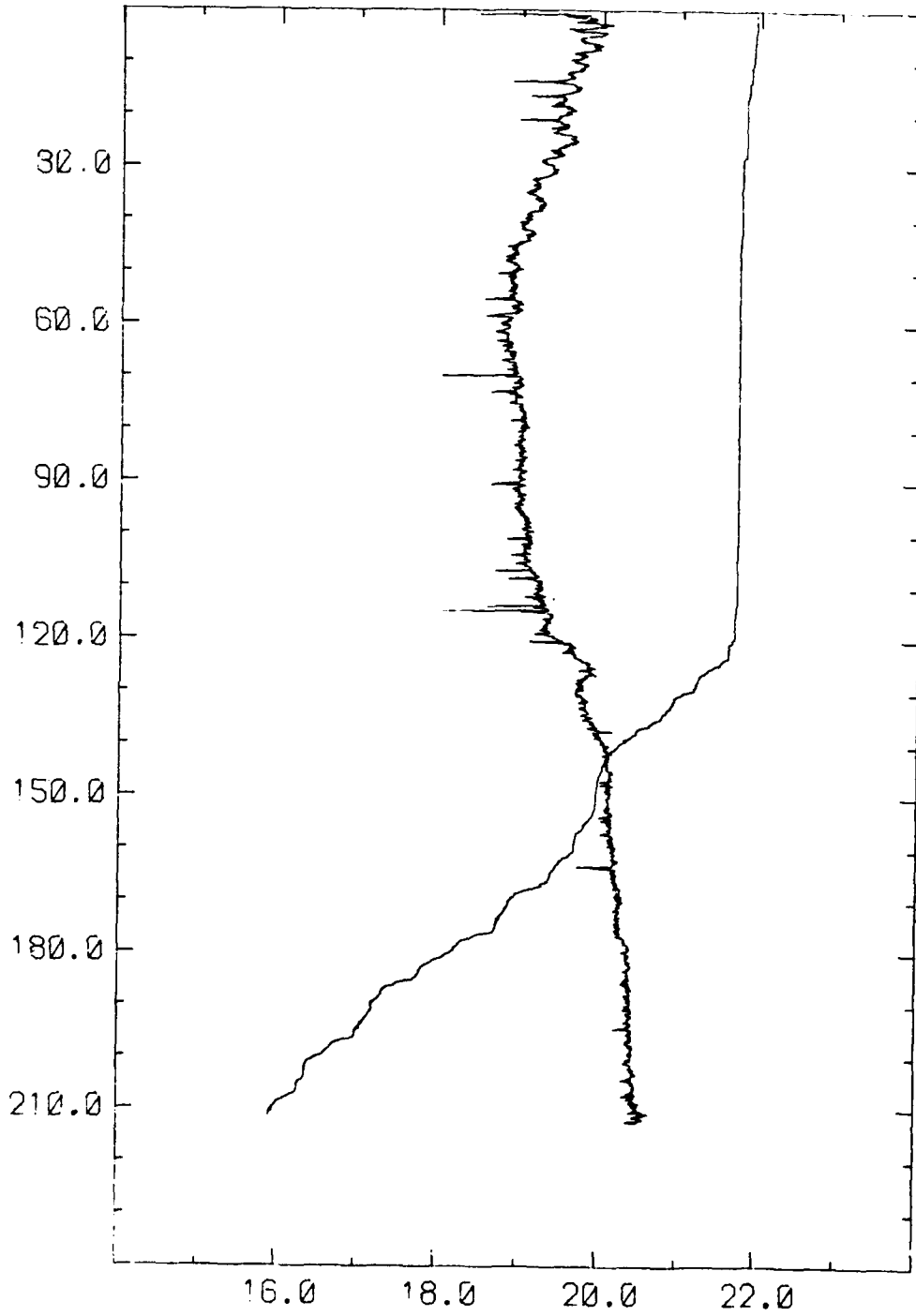
DATE 1/29/60
TIME 0229 GMT



DATE 1/29/80
TIME 0229 GMT

