Pulse Electromagnetic Survey Report

for

Teck Exploration Limited

Montcalm Project

Timmins, Ontario

February - March, 1997 Survey

by

Crone Geophysics & Exploration Ltd.

Client	:	Teck Exploration Limited North Bay, Onatrio
Project	:	Montcalm Project
Area	:	Timmins, Ontario
Survey	:	Pulse Electromagnetic (DEEPEM)
Survey By	:	Crone Geophysics & Exploration Ltd. 3607 Wolfedale Road Mississauga, Ontario
Survey Operators	:	Denis Jolin Steve Woodward Jim MacNeil
Survey Period	:	February 17, - March 15, 1997
Report By	:	Bill Ravenhurst
Report Date	:	May 10, 1997

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1. Introduction

Crone Geophysics & Exploration Limited was contracted by Teck Exploration Limited to conduct a Pulse Time Domain Electromagnetic (PEM) survey on the Montcalm Project, near Timmins, Ontario. Crone Geophysics had performed a similiar survey in 1995 on several grids within this project. In February of this year, new lines were added to three of those grids: Grid E, Grid H-East, and Grid F-G. These grid extensions were surveyed with the same parameters as the previous survey. A total of 85.4 kilometres were read.

This report outlines the geophysical work performed and presents an intepretation of the results.

2. Property Location and Access

The Montcalm Project is located approximately 70 kilometres northwest of the town of Timmins, Ontario, in the township of Montcalm, near the border with Strachan, Belford, and Nova Townships. The property can be accessed via the Malette logging road approximately 60 kilometres from the Malette mill on highway 101, west of Timmins. Refer to Figures 1 and 2 for property location.

A camp was established for the survey crew at kilometre 57 on the Malette road near the bridge over the Groundhog River. Grid E was accessible by road for 10 kilometres towards Outokumpu's Montcalm property and then by snow mobile trail. To access Grid H-East, the Malette road was followed across the Groundhog River for about 9 kilometres to the drill road into Grid H. The drill road is only travelable by snow mobiles. The crew travelled to Grid FG from the camp by snow mobile along a drill road.

3. Claim Group

The claim groups covered by the survey are in Montcalm Township, in the Mining Division District of Cochrane. The grid lines surveyed are located within the following claims:

Grid E: 1128009, 1128010, 1128011, 1128014, 1128177, 1128178, 1128179, 1128180, 1128181, 1128182, 1128183, 1128184, 1128185, 1128186, 1128187, 1128188, 1128190, 1128191, 1128192, 1128195, 1128196, 1128197, 1128198, 1128199, 1128203, 1128204, 1128205, 1128206, 1128207, 1113760, 1113761, 1113762, 1113763, 1113764, P393395, P393398, P393400, P452684, P452687, P452688, P458304, P458305.

Grid H-East: P1200541, P1200542, P1200543, P1200544.

Grid F-G: P1200532, P1200533

The location of these claims can be seen in the following maps: Figure 3; Grid E, Figure 4; Grid H-East, and Figure 5; Grid F-G.

Figure 1: General Project Location

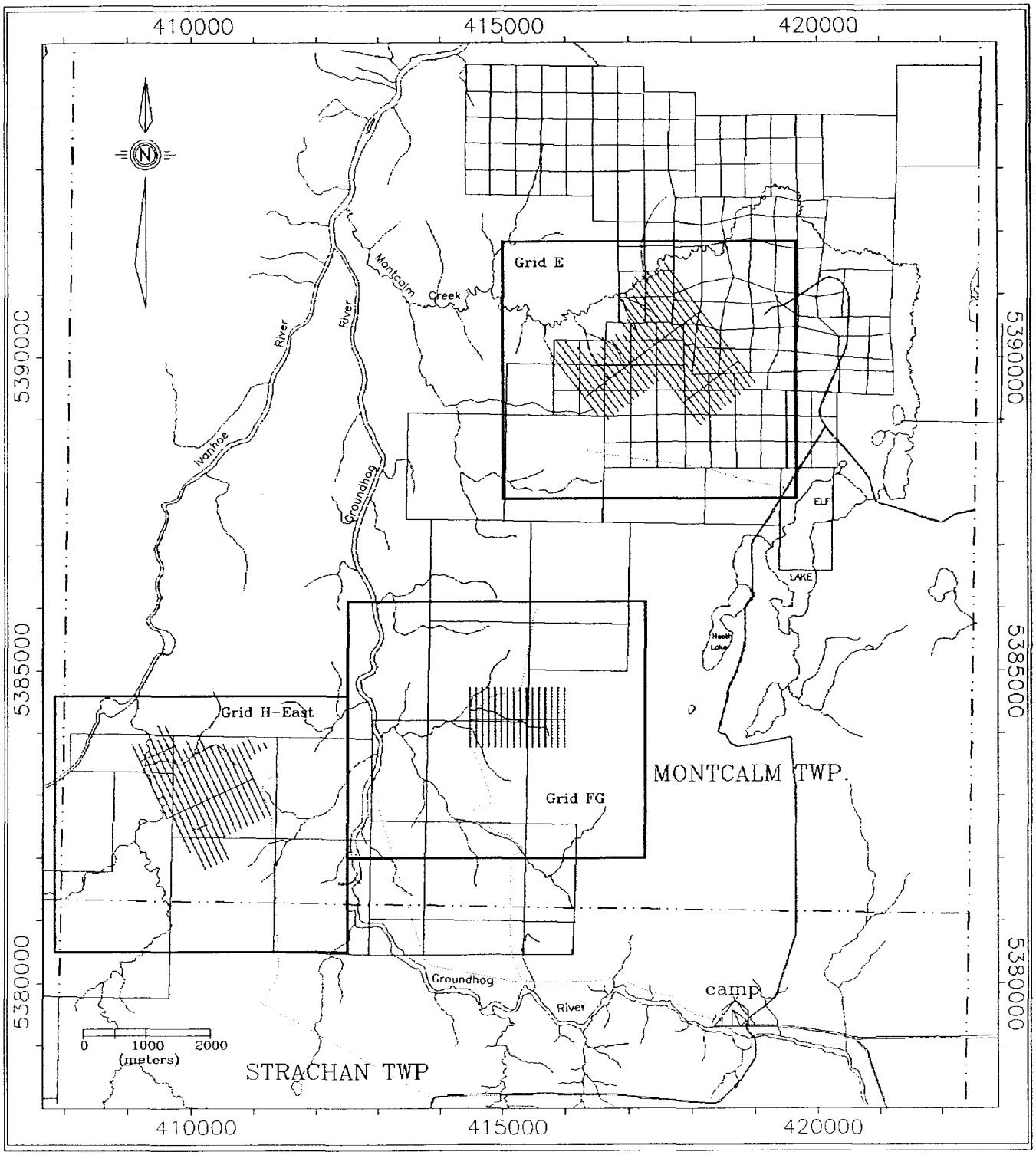


Figure 2: Project and Grids Location

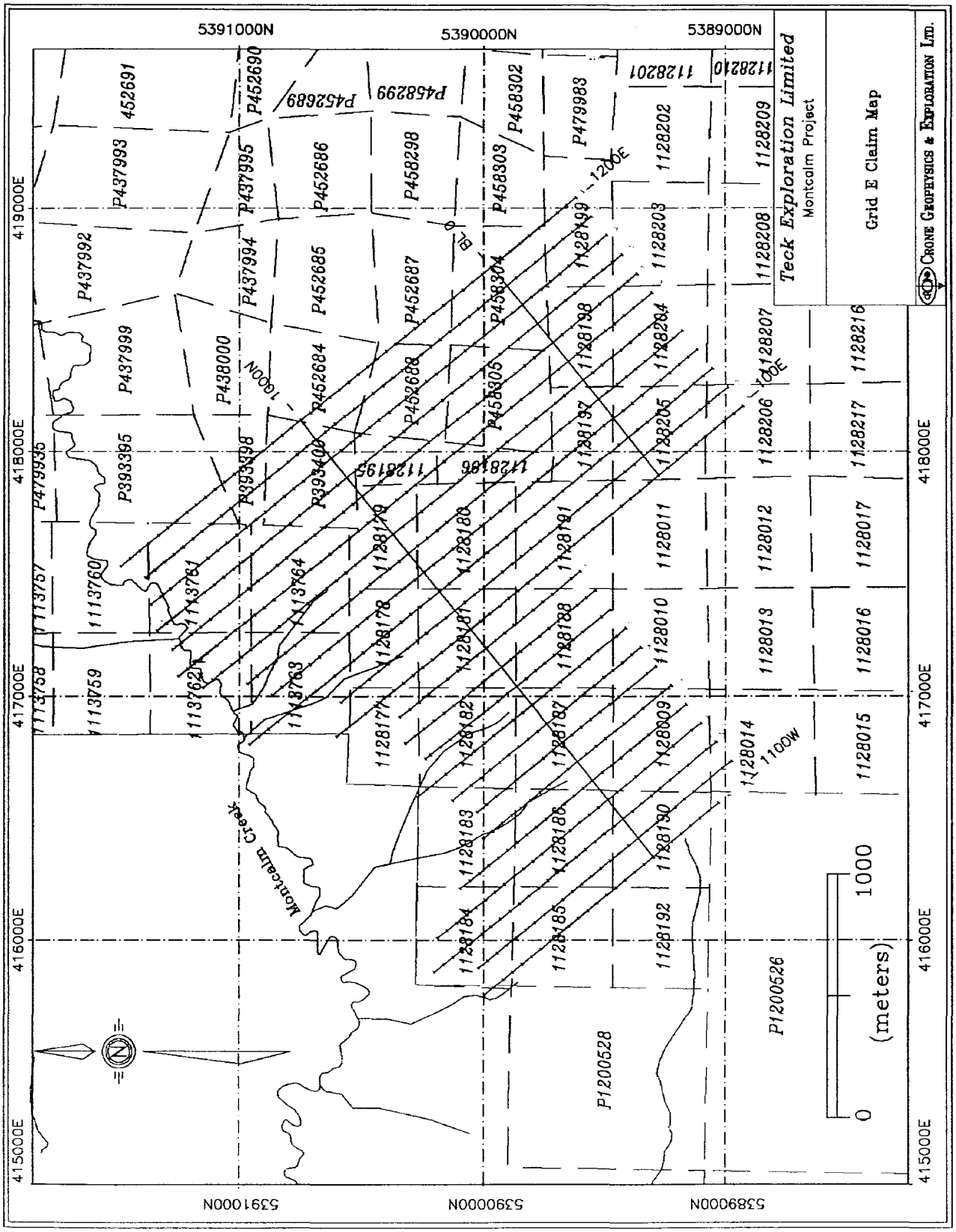


Figure 3: Grid E Claims Map

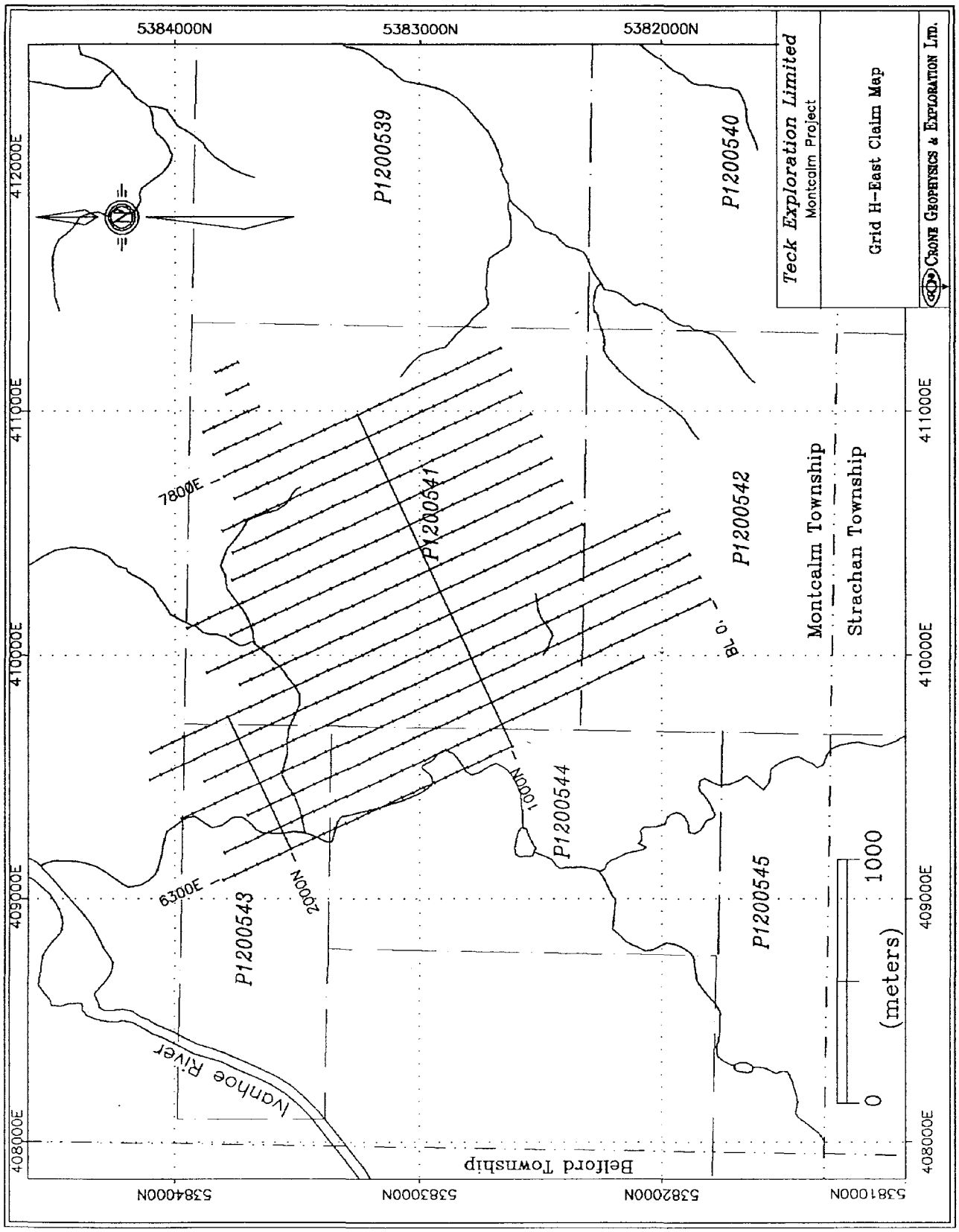


Figure 4: Grid H-East Claims Map

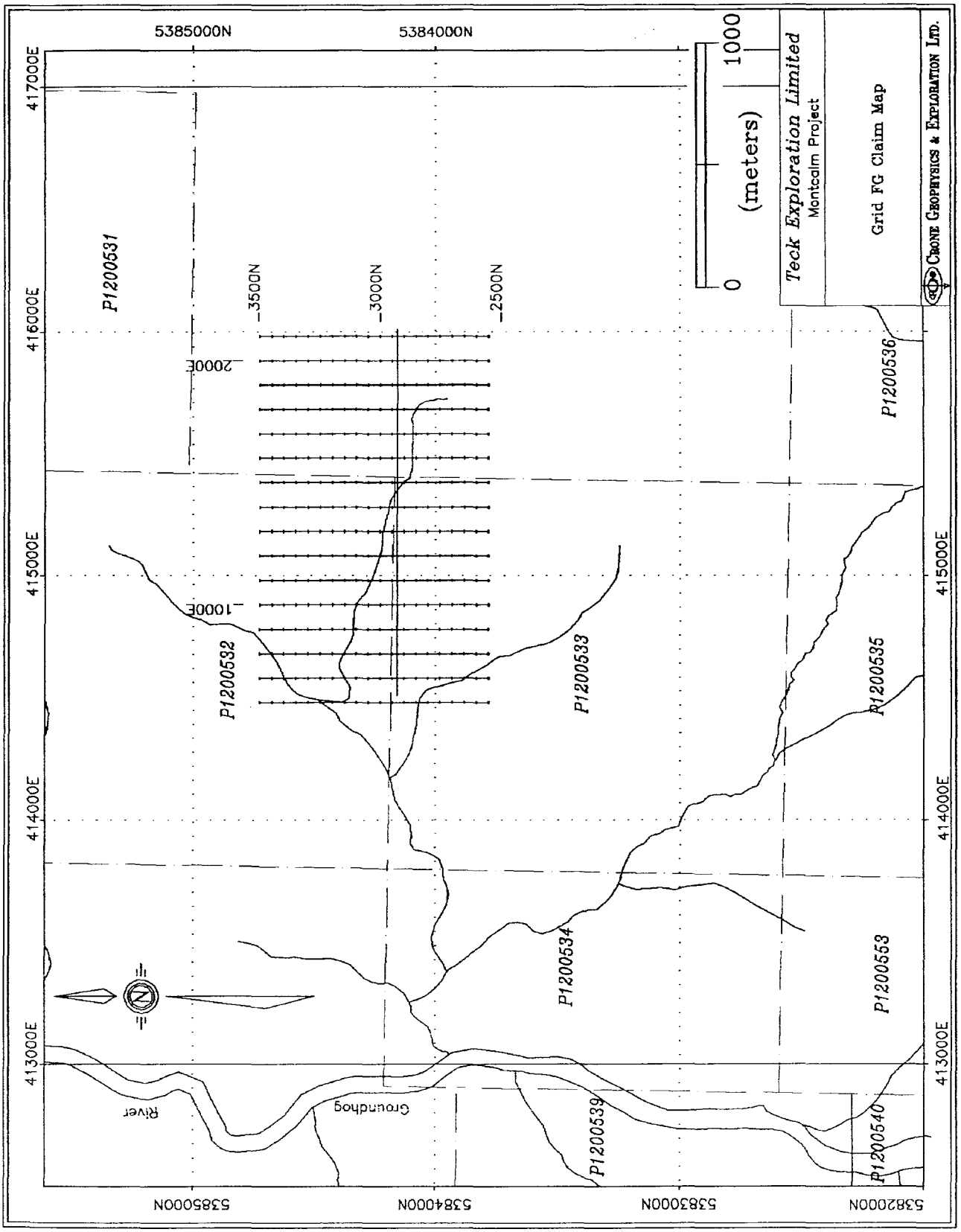


Figure 5: Grid F-G Claims Map

4. Personnel

The following personnel were involved in the collection of the data and production of this report:

Chief Operator:	Denis Jolin; Thunder Bay, Ontario. Data collection from February 18 to March 14, 1997.
Second Operator:	Steve Woodward; Dorchester, Ontario. Data collection from February 23 to March 18, 1997
Field Helper:	Wayne Beaton; Newmarket, Ontario Helper from February 18 to February 27, 1997.
Field Helper:	Guy Fortin; Larder Lake Helper from February 23 to March 18, 1997
Field Helper:	Alexander Kim; Toronto, Ontario Helper from February 27 to March 18, 1997
Field Foreman:	Jim MacNeil; Brampton, Ontario Data collection from March 14 to 18, 1997. Final data plotting and map production.
Geophysicist:	Bill Ravenhurst; Mississauga, Ontario Interpretation

5. Pulse EM Survey Program

5.1. Pulse EM General Description and Instrumentation

The Crone Pulse EM system is a time domain electromagnetic method that utilises an alternating pulsed primary current with a controlled shut-off and measures the rate of decay of the induced secondary field across a series of time windows during the off-time. The system uses a transmit loop of any size or shape. A portable **240VDC, 11hp Motor Generator** powers the **PEM 4.8 kW Transmitter** which provides a precise current waveform through the loop. The receiver apparatus is moved along surface lines or down boreholes.

The transmitter cycle consists of slowly increasing the current over a few milliseconds, a constant current , abrupt linear termination of the current ("Ramp Time") , and finally, zero current for a selected length of time in milliseconds ("Time Base"). The EMF created by the shutting-off of the current induces eddy currents in nearby conductive material thus setting-up a secondary magnetic field. When the primary field is terminated, this magnetic field will decay with time. The amplitude of the secondary field and the decay rate are dependent on the quality and size of the conductor. The receiver, which is synchronised to the off-time of the transmitter, measures this transient magnetic field where it cuts the receiver apparatus. These readings are across fixed time windows or "Channels" and are recorded with the **PEM Digital Receiver**. Synchronisation between the receiver and transmitter is maintained by a direct cable, radio link, or **Crystal Clock.**

In surface line profiling methods, a **Receive Coil,** mounted on a tripod is used to measure the induced secondary field. The coil can be orientated to measure the vertical (dBz/dt), in-line horizontal (dBx/dt), and cross-line horizontal (dBy/dt) components.

The system uses a maximum current of 20 amperes. As in all fixed loop EM surveys, as the loop size increases, the wire resistance rises and the current decreases. Higher voltage is then required to increase the current. The standard 2.4 kw PEM Transmitter has a maximum voltage of 120 volts. The 4.8 kw Transmitter is capable of 240 volts thus allowing for larger loops without losing current.

Specifications of the equipment used for the survey can be found in Appendix III at the end of the report.

5.2. Survey Procedure

There are several survey configurations possible with the Pulse EM equipment. Description of these methods can be found in Appendix IV.

The "DEEPEM" survey method was used for the Montcalm project In this mode, survey lines are read outside and perpendicular to the long side of a stationary transmit loop. It provides good depth penetration for conductors with dips of 45 ° or more. The distance that lines are read out from the loop is about twice the width of the loop. Line spacing was 100 metres and station interval was 50 metres. The survey read the vertical (dBz/dt) and the in-line horizontal (dBx/dt) components of the secondary EM field.

A crew of four was used to carry out the survey: two operators and two helpers. Two receiver units were used because a drilling program for Teck was underway and it was imperative that the survey on Grid E be completed, and potential drill target identified, before the current drilling finished. The crew was able to begin by mid February when most of the line cutting had been completed. The survey started on Grid E and then onto Grid H-East. Grid F-G was the last to be cut and surveyed. The operators worked on separate lines but from the same transmit loop. Both units were synchronized to the transmitter with a crystal clock. Enough wire was available to have the next loop prepare before reading on the first was completed. When not laying out or picking up loop wire, the helpers assisted the operators on the lines by carrying and orientating the receive coil.

Loop size in this survey program ranged from 700 x 500 metres to 1400 x 1300 metres. The size of grid area, the length of the lines to be read, and the most effective way to survey this area while staying within the method guidelines, determined the size of the loop to use. The nominal current through the loops was 16 amperes. To maintain this current through the larger loop, double strands of wire was used to lower the total loop resistance.

The polarity convention for a DEEPEM survey is that the vertical component of the primary field is positive outside the transmit loop. The horizontal component is positive in the direction towards the loop. The orientation of the receive coil does not change when reading extends inside the loop.

The data was uploaded and plotted at the camp. A copy of the profiles and digital data was given regularily to Crone and to Teck in Timmins so that drill targets could be identified.

5.3. Survey Coverage

The following tables list the lines and stations read by the survey.

Table I: Survey Coverage; Grid E

Line	Tx Loop	Components Measured	Channels Read	Station Interval (metres)	Start	Finish	Total (metres)
1100W	3	X, Z	20	50	650N	1900N	1300
1000W	3	X, Z	20	50	500N	1850N	1350
900W	3	X, Z	20	50	500N	2000N	1500
800W	3	X, Z	20	50	500N	1900N	1400
700W	3	X, Z	20	50	500N	1700N	1200
600W	3	X, Z	20	50	500N	1500N	1000
500W	3	X, Z	20	50	500N	1450N	950
400W	3	X, Z	20	50	500N	1500N	1000
300W	3	X, Z	20	50	500N	1600N	1100
200W	3	X, Z	20	50	500N	1450N	950
100W	3	X, Z	20	50	500N	1500N	1000
0	3	X, Z	20	50	500N	1450N	950
100E	1	X, Z	20	50	450S	650N	1100
100E	2	X, Z	20	50	650N	1700N	1050
200E	1	X, Z	20	50	450S	650N	1100
200E	2	X, Z	20	50	650N	1600N	950
300E	1	X, Z	20	50	450S	650N	1100
300E	2	X, Z	20	50	650N	2000N	1350
400E	1	X, Z	20	50	450S	650N	1100
400E	2	X, Z	20	50	650N	1800N	1150
500E	1	X, Z	20	50	450S	650N	1100
500E	2	X, Z	20	50	650N	1850N	1200
600E	1	X, Z	20	50	450S	650N	1100
600E	2	X, Z	20	50	650N	2000N	1350
700E	1	X, Z	20	50	450S	650N	1100
700E	2	X, Z	20	50	650N	2050N	1400
800E	1	X, Z	20	50	450S	650N	1100
800E	2	X, Z	20	50	650N	2000N	1350
900E	1	X, Z	20	50	450S	650N	1100
900E	2	X, Z	20	50	650N	2000N	1350
1000E	1	X, Z	20	50	450S	650N	1100
1000E	2	X, Z	20	50	650N	1950N	1300
1100E	1	X, Z	20	50	450S	650N	1100
1100E	2	X, Z	20	50	650N	1900N	1250
1200E	1	X, Z	20	50	450S	650N	1100
1200E	2	X, Z	20	50	650N	1950N	1300

Table II: Survey Coverage; Grid H-East

Line	Tx Loop	Components Measured	Channels Read	Station Interval (metres)	Start	Finish	Total (metres)
6300E	4	X, Z	20	50	1000N	2300N	1300
6400E	4	X, Z	20	50	350N	2250N	1900
6500E	4	X, Z	20	50	0	2100N	2100
6600E	4	X, Z	20	50	0	2350N	2350
6700E	4	X, Z	20	50	0	2200N	2200
6800E	4	X, Z	20	50	0	2400N	2400
6900E	4	X, Z	20	50	0	2350N	2350
7000E	4	X, Z	20	50	350N	1900N	1550
7100E	4	X, Z	20	50	350N	2000N	1650
7200E	4	X, Z	20	50	350N	1850N	1500
7300E	4	X, Z	20	50	350N	2000N	1650
7400E	4	X, Z	20	50	350N	1750N	1400
7500E	4	X, Z	20	50	350N	1700N	1350
7600E	4	X, Z	20	50	350N	1700N	1350
7700E	4	X, Z	20	50	350N	1600N	1250
7800E	4	X, Z	20	50	350N	1600N	1250
7900E	4	X, Z	20	50	1300N	1600N	300
8000E	4	X, Z	20	50	1350N	1600N	250
8100E	4	X, Z	20	50	1350N	1450N	100
8200E	4	X, Z	20	50	1350N	1450N	100

Table III: Survey Coverage; Grid F-G

Line	Tx Loop	Components Measured	Channels Read	Station Interval (metres)	Start	Finish	Total (metres)
600E	5	X, Z	20	50	2550N	3500N	950
700E	5	X, Z	20	50	2550N	3500N	950
800E	5	X, Z	20	50	2550N	3500N	950
900E	5	X, Z	20	50	2550N	3500N	950
1000E	5	X, Z	20	50	2550N	3500N	950
1100E	5	X, Z	20	50	2550N	3500N	950
1200E	5	X, Z	20	50	2550N	3500N	950
1300E	5	X, Z	20	50	2550N	3500N	950
1400E	6	X, Z	20	50	2550N	3500N	950
1500E	6	X, Z	20	50	2550N	3500N	950
1600E	6	X, Z	20	50	2550N	3500N	950
1700E	6	X, Z	20	50	2550N	3500N	950
1800E	6	X, Z	20	50	2550N	3500N	950
1900E	6	X, Z	20	50	2550N	3500N	950
2000E	6	X, Z	20	50	2550N	3500N	950
2100E	6	X, Z	20	50	2550N	3500N	950

5.4. Survey Parameters

The parameters for the survey are listed in the following table.

Table IV: Survey Parameters

Grid	Tx Loop	Loop Coordinates	Loop Size (metres)	Current (amps)	Time Base (ms)	Ramp Time (ms)	Sync Type
E	1	100E/500S, 100E/1100S, 1200E/1100S, 1200E/500S	1100 x 600	16	16.66	1.5	Crystal clock
E	2	100E/600N, 100E/0, 1200E/0, 1200E/600N	1100 x 600	16	16.66	1.5	Crystal clock
E	3	1100W/600N, 1100W/0, 100E/0, 100E/600N	1200 x 600	16	16.66	1.5	Crystal clock
H	4	6400E/300N, 6400E/1000S, 7800E/1000S, 7800E/300N	1400 x 1300	16	16.66	1.5	Crystal clock
F-G	5	600E/2500N, 600E/2000N, 1400E/2000N, 1400E/2500N	800 x 500	16	16.66	1.5	Crystal clock
F-G	6	1400E/2500N, 1400E/2000N, 2100E/2000N, 2100E/2500N	700 x 500	16	16.66	1.5	Crystal clock

5.5. Data Processing and Plotting

The data measured by the Pulse EM Digital Receiver is calibrated for the effective area of the Receive Coil and the output is in nanoTeslas/second. There is no internal scaling or filtering of the data. The data was uploaded to a PC and plotted as line profiles using a logarithmic data scale. The profiles of all the data collected can be found in the accompaning binder labelled #1: Appendix 1. No filtering or cleaning, apart from editting station number errors, was done to the data.

A second set of data profiles are included with the report in the binder labelled #2: Appendix II. They are line profile of the same data but a linear scale was used for the Horizontal component and the vertical component was filtered using a 50 metre Fraser Filter. The linear scale better represents subtle anomalies in the early channels than does the logarithmic scale. The Fraser filter treatment of the survey readings is an effective way of removing the long wavelength "ring current" effect in the vertical data caused by a horizontal conductive layer. The formula for the Fraser filter value is

$$f_{2,3} = (M_3+M_4) - (M_1+M_2)$$

where M_1, M_2, M_3, and M_4 are consecutive data points. $f_{2,3}$ is plotted midway between M_2 and M_3 .

6. Interpretation of Results

6.1. Interpretation Procedure

Since this was an extension of a Pulse EM survey performed in 1995. Conductor extensions maintained the same identification number, and new conductors have been given new, unique numbers. The interpretation procedure follows very closely the procedure outlined in the Interpretation Report from the 1995 survey (Watson: Final Report, 1995).

Depth estimates are approximate due to distortions from multiple conductors and because the anomaly from a deep vortex current in a sheet-like conductor can have the same wavelength as a line current channelled into thickened overburden in a wide bedrock trough. Thus, short wavelength anomalies can be written off as near-surface effects, but longer wavelength anomalies require further scutiny before concluding that their source is in bedrock. One clue is strike length - very long strike length conductors have been assumed to be overburden in linear troughs. Another clue is conductance. Unfortunately, none of the conductors identified in the survey have the usual high conductance associated with base metal targets.

6.2. Description of Conductors

The following tables describes the conductors identified in the three surveyed grids. 1:5000 scale Conductor Location Maps of each of the three grids accompanies the report.

Table V: Description of Conductors; Grid E

Cond. #	Strike Length	# of Chn.	Dip	Depth	Priorty	Comments
E17	1000m	6-7	near vert.	<50m	low	Weak, early channels response, probably caused by thickened overburden in bedrock trough.
E18	400m	7-8	near vert.	<50m	low	Weak, early channels response, probably caused by thickened overburden in bedrock trough.
E19	900m	8	near vert.	<50m	low	Weak, early channel response, probably caused by thickened overburden in bedrock trough.

Cont....

Table V: Description of Conductors; Grid E continued....

E20	100m	7-8	near vert.	<50m	low - medium	Weak, early channel response, associated with Mag high. Probably overburden; possibly serp/magnetite/sulphide zone at depth >100m.
E21	100m	9	near vert.	<50m	low	Weak, early channel response; probably caused by overburden.
E22	100m	7	near vert.	<50m	low	Weak, early channel response; probably caused by overburden.
E23	200m	6-7	near vert.	<50m	low	Weak, early channel response; probably caused by overburden.
E24	300m	8-9	south	50 - 100m	low	Asymmetric; early channel response becoming better defined to east. Probably serp. zone within UM and deepening to west.
E25	1600m	8-10	near vert.	<50m	low	Long, linear feature with no Mag correlation. Probable cause is thickened overburden in bedrock trough.
E26	600m	11-13	near vert.	<50m	medium	Medium conductivity, near surface conductor on Mag high. Probable serp. zone, possible sulphides.
E27	200m	10-11	near vert.	<50m	low	Best response is on line 100E, but still weak. Probable overburden or fault zone.
E28	600m	8-10	near vert.	<50m	low	Best defined anomaly on line 100W. Probable overburden. Possible weak mineralized zone.
E29	600m	8	near vert.	<50m	low	This is an extension of conductor E10 from the previous survey and is a likely extension of conductor E25 as well. Probable cause is overburden. Best response is on line 800W.
E30	300m	9-10	near vert.	<50m	low	Weak, early channels respone, probably caused by overburden.
E31	200m	9	near vert.	<50m	low	Very weak, early channels response, probably caused by overburden.
E32	300m	11	near vert.	<50m	low	Anomaly position shifts in time, indicating diffusion of induced currents. This implies a thick, 3-D body of medium conductivity, probably a serp. body associated with the Mag high just to the north.

Table VI: Description of Conductors; Grid H - East

Table VI: Description of Conductors; Grid H - East continued...

7. Conclusions and Recommendations

Due to the low conductance of all the identified conductors, there are no high priorty targets. Medium priorty targets are:

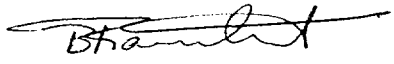
H64; 100 metres target depth below line 6500E at 1000N
H65; 120 metres target depth below line 6500E at 1750N
E26; 75 metres target depth below line 900E at 1800N

Slightly less of a priorty would be the following anomalies:

H61; 120m target depth below line 7100E at 950N
H67; (see description in Table VI. Should be detailed with additional lines and a closer loop)
E20; 120m target depth below line 1200E at 250N.

Results from previous drilling and any known geology should be considered before drilling these targets, because they are all of low conductance and, as mentioned previously, could easily be due to a wider section of thickened overburden.

Respectfully submitted,



Bill Ravenhurst
Geophysicist
Crone Geophysic & Exploration Ltd.

