

This item was submitted to Loughborough University as a PhD thesis by the author and is made available in the Institutional Repository (<https://dspace.lboro.ac.uk/>) under the following Creative Commons Licence conditions.



For the full text of this licence, please go to:
<http://creativecommons.org/licenses/by-nc-nd/2.5/>

BLLIDNO: - D 46803/83

**LOUGHBOROUGH
UNIVERSITY OF TECHNOLOGY
LIBRARY**

AUTHOR/FILING TITLE

SANDOVER, J

ACCESSION/COPY NO.

000 791/02

VOL. NO. 2

CLASS MARK

LOAN COPY

000 0791 02



Loughborough University	
of Technology Library	
Date	June 83
Class	
Acc. No.	000791/02

MEASUREMENT OF THE FREQUENCY RESPONSE
CHARACTERISTICS OF MAN EXPOSED TO VIBRATION

by

Jack Sandover

Vol II

A Doctoral Thesis submitted in partial fulfilment of the
requirements for the award of Doctor of Philosophy of the
Loughborough University of Technology.

October 1982



by Jack Sandover 1982.

APPENDIX 9: VALIDATION DATA FOR EXPERIMENT 4

The raw data from experiment 4 are included in this appendix. In all cases the transfer function (magnitude and phase) and coherence function graphs are given. In some cases the validation data (power spectra and amplitude histogram) are also given. In some cases the transfer function graph is in the form of the 99% confidence boundaries. The diagrams are coded according to the following tables. In addition the following codes are included:

Apparent Mass - A
Transmissibility - T
Foot apparent mass - F

All diagrams are scaled to the dimensions given in figs. A9.1 and A9.2.

Apparent mass scales assume a load cell suspended mass of 8.5 kg. Later measurements showed that the bead-bag contributed additional mass so that the figure should be 12 kg for those experiments where a bead-bag was used (i.e. not B_g). This leads to slight errors if absolute rather than comparative values are required. The errors are as below:-

Indicated Apparent mass	Actual value	Error
10 kg	7.3 kg	+27%
20	17.8	+11
40	38.7	+3
60	59.6	+0.7
70	70.0	0
80	80.4	-0.5
140	143.1	-2.2

Order of exposures. Experiment 4

Run No.	Condition	Validation data?	99% Confidence Limit?
81/ -	System calibrations		
81/01	Erect	✓	
81/02	Erect, buttock short circuit, arms restrained, abdominal restraint		
81/03	Very erect, " " " , " " , "	✓	
81/04	Erect, " " " , " "		
81/05	Erect, arms restrained		
81/06	Erect		
81/07	Erect, buttock short circuit		
81/08	Erect	✓	
81/09	Very Erect		
81/10	Erect, abdominal restraint		
81/11	Erect		
81/12	Erect, driving posture	✓	
81/13	Erect @ 2 m/s ² rms.		
82/01	Erect @ 2 m/s ² rms		
82/02	Erect, driving posture	✓	
82/03	Erect	✓	
82/04	Erect, abdominal restraint		
82/05	Very erect		
82/06	Erect		
82/07	Erect, buttocks short circuit	✓	
82/08	Erect	✓	
82/09	Erect, arms restrained		
82/10	Erect, buttocks short circuit, arms restrained		
82/11	Very erect, " " " , " "		
82/12	Erect, " " " , " " , abdominal restraint		
82/13	Very erect, " " " , " " , "	✓	
82/14	Erect (slightly slumped)		
82/ -	System calibrations		

		Validation data?	99% Confidence Limit?
Run No.	Condition		
85/01	Erect		
85/02	Very erect, buttock short circuit, arms restrained, abdominal restraint	✓	
85/03	Erect, " " " " " "		
85/04	Very erect, " " " " " "		
85/05	Erect, " " " " " "		
85/06	Erect, arms restrained		
85/07	Erect	✓	
85/08	Erect, buttock short circuit		
85/09	Erect		
85/10	Very erect		
85/11	Erect, abdominal restraint		
85/12	Erect		
85/13	Erect, driving posture	✓	
85/14	Erect @ 2 m/s ² rms		
84/01	Erect @ 2 m/s ² rms		
84/02	Erect, driving posture	✓	✓
84/03	Erect		
84/04	Erect, abdominal restraint		
84/05	Very erect		
84/06	Erect		
84/07	Erect, buttock short circuit		
84/08	Erect	✓	✓
84/09	Erect, arms restrained		
84/10	Erect, buttock short circuit, arms restrained		
84/11	Very erect, " " " " "		
84/12	Erect, " " " " , abdominal restraint		
84/13	Very erect, " " " " "	✓	✓
84/14	Erect		

Run No.		Condition	Validation data?	99% Confidence Limit?
83/01		Erect, buttock short circuit		
83/02		Erect	✓	✓
83/03		Very Erect		
83/04		Erect, abdominal restraint		
83/05		Erect		
83/06		Erect, driving posture	✓	✓
83/07		Erect @ 2 m/s ² rms		
83/08		Erect		
83/09		Very Erect, buttock short circuit, arms restrained, abdominal restraint	✓	✓
83/10		Erect, " " " " " "		
83/11		Very erect, " " " " " "		
83/12		Erect, " " " " " "		
83/13		Erect, arms restrained		
83/14		Erect		
01/01		Erect	✓	✓
01/02		Erect, arms restrained		
01/03		Erect, buttock short circuit, arms restrained		
01/04		Very erect, " " " " " "		
01/05		Erect, " " " " " , abdominal restraint		
01/06		Very erect, " " " " " "	✓	✓
01/07		Erect		
01/08		Erect @ 2 m/s ² rms		
01/09		Erect, driving posture	✓	✓
01/10		Erect		
01/11		Erect, abdominal restraint		
01/12		Very erect		
01/13		Erect		
01/14		Erect, buttock short circuit		

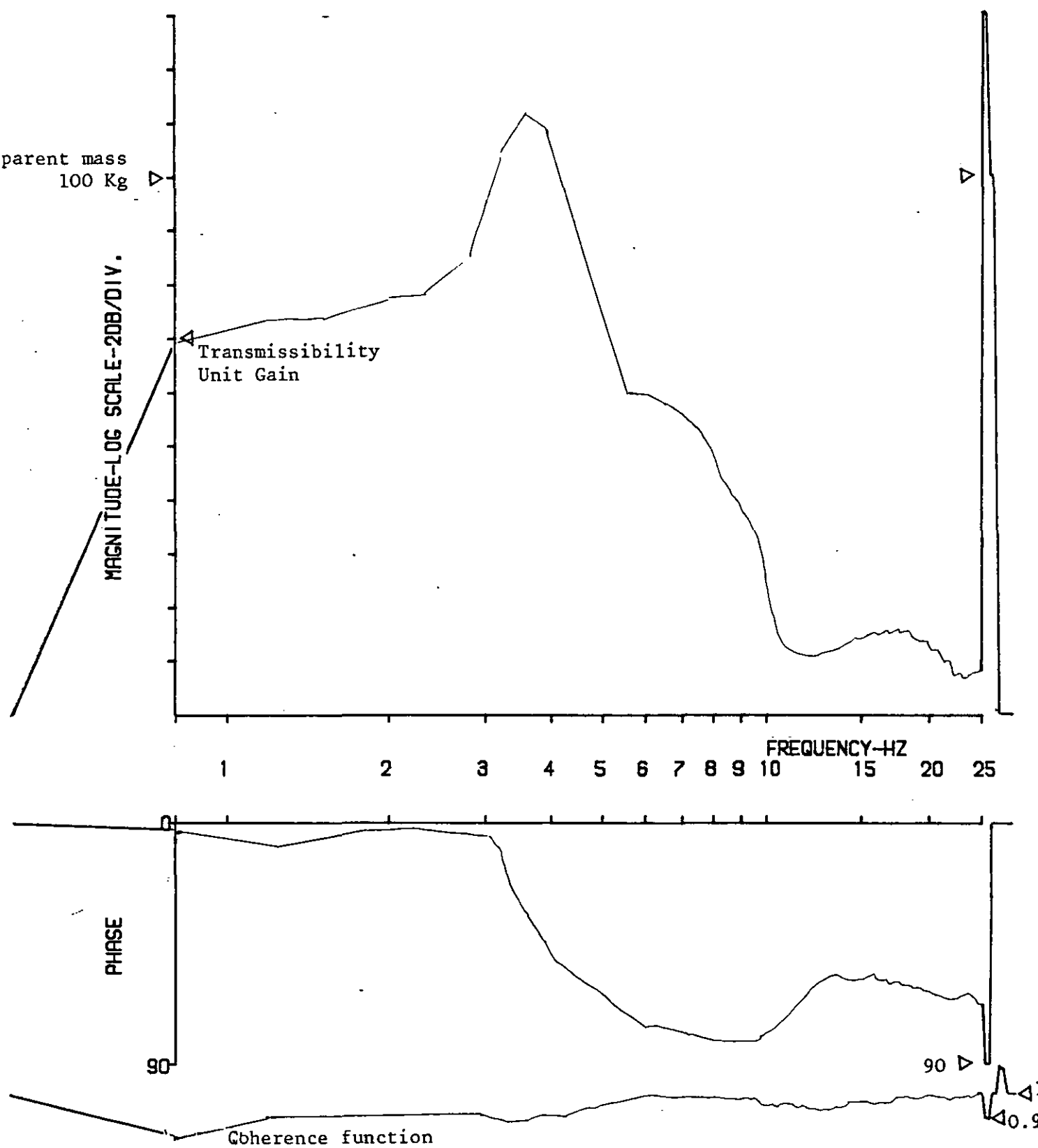


Fig. A9.1 Scale for all spectra

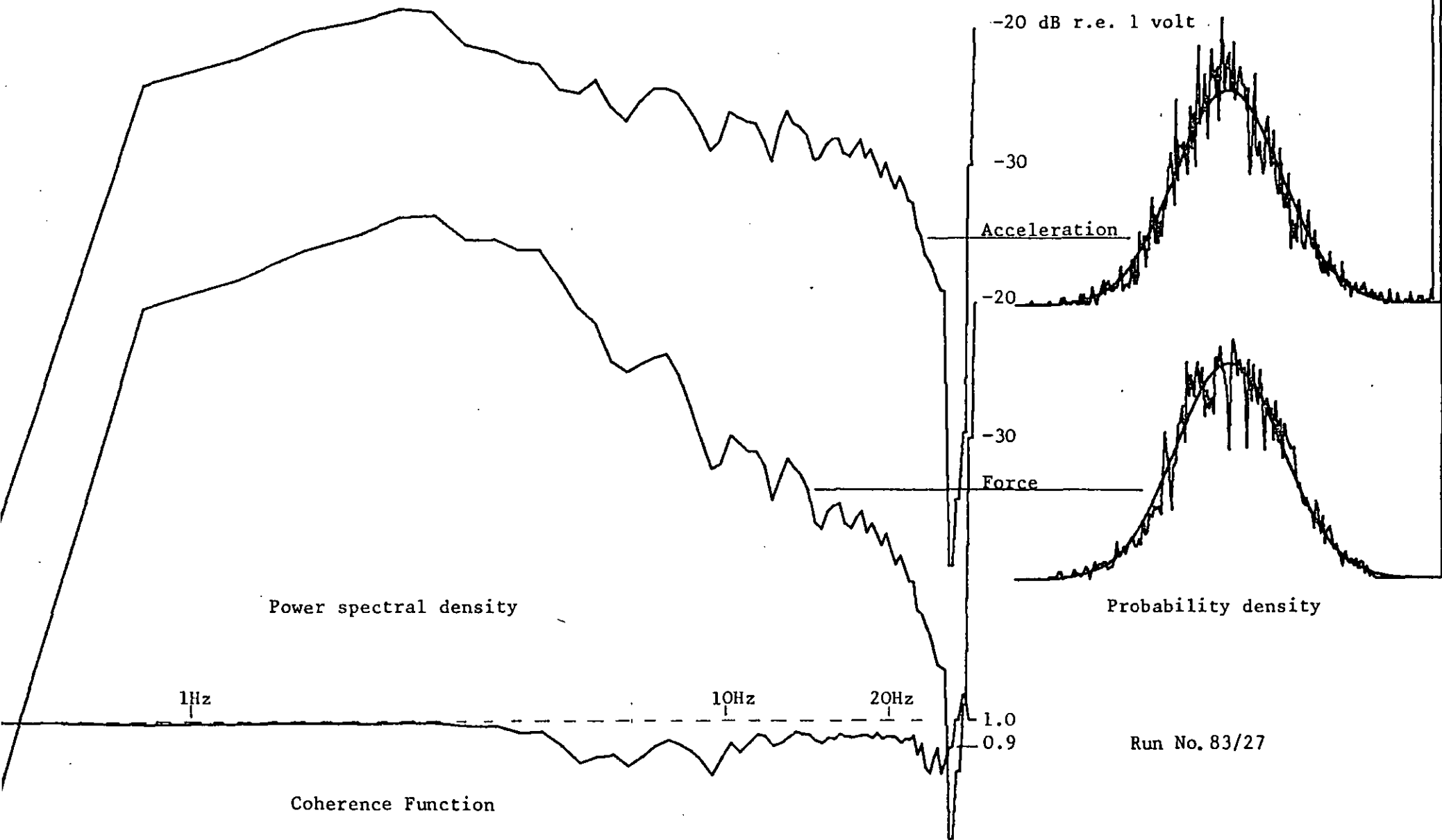
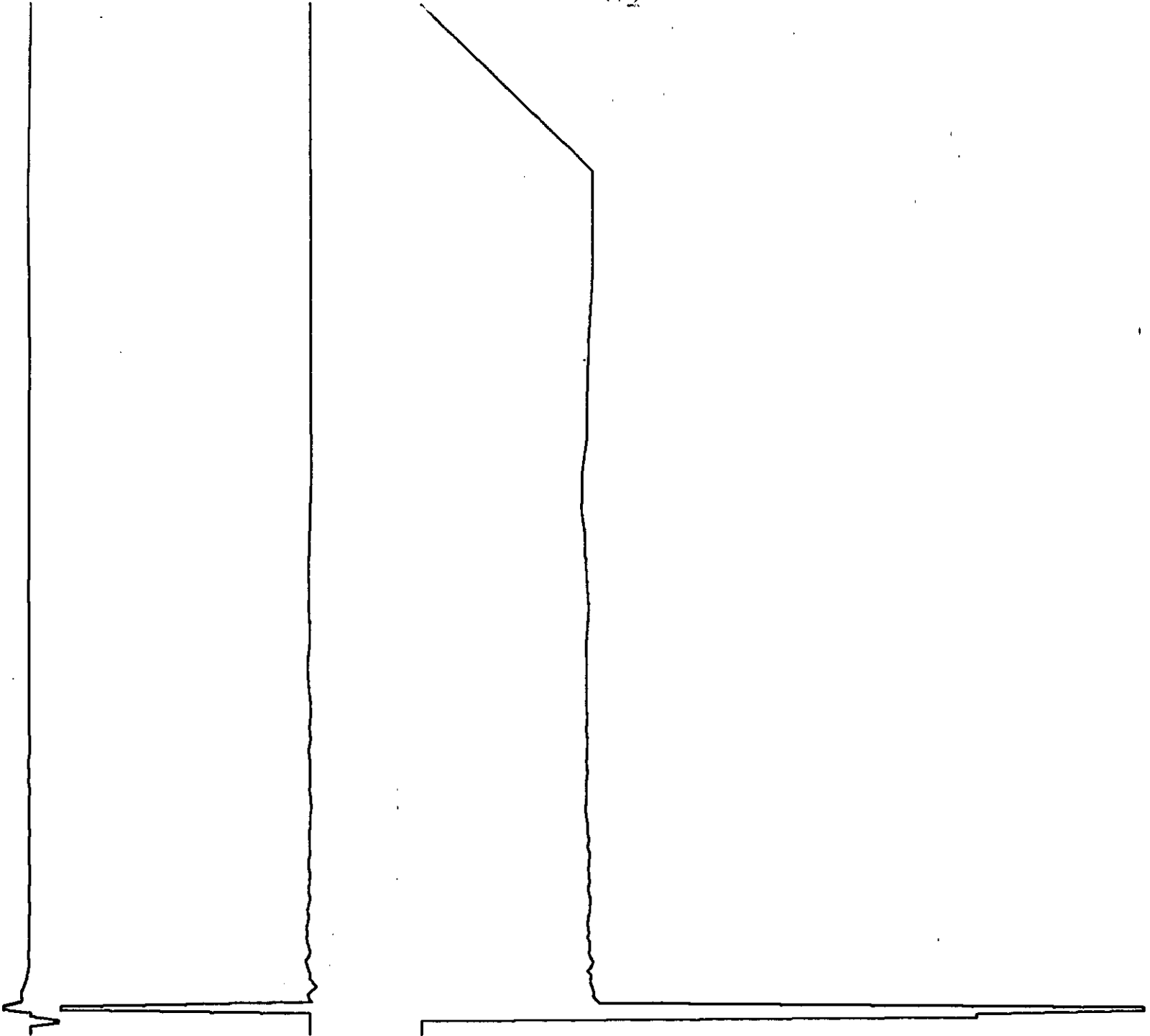
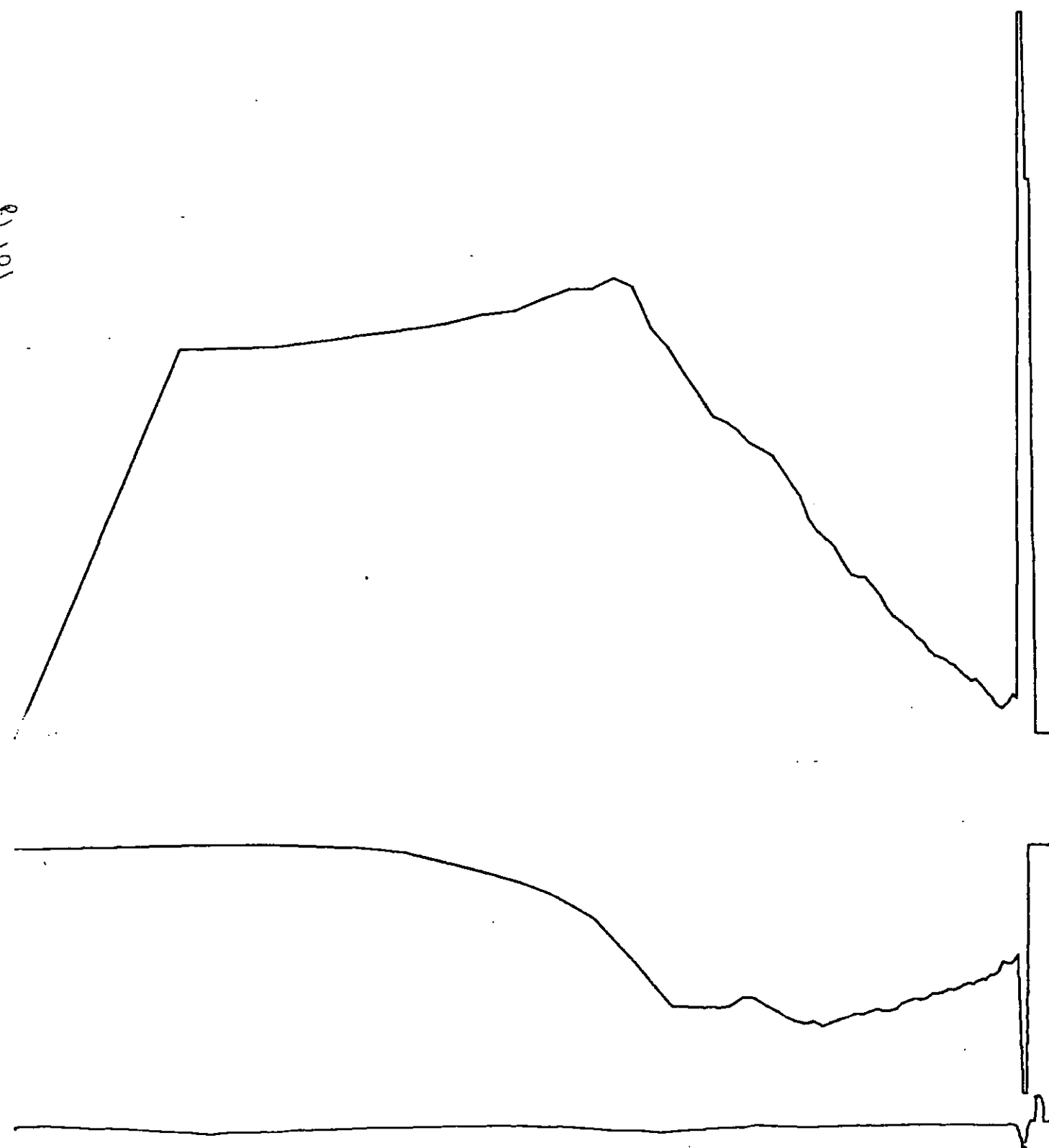