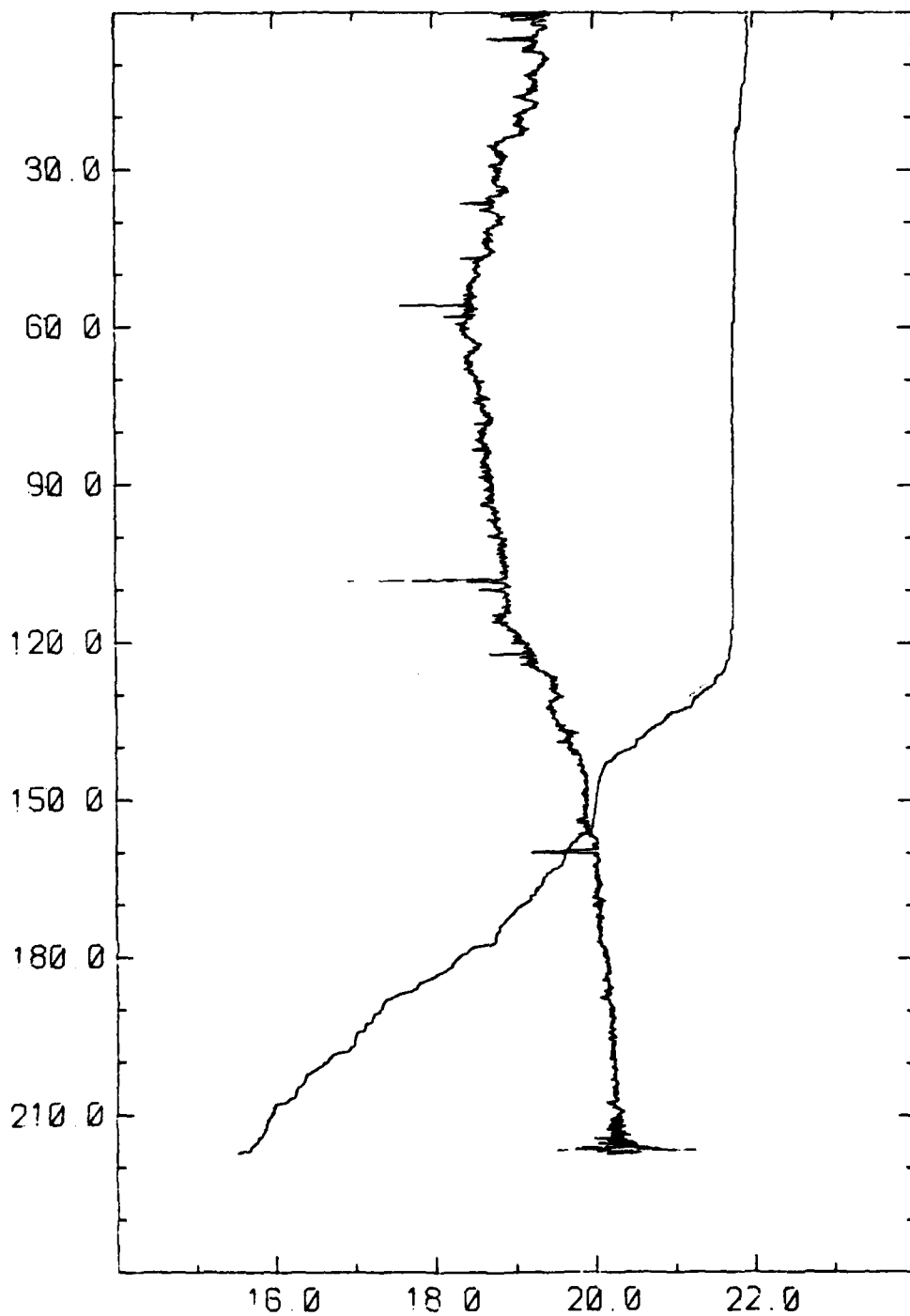
TAPE F8E FILE 2
UNIT 7 79

119



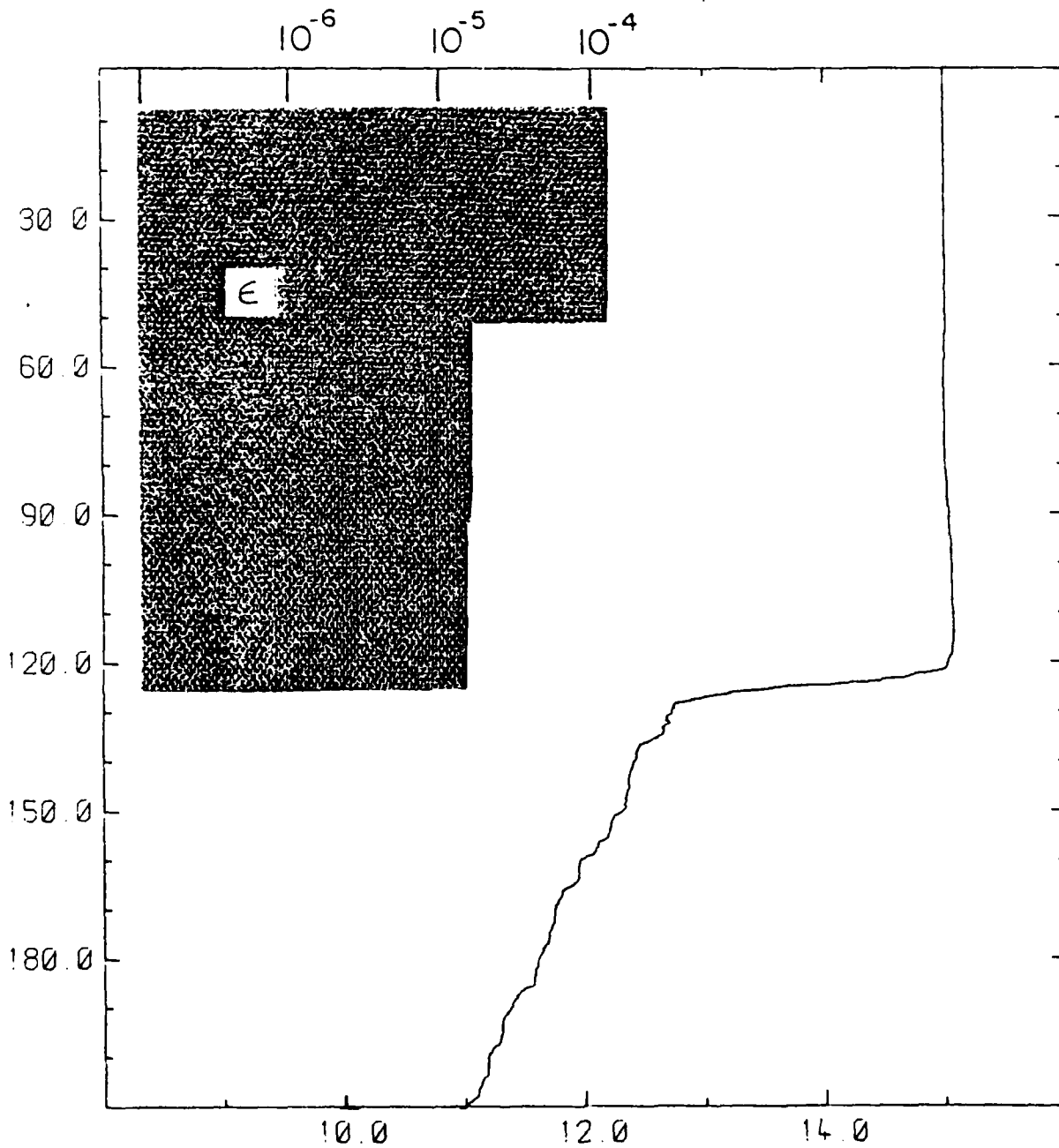
