



# Bergvesenet

Postboks 3021, N-7441 Trondheim

# Rapportarkivet

Bergvesenet rapport nr <b>7198</b>	Intern Journal nr	Internt arkiv nr	Rapport lokalisering	Gradering
Kommer fra ..arkiv Ni & Ol A/S	Ekstern rapport nr	Oversendt fra Ni & Ol A/S	Fortrolig pga	Fortrolig fra dato:

**Tittel**  
Protom Surveys at Nikkel og Olivin Mine in Ballangen, Norway

Forfatter	Dato    År 21.04 1997	Bedrift (Oppdragsgiver og/eller oppdragstaker) Soumen Malmi OY
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Kommune Ballangen	Fylke Nordland	Bergdistrikt	1: 50 000 kartblad 1331 1	1: 250 000 kartblad Narvik
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Fagområde Geofysikk	Dokument type	Forekomster (forekomst, gruvefelt, undersøkelsesfelt) Brevannsfeltet Råna
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Råstoffgruppe Malm/metall	Råstofftype Cu, Ni
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**Sammendrag, innholdstegnelse eller innholdsbeskrivelse**  
Rapporten viser på kart det området det er målt med Protom. Ellers ingen andre kommentarer.  
Det er vedlagt diskett med måleresultater

# **NIKKEL OG OLIVIN MINE**

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## **PROTEM SURVEYS AT NIKKEL OG OLIVIN MINE IN BALLANGEN, NORWAY**

**ESPOO 21, April 1997**



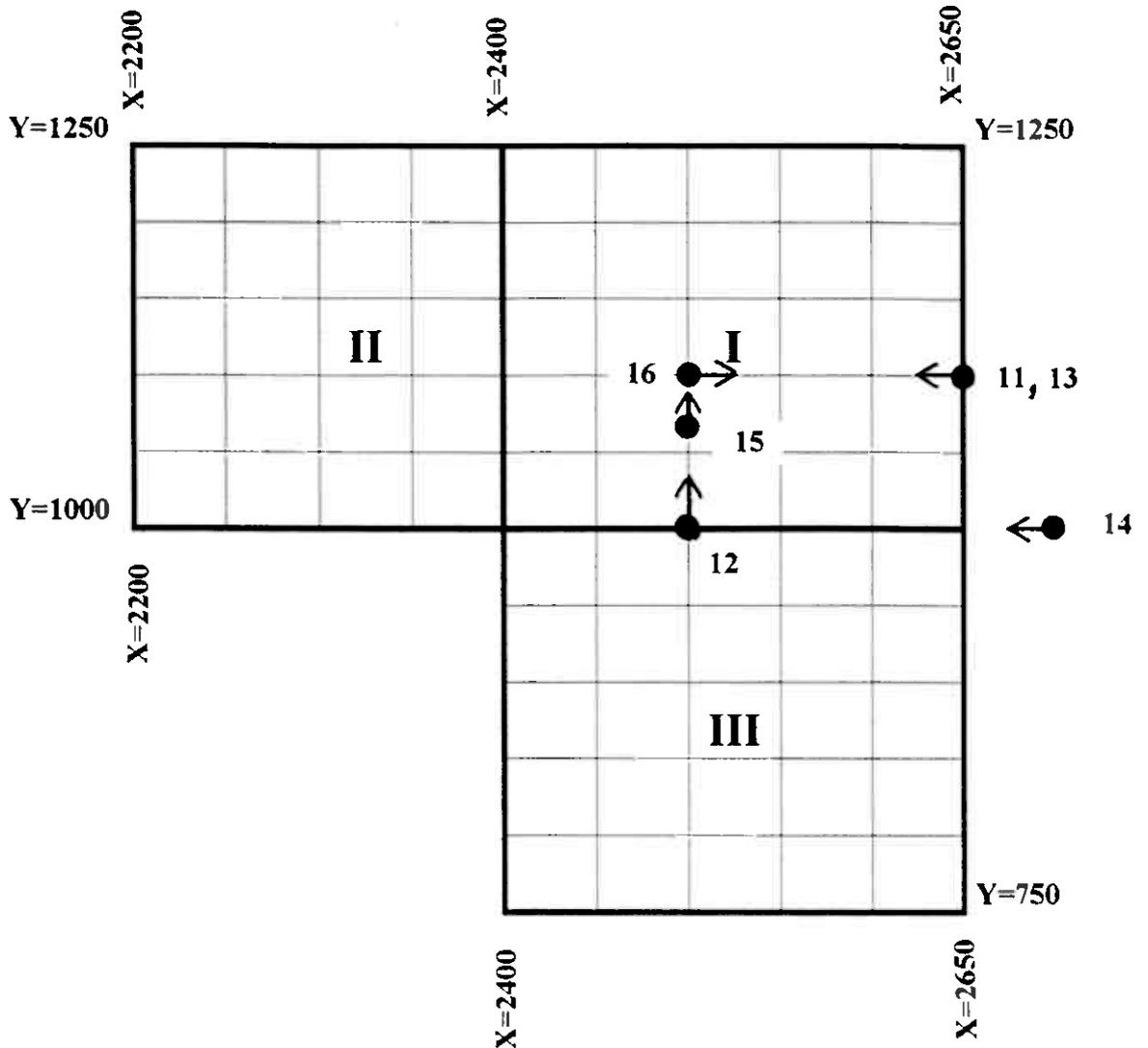
**Box 10, FIN - 02921 ESPOO**

**Tel + 358-0-8524 010**

**Fax + 358-0-8524 0123**

# BALLANGEN NORWAY

## PROTEM SURVEY INDEX MAP



<b>LOOP I</b>	250 x 250 m	X=2400 - 2650	Y= 1000 - 1250
<b>LOOP II</b>	400 x 250 m	X=2200 - 2650	Y= 1000 - 1250
<b>LOOP III</b>	250 x 250 m	X=2400 - 2650	Y= 750 - 1000

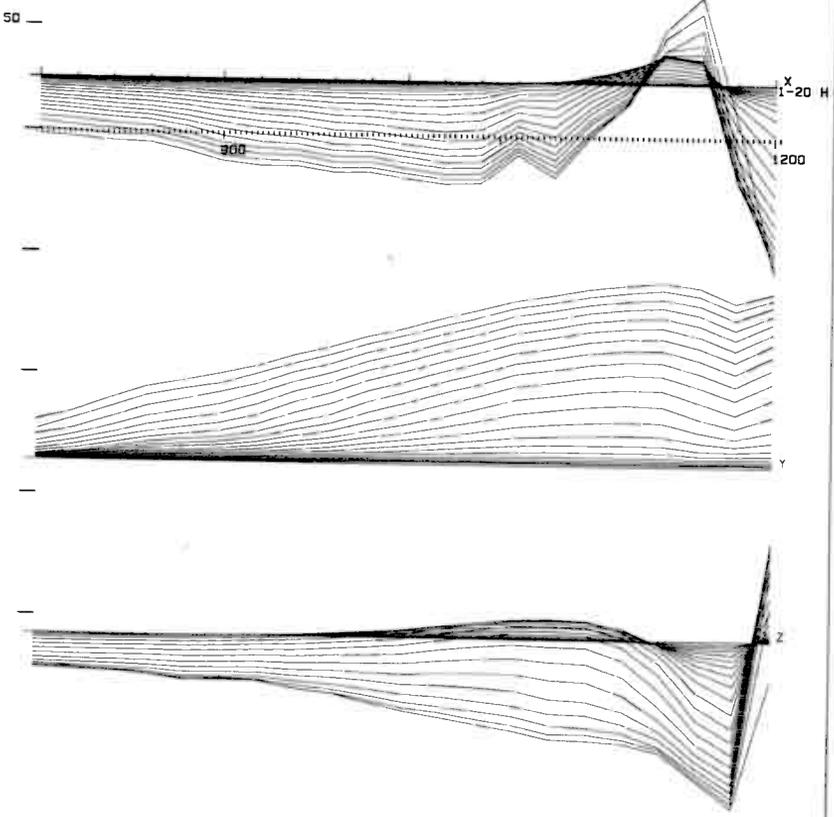
<b>LINE</b>	<b>X=2200</b>	<b>Y= 800 - 1200</b>			
<b>LINE</b>	<b>X=2250</b>	<b>Y= 1180 - 1200</b>			
<b>LINE</b>	<b>X=2300</b>	<b>Y= 800 - 1200</b>			
<b>LINE</b>	<b>X=2350</b>	<b>Y= 800 - 1200</b>	<b>HOLE 11</b>	<b>X=2650</b>	<b>Y=1100</b>
<b>LINE</b>	<b>X=2400</b>	<b>Y= 780 - 1200</b>	<b>HOLE 12</b>	<b>X=2500</b>	<b>Y=1000</b>
<b>LINE</b>	<b>X=2450</b>	<b>Y= 760 - 1200</b>	<b>HOLE 13</b>	<b>X=2650</b>	<b>Y=1100</b>
<b>LINE</b>	<b>X=2500</b>	<b>Y= 760 - 1200</b>	<b>HOLE 14</b>	<b>X=2710</b>	<b>Y=1000</b>
<b>LINE</b>	<b>X=2550</b>	<b>Y= 800 - 1200</b>	<b>HOLE 15</b>	<b>X=2500</b>	<b>Y=1070</b>
<b>LINE</b>	<b>X=2600</b>	<b>Y= 800 - 1200</b>	<b>HOLE 16</b>	<b>X=2500</b>	<b>Y=1100</b>

BALLANGEN PROTEM data: file 220397  
LINE 2200 LOOP II

3 Component

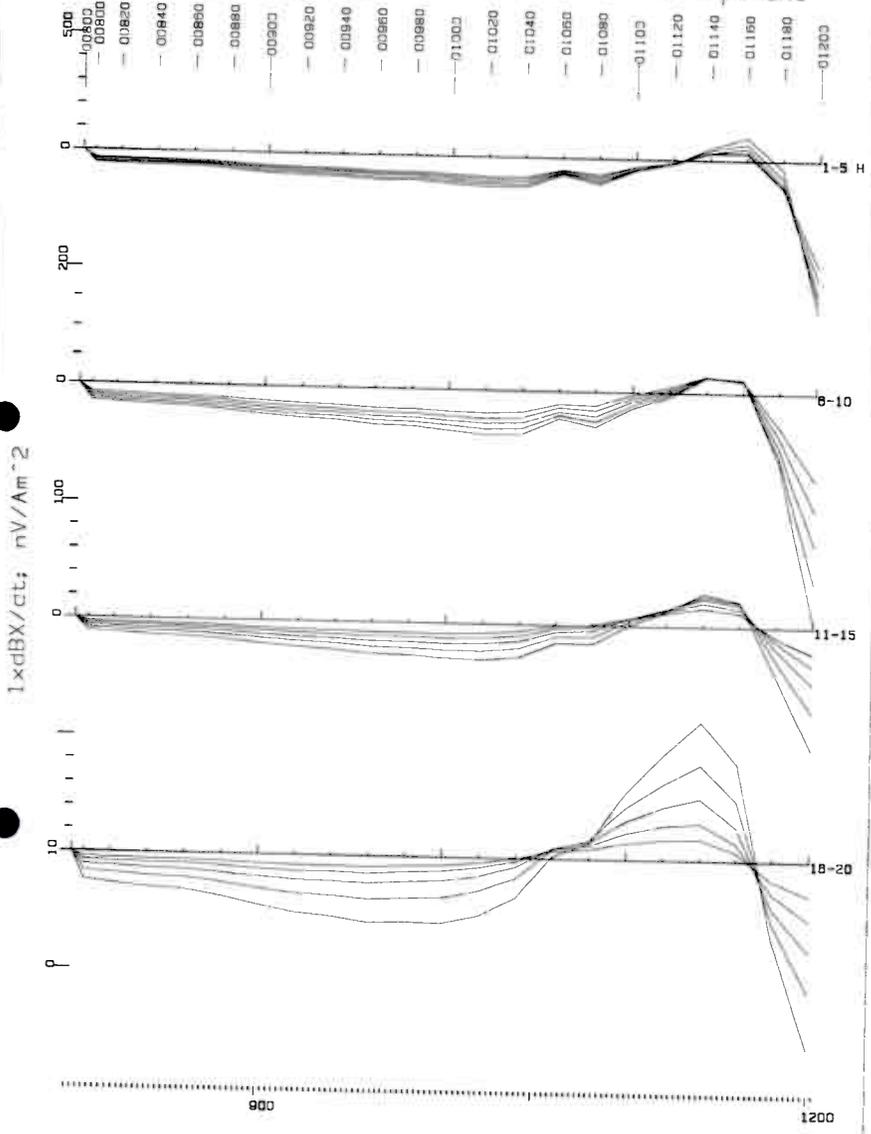
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00820  
00840  
00860  
00880  
00900  
00920  
00940  
00960  
00980  
01000  
01020  
01040  
01060  
01080  
01100  
01120  
01140  
01160  
01180  
01200

$1 \times dB/dt; nV/Am^2$



BALLANGEN PROTEM data; file 220397  
LINE 2200 LOOP II

X Component



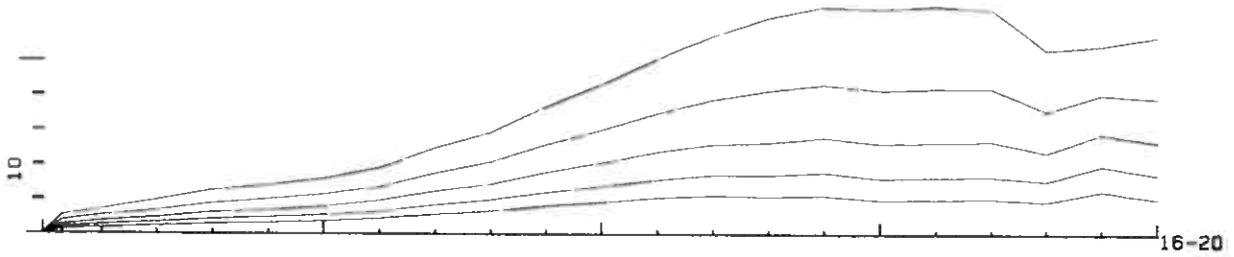
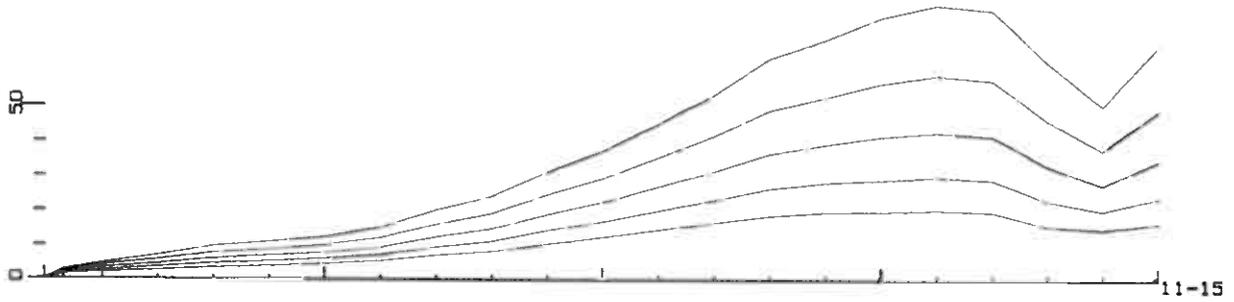
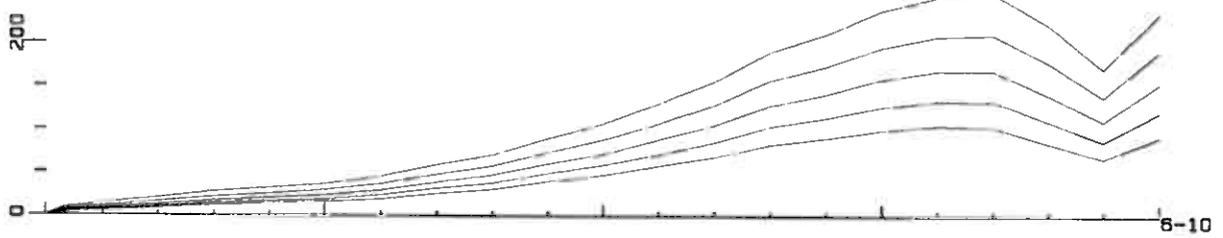
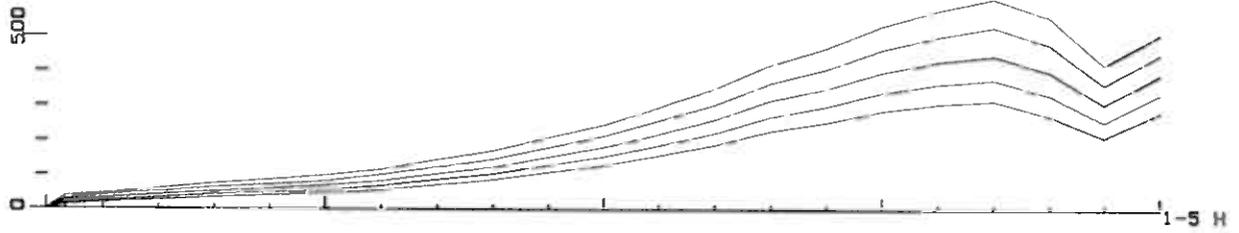
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LINE 2200 LOOP II

Y Component

0.0800 0.0800 0.0820 0.0840 0.0860 0.0880 0.0900 0.0920 0.0940 0.0960 0.0980 0.1000 0.1020 0.1040 0.1060 0.1080 0.1100 0.1120 0.1140 0.1160 0.1180 0.1200

1x dBY/dt: nV/Am<sup>2</sup>



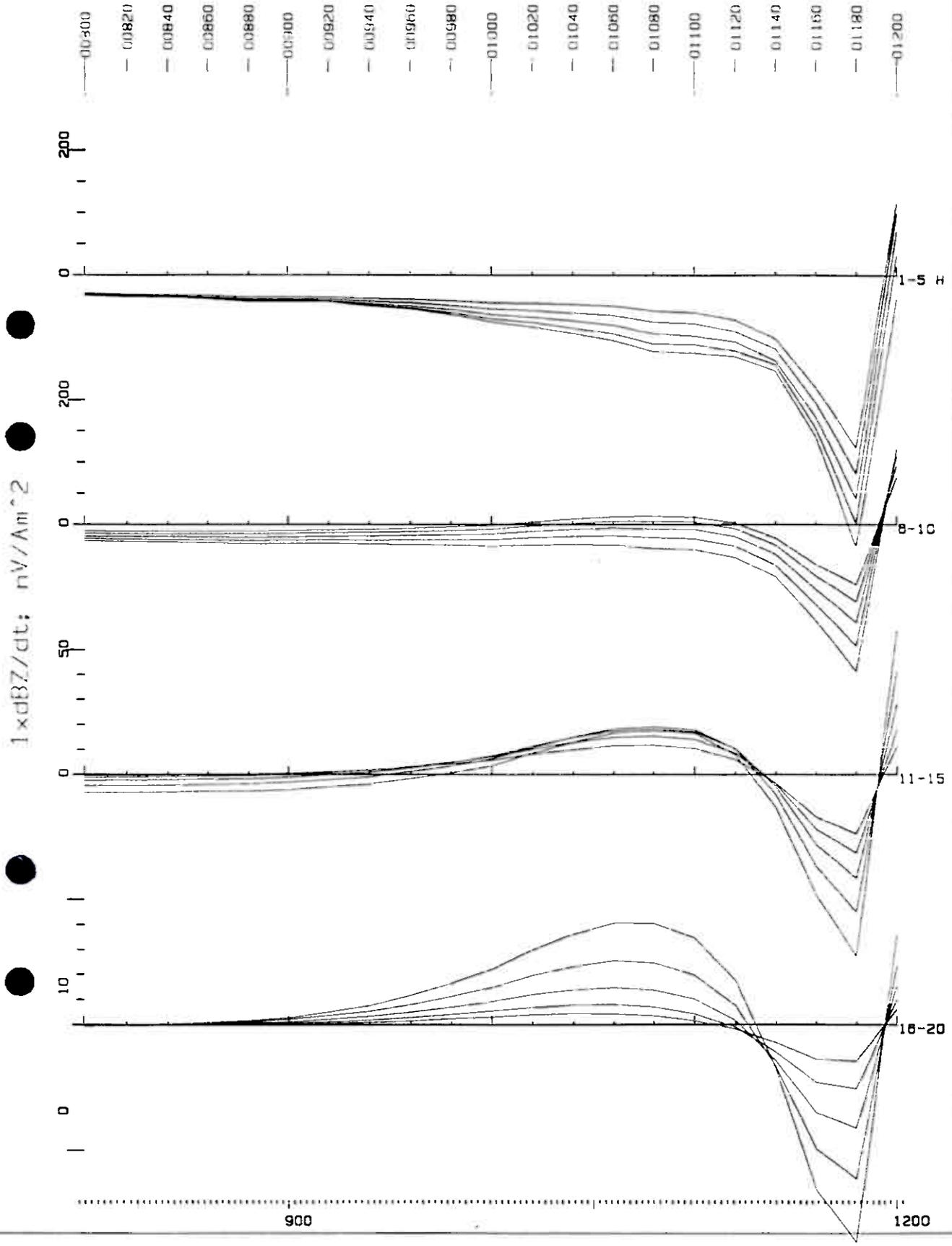
900

1200

LINE 2200

LOOP III

Z Component



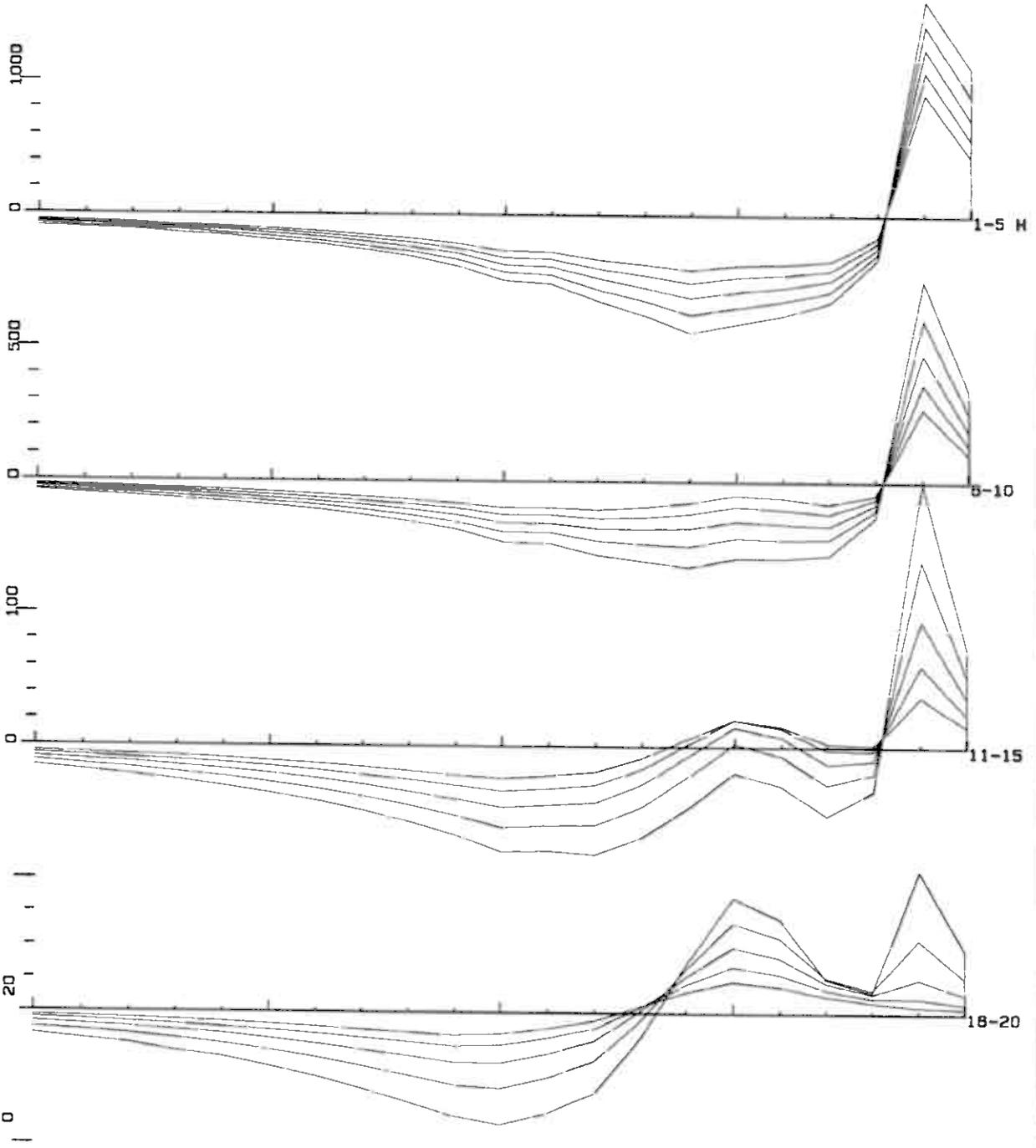


BALLANGEN PROTEM data; file 220397  
LINE 2300 LOOP II

X Component

00900 00820 00840 00860 00880 00900 00920 00940 00960 00980 01000 01020 01040 01060 01080 01100 01120 01140 01160 01180 01200

$1 \times dBX/dt; nV/\Lambda m^2$



900

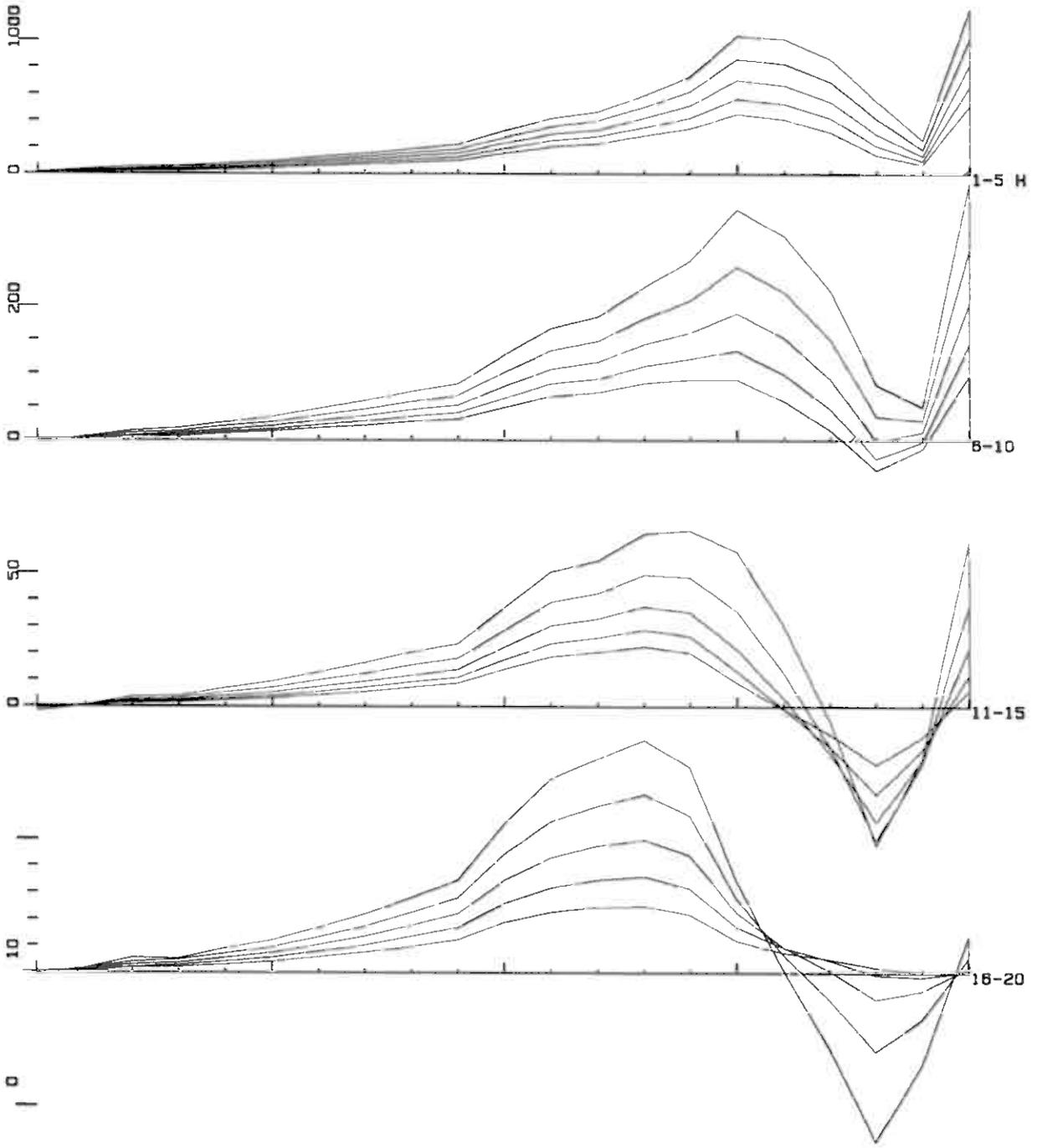
1200

BALLANGEN PROTEM data: file 220397  
LINE 2300 LOOP II

Y Component

00800 00820 00840 00860 00880 00900 00920 00940 00960 00980 01000 01020 01040 01060 01080 01100 01120 01140 01160 01180 01200