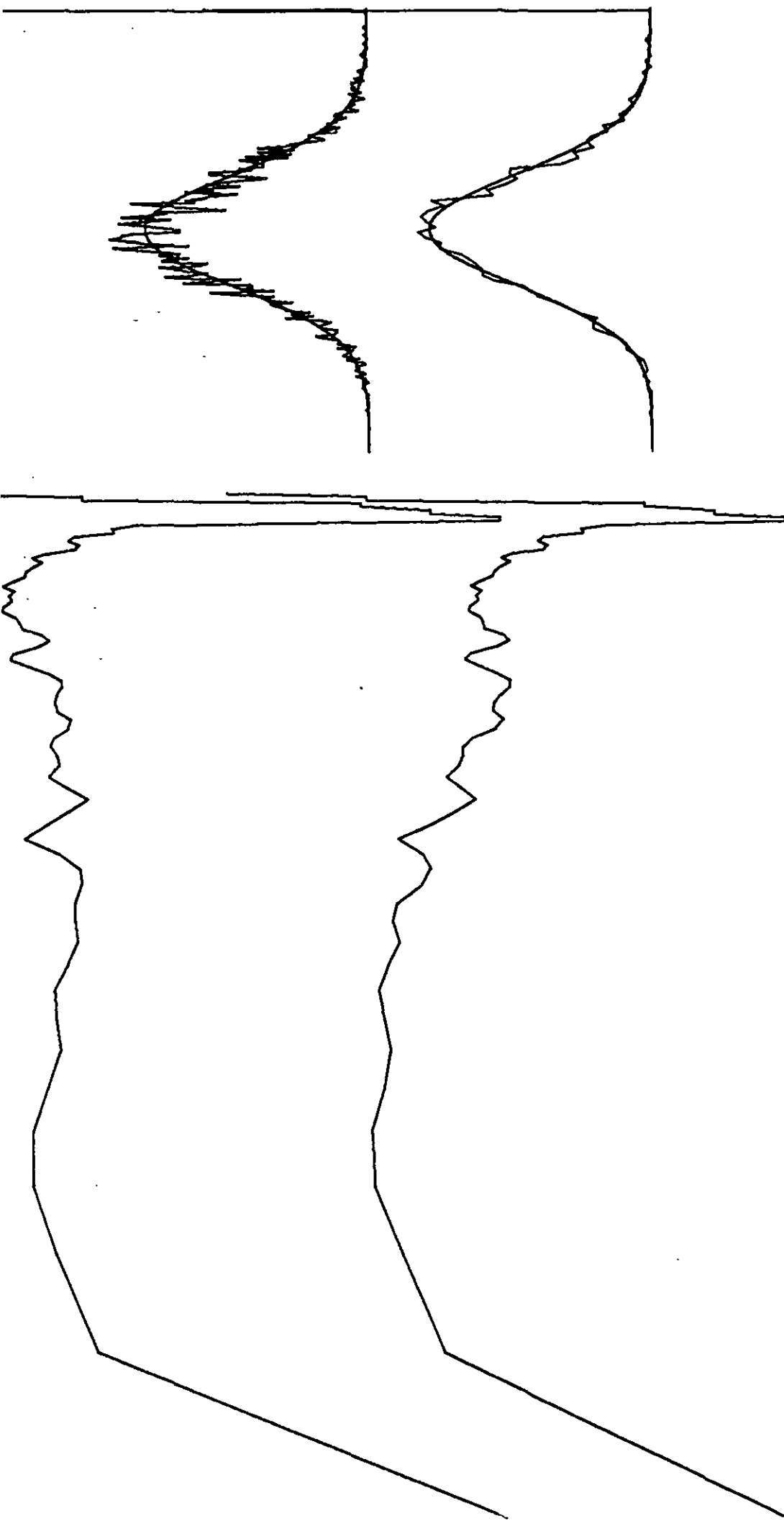
Fig. 9.2 Typical validation curves

81-A



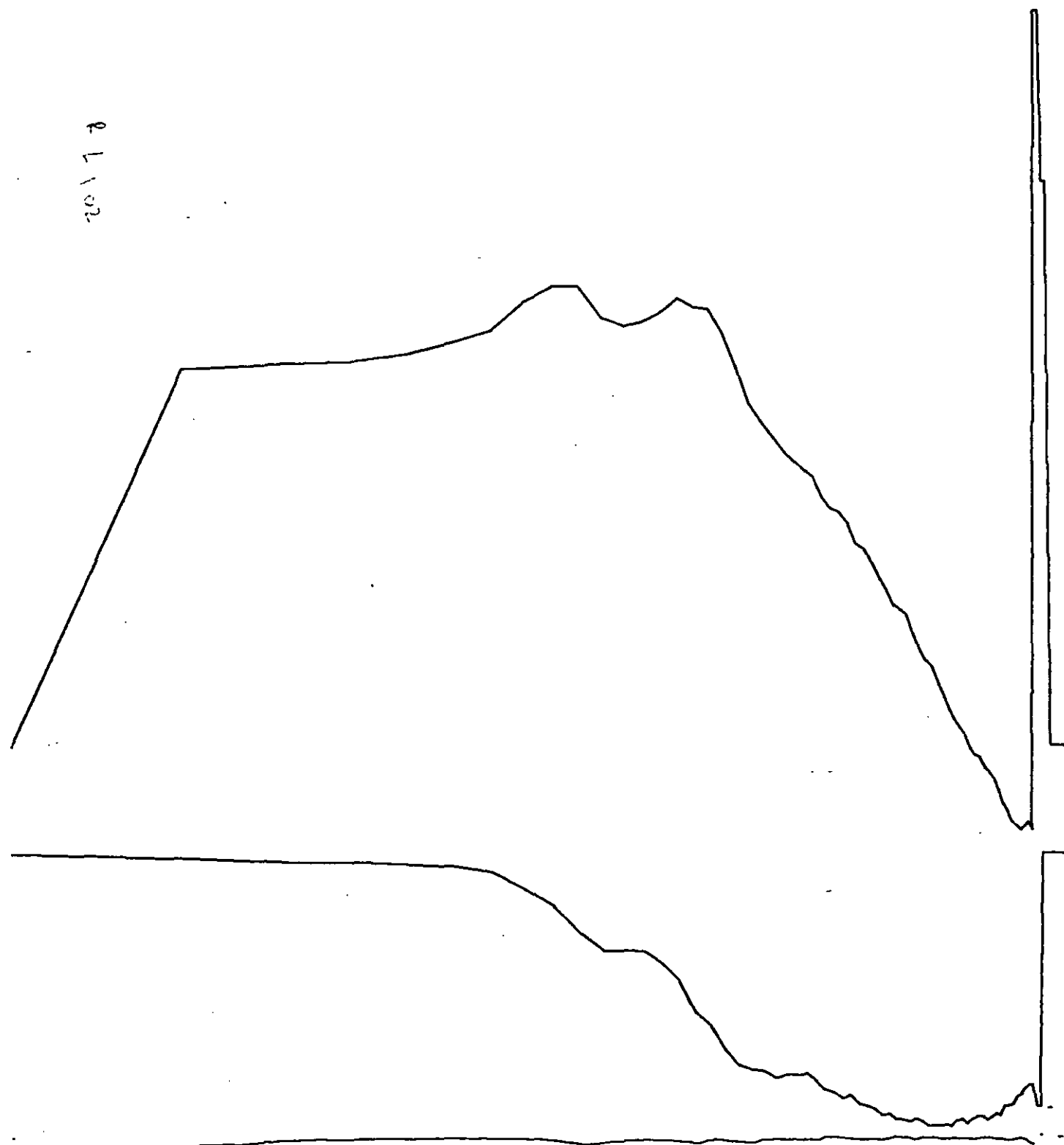


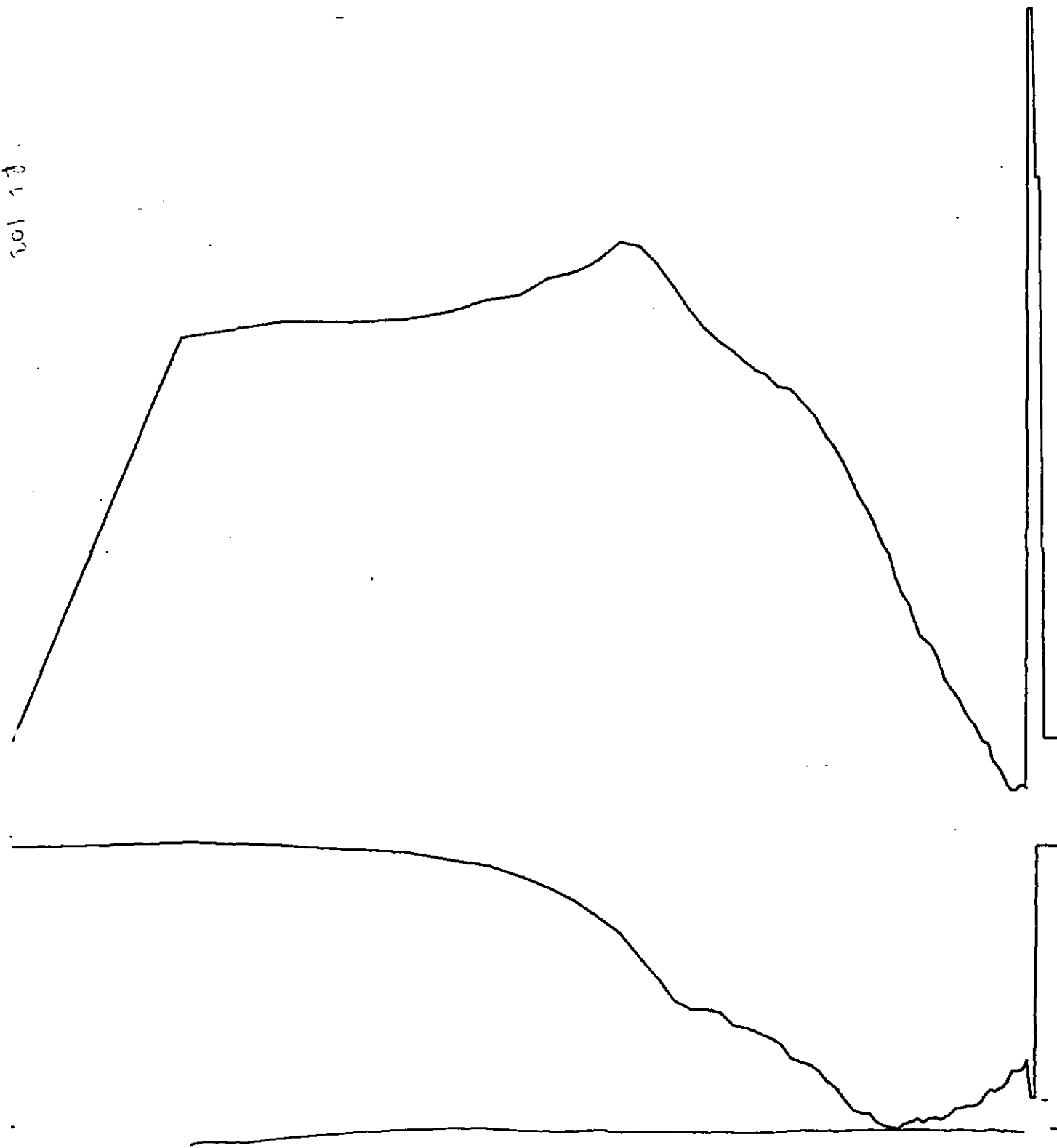
81 01 A



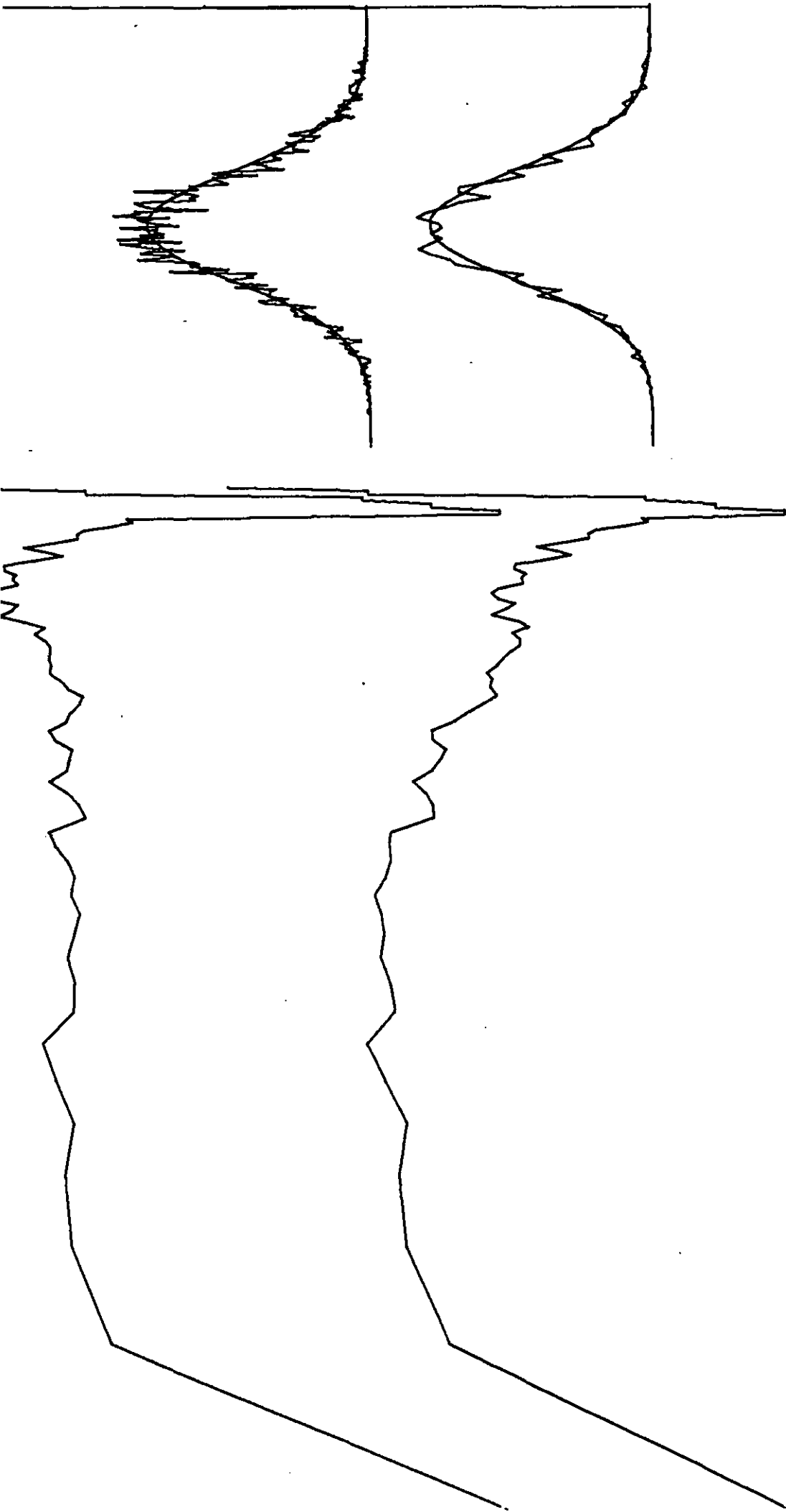
81 02 A

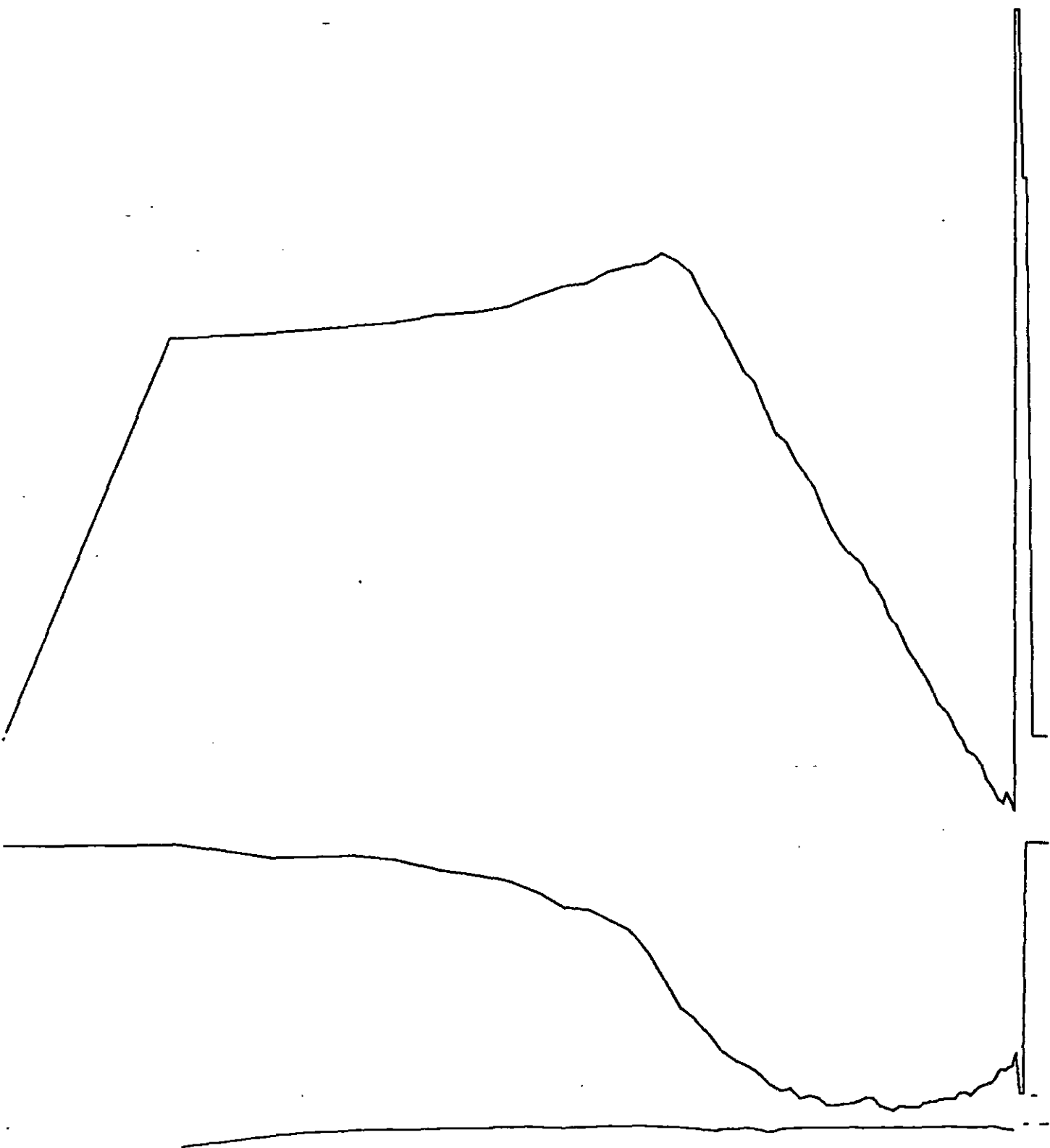
26102



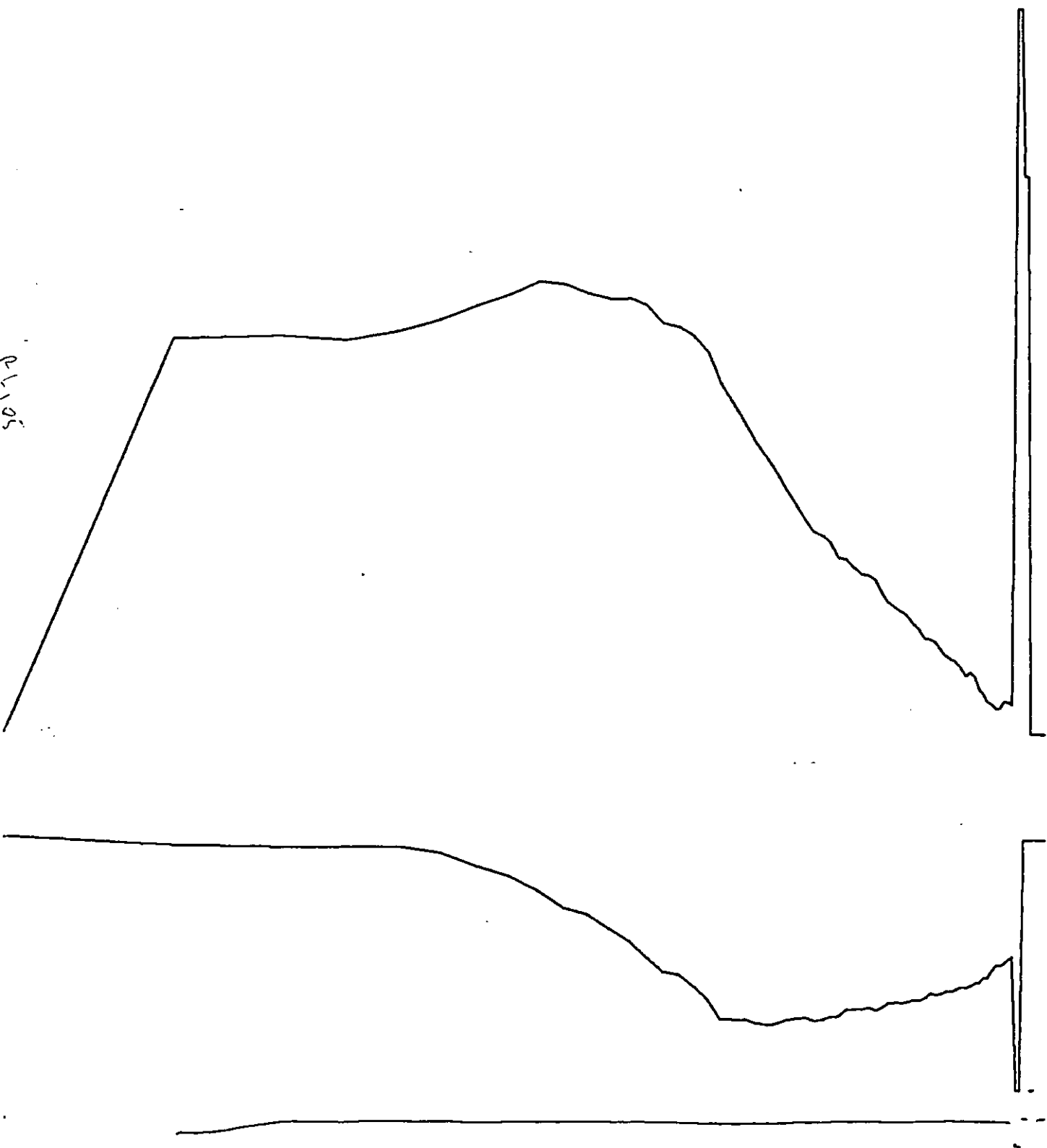


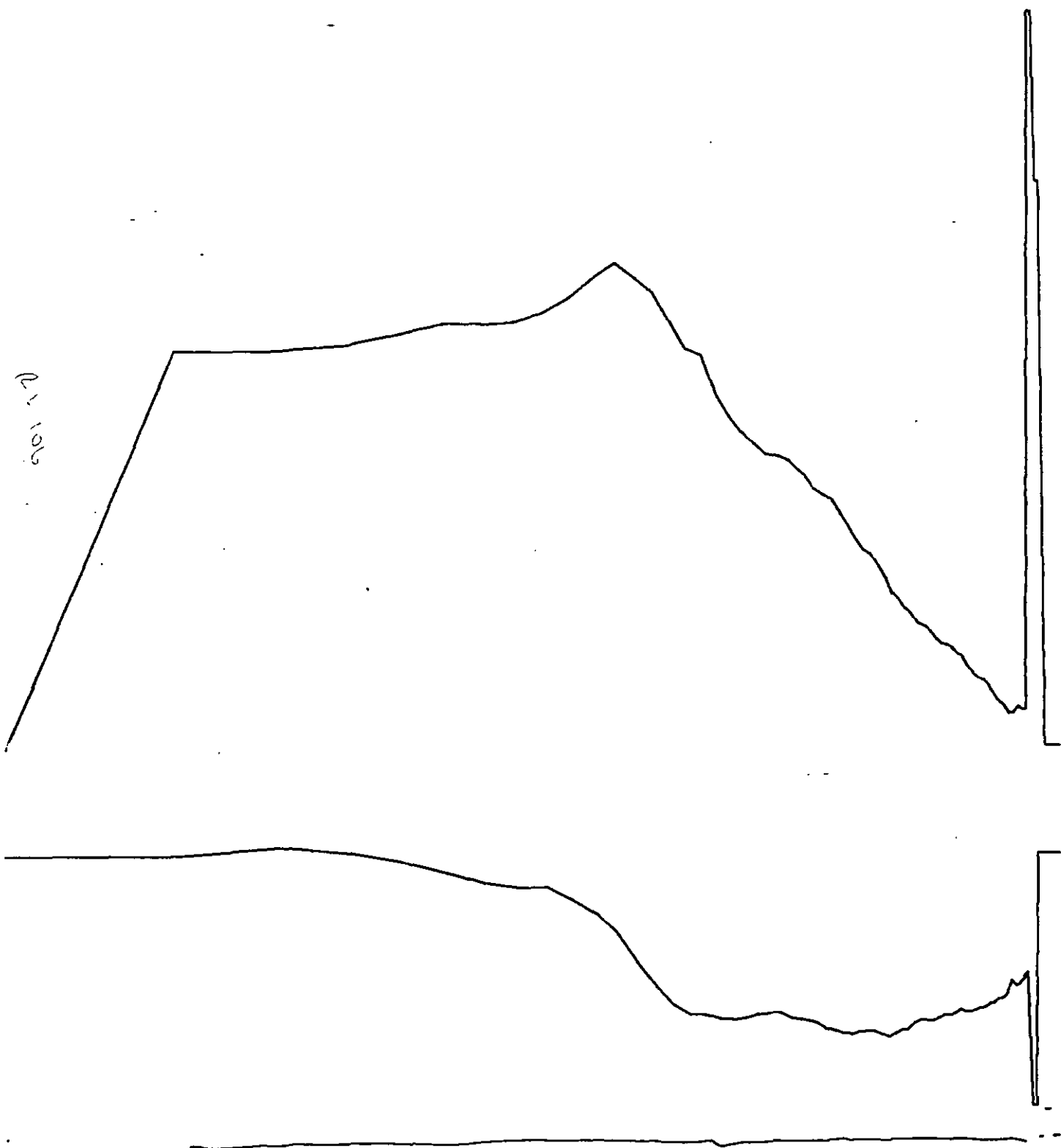
81 Q3A



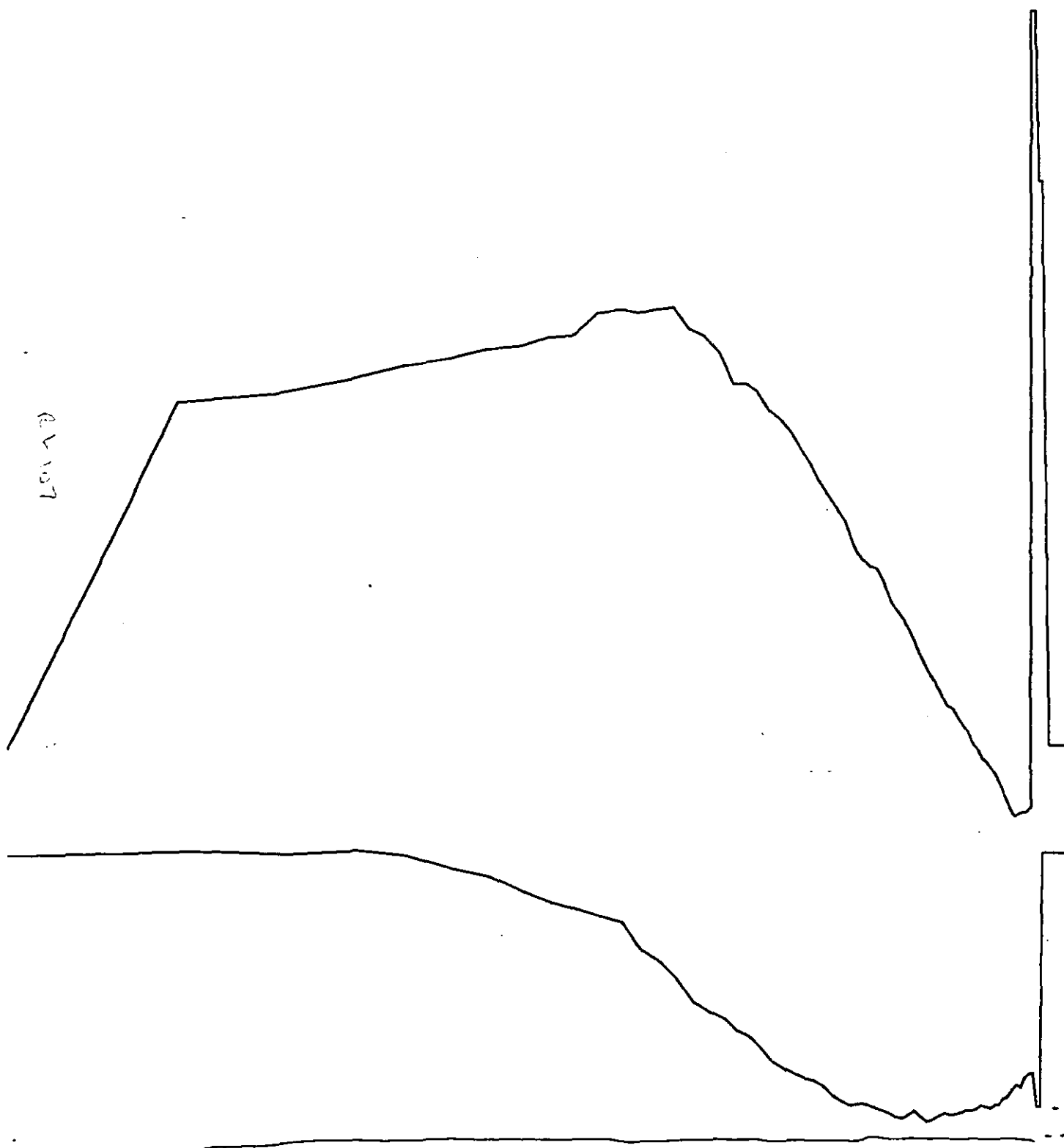


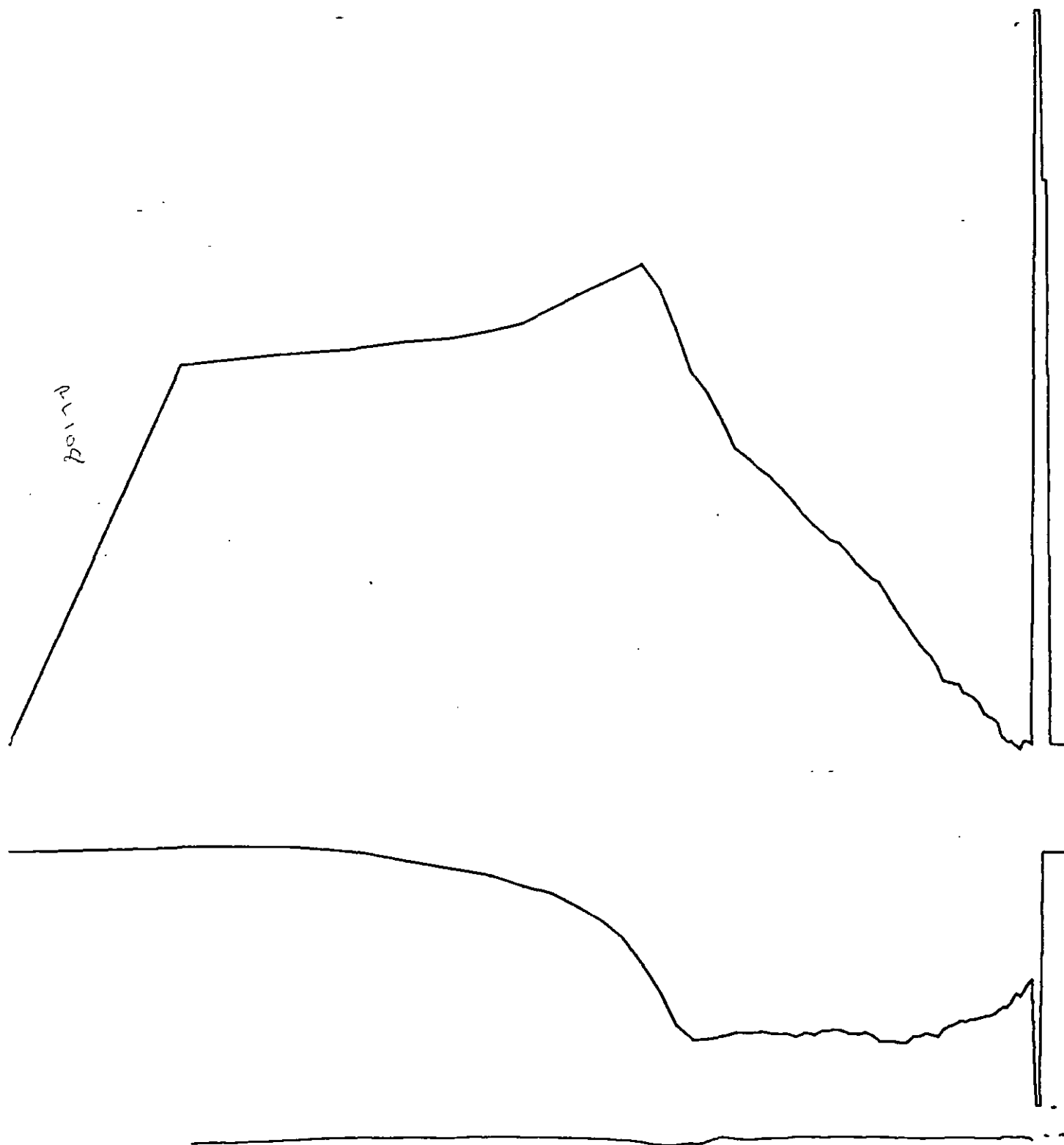
81 05 A



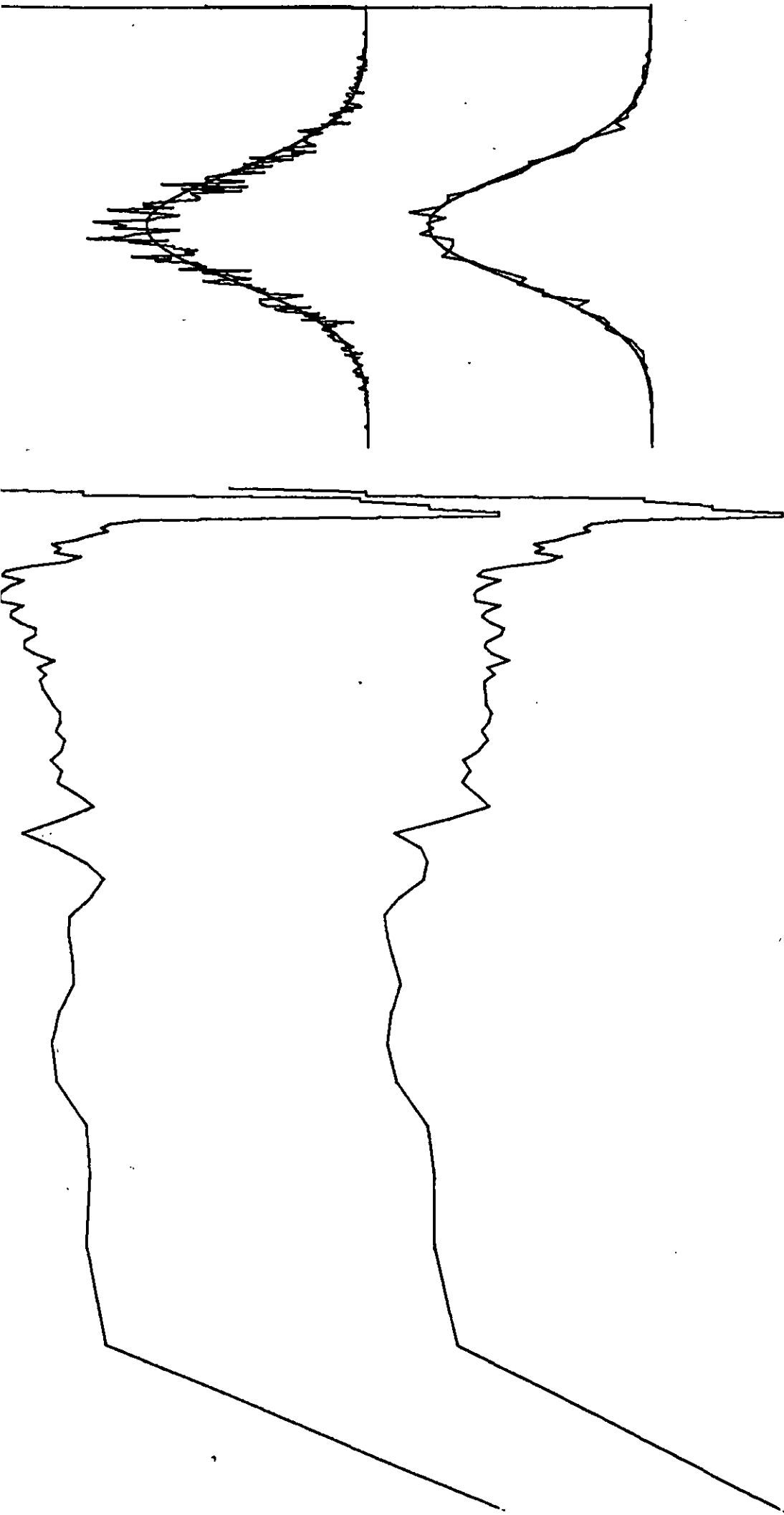


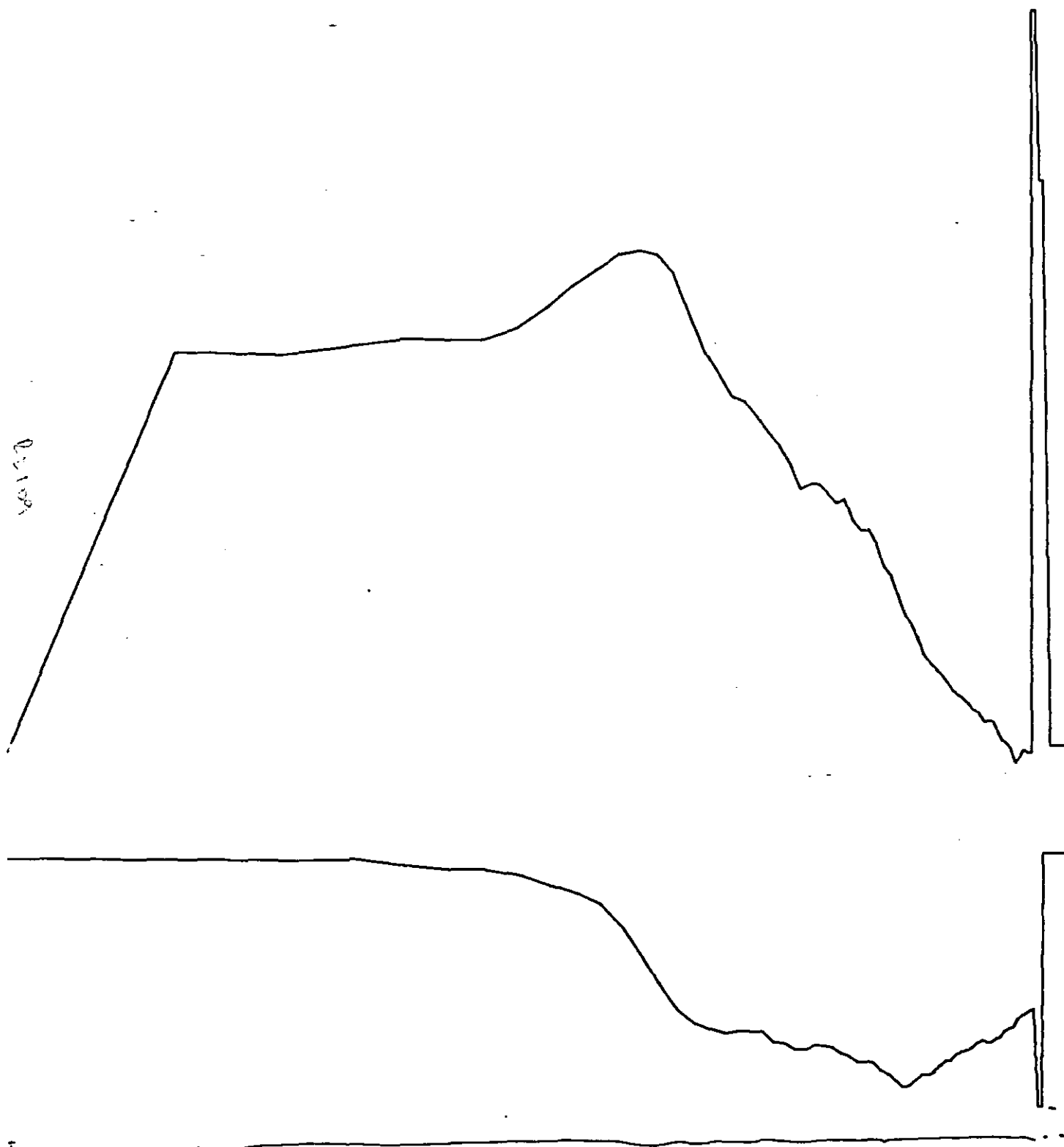
81 07A

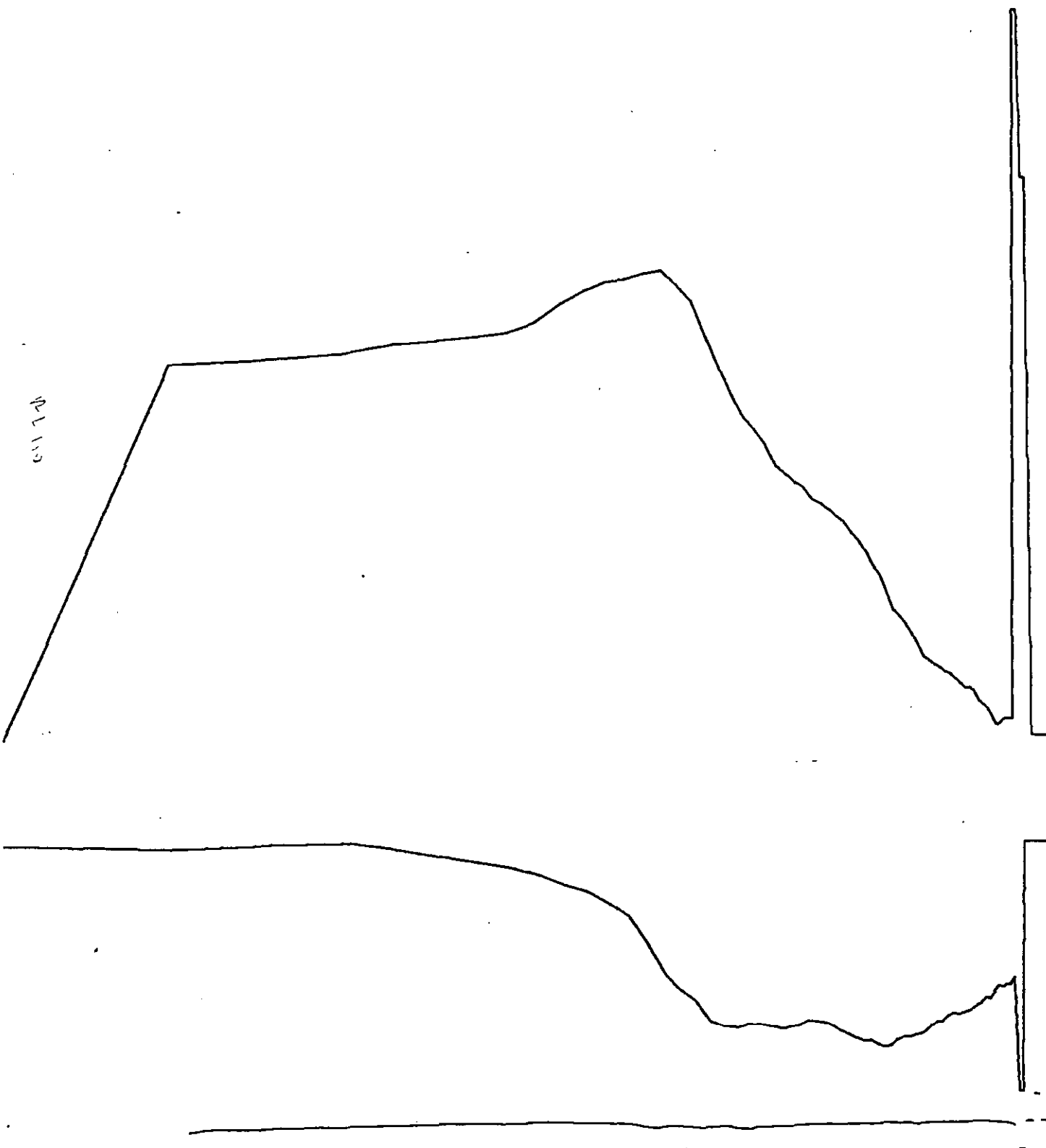




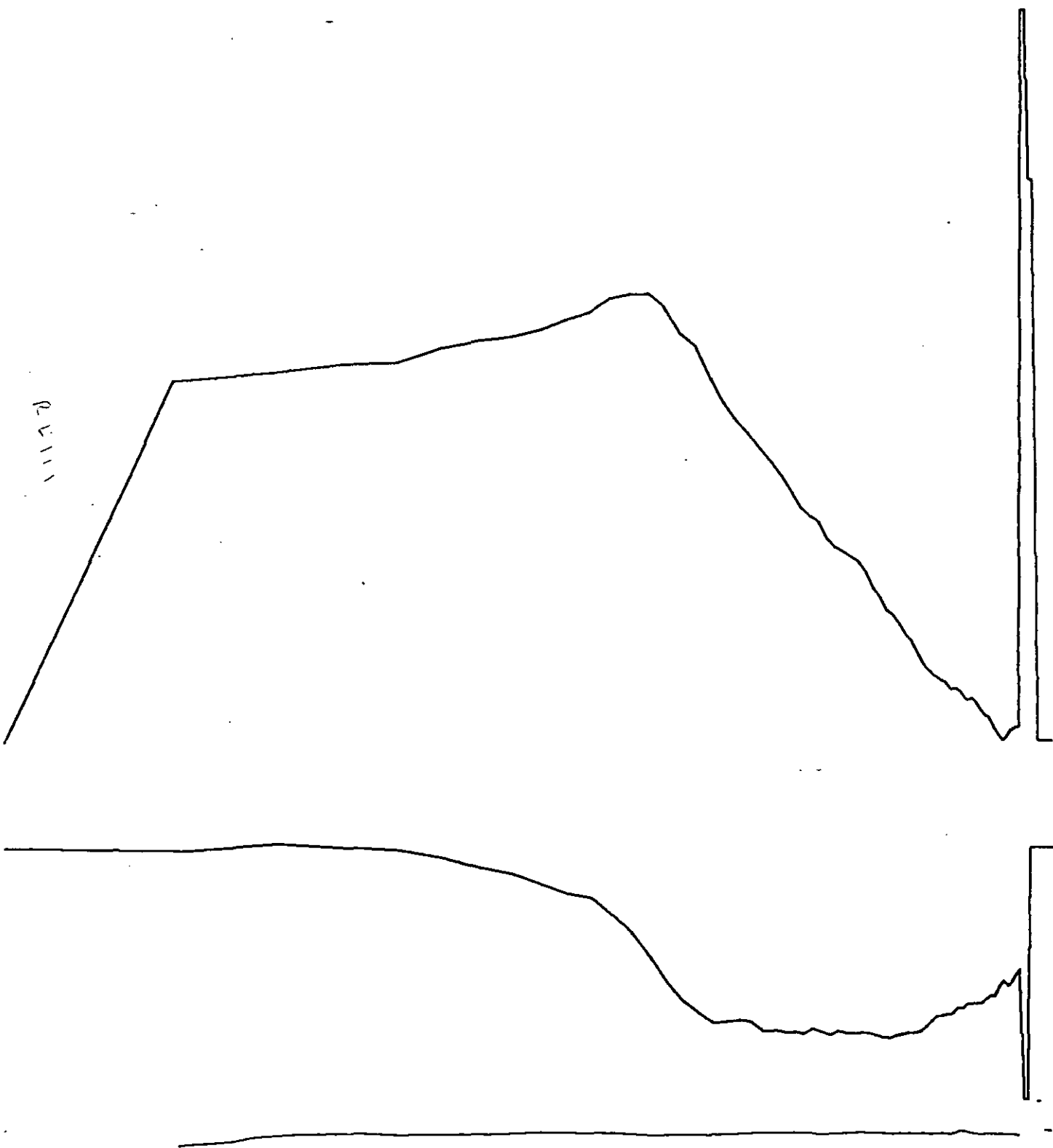
81 08A



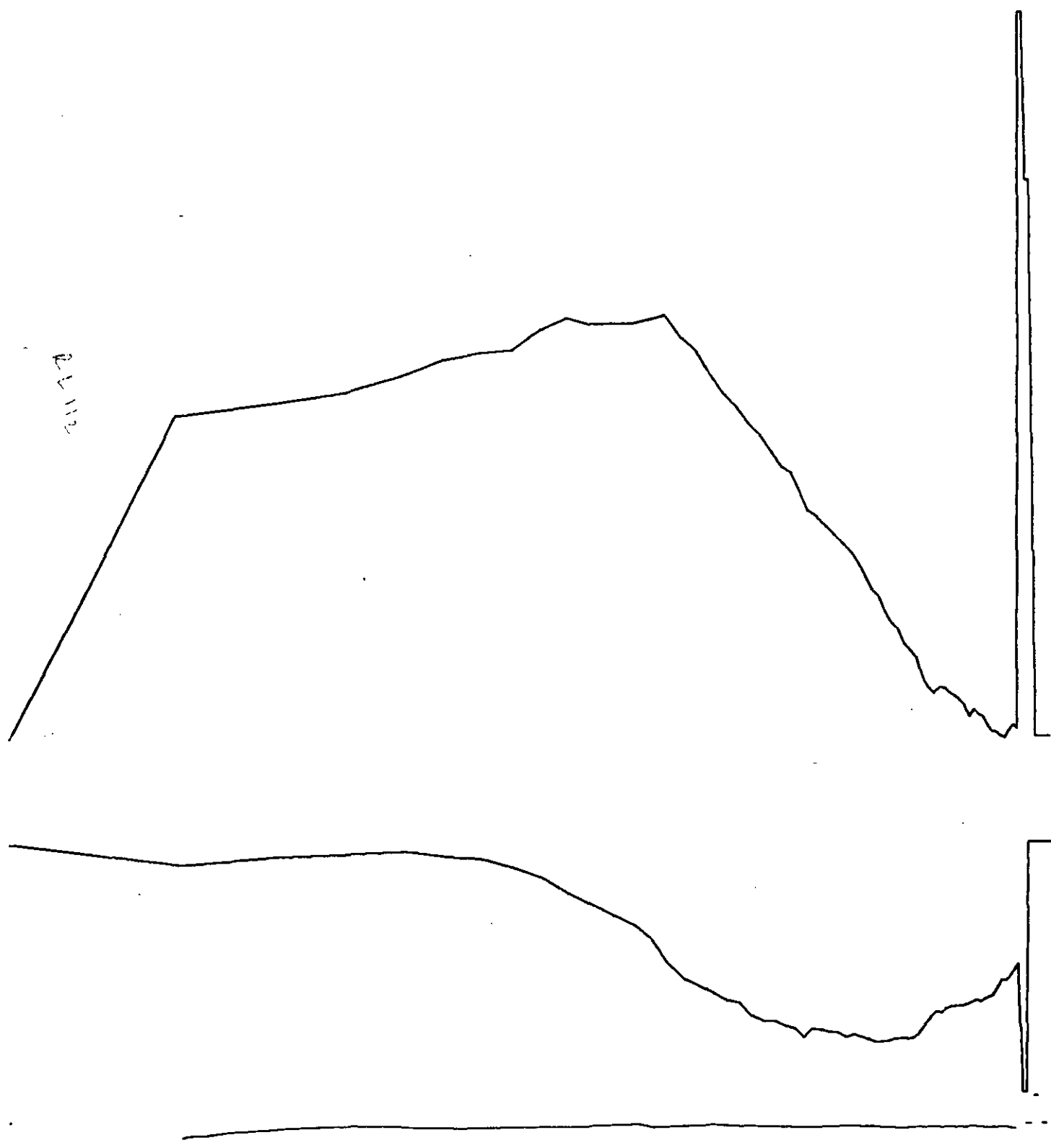




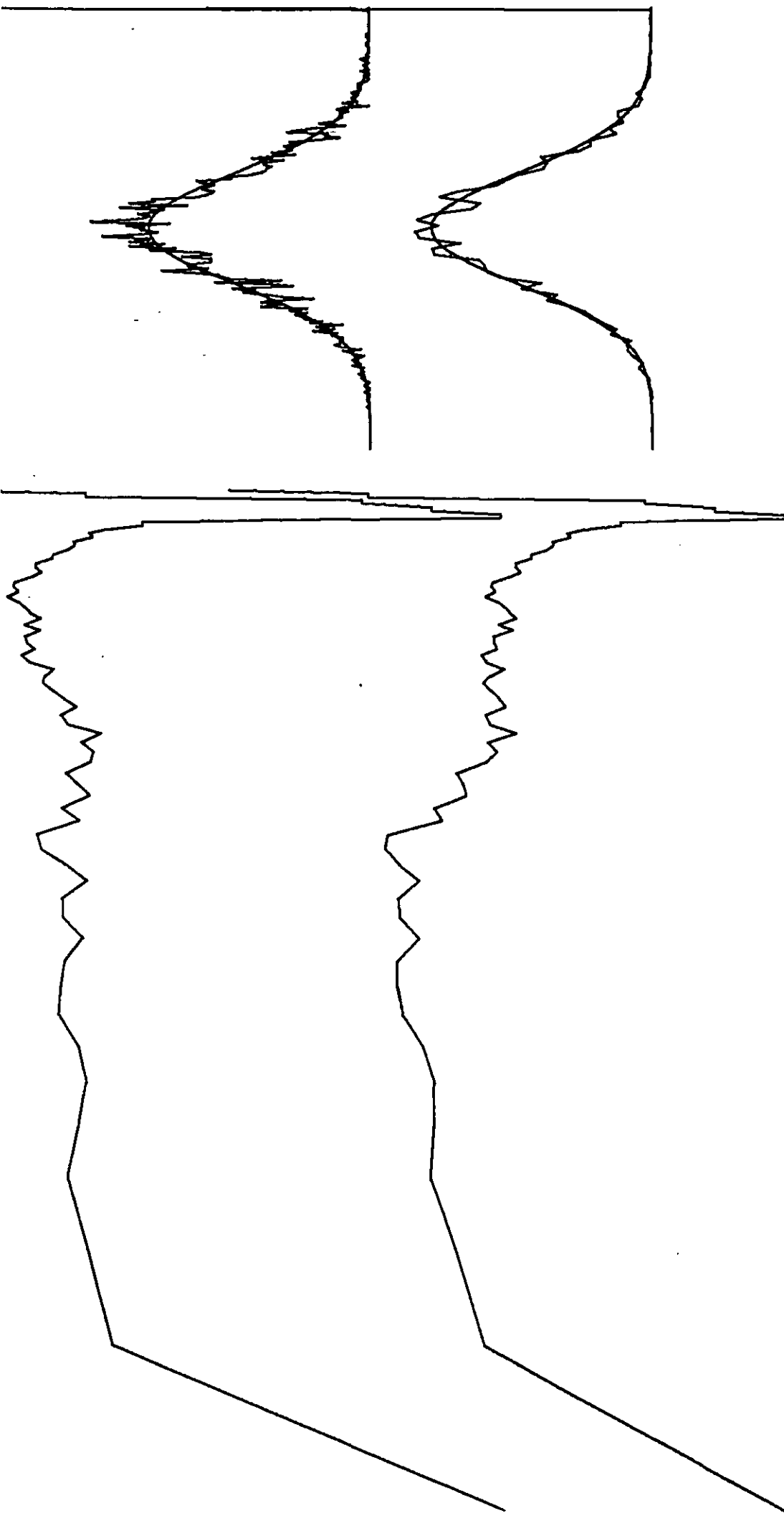
81 11 A

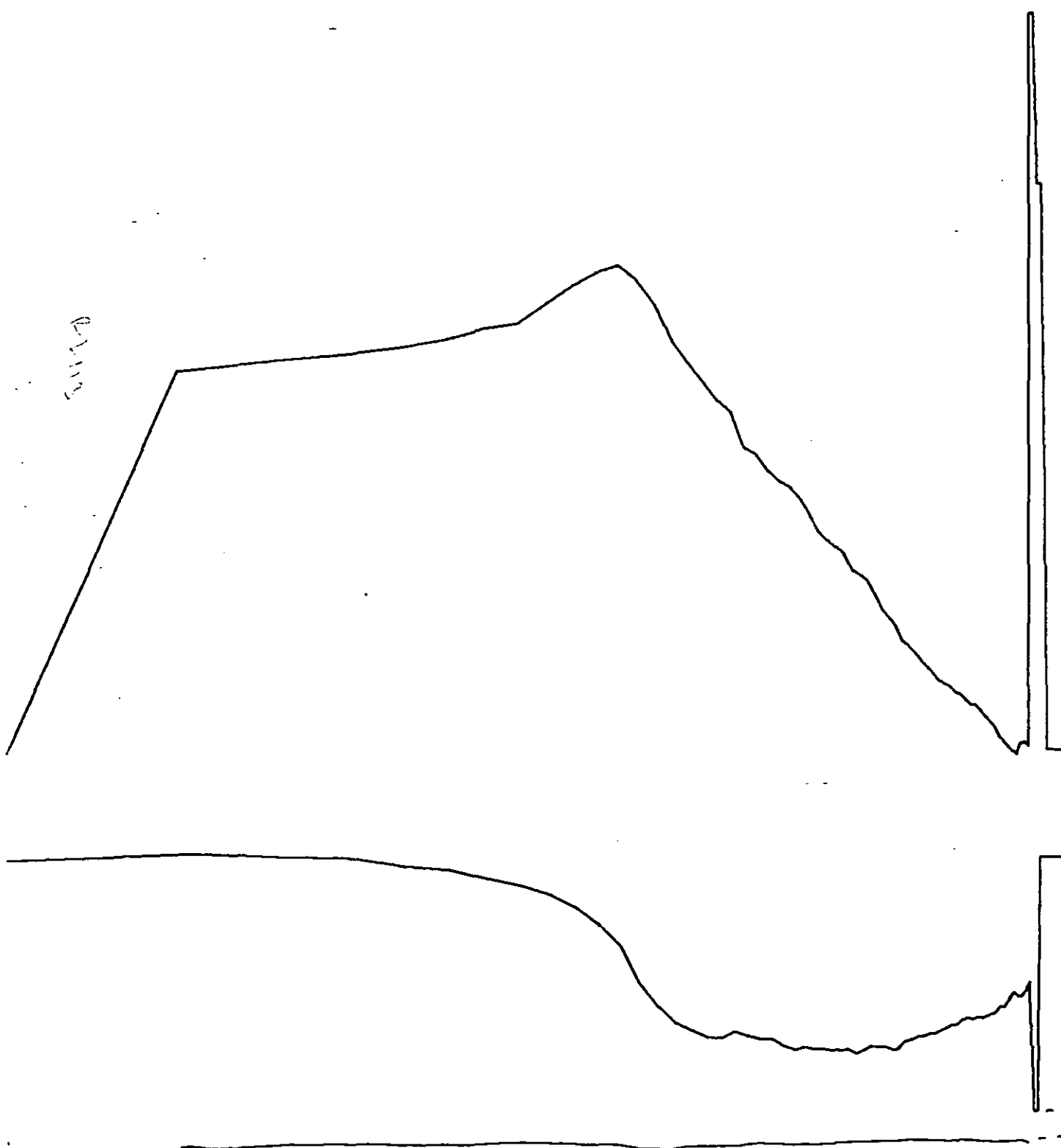


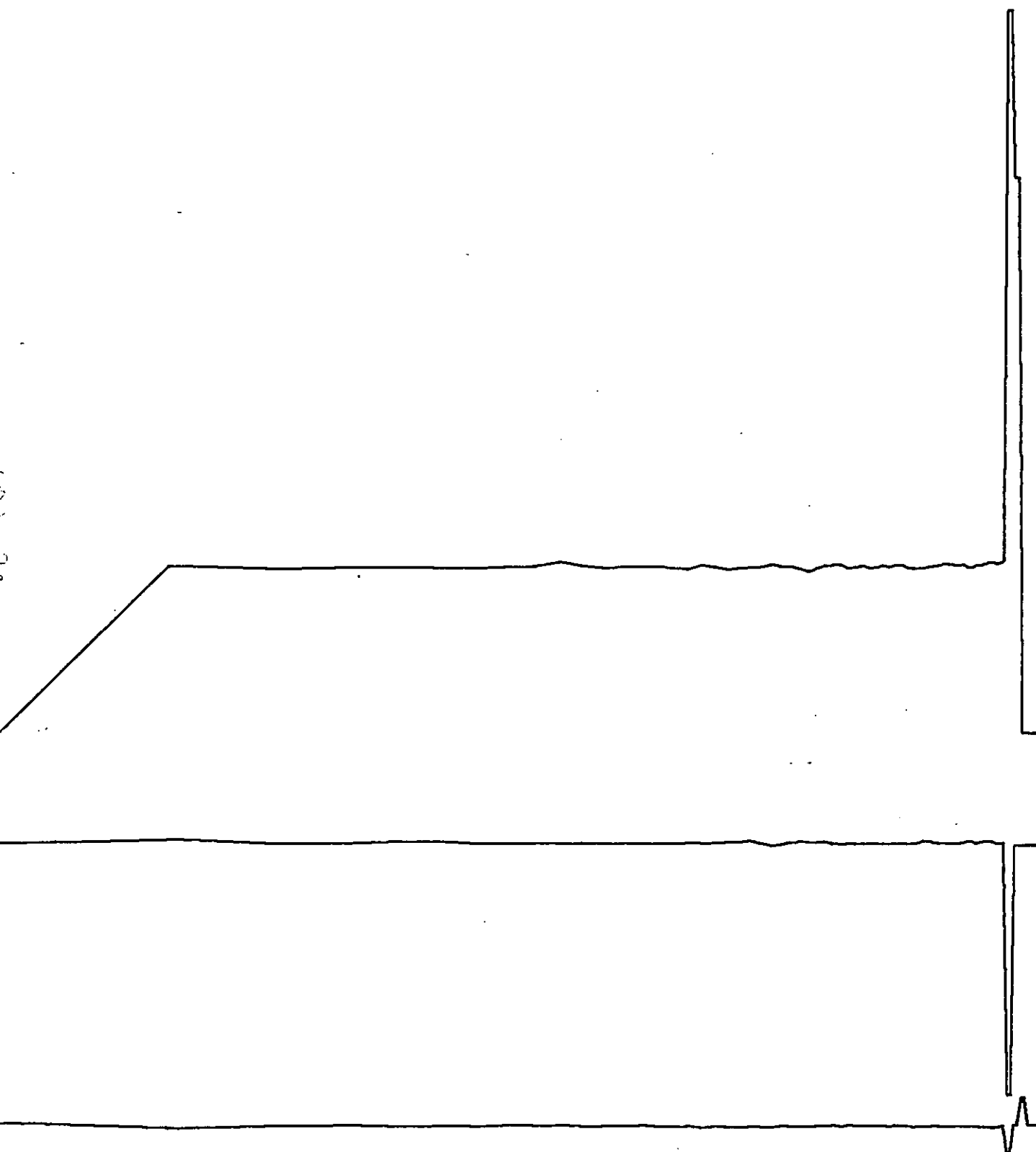
22112



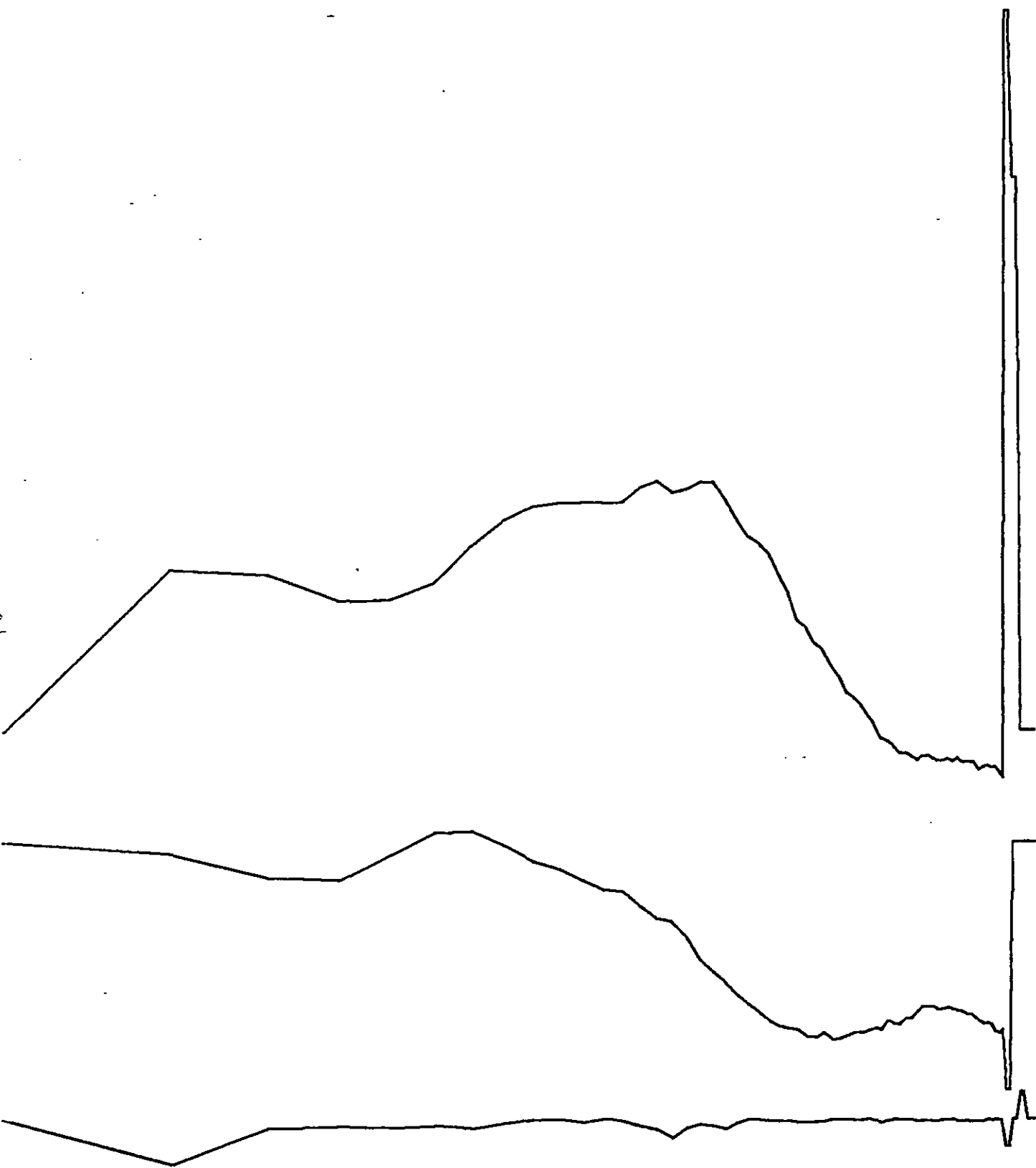
81 12 A



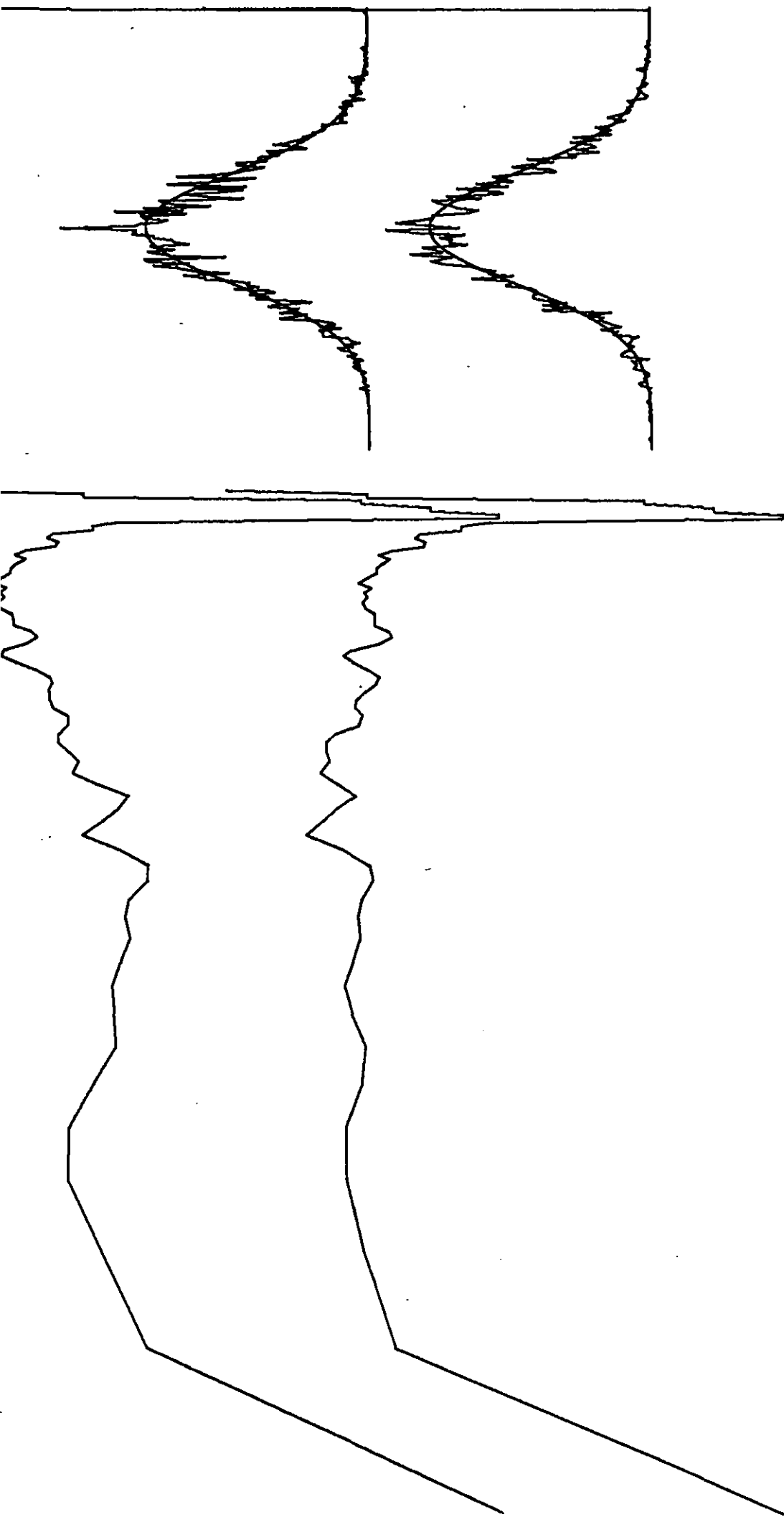




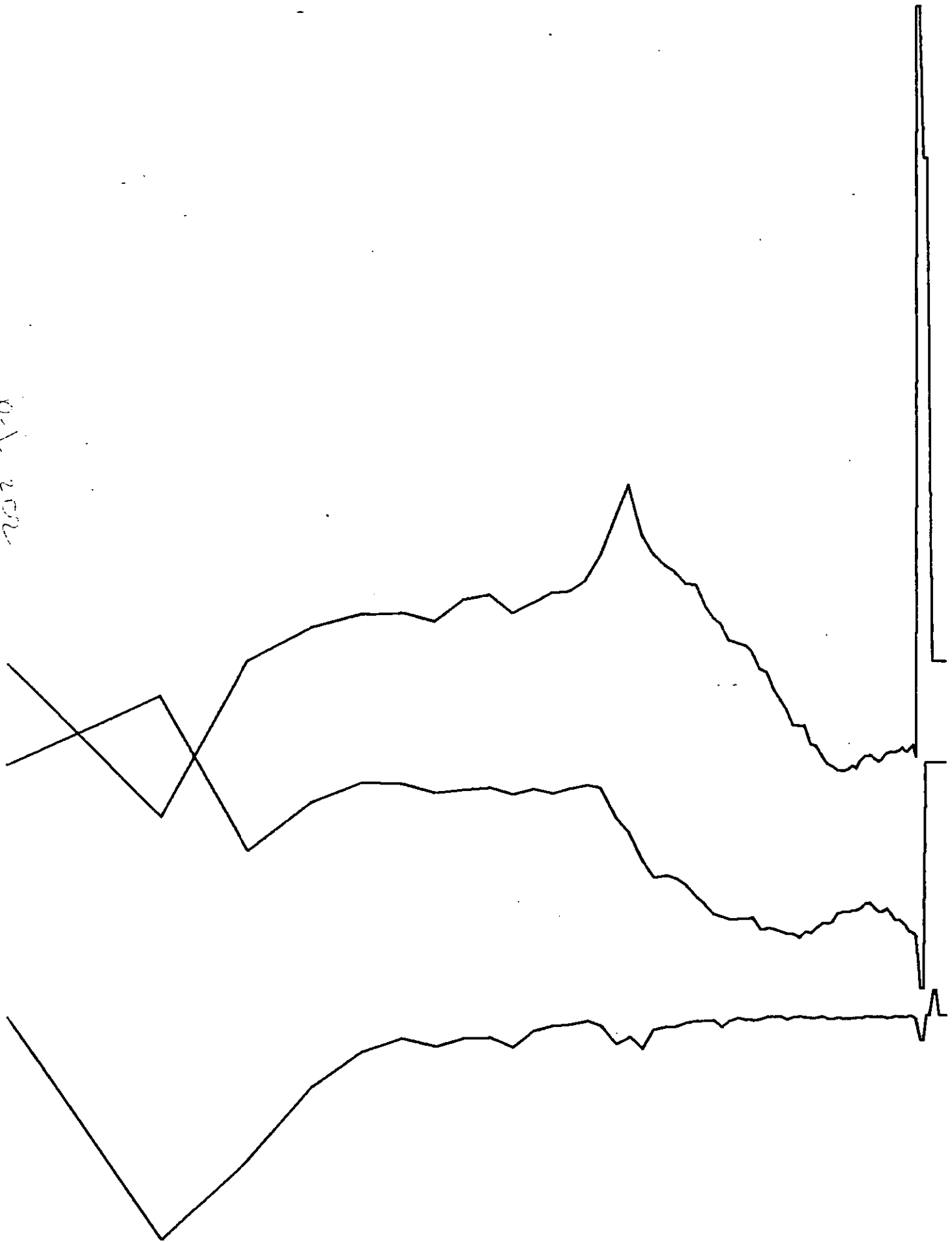
81 01 F



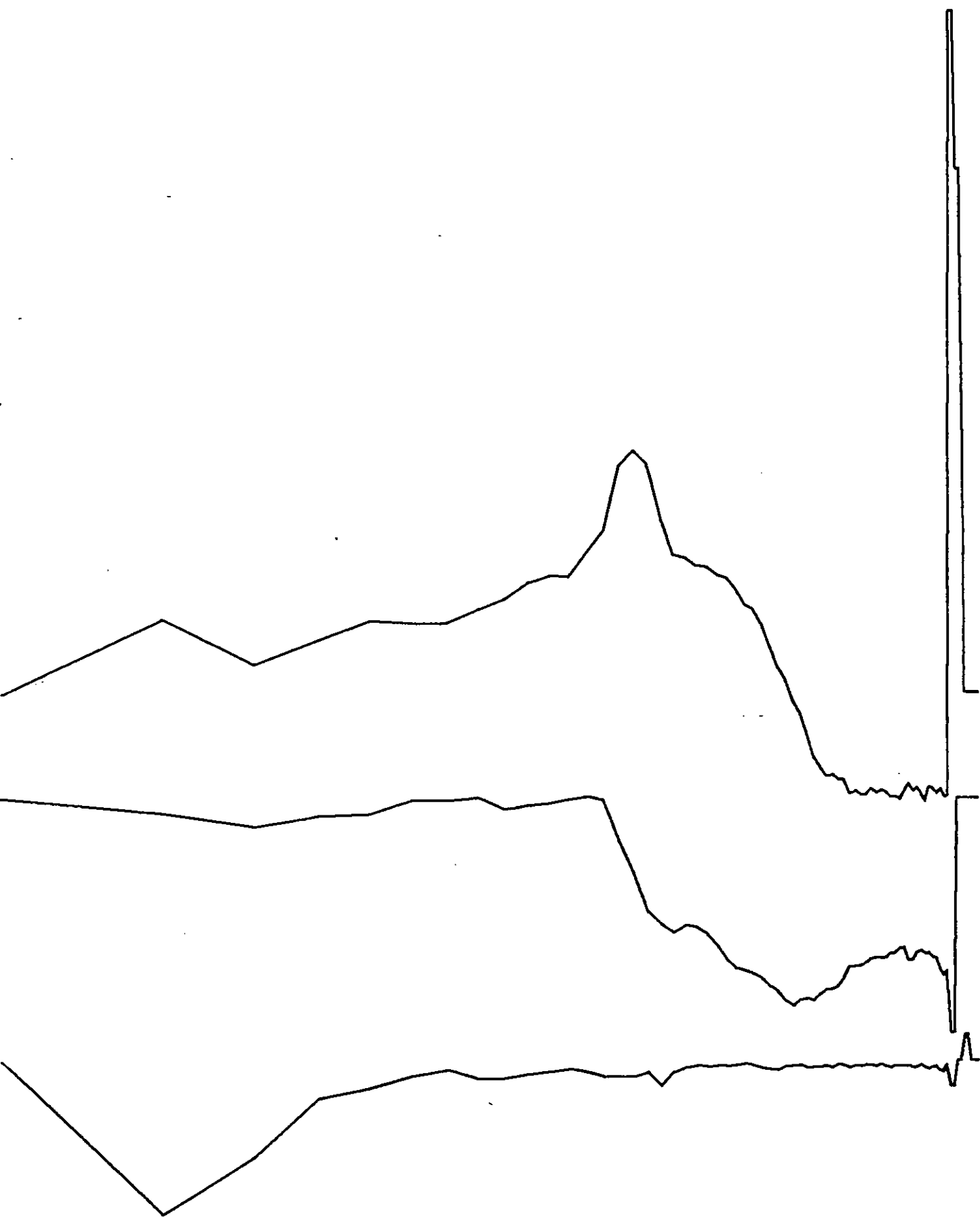
81 01F



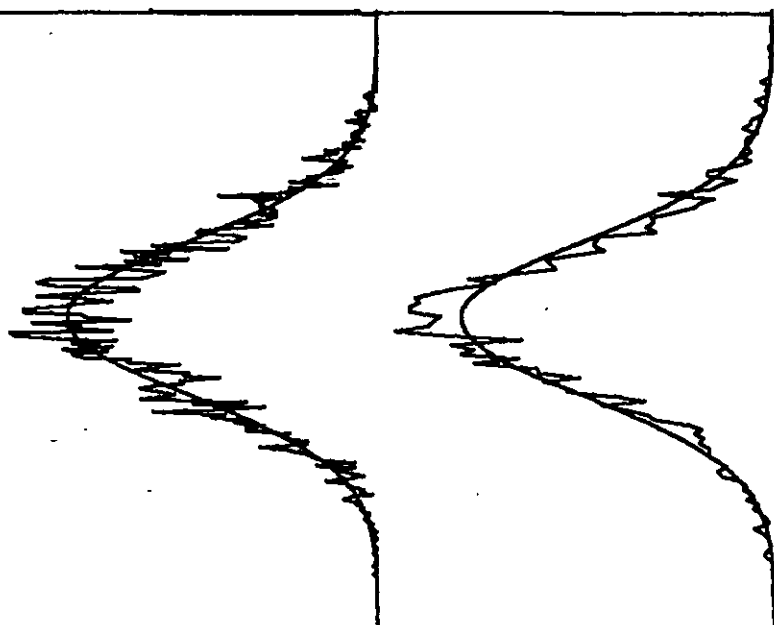
81 02 F



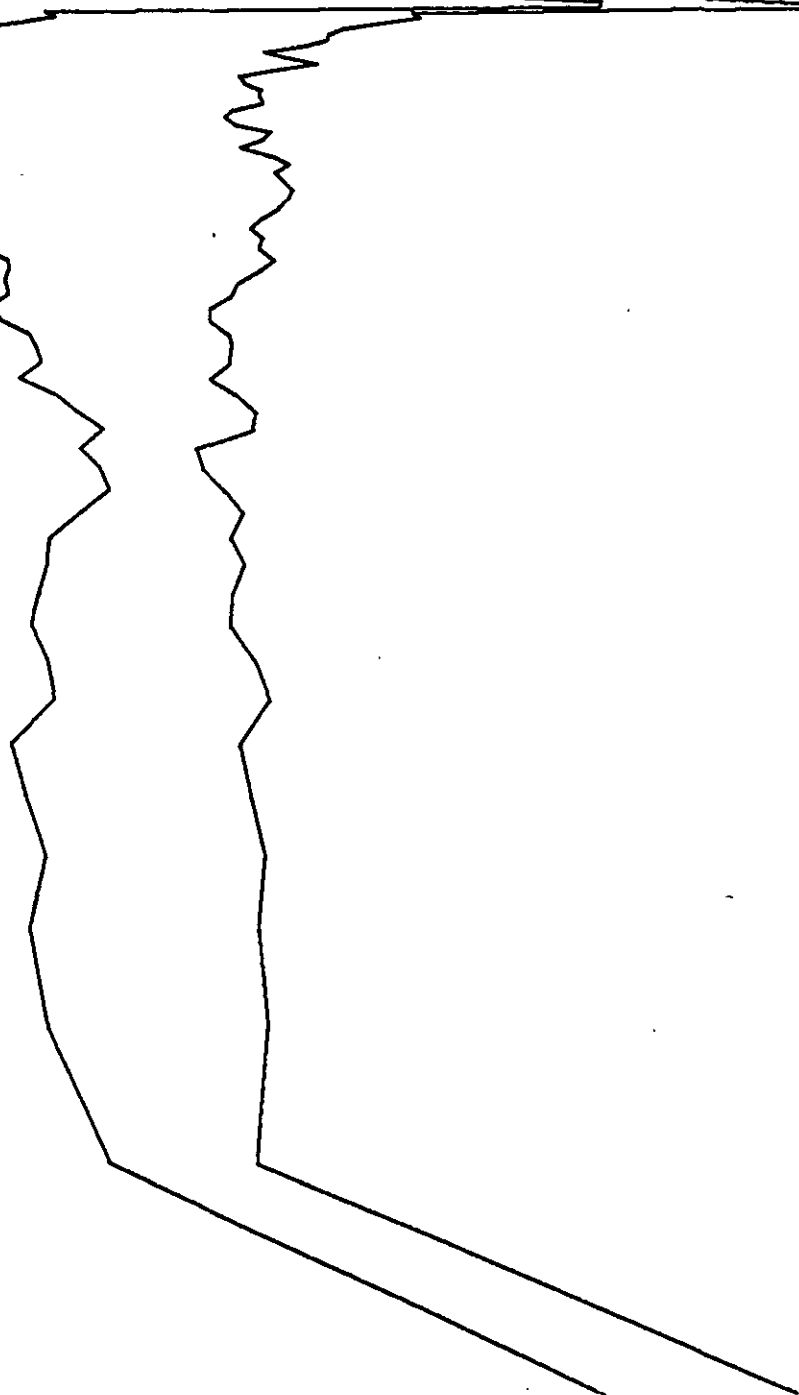
81 03F

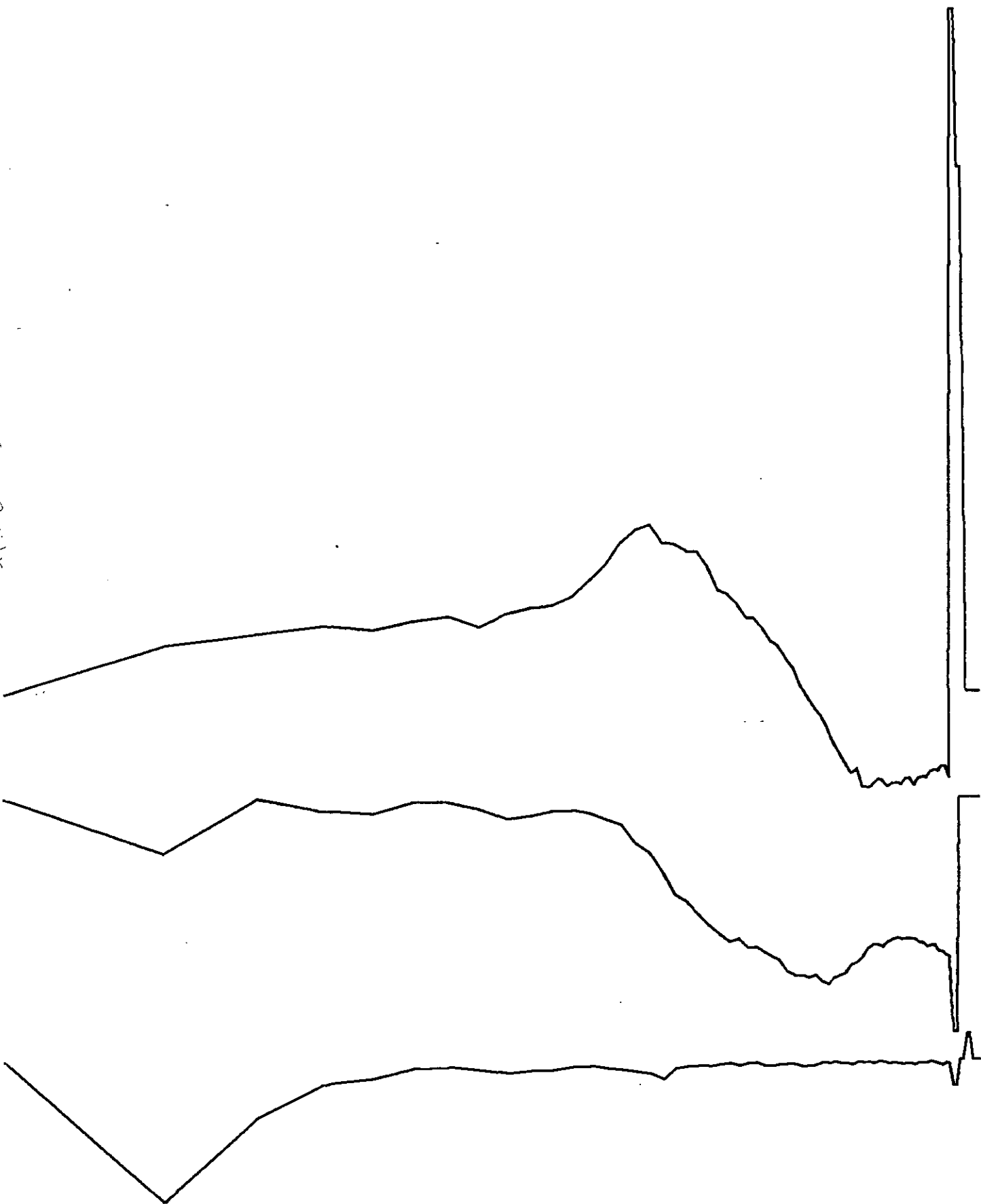


81 03 F



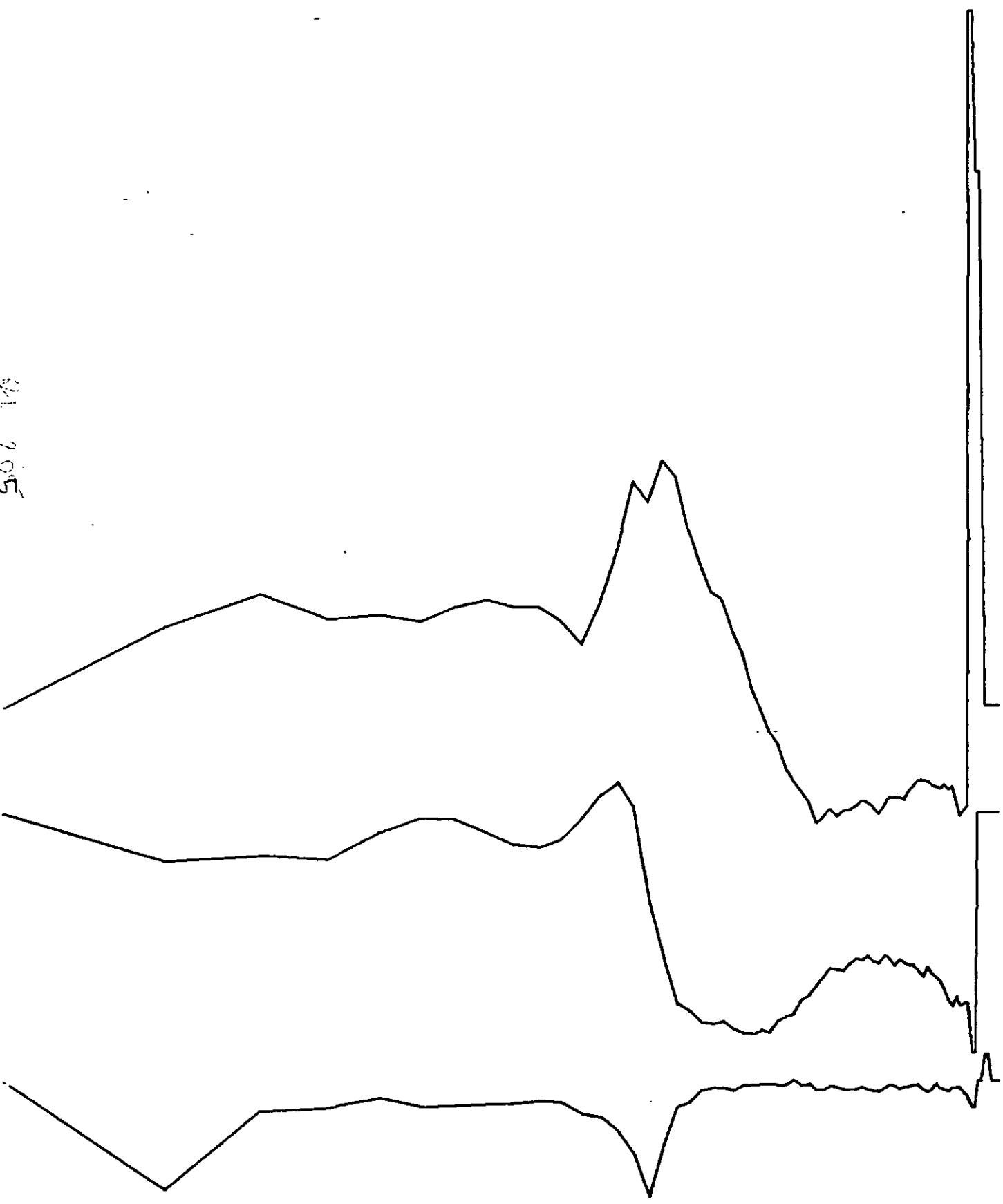
PL 203

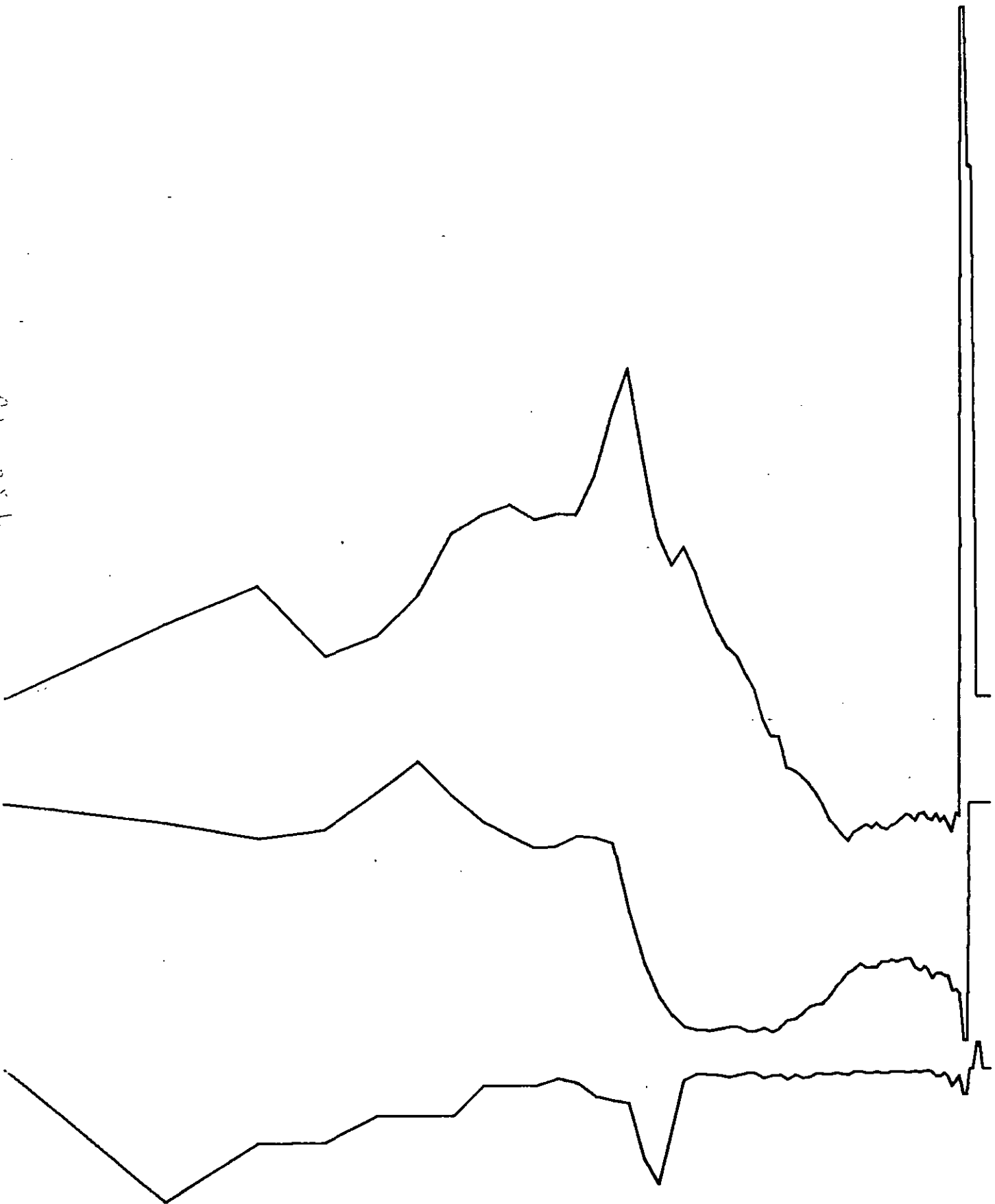




81 05F

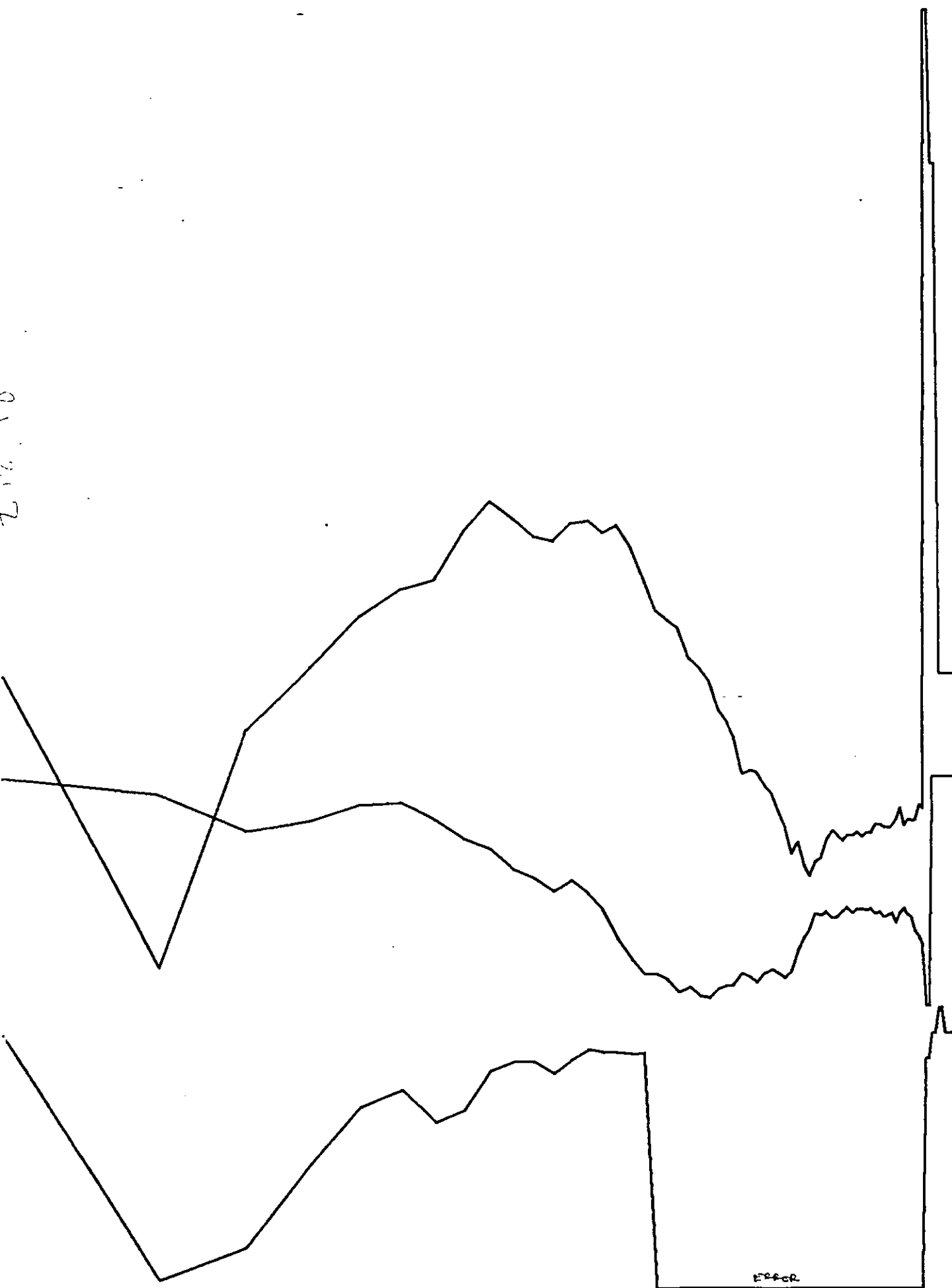
81 05F





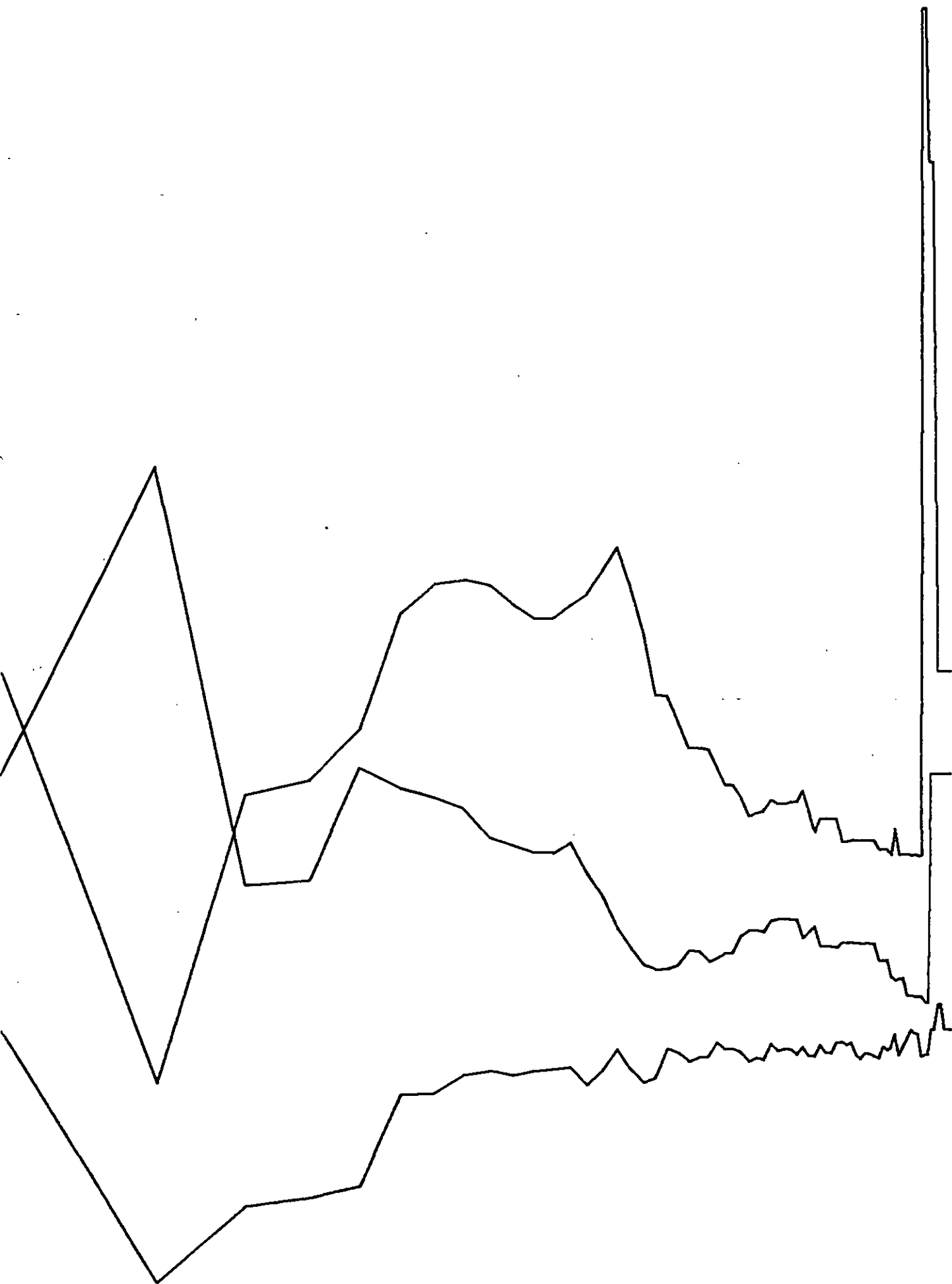
81 07 F

212.10

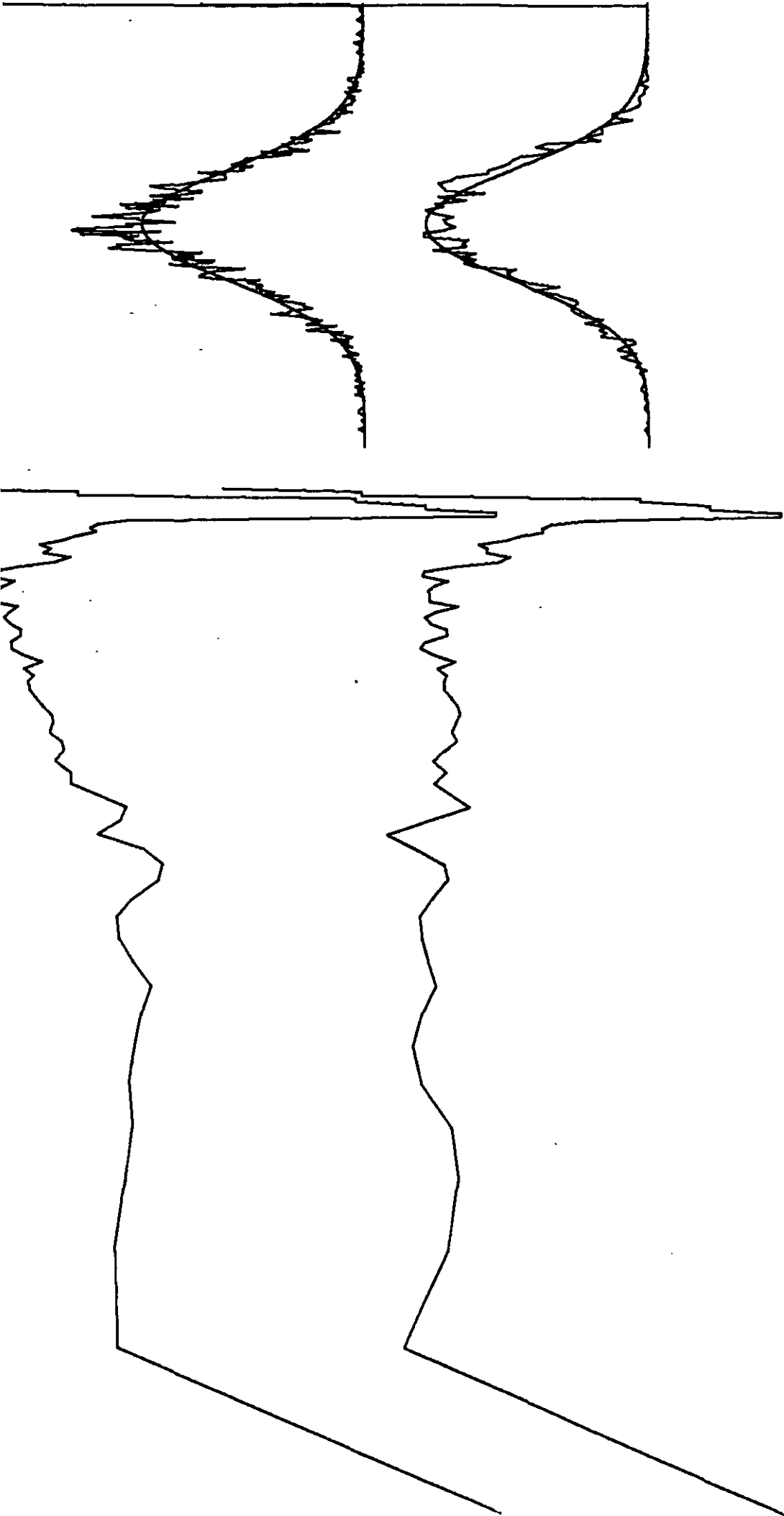


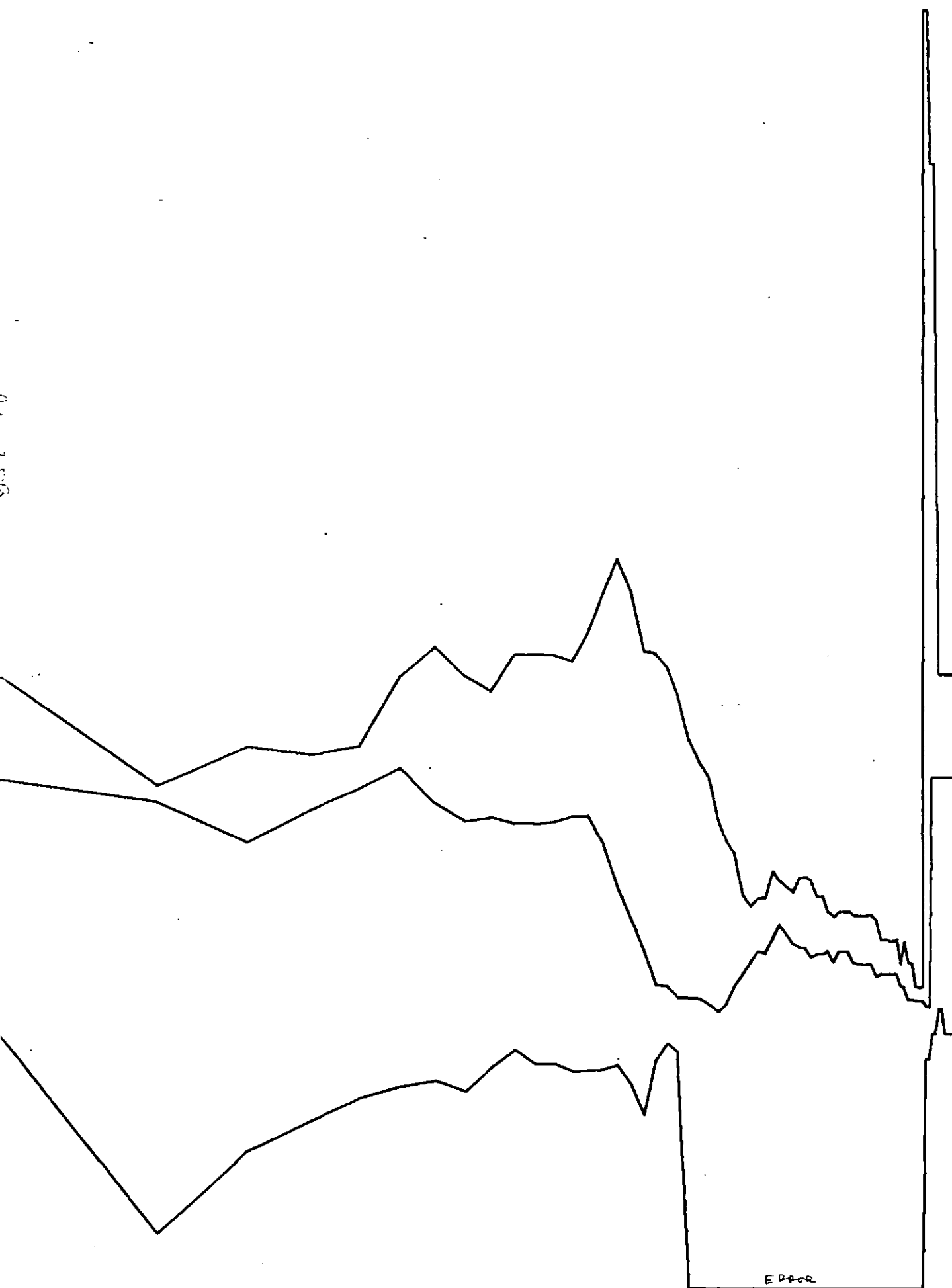
212.10

.81 08 F

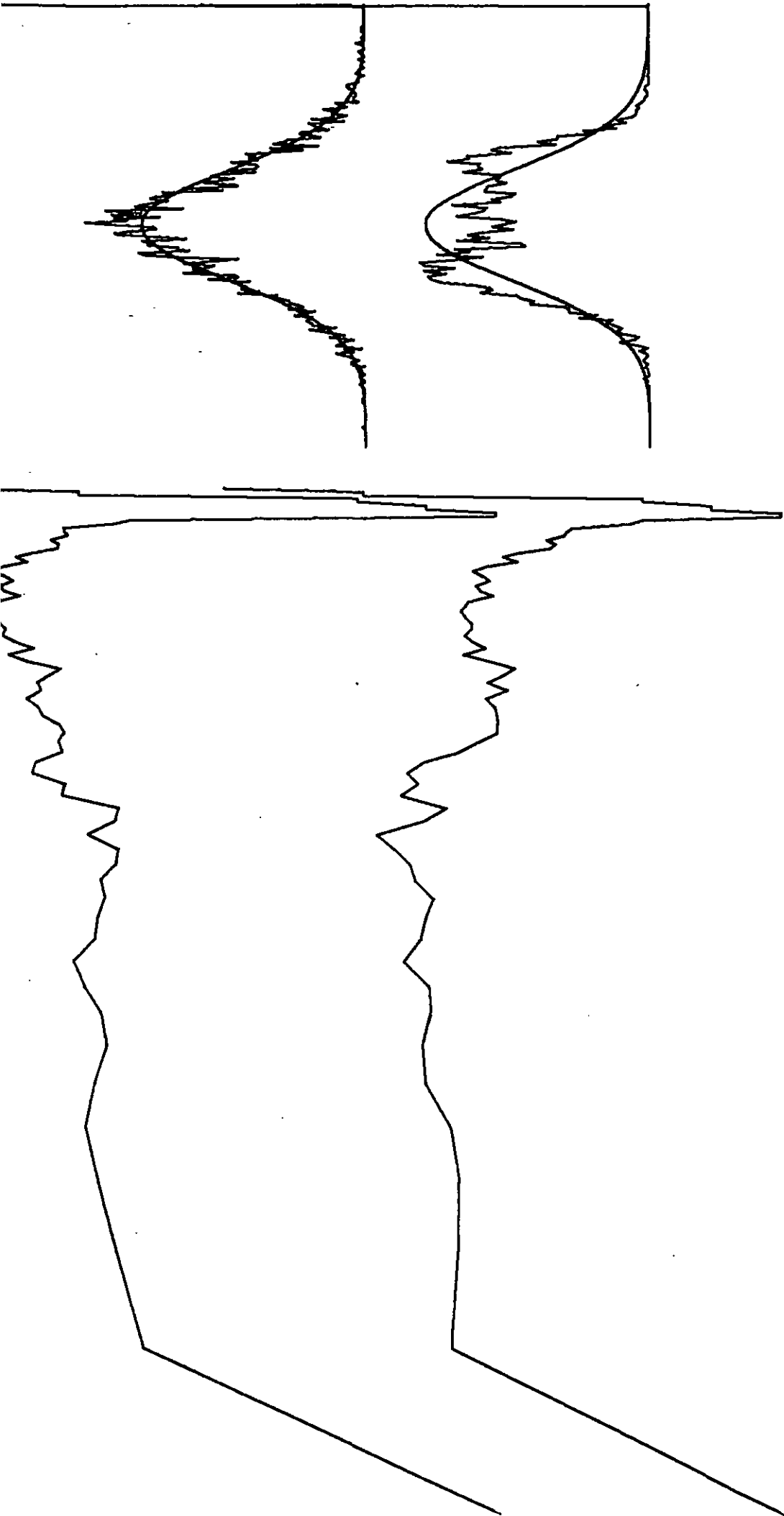


81 08F

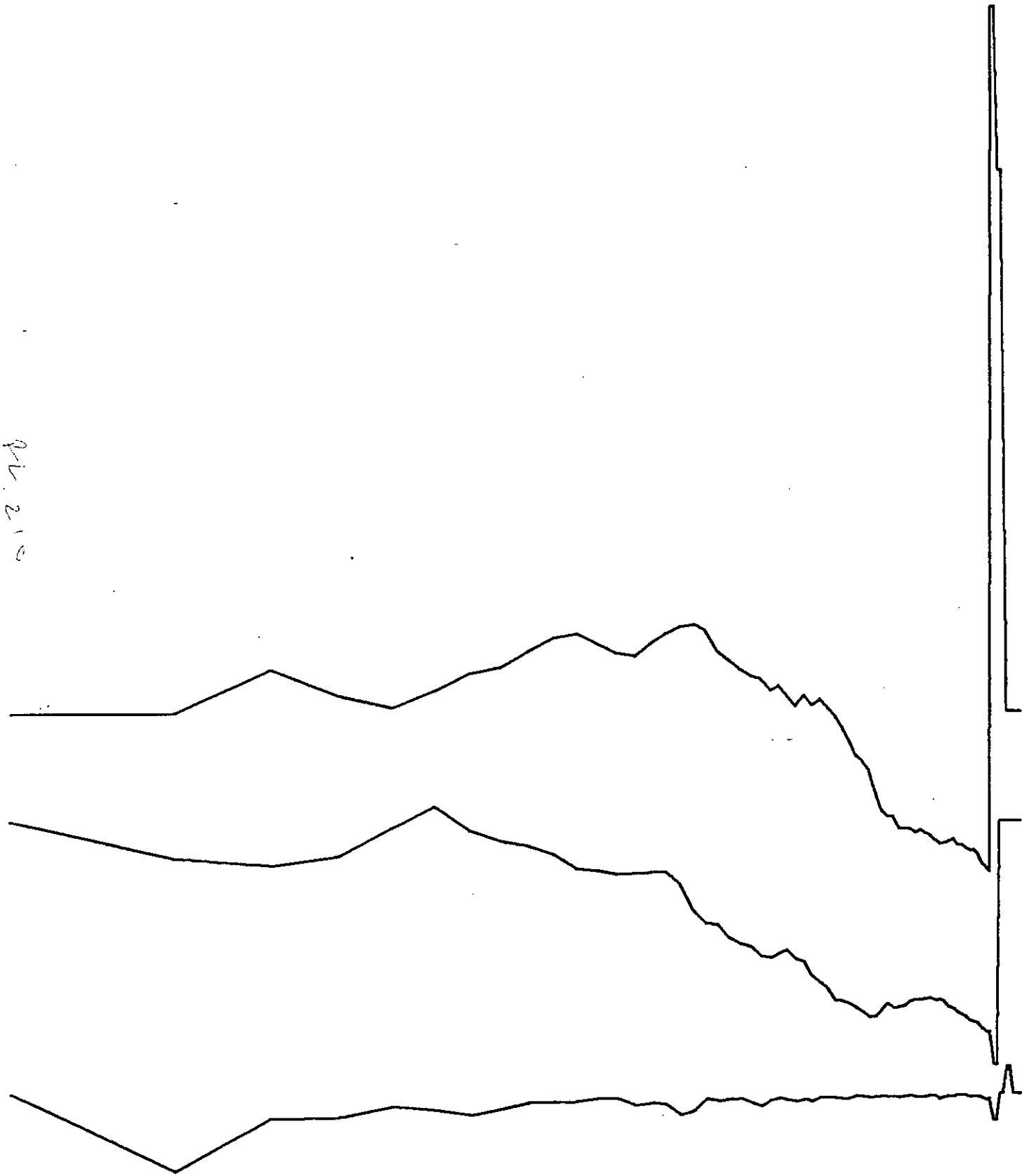




81 09 F

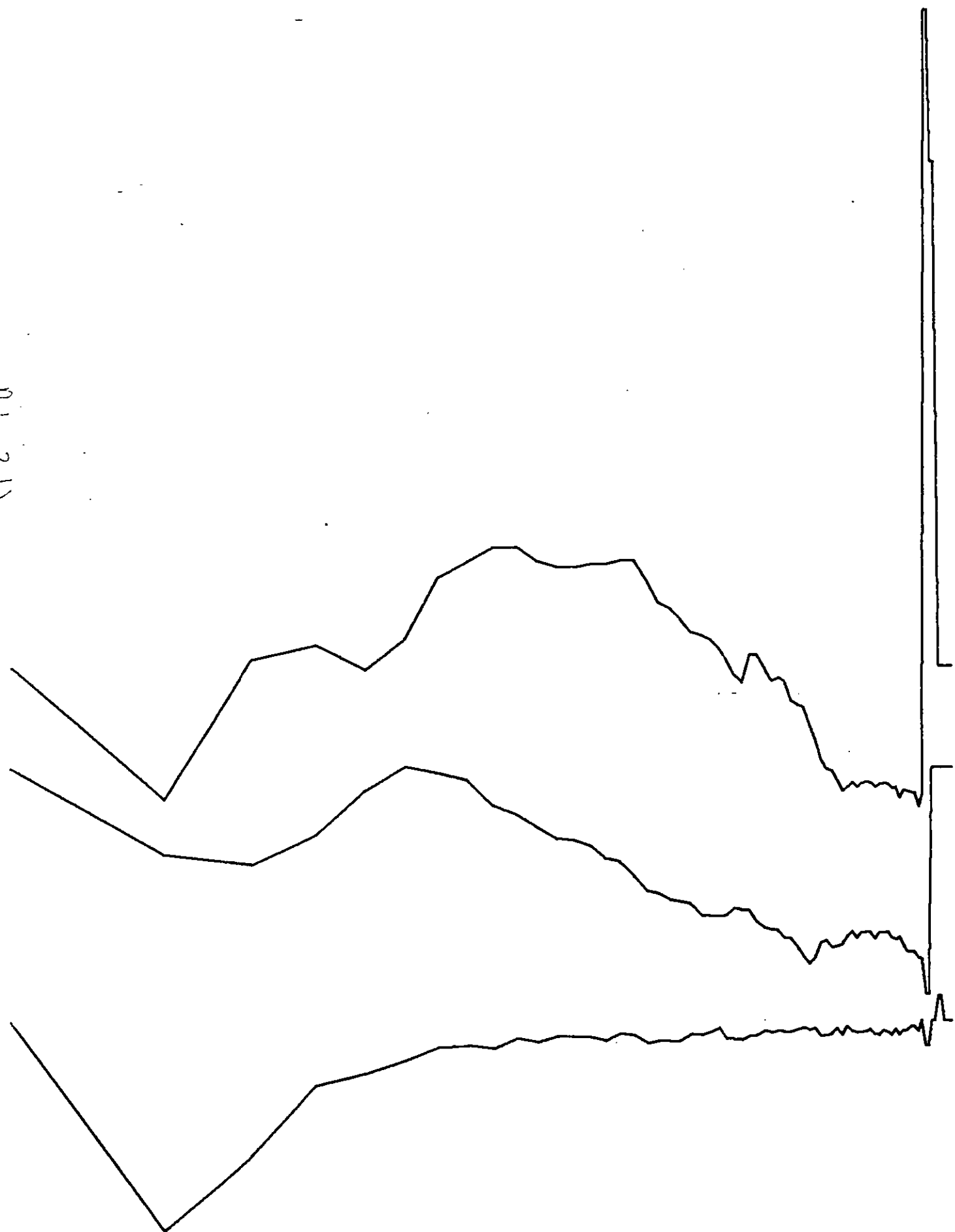


94.210



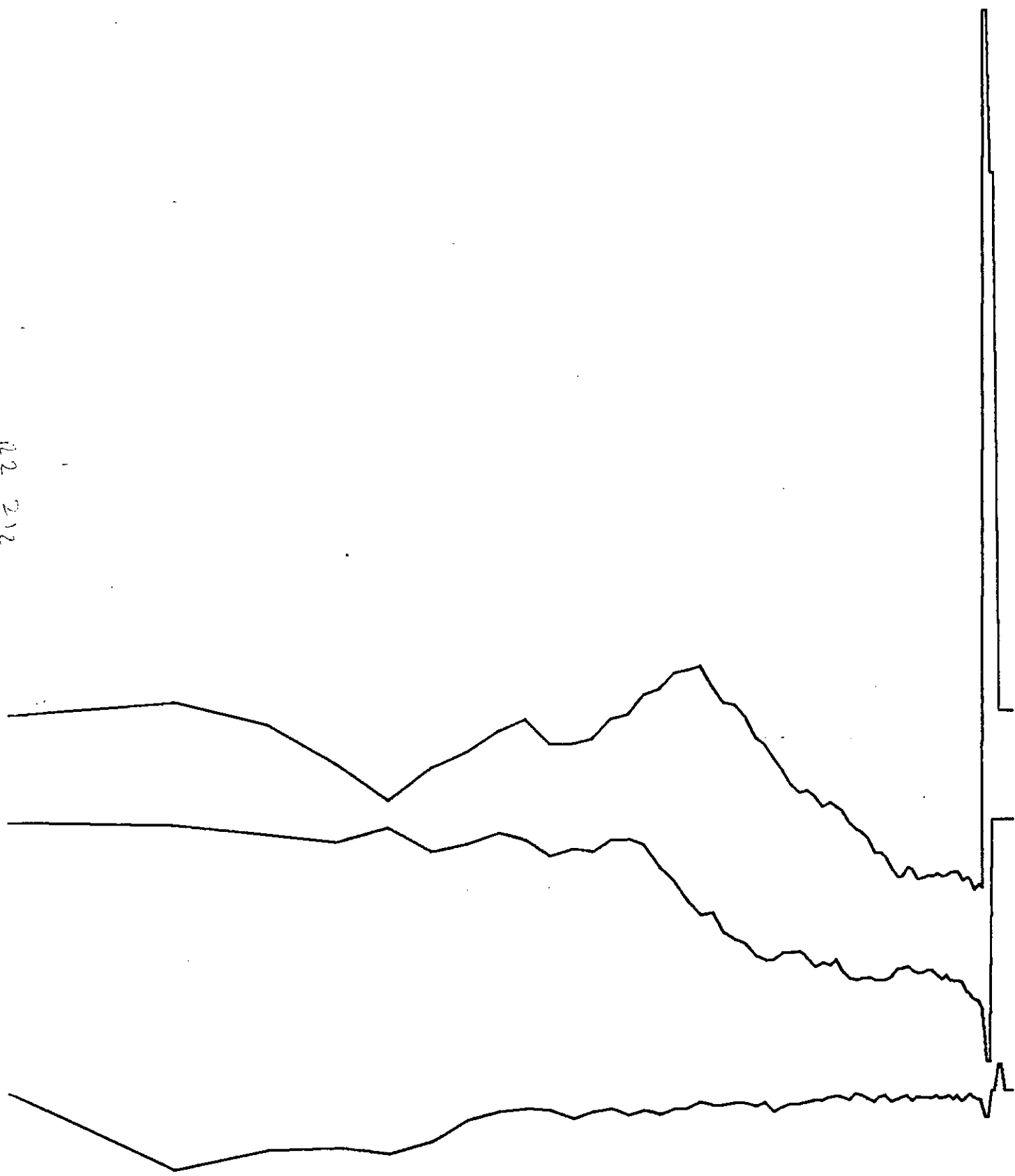
81 11F

01 217

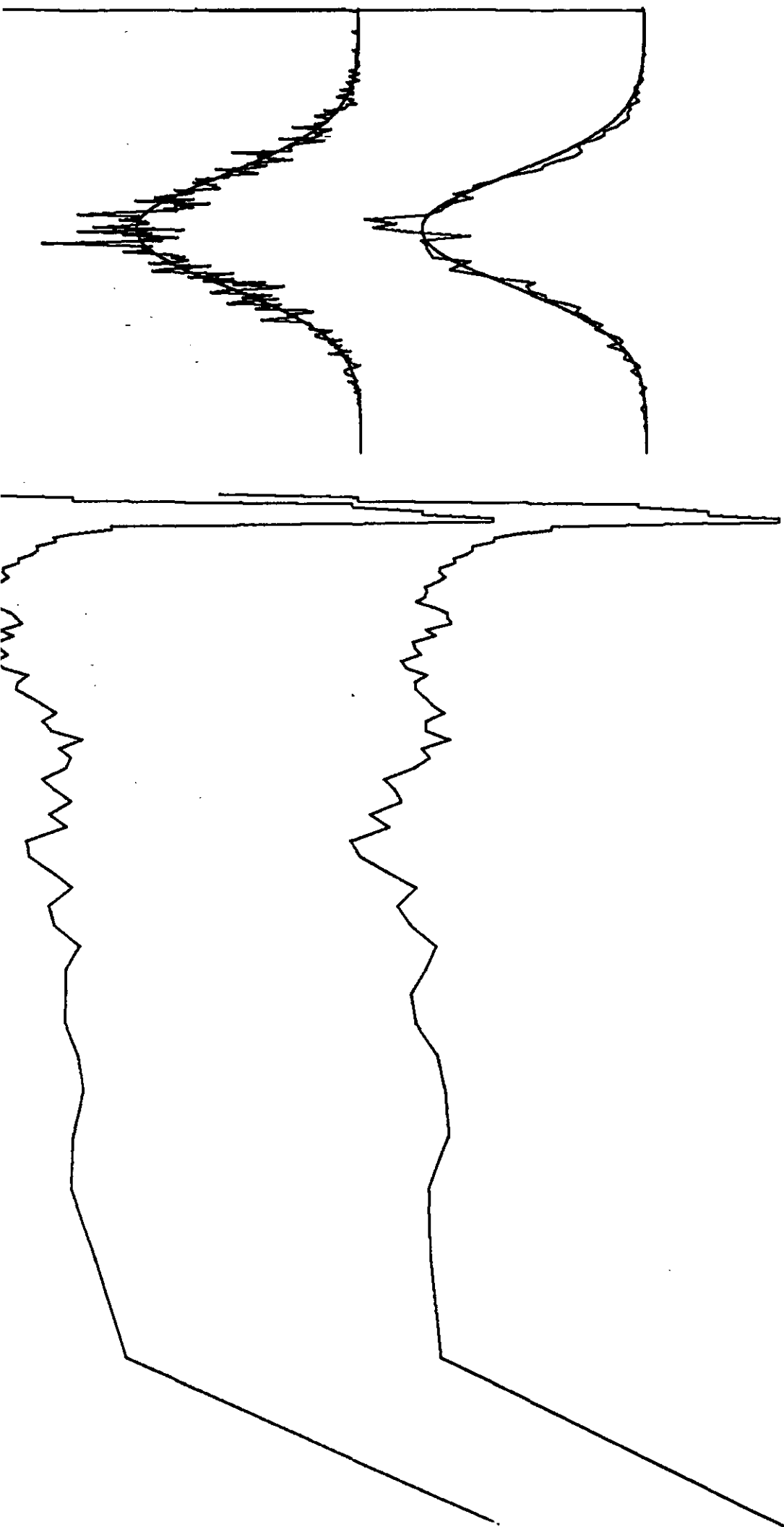


81 12 F

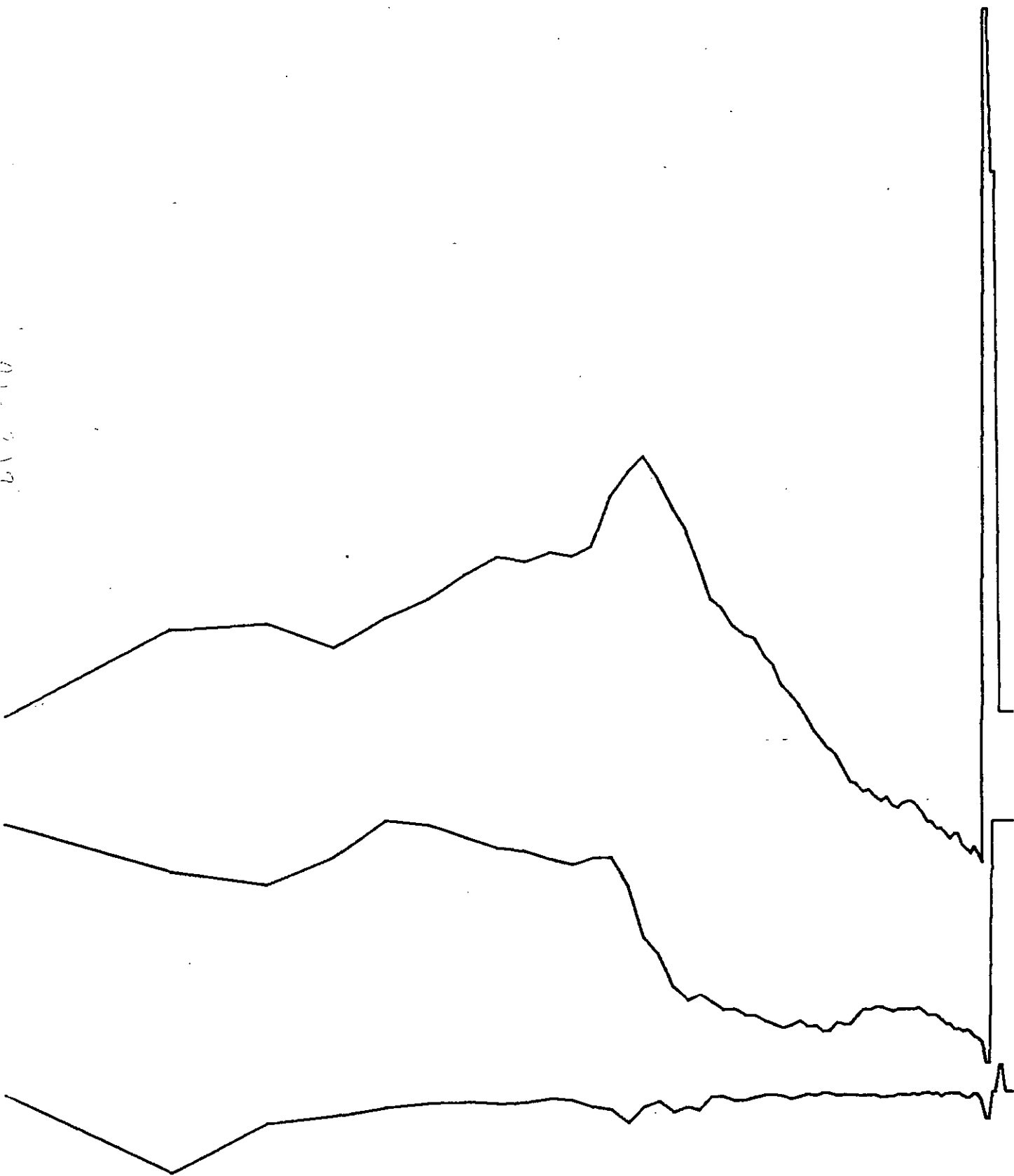
02 212

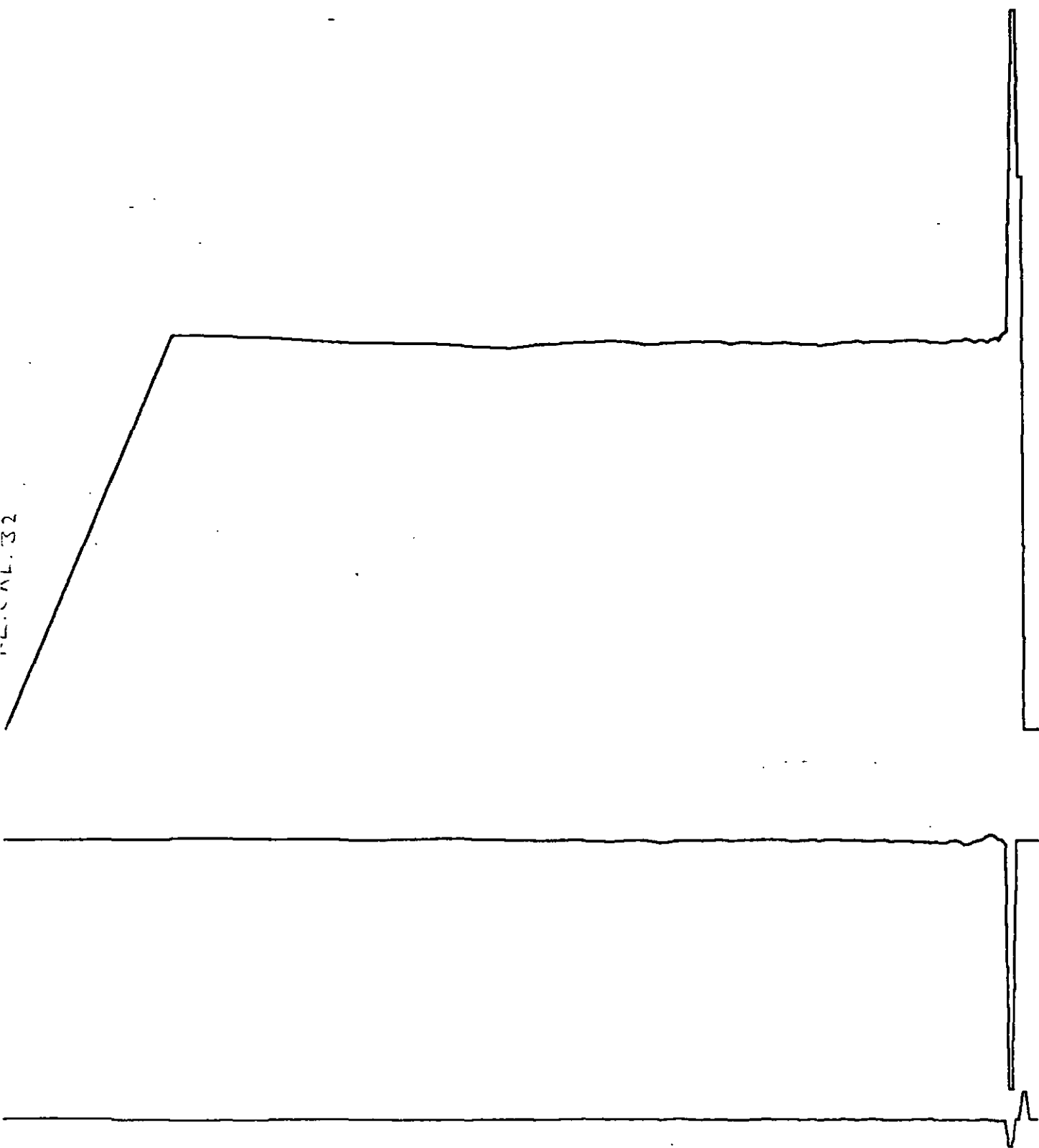


81 12F



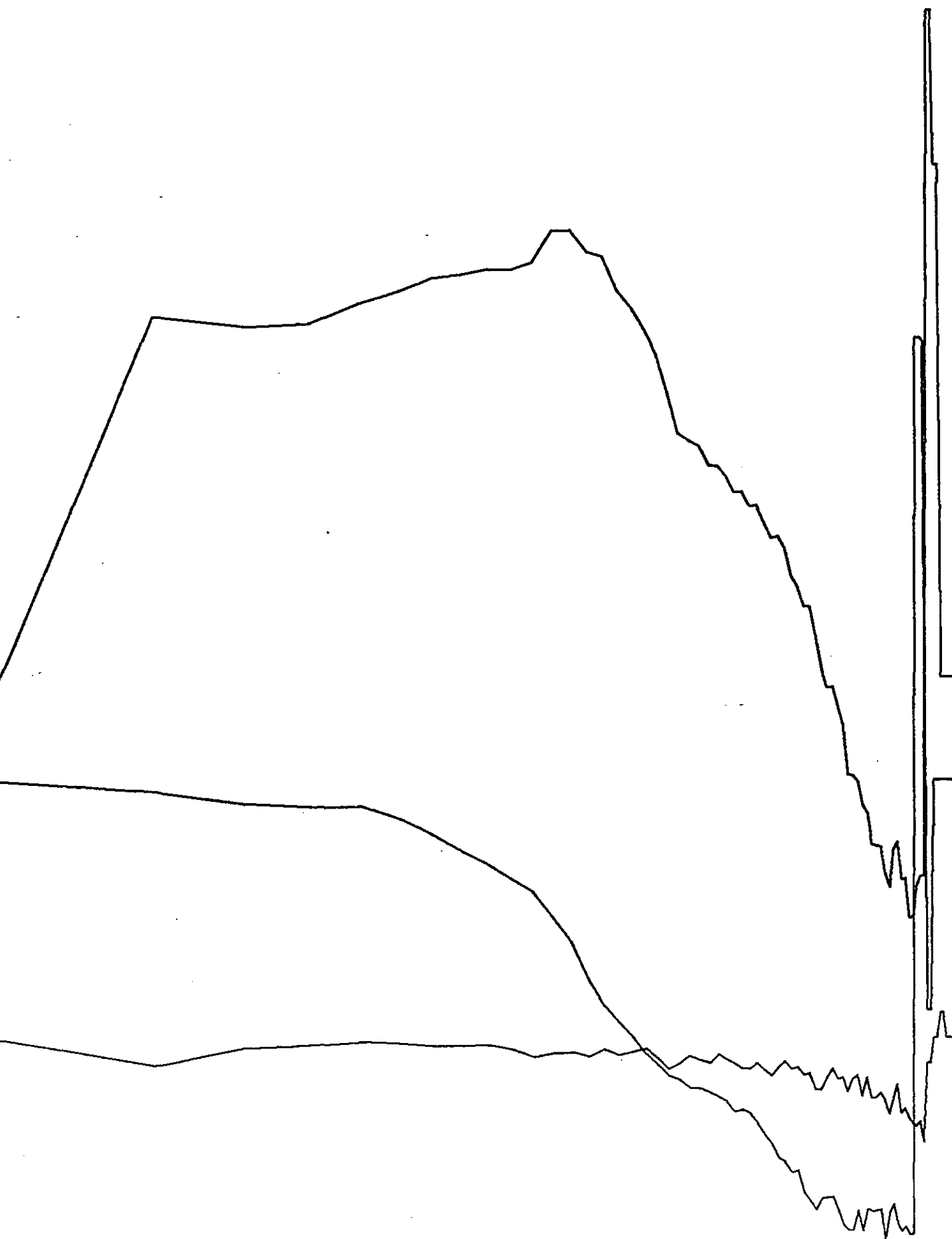
81 13 F





RECAL. 32

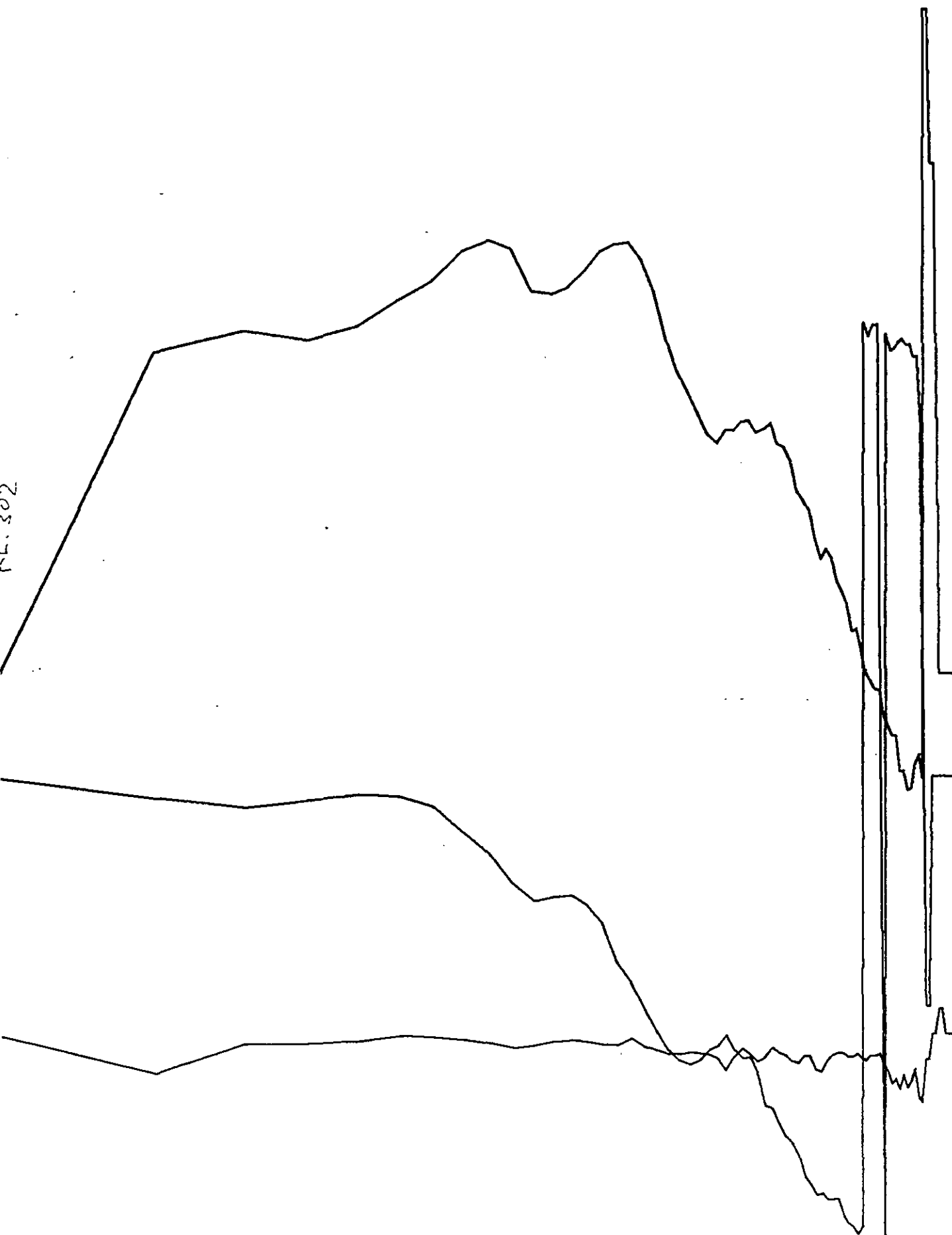
LIB 88



81 01 T

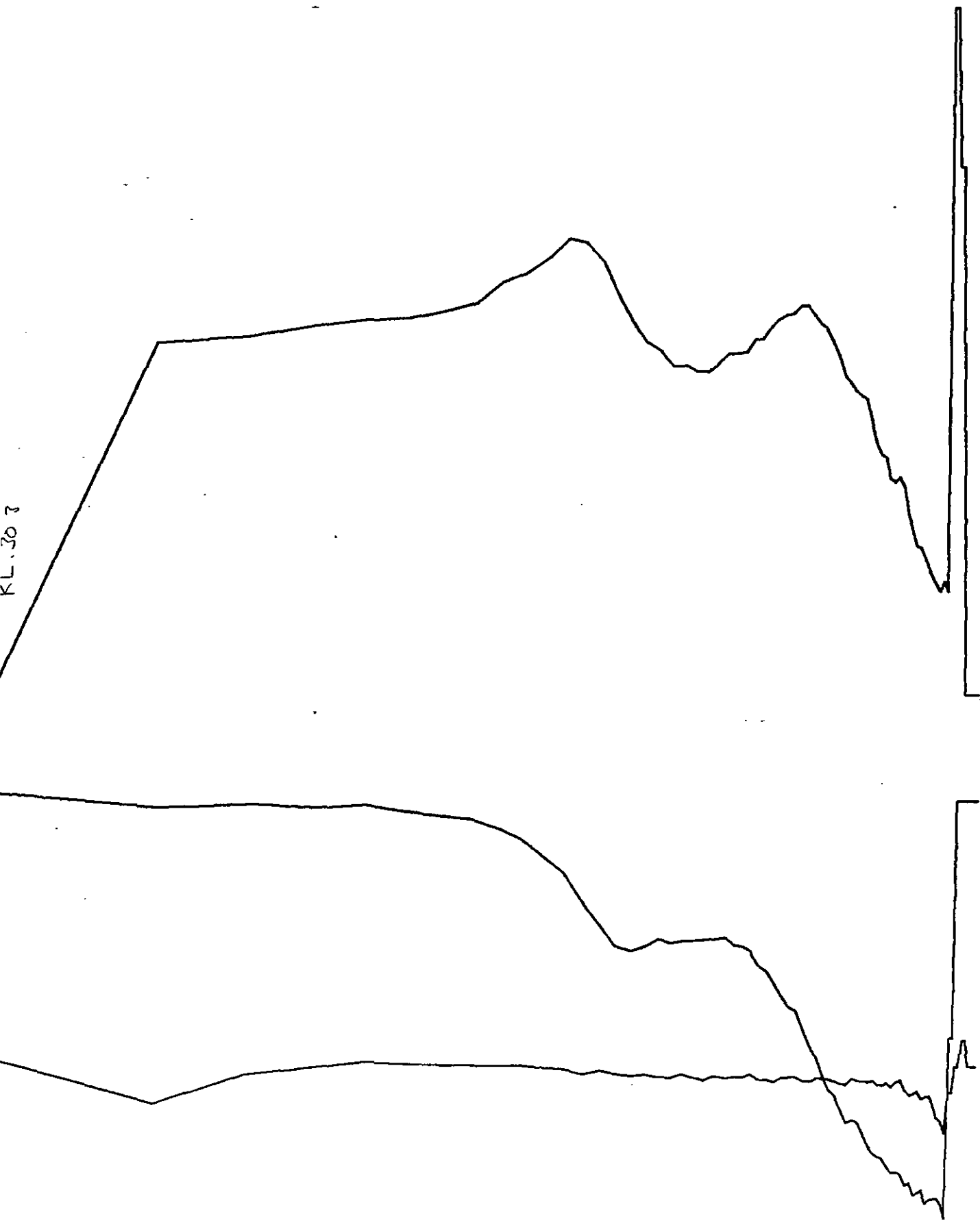


81 02 T

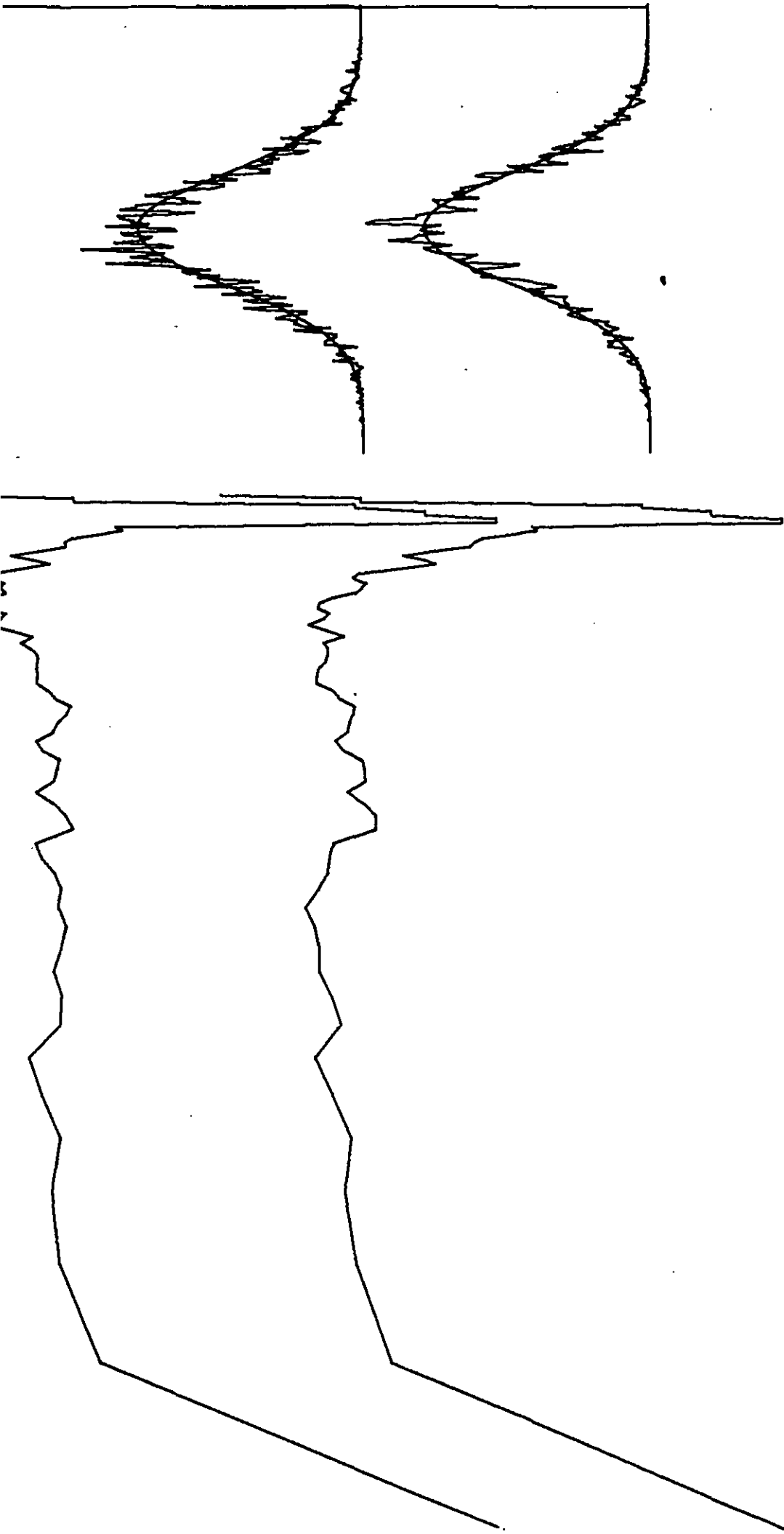


PL-302

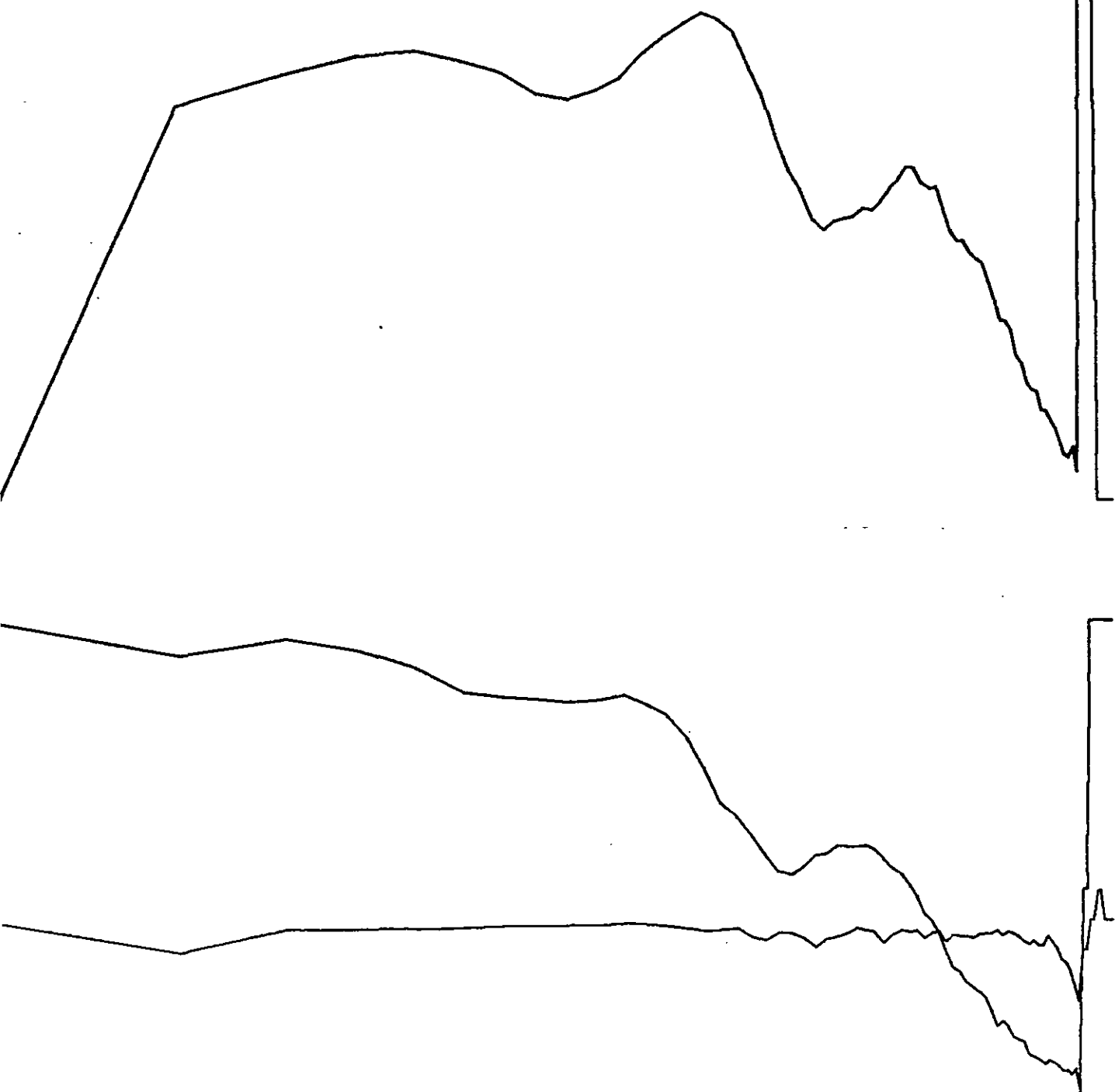
81 03 T



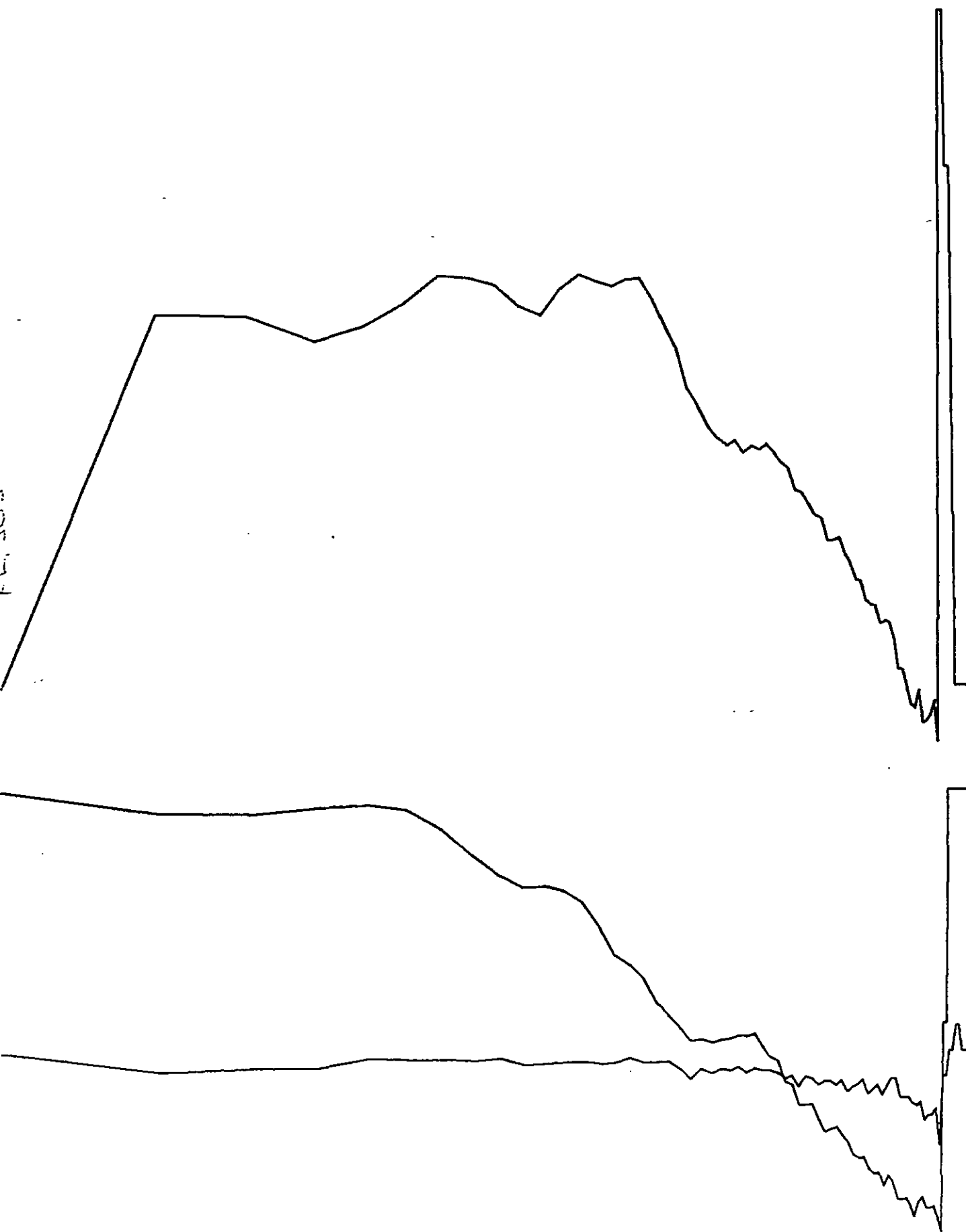
81 03T



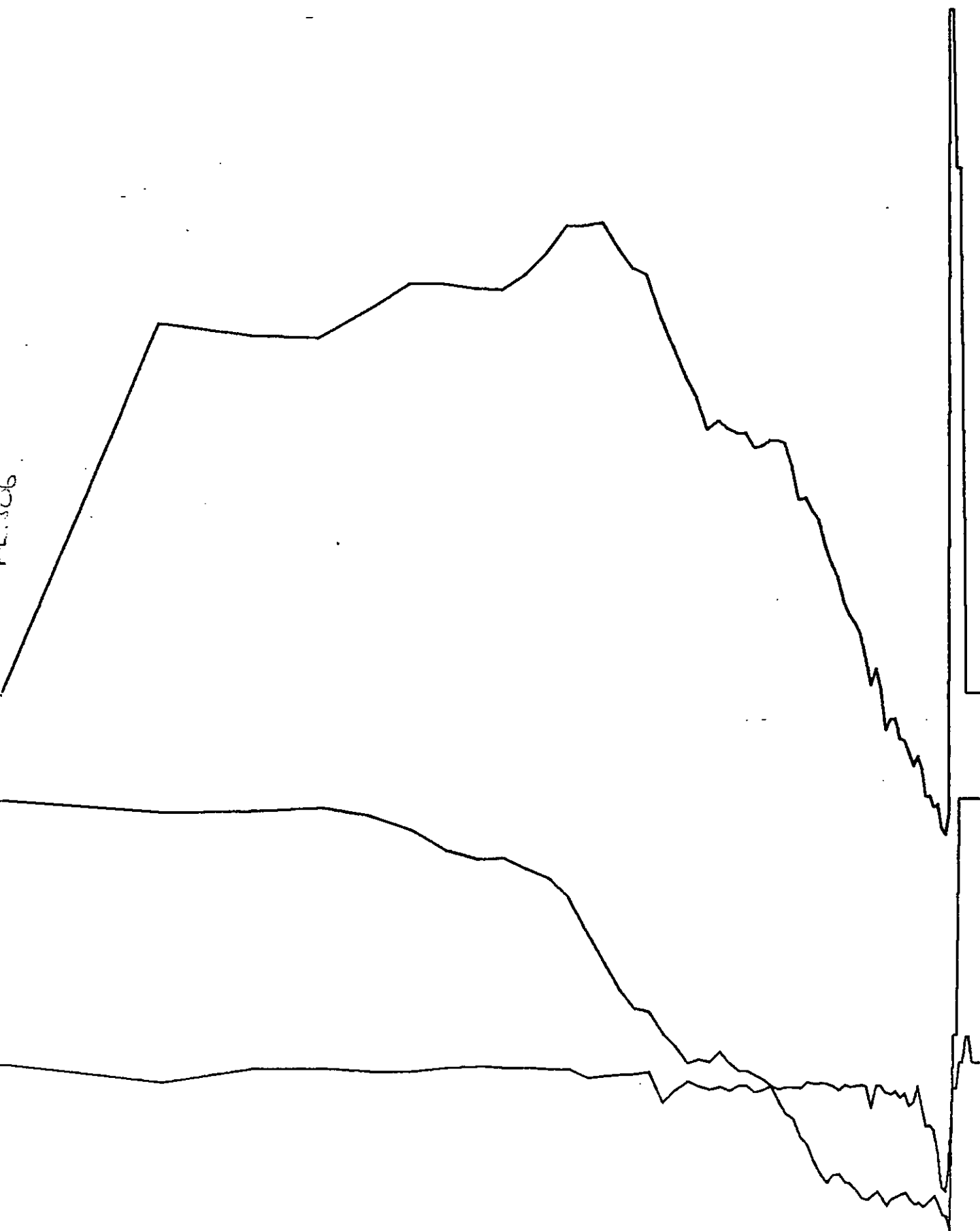
81 04T



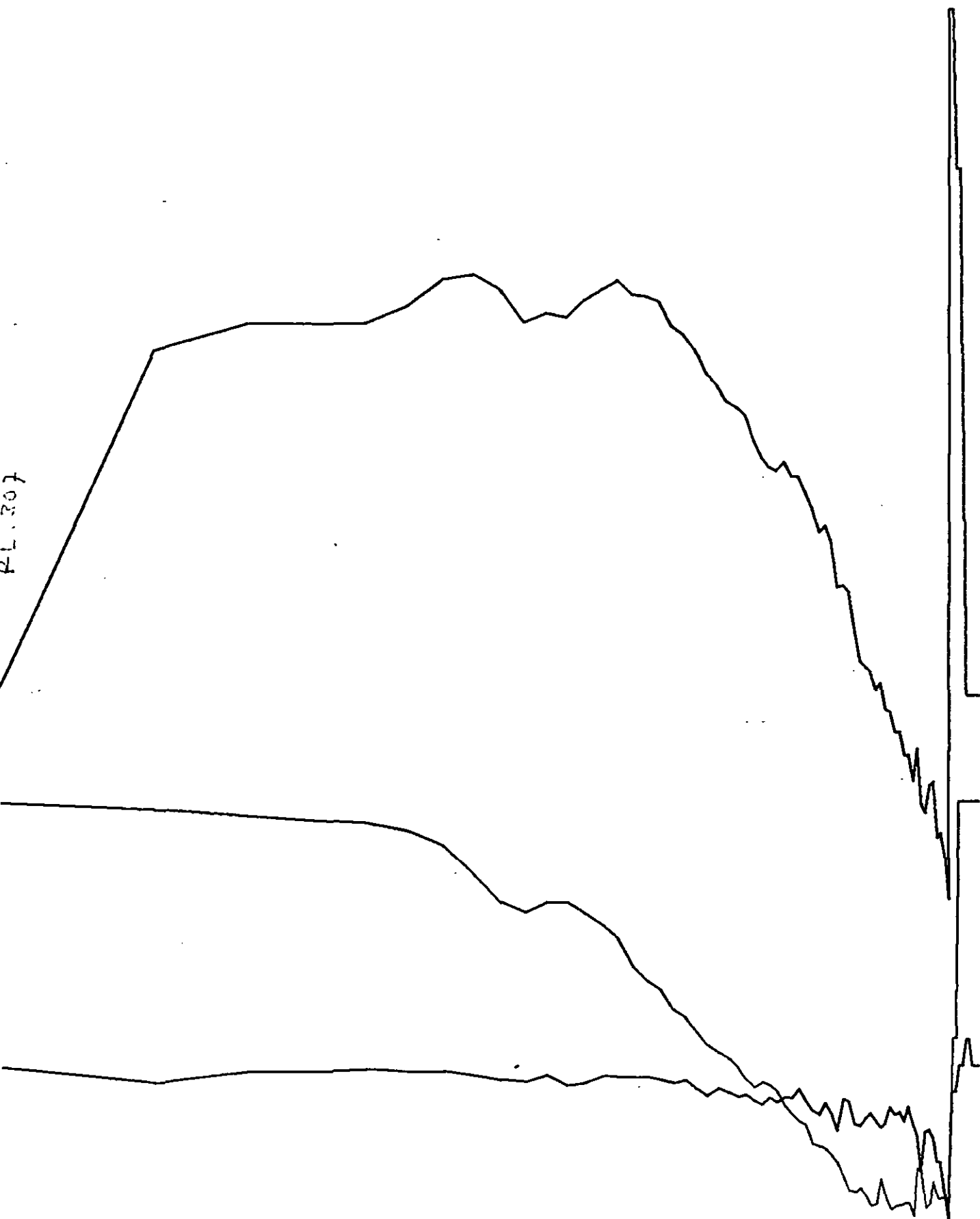
81 05 T



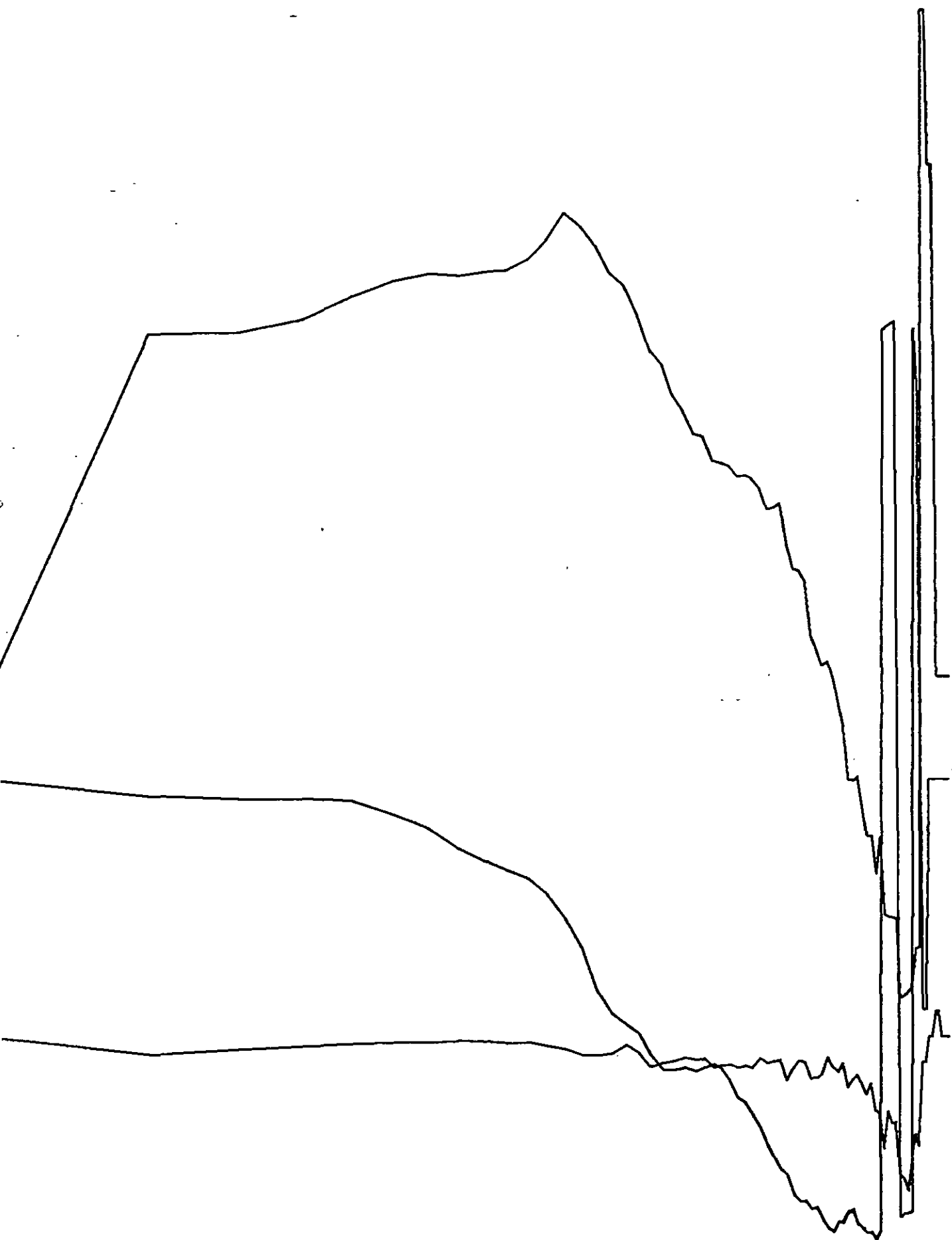
81 D6T



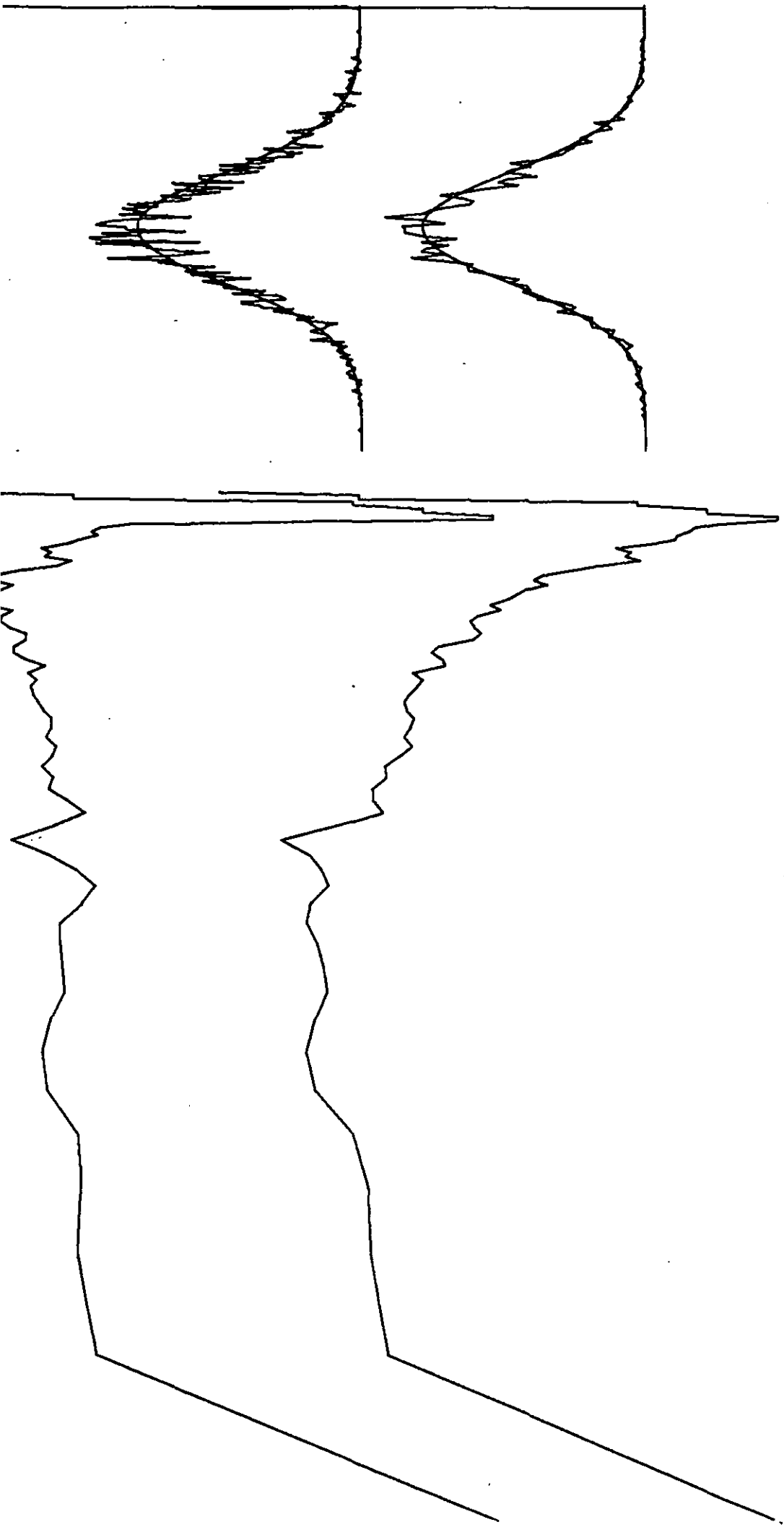
81 07T



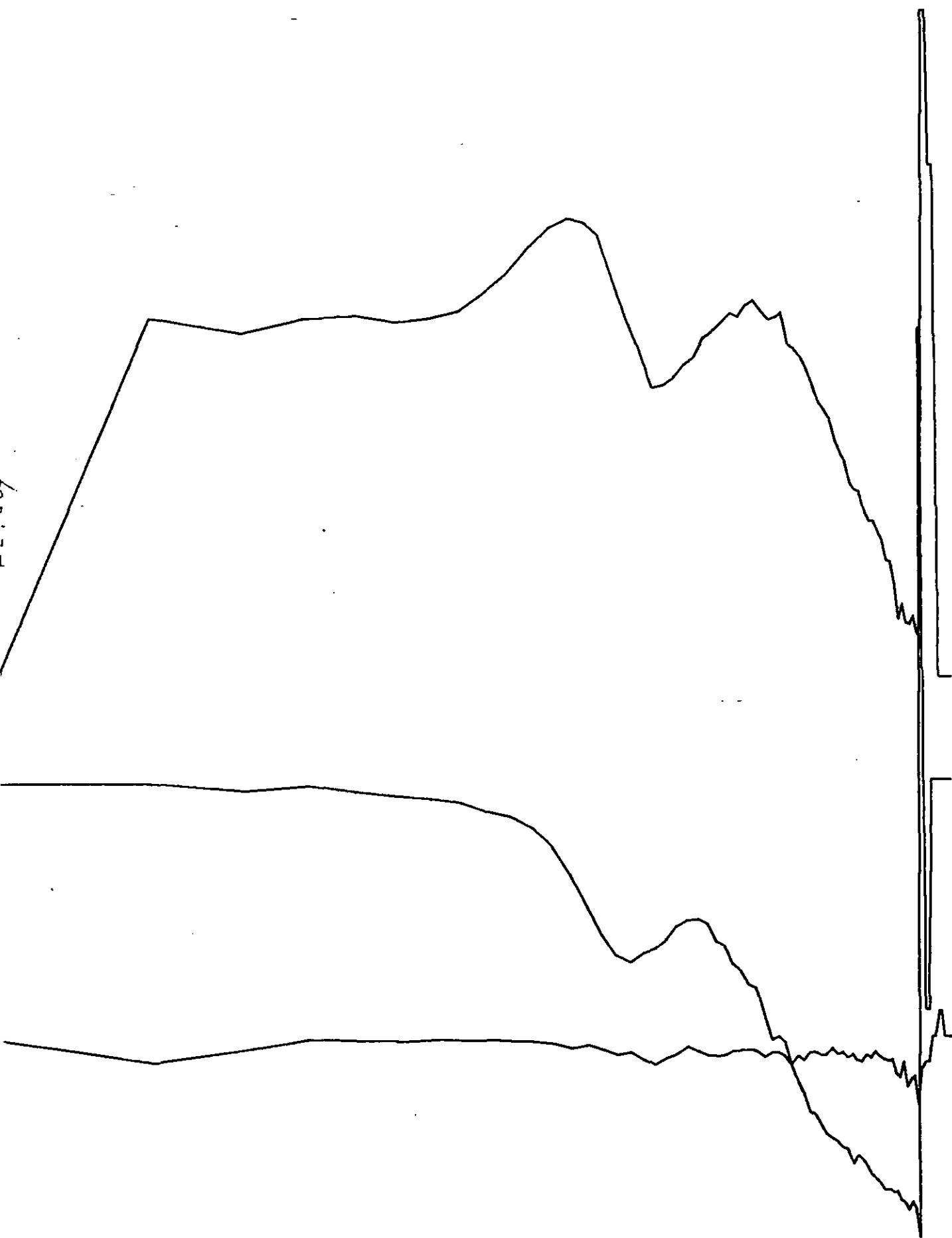
for 77



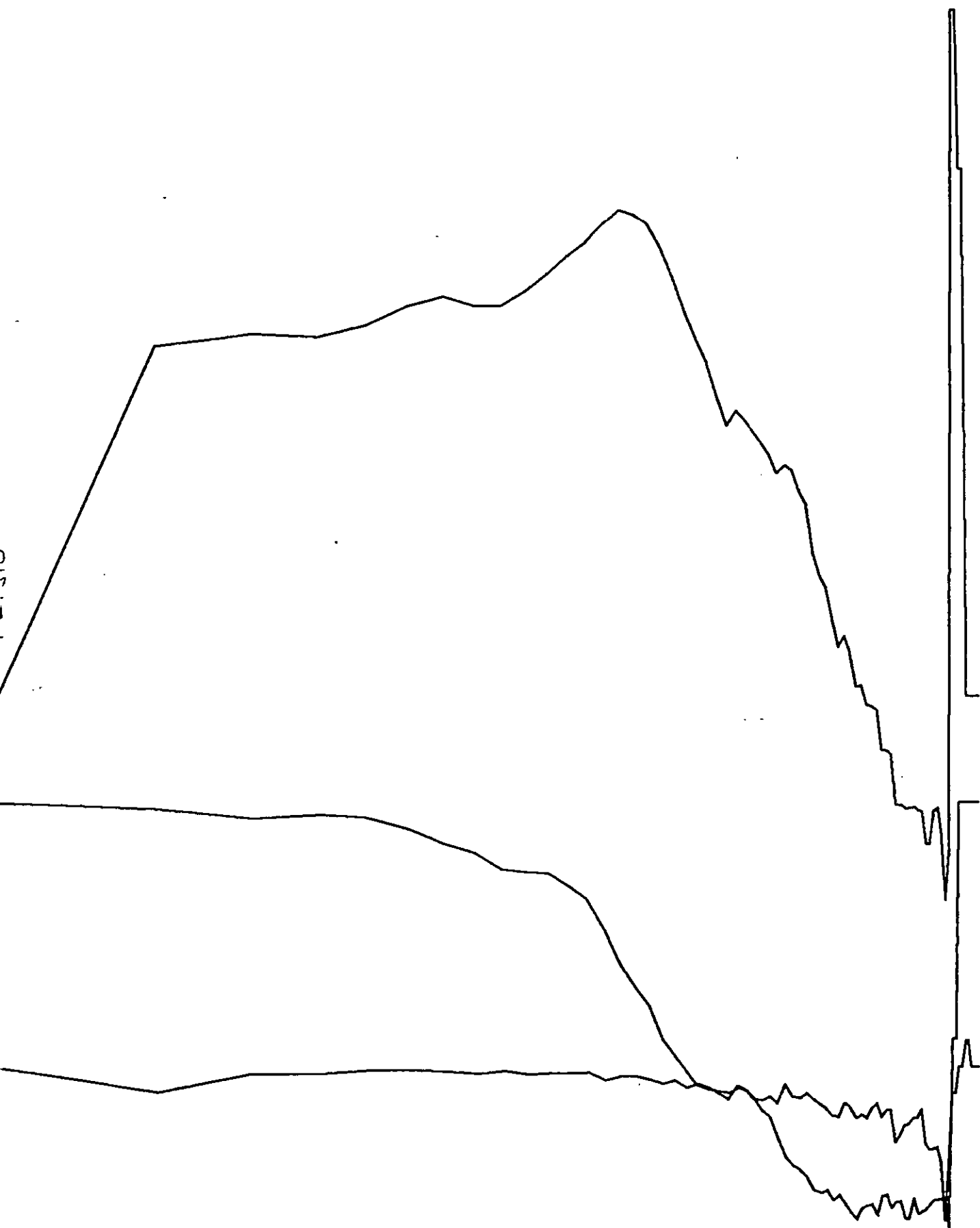
180 18

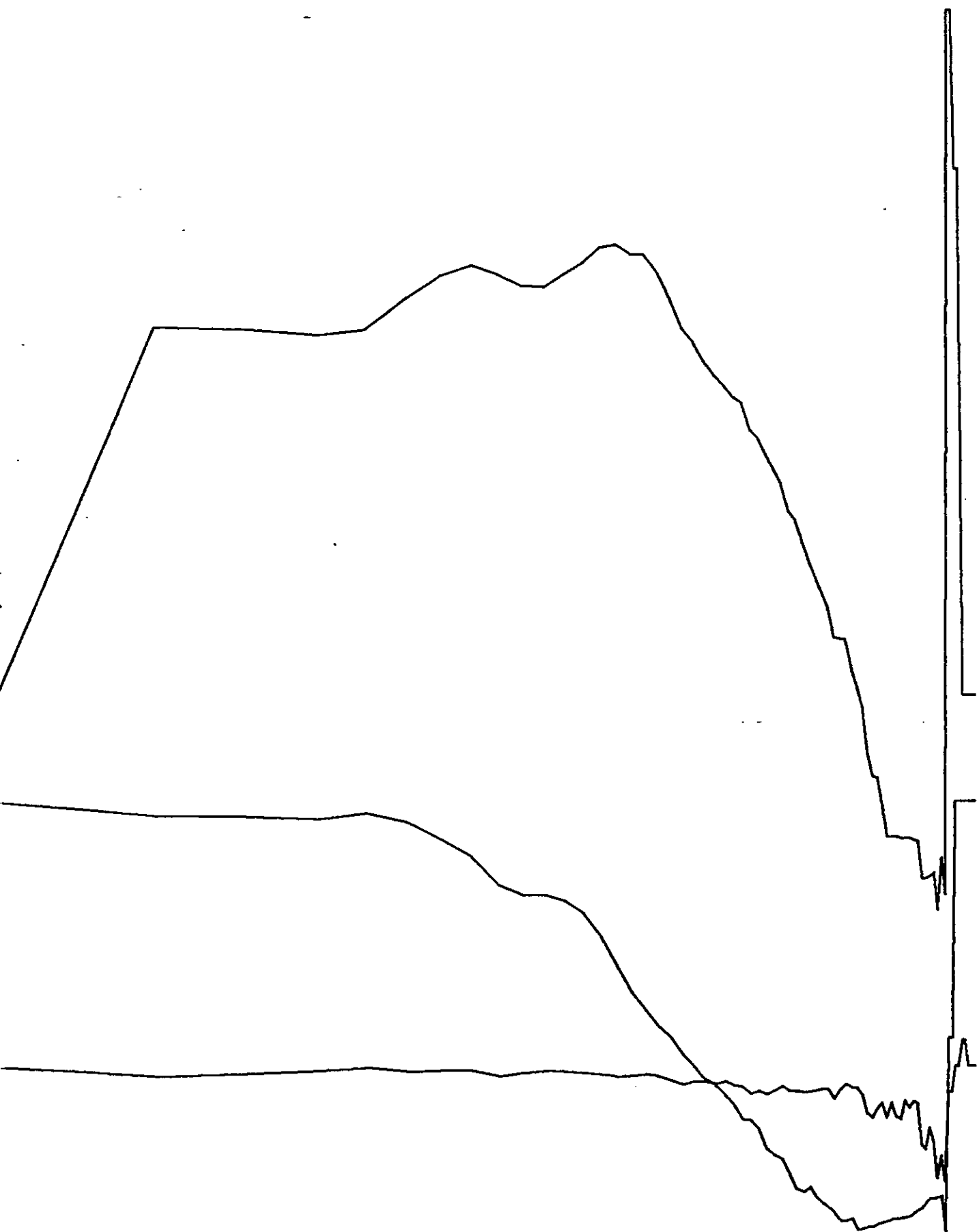


81 09 T

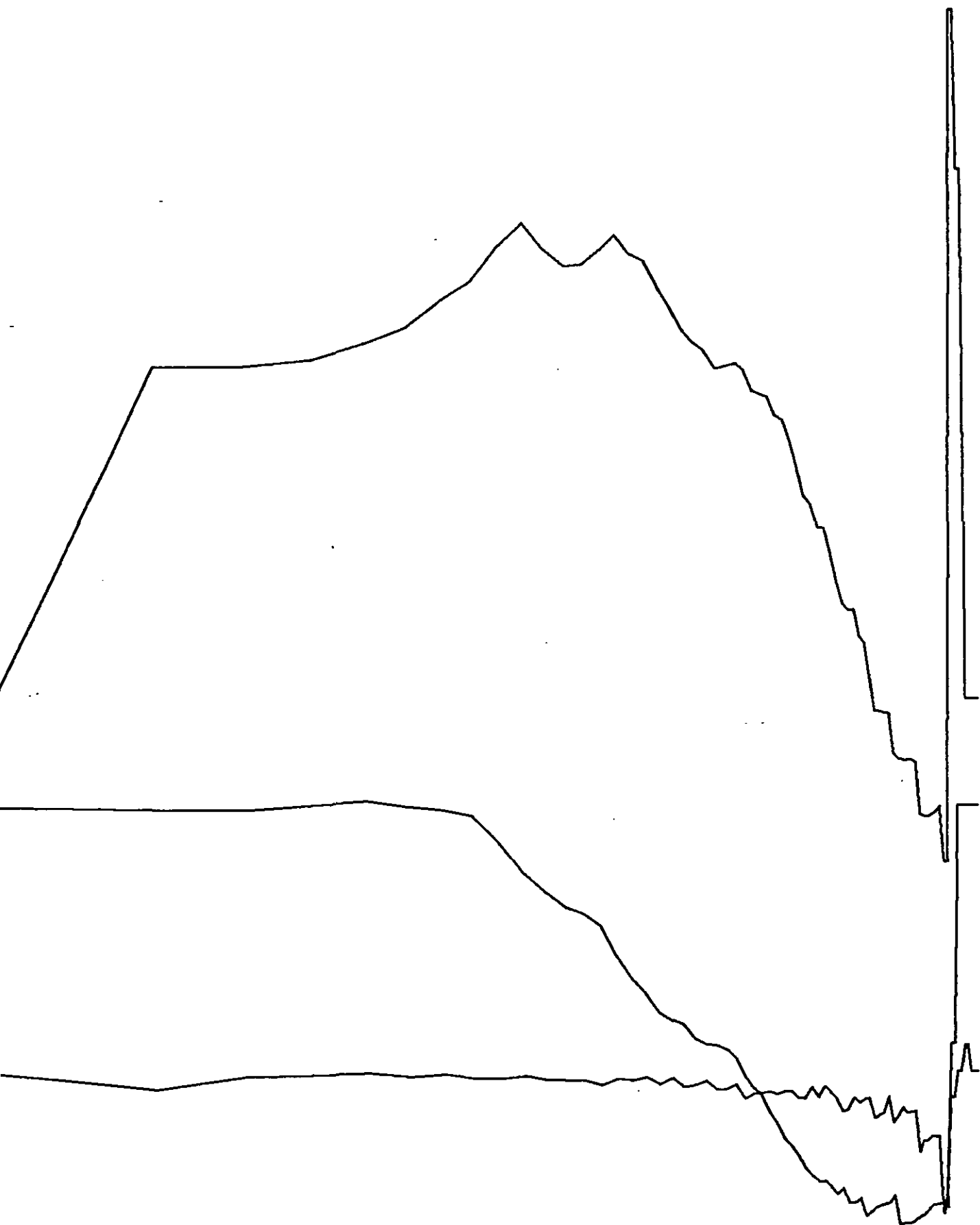


81 10T

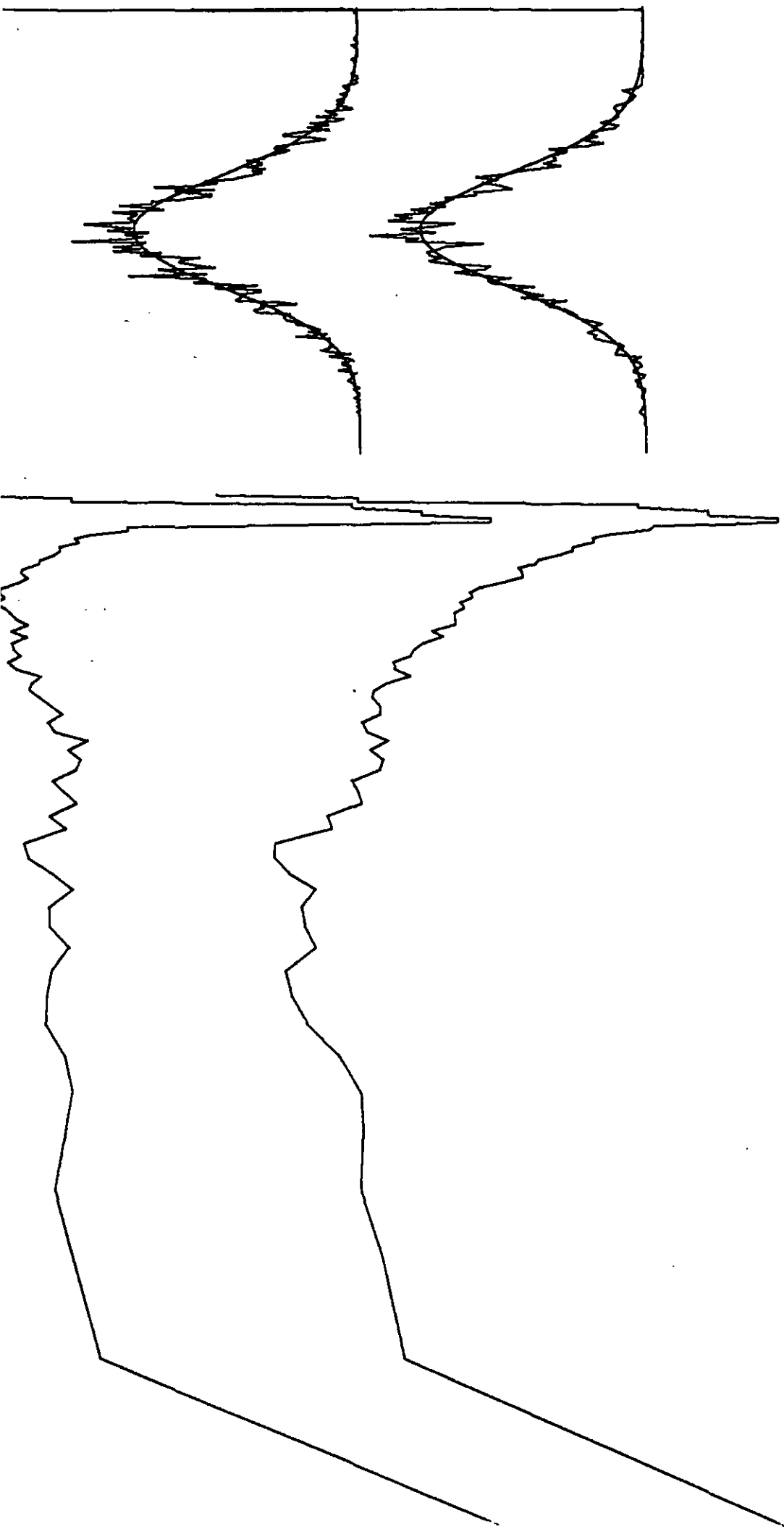


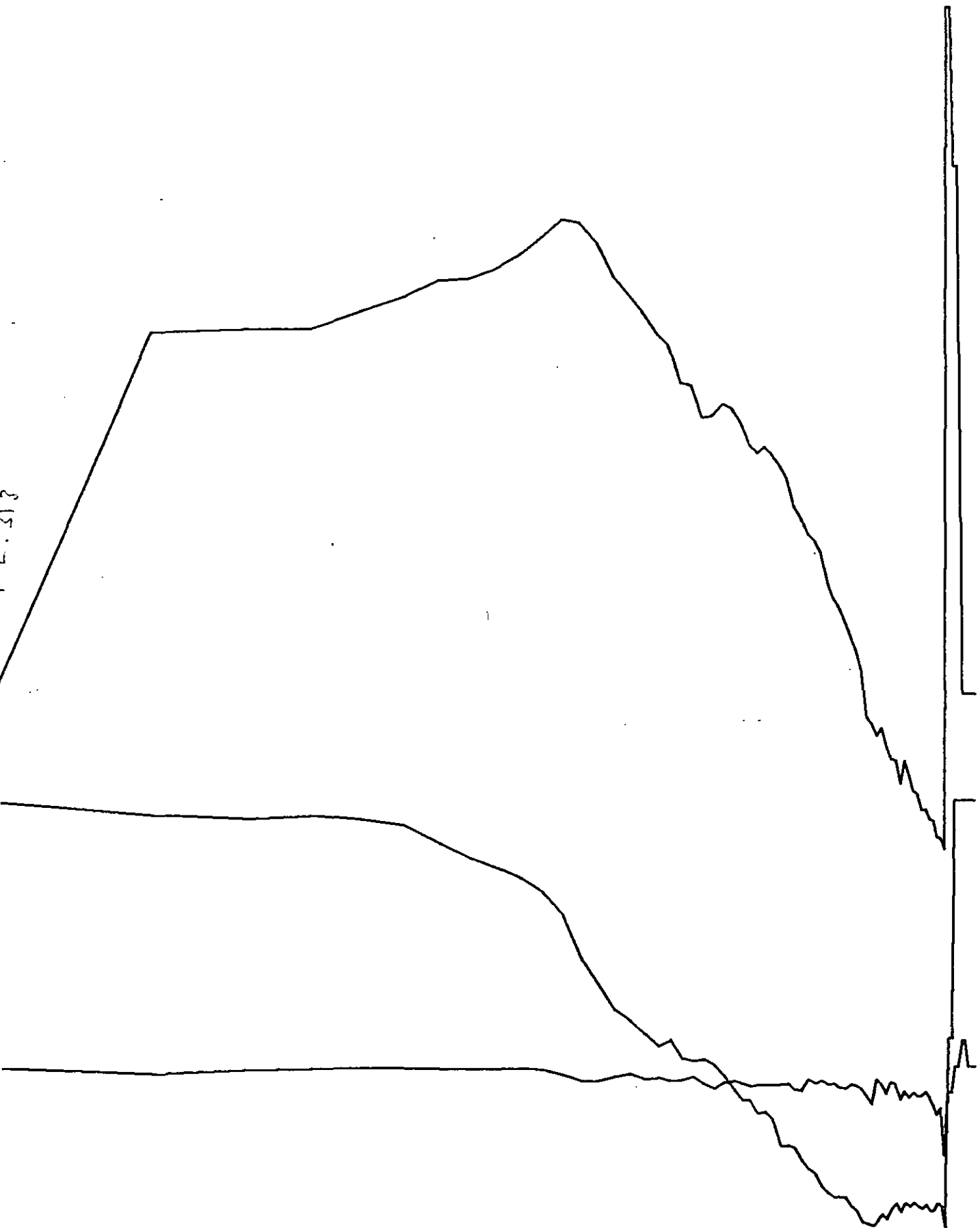


81 12T

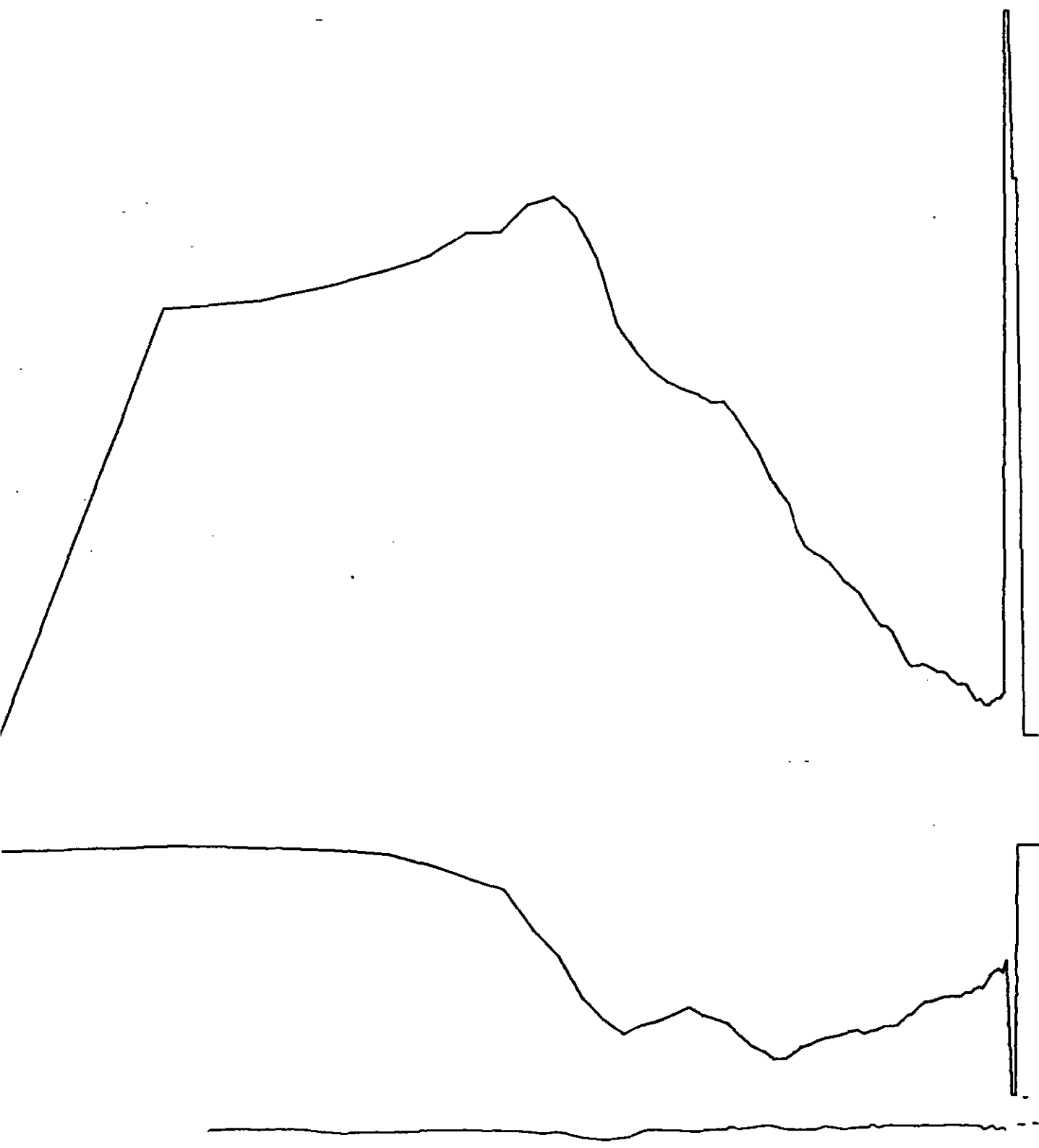


81 12T

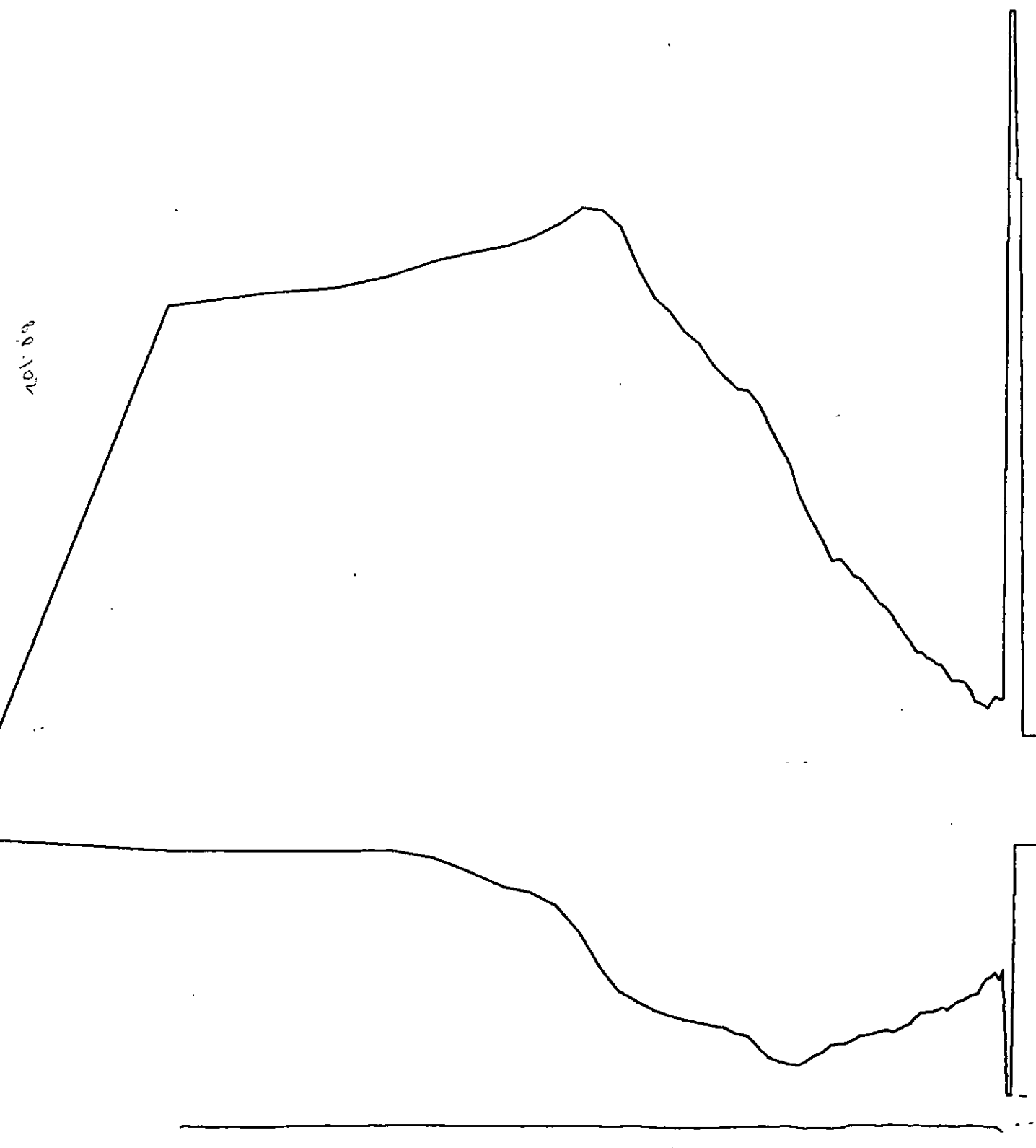




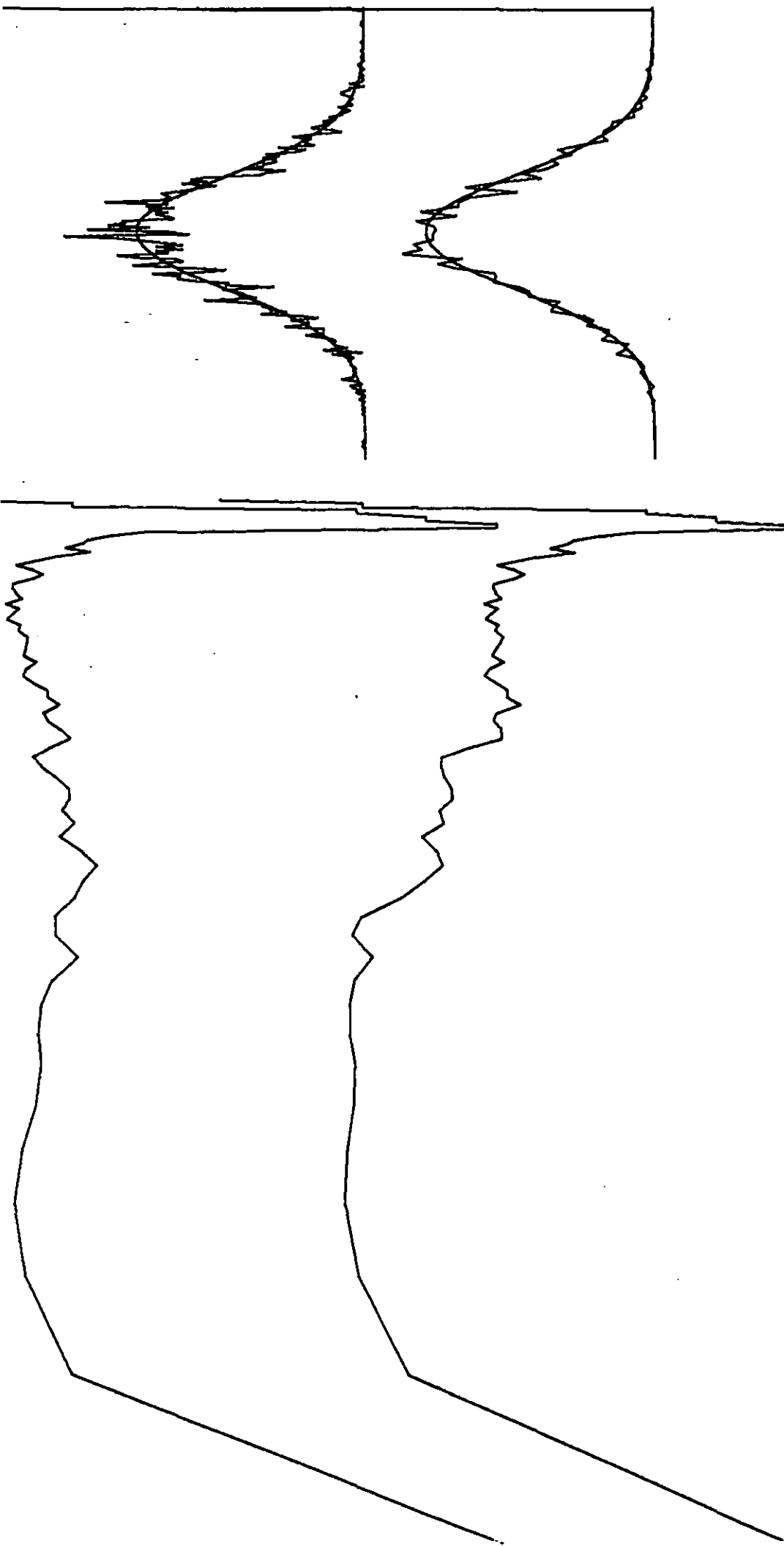
82 01A



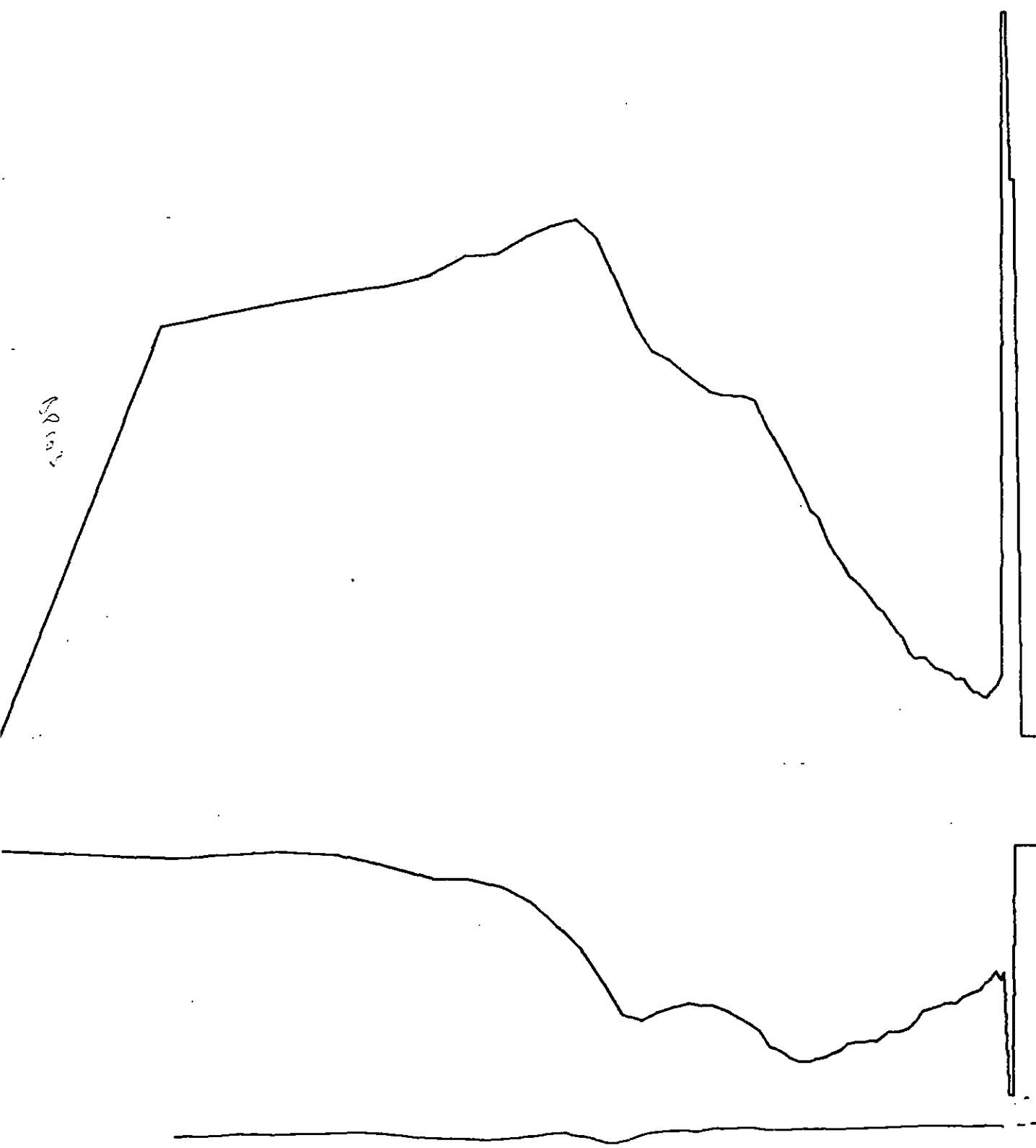
82 02 A



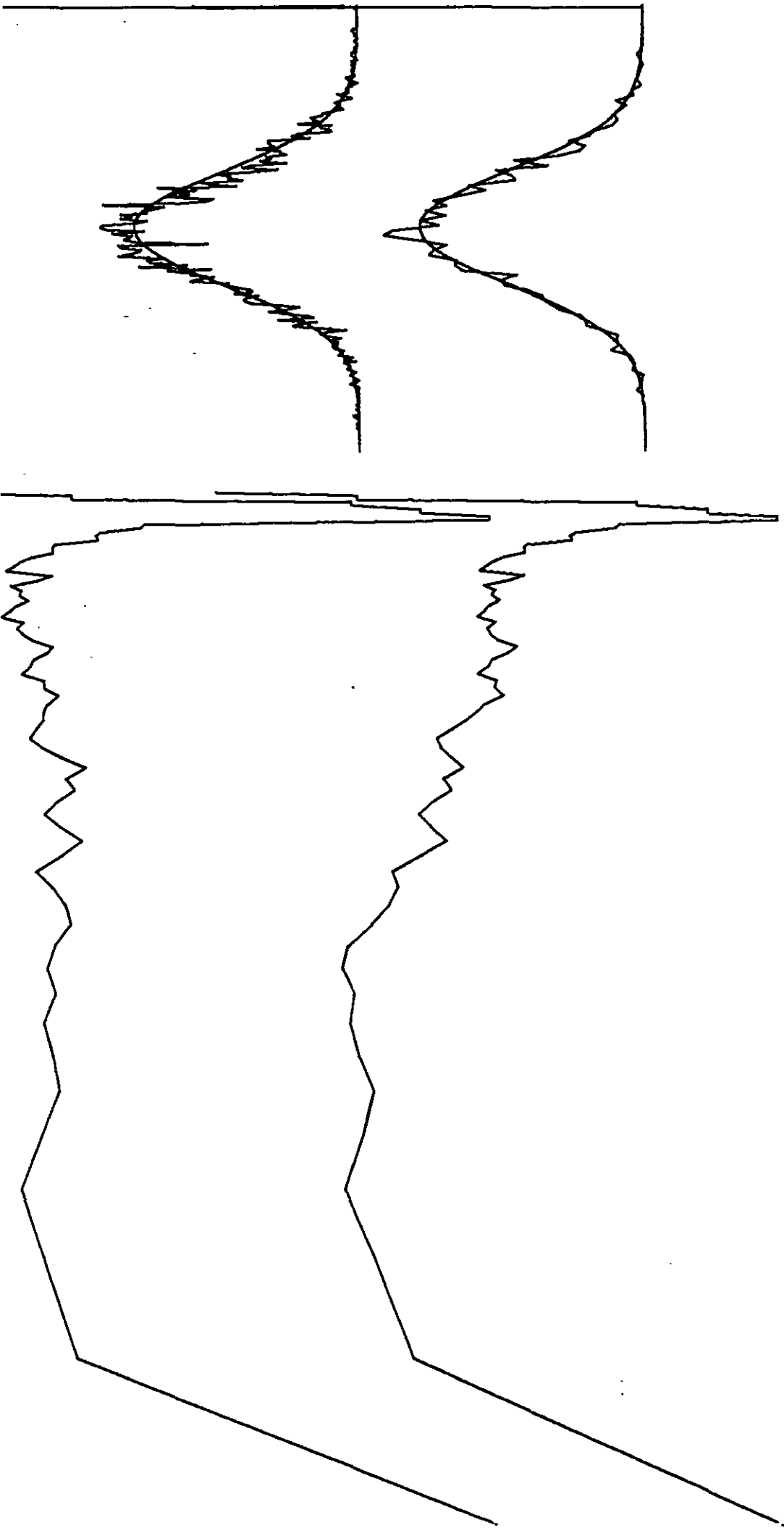
82 02A



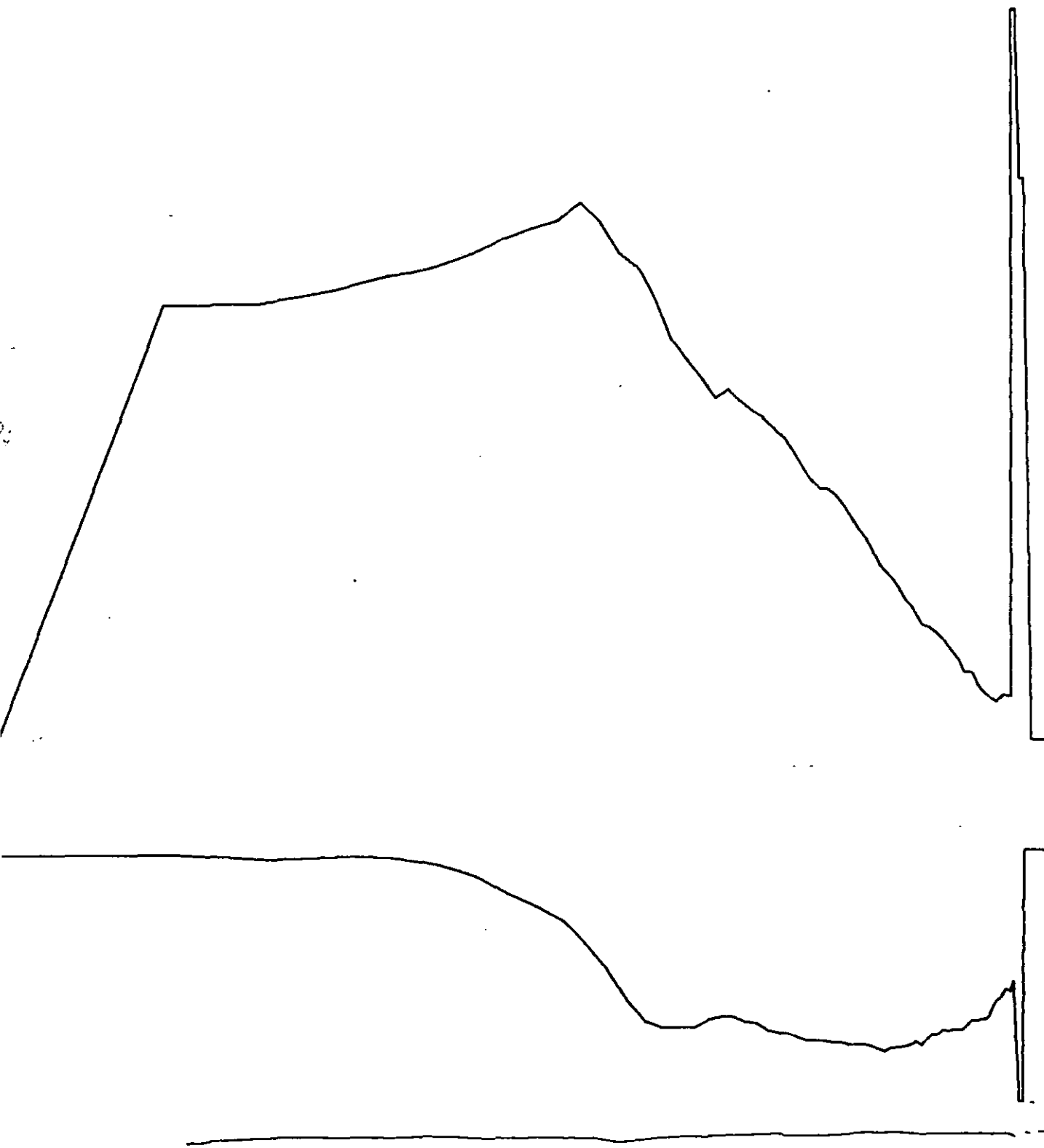
82 03 A



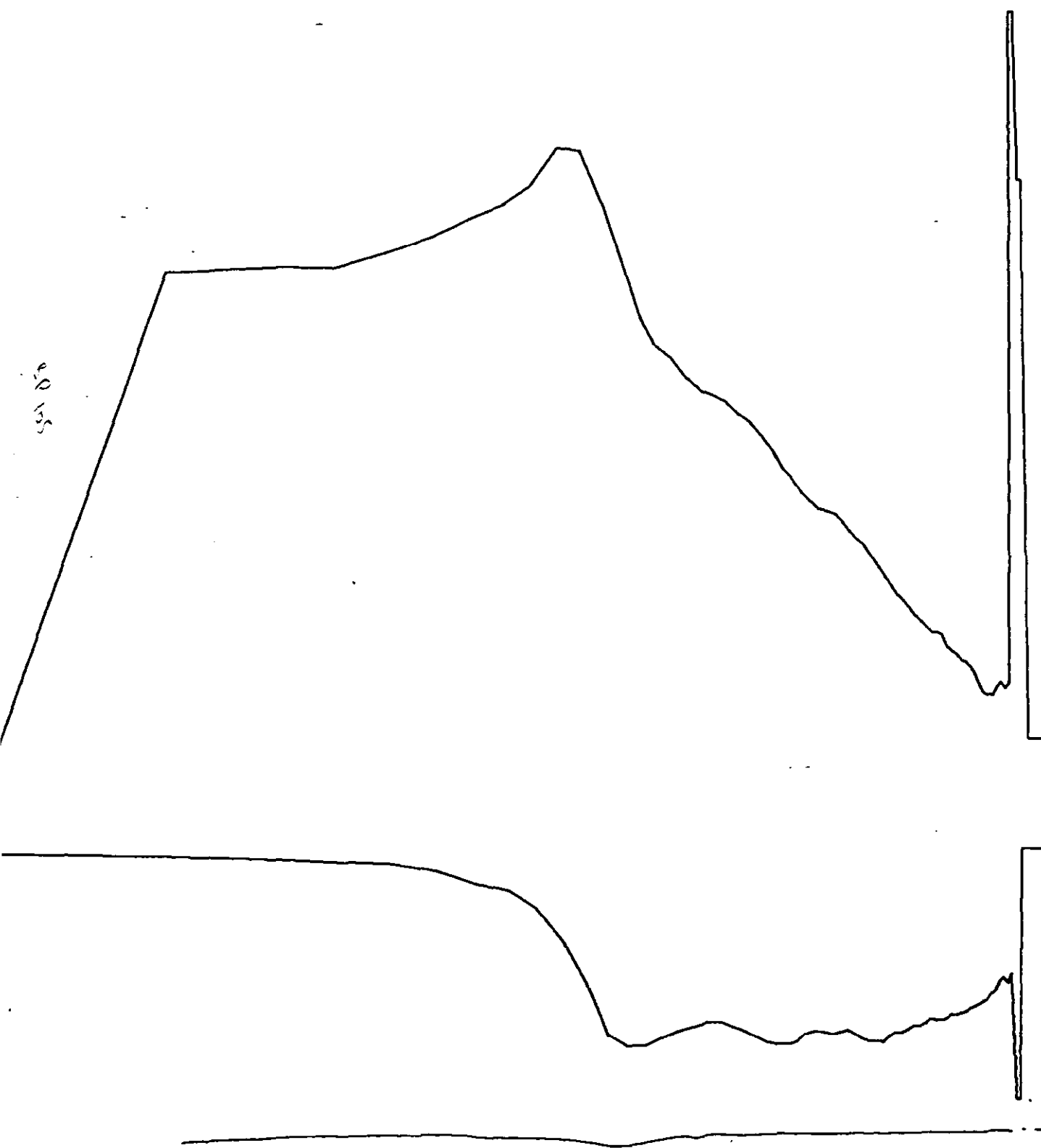
82 03A



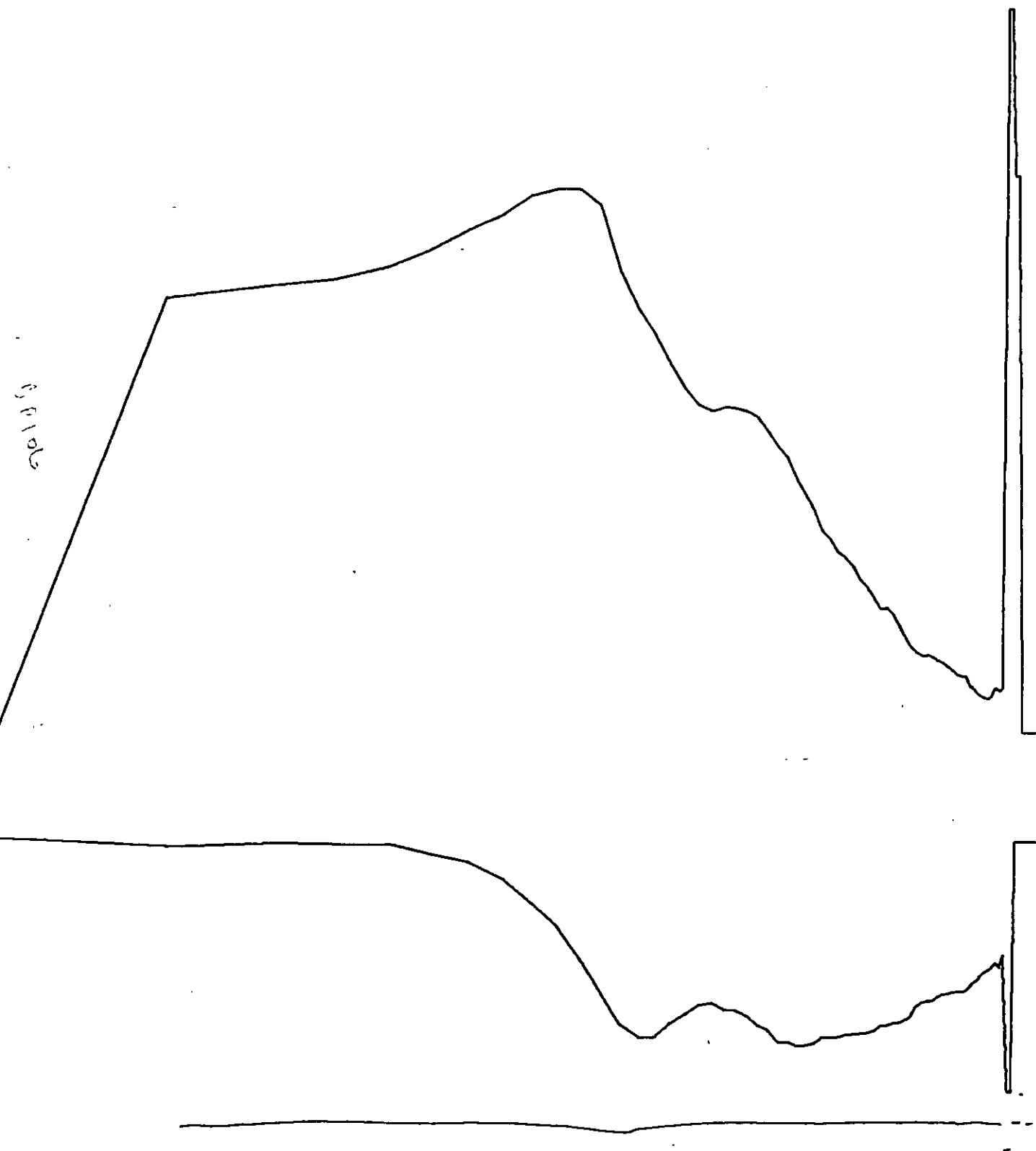
82 04 A



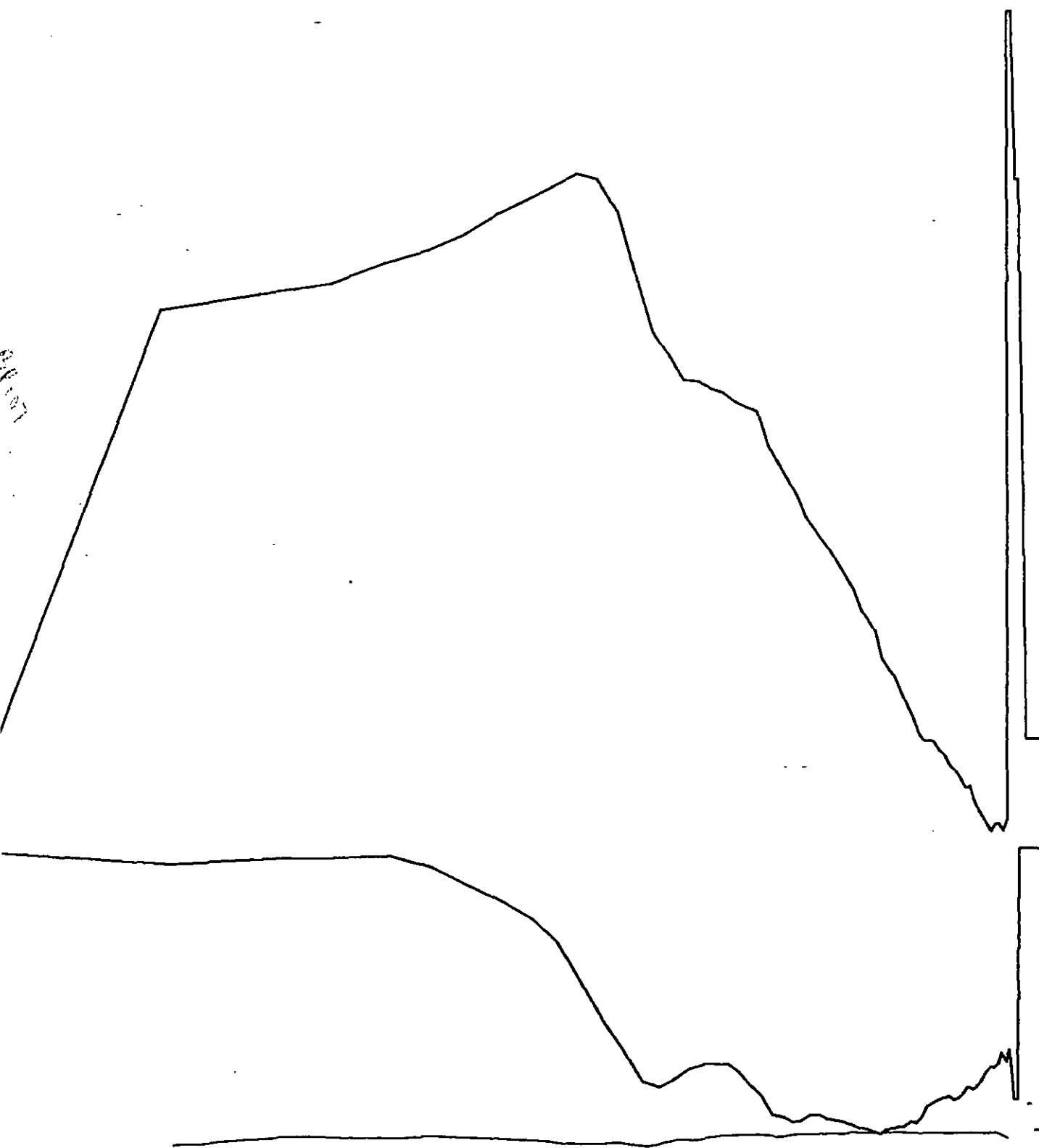
82 05A



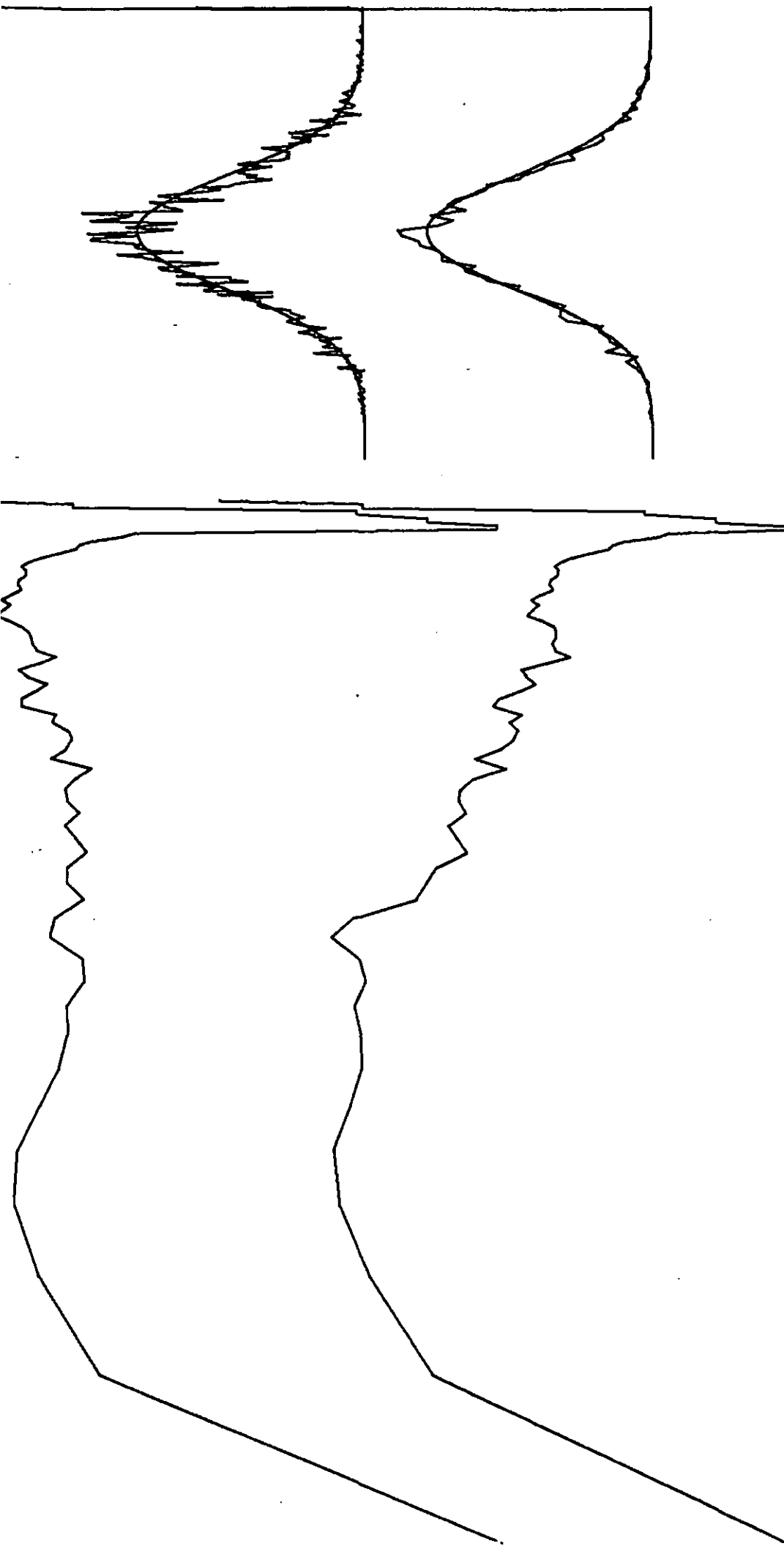
82 06A



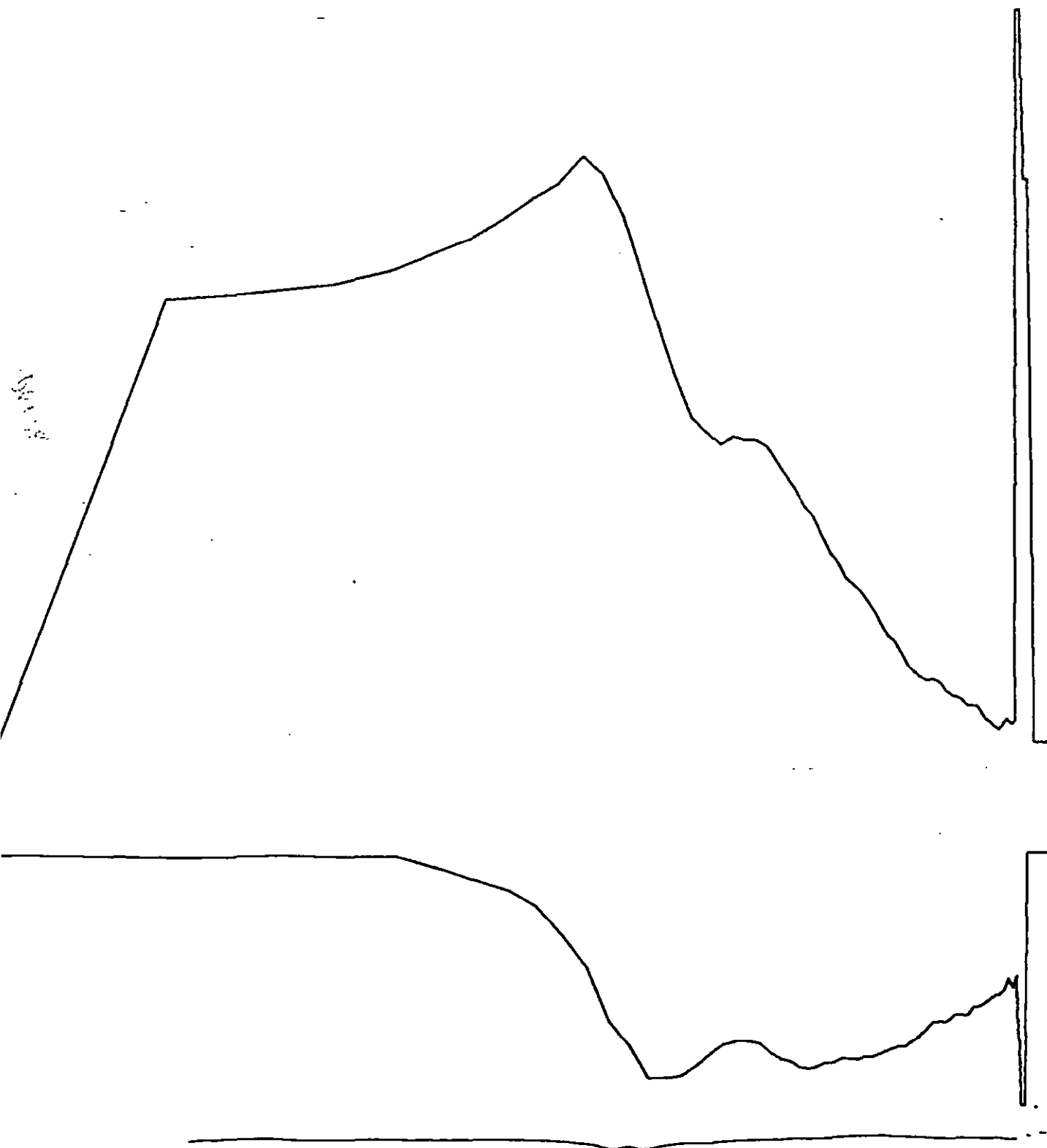
82 07A



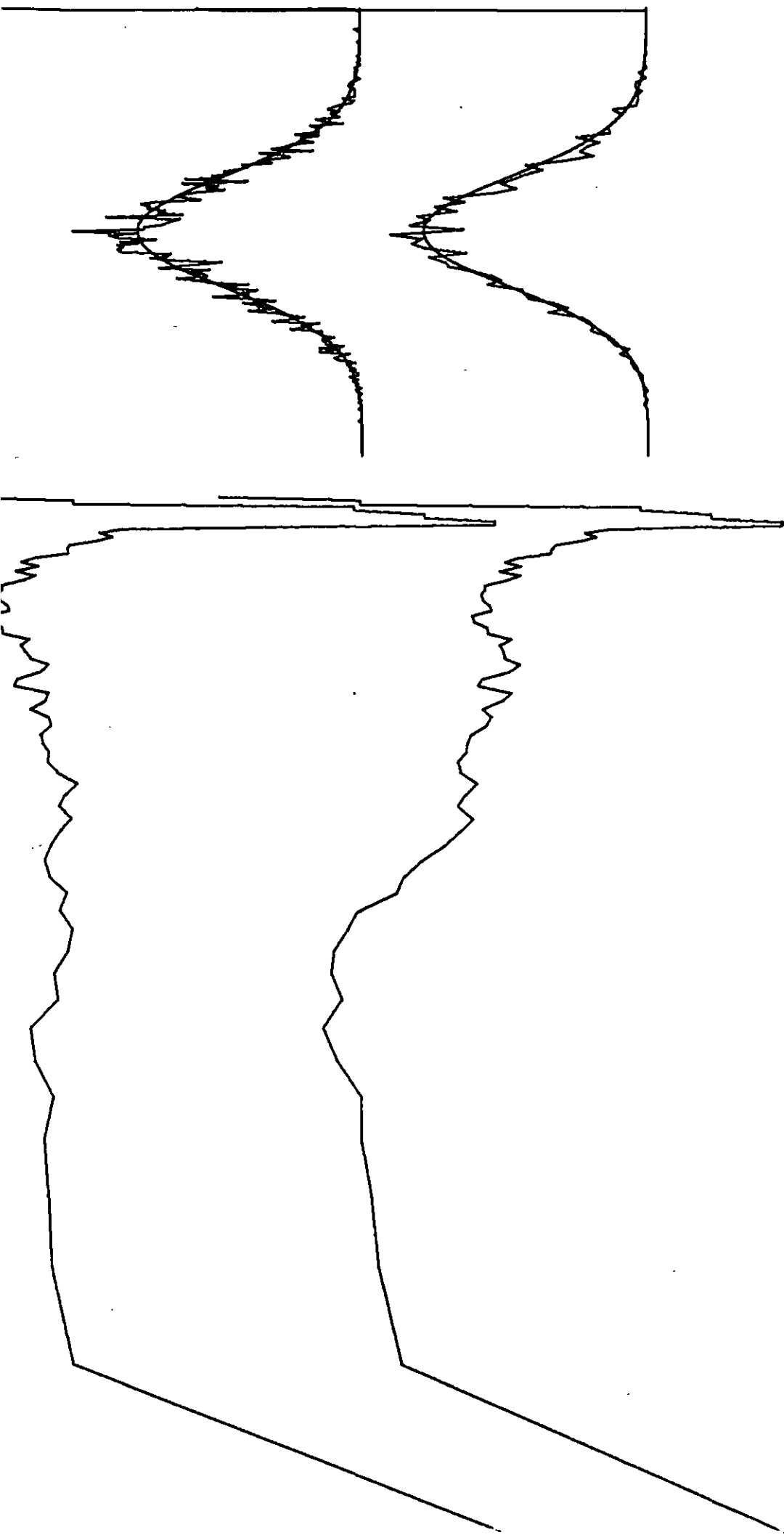
82 07A



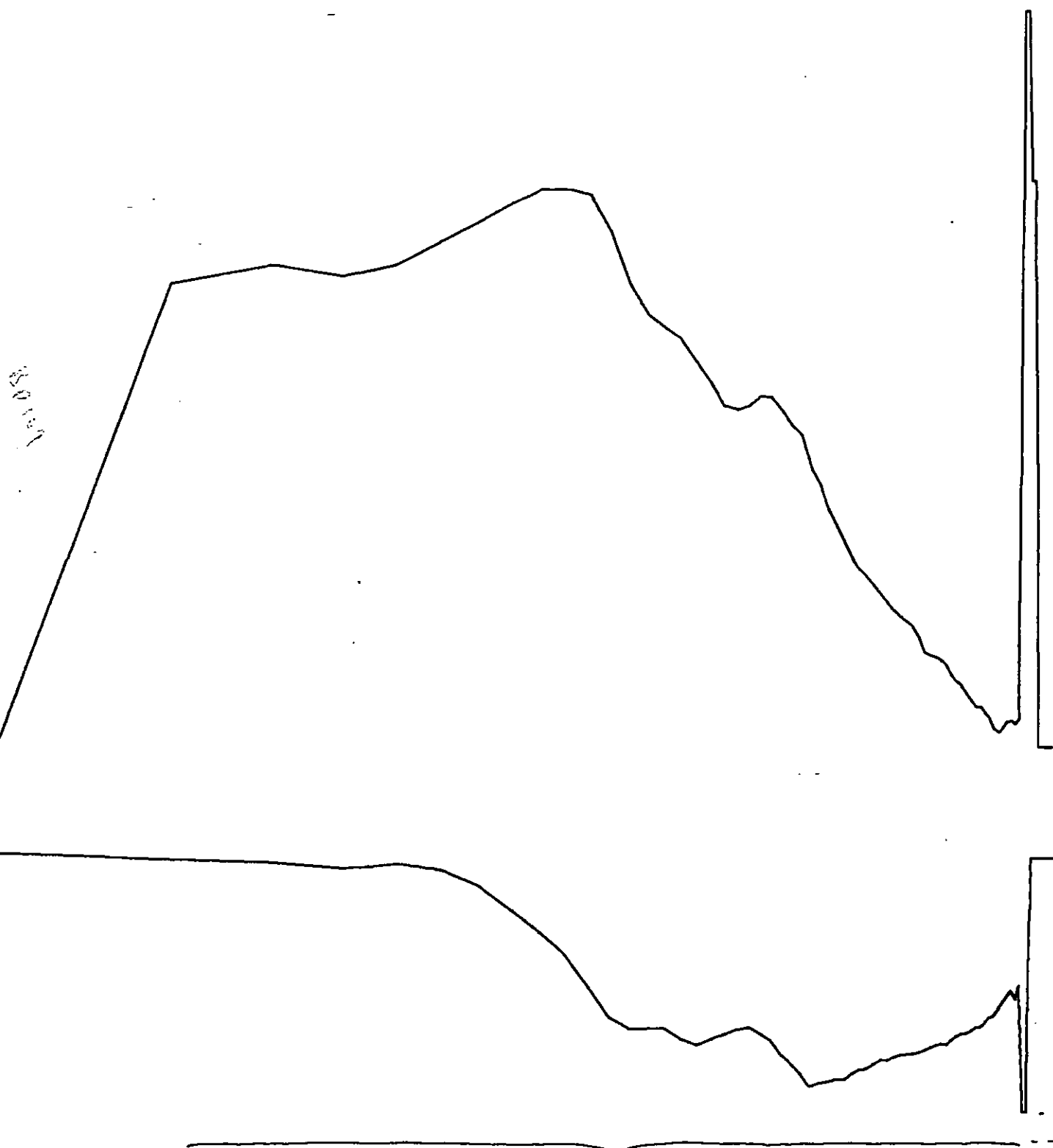
82 08A

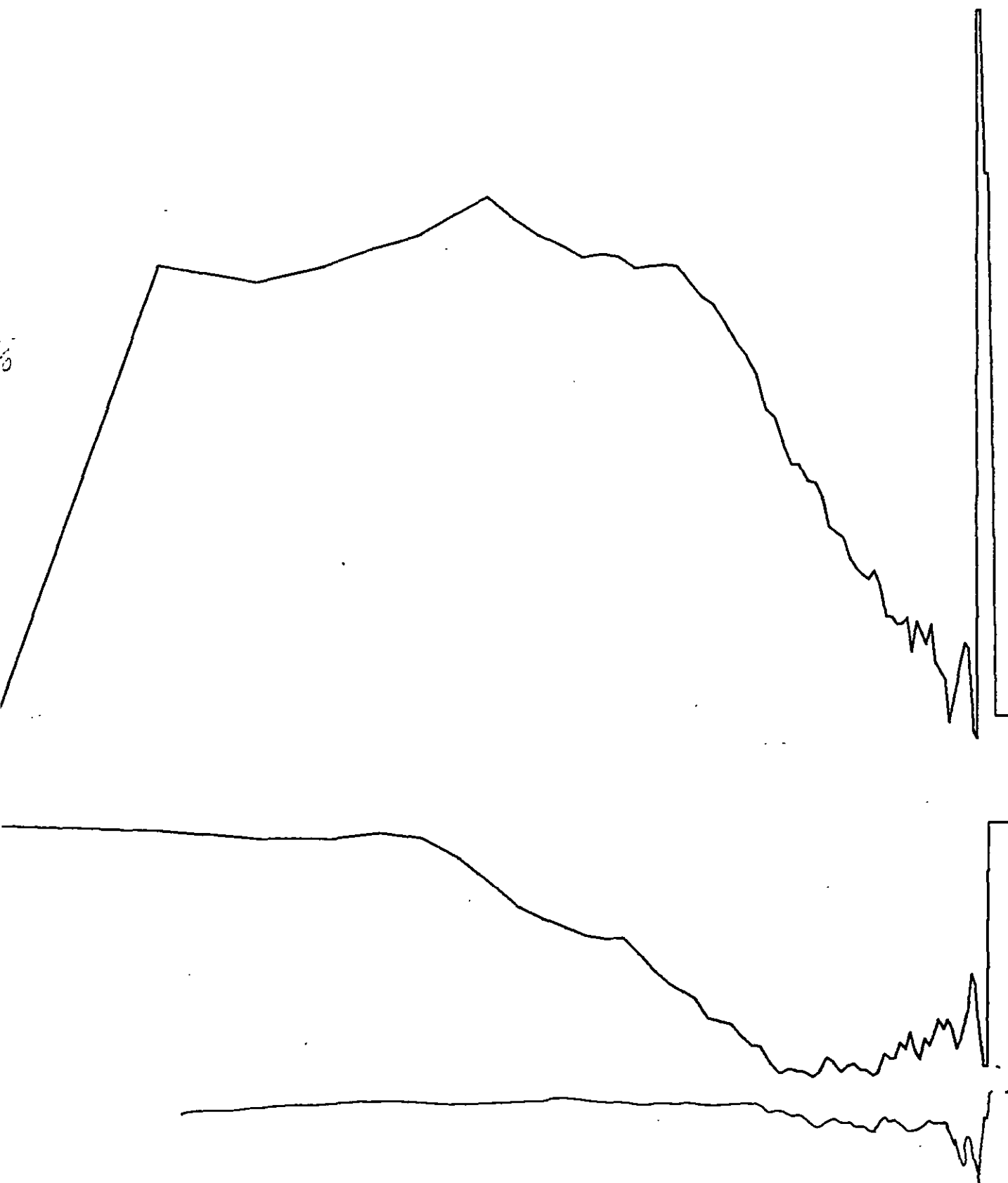


82 08A

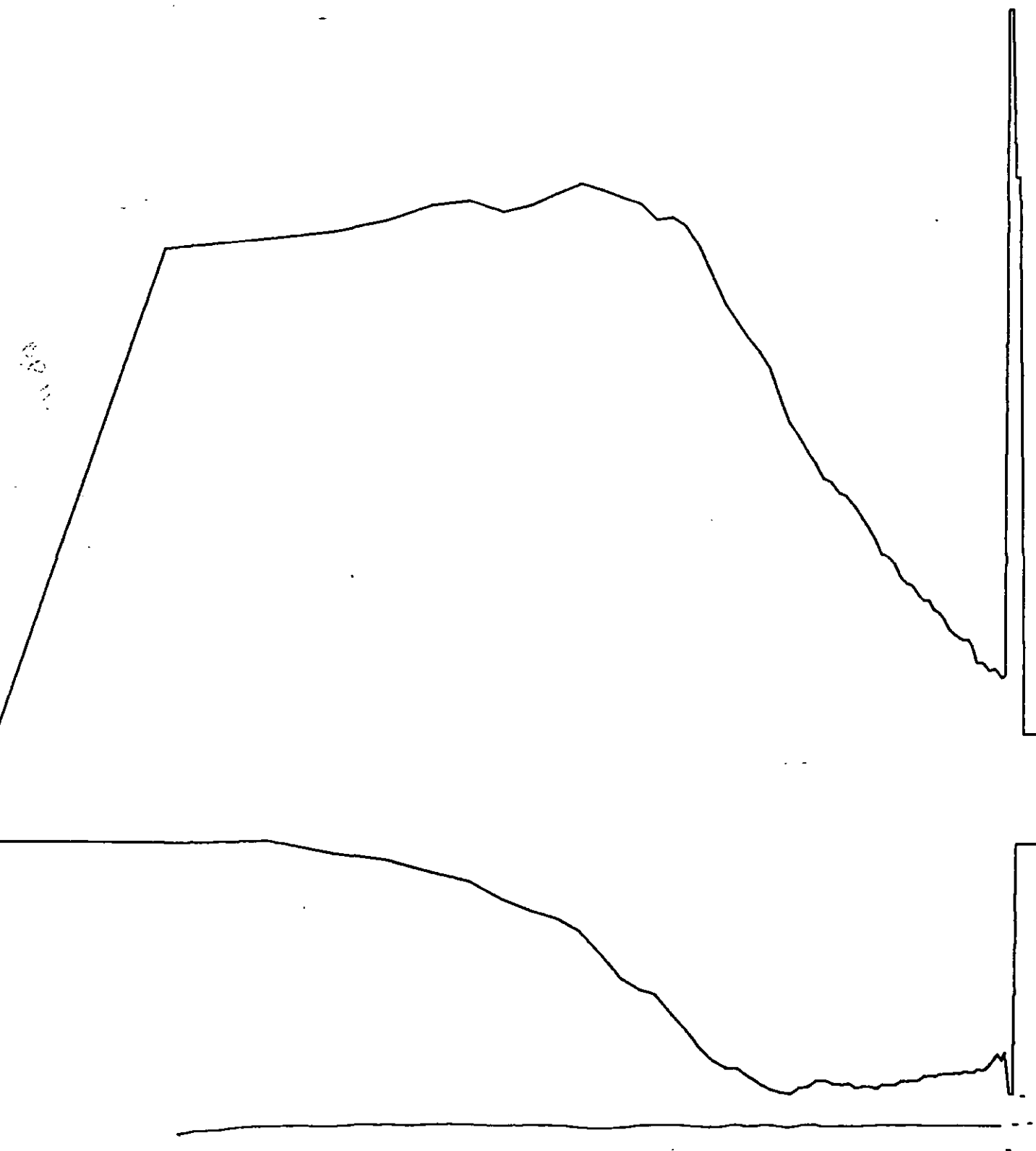


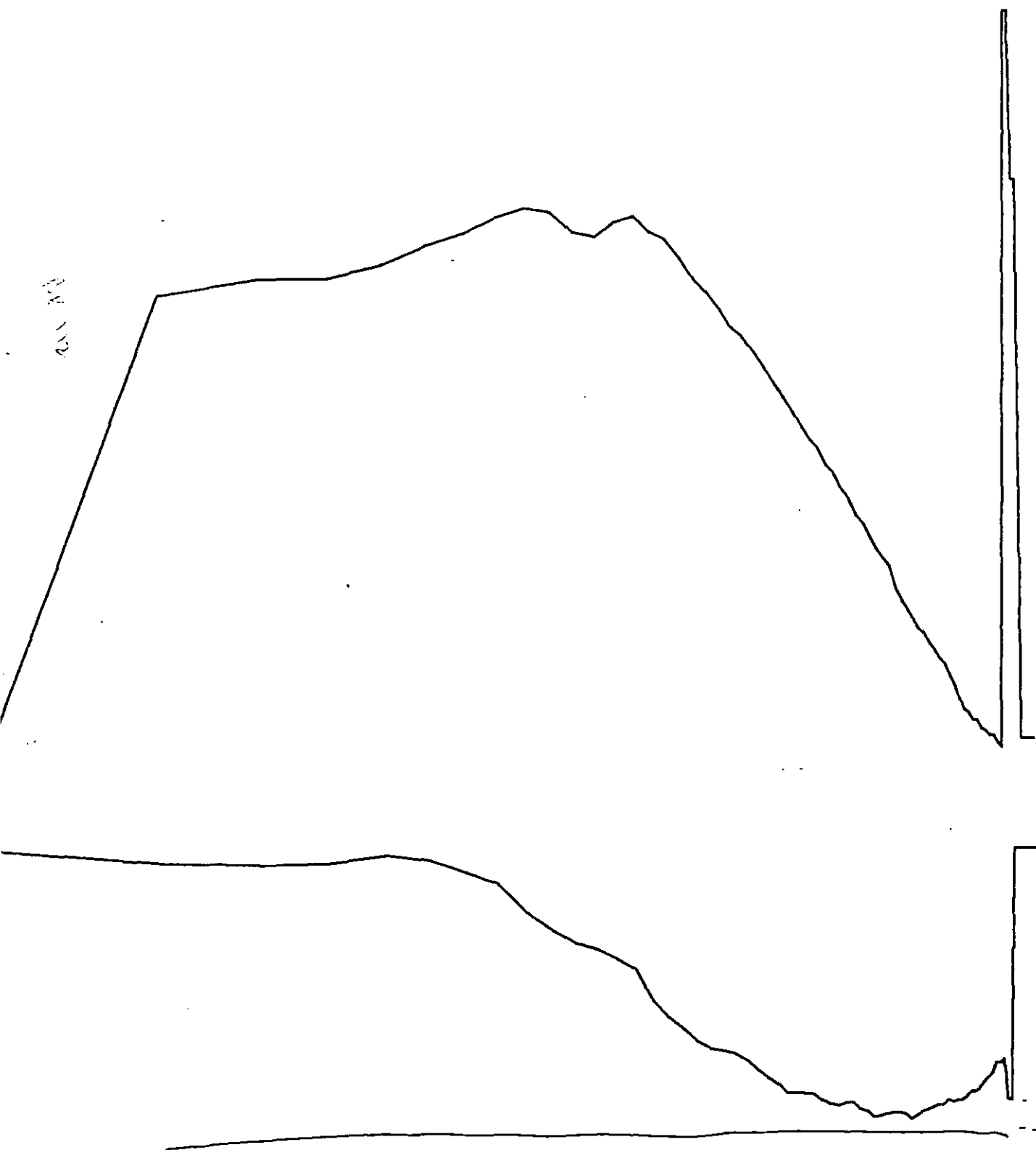
82 09A





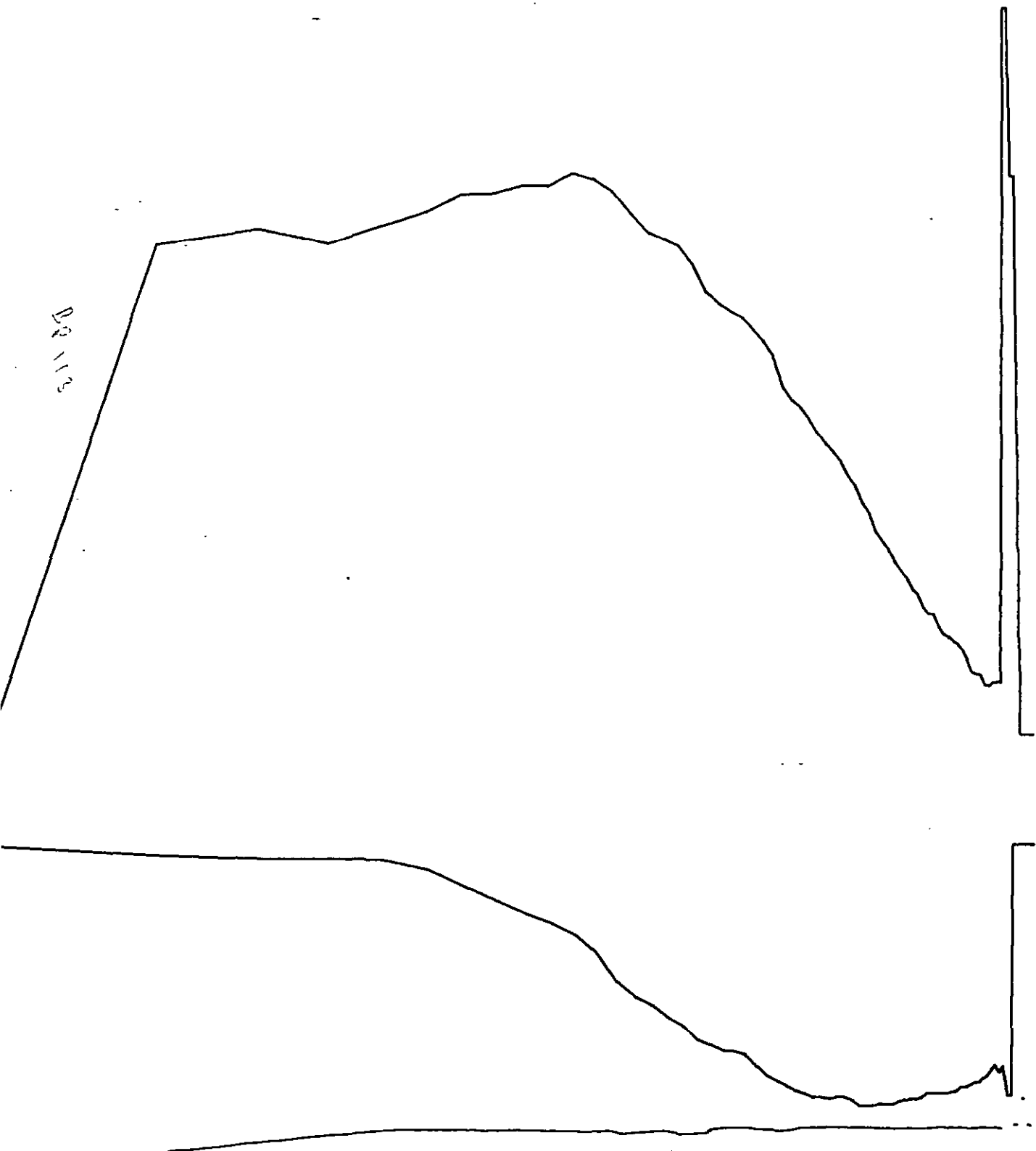
82 11A



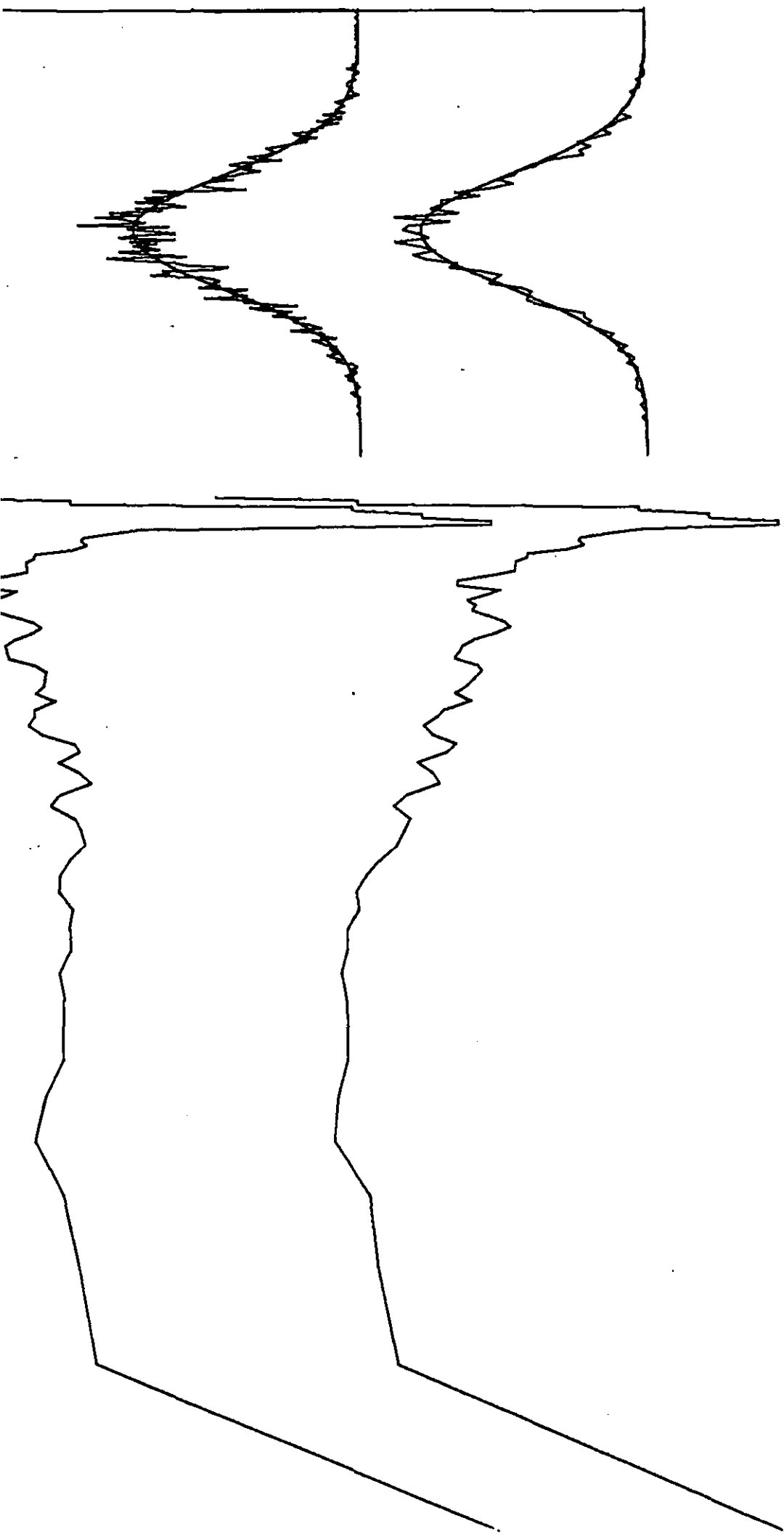


82 13A

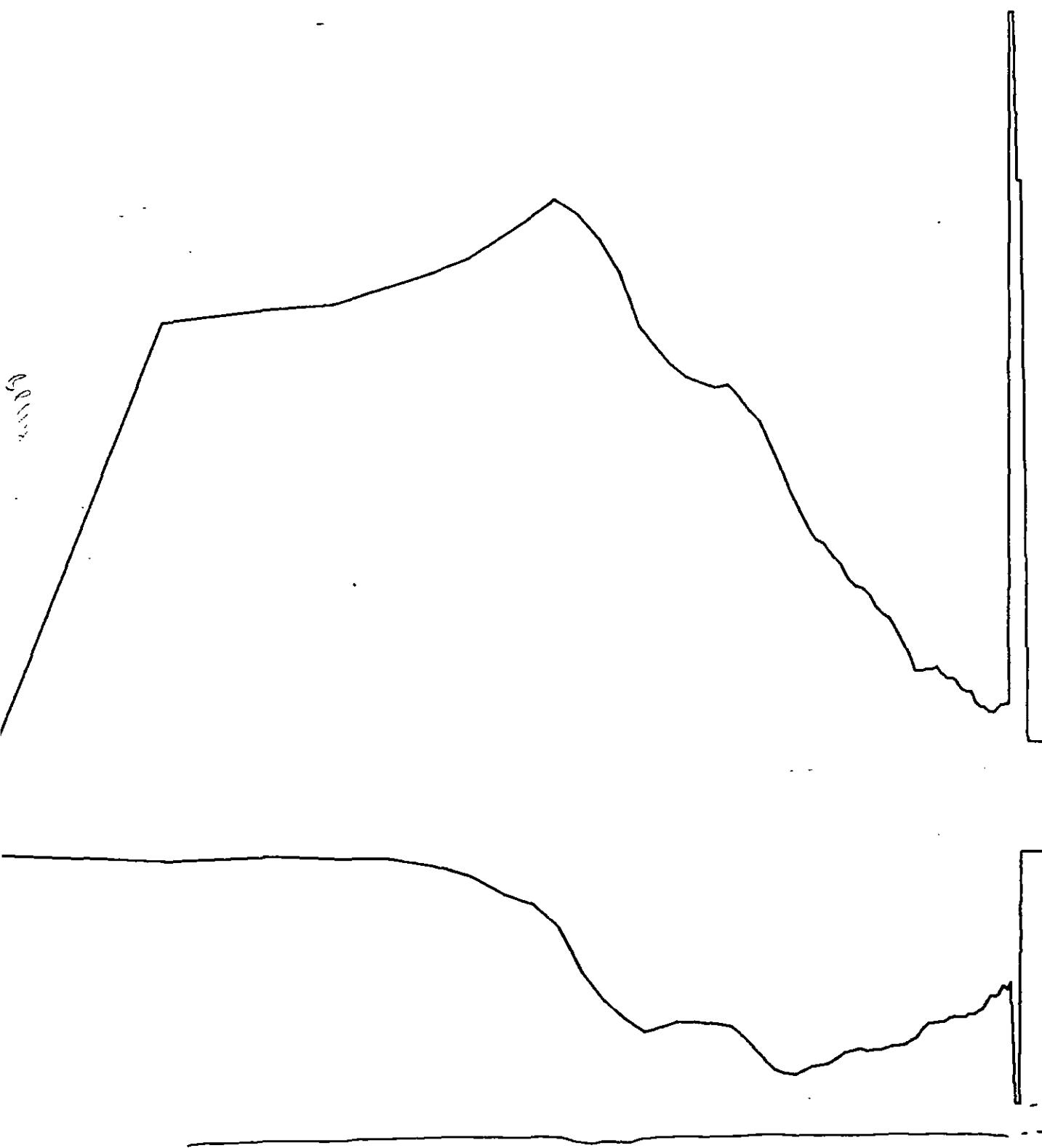
82 13



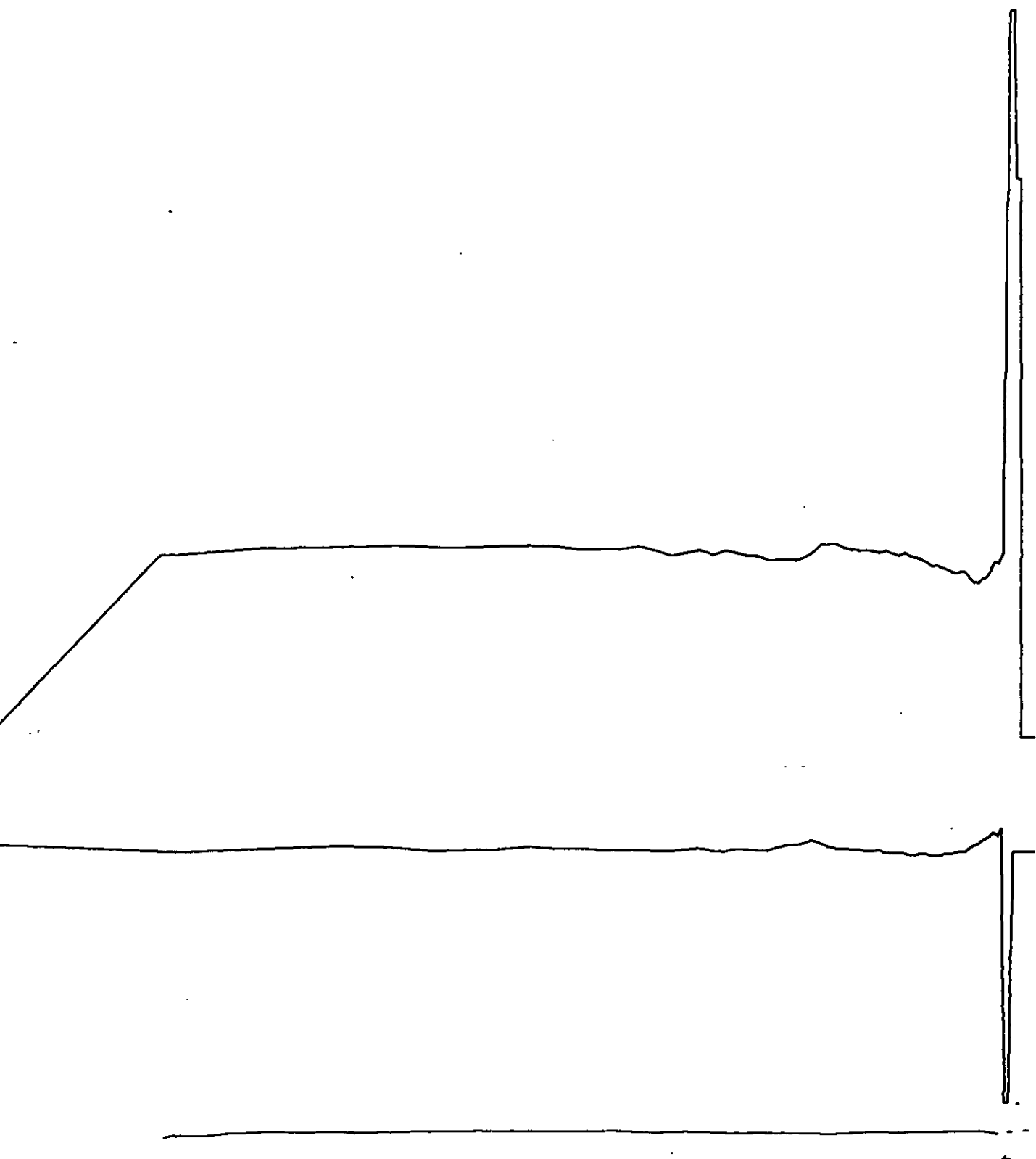
82 13 A



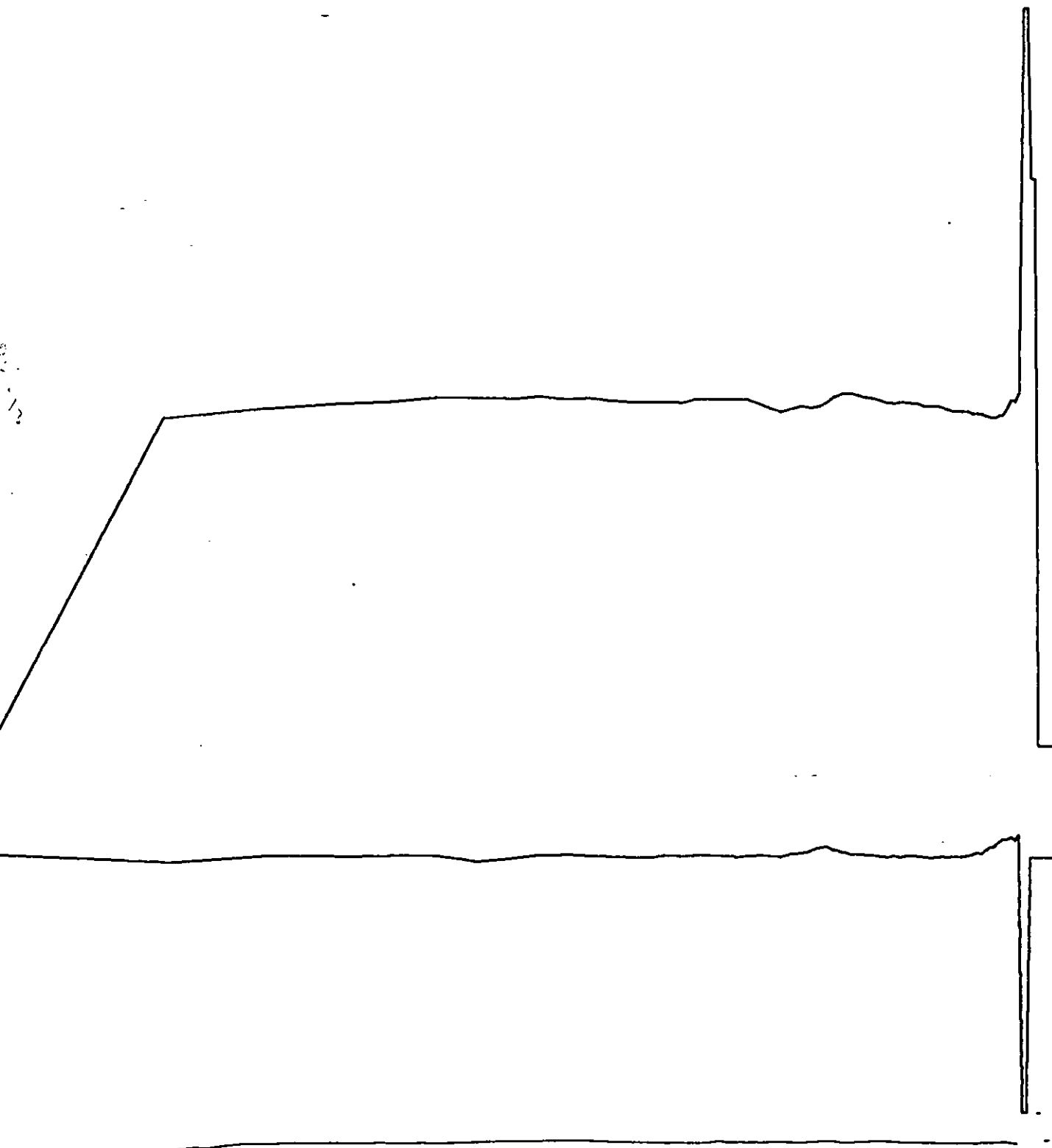
82 14A



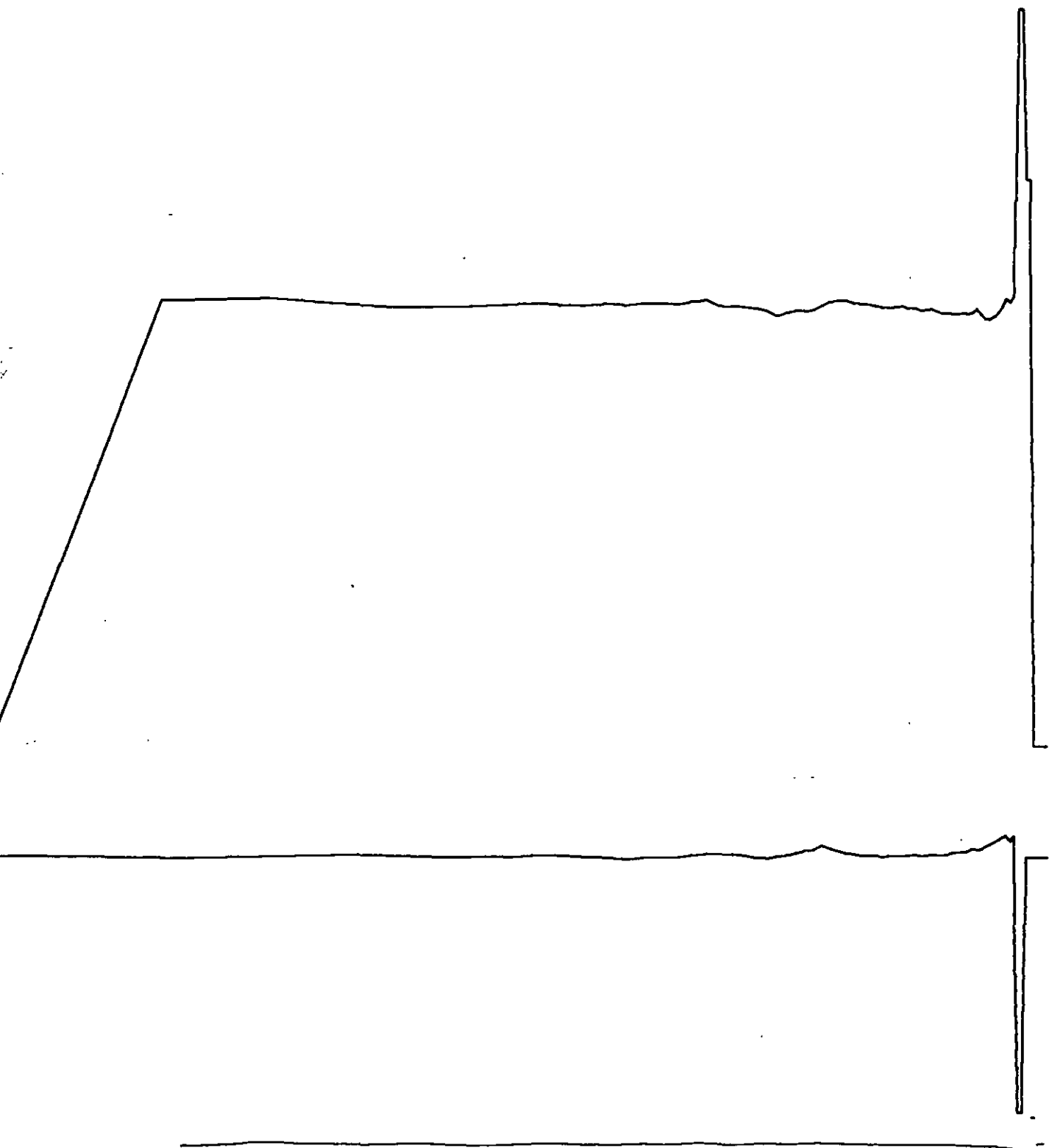
82 Azok₃



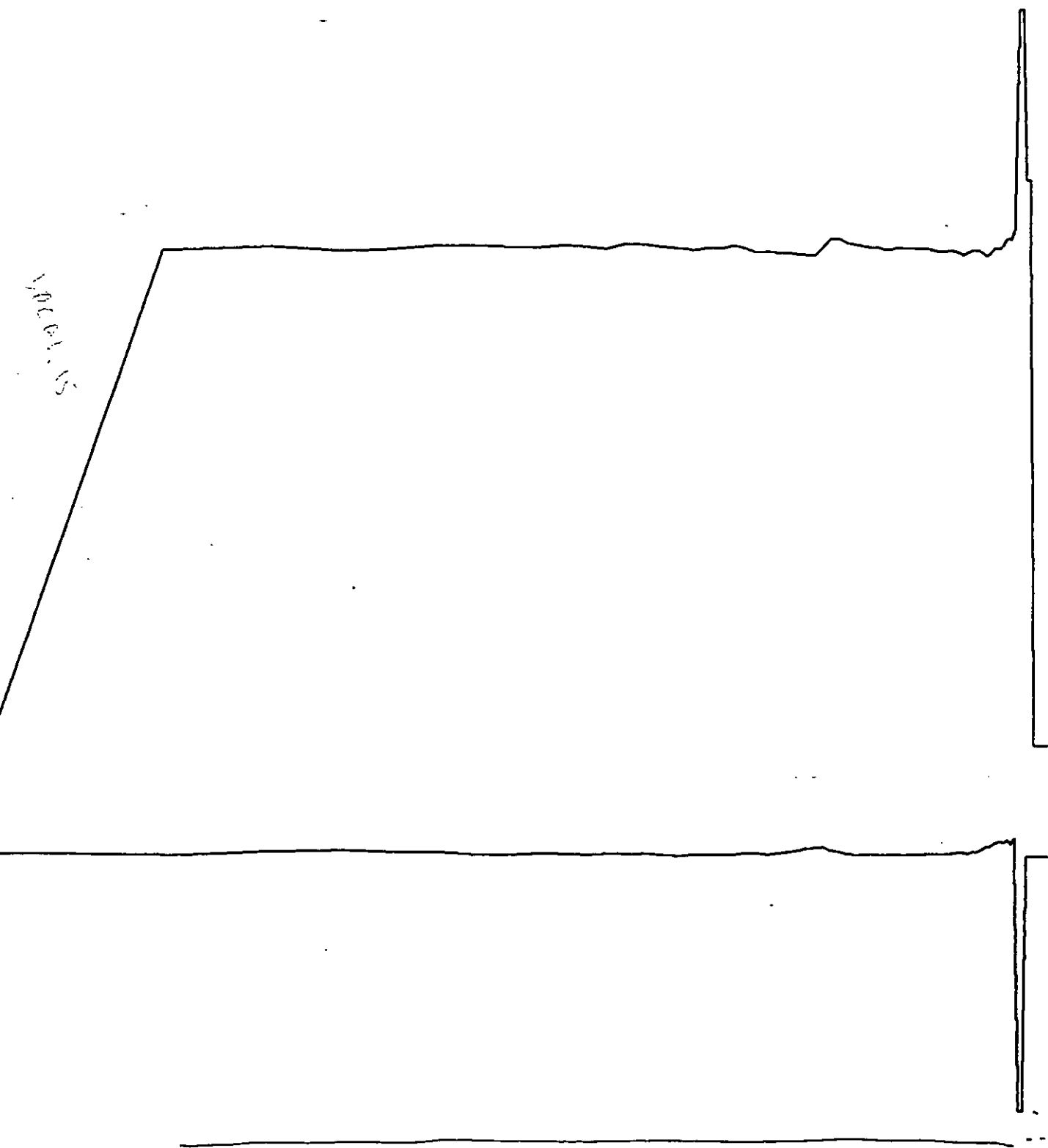
82 A-4-0ky



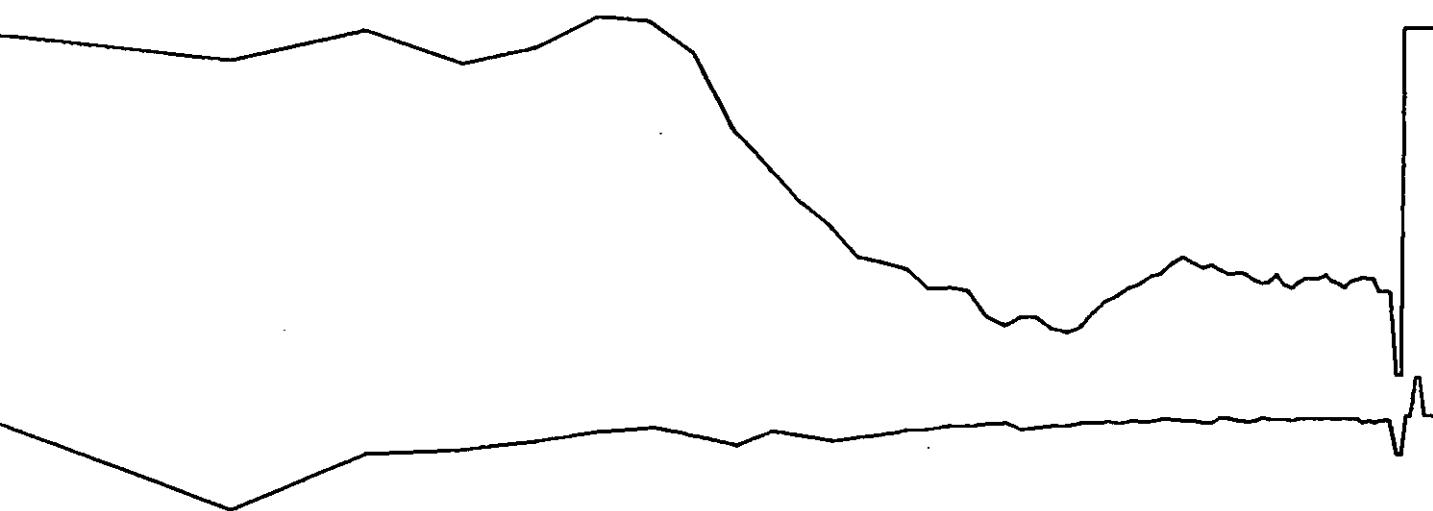
82 A-60kg



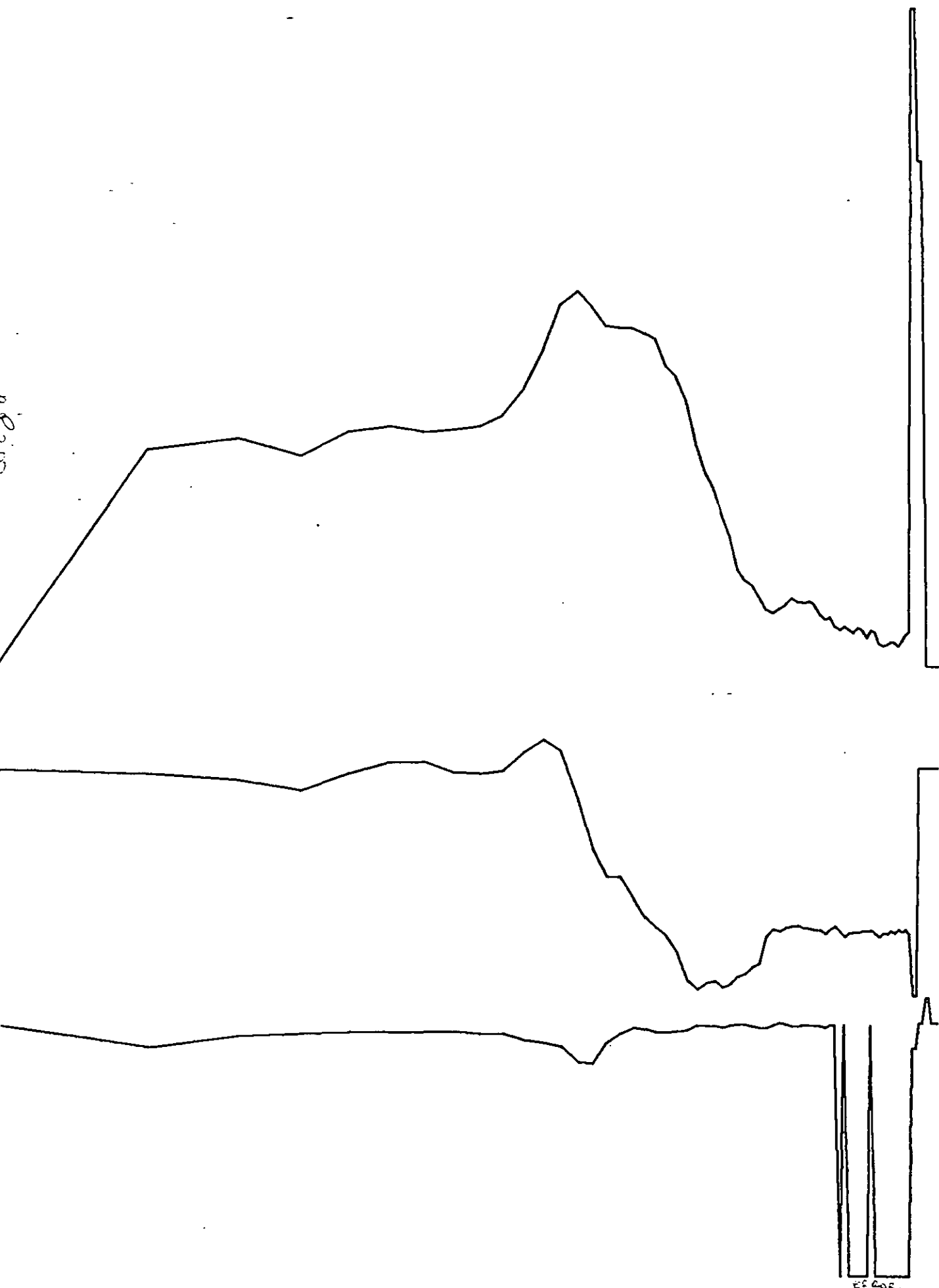
82 A - 70k



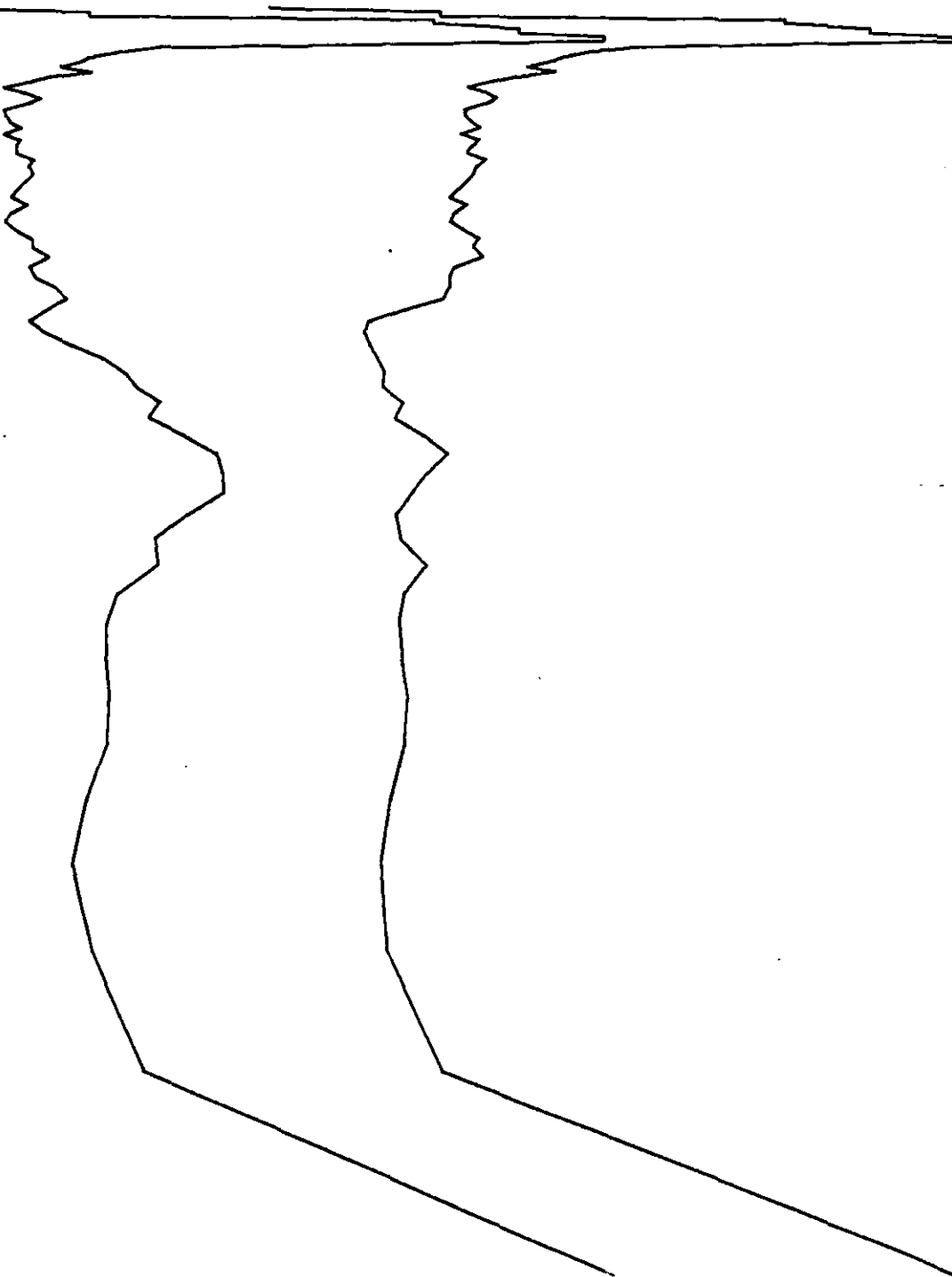
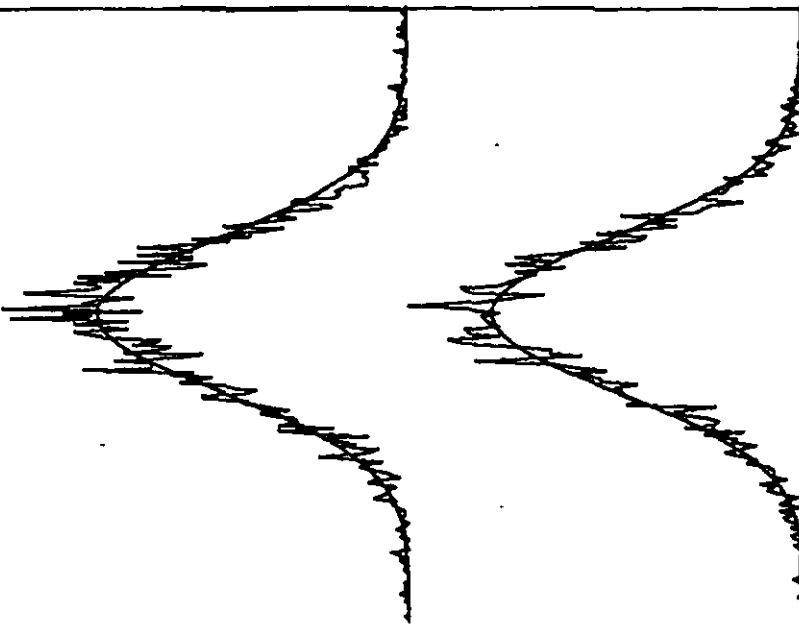
82 01 F