APPENDIX: I

Data Profiles
Logarithmic Scale of Horizontal and Vertical Components; channels 1-20

650N 750N 850N 950N 1050N 1150N 1250N 1350N 1450N 1550N 1650N 1750N 1850N 1950N 2050N

nanoTesla/sec²

10^3 10^2 10 0 −10 -10^2 -10^3

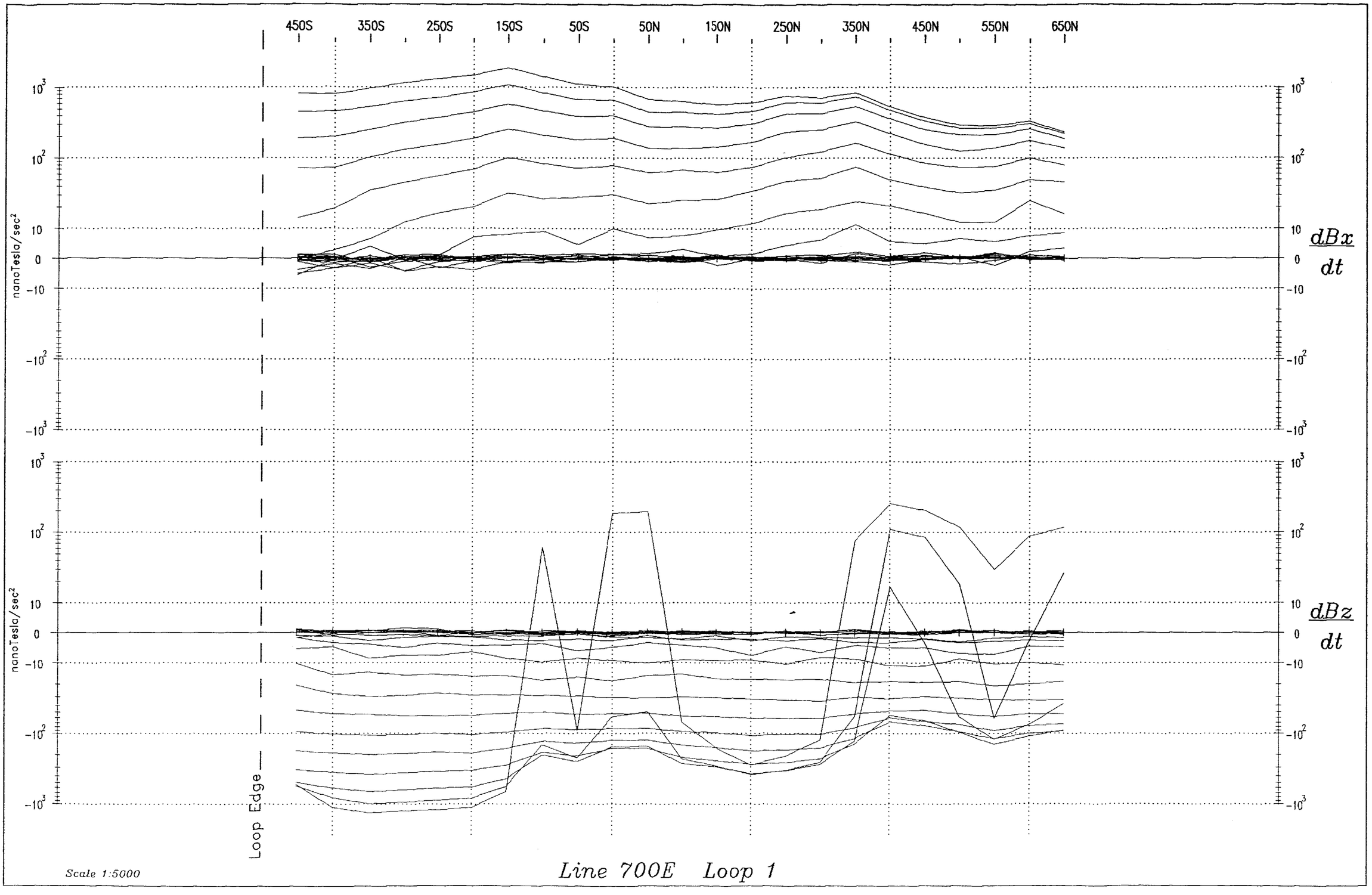
$\frac{dBx}{dt}$

$\frac{dBz}{dt}$

Loop Edge

Scale 1:5000

Line 700E Loop 2


450S
350S
250S
150S
50S
50N
150N
250N
350N
450N
550N
650N
nanoTesla/sec²
$\frac{dBx}{dt}$
$\frac{dBz}{dt}$
Loop Edge
Scale 1:5000
Line 700E Loop 1

650N 750N 850N 950N 1050N 1150N 1250N 1350N 1450N 1550N 1650N 1750N 1850N 1950N

nanoTesla/sec²

10^3 10^2 10 0 −10 -10^2 -10^3

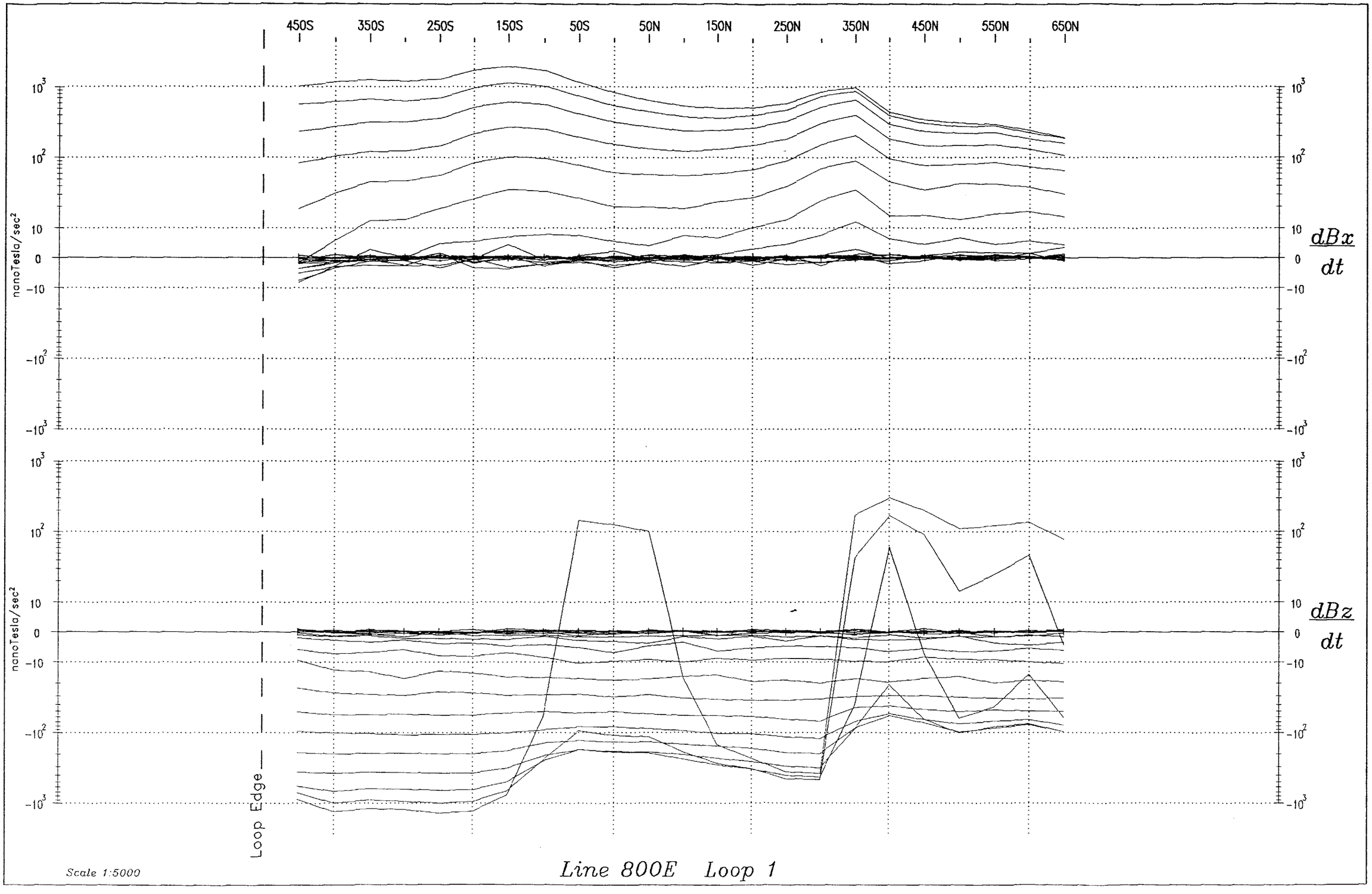
$\frac{dBx}{dt}$

$\frac{dBz}{dt}$

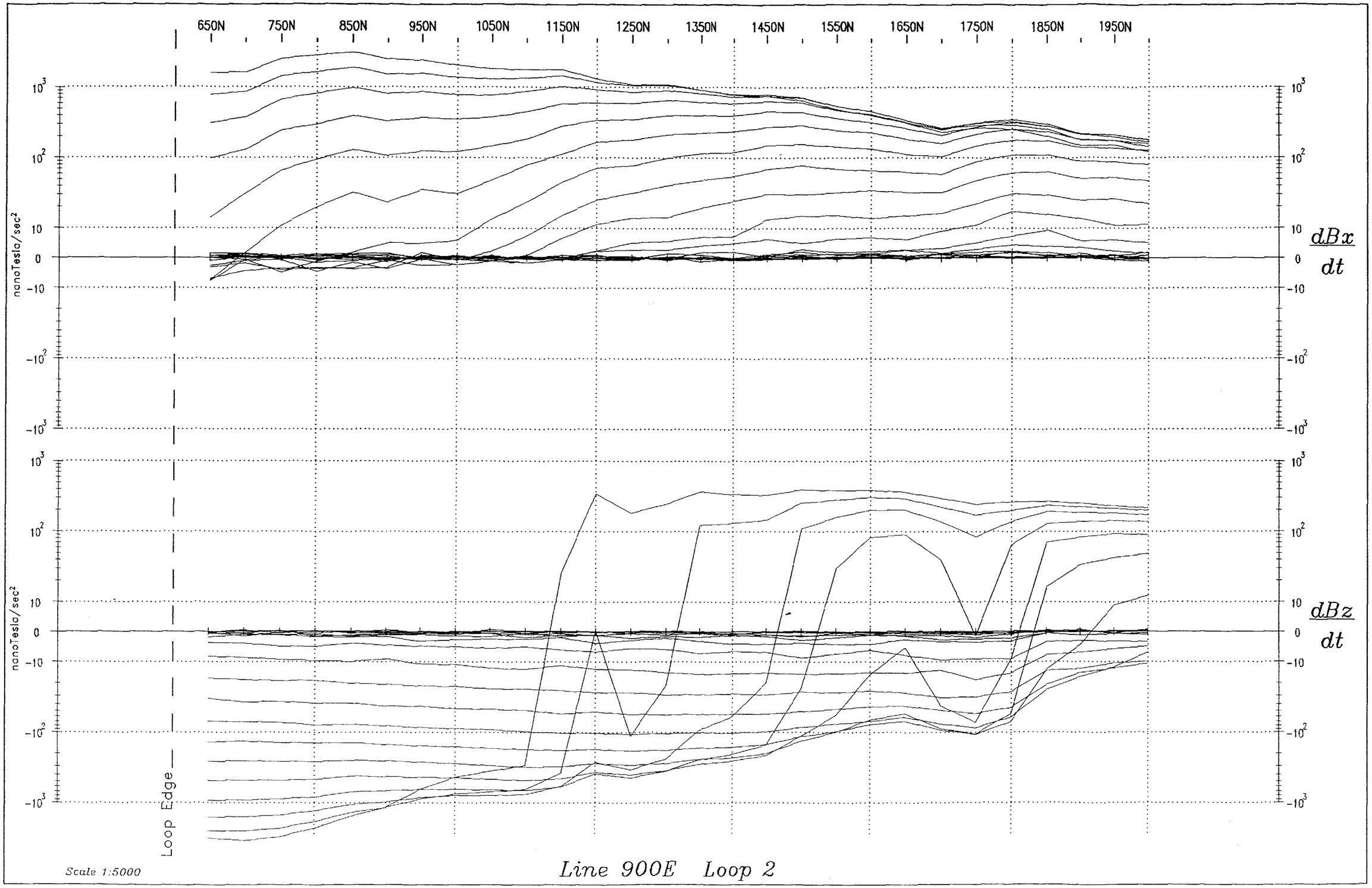
Loop Edge

Scale 1:5000

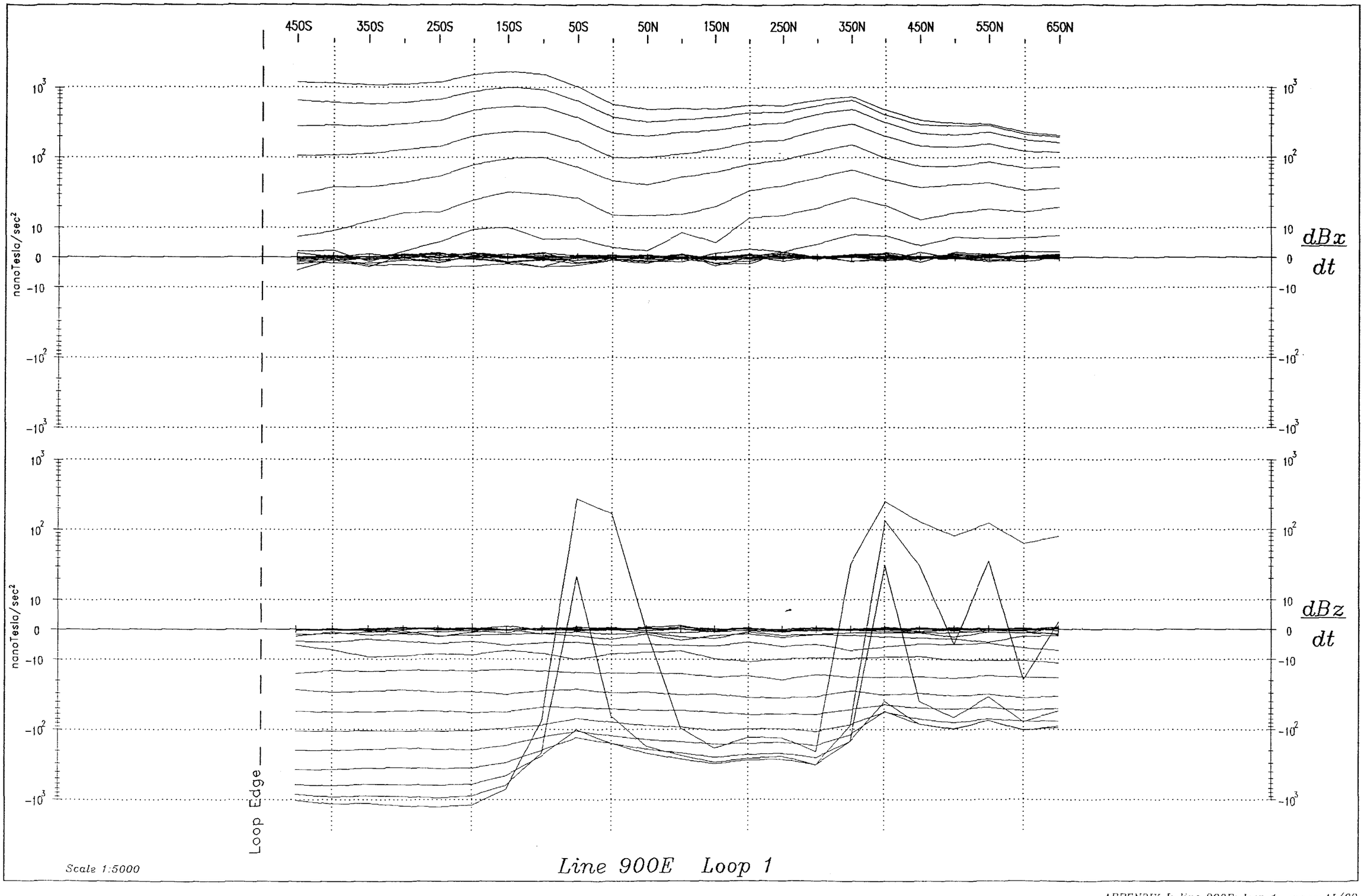
Line 800E Loop 2



Line 800E Loop 1



Line 900E Loop 2



Scale 1:5000

Line 900E Loop 1

650N 750N 850N 950N 1050N 1150N 1250N 1350N 1450N 1550N 1650N 1750N 1850N 1950N

nanoTesla/sec²

10^3 10^2 10 0 -10 -10^2 -10^3

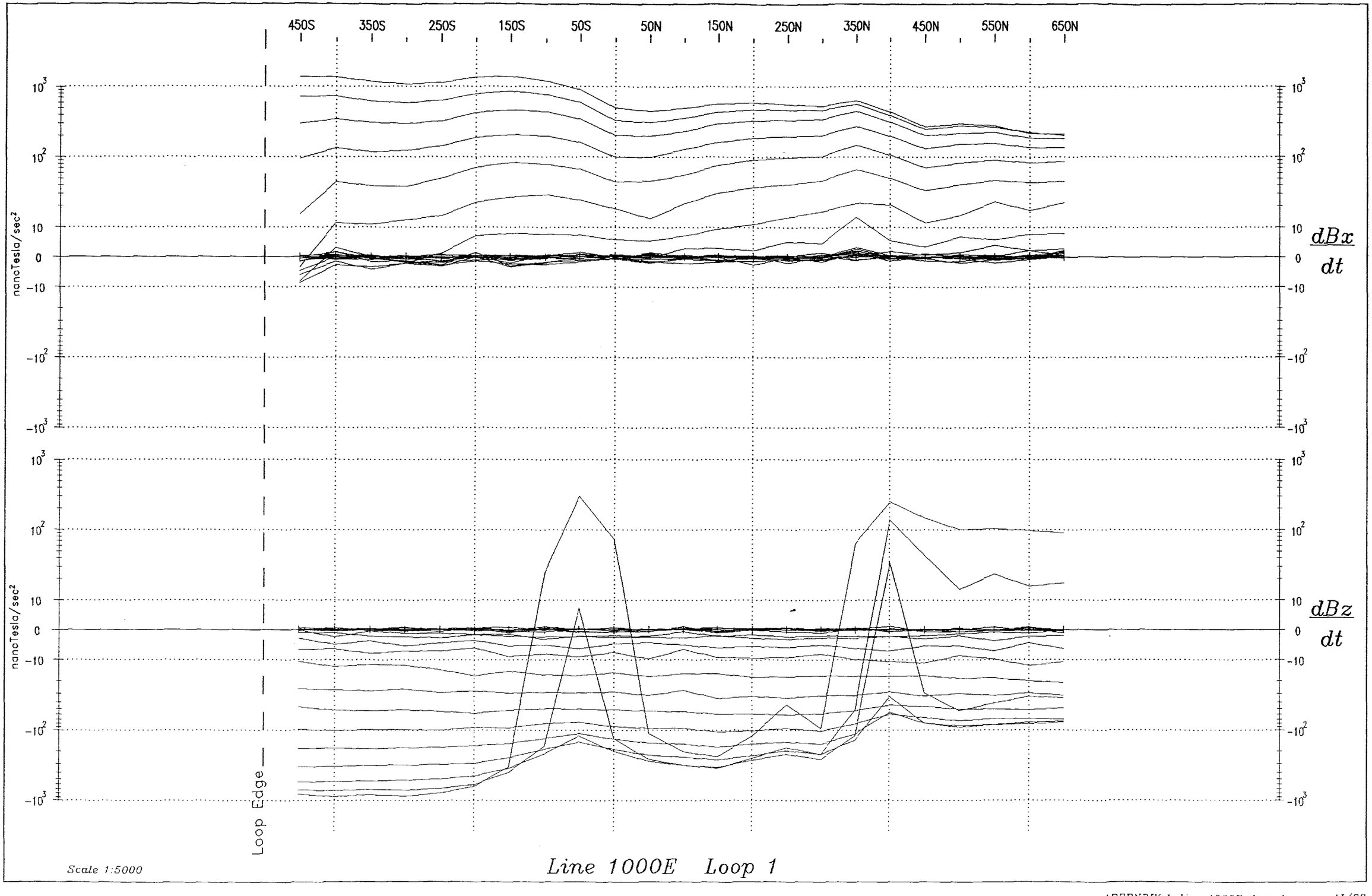
$\frac{dBx}{dt}$

$\frac{dBz}{dt}$

Loop Edge

Scale 1:5000

Line 1000E Loop 2



Scale 1:5000

Line 1000E Loop 1

650N 750N 850N 950N 1050N 1150N 1250N 1350N 1450N 1550N 1650N 1750N 1850N

nanoTesla/sec²

10^3 10^2 10 0 −10 -10^2 -10^3

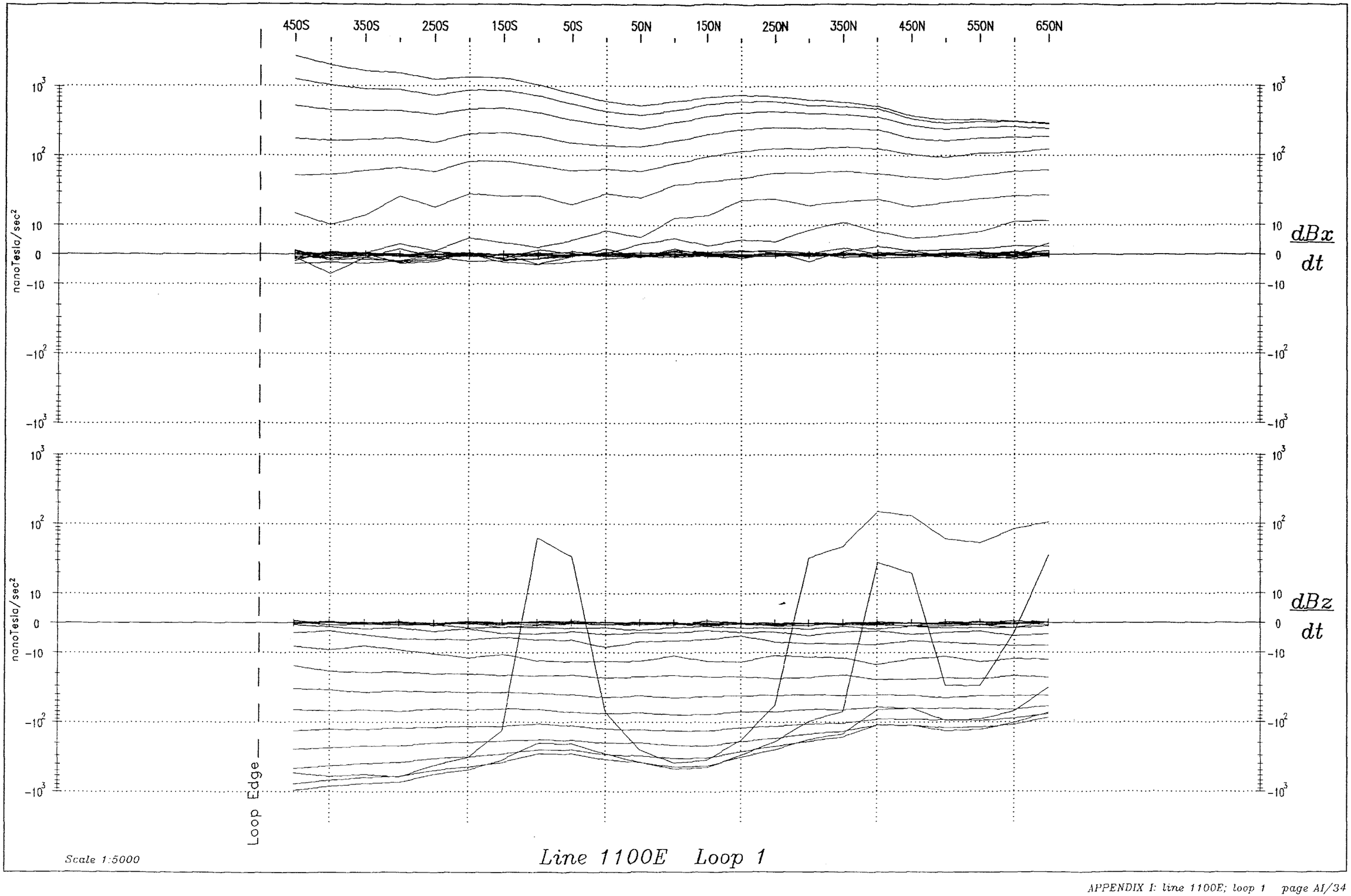
$\frac{dBx}{dt}$

$\frac{dBz}{dt}$

Loop Edge

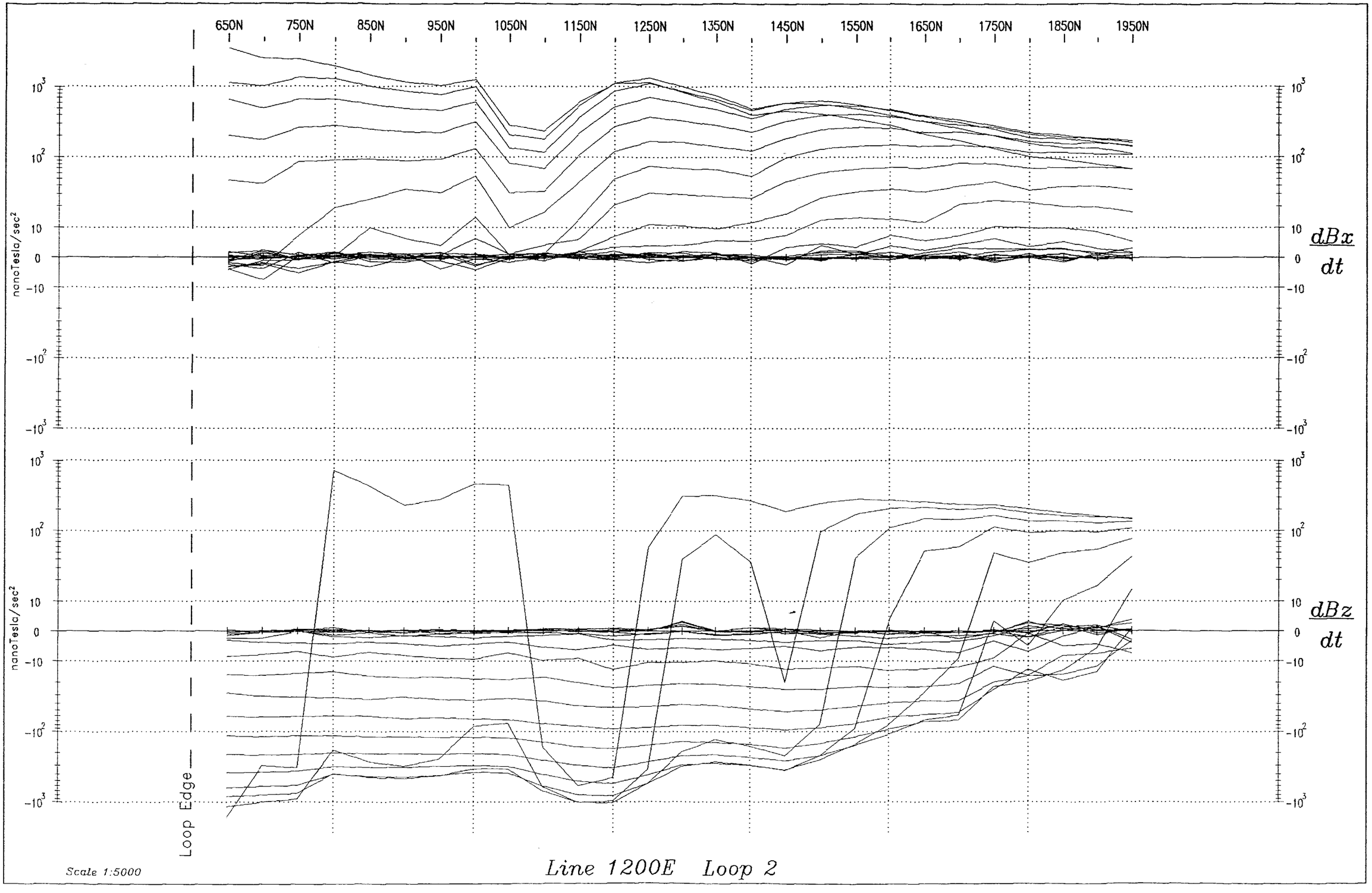
Scale 1:5000

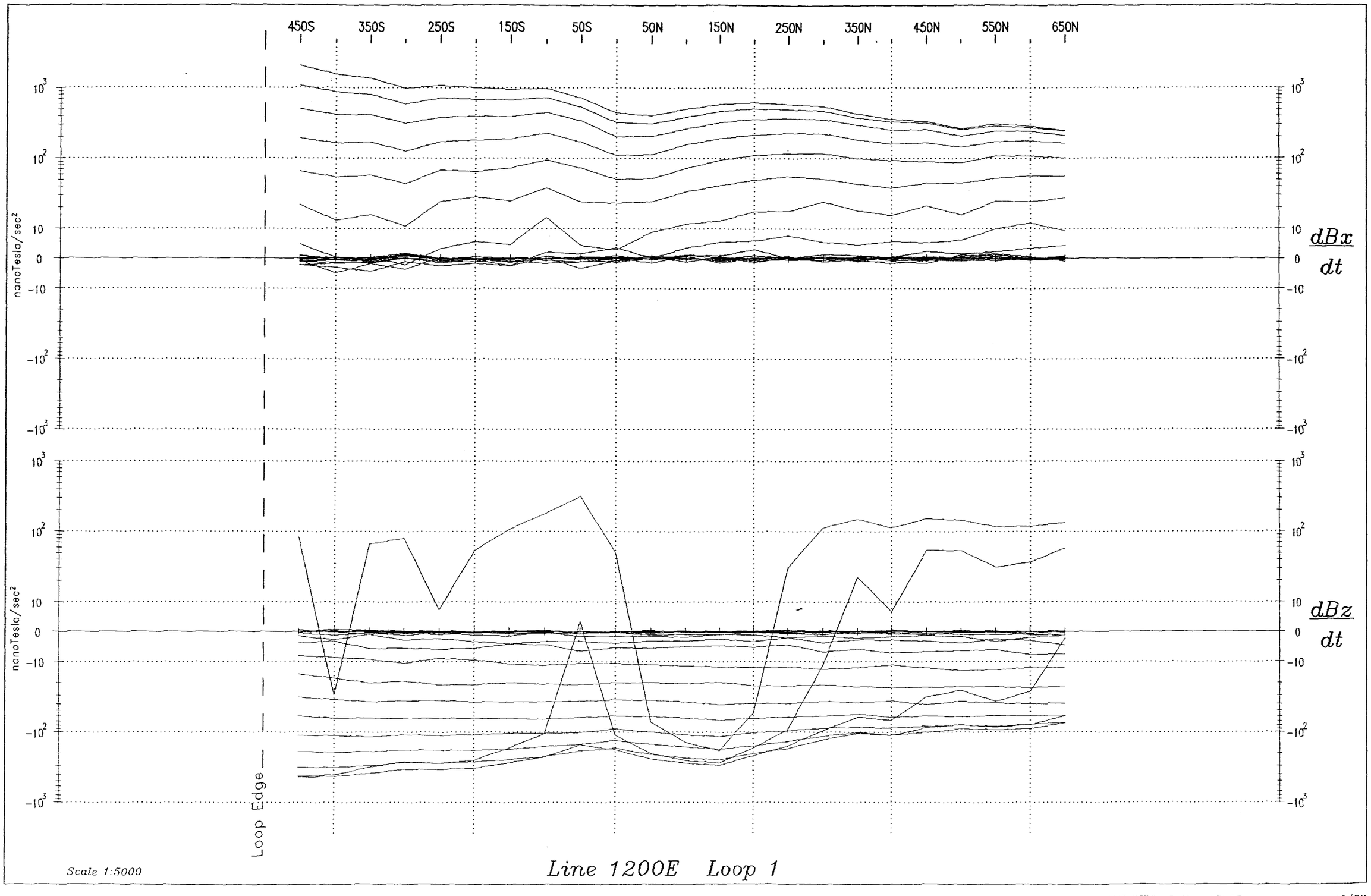
Line 1100E Loop 2



Scale 1:5000

Line 1100E Loop 1


650N
750N
850N
950N
1050N
1150N
1250N
1350N
1450N
1550N
1650N
1750N
1850N
1950N
nanoTesla/sec²
dBx/dt
dBz/dt
Loop Edge
Scale 1:5000
Line 1200E Loop 2



Scale 1:5000

Line 1200E Loop 1

APPENDIX: II

Data Profiles
Linear Scale of Horizontal Component, Channels 6-14
Logarmithic Scale of Fraser Filter of Vertical Component

650N 750N 850N 950N 1050N 1150N 1250N 1350N 1450N 1550N 1650N 1750N 1850N 1950N 2050N

nanoTesla/sec²

10^3 10^2 10 0 −10 -10^2 -10^3

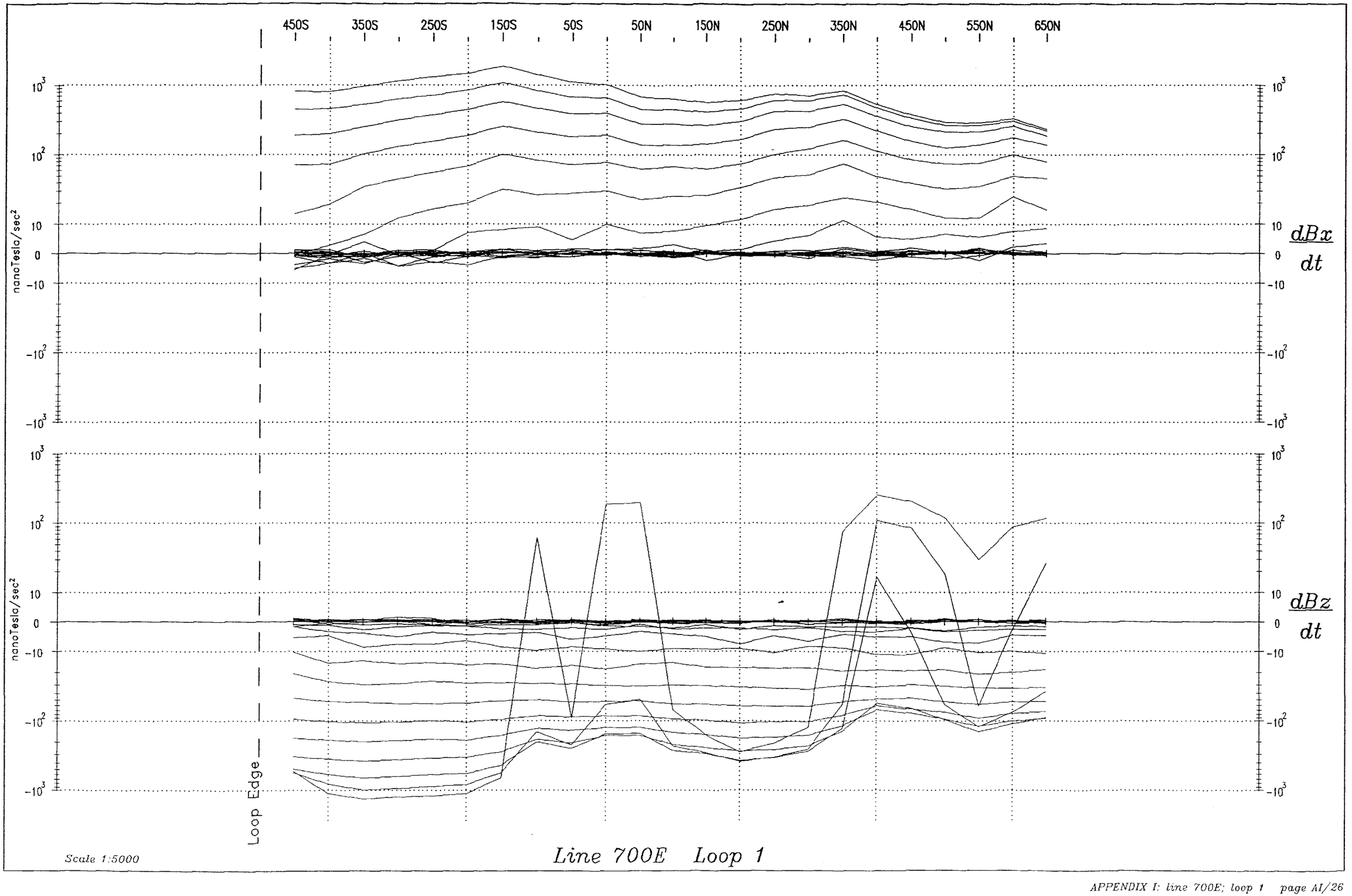
$\frac{dBx}{dt}$

$\frac{dBz}{dt}$

Loop Edge

Scale 1:5000

Line 700E Loop 2


450S
350S
250S
150S
50S
50N
150N
250N
350N
450N
550N
650N
nanoTesla/sec²
dBx/dt
dBz/dt
Loop Edge
Scale 1:5000
Line 700E Loop 1