$1 \times dBY/dt; nV/Am^2$

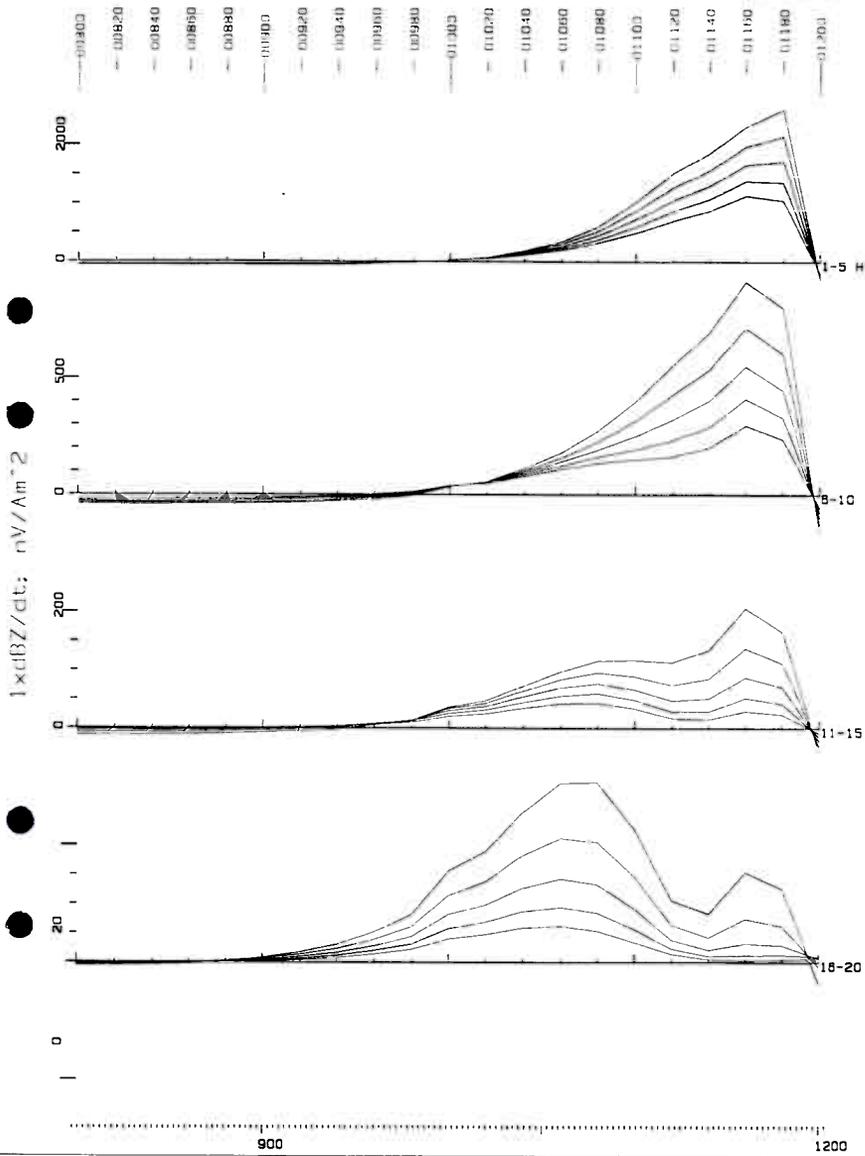


900

1200

LINE 2300 LOOPPI II

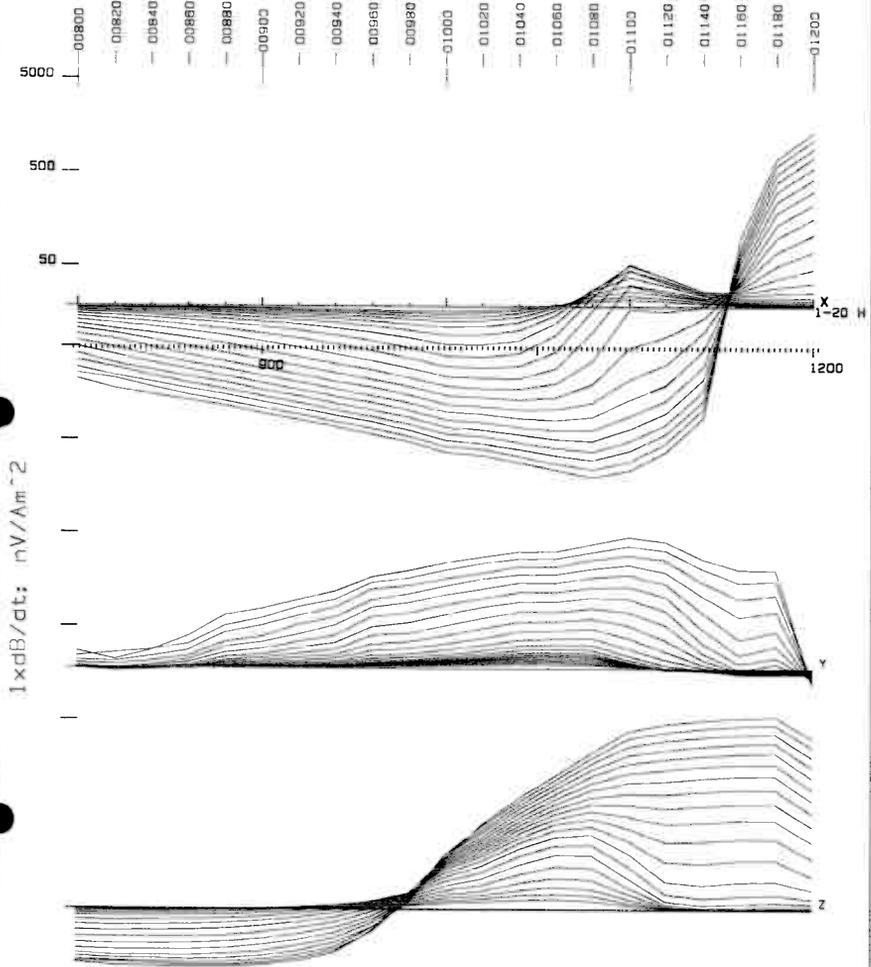
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BALLANGEN PROTEM data: file 220397

LINE 2350 LOOP II

3 Component

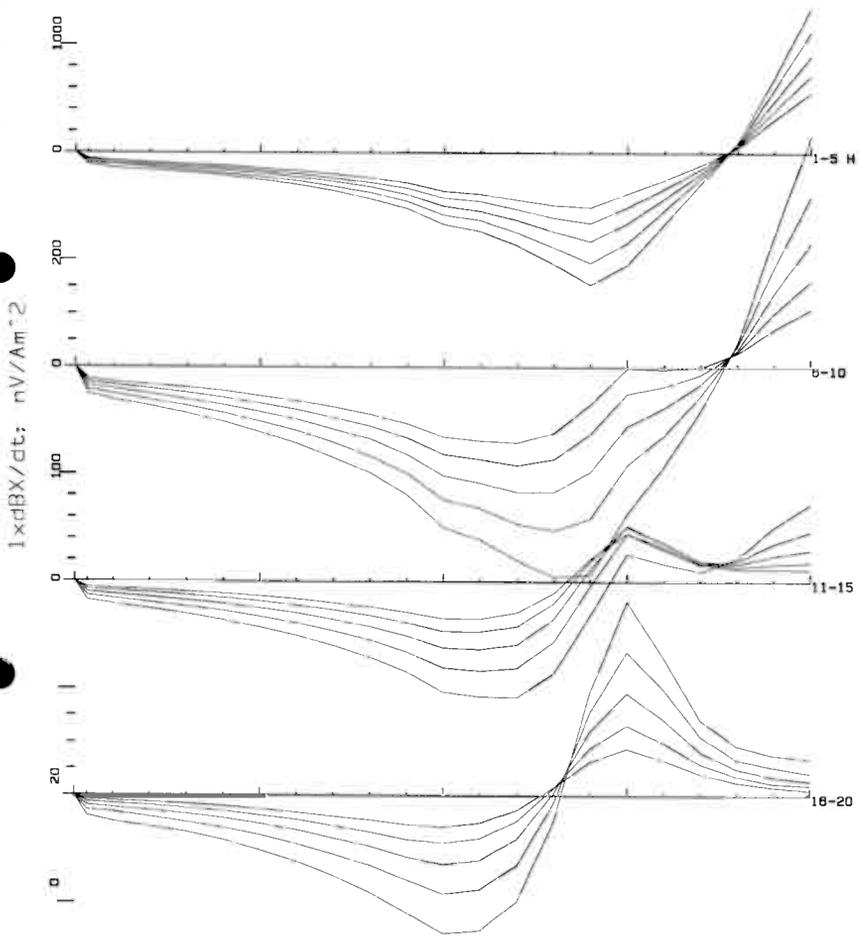


BALLANGEN PROTEM data: file 220397

LINE 2350 LOOP II

X Component

00800  
00820  
00840  
00860  
00880  
00900  
00920  
00840  
00860  
00880  
01000  
01020  
01040  
01060  
01080  
01100  
01120  
01140  
01160  
01180  
01200



900

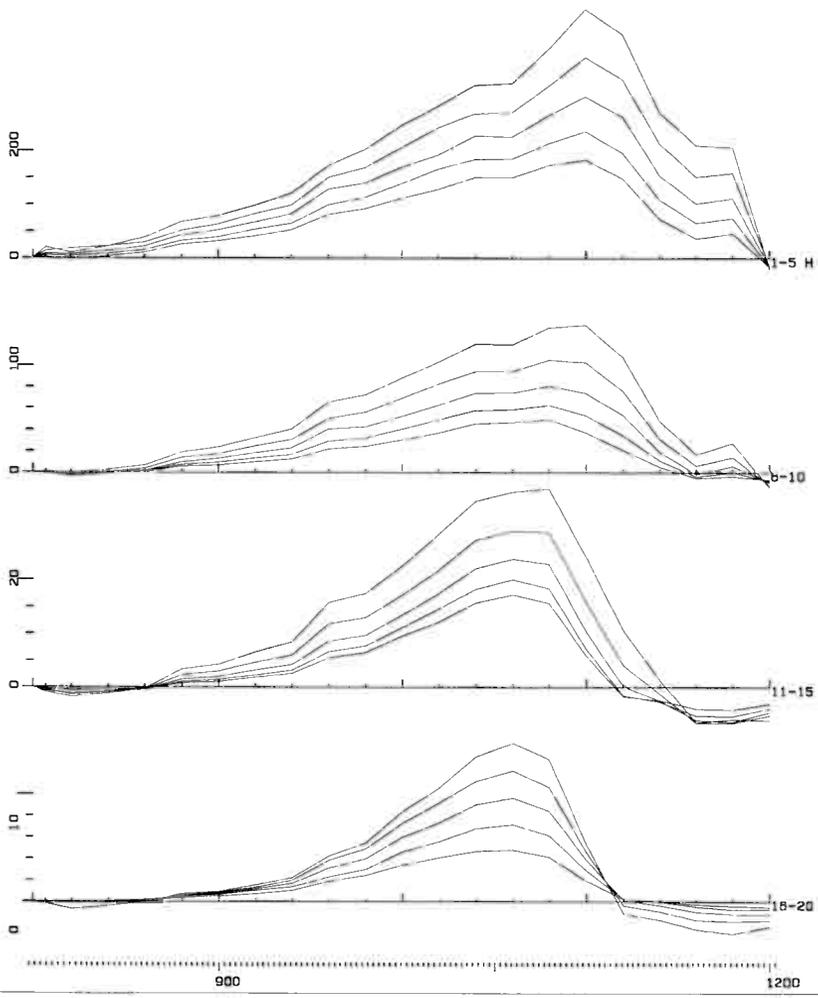
1200

BALLANGEN PROTEM data; file 220397  
LINE 2350 LOOP II

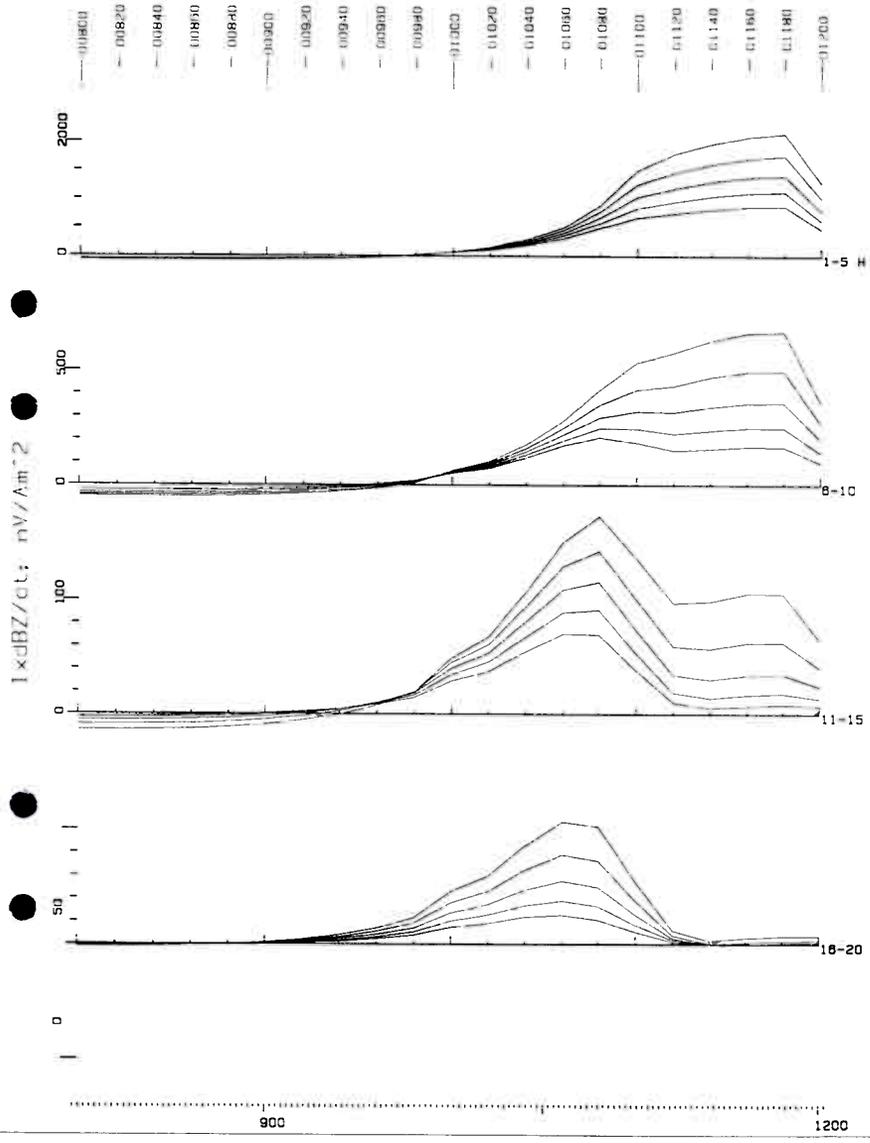
Y Component

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00800  
00820  
00840  
00860  
00880  
00900  
00920  
00940  
00960  
00980  
01000  
01020  
01040  
01060  
01080  
01100  
01120  
01140  
01160  
01180  
01200

1xdBY/dt; nV/Am<sup>2</sup>

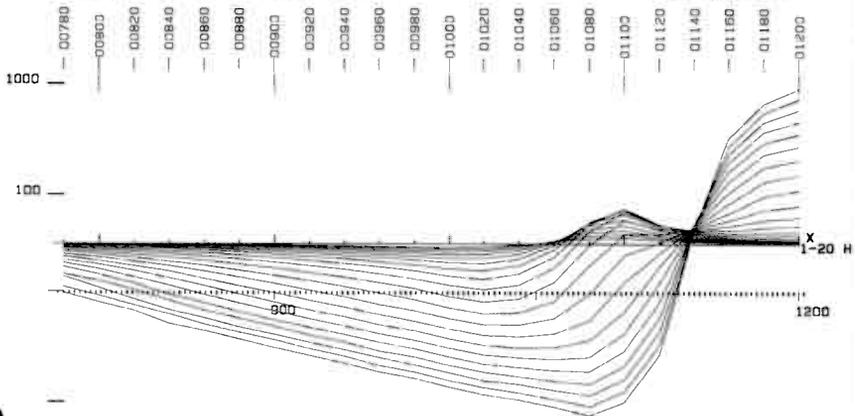


PROTEM data: file 220397  
LINE 2350 LOOPPI II Z Component

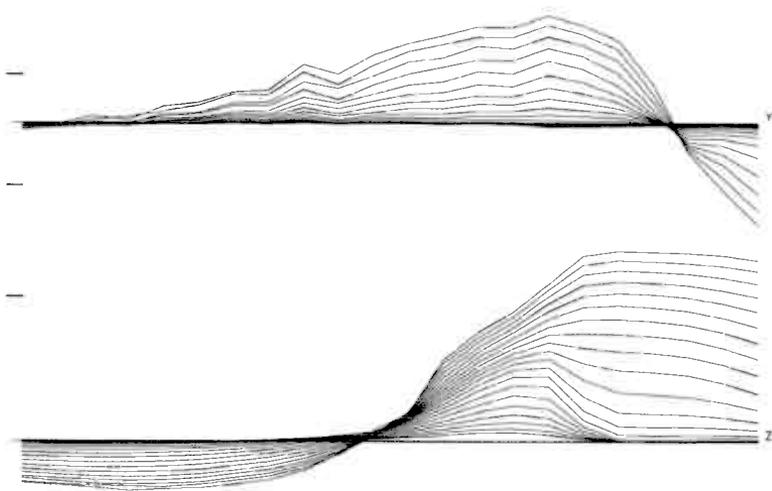


BALLANGEN PROTEM data: file 210397  
LINE 2400 LOOP II

A Component



$1 \times dB/dt: nV/Am^2$

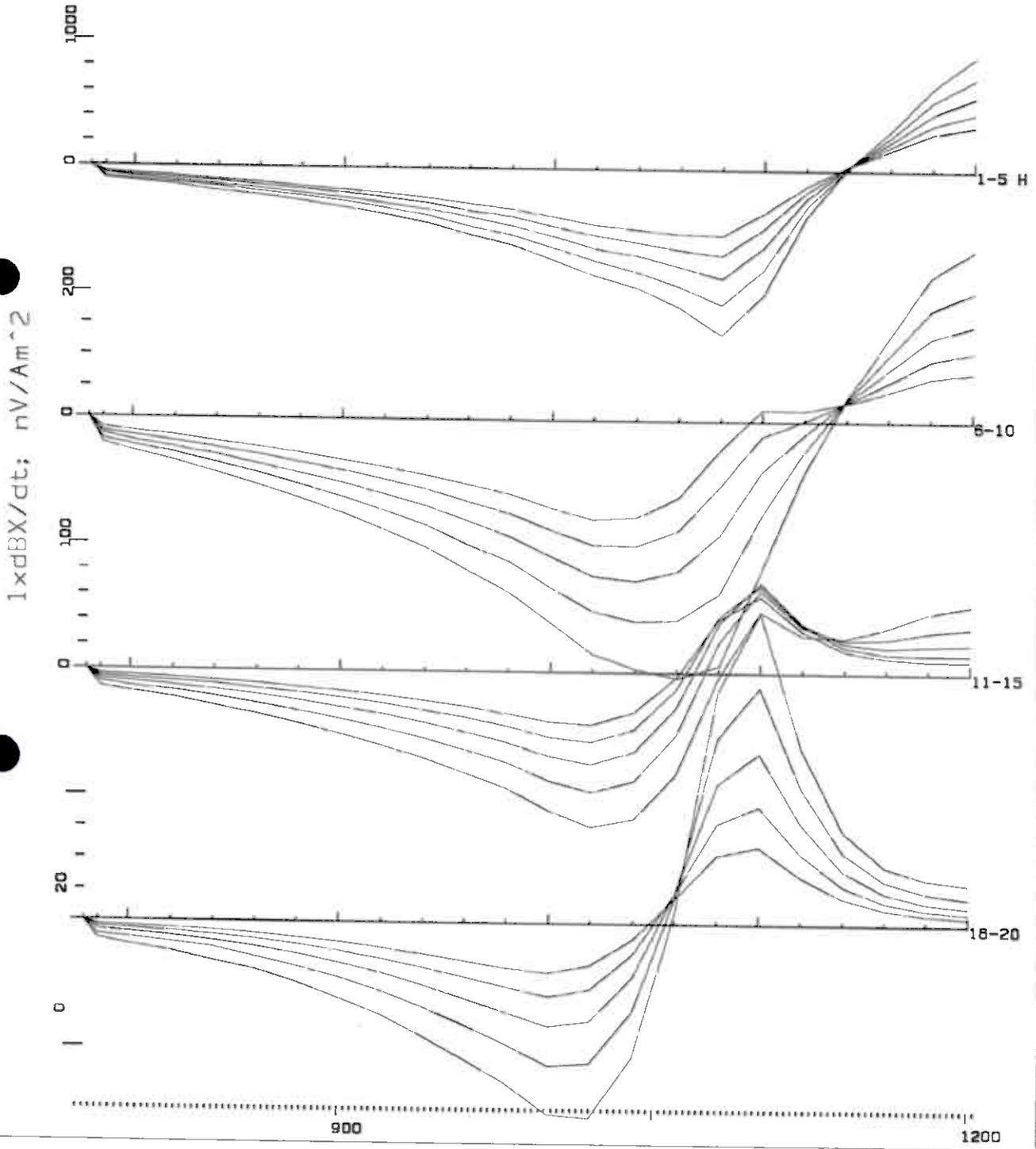


BALLANGEN PROTEM data: file 210397

LINE 2400 LOOP II

X Component

- 00780
- 00780
- 00800
- 00820
- 00840
- 00860
- 00880
- 00900
- 00920
- 00940
- 00960
- 00980
- 01000
- 01020
- 01040
- 01060
- 01080
- 01100
- 01120
- 01140
- 01160
- 01180
- 01200



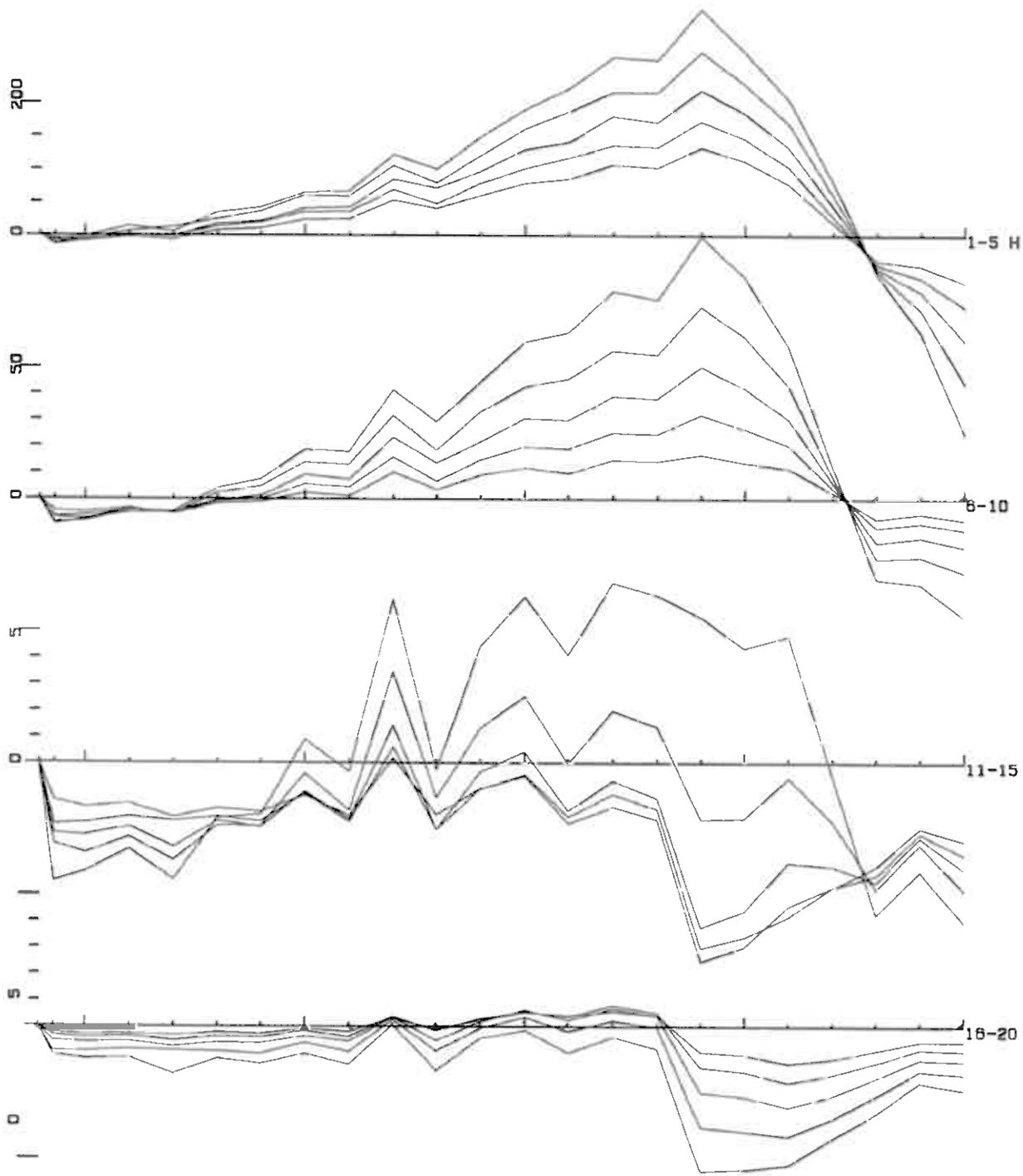
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LINE 2400 LOOP II