82 02F

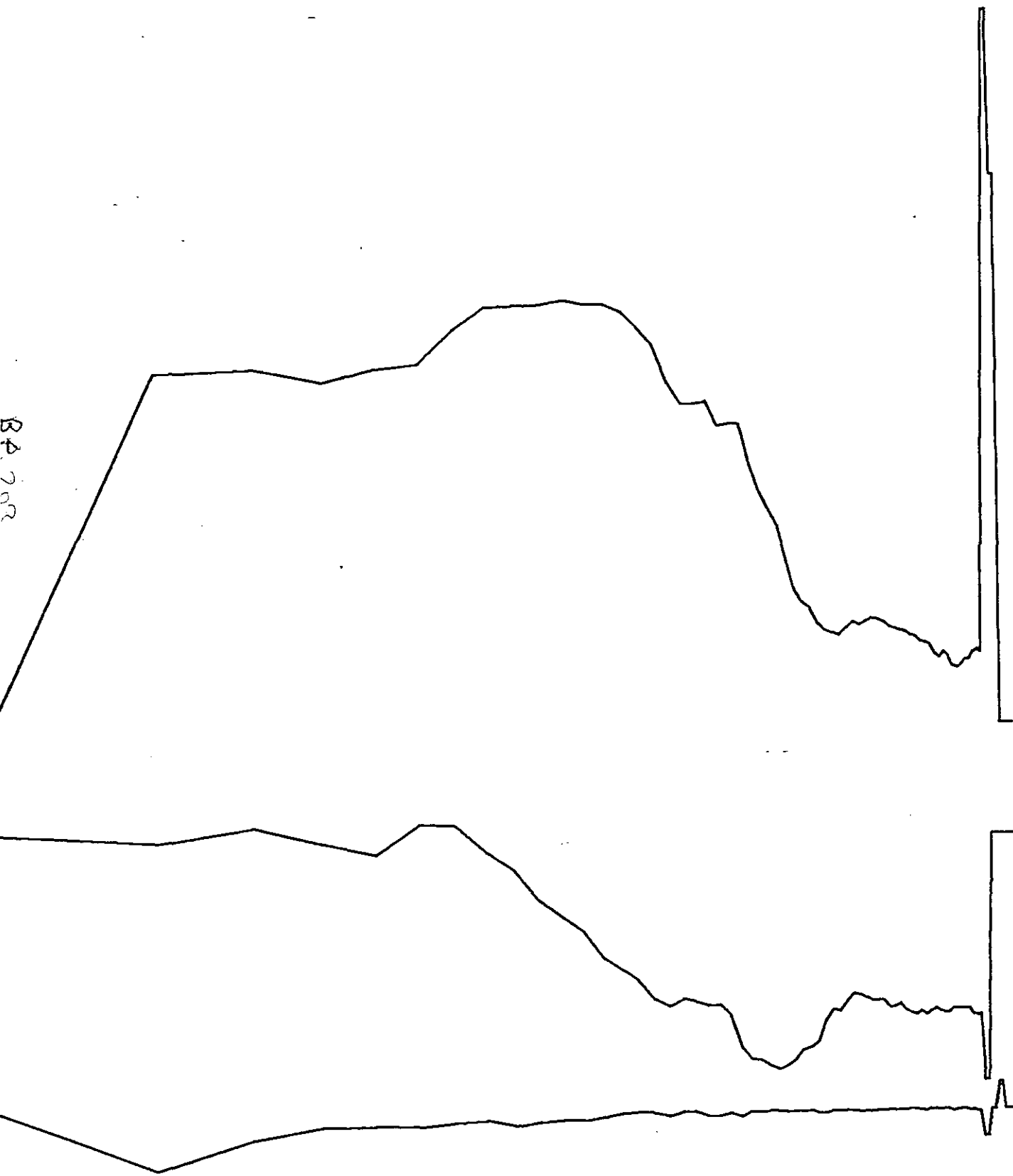


82 D2 F

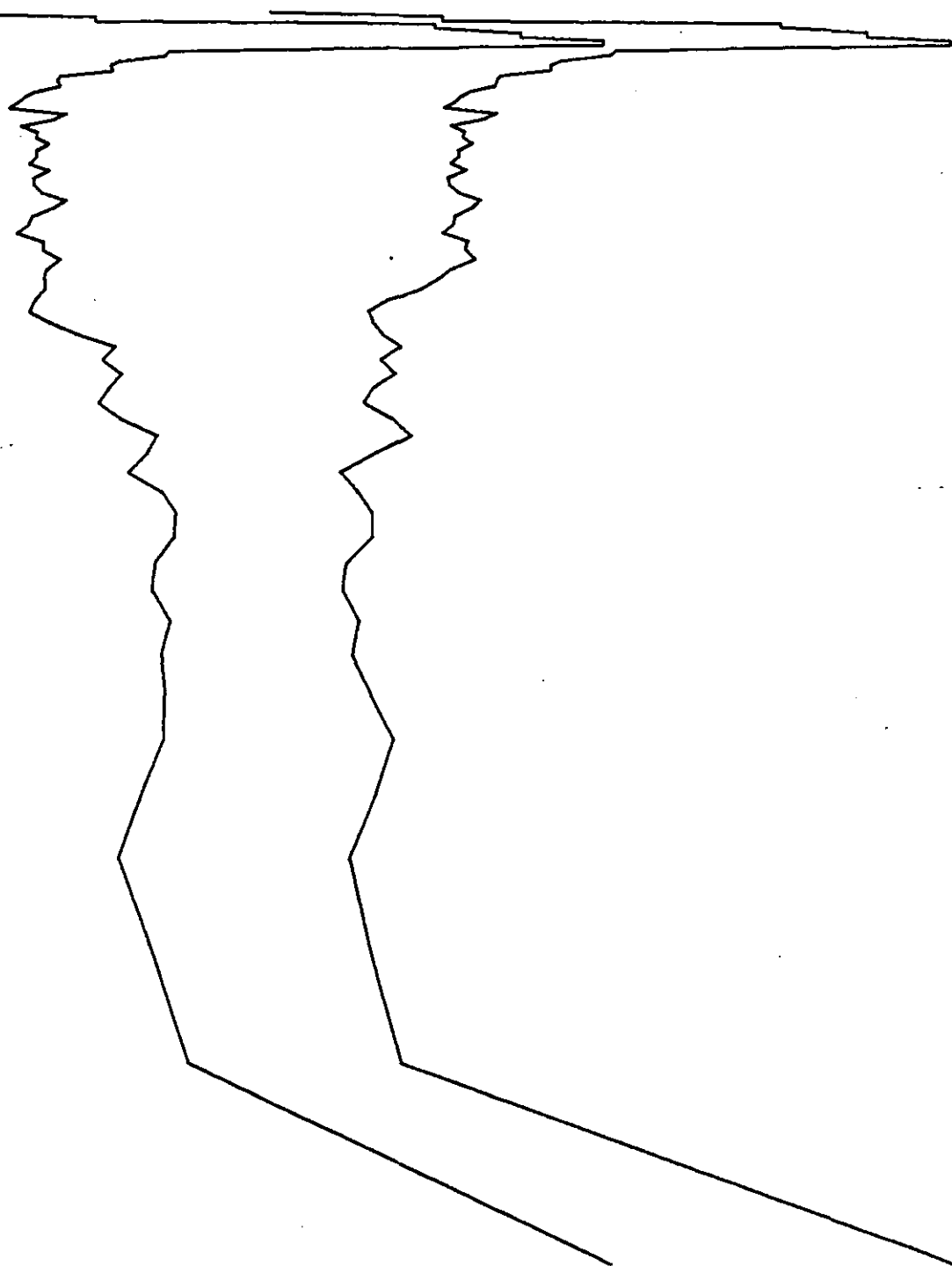
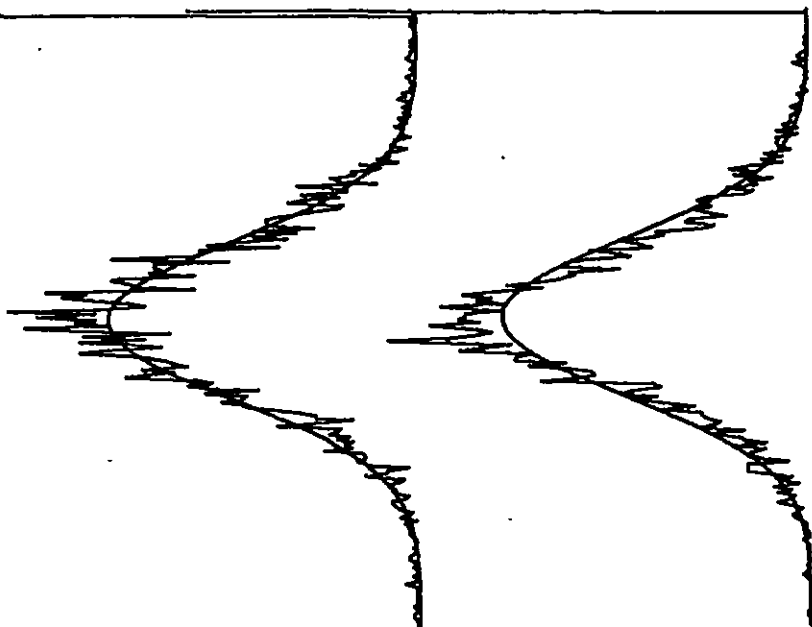


82 03F

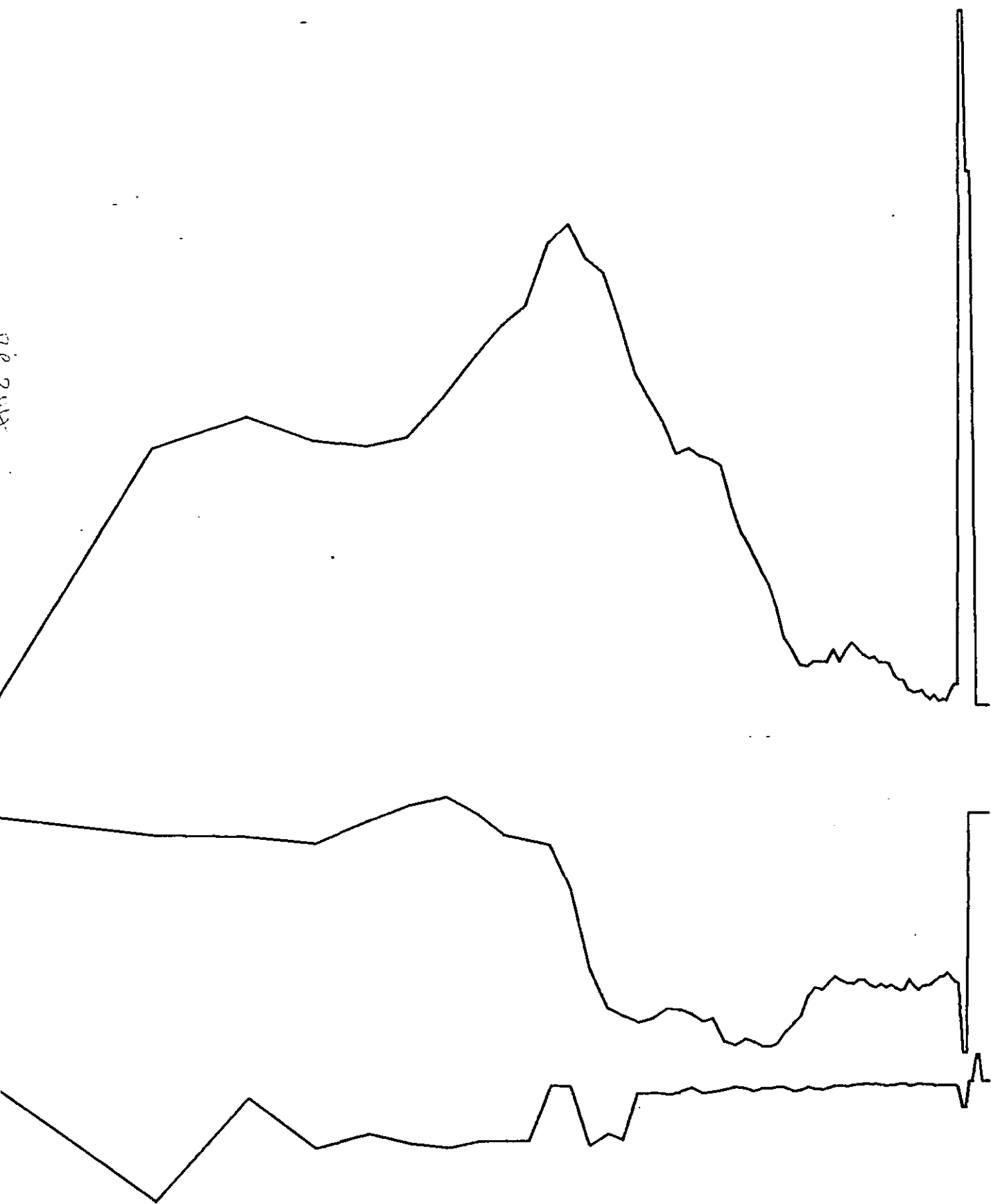
84.700



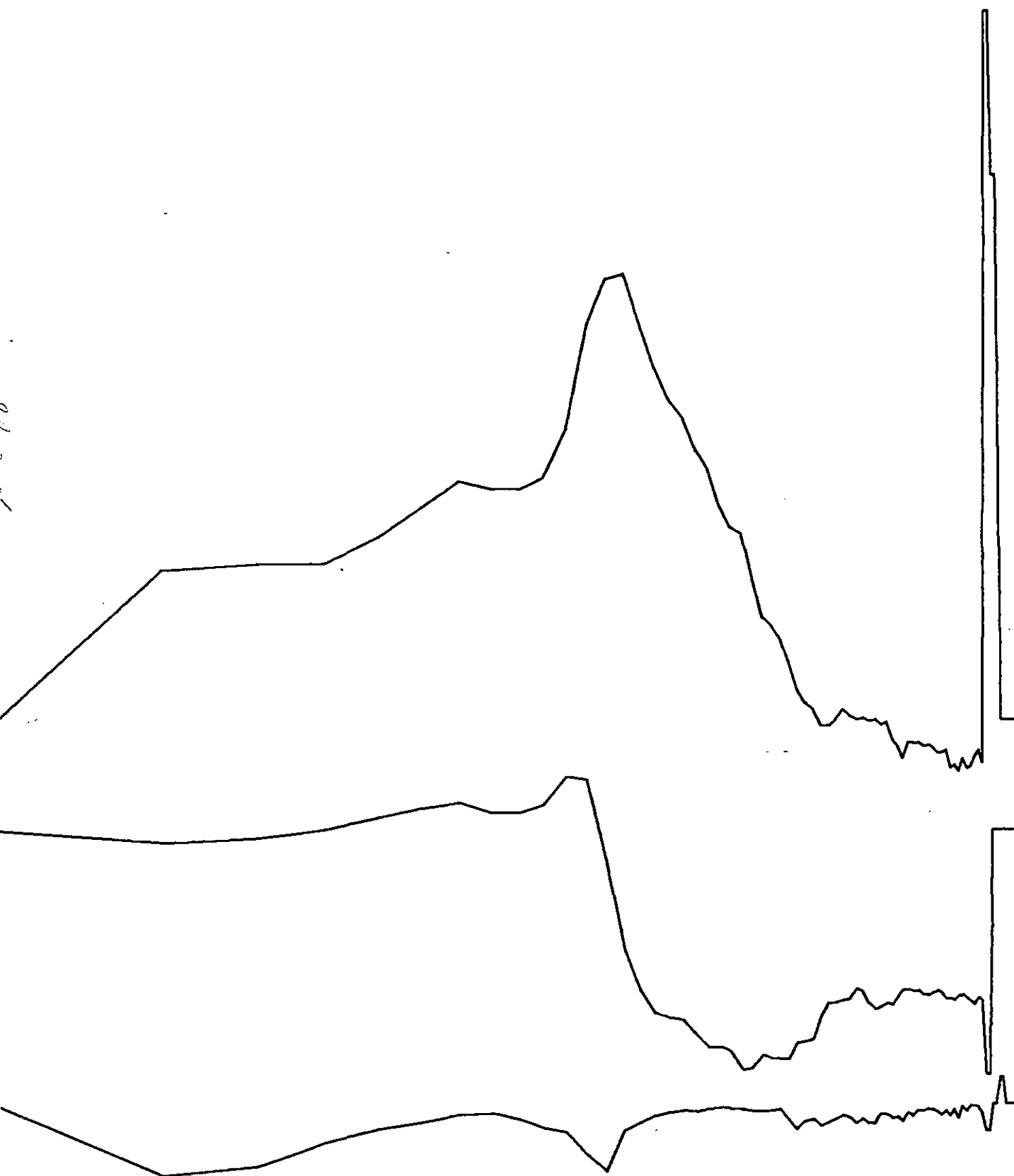
.82 03 F



82 04 F

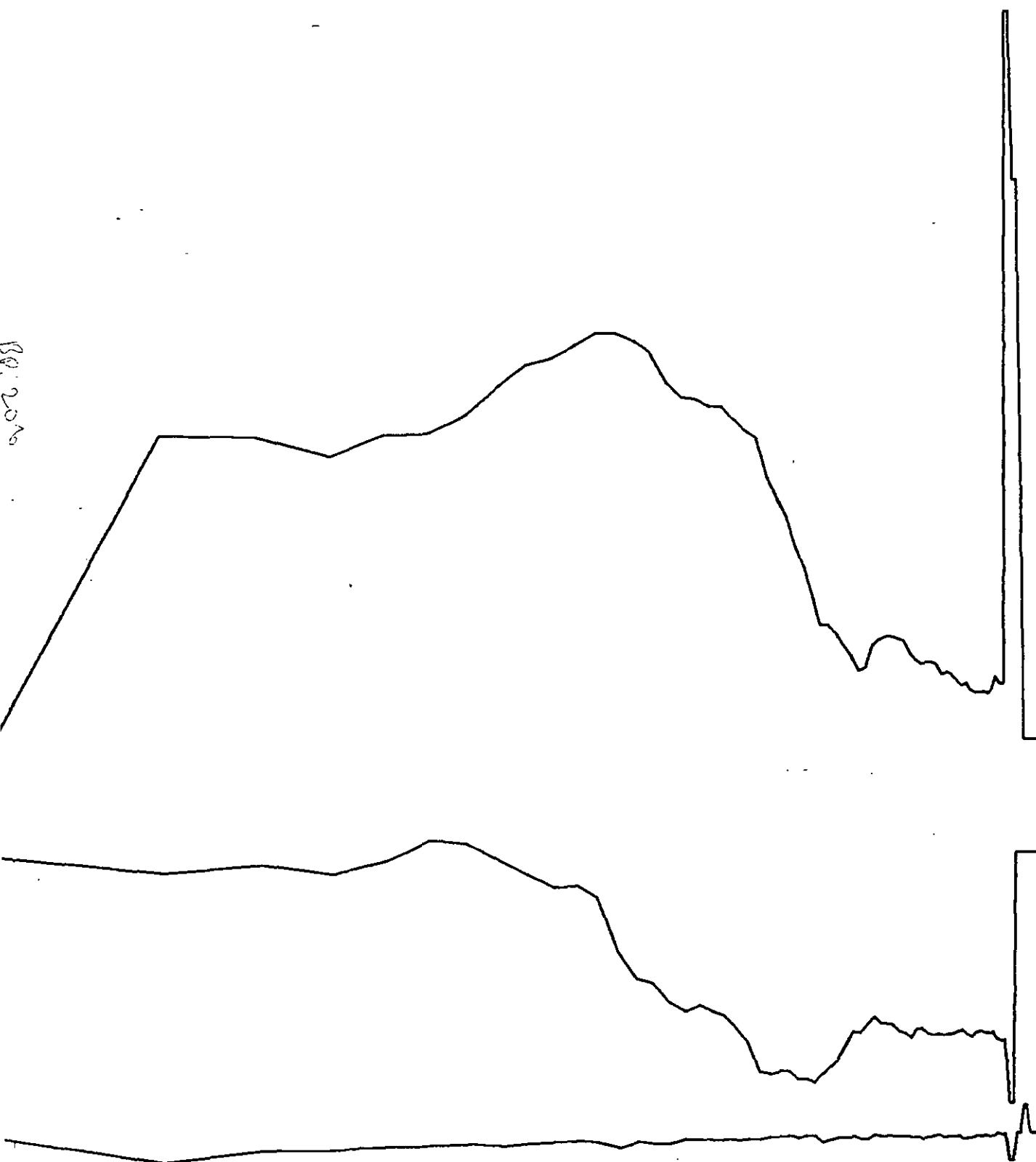


82 05 F



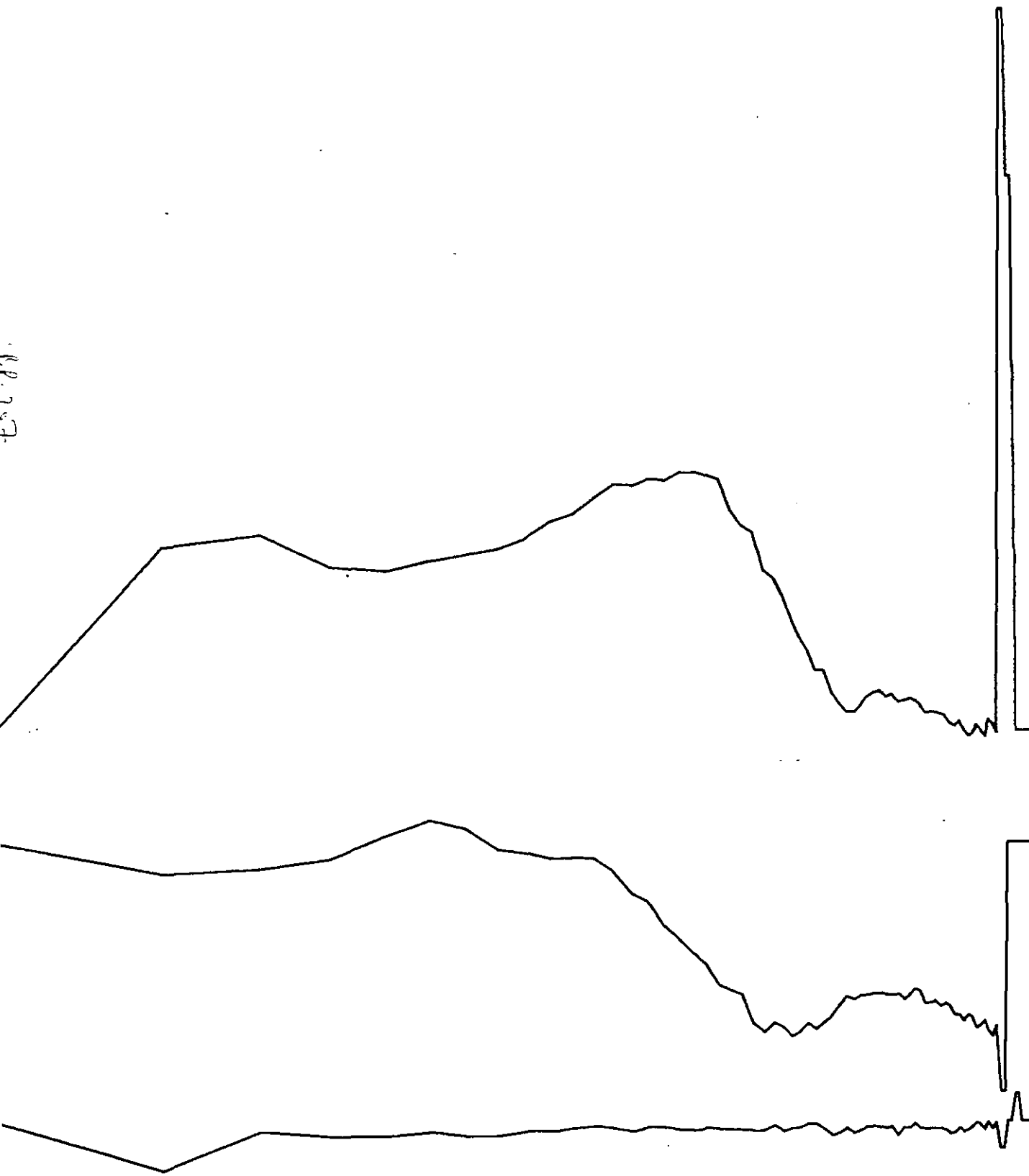
82 06 F

89.206

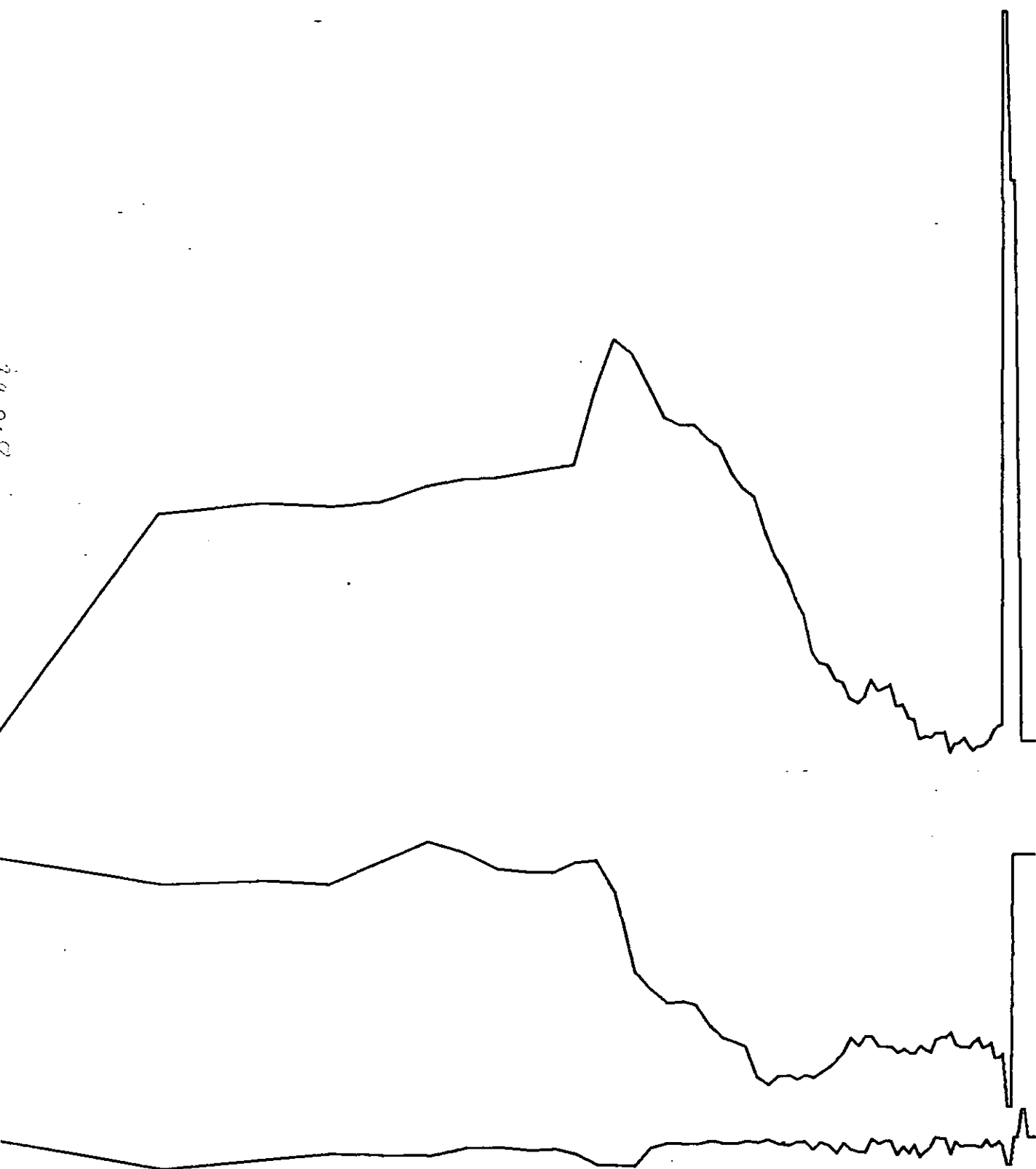


82 07F

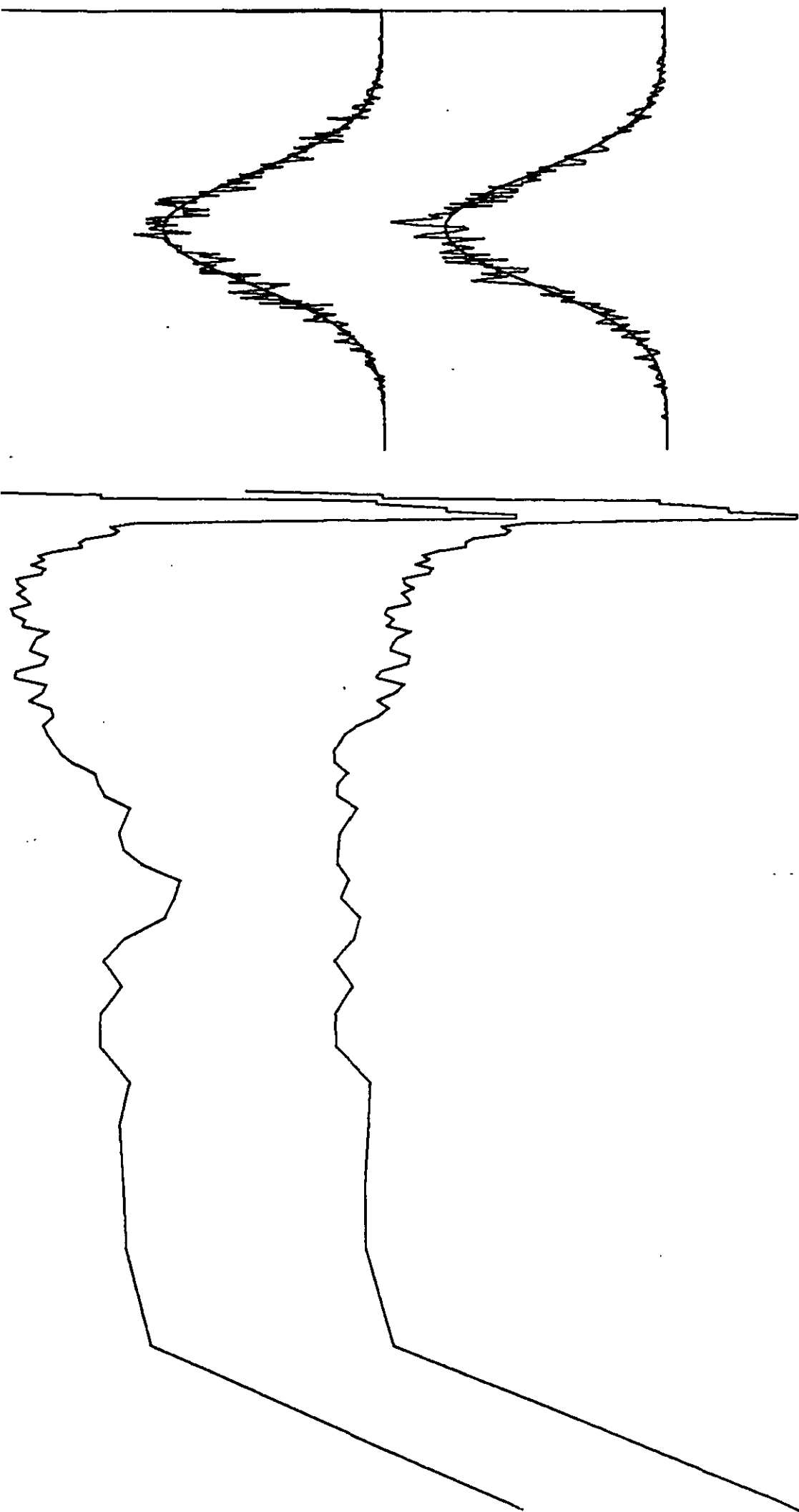
12.88



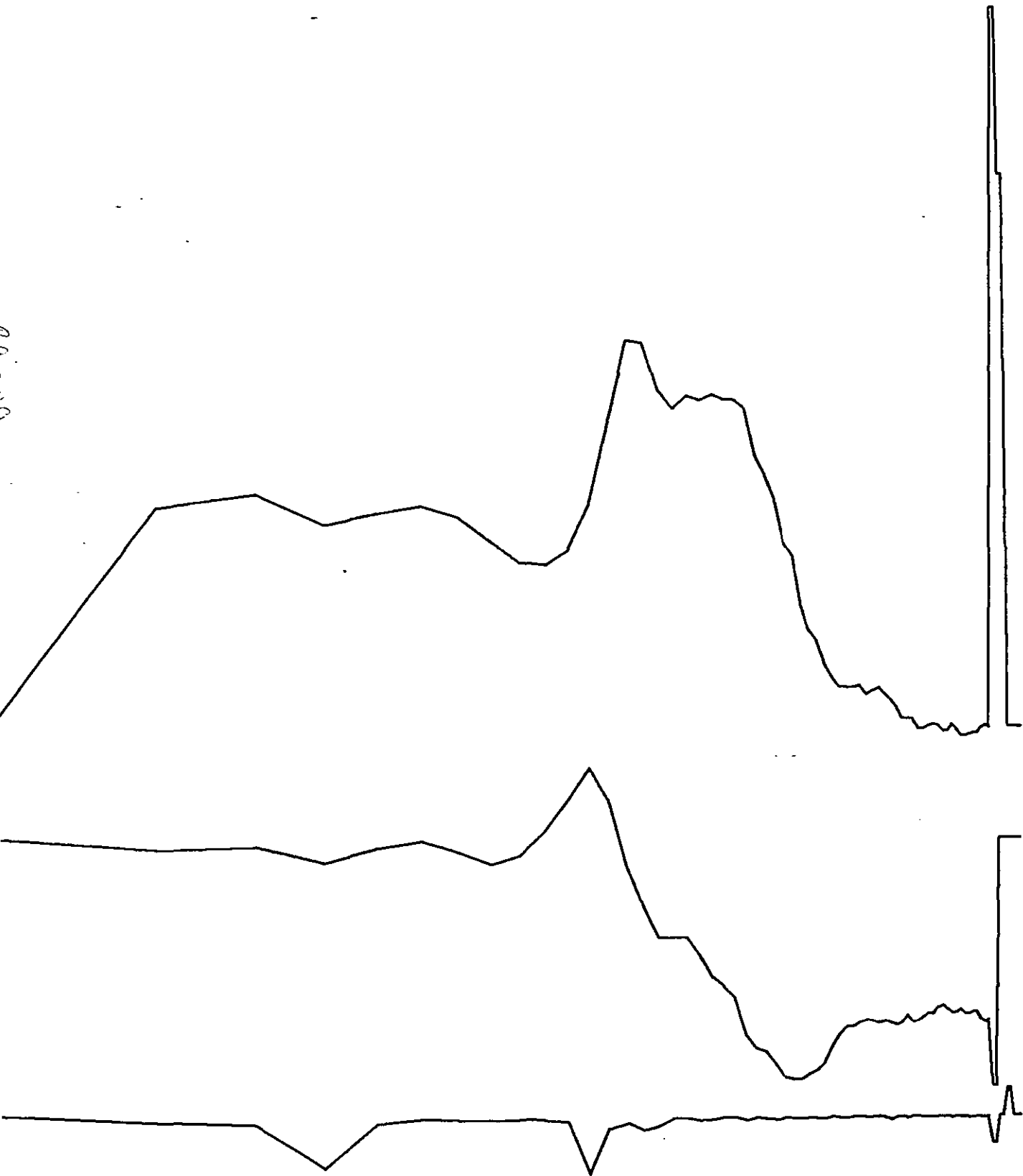
82 08F



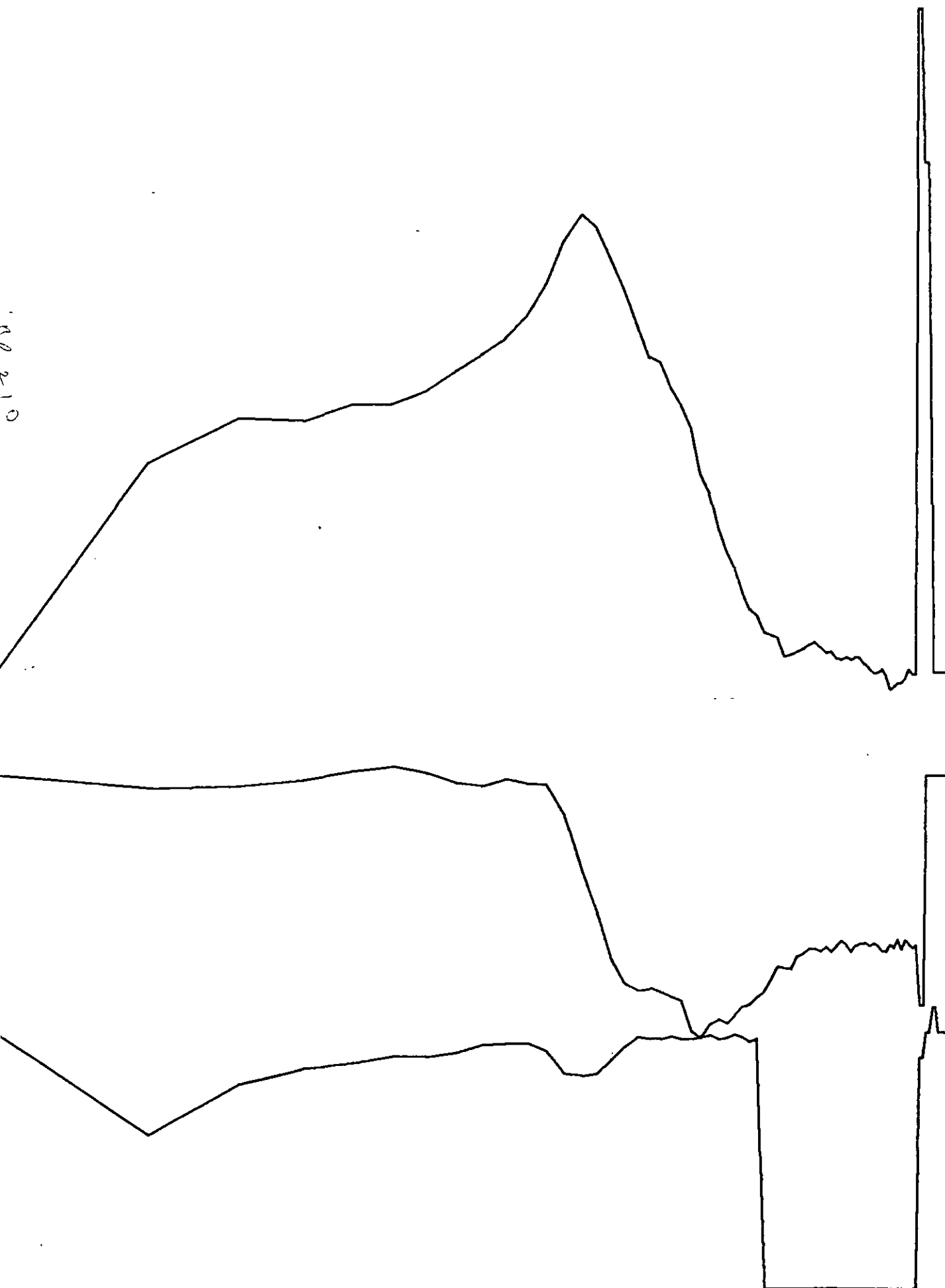
82 08F

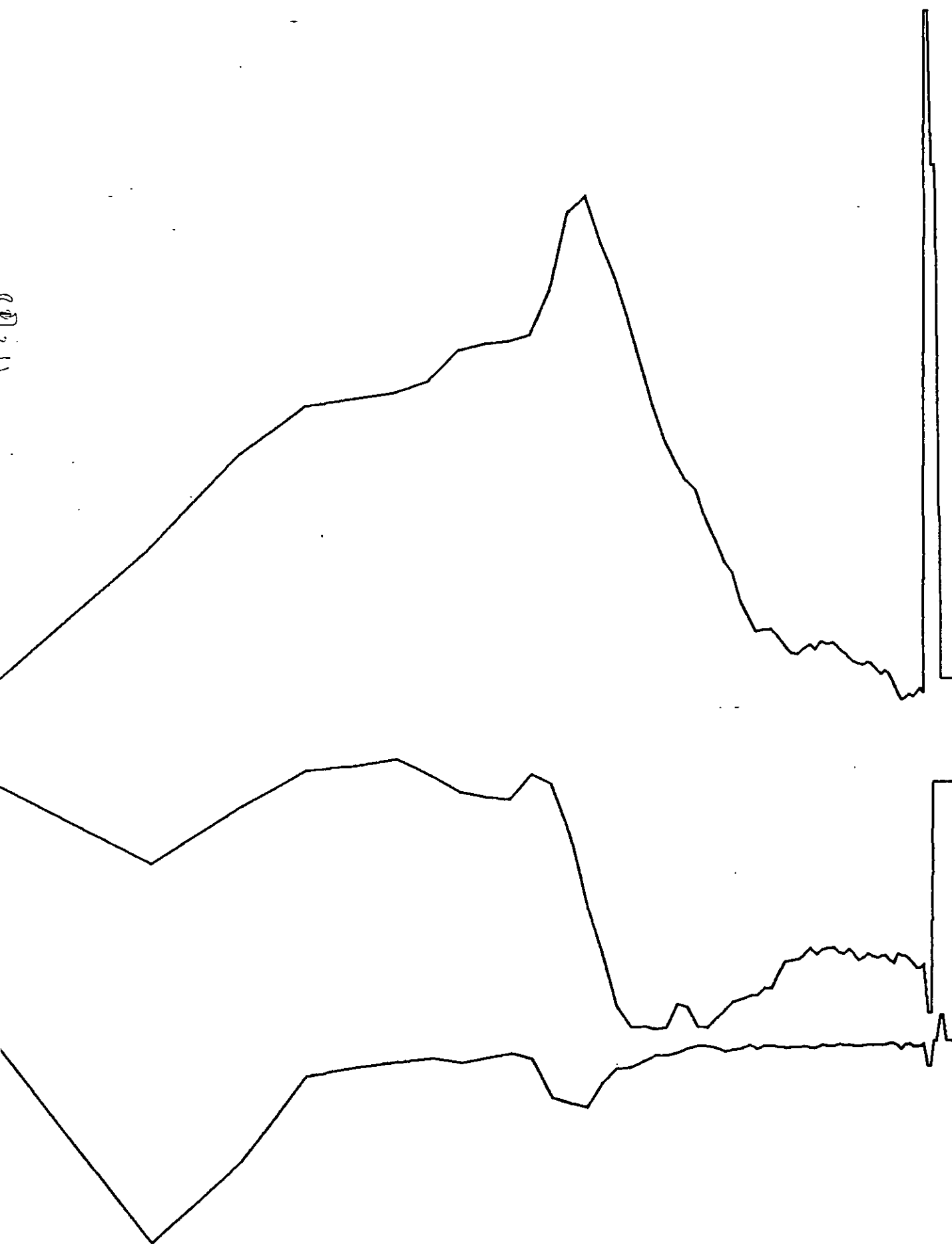


82 09F

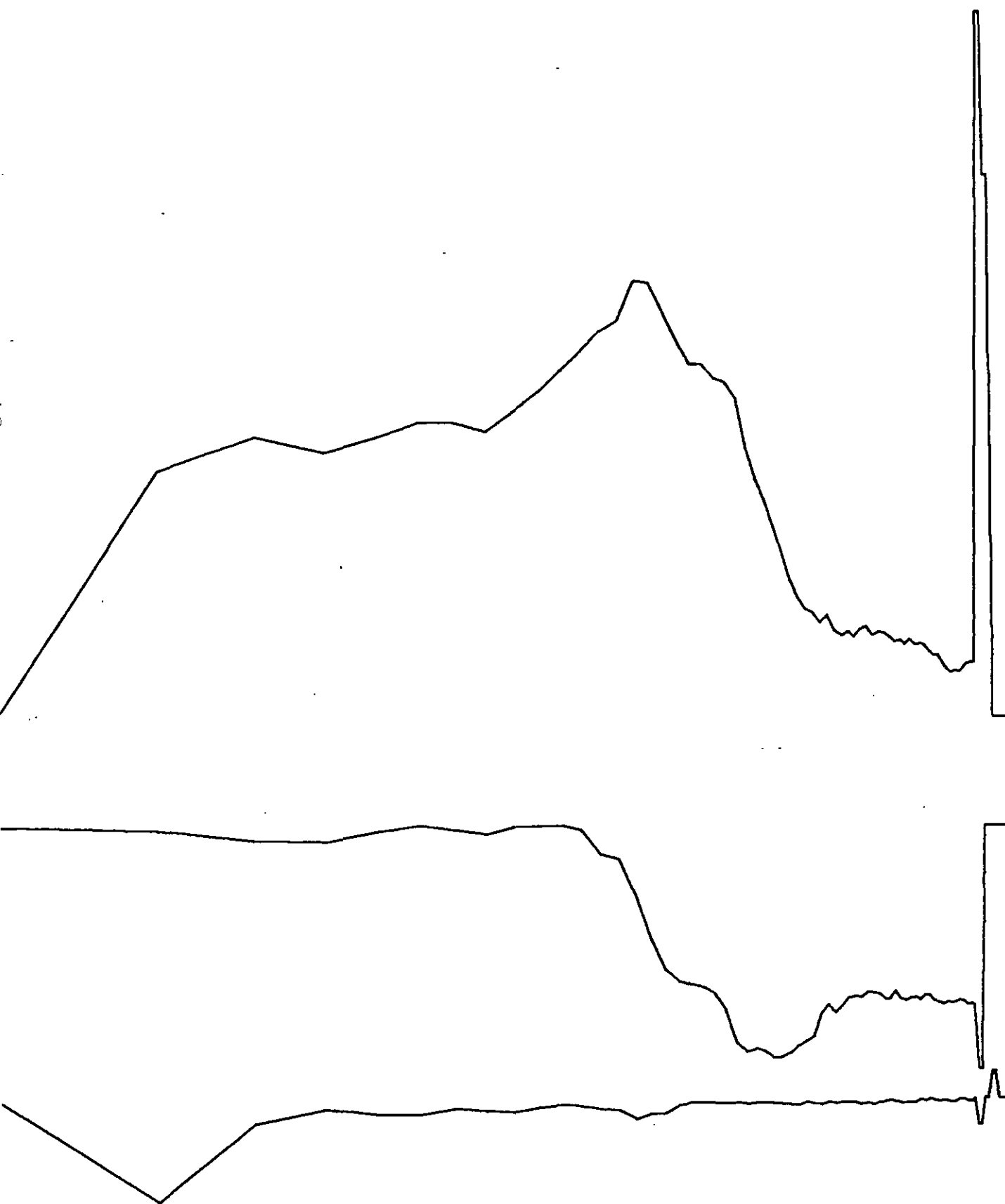


.82 10F



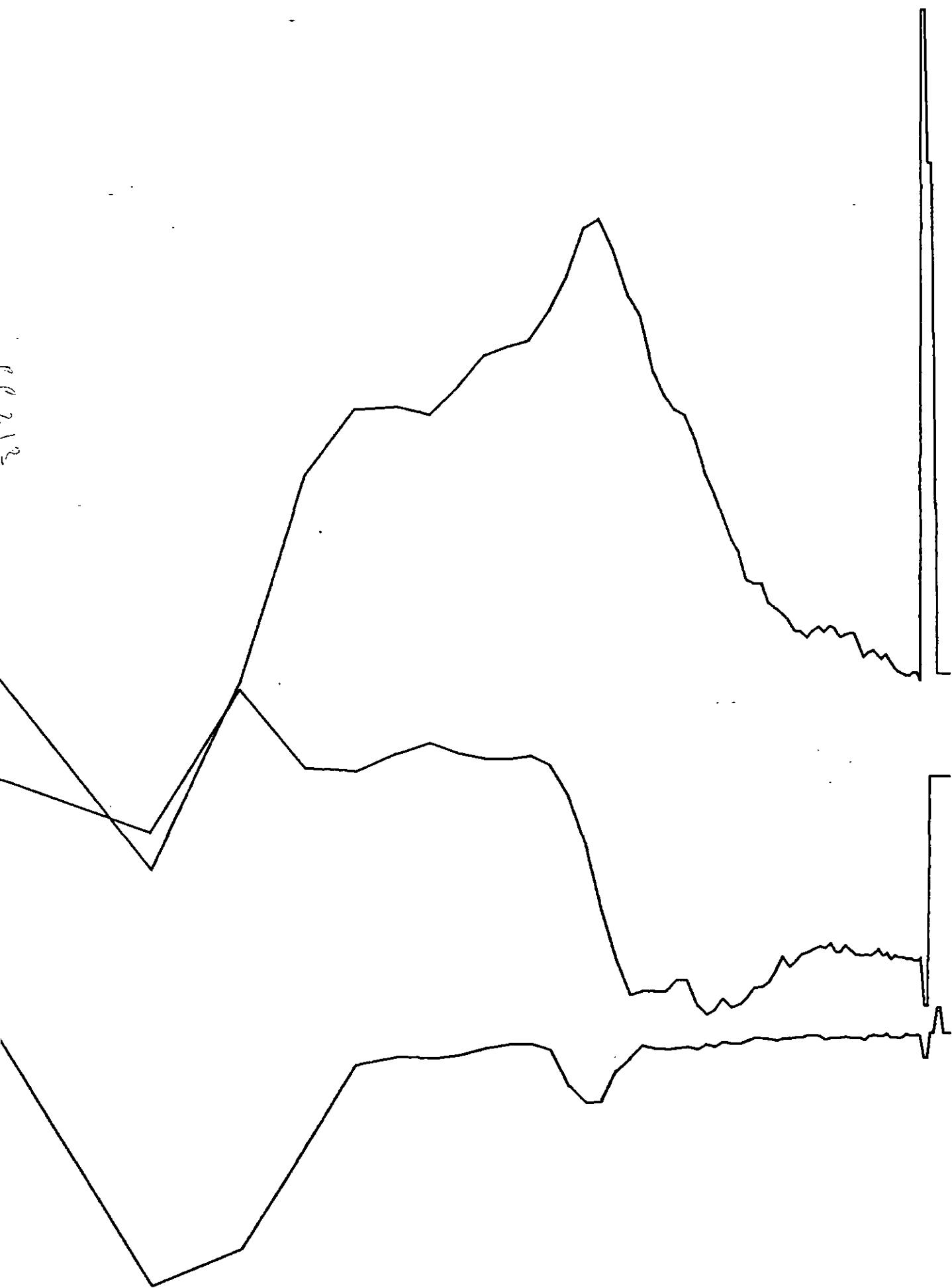


82 12 F

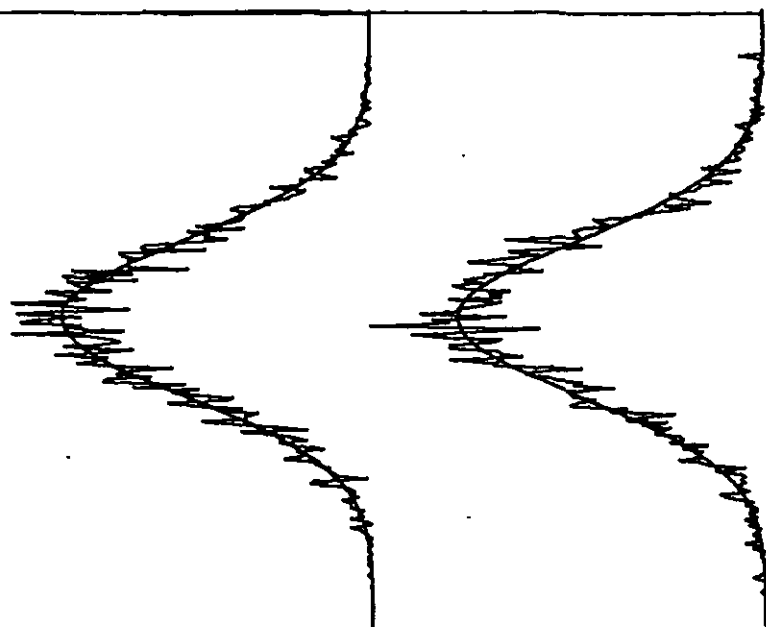


82 13 F

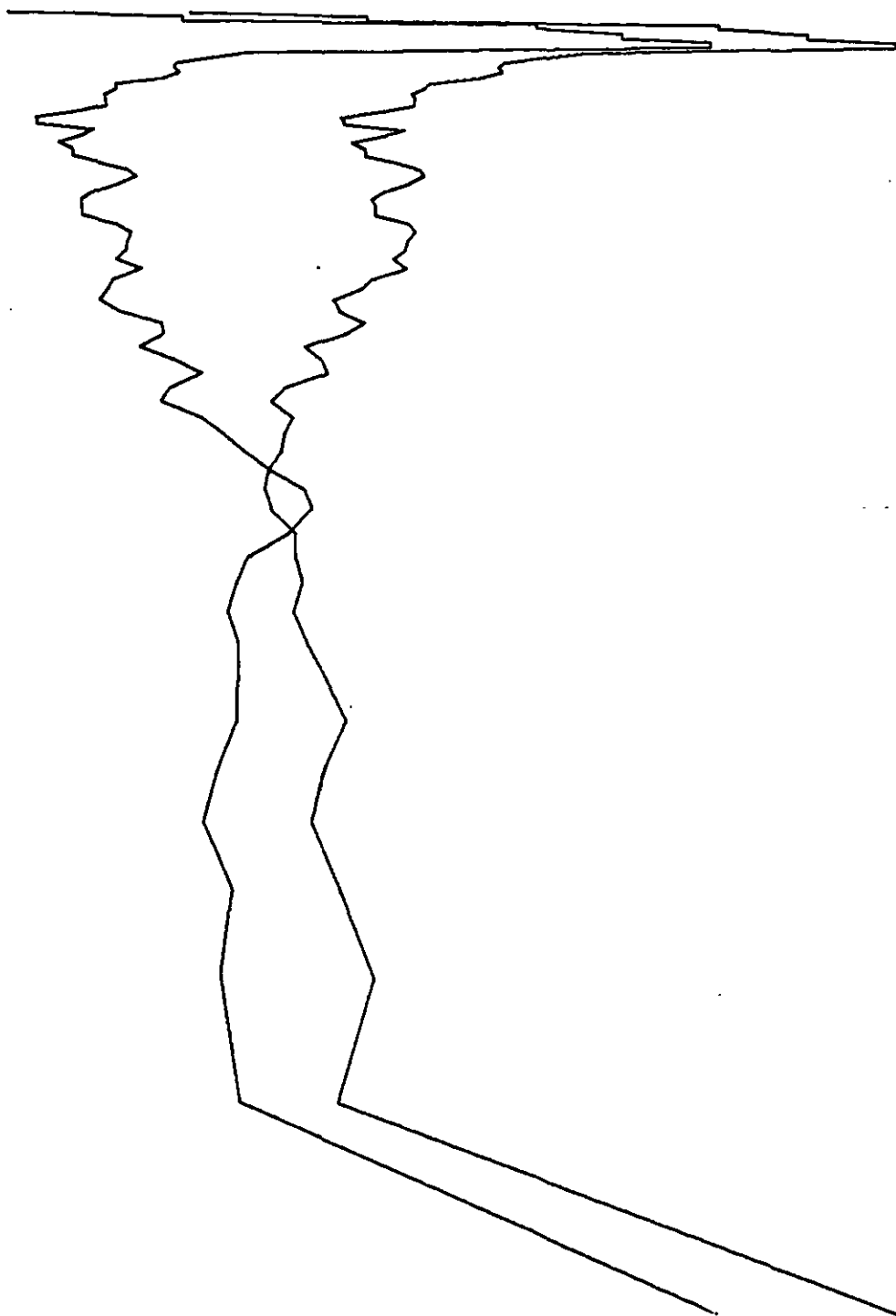
88212



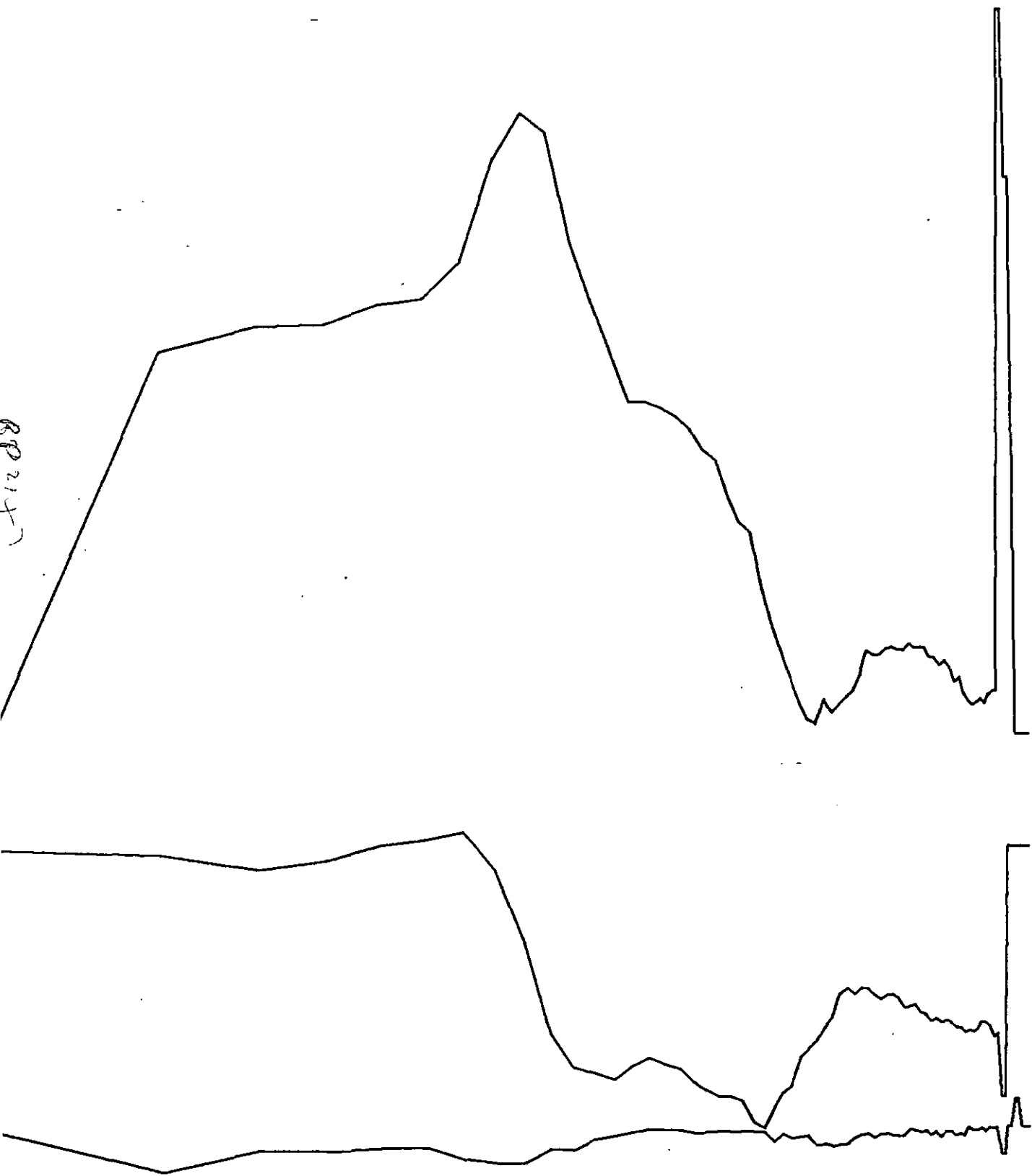
82 13 F



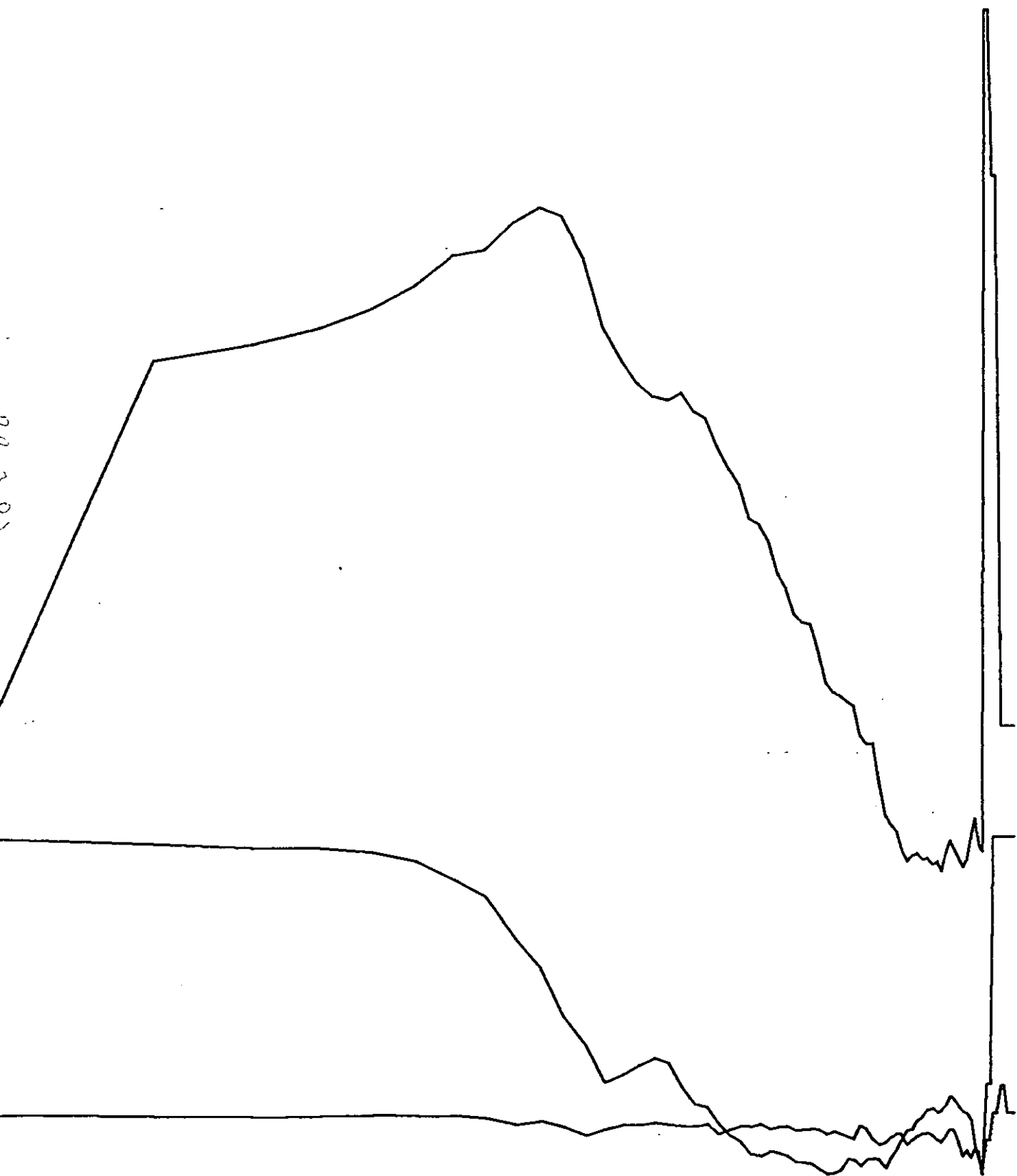
BP. 213



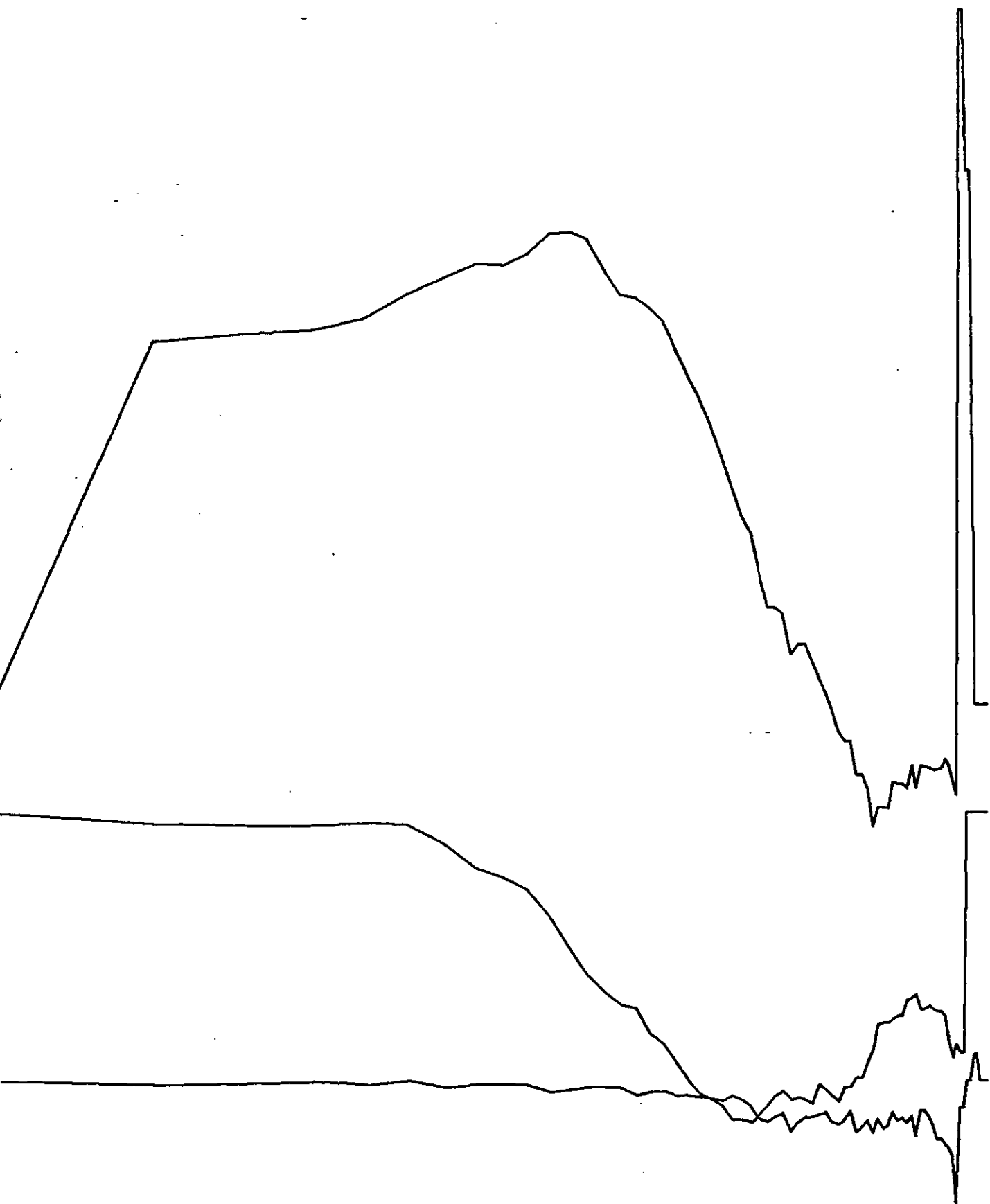
82 14F



82 01 T



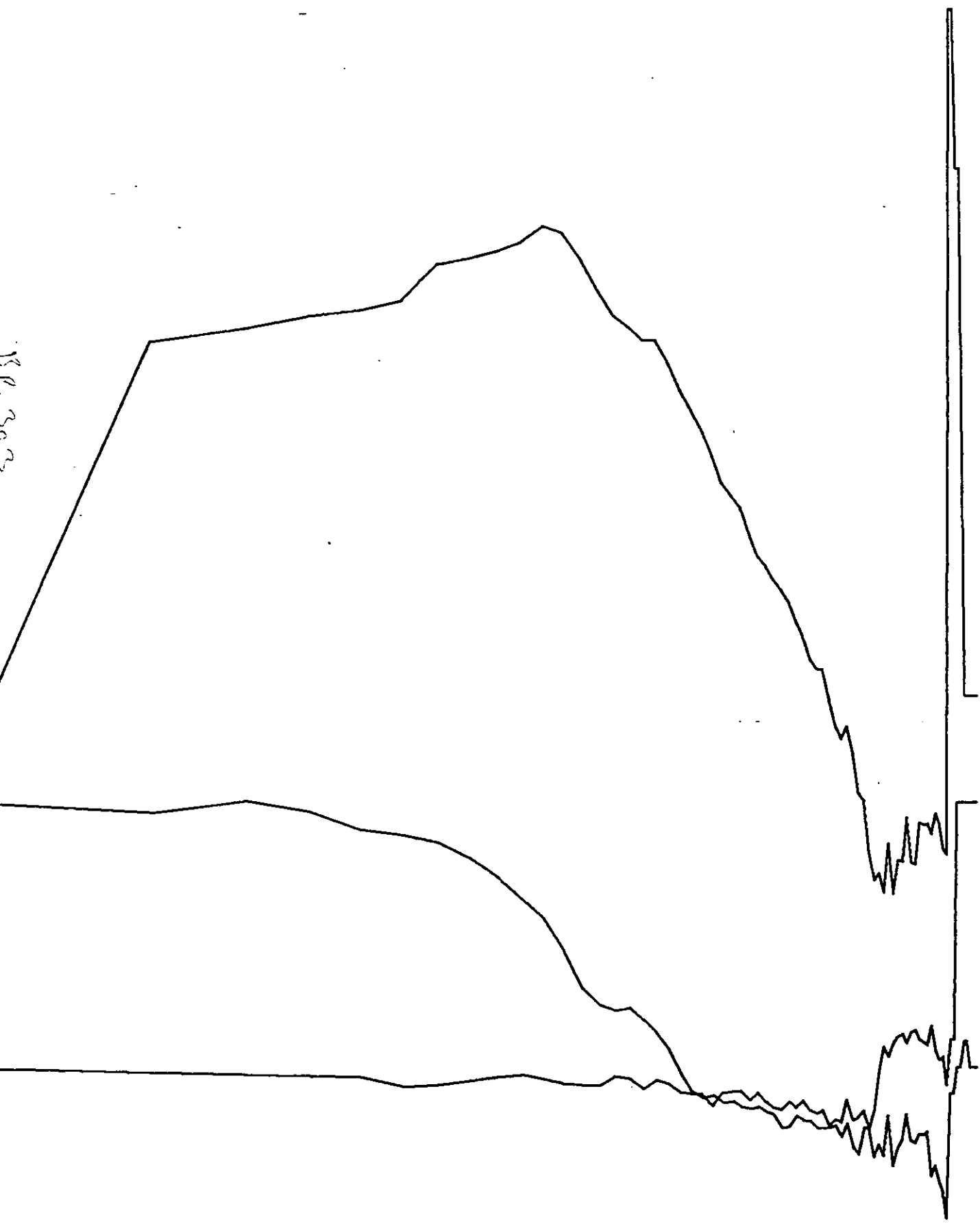
82 02 T

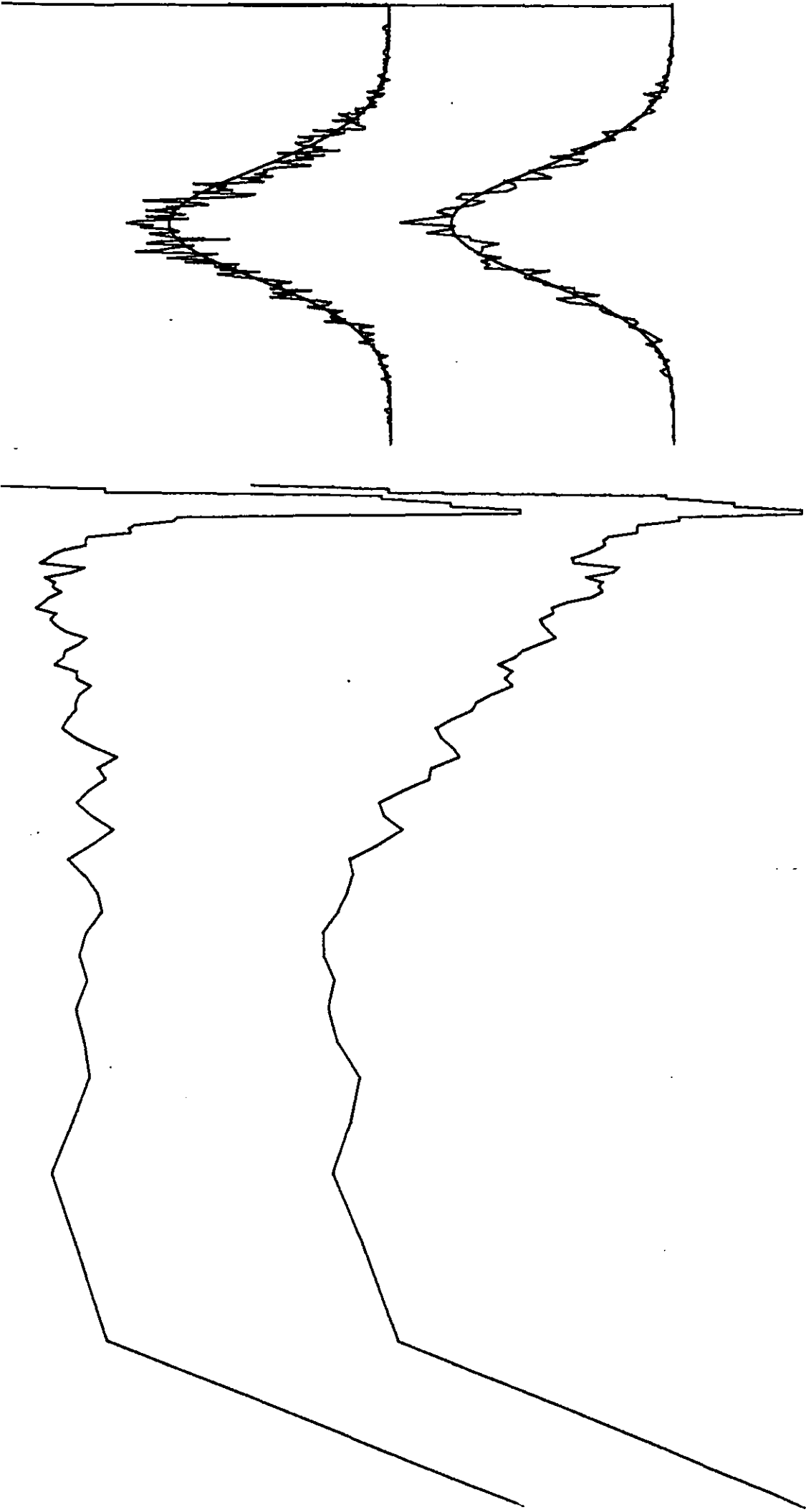


82 02T

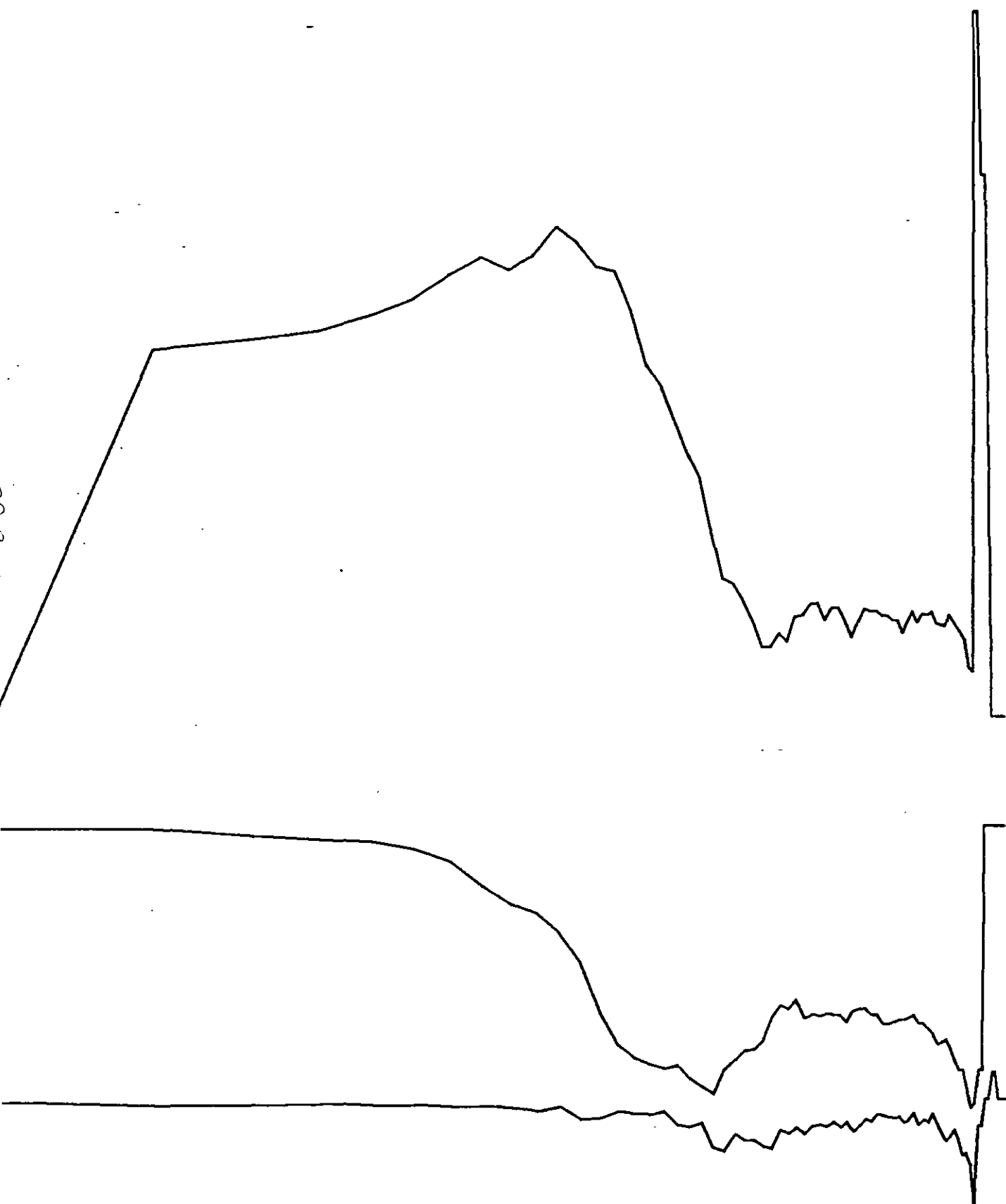


82 03 T

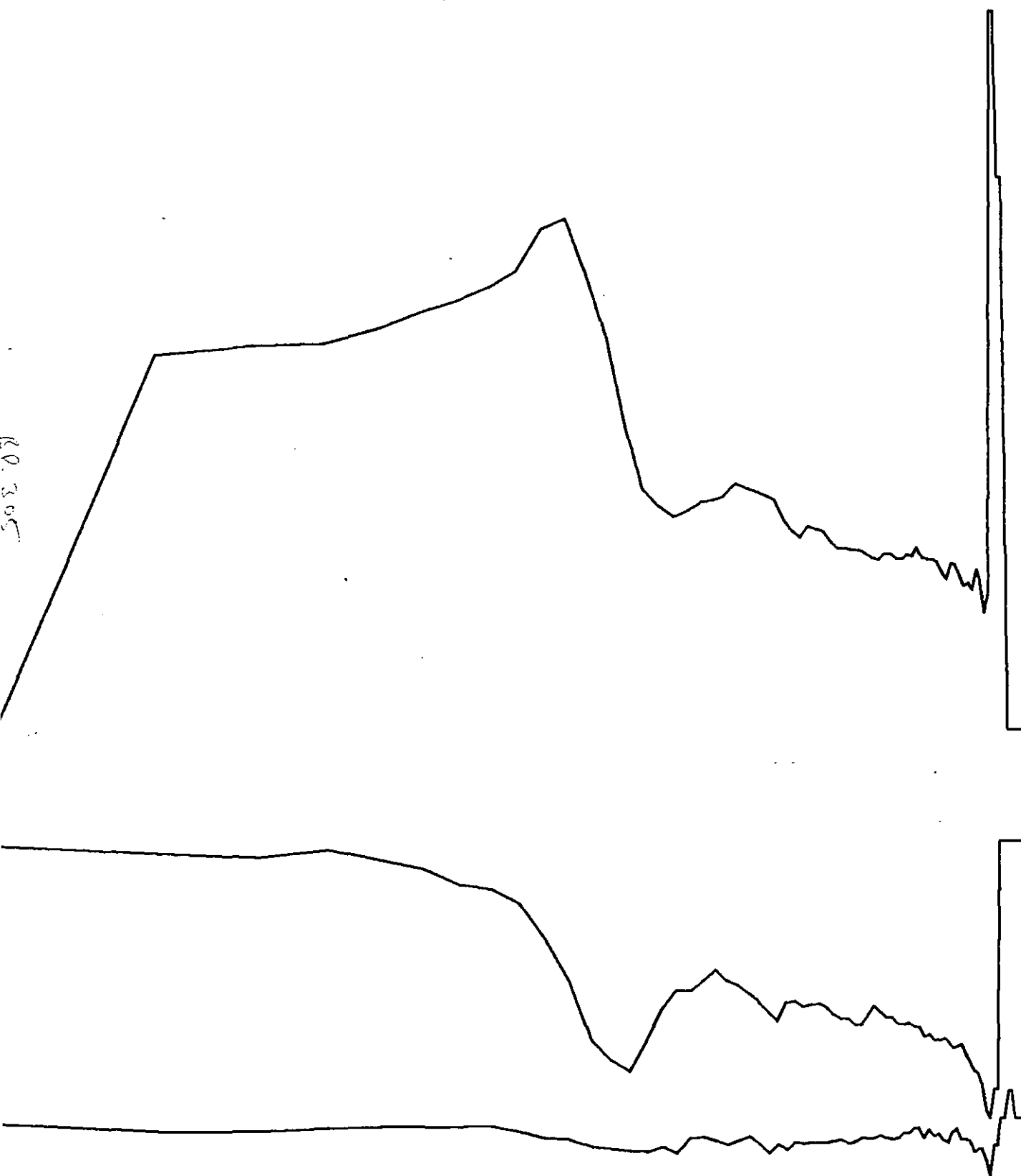




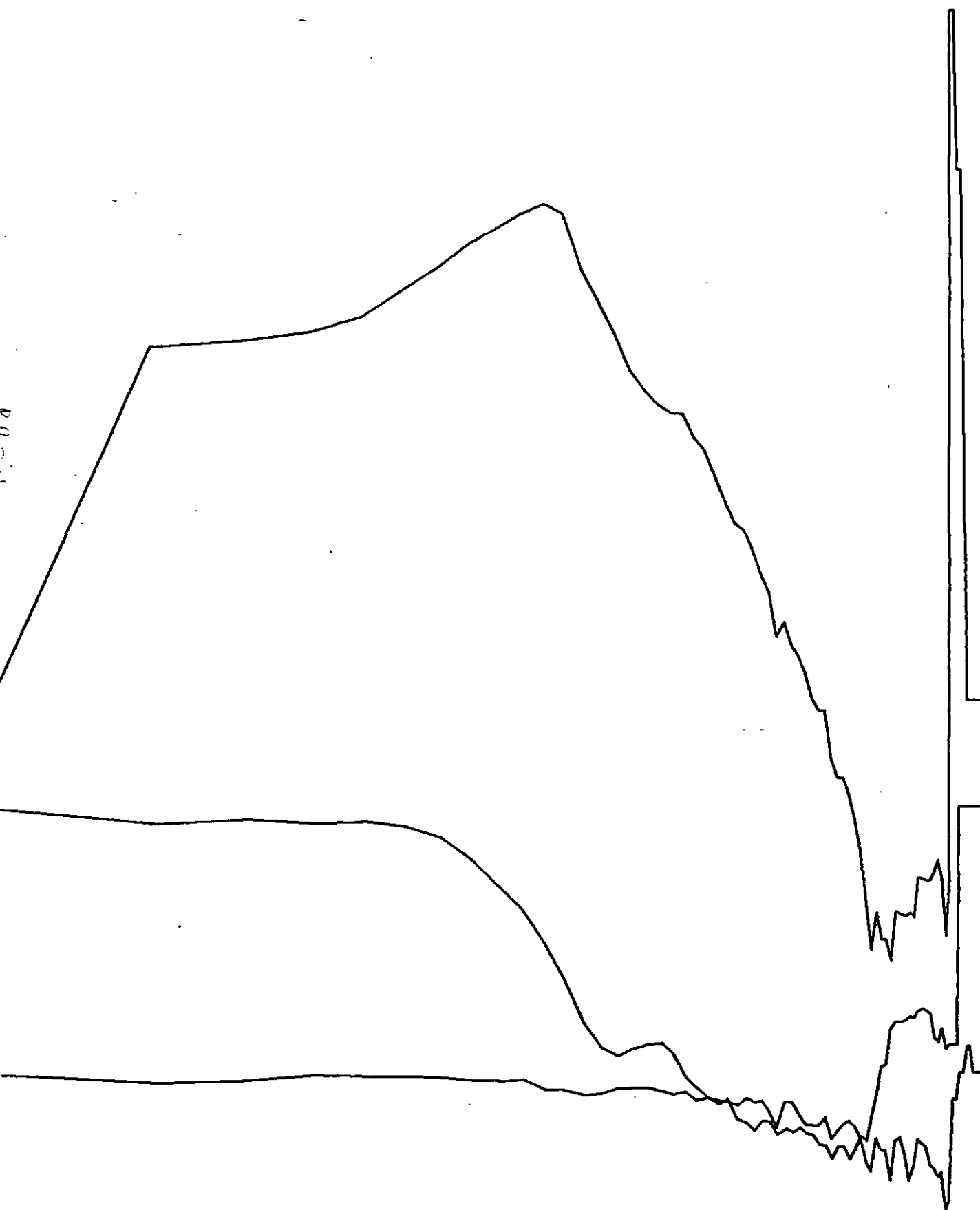
82 04T



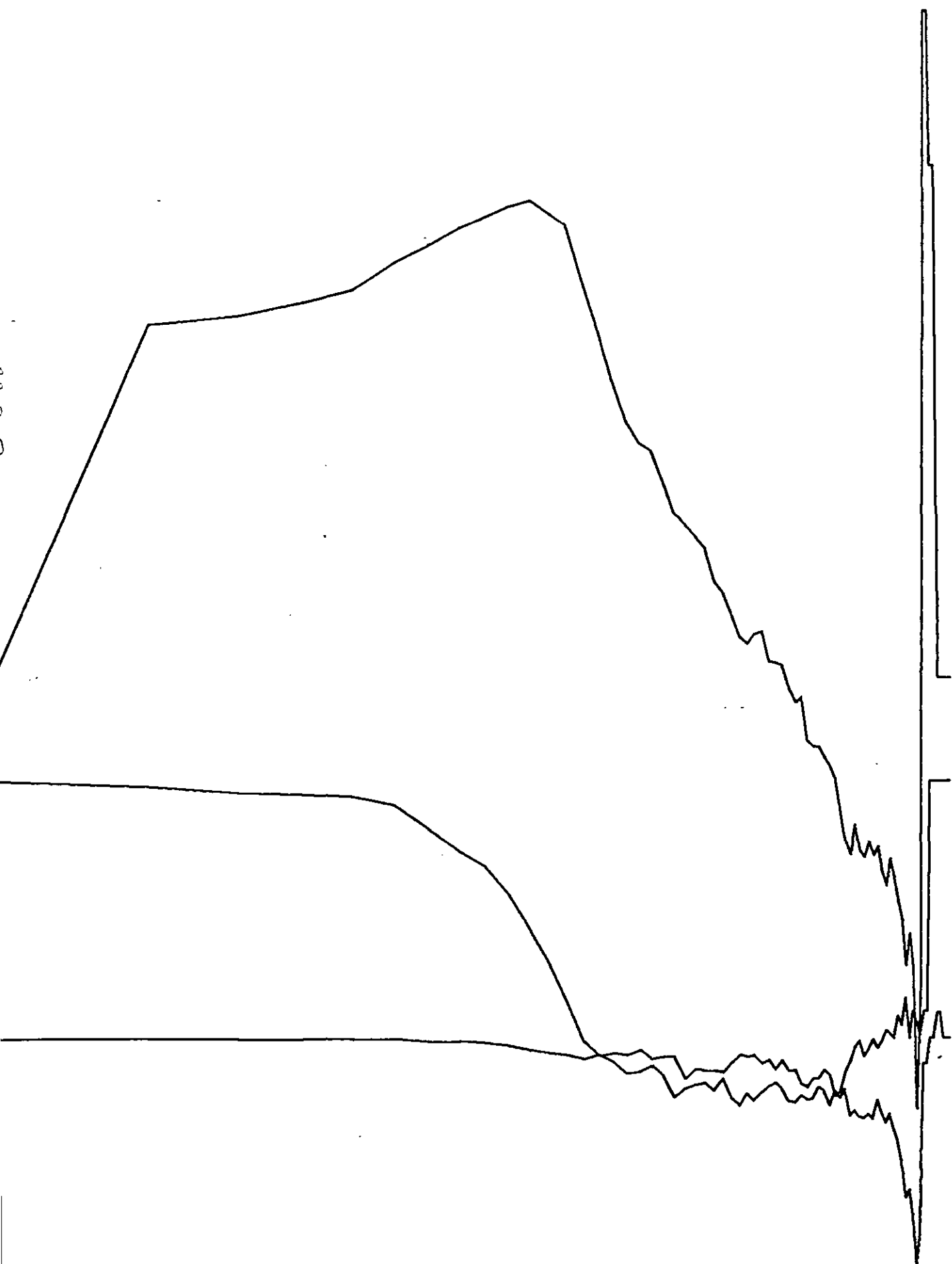
82 05 T

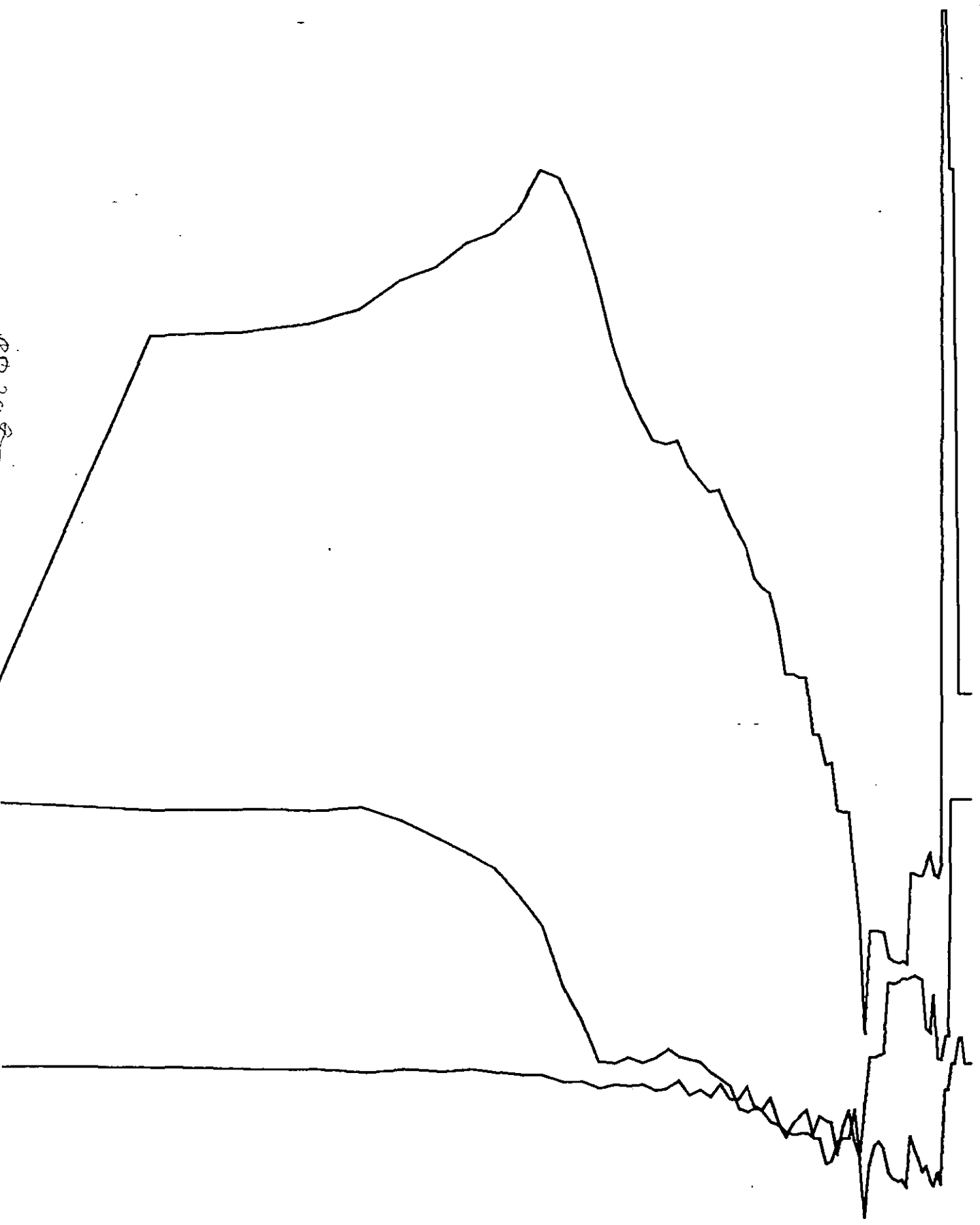


82 06T



82 07T

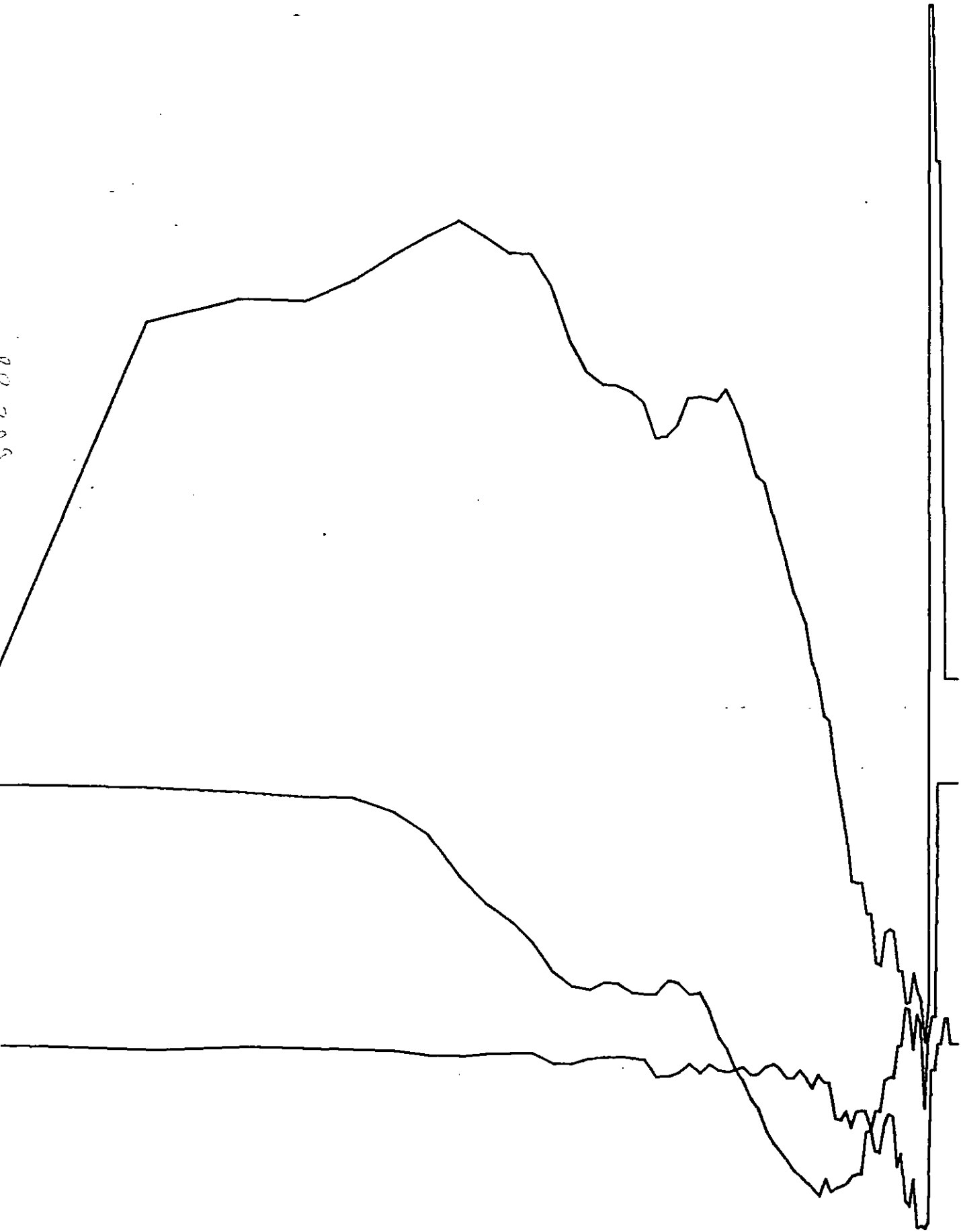




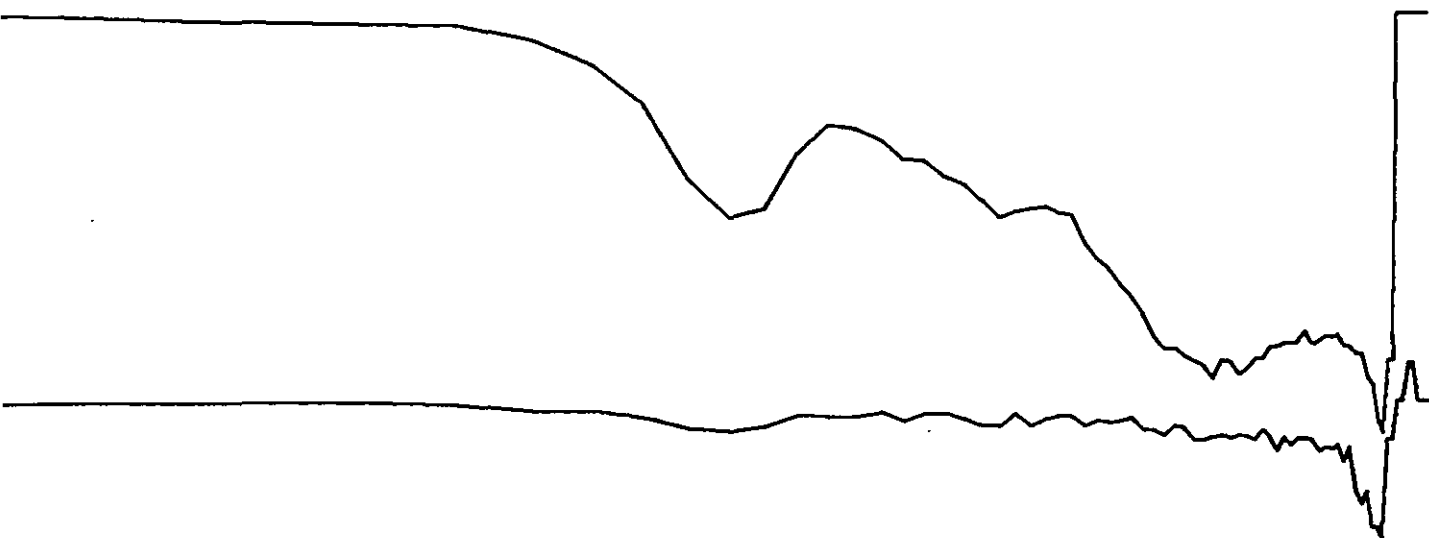
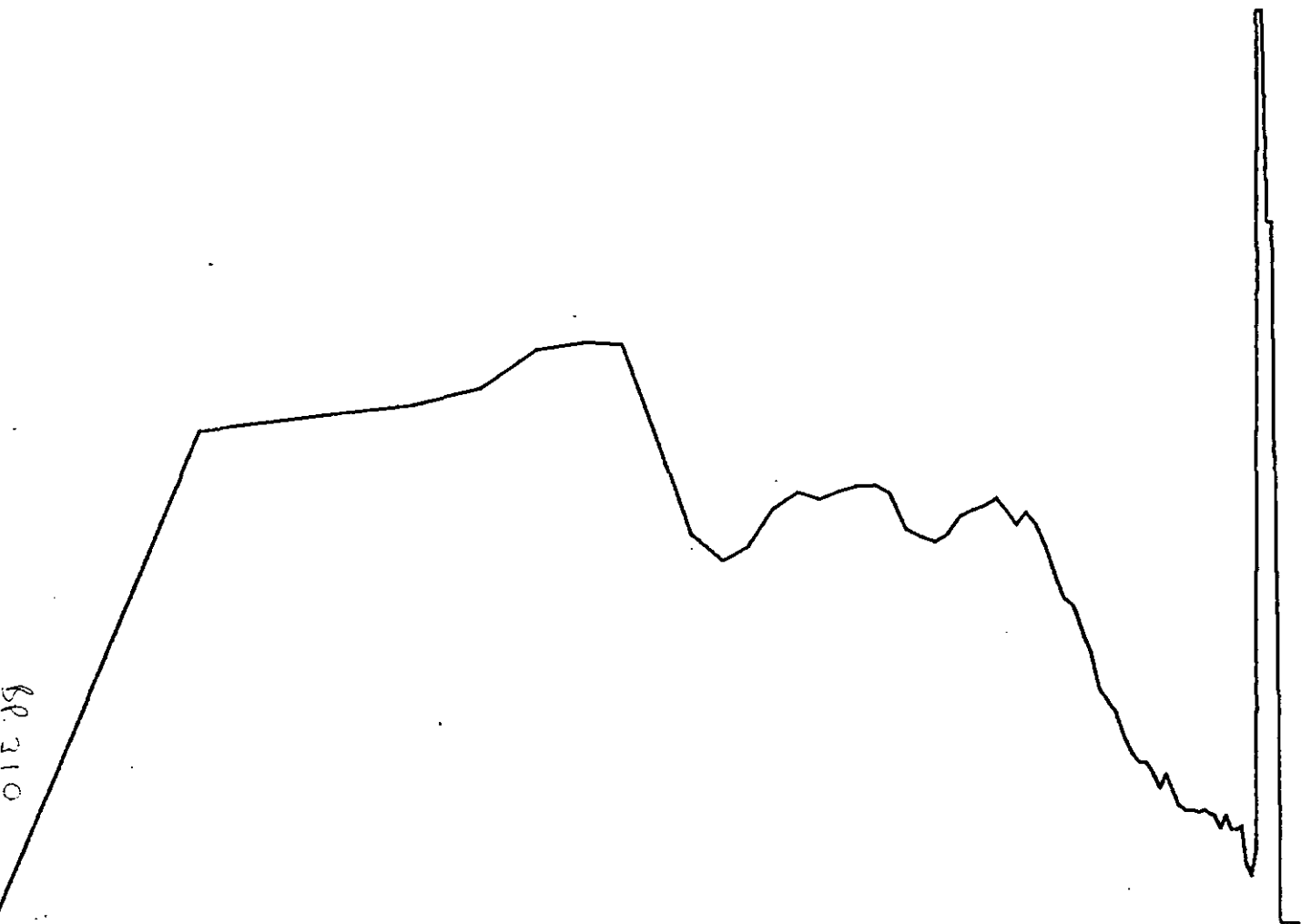
82 08 T