650N 750N 850N 950N 1050N 1150N 1250N 1350N 1450N 1550N 1650N 1750N 1850N 1950N

nanoTesla/sec²

10^3 10^2 10 0 -10 -10^2 -10^3

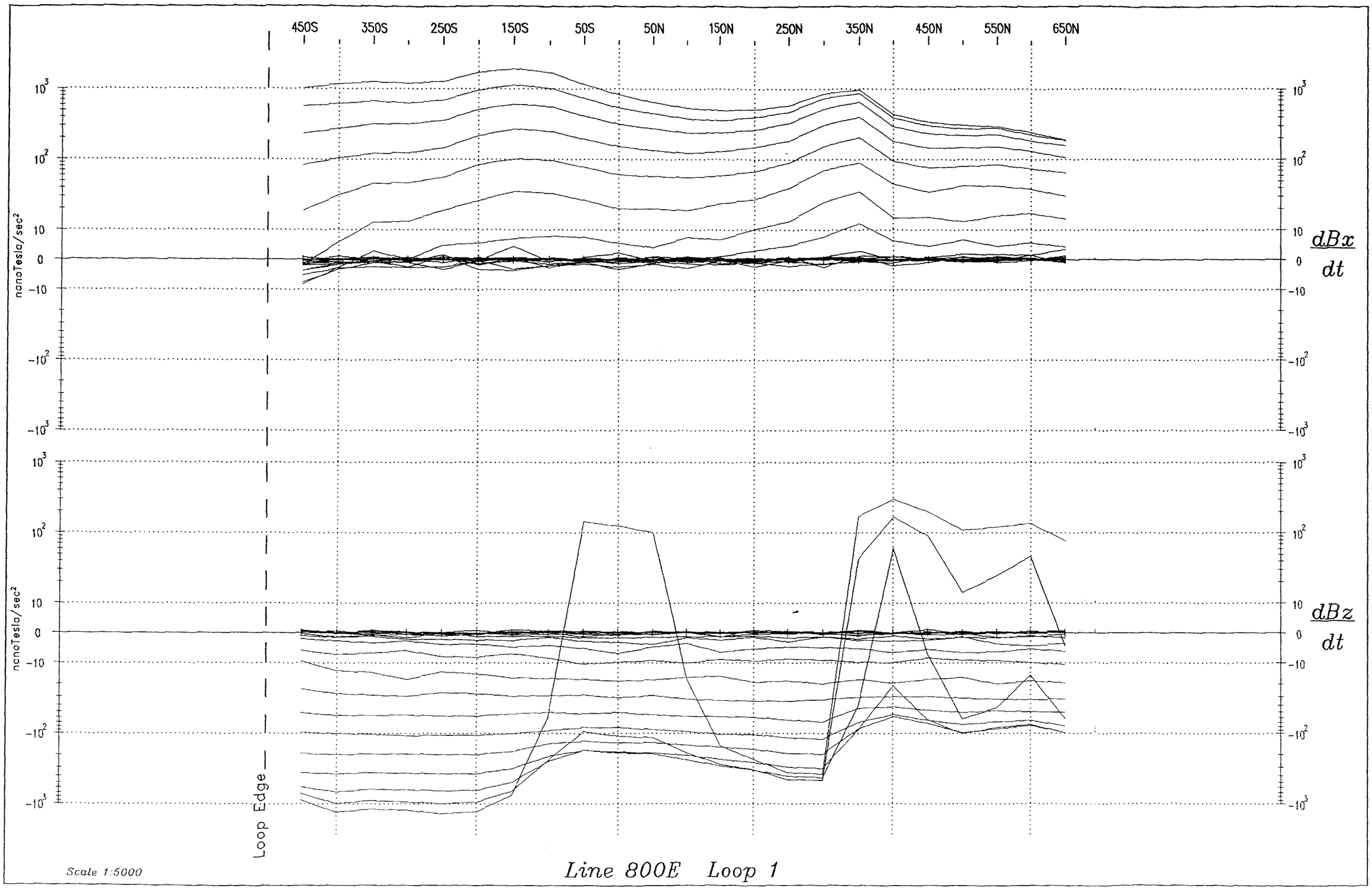
$\frac{dBx}{dt}$

$\frac{dBz}{dt}$

Loop Edge

Scale 1:5000

Line 800E Loop 2



Scale 1:5000

Line 800E Loop 1

650N 750N 850N 950N 1050N 1150N 1250N 1350N 1450N 1550N 1650N 1750N 1850N 1950N

nanoTesla/sec²

10^3 10^2 10 0 -10 -10^2 -10^3

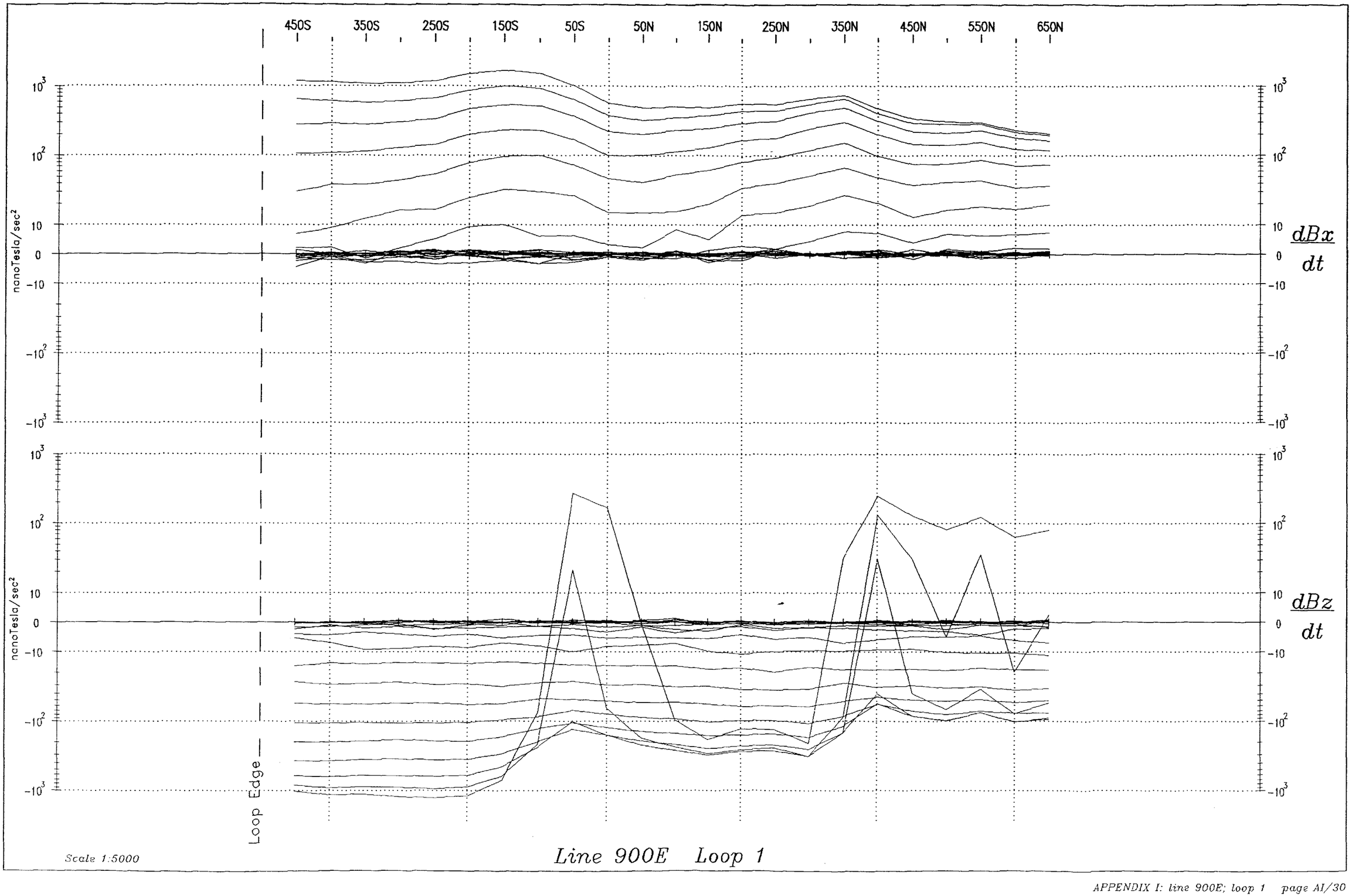
$\frac{dBx}{dt}$

$\frac{dBz}{dt}$

Loop Edge

Scale 1:5000

Line 900E Loop 2



Scale 1:5000

Line 900E Loop 1

650N 750N 850N 950N 1050N 1150N 1250N 1350N 1450N 1550N 1650N 1750N 1850N 1950N

nanoTesla/sec²

10^3 10^2 10 0 -10 -10^2 -10^3

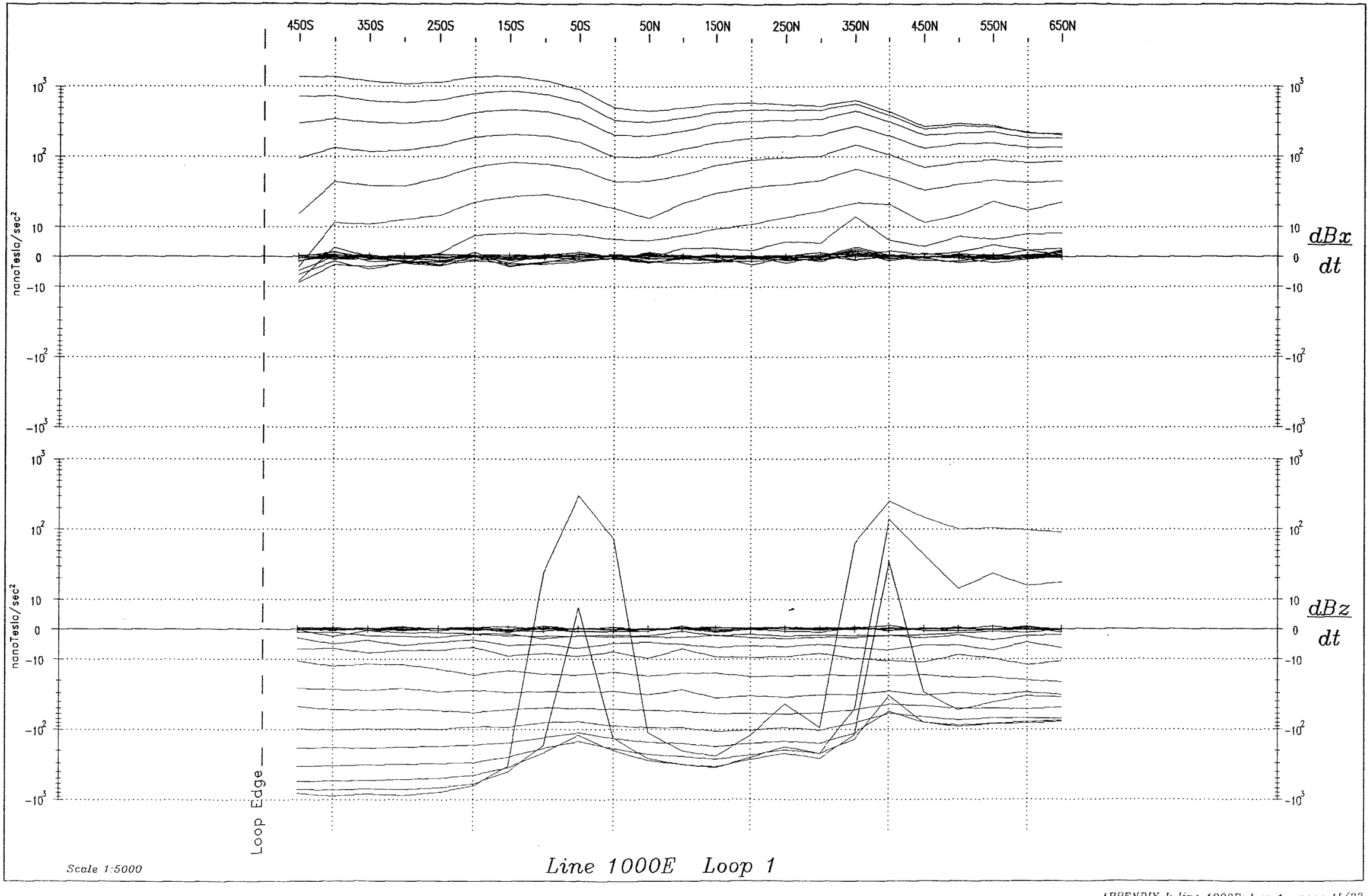
$\frac{dBx}{dt}$

Loop Edge

$\frac{dBz}{dt}$

Scale 1:5000

Line 1000E Loop 2



Scale 1:5000

Line 1000E Loop 1

650N 750N 850N 950N 1050N 1150N 1250N 1350N 1450N 1550N 1650N 1750N 1850N

nanoTesla/sec²

10^3 10^2 10 0 −10 -10^2 -10^3

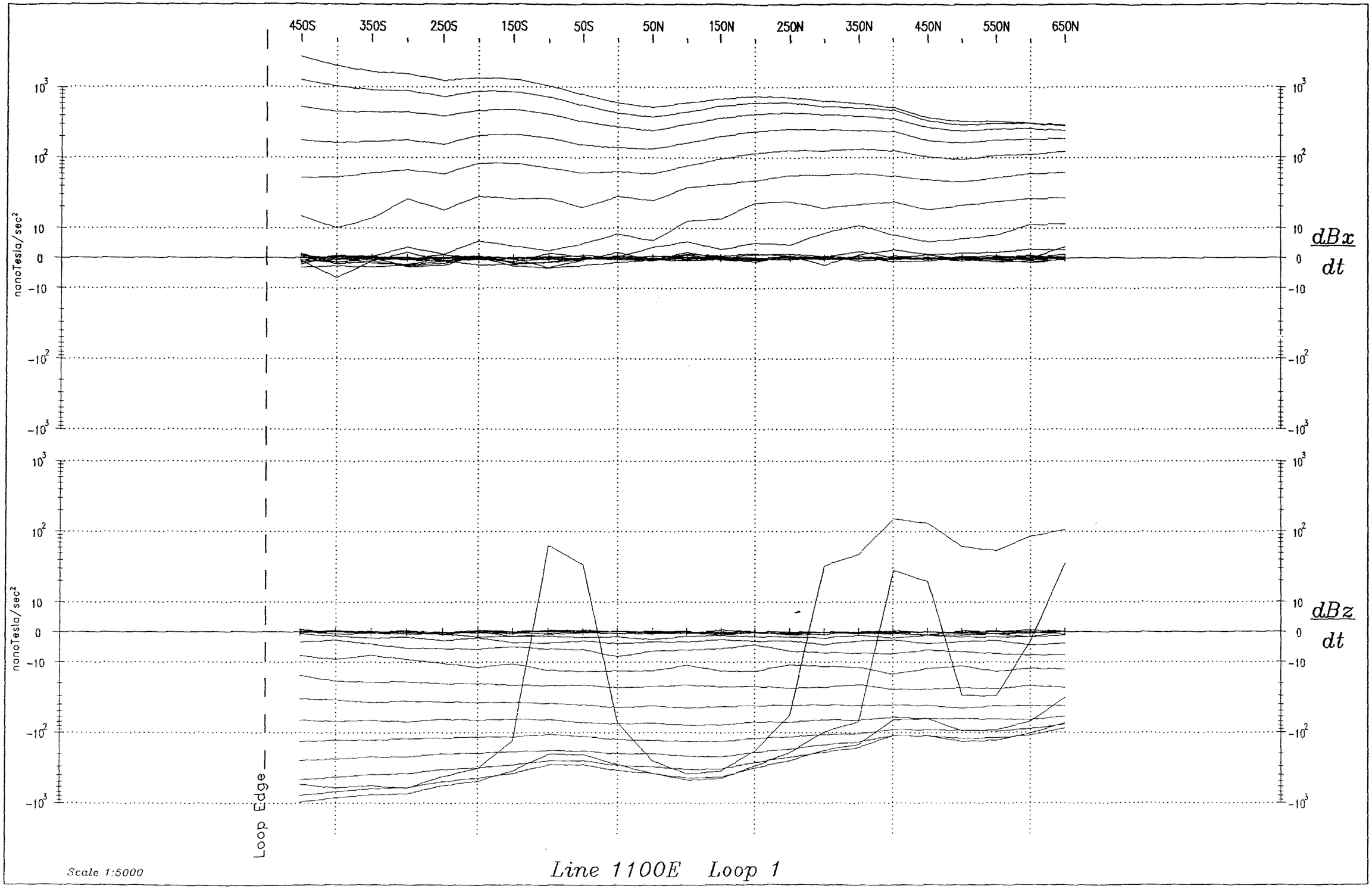
$\frac{dBx}{dt}$

$\frac{dBz}{dt}$

Loop Edge

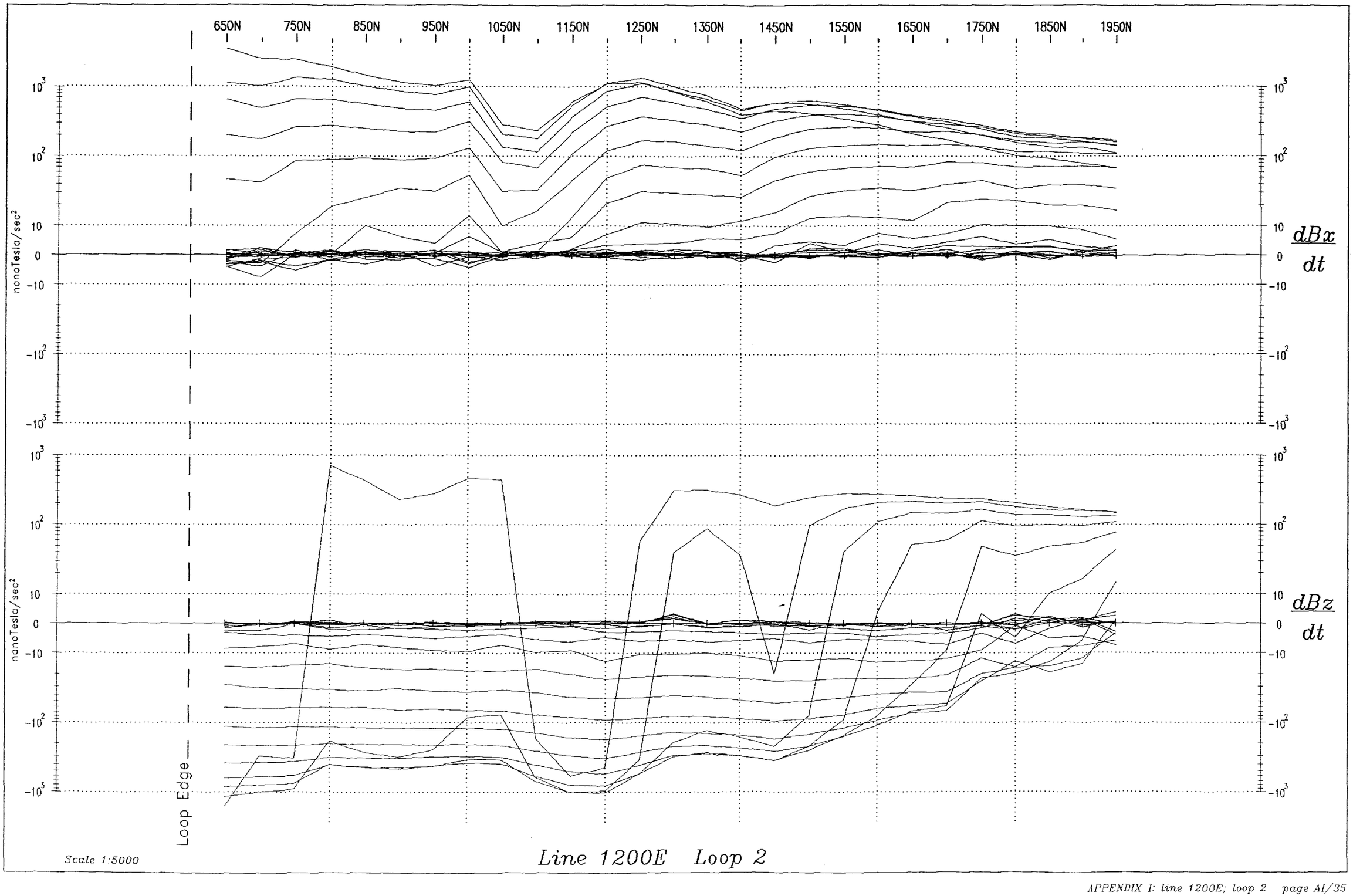
Scale 1:5000

Line 1100E Loop 2



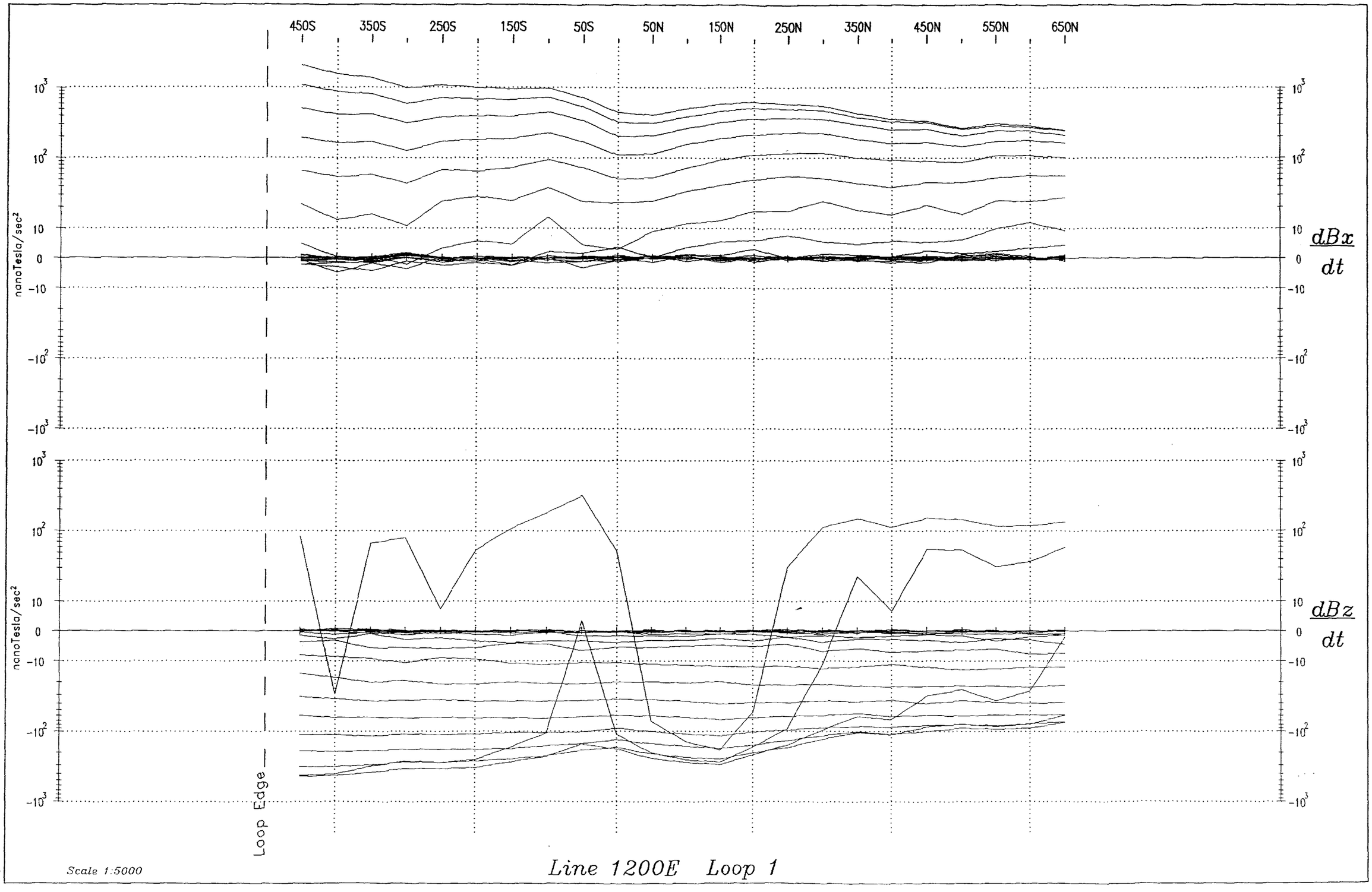
Scale 1:5000

Line 1100E Loop 1



Scale 1:5000

Line 1200E Loop 2



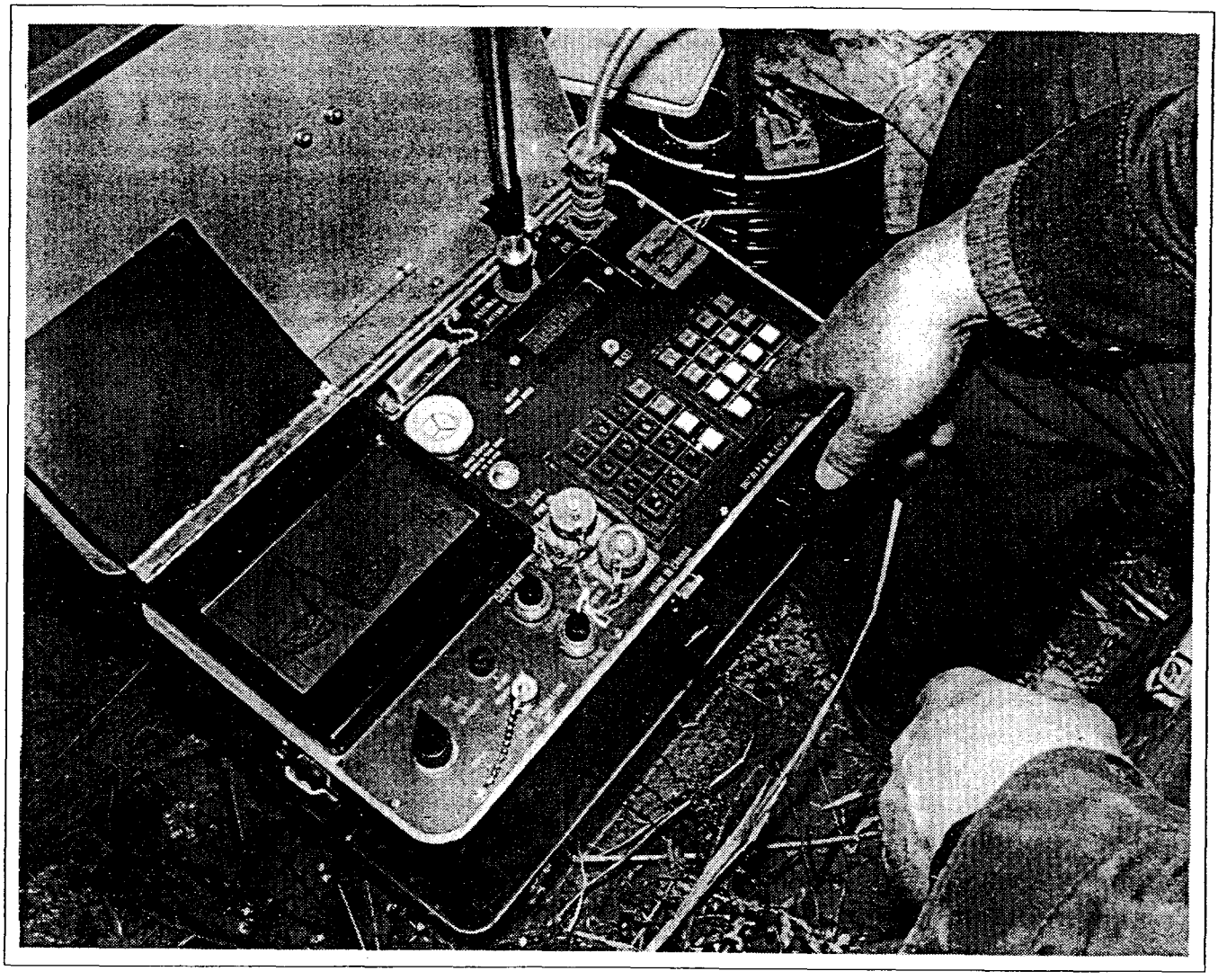
Line 1200E Loop 1

APPENDIX: III

Equipment Specifications

DIGITAL PULSE EM RECEIVER

- Flexible, fully digital receiver for all types of surface and borehole time-domain EM surveys.
- Measures time rate of change of a component of the magnetic field vector within programmable time channels. Measured component is defined by the orientation of the surface coil or borehole probe.
- Standard 10, 20, and 30 channel configurations; five 37-channel tables programmable in the field.
- Primary field "PP" channel always used. Provides indispensable polarity and amplitude information.
- Decay curve and profile plot on graphic LCD: excellent quality; line or bar; linear or log; numerous scales; scrolling; grid lines; superimpose mode; vertical line cursor steps through channels or stations.
- Automatic gain control. No data scaling or reduction. Output is in nanoTesla/sec (nV/m^2).
- Researched, designed, and tested since 1982. Field proven since 1986. Feedback and rigorous field testing under all conditions from our most demanding customer - our own survey crews.



Decay curves and profile plots of some or all channels can be viewed on the spot for excellent data quality control and survey decision-making.

SPECIFICATIONS - DIGITAL PULSE EM RECEIVER

HARDWARE:
Modular board design for easy software and hardware upgrades.
Small LCD - 2 lines, 16 characters. Heated for operation below -20°C. LCD viewing adjustment.
Large LCD - 16 lines, 42 characters or 256 x 128 pixels graphics. Lid for sunlight. LCD viewing adjustment.
32 key alphanumeric keyboard with arrows and special function keys. Positive feedback key action.
Two CMOS microprocessors in parallel; 16 bit A/D conversion; Dynamic range: 138 dB; Max input voltage: ± 1V.

SOFTWARE CONTROLS:
Menu-driven functions: easy selection with moving highlight or letter code on 16 x 42 character LCD.
Pre-survey file preparation: up to 32 files can be set up with header information before surveying.
File switching and expansion; continue reading in any file at any time - until memory is full.
Extensive file and data handling routines; Selectively delete files or station readings.

VIEWING DATA IN THE FIELD (LISTS AND PLOTS):
List all channel reading simultaneously for 1 decay curve, or list data 3 channels at a time over all stations.
Plot channel readings as a decay curve at one station, or as a profile over several stations.
Excellent-quality plots on 256 x 128 pixel graphic LCD; line or bar; linear or log; numerous scales; scrolling; grid lines; superimpose mode, vertical line cursor steps through channels or stations.

TIME BASE (ON-TIME – RAMP, or OFF-TIME + RAMP):
8.33 msec, 16.66 msec, 33.33 msec for 60 Hz noise areas (30 Hz, 15 Hz, 7.5 Hz base frequencies).
10.0 msec, 20.0 msec, 40.0 msec for 50 Hz noise areas (25 Hz, 12.5 Hz, 6.25 Hz base frequencies).
10.89 msec, 21.79 msec for compatibility with Analog and Datalogger PEM Receivers.

CHANNEL CONFIGURATION:
Three logarithmic configurations each starting at 76.5 µsec. (10, 20, or 30 channels in 16.66 msecc)
- each of 10 channels is split in 2 (20 channels) or 3 (30 channels) for ease of data comparison.
Five programmable configurations - each with a minimum time interval of 4.5 µsec, and a maximum of 37 channels
- each can be configured in the field, and changed after dumping data
One 8 channel configuration identical to Analog PEM channels.
One preset 45 channel configuration over 202 µsec for current ramp analysis and zero-time-set procedure.
Time base can be changed without affecting the channel configuration.

PRIMARY FIELD MONITOR: A Primary Pulse "PP" channel is always used in addition to the above configurations as it provides indispensable primary field polarity and amplitude information. It measures during the current ramp.

ZERO-TIME-SET: The current shut-off is measured using 45 channels 4.5 µsec wide. A linear plot on the large LCD clearly shows the shape of the ramp, and the zero time (end of ramp) can be set.

SYNCHRONIZATION: Cable and Radio are standard. Optional internal crystal clock.

CALiBRATION OF DATA: Effective area of coil or probe is entered into the Receiver in square metres. Thereafter, readings are measured and stored in nanoTeslas/sec (=nV/m^2).

GAINS: 10-1280; Internally selected for each channel for best Signal-to-Noise, or manual override. Internal scaling of data.

NOISE REJECTION: Automatic spike rejection. Powerline rejection typically 78dB.

STACKING: 512 to 65,536 readings in seven doubling steps.

STATISTICAL ANALYSIS: Calculation and display of statistical reading error.

STORAGE: 64 KBytes data storage (approximately 500 readings of 20 channel data).

DATA TRANSFER: RS232 connection to computer with menu-selectable serial parameters.

BATTERIES: 2 rechargeable 12V gel cells. Battery test and low battery warning. Minimum 8 hours of field use.

TEMPERATURE RANGE: Operational from -40°C to +50°C.

HUMIDITY: Refillable desiccant container with colour indicator accessible from top panel.

WEIGHT: 15 kg., shipping: 23kg.

TRANSPORT: Plywood box for shipping and field transport with closed cell foam shock protection.

ACCESSORIES: Battery charger; RS 232 cable; Uploading software; Data presentation software; optional packframe.

* Specifications subject to change without notice.

CRONE Since 1962

CRONE GEOPHYSICS & EXPLORATION LTD.

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PULSE EM TRANSMITTER EQUIPMENT

- Flexible, multi-purpose transmitter and complete transmitting equipment for all types of surface and borehole time-domain EM surveys.

NEW
4.8 KWatt transmitter now available
Ask for details

- 2000 Watt Transmitter can be powered 3 ways:
  - 24V rechargeable Battery Pack.
  - 24V Battery and 500W Motor Generator.
  - 24V-120V from 2000 W Motor Generator and Voltage Regulator.

- 24V input for Low-Power PEM surveys:

  18 Amps through 7-turn, 14m diameter Moving Coil (19,000 Am^2 dipole moment)
  - locates shallow (up to 150m deep) conductors even in conductive environments when used in profiling mode (Slingram method).
  - shallow resistivity soundings to 200m or more.

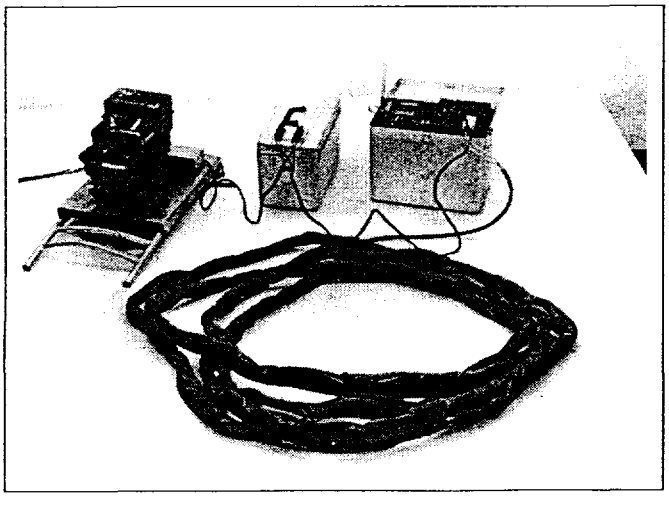
  18 Amps through 100m x 100m loop (180,000 Am^2 dipole moment)
  - Moving Loop or Moving In-Loop surveys for deeper conductor detection even in conductive environments.
  - Borehole logging to 300m or 300m long surface lines outside loop (small scale DEEPEM).
  - Resistivity sounding to hundreds of metres.

- 24V-120V input for High-Power PEM surveys:
  - Any loop size from 100m x 100m to 1 or 2 km square.
  - Can be used for all Surface and Borehole PEM surveys for deep conductor detection or deep resistivity sounding.

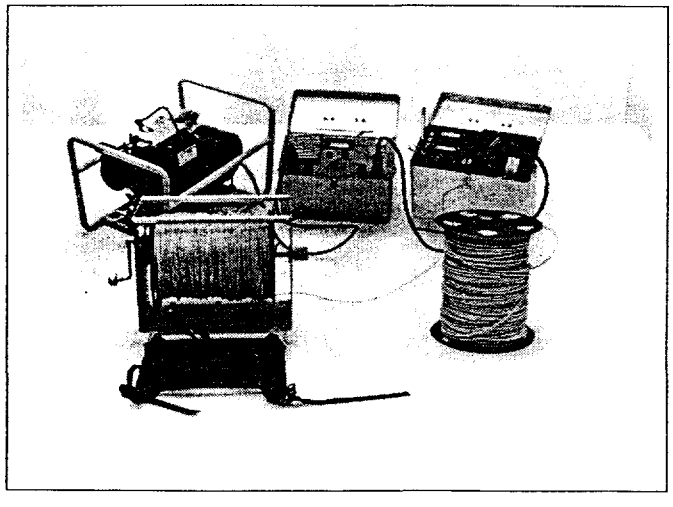
- 3 selectable current ramp times, 8 selectable time bases, and 3 synchronization methods.

- **Ramp times are fixed** to allow for proper data comparisons from loop to loop.

- Cleared for safe use in producing mines for underground borehole surveys.



Lower Power Gear
The 500W Motor Generator is required if the Transmitter is on for long periods. It is optional for the Moving Coil method.



2000 Watt Gear
Can power any size loop from 100m x 100m to 1 or 2 km square

SPECIFICATIONS - PULSE EM TRANSMITTER EQUIPMENT

2000 WATT PEM TRANSMITTER:

Controls bipolar, on-off waveform and linear current shut-off ramp time. Operating voltage: 24V to 120V.

Synchronization: Radio and cable synchronization are standard. Internal radio powers 1 metre long telescoping antenna (standard) or optional 1/4 Wave CB booster antenna on mast. In hilly terrain, use external (remote) radio and booster antenna on high point of grid, controlled by cable sync. Optional external crystal clock sync system.

On-Off times for 60 Hz powerline filtering: 8.33ms, 16.66ms, 33.33ms; for 50 Hz powerline filtering: 10.0ms, 20.0ms, 40ms; for analog PEM operation: 10.9ms, 21.8ms.

Linear controlled current shut-off ramp times of 0.5, 1.0 and 1.5ms. Ramp time is fixed and non-drifting with temperature and loop size to allow for accurate data comparison and interpretation.

Monitors for shut-off ramp operation, instrument temperature, Tx loop continuity, and overload output current.

Meters for loop current, input voltage, sync test.
Automatic shut-down for open Tx loop, high instrument temperature, and overload.

Net weight: 12.5 kg, shipping: 22 kg.

2000WATT MOTOR GENERATOR:

4 1/2 H.P. Wisconsin Robin, 4 cycle engine with belt drive to D.C. alternator; both mounted on frame; output: 120V, 20 Amps; external gas tank with hose and valve for full day of unattended operation; Net weight: 33 kg; shipping: 47 kg.

24V-120V VARIABLE VOLTAGE REGULATOR:

Controls and filters the alternator output; continuously variable between 24V and 120V D.C., 20 Amp maximum current; Net weight: 10kg, shipping: 20 kg.

WIRE, SPOOLS AND WINDERS:

Transmitter wire is usually No. 10 or 12 AWG insulated copper wire in 300m or 400m lengths, 1 length per spool; 2 spools in a shipping box; winder is mounted on a magnesium packframe.

MULTI-TURN MOVING COIL:

7 turn, 14 meter diameter Tx loop; plugs to break loop into 2 sections for easy station-to-station movement. Aluminum or copper wire and various coverings depending on area being used.

BATTERY POWER SUPPLY:

24V, 20 amp hour; rechargeable battery supply for use with PEM Transmitter as power source rather than motor-generator-regulator. In aluminum case, with clamp connectors. Net weight: 20.5 kg, shipping: 29 kg.

500 WATT, LOW-POWER MOTOR GENERATOR:

For continuous transmitter operation in Low-power PEM surveys. 3.5 H.P. Motor with belt drive to Alternator and Regulator; mounted on frame; output: 24V DC, 500W; connect to transmitter in parallel with 24V Battery Pack.

- Battery chargers supplied for all rechargeable battery units.
- All instruments and equipment operational from -40°C to +50°C.
- Plywood boxes for shipping and field transport with closed cell foam shock protection.

* Specifications subject to change without notice.

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PULSE EM SYNCHRONIZATION and CRYSTAL CLOCK CALIBRATION

Crone provides three methods for synchronizing the PEM receiver and transmitter:

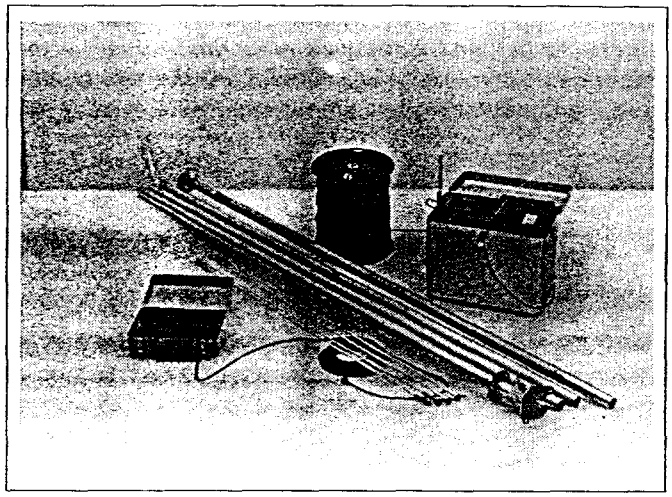
- RADIO — 1 metre long telescoping antennas provided as standard features on Rx and Tx; timing signal send from Tx to Rx using either internal radio (standard) or remote radio (optional).
- CABLE — clips for 2-conductor cable provided as standard features on Rx and Tx; Tx sends timing signal to Rx along direct wire link
- CRYSTAL CLOCKS — optional; one clock controls the timing of transmitter waveform; it and one or more receiver clocks are synchronized to extremely high accuracy through the use of our atomic accuracy clock calibration station.

RADIO SYNC

Method 1. For short separations of the receiver and transmitter (<300m), the transmitter's internal radio and the 1 metre long telescoping antenna on the transmitter console can be used.

Method 2. For increased range (1-2 km), a 1/4 wave CB antenna can be mounted on a mast beside the transmitter and connected to the transmitter's internal radio with coaxial cable.

Method 3. In hilly terrain, the CB "booster" antenna should be set up on a high point within the survey area , and connected to a Crone PEM Remote Radio which in turn is connected to the transmitter with cable sync.

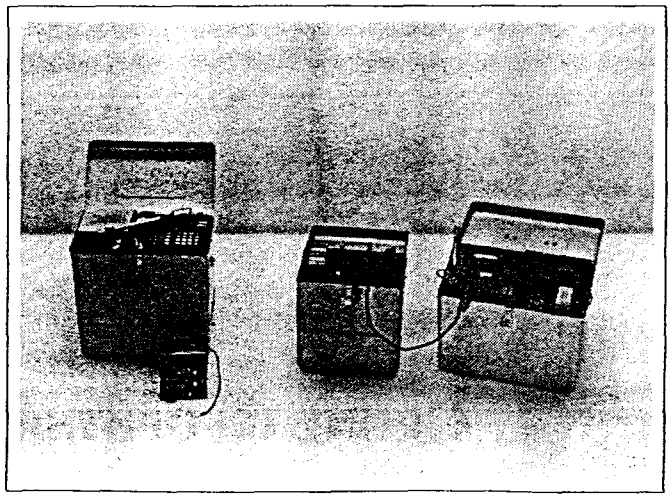


CABLE SYNC

Cable synchronization involves a direct 2-conductor wire link between the receiver and transmitter. It is the most accurate of the three types, but it is only convenient where the separation between receiver and transmitter is fixed. Therefore, it is used for borehole surveys where the collar is at surface, and for Moving Loop or Moving Coil surveys. It is also used in sounding surveys where high accuracy is required and the receiver does not move very often.

CRYSTAL CLOCKS

The PEM crystal clock synchronization system was originally developed for use in underground PEM surveys where it is impossible to use the radio or connect a wire to the transmitter located at surface. However, the system is also optional for all other types of PEM surveys. There is no net advantage where a cable connection can be easily used. The advantage, therefore, other than for underground work, is in improved accuracy over radio sync for moving receiver surveys.



CRYSTAL CLOCK CALIBRATION STATION

At considerable expense, Crone Geophysics has set up a crystal clock calibration station for in-house testing and analysis of clock aging and drift. Each clock is compared to the atomic standard over a period of several days to confirm the manufacturer's specifications and to check that it meets our own special requirements. This analysis and screening allows us to achieve a much higher accuracy than by ordering the so called "matched pairs" from the clock manufacturer. It also allows us to use more than one receiver clock with each transmitter clock without sacrificing accuracy. By collecting this information, we have learned some surprising things about the clocks used routinely in geophysical equipment, and we have put this knowledge to use in continually upgrading all our clock systems to new standards in accuracy.

By properly analyzing the characteristics of crystals, and by having the proper tools to make these tests, Crone PEM crystal clocks can be used with confidence for full days of worry-free operation.

SYNCHRONIZATION ACCURACY

Radio sync is the most convenient, but it is also the least accurate sync option. Background readings in resistive environments are susceptible to small timing shifts, since the early time secondary field changes rapidly, and these channels are narrow. However, the accuracy is more than adequate for standard profiling techniques where the response from any significant conductor will be easily visible in the data.

The problem of crystal clock drift is not a simple one. Using our calibration station, we have observed large drifts during the day which change direction and produce low net daily drifts. Although we reject such crystals, this problem could go undetected in the field unless the synchronization is tested periodically during the day. The PEM system has unique design features which allow the field operator to monitor or correct for clock drift without the need to re-synchronize them or even to have them in close proximity.

PULSE EM SYNCHRONIZATION EQUIPMENT

ANTENNA AND MAST:

Used for radio timing synchronization on large survey grids; range up to 2 km; antenna is fiberglass 1/4 wave CB mounted on a 4 section aluminum mast - each section 2m long; 15m coaxial cable plugs directly into Tx or into remote radio. Mast and antenna shipped as a bundle: 6.4 kg.

REMOTE RADIO:

Provides radio sync signal to booster antenna via 15m coaxial cable; connected to transmitter with sync cable; radio has 12V rechargeable gel cell battery supply; battery charger supplied; Net weight: 2.7 kg, shipping 6.0 kg.

SYNCHRONIZATION CABLE:

2-conductor wire available in various lengths; up to 900m on spool; 24 AWG, teflon coated; spool has clamp connections on rim for access to other end of wire; spool fits into standard Crone wire winder packframe.

CRYSTAL CLOCKS:

One clock installed inside Digital PEM Receiver; uses receiver battery supply; adds approximately 1 kg to weight of receiver; several receivers with clocks can be synchronized to one clock at transmitter. Other clock in separate box and plugged into PEM Transmitter; rechargeable gel cell battery supply; battery charger and cables supplied; Net weight: 10 kg, shipping 15 kg.

* Specifications subject to change without notice.

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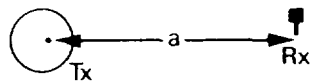
APPENDIX: IV

Pulse EM Survey Methods

SURFACE PULSE EM SURVEY METHODS

Since 1962

MOVING COIL



Rx and Tx move together along survey line at a constant separation of 50m to 150m (Slingram style). Reading station is at mid-point. Normal station interval is 25m.