Y Component

00780  
00780  
00800  
00820  
00840  
00860  
00880  
00900  
00920  
00940  
00960  
00980  
01000  
01020  
01040  
01060  
01080  
01100  
01120  
01140  
01160  
01180  
01200

$1 \times dBY/dt: nV/\Lambda m^2$

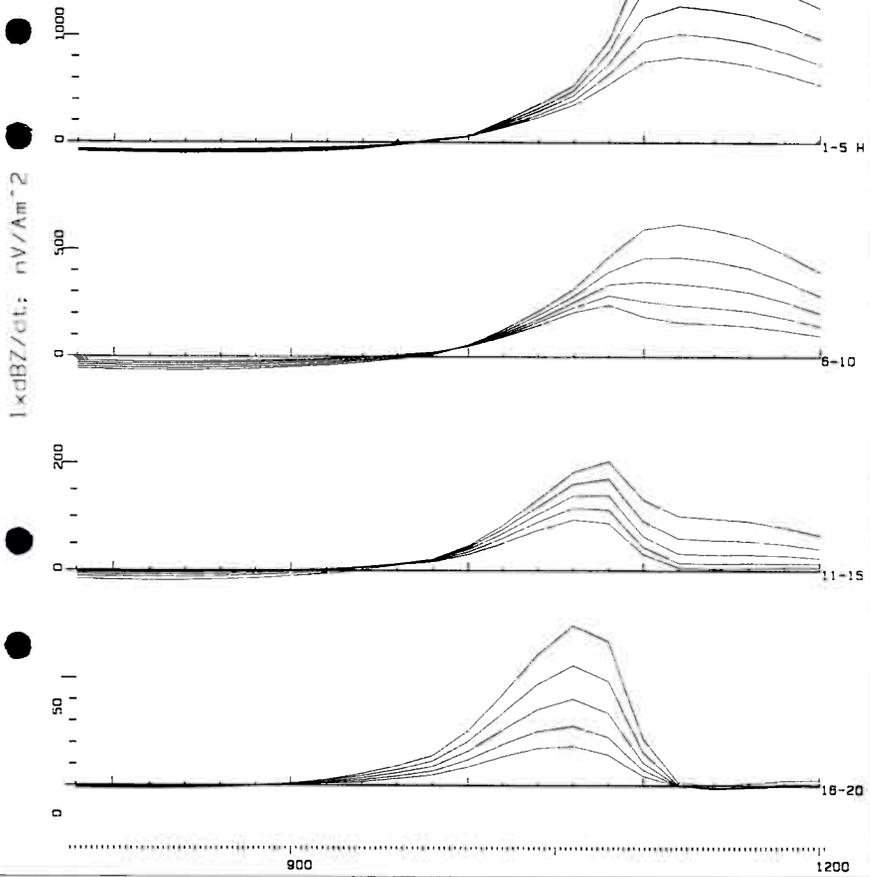


900

1200

LINE 2400 .PROTEM data: file 210397  
 LOOPPI II Z Component

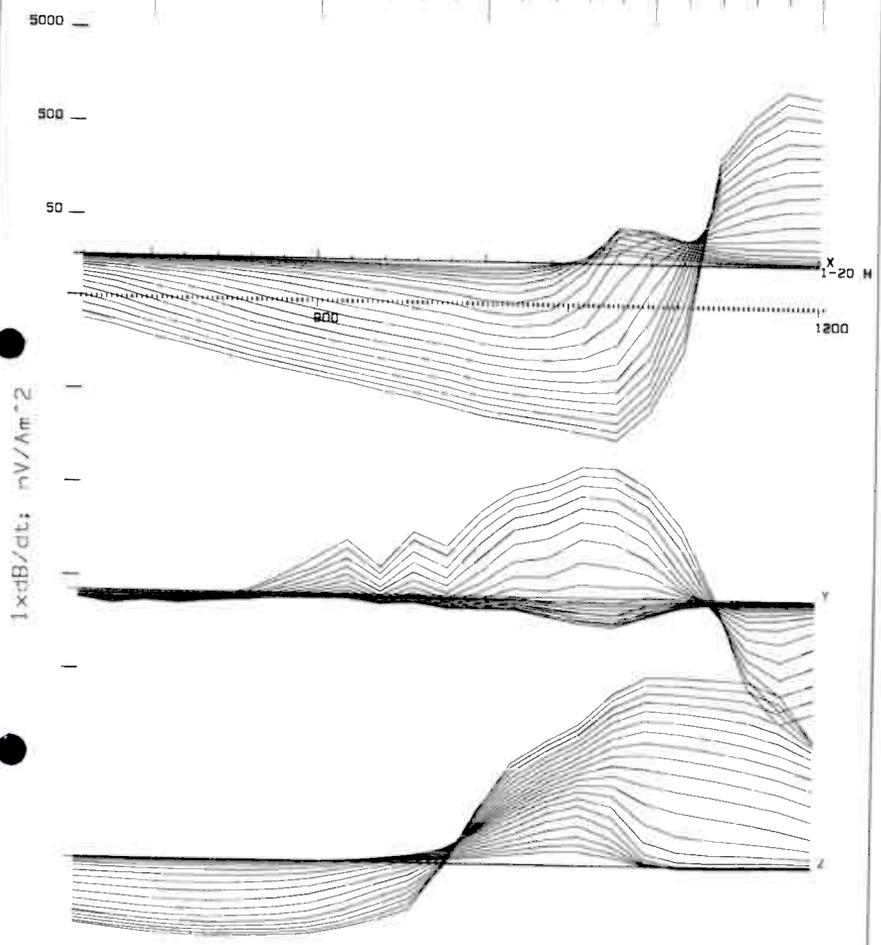
- 00780
- 00800
- 00820
- 00840
- 00860
- 00880
- 00900
- 00920
- 00940
- 00960
- 00980
- 01000
- 01020
- 01040
- 01060
- 01080
- 01100
- 01120
- 01140
- 01160
- 01180
- 01200



BALLANGEN PROTEM data: file 210397  
LINE 2450 LOOP II

3 Component

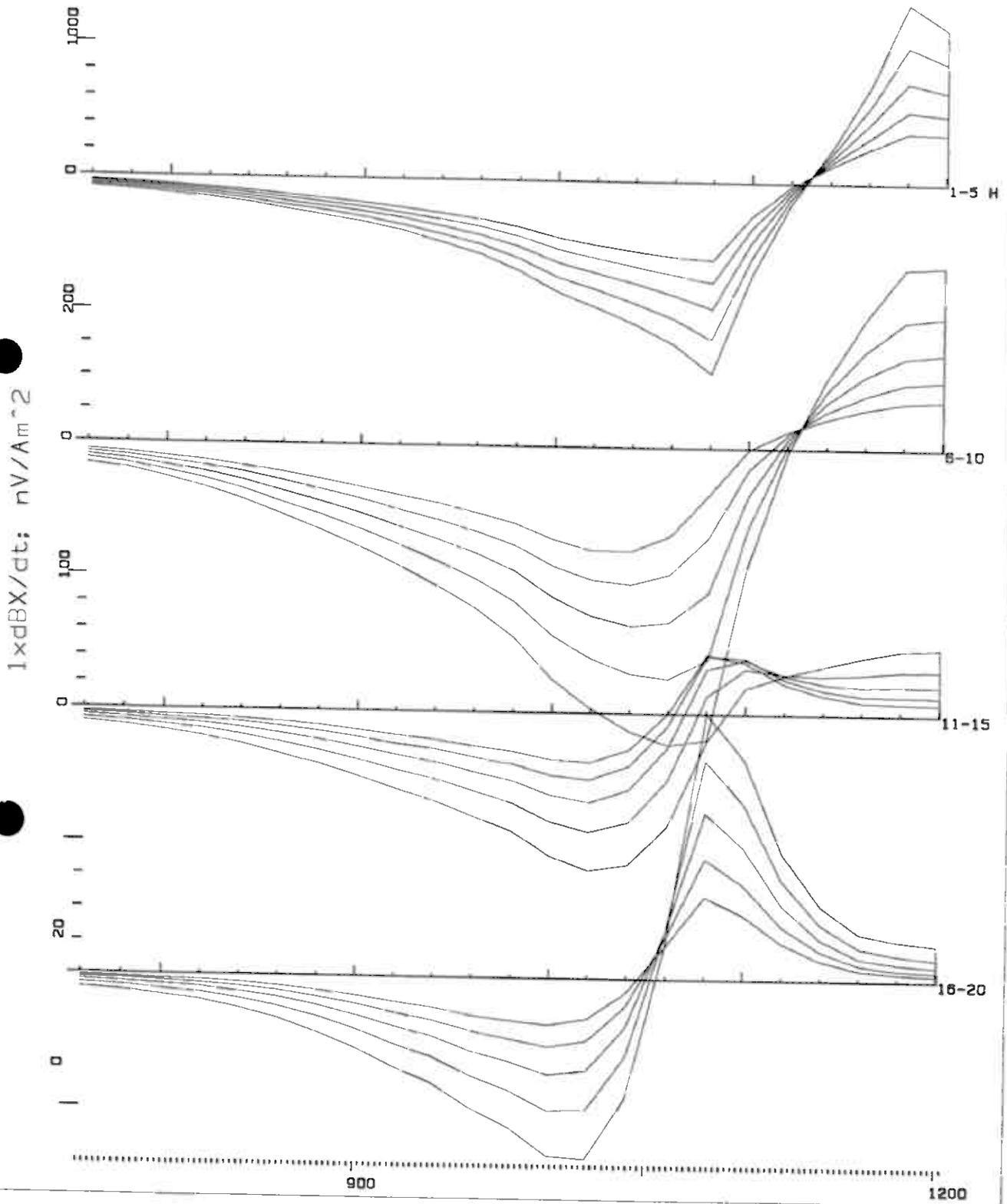
- 00726
- 00780
- 00800
- 00820
- 00840
- 00860
- 00880
- 00900
- 00920
- 00940
- 00960
- 00980
- 10000
- 01020
- 01040
- 01060
- 01080
- 01100
- 01120
- 01140
- 01160
- 01180
- 01200



BALLANGEN PROTEM data: file 210397  
LINE 2450 LOOP II

X Component

00760 00780 00800 00820 00840 00860 00880 00900 00920 00940 00960 00980 01000 01020 01040 01060 01080 01100 01120 01140 01160 01180 01200

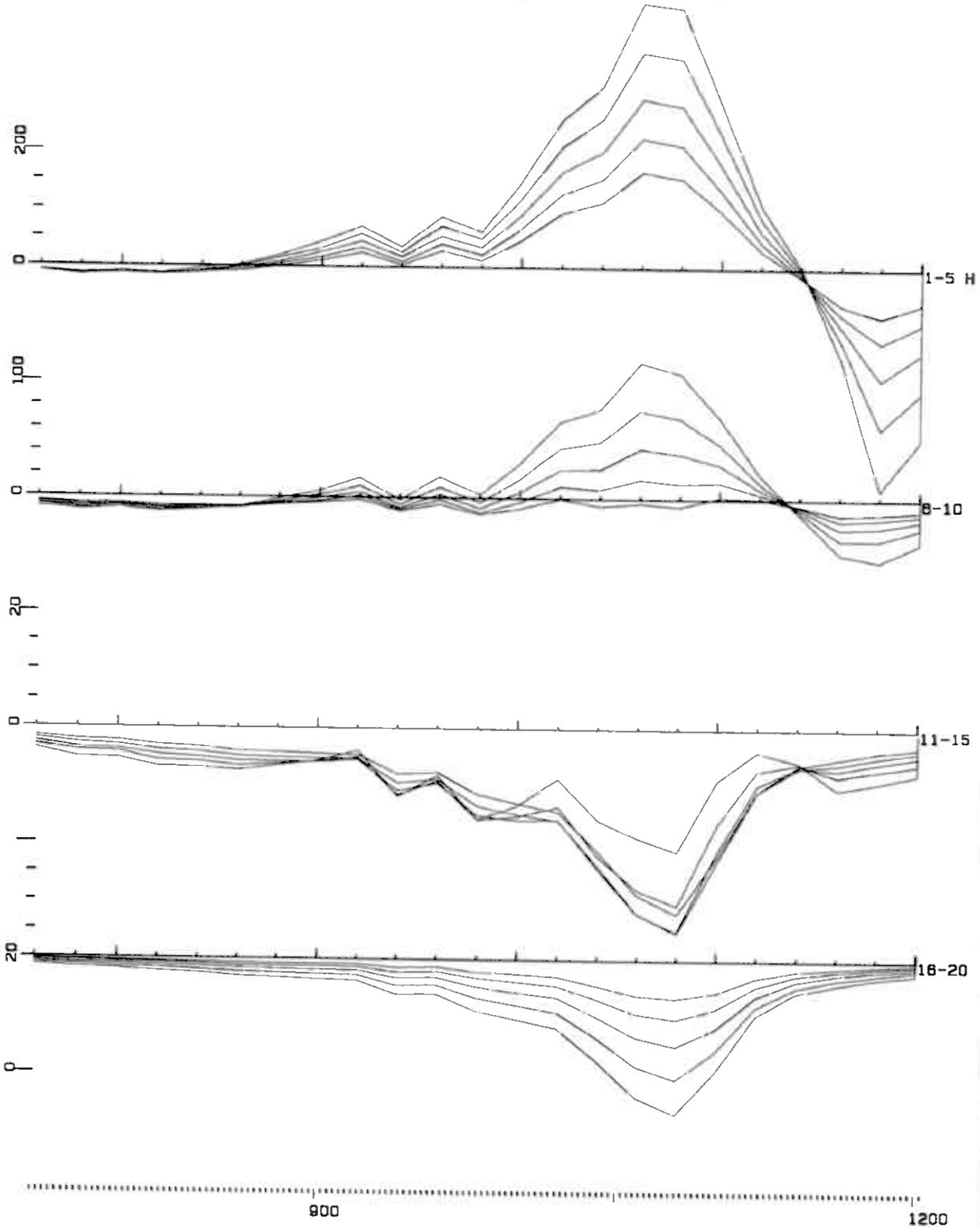


BALLANGEN PROTEM data: file 210397  
LINE 2450 LOOP II

Y Component

00760 00780 00800 00820 00840 00860 00880 00900 00920 00940 00960 00980 01000 01020 01040 01060 01080 01100 01120 01140 01160 01180 01200

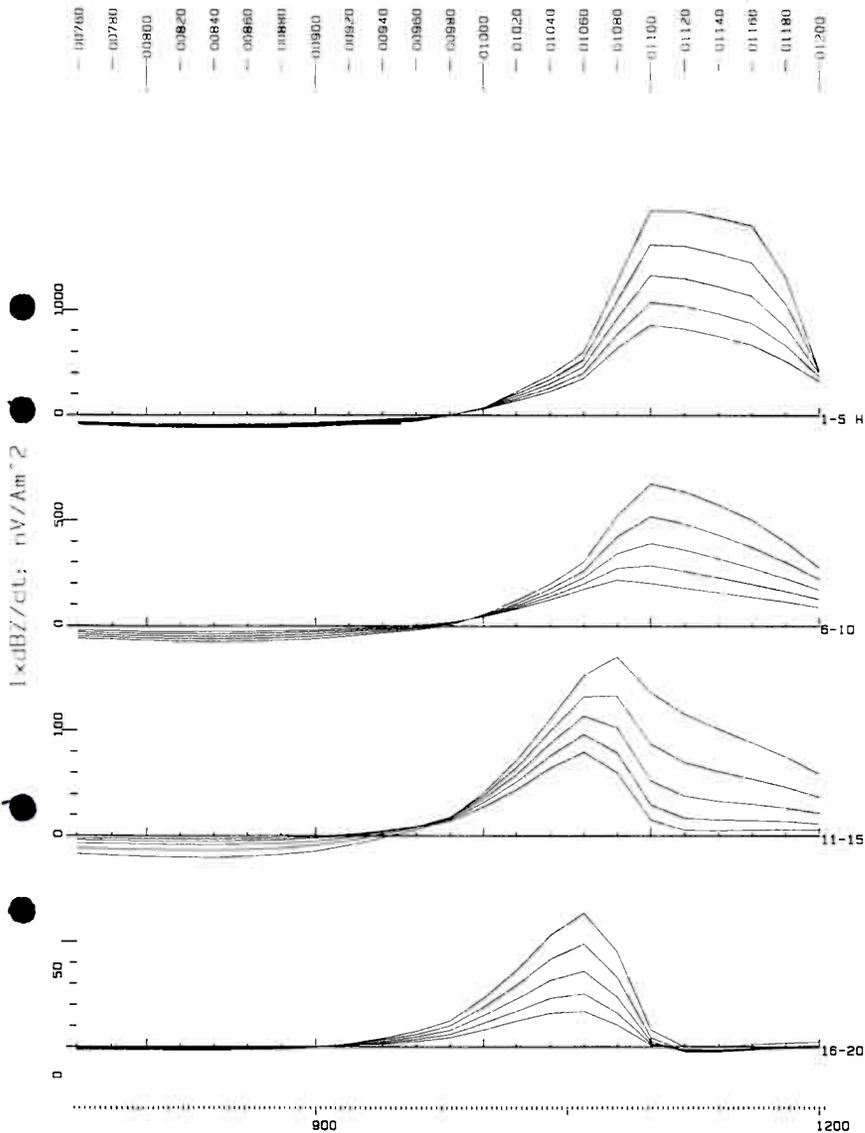
$1 \times dB/dt; nV/Am^2$



LINE 2450 .PROTEM data: file 210397

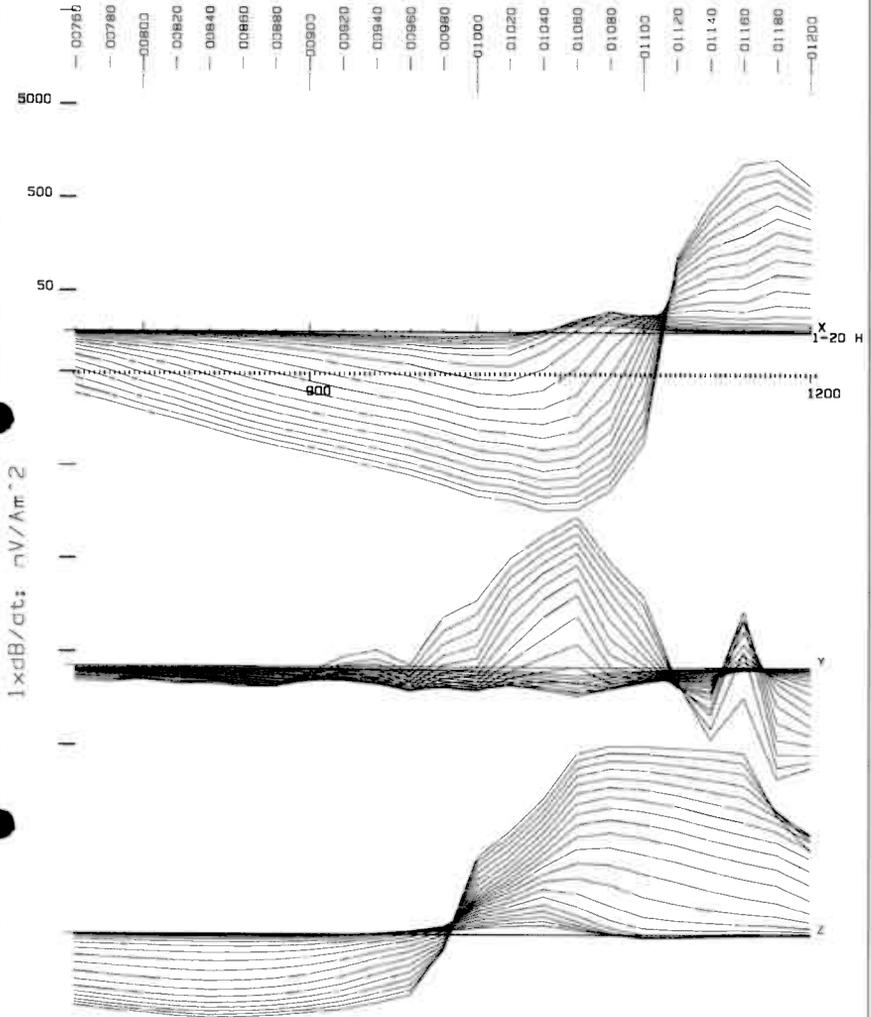
LOOPPI II

Z Component



BALLANGEN PROTEM data: file 210397  
LINE 2500 LOOP II

3 Component



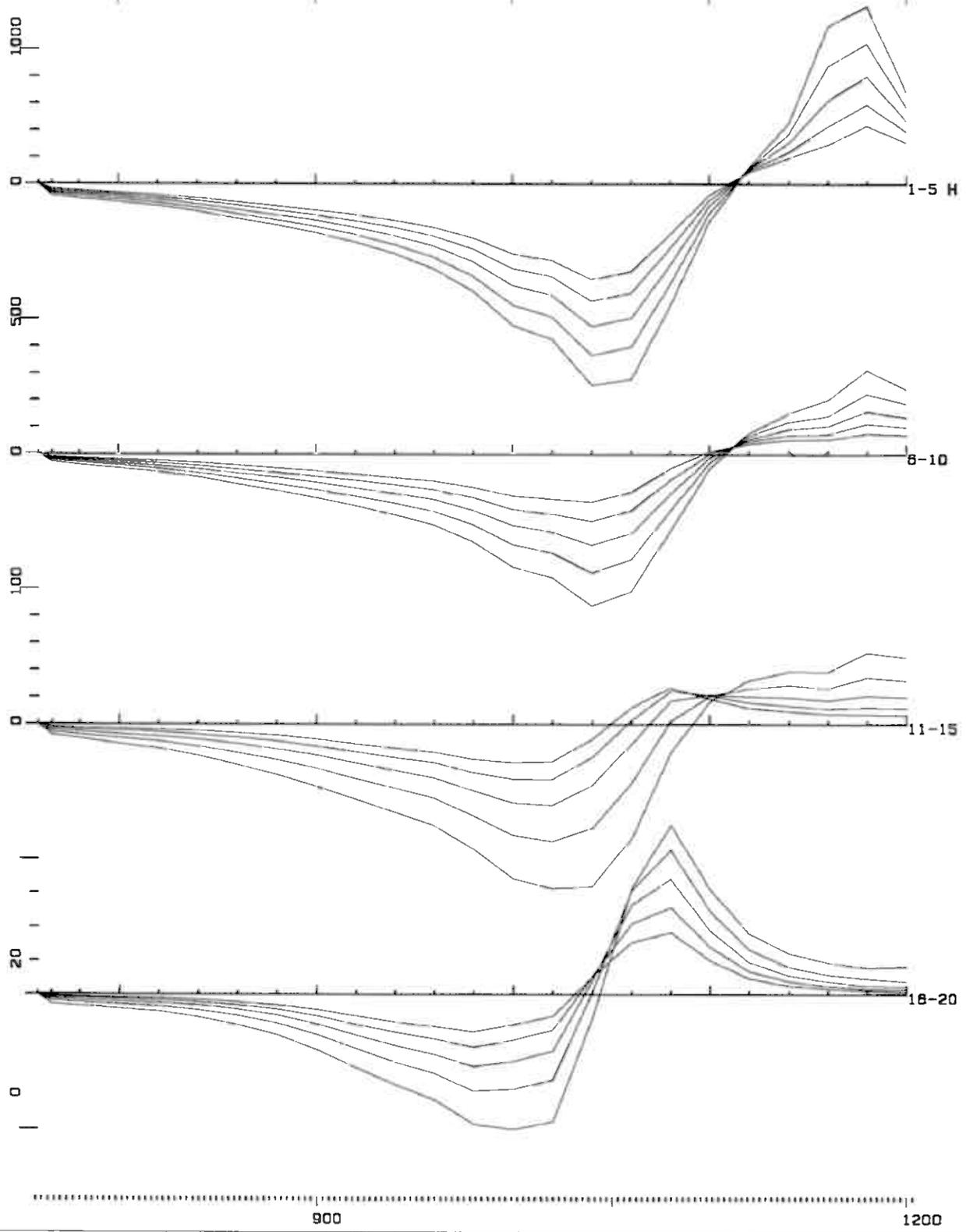
BALLANGEN PROTEM data: file 210397

LINE 2500 LOOP II

X Component

00760  
00760  
00780  
00800  
00820  
00840  
00860  
00880  
00900  
00920  
00940  
00960  
00980  
01000  
01020  
01040  
01060  
01080  
01100  
01120  
01140  
01160  
01180  
01200