DATE 1/29/80
TIME 0229 GMT

TAPE F8E FILE 1
UNIT 7.79



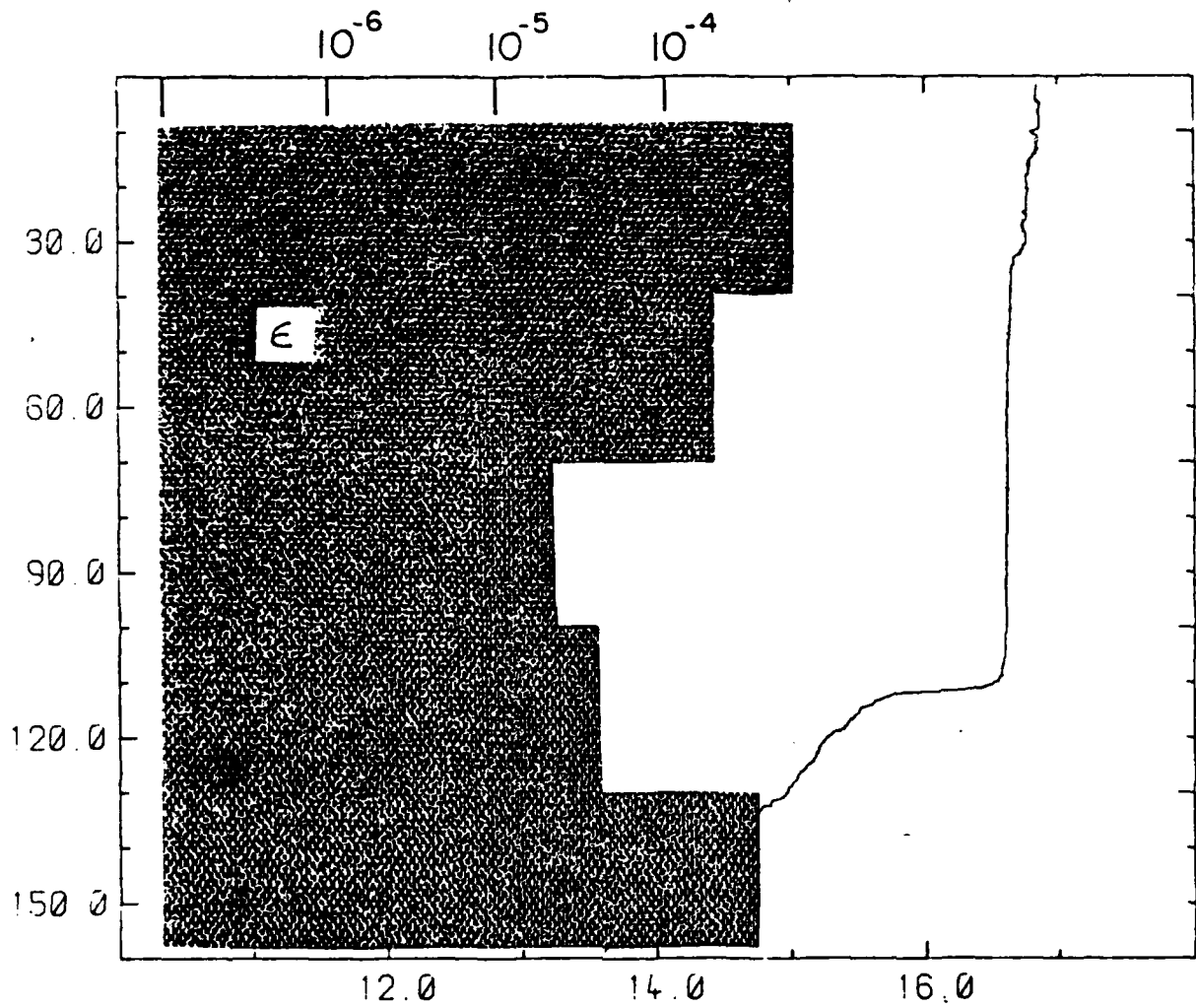