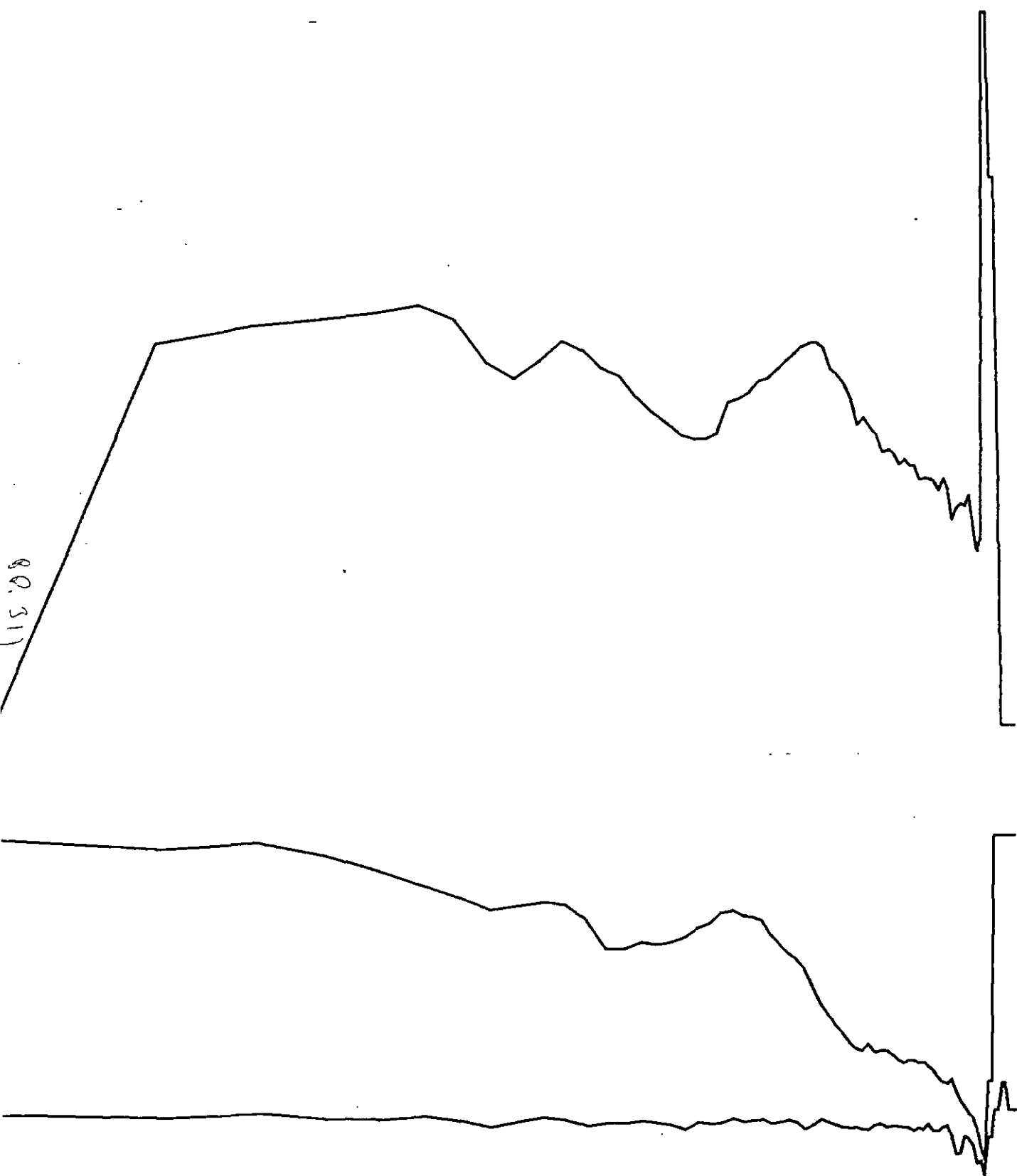
82 09 T



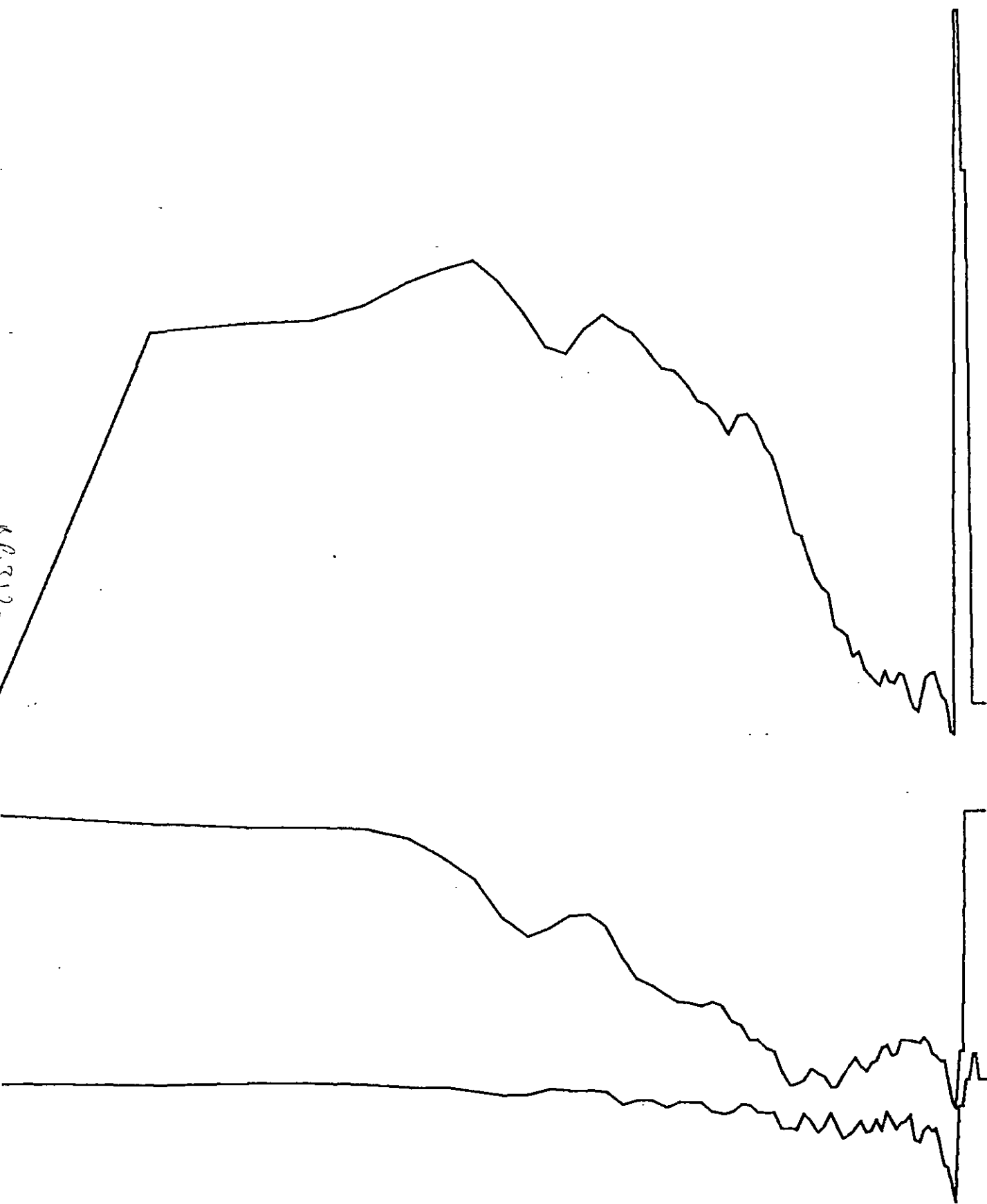
82 10 T



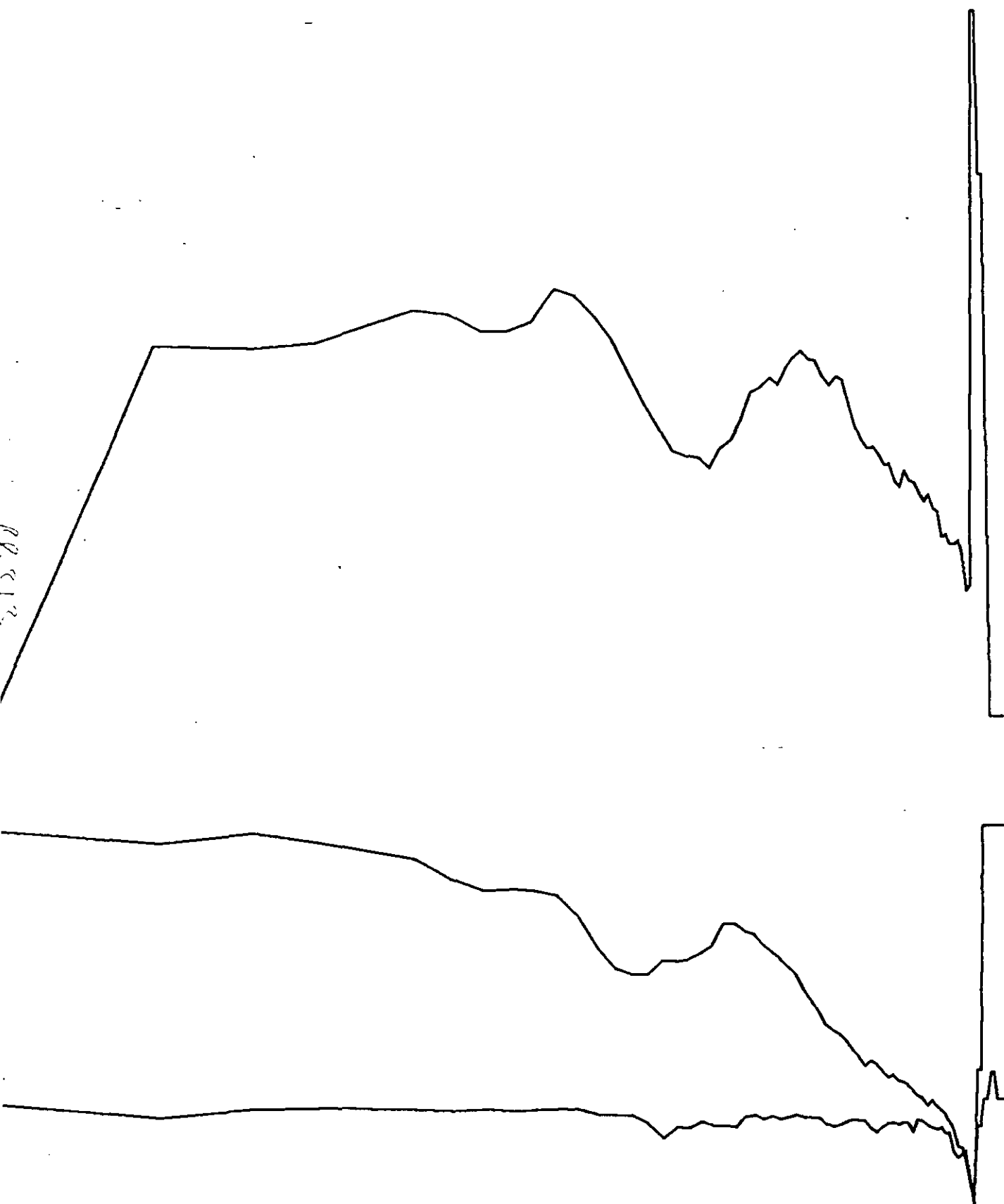
82 11T

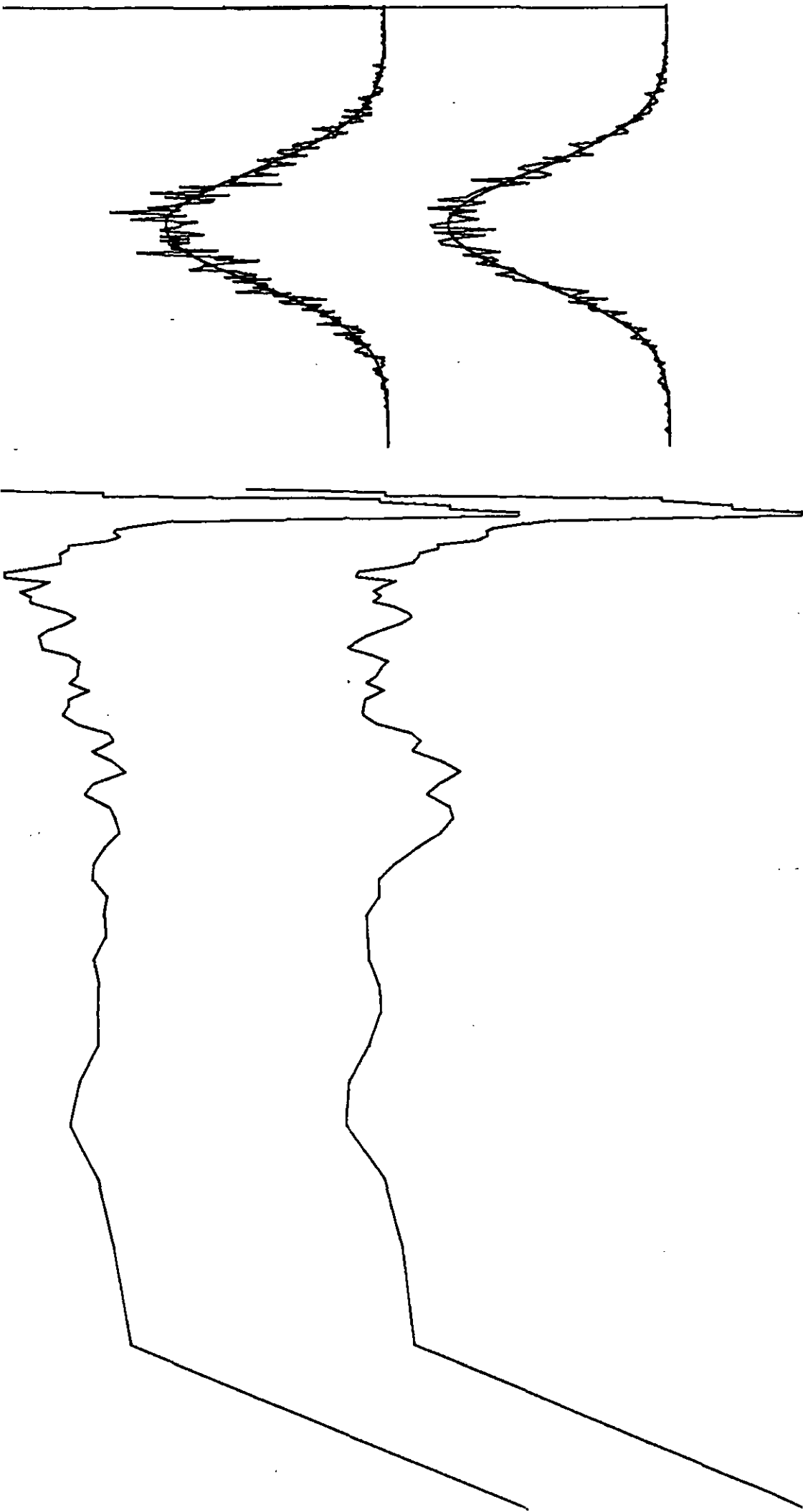


82 12T



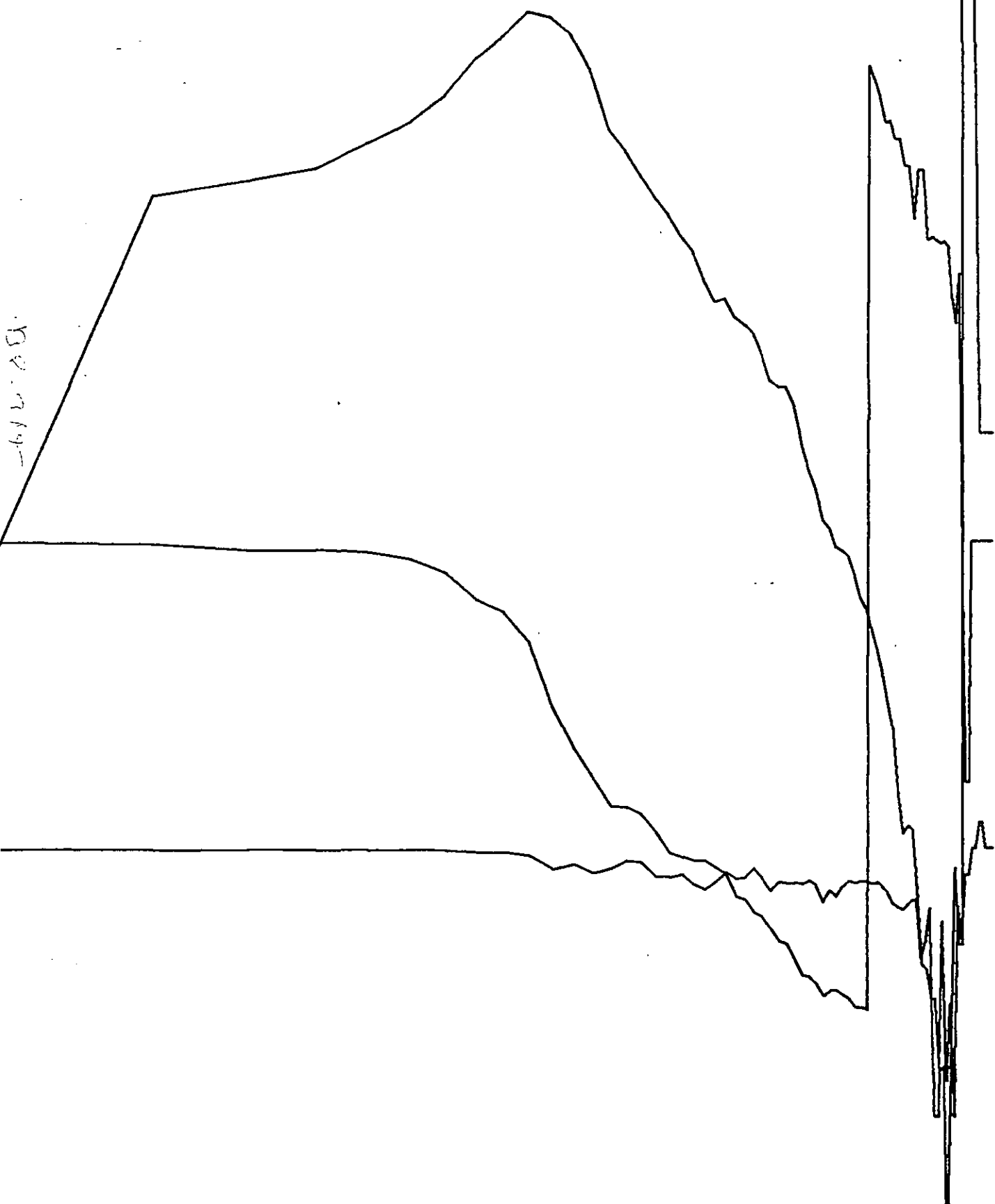
82 13T



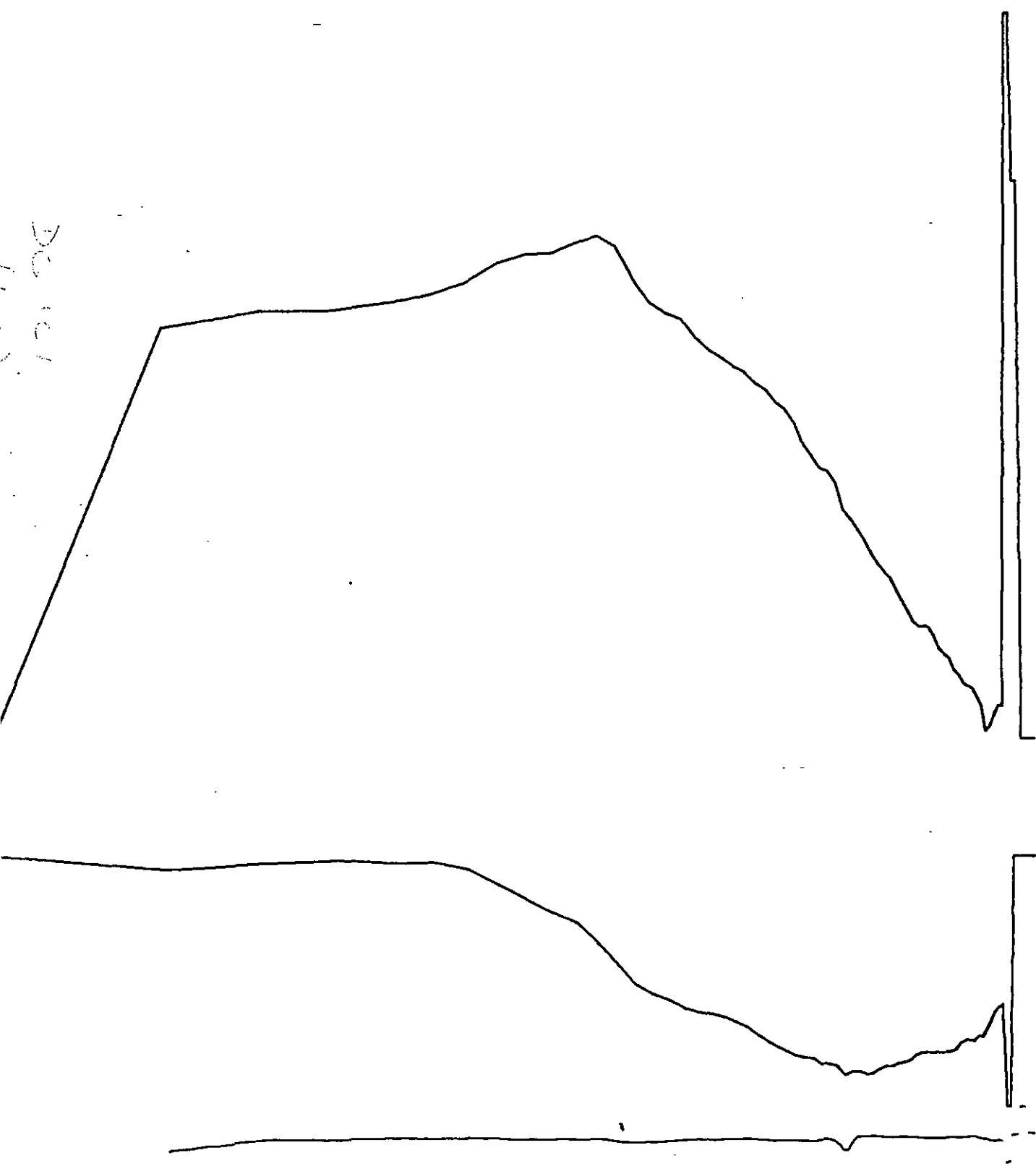


82 14 T

Scale
Incorrect

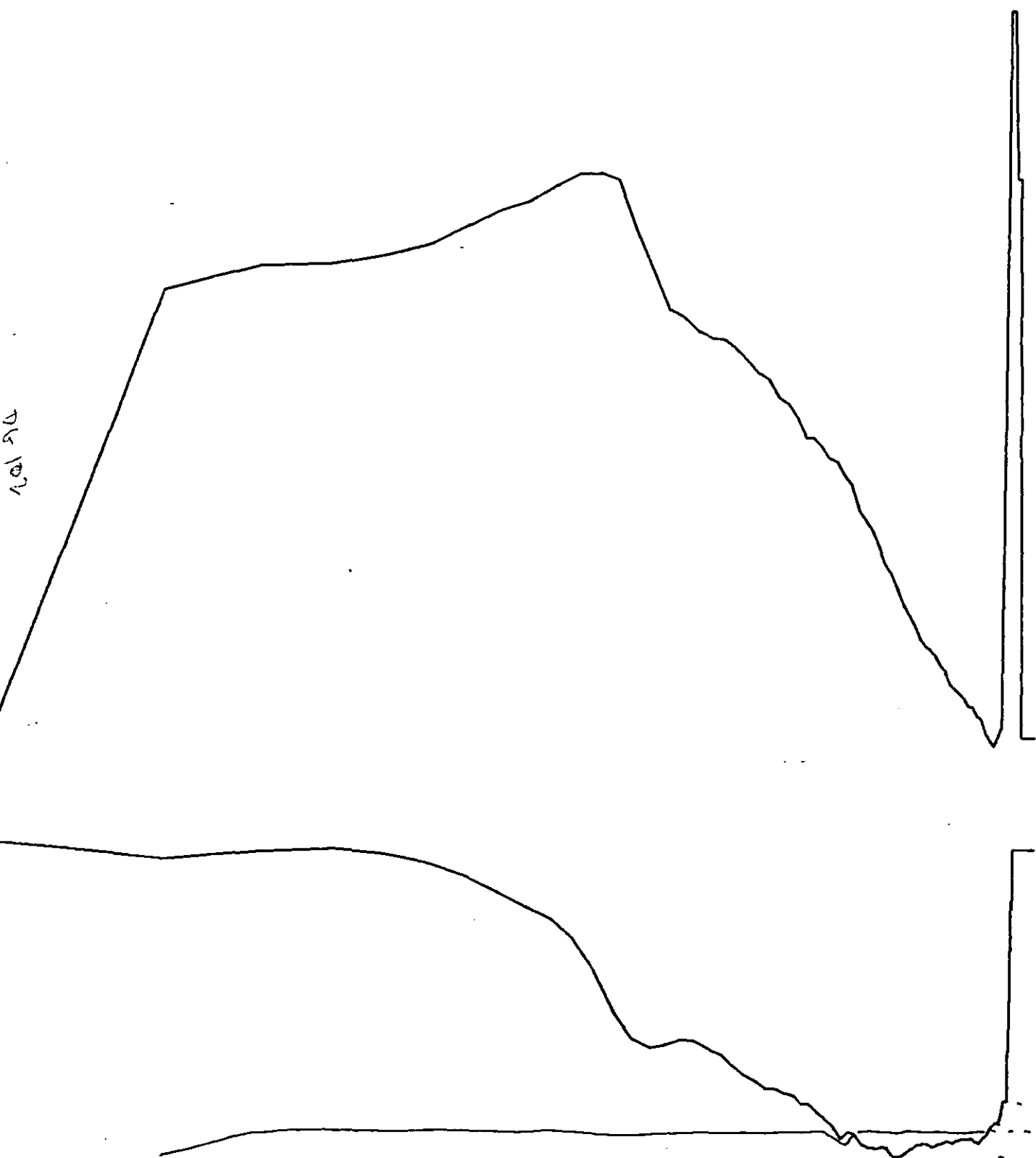


85 01A

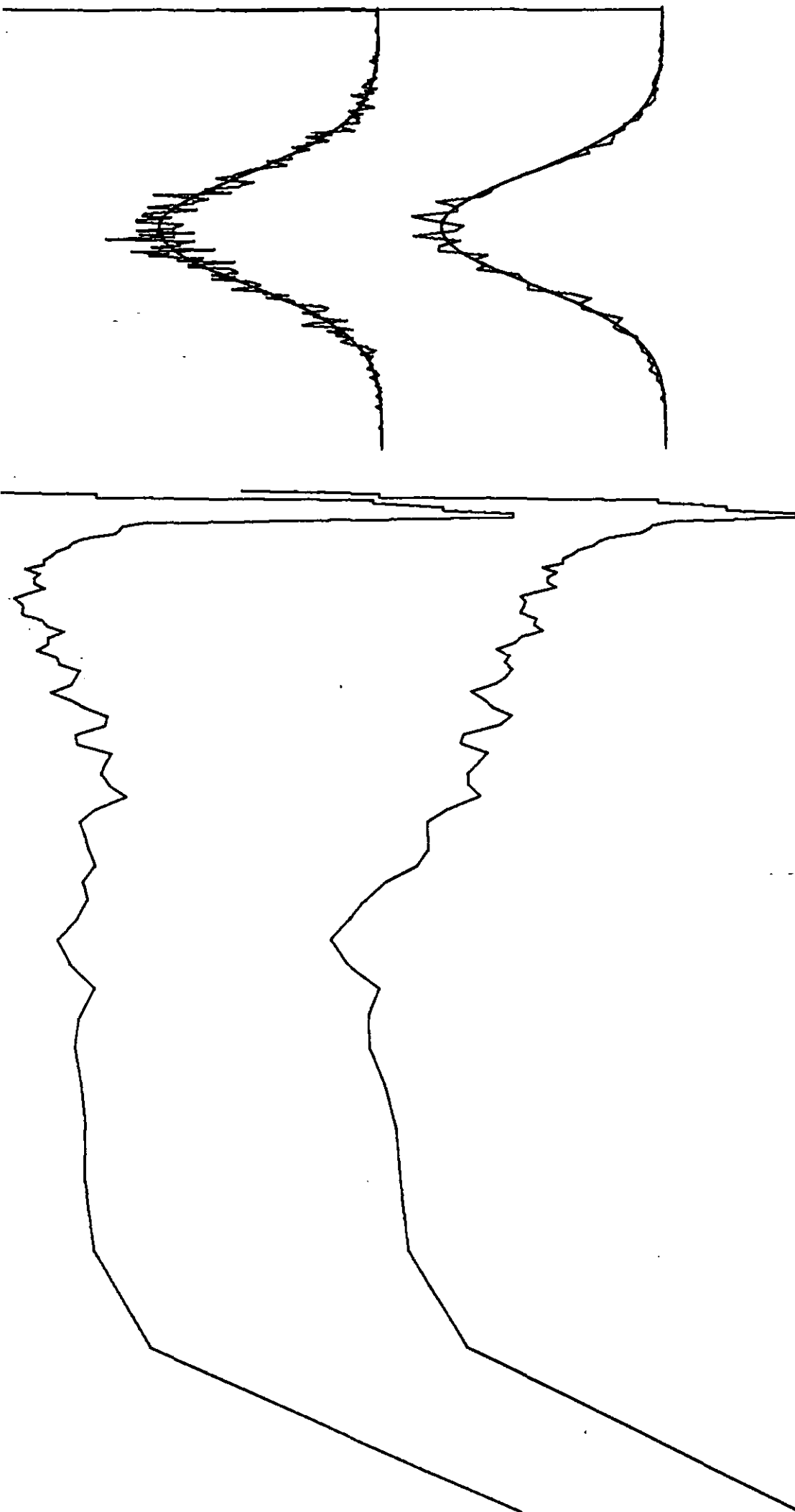


Dec 1

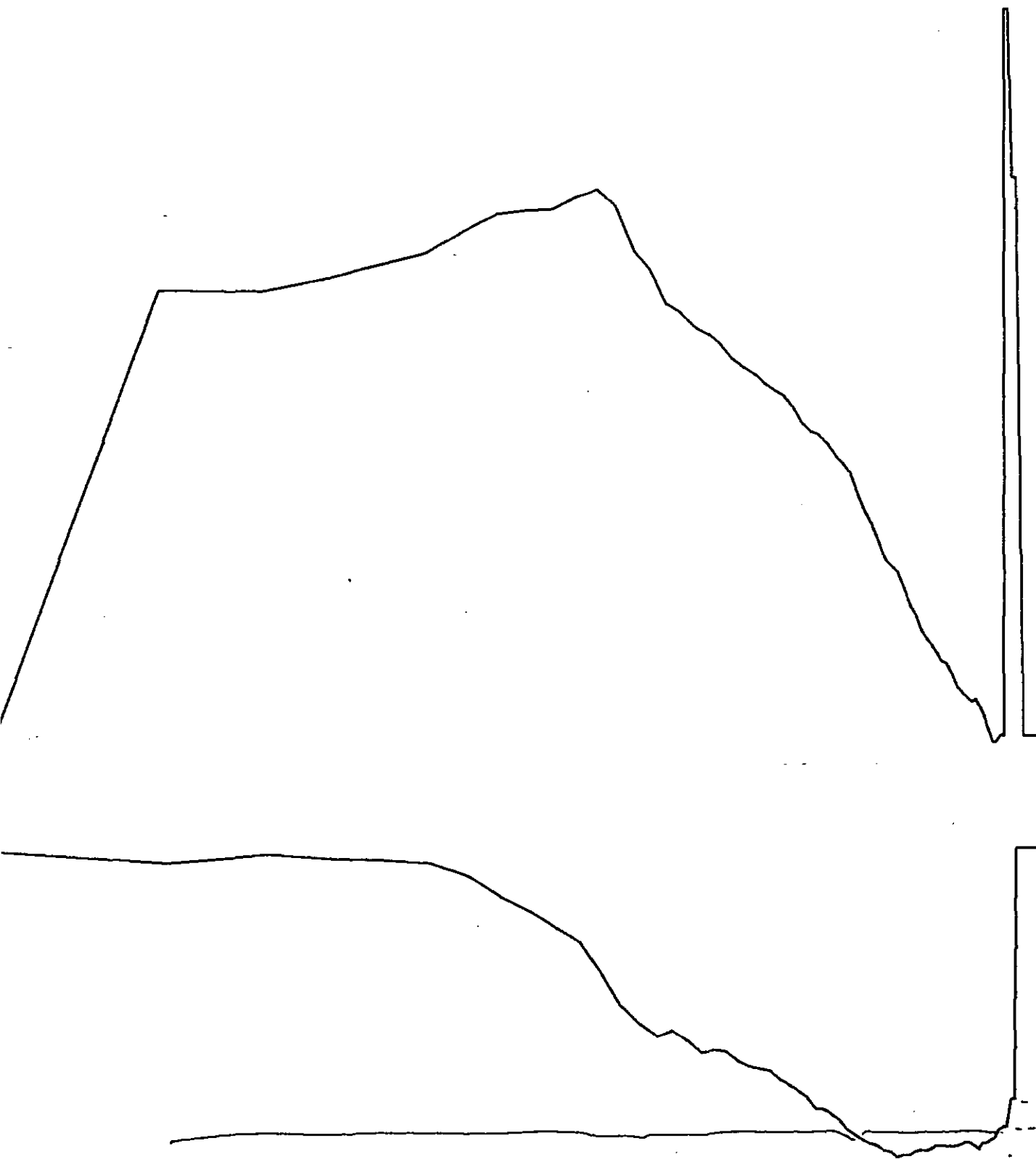
85 02A



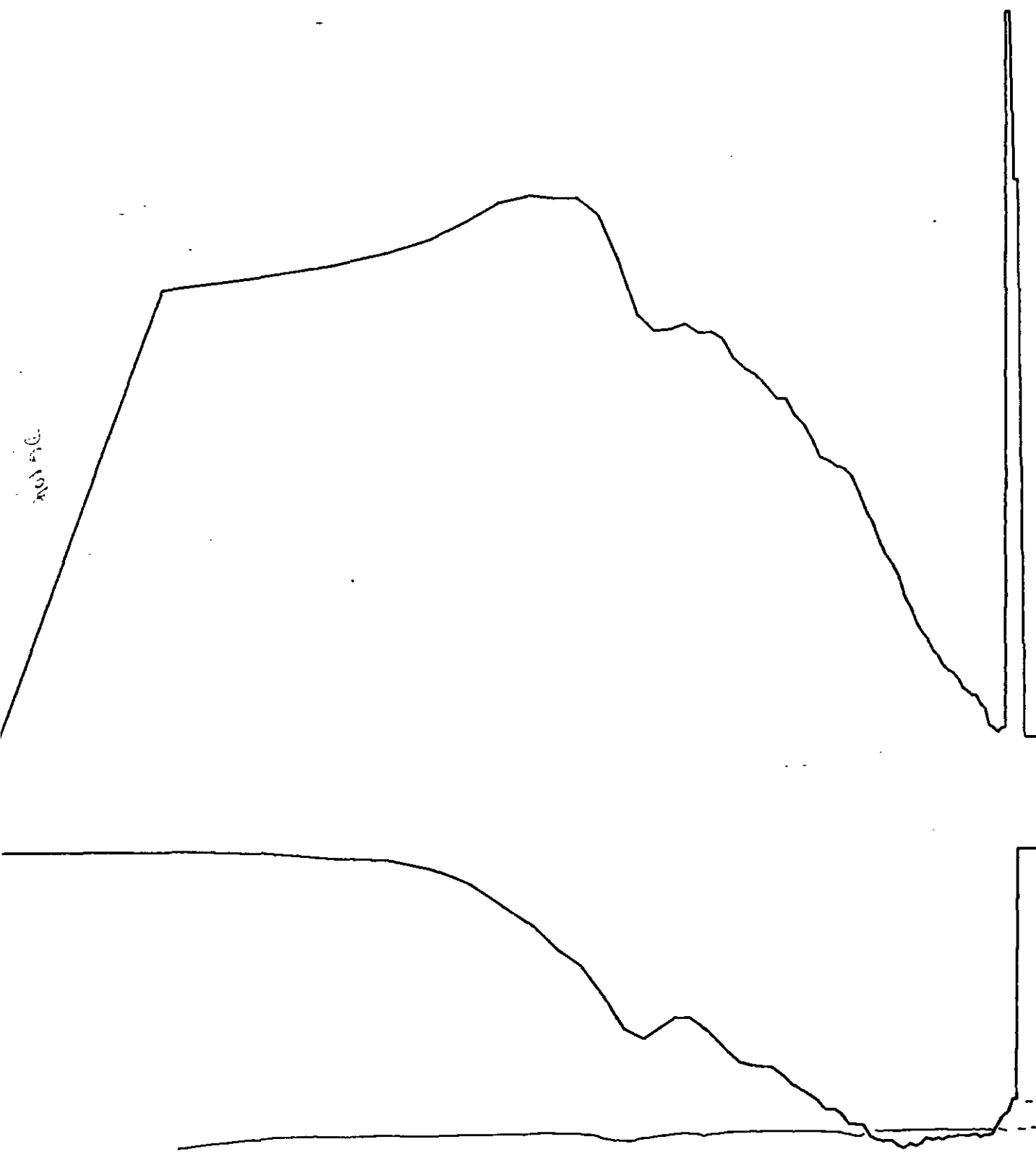
85 02A



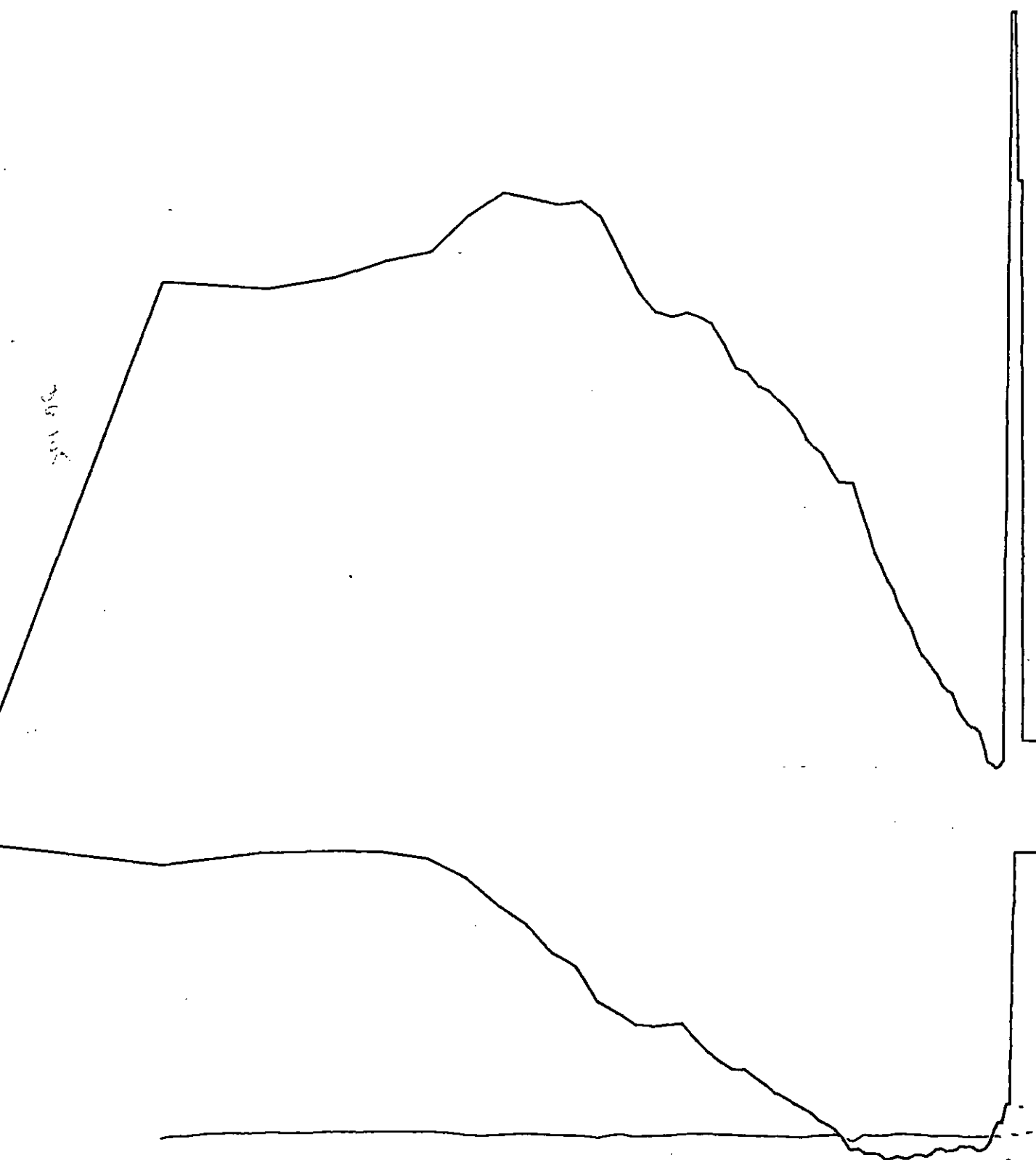
85 03A

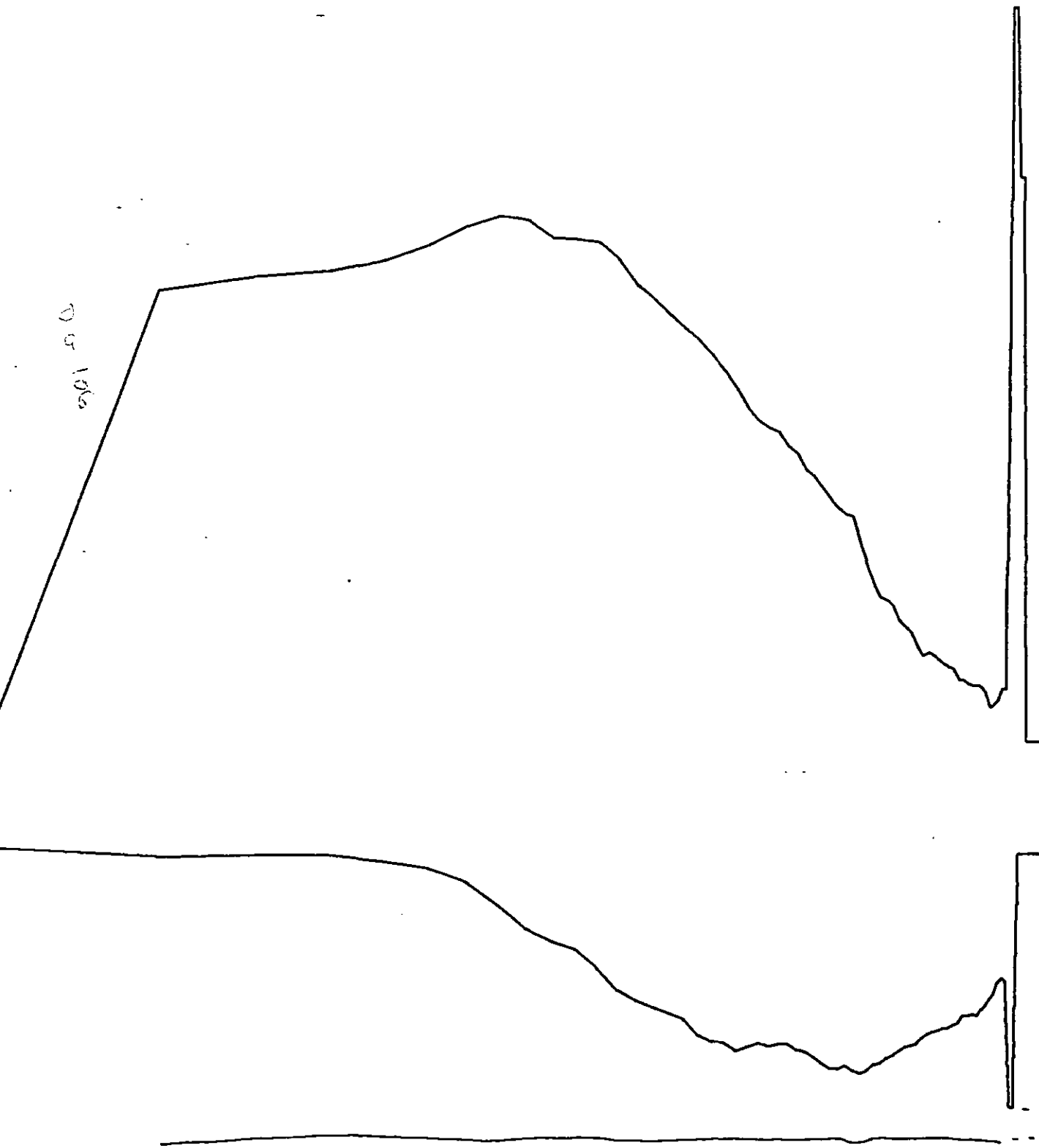


85 04A

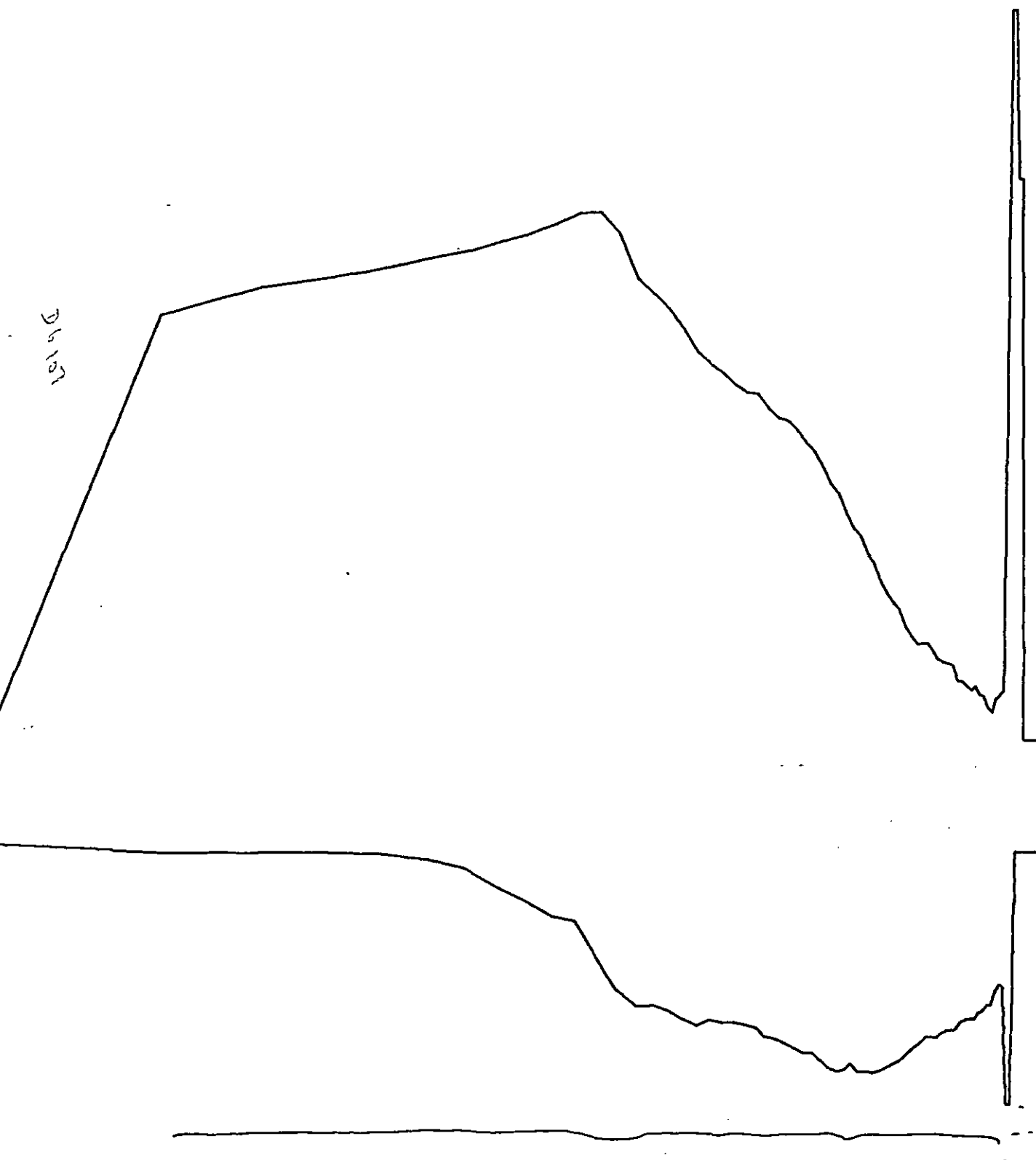


85 05A

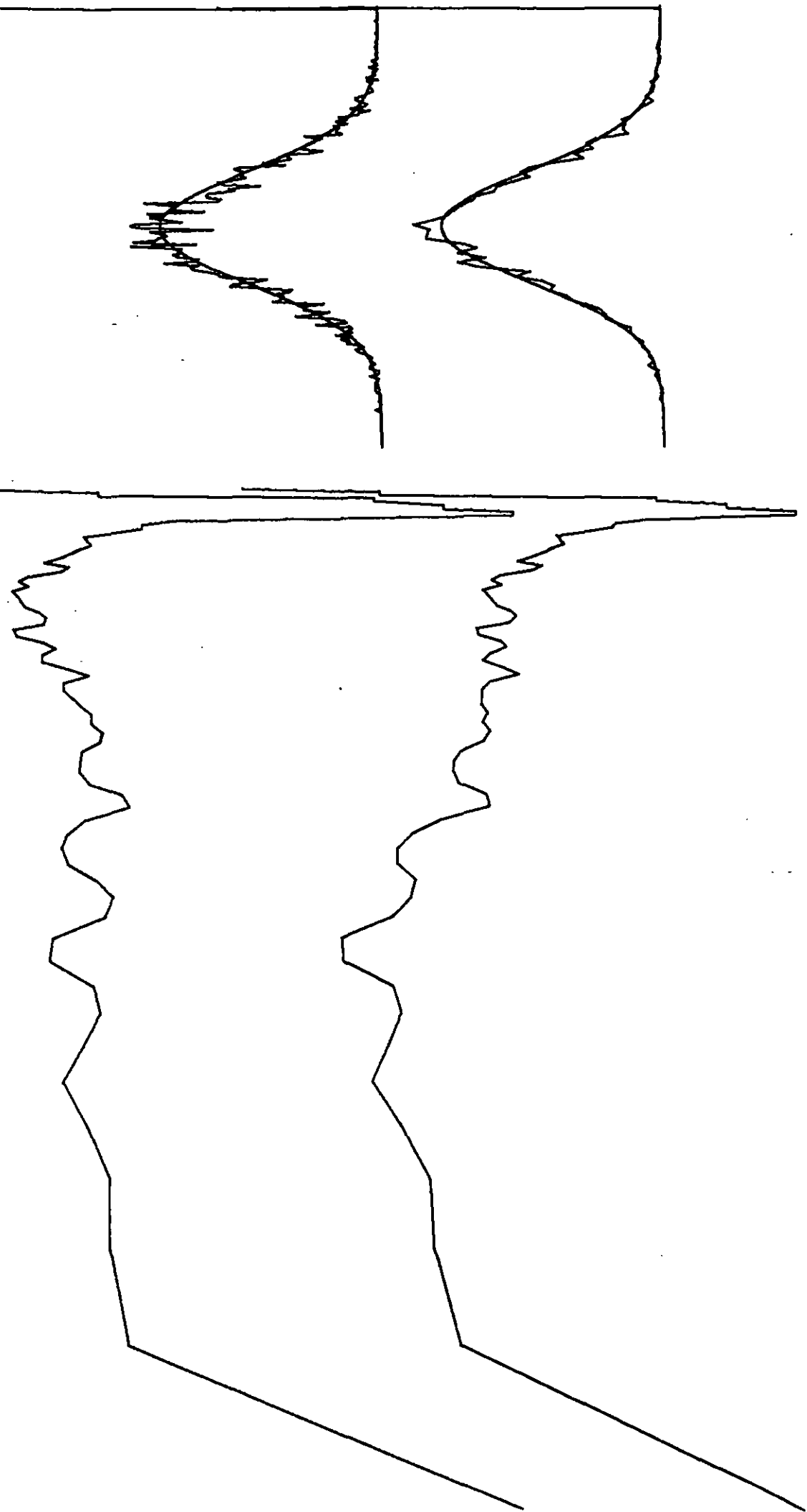




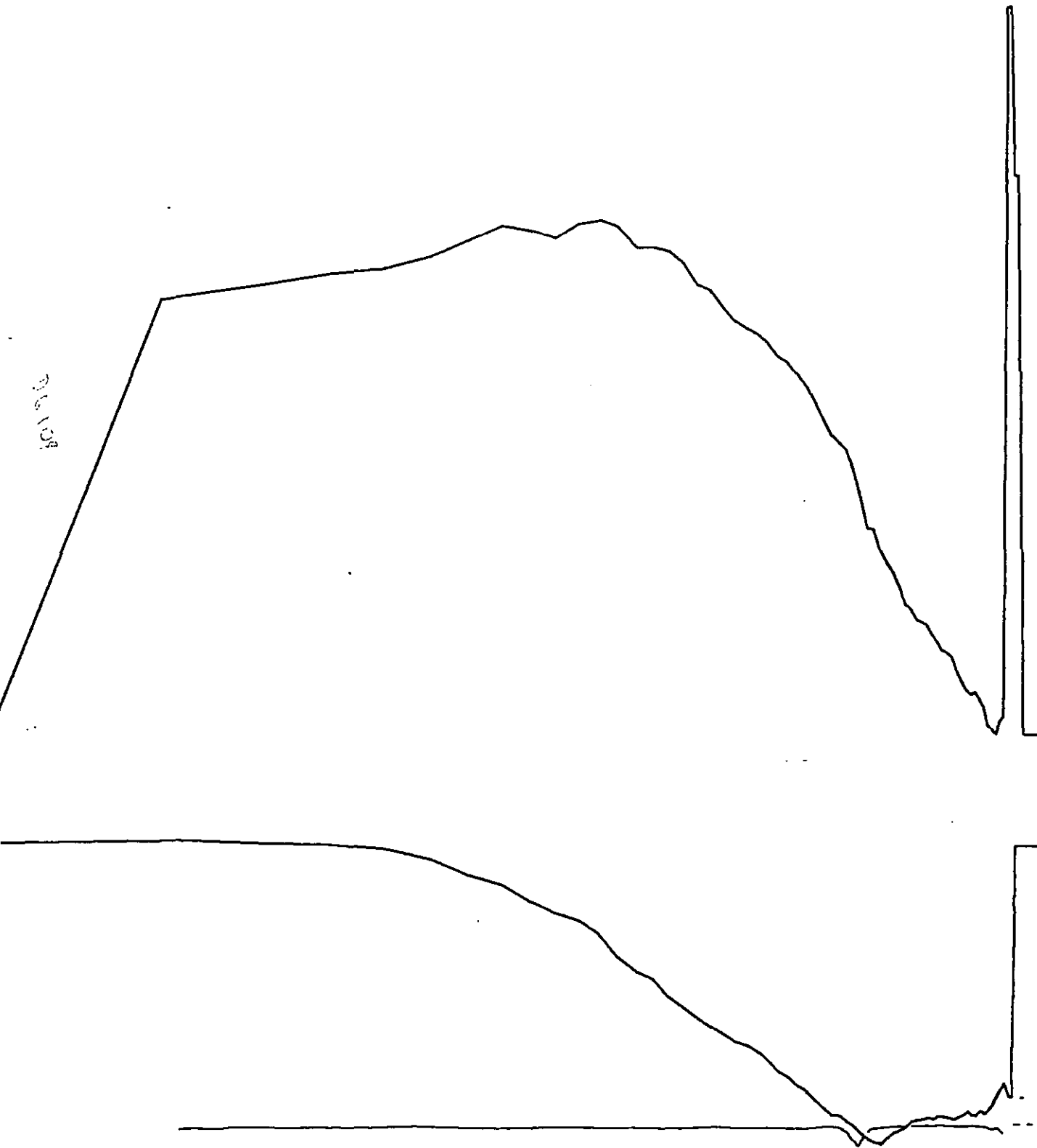
85 07A



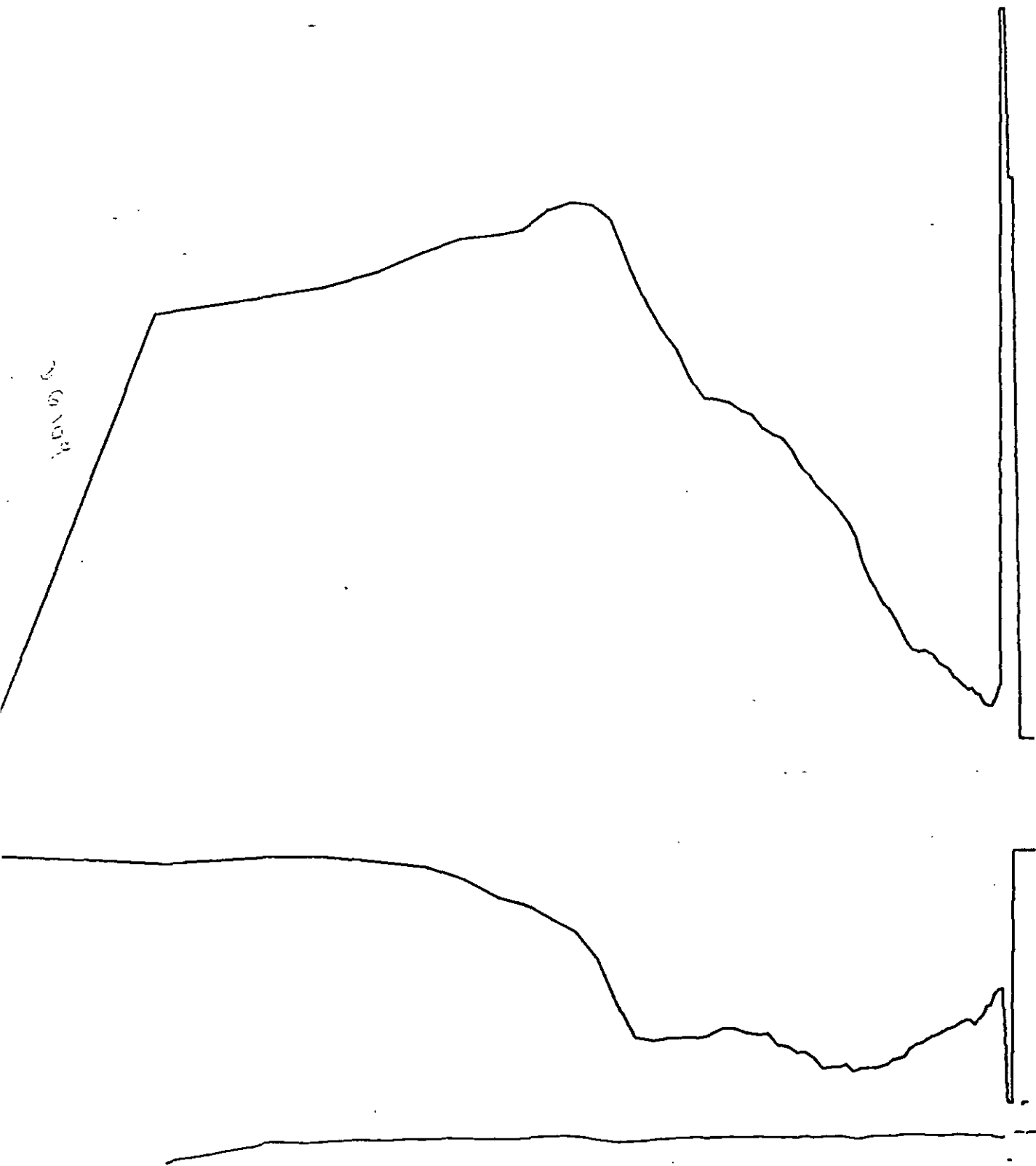
85 07A



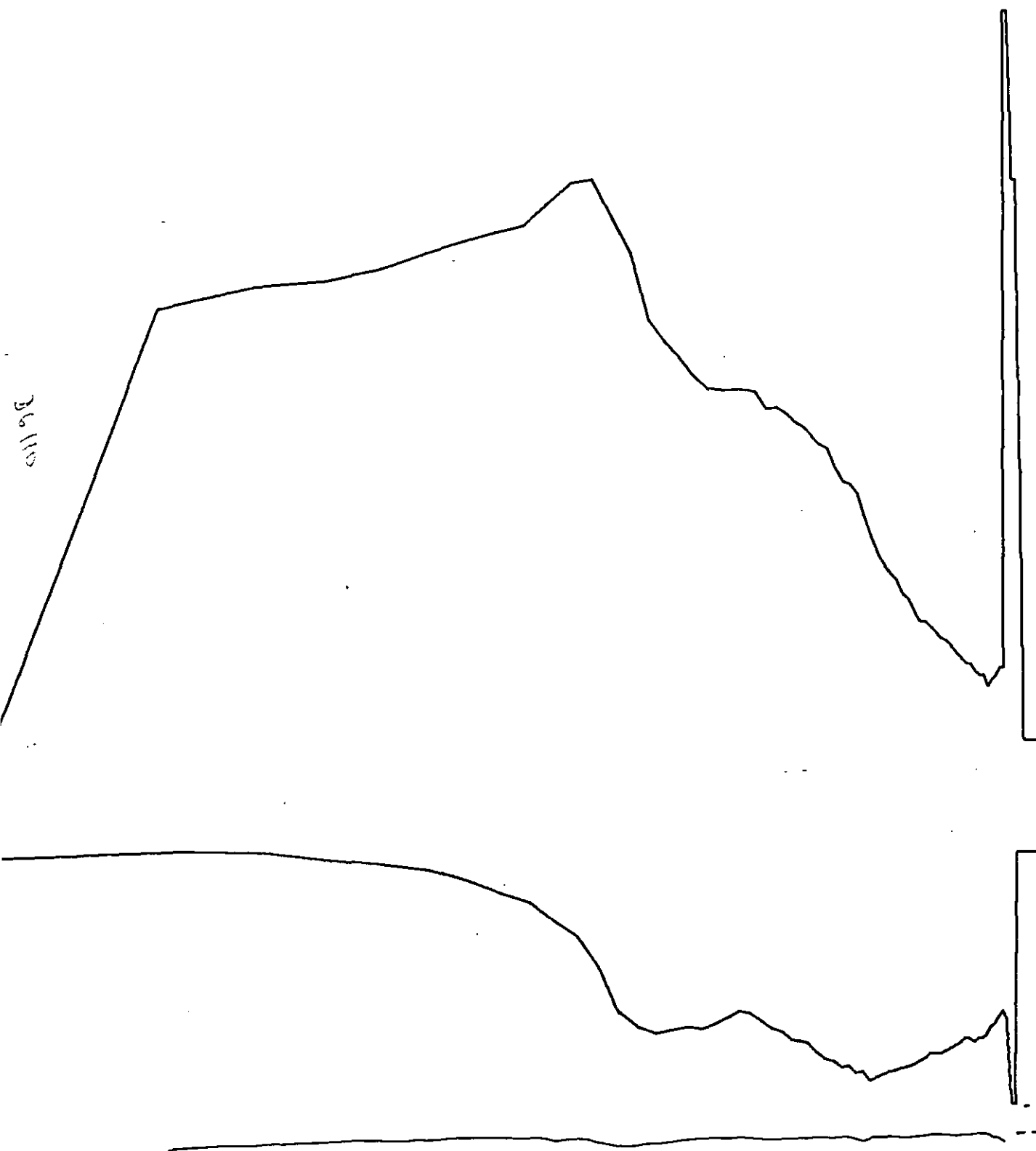
85 08A

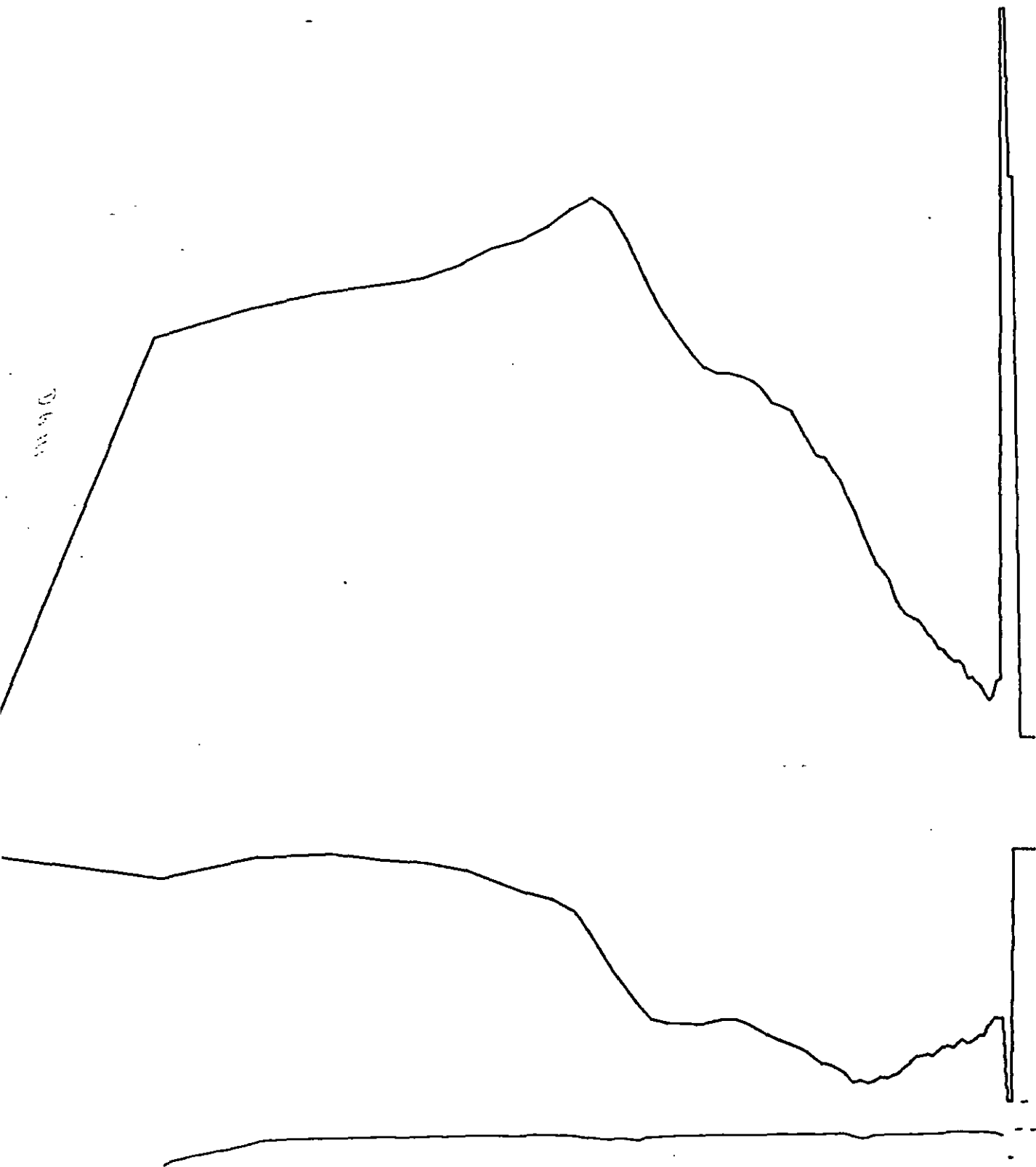


9/10/08

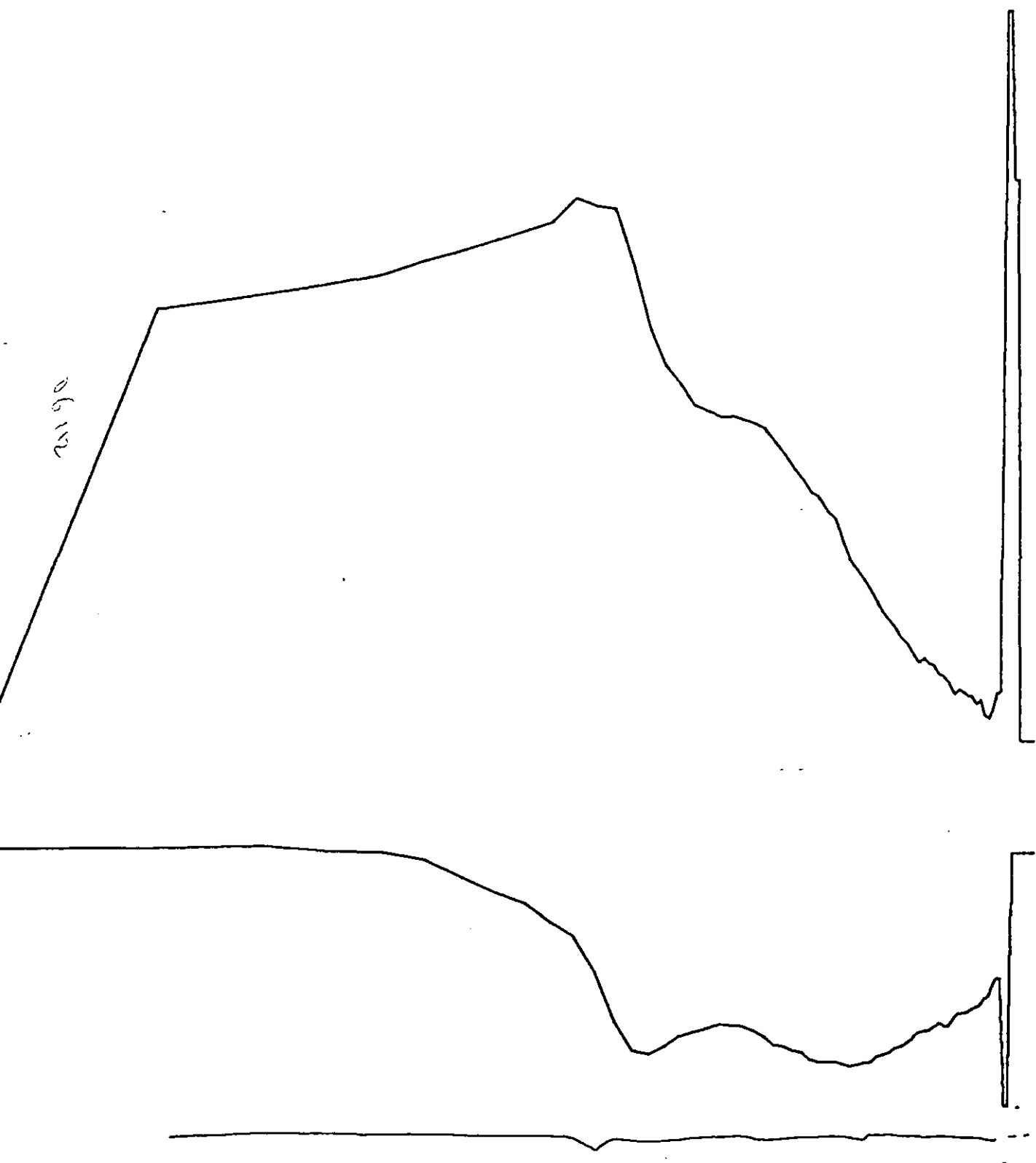


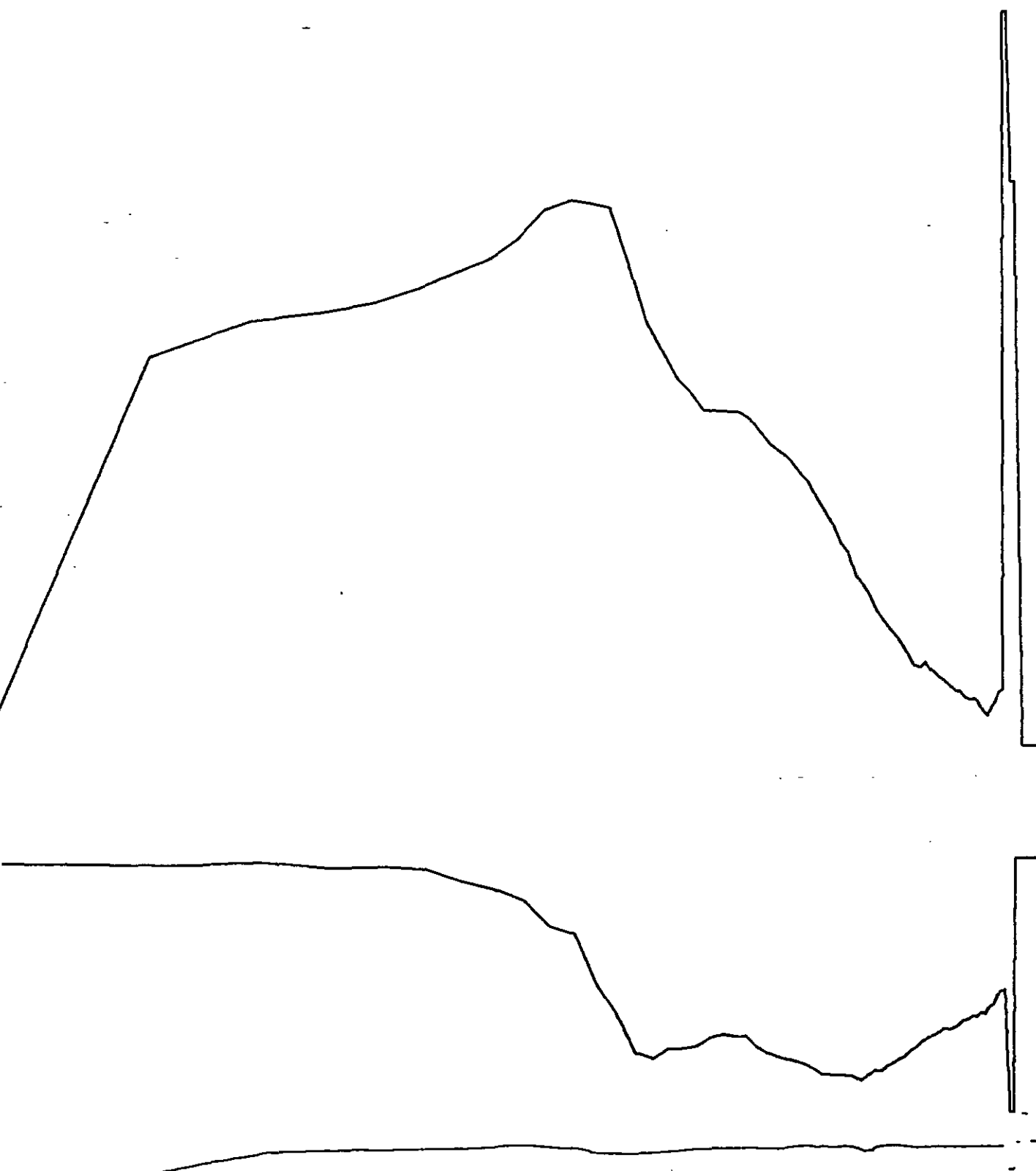
85 10 A

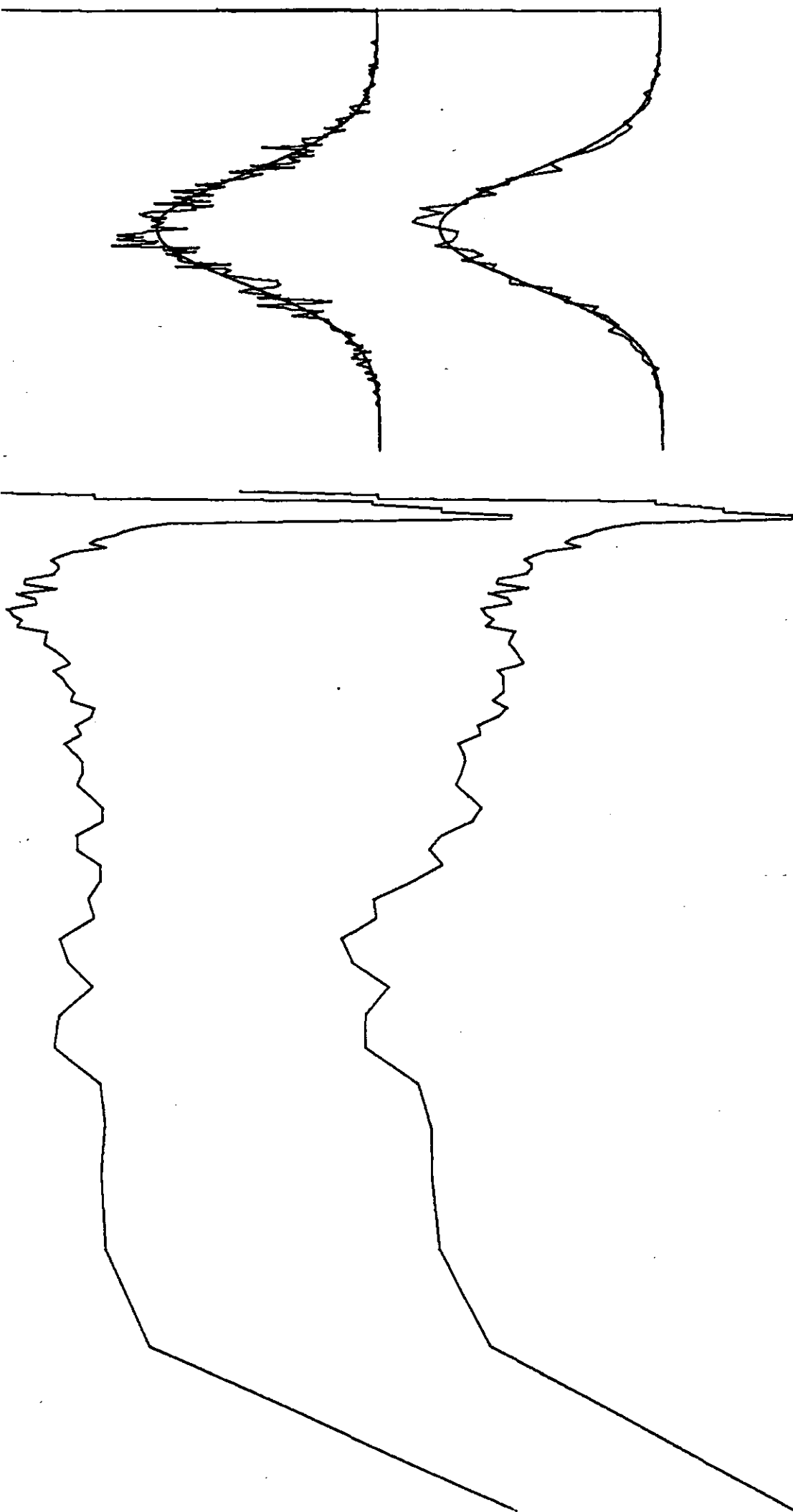




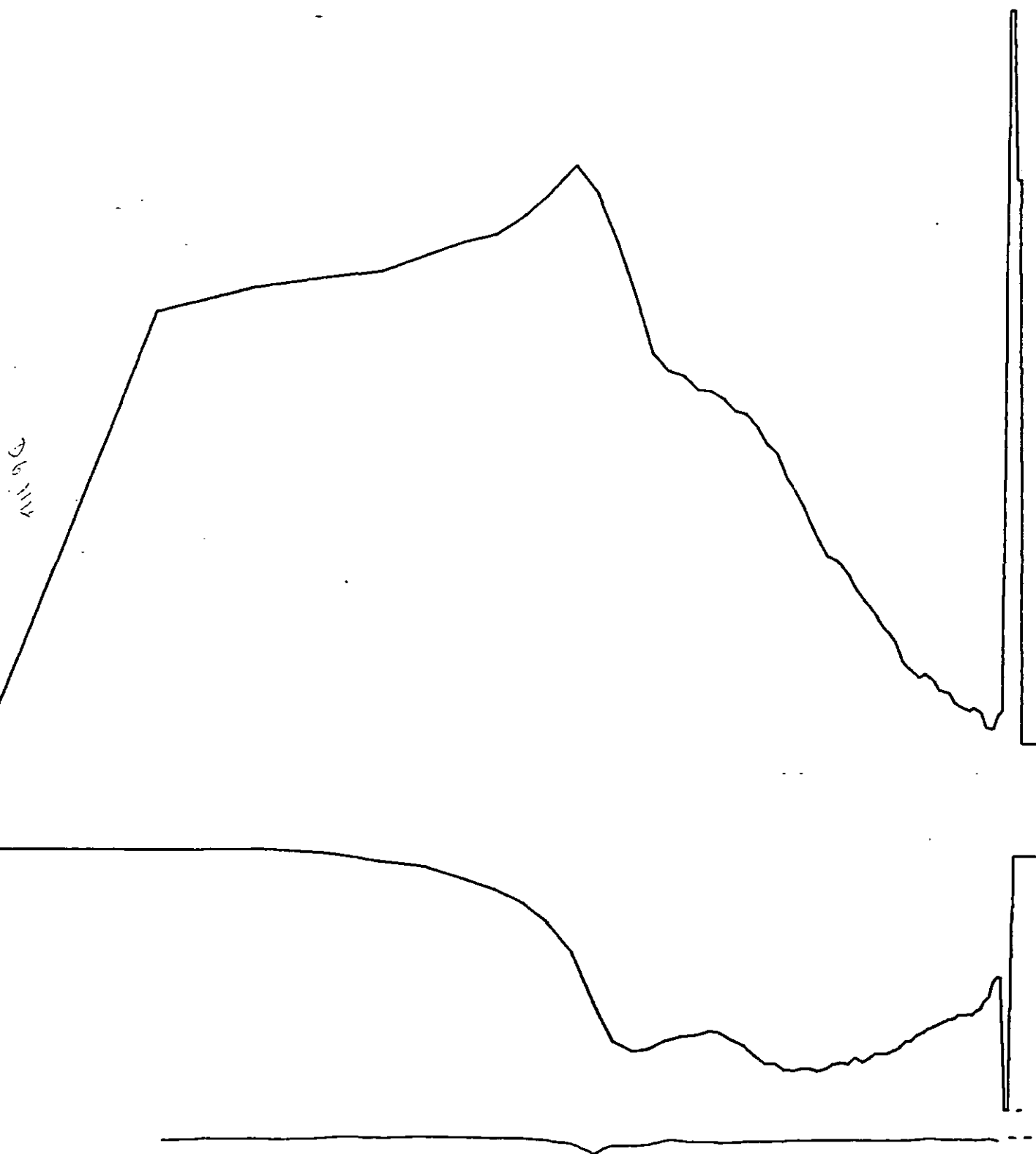
85 12A





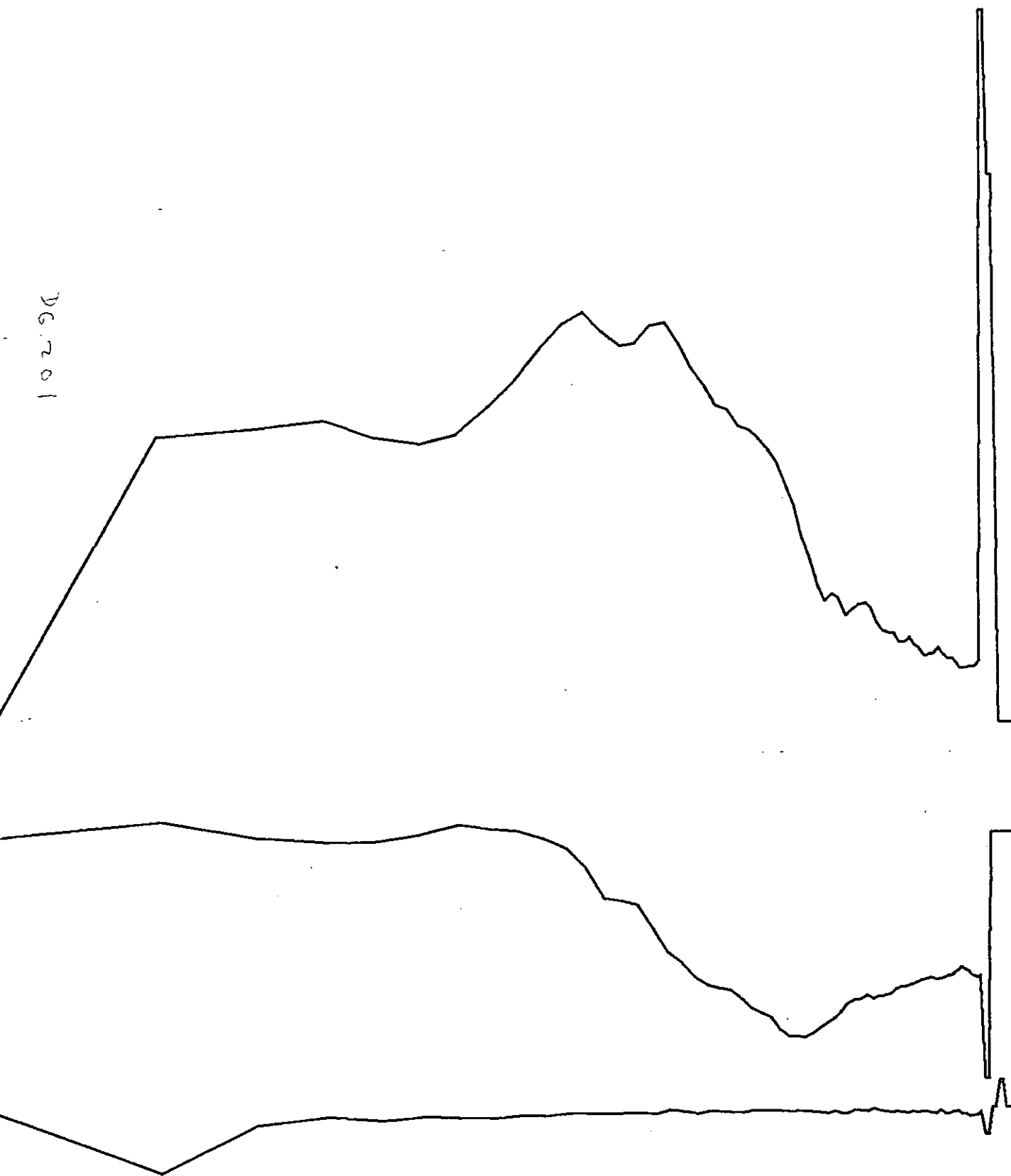


85 14A

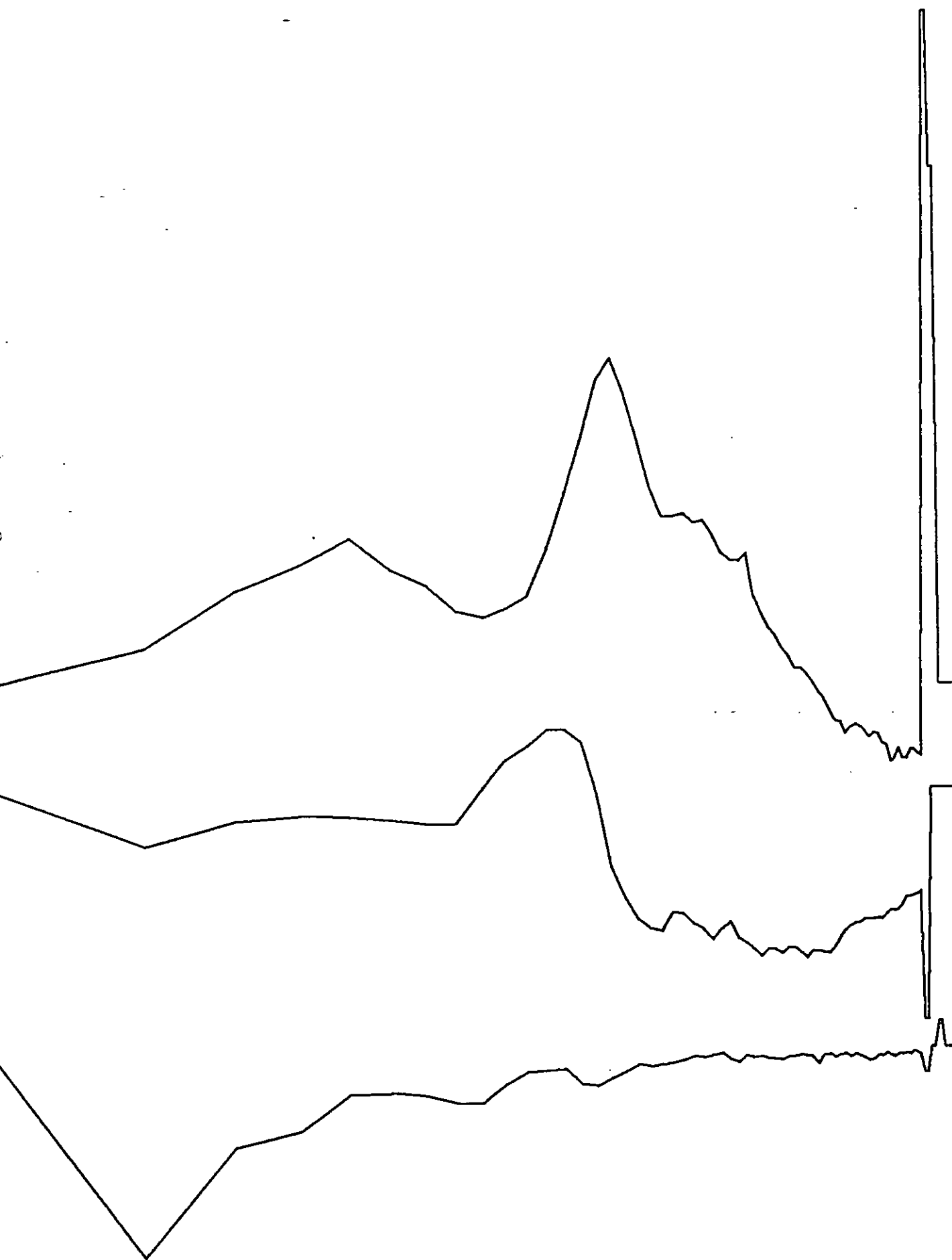


85 01 F

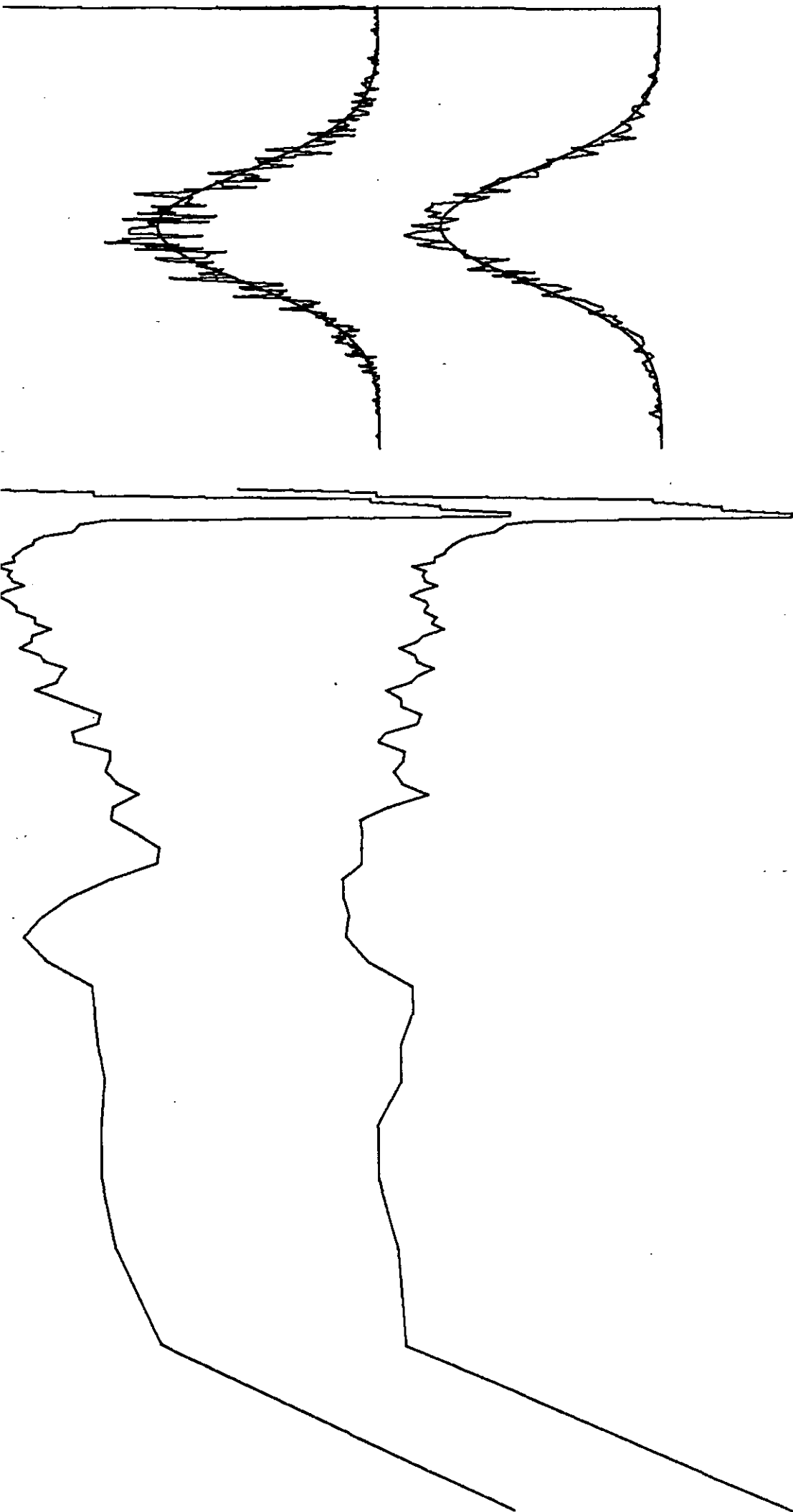
06.201



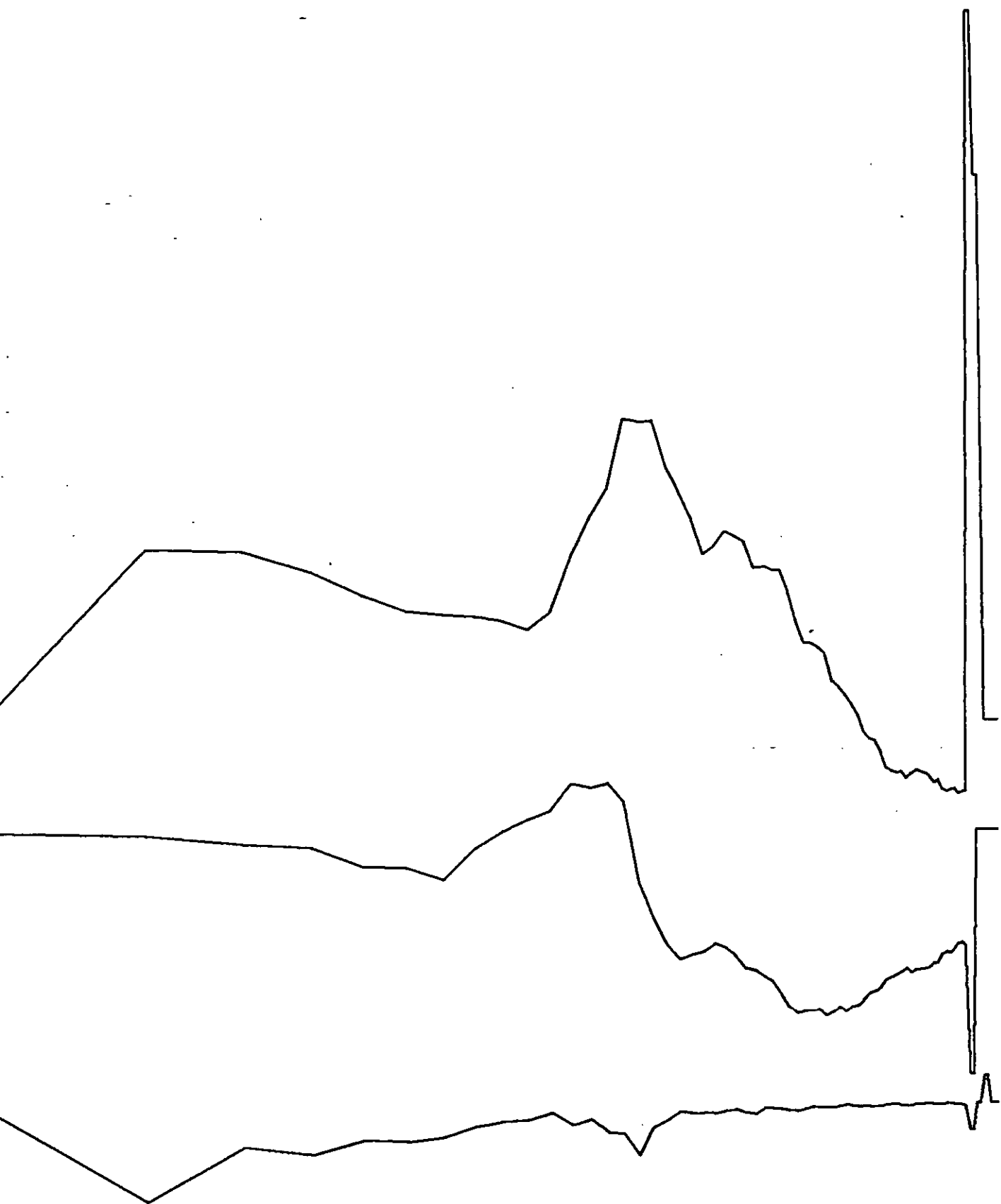
85 02 F



85 02 F

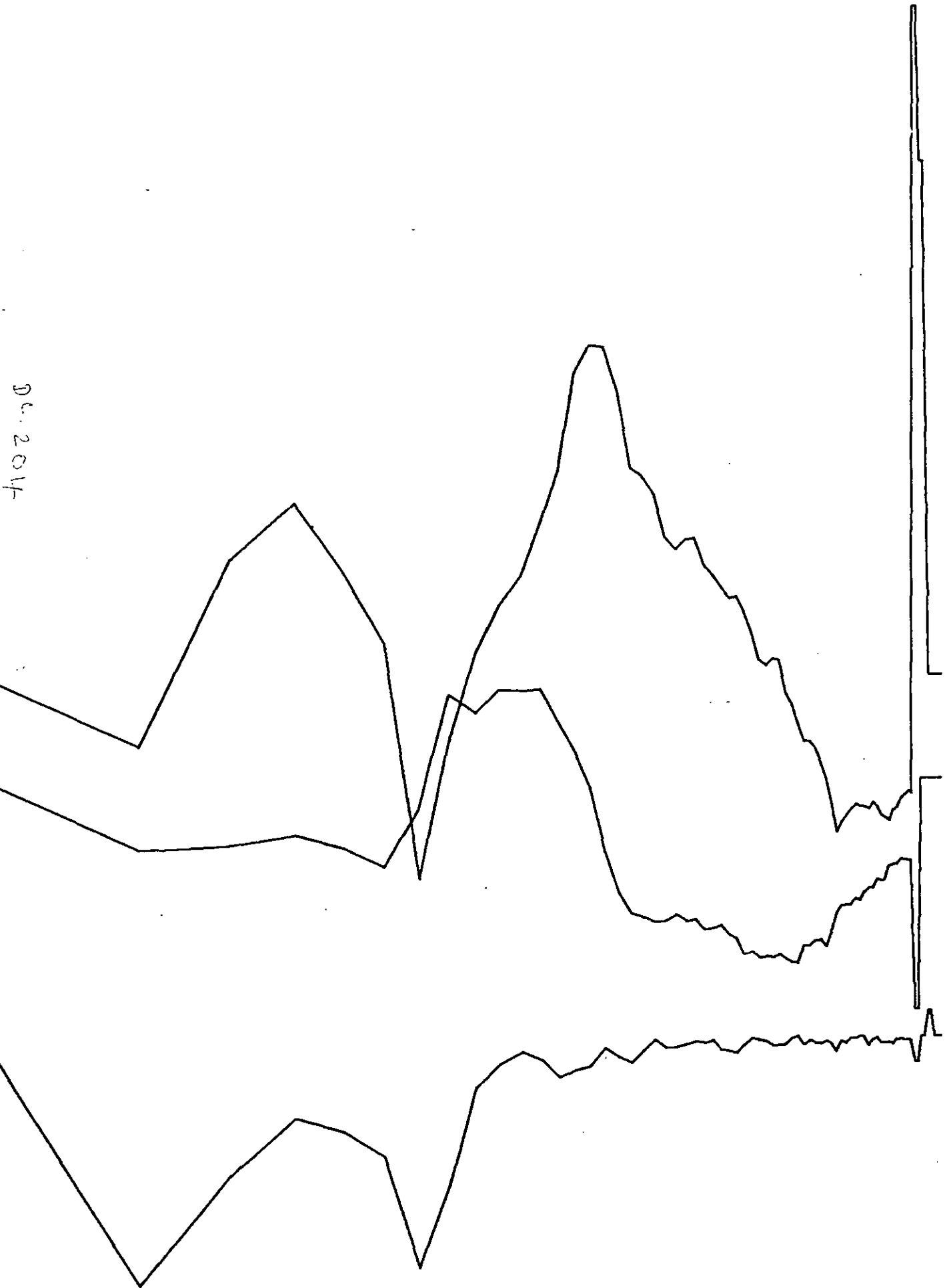


85 03F



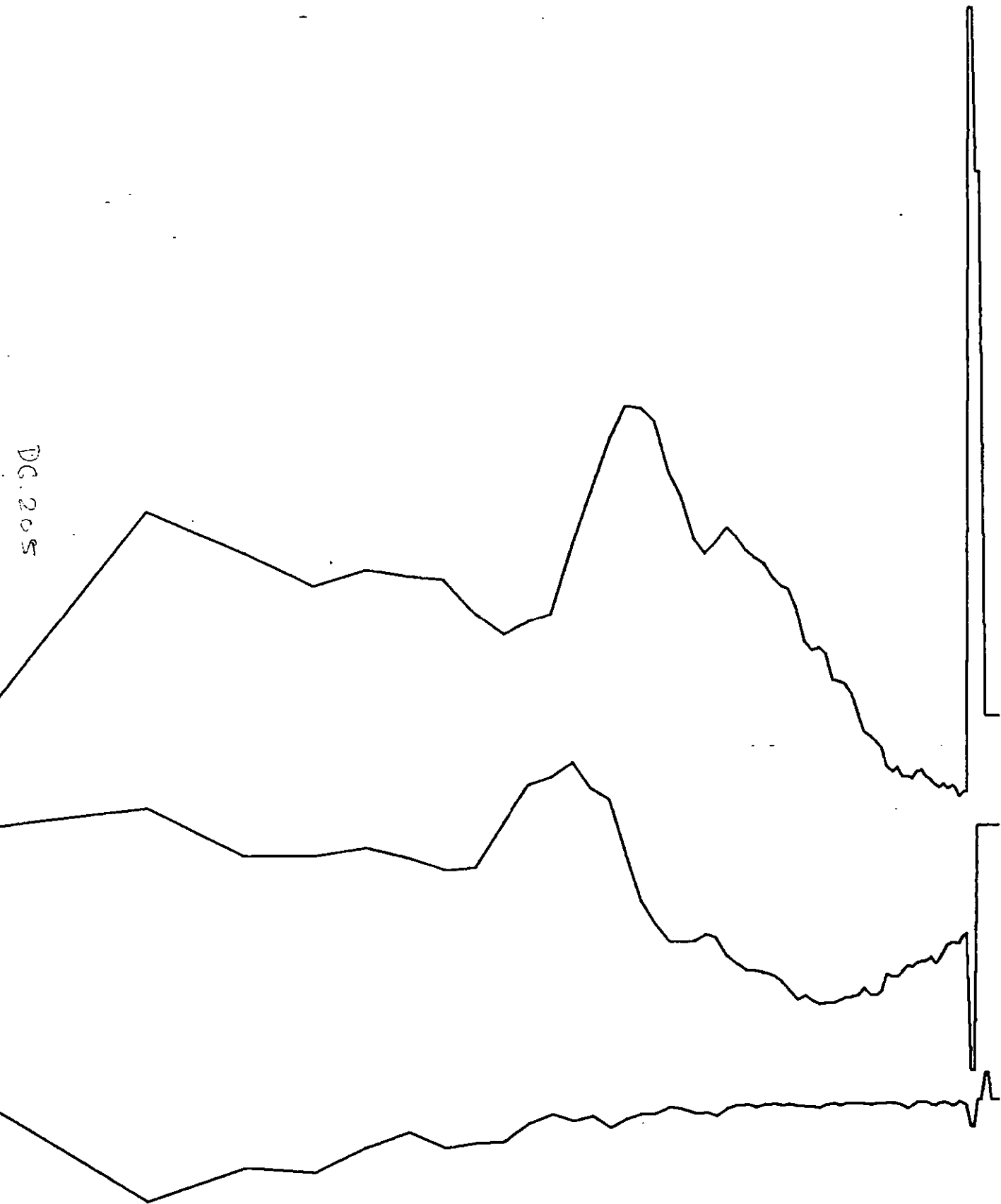
85 04F

Dec. 2014

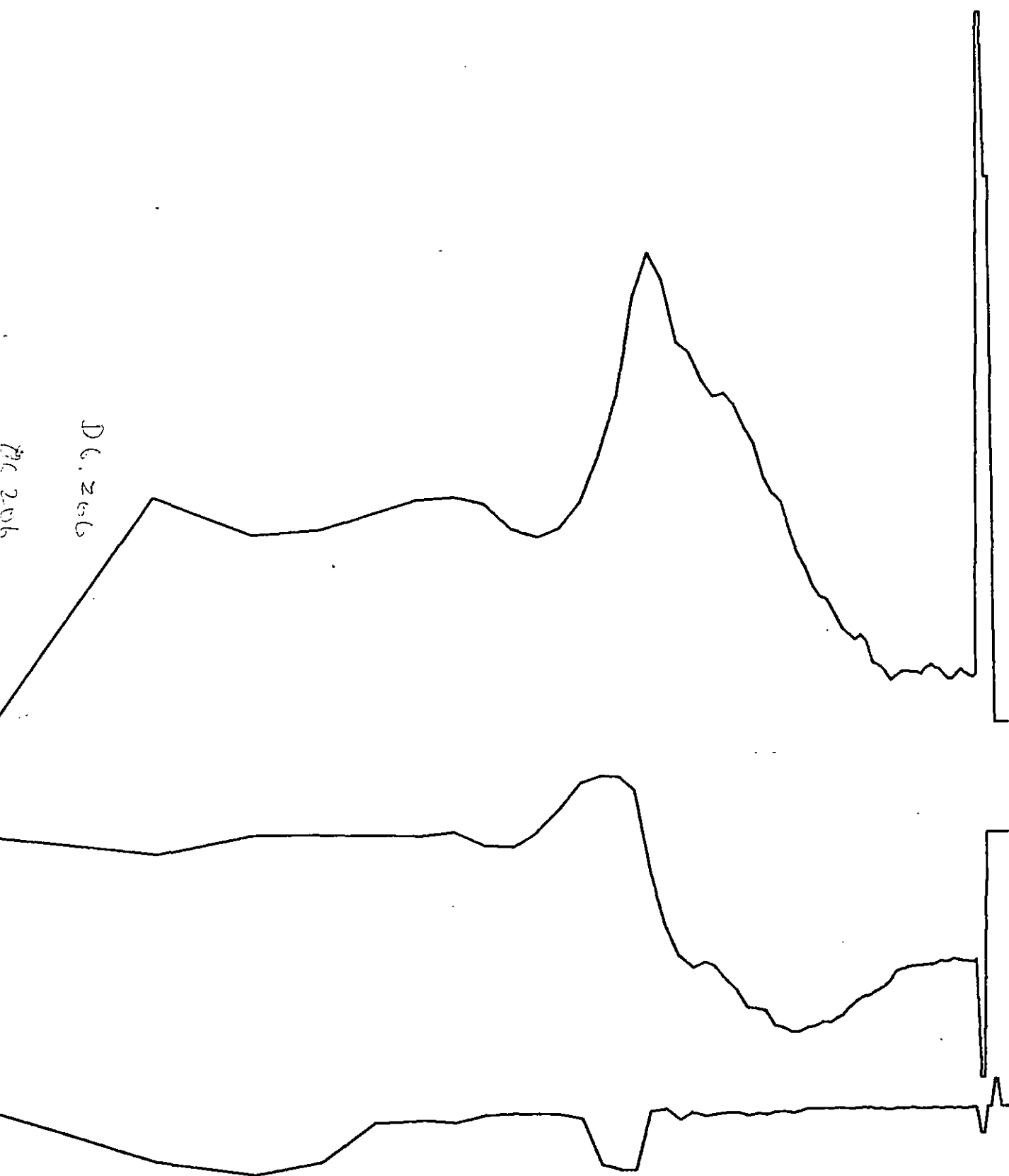


85 05F

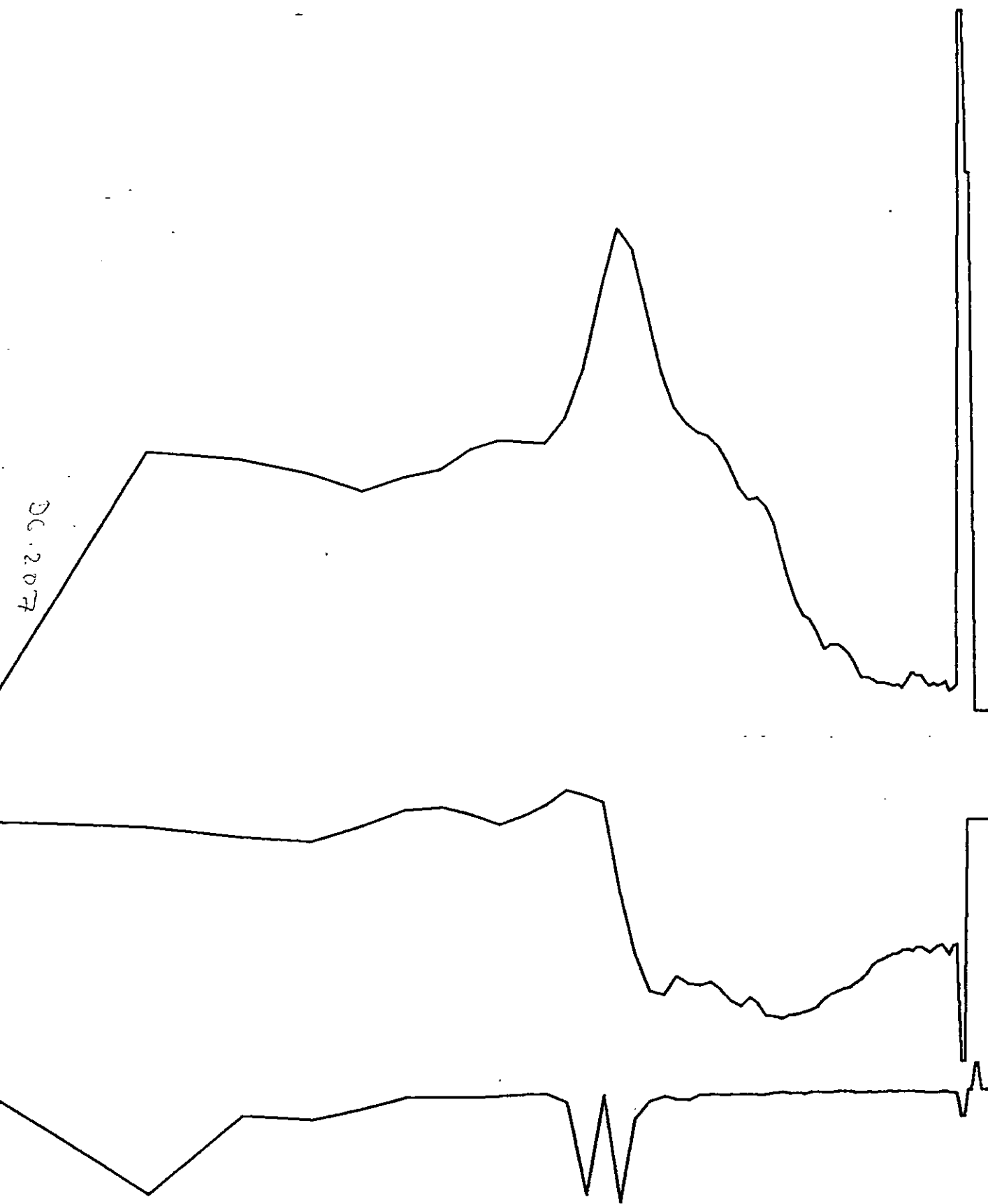
DC.205



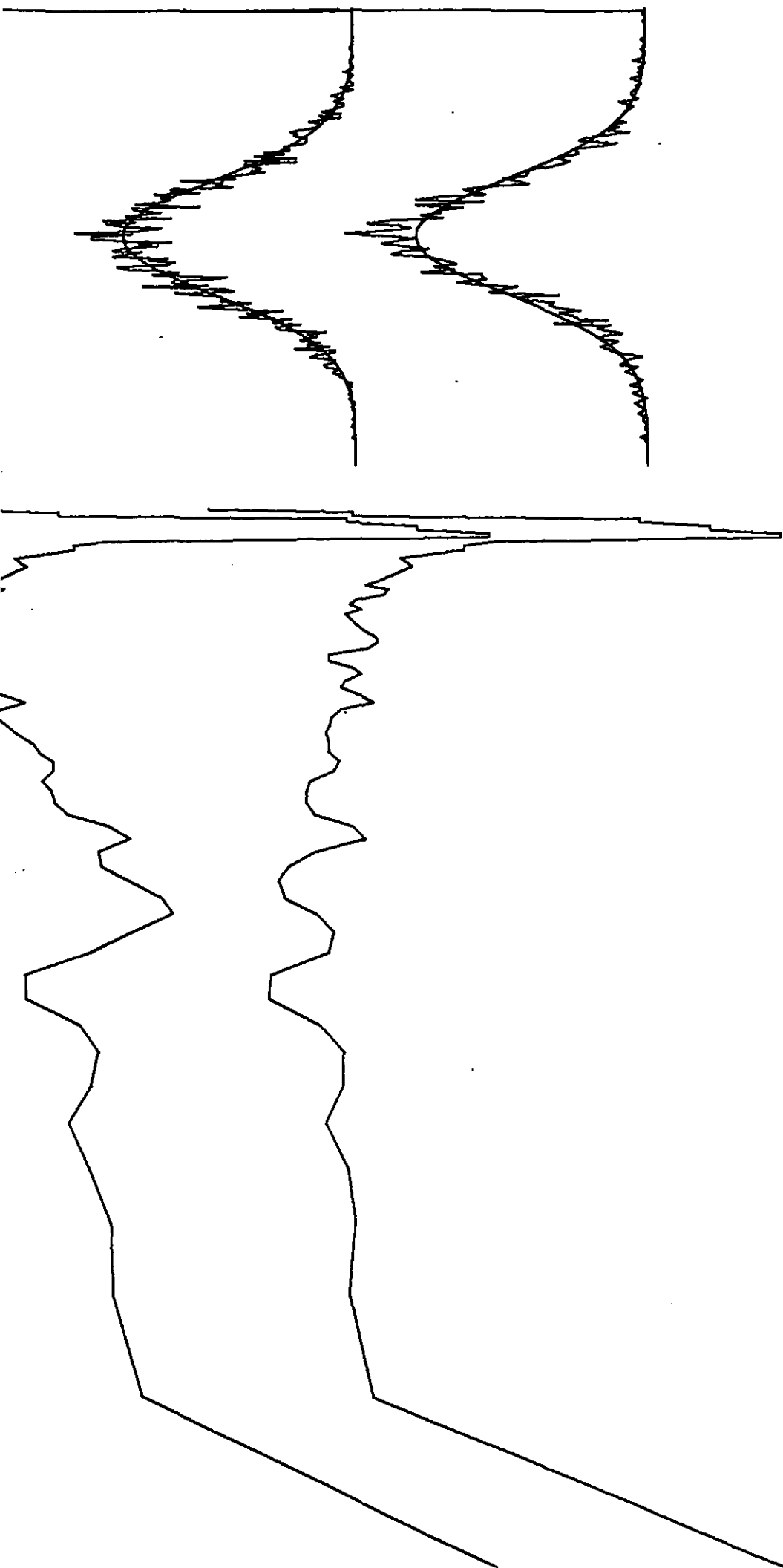
85 06 F



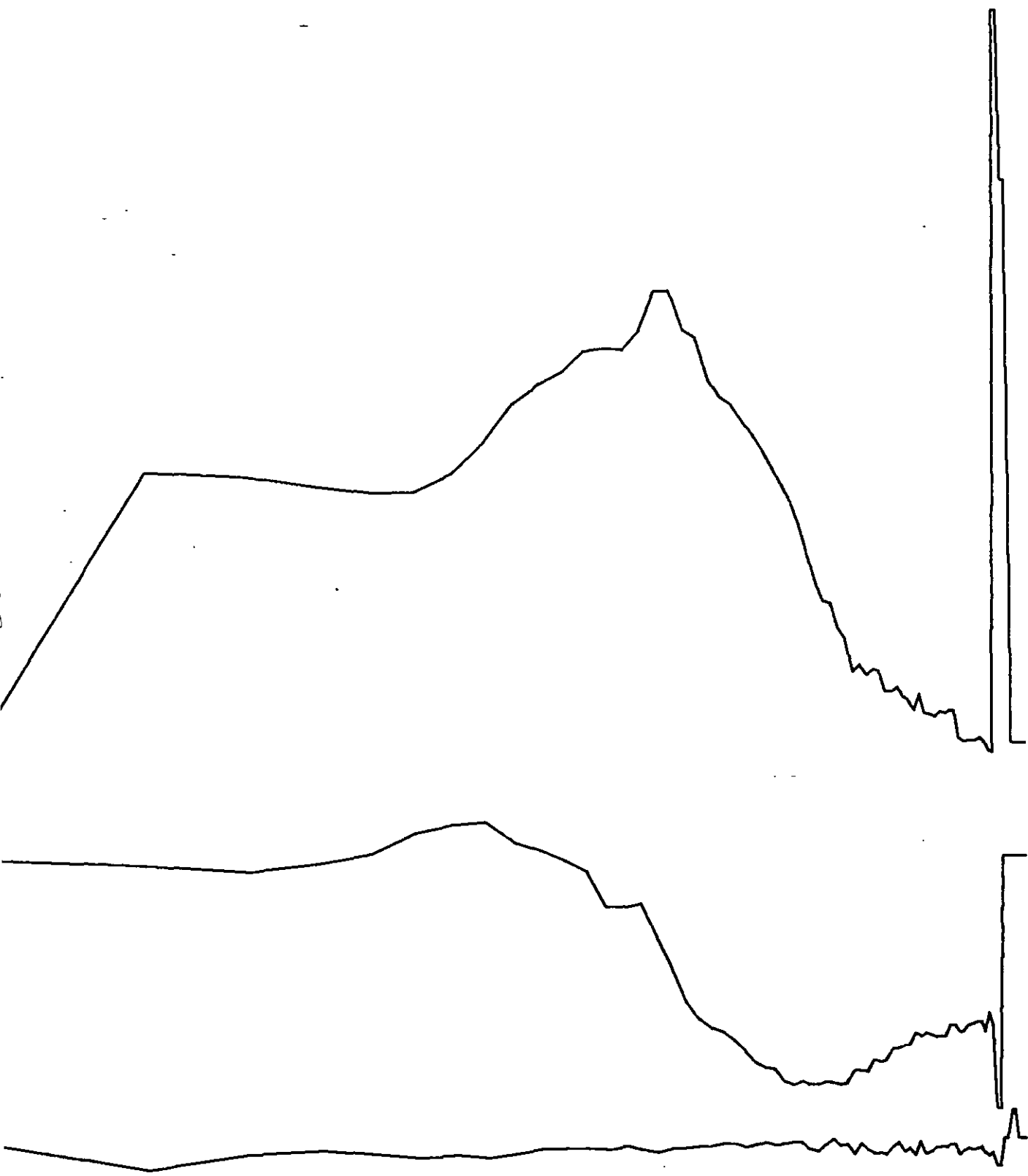
85 07 F



85 07 F

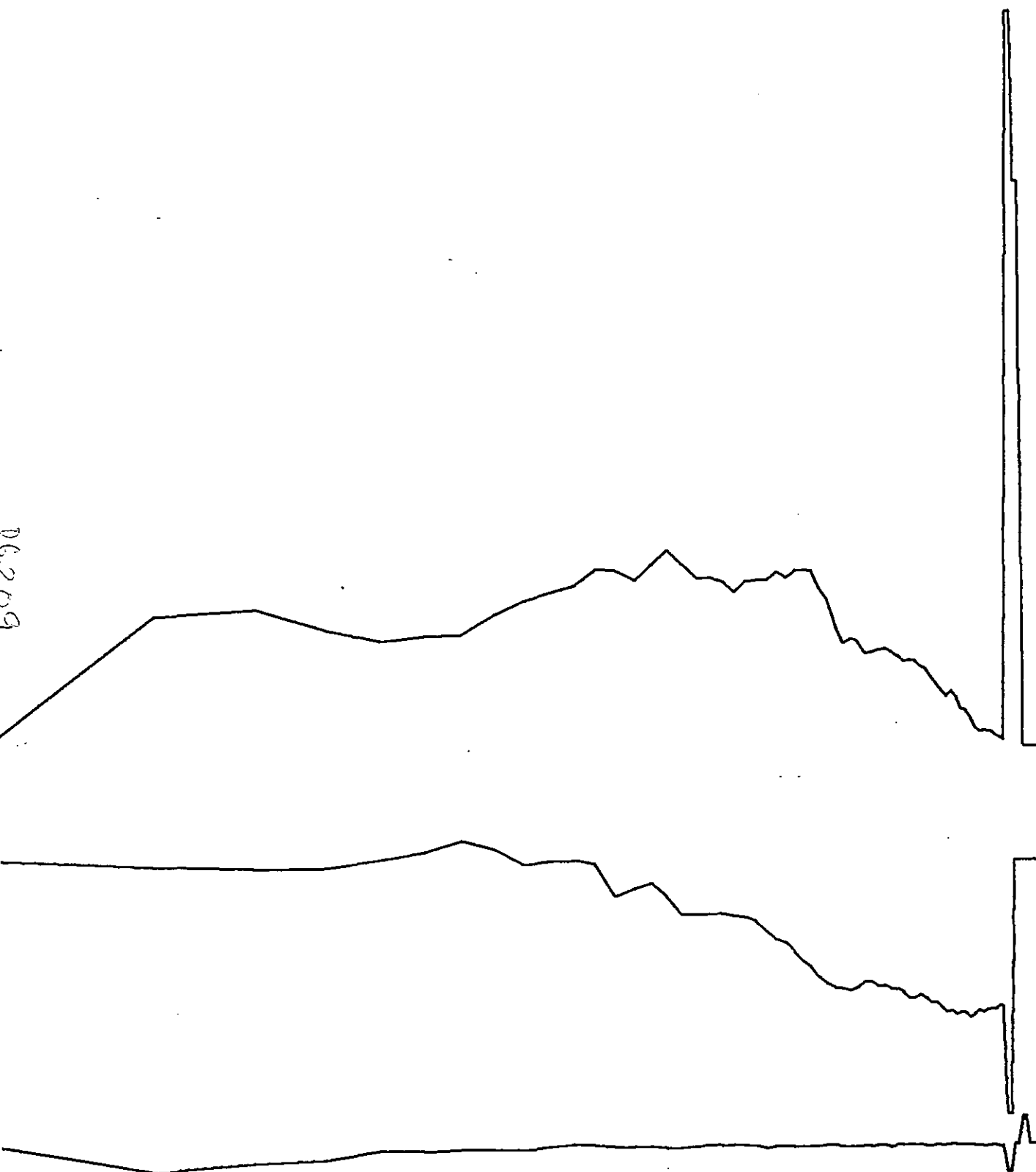


85 Q8 F



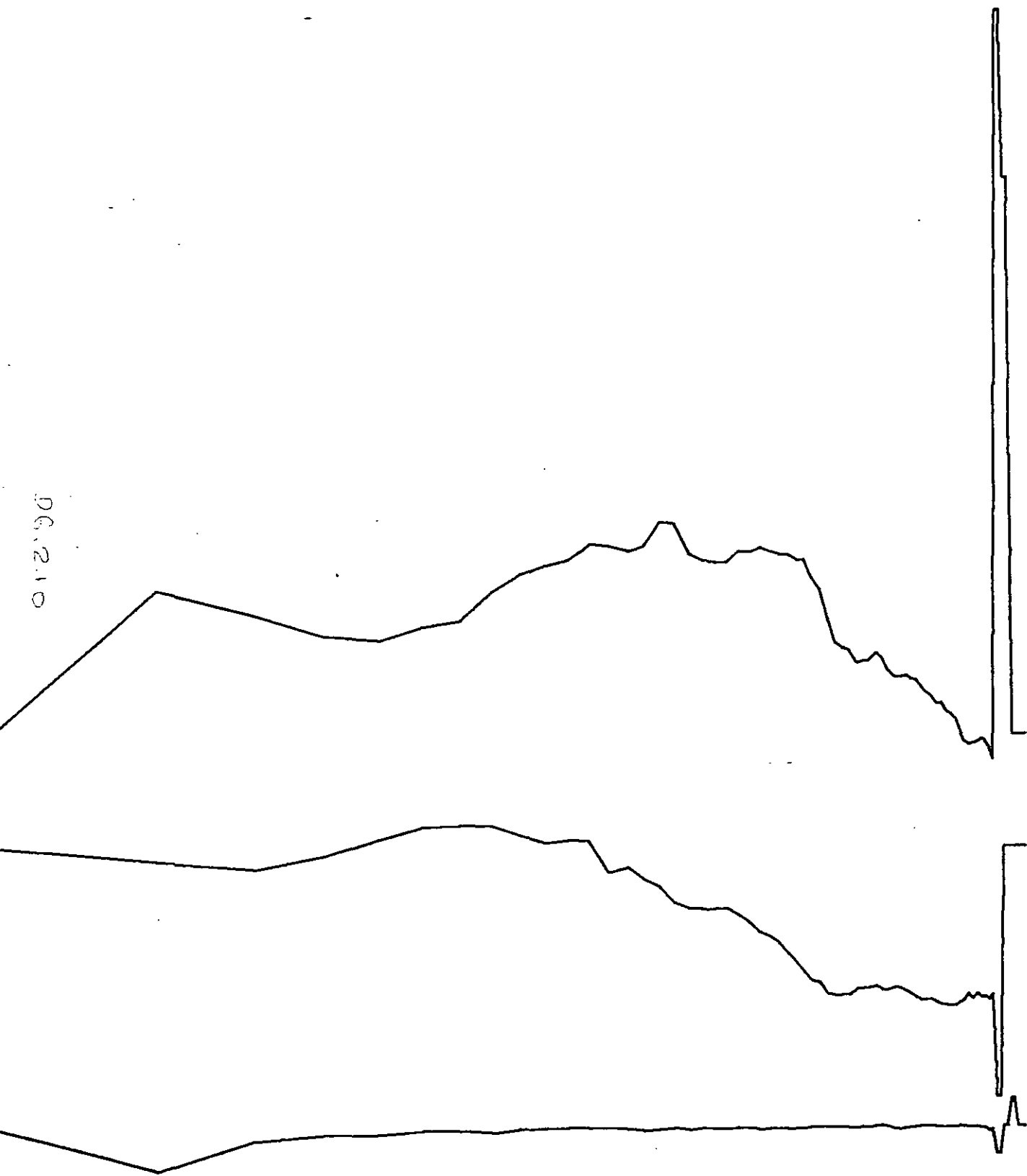
85 09 F

06209

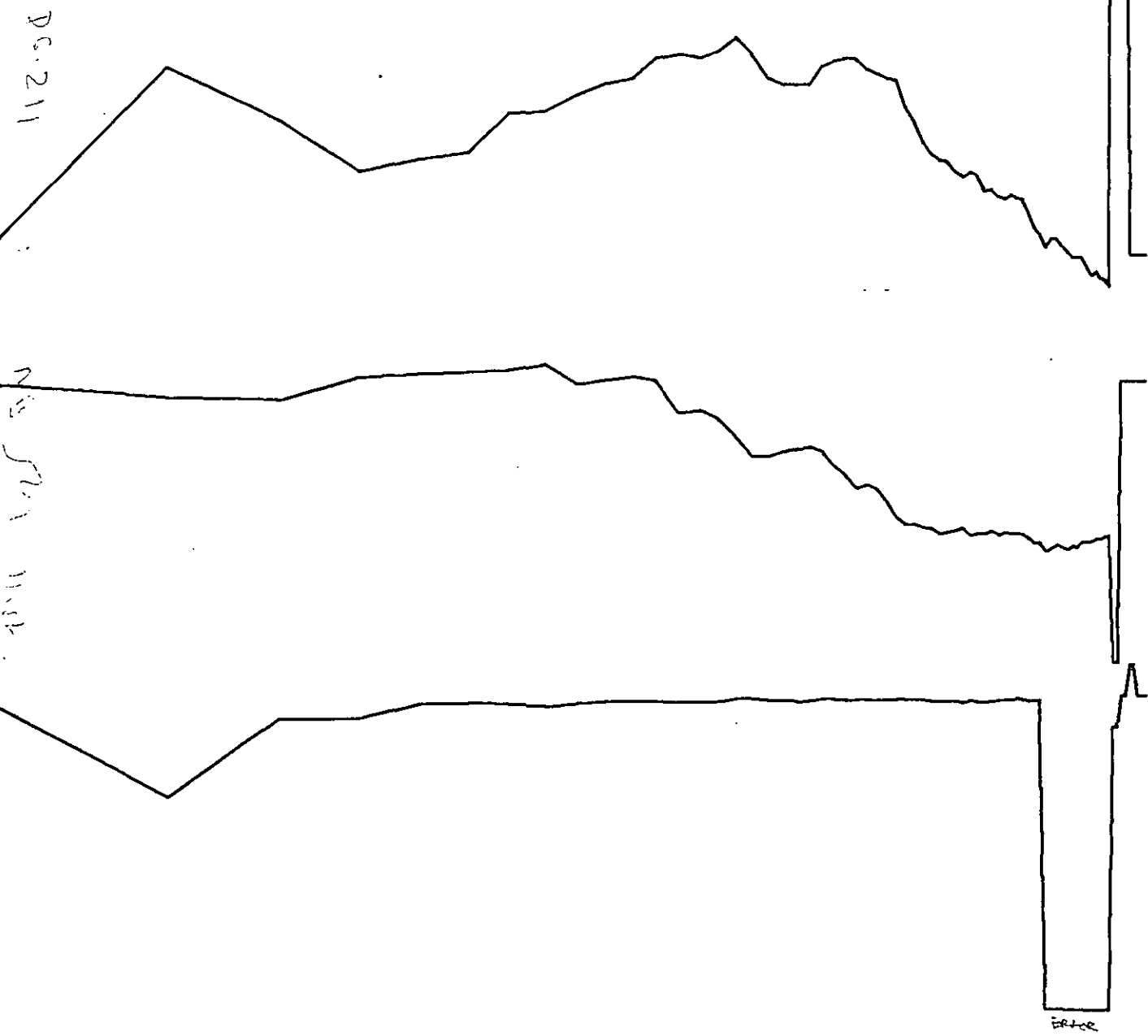


85 10F

06.210

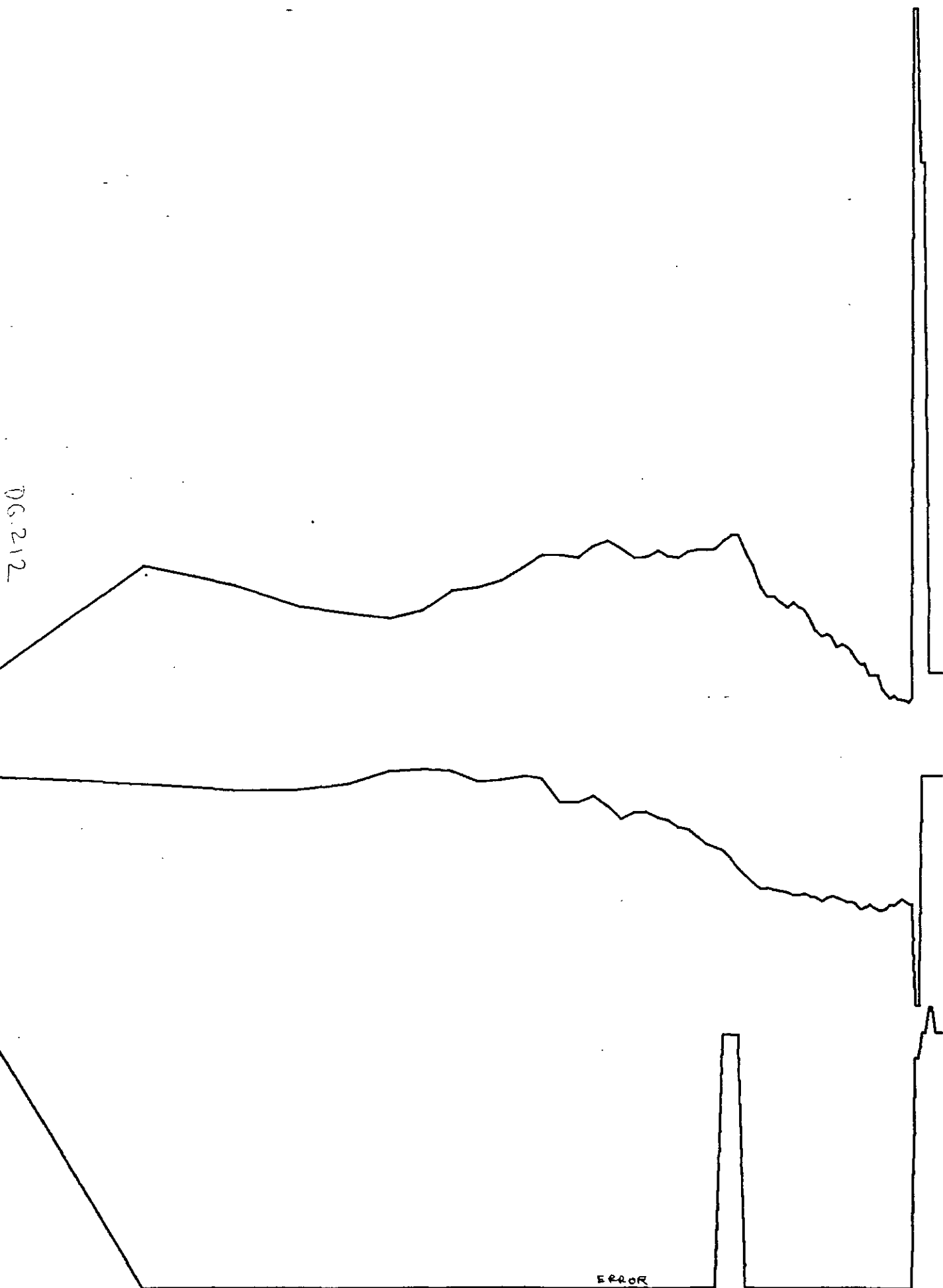


85 11 F

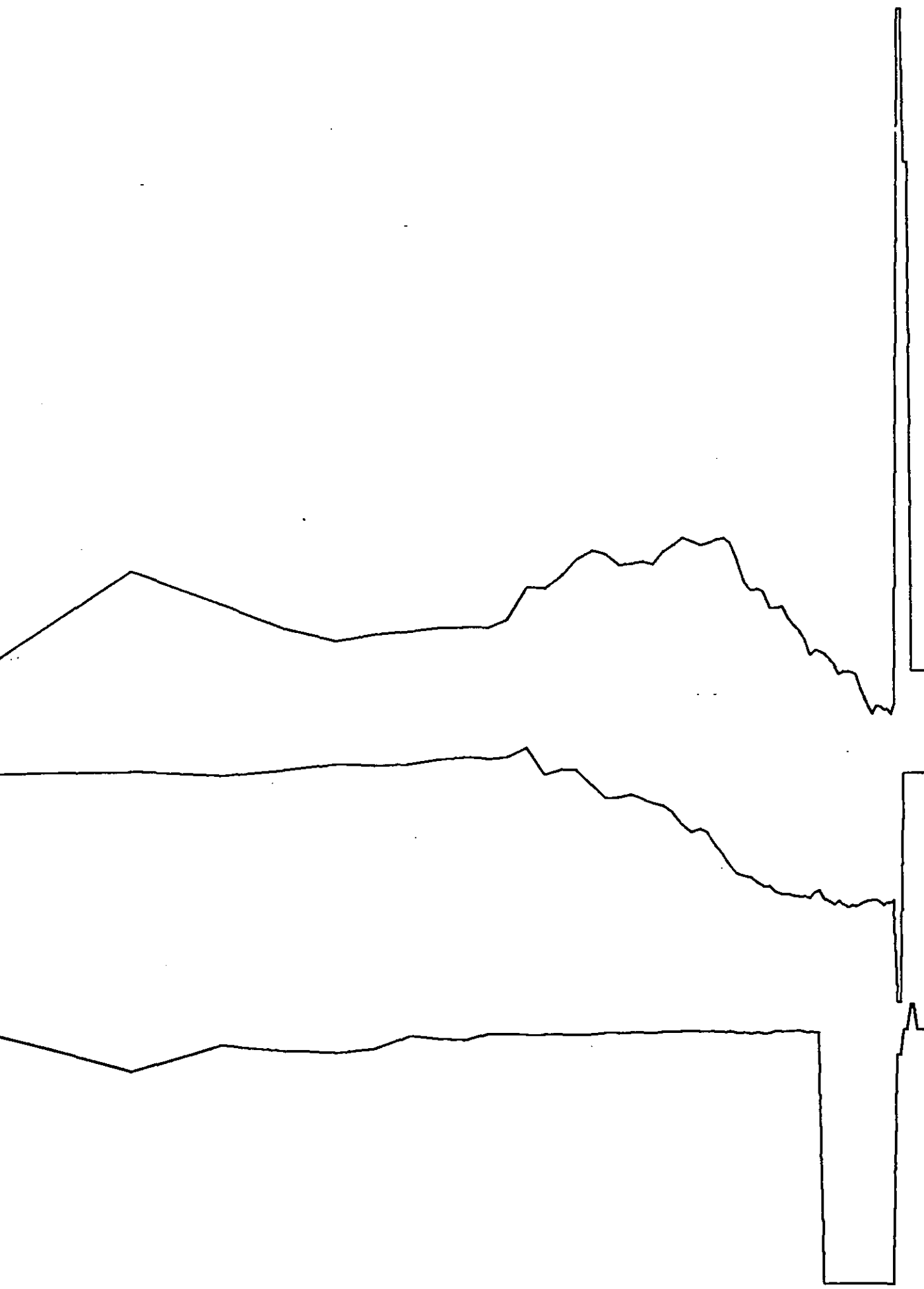


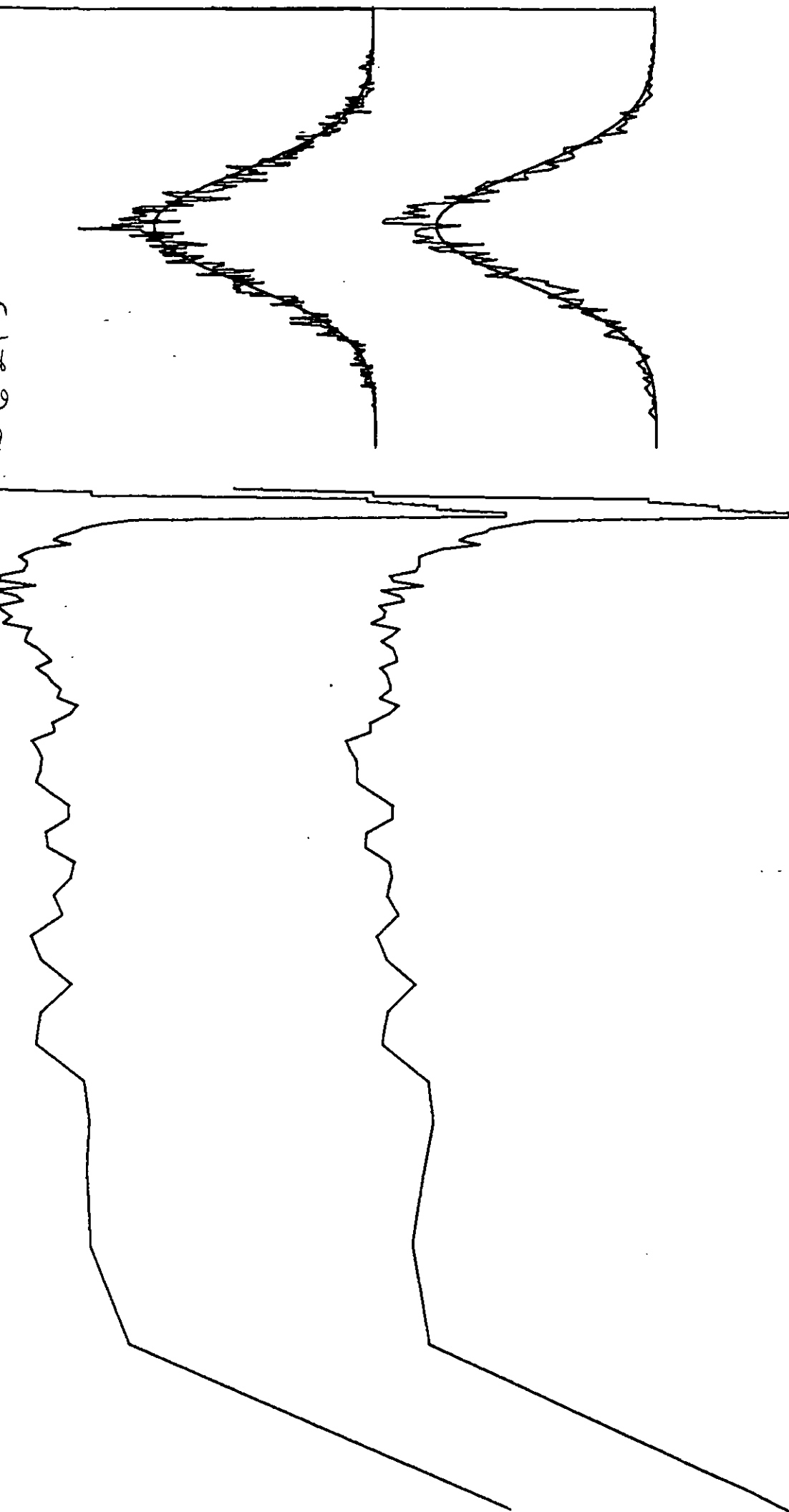
85 12 F

06.212



85 13 F

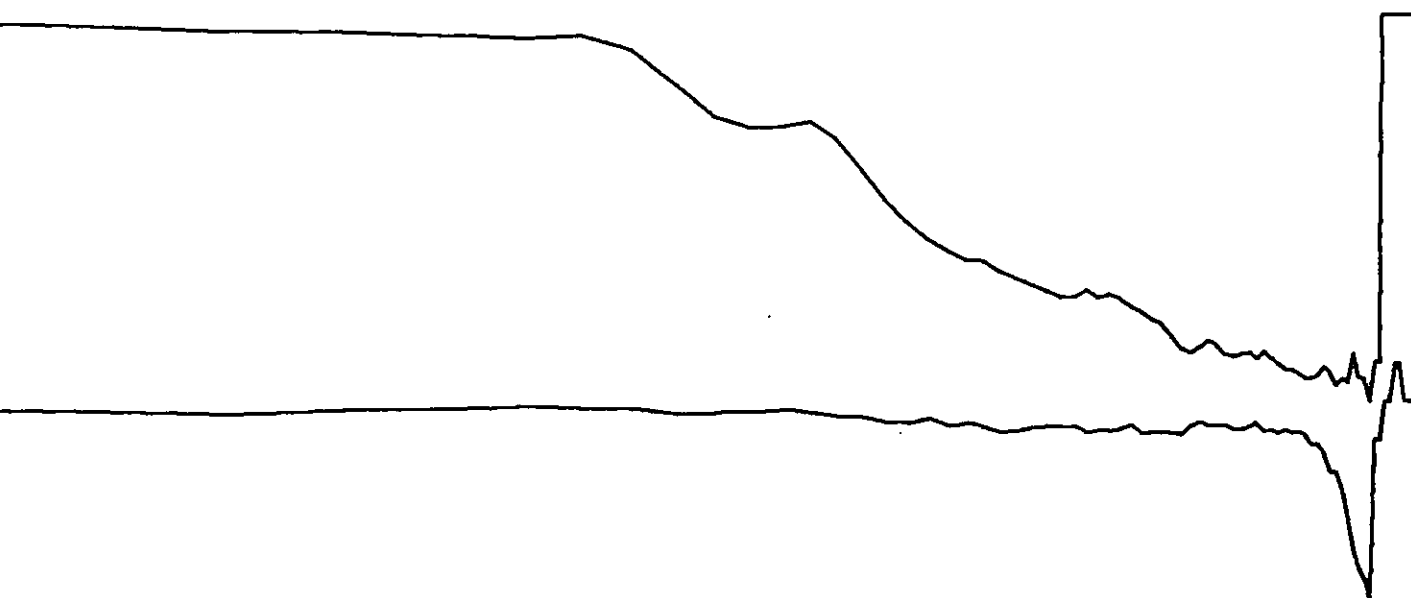
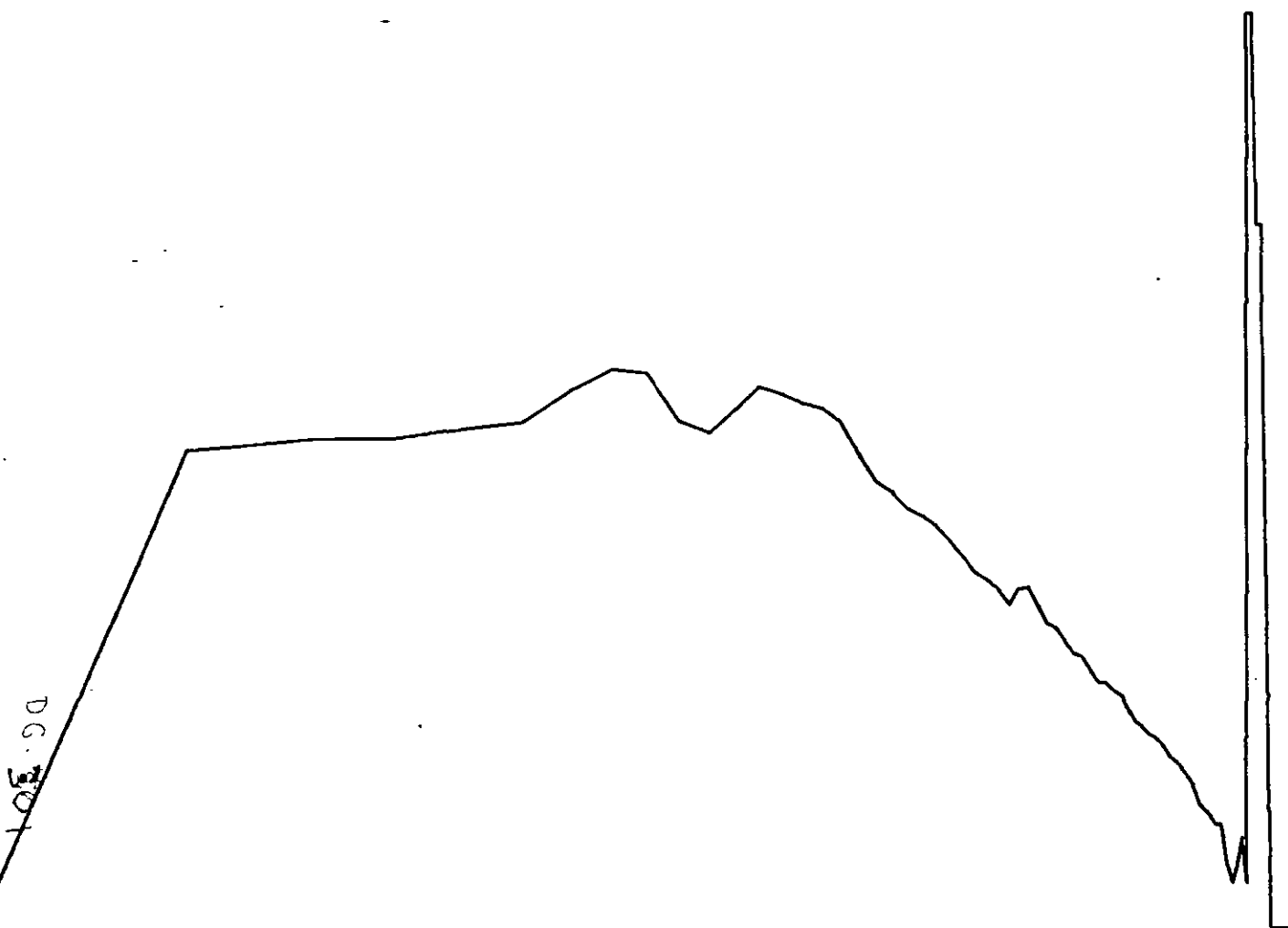