$1 \times dBX/dt; nV/Am^2$

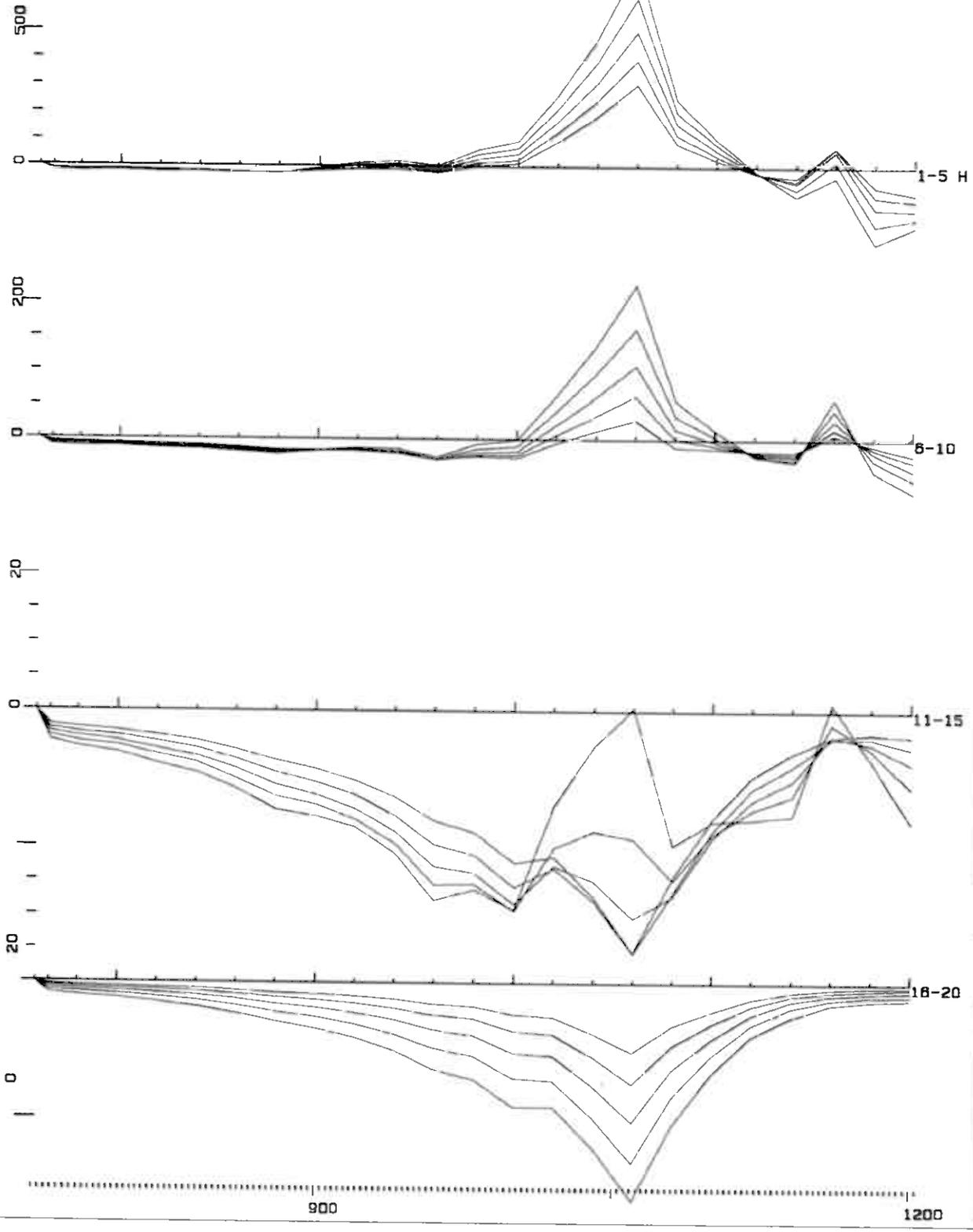


BALLANGEN PROTEM data: file 210397  
LINE 2500 LOOP II

Y Component

00760  
00760  
00780  
00800  
00820  
00840  
00860  
00880  
00900  
00920  
00940  
00960  
00980  
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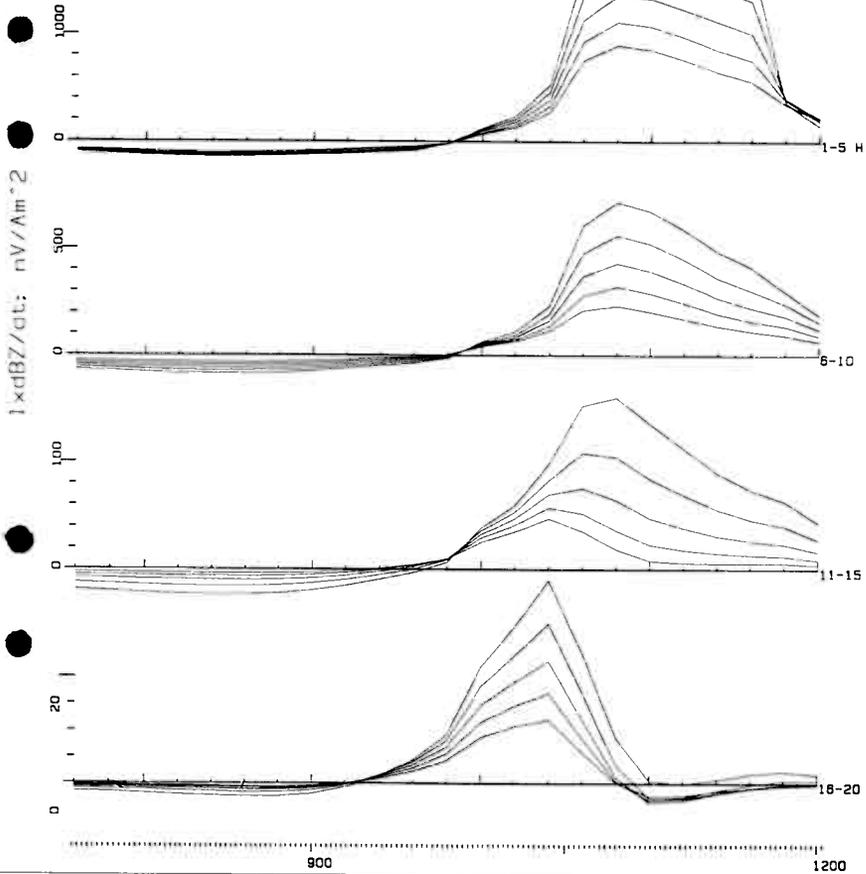
$1 \times dBY/dt: nV/Am^2$



LINE 2500 .PROTEM data; file 210397

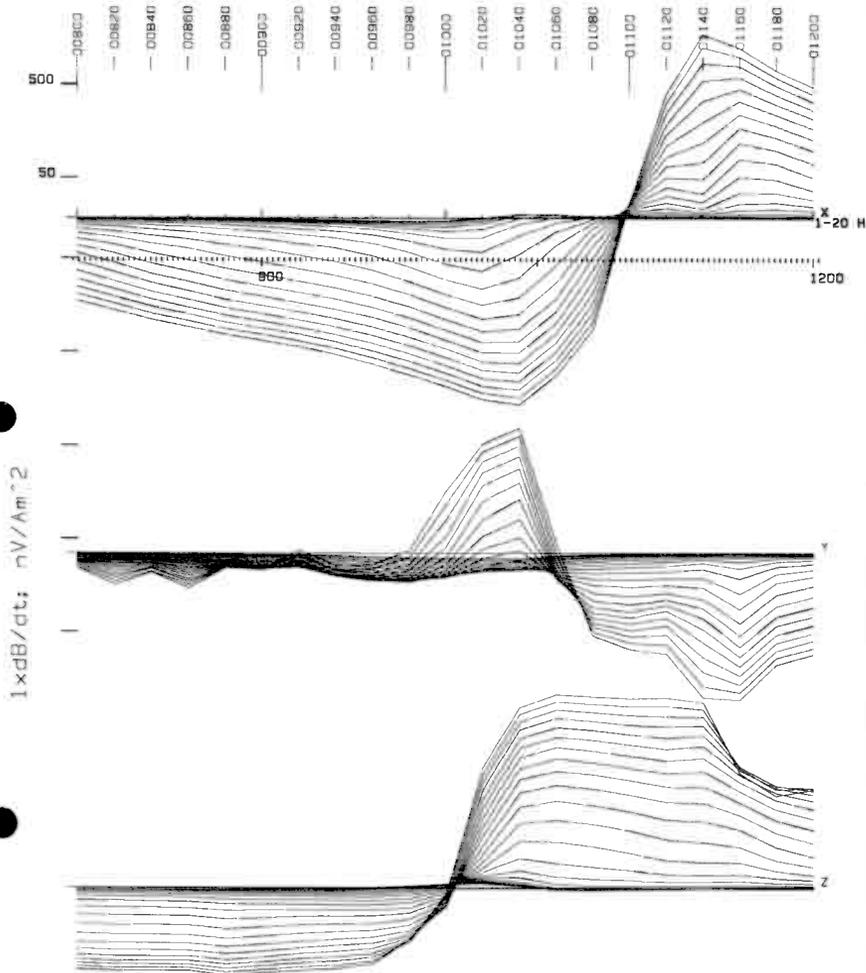
Z Component

- 00760
- 00780
- 00800
- 00820
- 00840
- 00860
- 00880
- 00900
- 00920
- 00940
- 00960
- 00980
- 01000
- 01020
- 01040
- 01060
- 01080
- 01100
- 01120
- 01140
- 01160
- 01180
- 01200



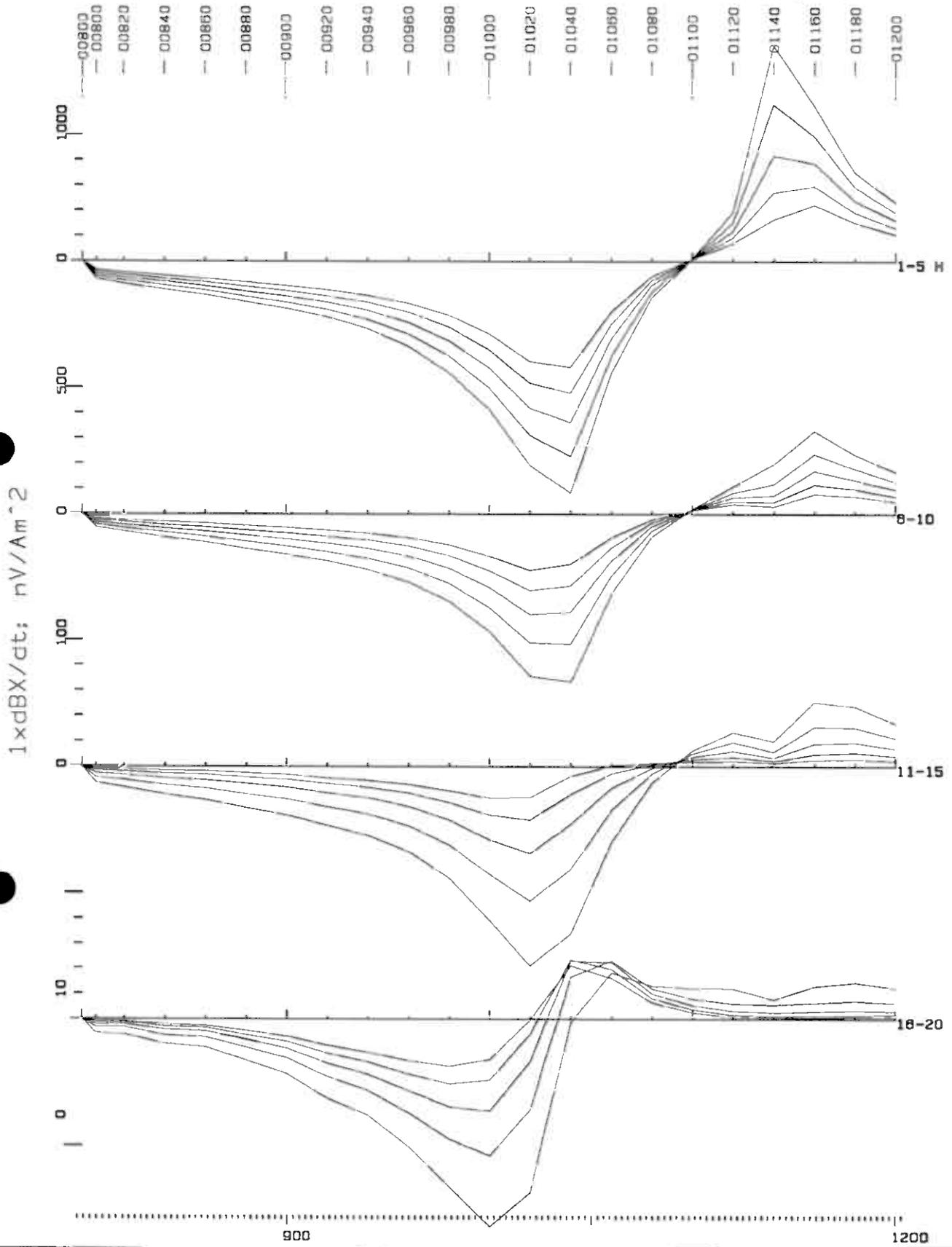
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LINE 2550 LOOP 11

3 Component



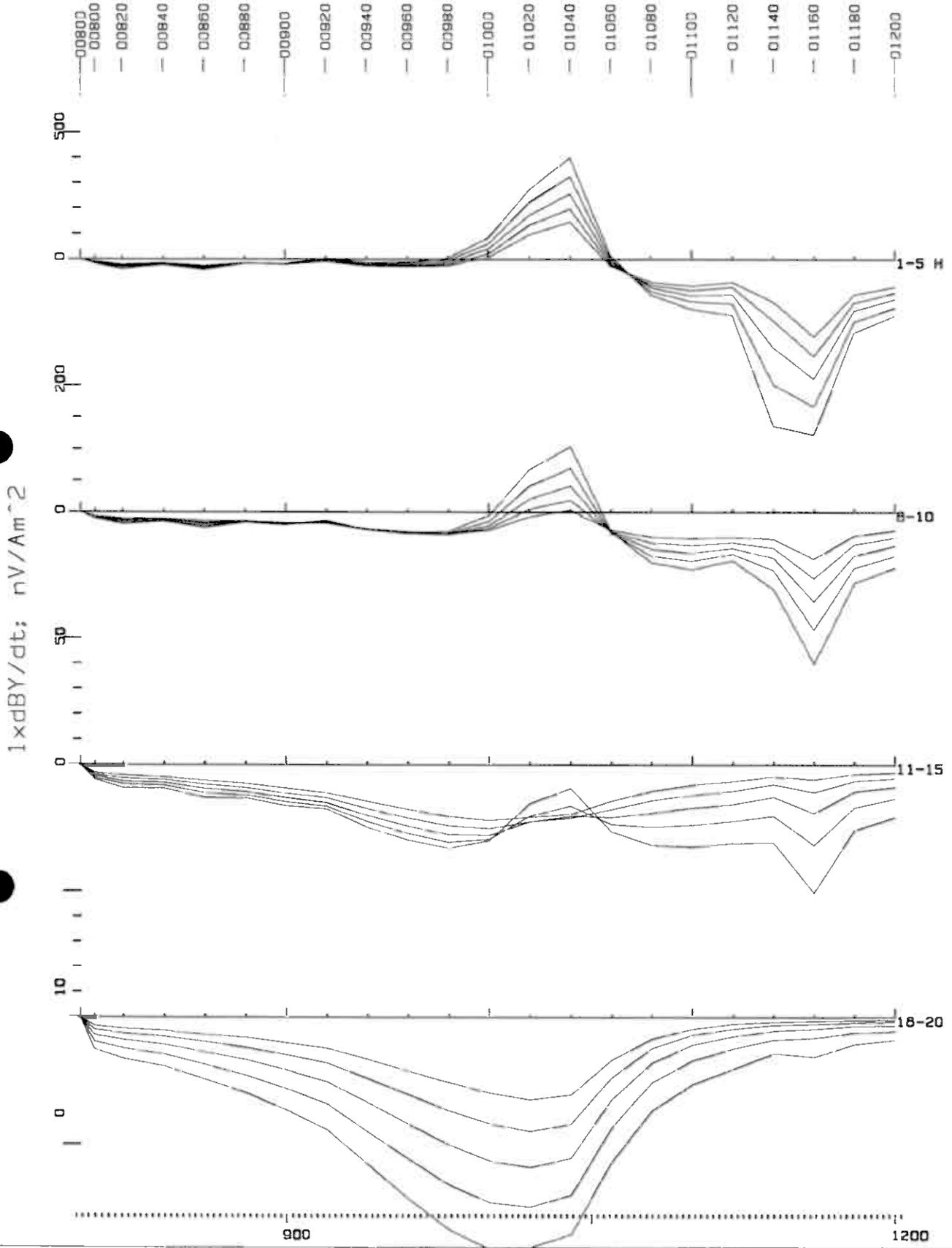
BALLANGEN PROTEM data; file 210397  
LINE 2550 LOOP II

X Component



BALLANGEN PROTEM data; file 210397  
LINE 2550 LOOP 11

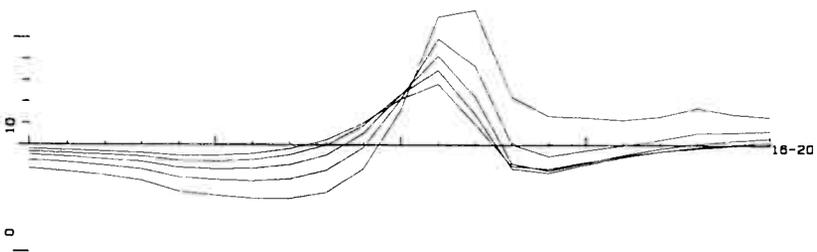
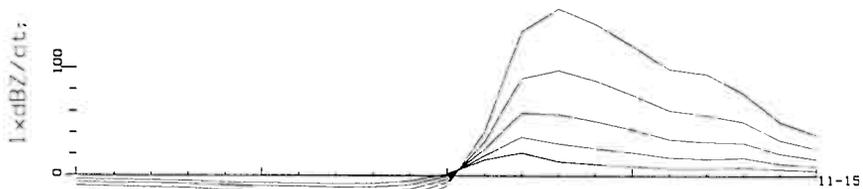
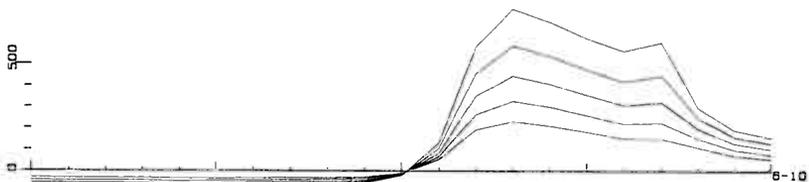
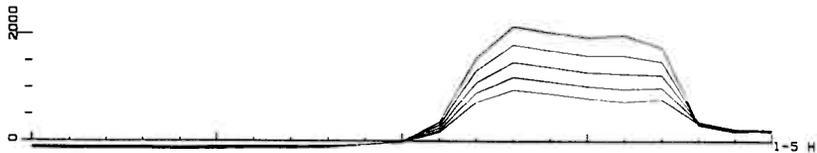
Y Component



LINE 2550 .PROTEM data: File 210397

Z Component

01000 01020 01040 01060 01080 01100 01120 01140 01160 01180 01200



900

1200

BALLANGEN PROTEM data; file 210397  
LINE 2600 LOOP II

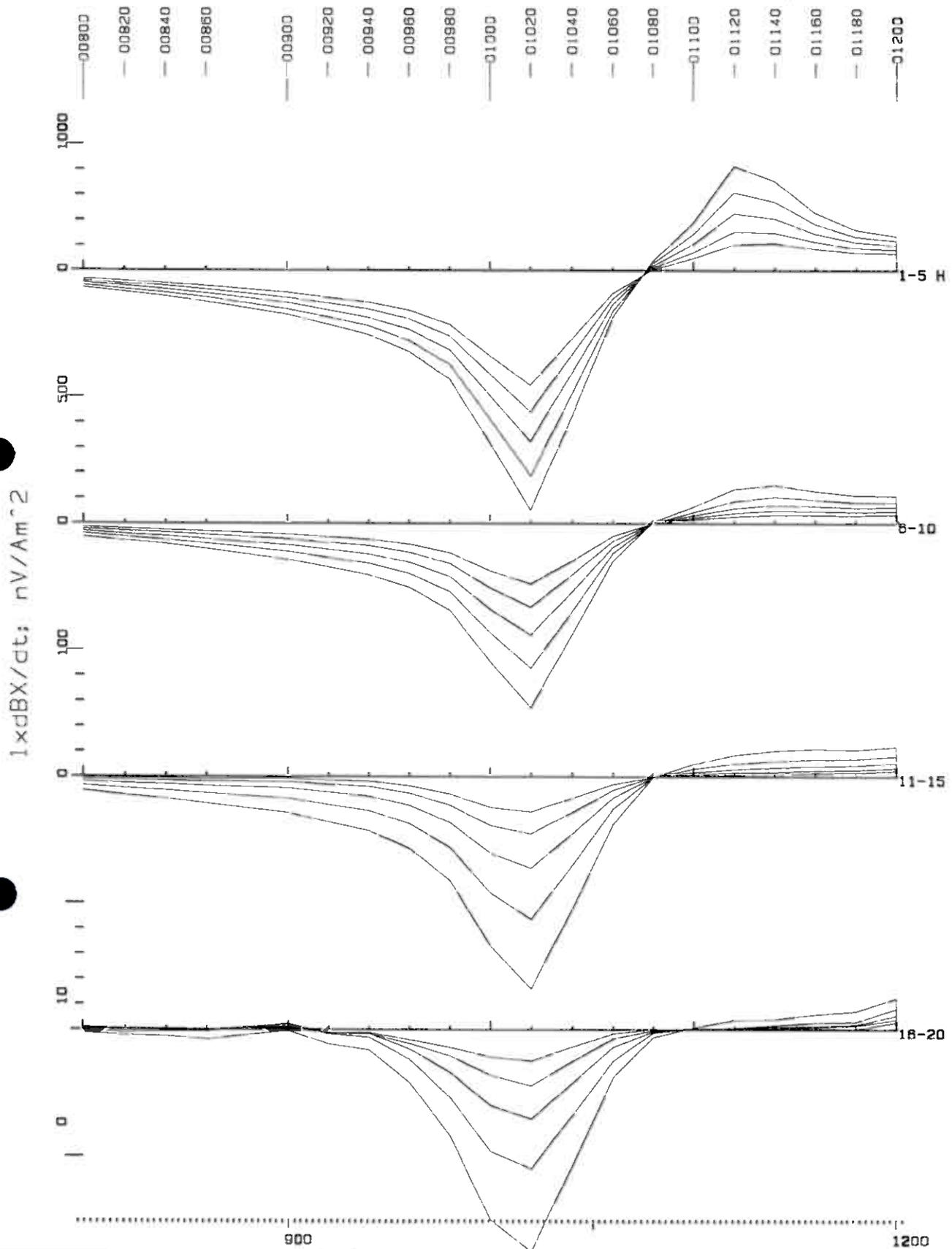
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- 0.0003
- 0.0020
- 0.0040
- 0.0080
- 0.0160
- 0.0320
- 0.0640
- 0.1280
- 0.2560
- 0.5120
- 1.0240
- 2.0480
- 4.0960
- 8.1920
- 16.3840
- 32.7680
- 65.5360
- 131.0720
- 262.1440
- 524.2880
- 1048.5760
- 2097.1520
- 4194.3040
- 8388.6080
- 16777.2160
- 33554.4320
- 67108.8640
- 134217.7280
- 268435.4560
- 536870.9120
- 1073741.8240
- 2147483.6480
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- 8589934.5920
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BALLANGEN PROTEM data; file 210397

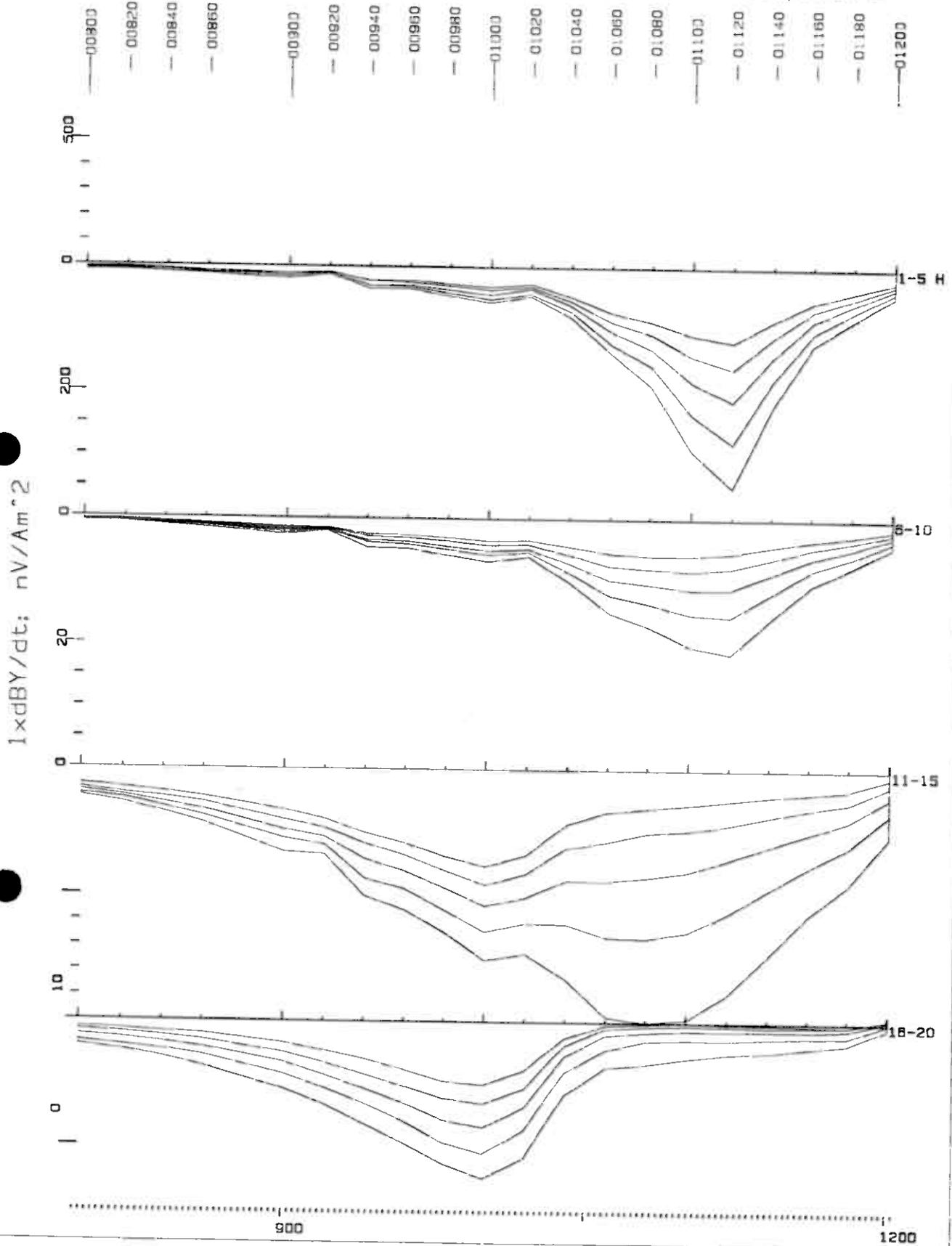
LINE 2600 LOOP I!