DATE 1/29/80
TIME 0209 GMT

TAPE F10 FILE 2
UNIT 2.79



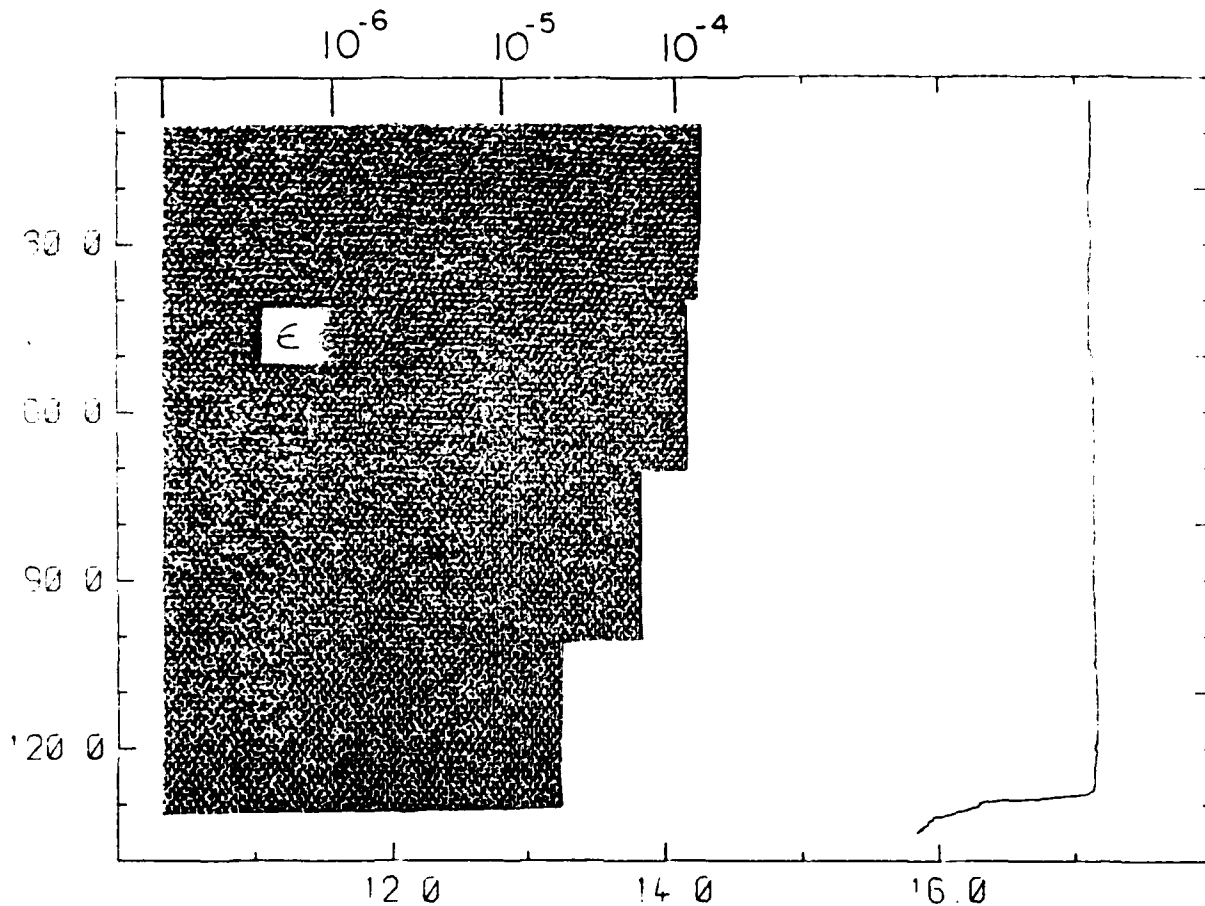