85 14 F

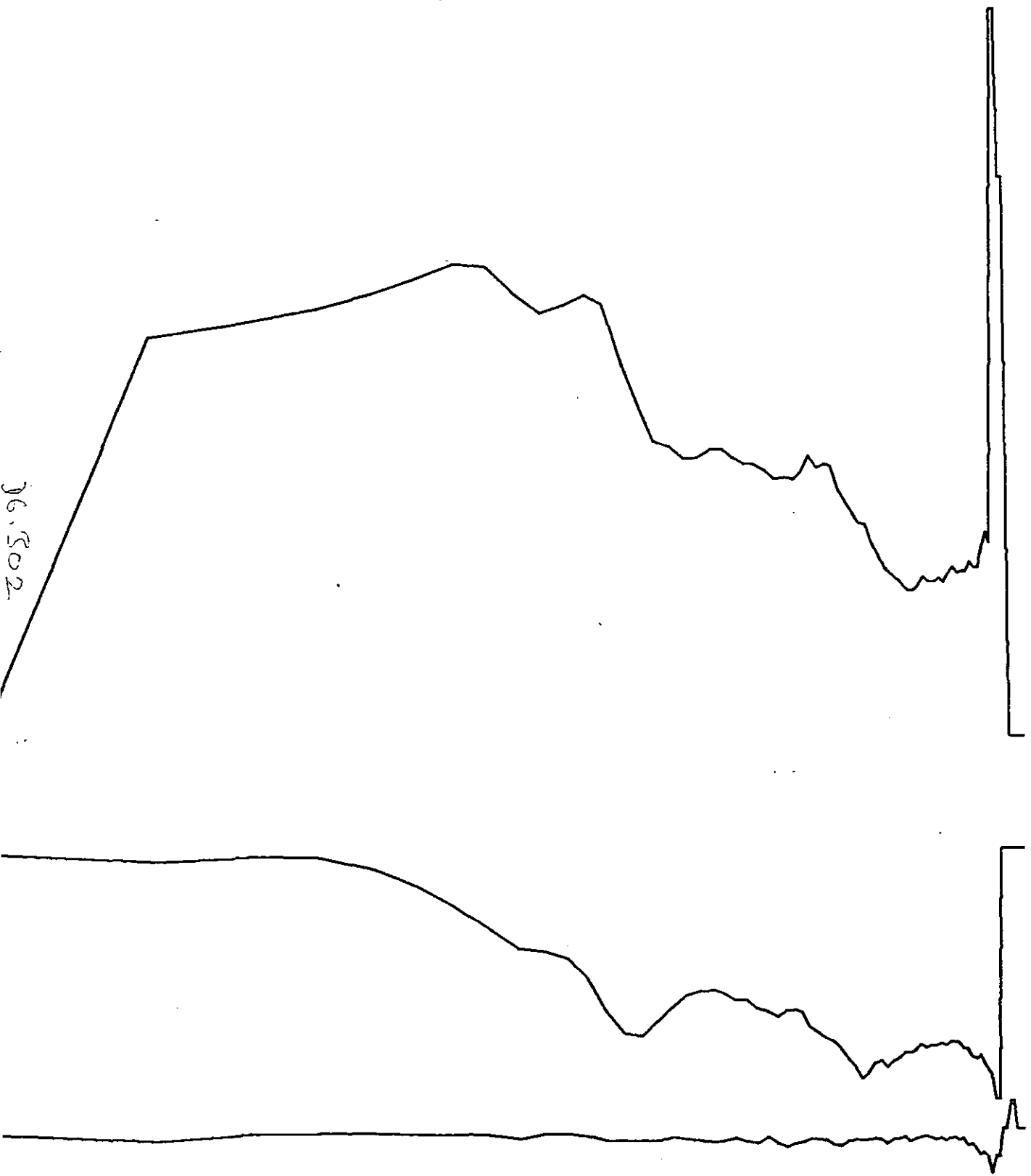


85 01 T

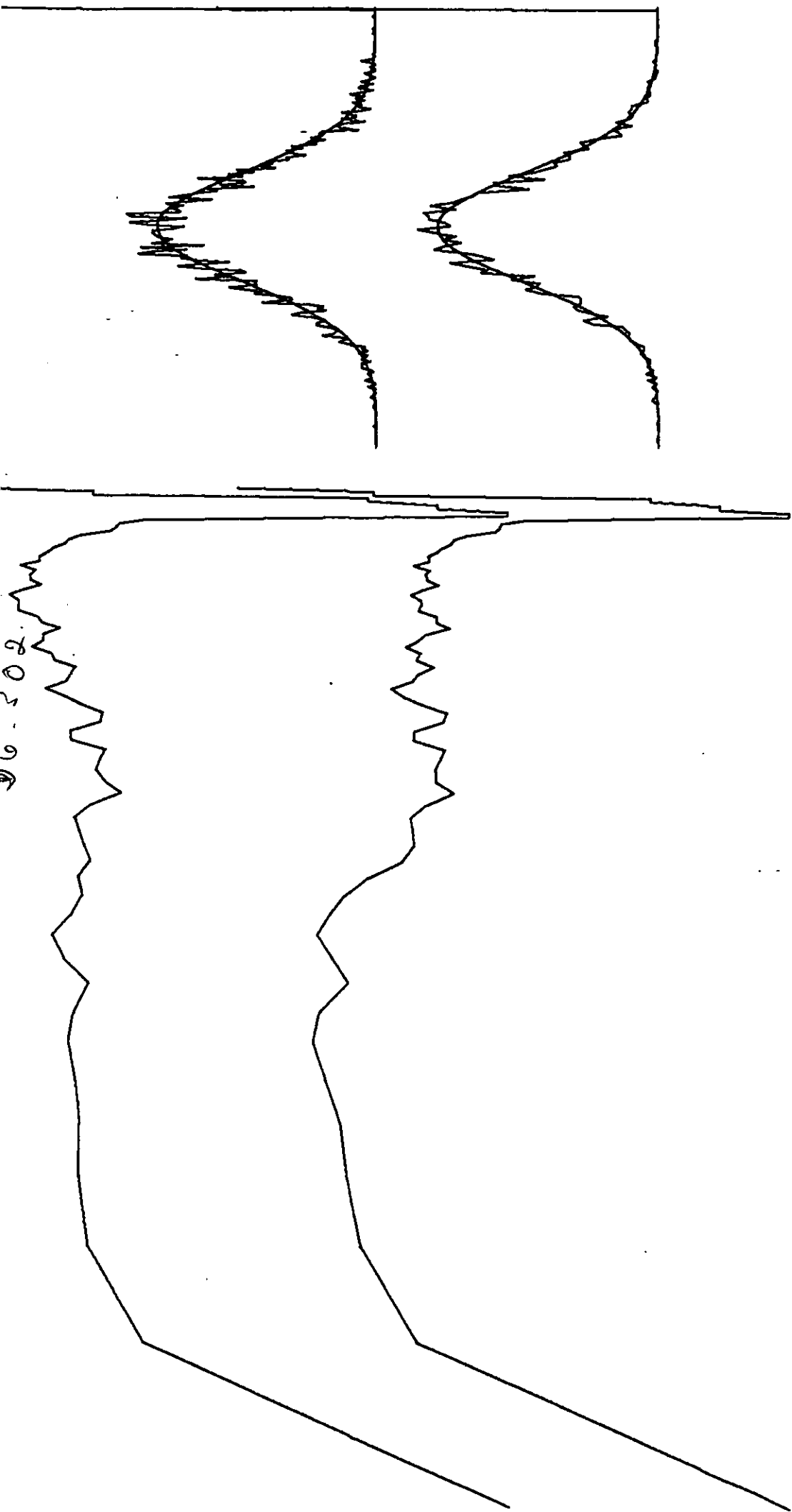


85 0.2 T

36.502

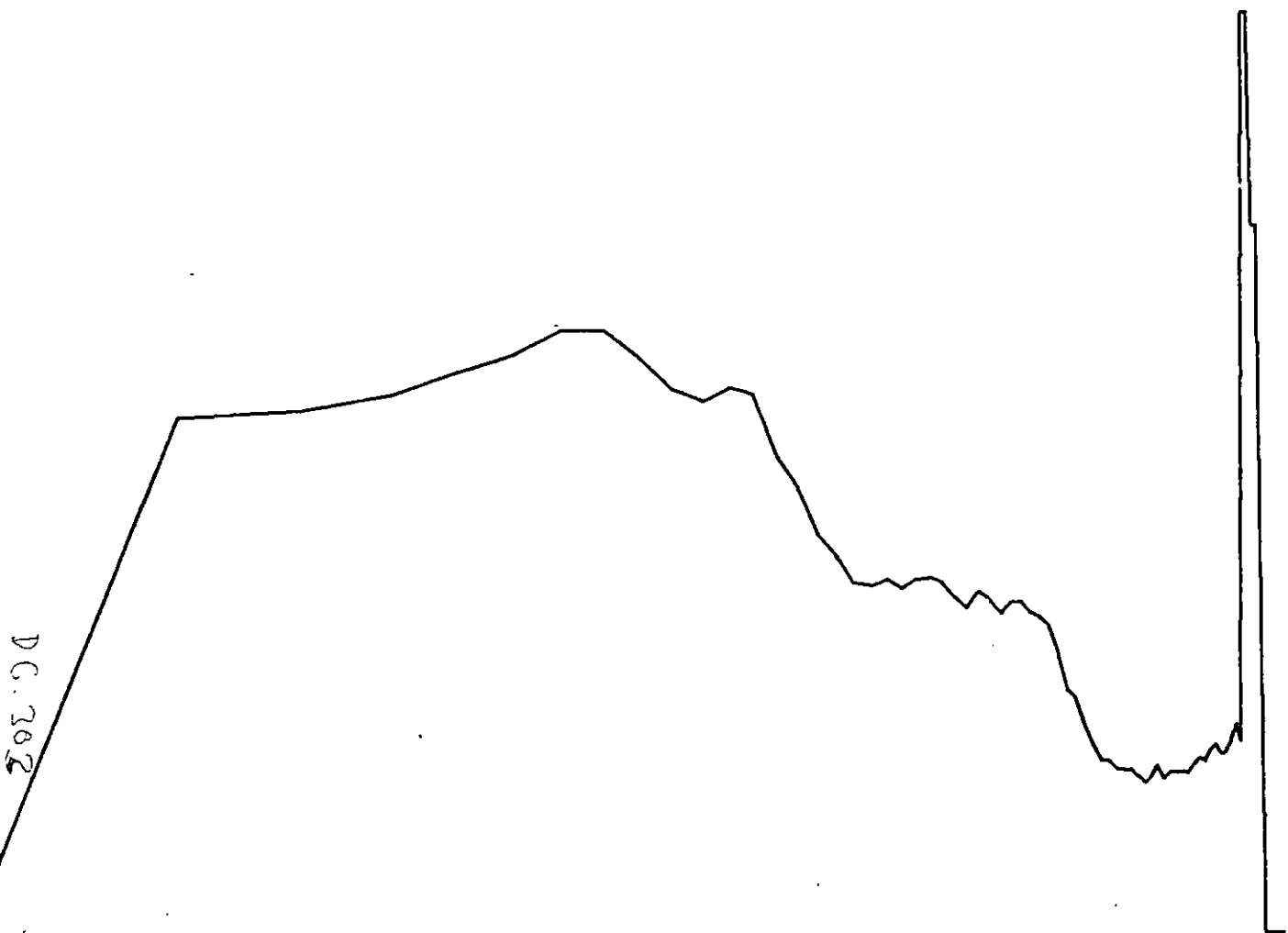


85 02T

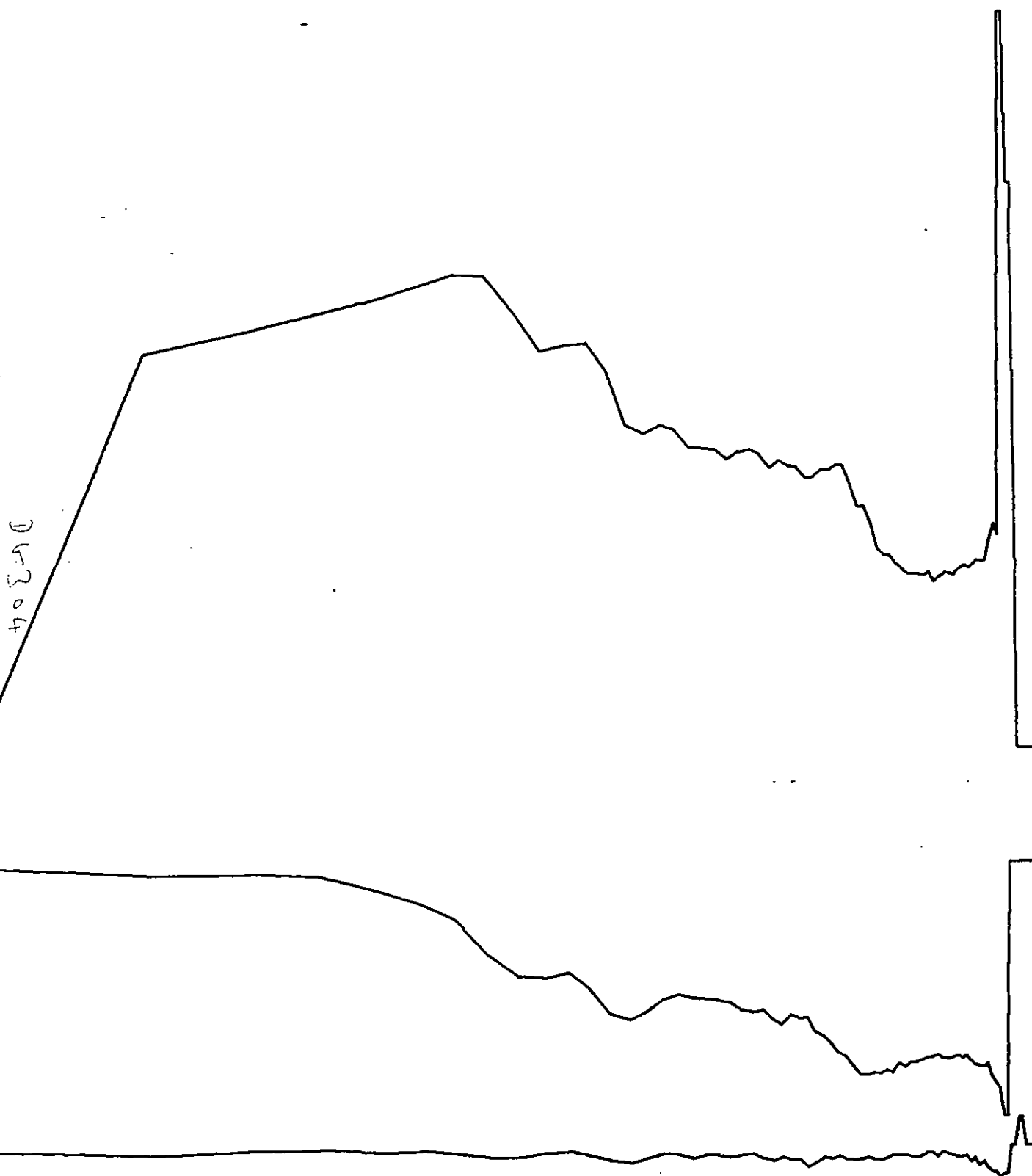


96-502

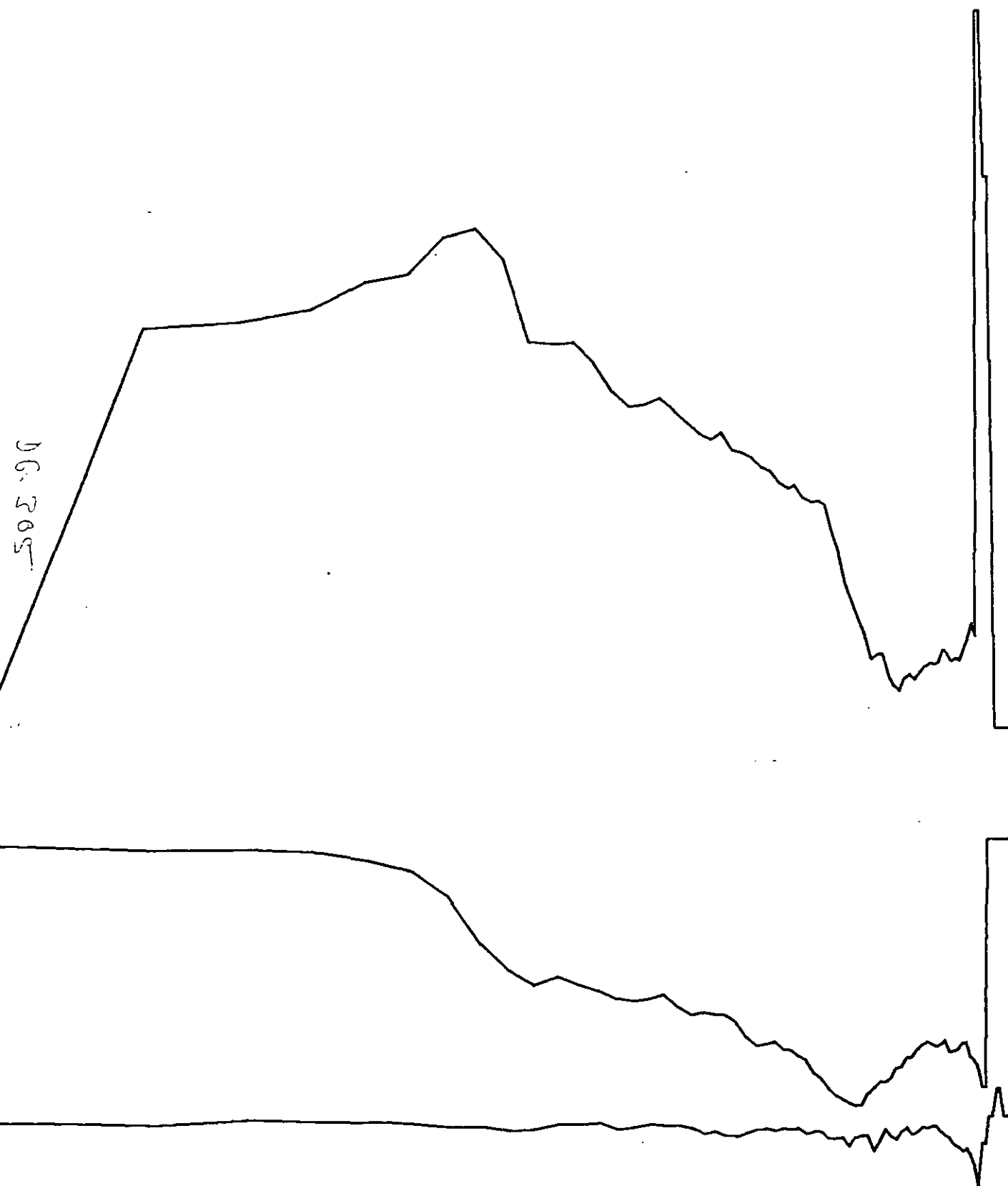
85 03T



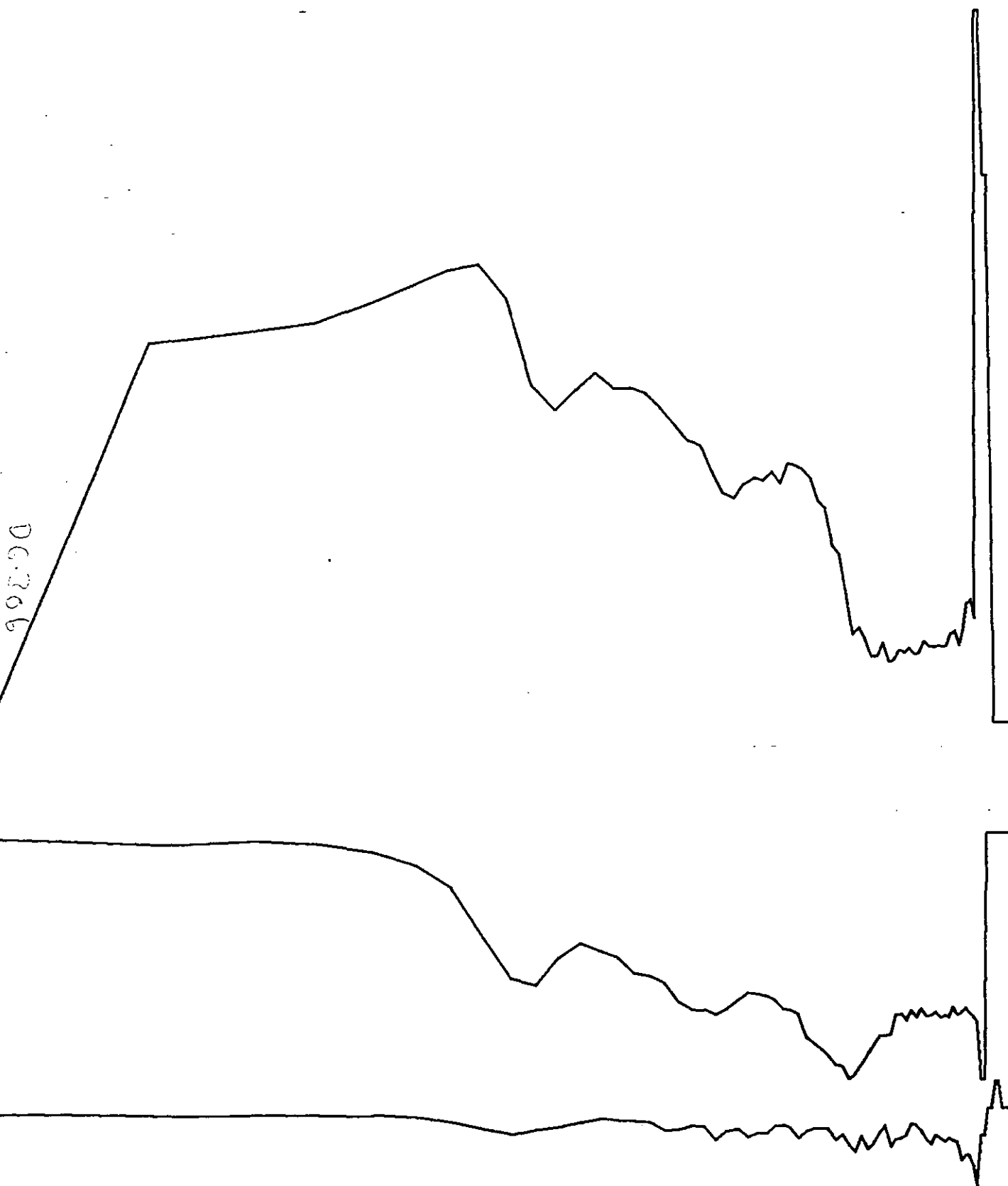
85 01T



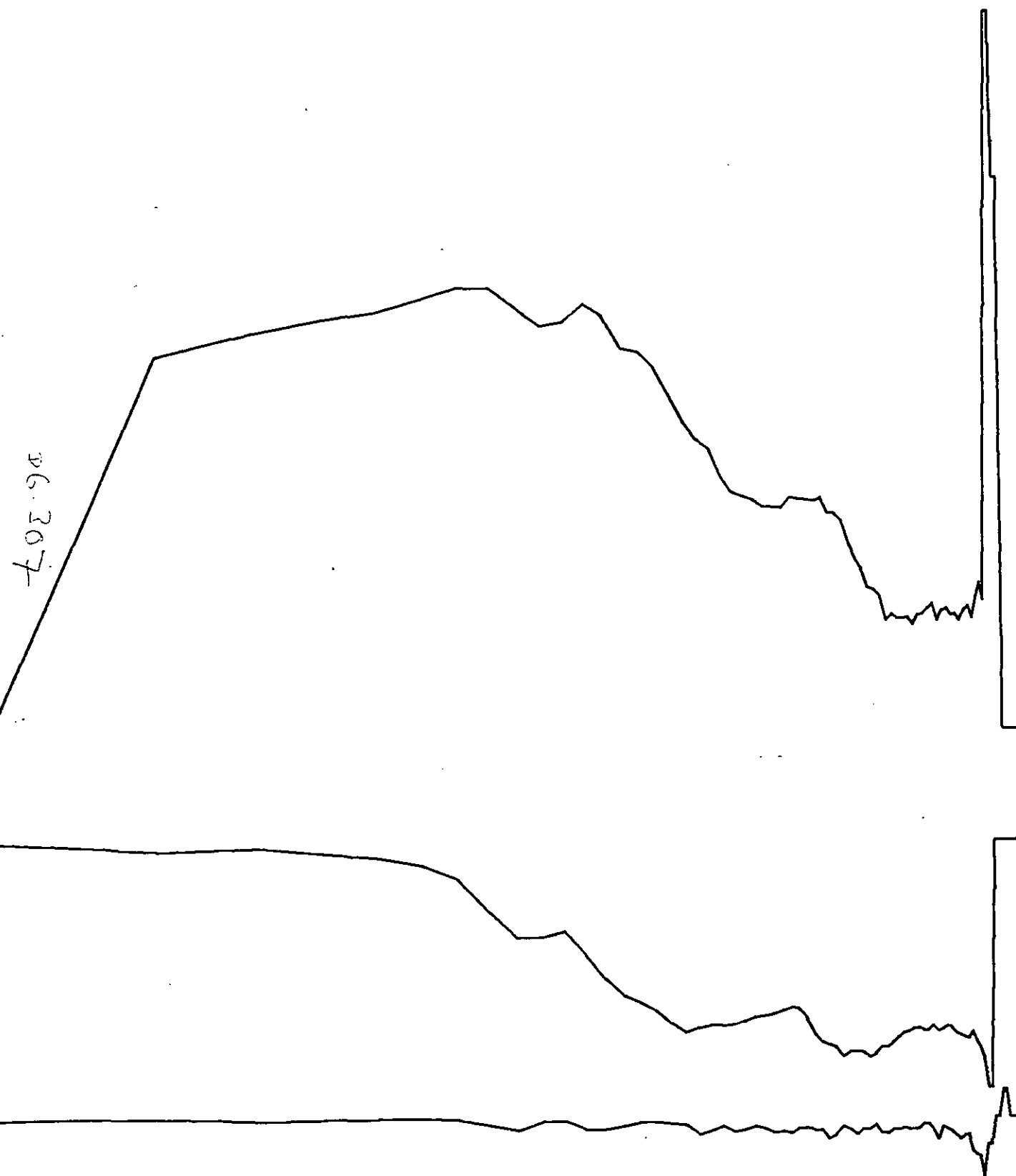
85 05T



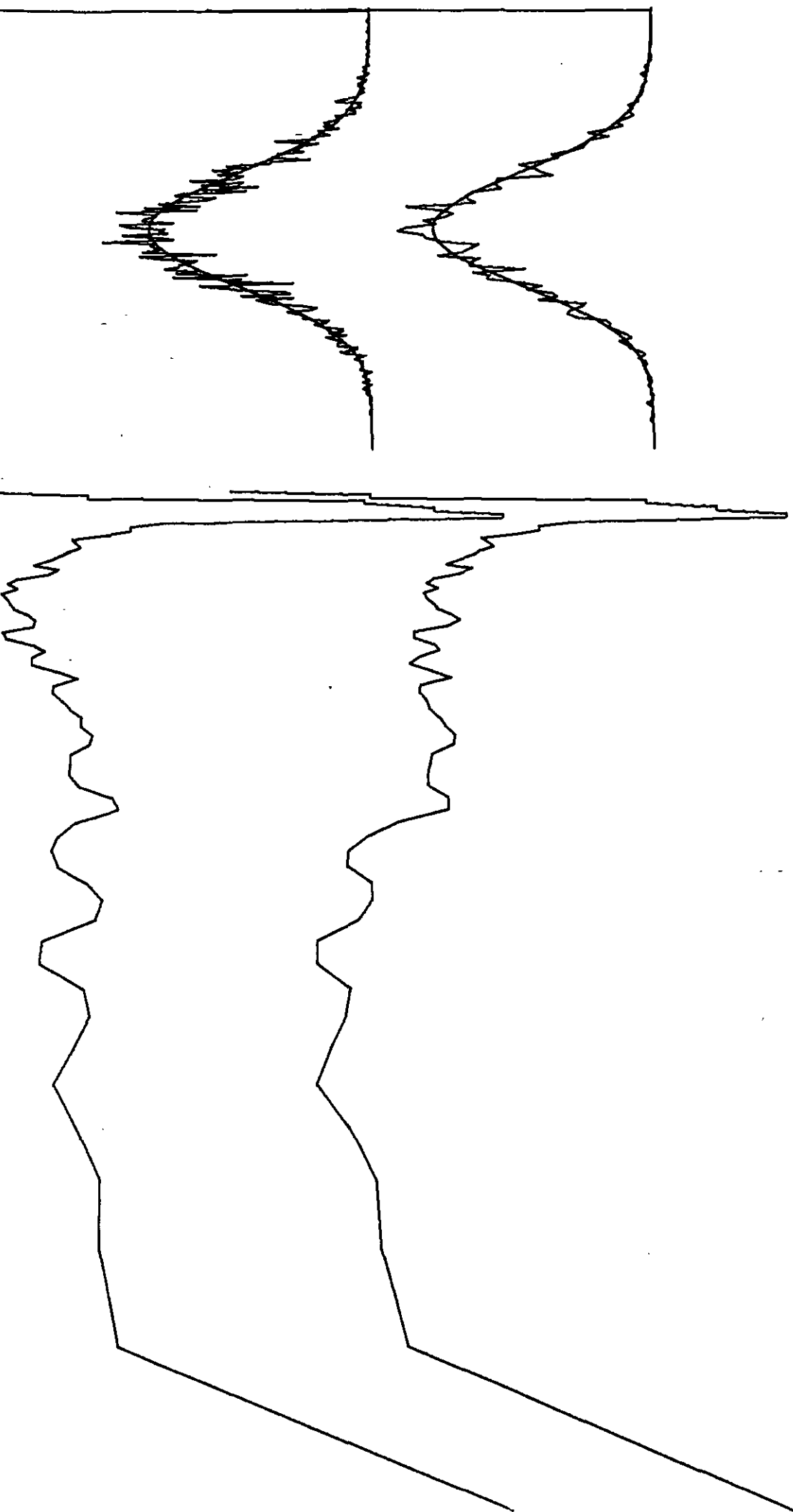
85 06 T



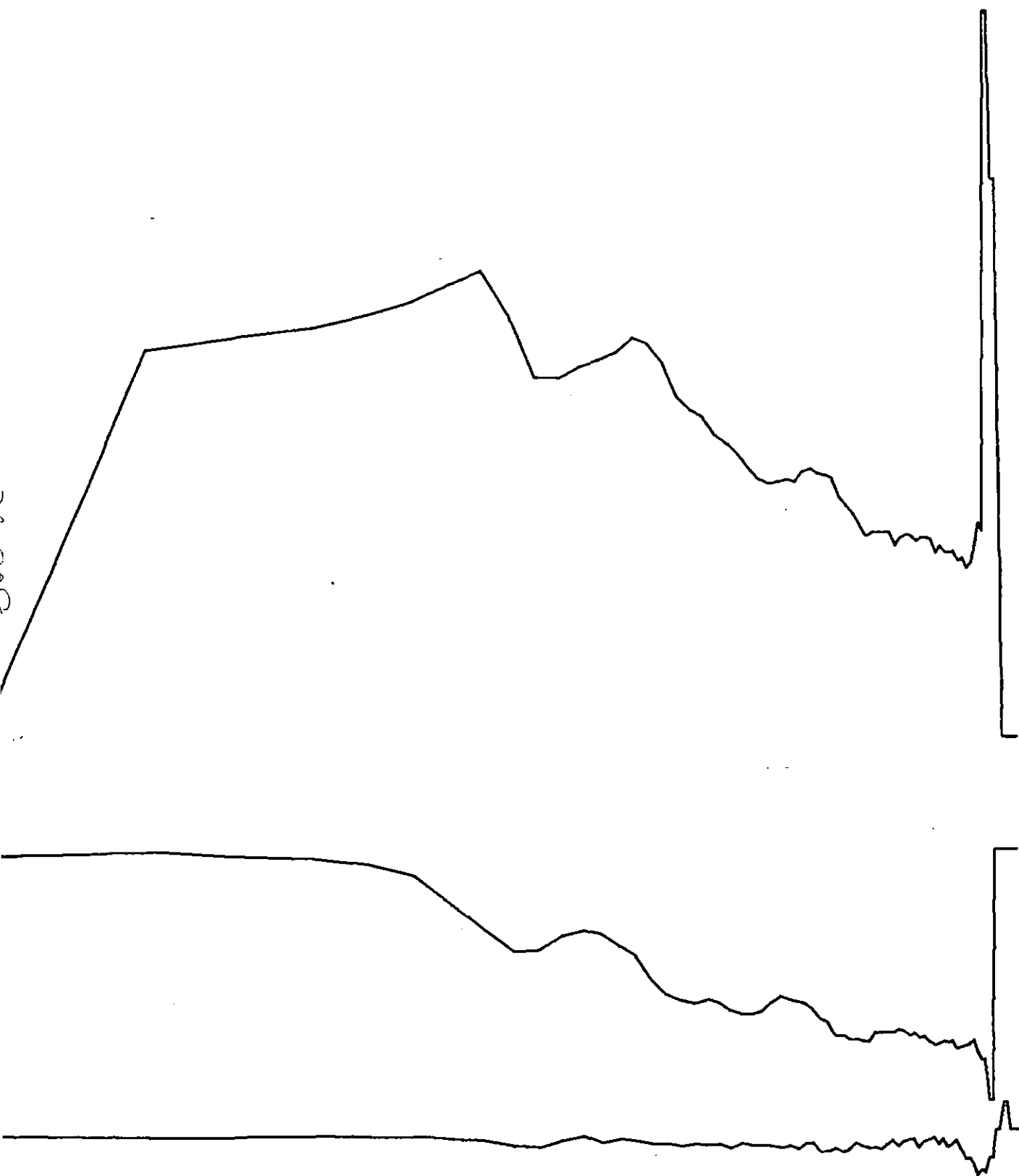
85 07 T

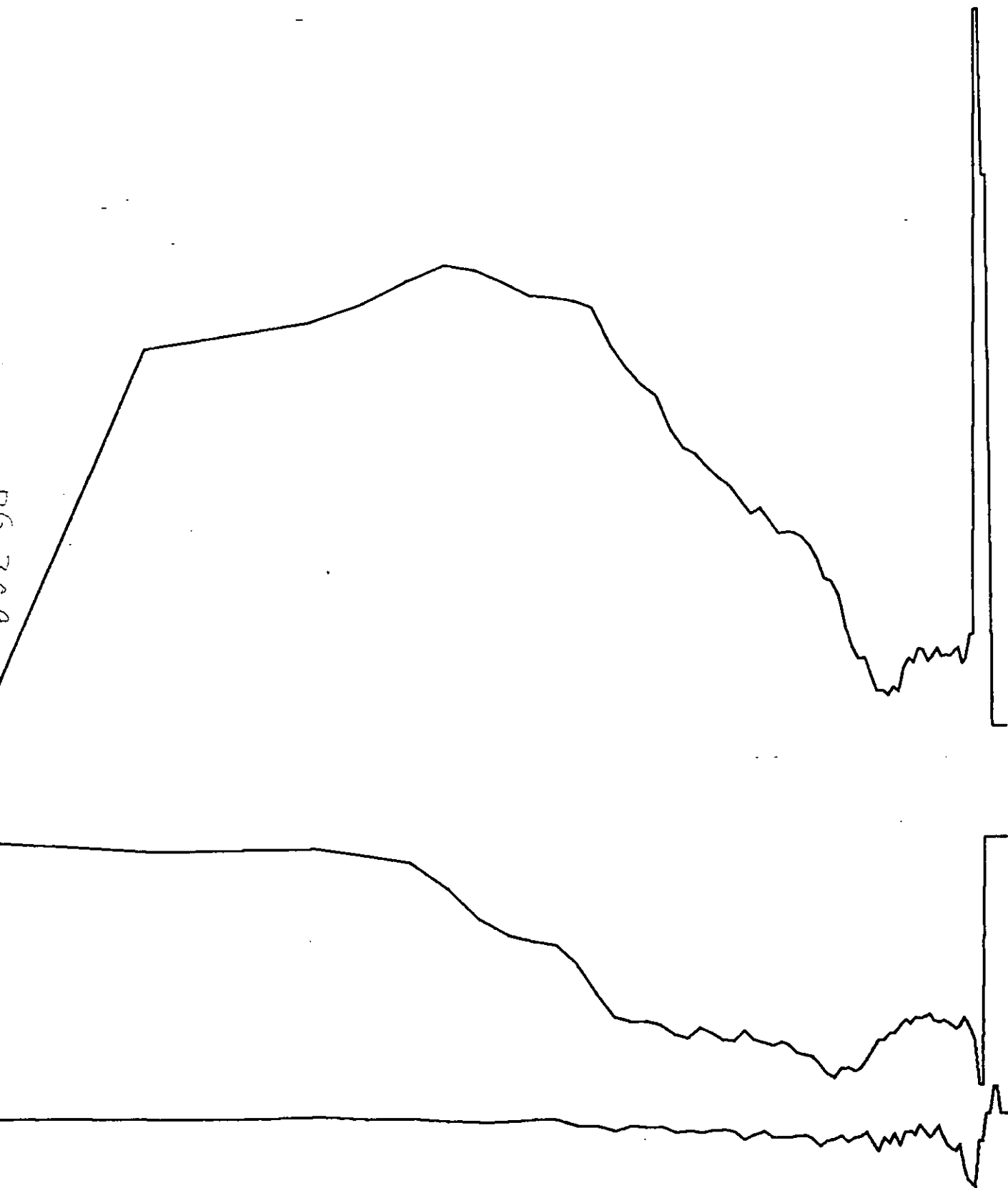


85 07T

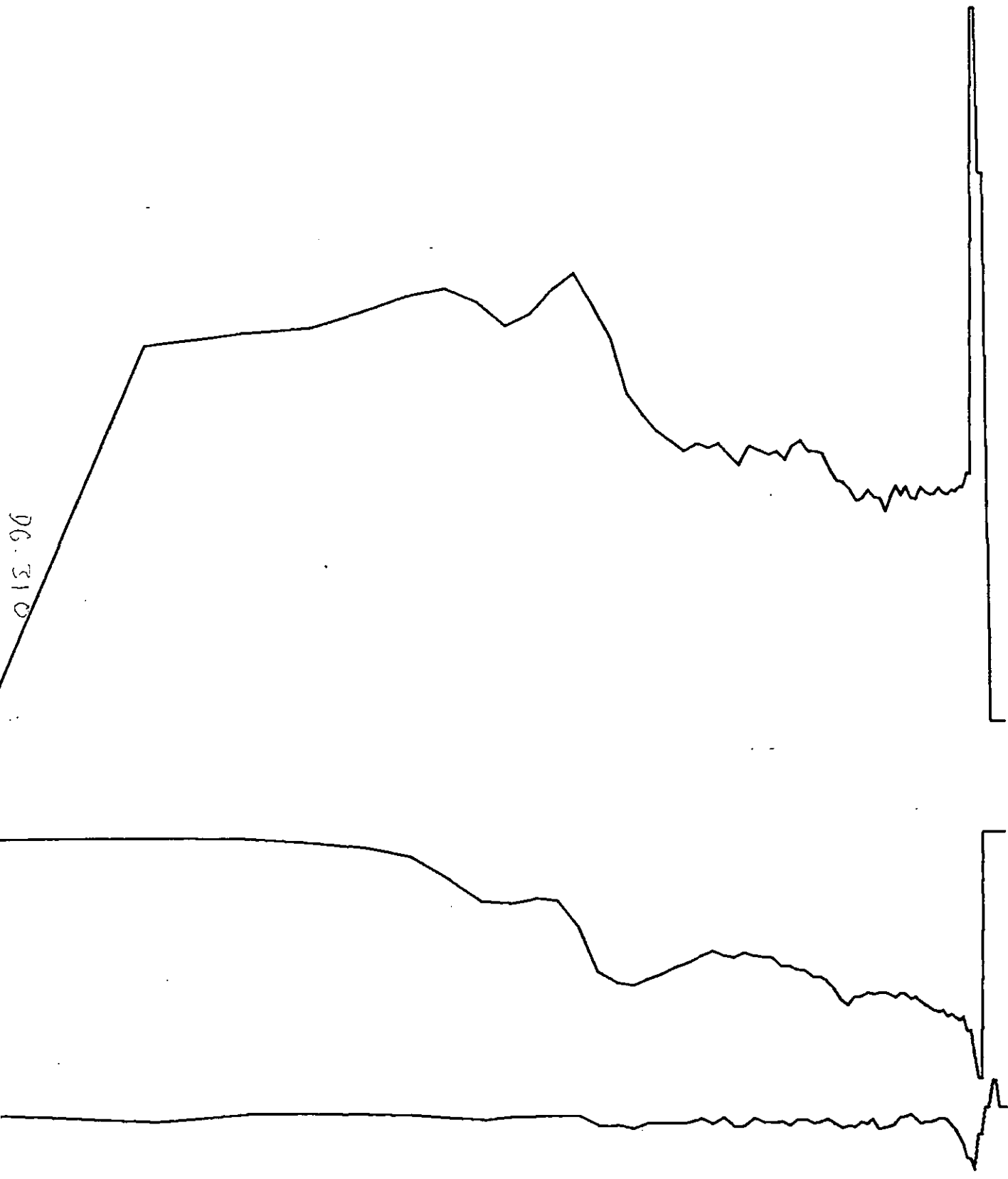


85 08 T

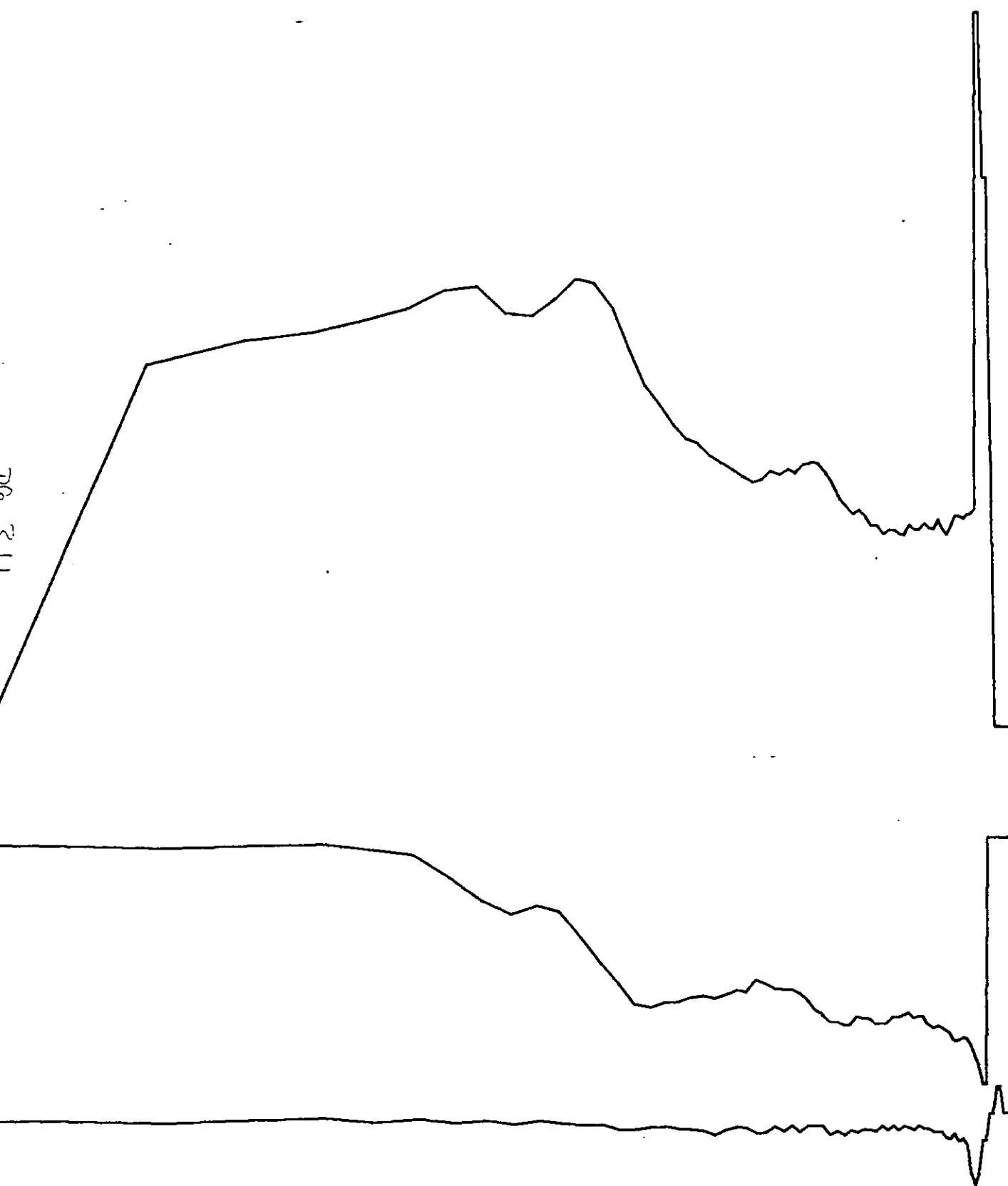




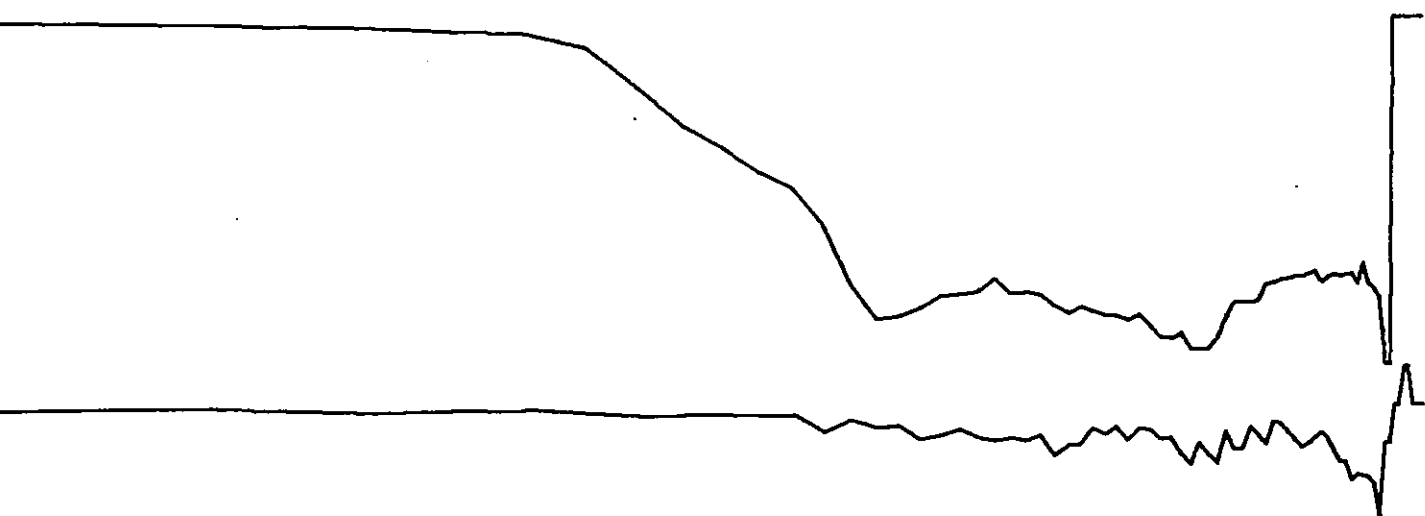
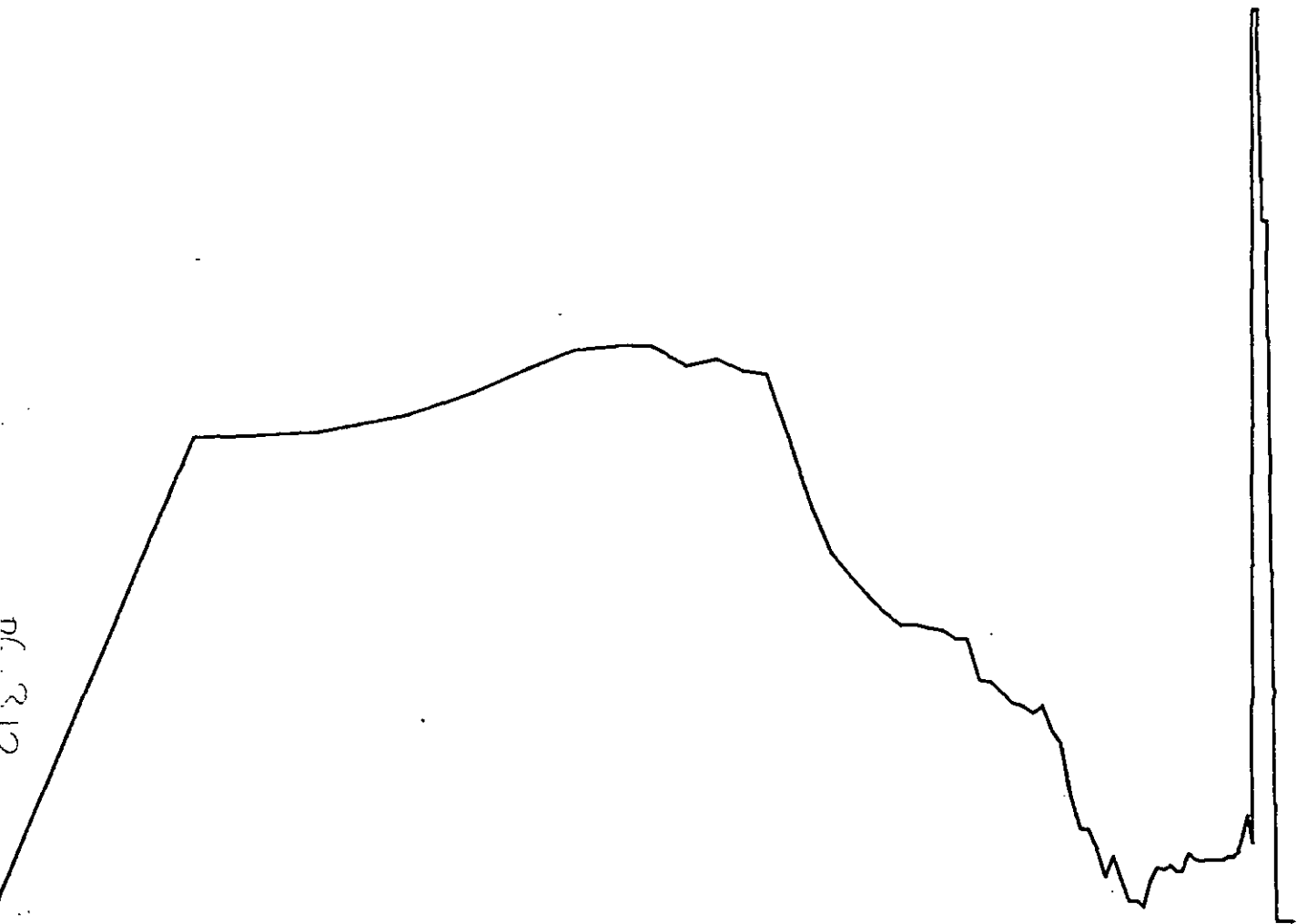
85 10 T



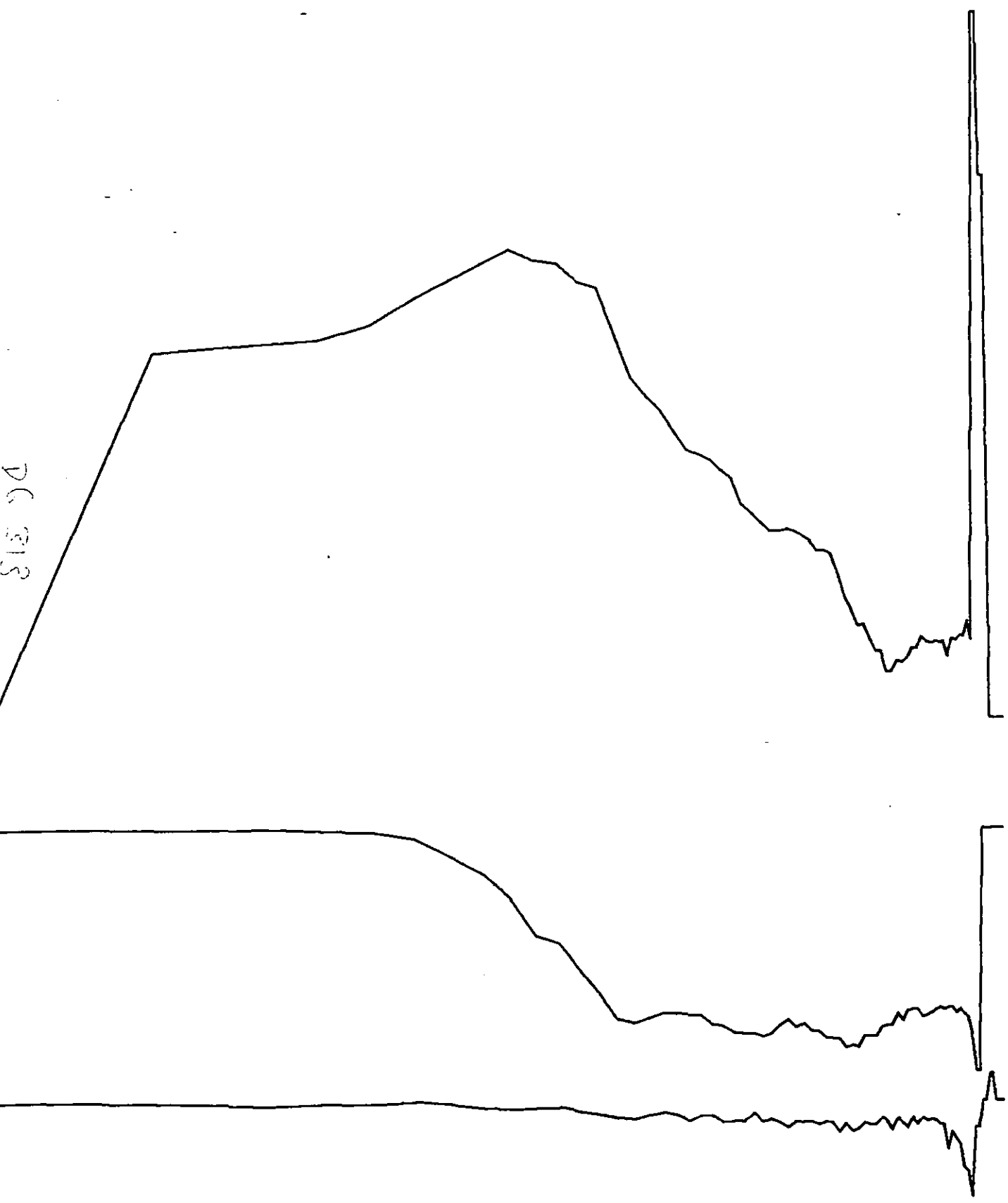
85 11T

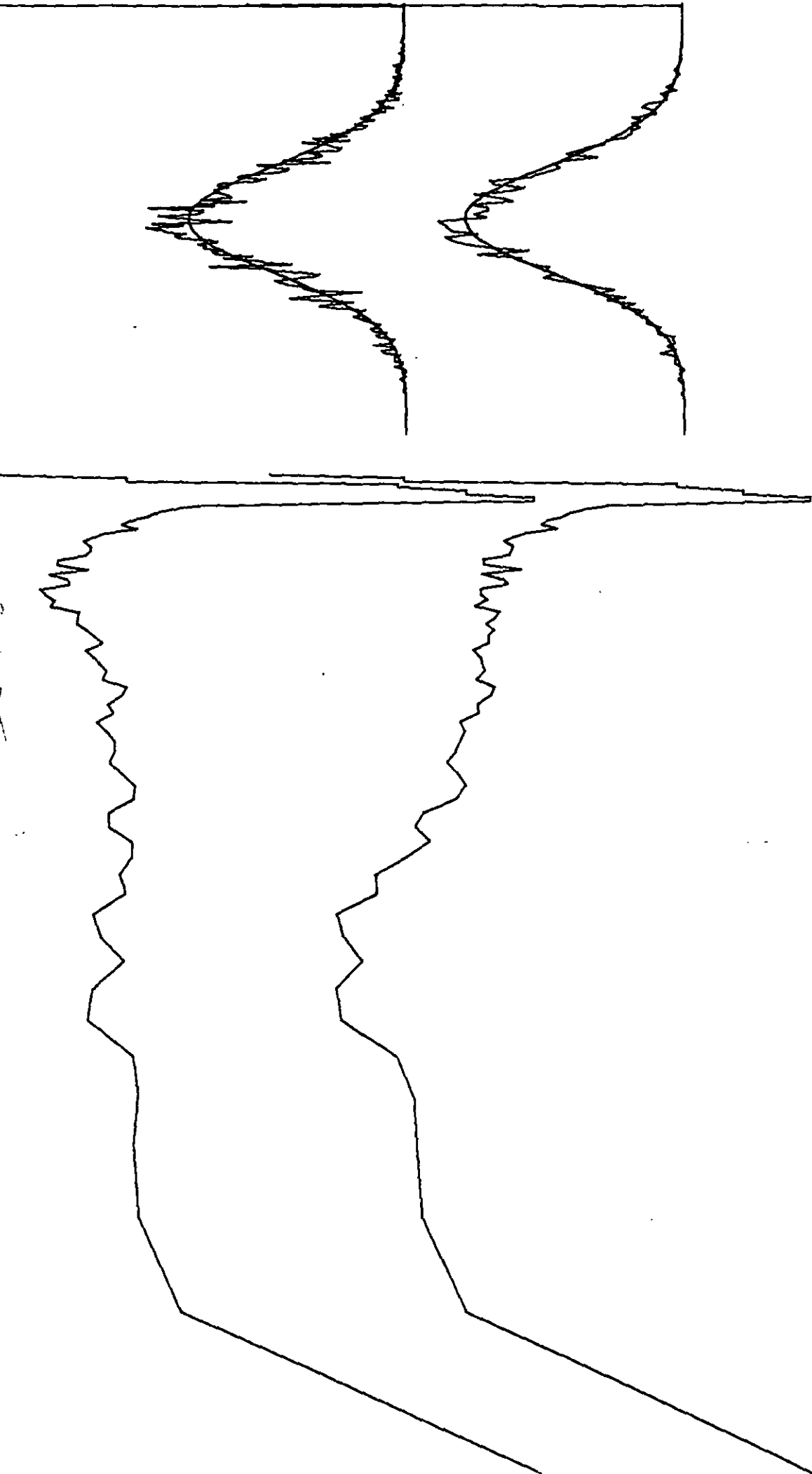


85 12 T

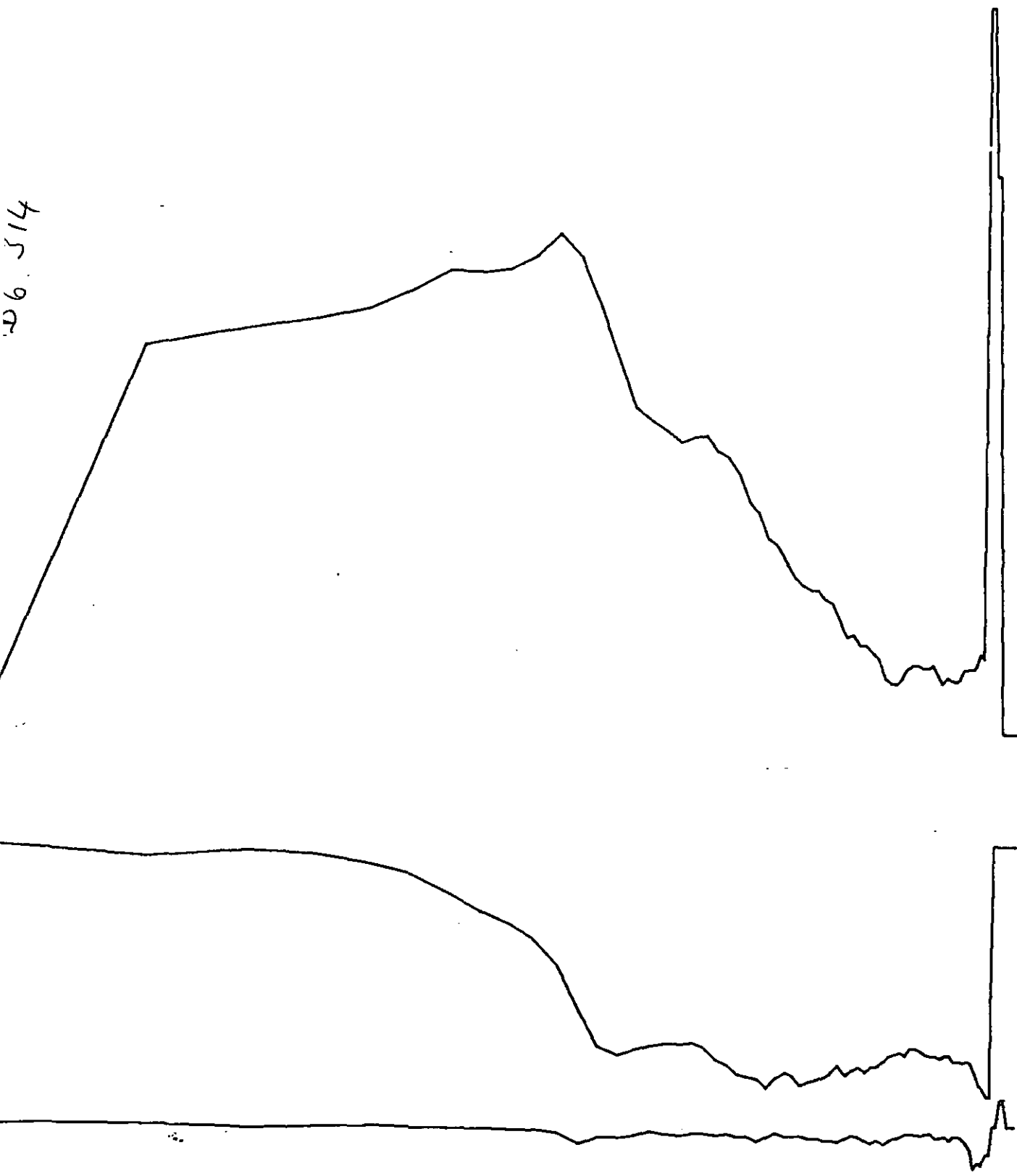


85 13T

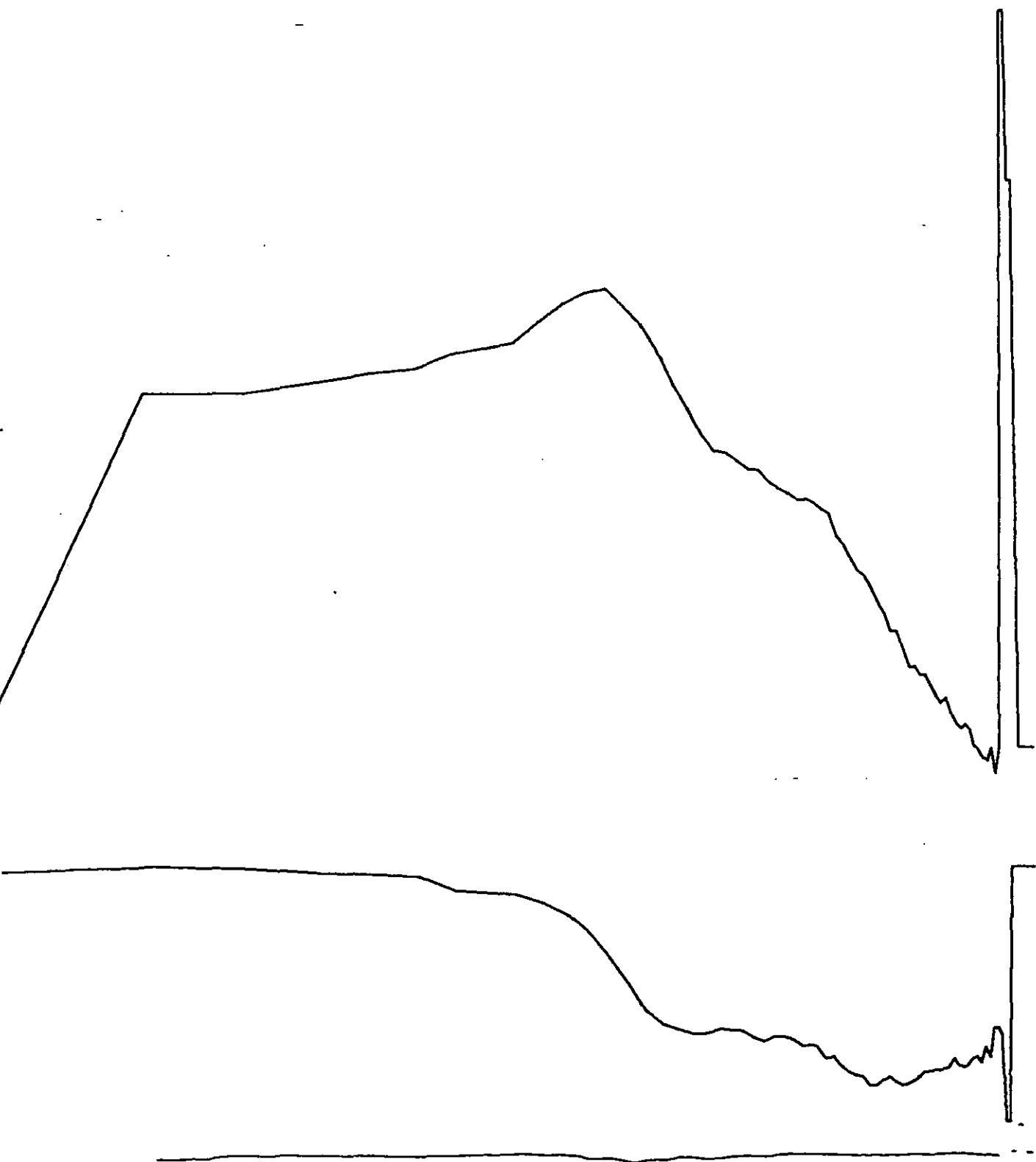




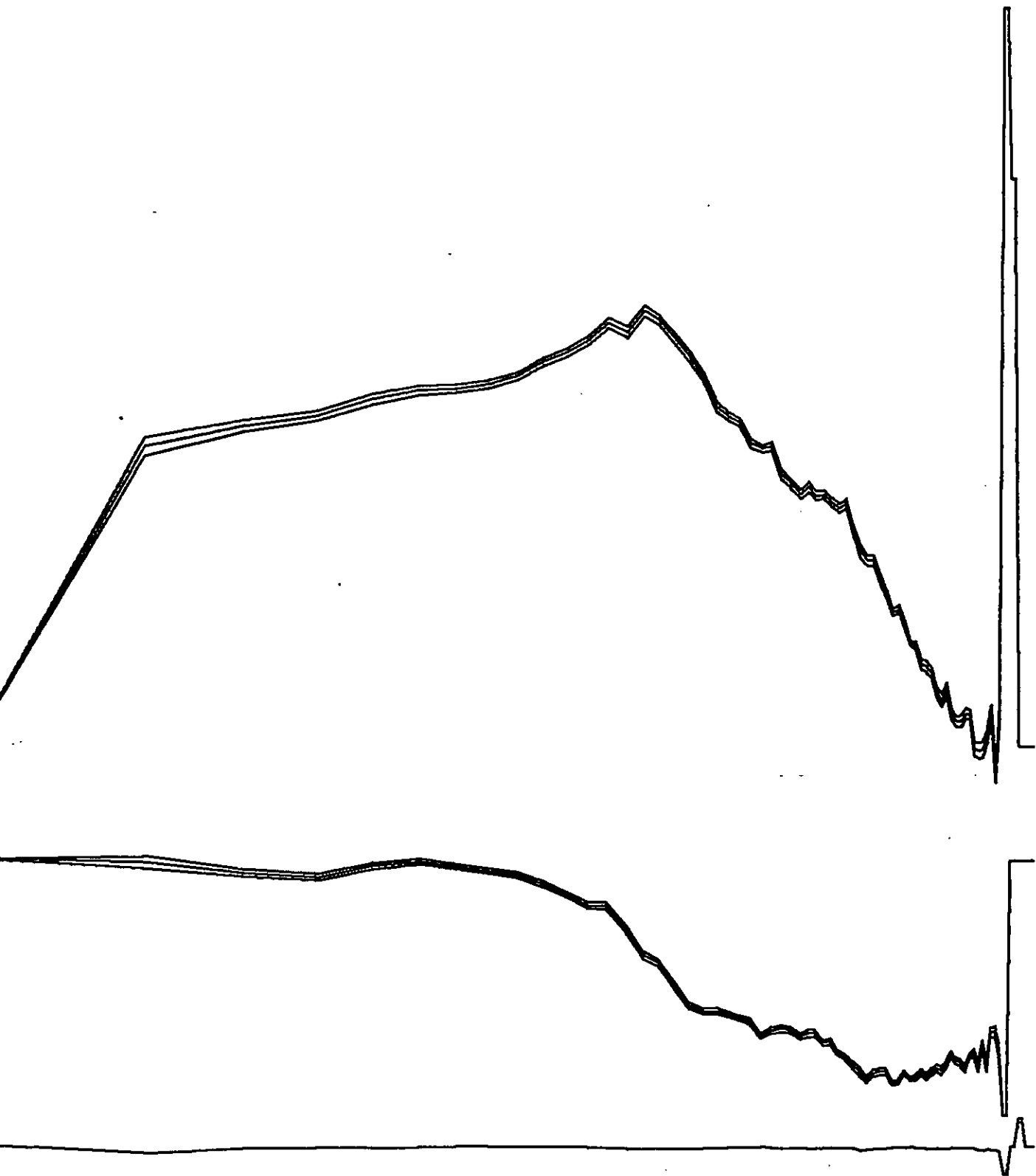
26.514



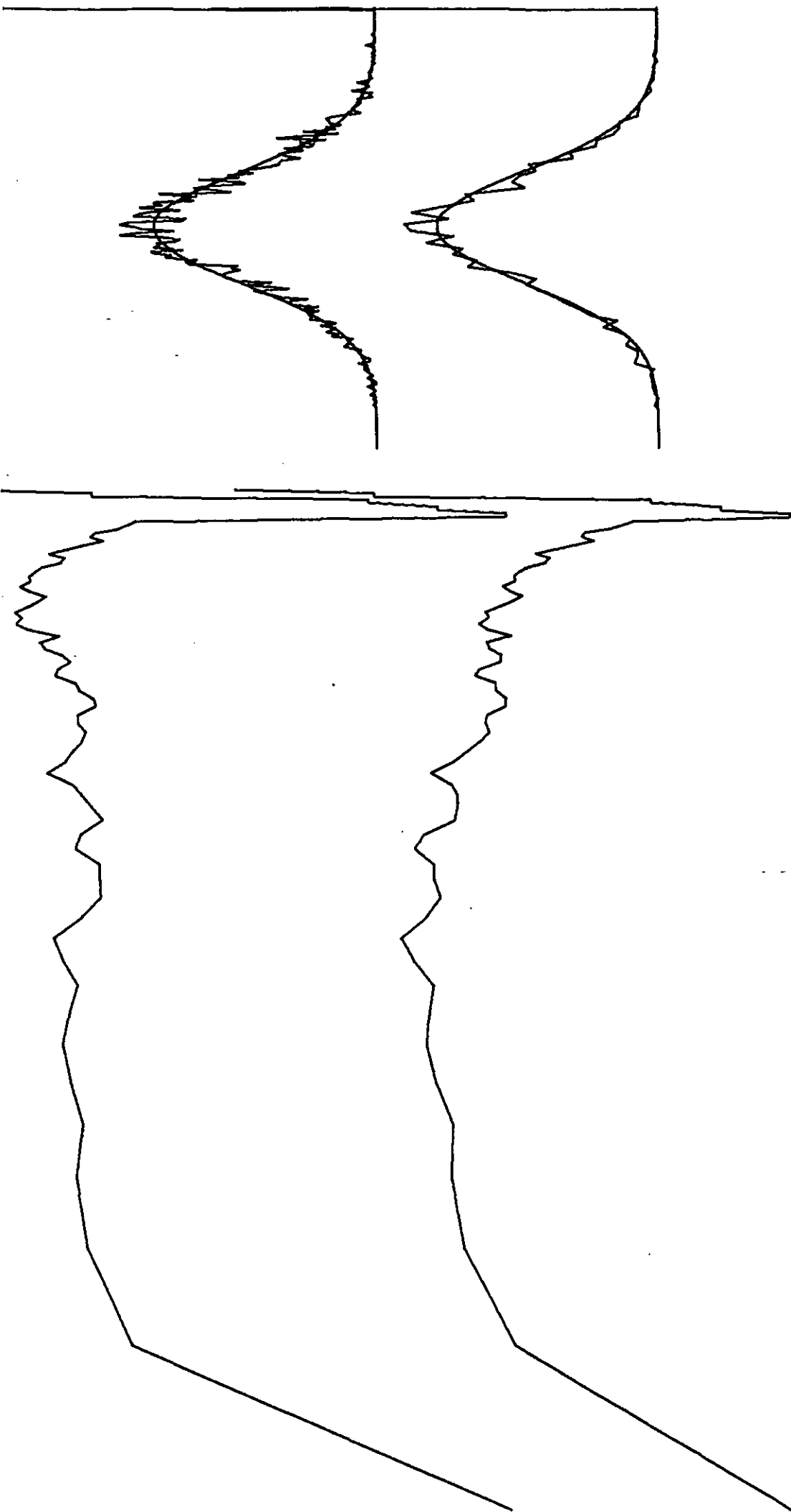
84 01 A

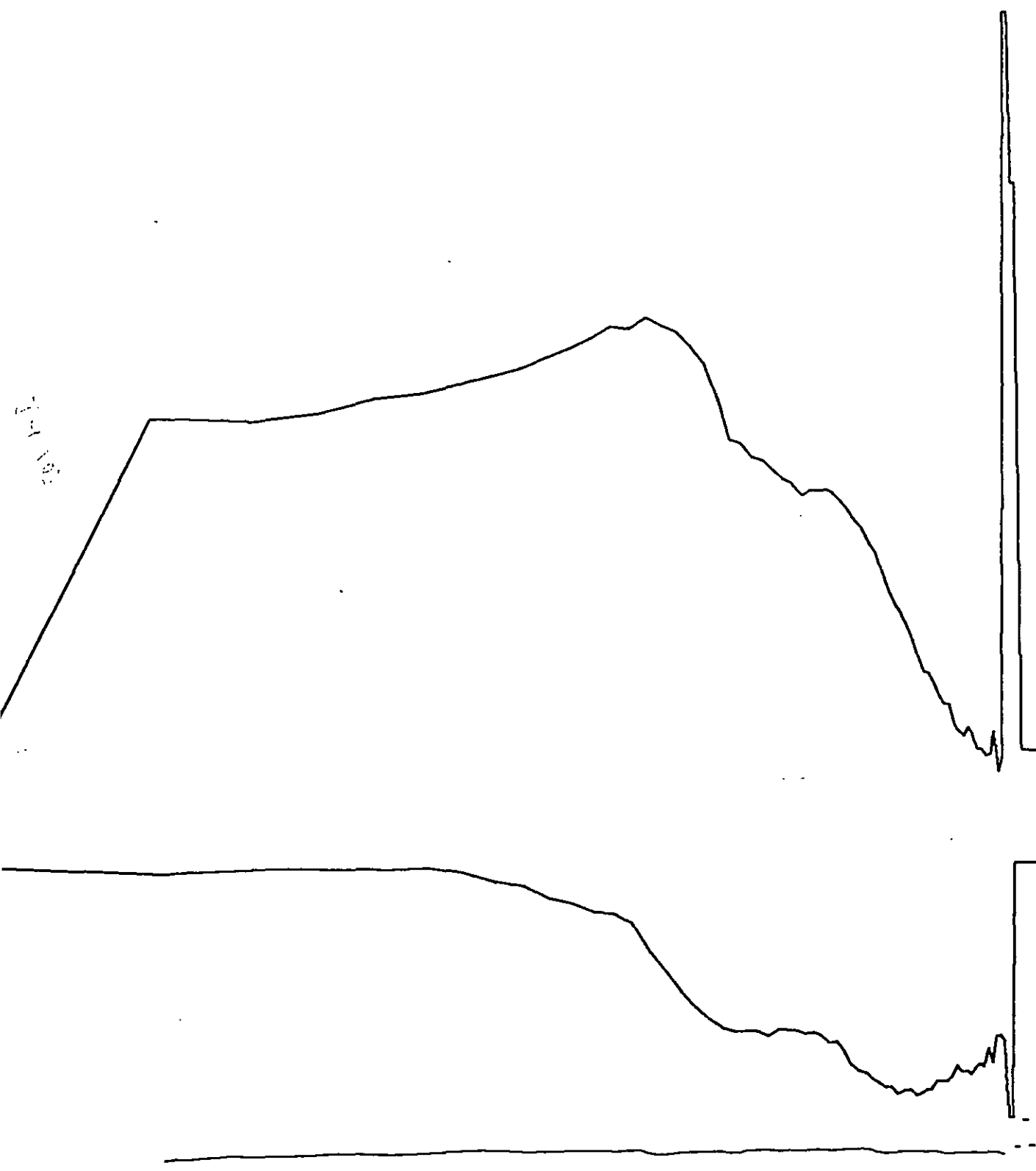


84 02 A

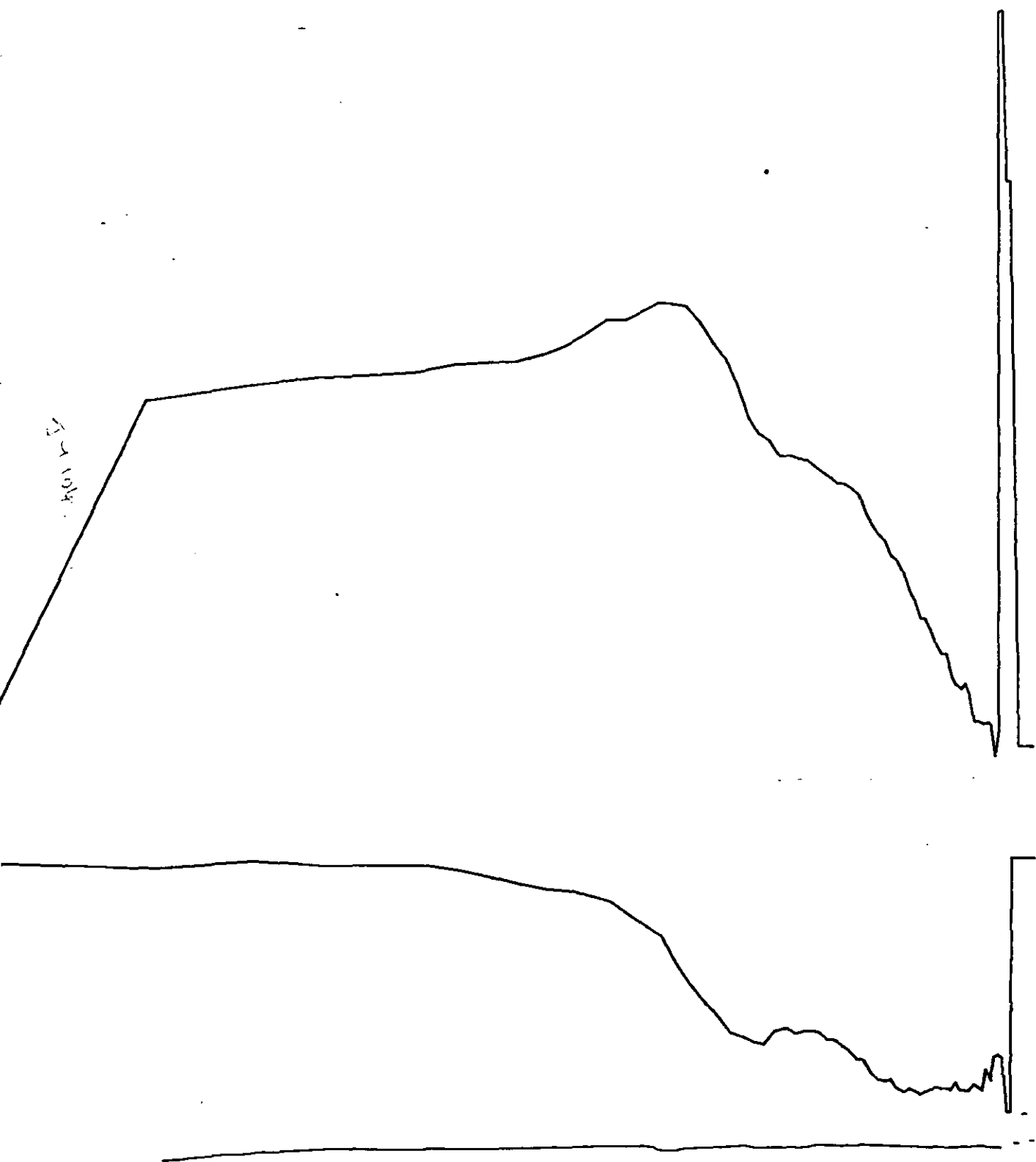


84 02 A

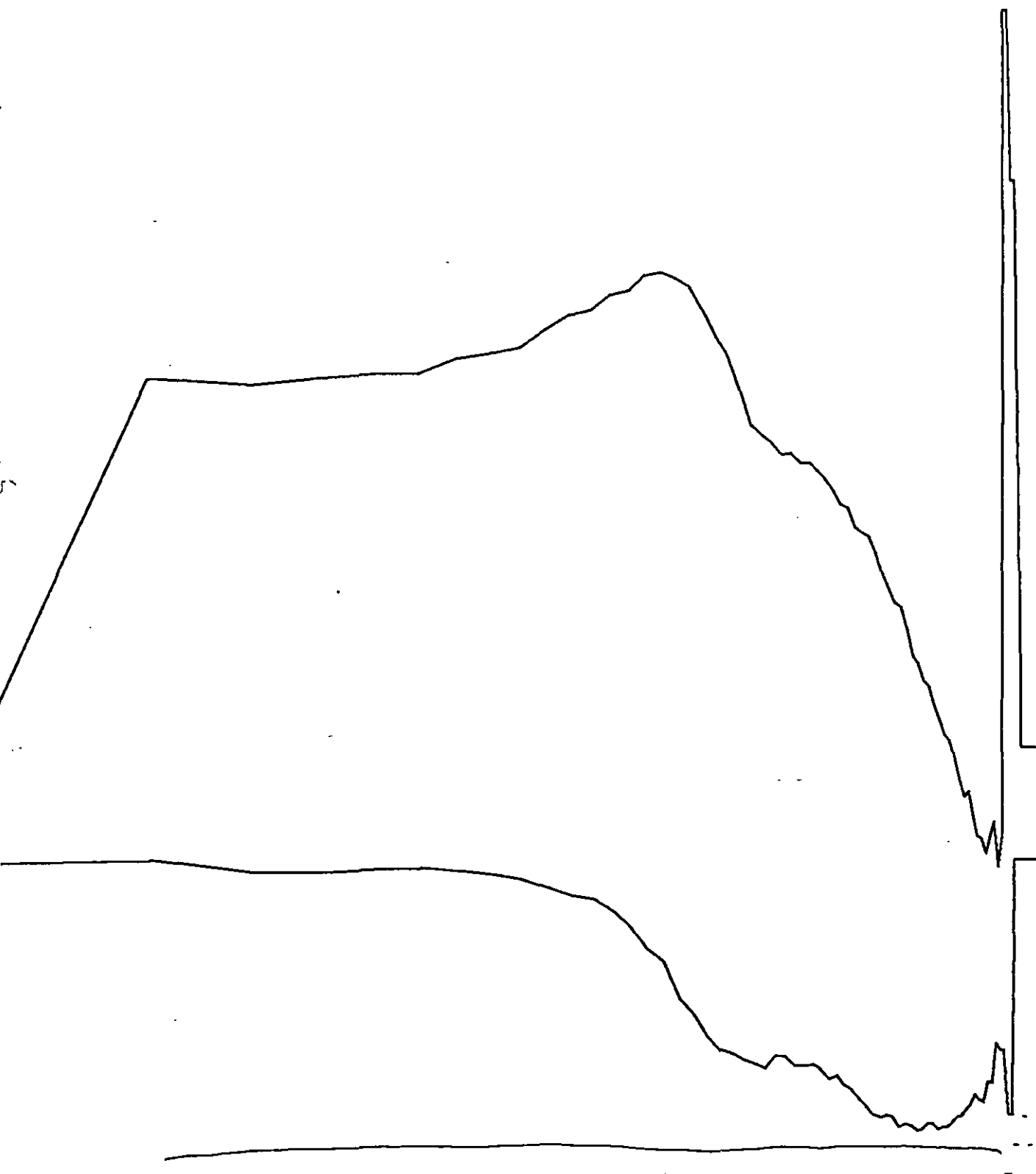




84 04A

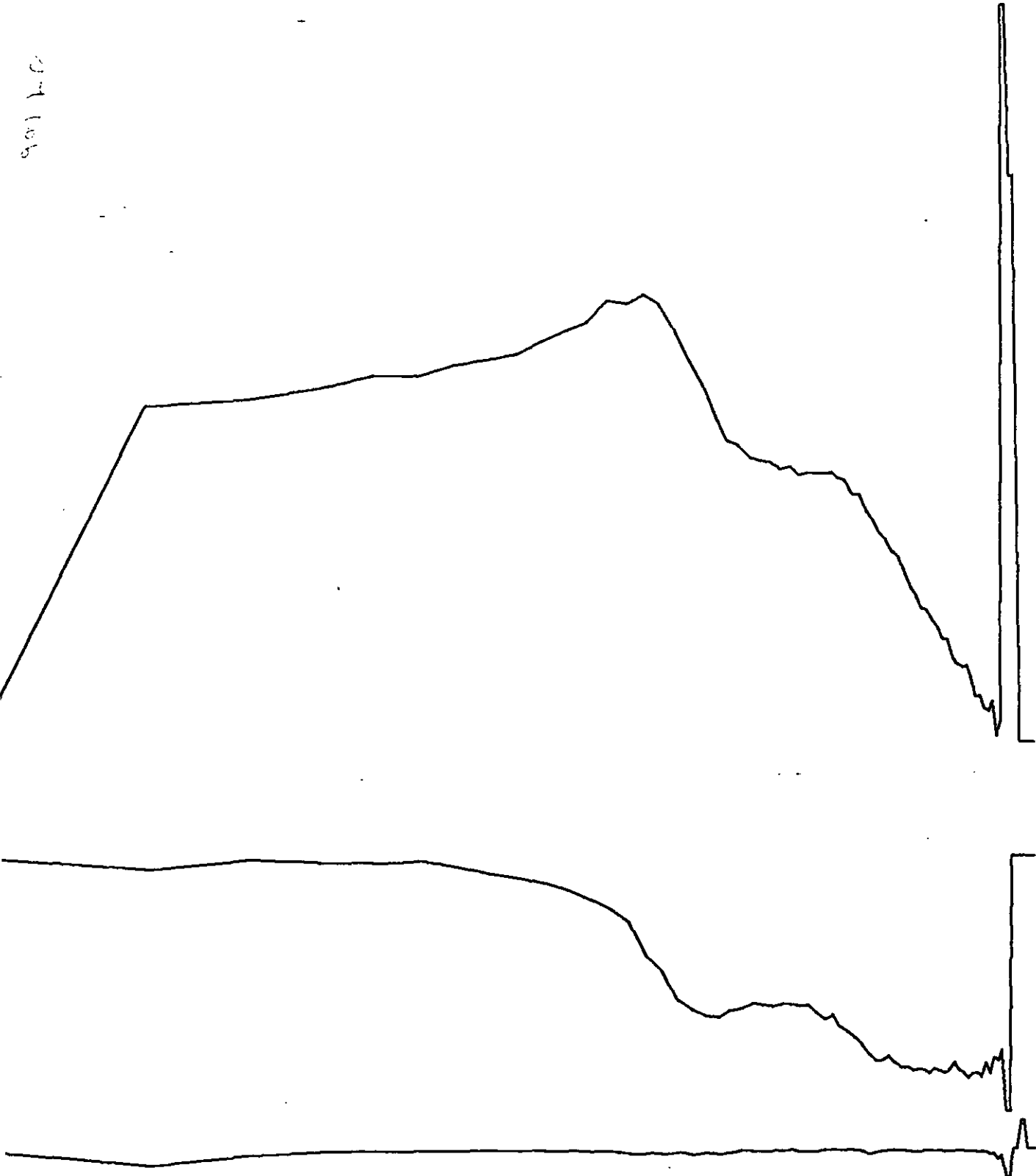


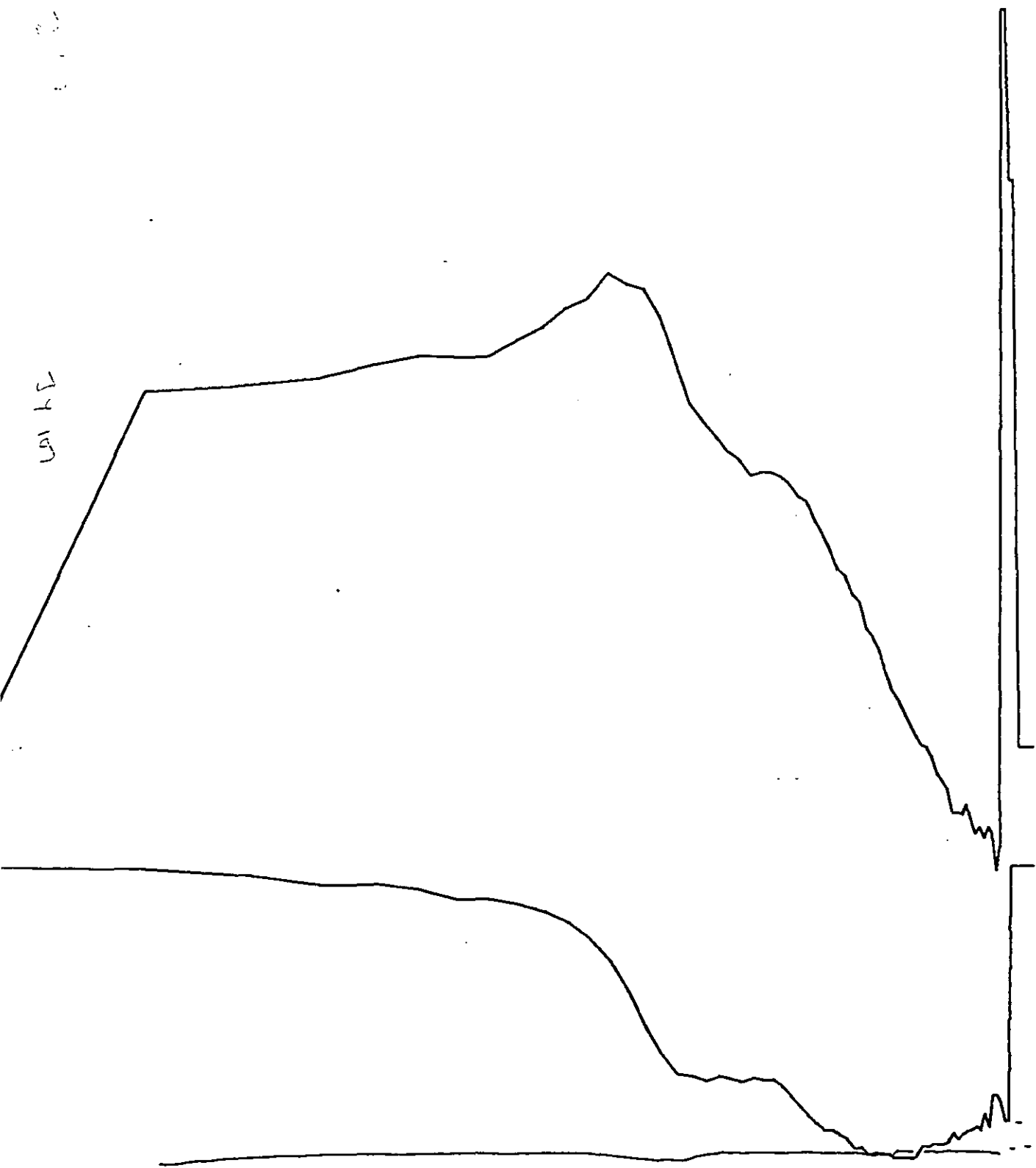
84 Q5A



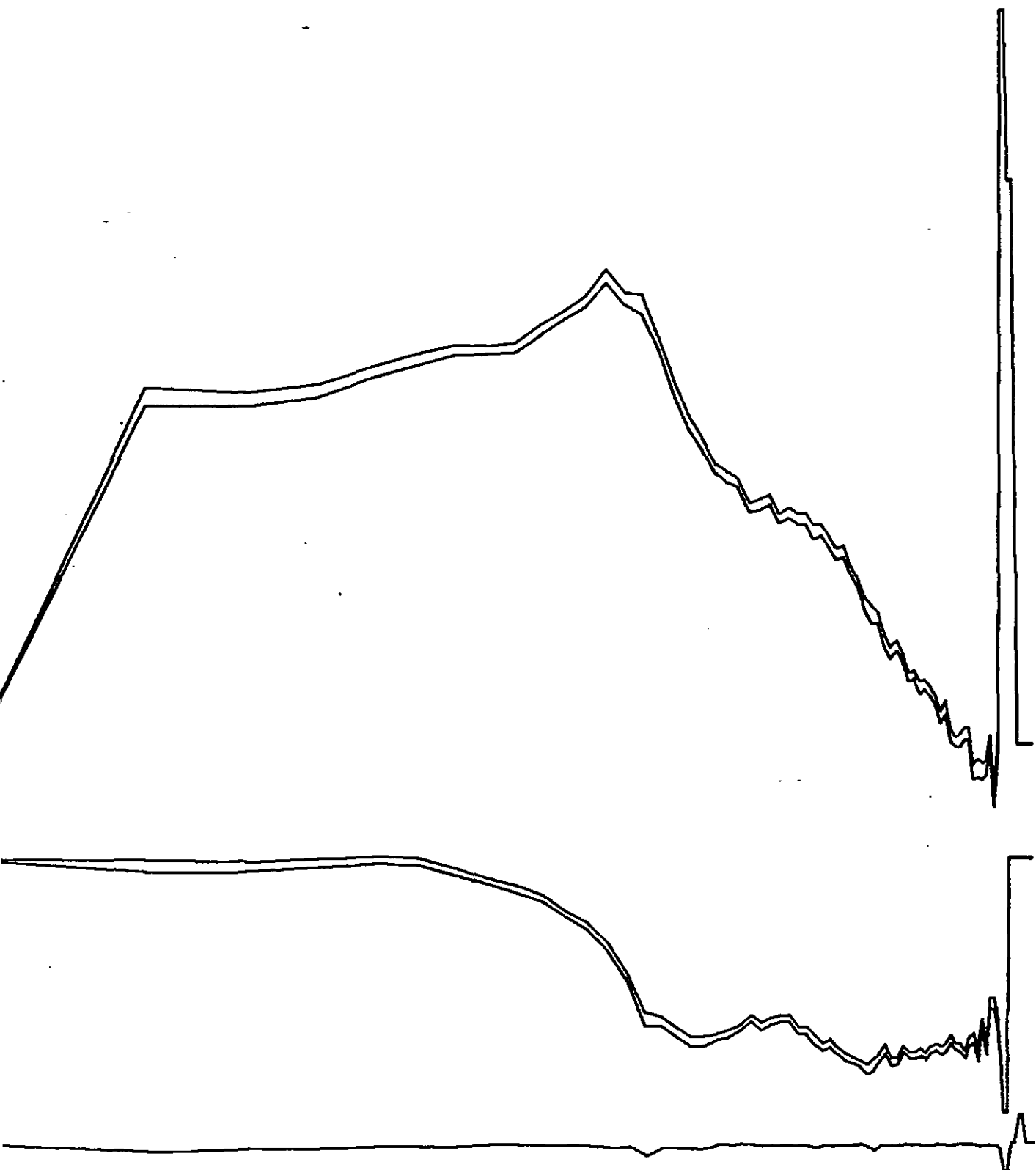
84 Q6A

901 L.C.



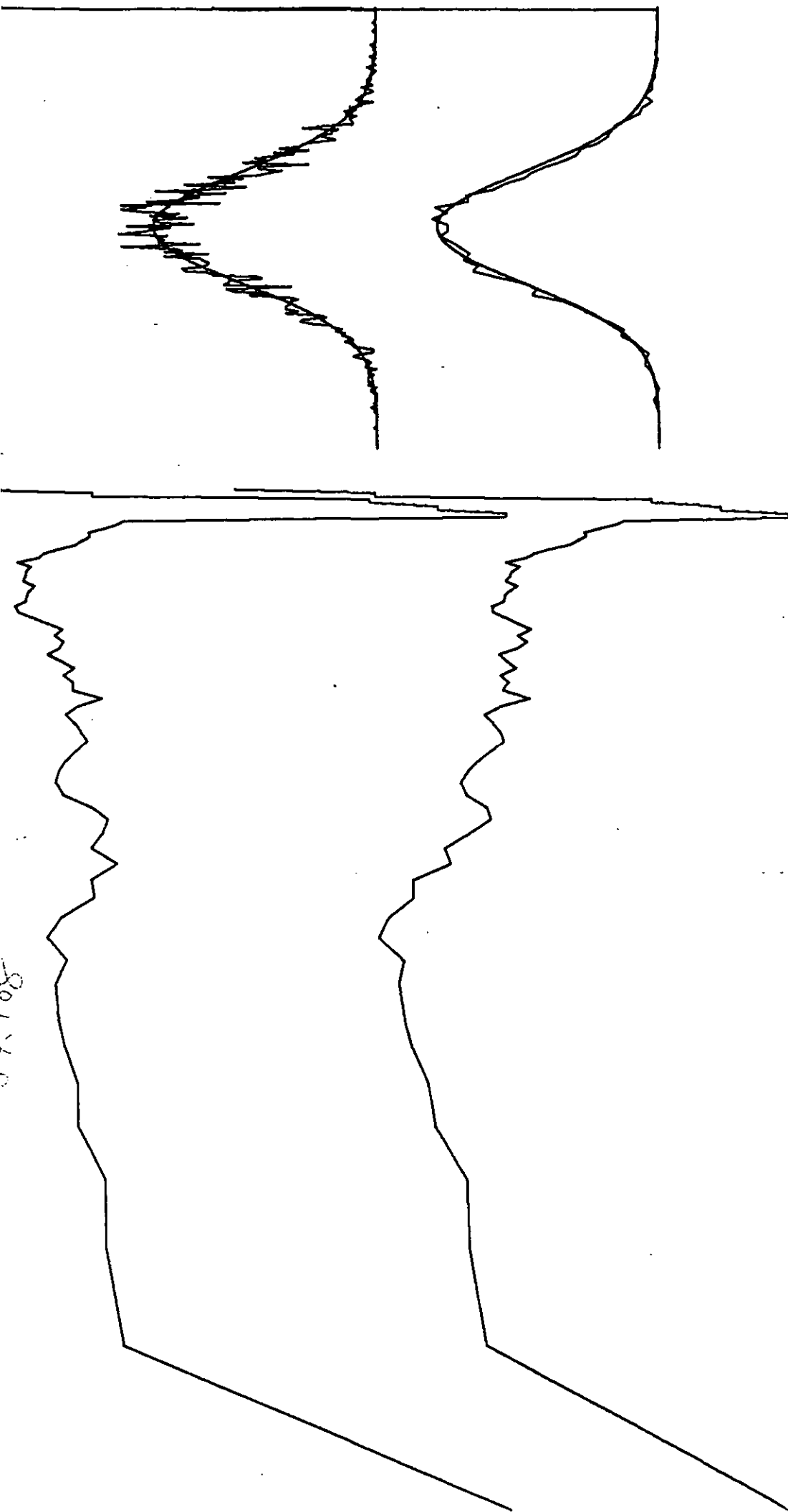


84 08 A

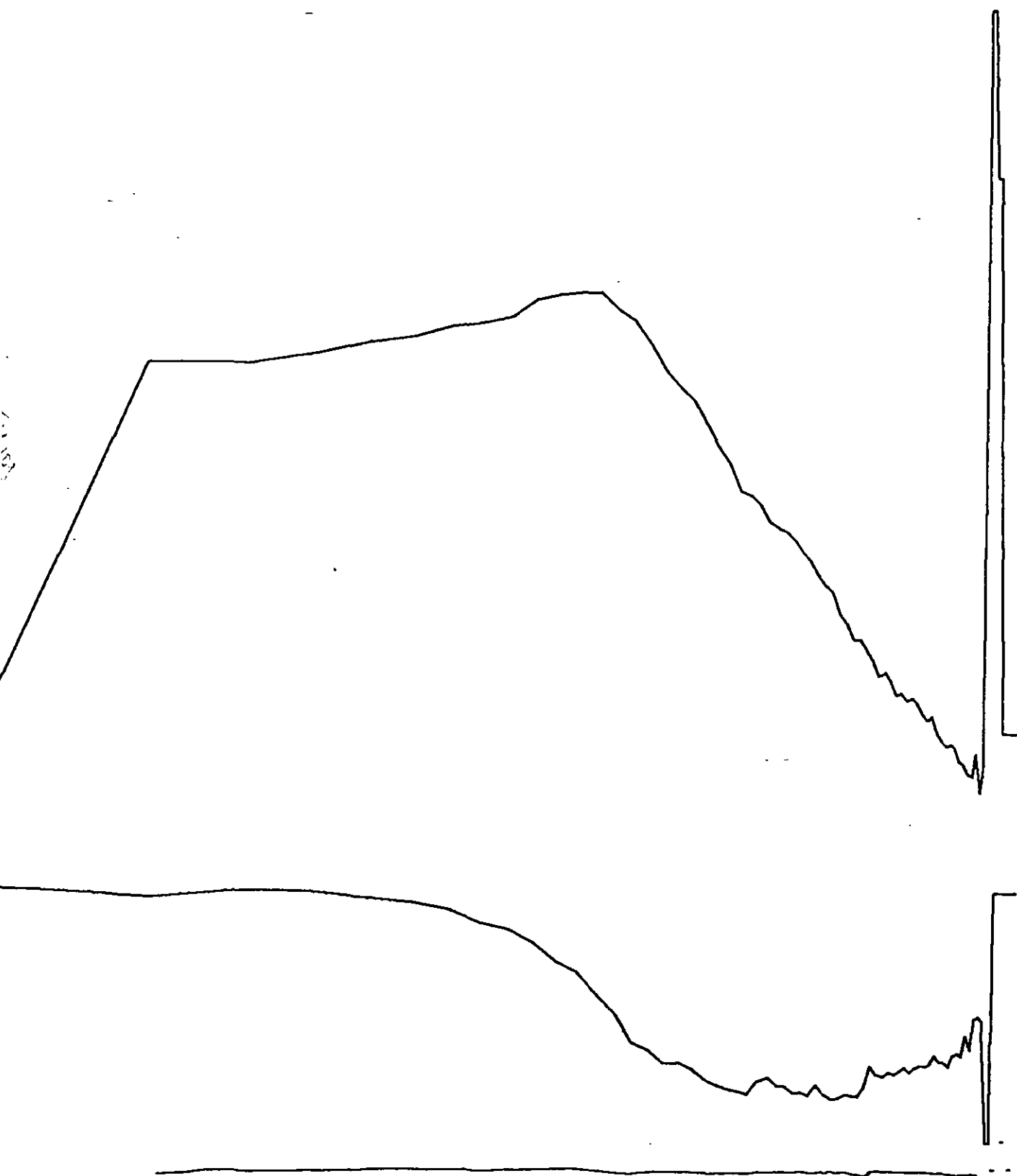


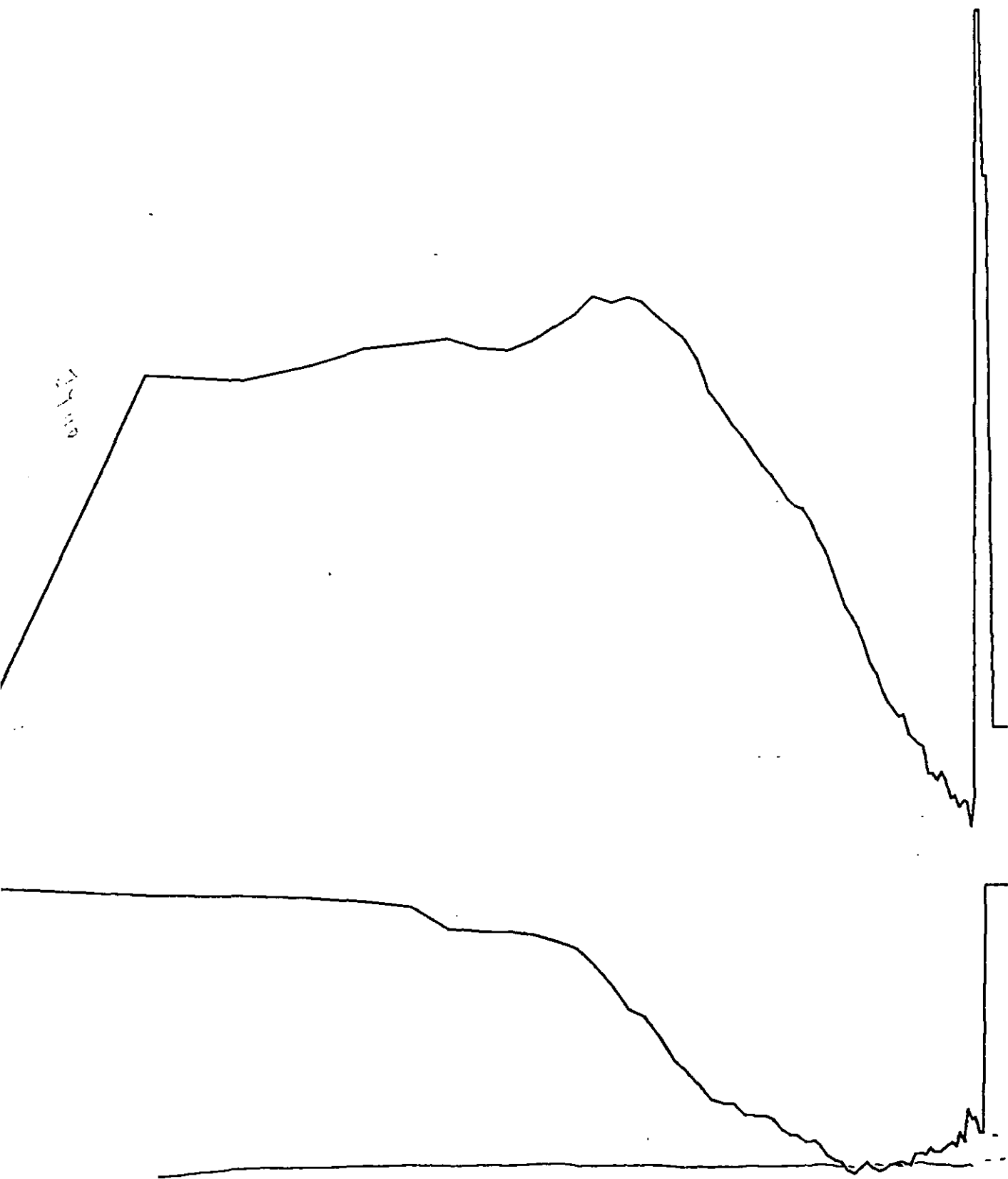
15-1-08

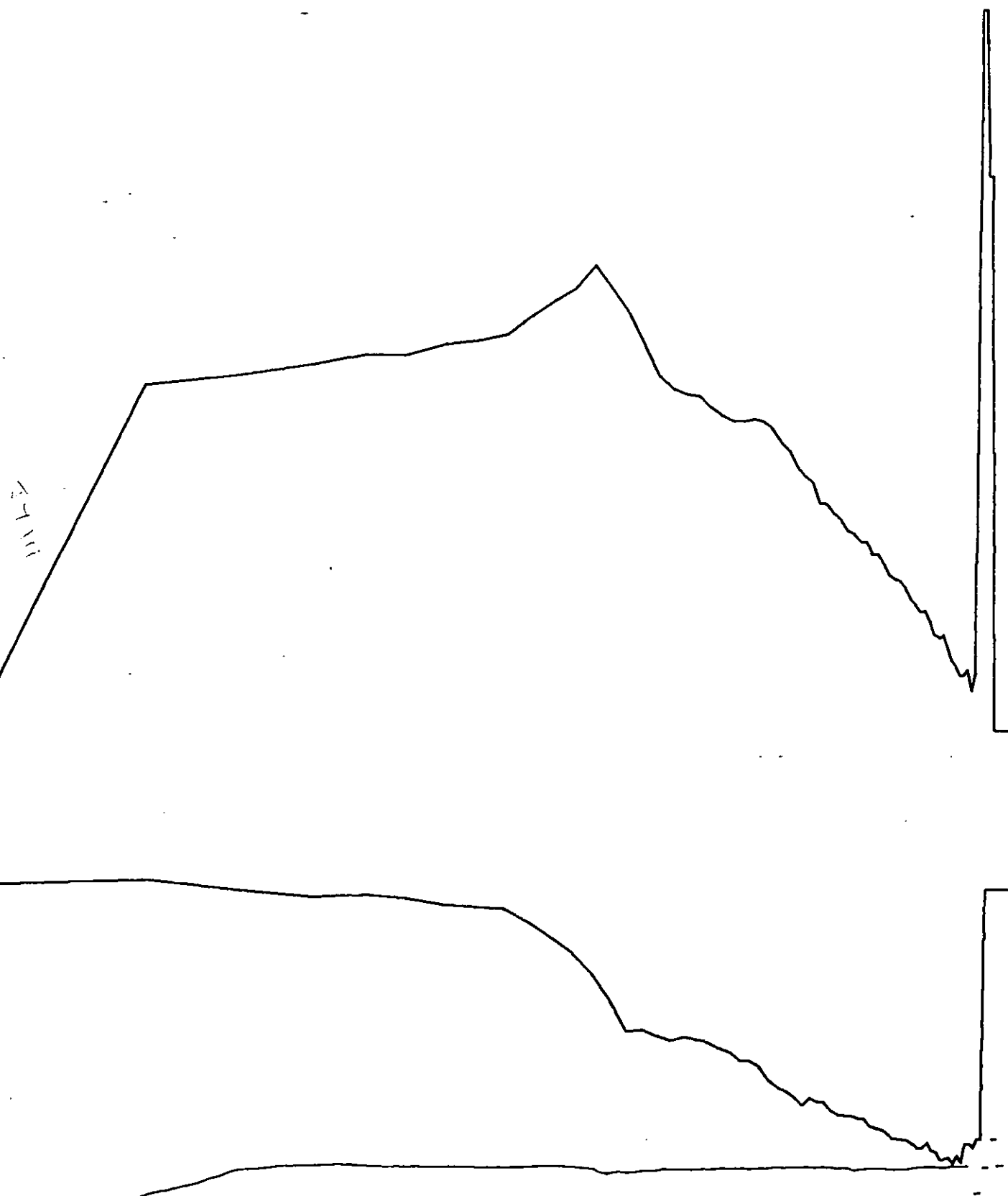
84 08A



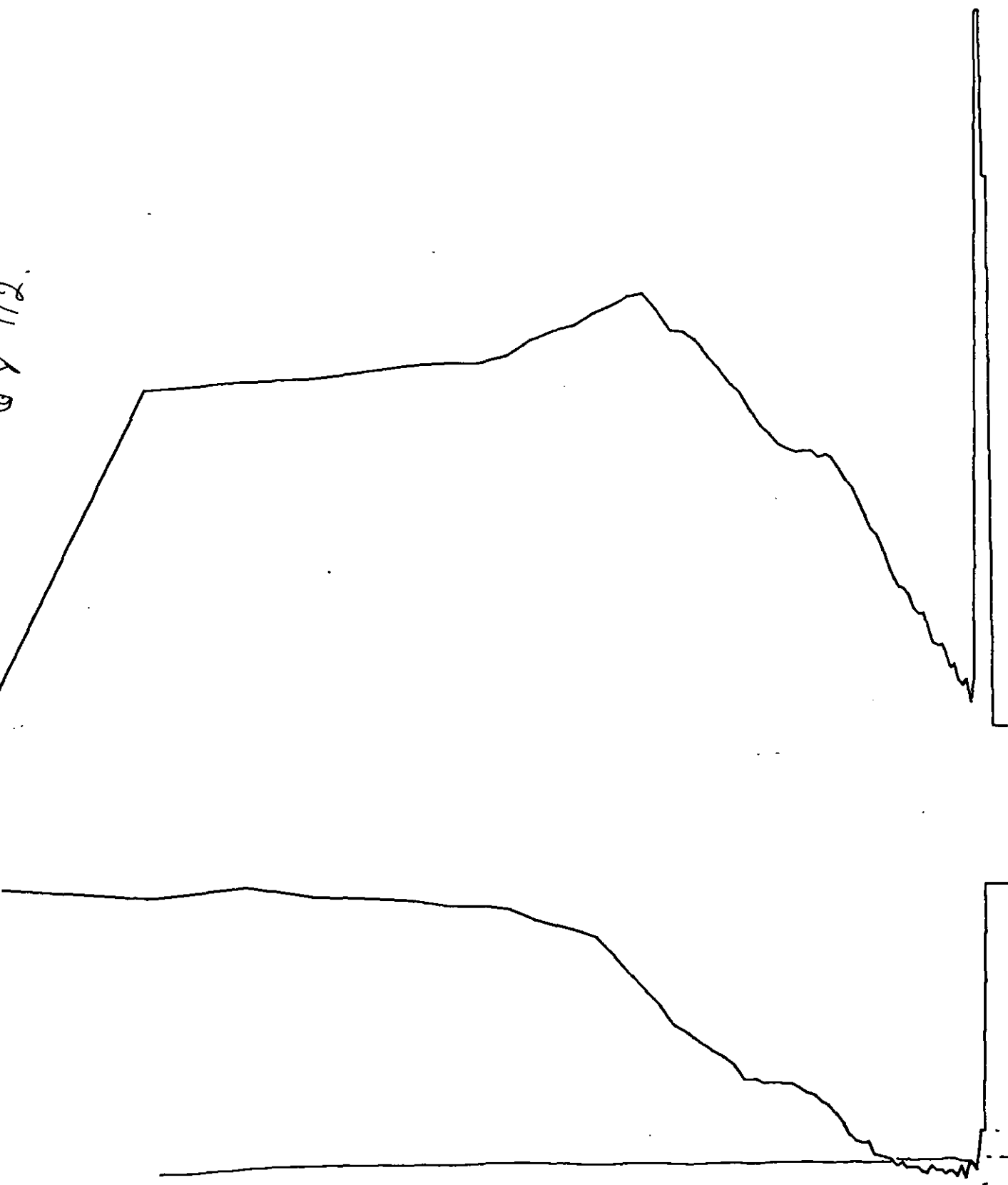
84 09A

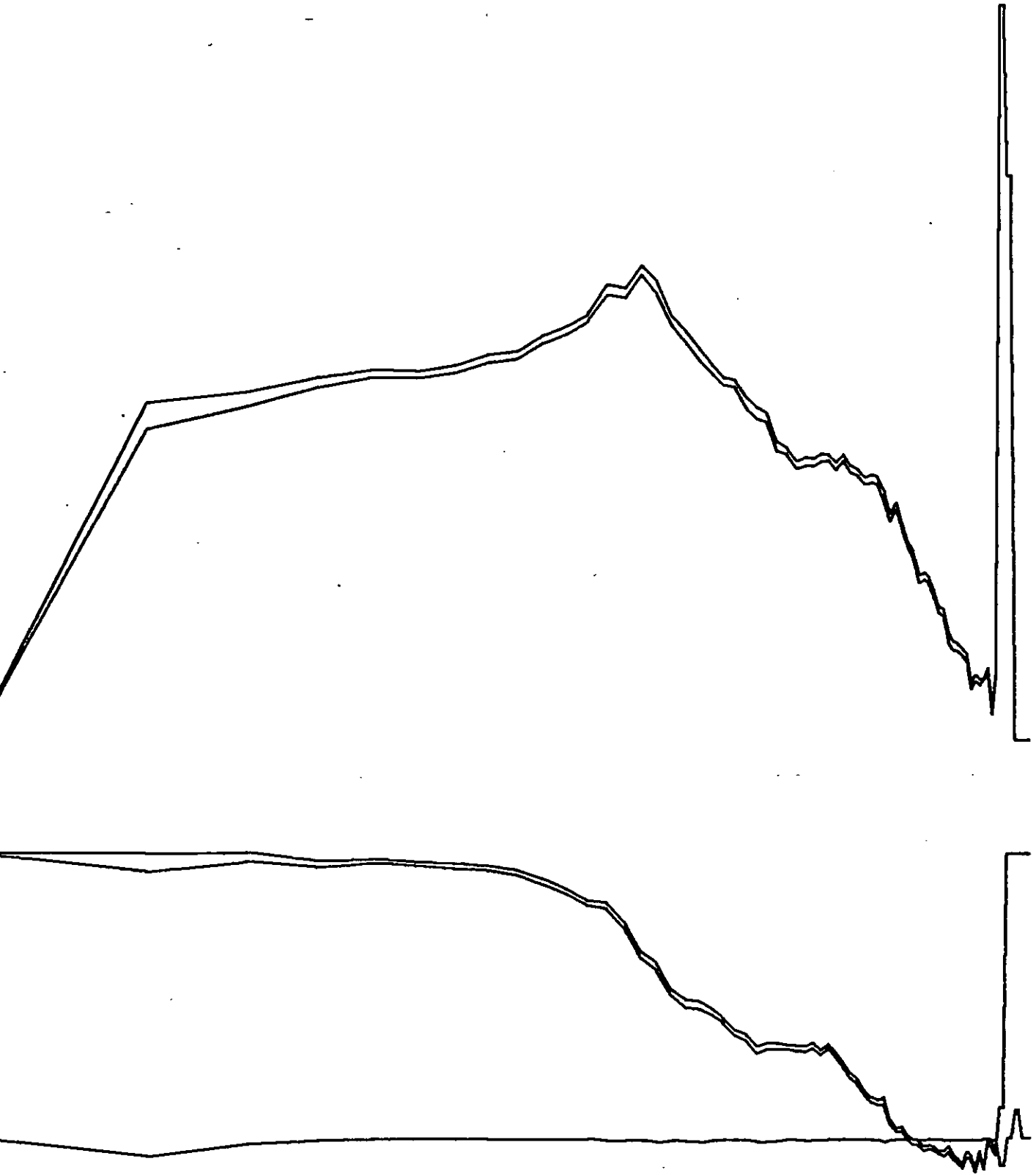




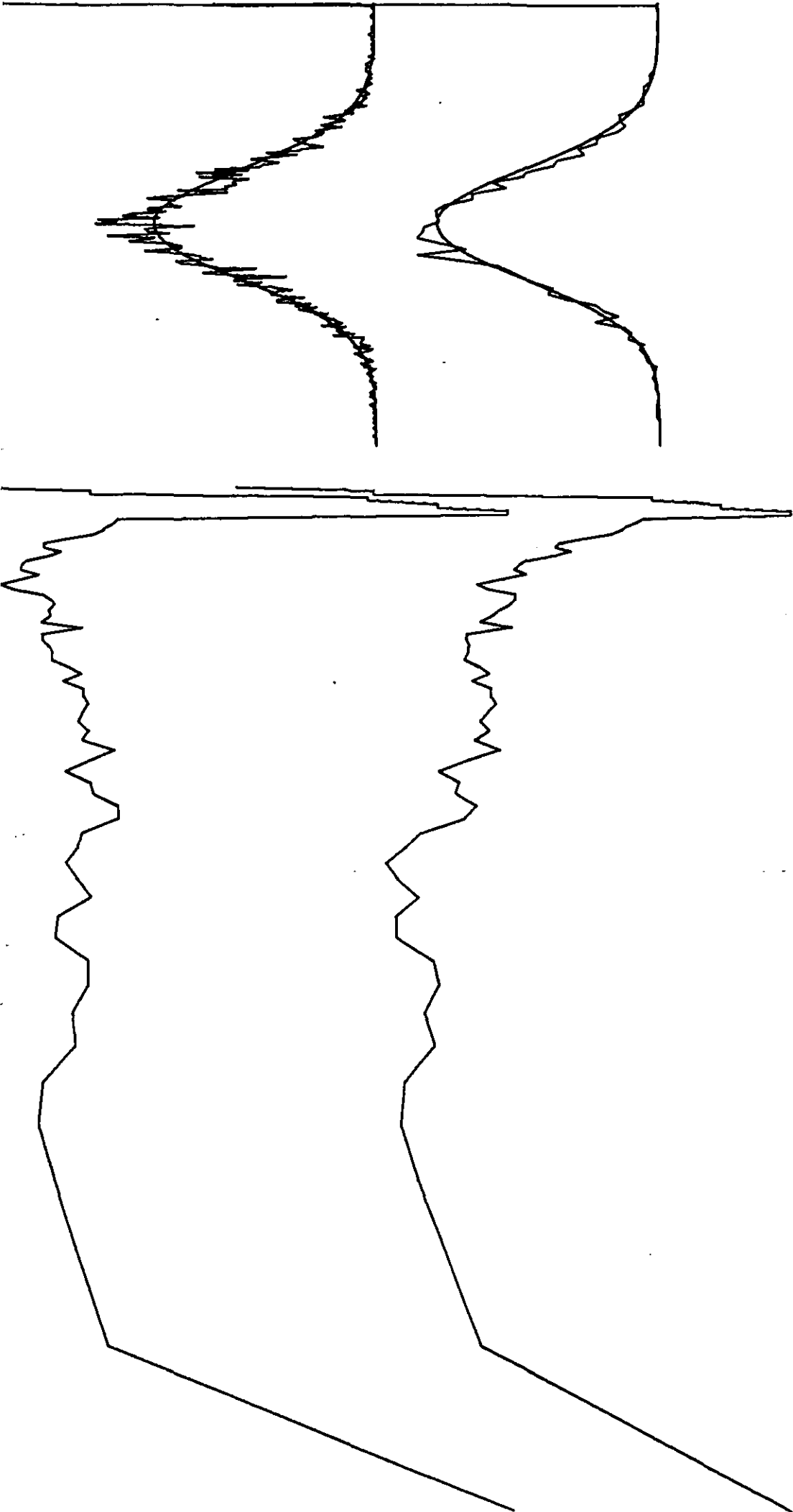


9 x 112.