X Component

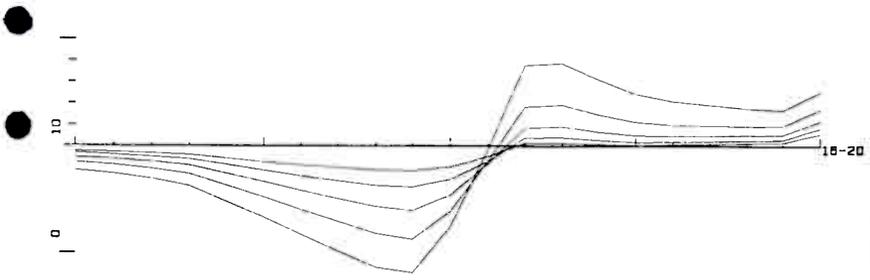
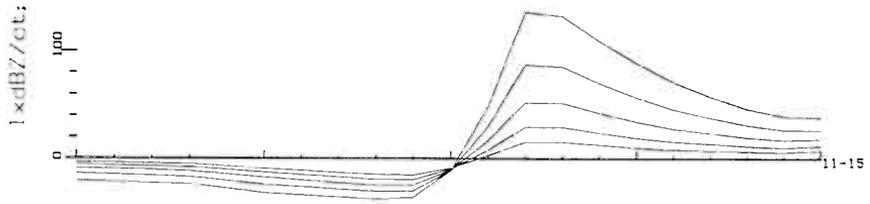
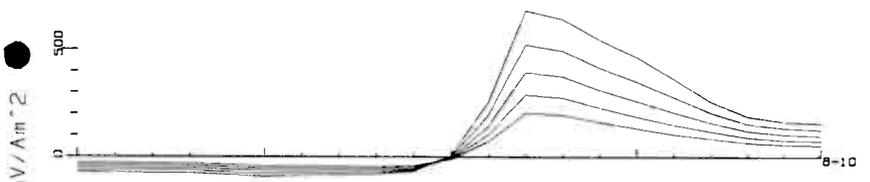
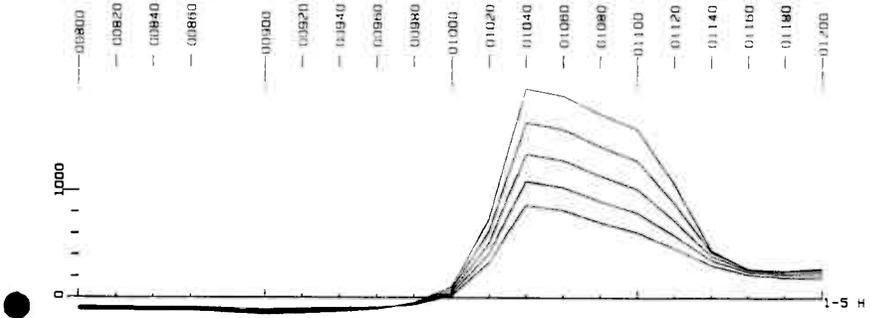


BALLANGEN PROTEM data; file 210397  
LINE 2600 LOOP II

Y Component



LINE 2600 .PROTEM data: file 210397  
LOOPPI II Z Component

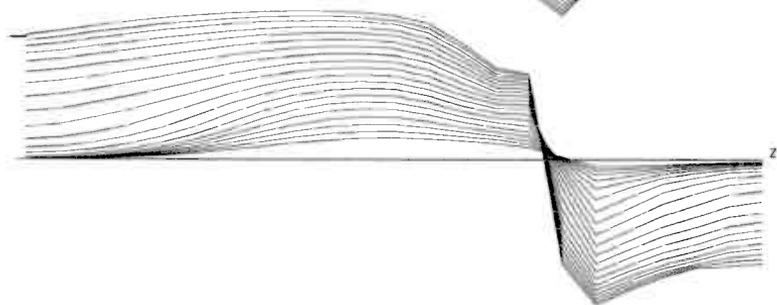
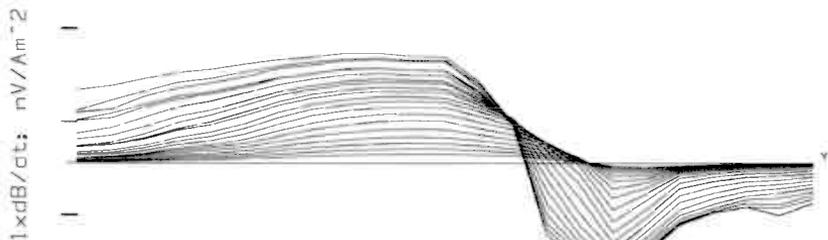
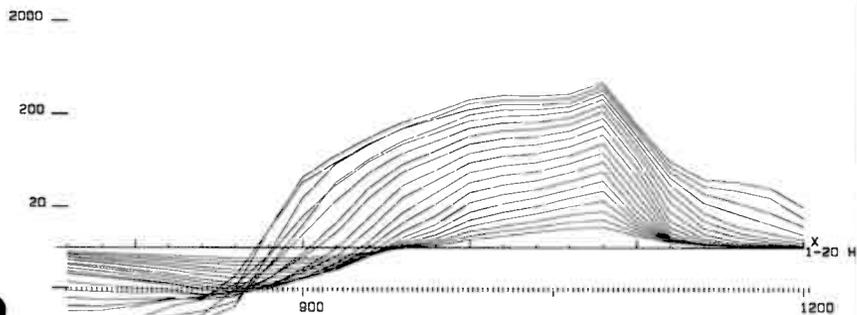


BALLANGEN PROTEM data: file 230397

LINE 2450 LOOP III

3 Component

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-0.780  
-0.800  
-0.820  
-0.840  
-0.860  
-0.880  
-0.900  
-0.920  
-0.940  
-0.960  
-0.980  
-1.000  
-1.020  
-1.040  
-1.060  
-1.080  
-1.100  
-1.120  
-1.140  
-1.160  
-1.180  
-1.200



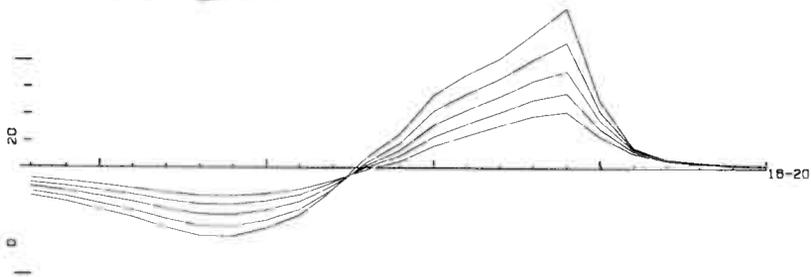
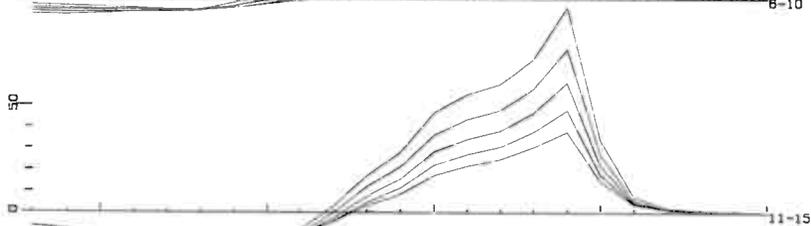
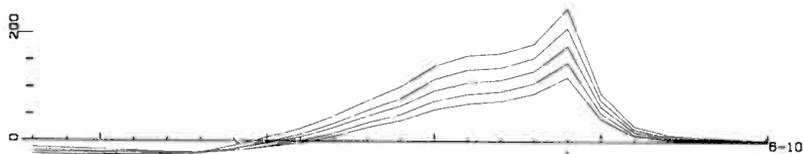
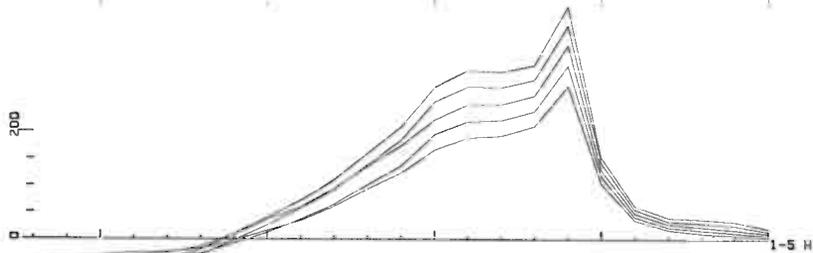
BALLANGEN PROTEM data; file 230397

LINE 2450 LOOP III

X Component

00760  
00780  
00800  
00820  
00840  
00860  
00880  
00900  
00920  
00940  
00960  
00980  
01000  
01020  
01040  
01060  
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01100  
01120  
01140  
01160  
01180  
01200

$1 \times dBX/dt; nV/Am^2$

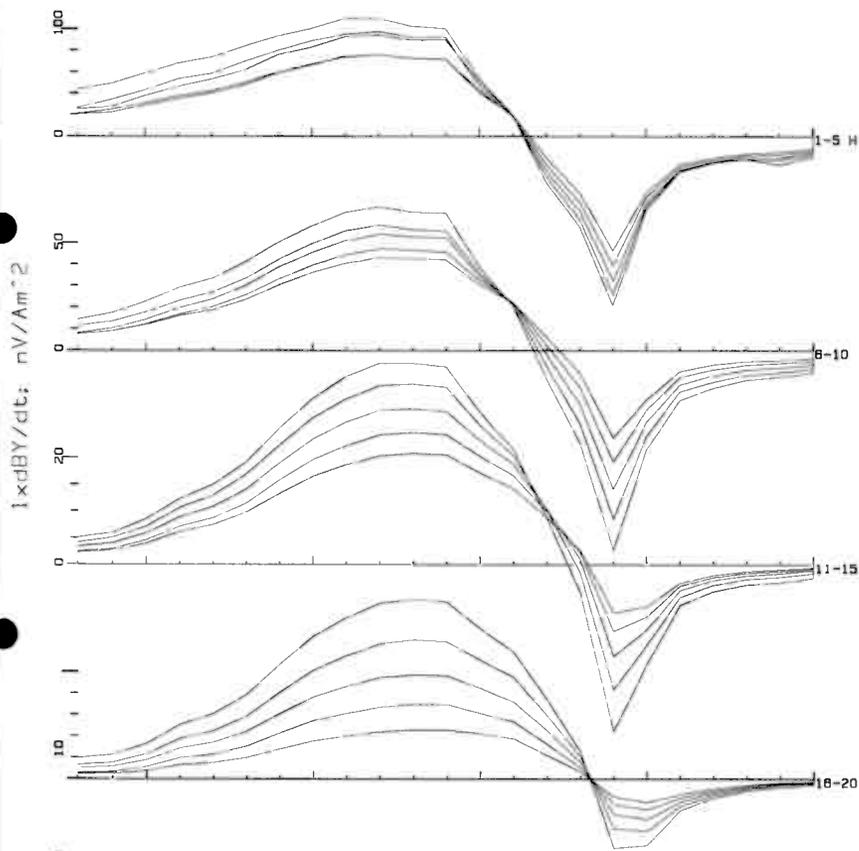


BALLANGEN PROTEM data: file 230397

LINE 2450 LOOP III

Y Component

00760  
00780  
00800  
00820  
00840  
00860  
00880  
00900  
00920  
00940  
00960  
00980  
01000  
01020  
01040  
01060  
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01100  
01120  
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01200

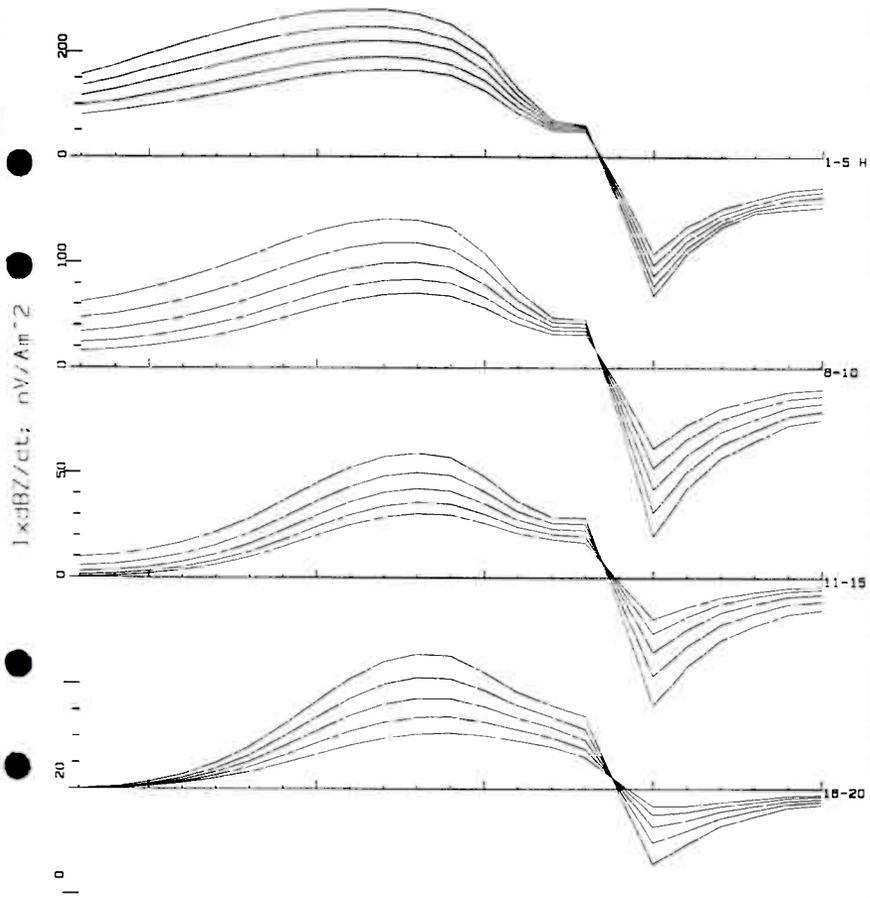


900

1200

LINE 2450 .PROTEM data; file 230397L  
 LOOPPI III Z Component

00760  
 00780  
 00800  
 00820  
 00840  
 00860  
 00880  
 00900  
 00920  
 00940  
 00960  
 00980  
 01000  
 01020  
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 01060  
 01080  
 01100  
 01120  
 01140  
 01160  
 01180  
 01200



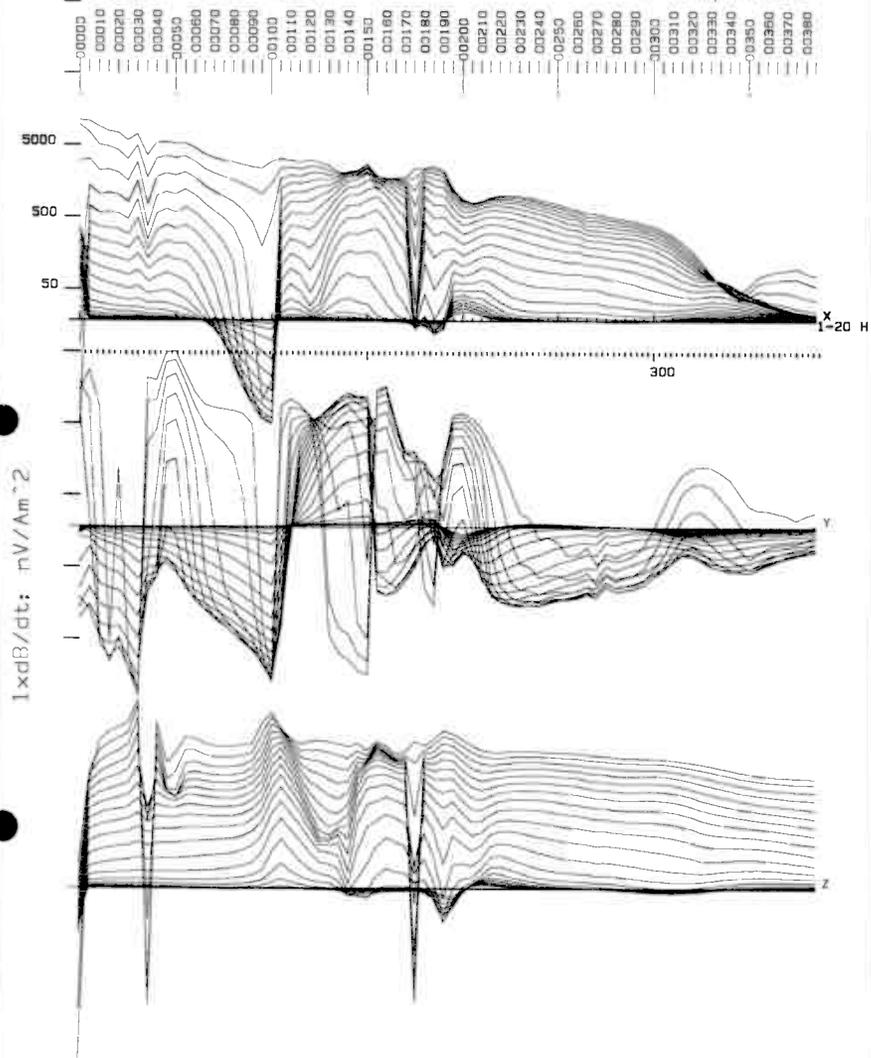
900

1200

BALLANGEN PROTEM data; file 200397

HOLE 11 LOOP 1

3 Component

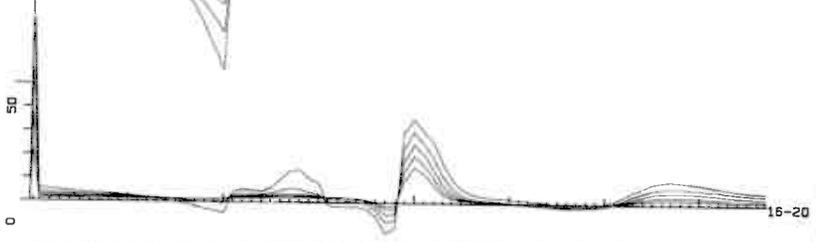
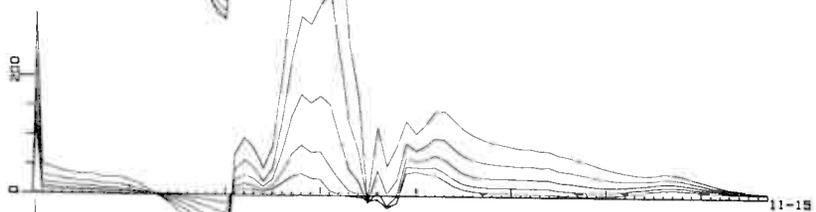
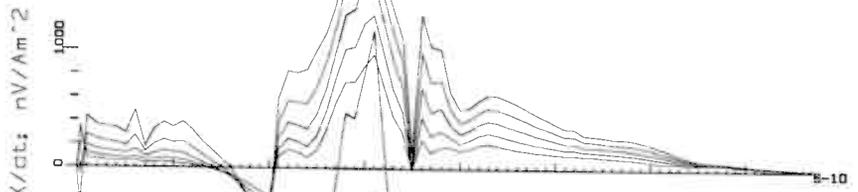
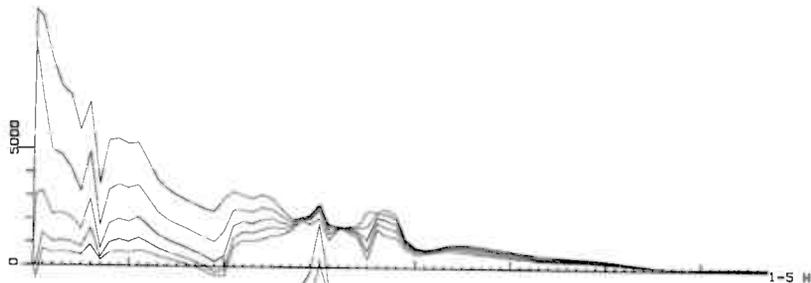


BALLANGEN PROTEM data; File 200397

HOLE 11 LOOP 1

X Component

00000 00010 00020 00030 00040 00050 00060 00070 00080 00090 00100 00110 00120 00130 00140 00150 00160 00170 00180 00190 00200 00210 00220 00230 00240 00250 00260 00270 00280 00290 00300 00310 00320 00330 00340 00350 00360 00370 00380



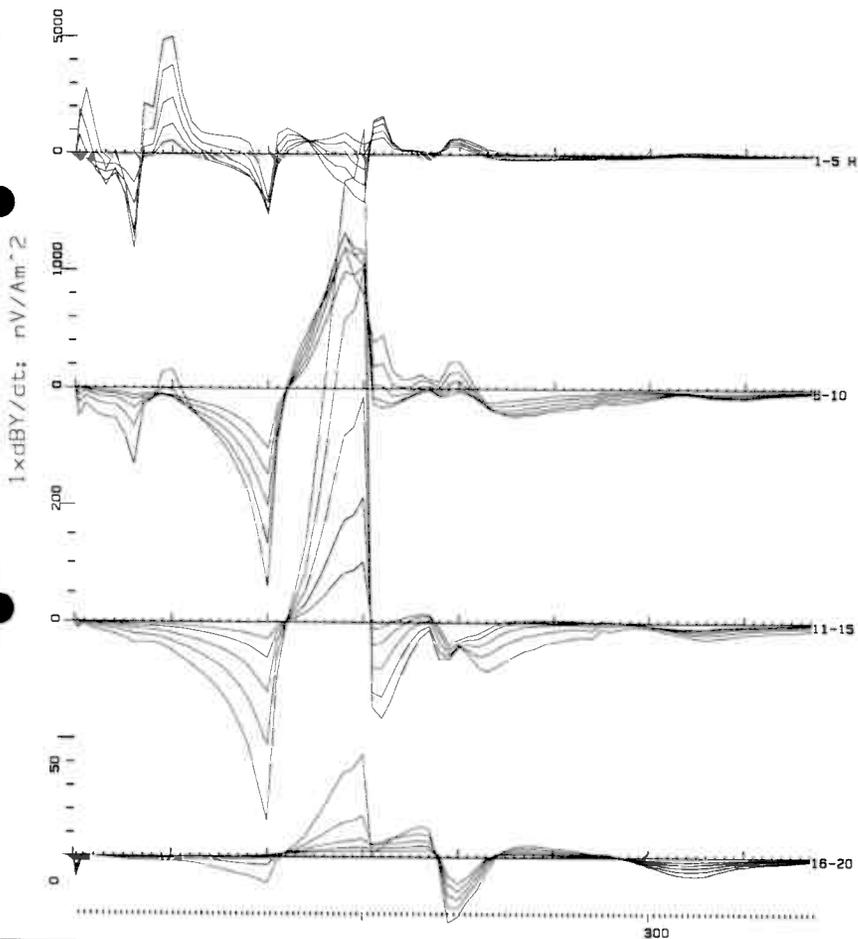
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BALLANGEN PROTEM data; file 200397

HOLE 11 LOOP 1

Y Component

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00030  
00040  
00050  
00060  
00070  
00080  
00090  
00100  
00110  
00120  
00130  
00140  
00150  
00160  
00170  
00180  
00190  
00200  
00210  
00220  
00230  
00240  
00250  
00260  
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00380





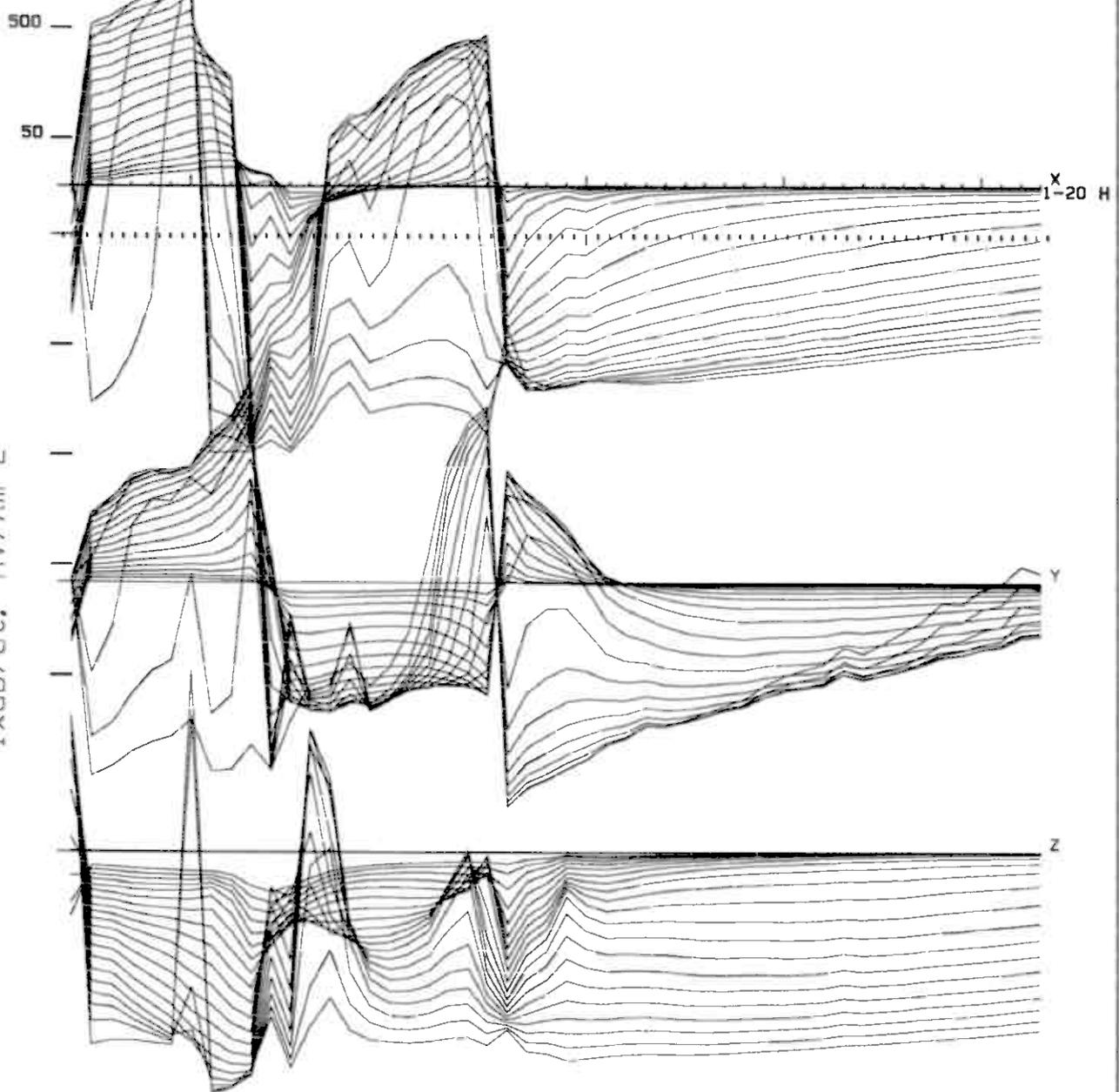
BALLANGEN  
HOLE 12

PROTEM data; file 190397  
LOOP I

3 Component

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00050  
00055  
00060  
00065  
00070  
00075  
00080  
00085  
00090  
00095  
00100  
00105  
00110  
00115  
00120  
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00195  
00200  
00205  
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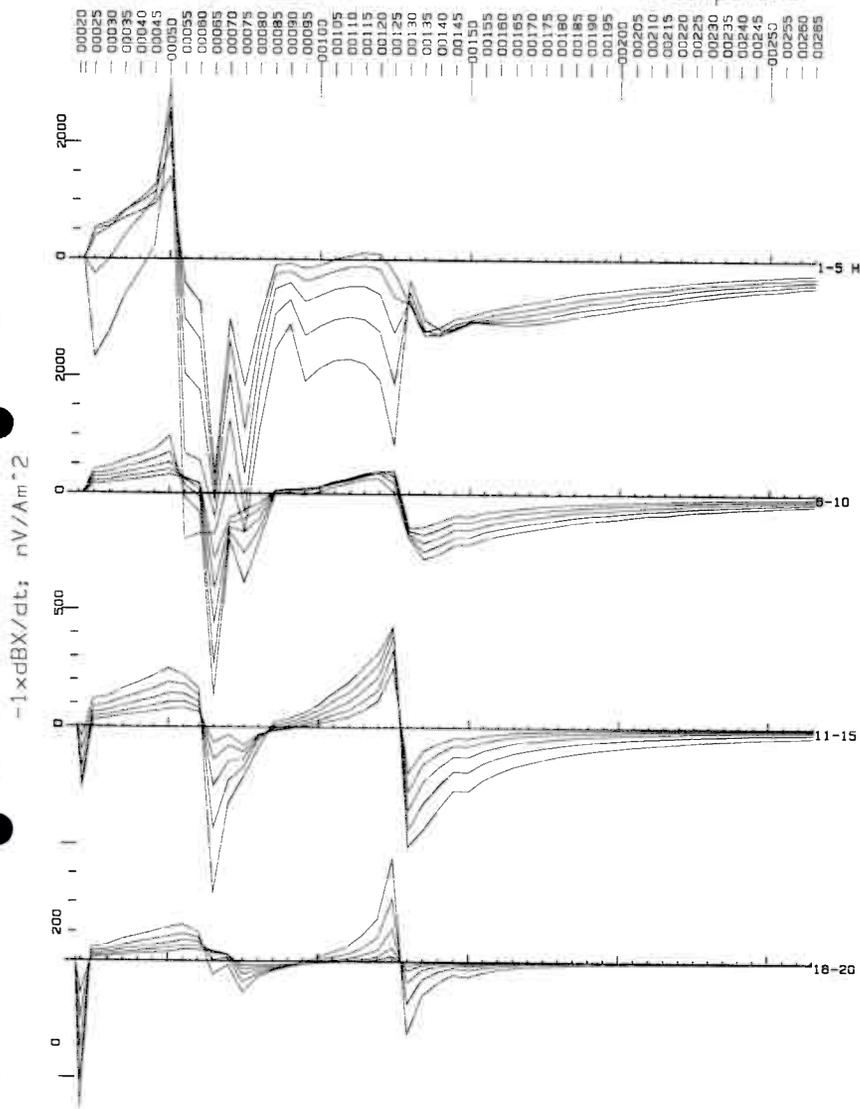
-1 x dB/dt: nV/Am<sup>2</sup>