Reading Component: dBz/dt.

Tx Loops: 7 turn, 14m diameter.

Synchronization: Radio or Cable.

Power Source: Battery Pack (24V, 20 Amp Hr.).

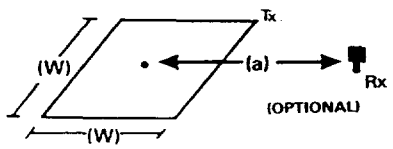
Depth Capabilities: to 150m;
0.75a for vertical conductors, 1.25a for flat lying conductors.

Applications:
- Quick reconnaissance even in areas of high surficial conductivity.
- Vertical to flat lying and lens-type conductors.

Advantages:
- Portable; can operate with 2 man crew.
- Coil alignment and separation are not critical as in frequency domain.
- Good penetration through conductive overburden.
- Good definition of conductor geometry and depth due to moving Tx.
- Basic Slingram curve shapes.

Interpretation: Conductor depth, width, dip, and σt.

MOVING LOOP



Same as Moving Coil Survey but larger scale. Readings taken at 2 or more separations (200m to 700m). Reading station is at mid-point. Station interval generally equal to or less than loop size (typically 50m).

Can be combined with Moving In-Loop survey.

Reading Component: dBz/dt (dBx/dt, dBy/dt).

Tx Loops: 100m x 100m to 300m x 300m.

Synchronization: Radio or Cable

Power Source:
- 24V Battery and 500 Watt Motor Generator for 100m x 100m loops.
- 2000 Watt Motor Generator and Voltage Regulator for all loops.

Depth Capabilities: to 300m.

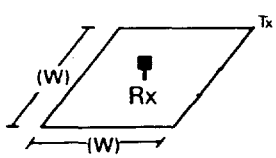
Applications:
- Vertical to flat lying and lens-type conductors even in areas of high surficial conductivity.
- Detail profiling (after Moving Coil) for better conductor discrimination and definition. (drilling priorities and targets).

Advantages:
- Good penetration through conductive overburden and deep weathering.
- Good definition of conductor geometry and depth due to moving Tx.

Disadvantages:
- Repeated loop movements requires large crew and may be operationally difficult for large loops in wooded or rough terrain.

Interpretation: Conductor depth, width, dip, and σt.

MOVING IN-LOOP



Rx and Tx move together along survey line. Reading taken in centre of loop. Station interval generally equal to or less than loop size (typically 50m).

Can be combined with Moving Loop survey.

Reading Component: dBz/dt (dBx/dt, dBy/dt).

Tx Loops: 100m x 100m to 300m x 300m.

Synchronization: Radio or Cable

Power Source:
- 24V Battery and 500 Watt Motor Generator for 100m x 100m loops.
- 2000 Watt Motor Generator and Voltage Regulator for all loops.

Depth Capabilities: to 600m.

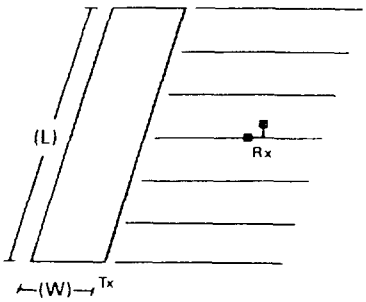
Applications:
- Flat lying and lens-type conductors in areas of high surficial conductivity.

Advantages:
- Good penetration through conductive overburden and deep weathering.
- Good definition of conductor geometry and depth due to moving Tx.

Disadvantages:
- Repeated loop movements requires large crew and may be operationally difficult for large loops in wooded or rough terrain.

Interpretation: Conductor depth, width, dip, and σt.

DEEPEM



Survey lines are read perpendicular to long side of stationary Tx Loop. Line length can be 2 or 3 times the loop width.

Can be combined with large In-Loop method by continuing lines inside the Loop.

Reading Component: dBz dt, dBx dt, (dBy/dt).

Tx Loops: 100m x 100m to 1000m x 2000m. Typically 300m x 600m or 400m x 800m.

Synchronization: Radio or Crystal Clocks.

Power Source:
- 24V Battery and 500 Watt Motor Generator for 100m x 100m loops.
- 2000 Watt Motor Generator and Voltage Regulator for all loops.

Depth Capabilities: to 600m.

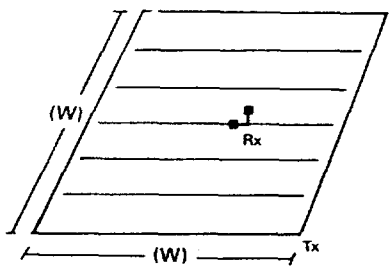
Applications:
- Conductors with dips of 45° or more.

Advantages:
- Deep penetration for conductors with steep dip.
- Multiple, near vertical conductors can be well resolved, even in conductive environments (with data filtering).
- More productive than Moving Loop or Moving In-Loop surveys.

Disadvantages:
- Data filtering required in conductive environments.
- Large loops are blind to narrow, vertical, near-surface conductors with little depth extent - use small (100m x 100m) loops in such cases.
- Some knowledge of dip and depth of target is helpful to optimize loop location.

Interpretation: Conductor depth, size, dip, and σt.

LARGE IN-LOOP



Survey lines are read inside a large, stationary Tx loop.

Reading Component: dBz dt, dBx/dt (dBy/dt).

Tx Loops: 400m x 400m to 1000m x 1000m or greater.

Synchronization: Radio or Crystal Clocks.

Power Source: 2000 Watt Motor Generator and Voltage Regulator.

Depth Capabilities: to 1000m.

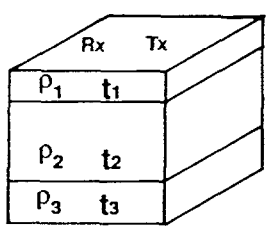
Applications:
- Conductors with dips of 50° or less.

Advantages:
- Deep penetration for flat-lying conductors.

Disadvantages:
- Data filtering required in conductive environments.
- Not recommended for near - vertical conductors.

Interpretation: Conductor depth, size, dip, and σt.

RESISTIVITY SOUNDING



In layered earth environments, the data collected in each of the above 5 methods can be interpreted in terms of a geoelectric section.

Reading Component: dBz dt (dBx dt).

Tx Loops: 7 turn, 14m diameter Moving Coil
100m x 100m to 1000m x 1000m.

Synchronization: Cable preferred; Crystal Clocks optional.

Power Source: 24V Battery and 500 Watt Motor Generator for Moving Coil and 100m x 100m loops only.
2000 Watt Motor Generator and Voltage Regulator for all loops.

Depth Capabilities: Variable, depends on loop size and geoelectric section. Typical maximum 1000m.

Applications:
- Layered earth environments.
- Groundwater, geothermal, geotechnical/engineering, environmental, oil and gas, and some mining applications.

Interpretation: Layer thicknesses and resistivities.

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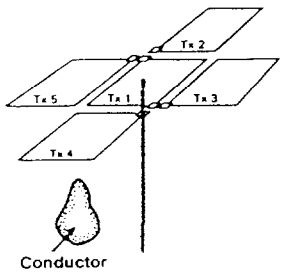
BOREHOLE PULSE EM SURVEY METHODS

ISOLATED BOREHOLE



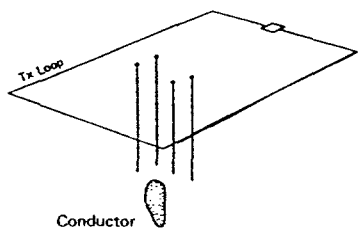
One hole is read from an array of transmit loops (usually 5).

Change in loop-conductor coupling can give conductor direction and shape information.

Fewer loops required if all 3 components are read.

Reading Component:	Axial Probe: dBz/dt. X-Y Probe: dBx/dt, dBy/dt.
Tx Loops:	100m x 100m to 400m x 400m. Loop size generally 1/3 to 1/2 of hole depth.
Synchronization:	Cable.
Power Source:	24V Battery and 500 Watt Motor Generator for 100m x 100m loops. 2000 Watt Motor Generator and Voltage Regulator for all loops.
Hole Depth:	to 2500m (custom tested probes for deeper).
Applications:	Conductor detection up to 200m from hole, dependent on size.
Interpretation:	Conductor distance, size, conductance, attitude, shape, and direction. Primary field diagrams are essential to determine coupling characteristics.

MULTIPLE BOREHOLES



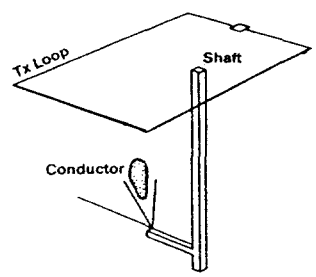
Multiple, closely spaced holes are read from one large loop.

Change in response from hole to hole can give directional information.

More reliable directional information if all 3 components are read.

Reading Component:	Axial Probe: dBz/dt. X-Y Probe: dBx/dt, dBy/dt.
Tx Loops:	300m x 300m to 1000m x 1000m.
Synchronization:	Cable
Power Source:	2000 Watt Motor Generator and Voltage Regulator.
Hole Depth:	to 2500m (custom tested probes for deeper).
Applications:	Conductor detection up to 200m from hole, dependent on size.
Interpretation:	Conductor distance, size conductance, attitude, shape, and direction. Primary field diagrams are essential to determine coupling characteristics.

UNDERGROUND BOREHOLE



Underground holes are read from large transmit loops on surface. Push rods are used for flat-dipping holes.

Change in response from hole to hole can give directional information.

More reliable directional information if all 3 components are read.

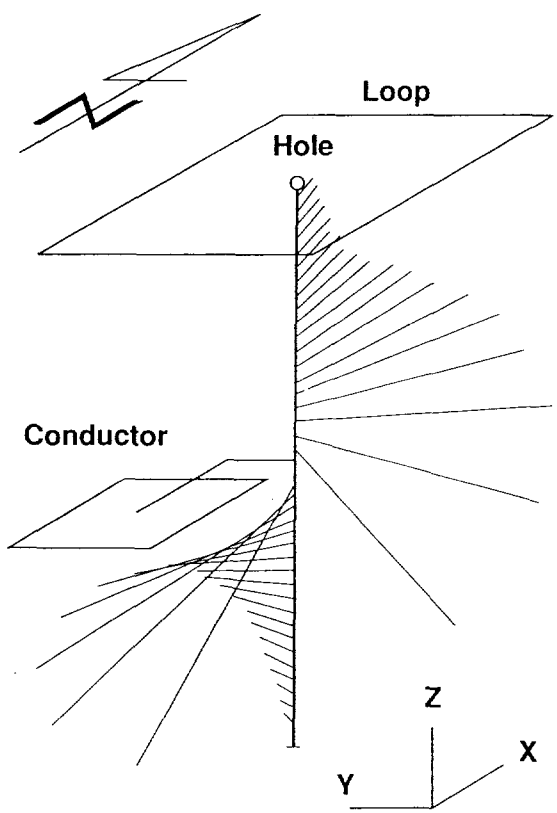
Reading Component:	Axial Probe: dBz/dt. X-Y Probe: dBx/dt, dBy/dt.
Tx Loops:	300m x 300m to 1000m x 1000m.
Synchronization:	Crystal Clocks.
Power Source:	2000 Watt Motor Generator and Voltage Regulator.
Hole Depth:	to 2500m for hole dips (throughout length of hole) of -20° to -90° typically 400m for flat-dipping holes typically 200m for up-dipping holes.
Applications:	Conductor detection up to 200m from hole, dependent on size.
Interpretation:	Conductor distance, size conductance, attitude, shape, and direction. Primary field diagrams are essential to determine coupling characteristics.

3-DIMENSIONAL BOREHOLE PULSE EM

Conventional TDEM borehole surveys measure only the axial (Z) component of the EM field down the hole. In 3-D Borehole PEM, the other 2 components perpendicular to the axis of the hole are measured (X and Y). By measuring all 3 components, the 3-D vector EM field can be visualized over the length of the hole. This is a tremendous advantage in pinpointing the direction to conductive bodies.

We all know the importance of reading at least two components of the EM field in surface EM surveys in order to locate and define conductors. In borehole work, conductors can be above, below, or to either side of the hole; they can be intersected on an edge, or toward their centre; they can be in the form of conductive horizons which pinch and swell to form pod-like borehole targets; or they can be pipe-like and sit at odd angles to the hole. Throw in the complications of multiple conductors and borehole deviation, and we see that the interpreter needs all the help he can get. Measuring multiple components down the hole goes a long way in resolving these borehole complexities.

VECTOR REPRESENTATION



In the case of boreholes which are nearly perpendicular to strike and dip, the X and Y component anomalies will be cross-overs. The **polarity** of these cross-overs is diagnostic of direction to off-hole conductors or to the centre of in-hole conductors. Even in areas of high geological noise where many anomaly characteristics are obscured, the **polarity** of the cross-over can be determined, and thus, a direction to the conductor can be given with reasonable accuracy.

Any of the standard Crone Borehole Pulse EM methods can be used for the collection of 3-component data. The standard survey is run as usual in order to collect the axial (Z) data. The axial probe is then replaced by the Crone X-Y probe* and another pass is made down the hole. Thus, the only additional gear required is going from 1-D to 3-D surveys is an X-Y probe and a switch box.

* Development of the X-Y probe was supported by Noranda Exploration Co. Ltd.

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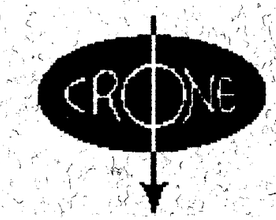
Appendix I: Data Profiles; Logarithmic Scale

Pulse Electromagnetic Survey
for
Teck Exploration Limited
Montcalm Project
February - March 1997

Crone Geophysics & Exploration Ltd.



Grid E

650N 750N 850N 950N 1050N 1150N 1250N 1350N 1450N 1550N 1650N 1750N 1850N

nanoTesla/sec

10^3 10^2 10 0 -10 -10^2 -10^3

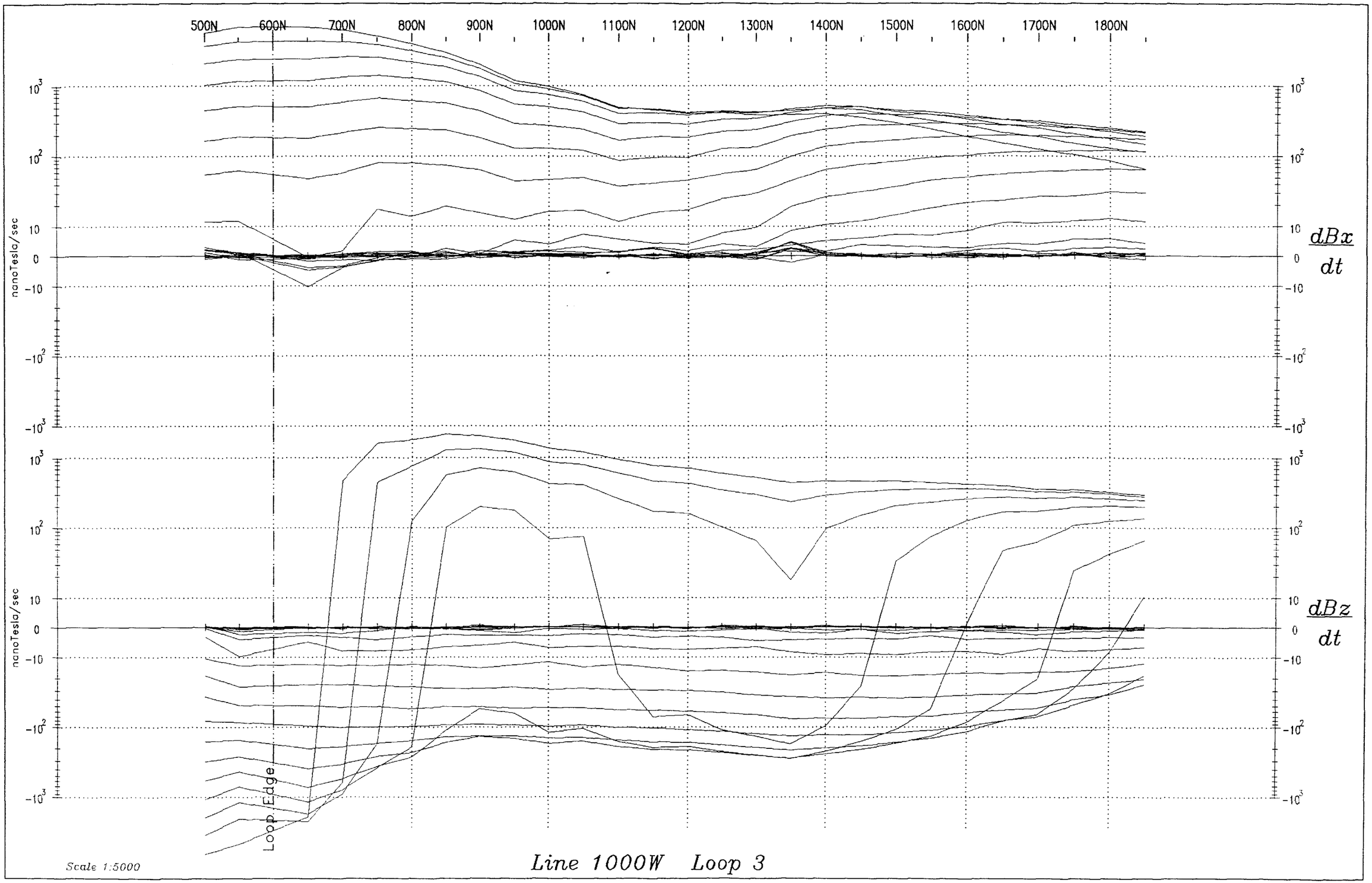
$\frac{dBx}{dt}$

$\frac{dBz}{dt}$

Loop Edge

Scale 1:5000

Line 1100W Loop 3


500N
600N
700N
800N
900N
1000N
1100N
1200N
1300N
1400N
1500N
1600N
1700N
1800N
nanoTesla/sec
10^3
10^2
10
0
-10
-10^2
-10^3
$\frac{dBx}{dt}$
$\frac{dBz}{dt}$
Loop Edge
Scale 1:5000
Line 1000W Loop 3

500N 600N 700N 800N 900N 1000N 1100N 1200N 1300N 1400N 1500N 1600N 1700N 1800N 1900N 2000N

nanoTesla/sec

10^3 10^2 10 0 -10 -10^2 -10^3

$\frac{dBx}{dt}$

nanoTesla/sec

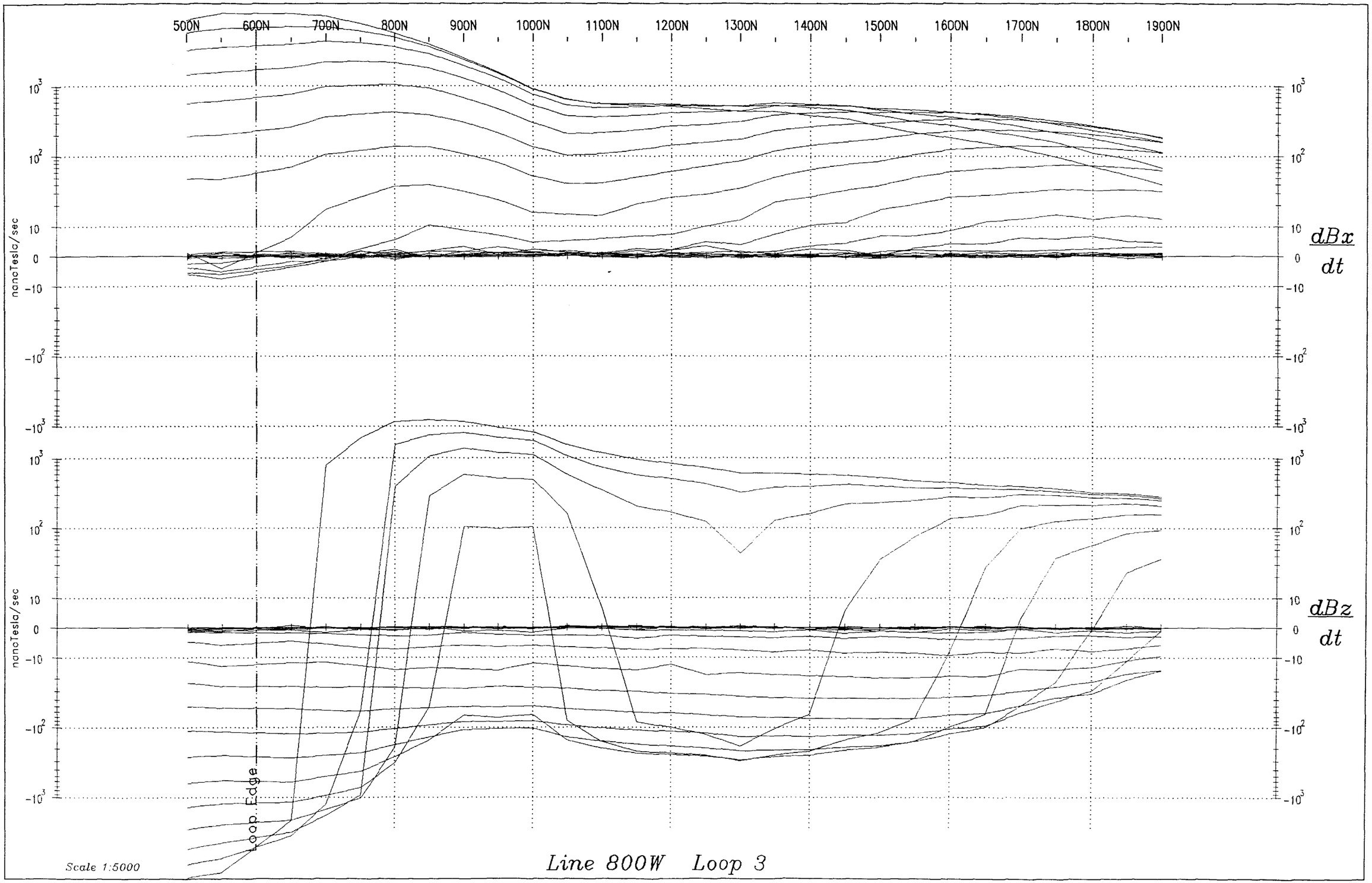
10^3 10^2 10 0 -10 -10^2 -10^3

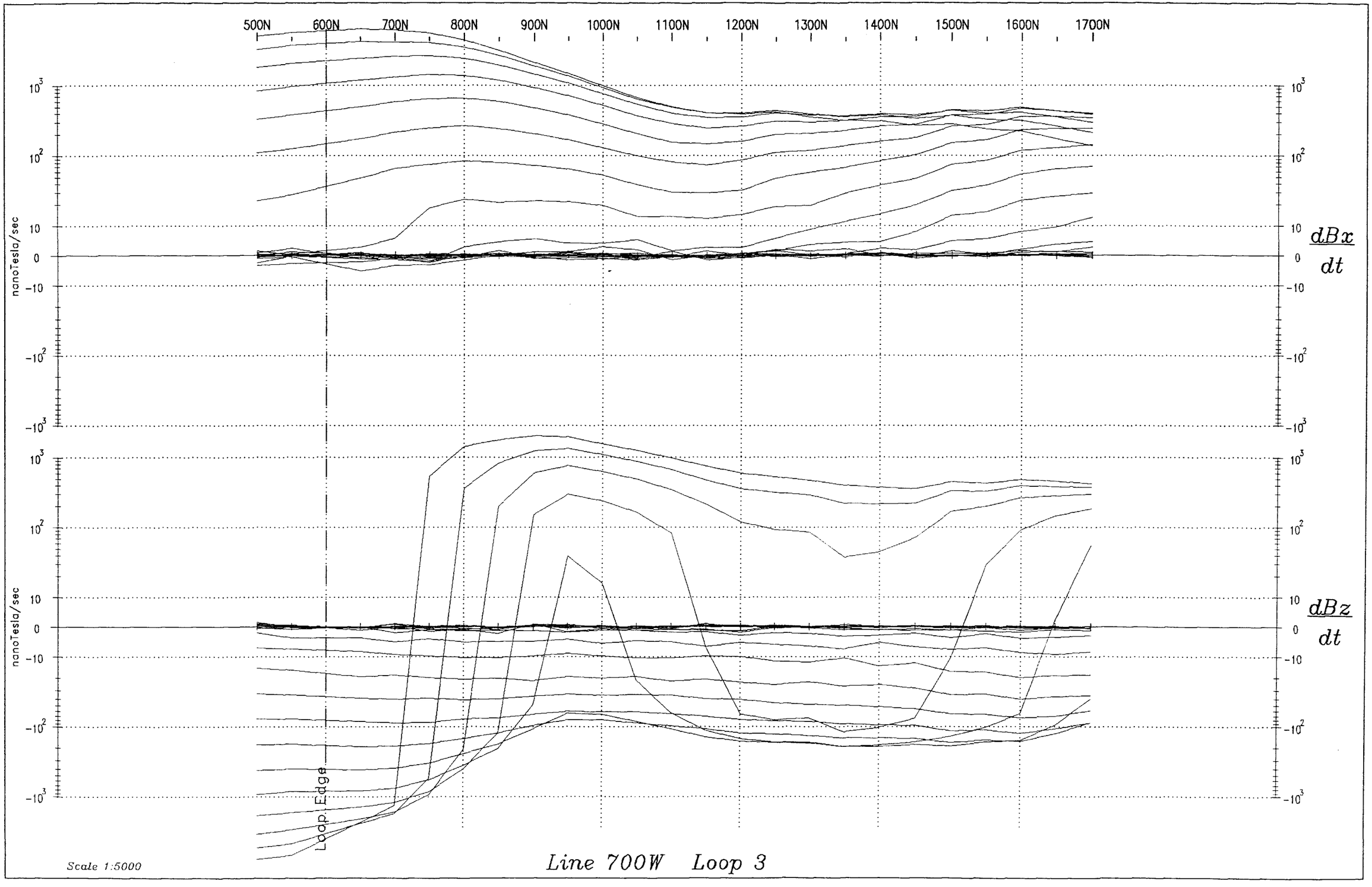
$\frac{dBz}{dt}$

Loop Edge

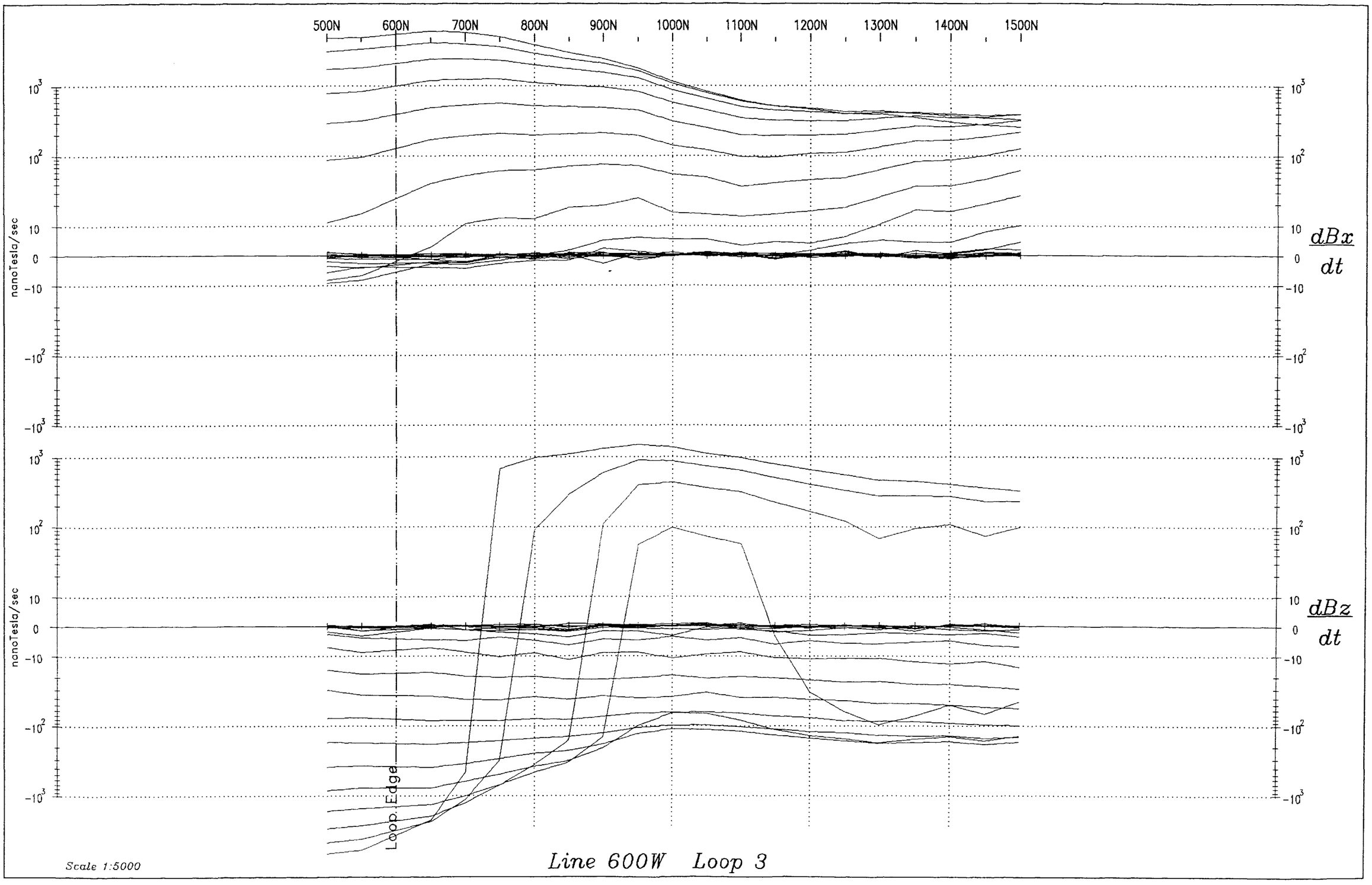
Scale 1:5000

Line 900W Loop 3


500N
600N
700N
800N
900N
1000N
1100N
1200N
1300N
1400N
1500N
1600N
1700N
1800N
1900N
nanoTesla/sec
10^3
10^2
10
0
-10
-10^2
-10^3
$\frac{dBx}{dt}$
$\frac{dBz}{dt}$
Loop Edge
Scale 1:5000
Line 800W Loop 3



Line 700W Loop 3


500N
600N
700N
800N
900N
1000N
1100N
1200N
1300N
1400N
1500N
nanoTesla/sec
10^3
10^2
10
0
-10
-10^2
-10^3
$\frac{dBx}{dt}$
$\frac{dBz}{dt}$
Loop Edge
Scale 1:5000
Line 600W Loop 3