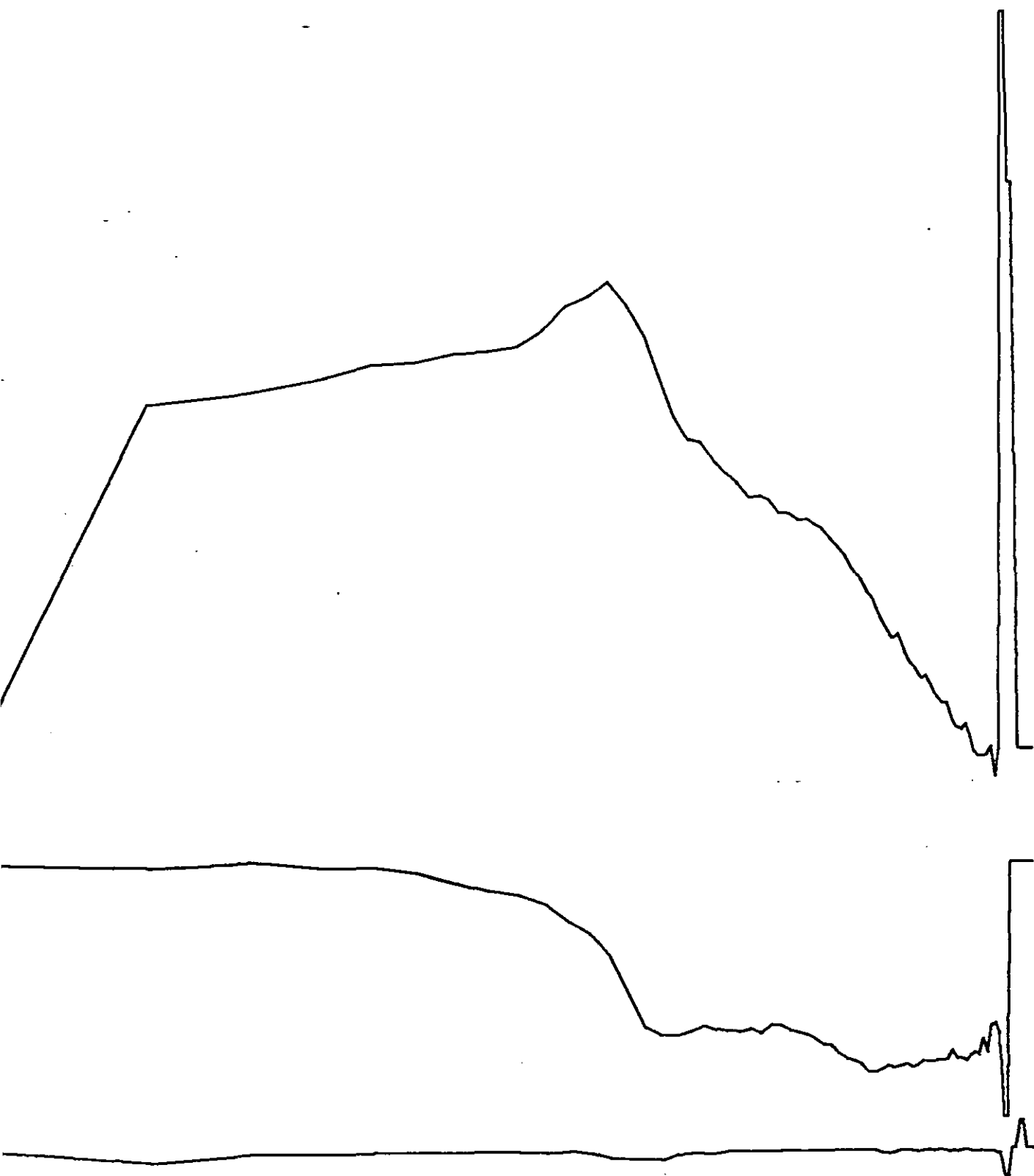


5/1/13

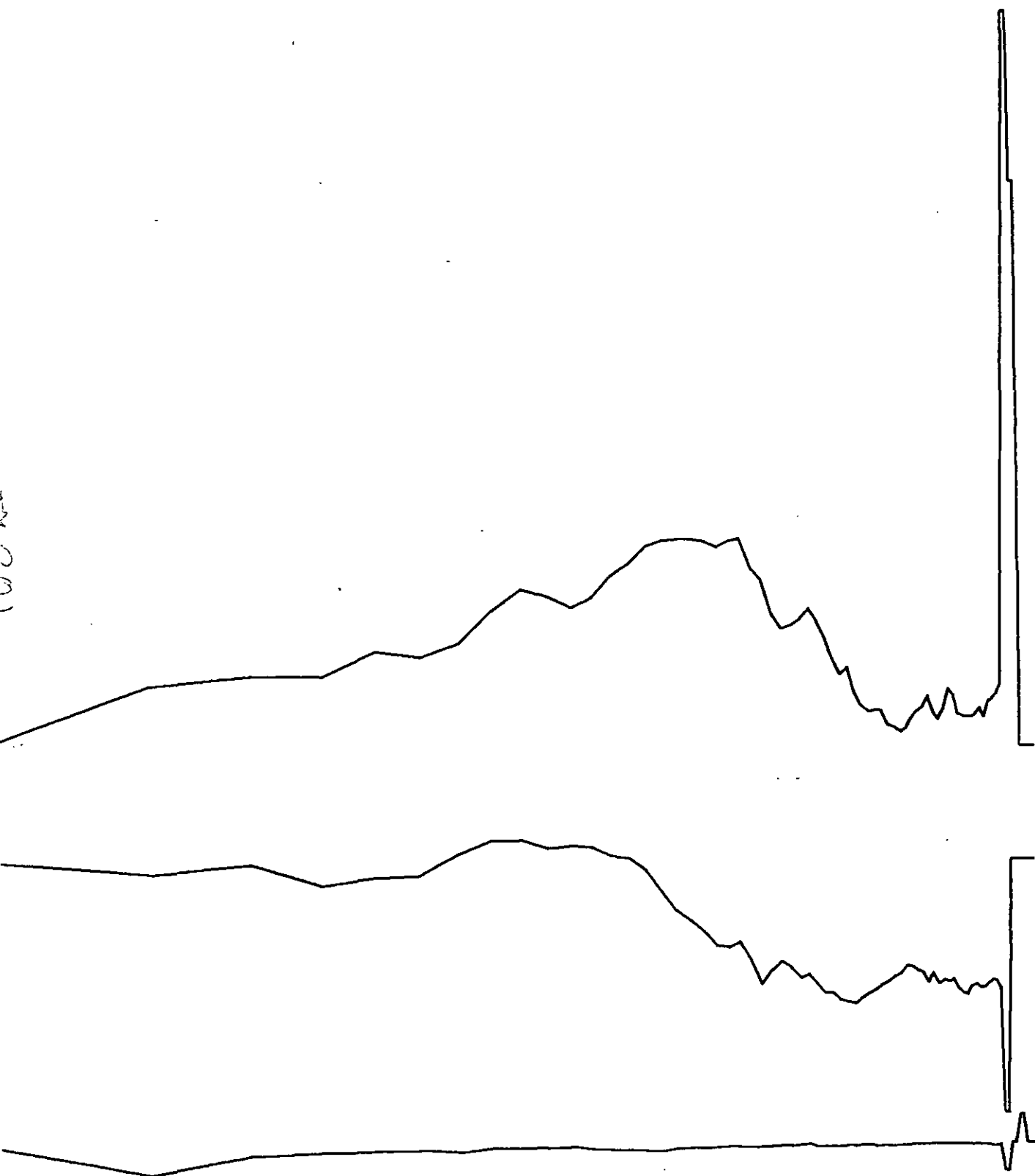


11A

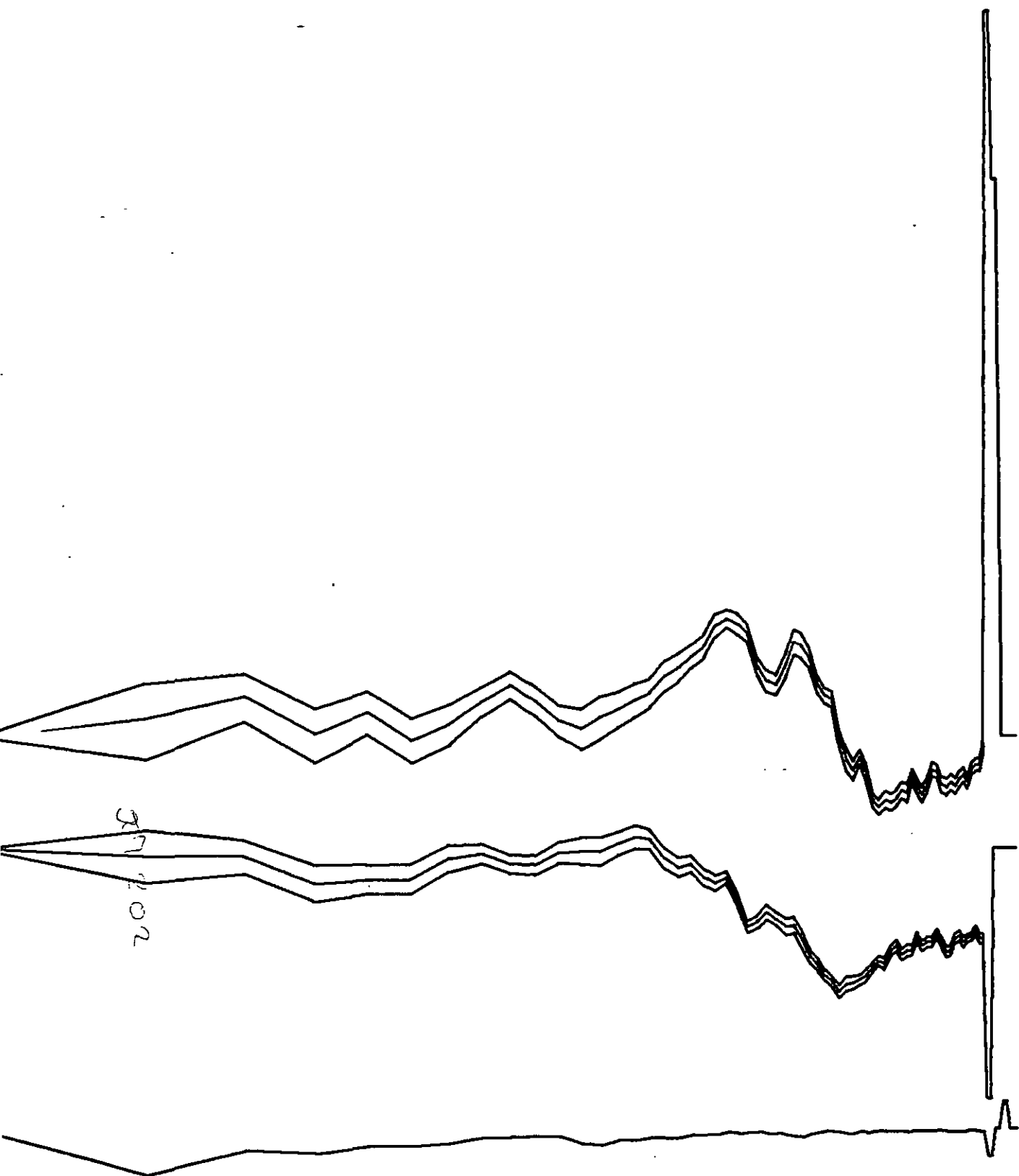
84 14A



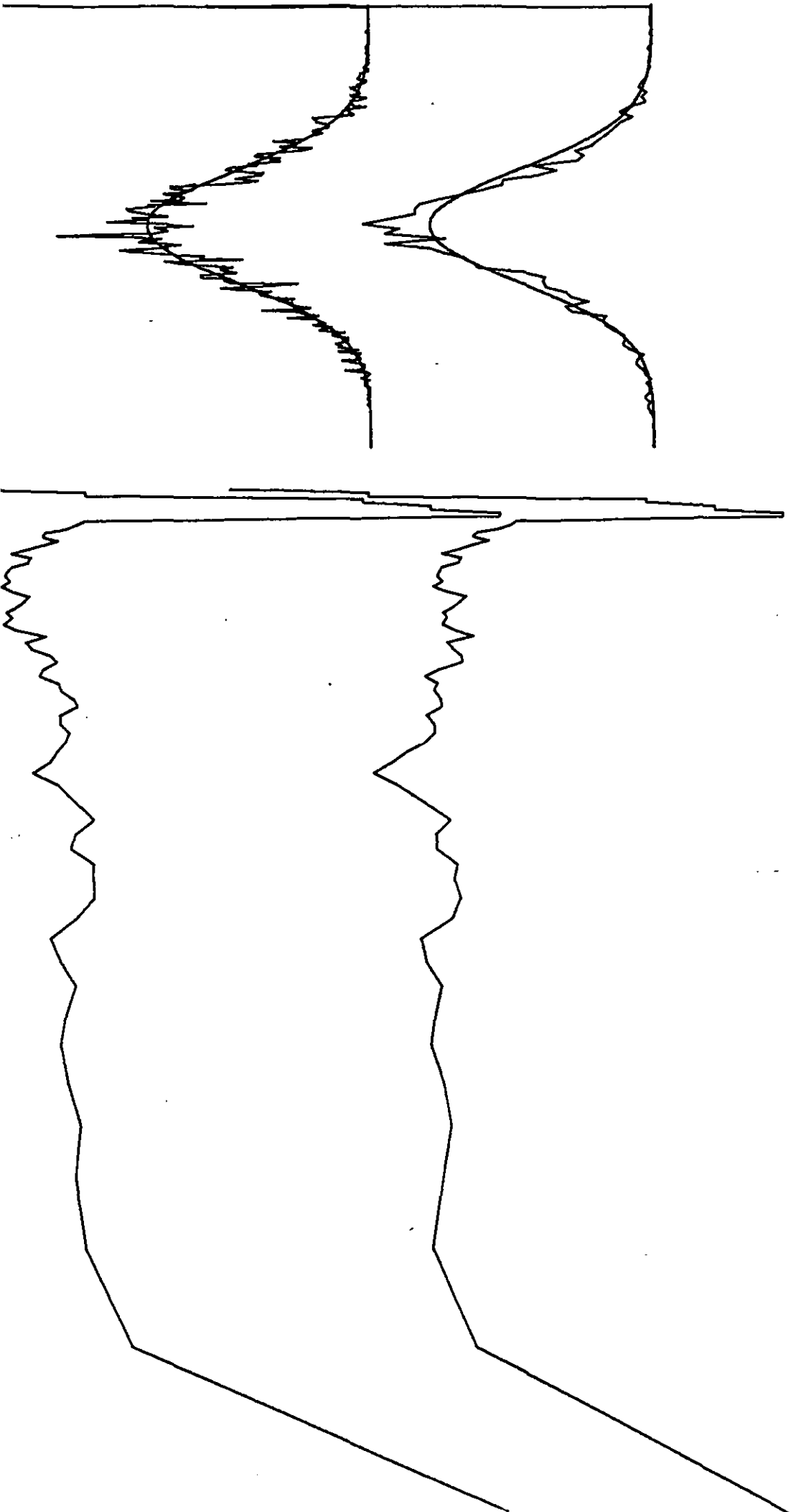
84 01 F



84 02 F

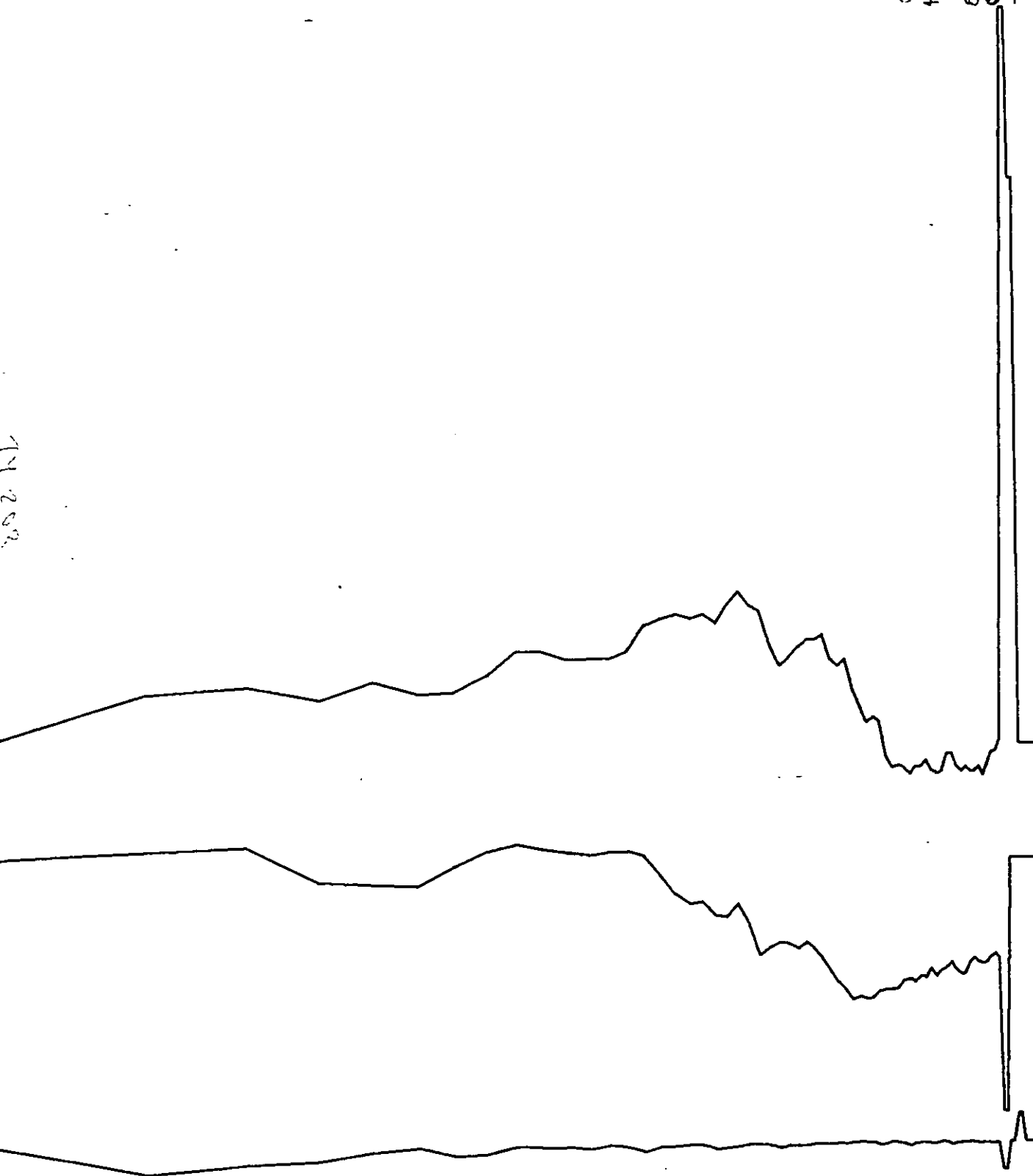


84 02 F

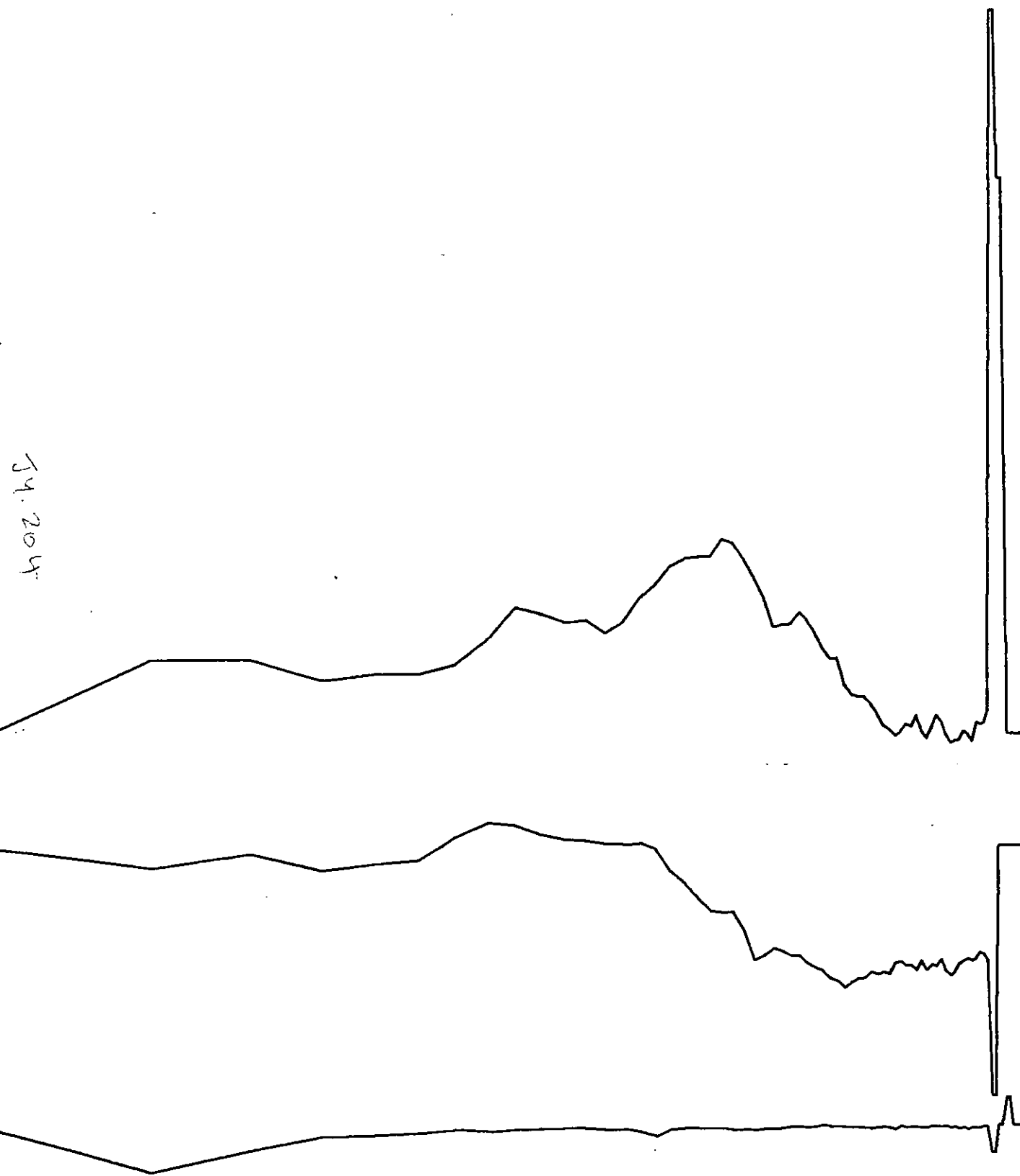


84 03 F

1920

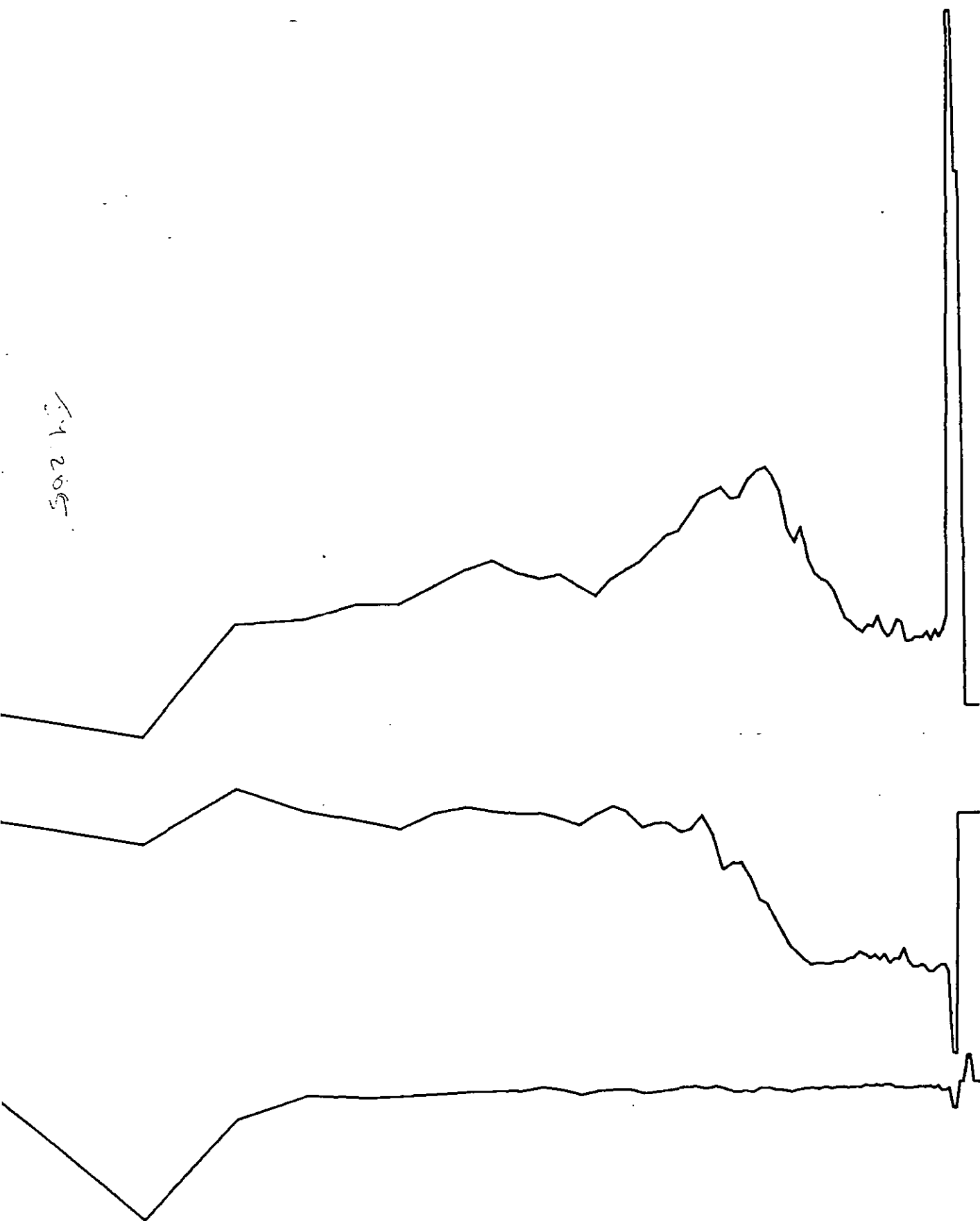


84 04 F



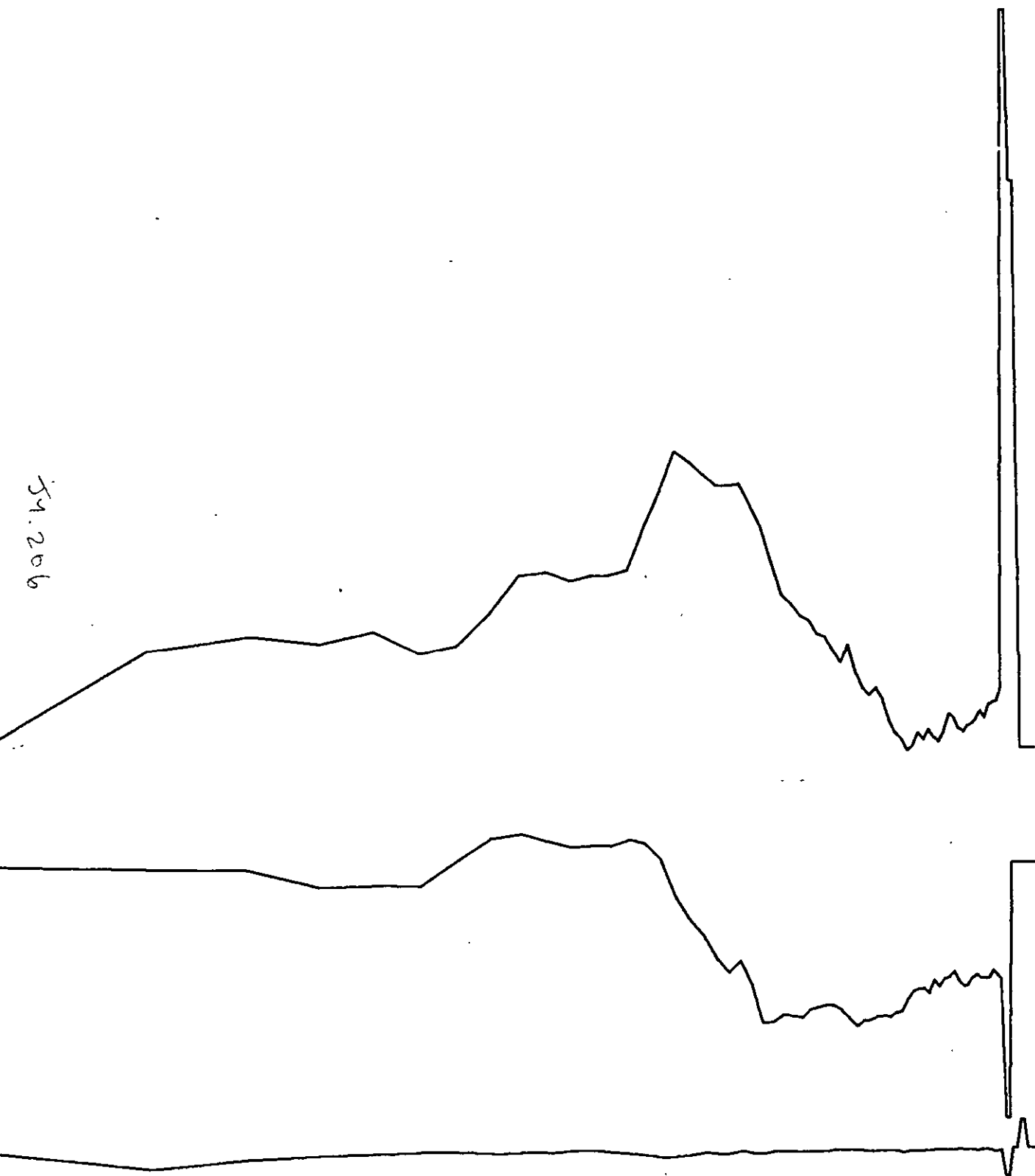
84 05 F

50217



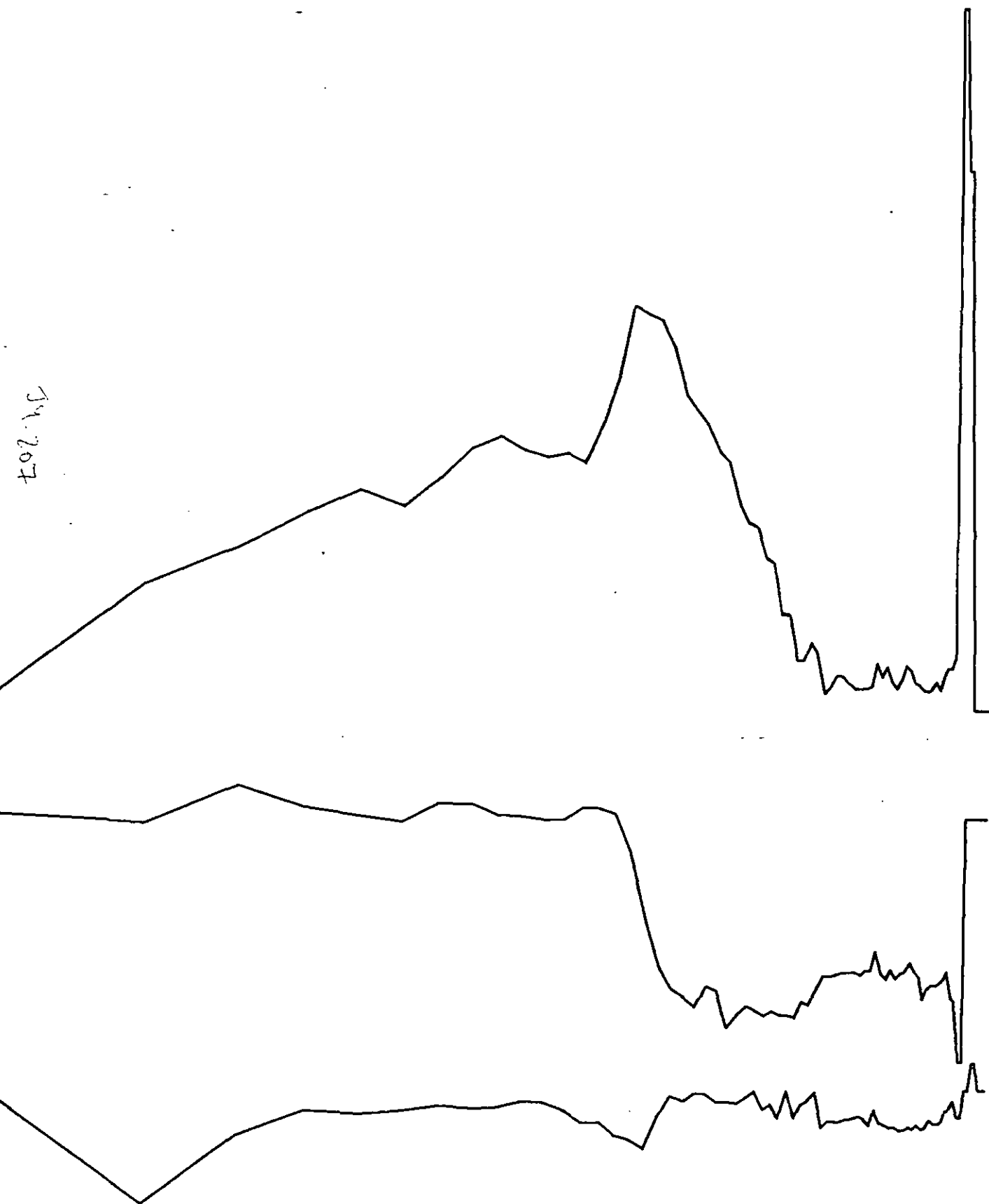
84 06 F

59.206

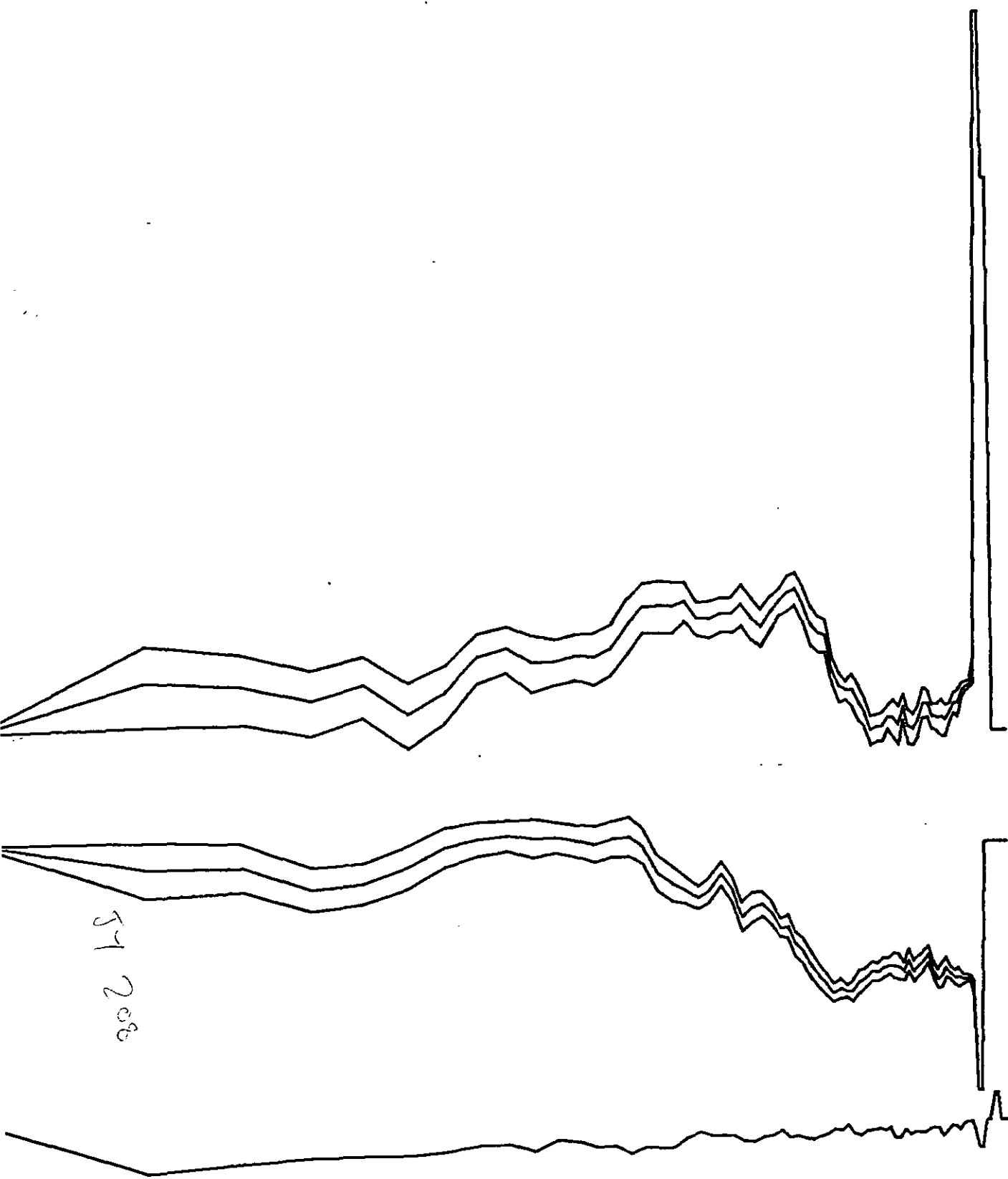


84 07F

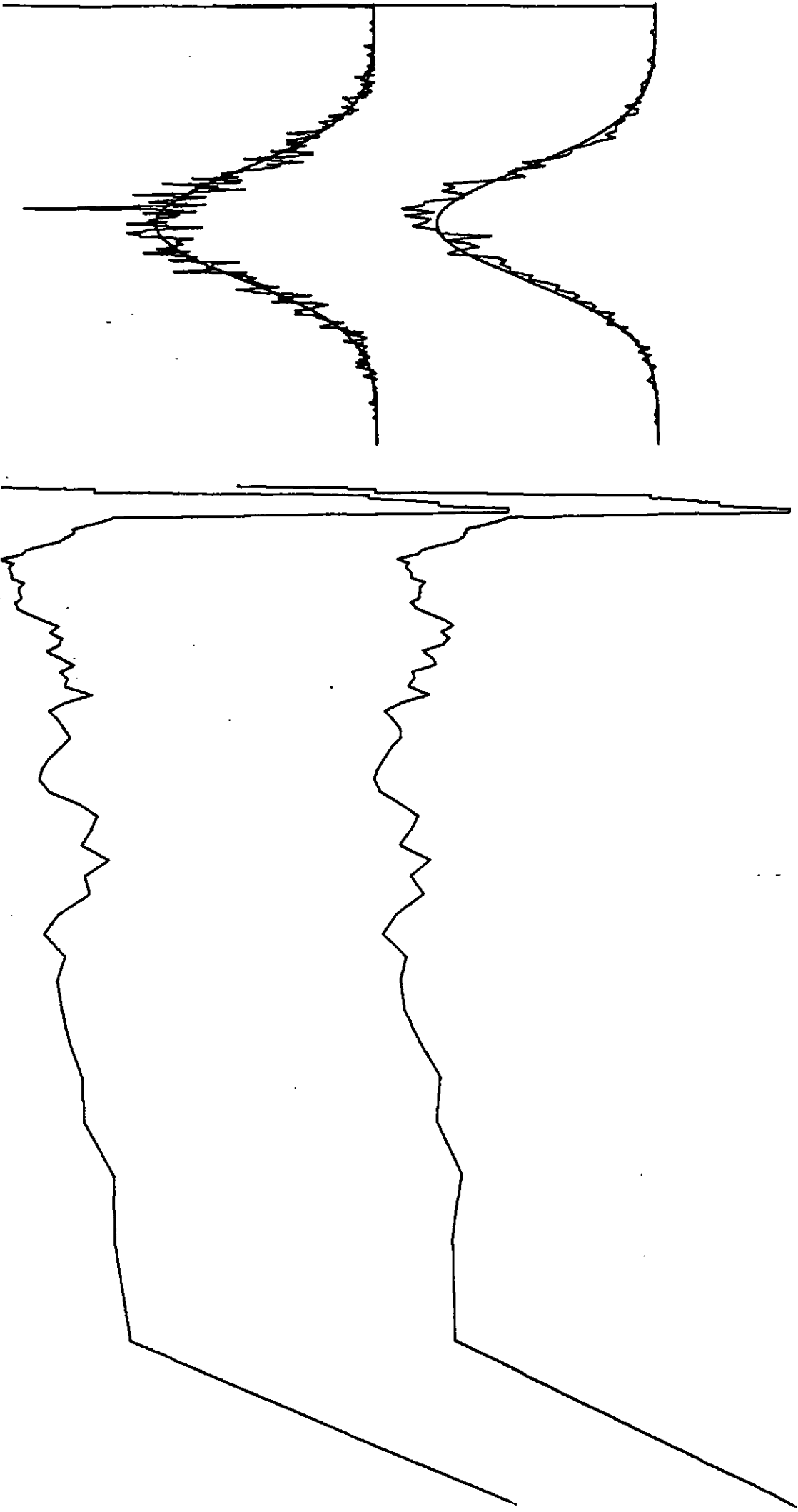
34.207



84 08 F

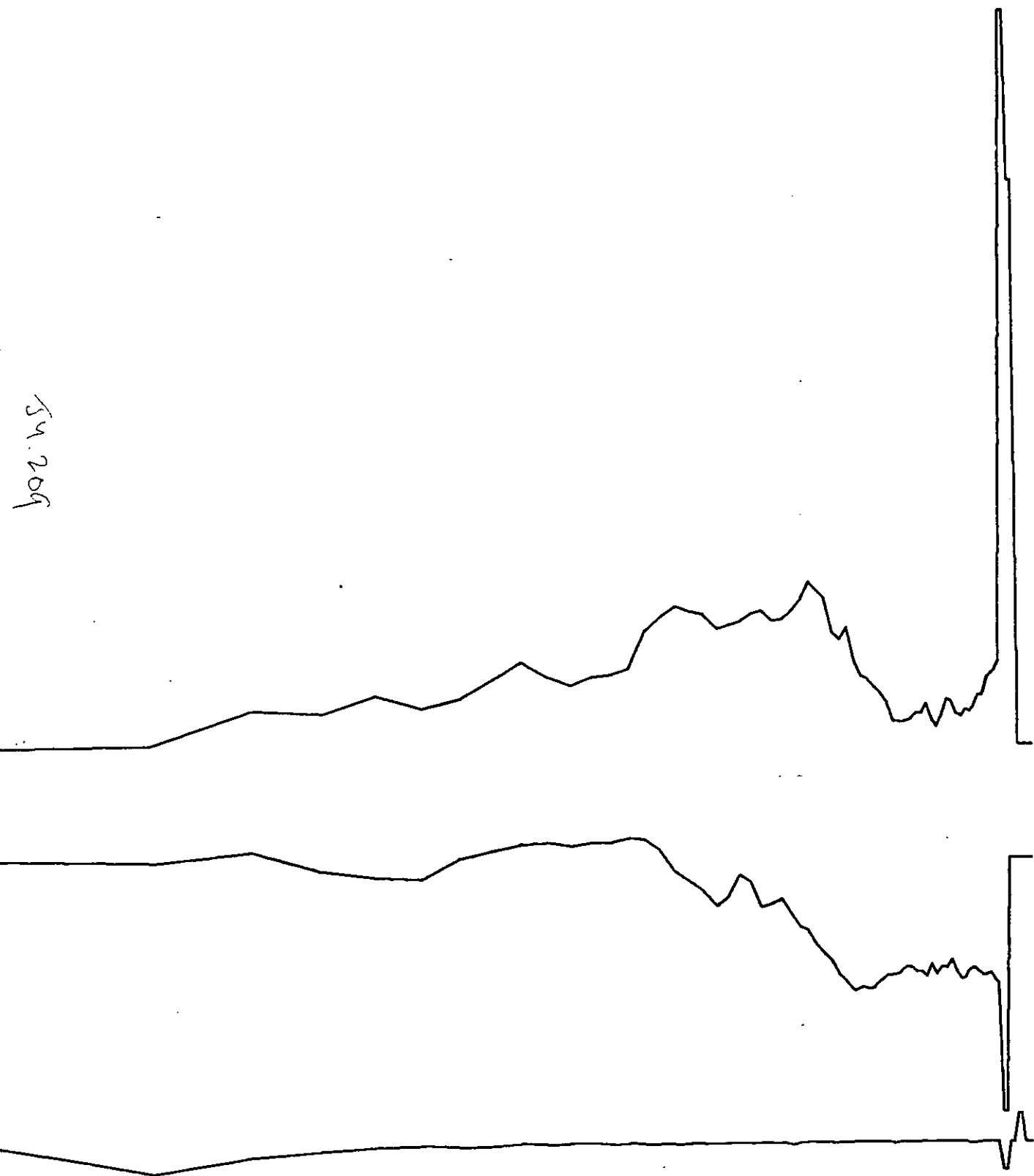


84 08 F



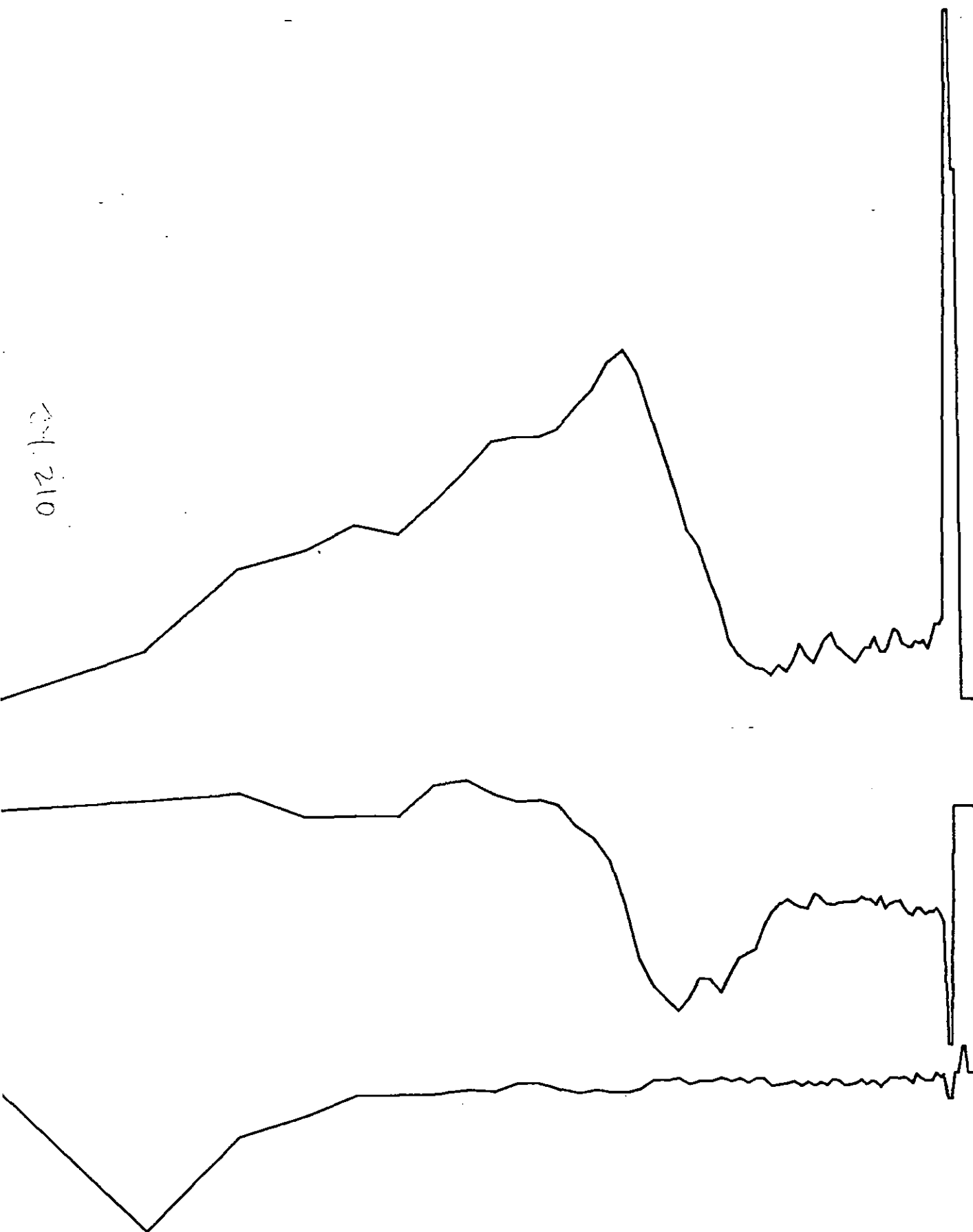
84 09 F

54.209

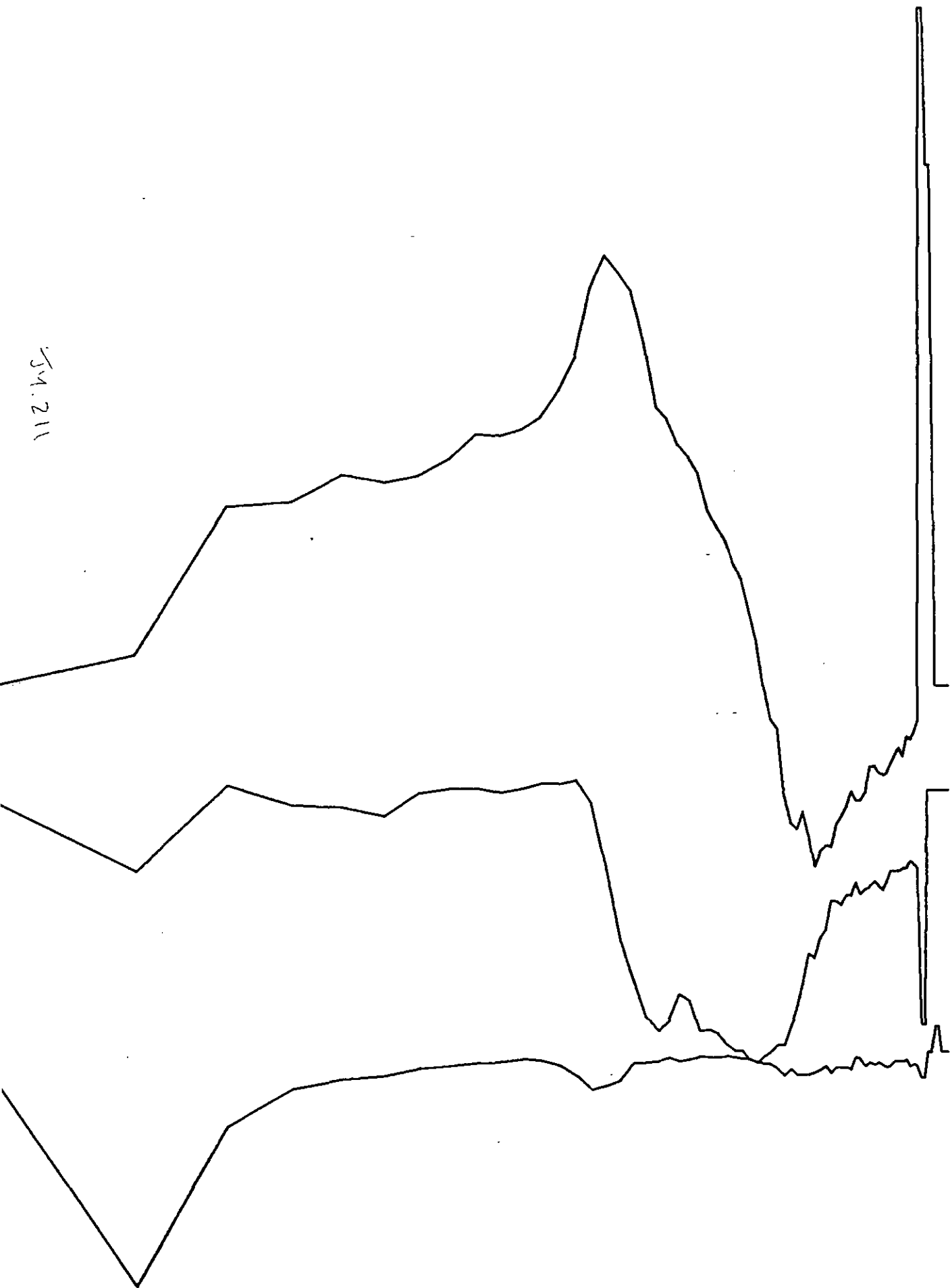


84 10F

24.210

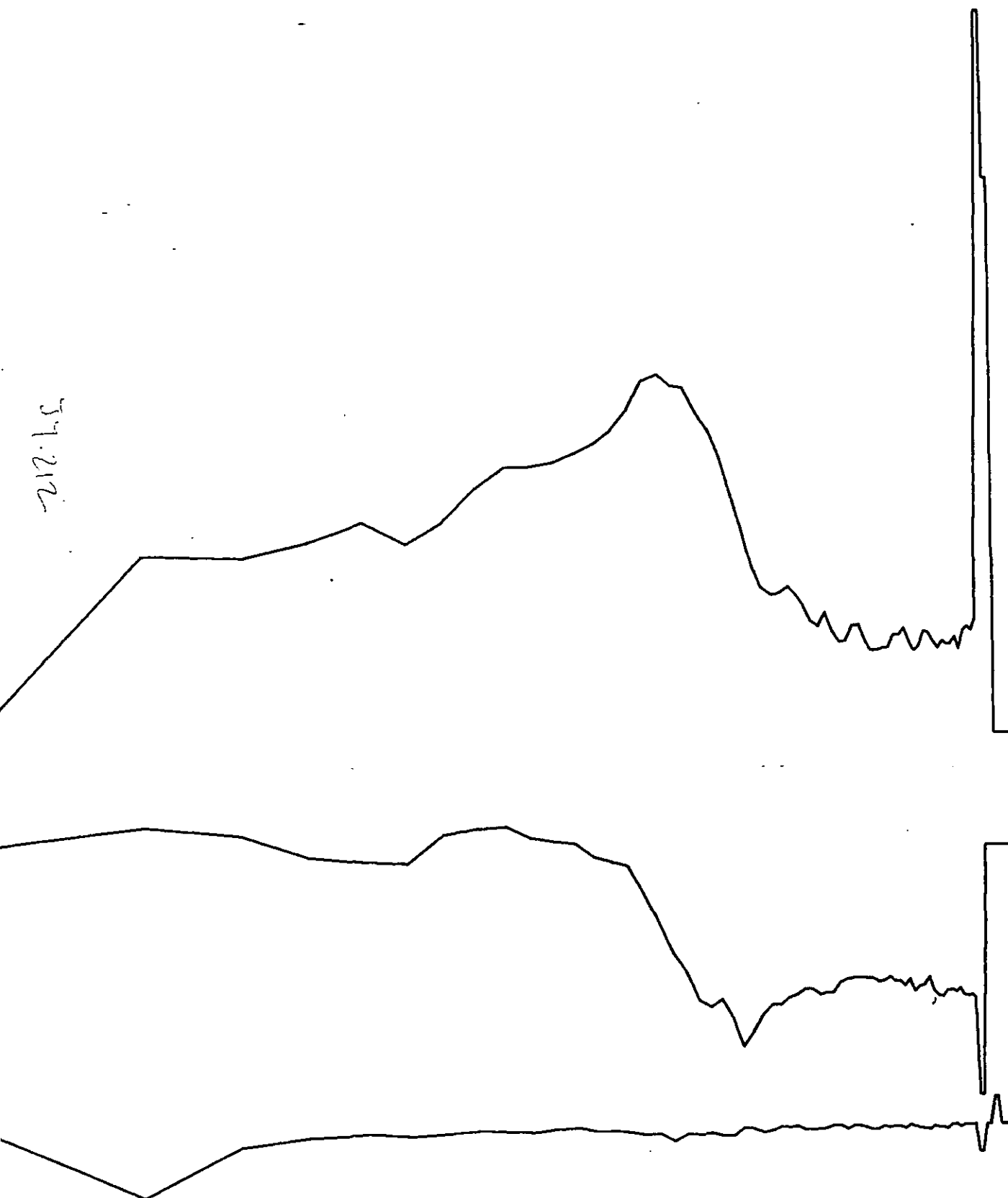


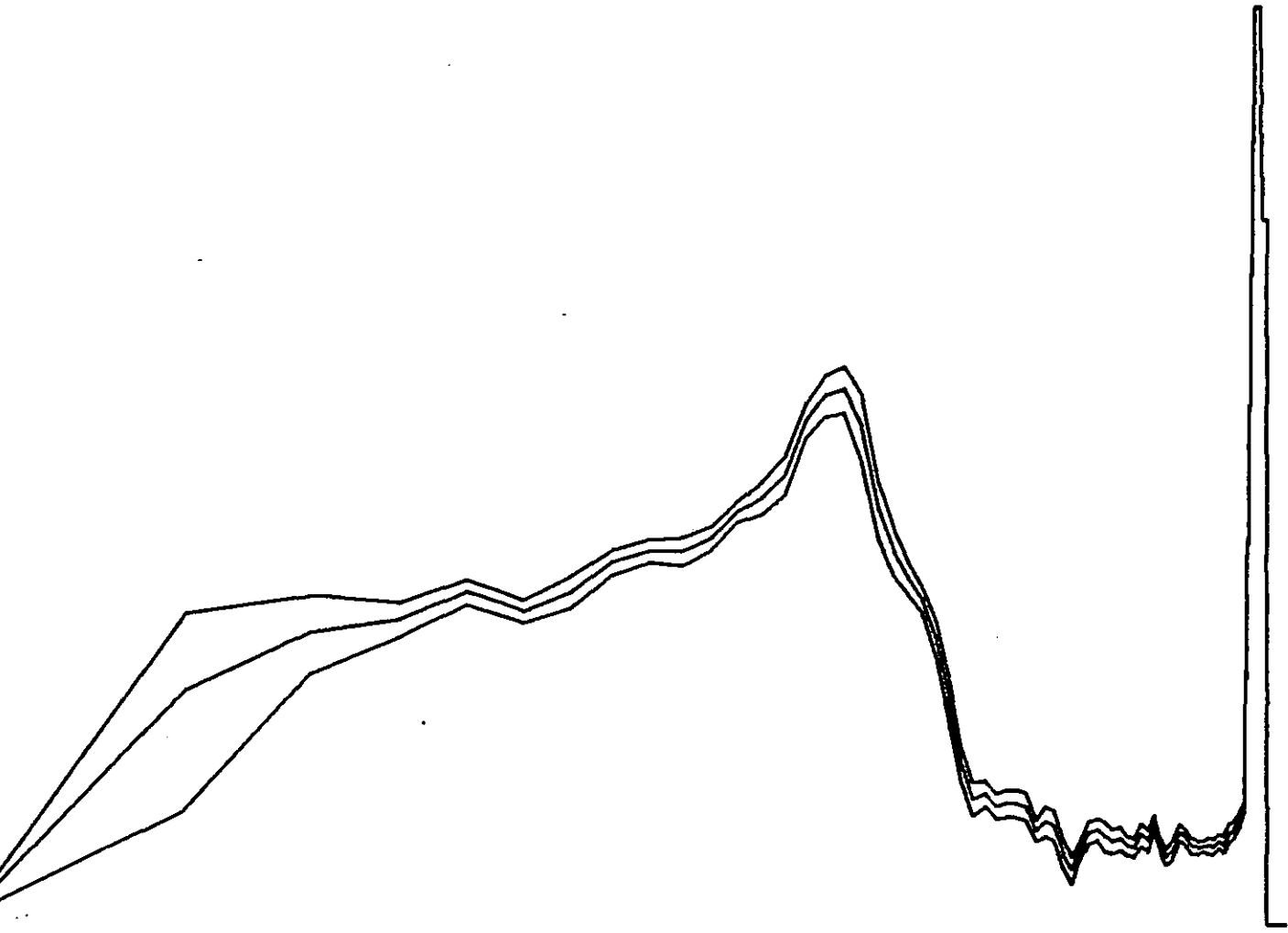
54.211



84 12 F

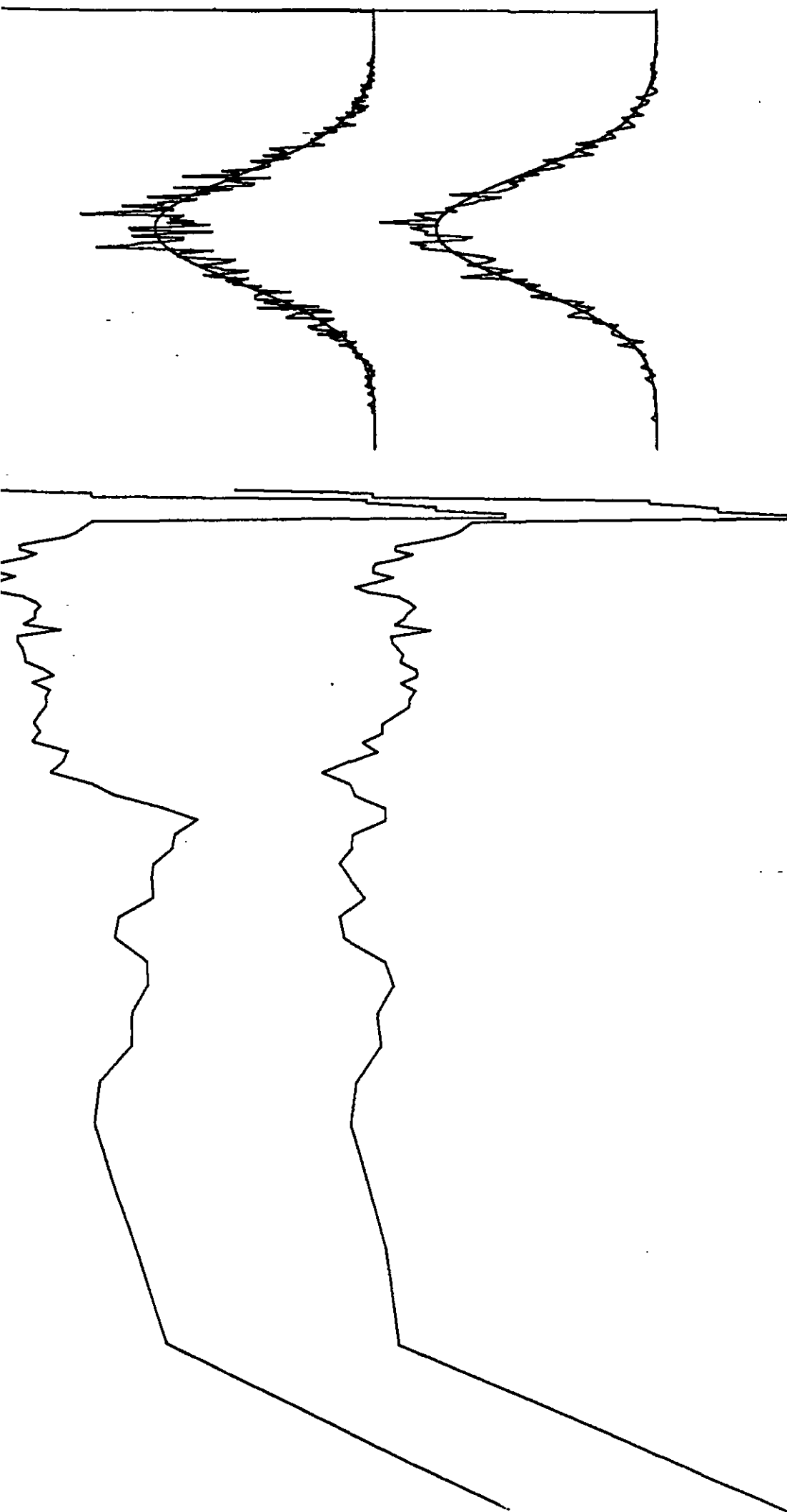
59.212





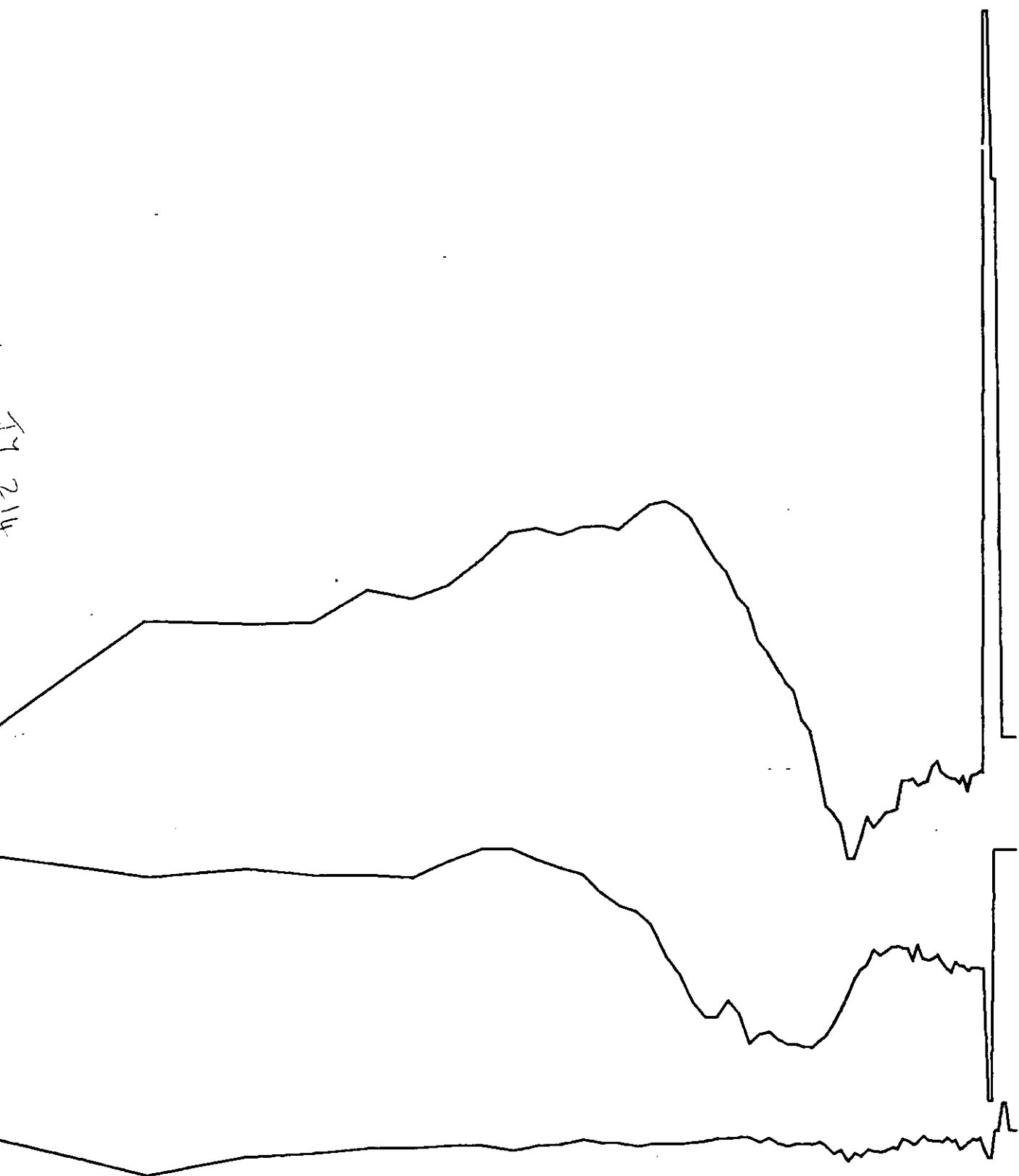
7-1 200

84 13 F

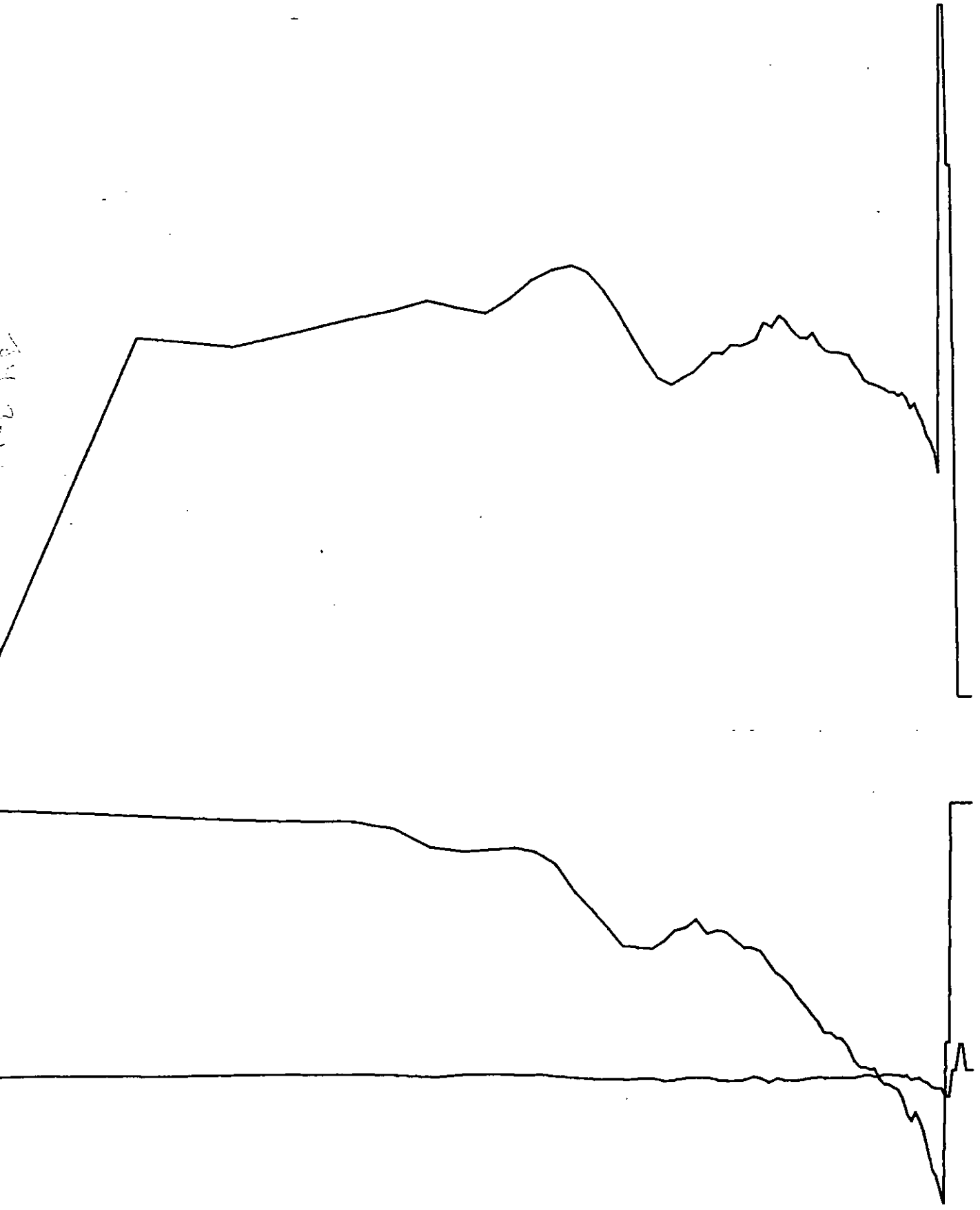


84 14 F

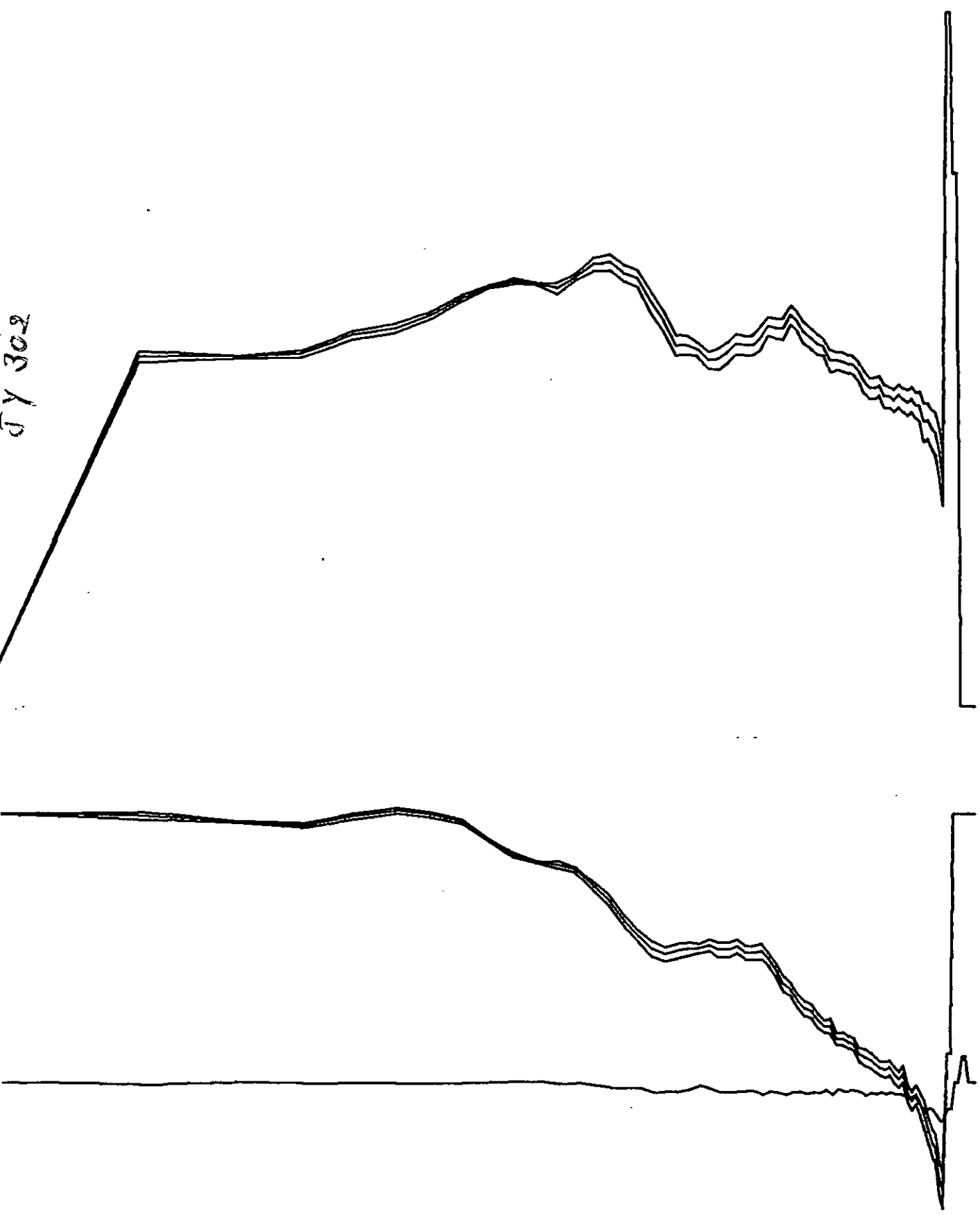
19 214



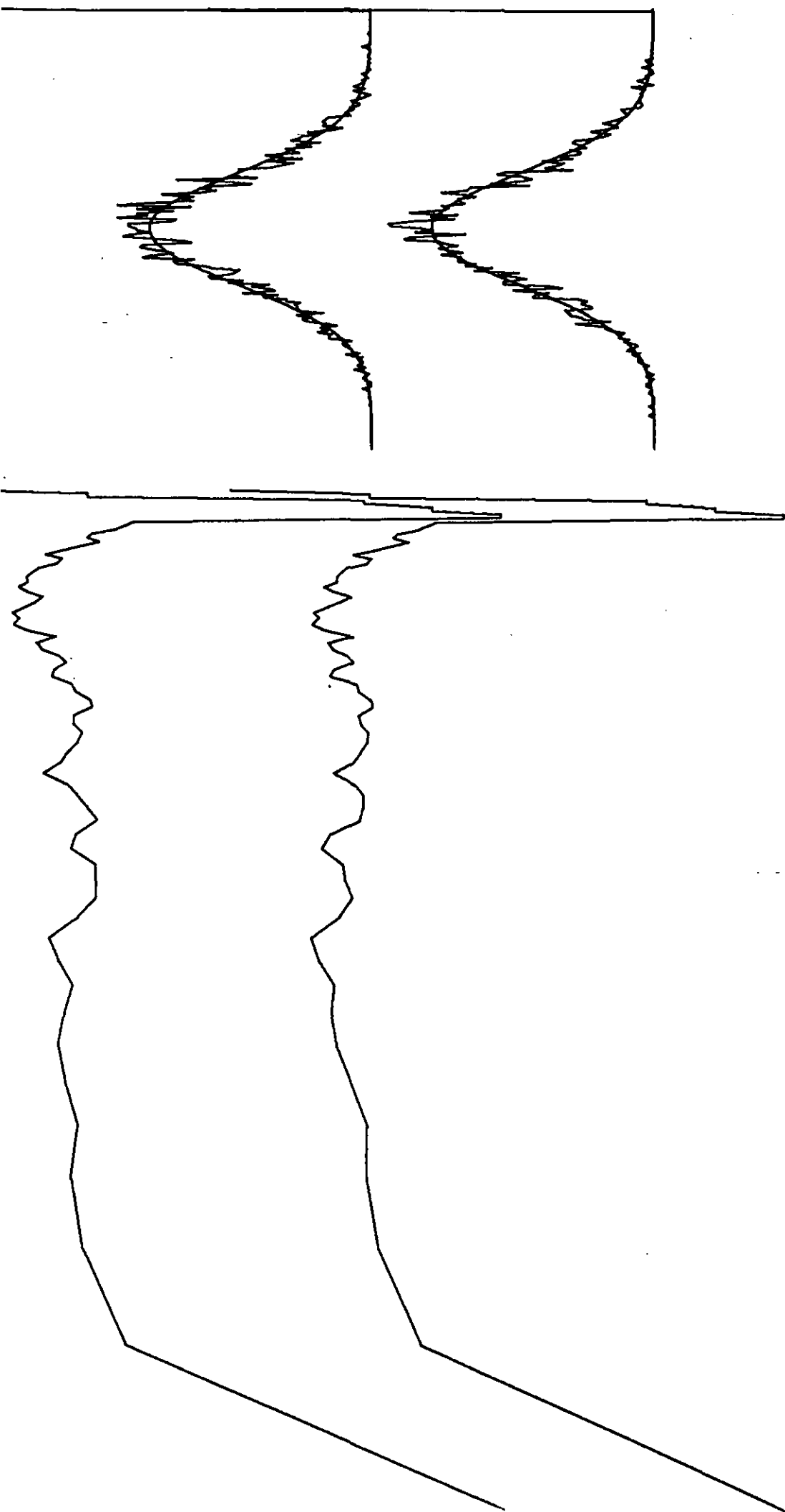
84 01T

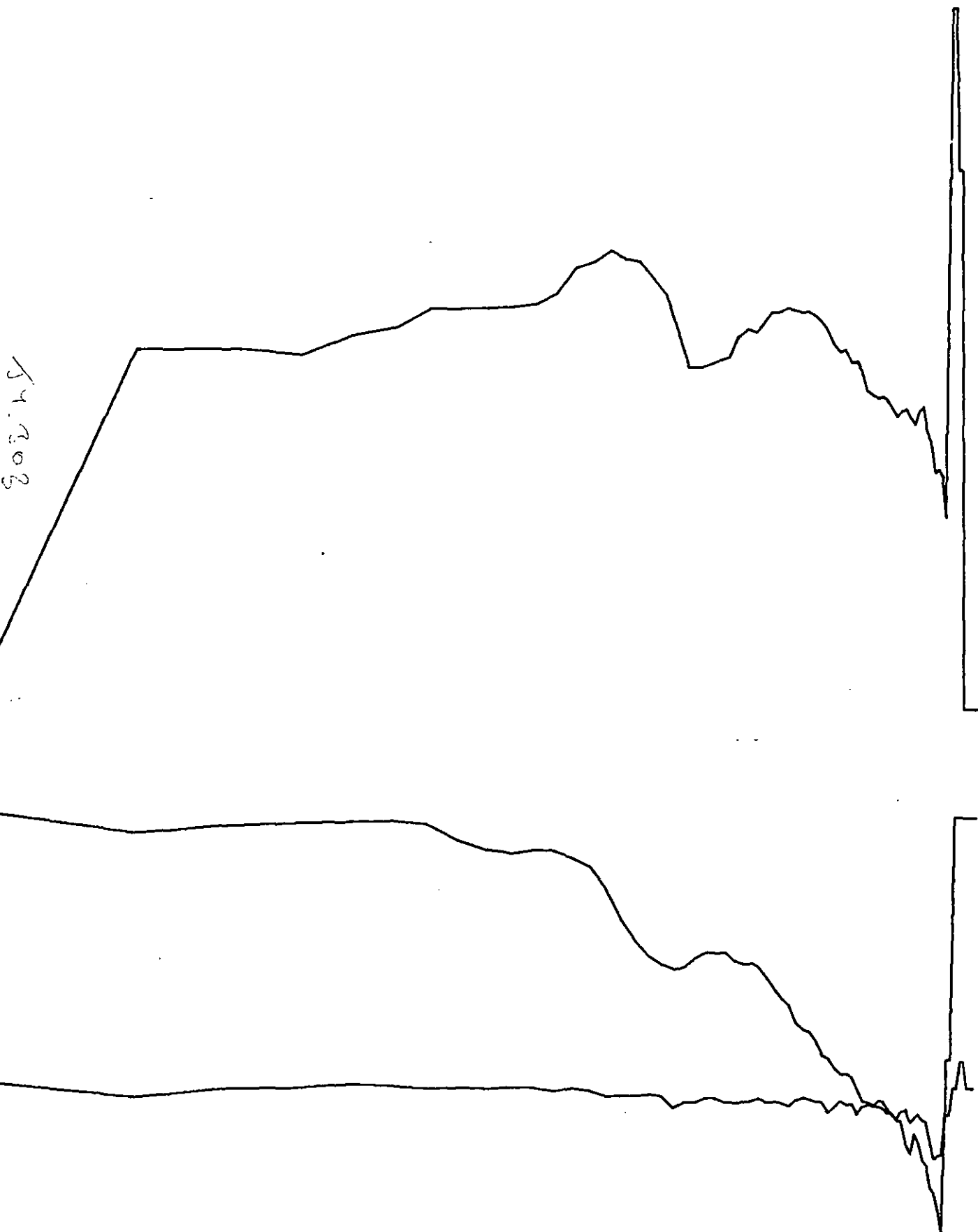


dy 302

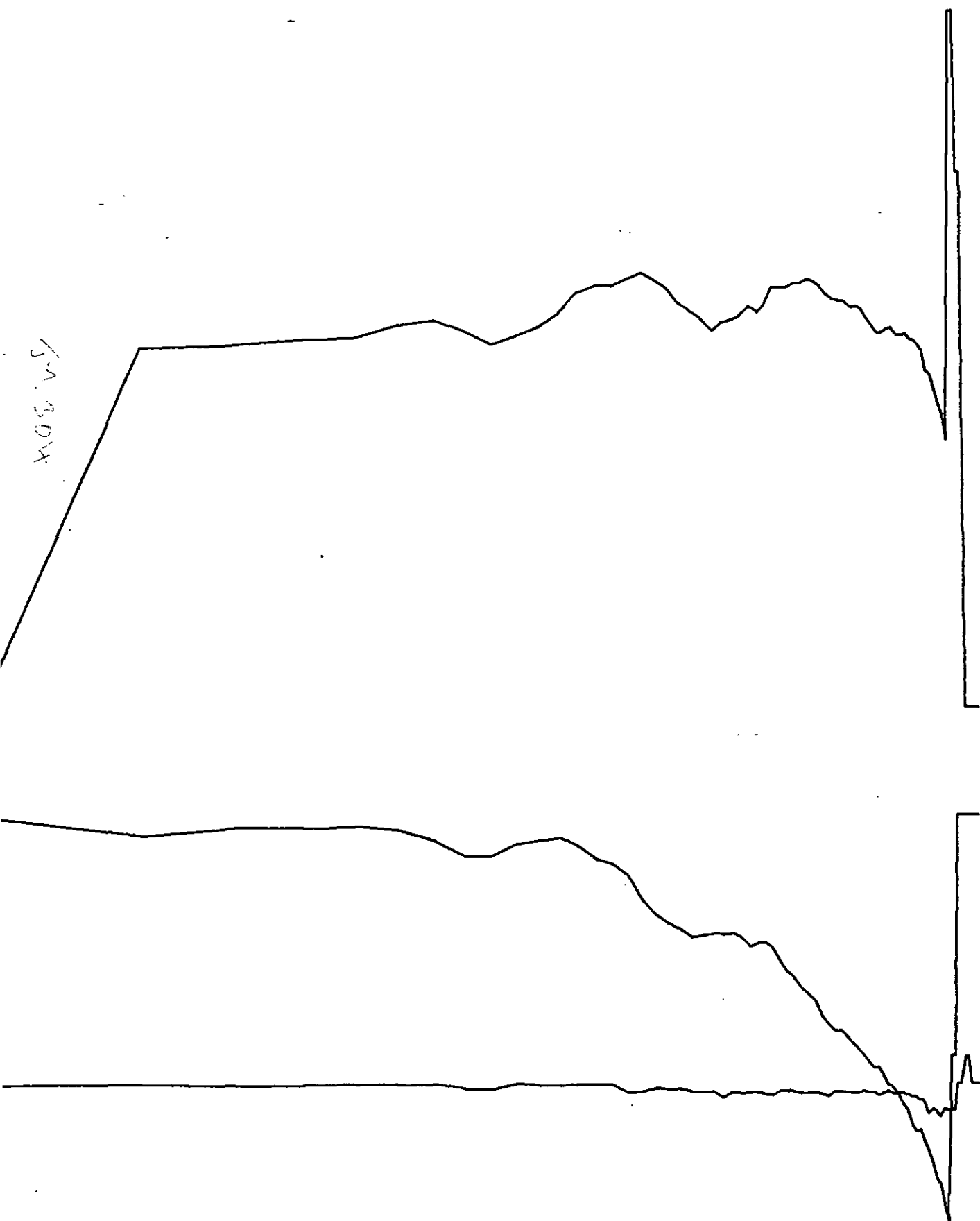


84 02T

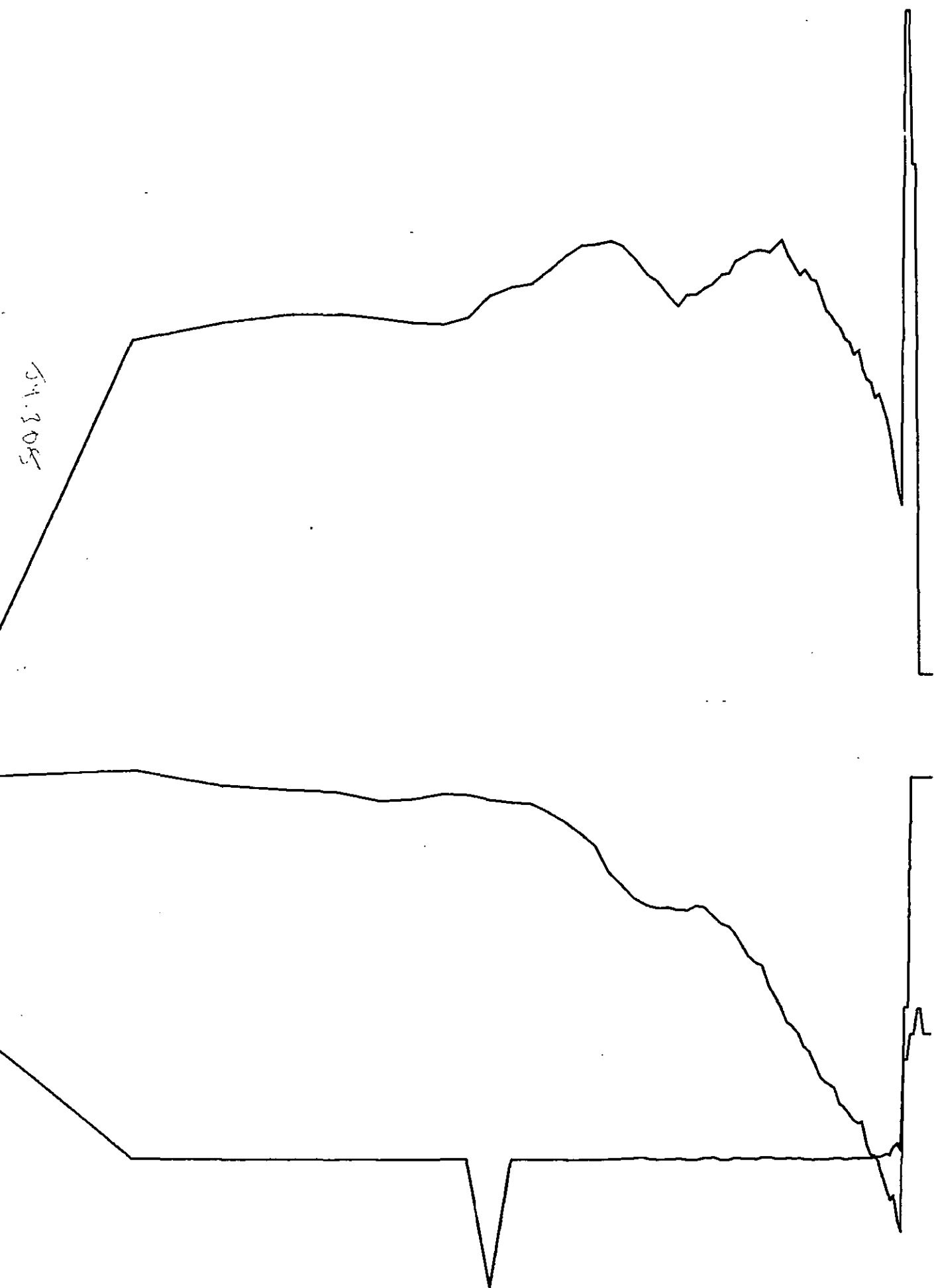




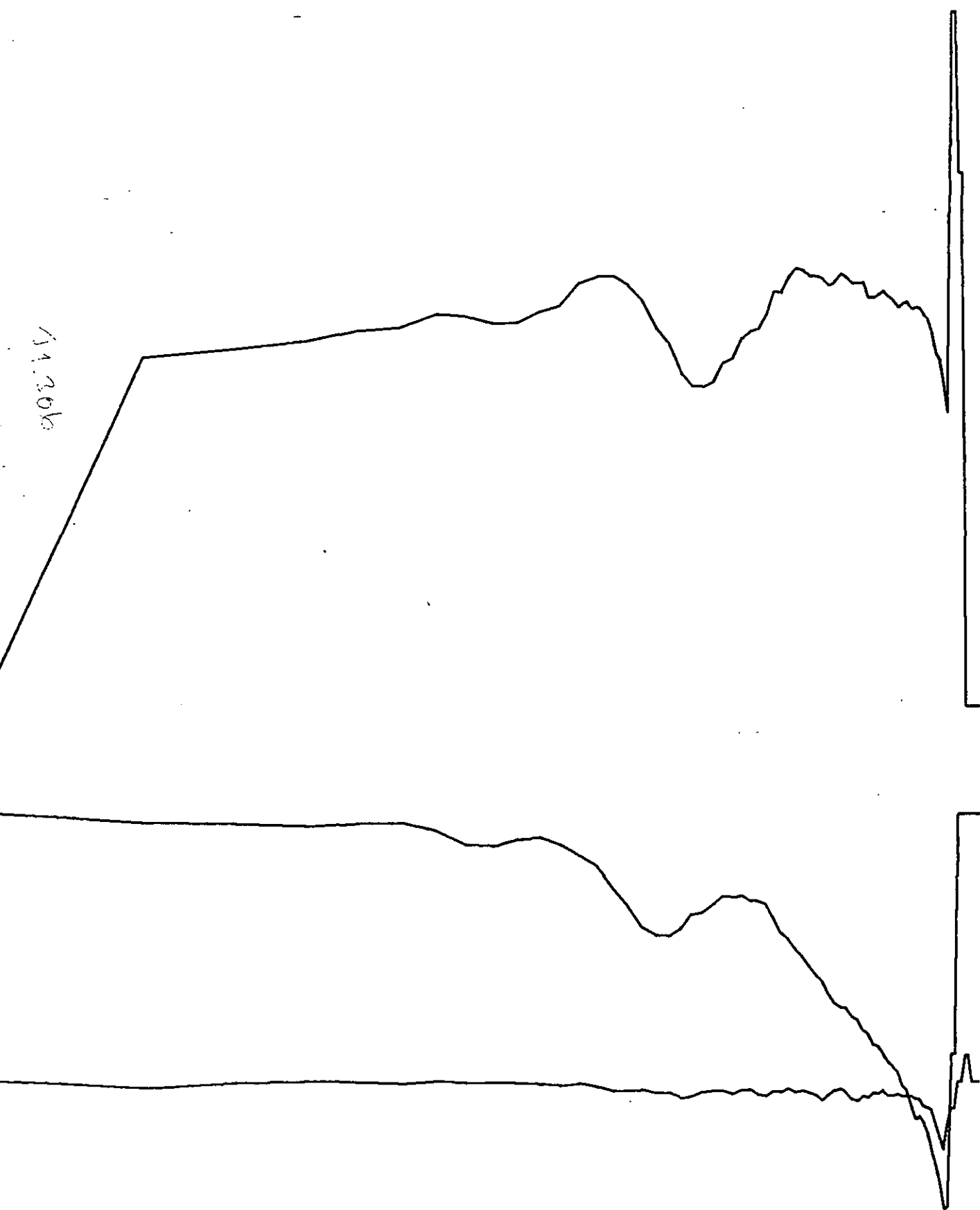
84 04T

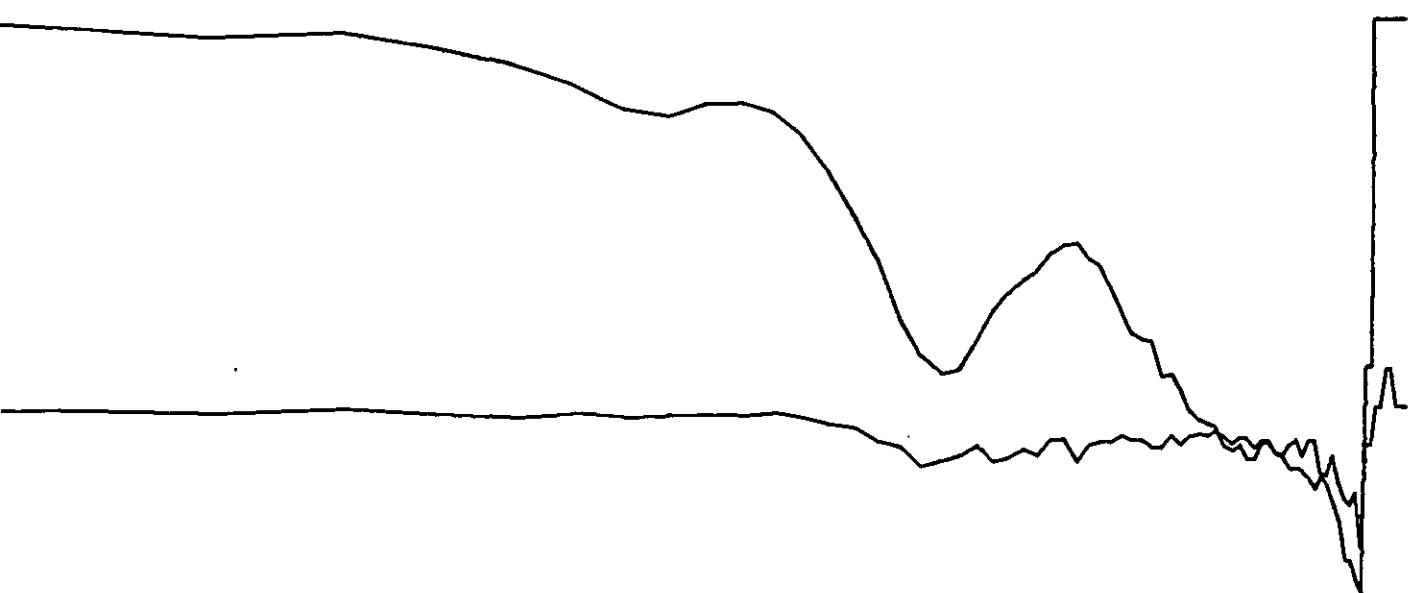
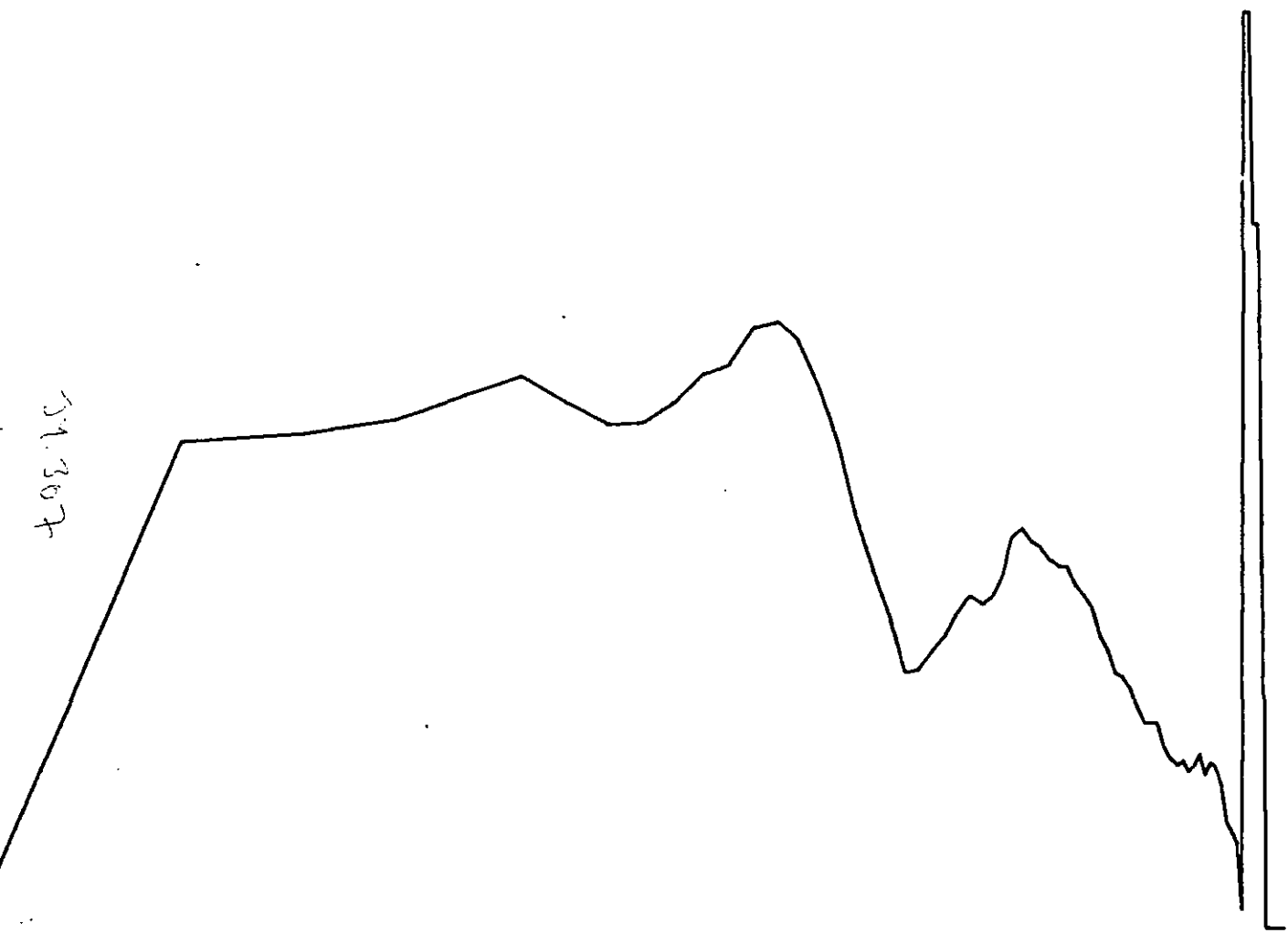


84 05T

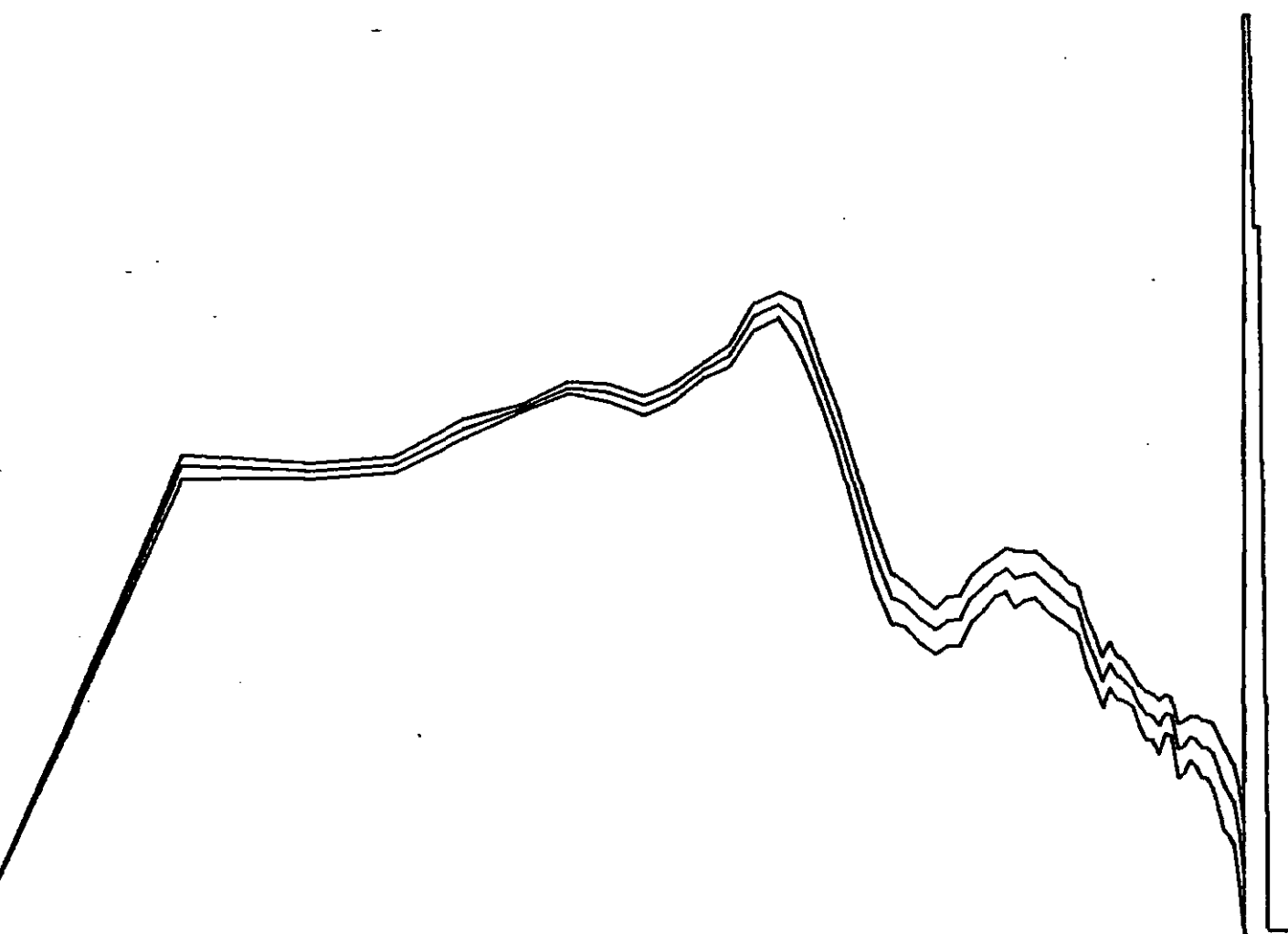


84 06T



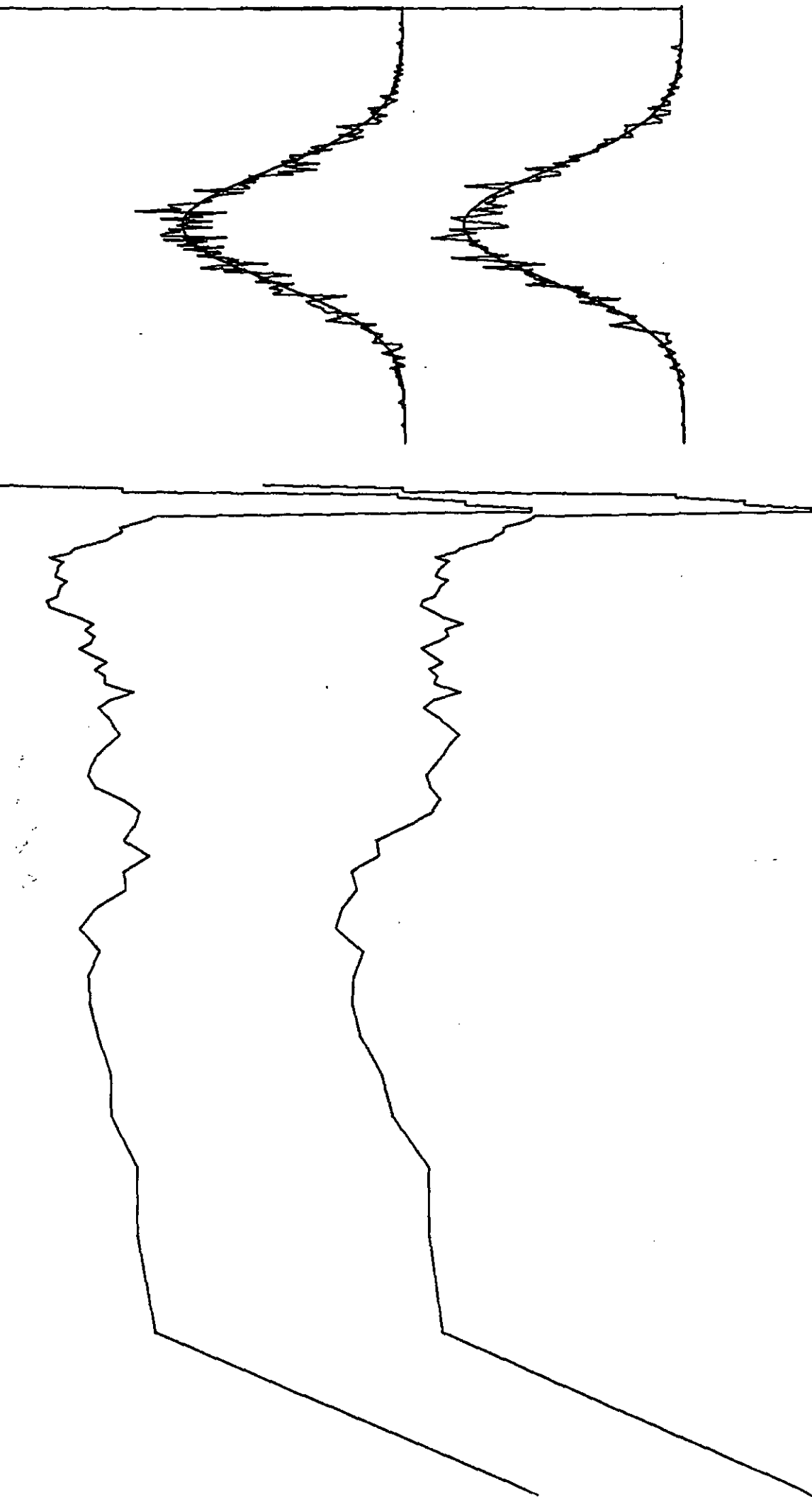


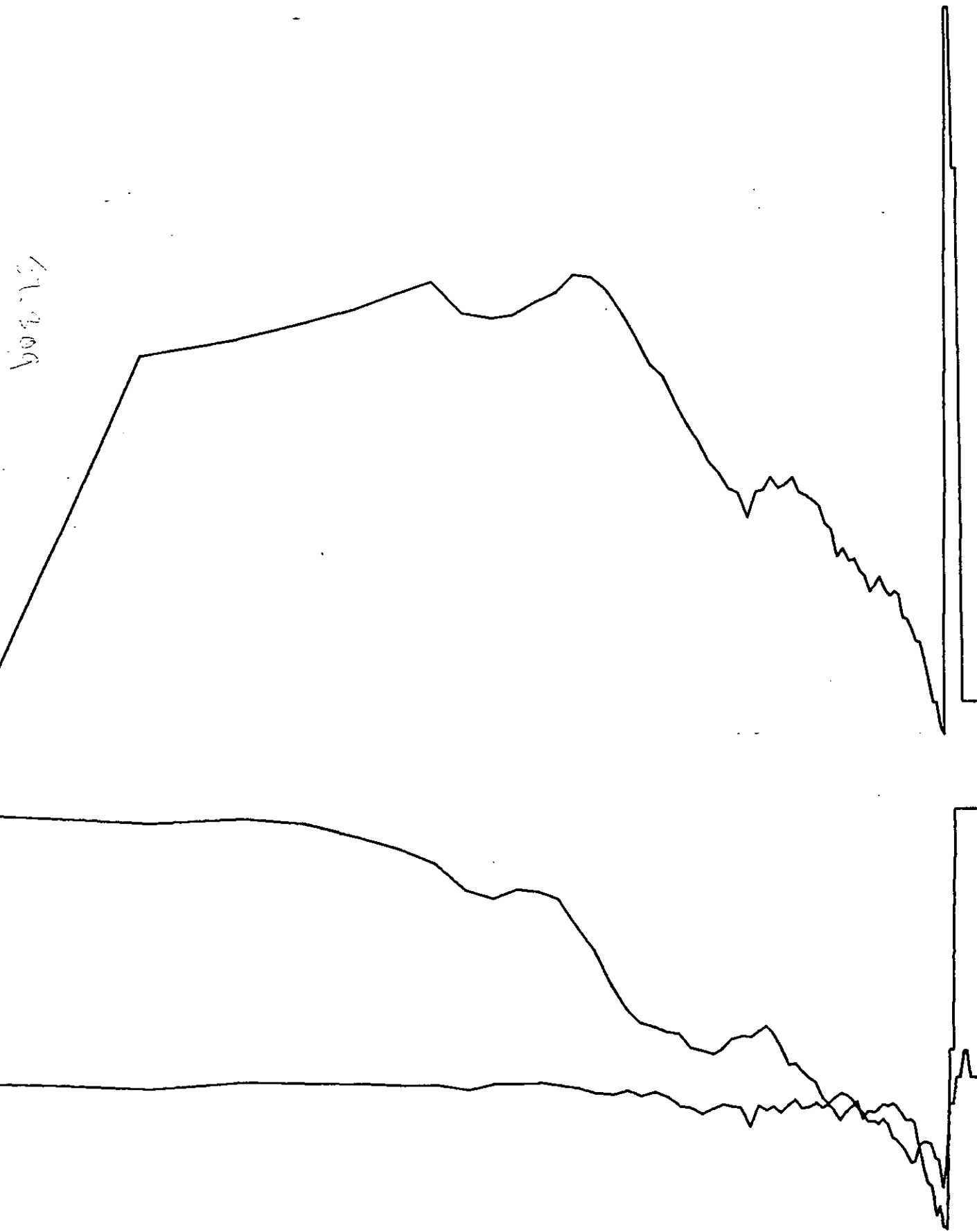
84 08 T



2003 LC

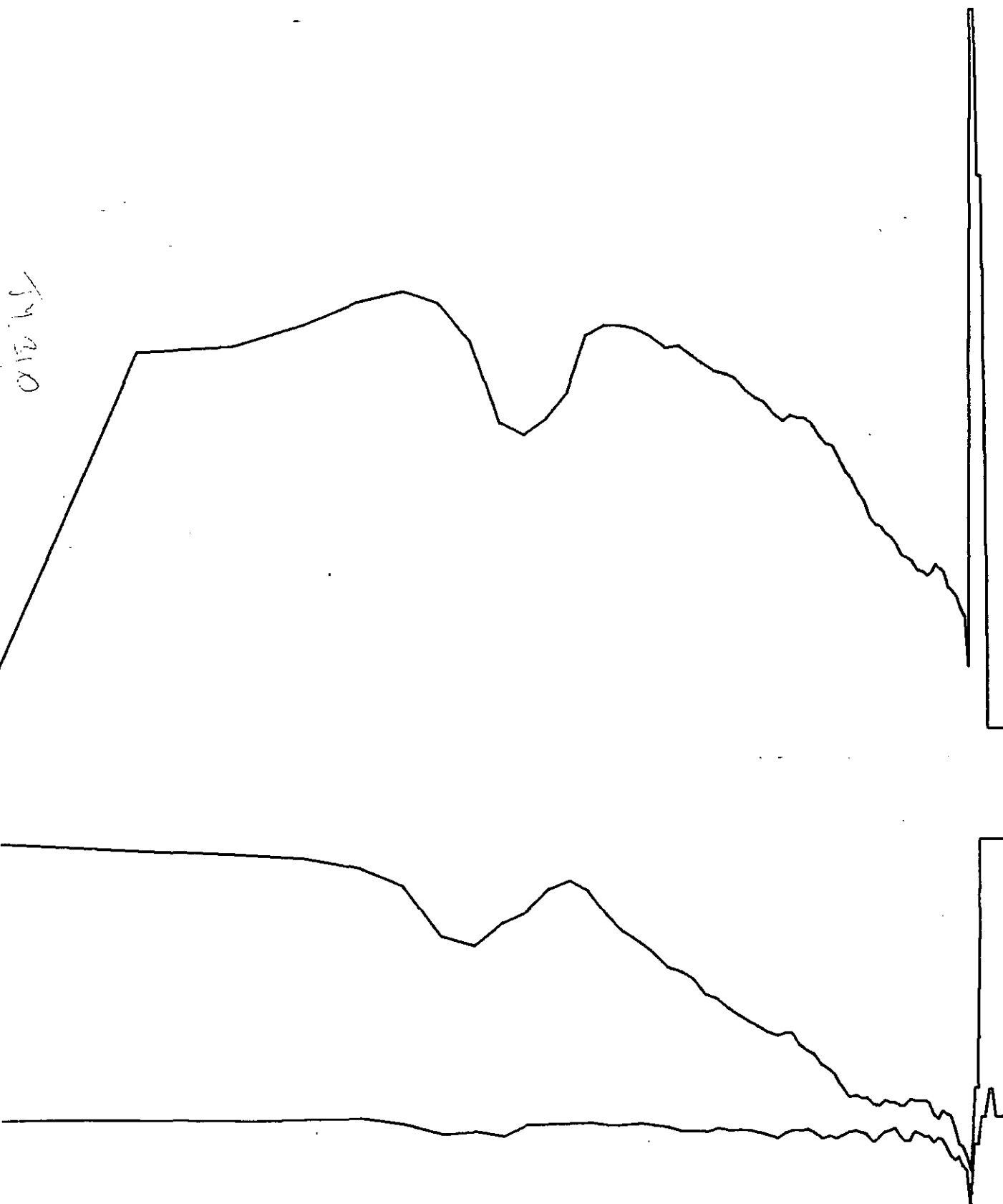




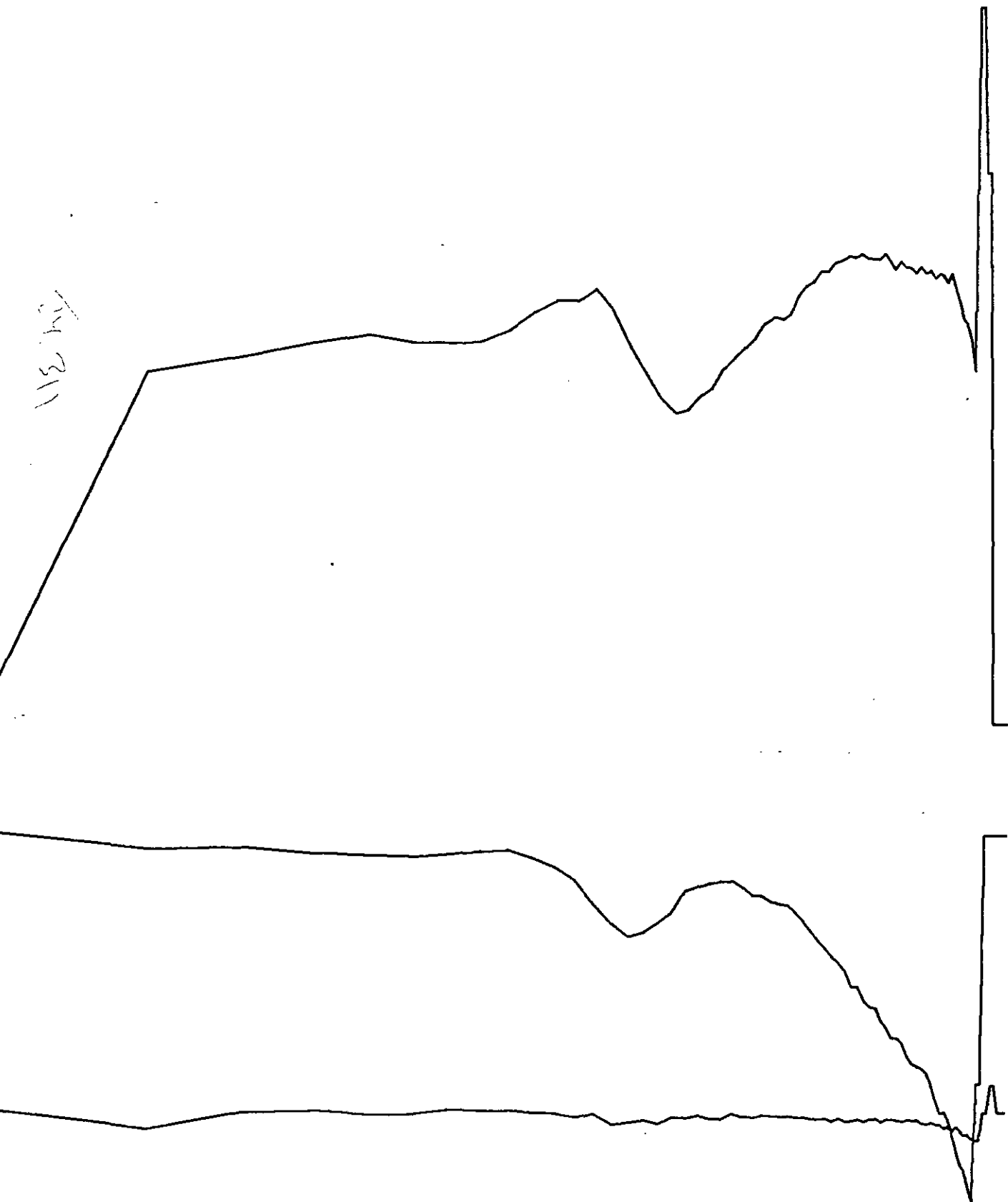


51.309

84 10T

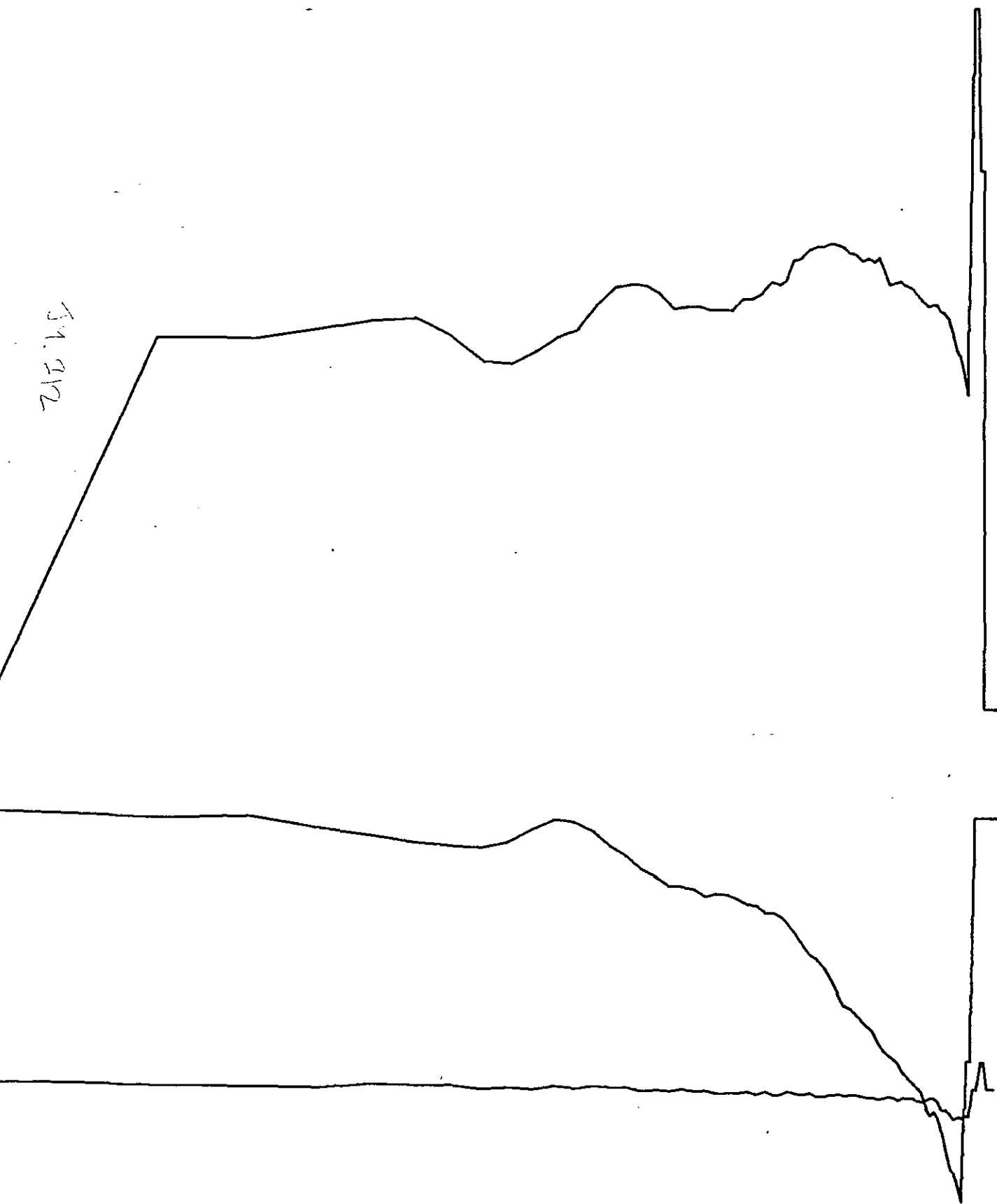


112.12

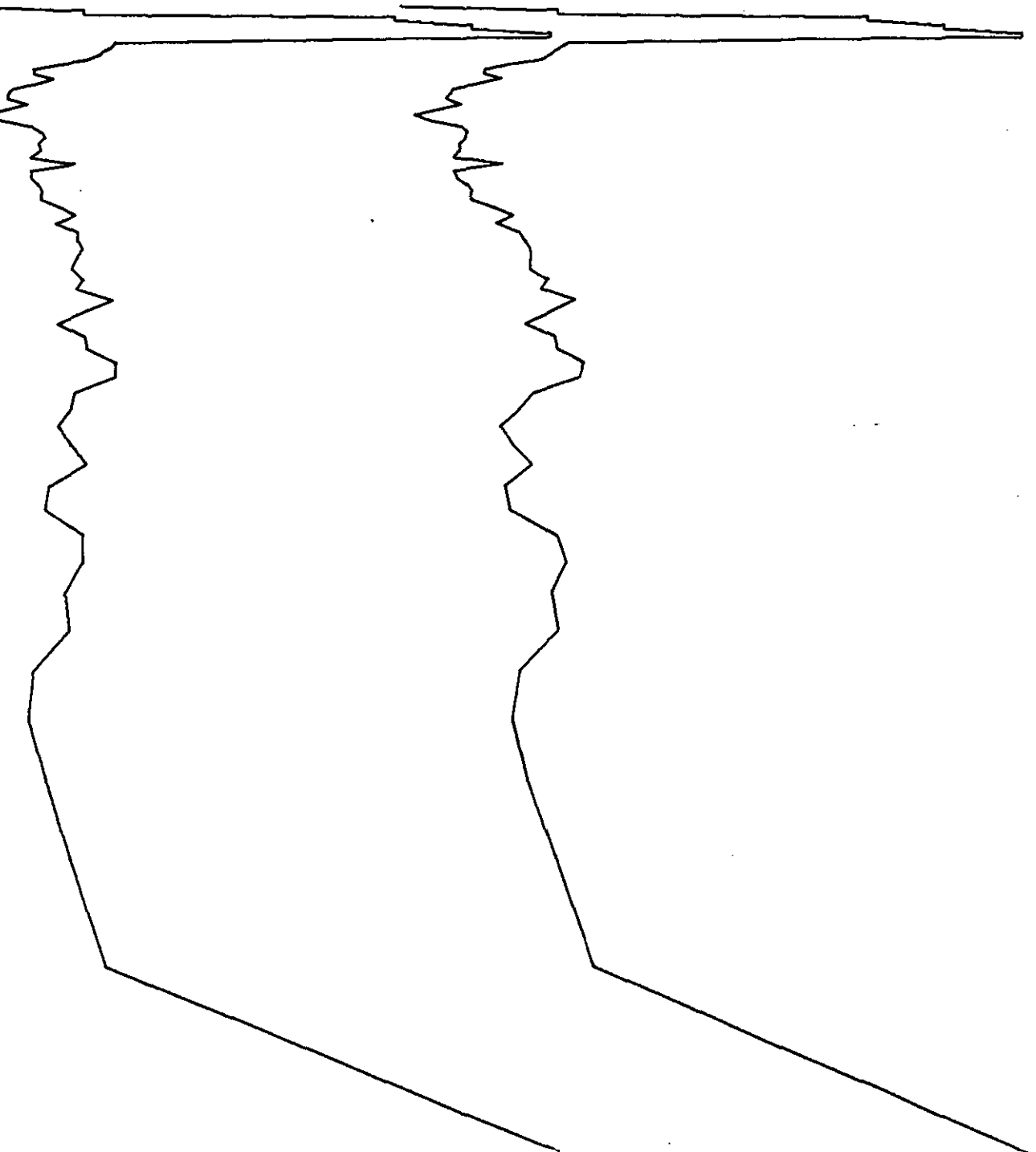
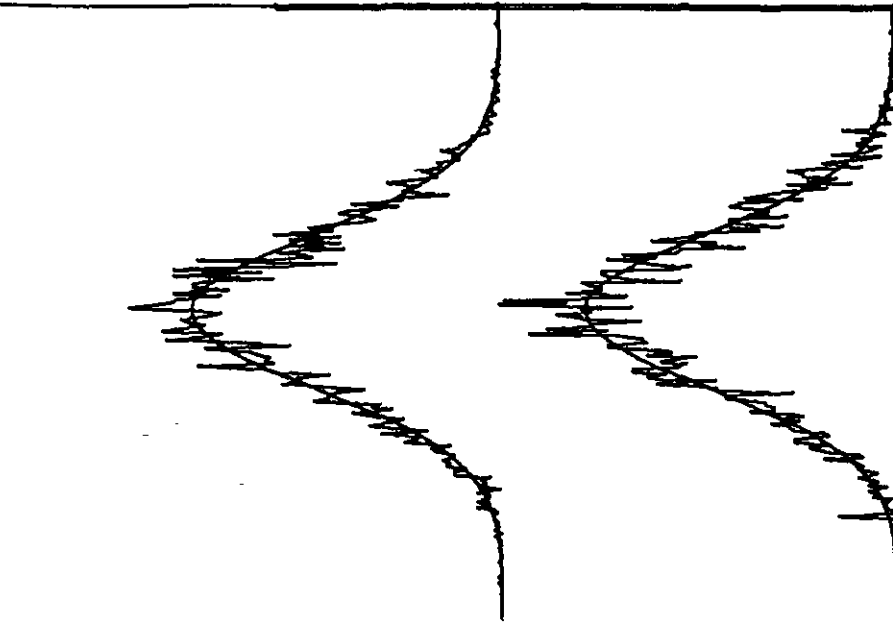


84 12T

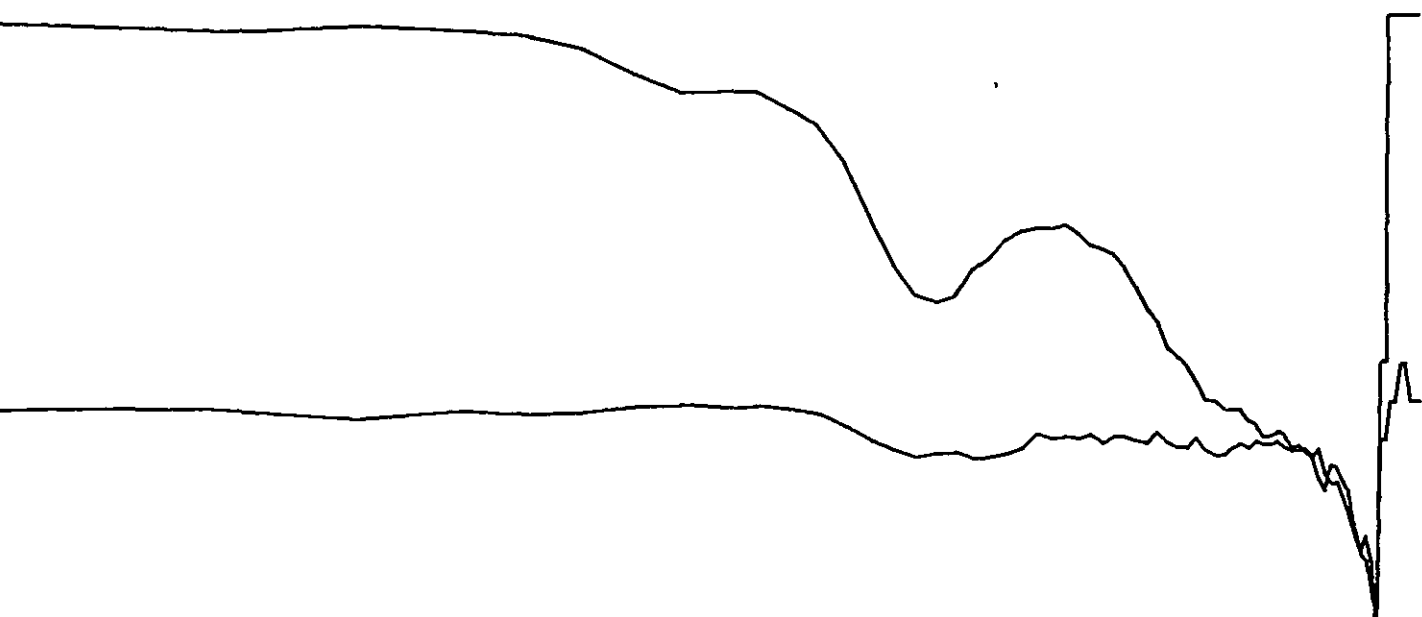
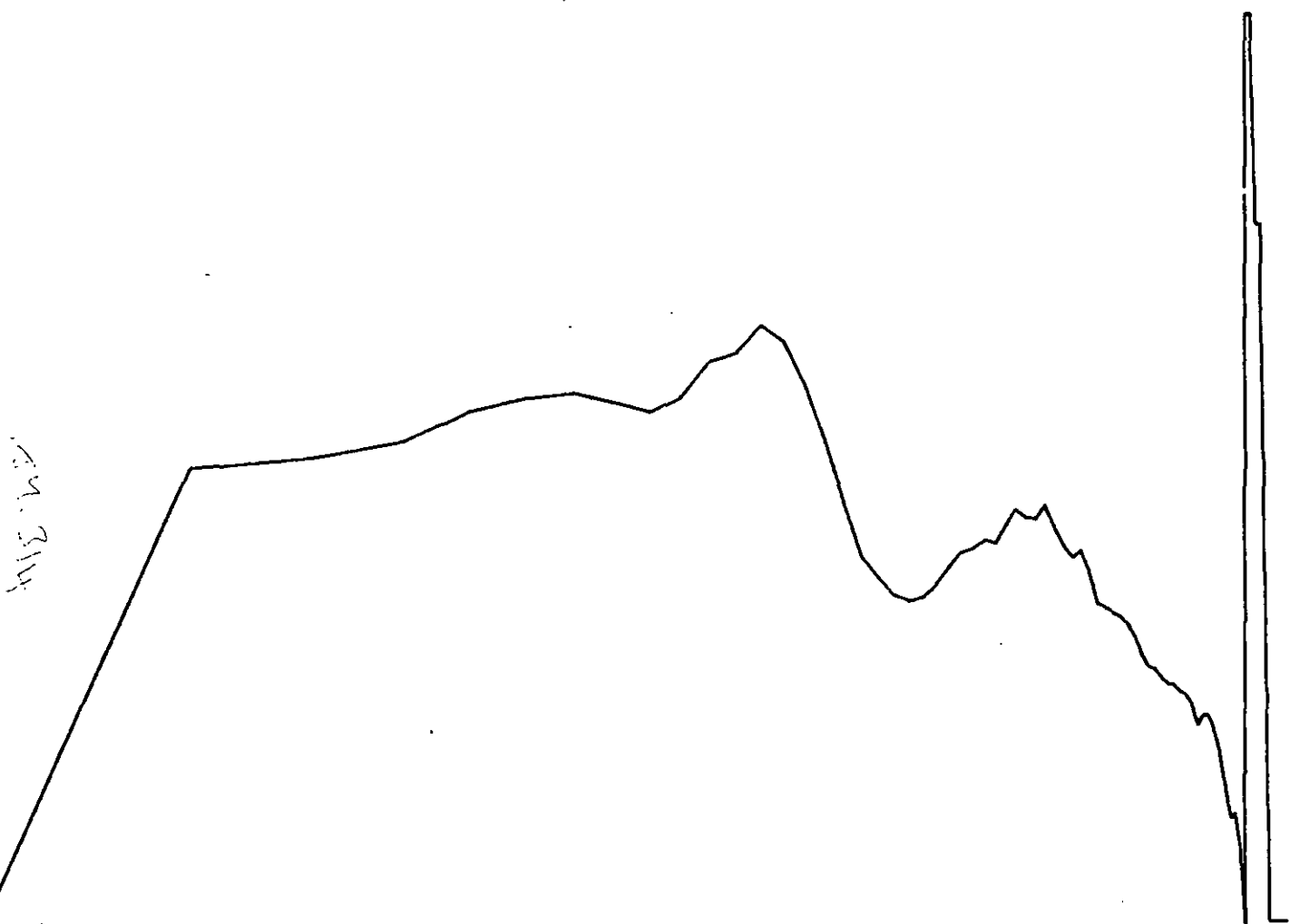
51.212