BALLANGEN  
HOLE 12

PROTEM data; file 190397  
LOOP I

X Component

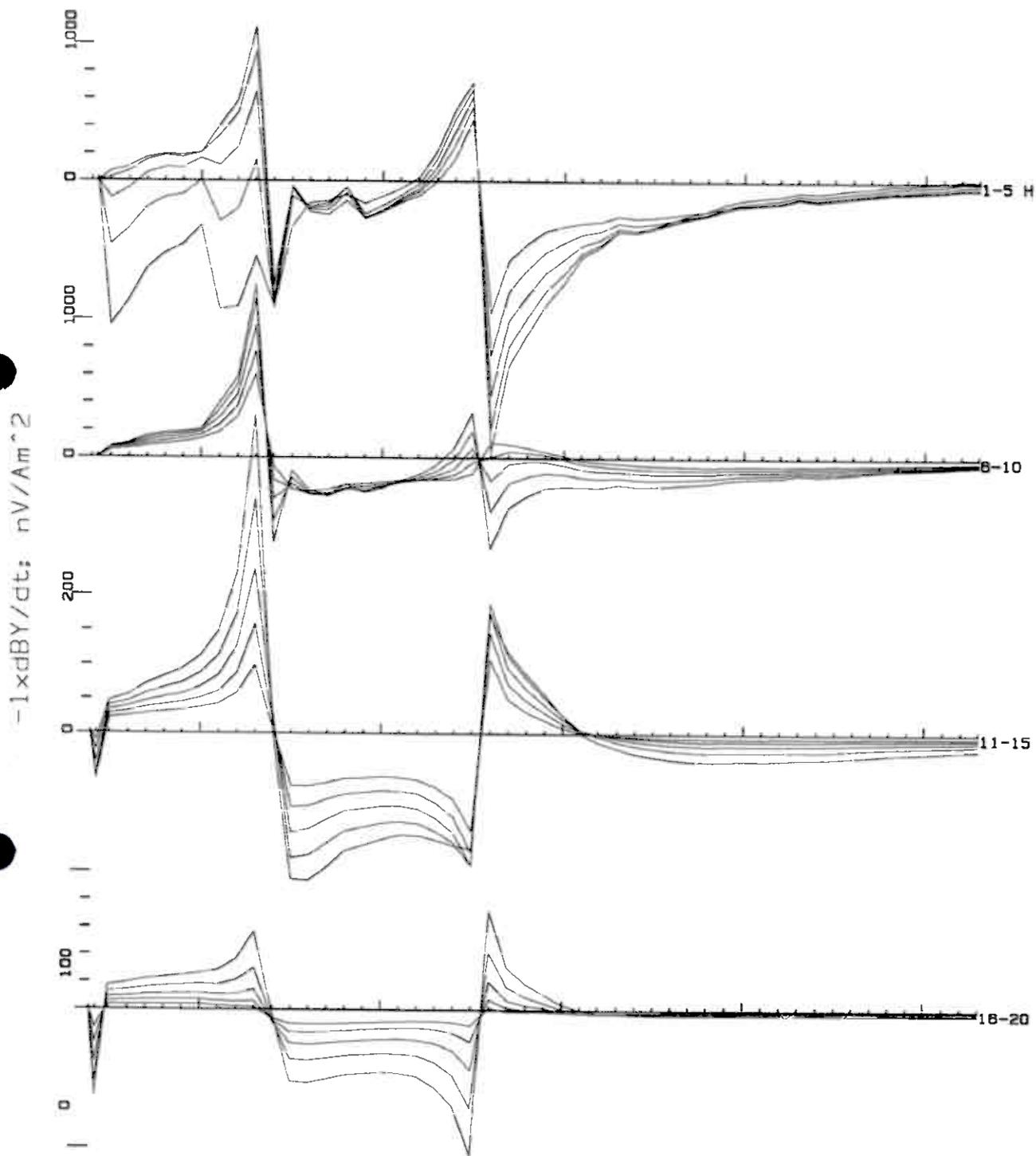


BALLANGEN  
HOLE 12

PROTEM data; file 190397  
LOOP I

Y Component

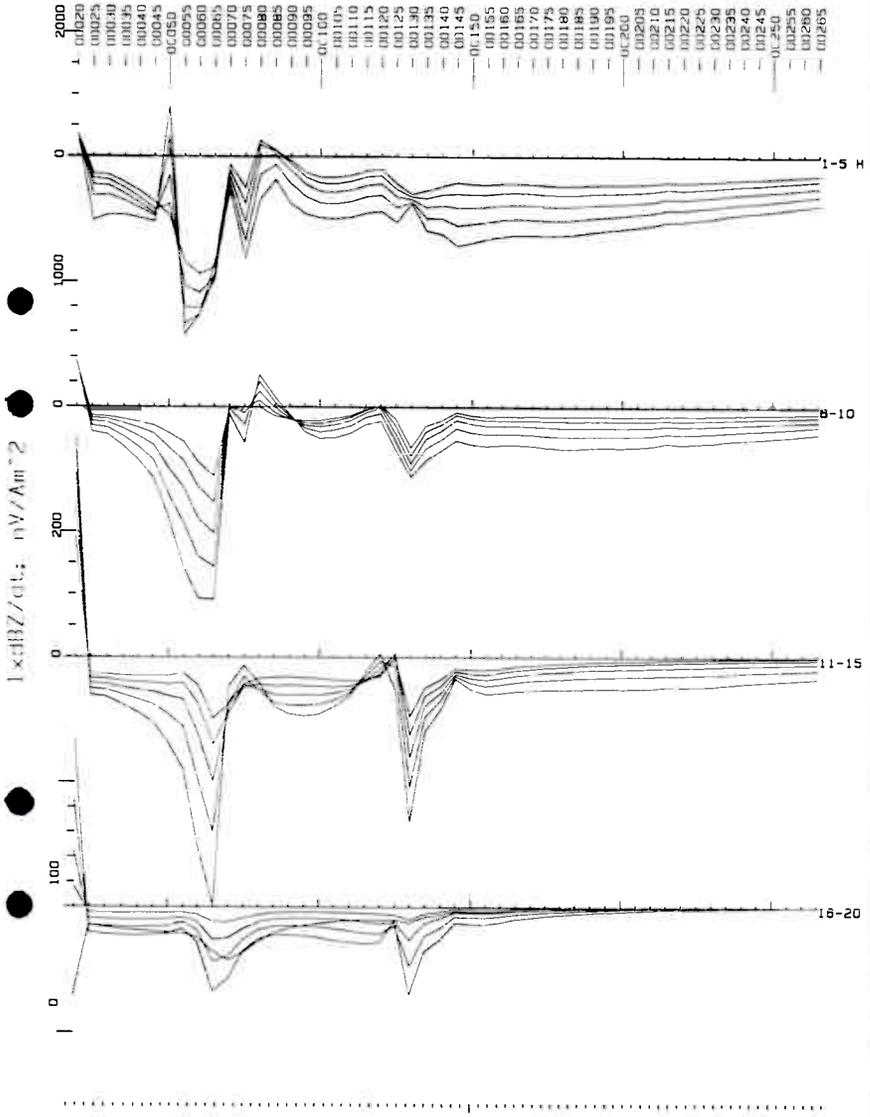
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00260  
00265



. PROTEM data: file 190397@

HOLM IN LOOPPI I

Z Component

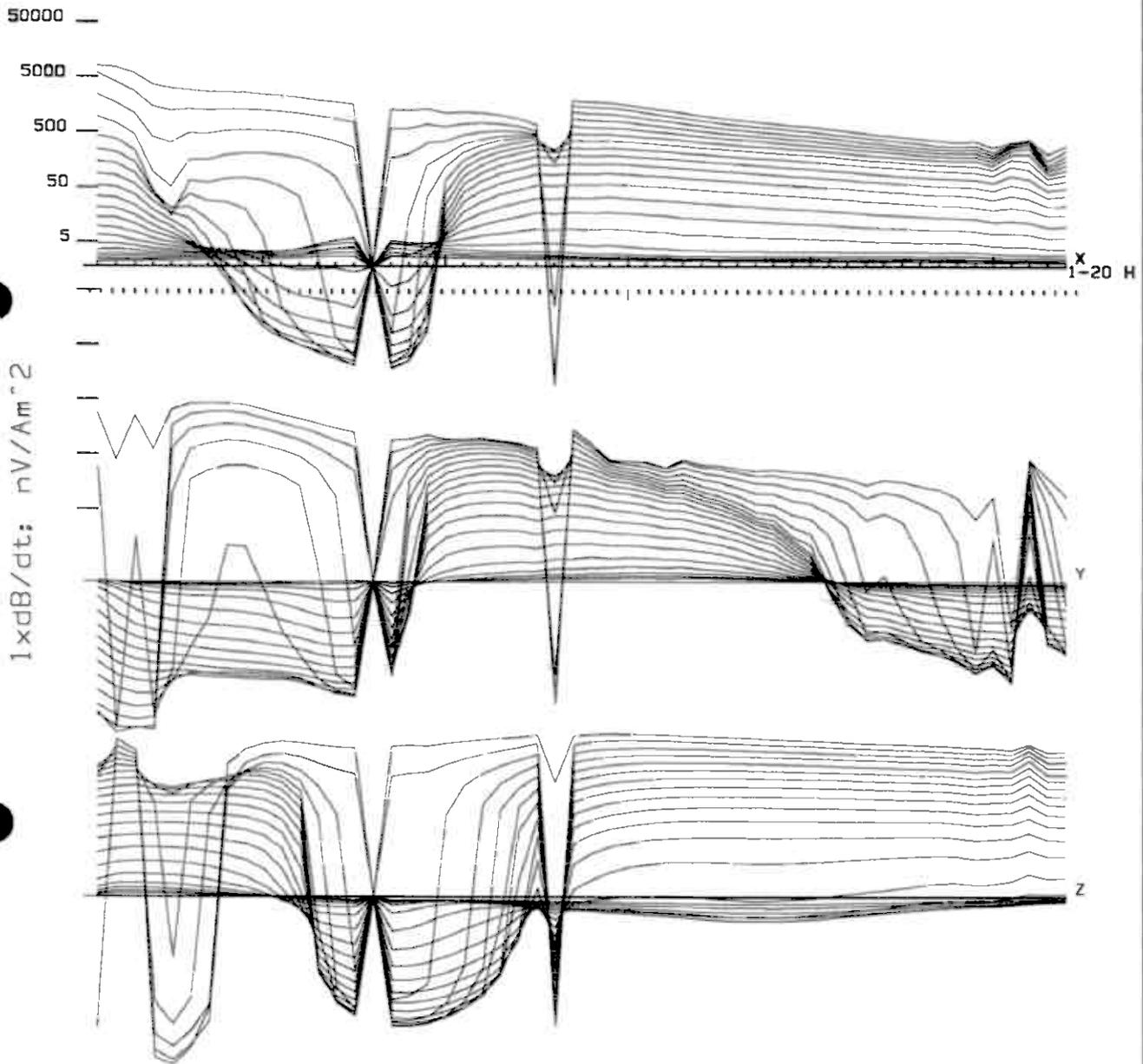


BALLANGEN PROTEM data; file 200397

HOLE 13 LOOP I

3 Component

00005  
00010  
00015  
00020  
00025  
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00035  
00040  
00045  
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00195  
00200  
00205  
00210  
00215  
00220  
00225  
00230  
00235  
00240  
00245  
00250  
00255  
00260  
00265  
00270



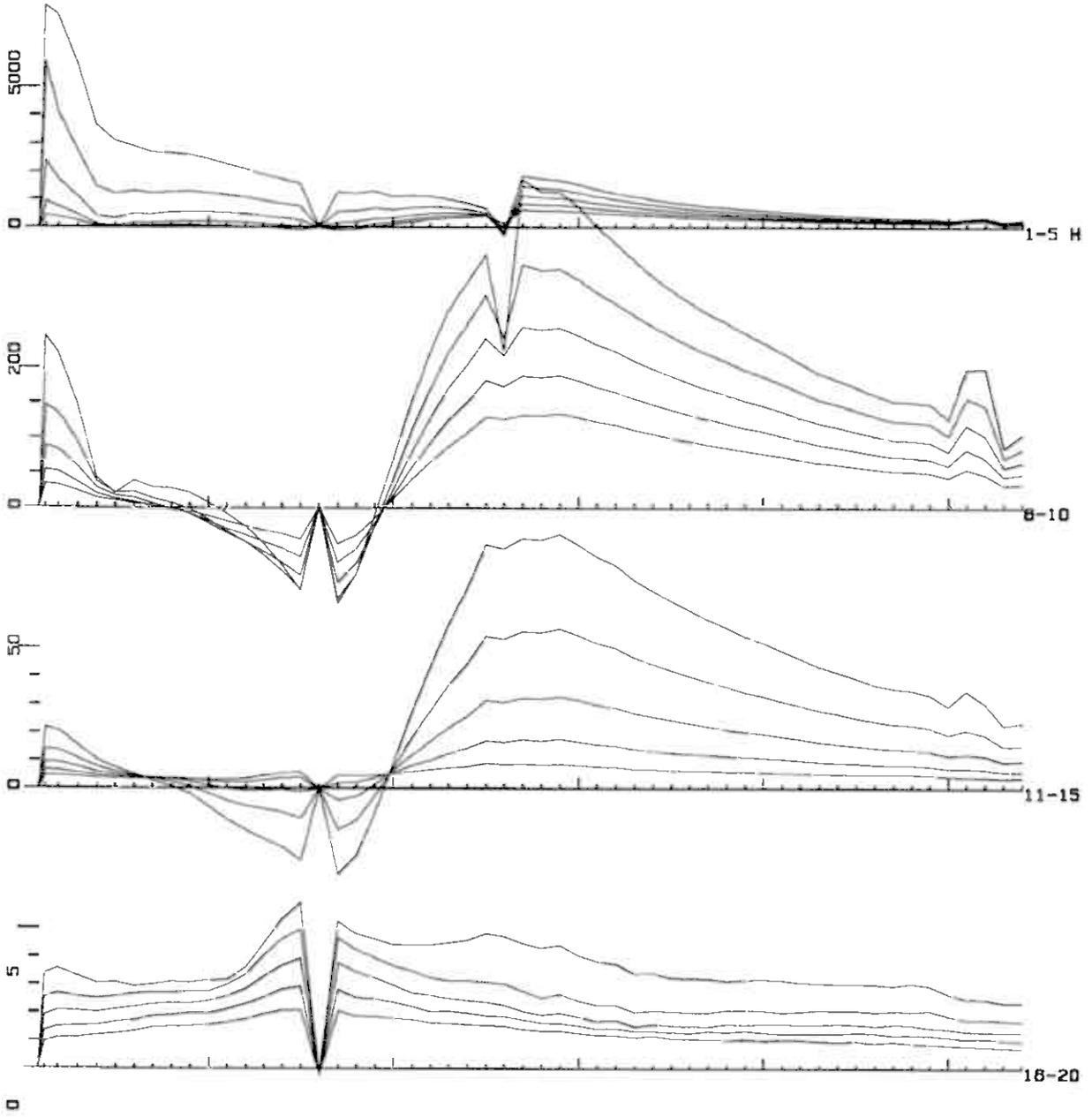
1 x dB/dt: nV/Am<sup>2</sup>

BALLANGEN PROTEM data; file 200397  
HOLE 13 LOOP I

X Component

00005  
00010  
00015  
00020  
00025  
00030  
00035  
00040  
00045  
00050  
00055  
00060  
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00075  
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00195  
00200  
00205  
00210  
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00220  
00225  
00230  
00235  
00240  
00245  
00250  
00255  
00260  
00265  
00270

$1 \times dBX/dt; nV/Am^2$



.....

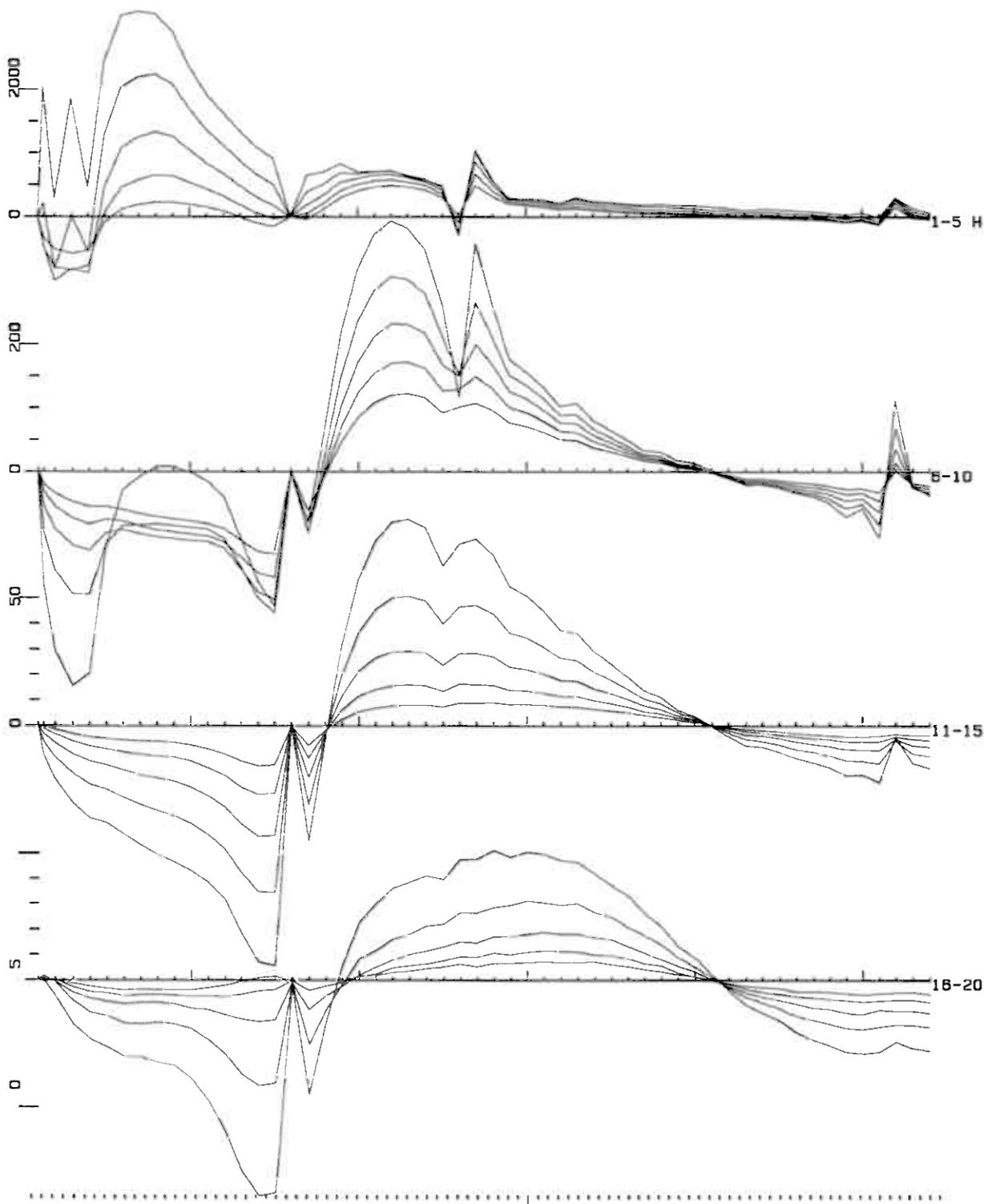
BALLANGEN PROTEM data; file 200397

HOLE 13 LOOP I

Y Component

00005  
00010  
00015  
00020  
00025  
00030  
00035  
00040  
00045  
00050  
00055  
00060  
00065  
00070  
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00195  
00200  
00205  
00210  
00215  
00220  
00225  
00230  
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00240  
00245  
00250  
00255  
00260  
00265  
00270

1x dBY/dt: nV/Am<sup>2</sup>

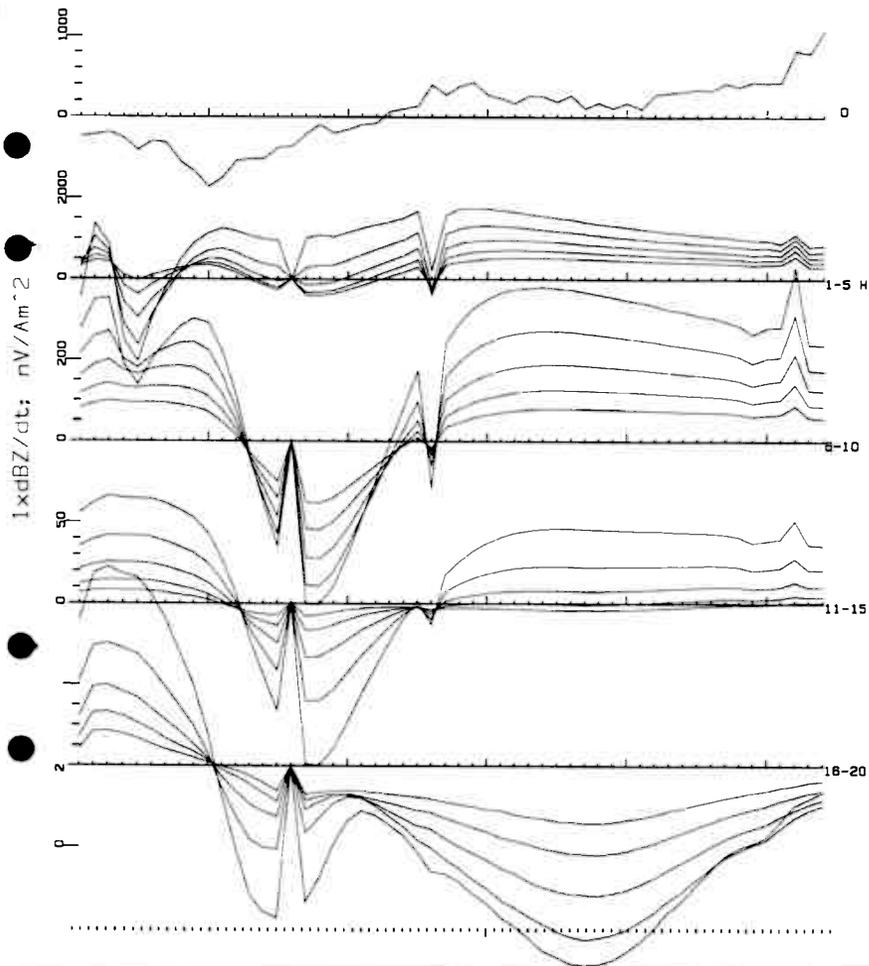


.PROTEM data: file 200397

LINE 0013

Z Component

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00010  
00015  
00020  
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00030  
00035  
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00045  
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00100  
00105  
00110  
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00130  
00135  
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00155  
00160  
00165  
00170  
00175  
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00185  
00190  
00195  
00200  
00205  
00210  
00215  
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00225  
00230  
00235  
00240  
00245  
00250  
00255  
00260  
00265  
00270

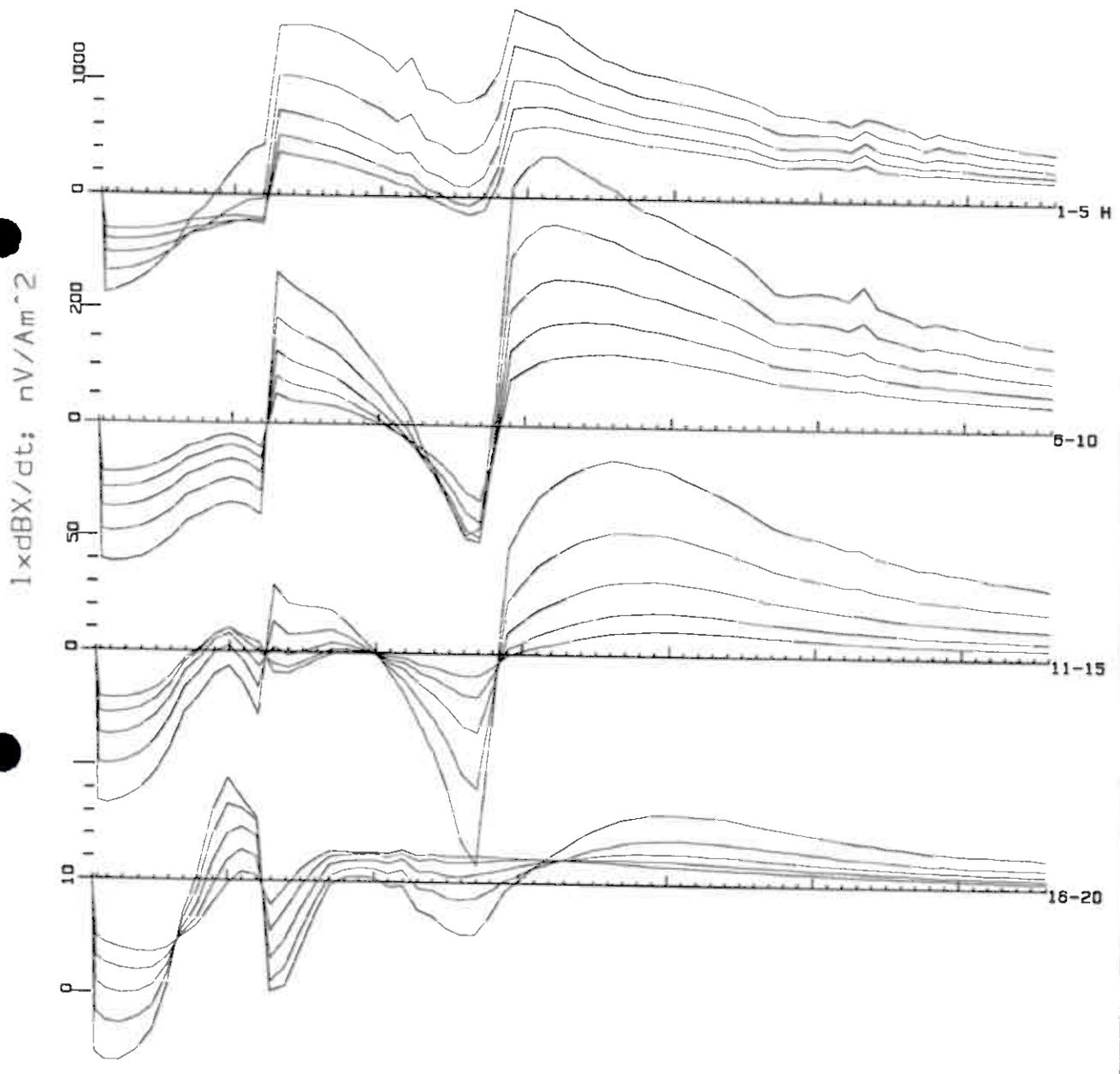




BALLANGEN PROTEM data: file 200397  
HOLE 14 LOOP I

X Component

00005  
00010  
00015  
00020  
00025  
00030  
00035  
00040  
00045  
00050  
00055  
00060  
00065  
00070  
00075  
00080  
00085  
00090  
00095  
00100  
00105  
00110  
00115  
00120  
00125  
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00135  
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00145  
00150  
00155  
00160  
00165  
00170  
00175  
00180  
00185  
00190  
00195  
00200  
00205  
00210  
00215  
00220  
00225  
00230  
00235  
00240  
00245  
00250  
00255  
00260  
00265  
00270  
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00280  
00285  
00290  
00295  
00300  
00305  
00310  
00315  
00320  
00325  
00330