DATE 1/15/80
TIME 0935 GMT

TAPE F2E FILE 1
UNIT 3.79



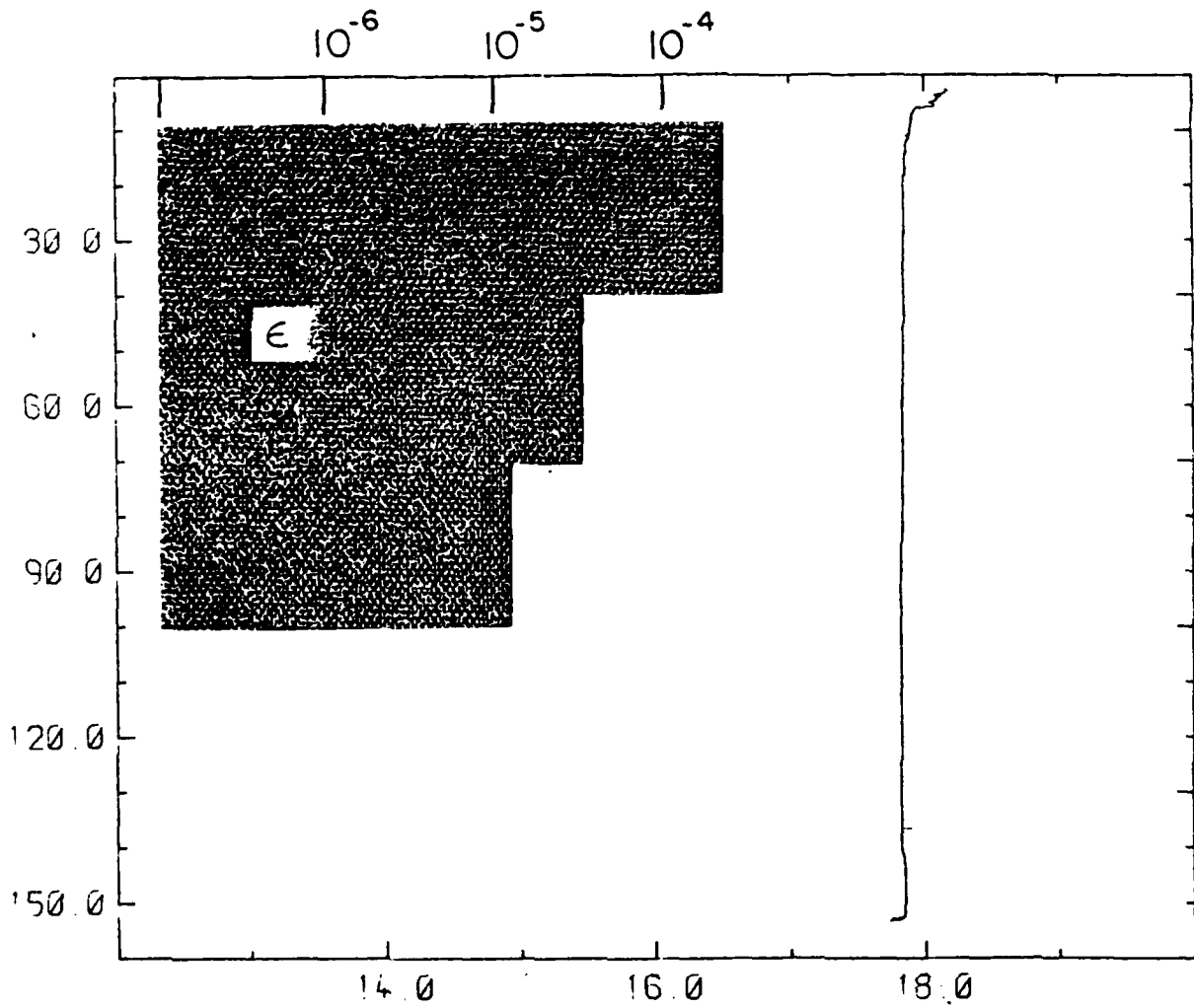
DATE 1/24/80