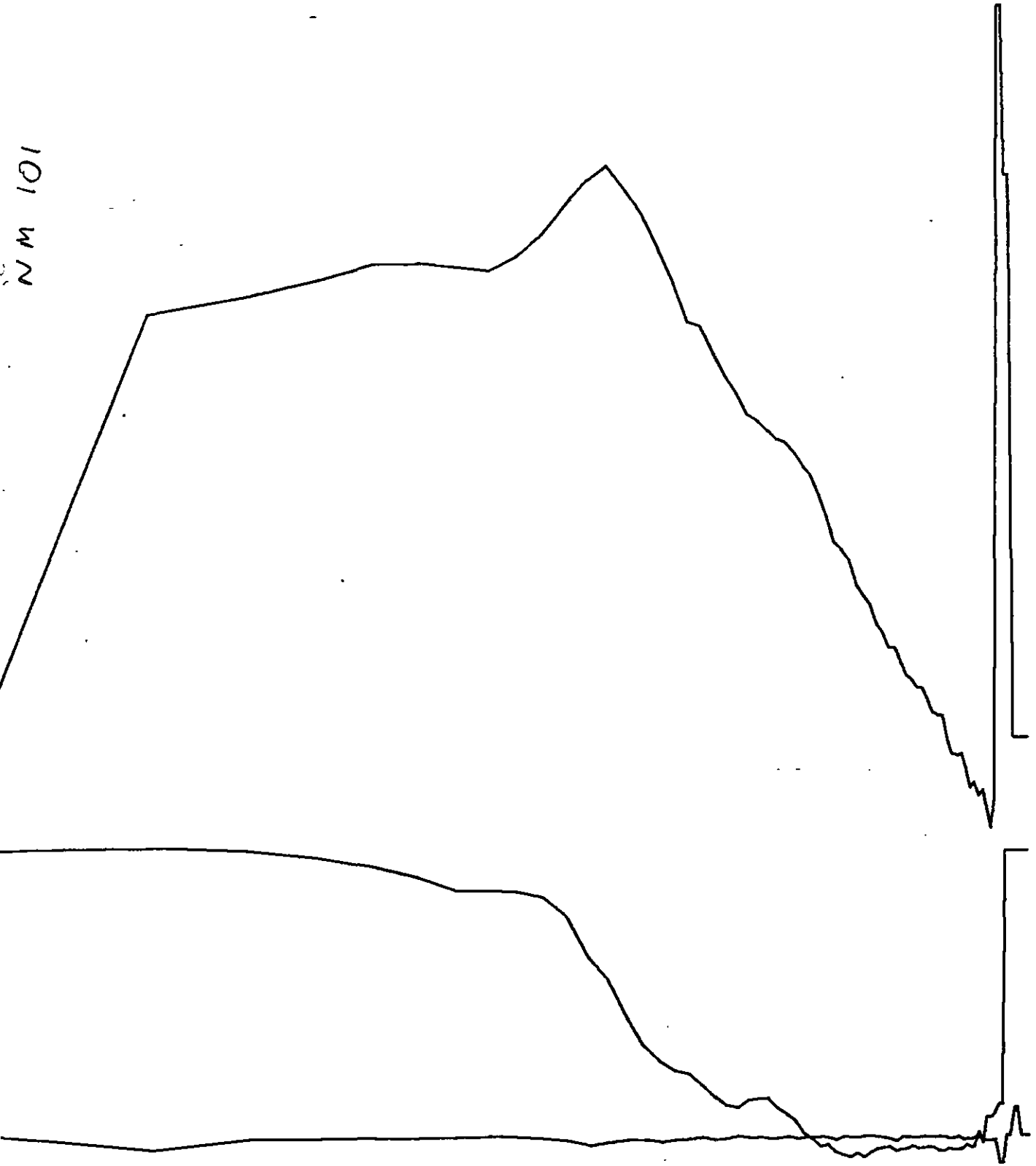




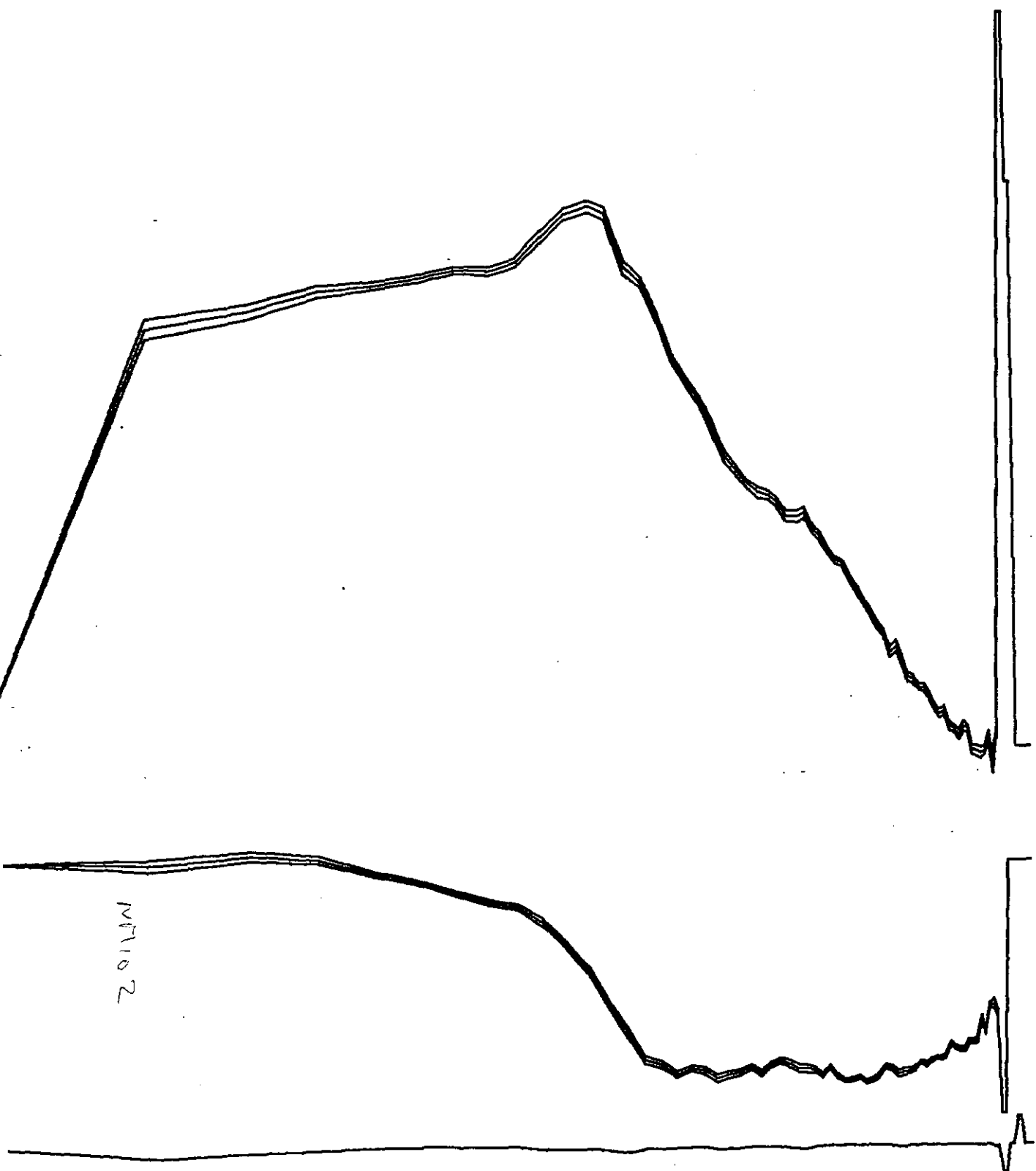
84 14 T



101 NM



83 02 A



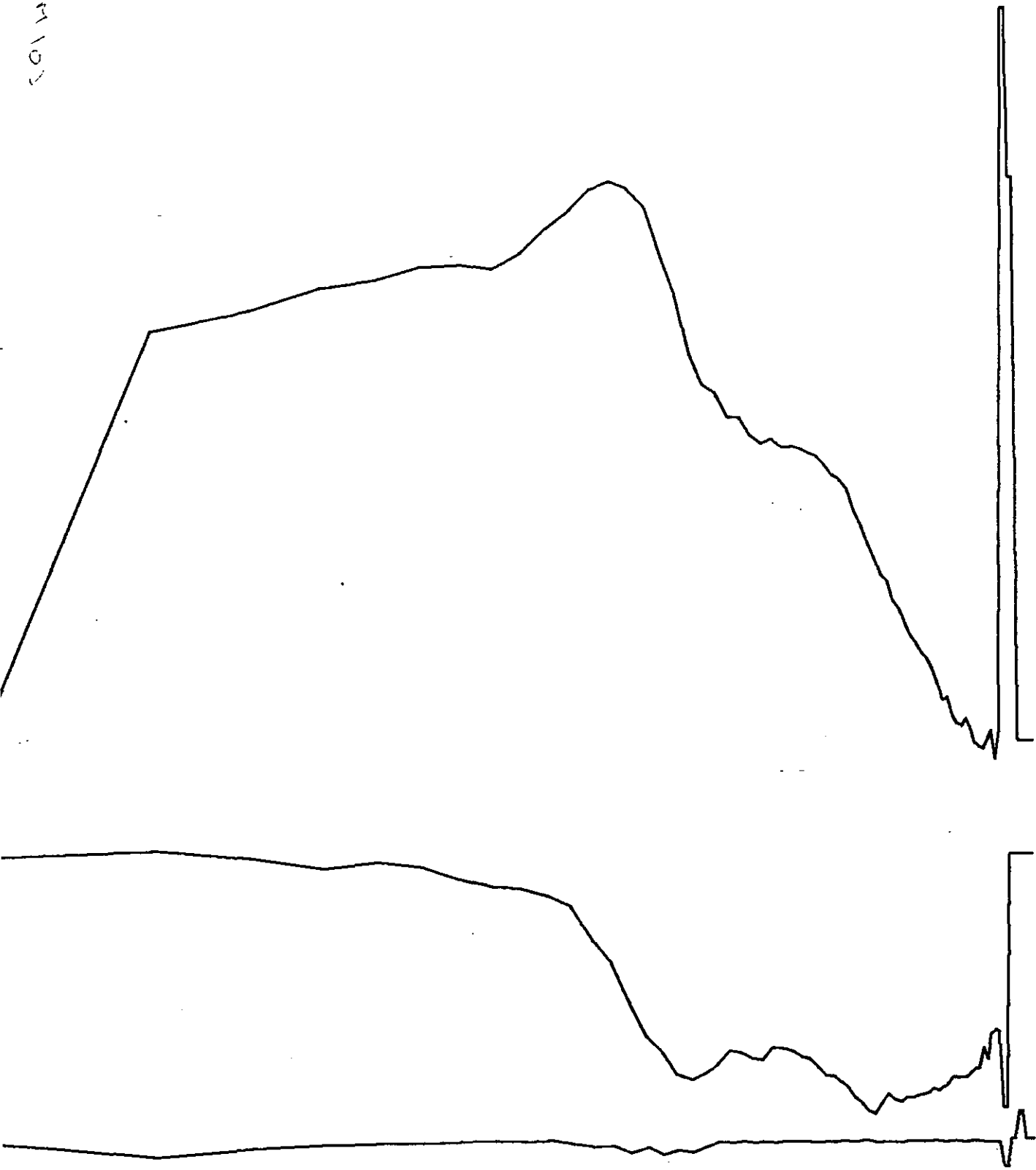
83 02A



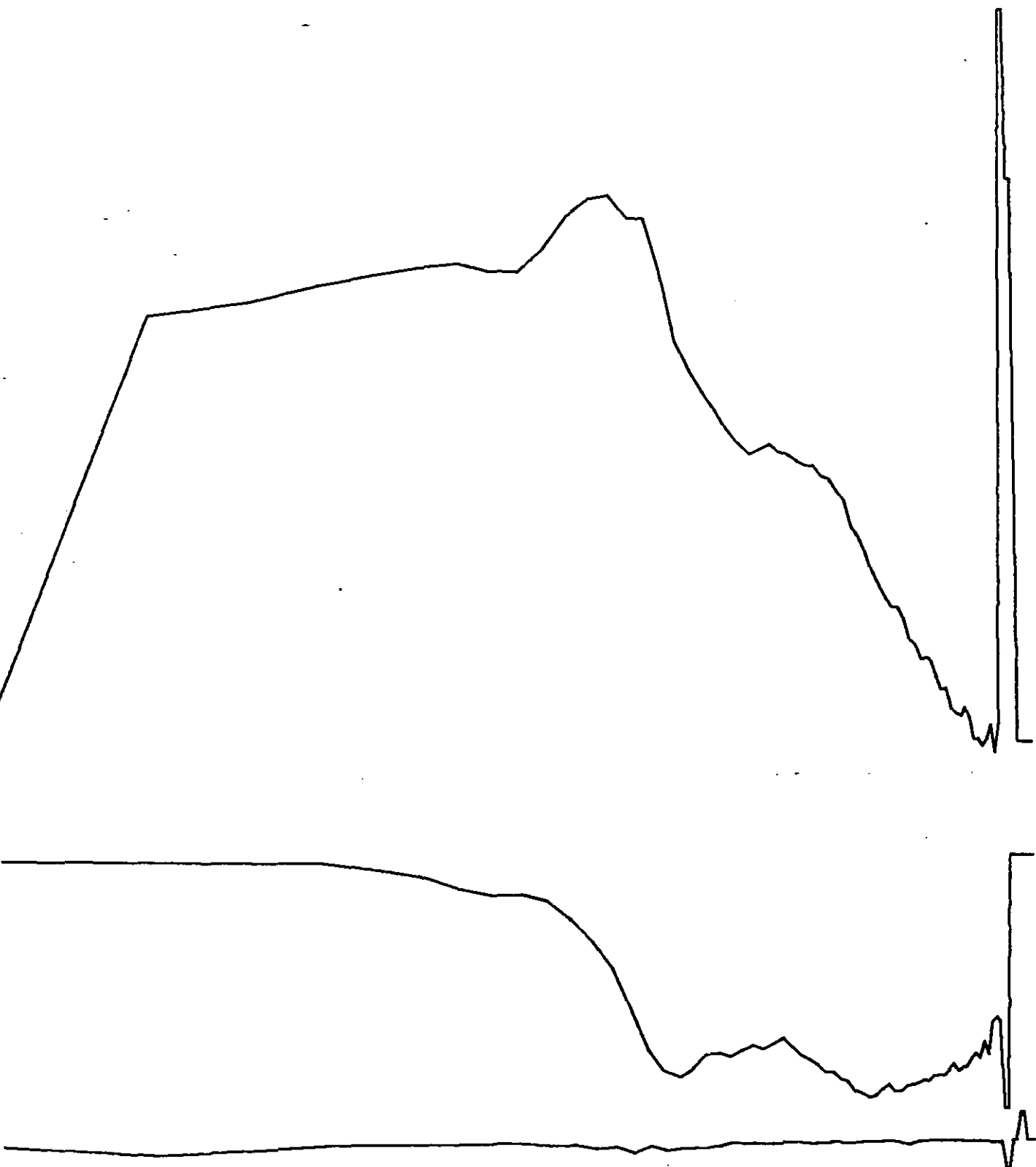
83 03A

1003

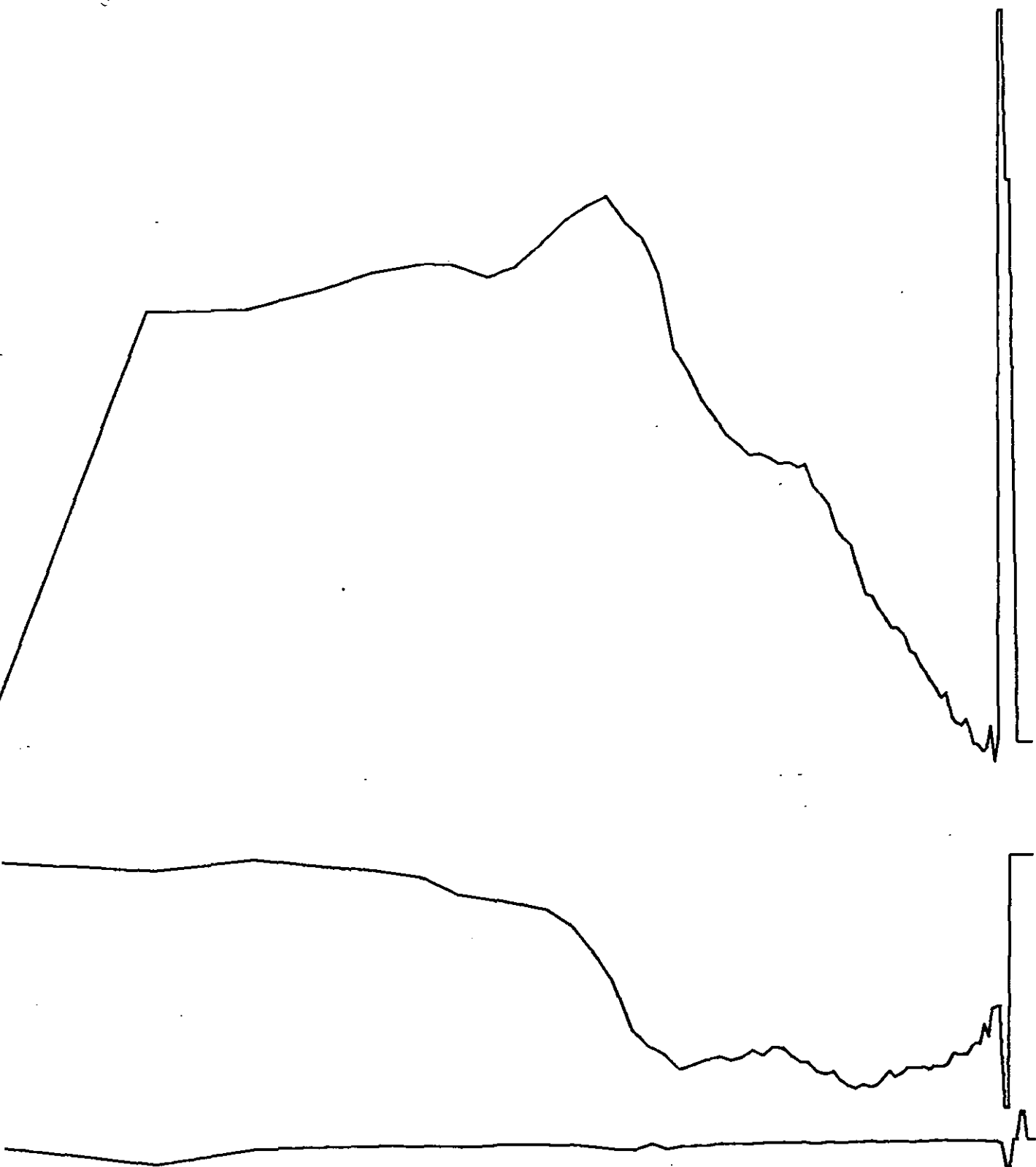
MM 100



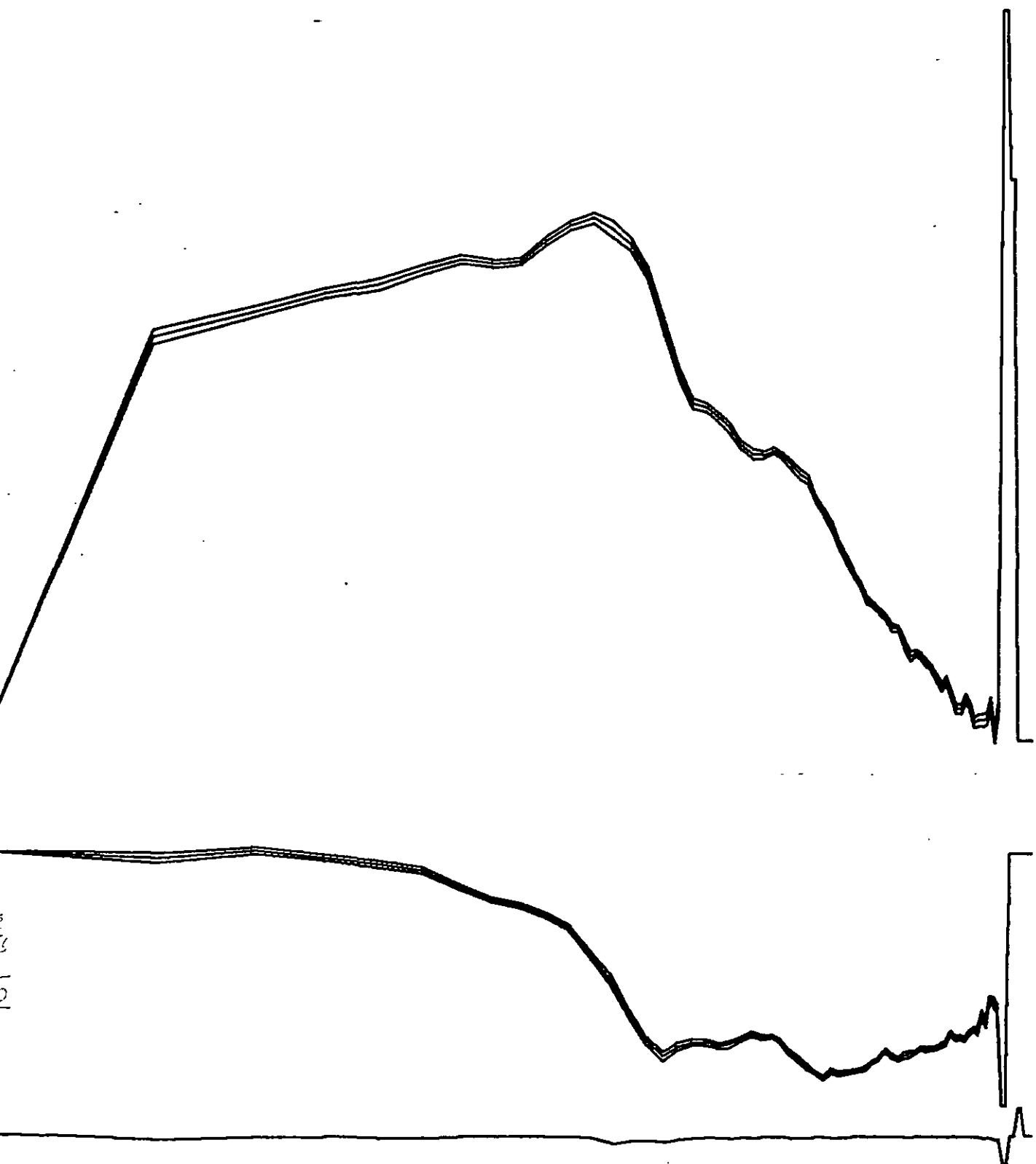
83 04 A



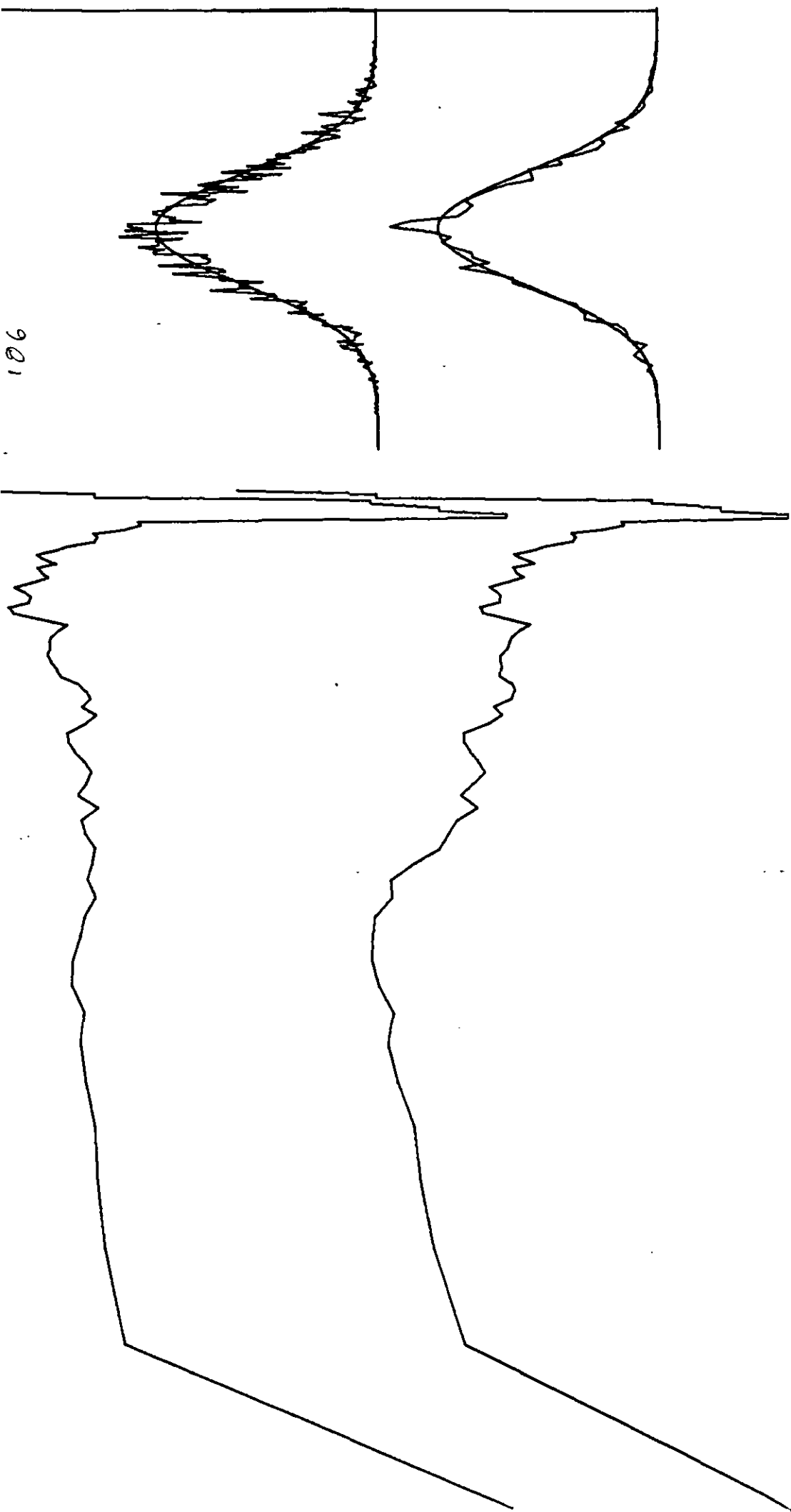
83 05A



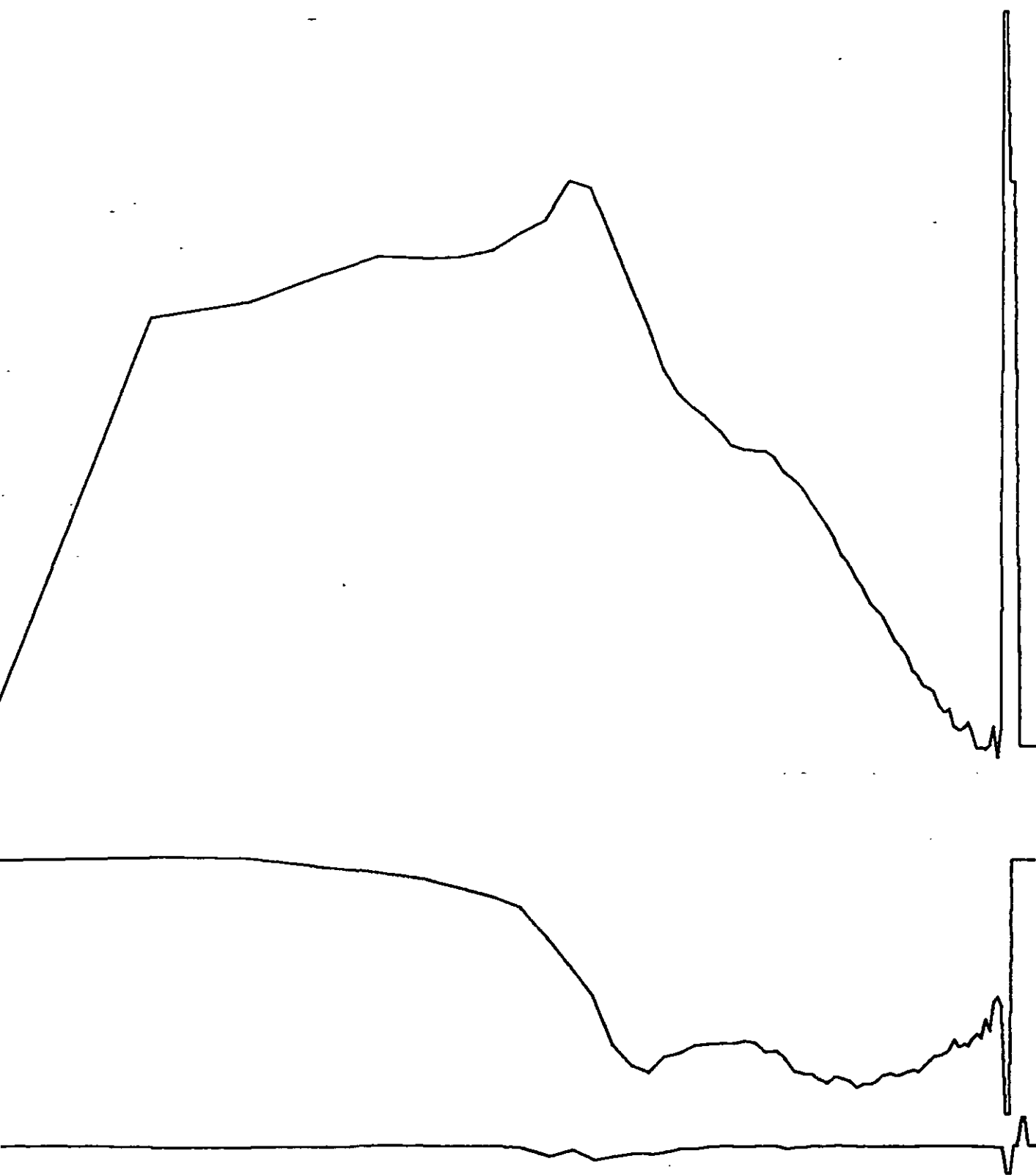
83 06A



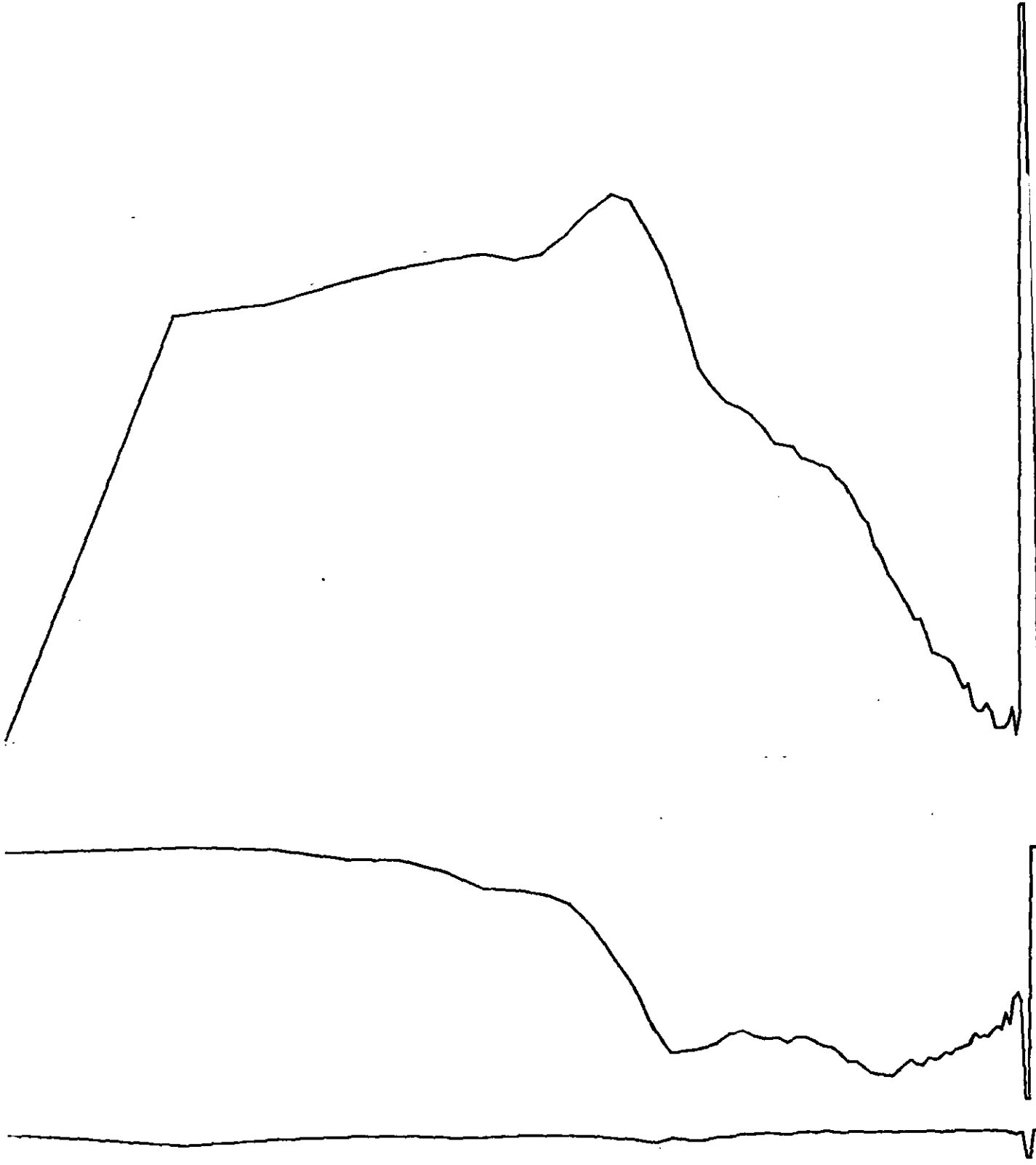
901

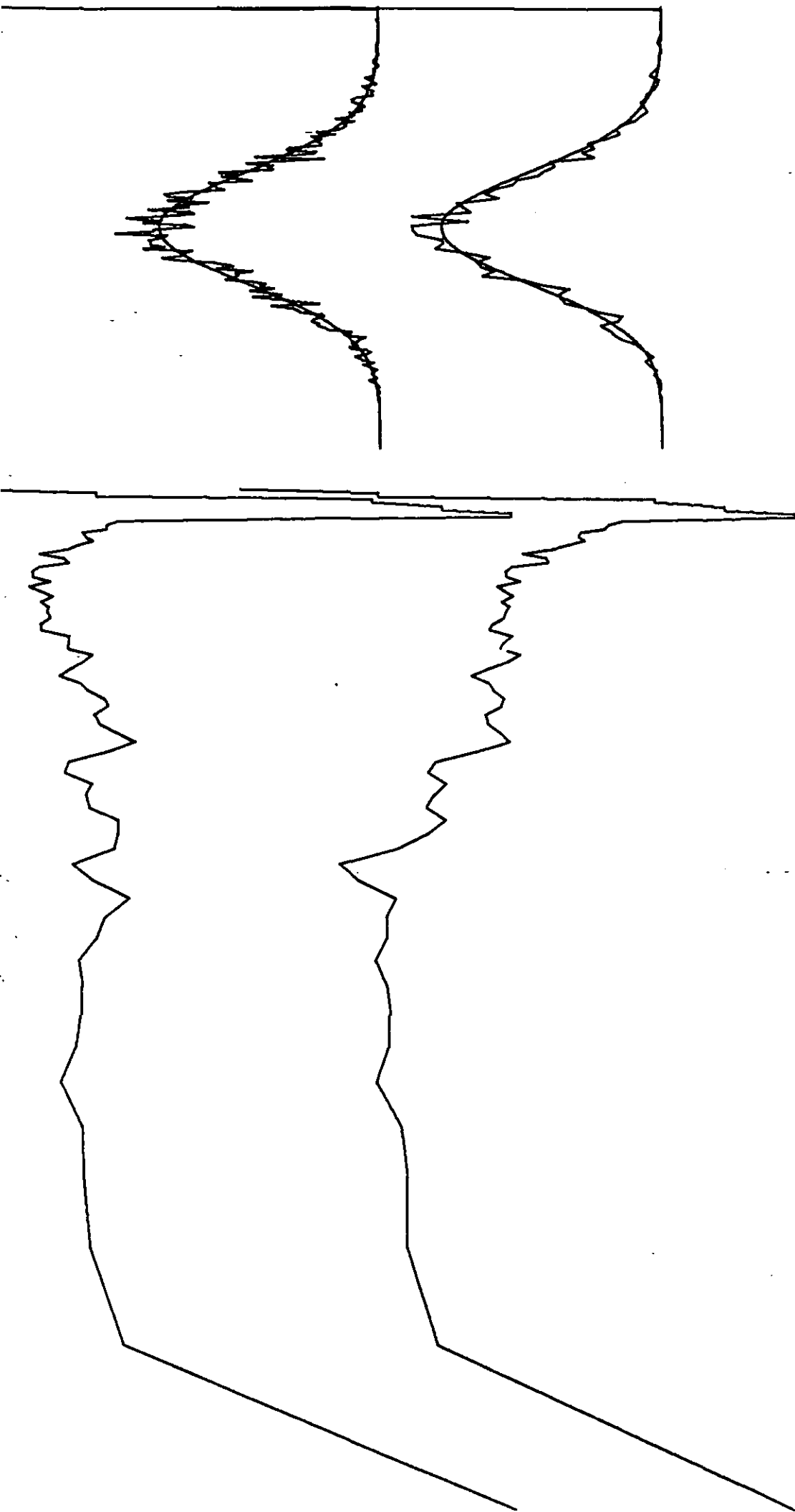


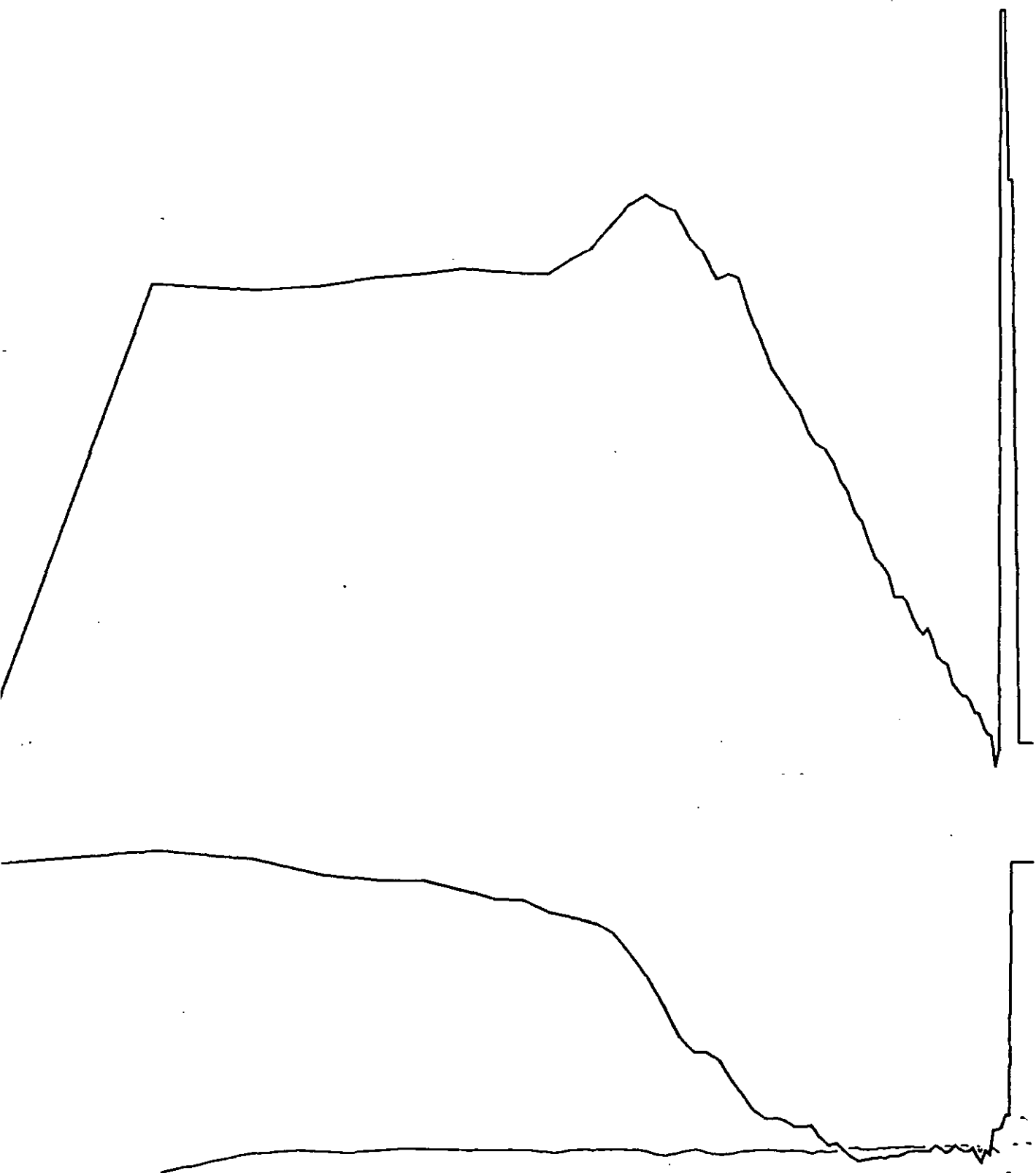
83 07A

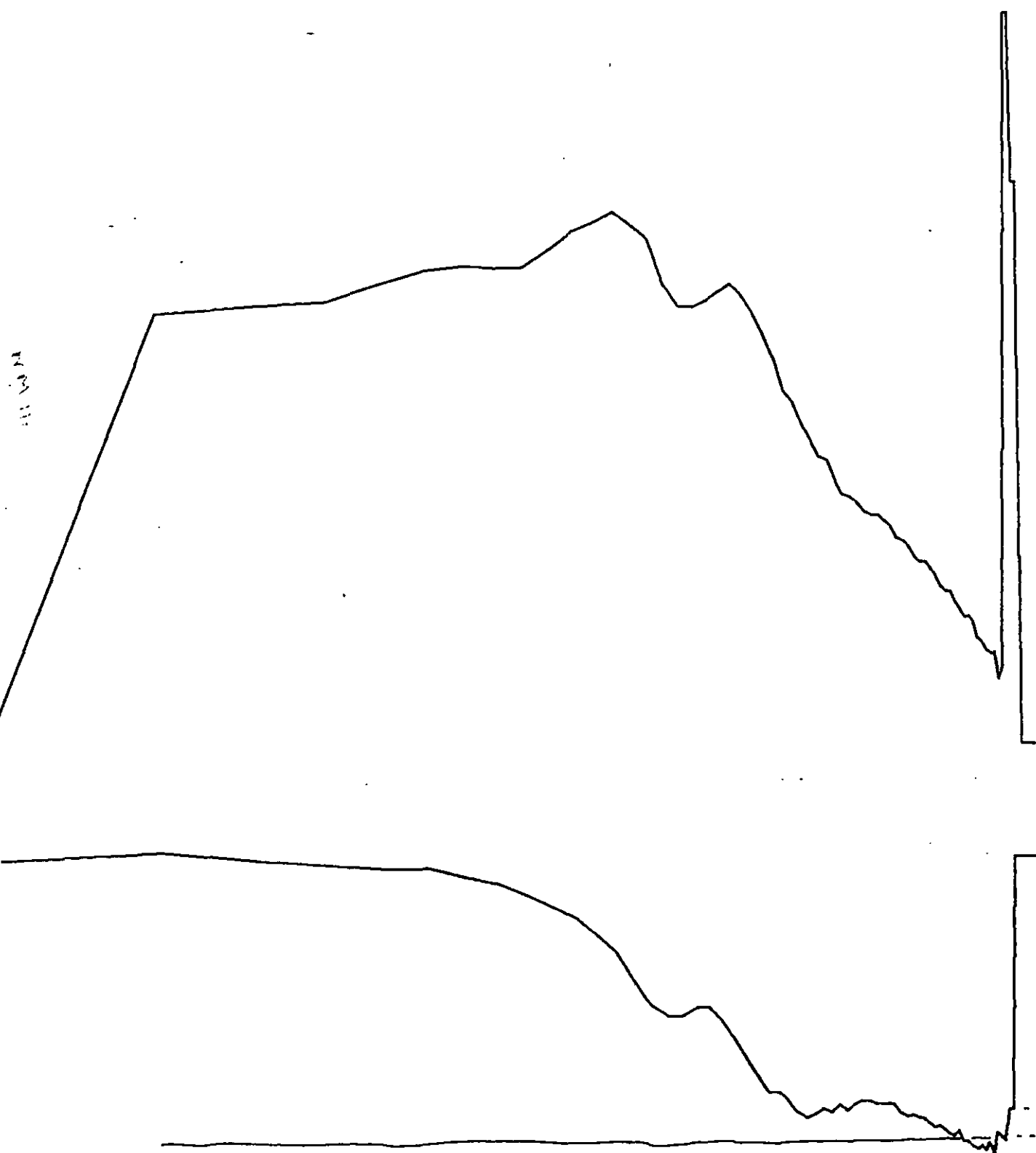


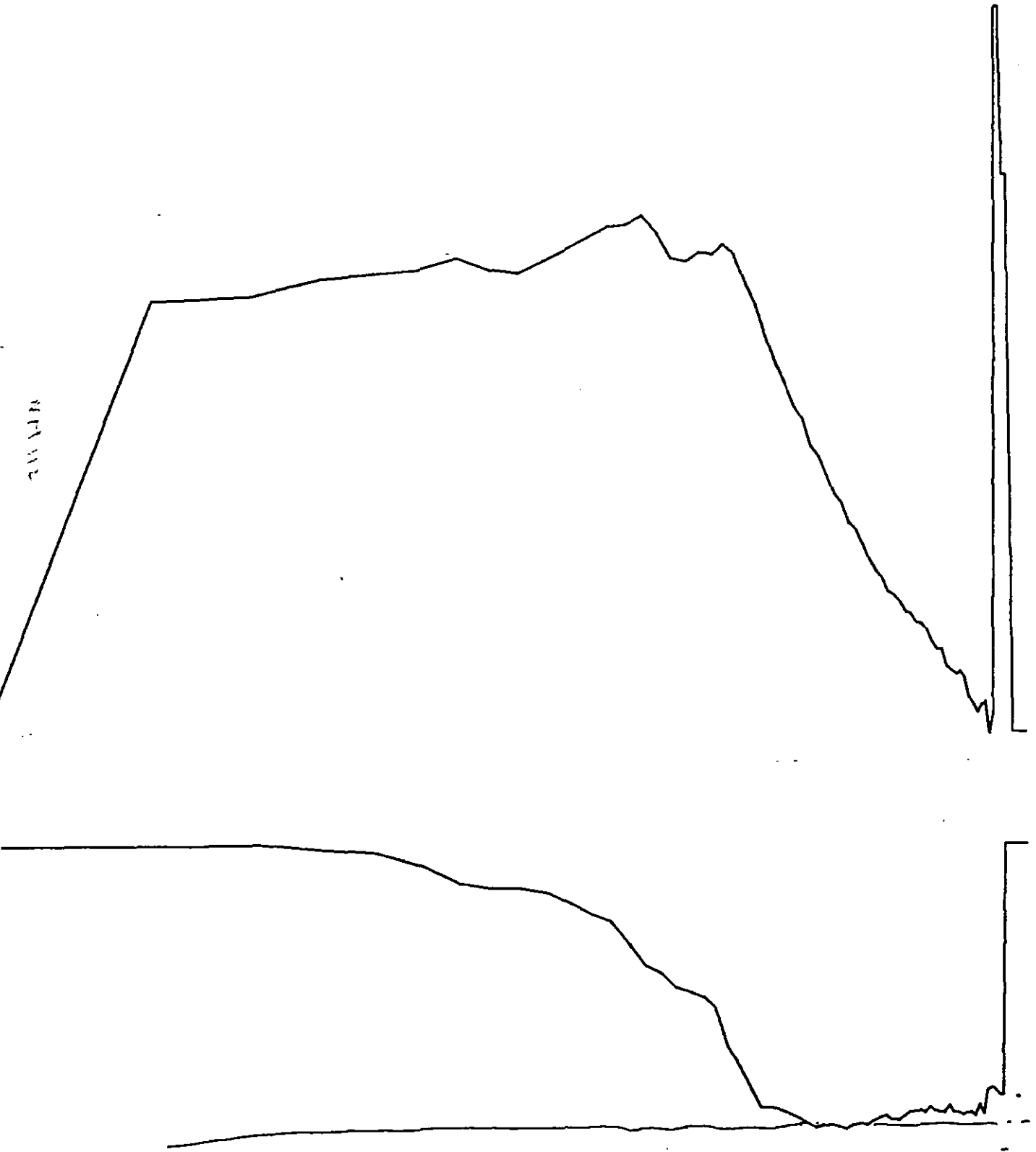
1/5

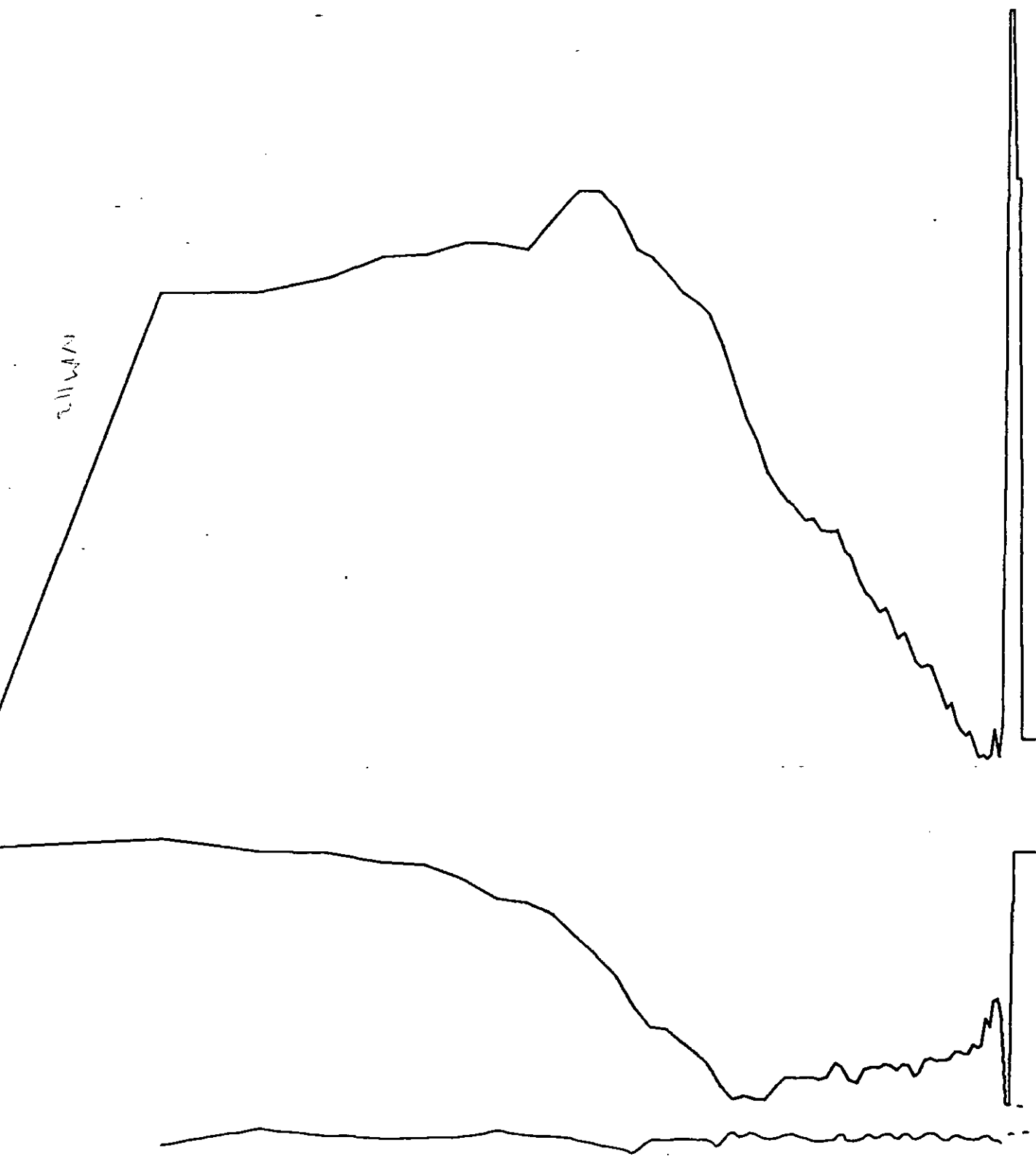


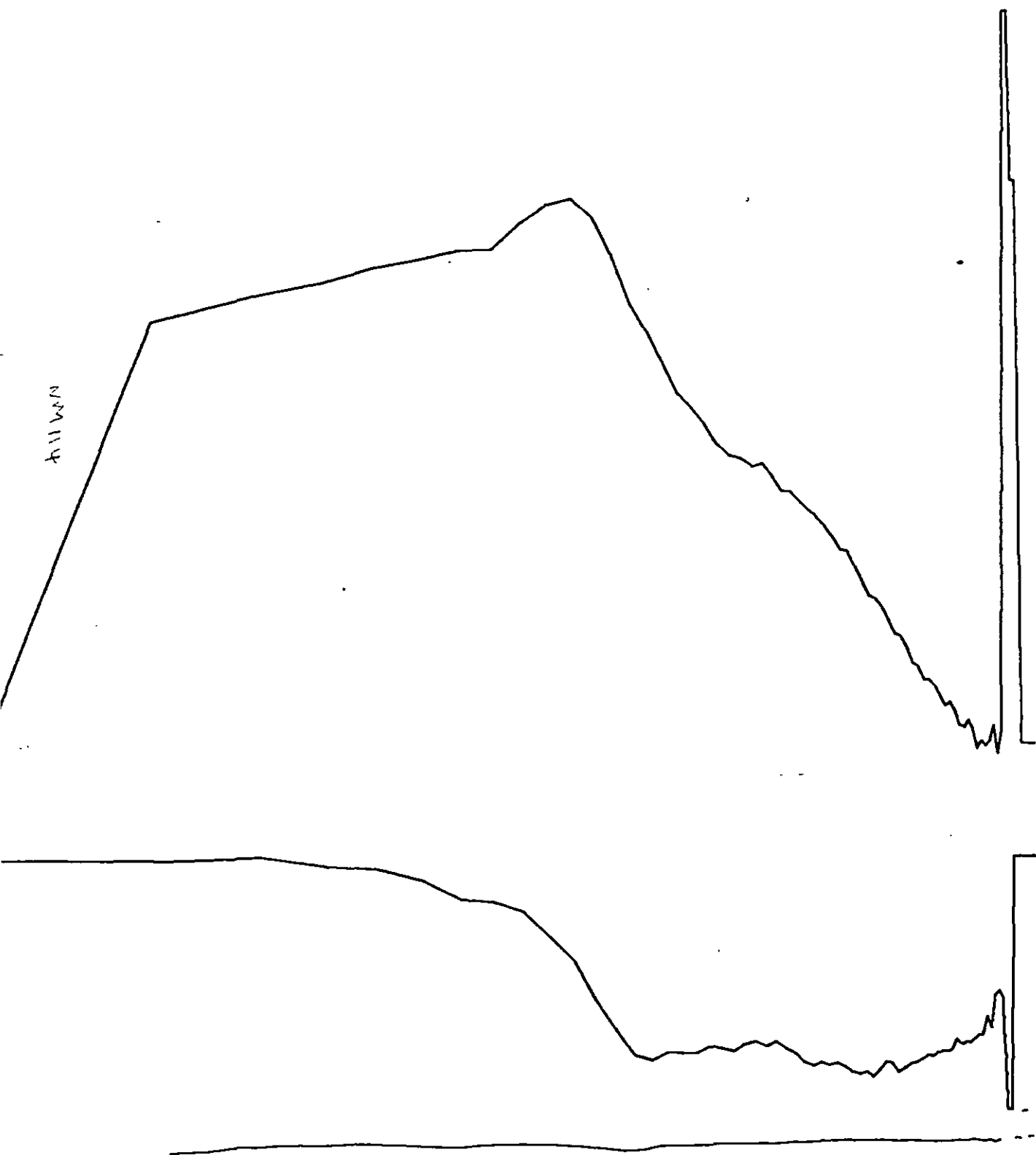


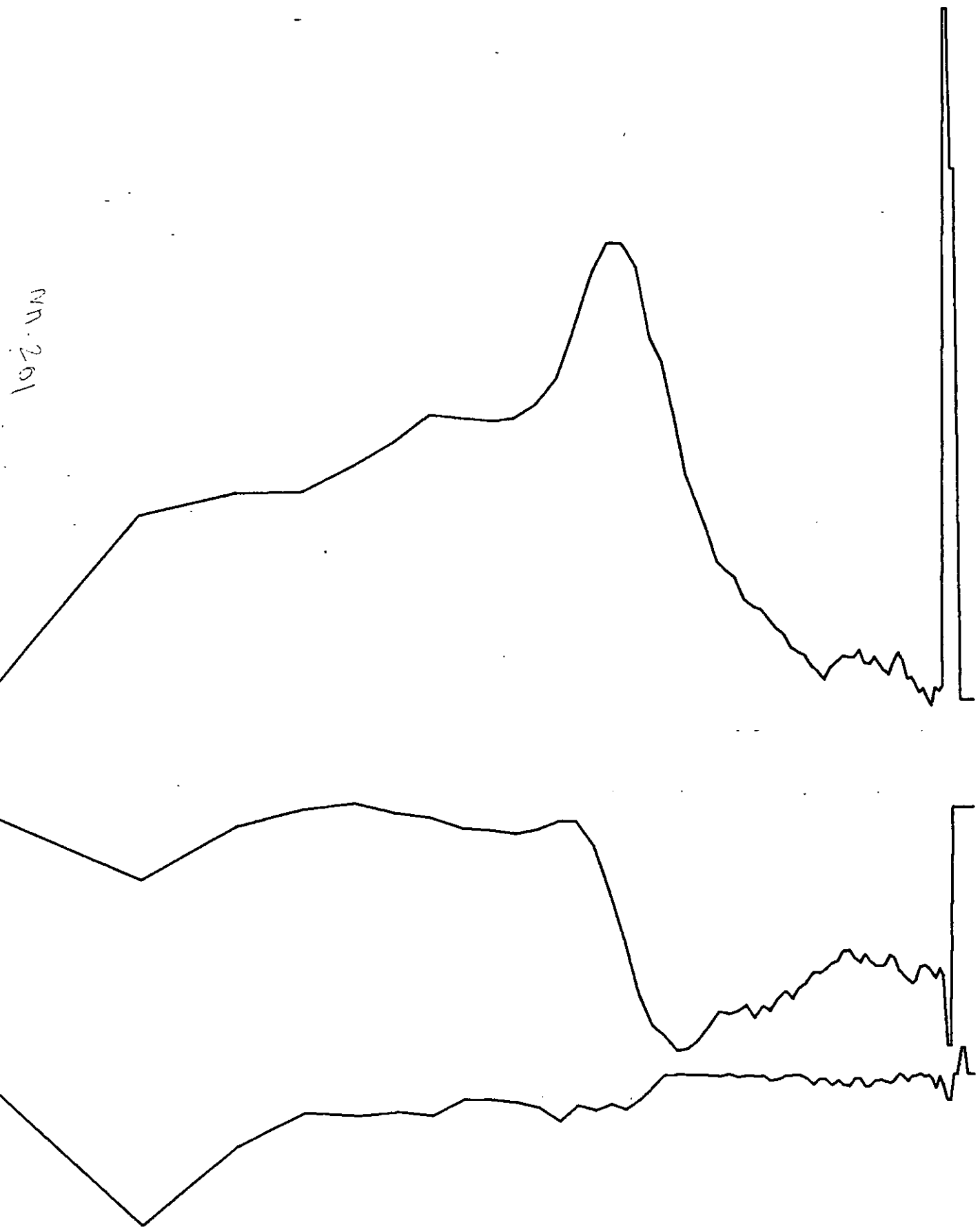




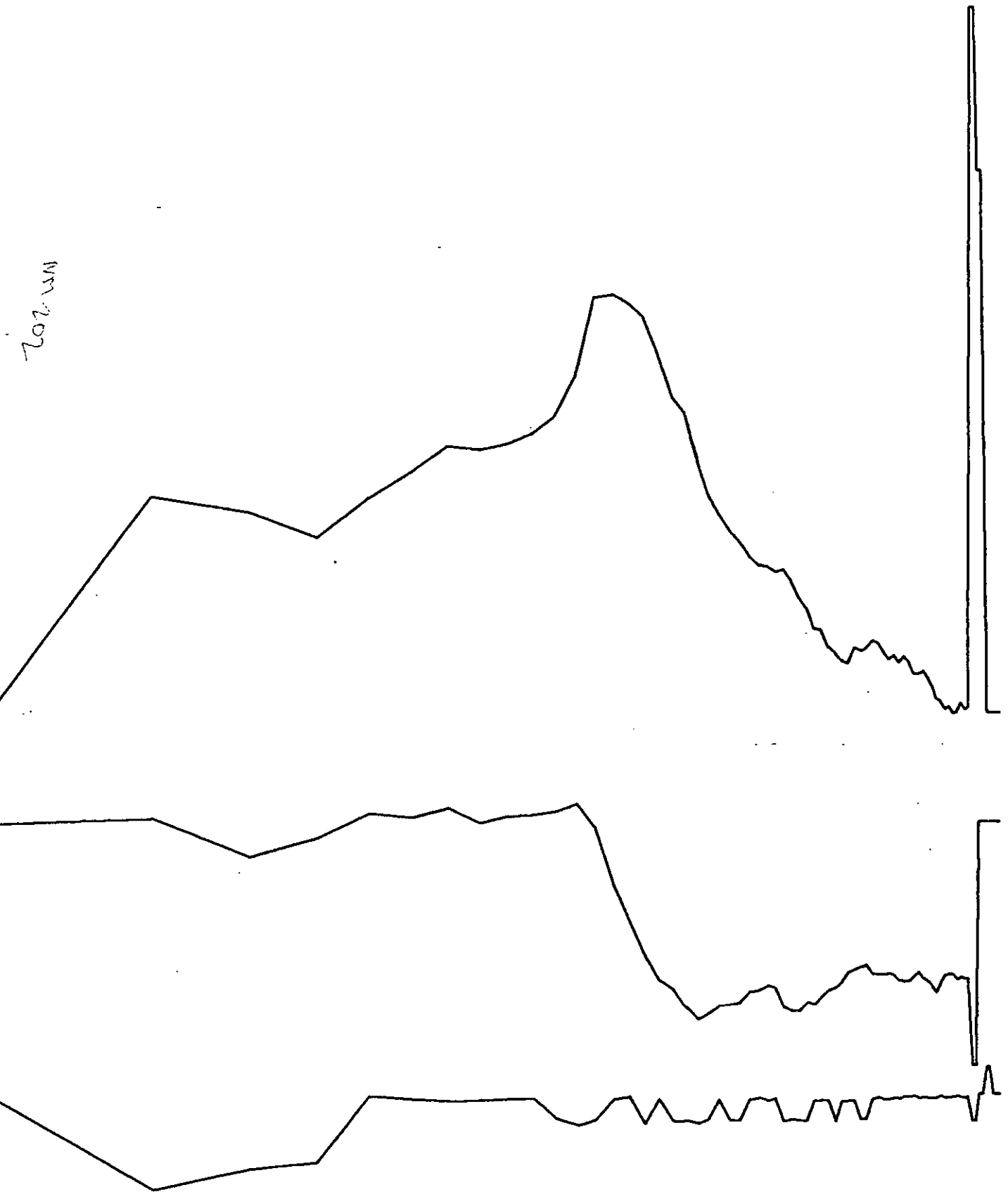




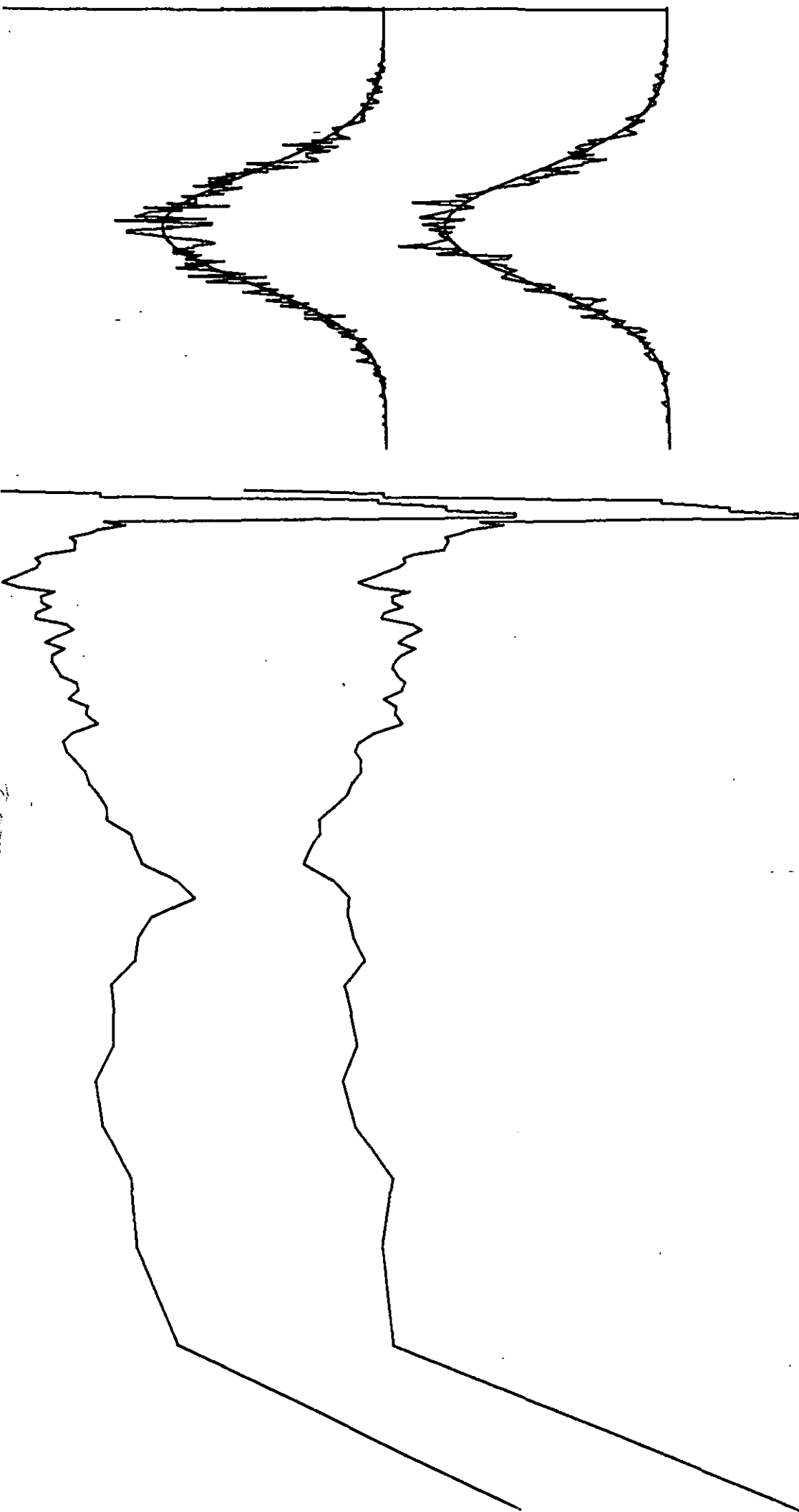




MM 202

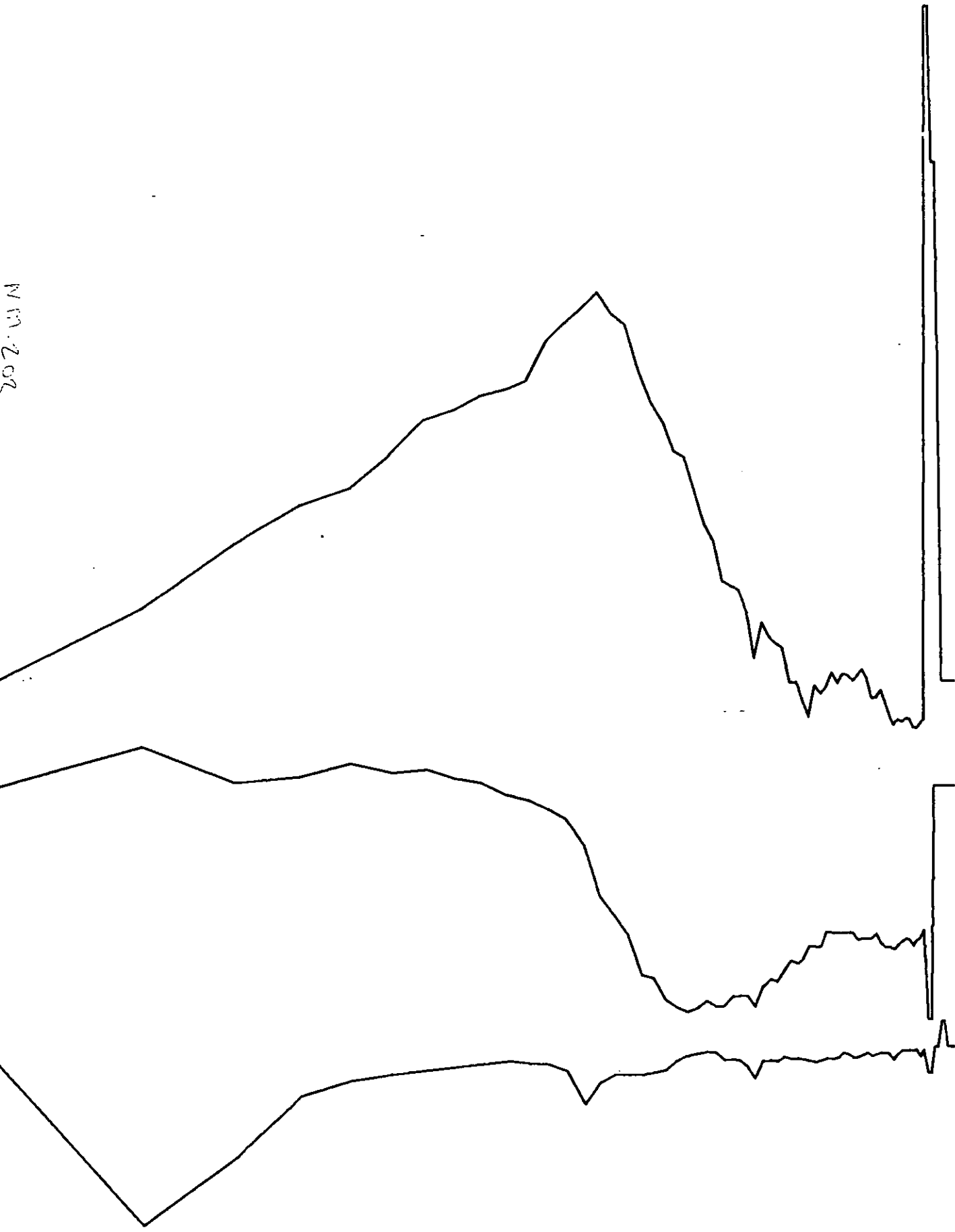


83 02F



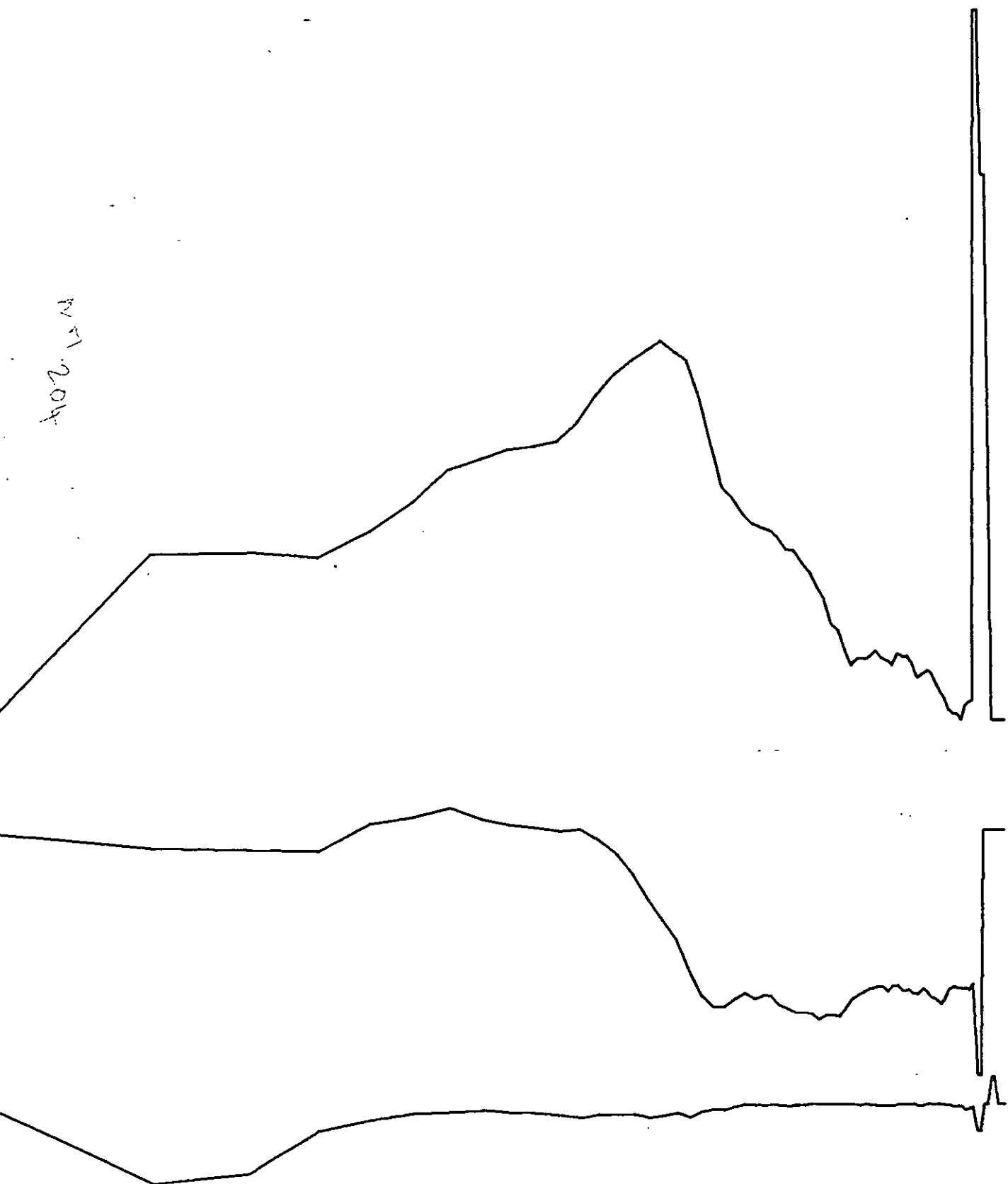
83 03 F

W 11.202



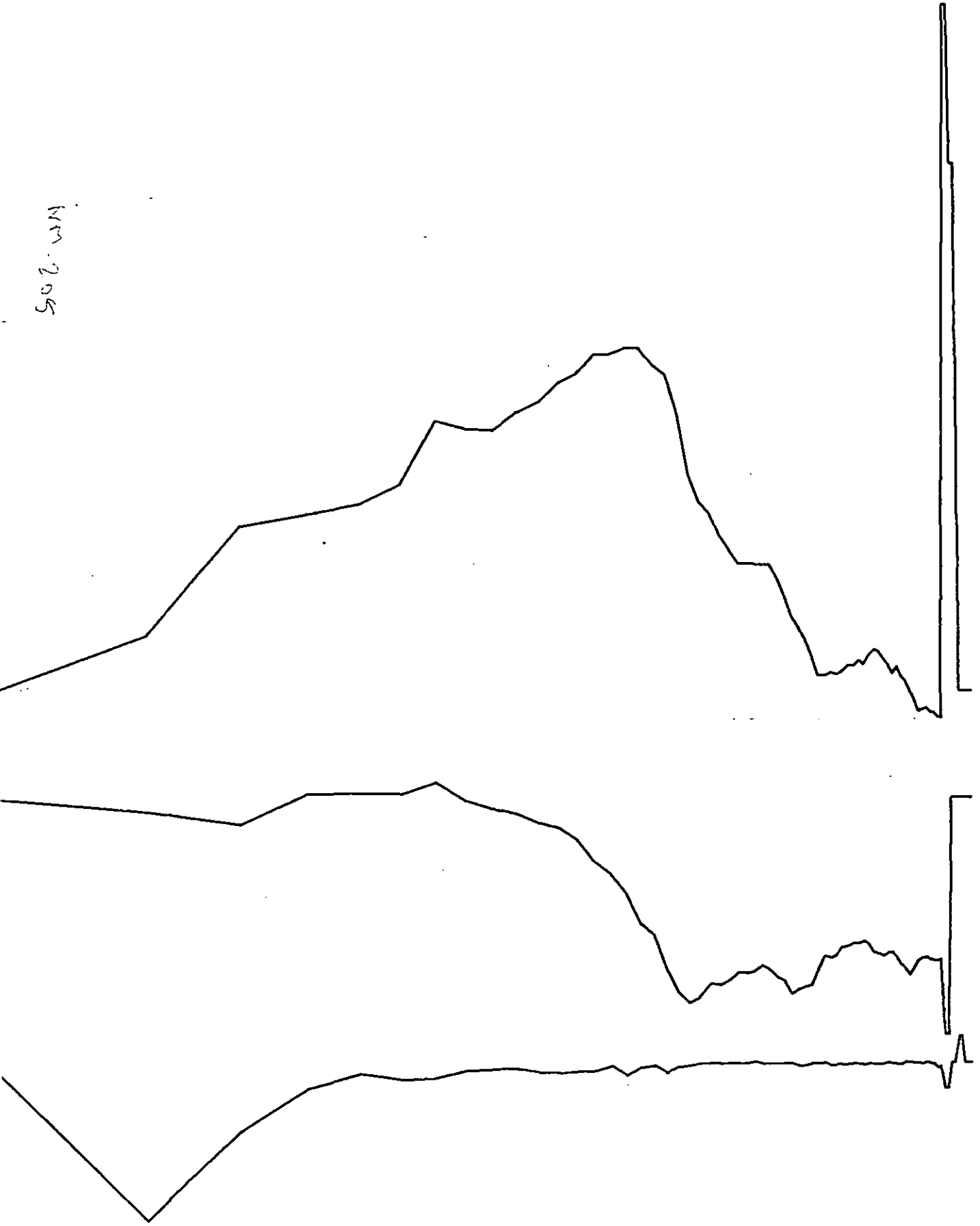
83 04F

W-1.204



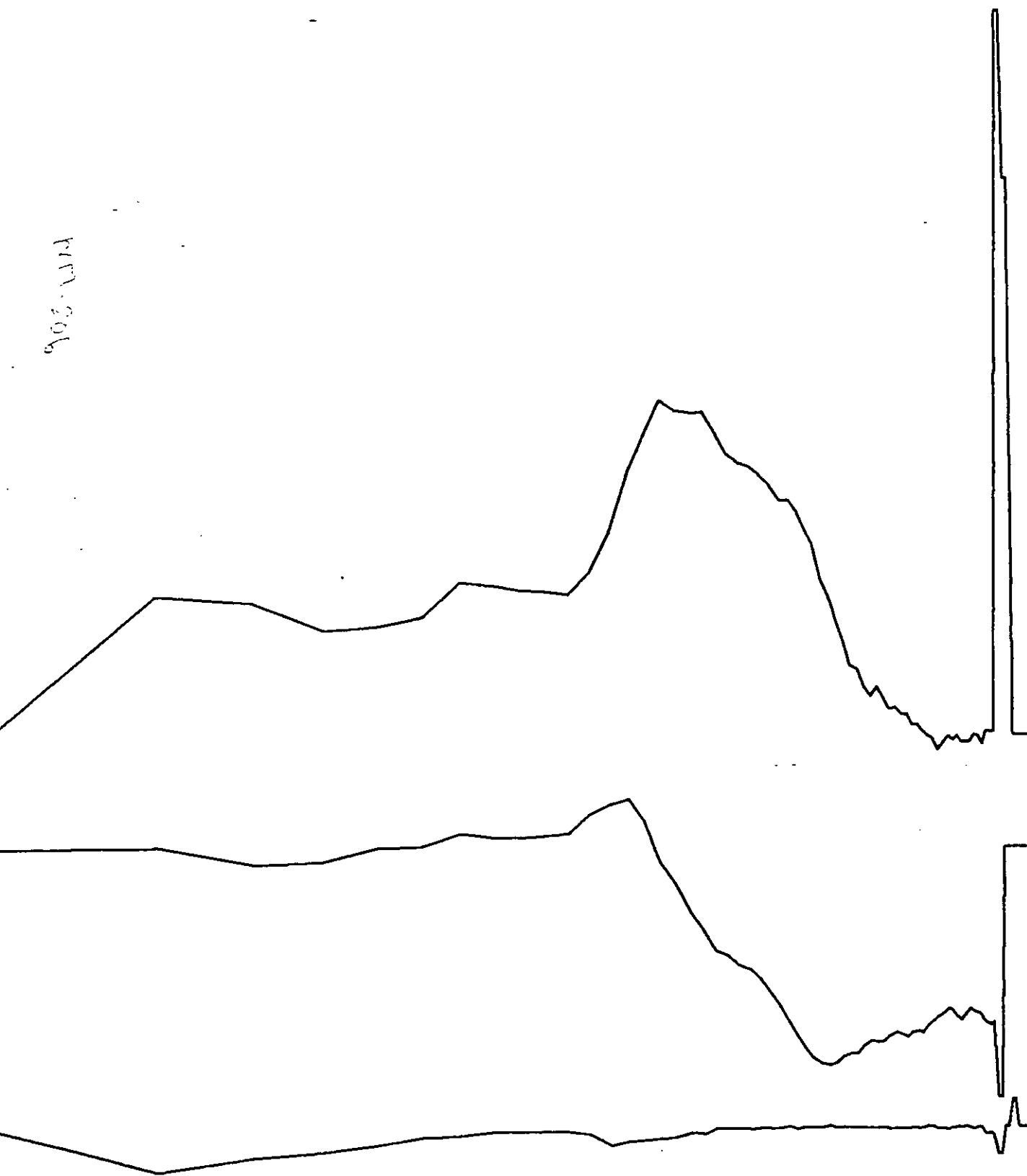
83 05F

mm. 205

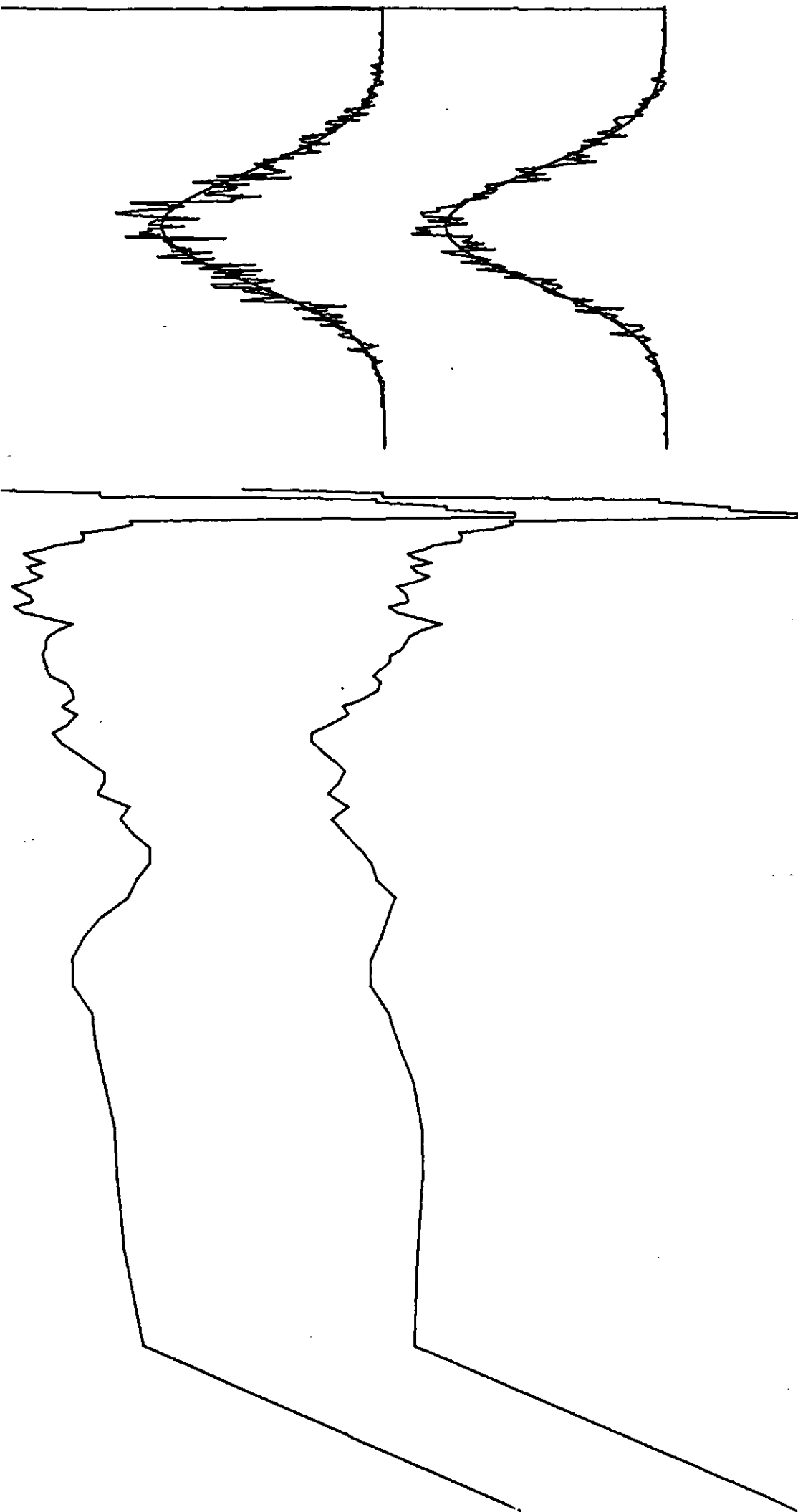


83 06F

1177.206

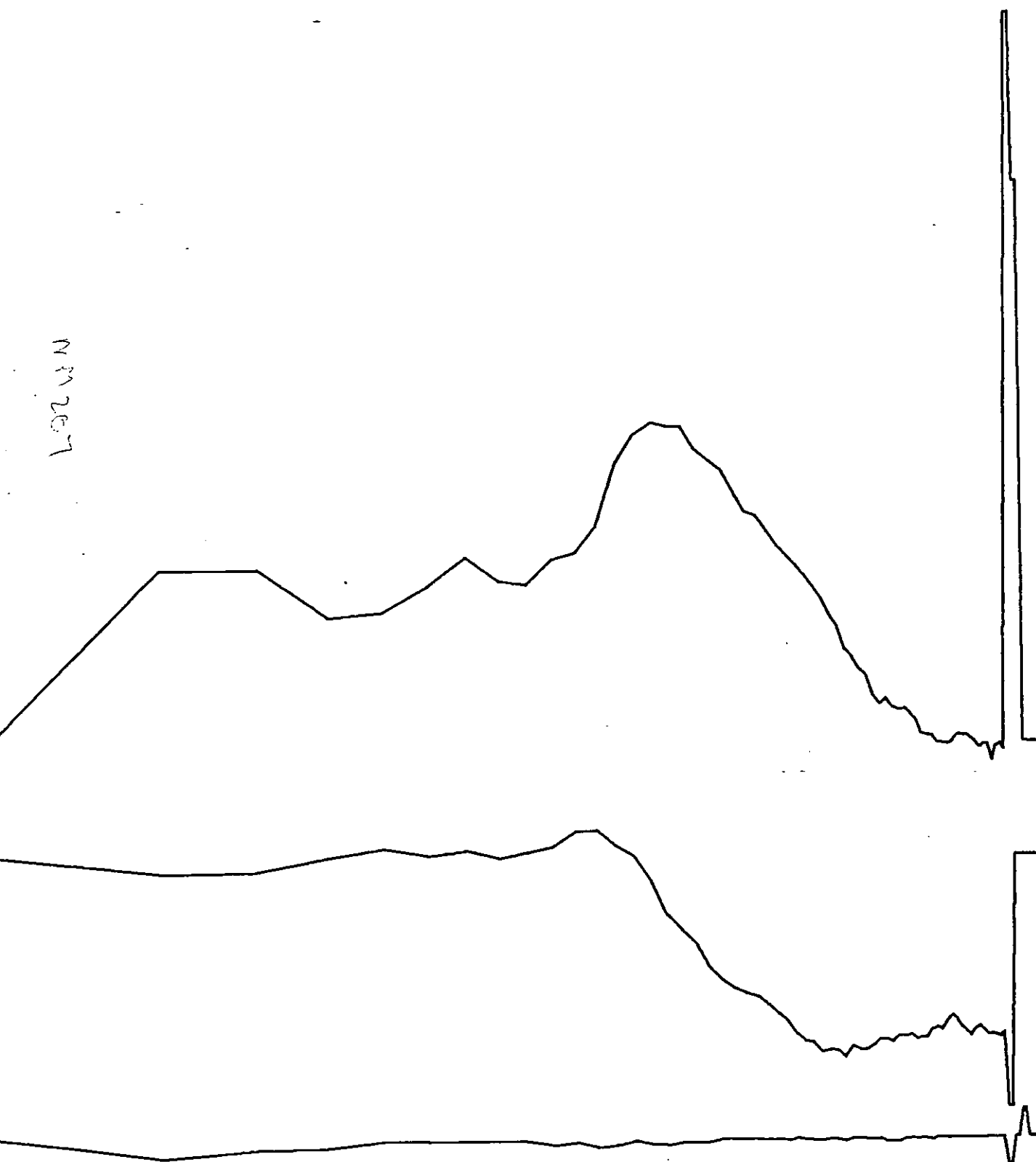


83 Q6 F



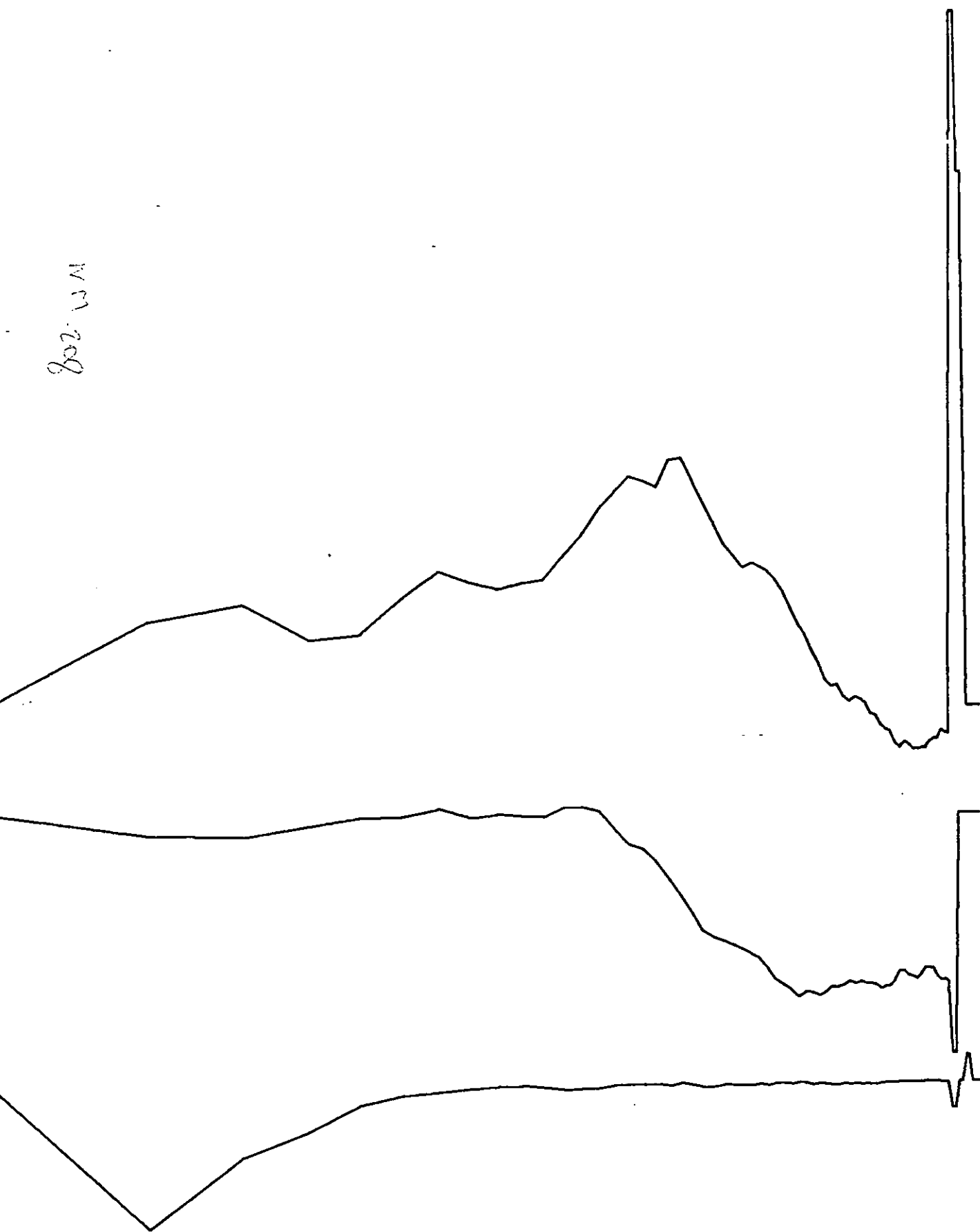
83 07F

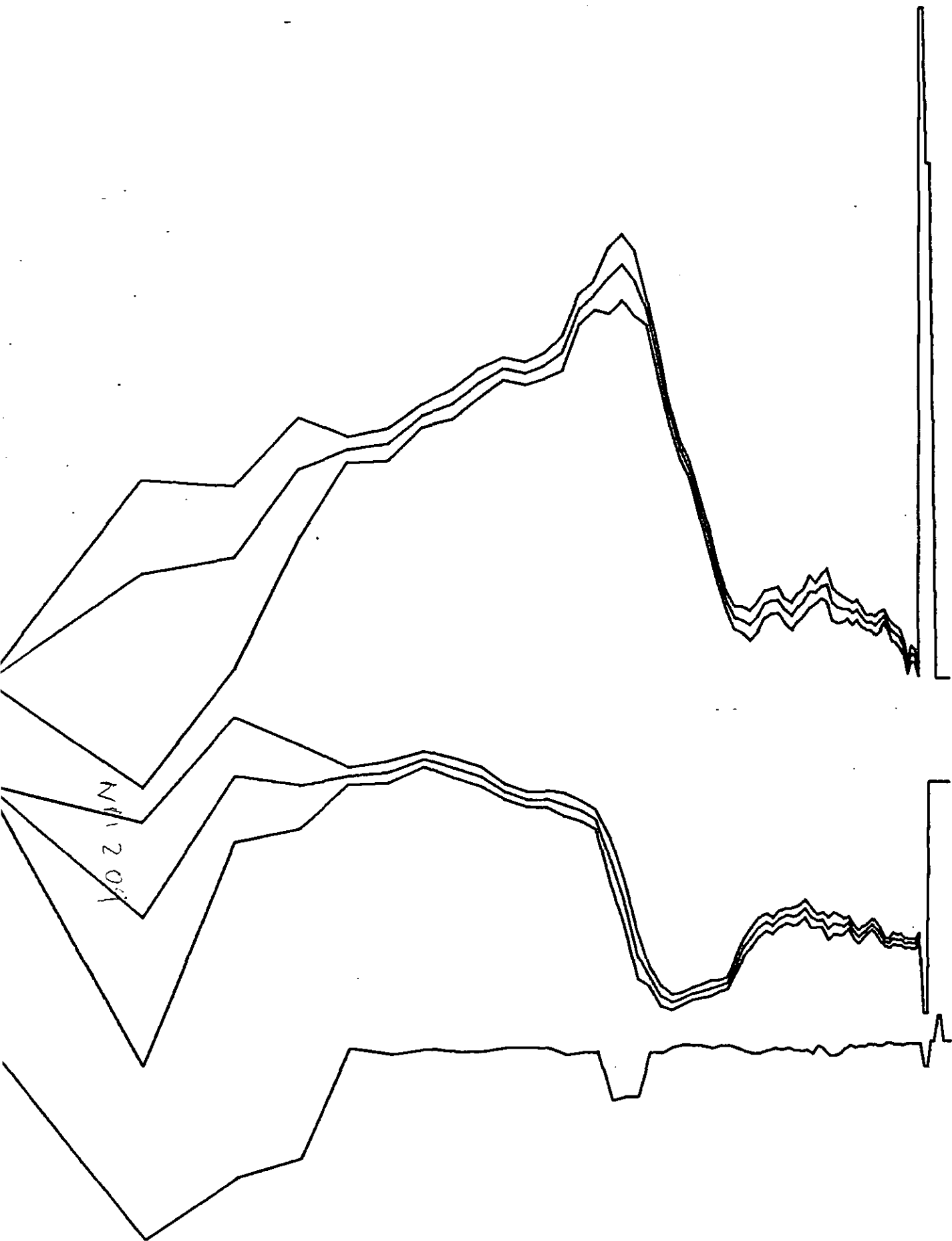
NH267



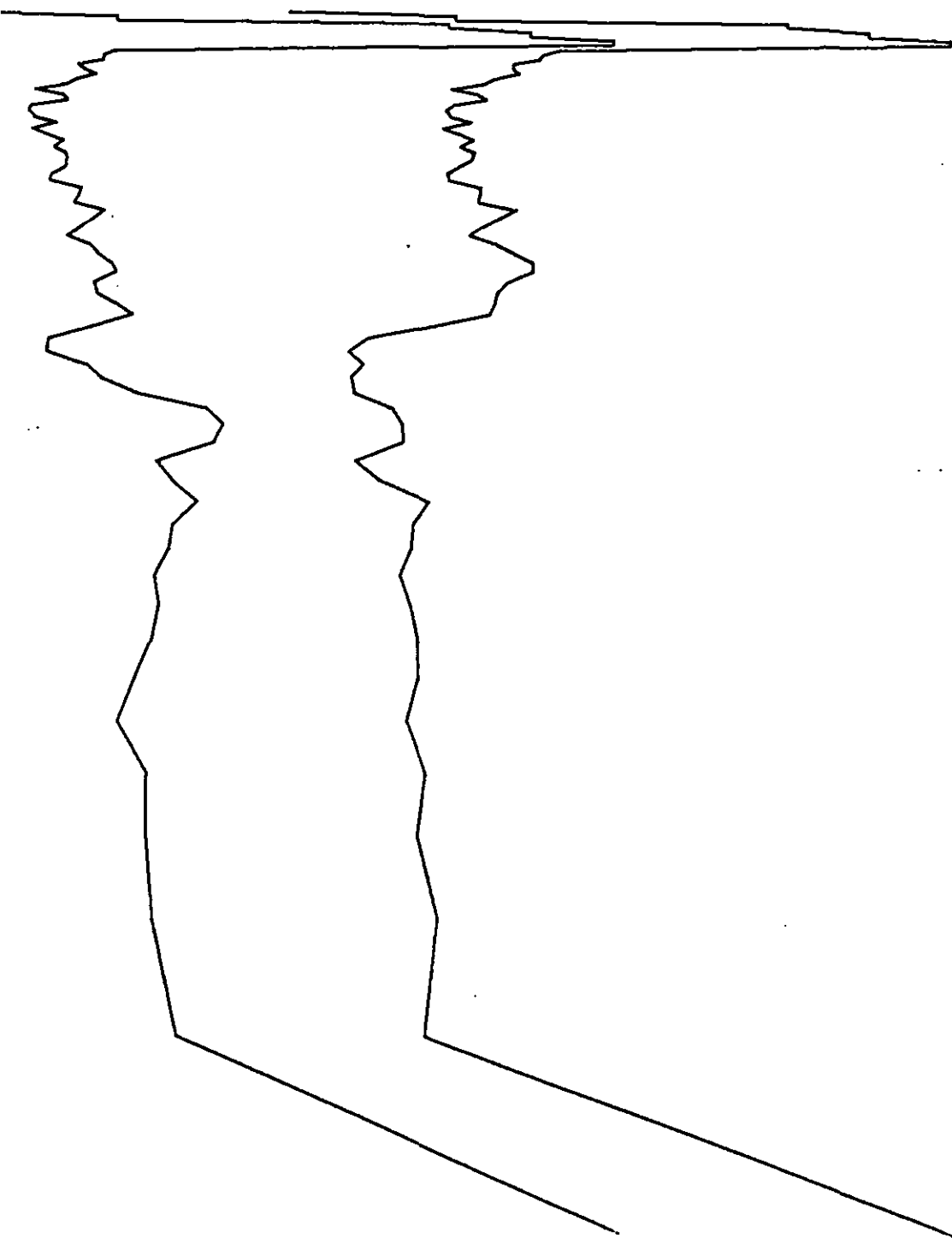
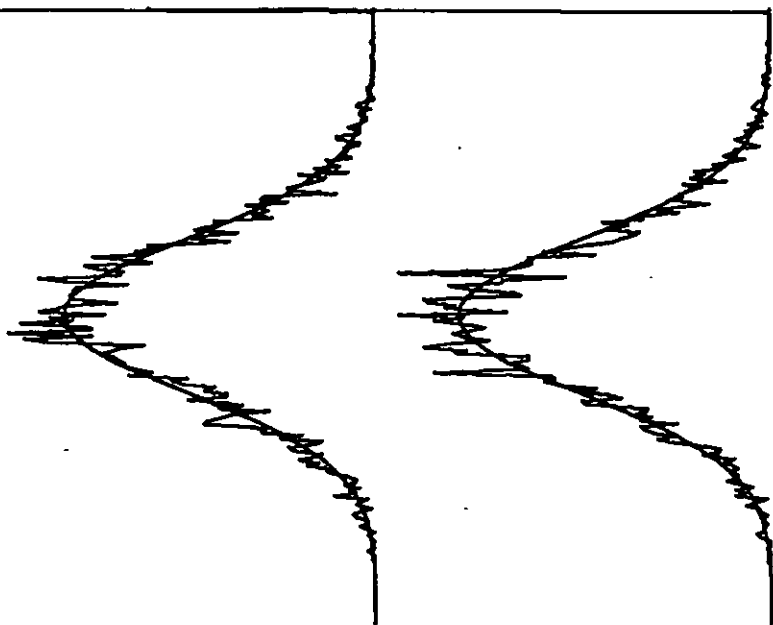
83 08 F

W. 208

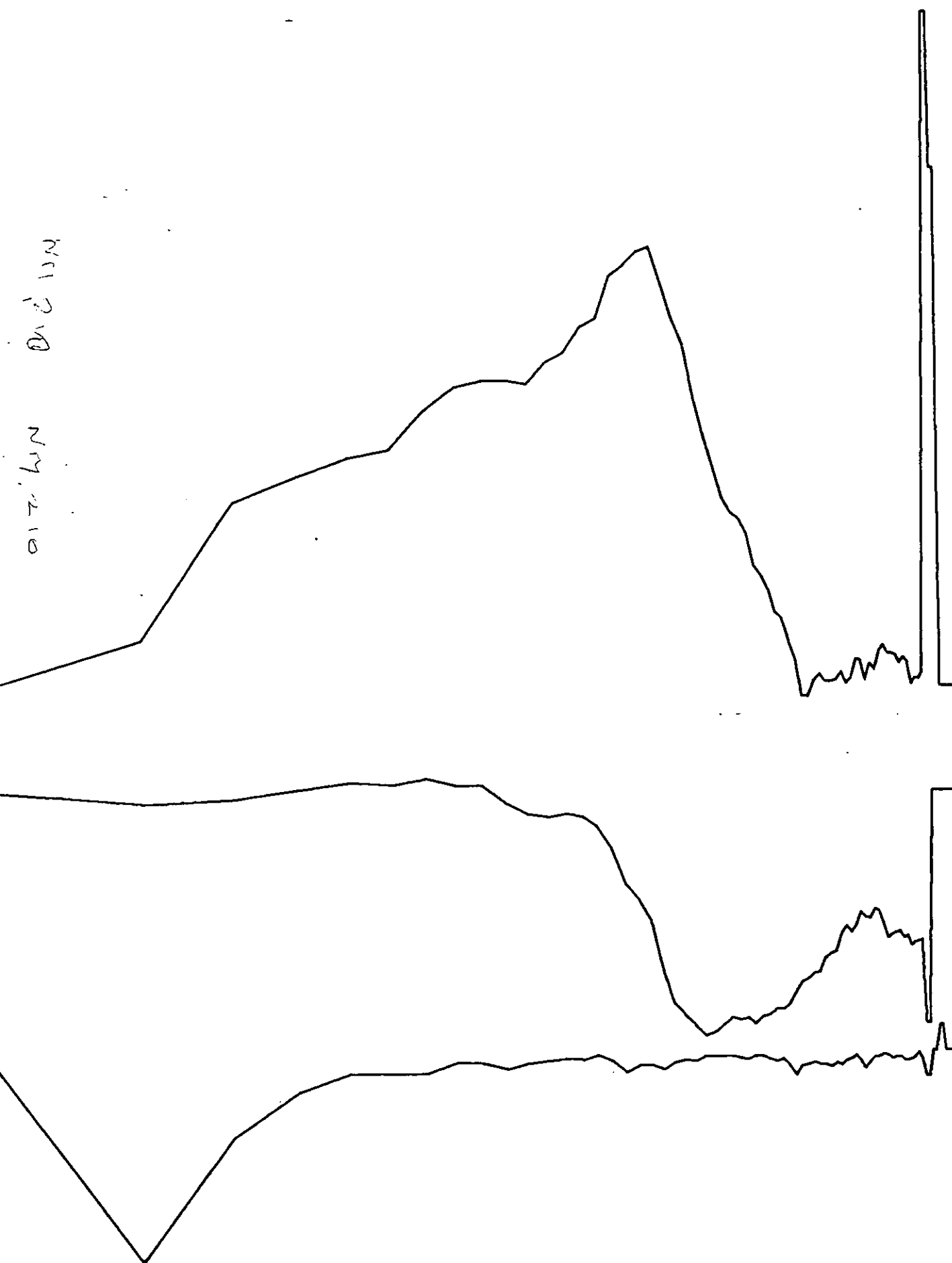




83 09F

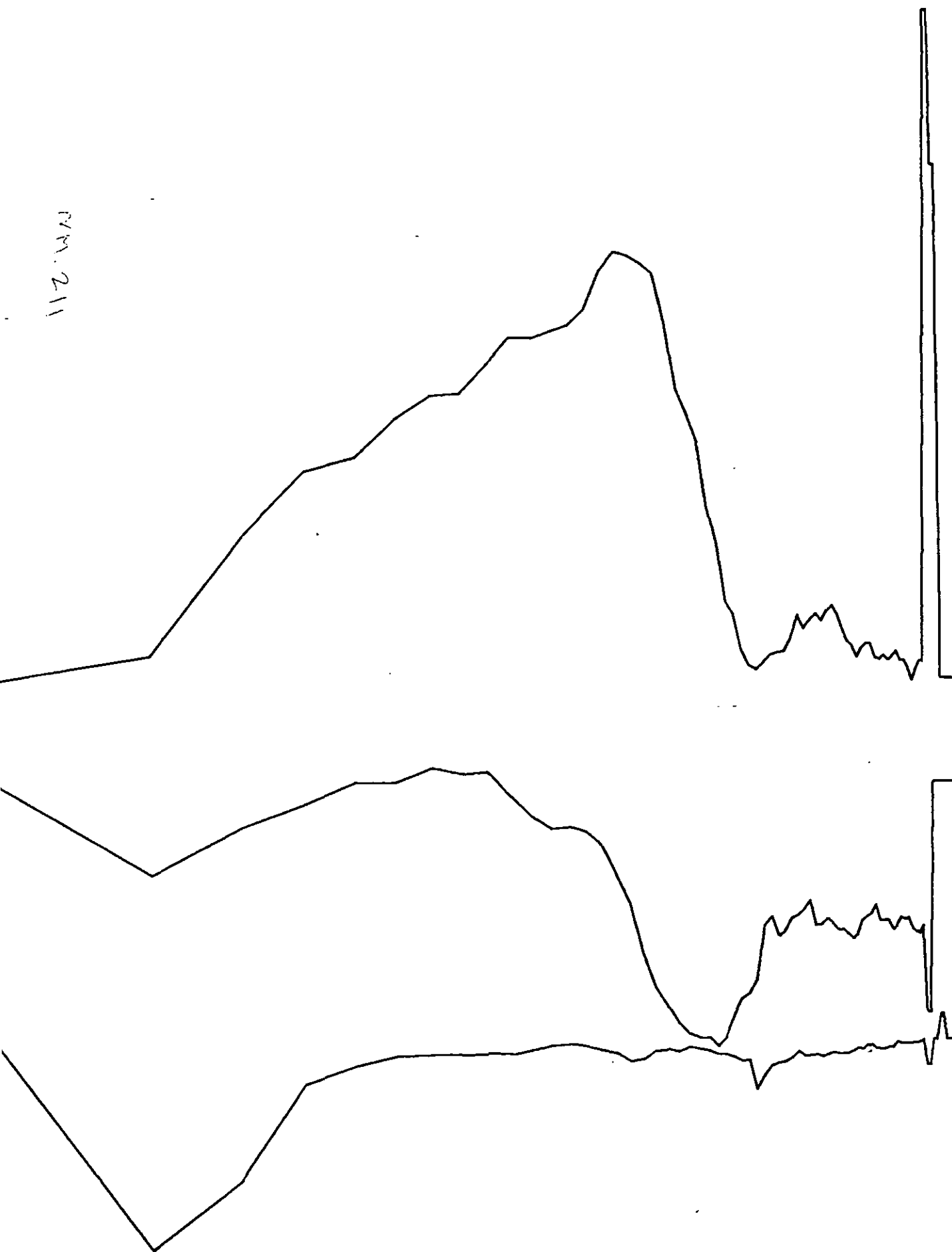


83 10 F



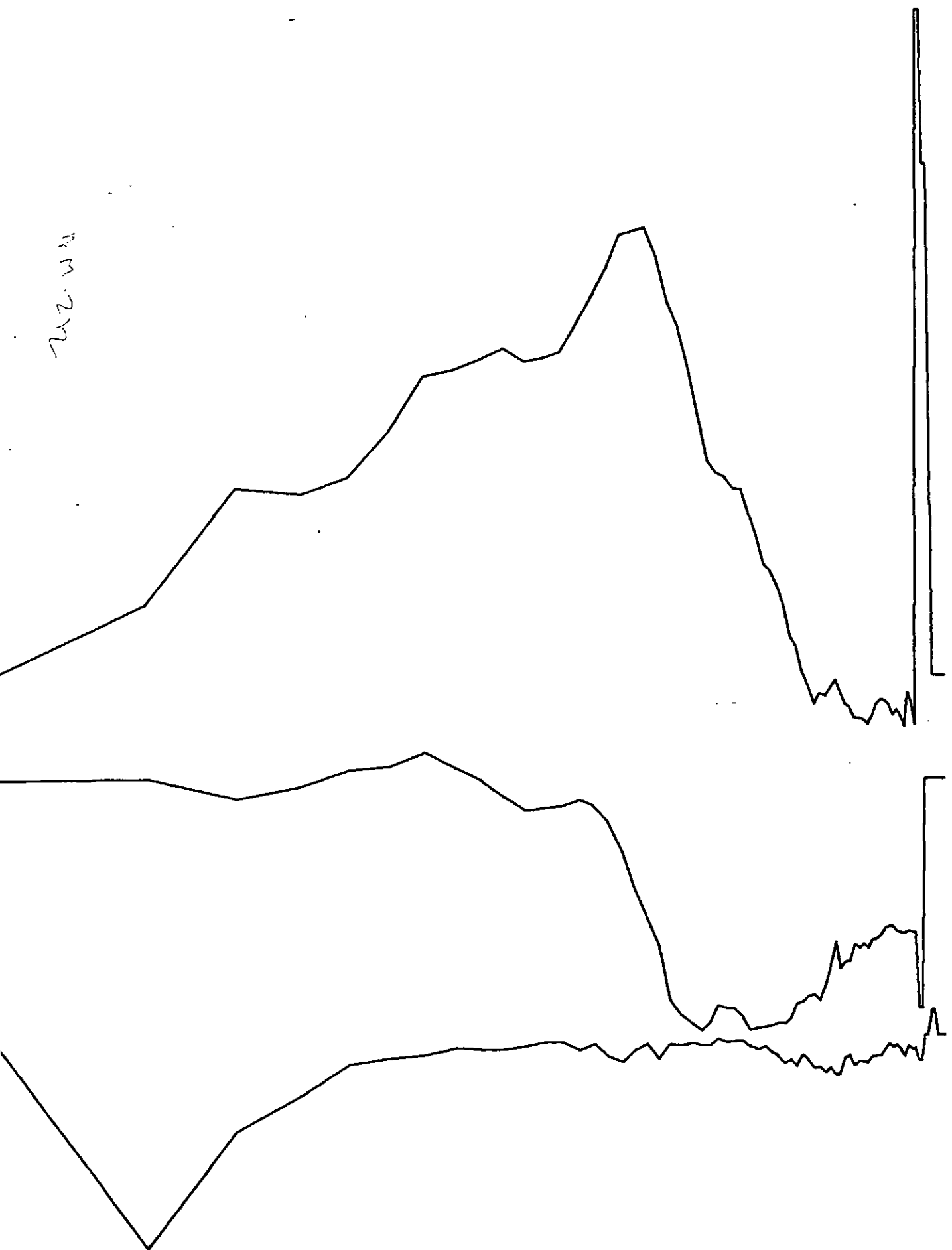
83 11 F

MM. 211



83 12 F

22.22



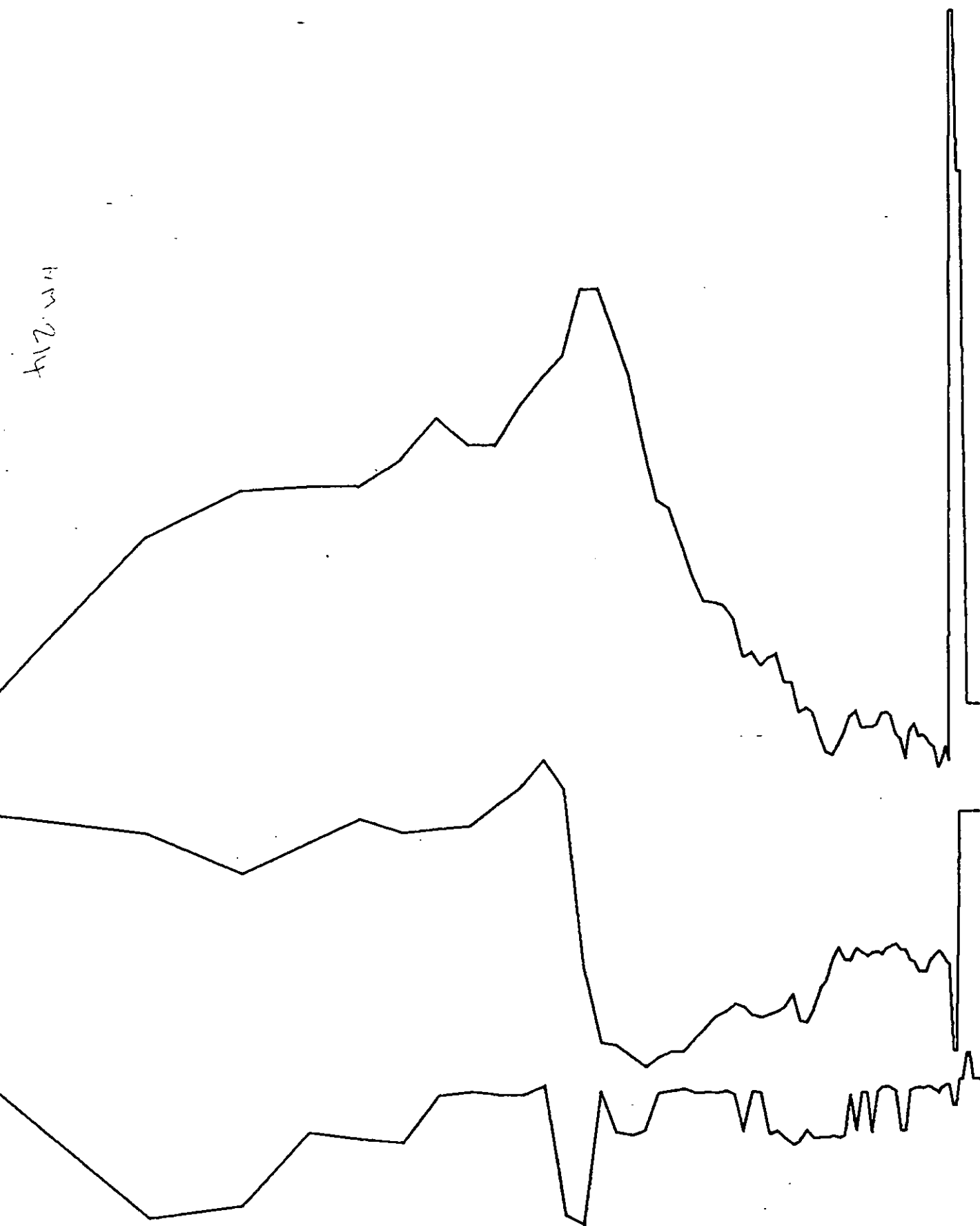
83 13 F

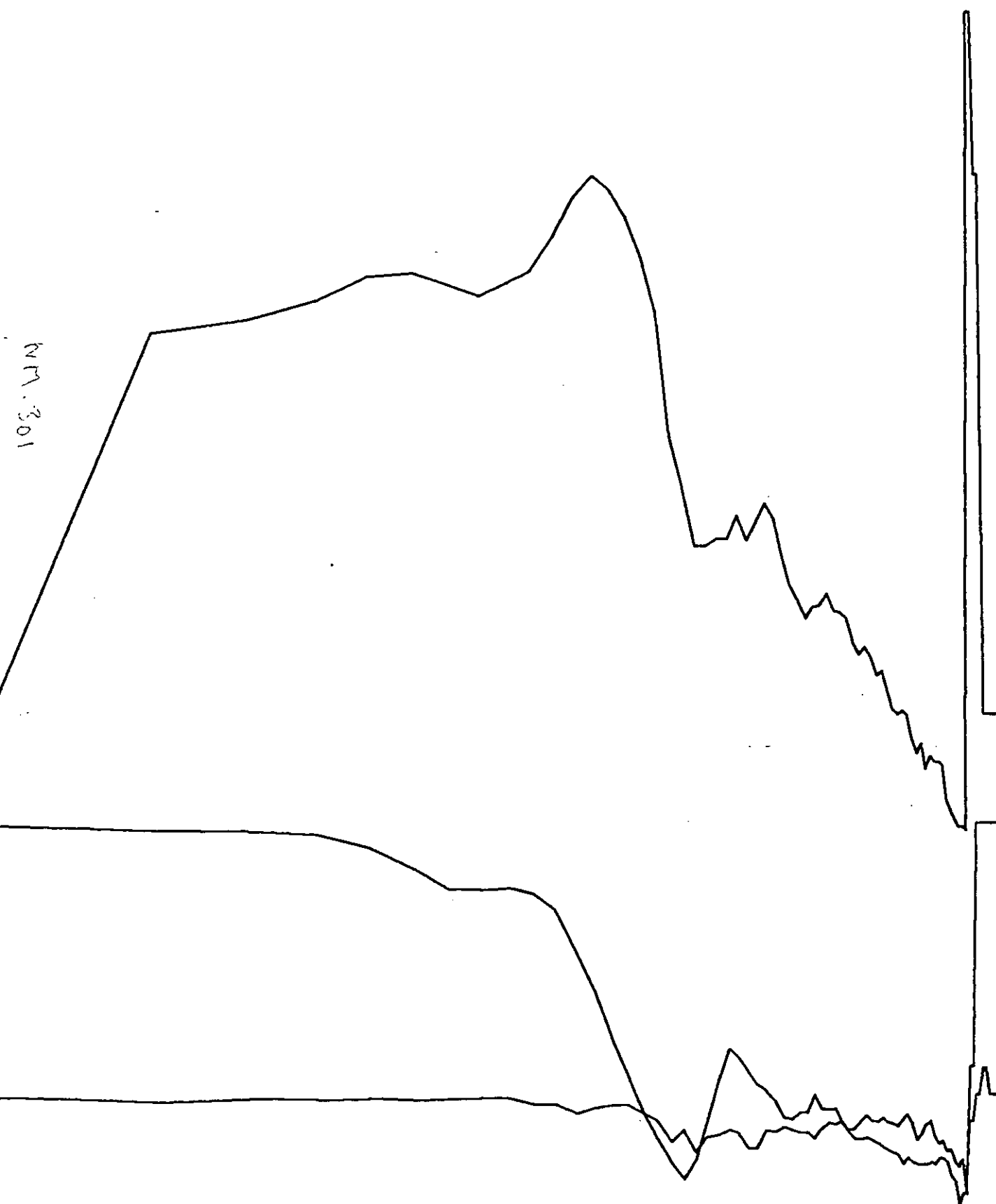
MM 213

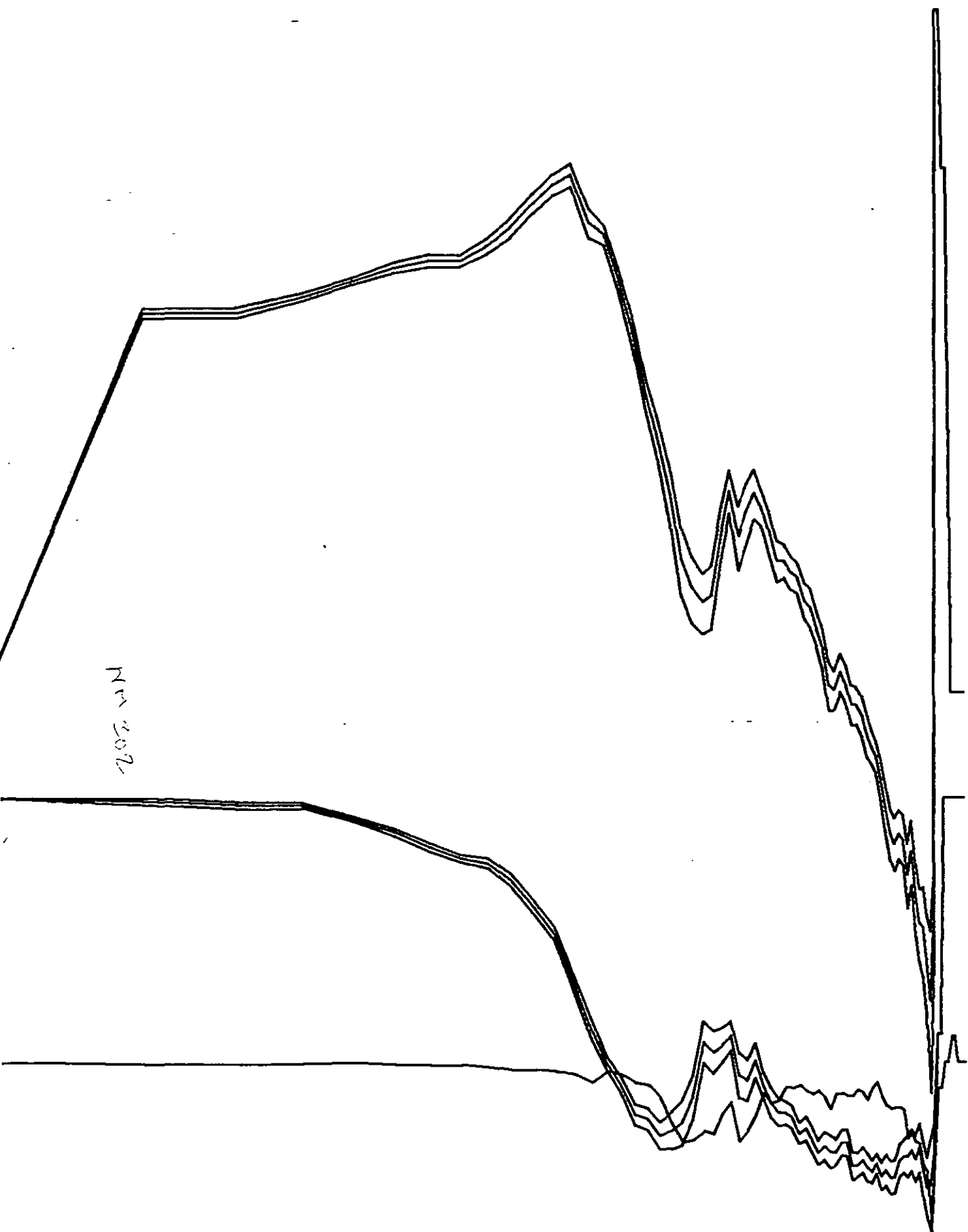


83 14 F

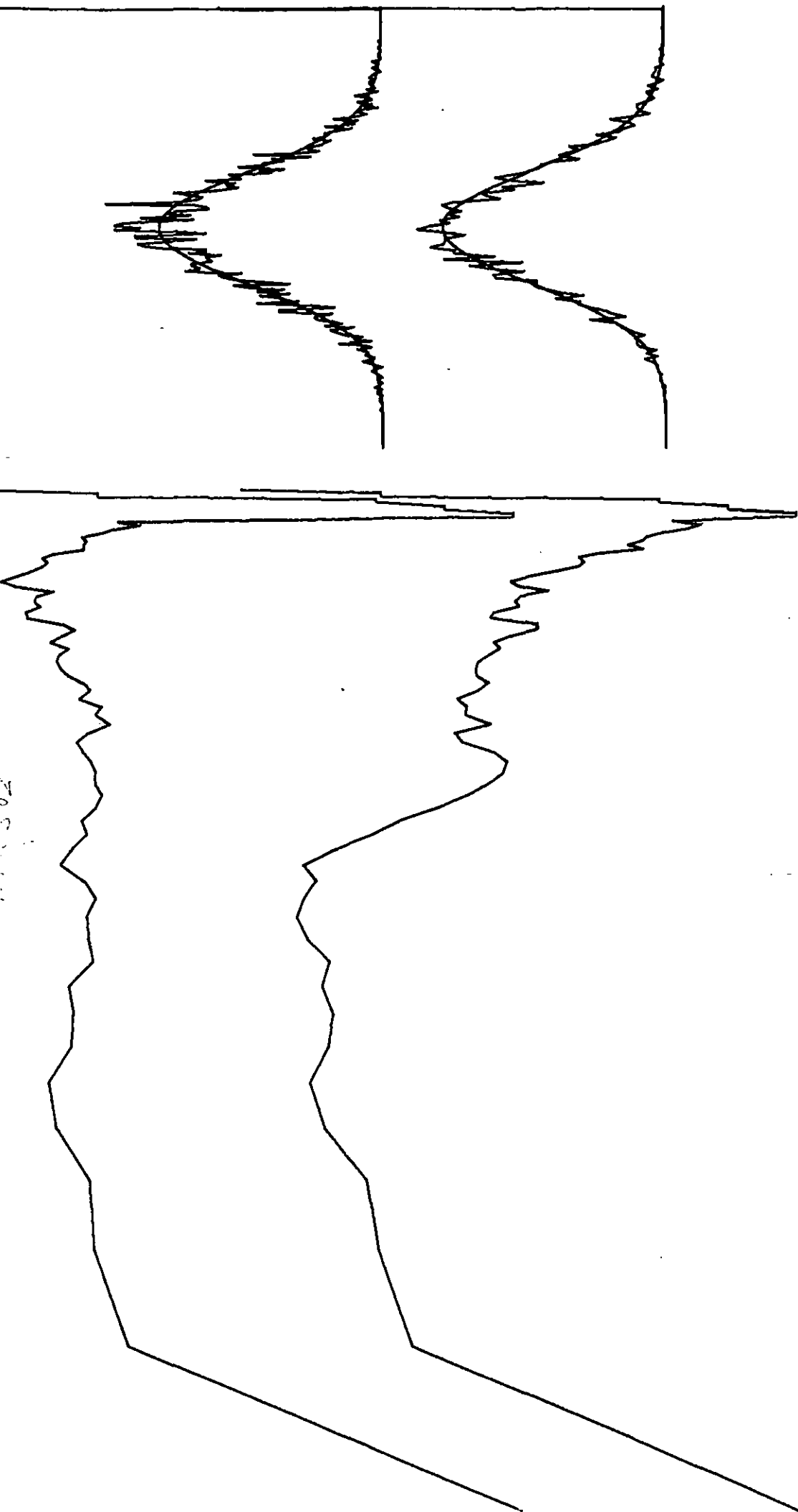
412.214

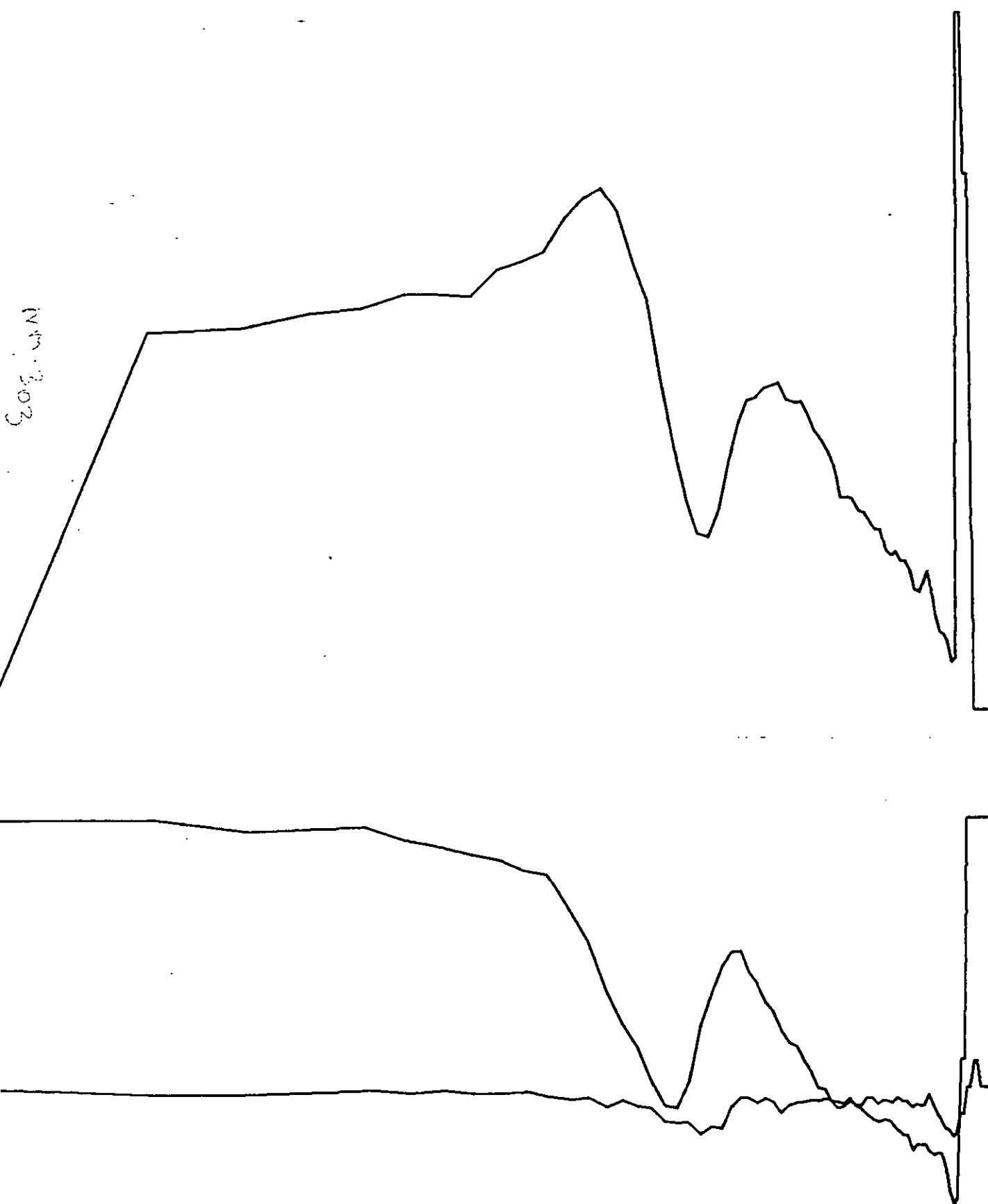


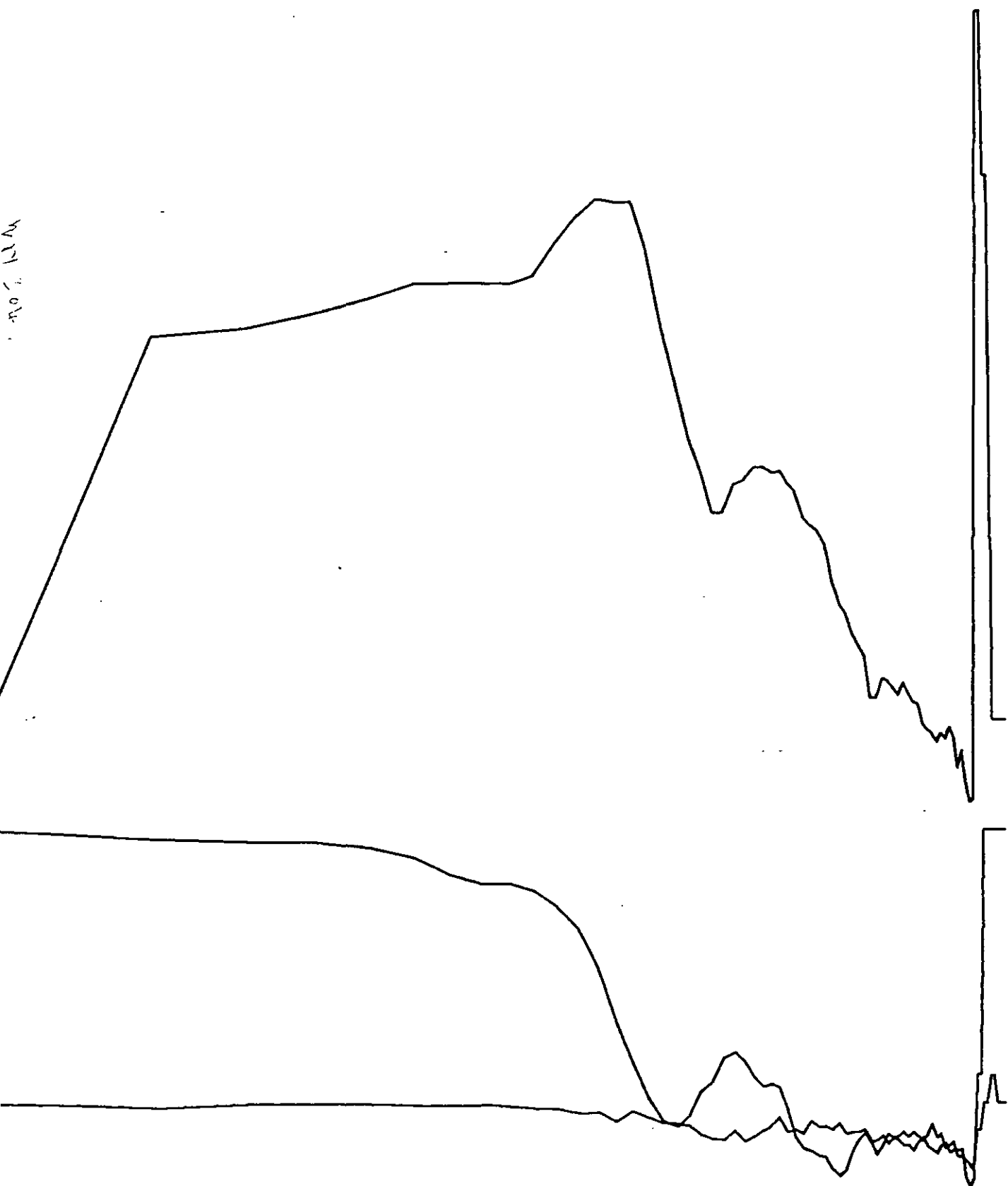




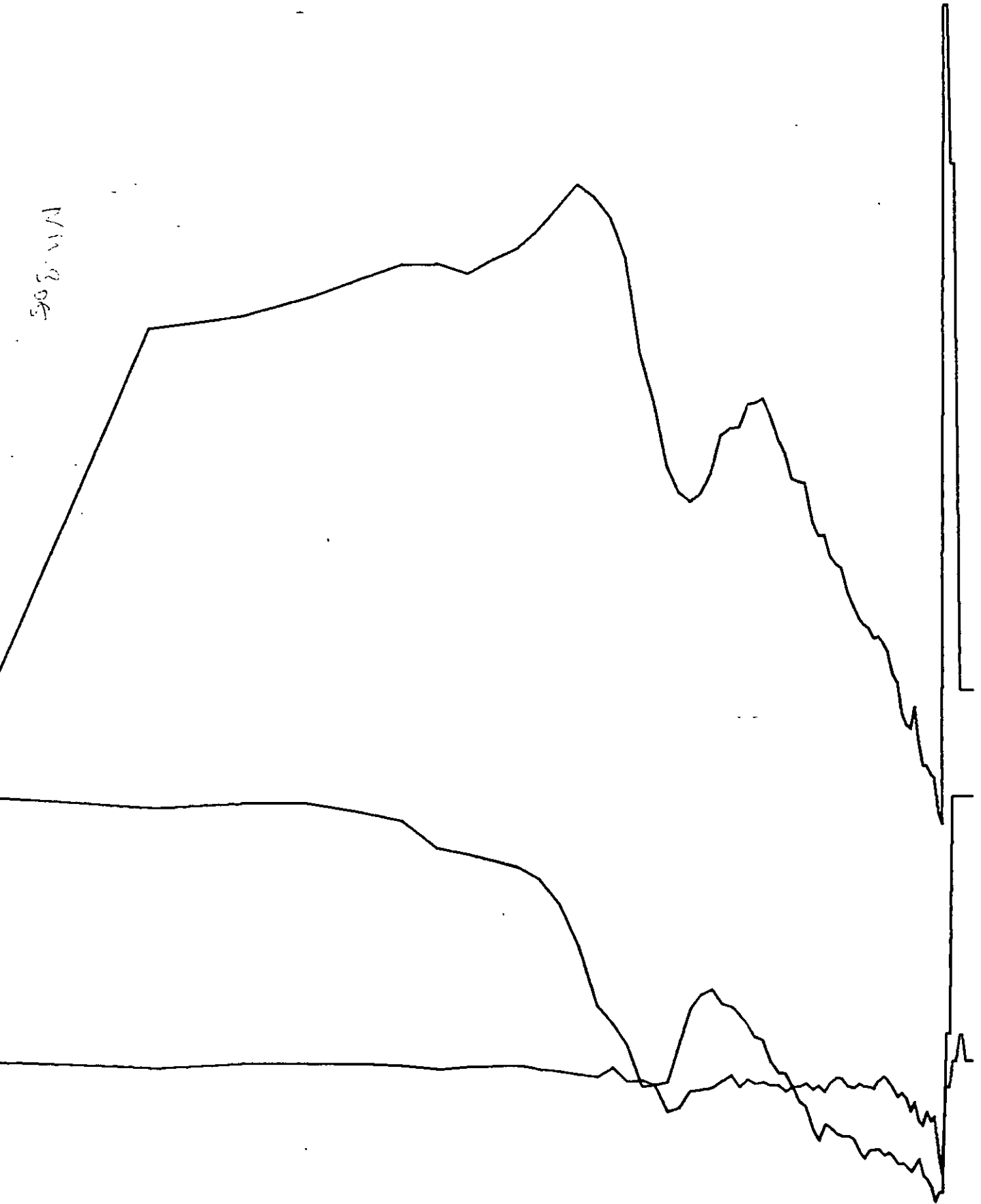
83 02 T

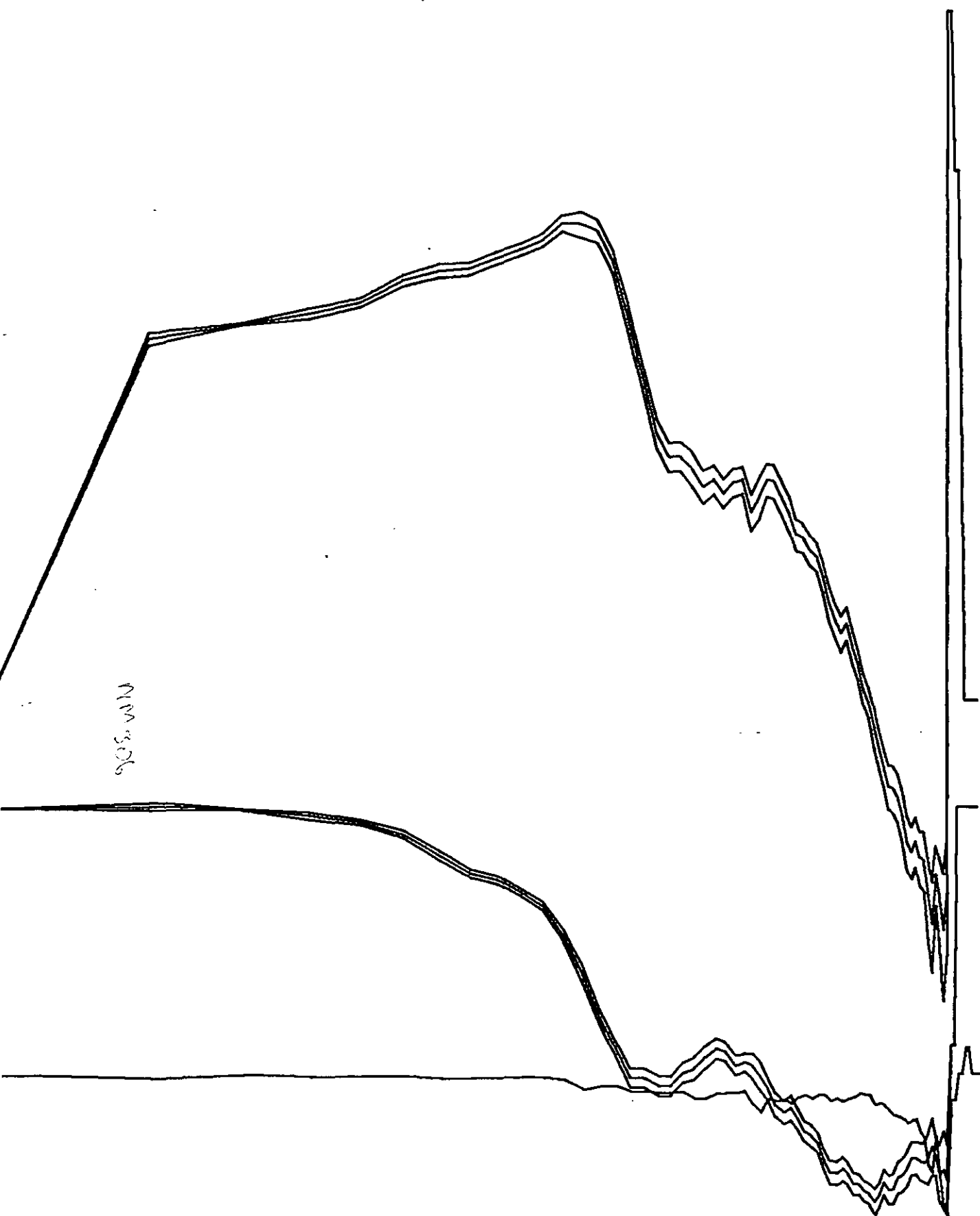






11.805

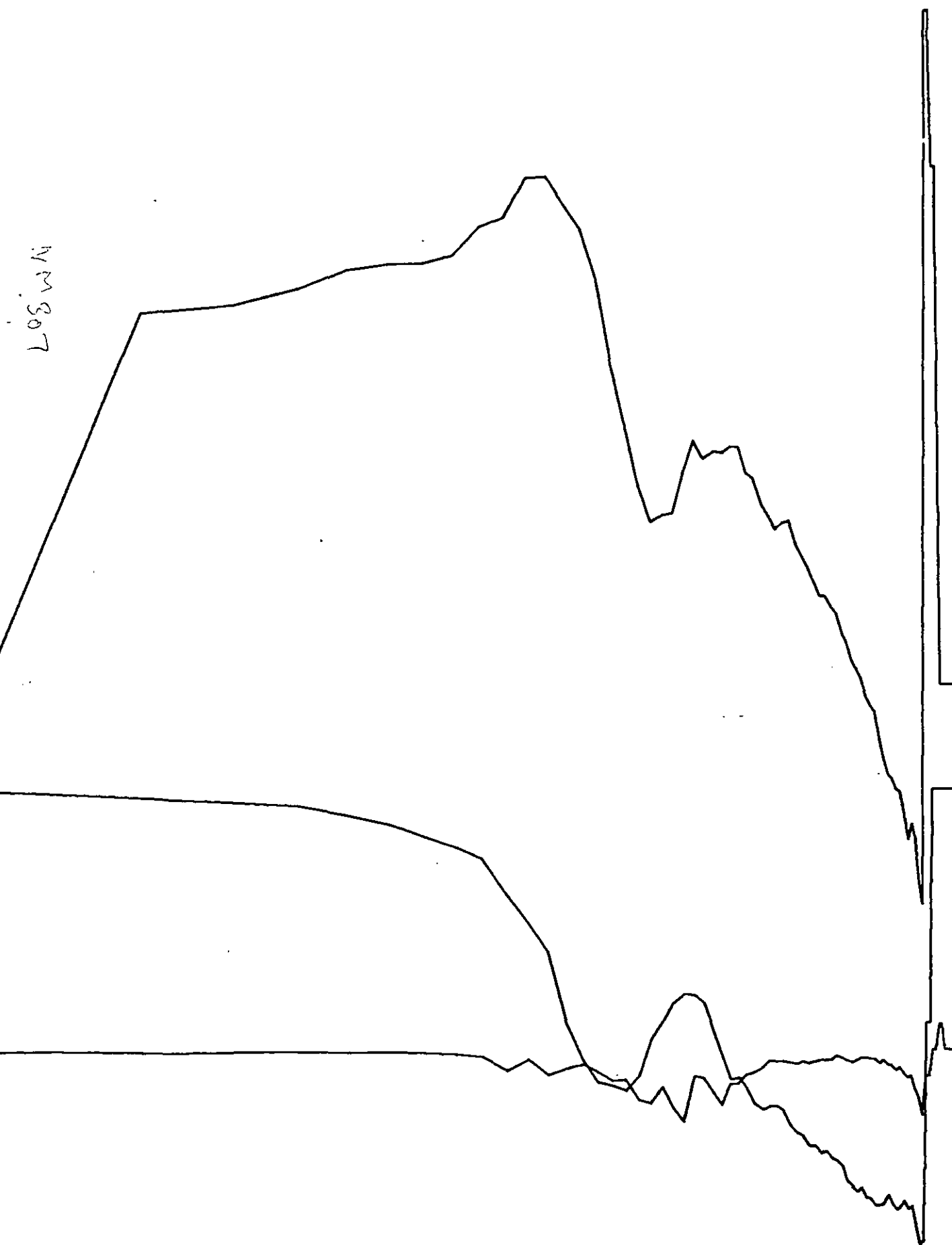




83 06T

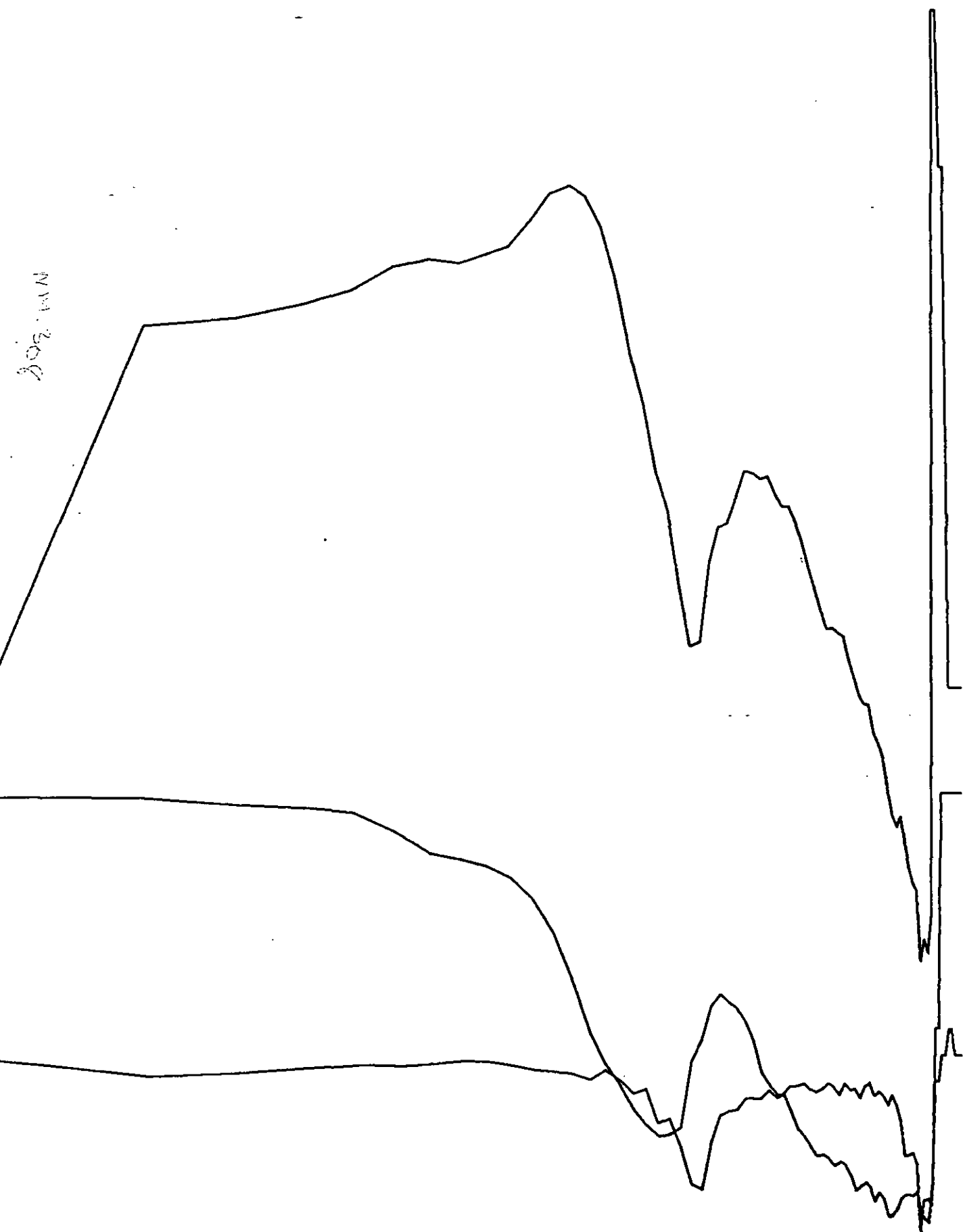


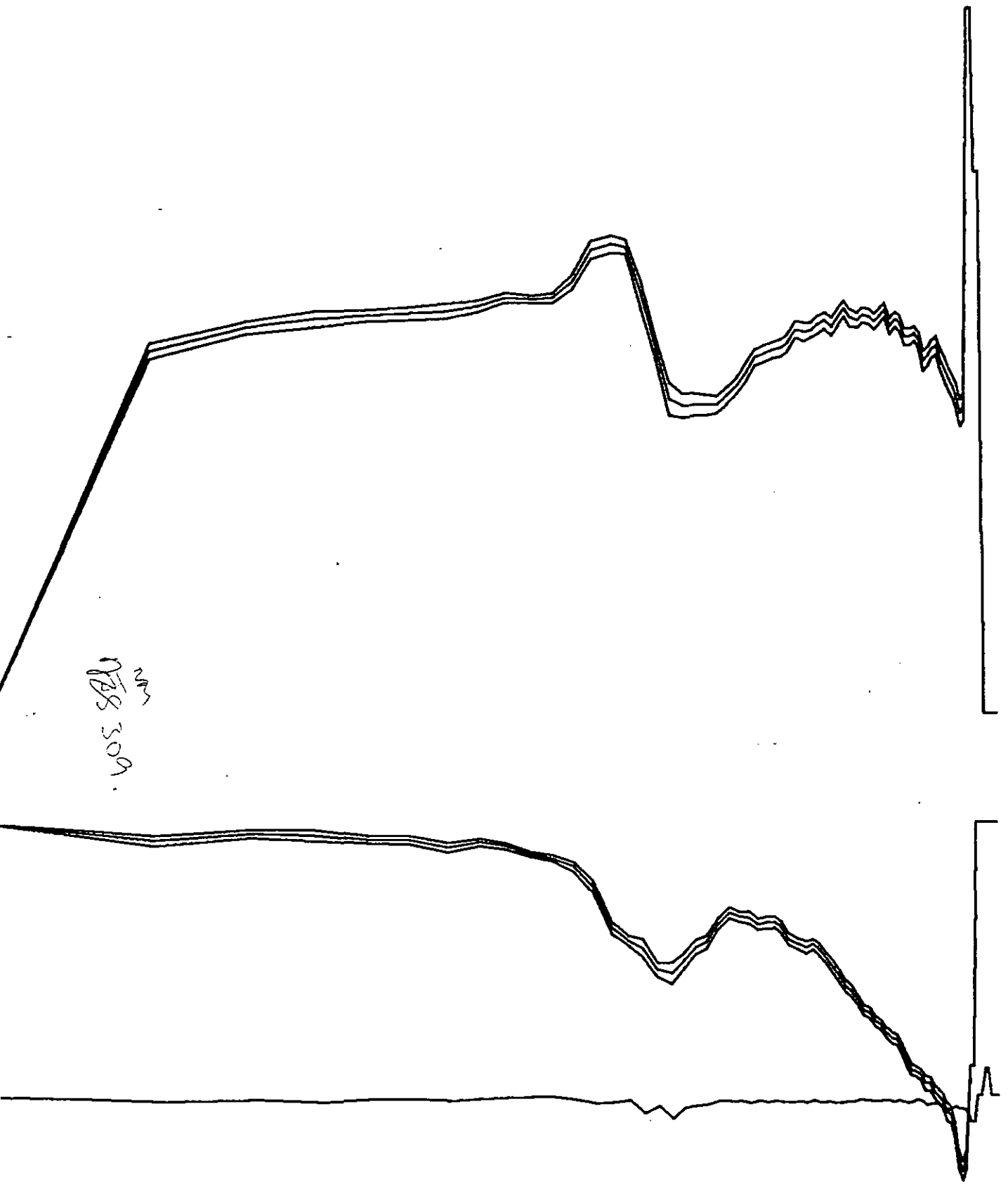
83 07T



LOG W N

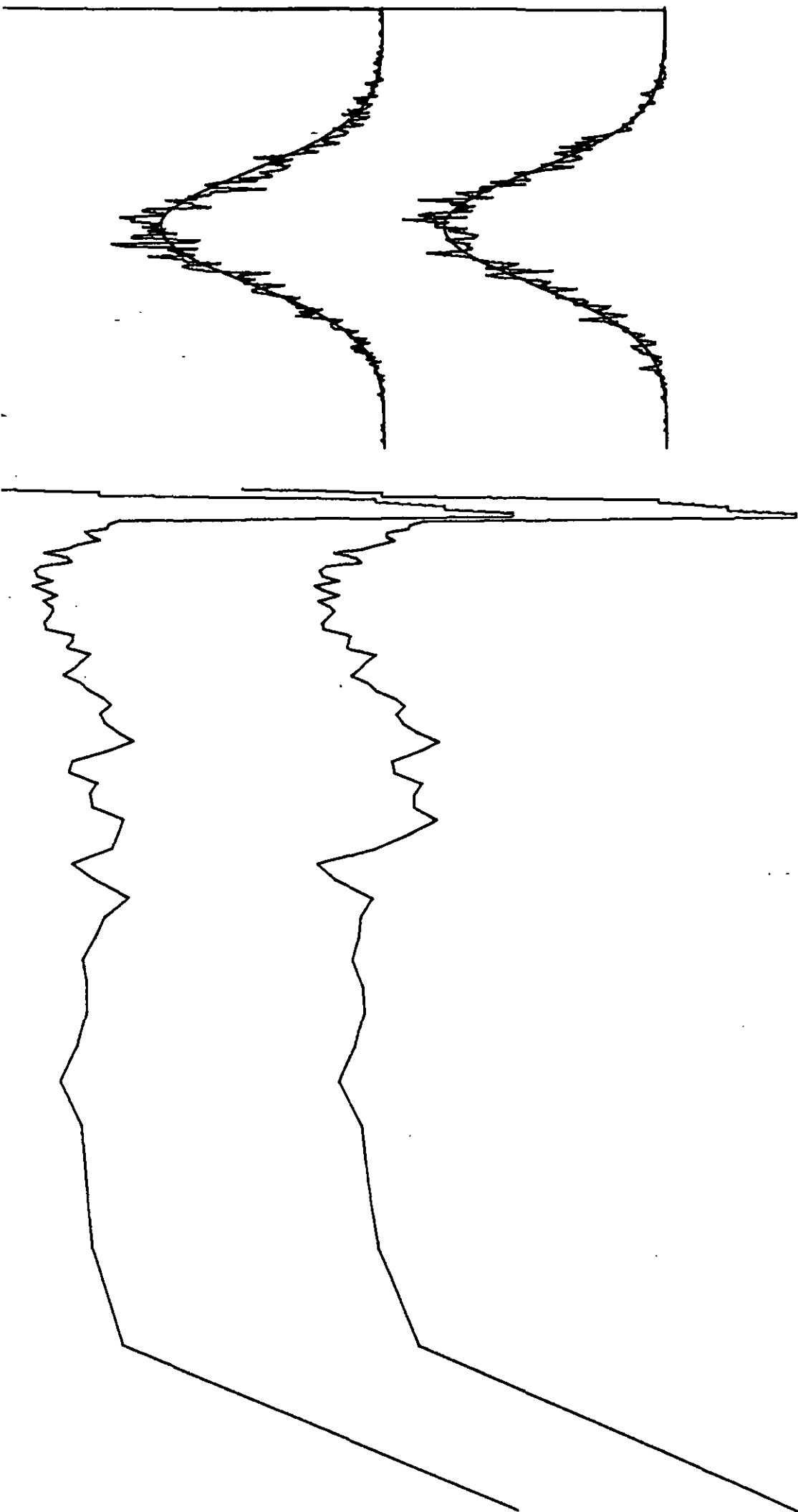
MM. 308





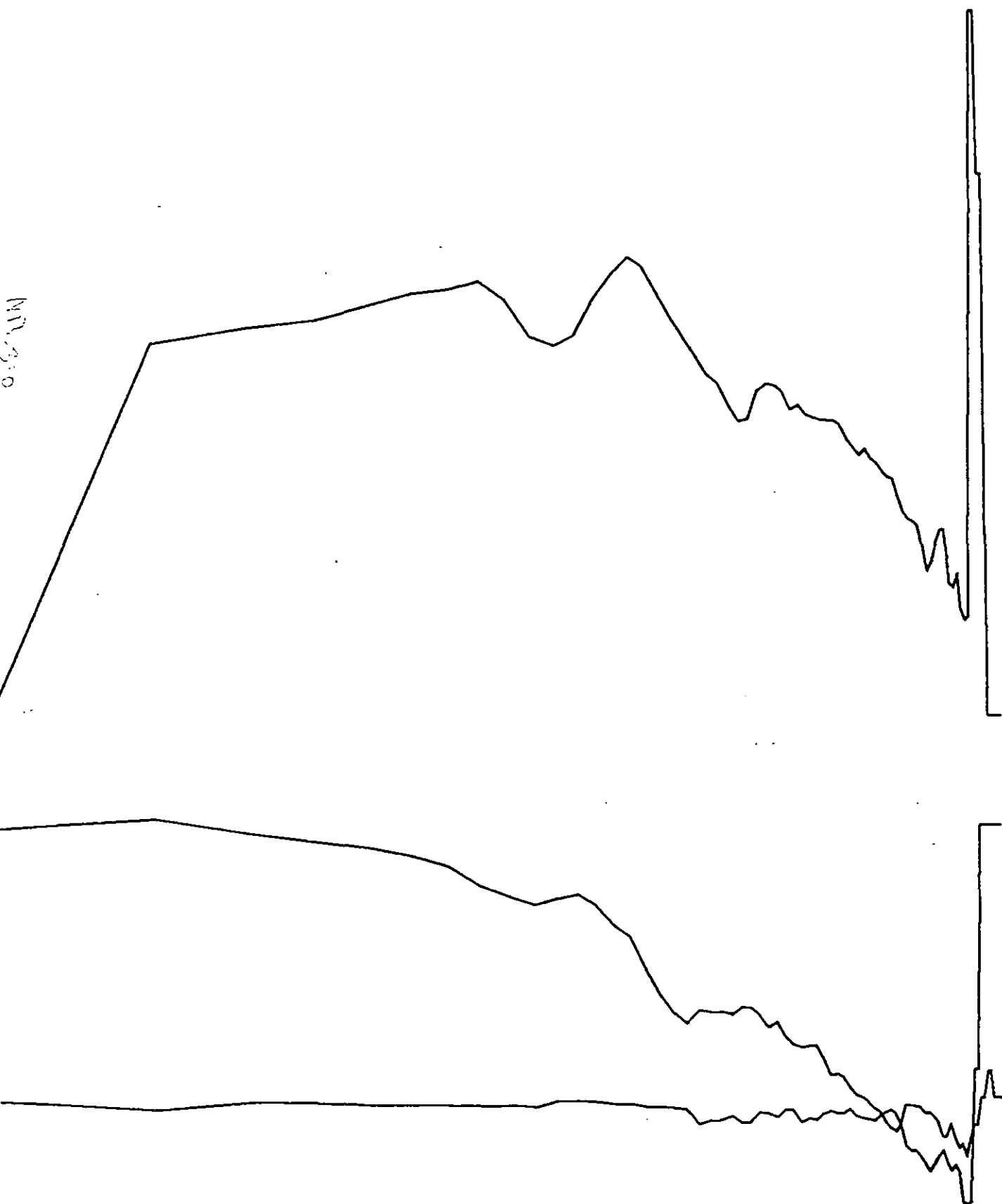
ms
309.

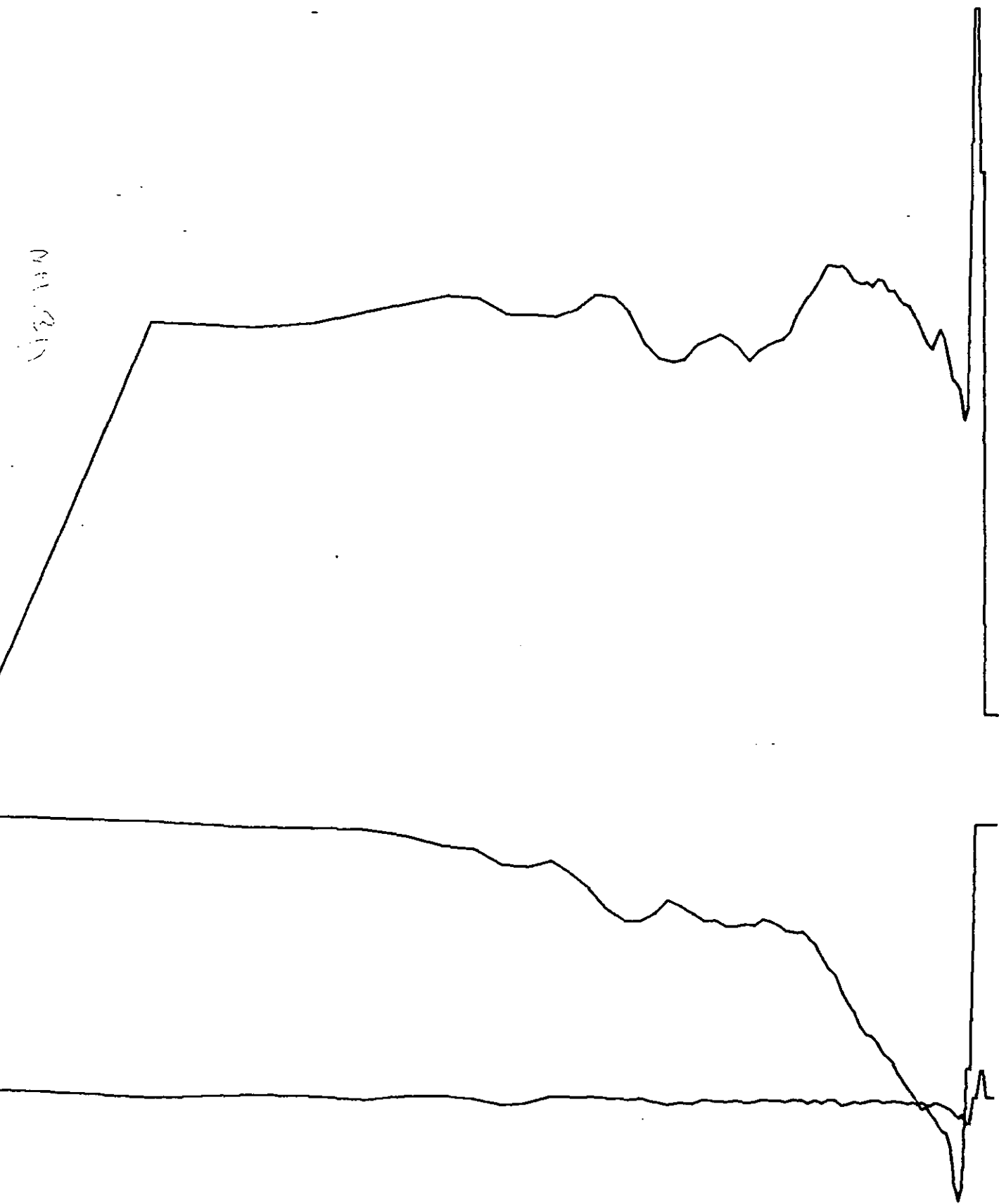
83 09T



83 10T

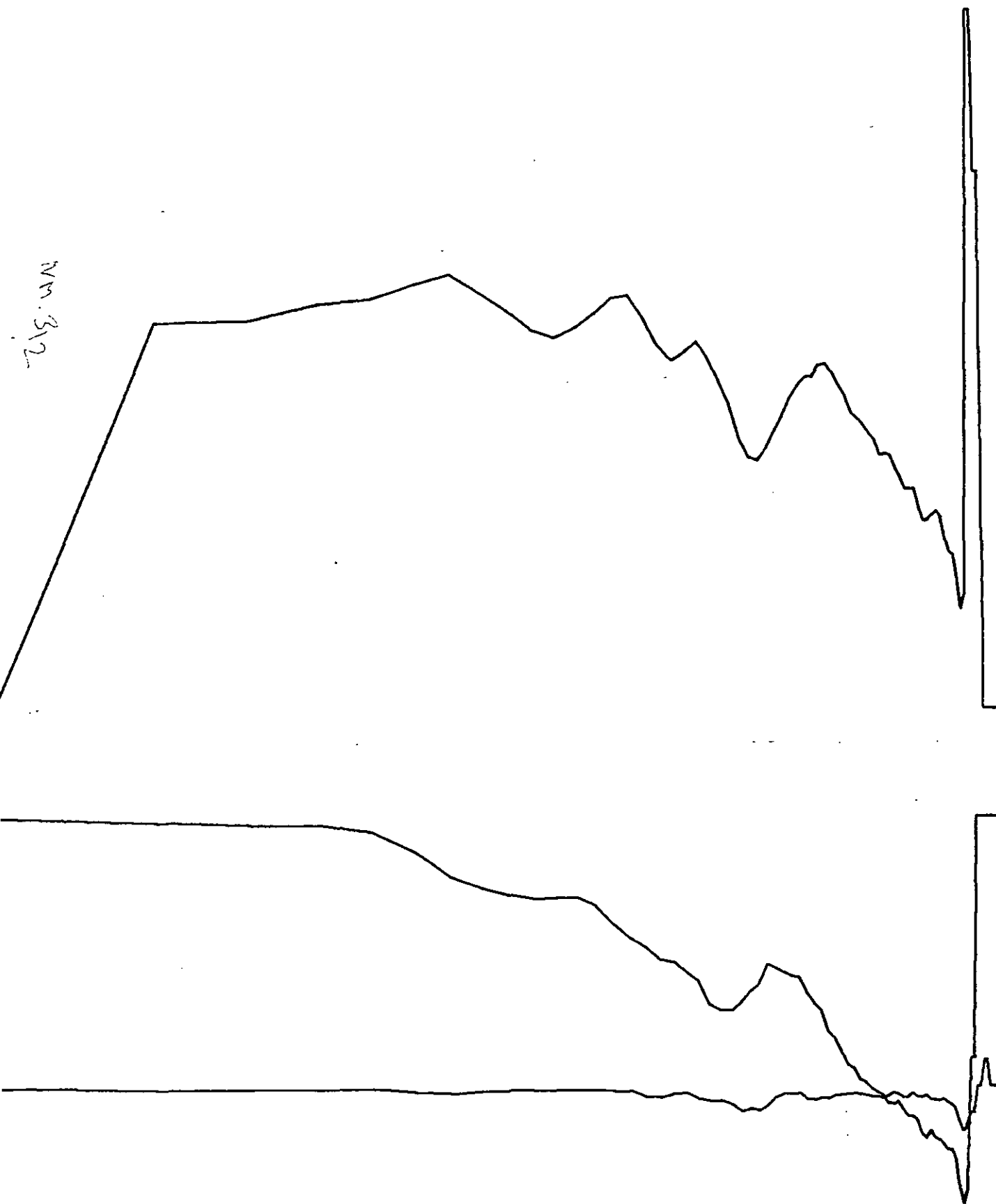
MT-310

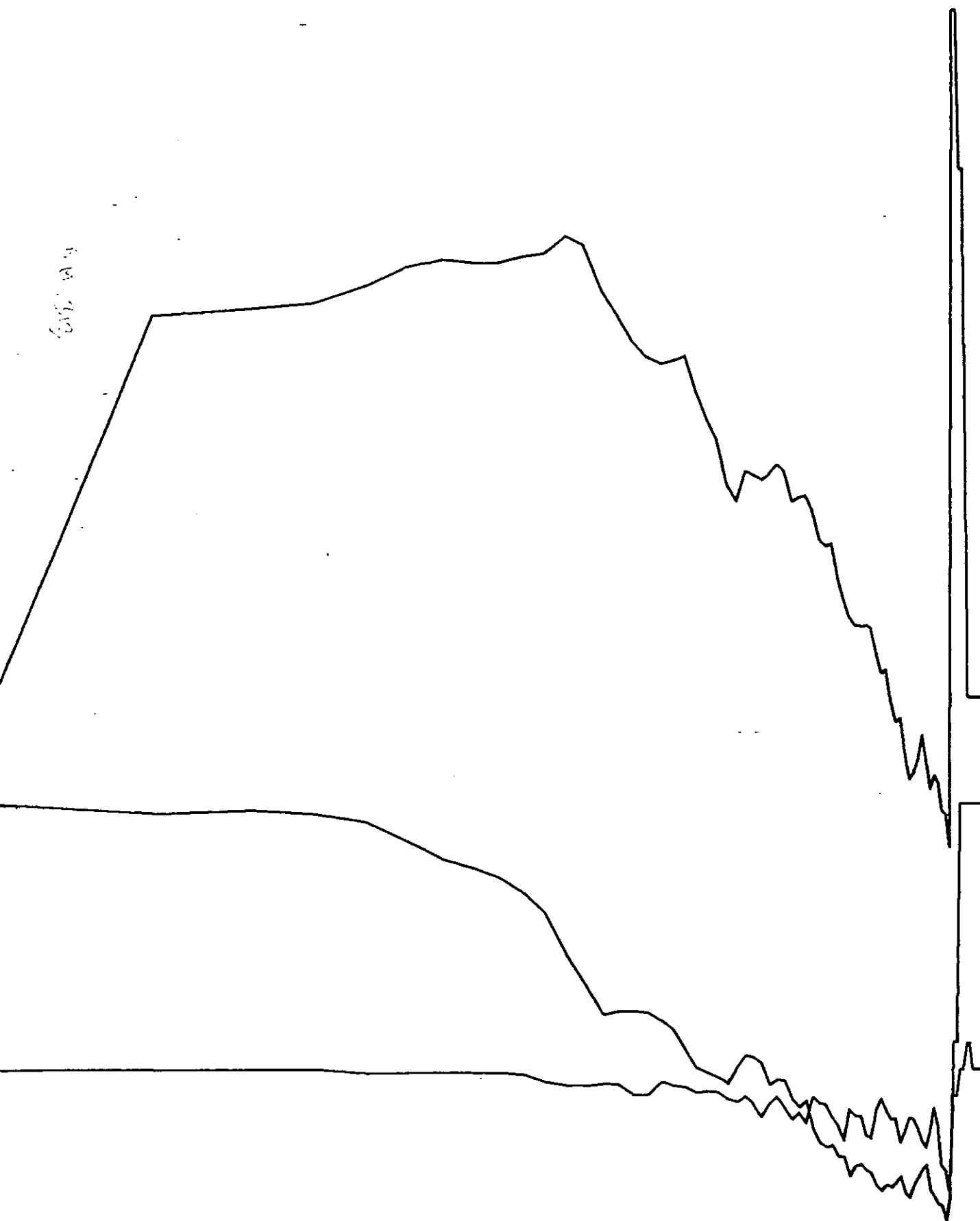




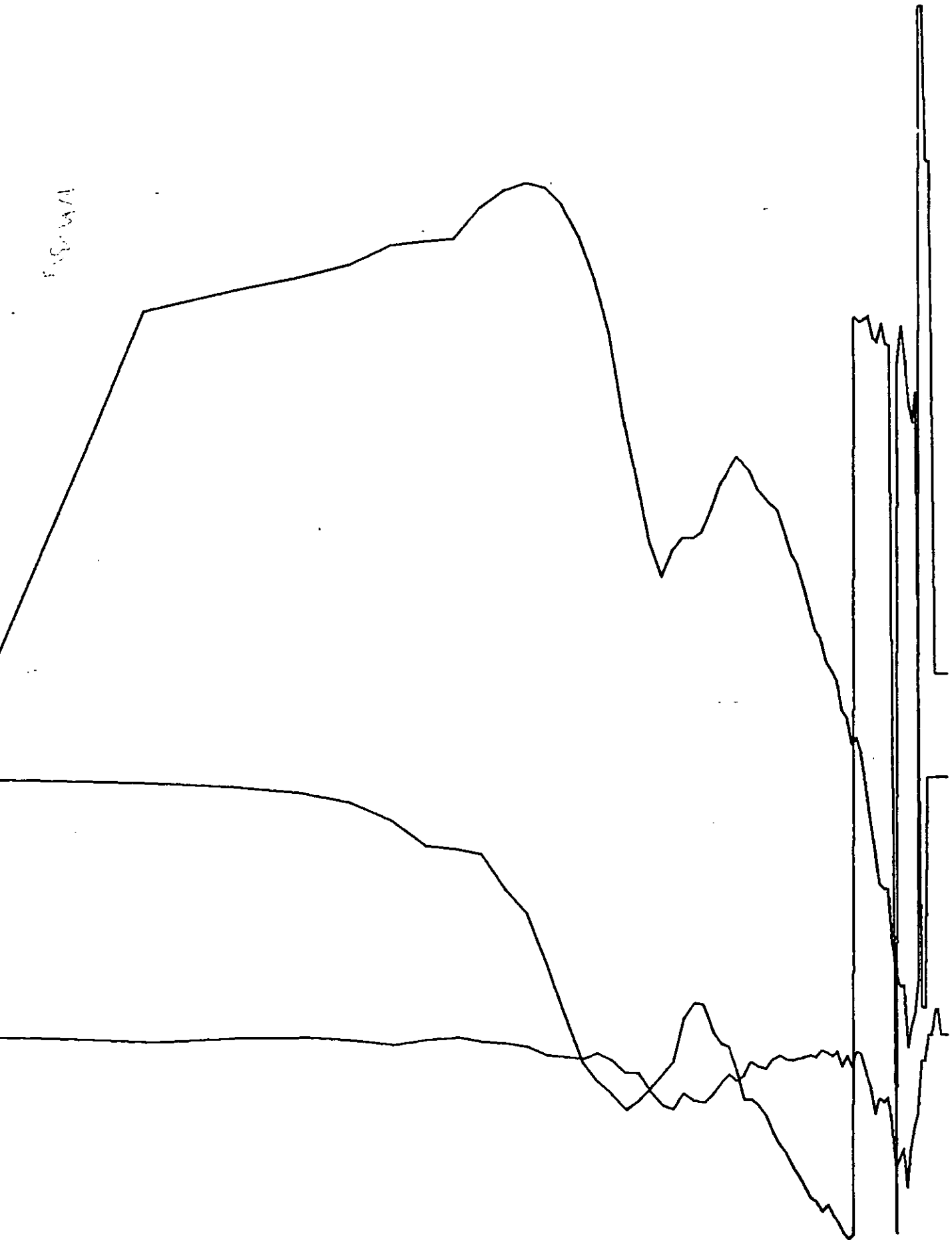
83 12 T

mm. 312

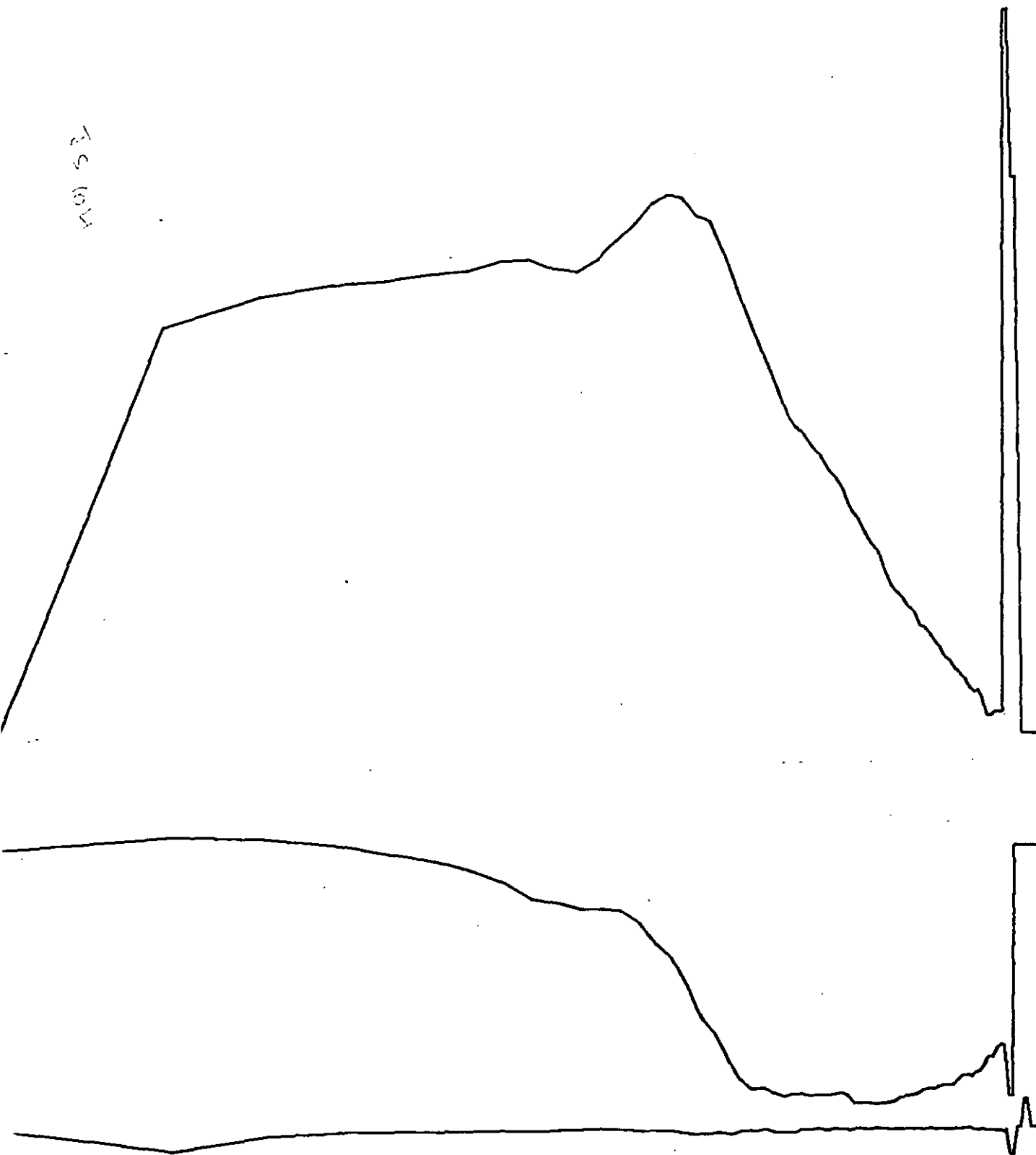




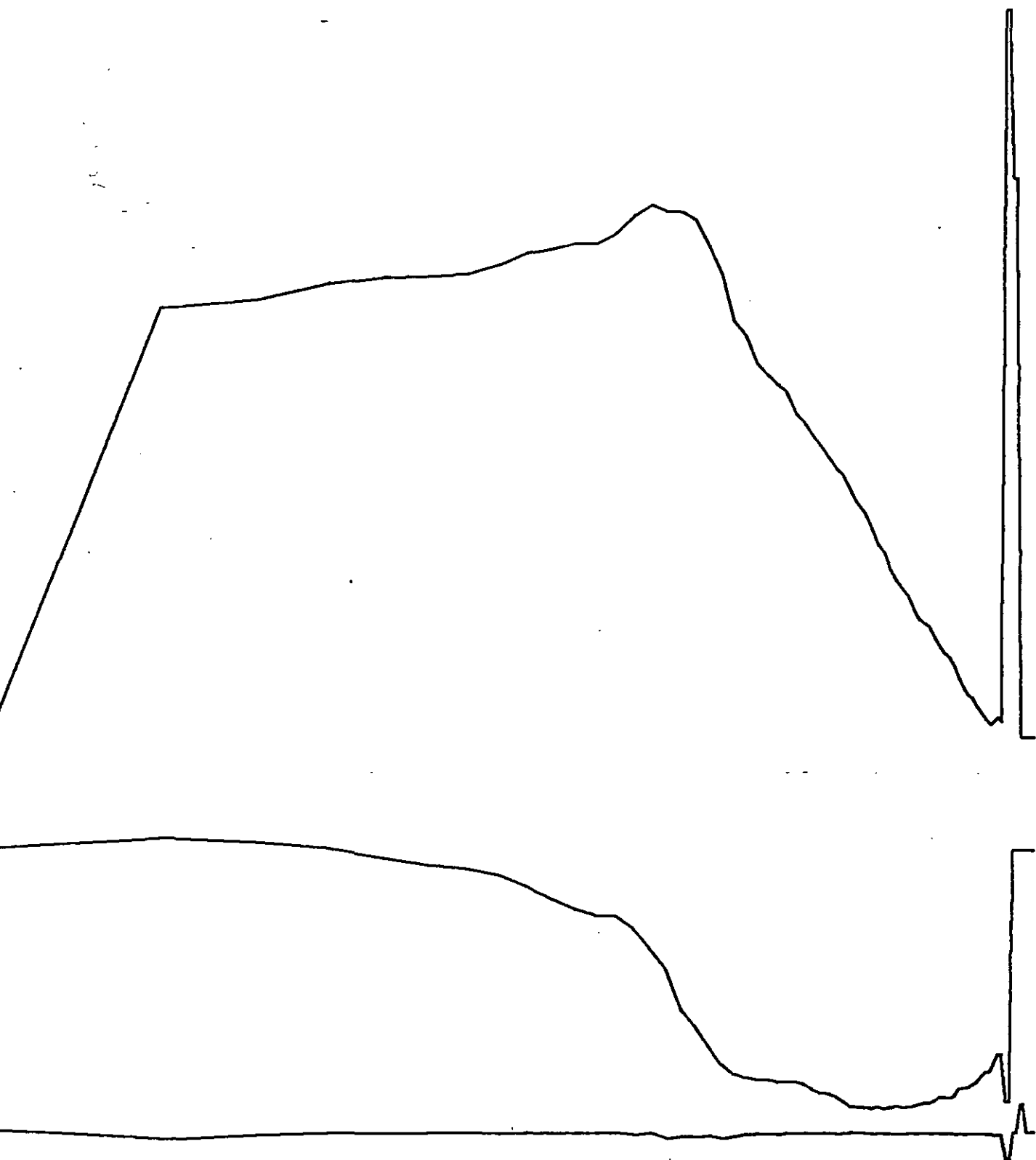
1/10/53



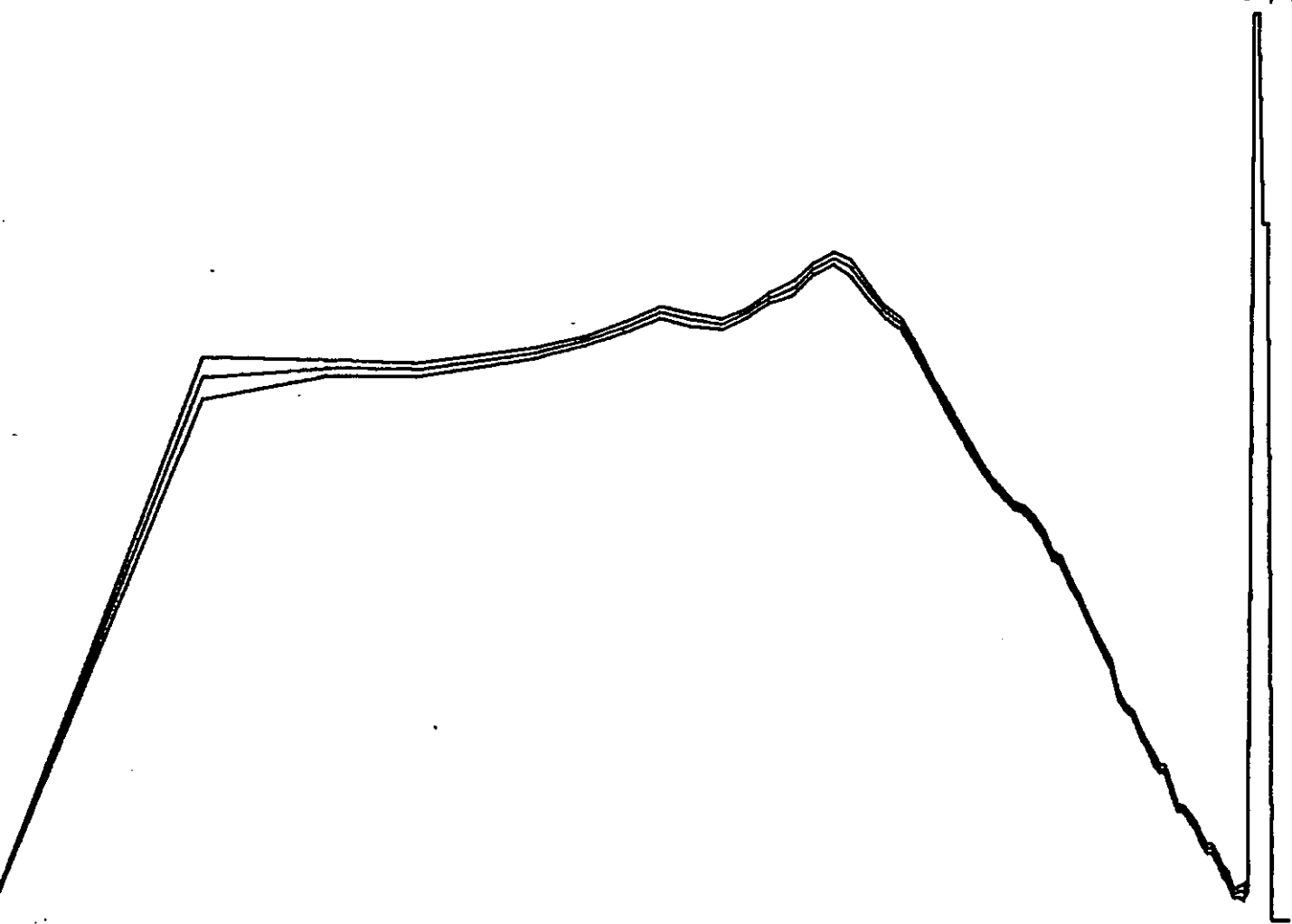
100 52



01 05A

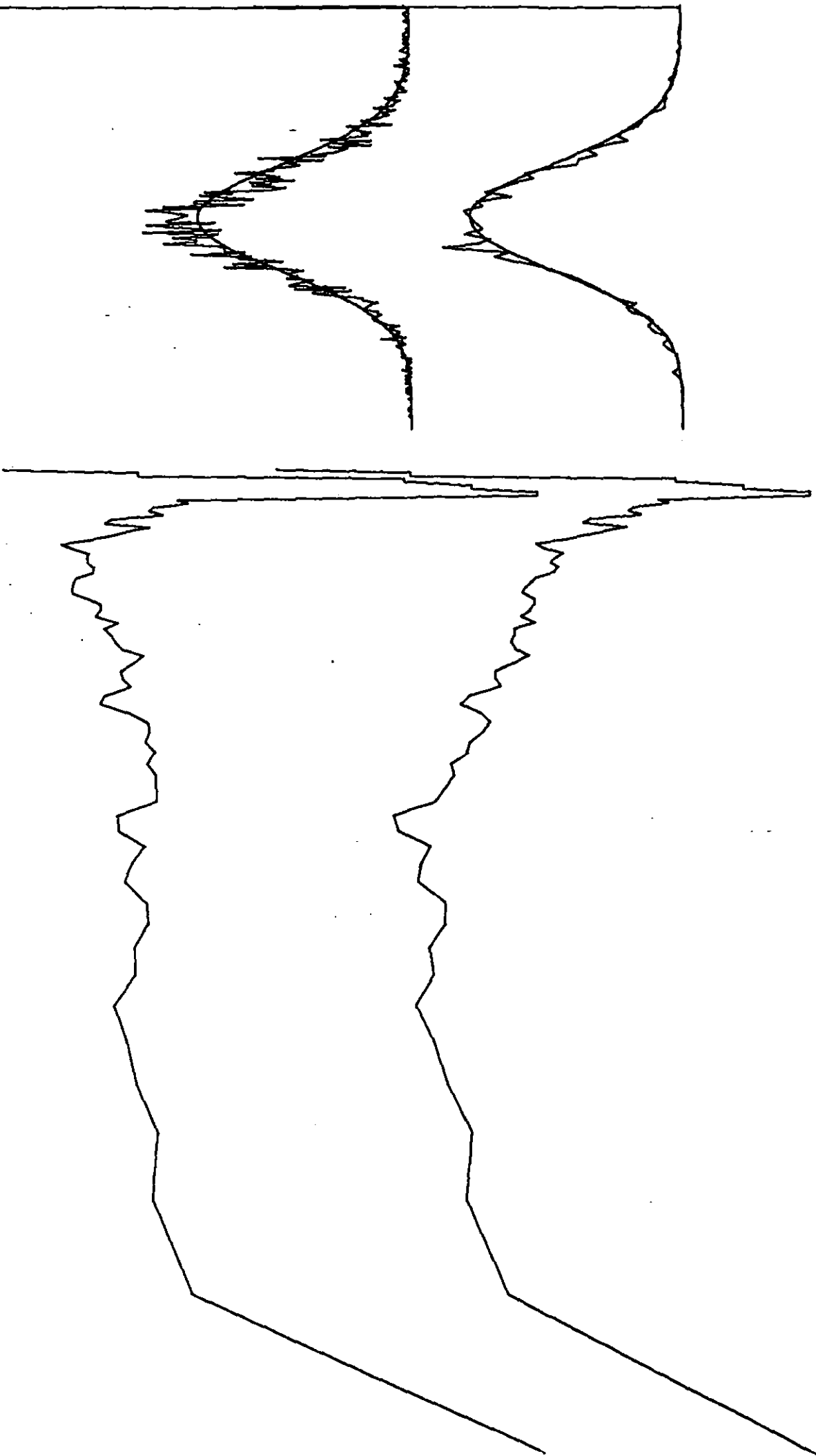


01 06 A



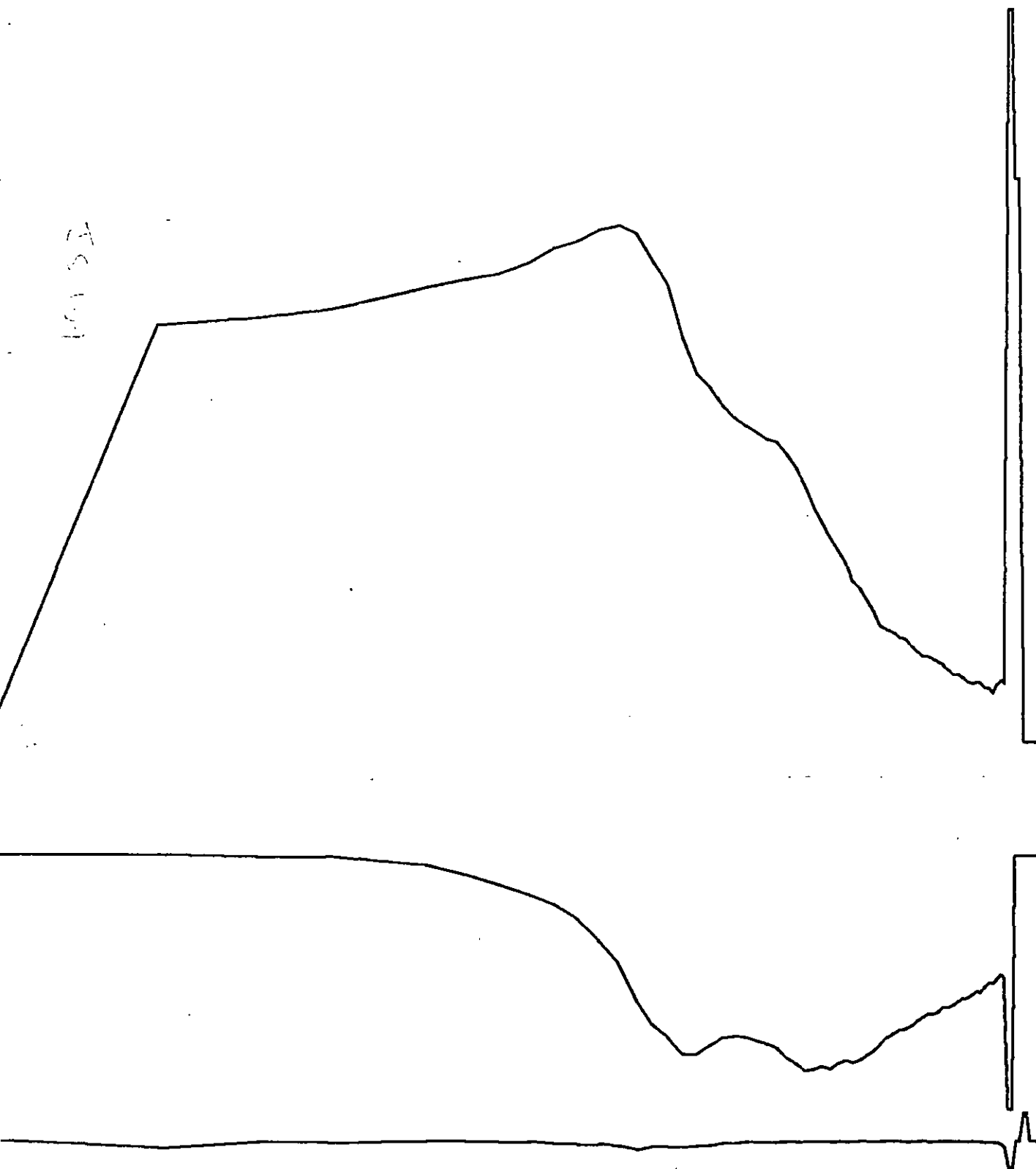
58106

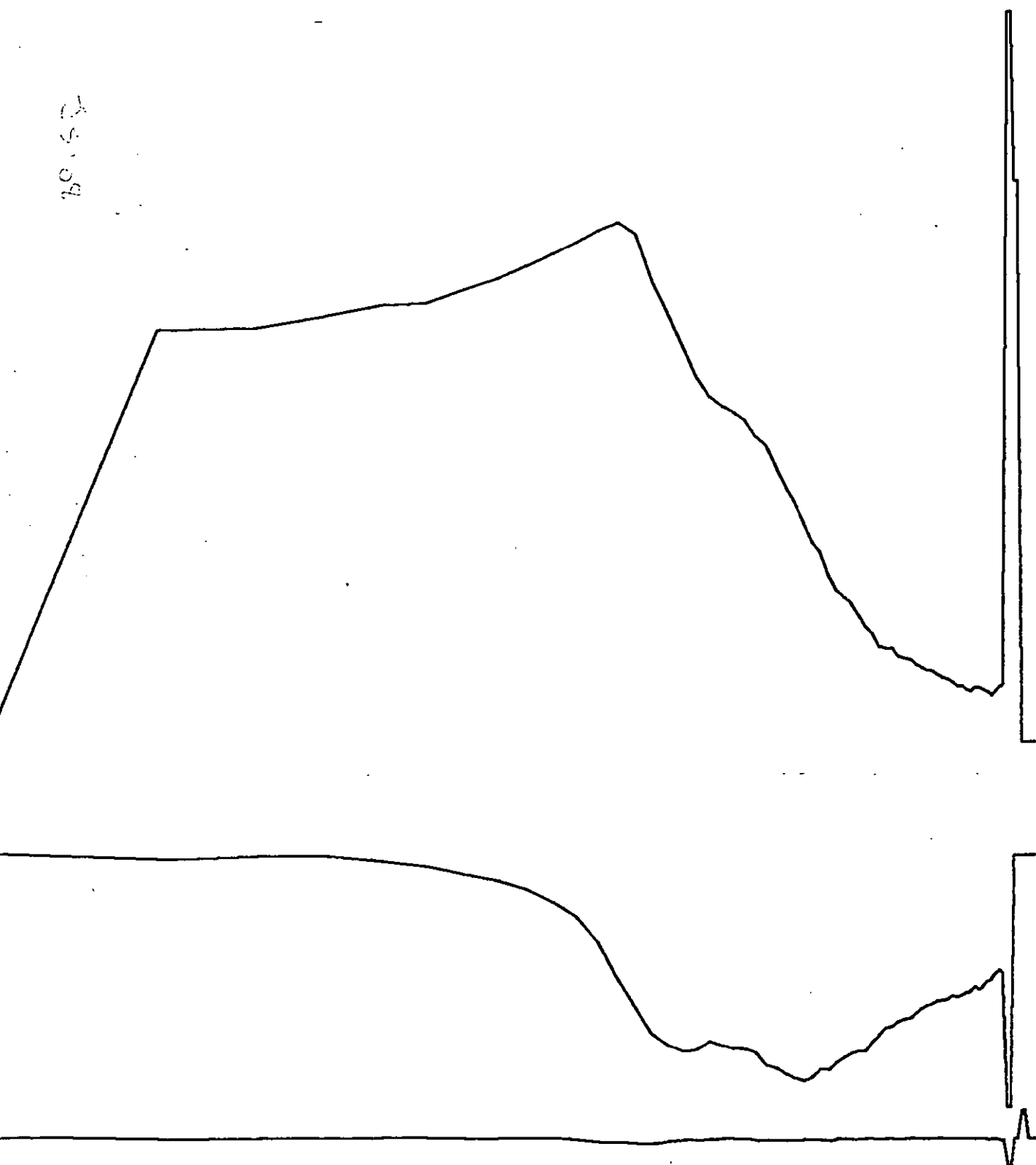




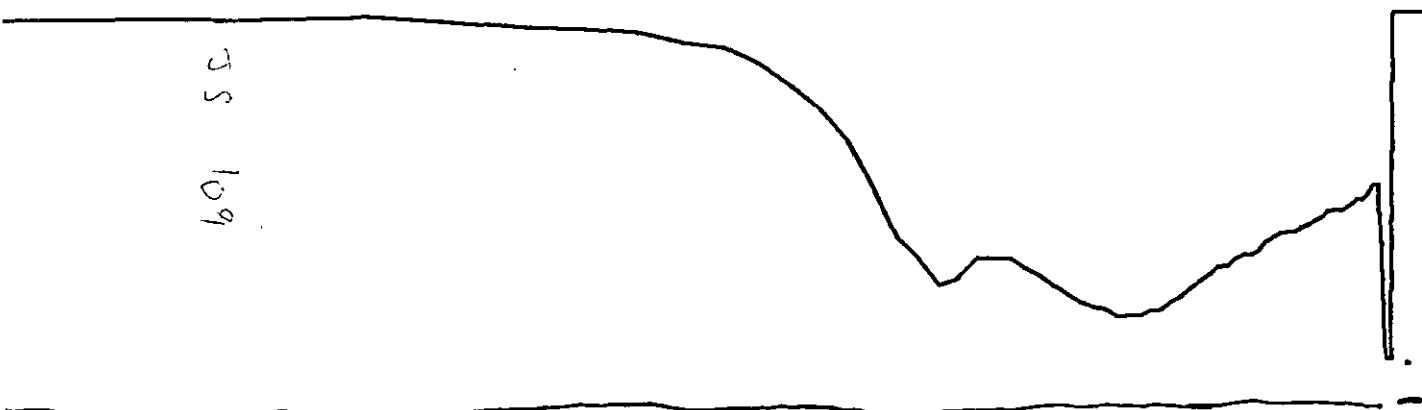
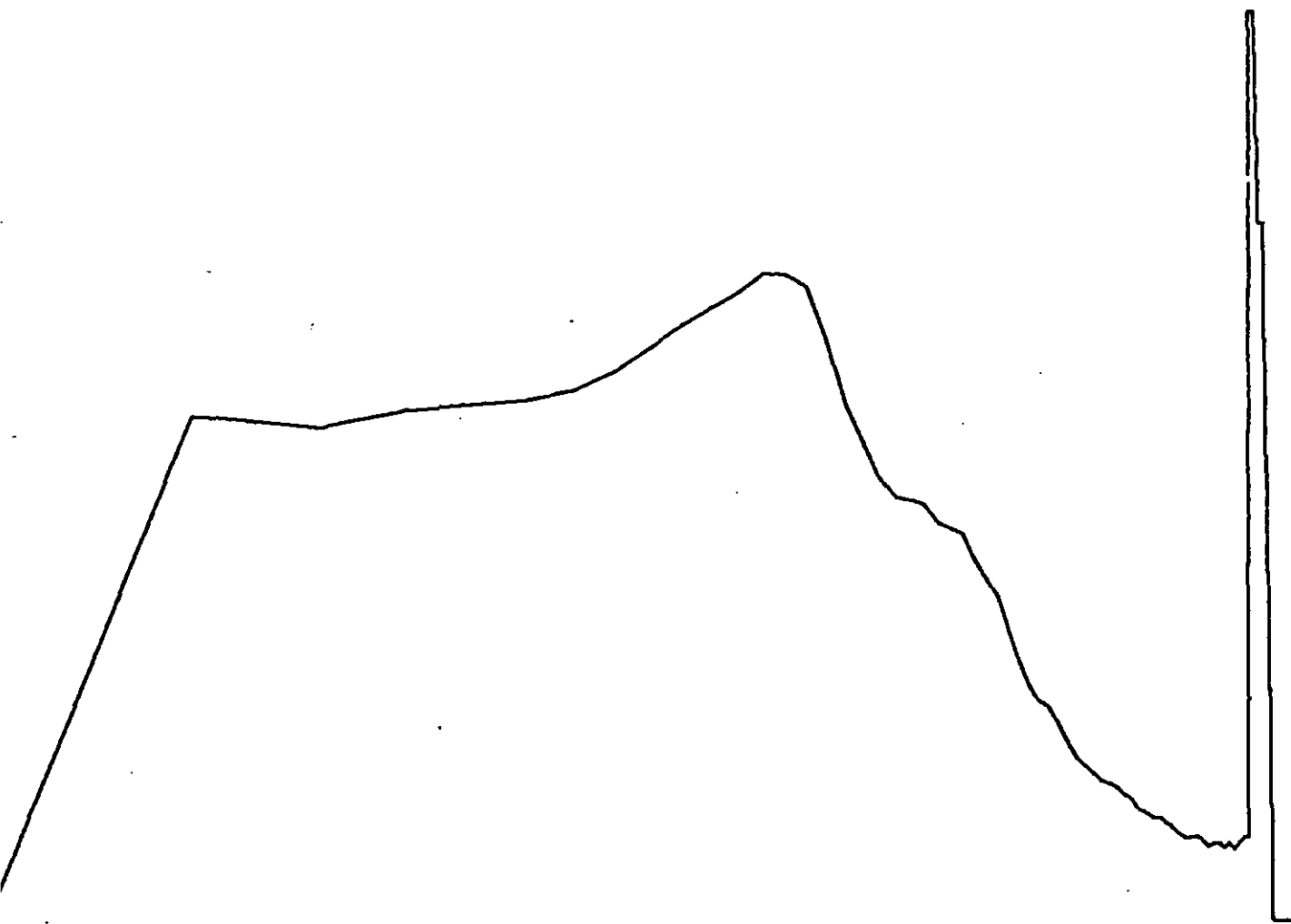
01 07A