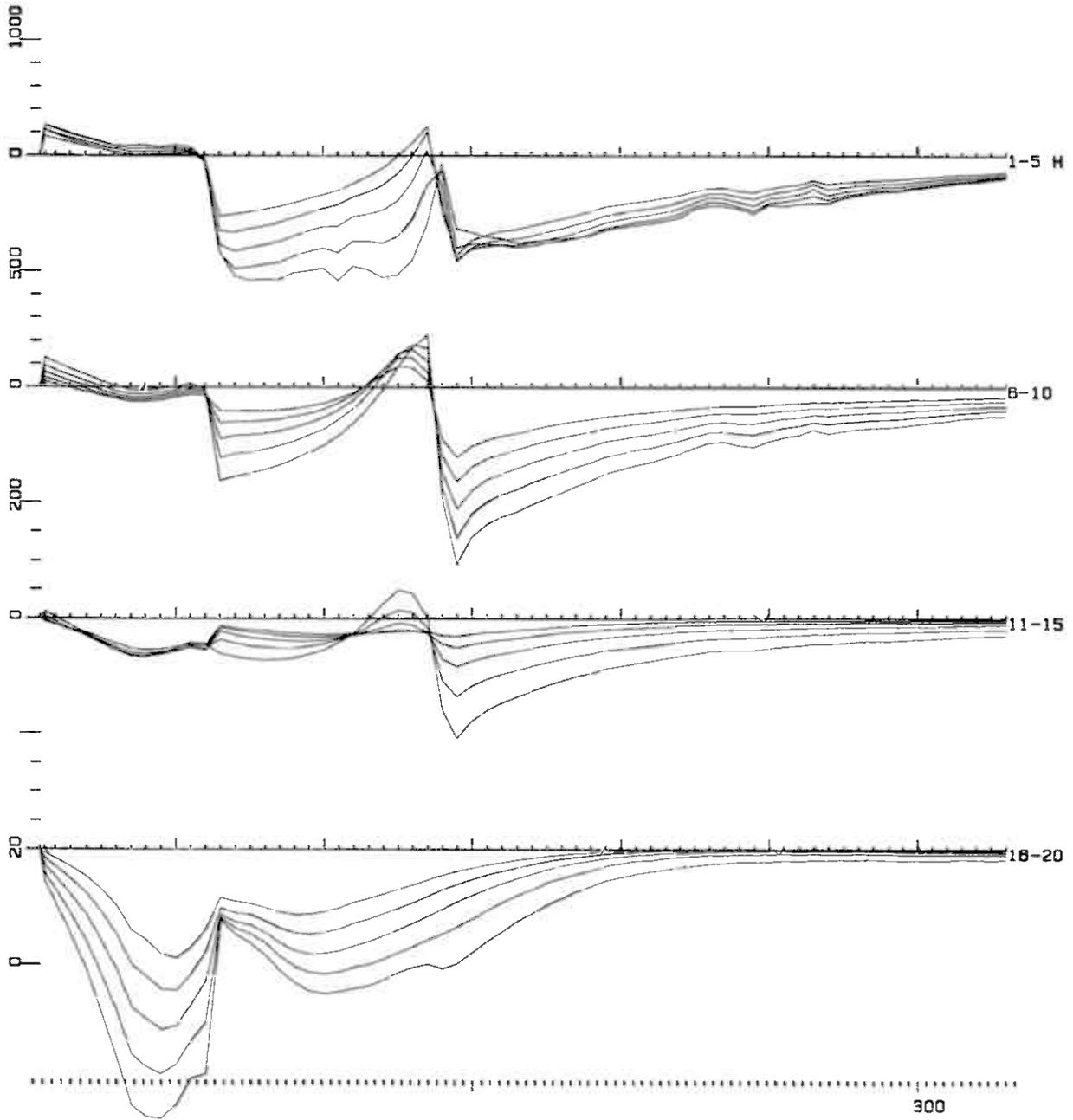
BALLANGEN  
HOLE 14

PROTEM data; file 200397  
LOOP I

Y Component

00005  
00010  
00015  
00020  
00025  
00030  
00035  
00040  
00045  
00050  
00055  
00060  
00065  
00070  
00075  
00080  
00085  
00090  
00095  
01000  
01005  
01010  
01015  
01020  
01025  
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01045  
01050  
01055  
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01065  
01070  
01075  
01080  
01085  
01090  
01095  
02000  
02005  
02010  
02015  
02020  
02025  
02030  
02035  
02040  
02045  
02050  
02055  
02060  
02065  
02070  
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02085  
02090  
02095  
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03005  
03010  
03015  
03020  
03025  
03030

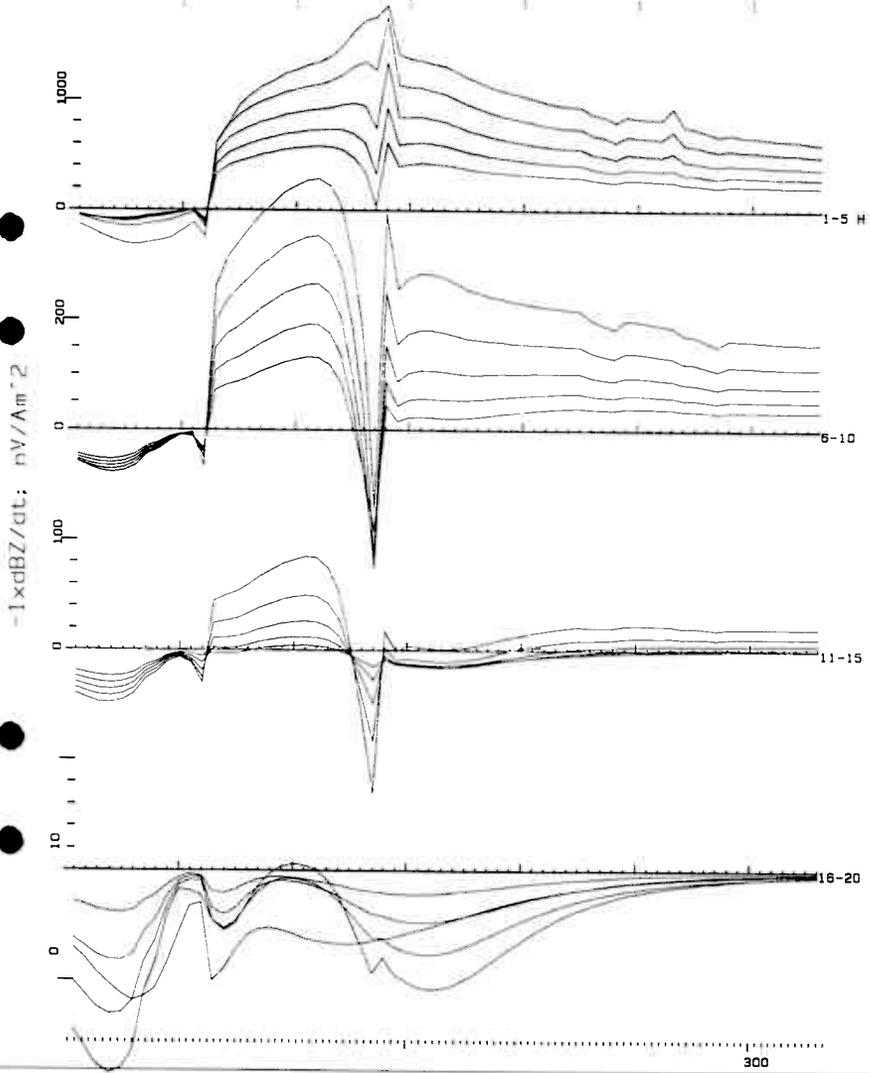
1 x dB/dt; nV/Am<sup>2</sup>



.PROTEM data; file 200397@  
HOLE 14 LOGPRI 1

Z Component

000015  
000010  
000015  
000200  
000300  
000400  
000450  
000500  
000600  
000650  
000700  
000750  
000800  
000850  
000900  
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001100  
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001750  
001800  
001850  
001900  
001950  
002000  
002100  
002150  
002200  
002250  
002300  
002350  
002400  
002450  
002500  
002600  
002650  
002700  
002750  
002800  
002850  
002900  
002950  
003000  
003100  
003150  
003200  
003250  
003300



BALLANGEN PROTEM data; file 190397

HOLE 15

LOOP I

3 Component

00019  
00029  
00030  
00035  
00049  
00050  
00055  
00065  
00070  
00075  
00085  
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00105  
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00155  
00165  
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00190  
00195  
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00225  
00230  
00240  
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00250  
00255  
00265  
00270  
00280  
00285  
00290  
00300  
00305  
00310  
00320

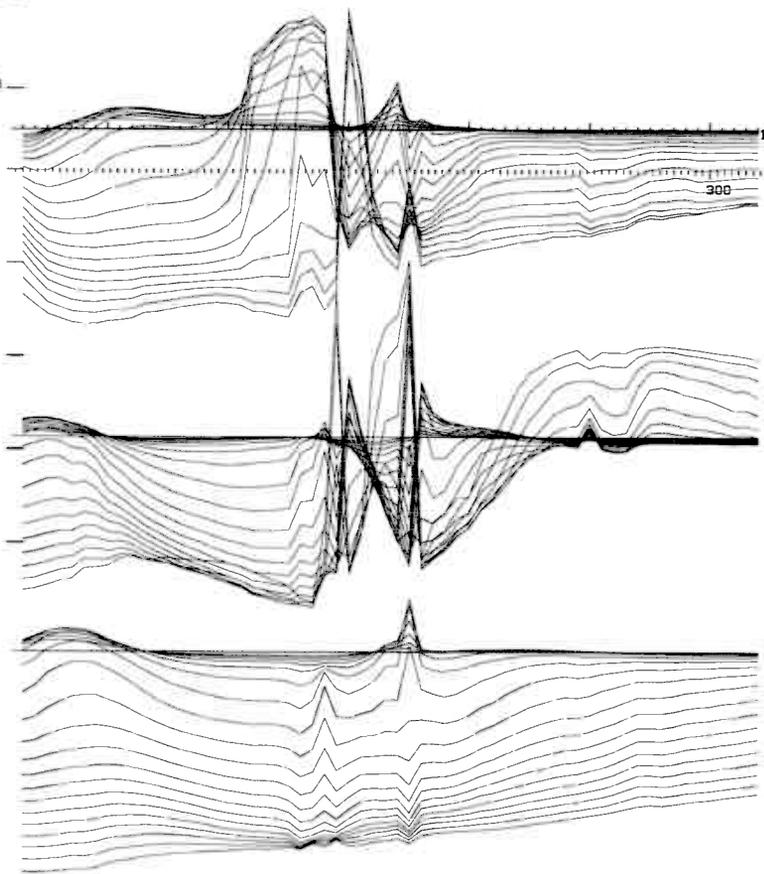
500

50

X  
1-20 H

300

-1x dB/dt; nV/Am<sup>2</sup>



BALLANGEN PROTEM data; file 190397

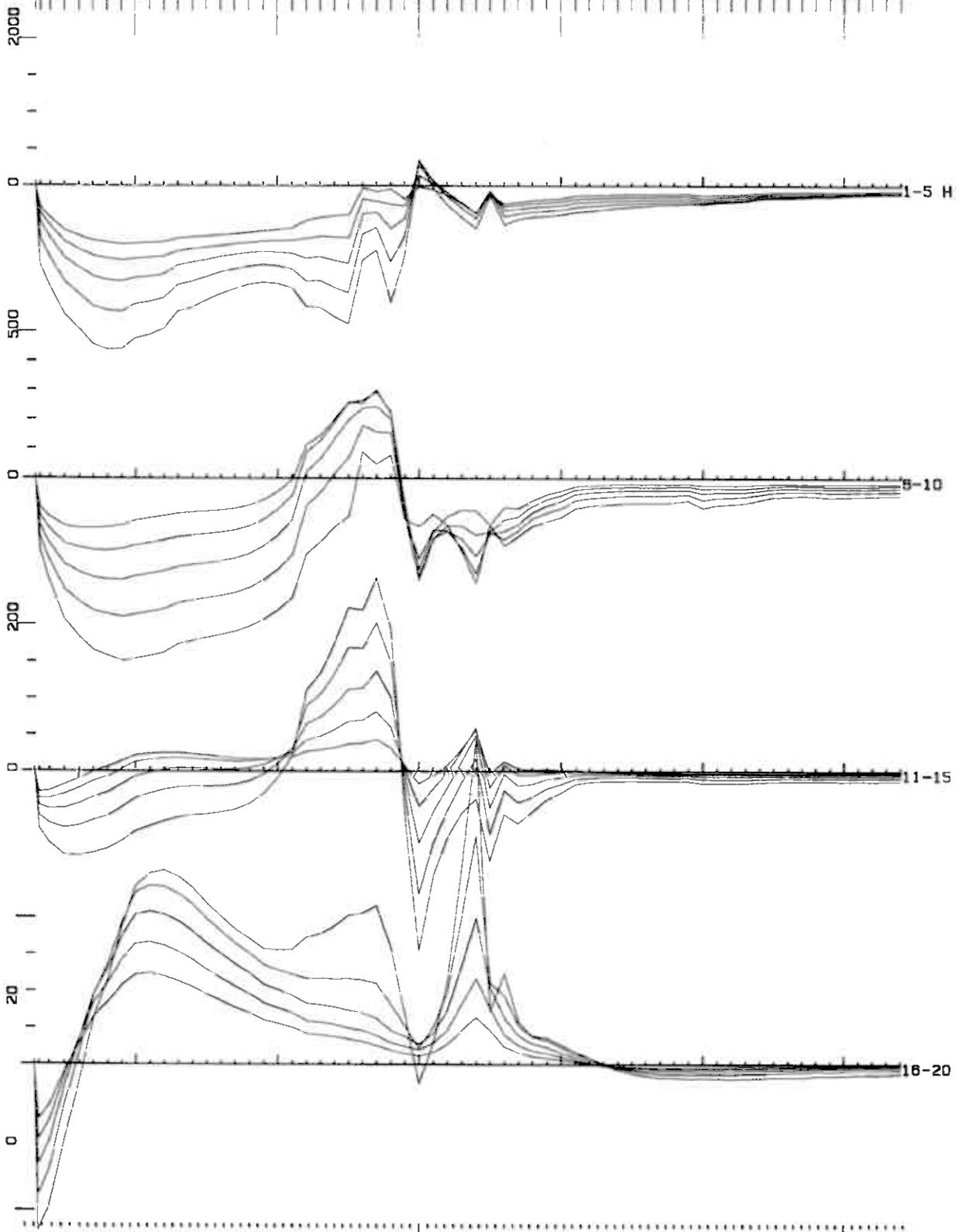
HOLE 15

LOOP I

X Component

00015  
00020  
00025  
00030  
00035  
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00060  
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00075  
00080  
00085  
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00105  
00110  
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00230  
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00245  
00250  
00255  
00260  
00265  
00270  
00275  
00280  
00285  
00290  
00295  
00300  
00305  
00310  
00315  
00320

$-1 \times dBX/dt; nV/Am^2$



BALLANGEN PROTEM data: file 190397

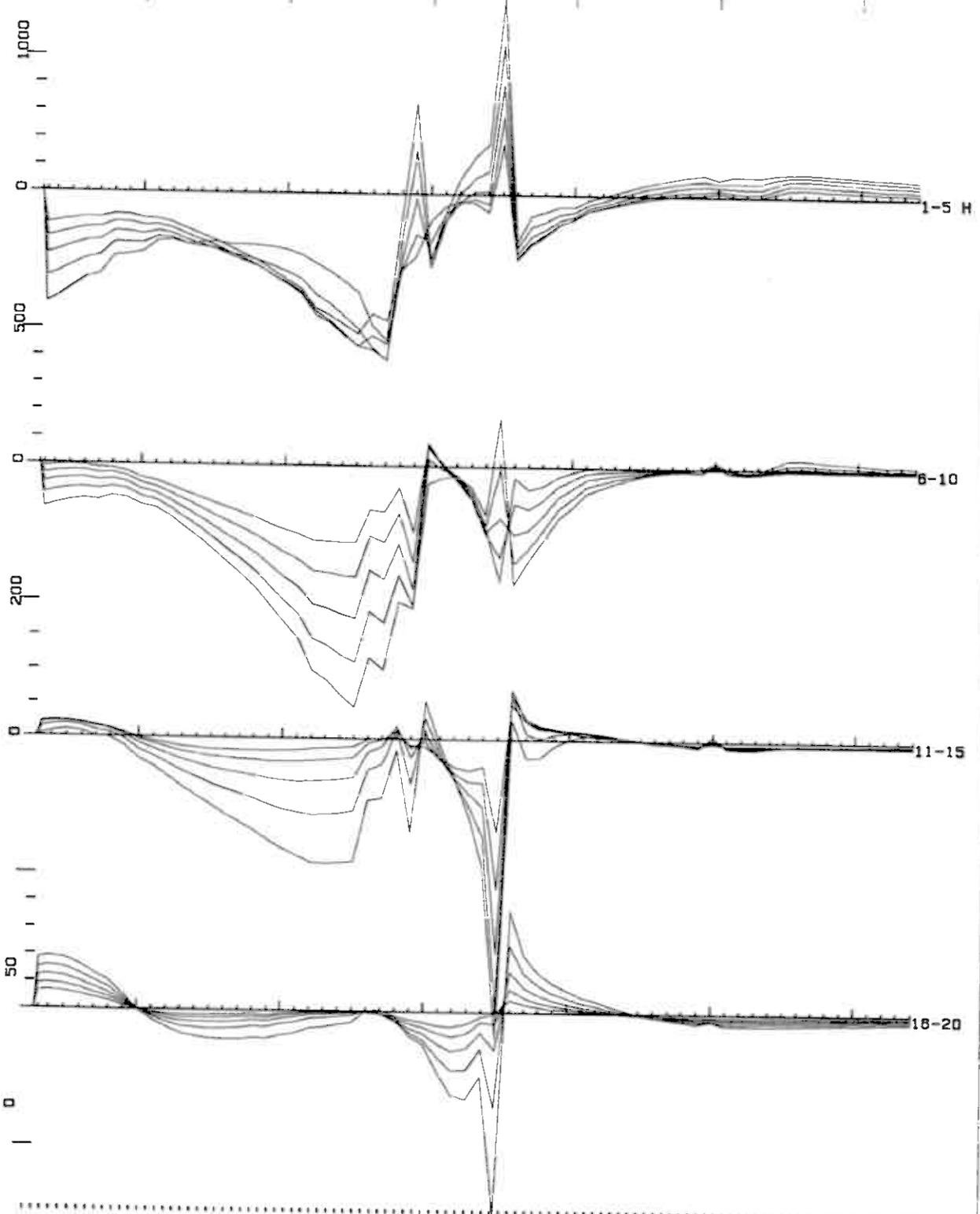
HOLE 15

LOOP I

Y Component

00015  
00020  
00025  
00030  
00035  
00040  
00045  
00050  
00055  
00060  
00065  
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00205  
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00290  
00295  
00300  
00305  
00310  
00315  
00320

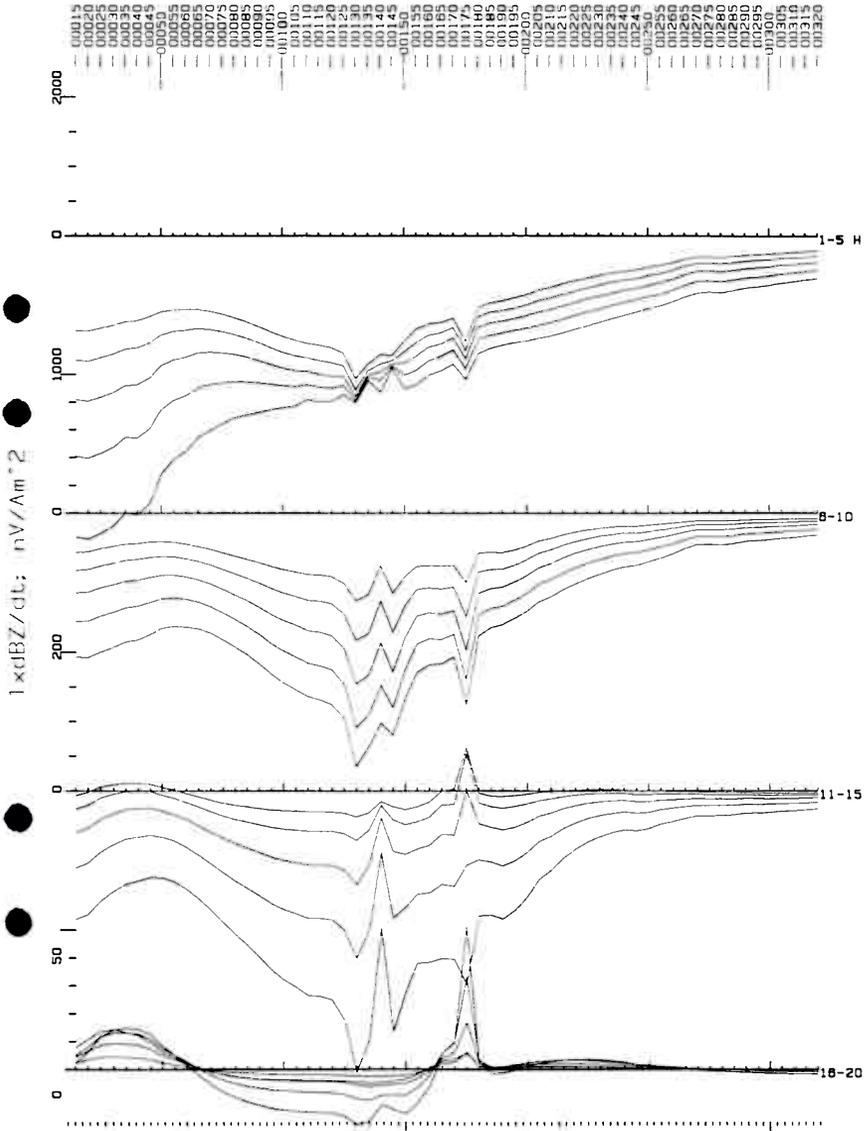
$-1 \times dB Y / dt; nV / Am^2$



.PROTEM data; file 190397@

HOLE 15 LOOPPI I

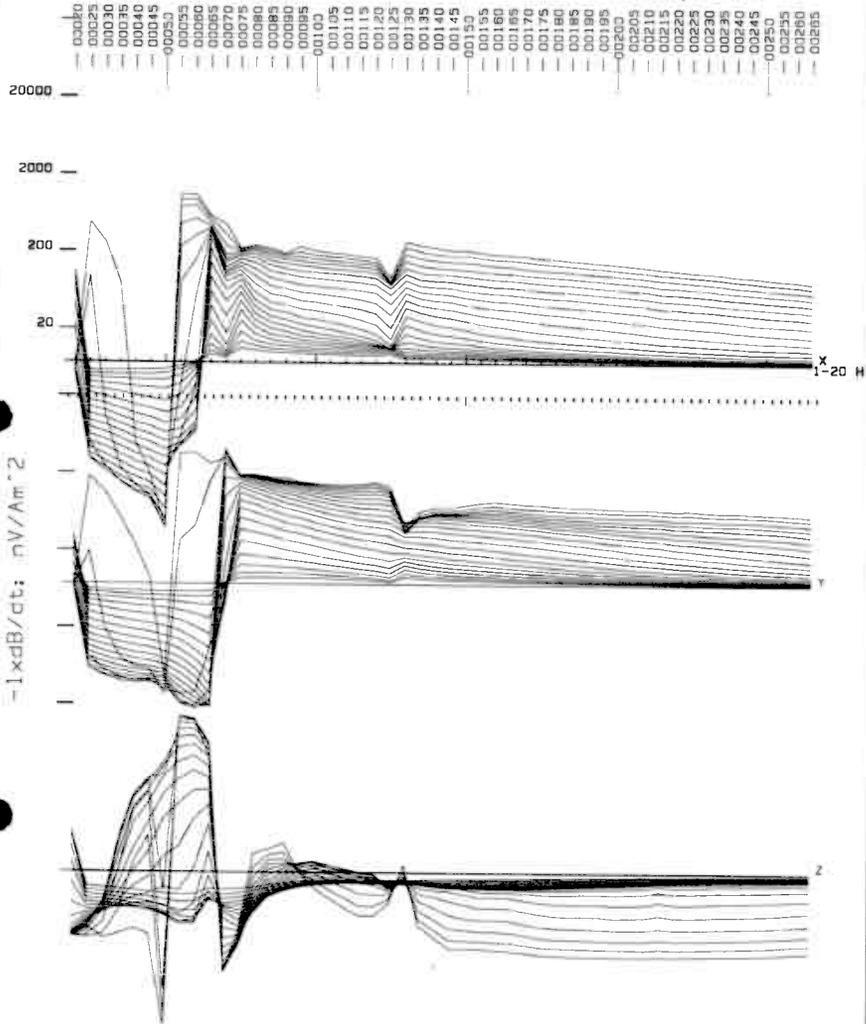
Z Component



BALLANGEN PROTEM data: file 230397

HOLE 12 LOOP III

3 Component

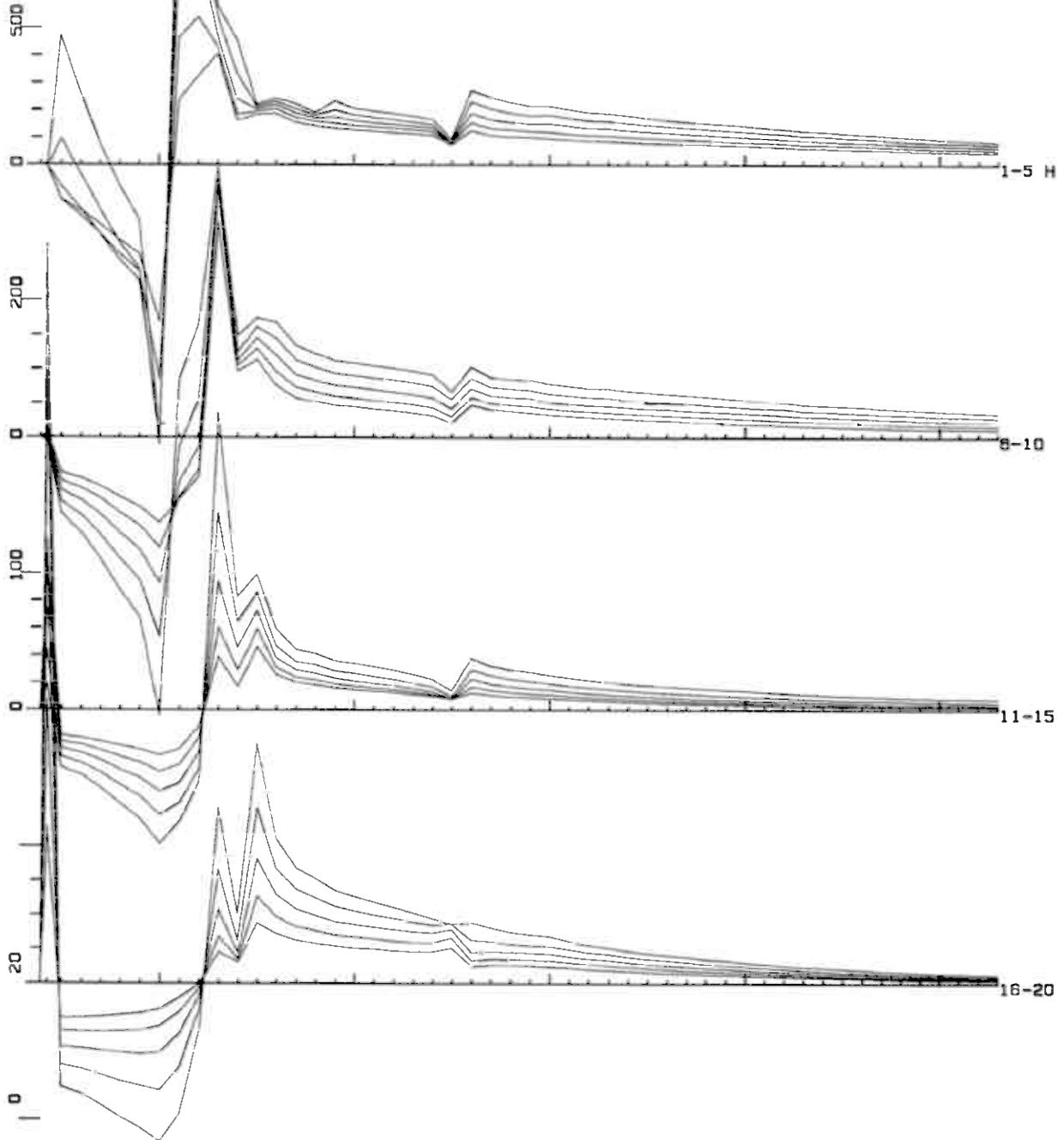


BALLANGEN PROTEM data; file 230397  
HOLE 12 LOOP III

X Component

00020  
00025  
00030  
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00045  
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00100  
00105  
00110  
00115  
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00165  
00170  
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00195  
00200  
00205  
00210  
00215  
00220  
00225  
00230  
00235  
00240  
00245  
00250  
00255  
00260  
00265