500N 600N 700N 800N 900N 1000N 1100N 1200N 1300N 1400N

10^3 10^2 10 0 -10 -10^2 -10^3

nanoTesla/sec

$\frac{dBx}{dt}$

10^3 10^2 10 0 -10 -10^2 -10^3

Loop Edge

10^3 10^2 10 0 -10 -10^2 -10^3

nanoTesla/sec

$\frac{dBz}{dt}$

10^3 10^2 10 0 -10 -10^2 -10^3

Loop Edge

Scale 1:5000

Line 500W Loop 3

500N 600N 700N 800N 900N 1000N 1100N 1200N 1300N 1400N 1500N

nanoTesla/sec

10^3 10^2 10 0 −10 -10^2 -10^3

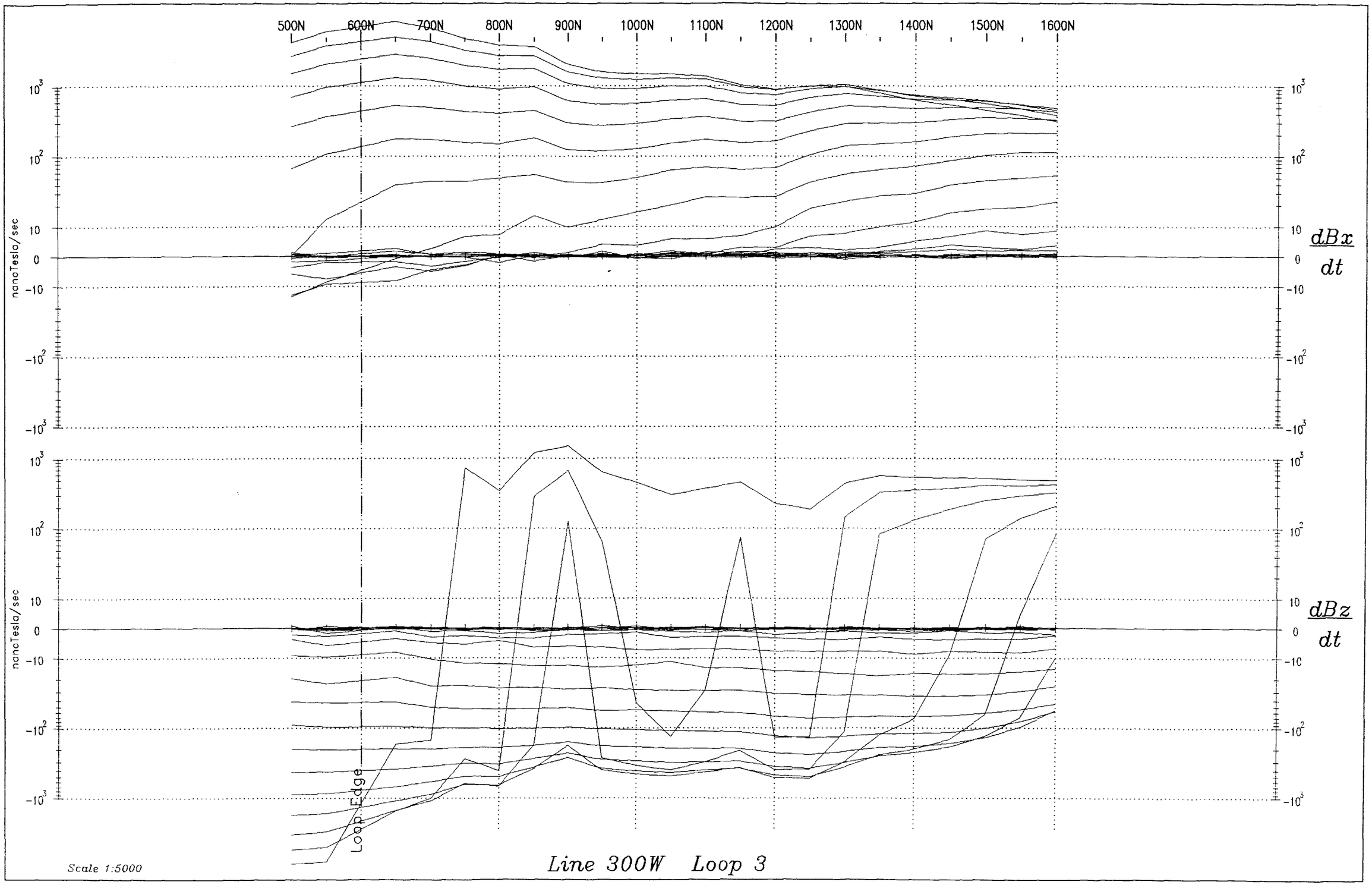
$\frac{dBx}{dt}$

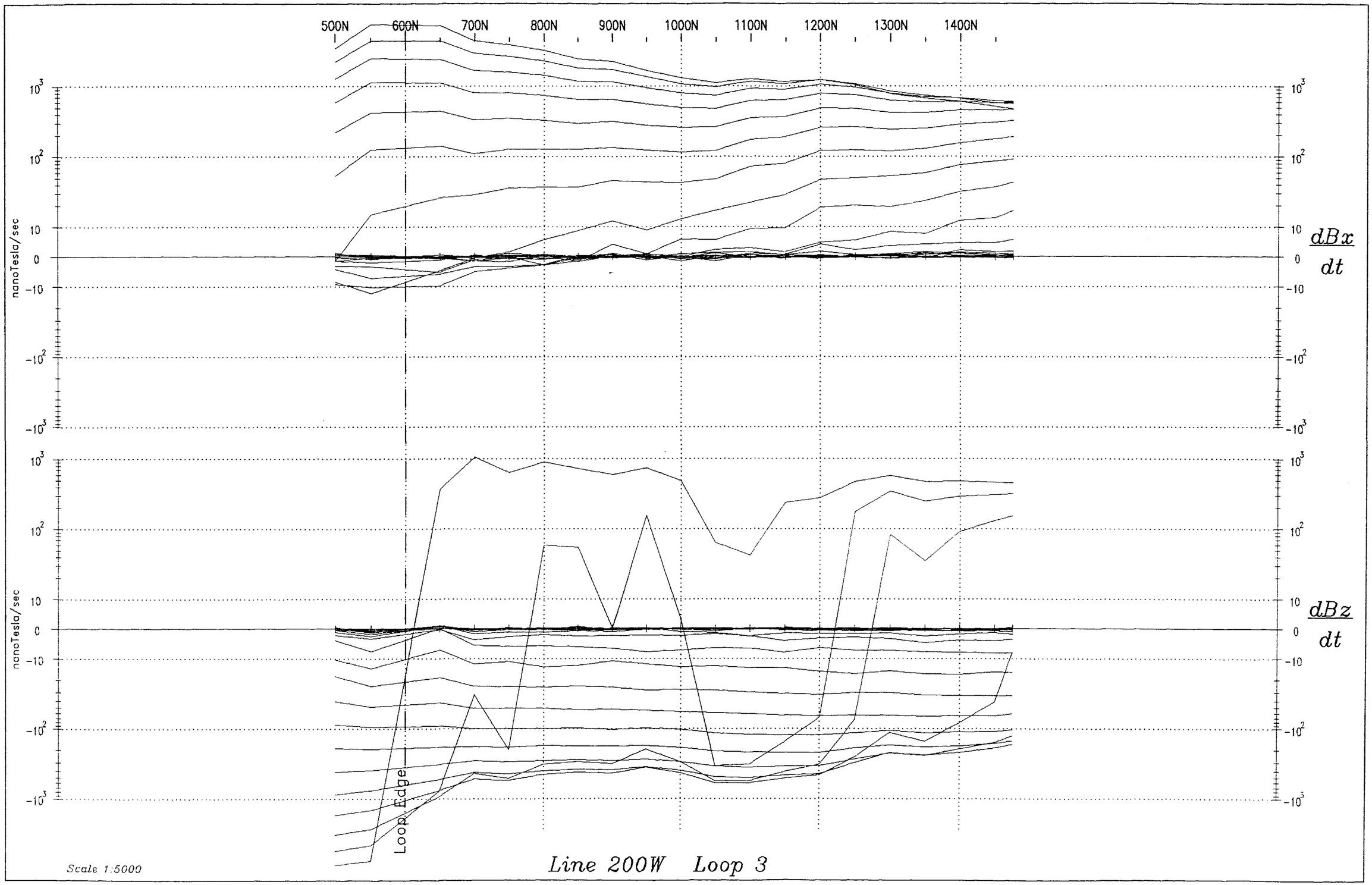
$\frac{dBz}{dt}$

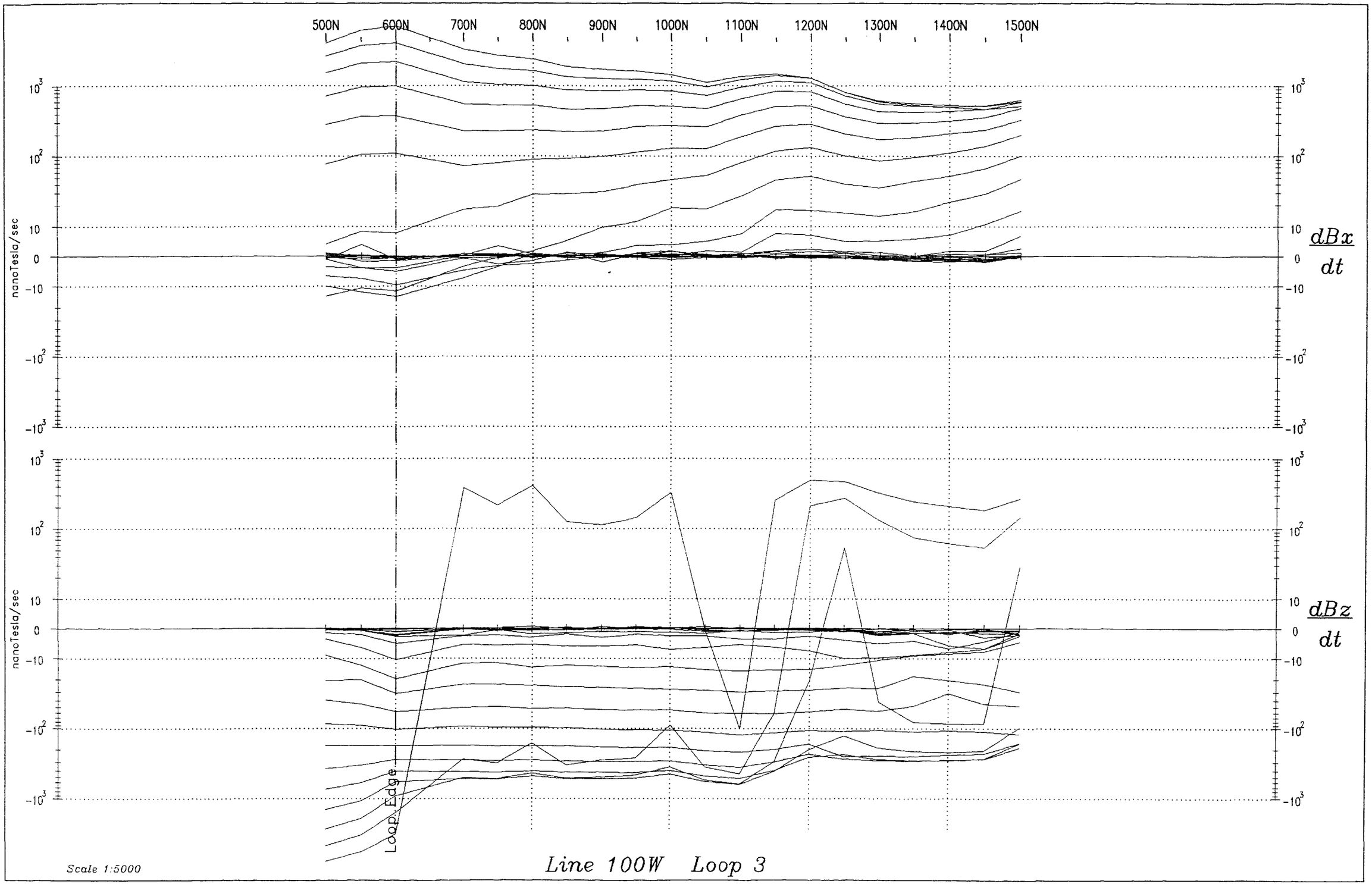
Loop Edge

Scale 1:5000

Line 400W Loop 3

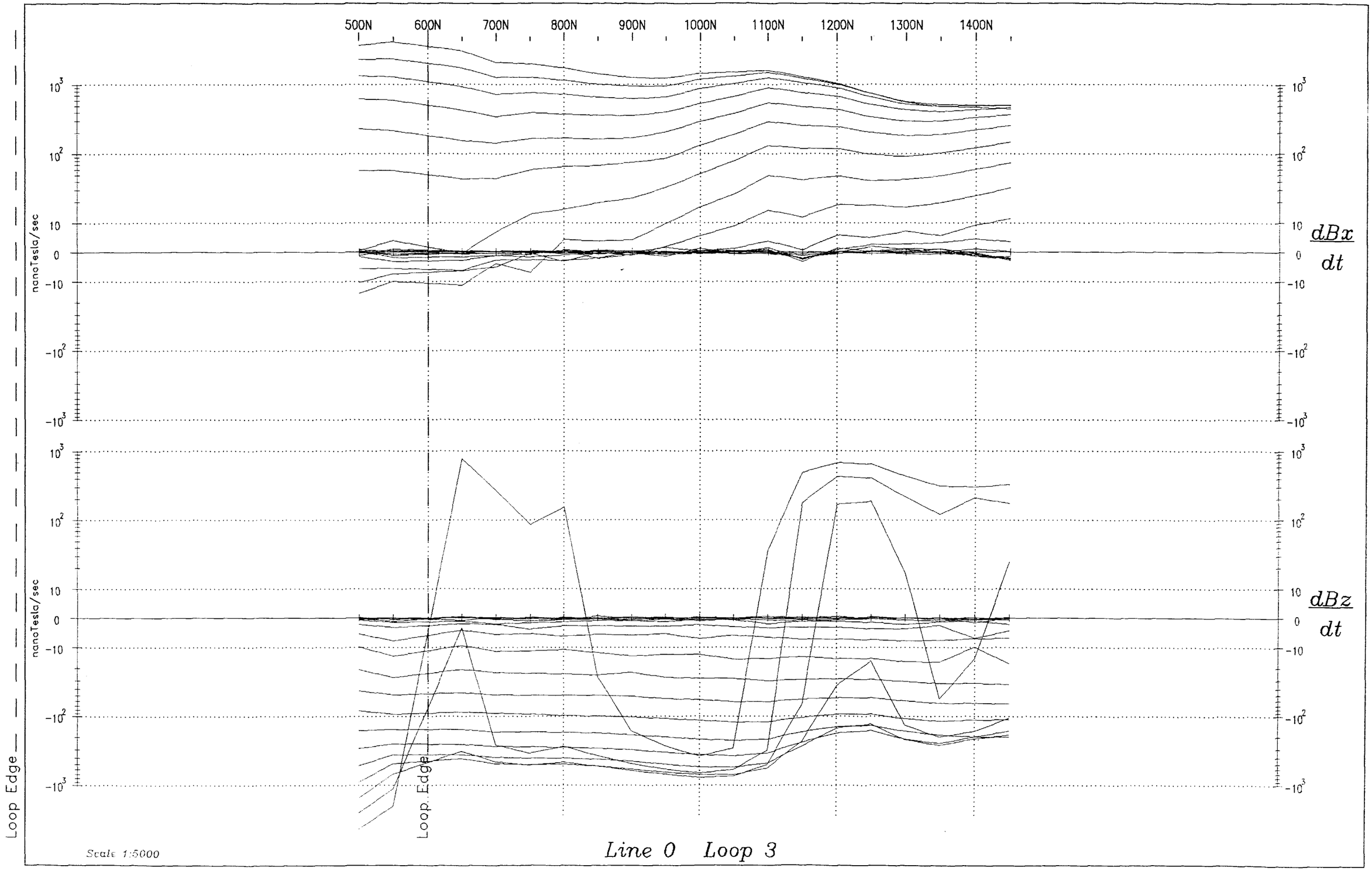

500N
600N
700N
800N
900N
1000N
1100N
1200N
1300N
1400N
1500N
1600N
nanoTesla/sec
$\frac{dBx}{dt}$
$\frac{dBz}{dt}$
Loop Edge
Scale 1:5000
Line 300W Loop 3


500N
600N
700N
800N
900N
1000N
1100N
1200N
1300N
1400N
nanoTesla/sec
10^3
10^2
10
0
-10
-10^2
-10^3
$\frac{dBx}{dt}$
$\frac{dBz}{dt}$
Loop Edge
Loop Edge
Scale 1:5000
Line 200W Loop 3



Scale 1:5000

Line 100W Loop 3


500N
600N
700N
800N
900N
1000N
1100N
1200N
1300N
1400N
nanoTesla/sec
$\frac{dBx}{dt}$
$\frac{dBz}{dt}$
Loop Edge
Loop Edge
Scale 1:5000
Line 0 Loop 3

650N 750N 850N 950N 1050N 1150N 1250N 1350N 1450N 1550N 1650N

nanoTesla/sec²

10^3 10^2 10 0 −10 -10^2 -10^3

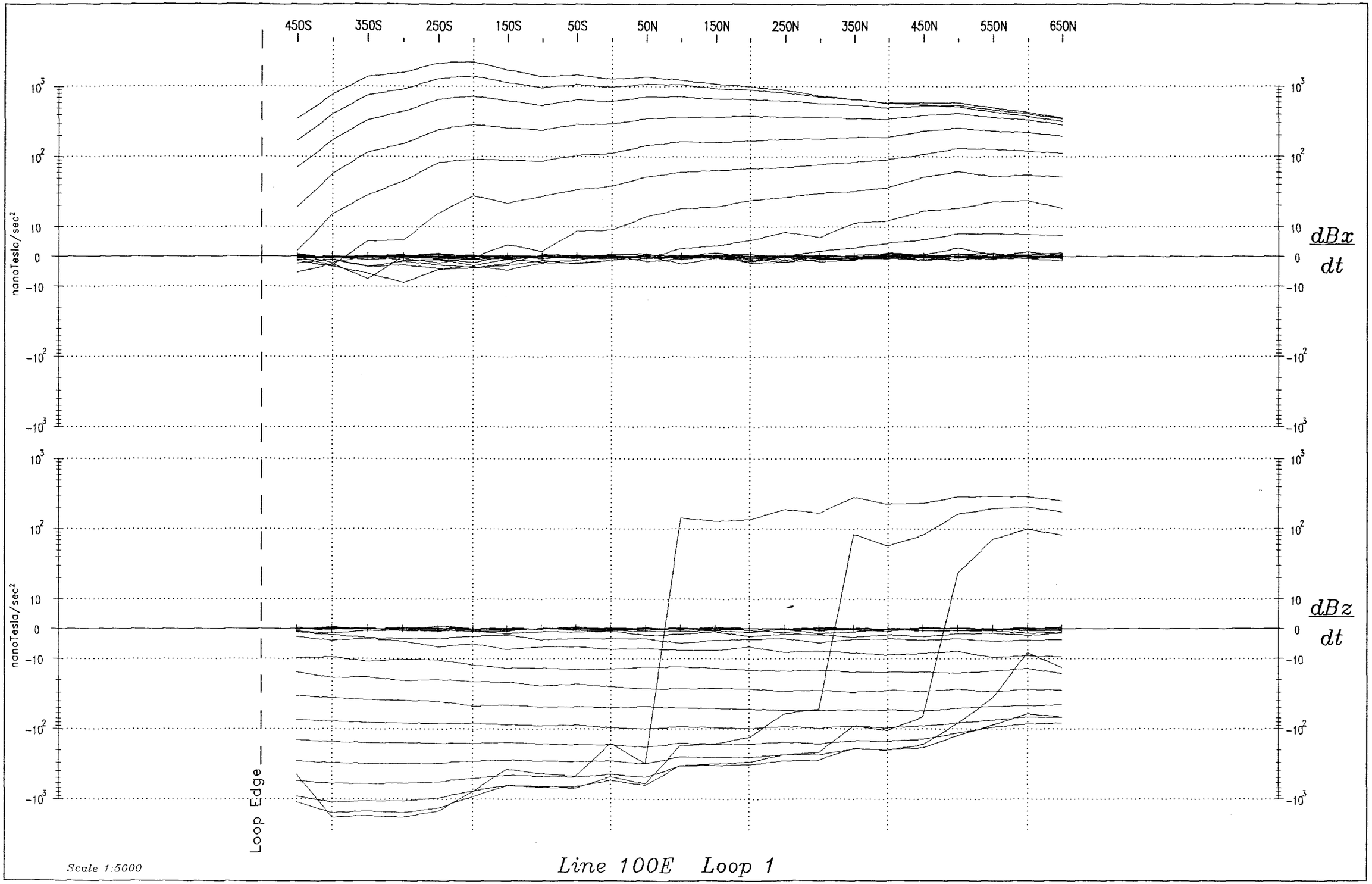
$\frac{dBx}{dt}$

$\frac{dBz}{dt}$

Loop Edge

Scale 1:5000

Line 100E Loop 2



Scale 1:5000

Line 100E Loop 1

650N 750N 850N 950N 1050N 1150N 1250N 1350N 1450N 1550N

nanoTesla/sec²

10^3 10^2 10 0 -10 -10^2 -10^3

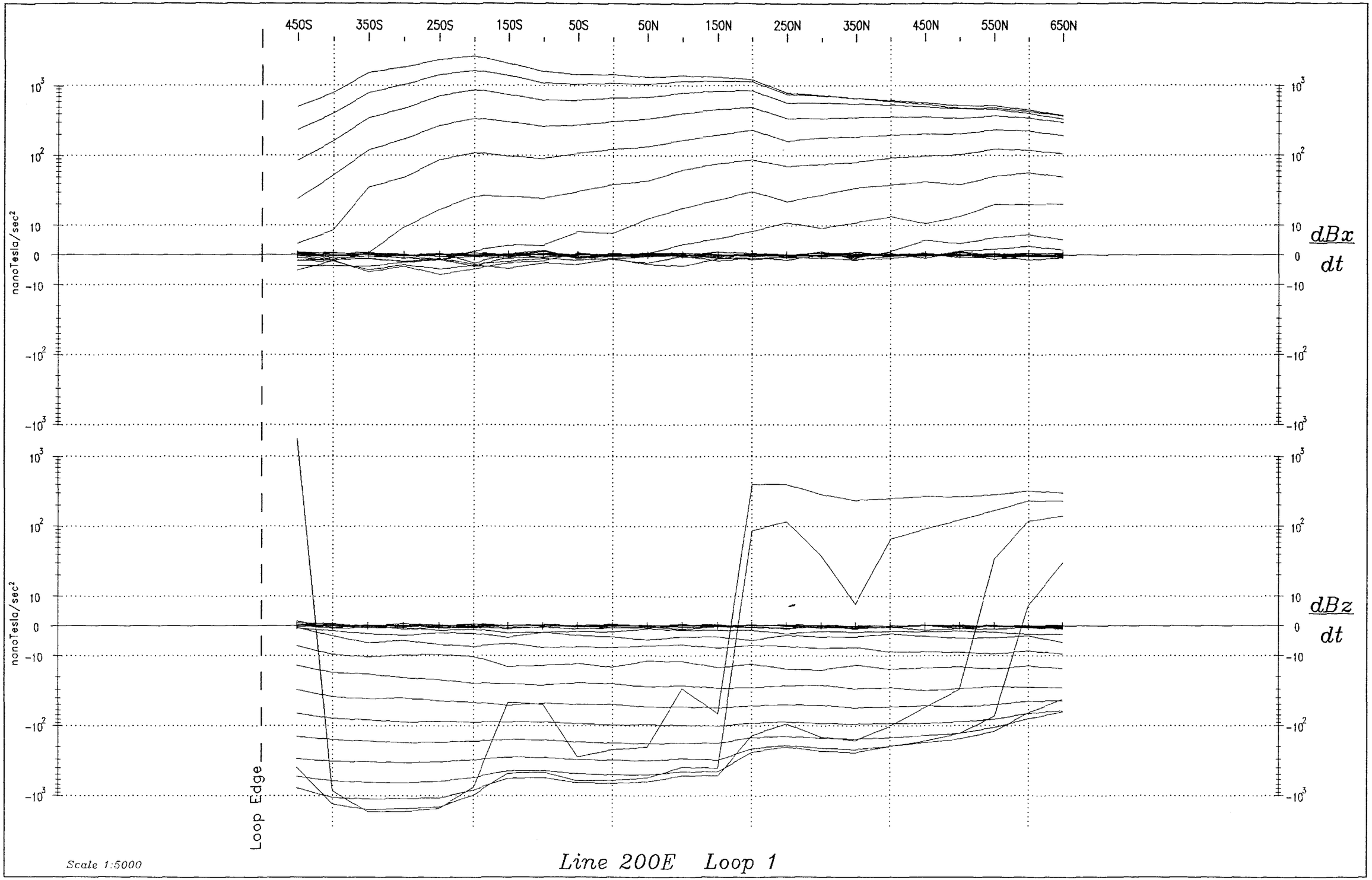
$\frac{dBx}{dt}$

$\frac{dBz}{dt}$

Loop Edge

Scale 1:5000

Line 200E Loop 2



Line 200E Loop 1

650N 750N 850N 950N 1050N 1150N 1250N 1350N 1450N 1550N 1650N 1750N 1850N 1950N

nanoTesla/sec²

10^3 10^2 10 0 −10 -10^2 -10^3

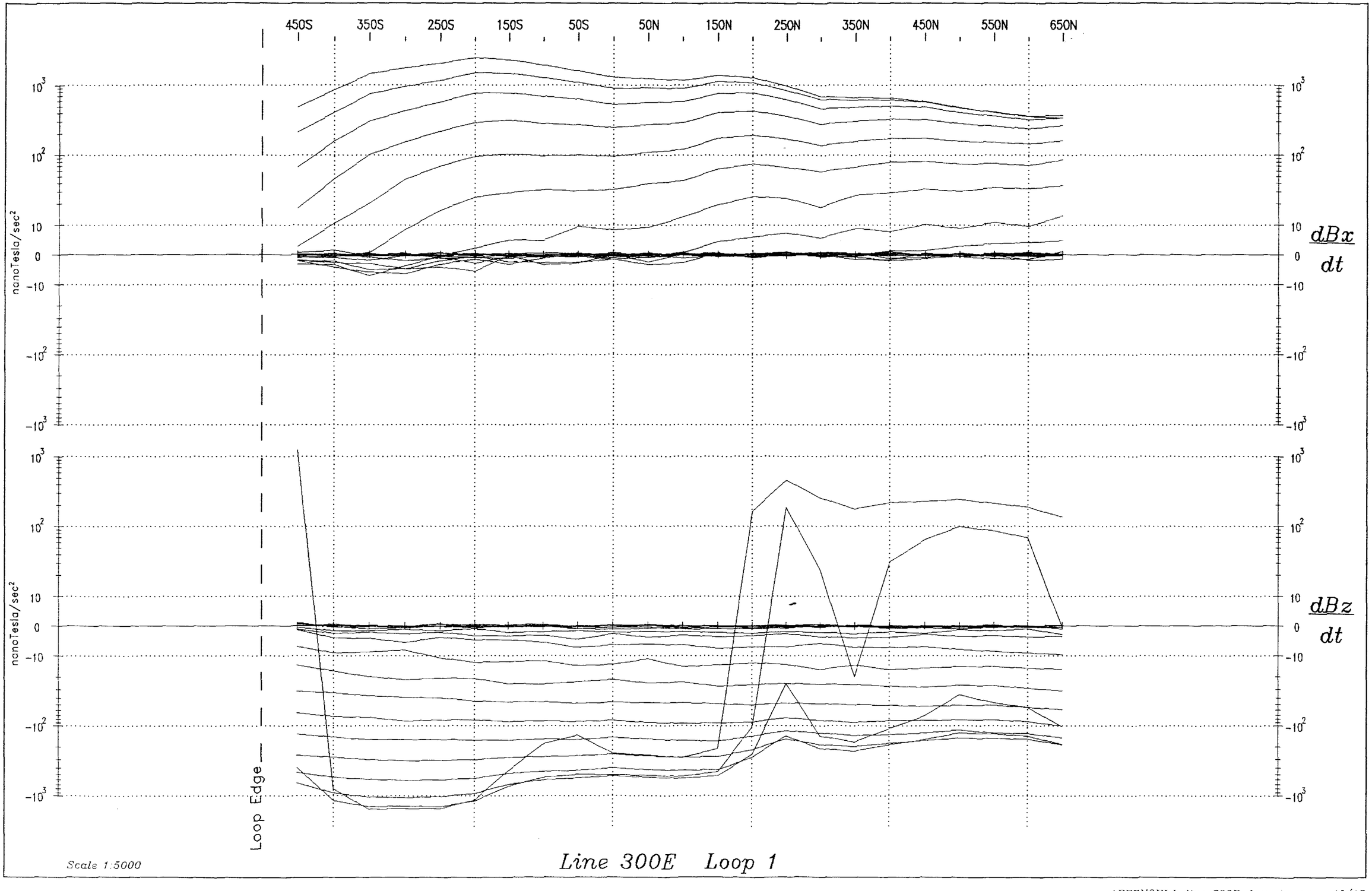
$\frac{dBx}{dt}$

$\frac{dBz}{dt}$

Loop Edge

Scale 1:5000

Line 300E Loop 2


450S
350S
250S
150S
50S
50N
150N
250N
350N
450N
550N
650N
nanoTesla/sec²
$\frac{dBx}{dt}$
$\frac{dBz}{dt}$
Loop Edge
Scale 1:5000
Line 300E Loop 1