TIME 0124 GMT

TAPE F3E FILE 1
UNIT 2 79



DATE 1/24/80
TIME 2317 GMT

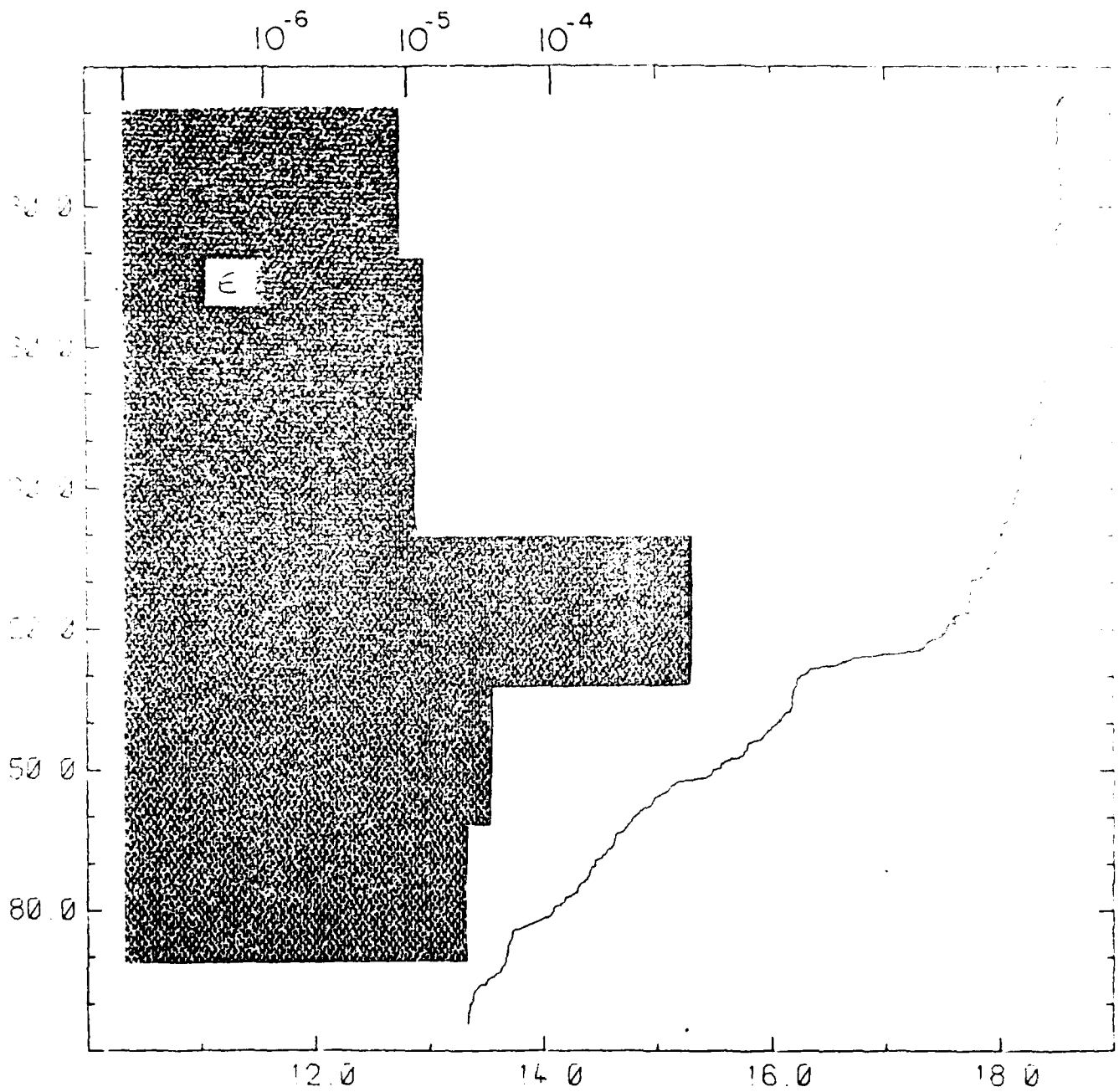