1000



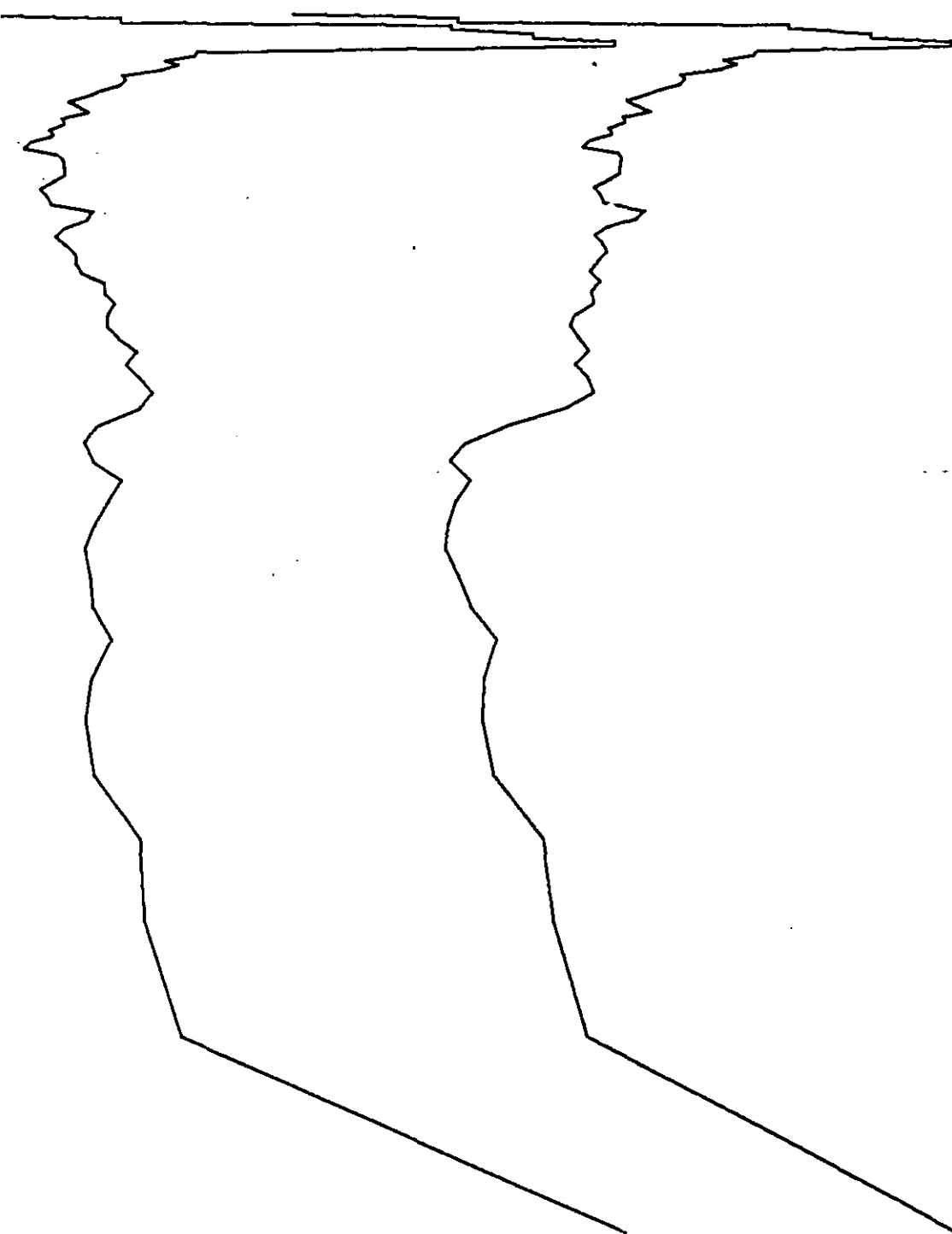
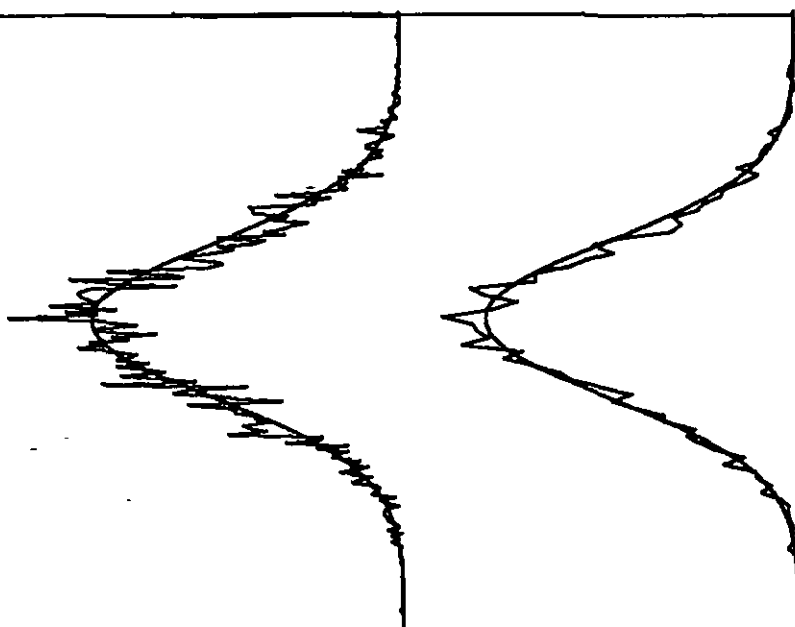


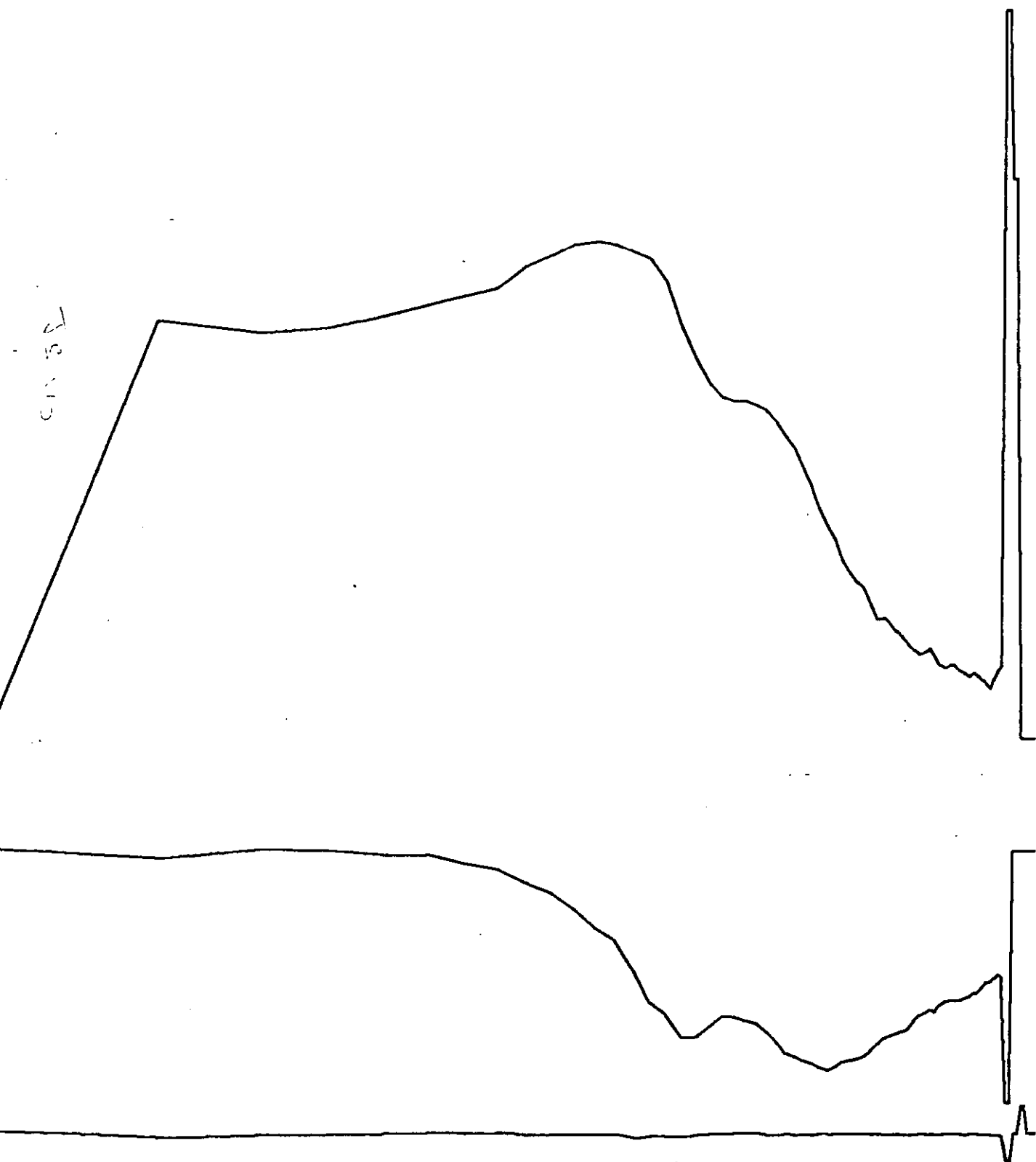
01 09A



55 109

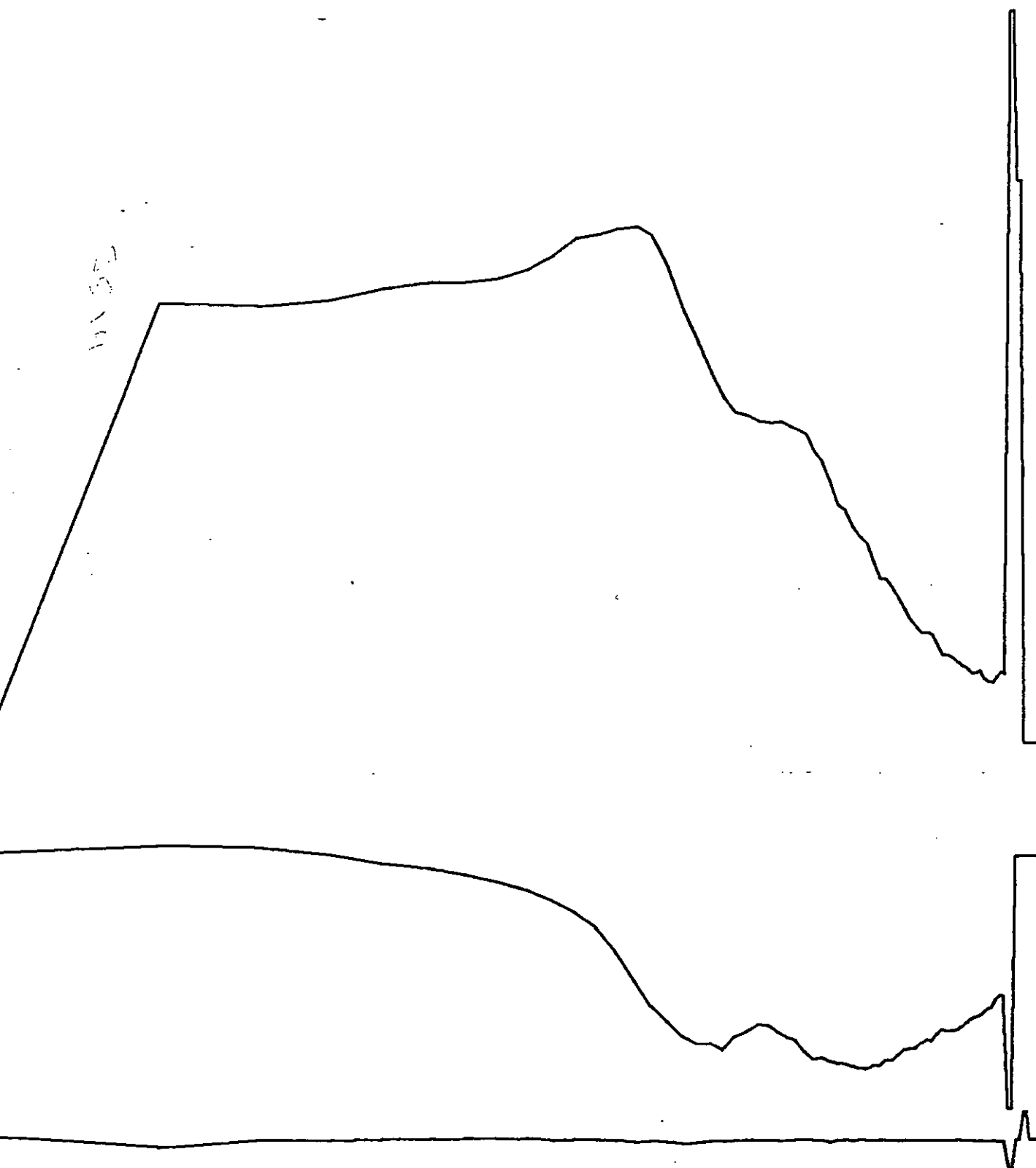
01 09A



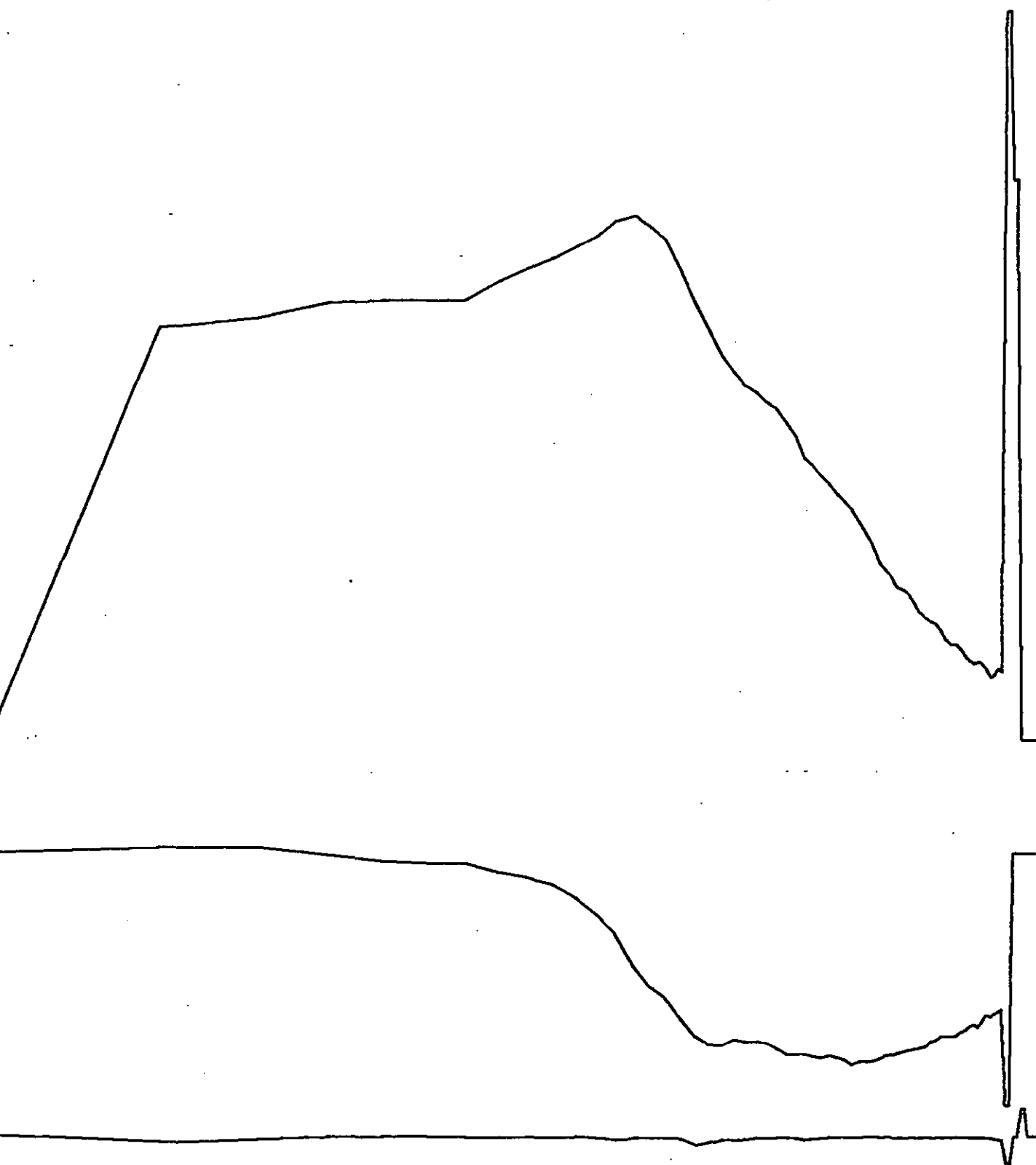


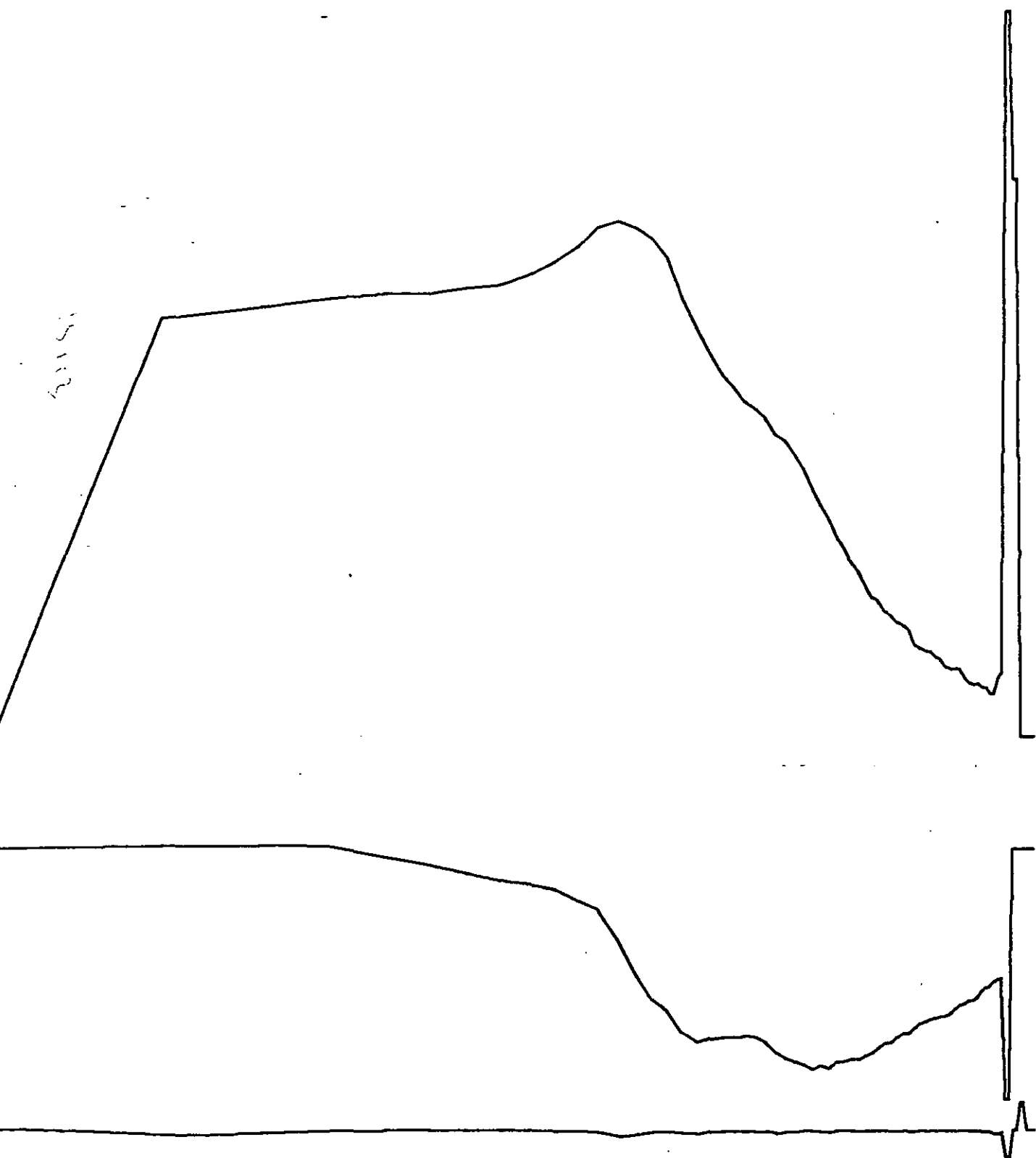
01 10A

01 11A

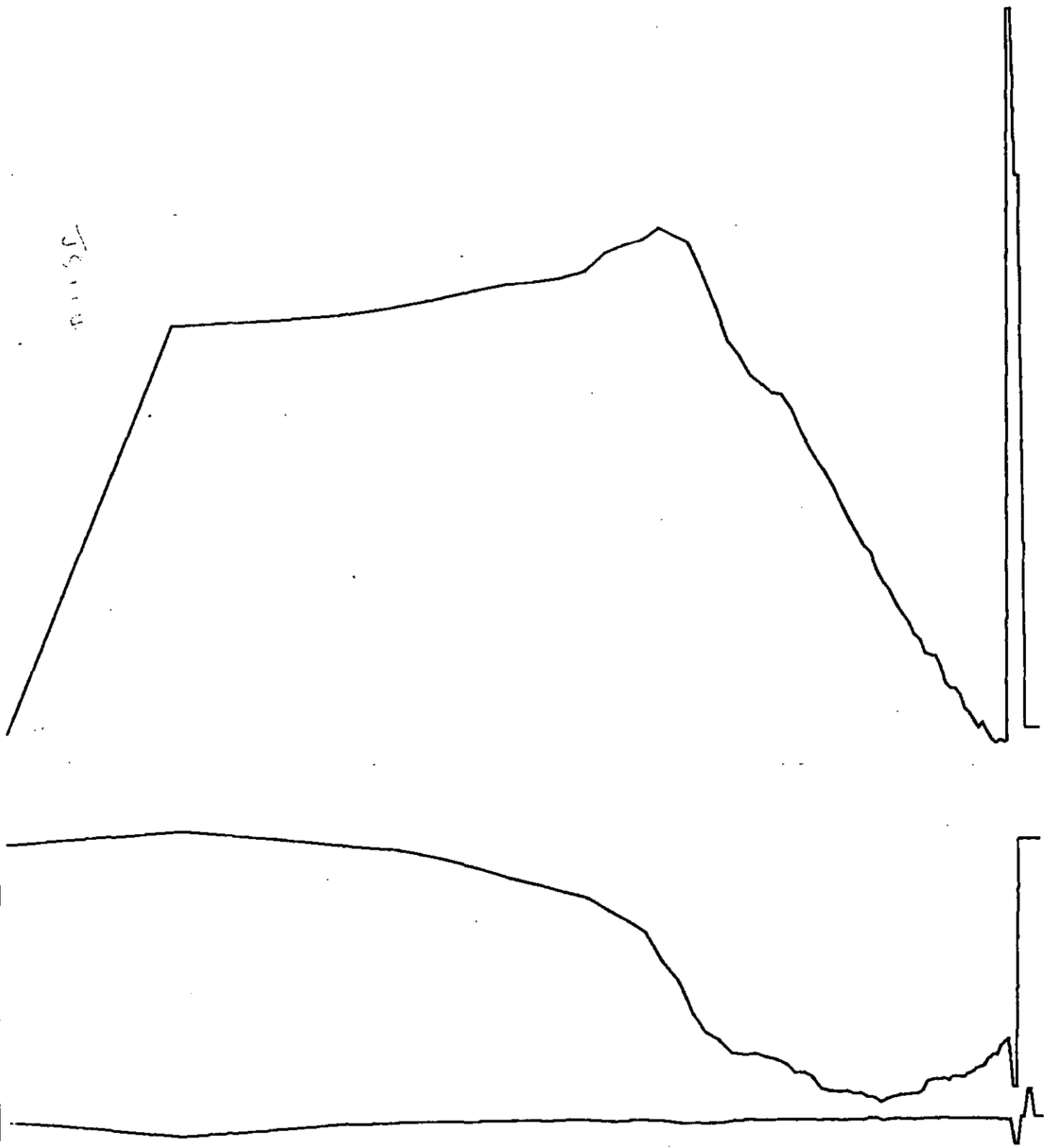


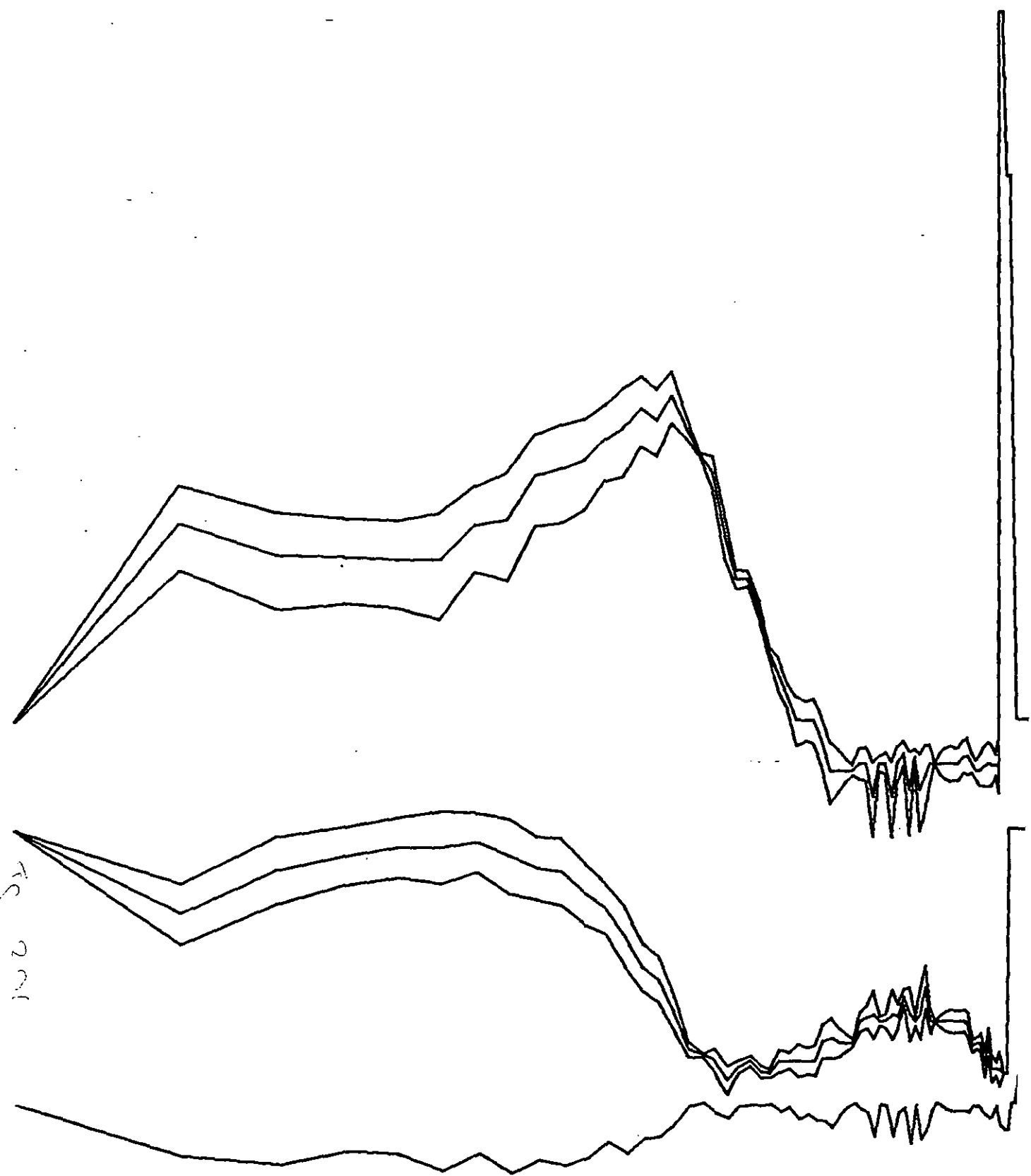
01 12 A



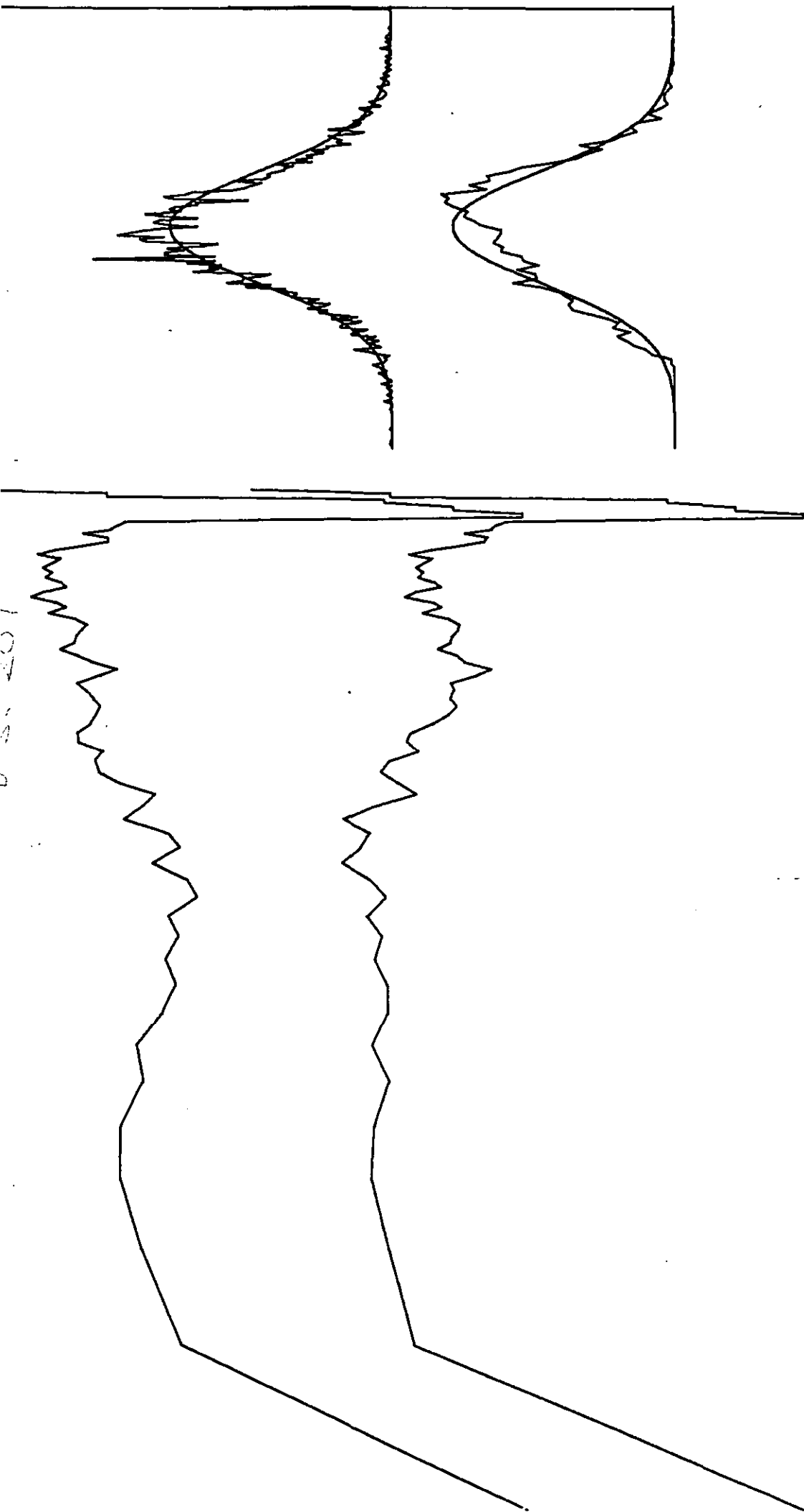


50.10



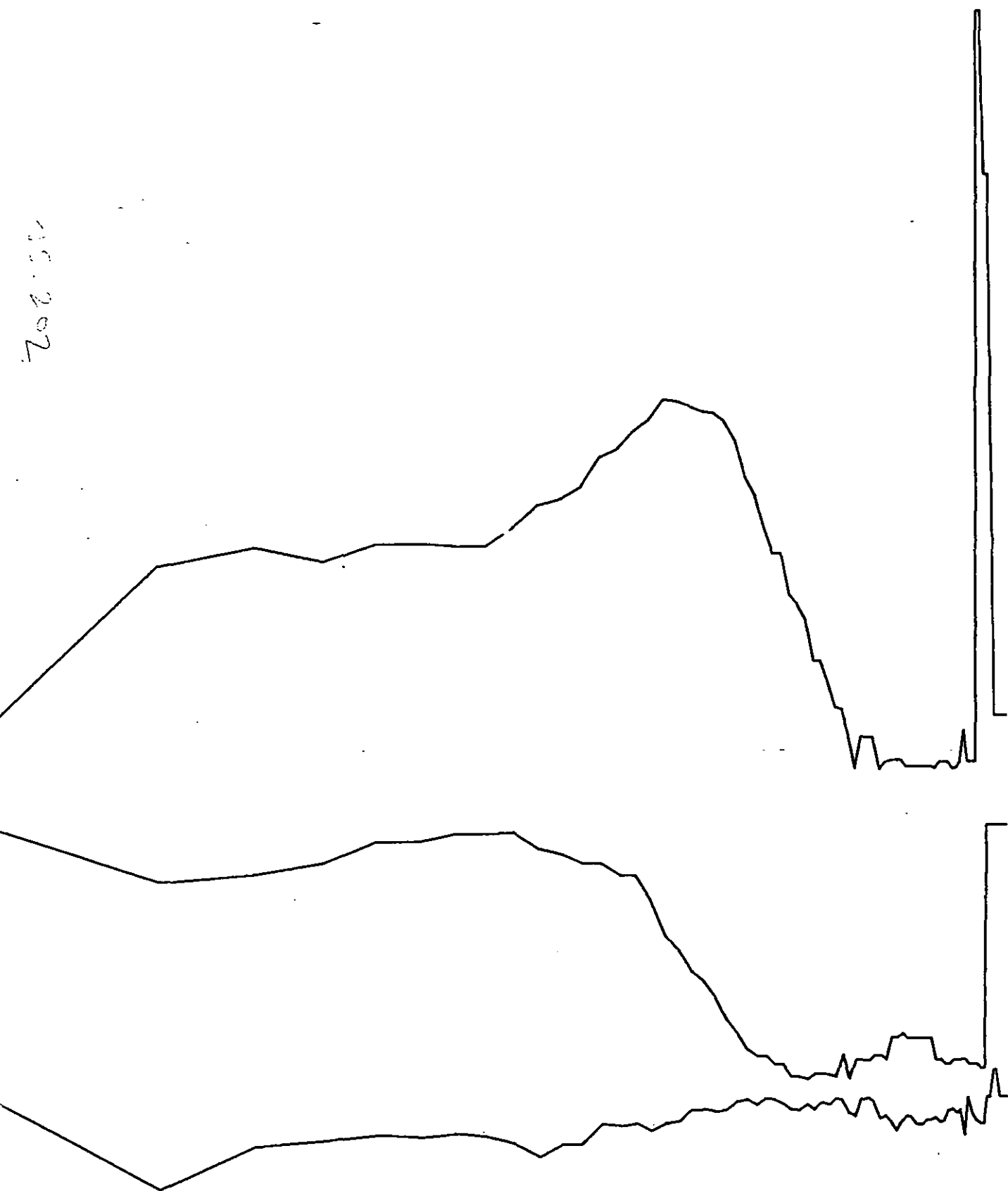


01 01 F



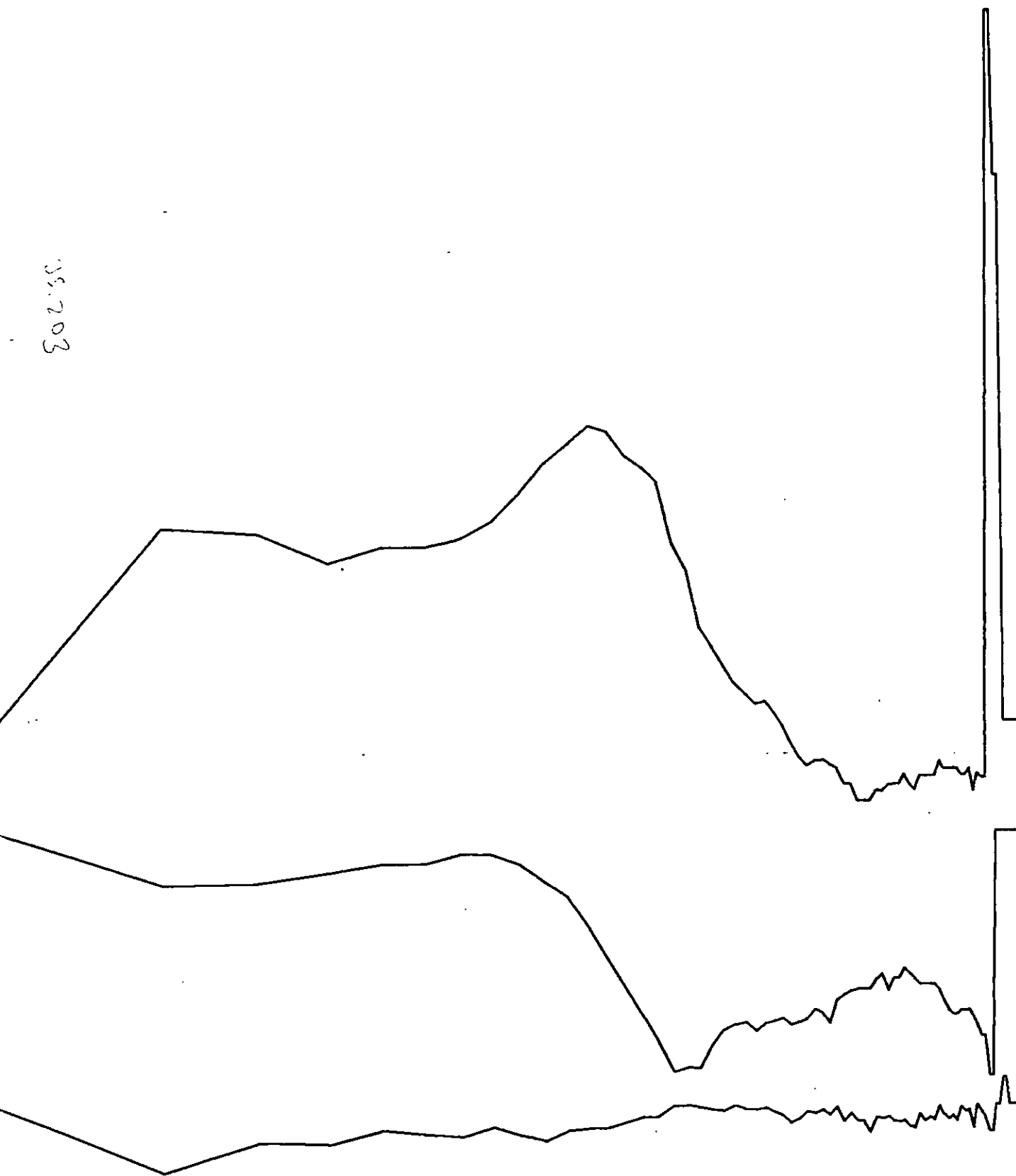
01 02 F

15.202



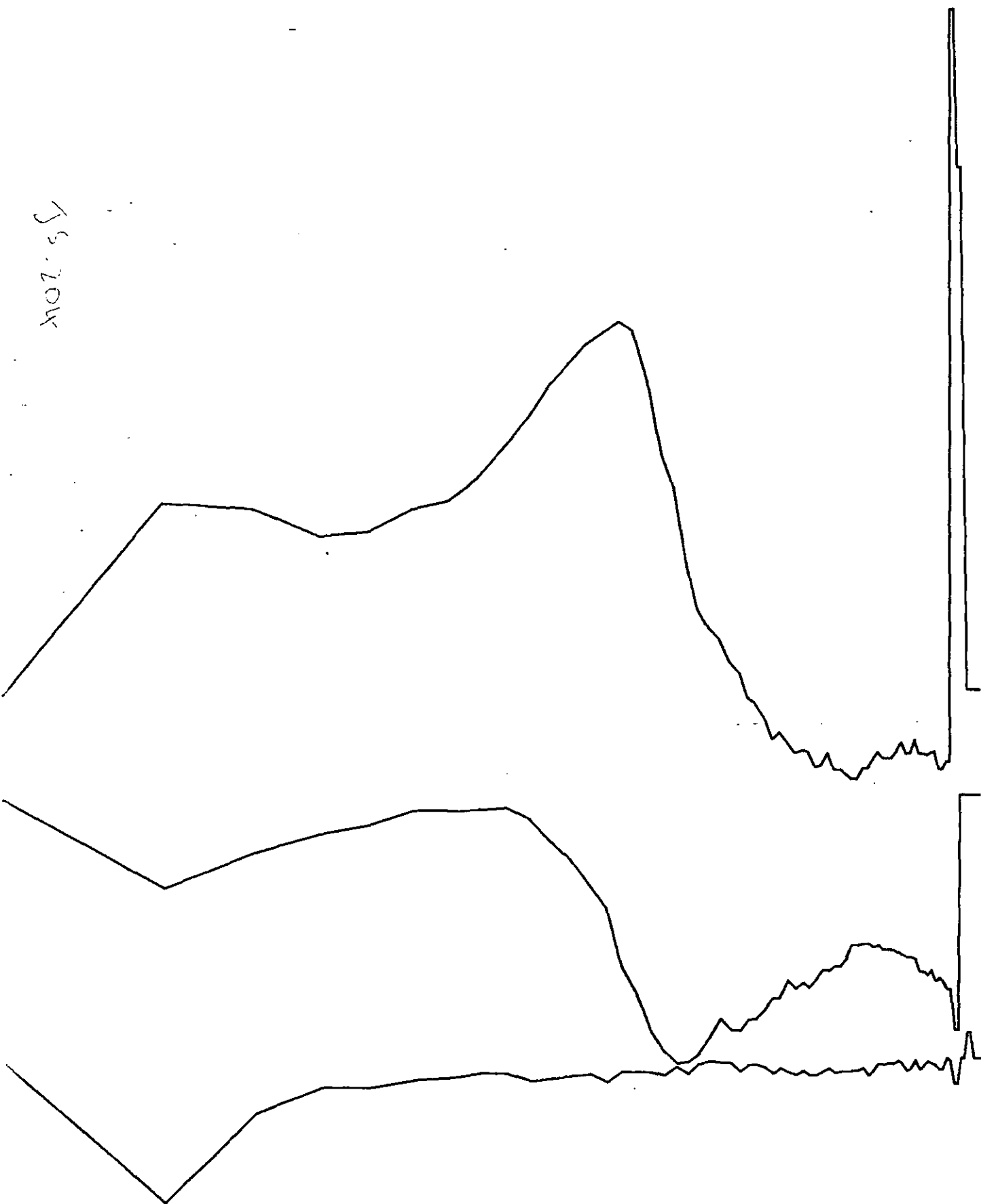
01 03 F

03.203

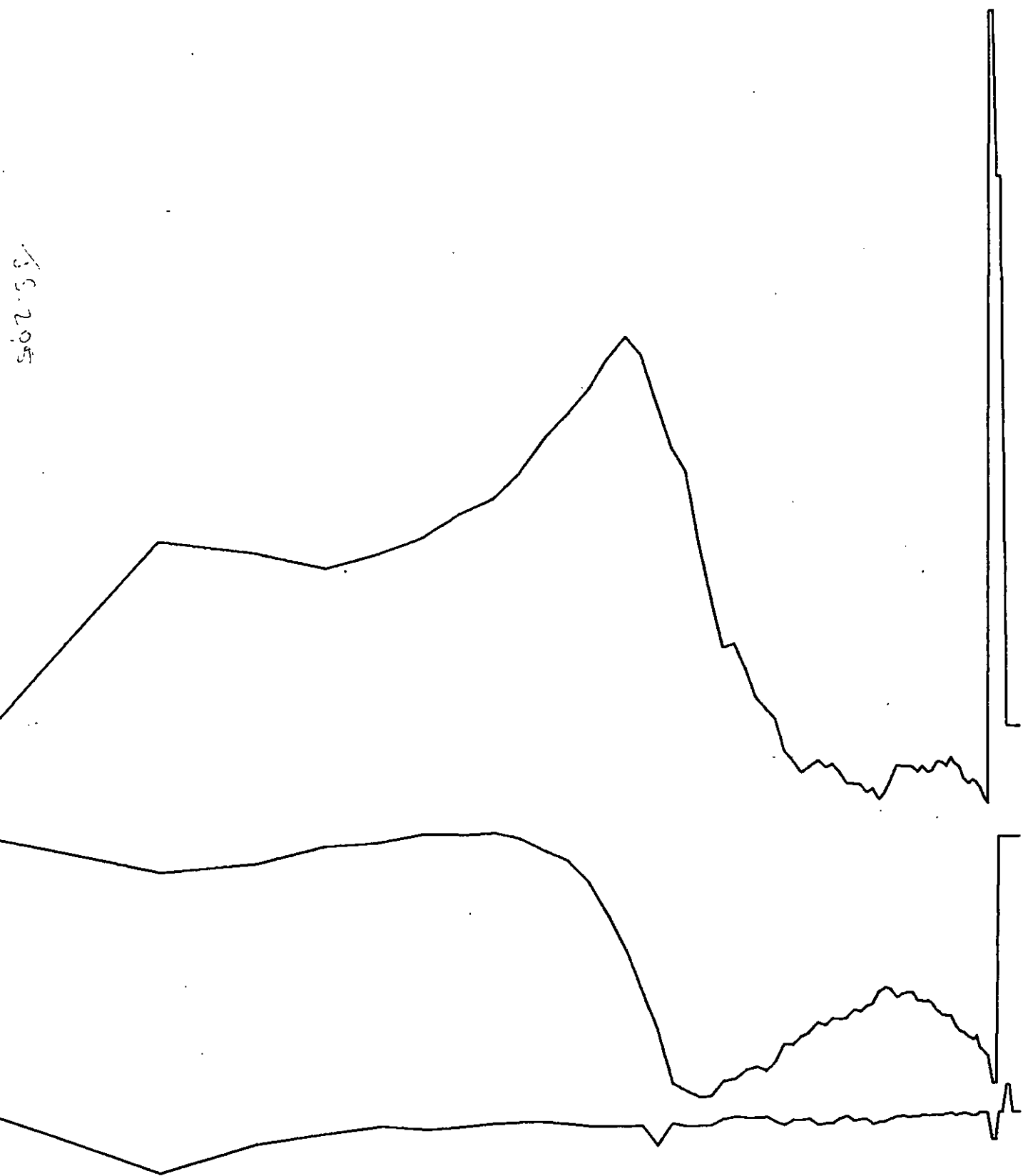


01 04F

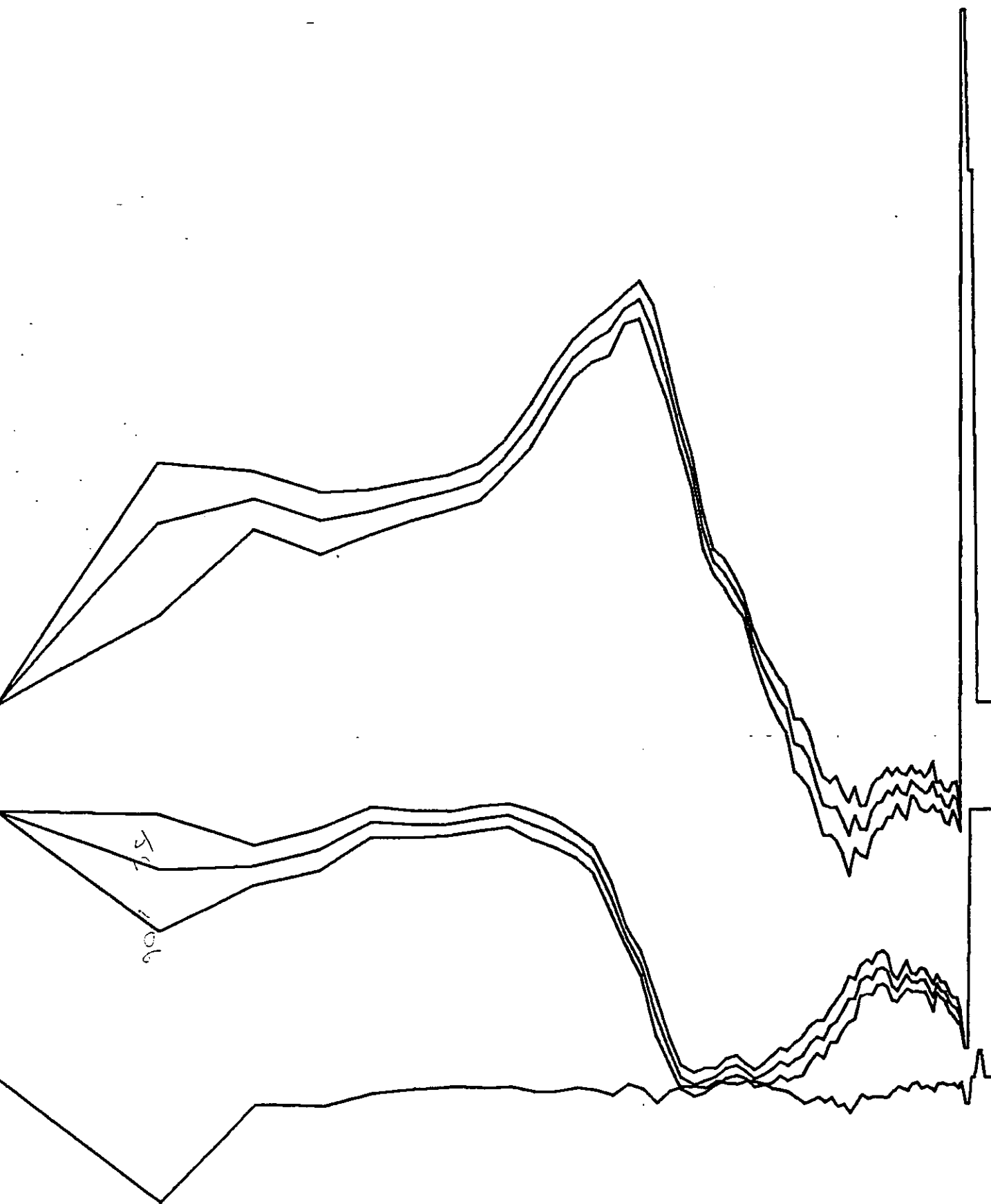
5.20K



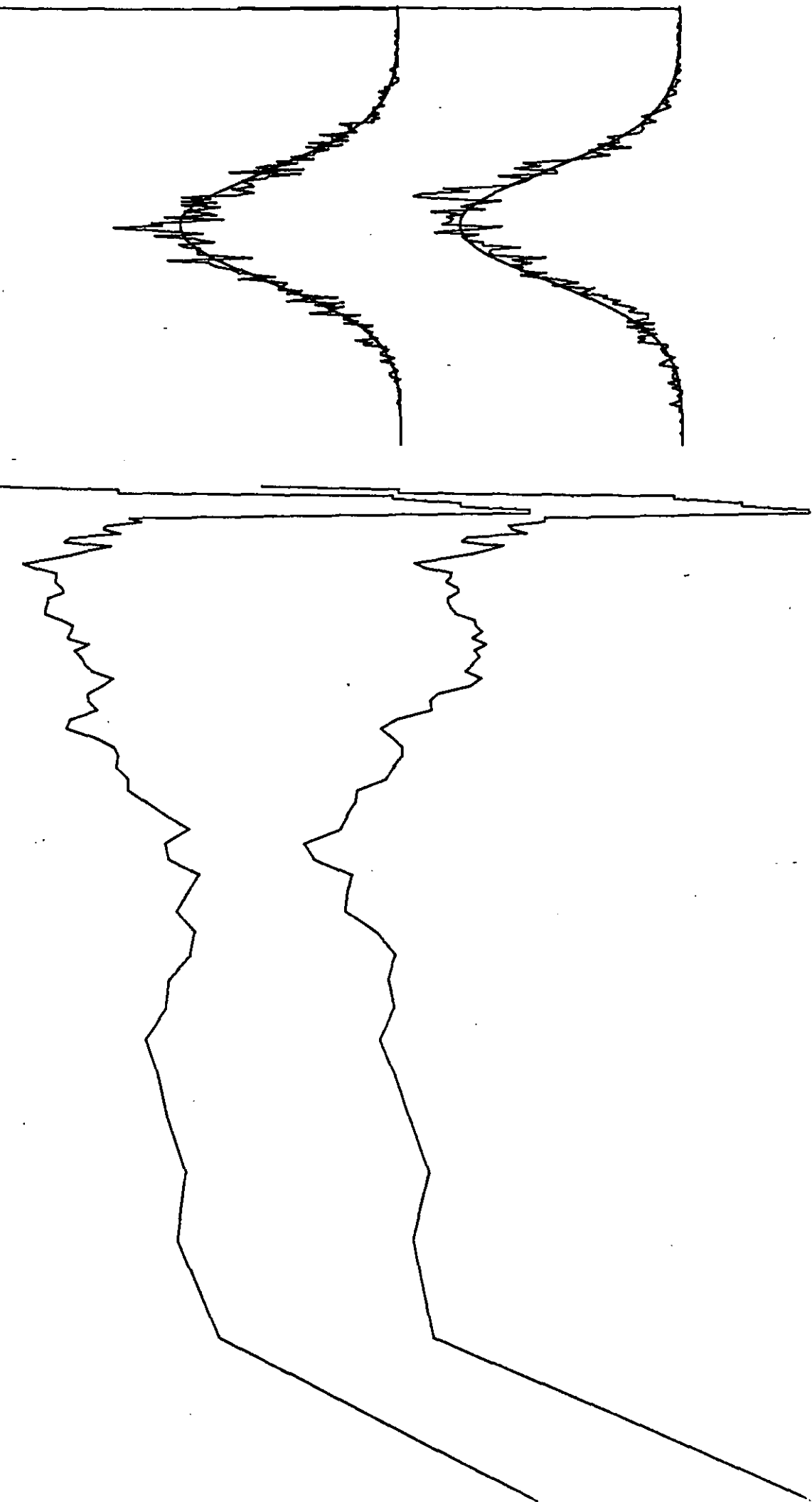
01 05 F



85.205



01 06 F

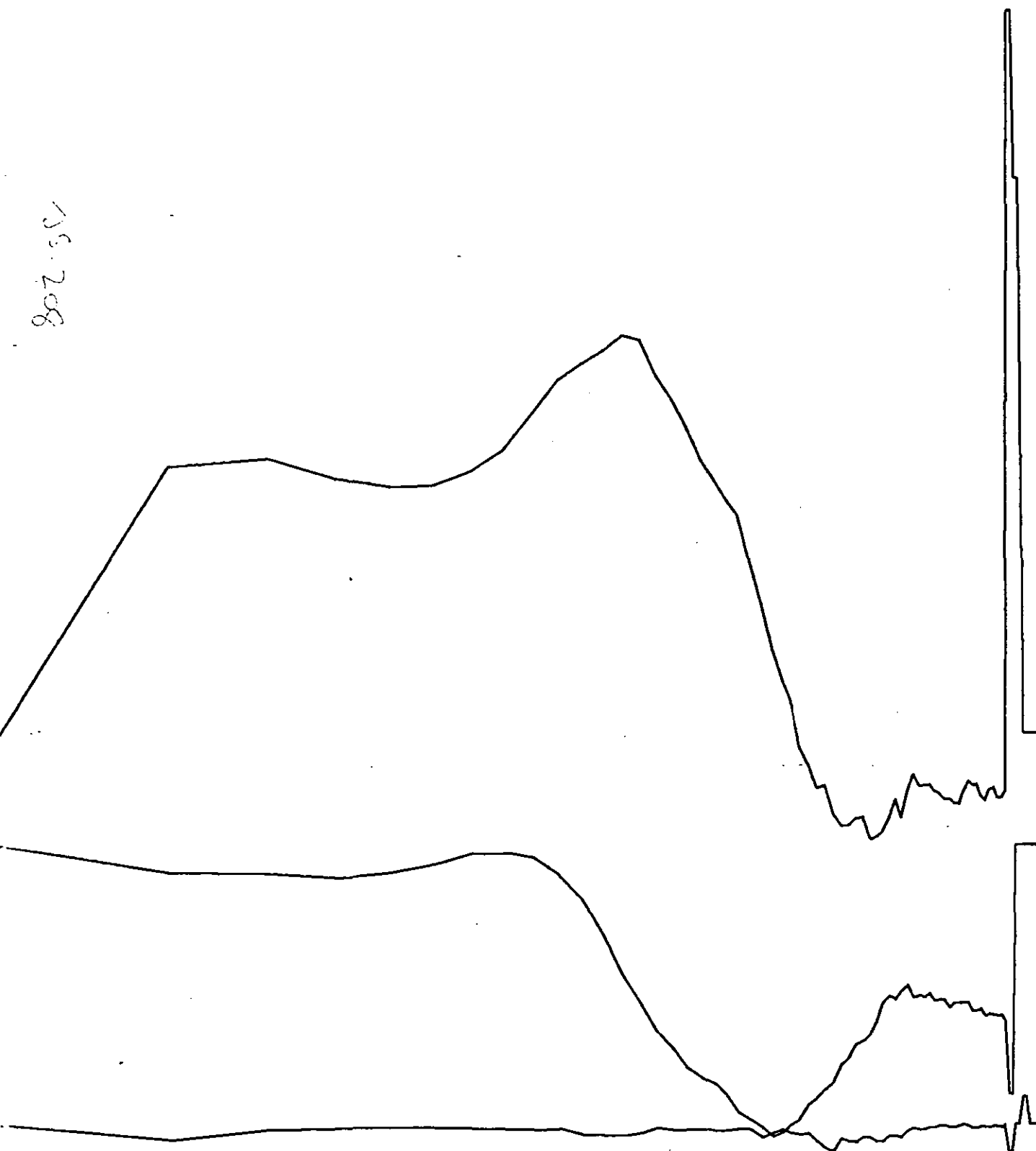


01 07 F

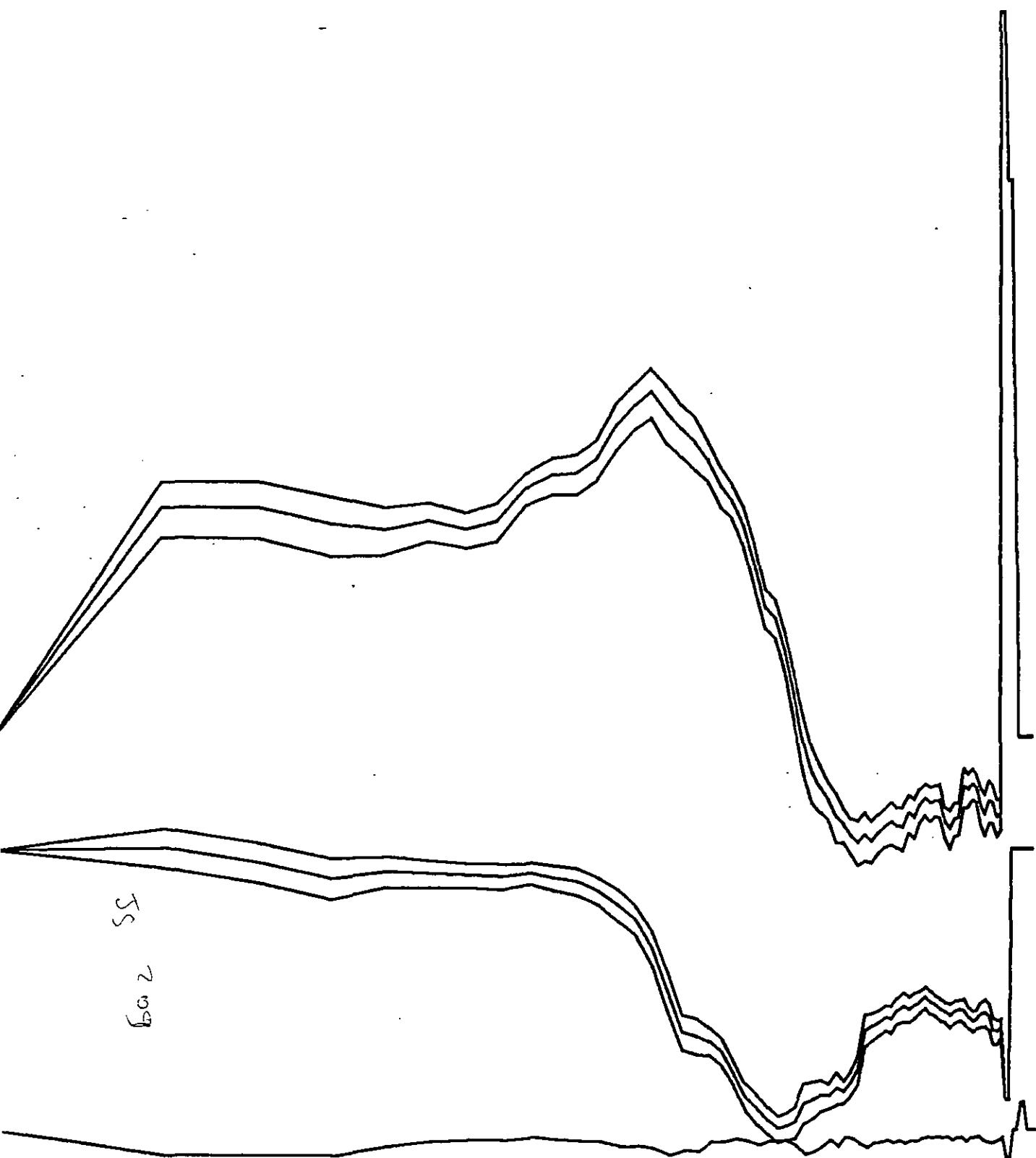


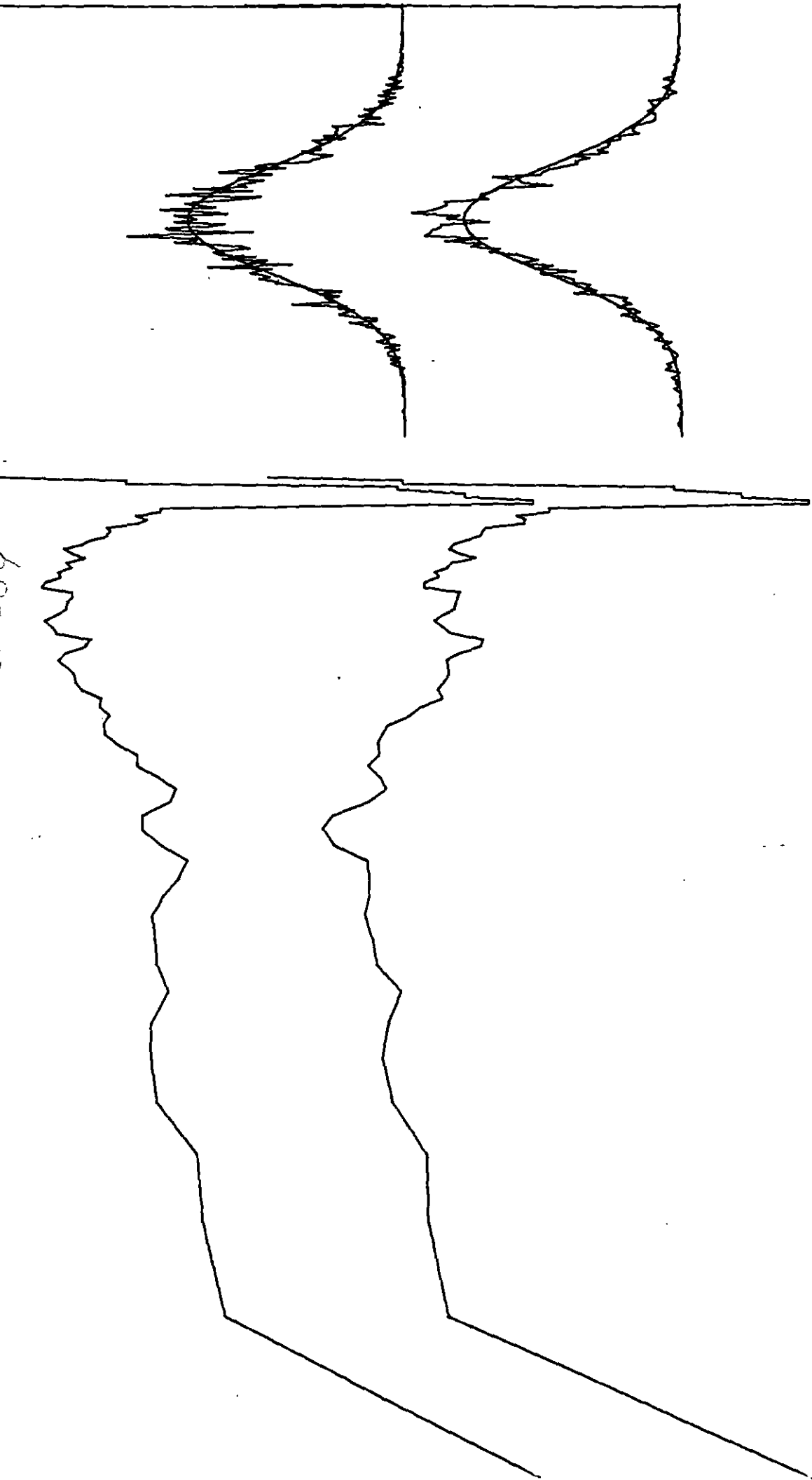
01 08 F

15.208

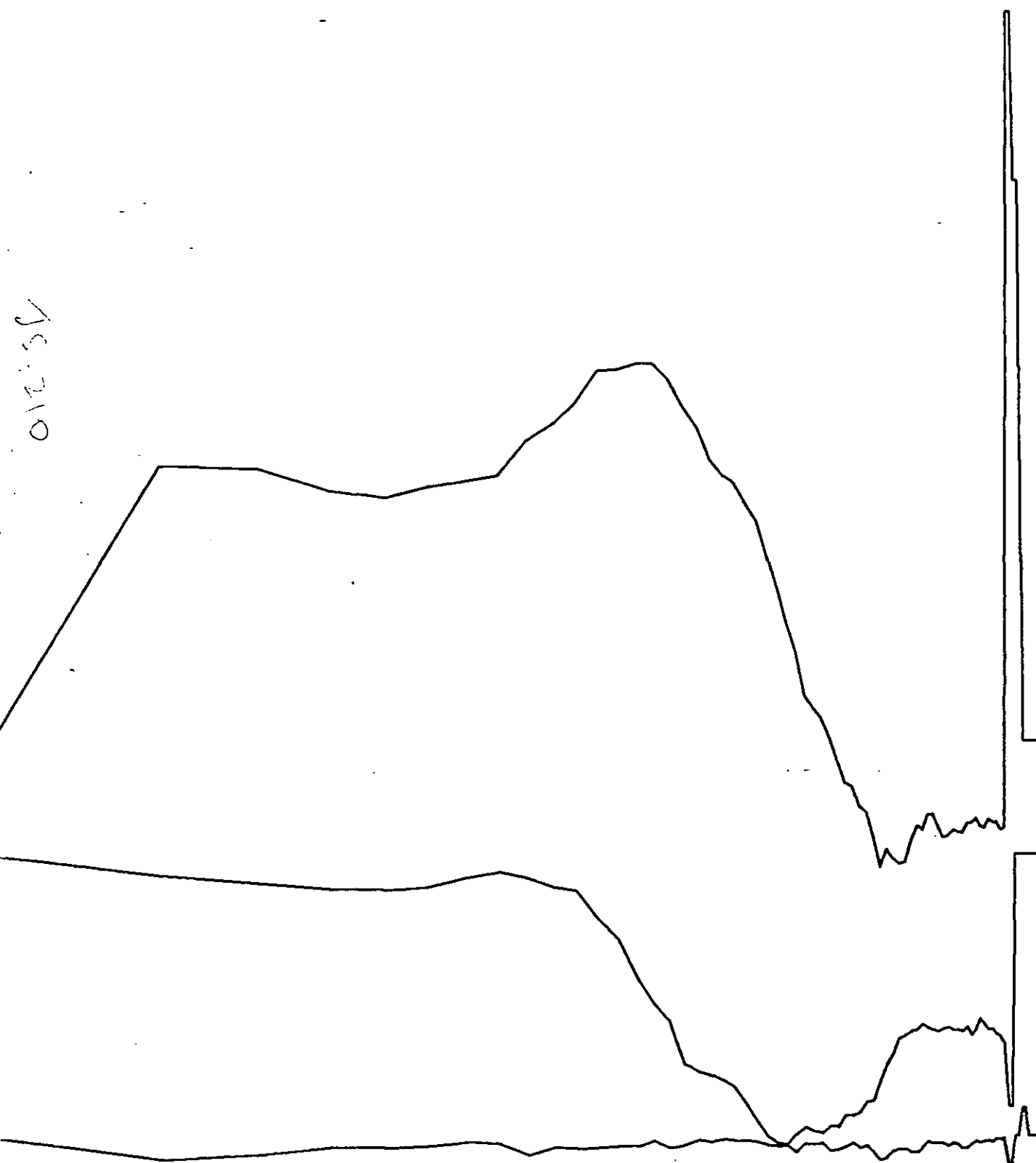


01 09 F

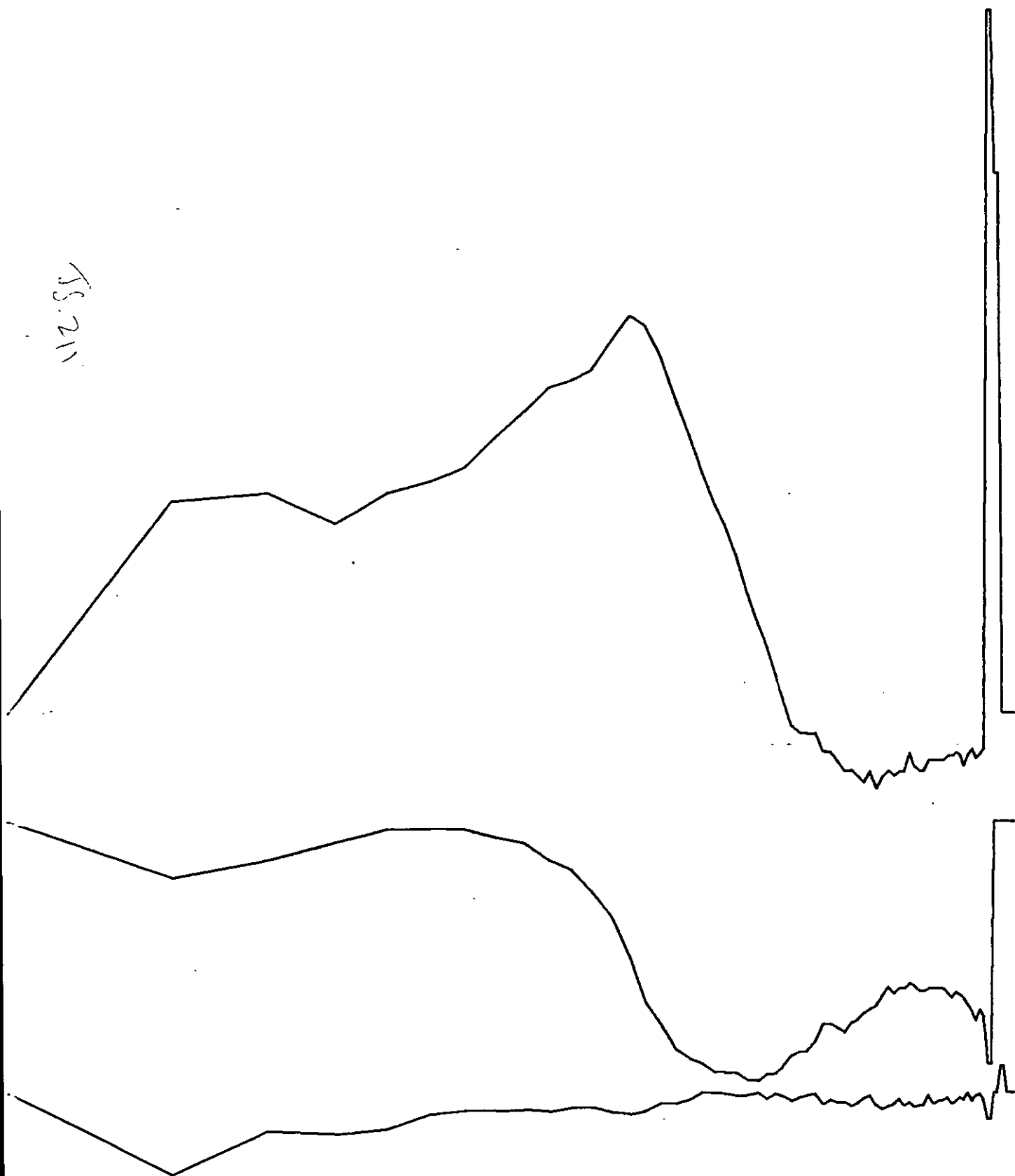




01 10 F

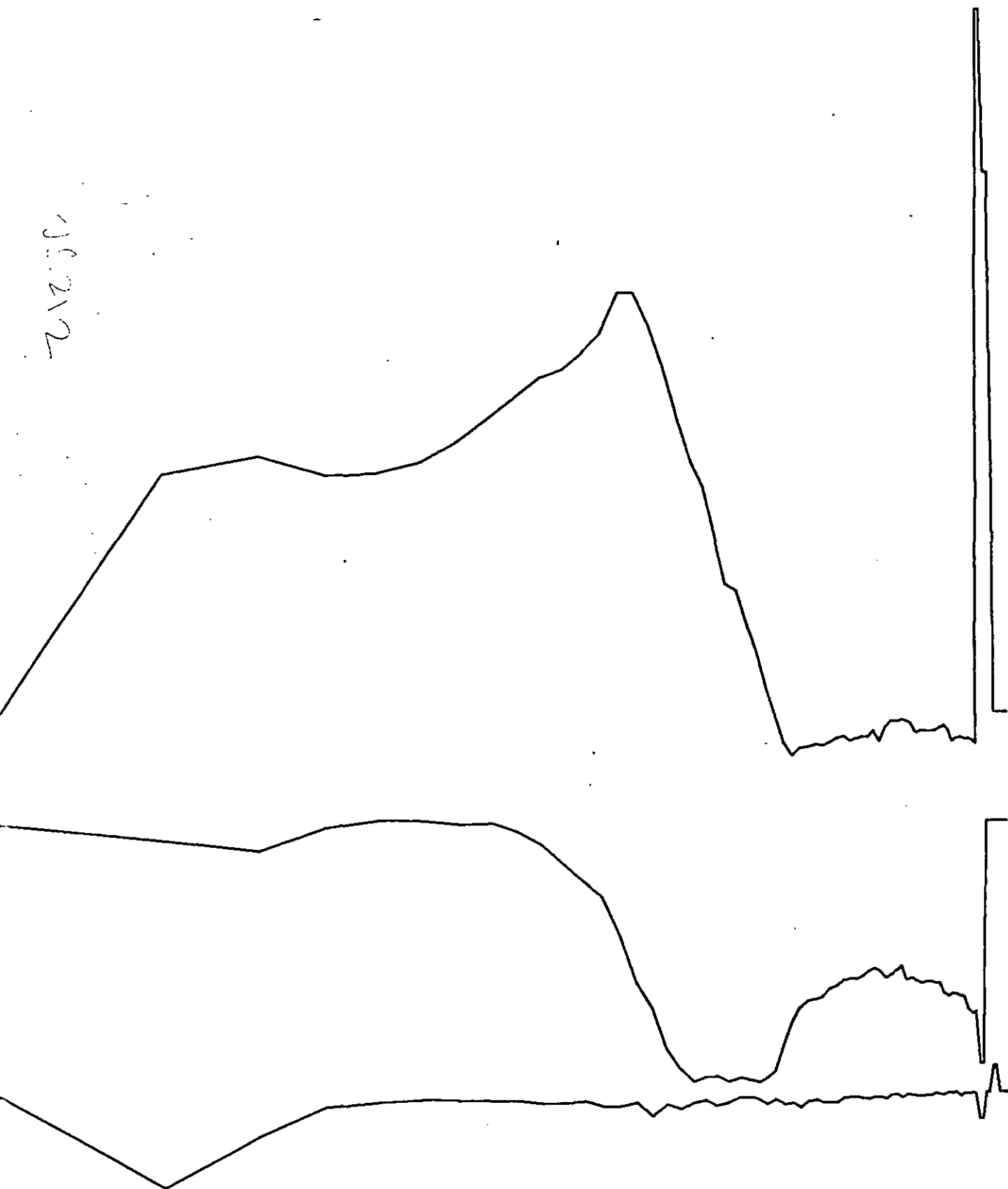


15.211

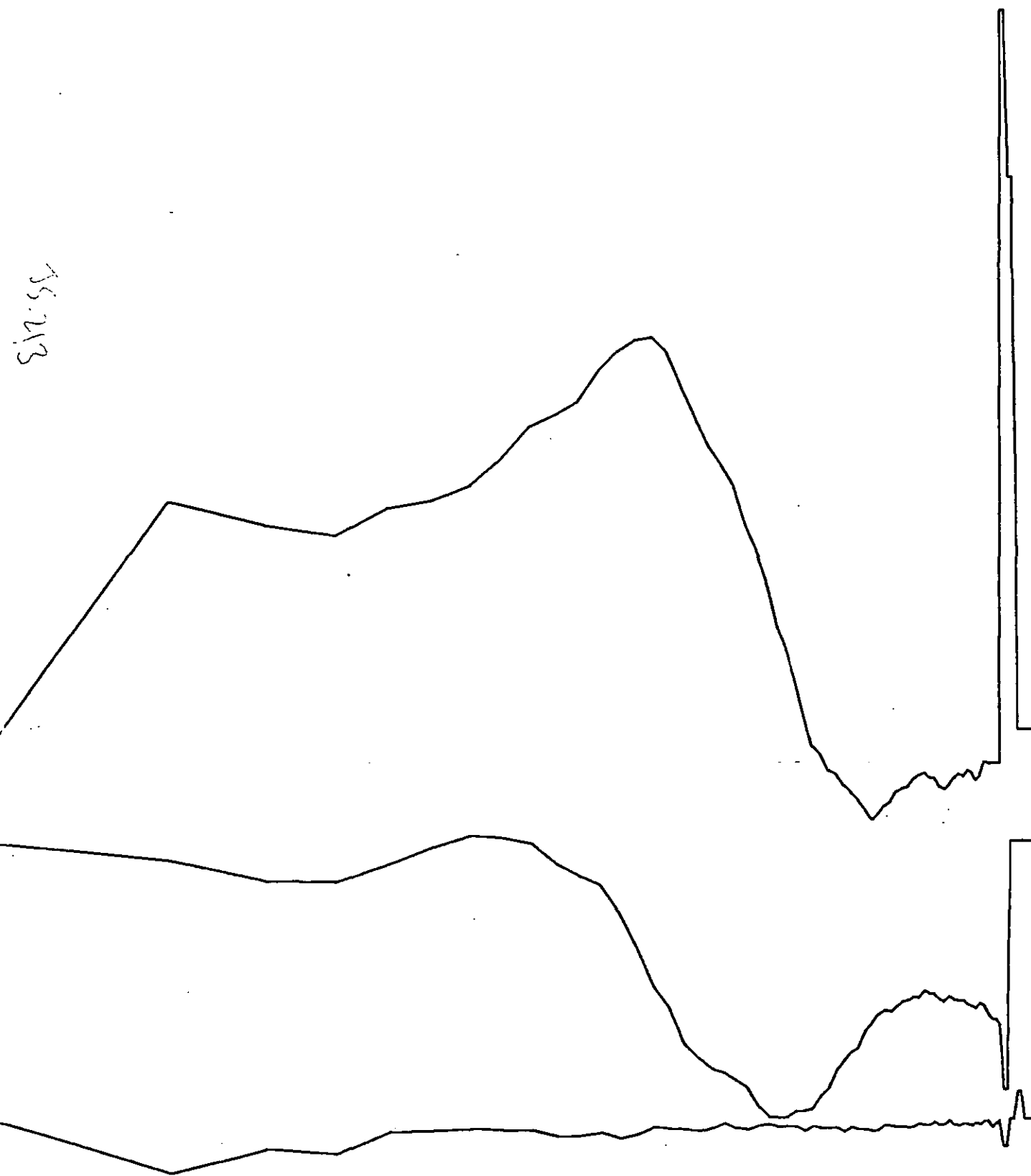


01 12 F

212.2



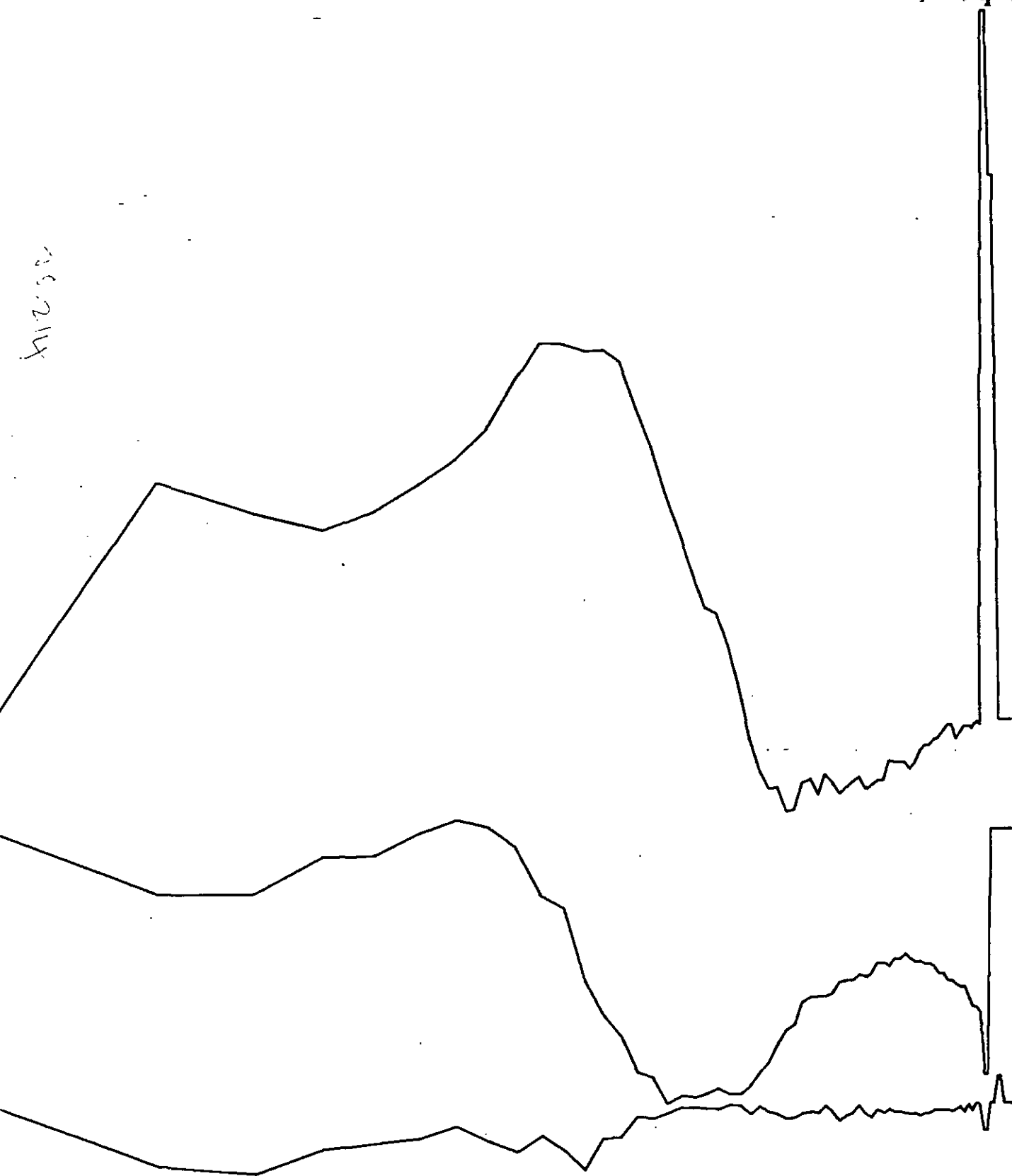
01 13 F

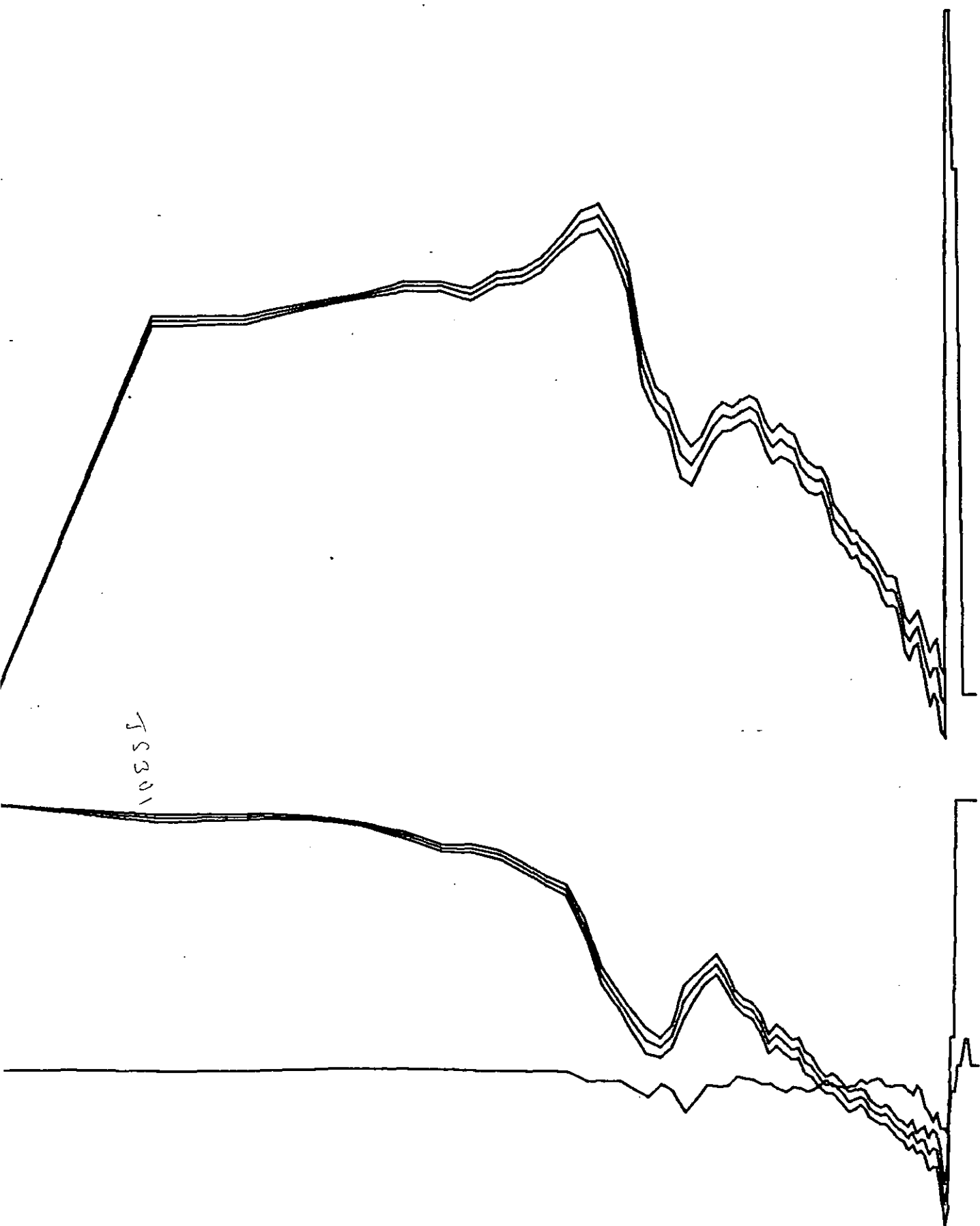


35.213

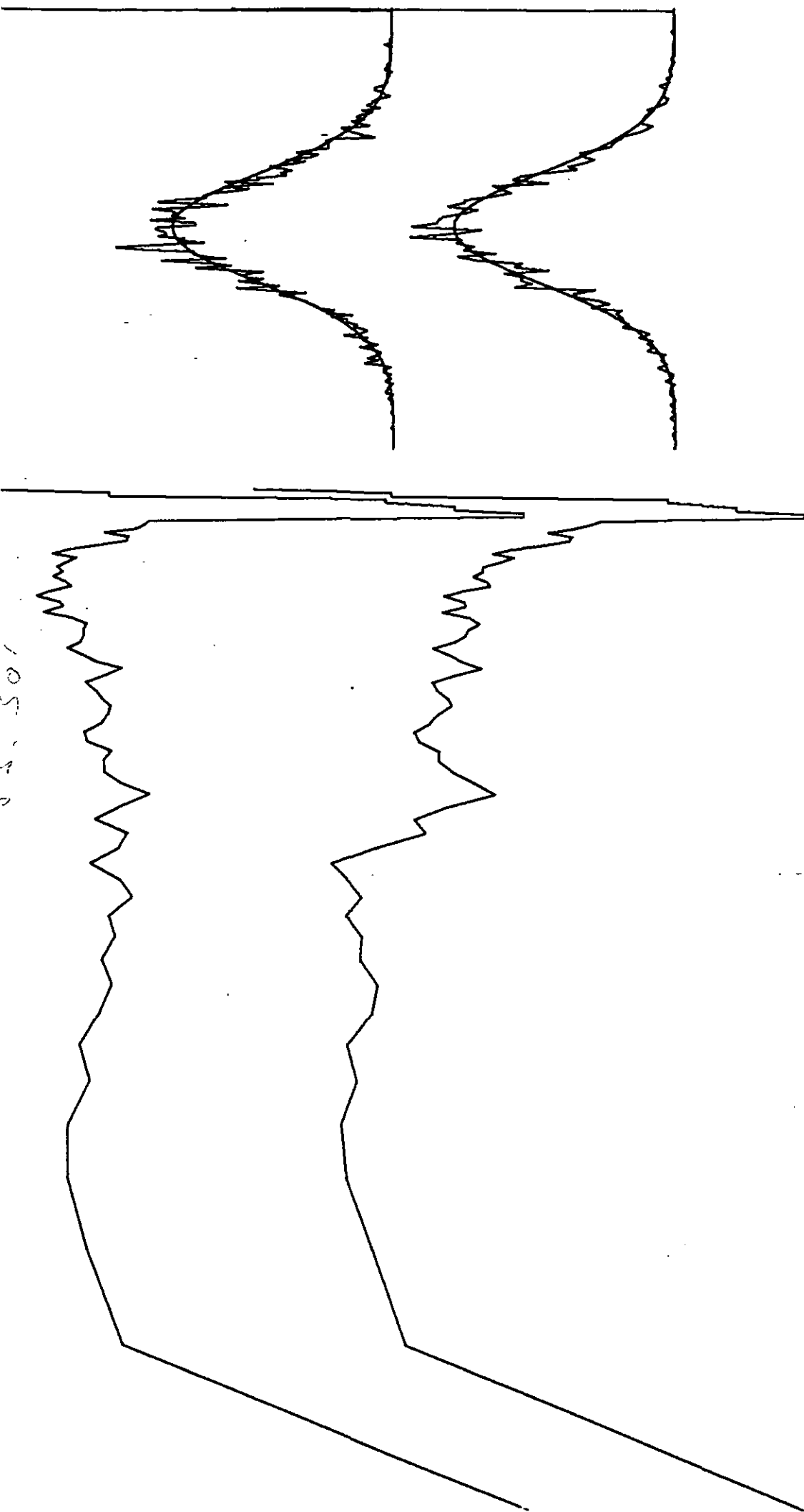
01 14 F

2014



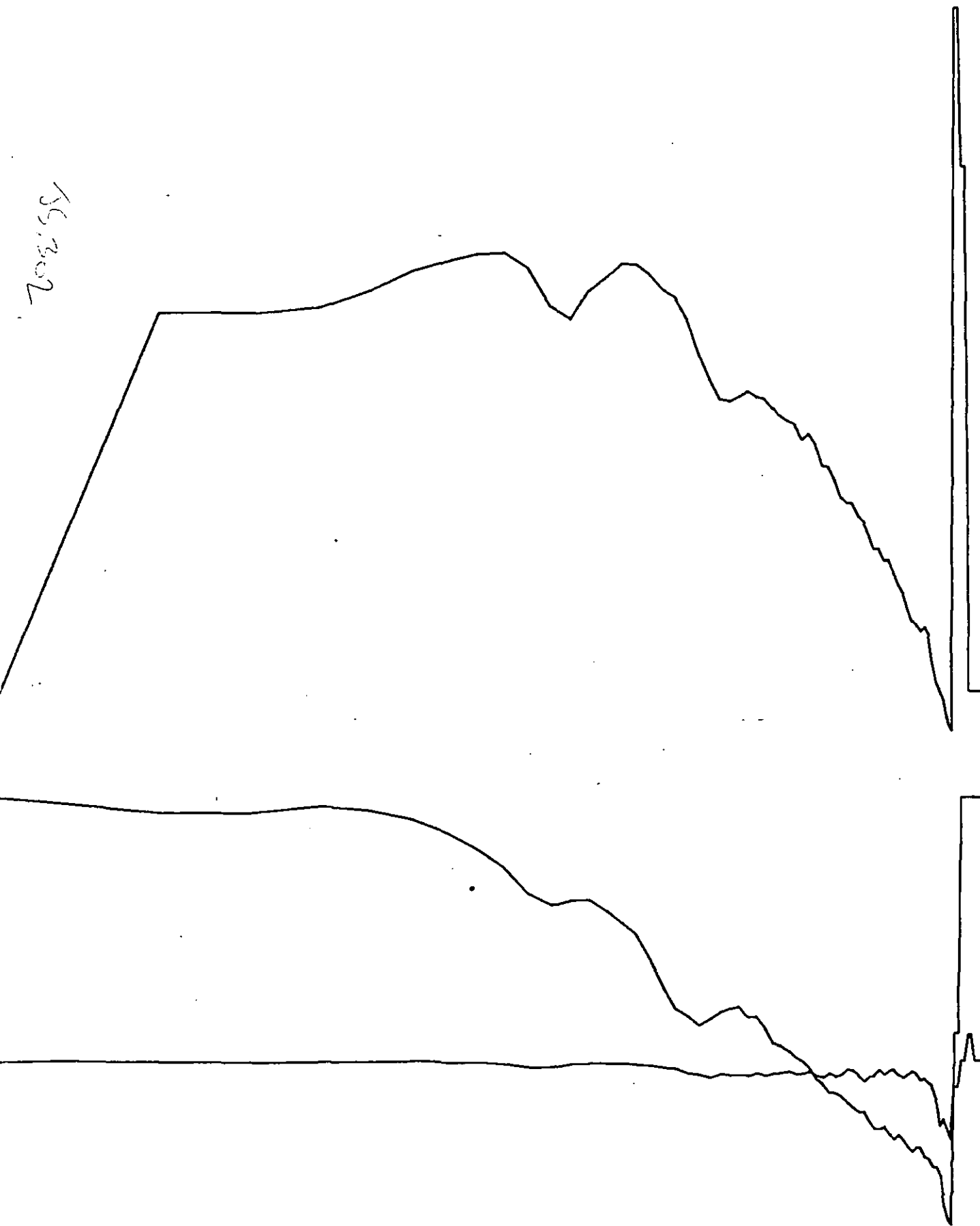


01 01 T



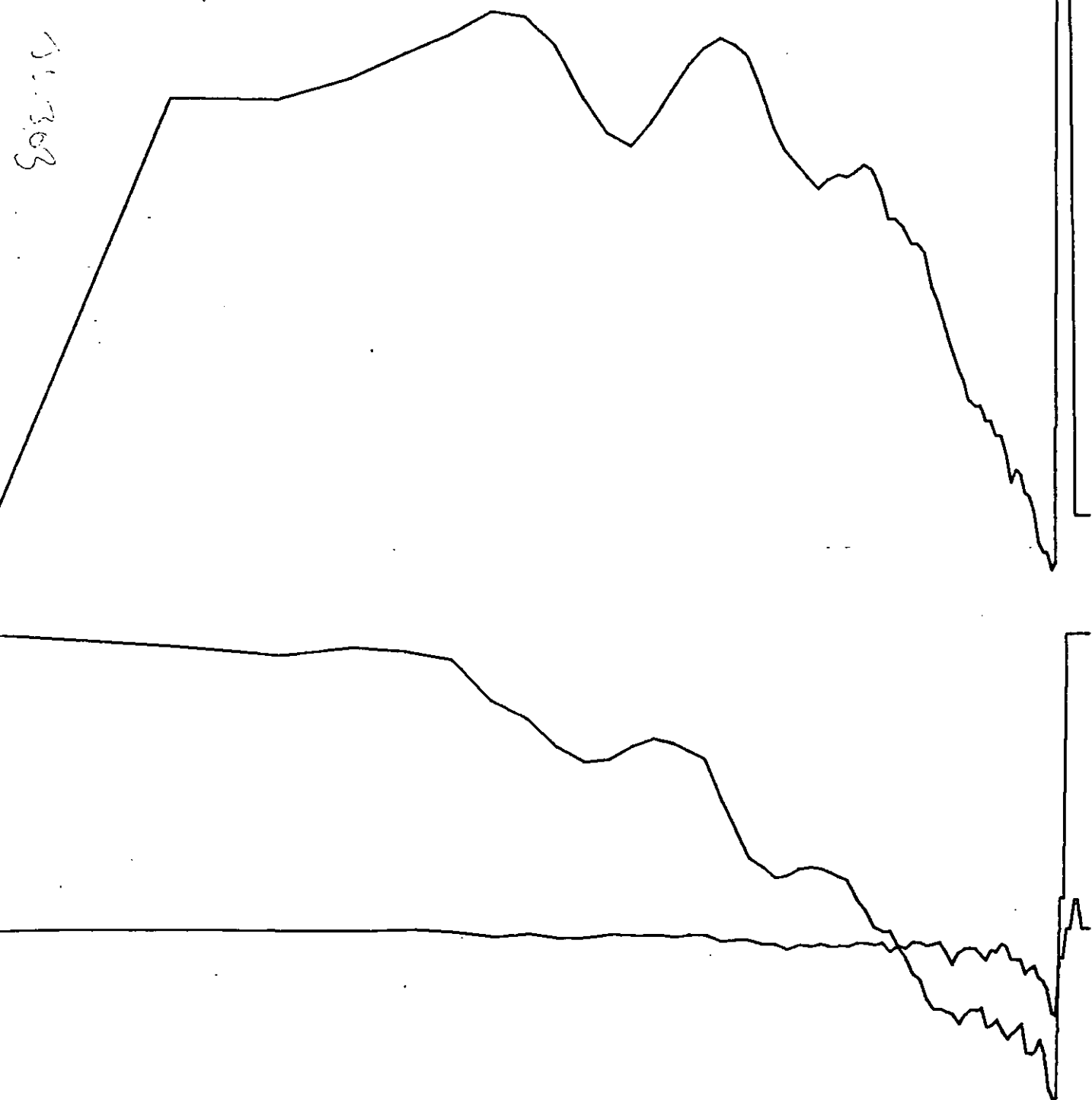
105-501

01 02 T



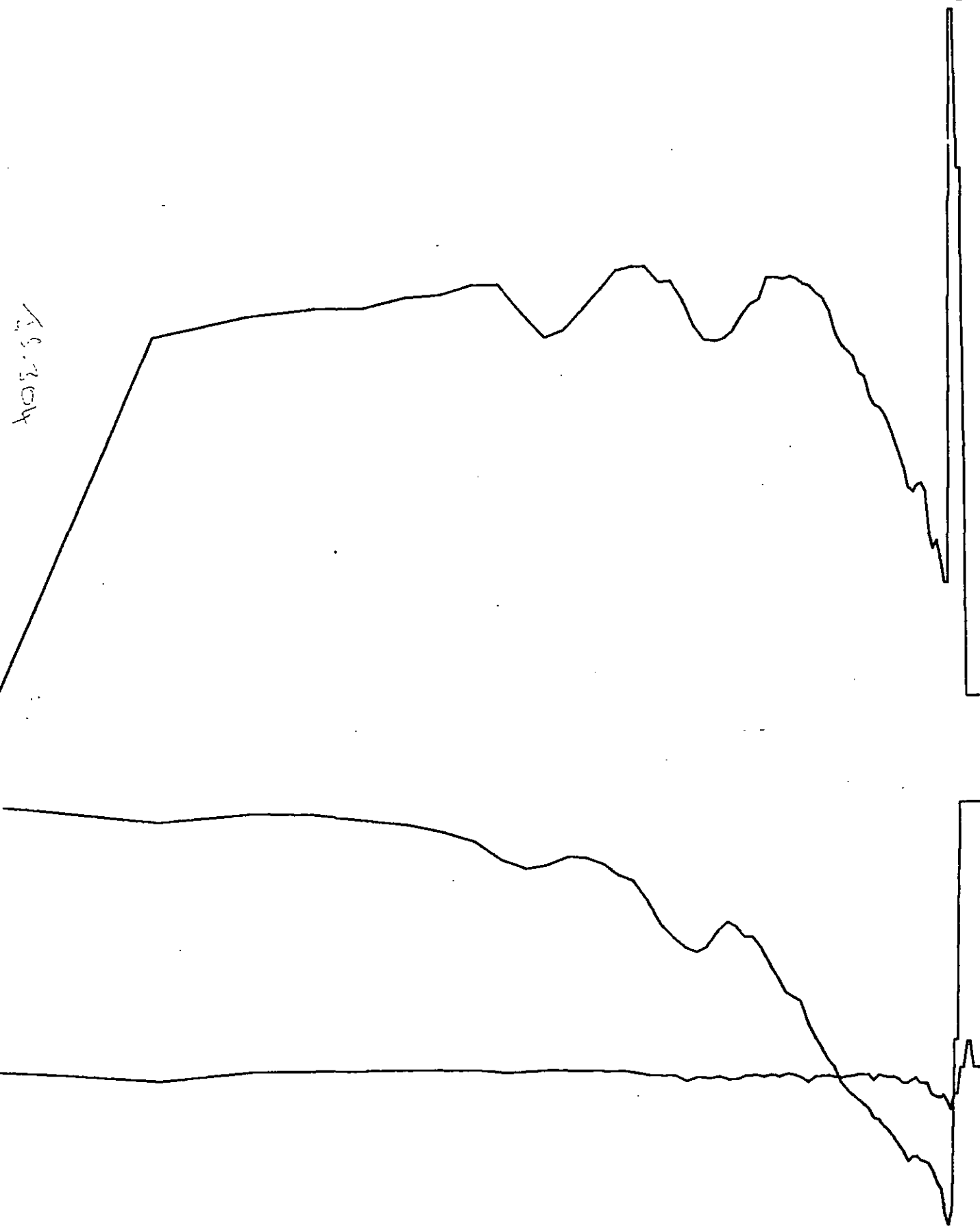
155,302

01 03T



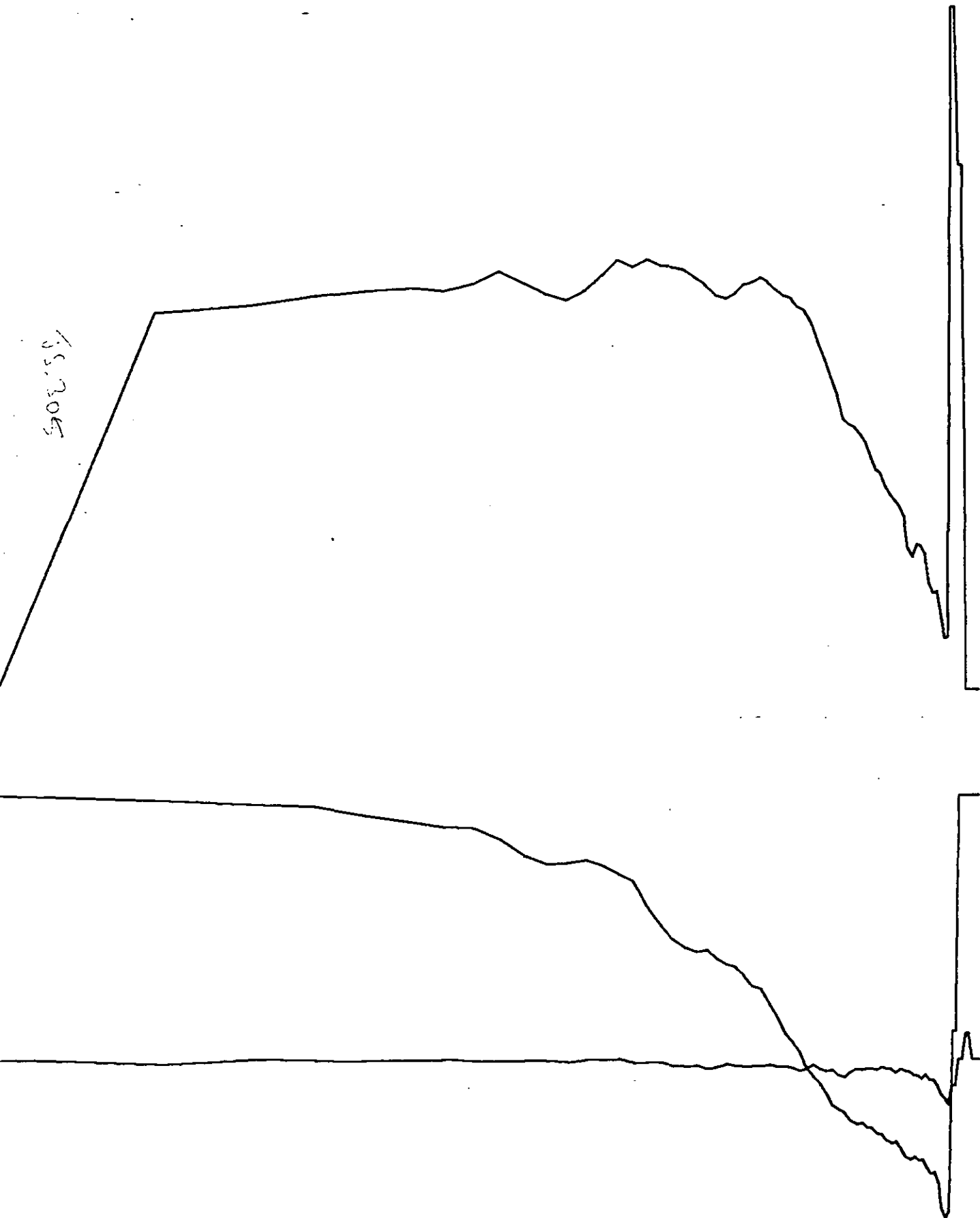
01 04T

15.304

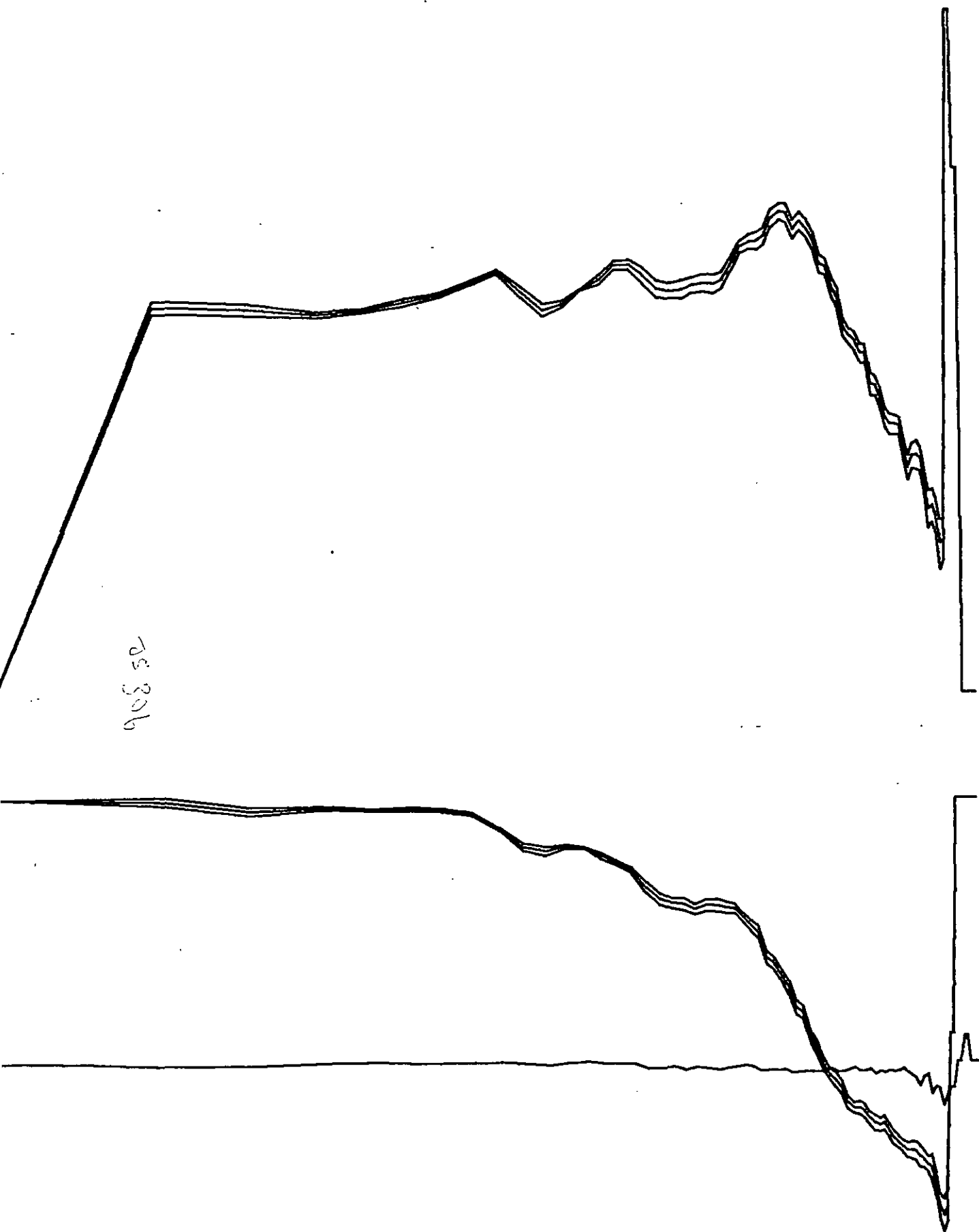


01 05T

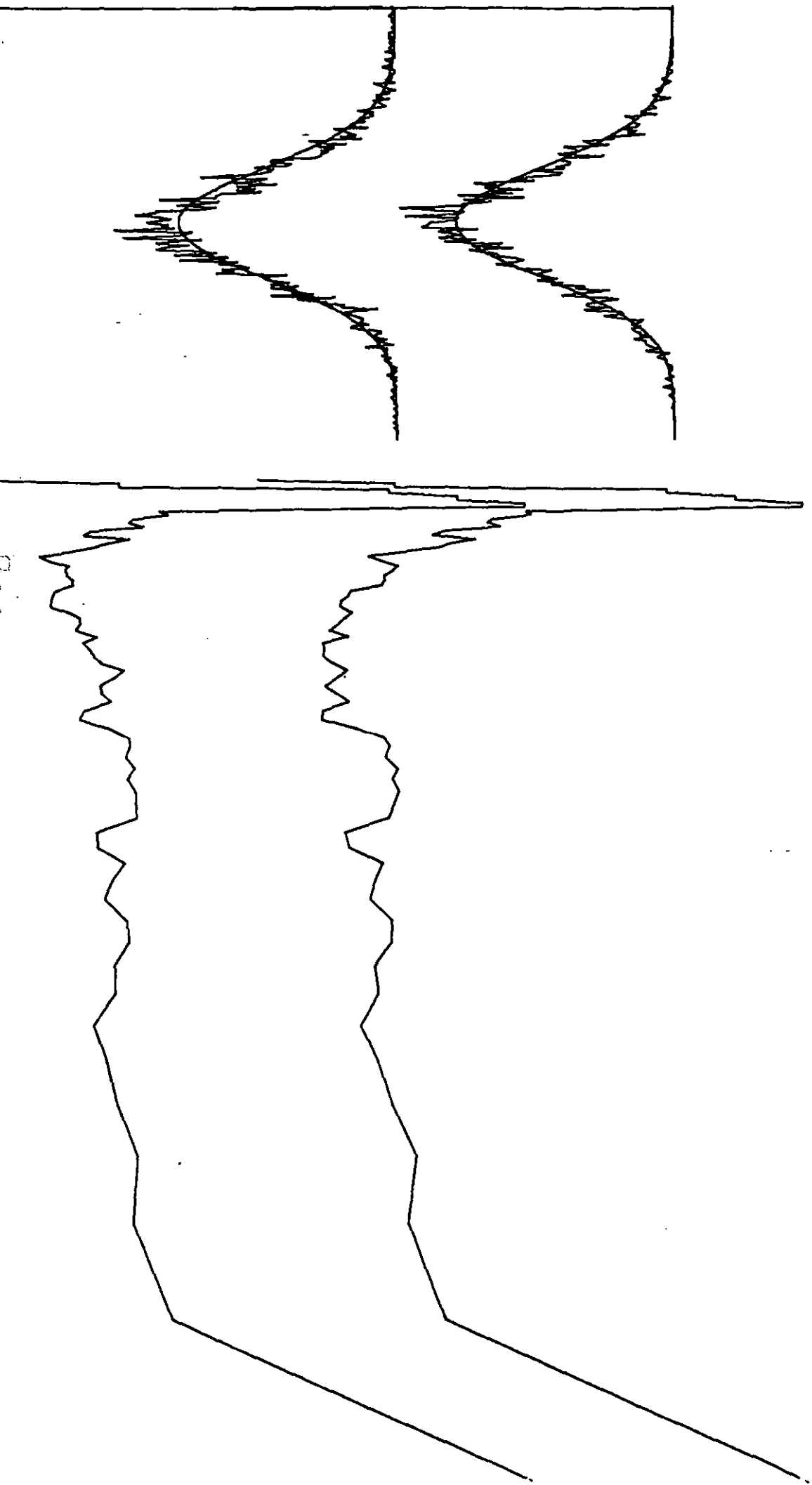
15.305



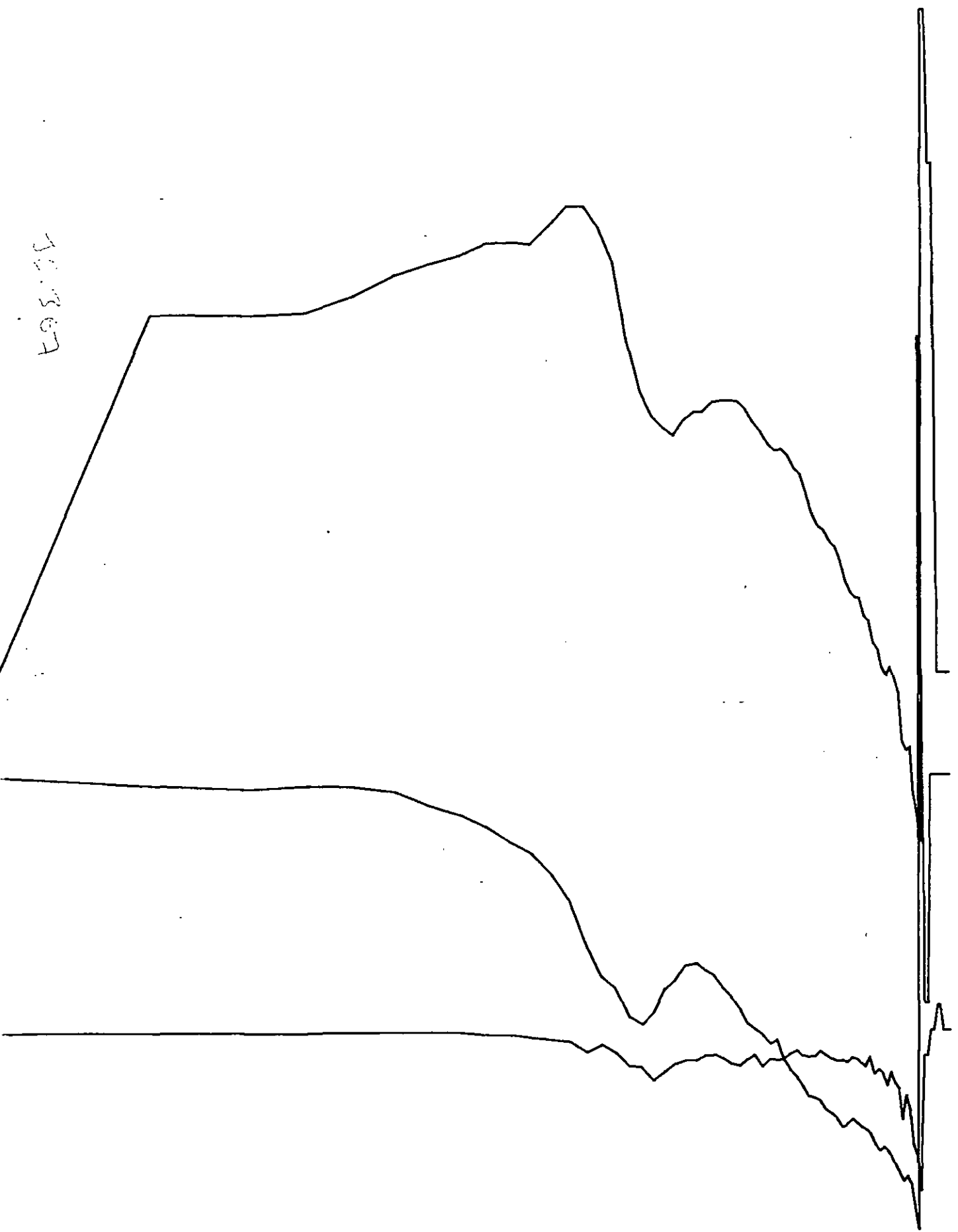
01 06 T



01 06T

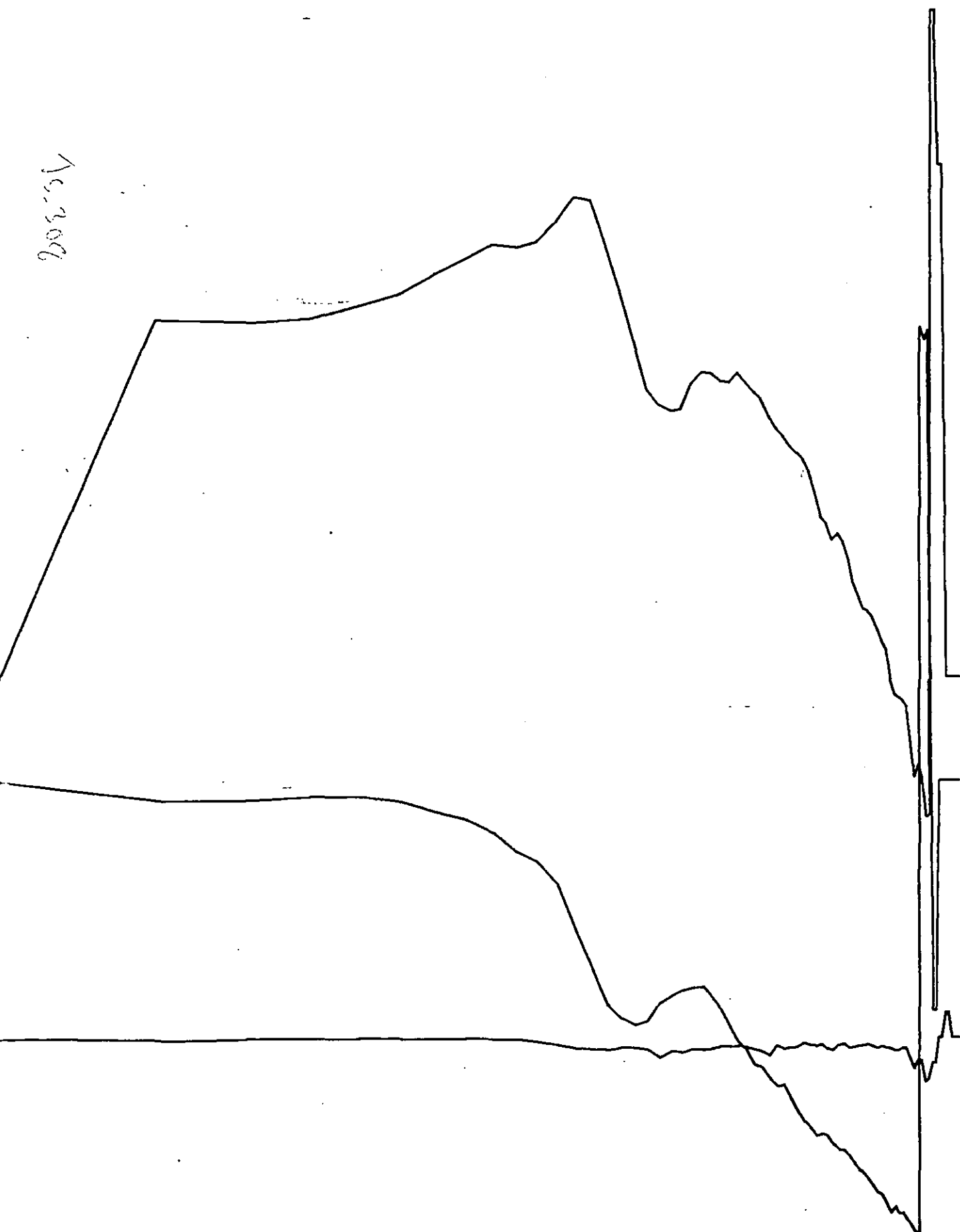


10.367

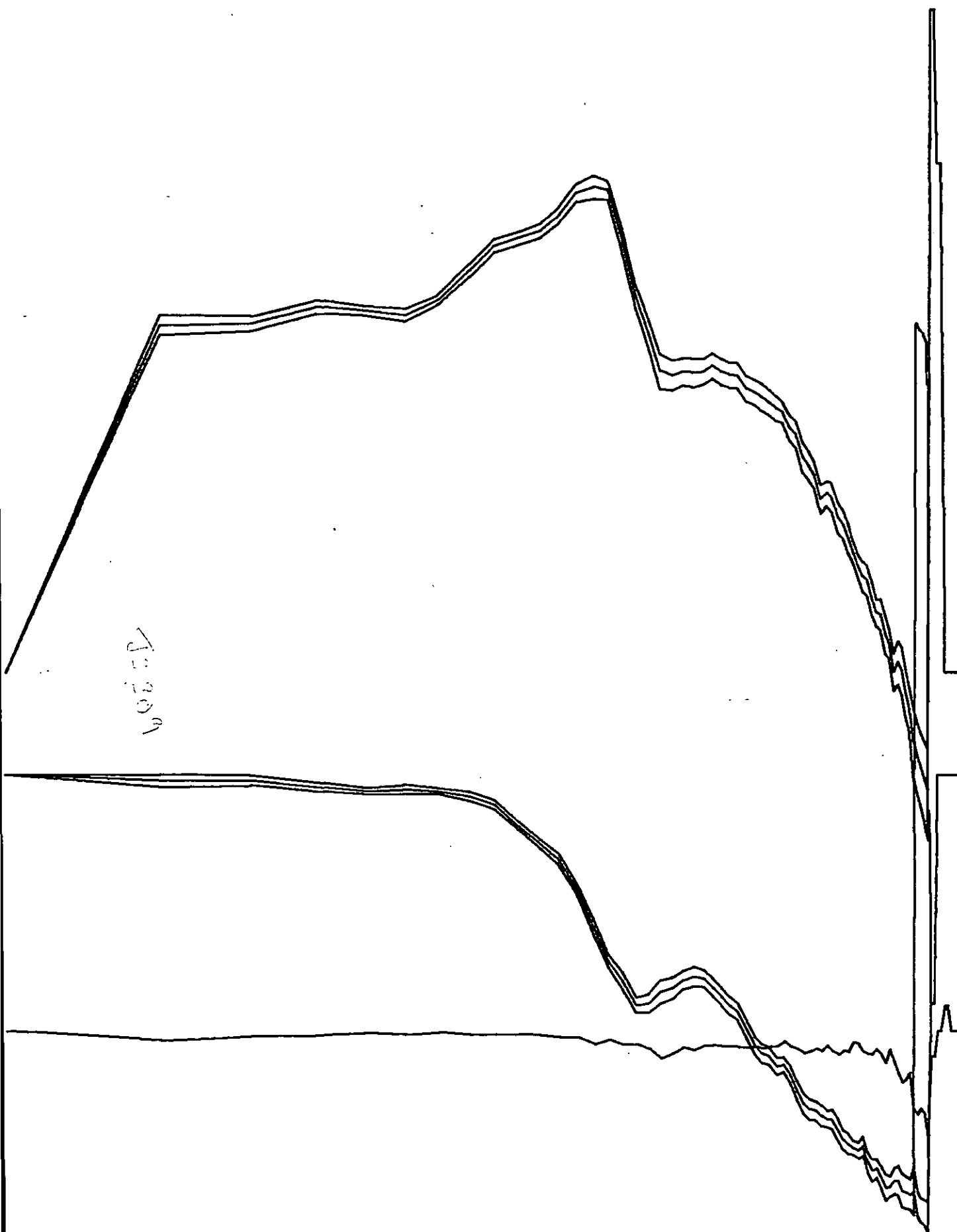


01 08T

15.308



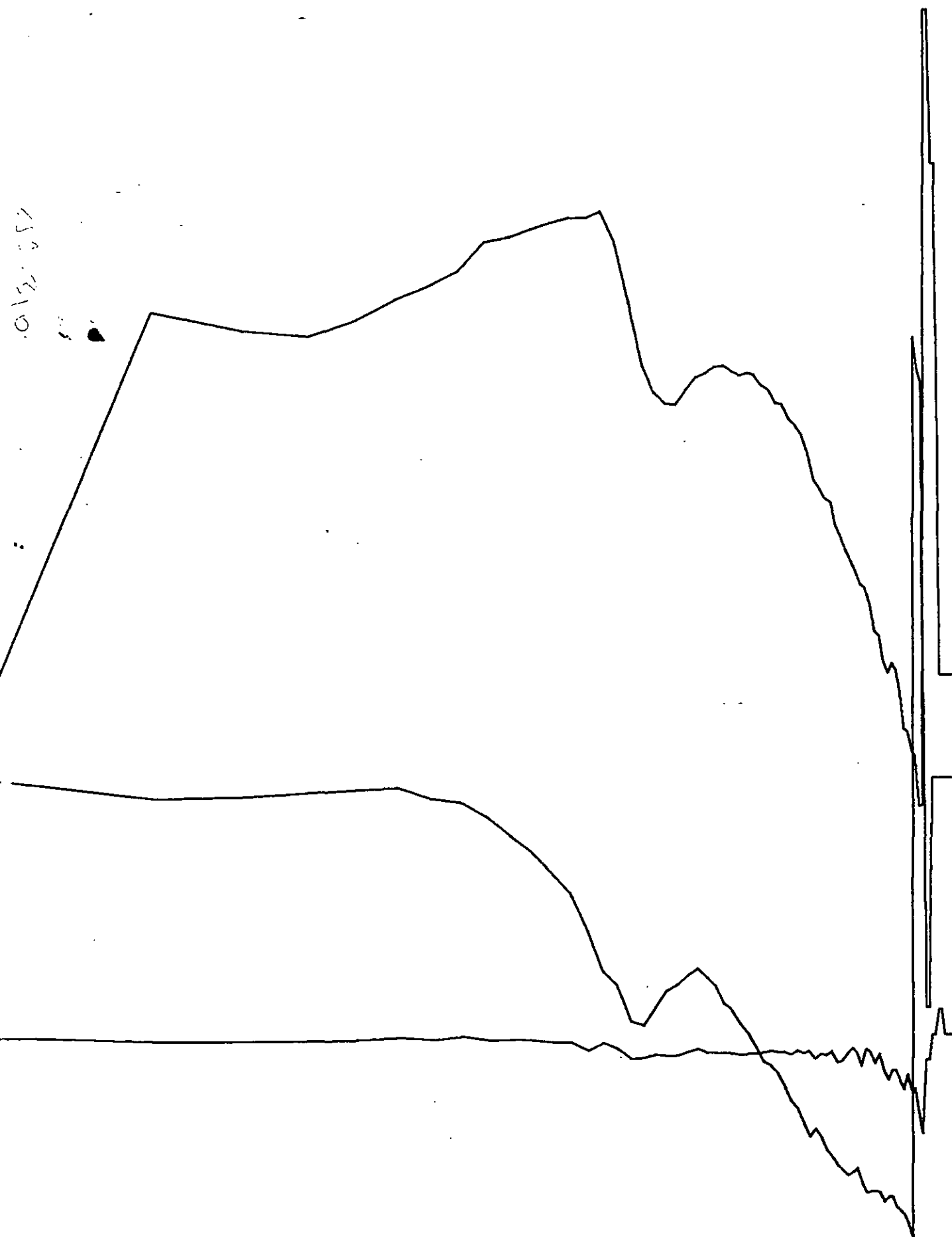
01 09T



1000

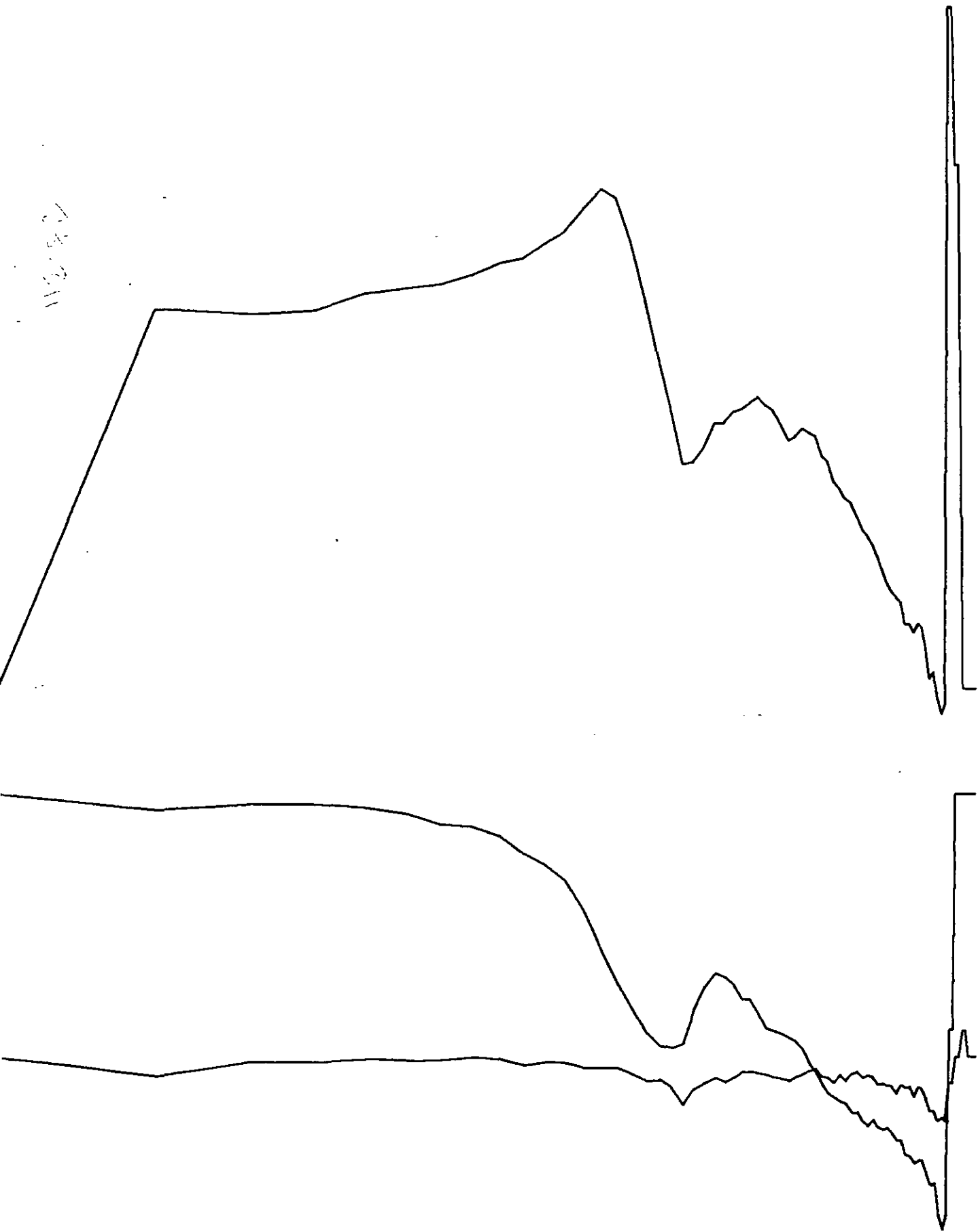
01 09 T

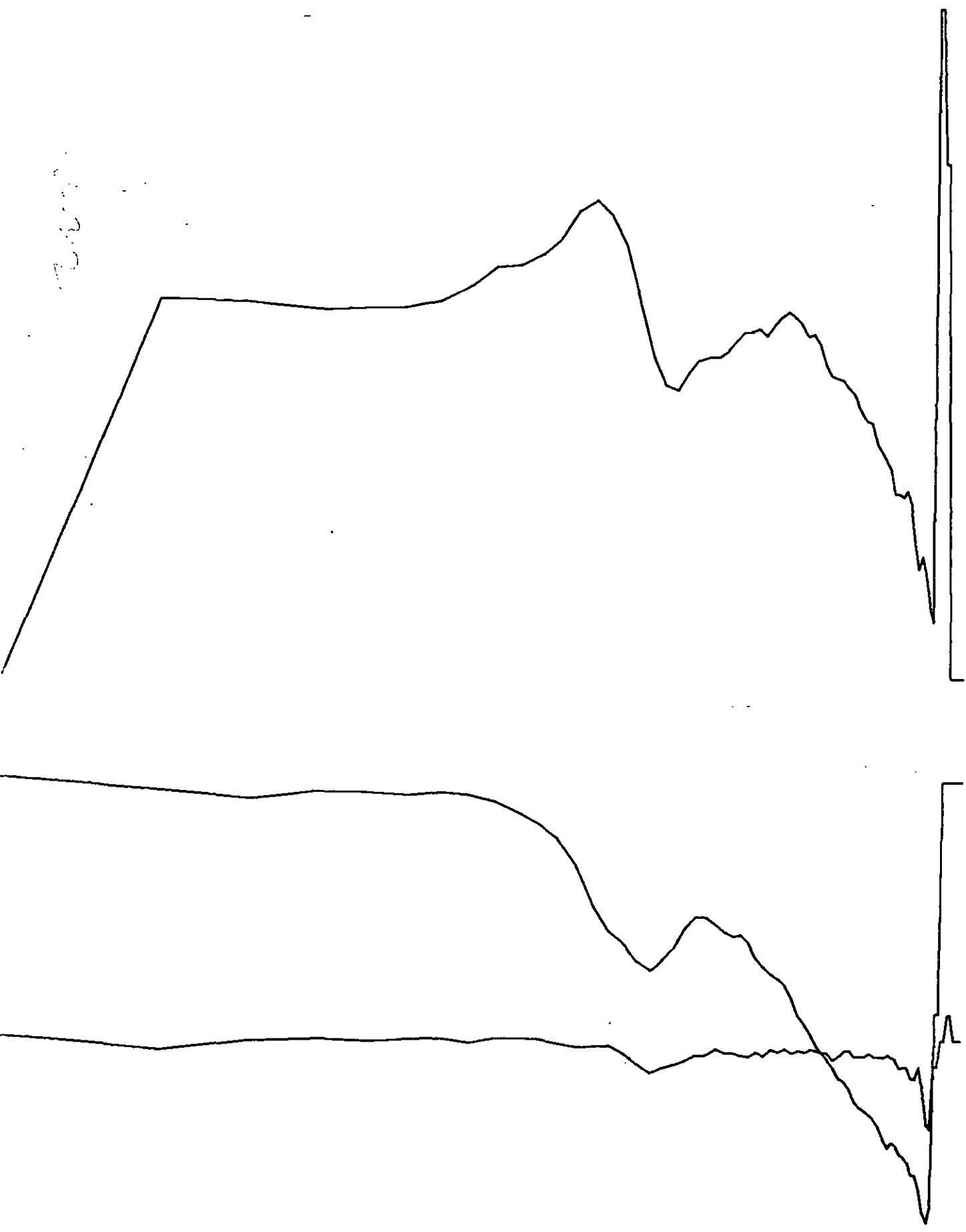




012058

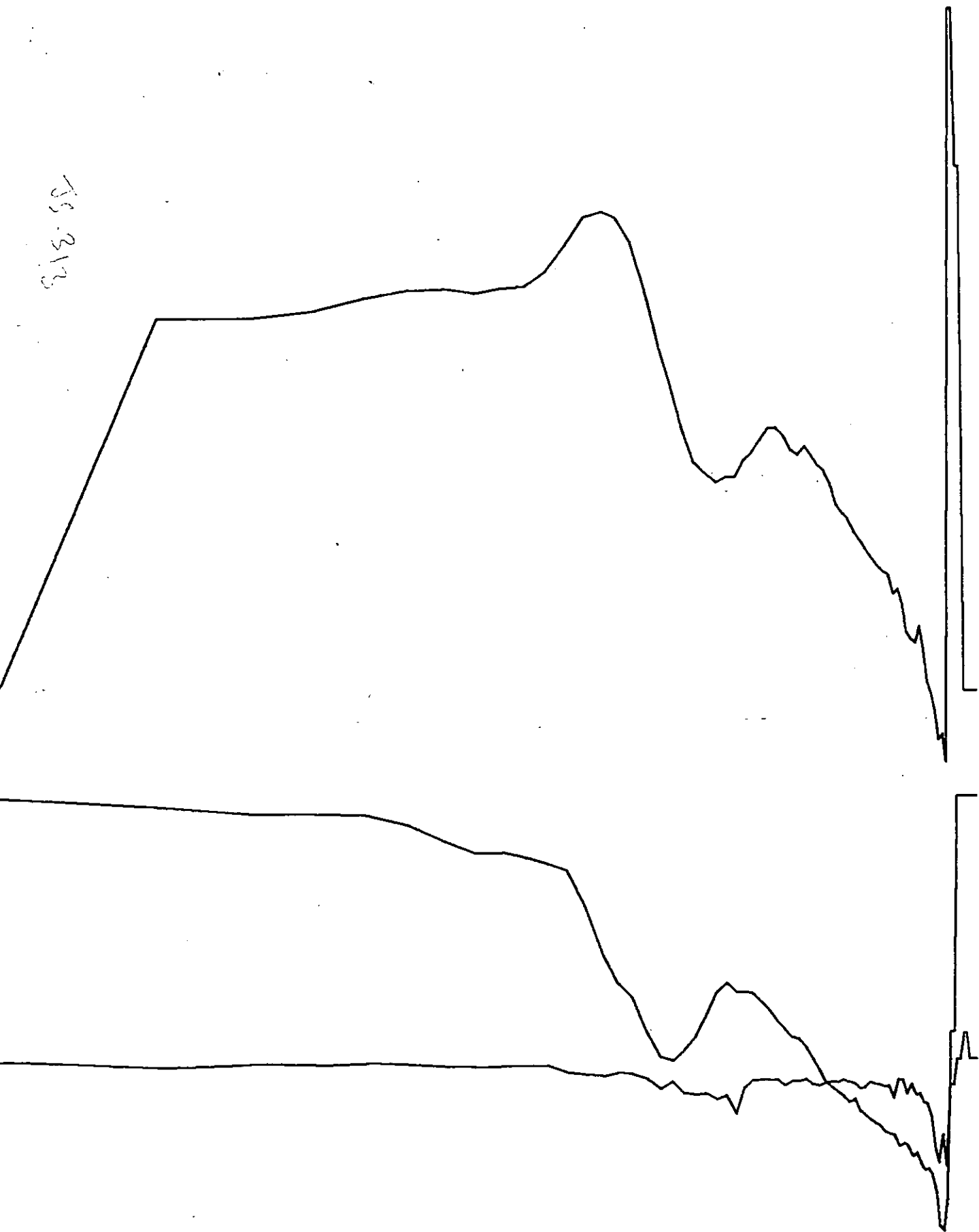
112.92





01 13T

35.813



01 14 T

SS 314