650N 750N 850N 950N 1050N 1150N 1250N 1350N 1450N 1550N 1650N 1750N

nanoTesla/sec²

10^3 10^2 10 0 −10 -10^2 -10^3

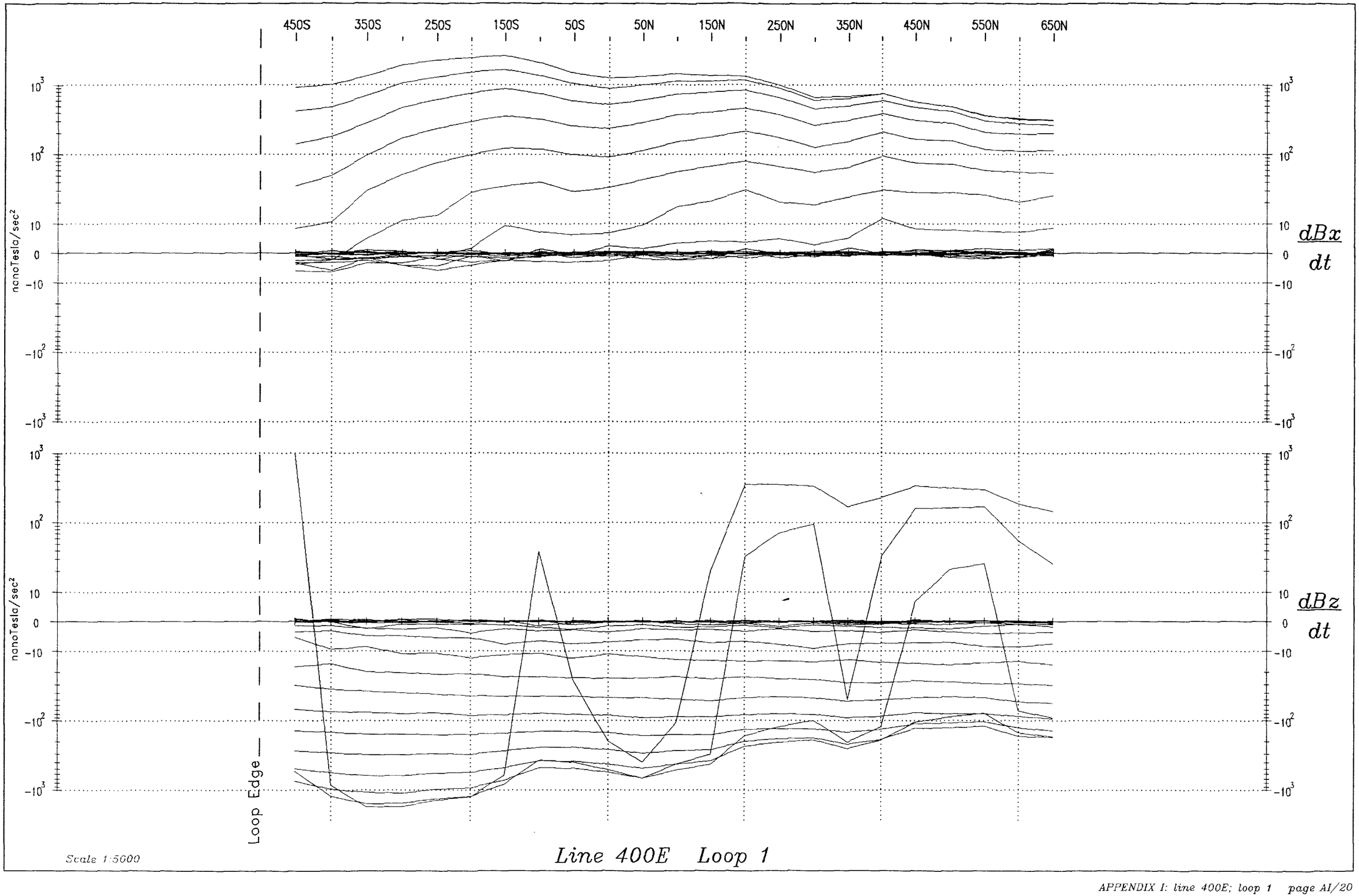
$\frac{dBx}{dt}$

$\frac{dBz}{dt}$

Loop Edge

Scale 1:5000

Line 400E Loop 2



Scale 1:5000

Line 400E Loop 1

650N 750N 850N 950N 1050N 1150N 1250N 1350N 1450N 1550N 1650N 1750N 1850N

10^3 10^2 10 0 -10 -10^2 -10^3

nanoTesla/sec²

$\frac{dBx}{dt}$

10^3 10^2 10 0 -10 -10^2 -10^3

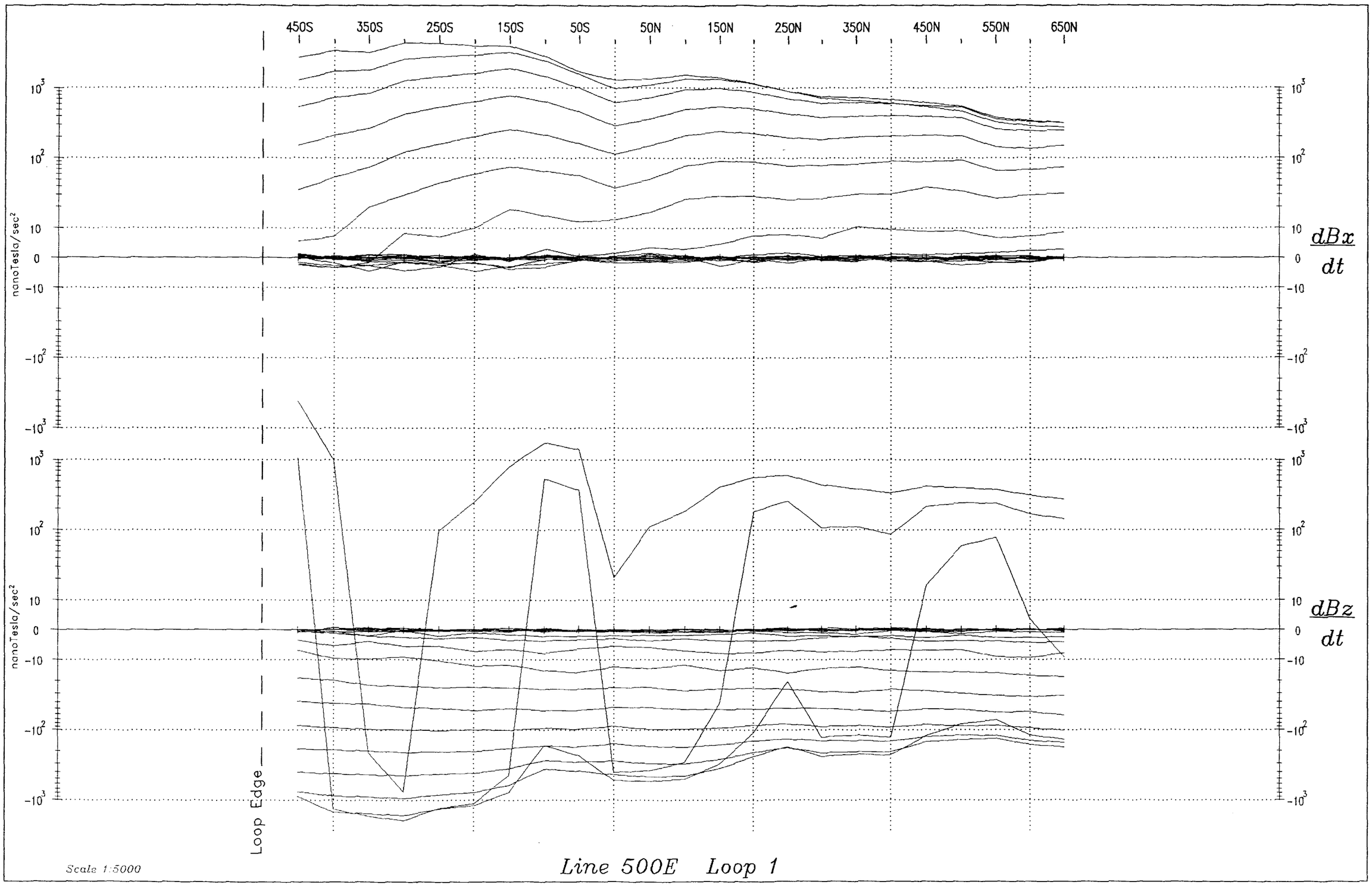
nanoTesla/sec²

$\frac{dBz}{dt}$

Loop Edge

Scale 1:5000

Line 500E Loop 2



Scale 1:5000

Line 500E Loop 1

650N 750N 850N 950N 1050N 1150N 1250N 1350N 1450N 1550N 1650N 1750N 1850N 1950N

nanoTesla/sec²

10^3 10^2 10 0 -10 -10^2 -10^3

$\frac{dBx}{dt}$

$\frac{dBz}{dt}$

Loop Edge

Scale 1:5000

Line 600E Loop 2

450S 350S 250S 150S 50S 50N 150N 250N 350N 450N 550N 650N

10^3 10^2 10 0 -10 -10^2 -10^3

$\frac{dBx}{dt}$

$\frac{dBz}{dt}$

Loop Edge

Scale 1:5000

Line 600E Loop 1

650N 750N 850N 950N 1050N 1150N 1250N 1350N 1450N 1550N 1650N 1750N 1850N 1950N 2050N

nanoTesla/sec²

10^3 10^2 10 0 -10 -10^2 -10^3

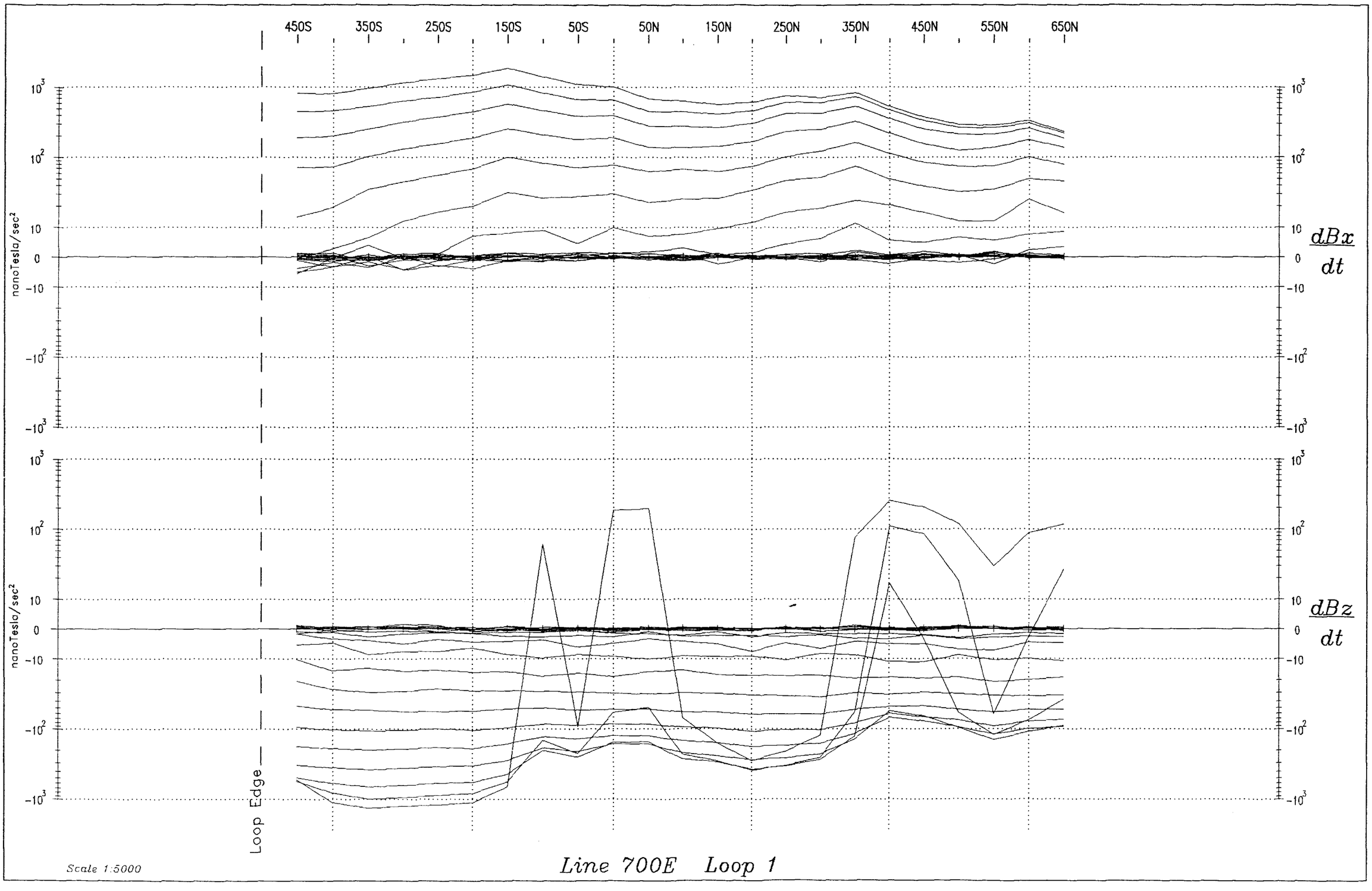
$\frac{dBx}{dt}$

$\frac{dBz}{dt}$

Loop Edge

Scale 1:5000

Line 700E Loop 2



Line 700E Loop 1

650N 750N 850N 950N 1050N 1150N 1250N 1350N 1450N 1550N 1650N 1750N 1850N 1950N

nanoTesla/sec²

10^3 10^2 10 0 −10 -10^2 -10^3

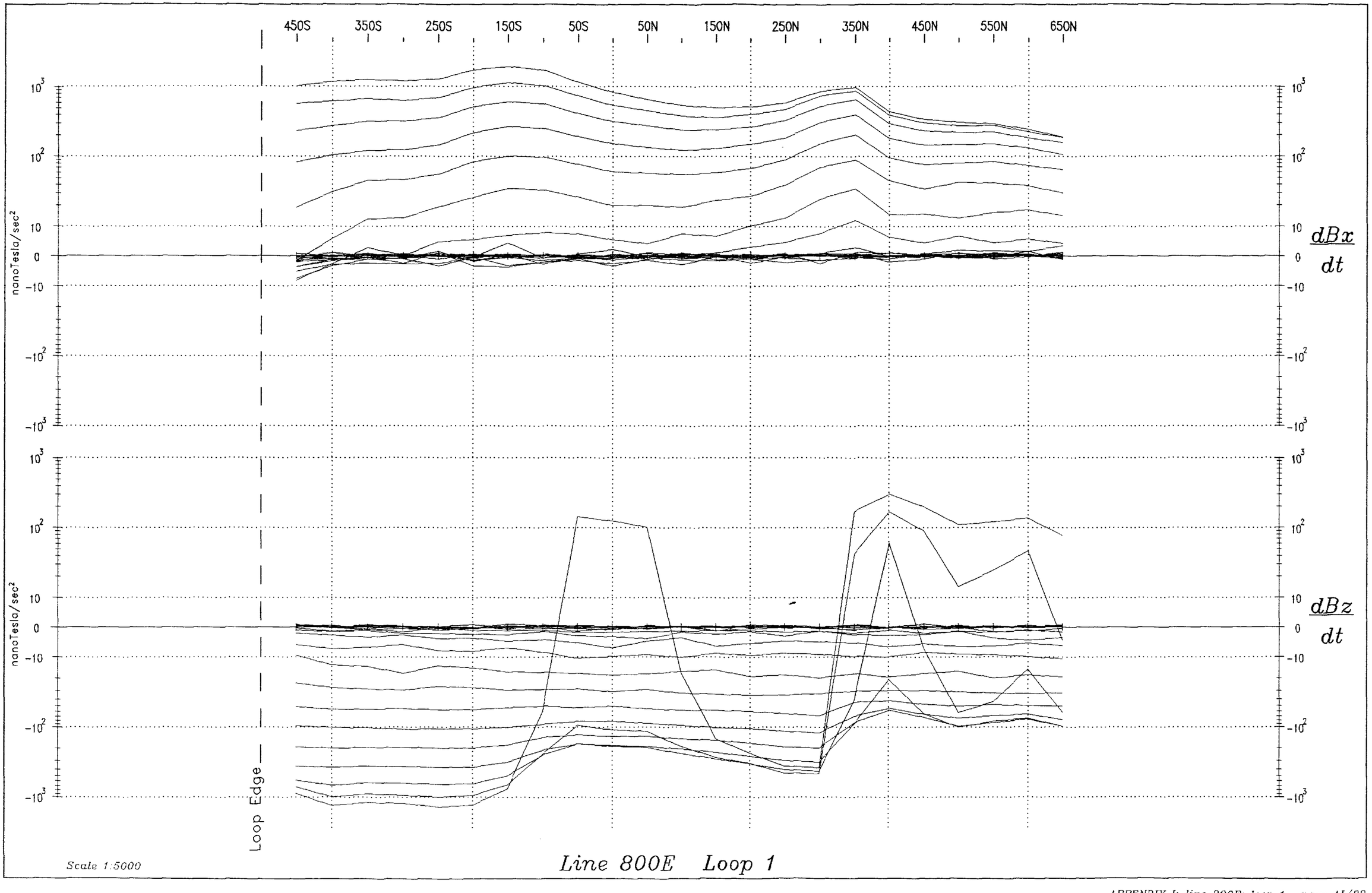
$\frac{dBx}{dt}$

Loop Edge

$\frac{dBz}{dt}$

Scale 1:5000

Line 800E Loop 2



Line 800E Loop 1

650N 750N 850N 950N 1050N 1150N 1250N 1350N 1450N 1550N 1650N 1750N 1850N 1950N

nanoTesla/sec²

10^3 10^2 10 0 -10 -10^2 -10^3

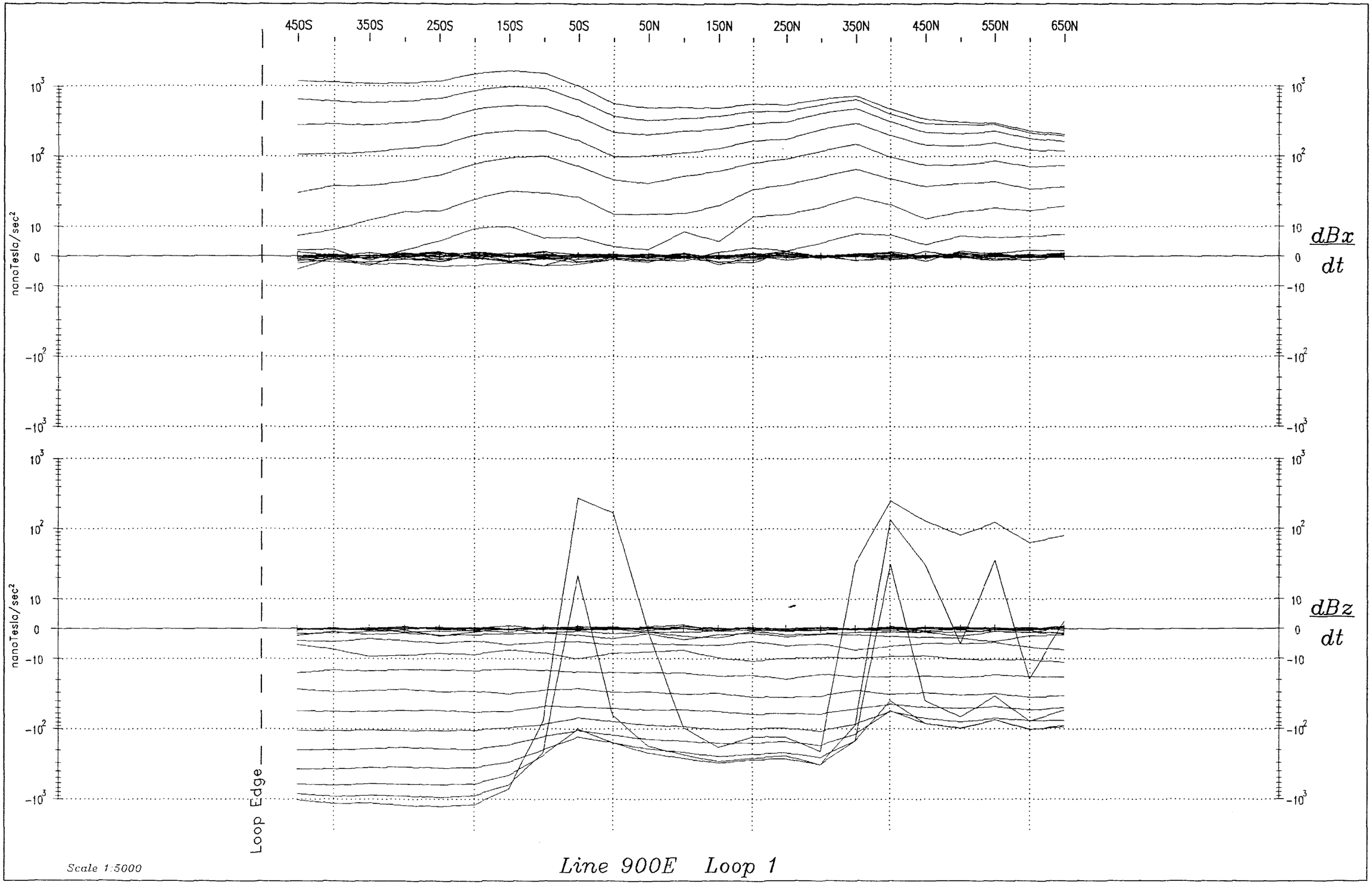
$\frac{dBx}{dt}$

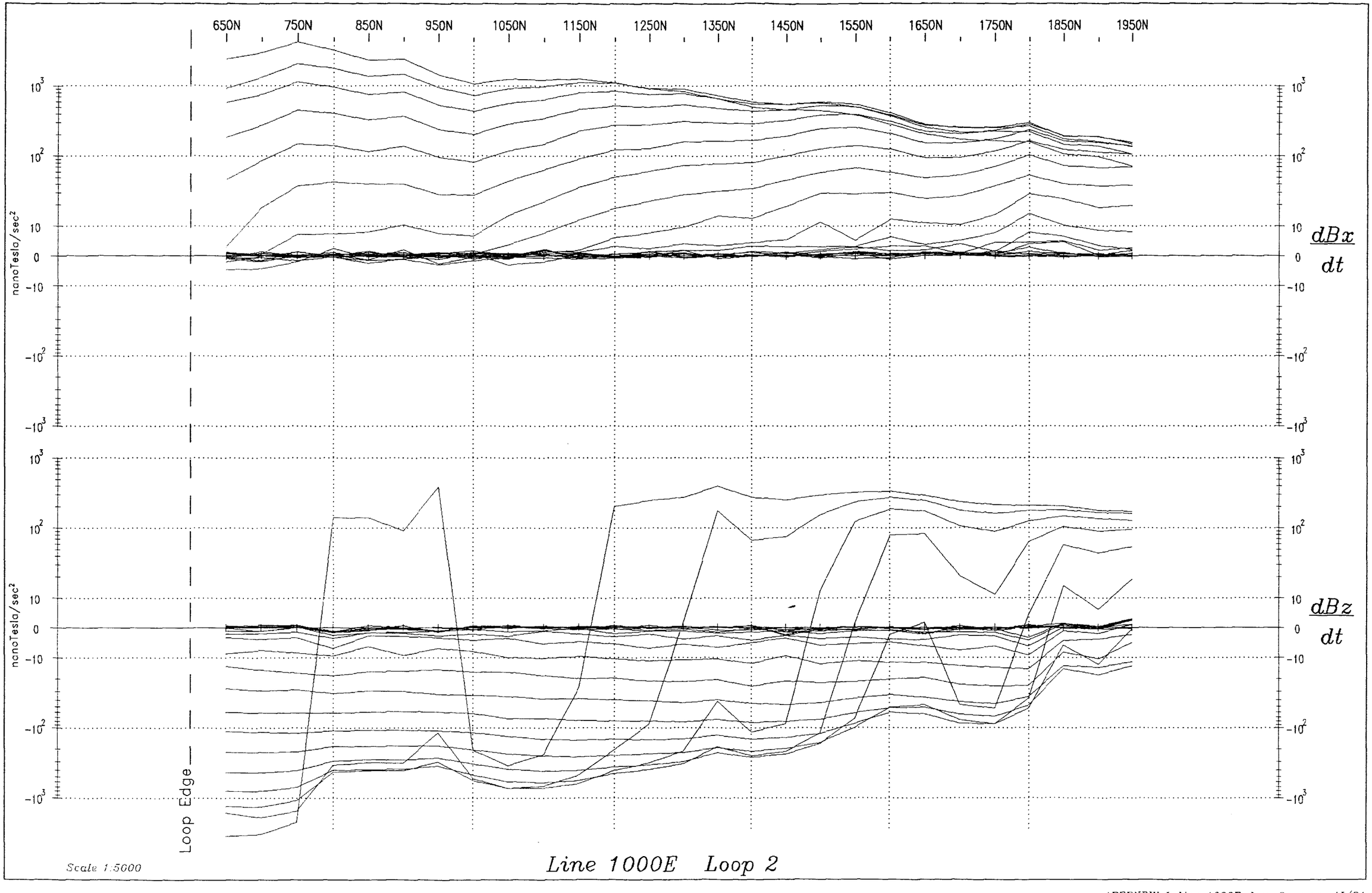
$\frac{dBz}{dt}$

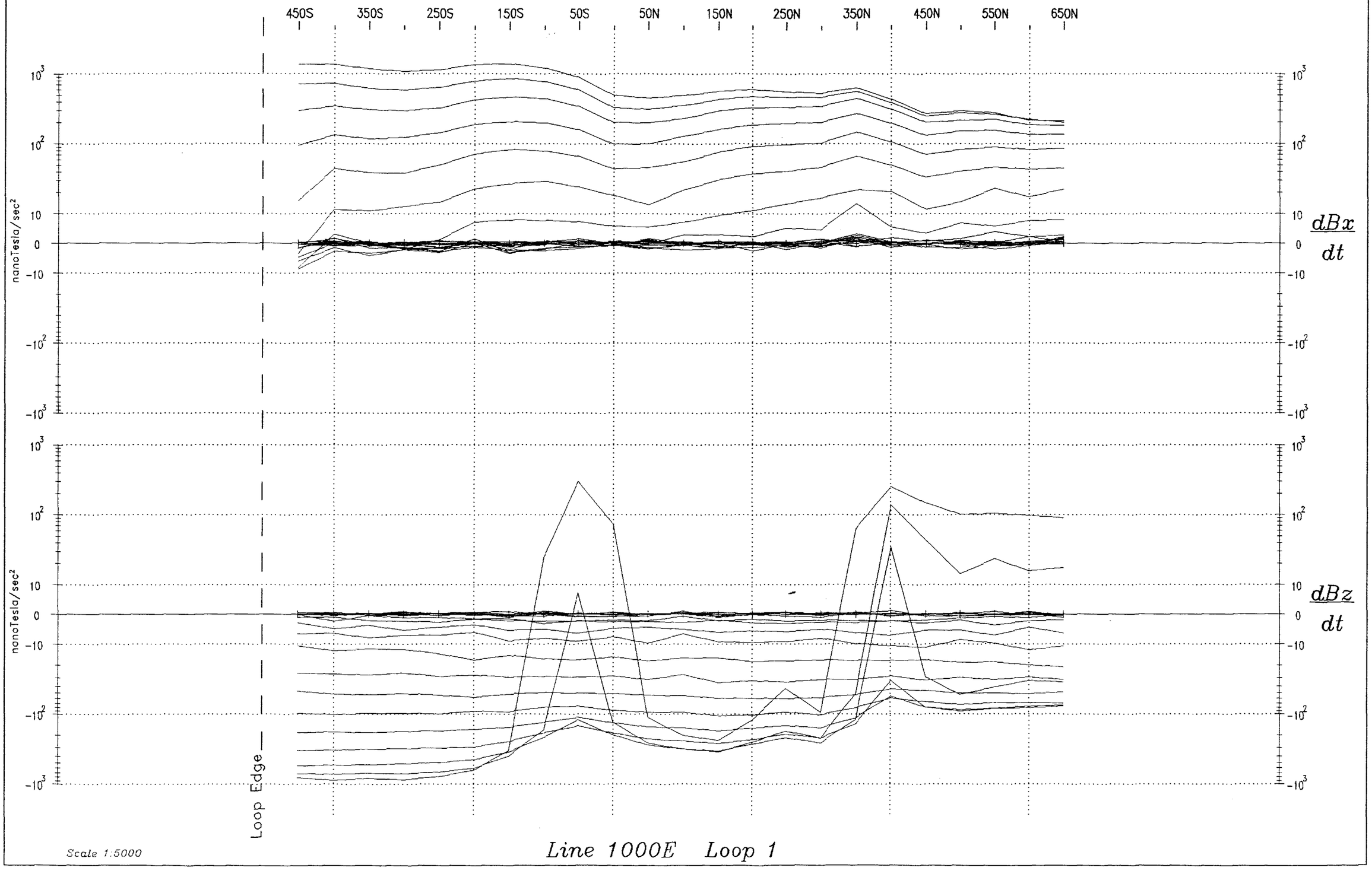
Loop Edge

Scale 1:5000

Line 900E Loop 2


450S
350S
250S
150S
50S
50N
150N
250N
350N
450N
550N
650N
nanoTesla/sec²
$\frac{dBx}{dt}$
$\frac{dBz}{dt}$
Loop Edge
Scale 1:5000
Line 900E Loop 1


650N
750N
850N
950N
1050N
1150N
1250N
1350N
1450N
1550N
1650N
1750N
1850N
1950N
nanoTesla/sec²
dBx/dt
dBz/dt
Loop Edge
Scale 1:5000
Line 1000E Loop 2



Scale 1:5000

Line 1000E Loop 1

650N 750N 850N 950N 1050N 1150N 1250N 1350N 1450N 1550N 1650N 1750N 1850N

nanoTesla/sec²

10^3 10^2 10 0 −10 -10^2 -10^3

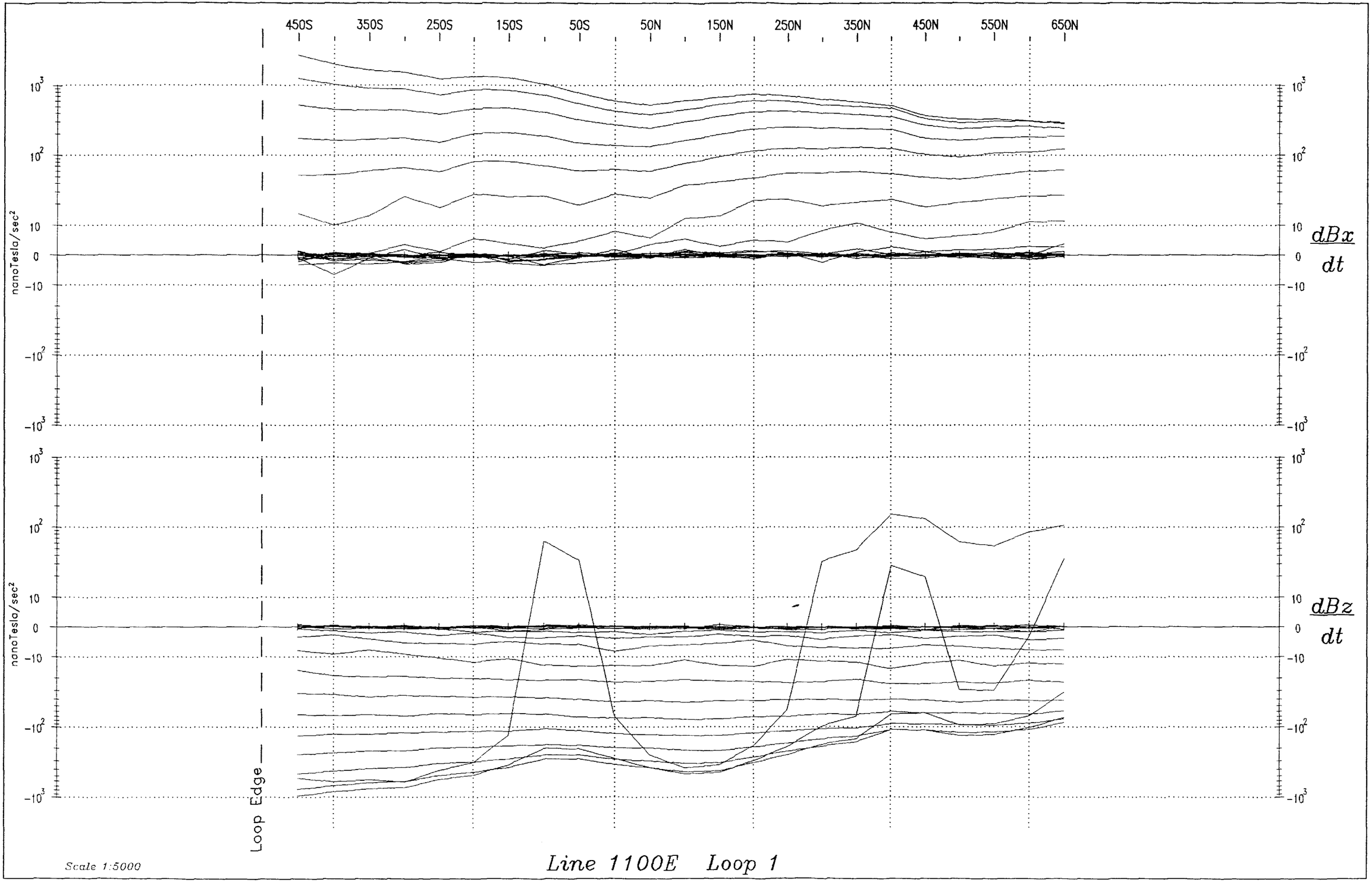
$\frac{dBx}{dt}$

$\frac{dBz}{dt}$

Loop Edge

Scale 1:5000

Line 1100E Loop 2



Scale 1:5000

Line 1100E Loop 1

650N 750N 850N 950N 1050N 1150N 1250N 1350N 1450N 1550N 1650N 1750N 1850N 1950N

nanoTesla/sec²

10^3 10^2 10 0 −10 -10^2 -10^3

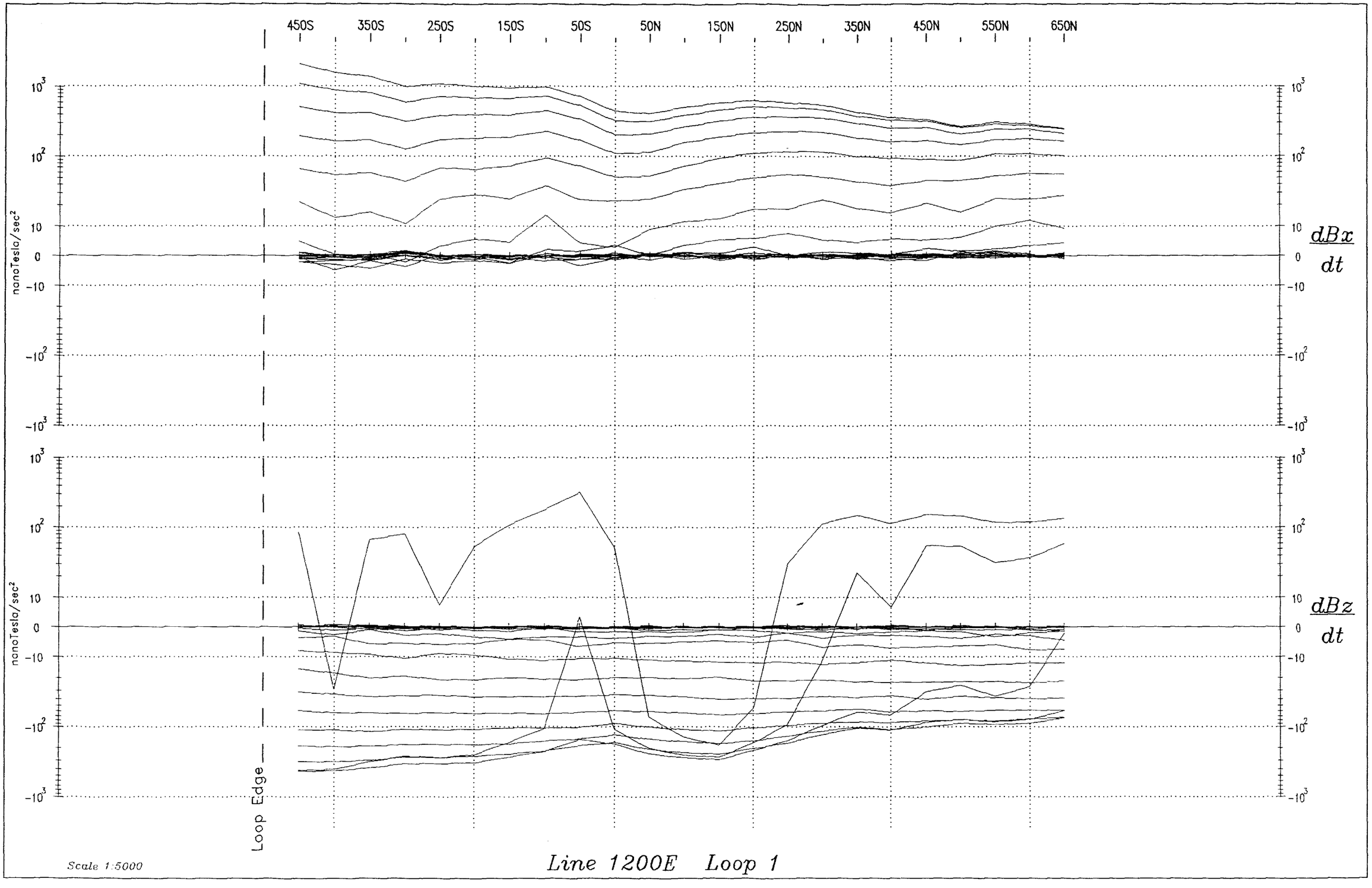
$\frac{dBx}{dt}$

$\frac{dBz}{dt}$

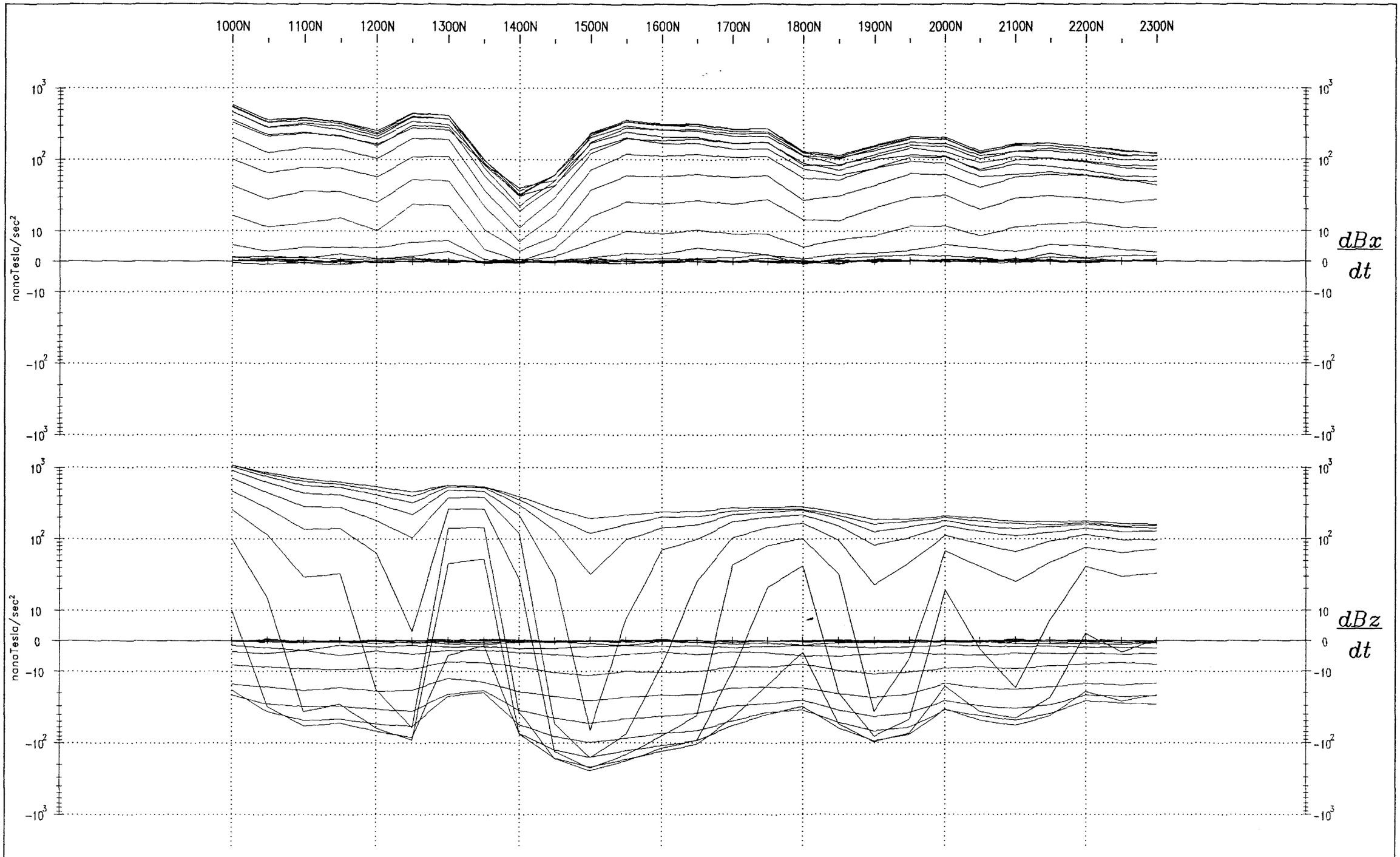
Loop Edge

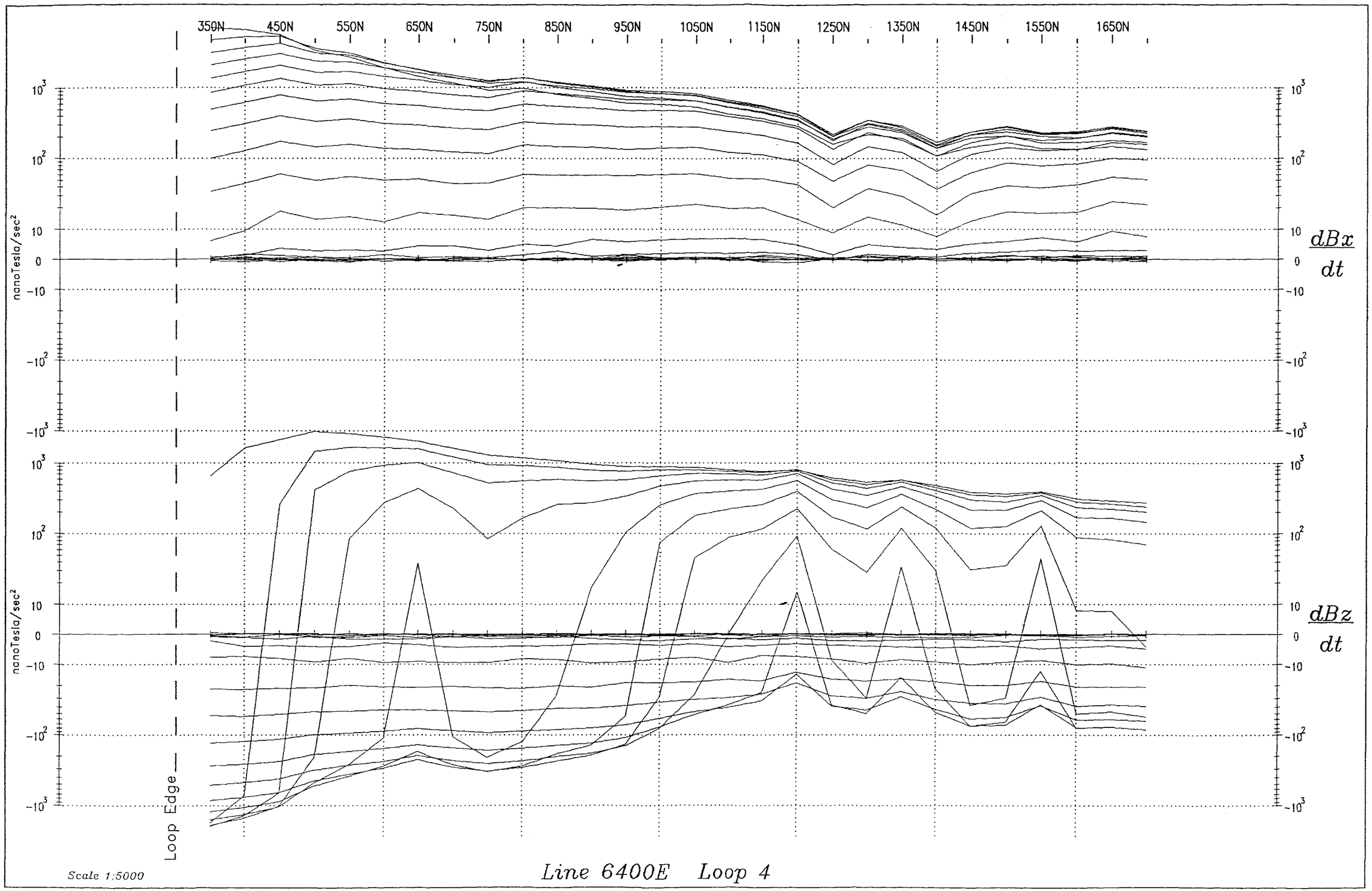
Scale 1:5000

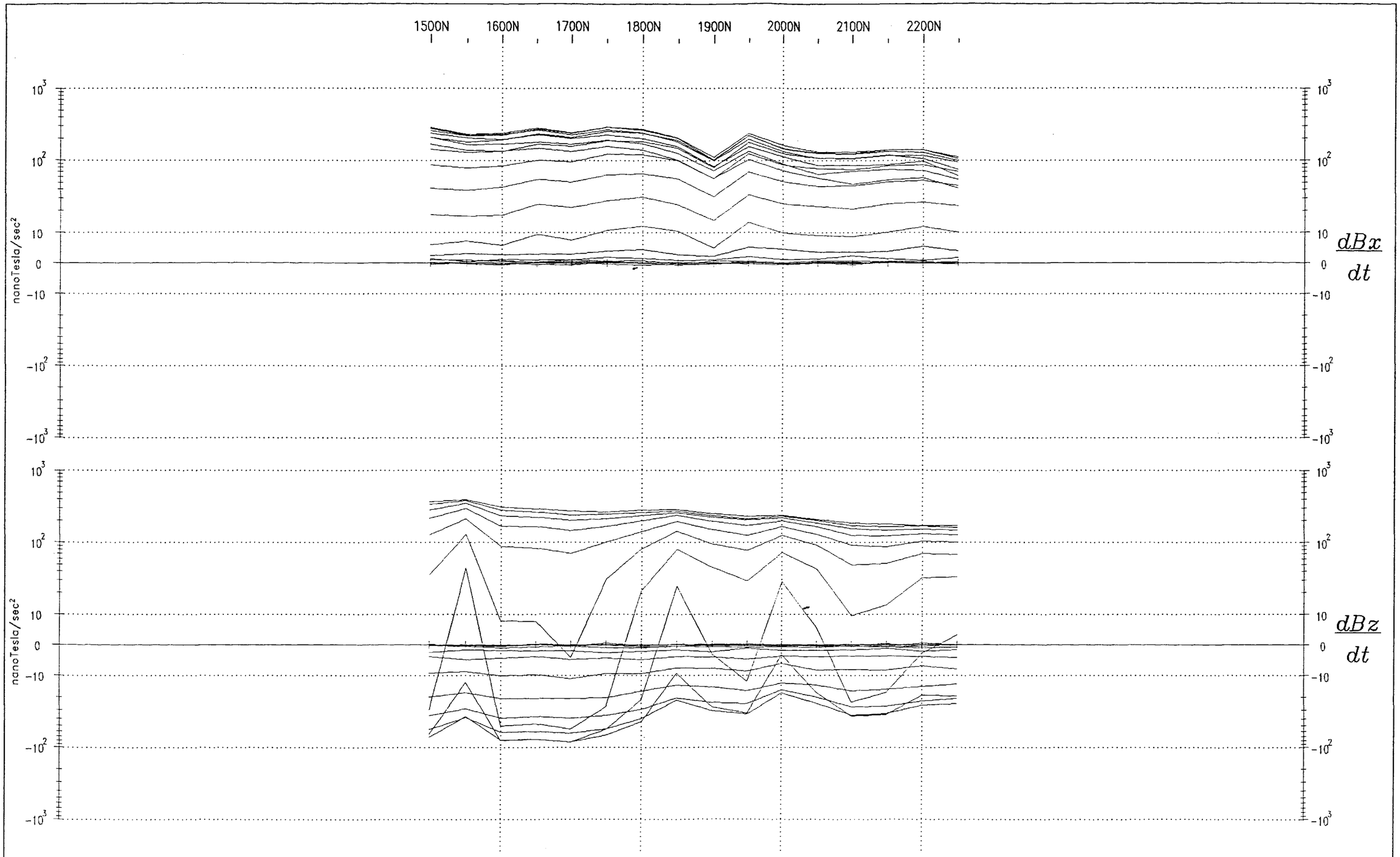
Line 1200E Loop 2


450S
350S
250S
150S
50S
50N
150N
250N
350N
450N
550N
650N
nanoTesla/sec²
dBx/dt
dBz/dt
Loop Edge
Scale 1:5000
Line 1200E Loop 1

Grid H-East

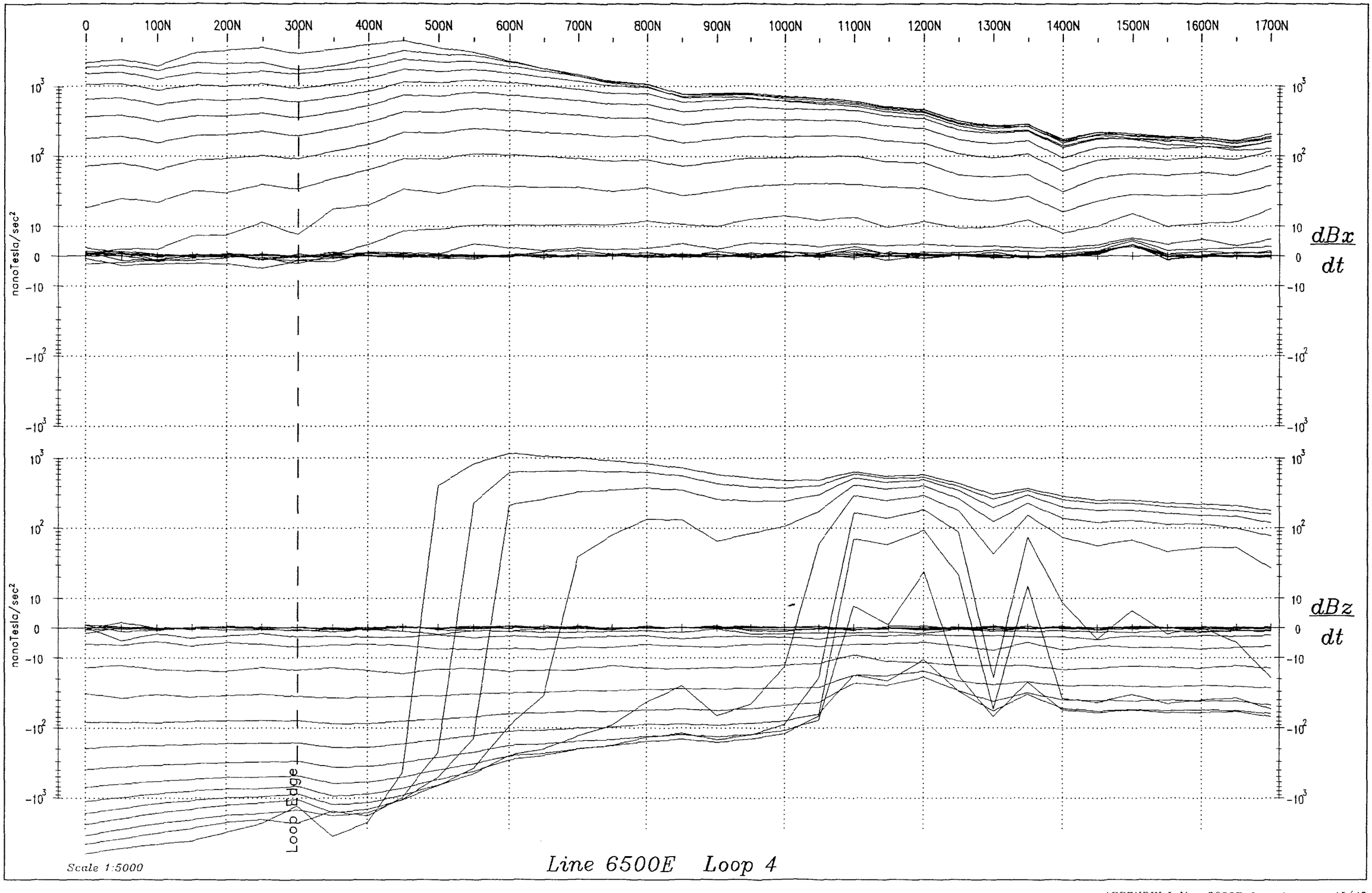

1000N
1100N
1200N
1300N
1400N
1500N
1600N
1700N
1800N
1900N
2000N
2100N
2200N
2300N
nanoTesla/sec²
dBx/dt
dBz/dt
Scale 1:5000
Line 6300E Loop 4

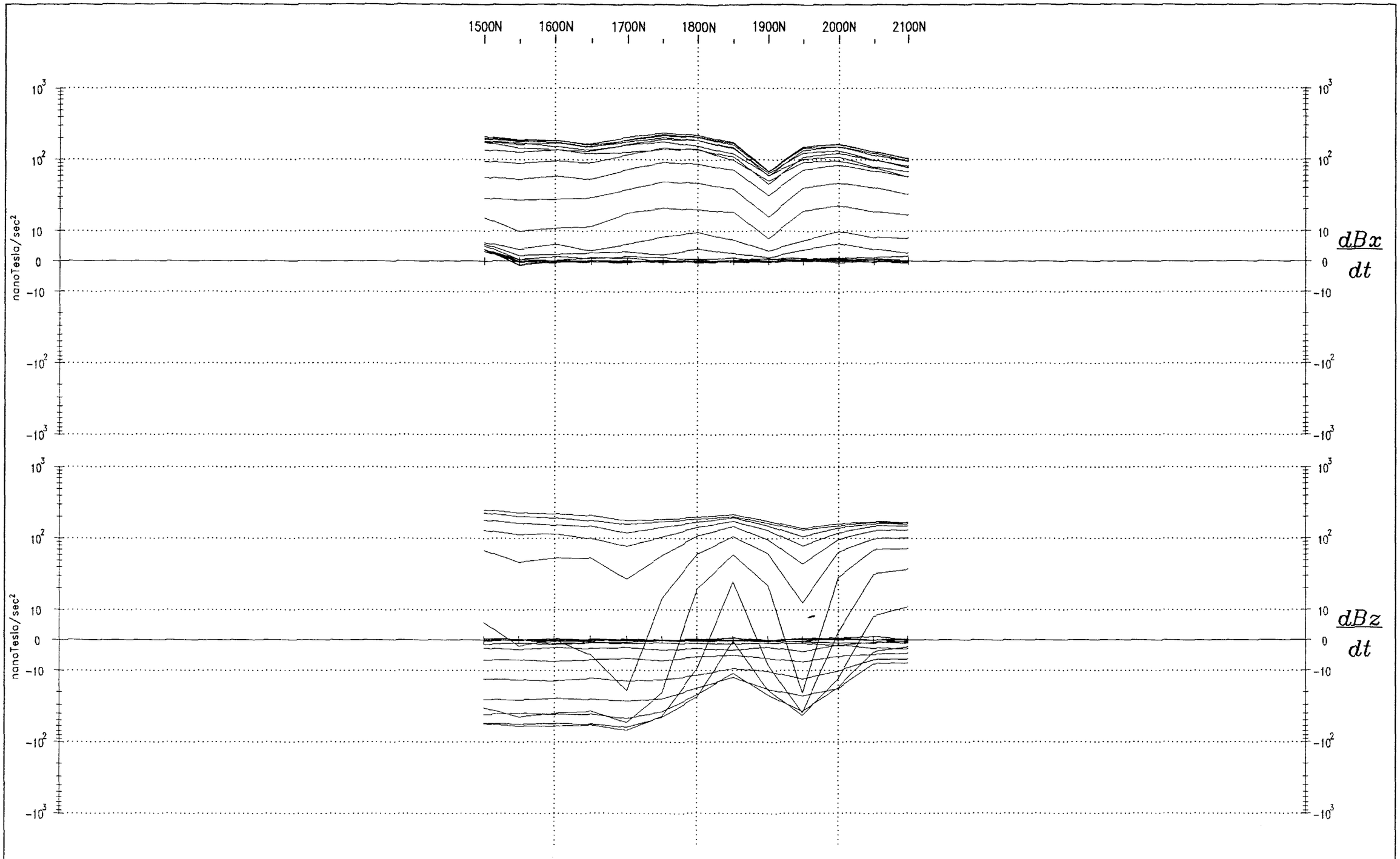

350N
450N
550N
650N
750N
850N
950N
1050N
1150N
1250N
1350N
1450N
1550N
1650N
nanoTesla/sec²
10^3
10^2
10
0
-10
-10^2
-10^3
$\frac{dBx}{dt}$
$\frac{dBz}{dt}$
Loop Edge
Scale 1:5000
Line 6400E Loop 4