$-1 \times dBX/dt; nV/Am^2$

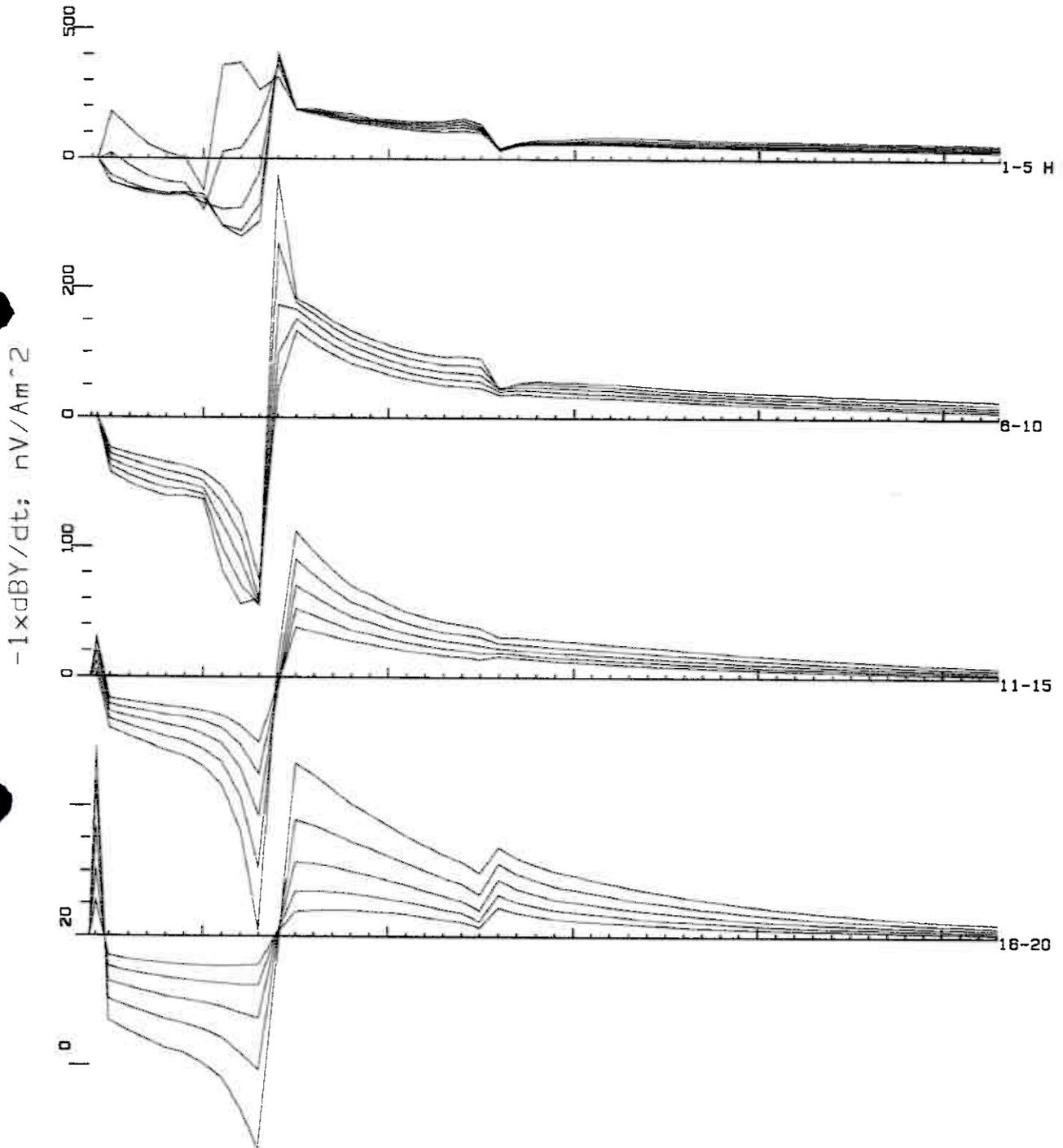


BALLANGEN  
HOLE 12

PROTEM data: file 230397  
LOOP III

Y Component

00020  
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00050  
00055  
00060  
00065  
00070  
00075  
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00085  
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00110  
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00195  
00200  
00205  
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00225  
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00255  
00260  
00265

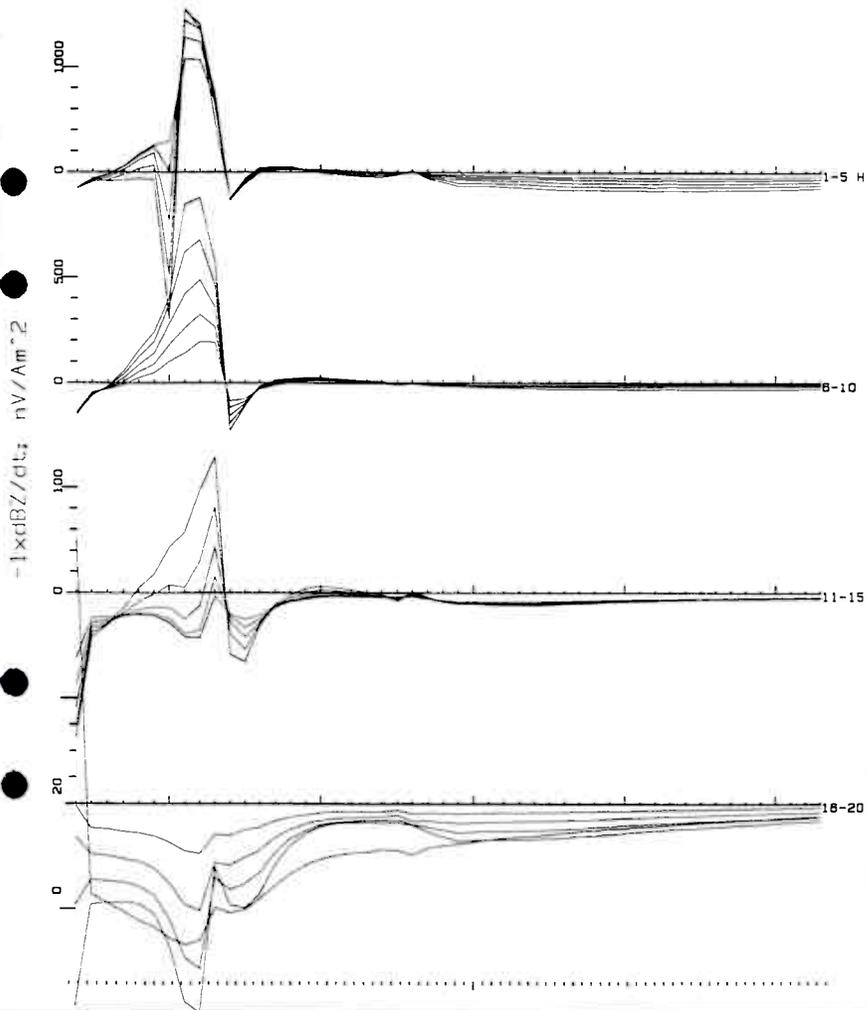


.PROTEM data: file 230397@

HOLE 12 LOOP1 III

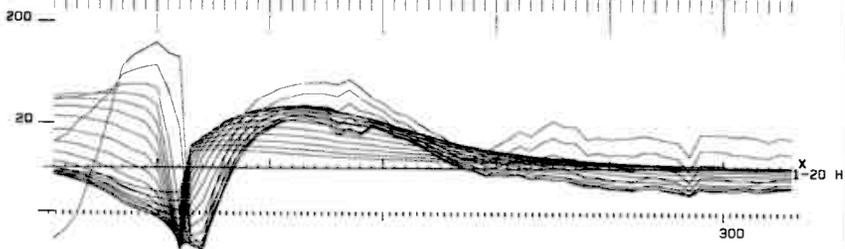
Z Component

00020  
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00190  
00195  
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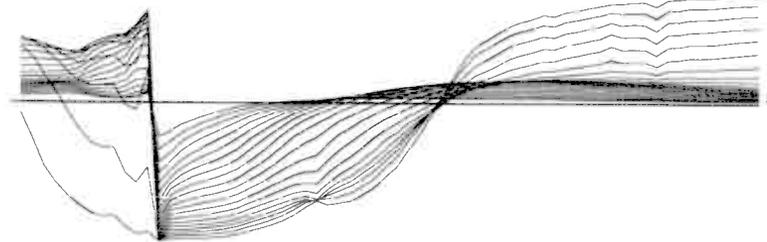
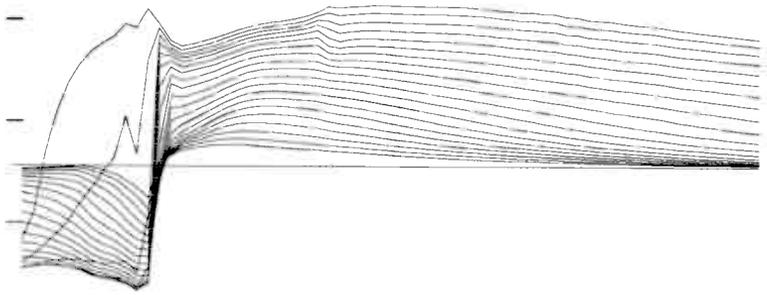


BALLANGEN PROTEM data; file 230397  
- HOLE 14 LOOP III

3 Component



1 x dB/ct: nV/Am<sup>2</sup>



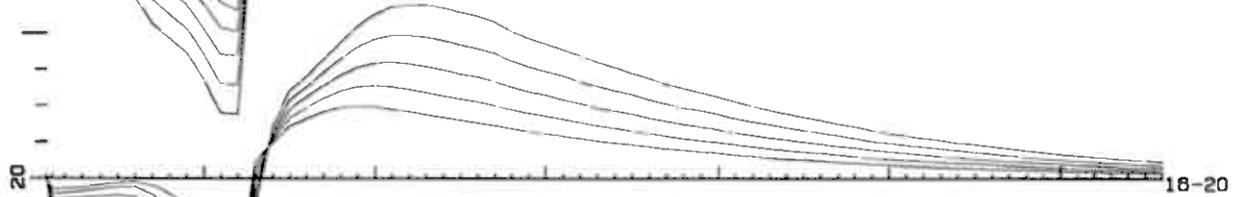
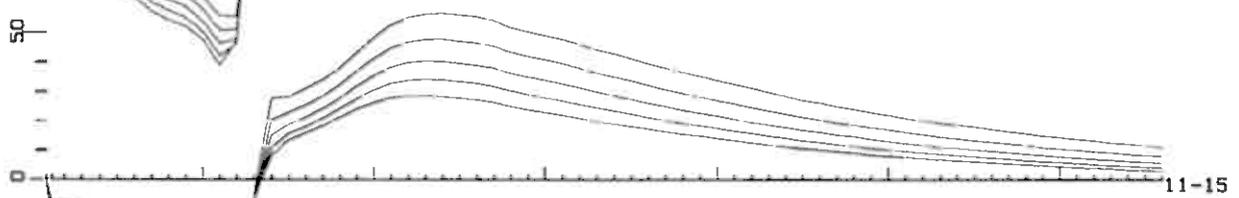
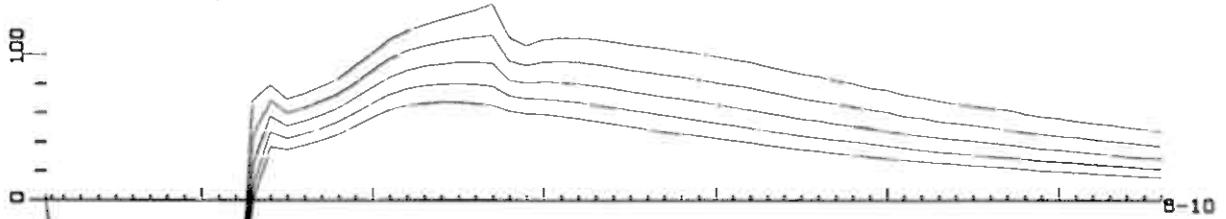
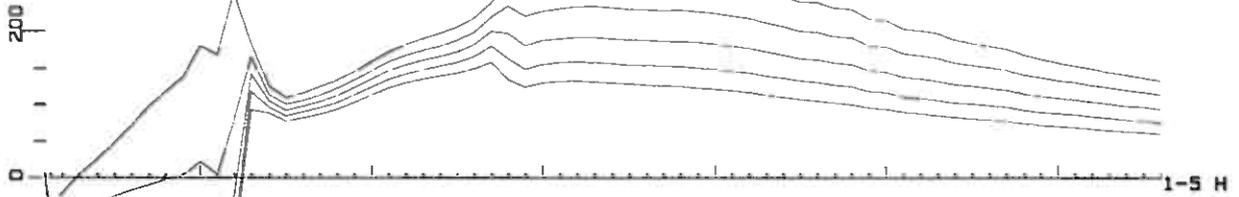


BALLANGEN PROTEM data; file 230397  
HOLE 14 LOOP III

Y Component

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00015  
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00255  
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00265  
00270  
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00285  
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00320  
00325  
00330

1x dBY/dt: nV/Am<sup>2</sup>





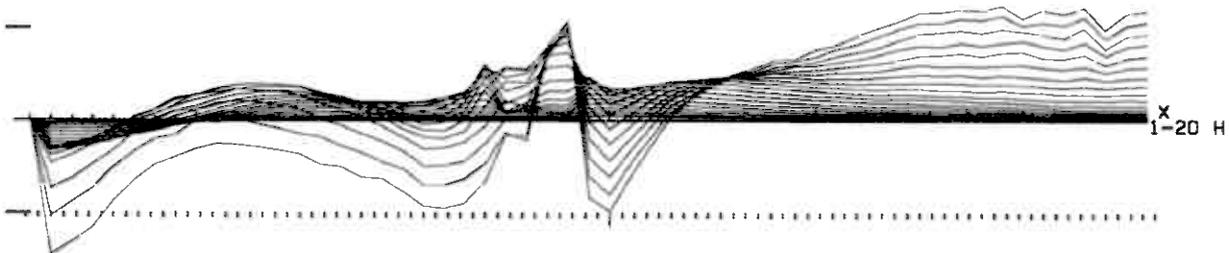
BALLANGEN PROTEM data; file 230397

HOLE 16 LOOP III

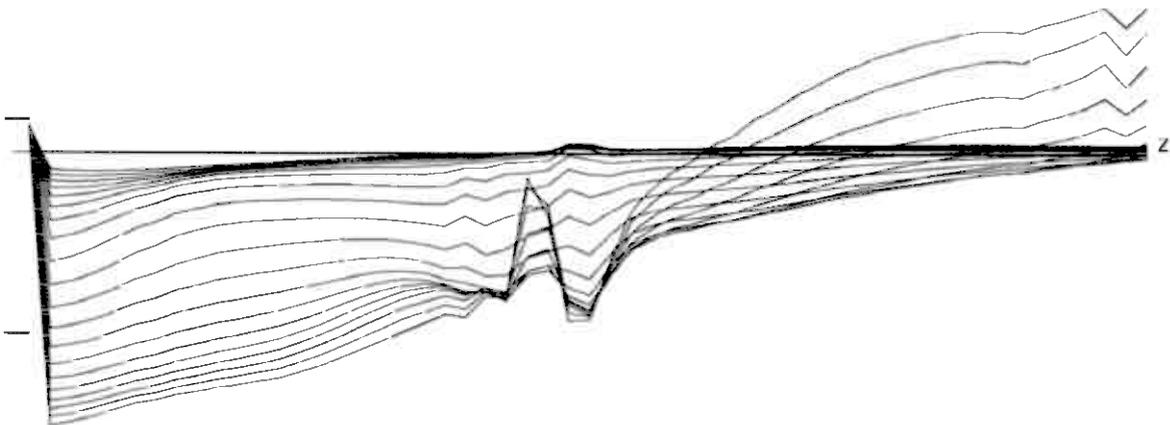
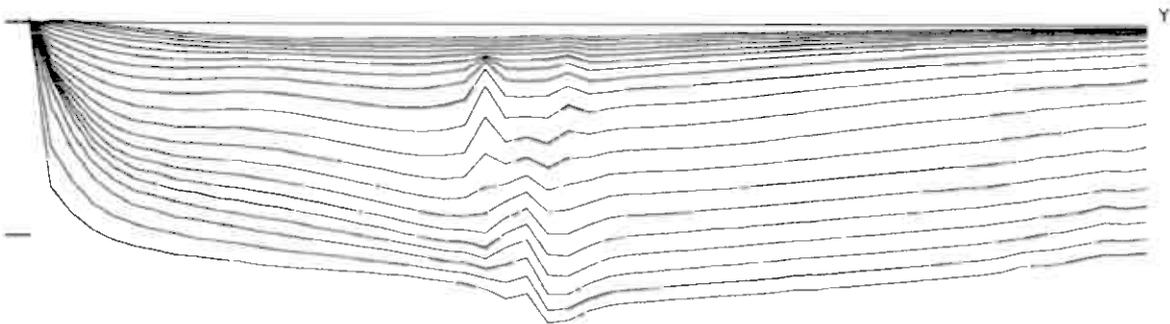
3 Component

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00015  
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00025  
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00035  
00040  
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00050  
00055  
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00215  
00220  
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00255  
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00265  
00270  
00275  
00280

20



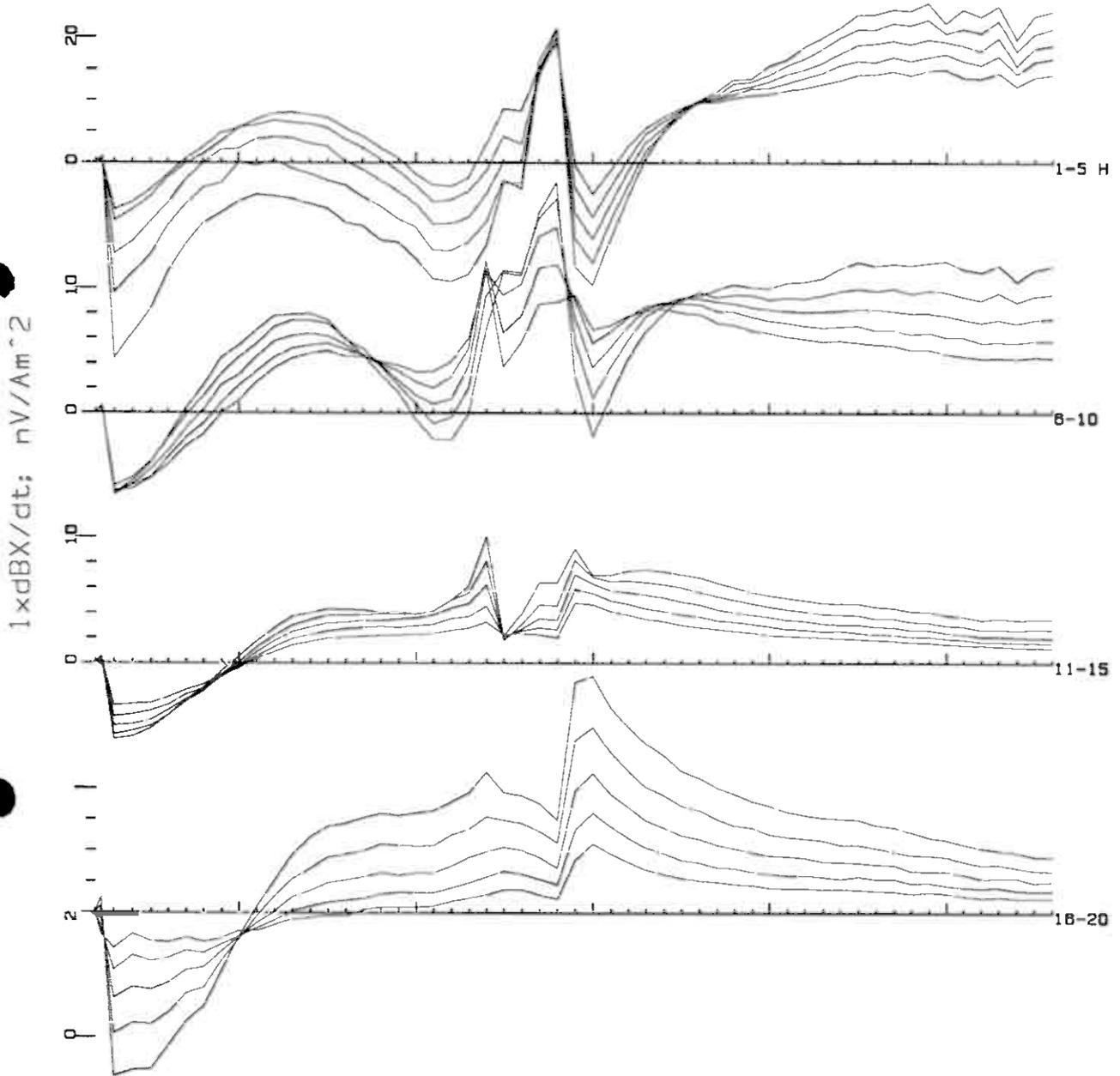
1 x dB/dt: nV/Am<sup>2</sup>



BALLANGEN PROTEM data; file 230397  
HOLE 16 LOOP III

X Component

00010  
00015  
00020  
00025  
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00070  
00075  
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00280



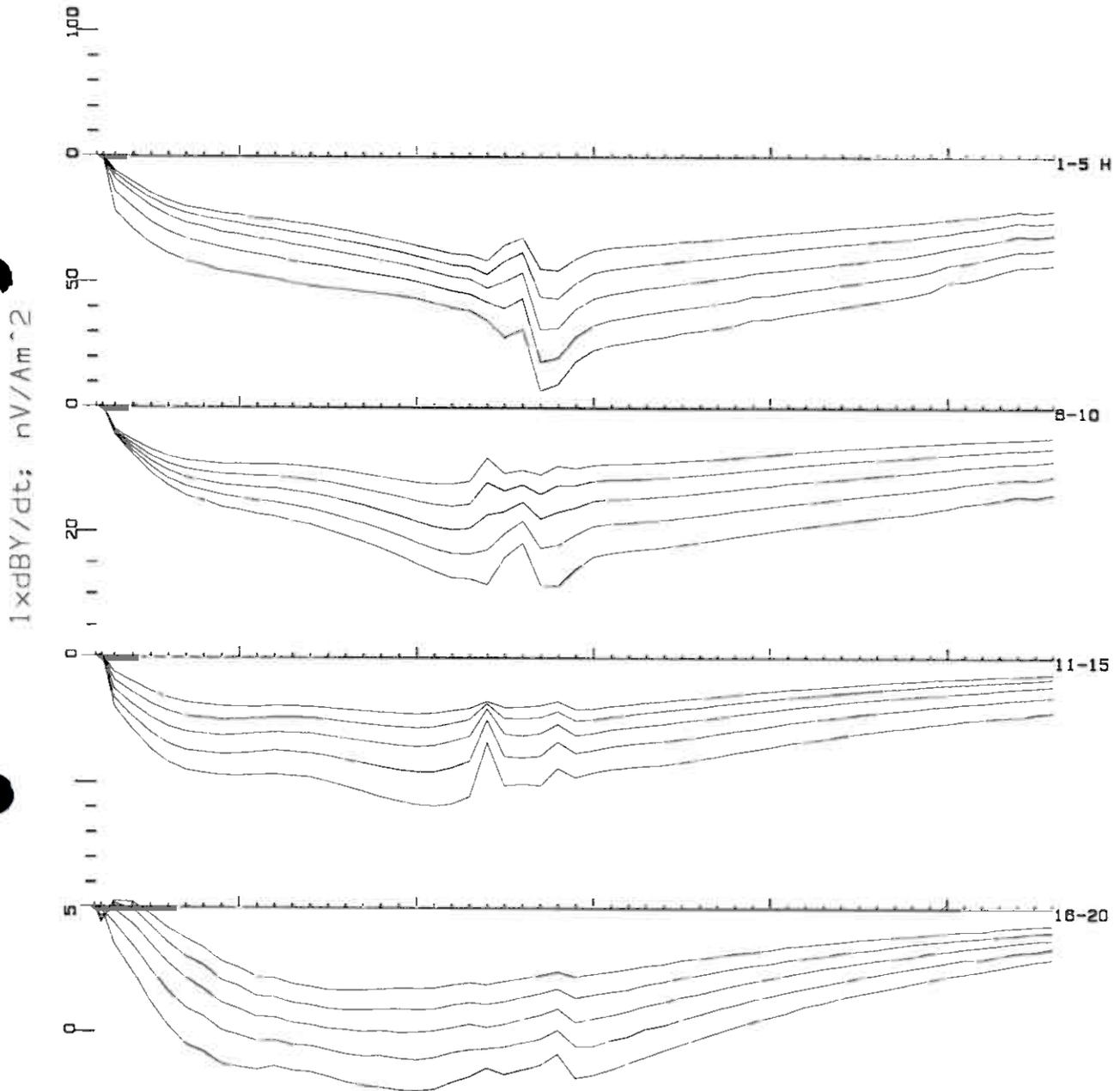
.....|.....

BALLANGEN PROTEM data: file 230397

HOLE 16 LOOP III

Y Component

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00015  
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00040  
00045  
00050  
00055  
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00065  
00070  
00075  
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00225  
00230  
00235  
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00250  
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00270  
00275  
00280



.PROTEM data; file 230397@

HOLE 10 LOOPPI III

Z Component