TAPE F50 FILE 3
UNIT 2 79



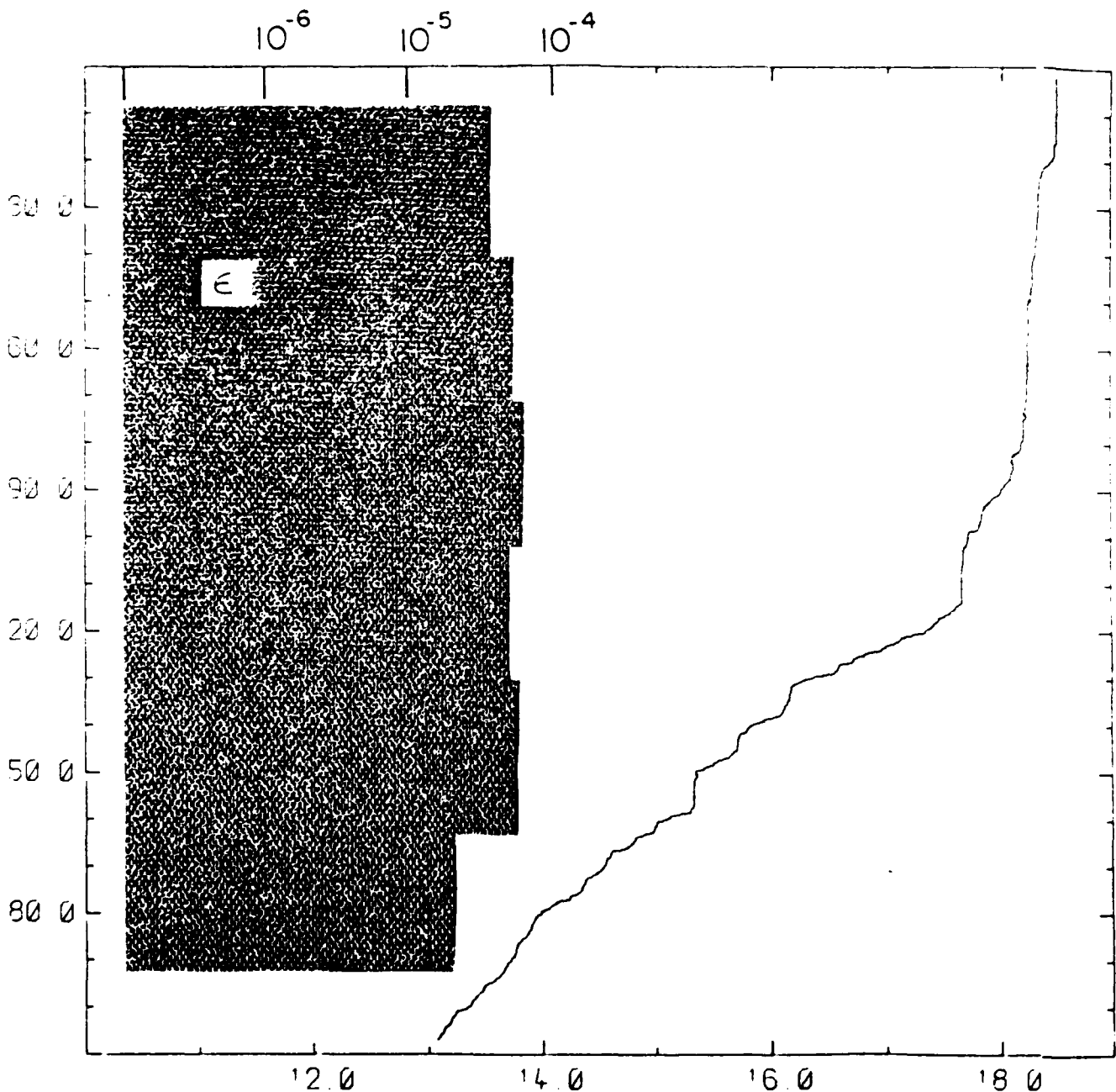
DATE 1/26/80
TIME 0054 GMT

TAPE #5E FILE 2
UNIT 2 79

125



DATE 1/26/80
TIME 0351 GMT



DATE 1/26/80
TIME 2102 GMT

LMED
8