Scale 1:5000

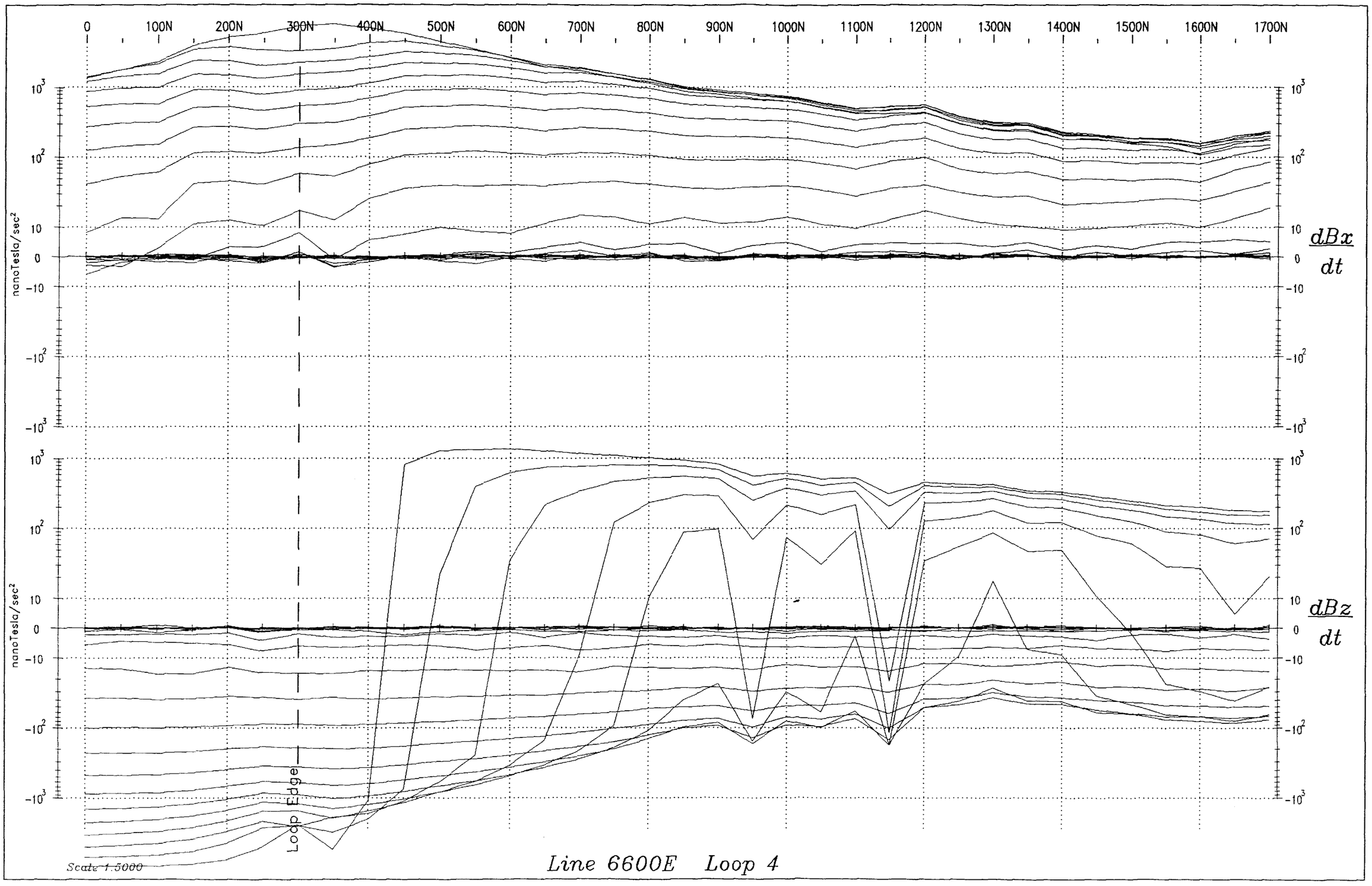
Line 6400E Loop 4


0
100N
200N
300N
400N
500N
600N
700N
800N
900N
1000N
1100N
1200N
1300N
1400N
1500N
1600N
1700N
nanoTesla/sec²
dBx/dt
dBz/dt
Loop Edge
Scale 1:5000
Line 6500E Loop 4

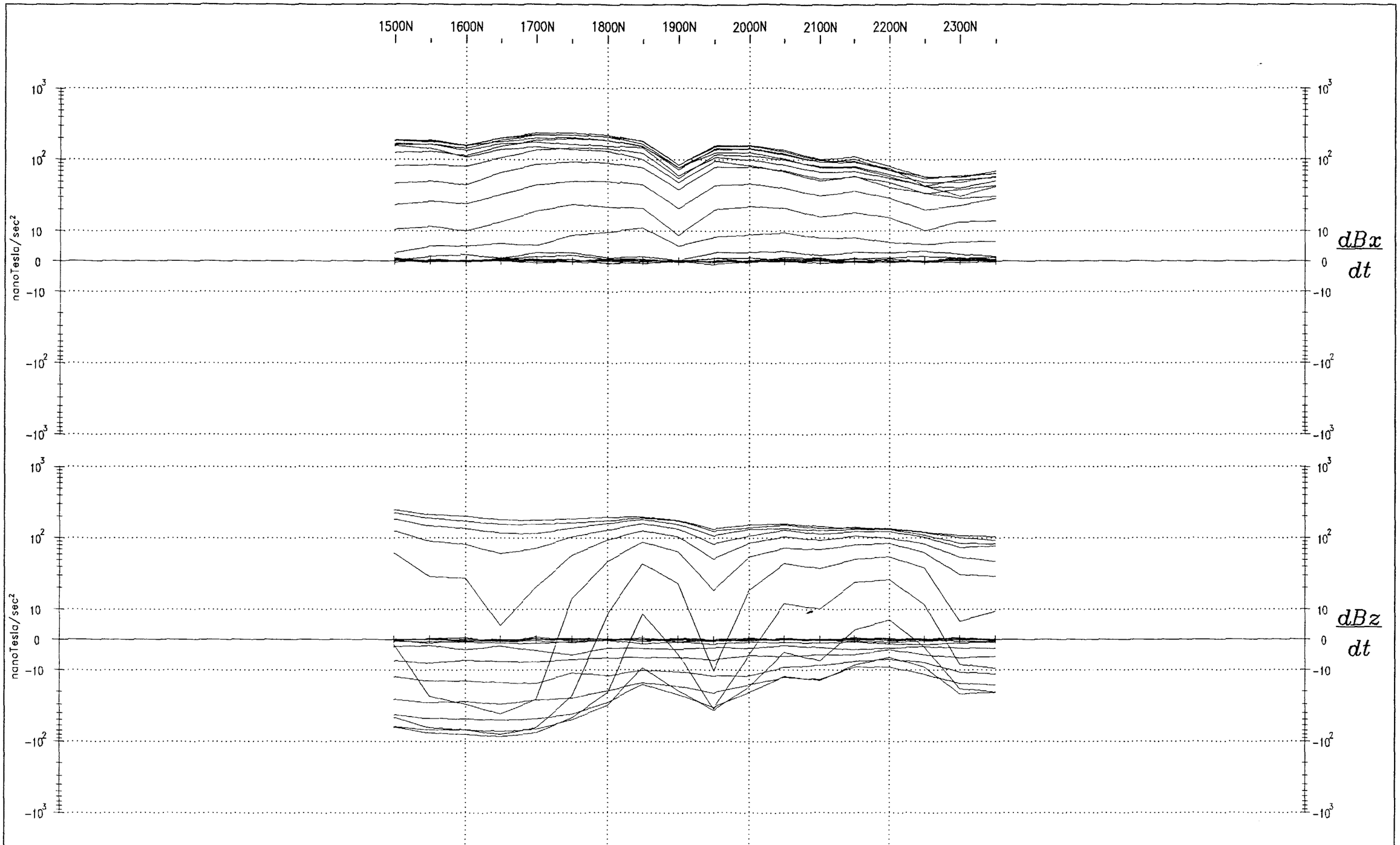


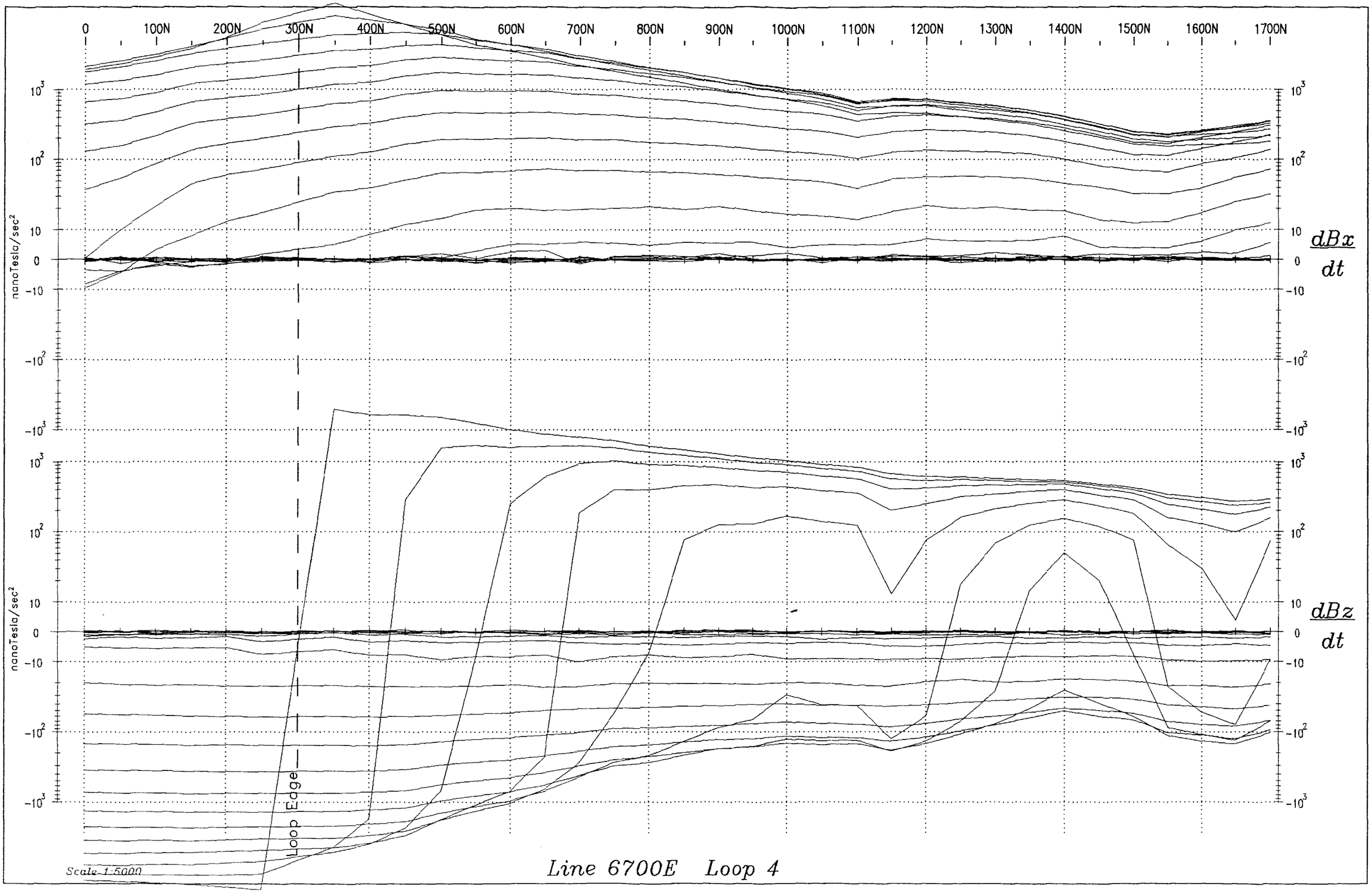
Scale 1:5000

Line 6500E Loop 4

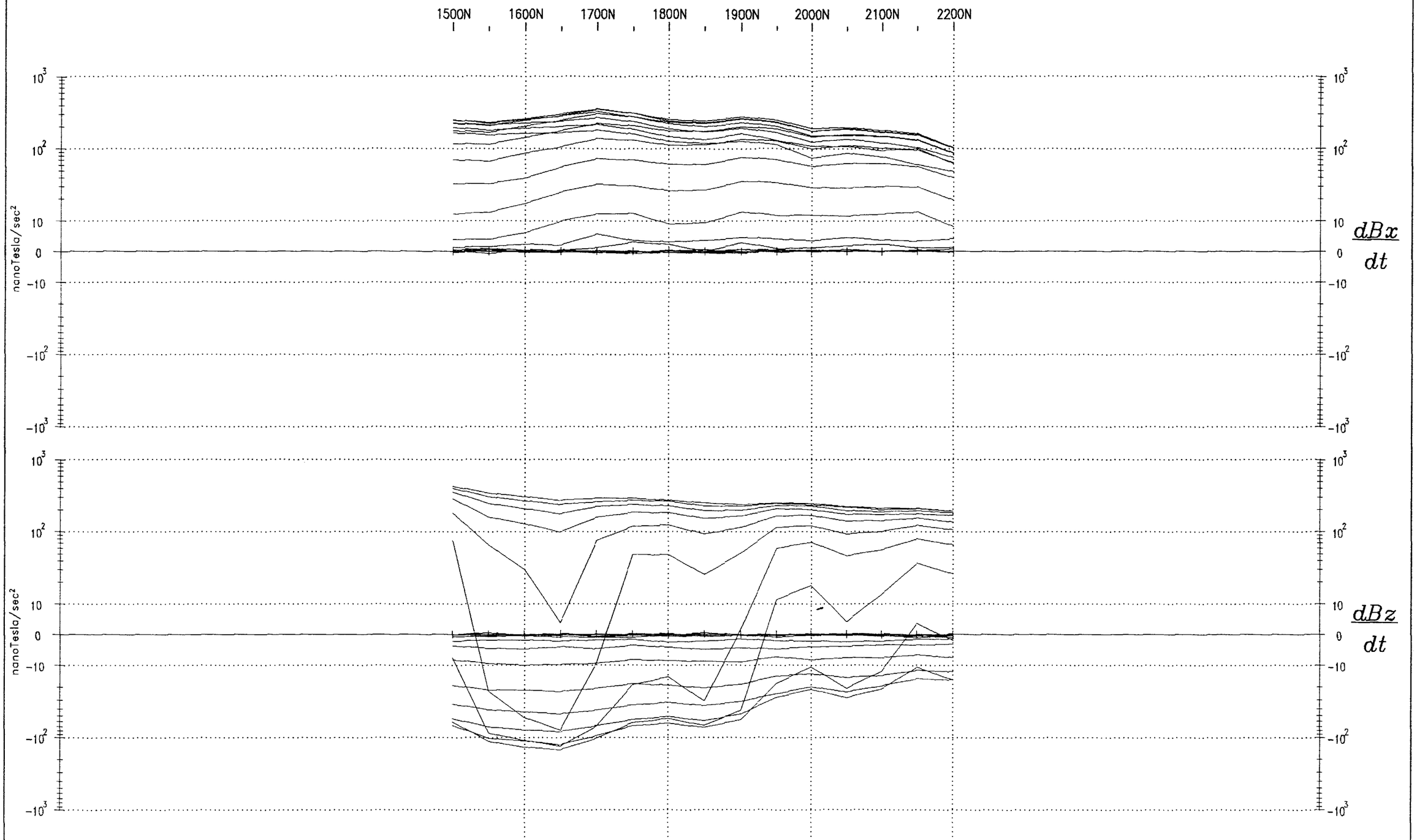


Line 6600E Loop 4


1500N
1600N
1700N
1800N
1900N
2000N
2100N
2200N
2300N
nanoTesla/sec²
dBx/dt
dBz/dt
Scale 1:5000
Line 6600E Loop 4



Line 6700E Loop 4



Scale 1:5000

Line 6700E Loop 4

0 100N 200N 300N 400N 500N 600N 700N 800N 900N 1000N 1100N 1200N 1300N 1400N 1500N 1600N 1700N

nanoTesla/sec²

10^3 10^2 10 0 -10 -10^2 -10^3

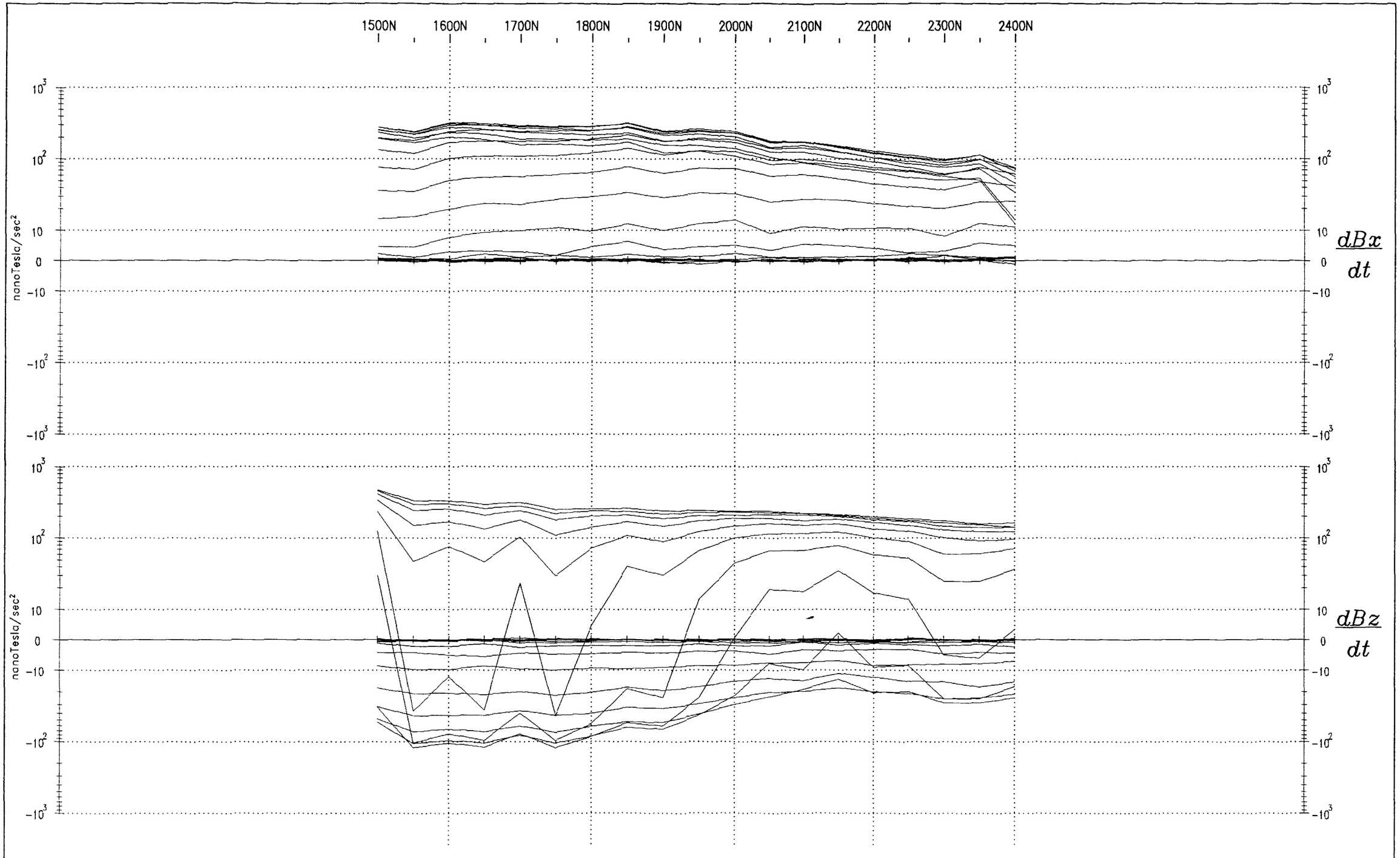
$\frac{dBx}{dt}$

$\frac{dBz}{dt}$

Loop Edge

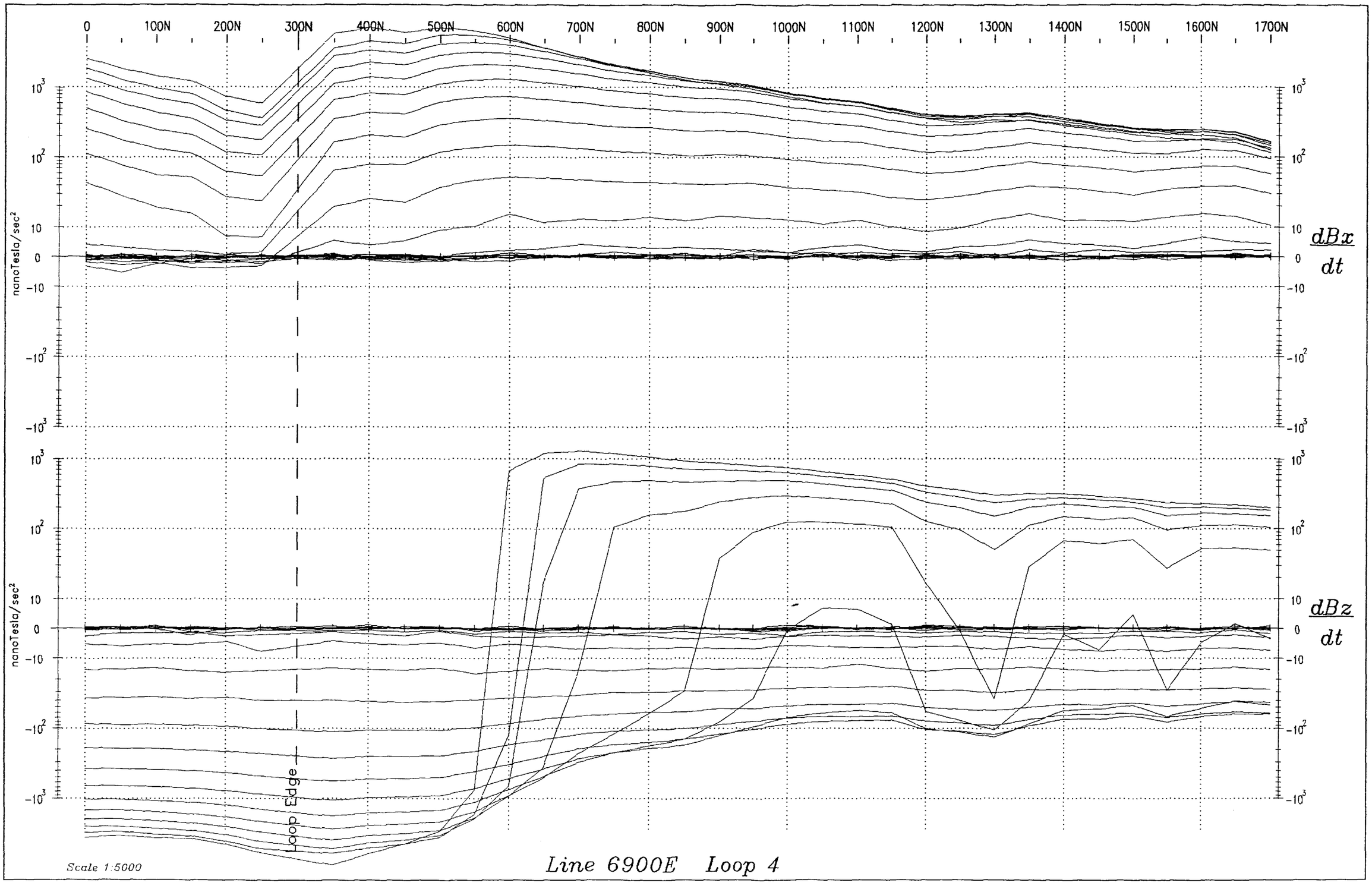
Scale 1:5000

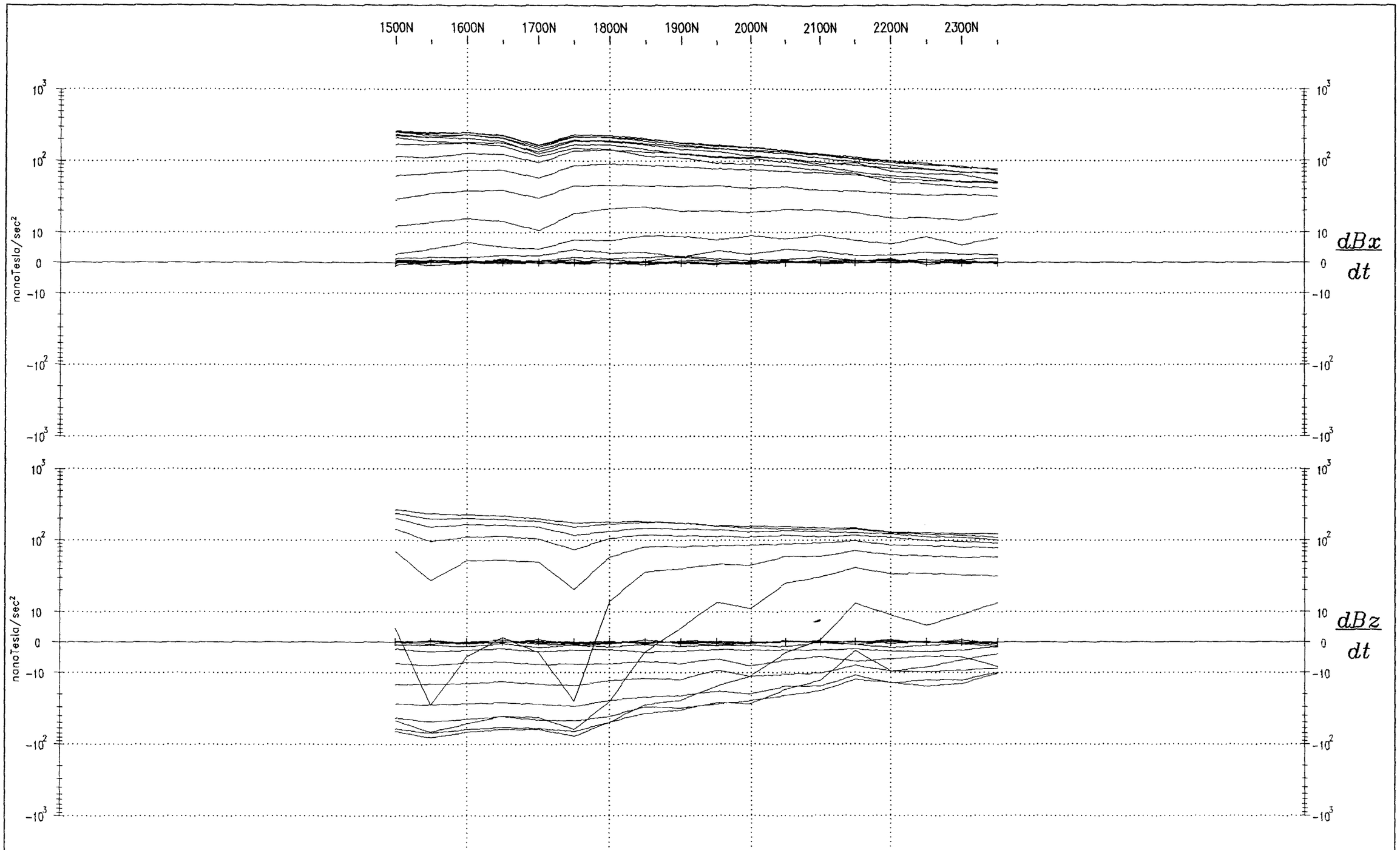
Line 6800E Loop 4



Scale 1:5000

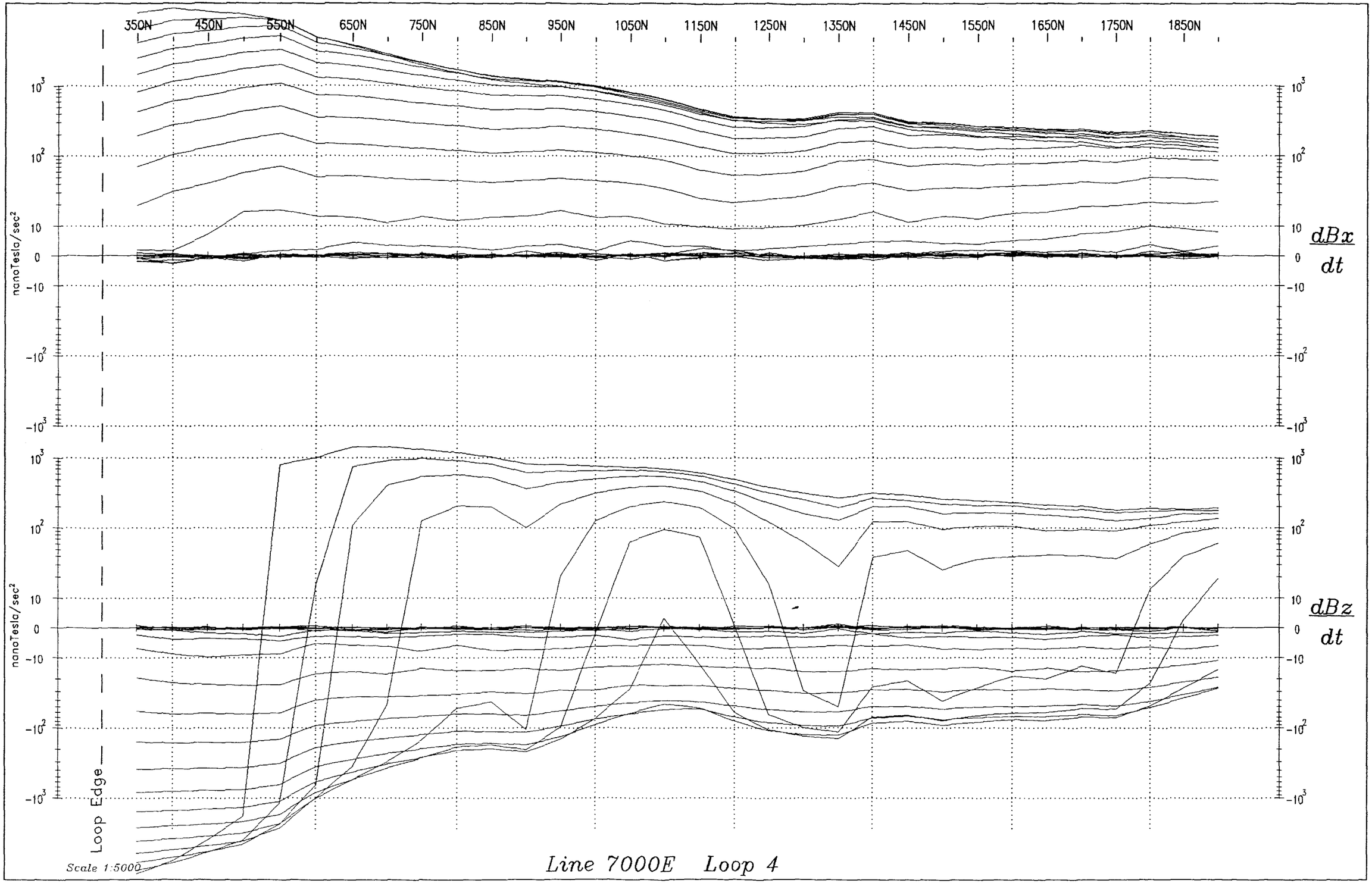
Line 6800E Loop 4


0
100N
200N
300N
400N
500N
600N
700N
800N
900N
1000N
1100N
1200N
1300N
1400N
1500N
1600N
1700N
nanoTesla/sec²
dBx/dt
dBz/dt
Loop Edge
Scale 1:5000
Line 6900E Loop 4

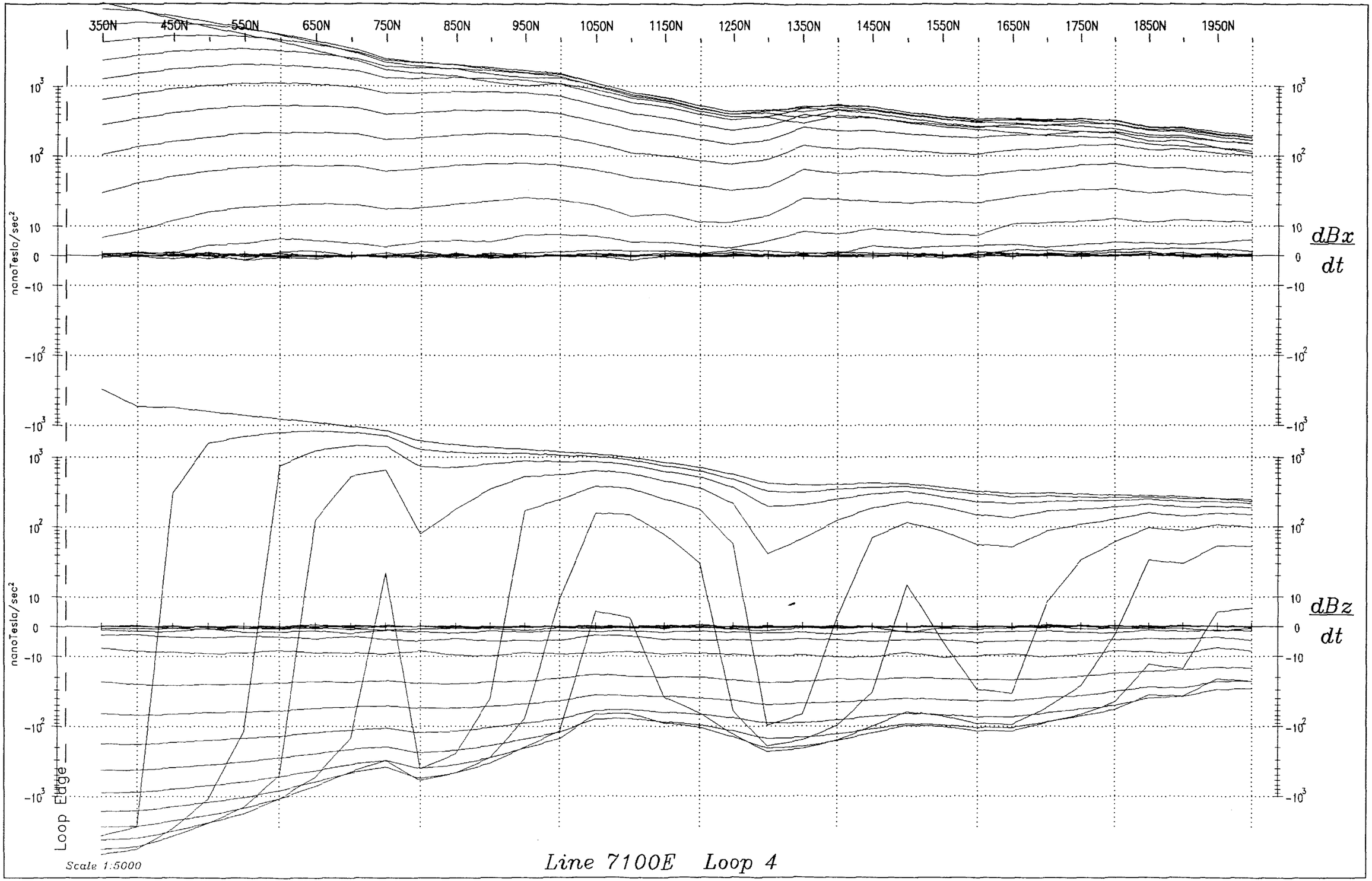


Scale 1:5000

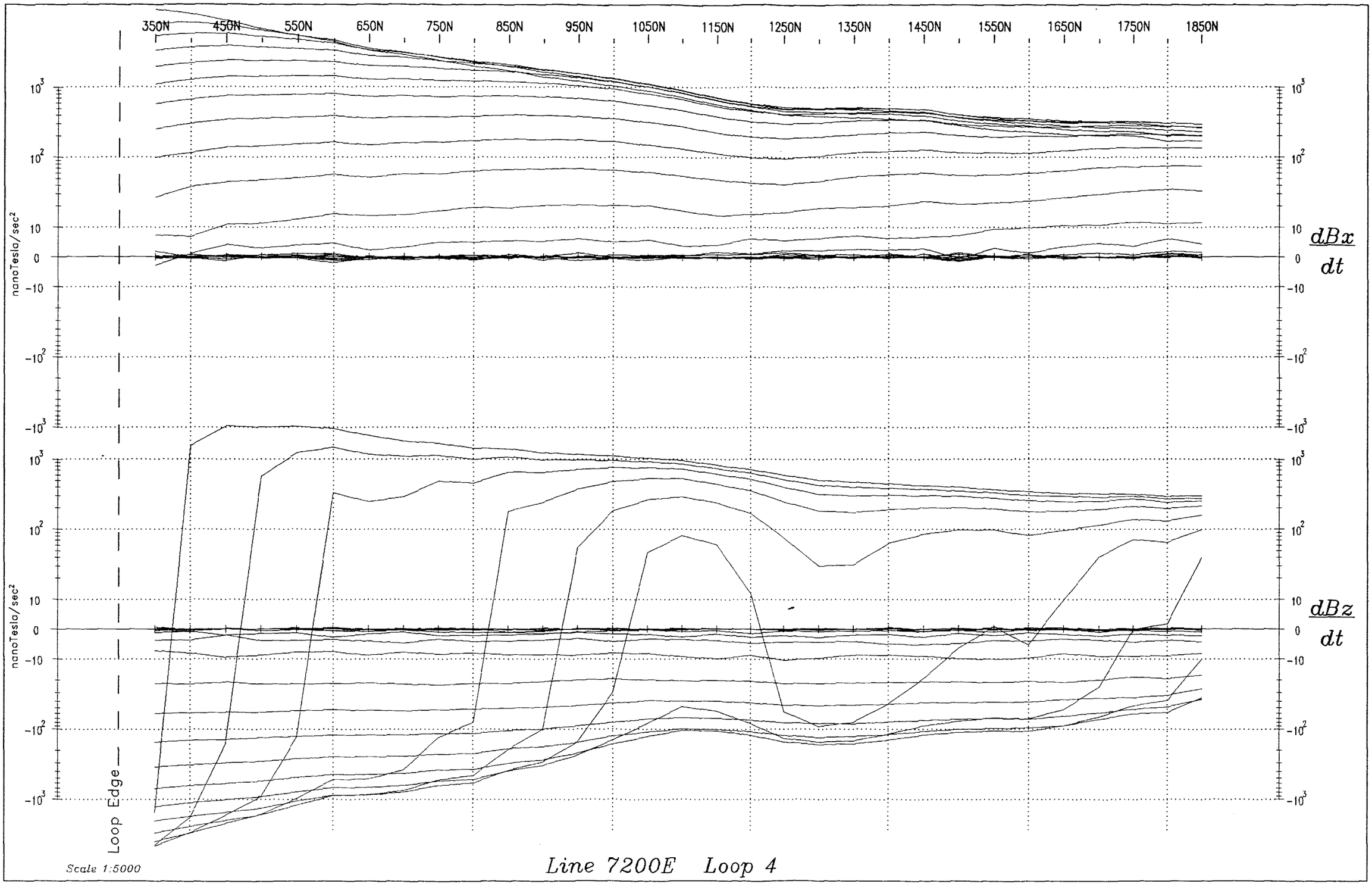
Line 6900E Loop 4



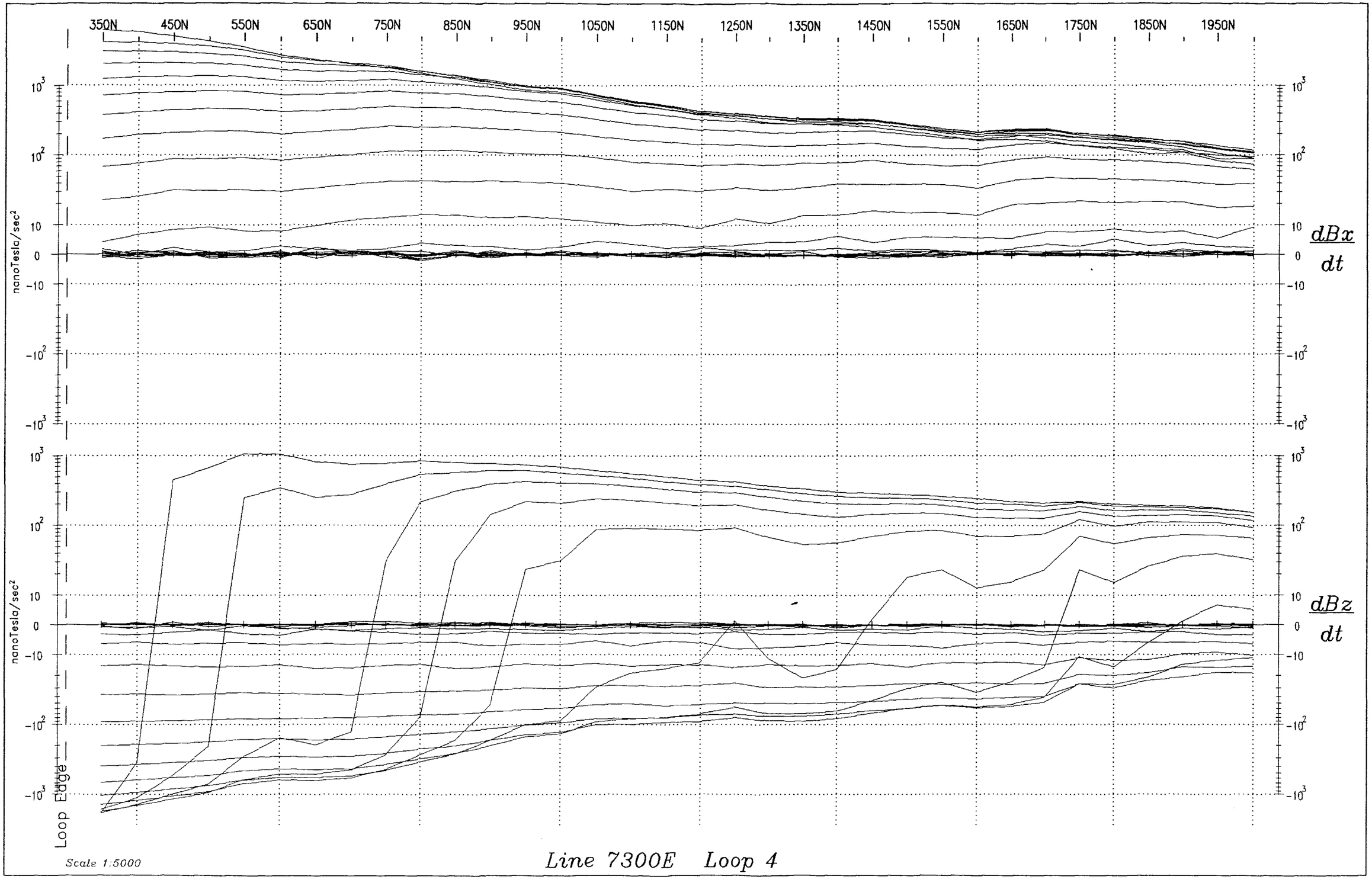
Line 7000E Loop 4

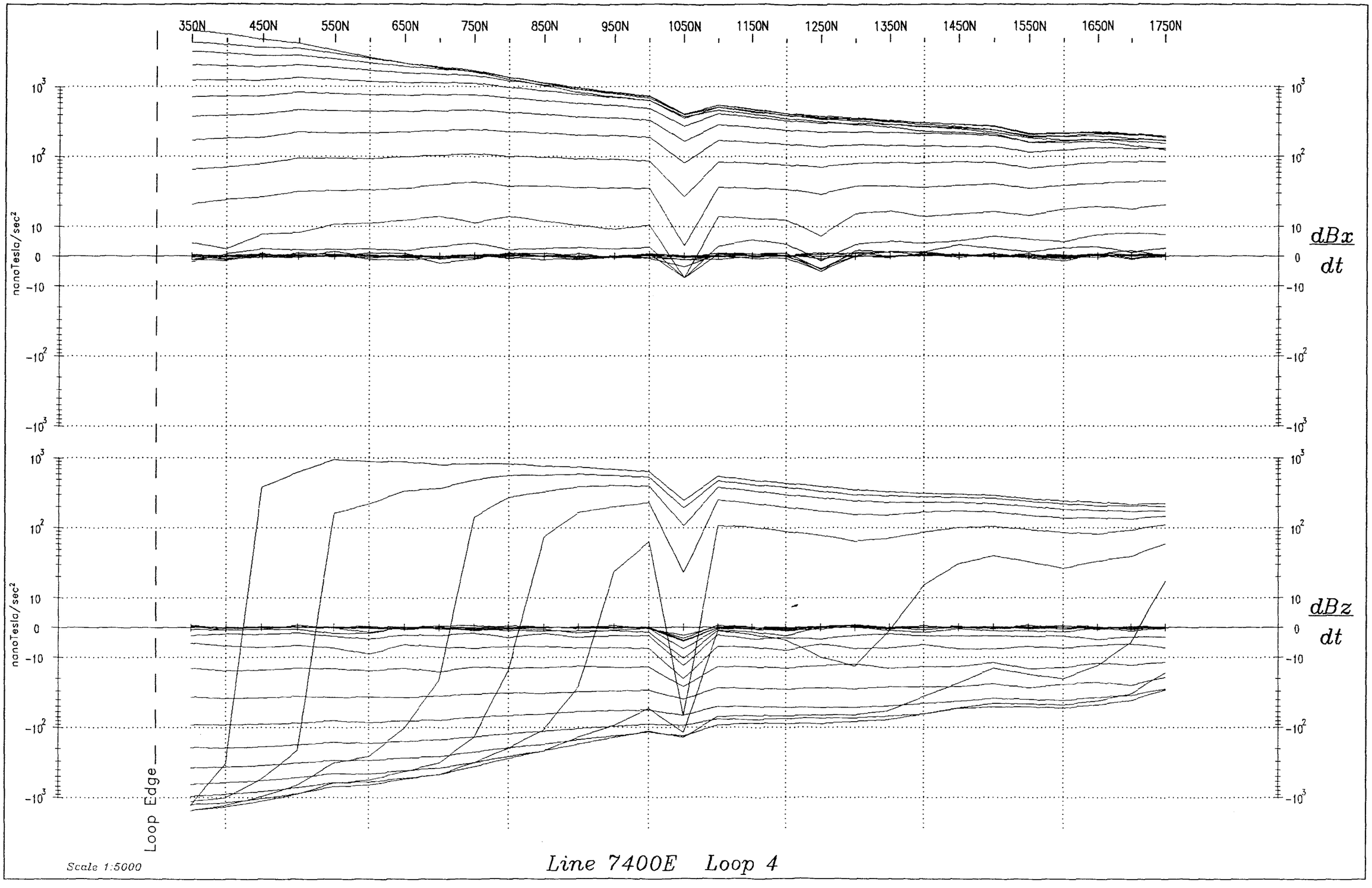


Line 7100E Loop 4



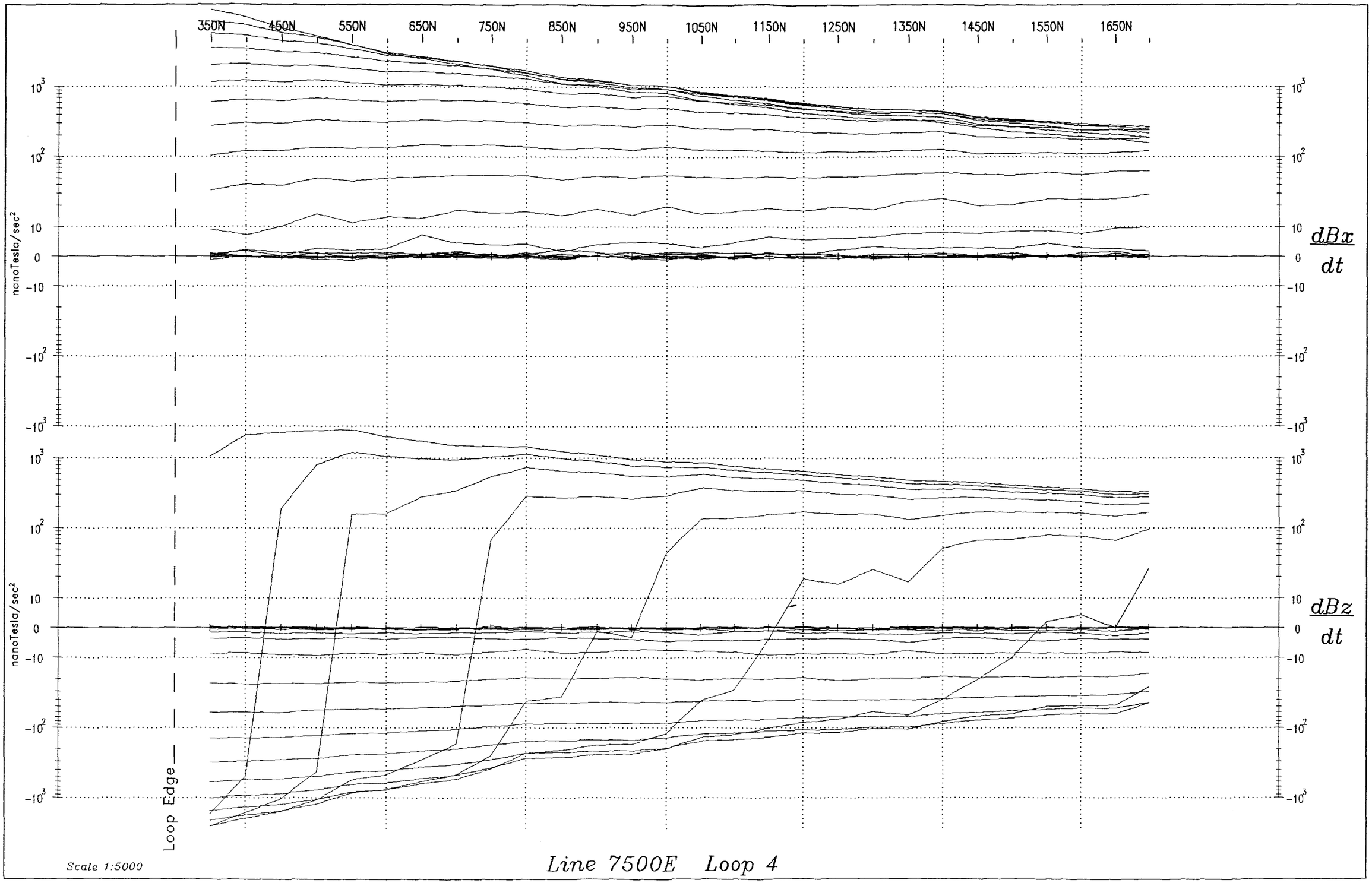
Line 7200E Loop 4


350N
450N
550N
650N
750N
850N
950N
1050N
1150N
1250N
1350N
1450N
1550N
1650N
1750N
1850N
1950N
nanoTesla/sec²
dBx/dt
dBz/dt
Loop Edge
Scale 1:5000
Line 7300E Loop 4

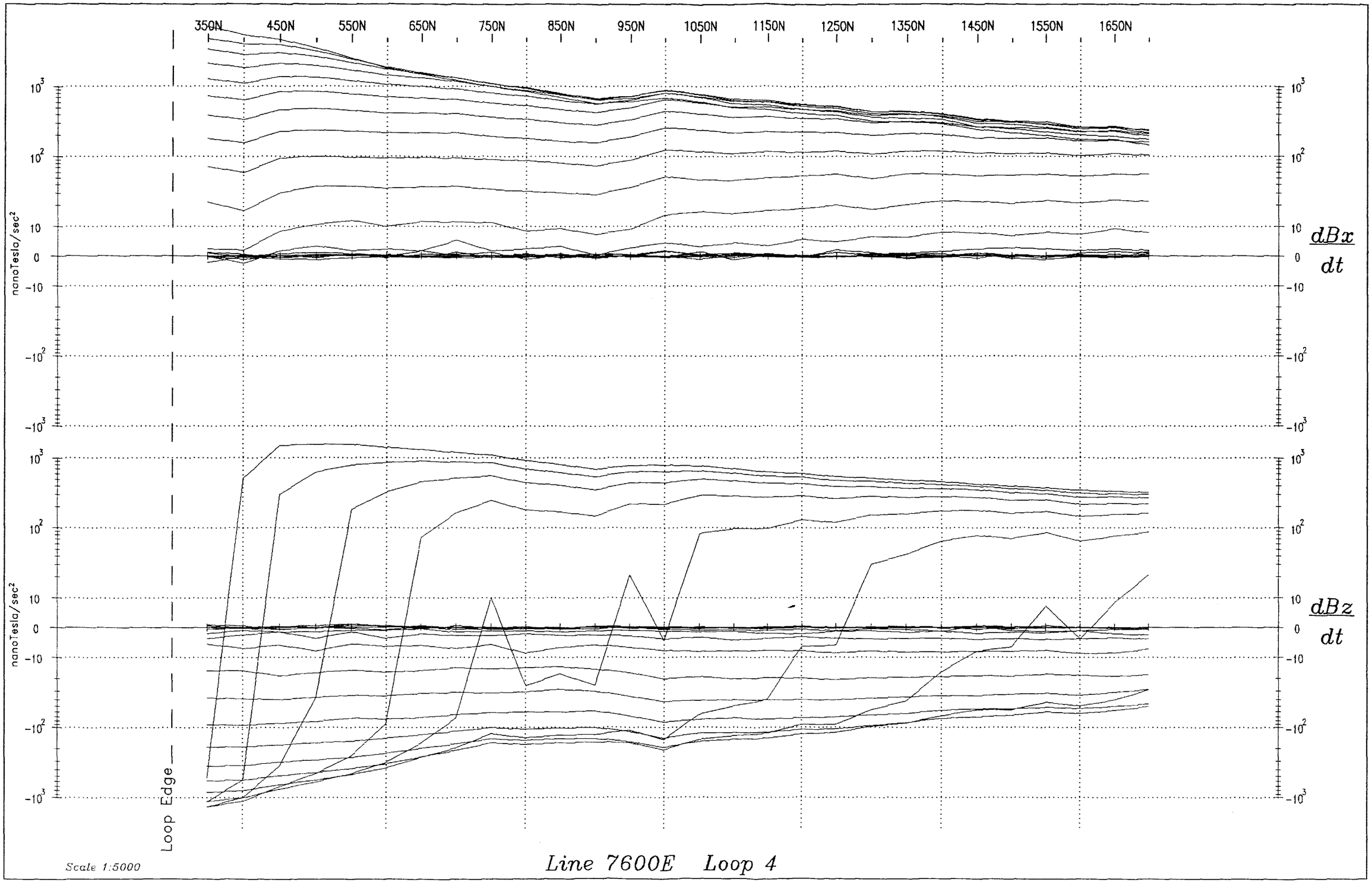


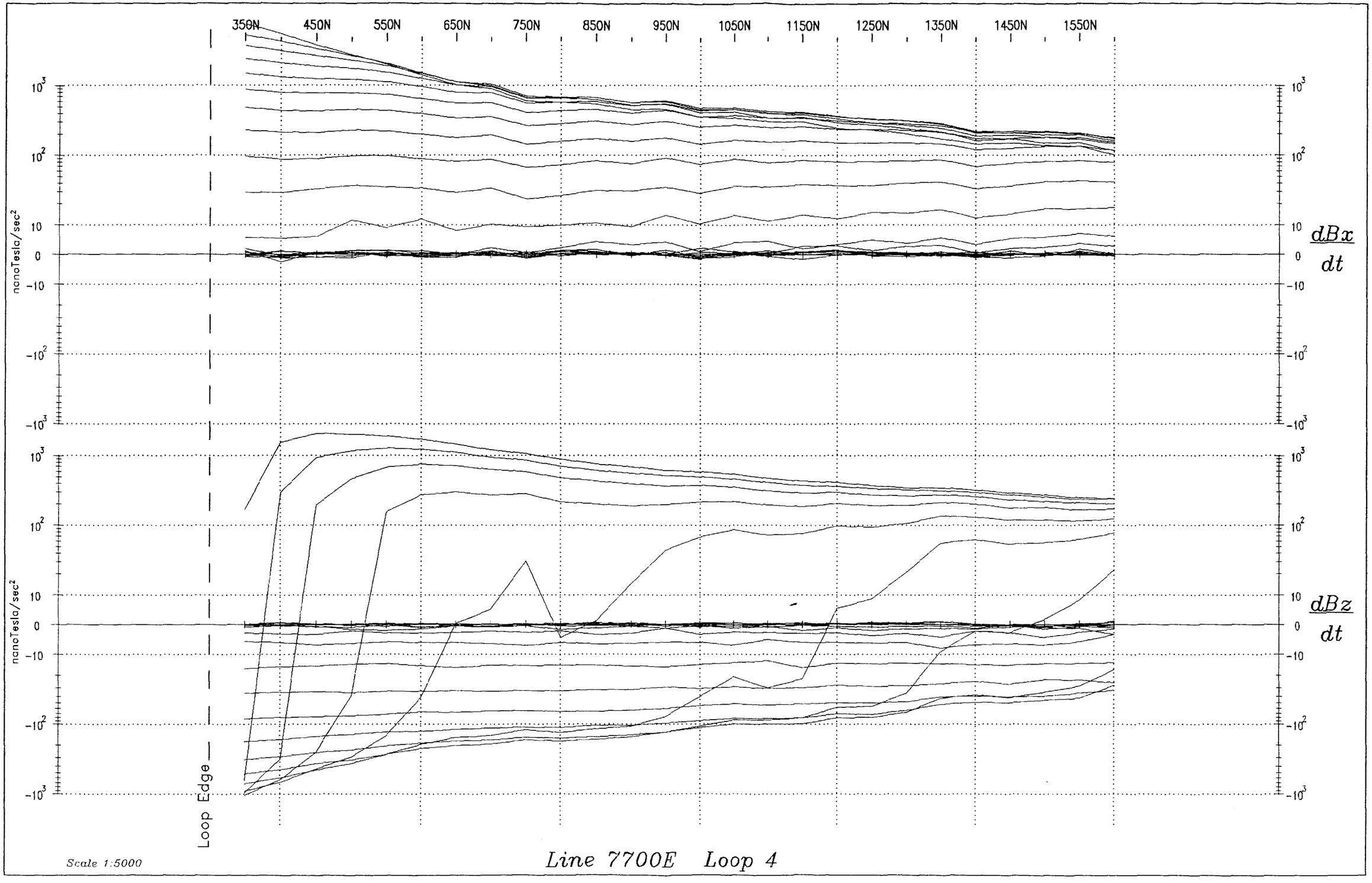
Scale 1:5000

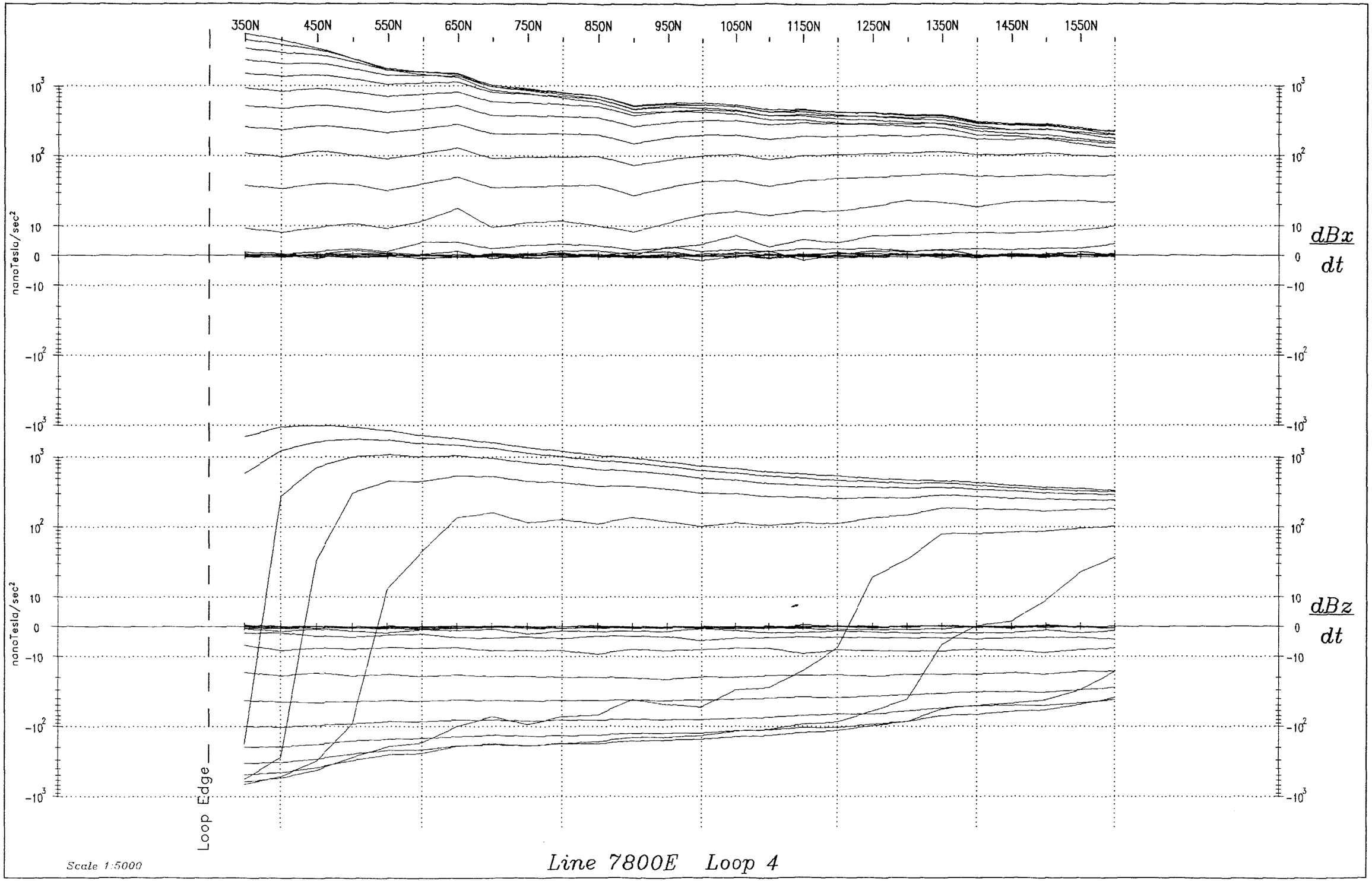
Line 7400E Loop 4



Line 7500E Loop 4

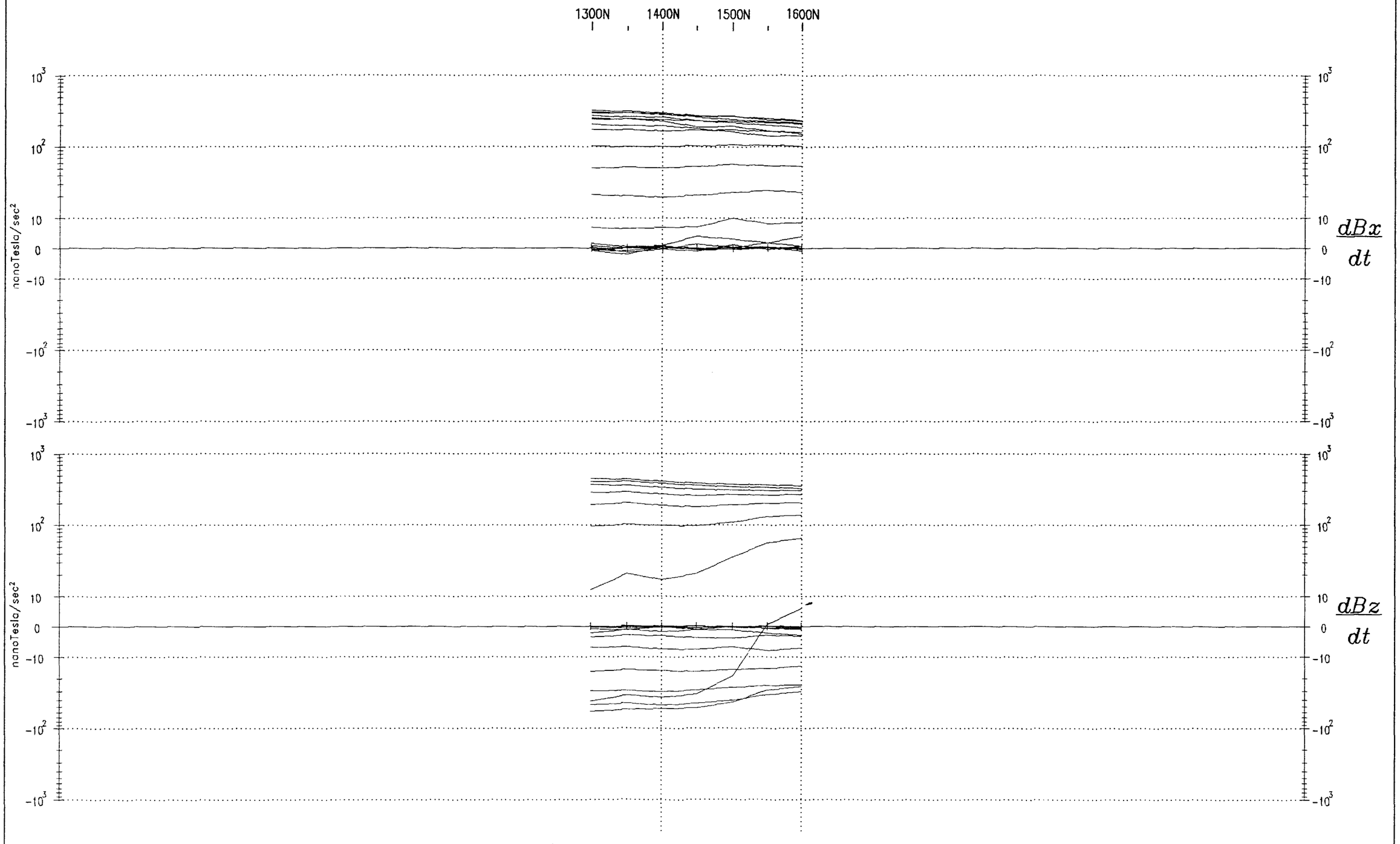

350N
450N
550N
650N
750N
850N
950N
1050N
1150N
1250N
1350N
1450N
1550N
1650N
nanoTesla/sec²
10^3
10^2
10
0
-10
-10^2
-10^3
$\frac{dBx}{dt}$
$\frac{dBz}{dt}$
Loop Edge
Scale 1:5000
Line 7600E Loop 4

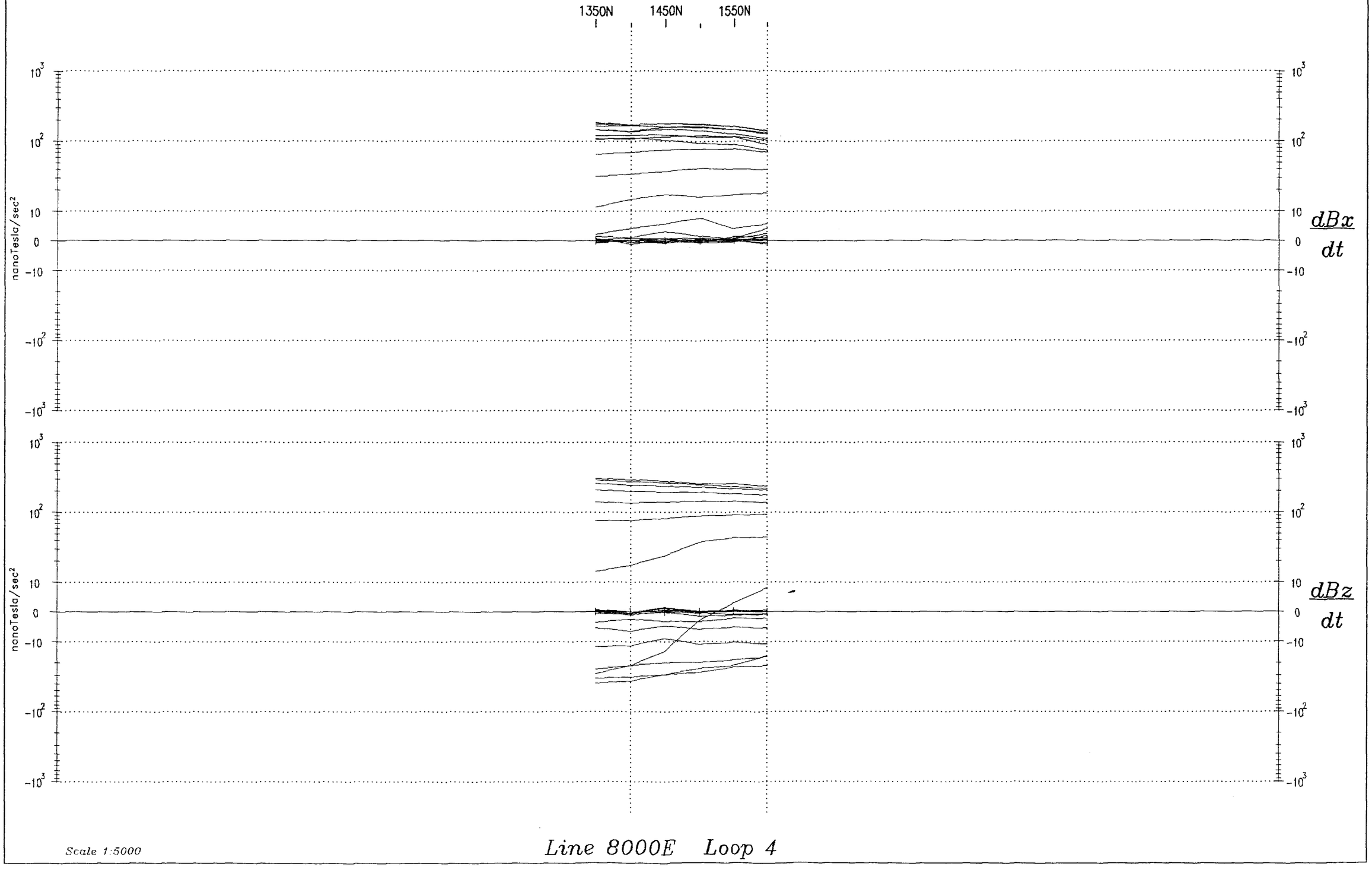

350N
450N
550N
650N
750N
850N
950N
1050N
1150N
1250N
1350N
1450N
1550N
nanoTesla/sec²
dBx/dt
dBz/dt
Loop Edge
Scale 1:5000
Line 7700E Loop 4



Scale 1:5000

Line 7800E Loop 4


1300N
1400N
1500N
1600N
nanoTesla/sec²
dBx/dt
dBz/dt
Scale 1:5000
Line 7900E Loop 4


1350N
1450N
1550N
nanoTesla/sec²
$\frac{dBx}{dt}$
$\frac{dBz}{dt}$
Scale 1:5000
Line 8000E Loop 4

1350N 1450N

nanoTesla/sec²

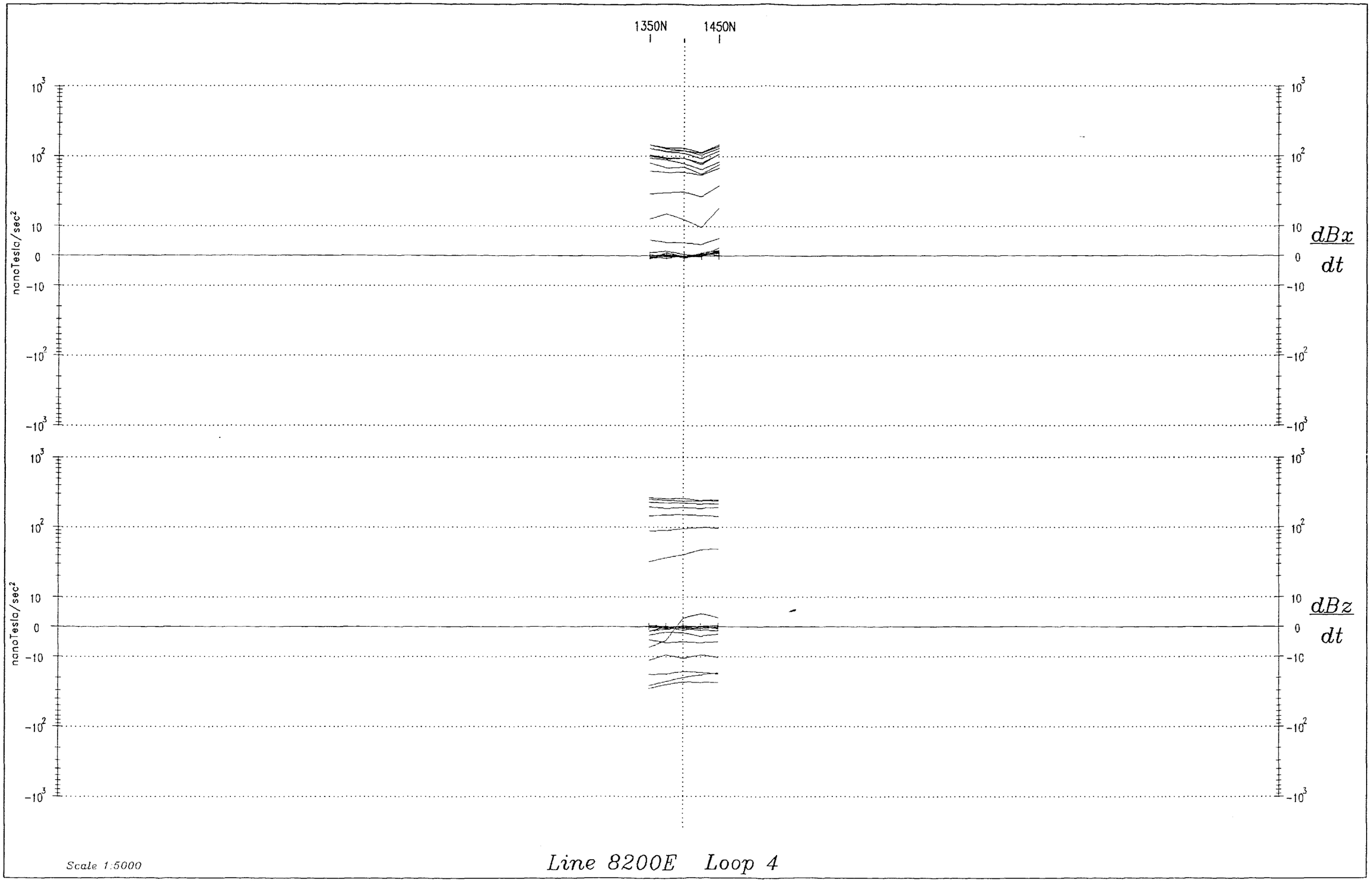
10^3 10^2 10 0 -10 -10^2 -10^3

$\frac{dBx}{dt}$

$\frac{dBz}{dt}$

Scale 1:5000

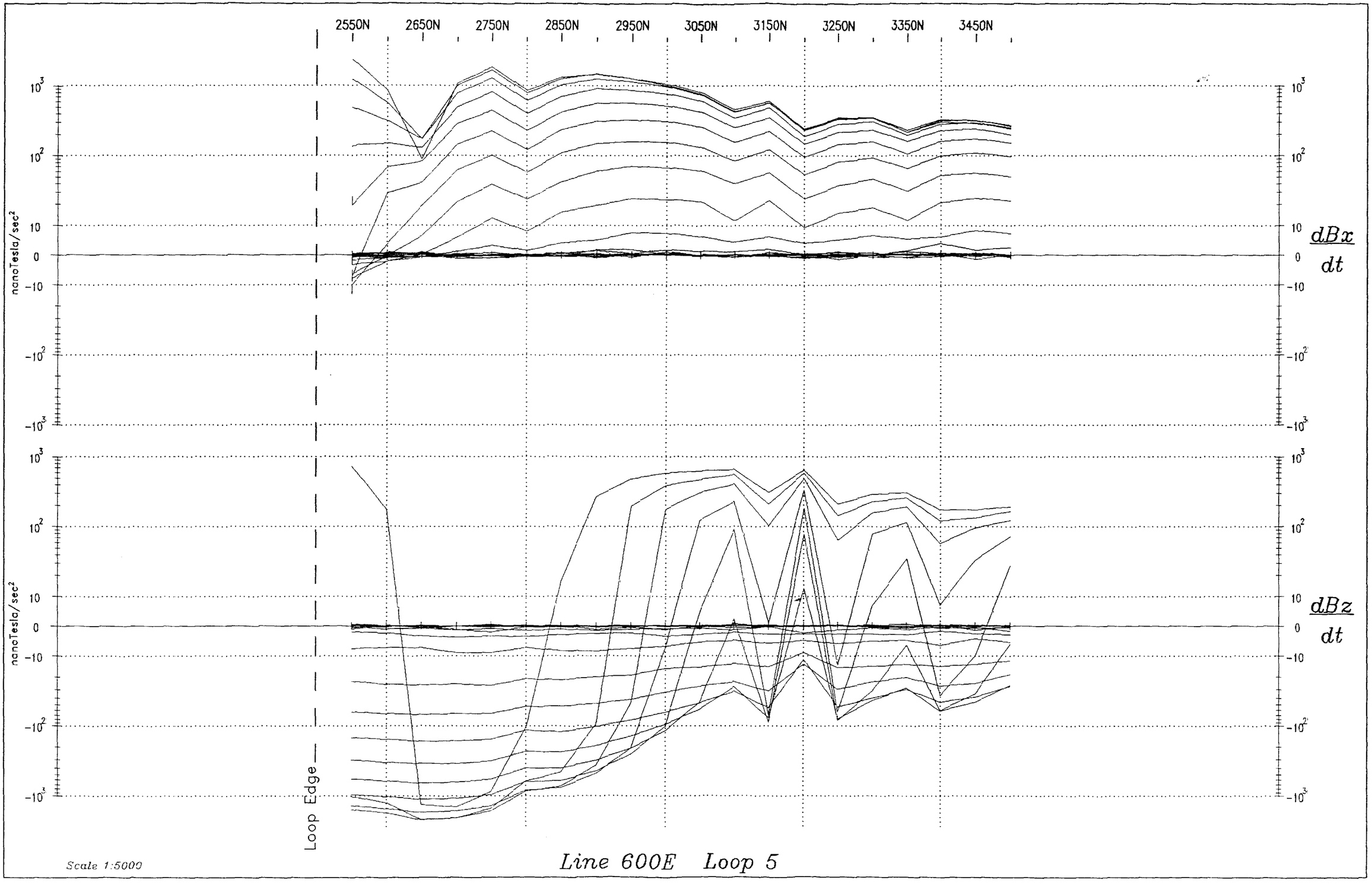
Line 8100E Loop 4



Scale 1:5000

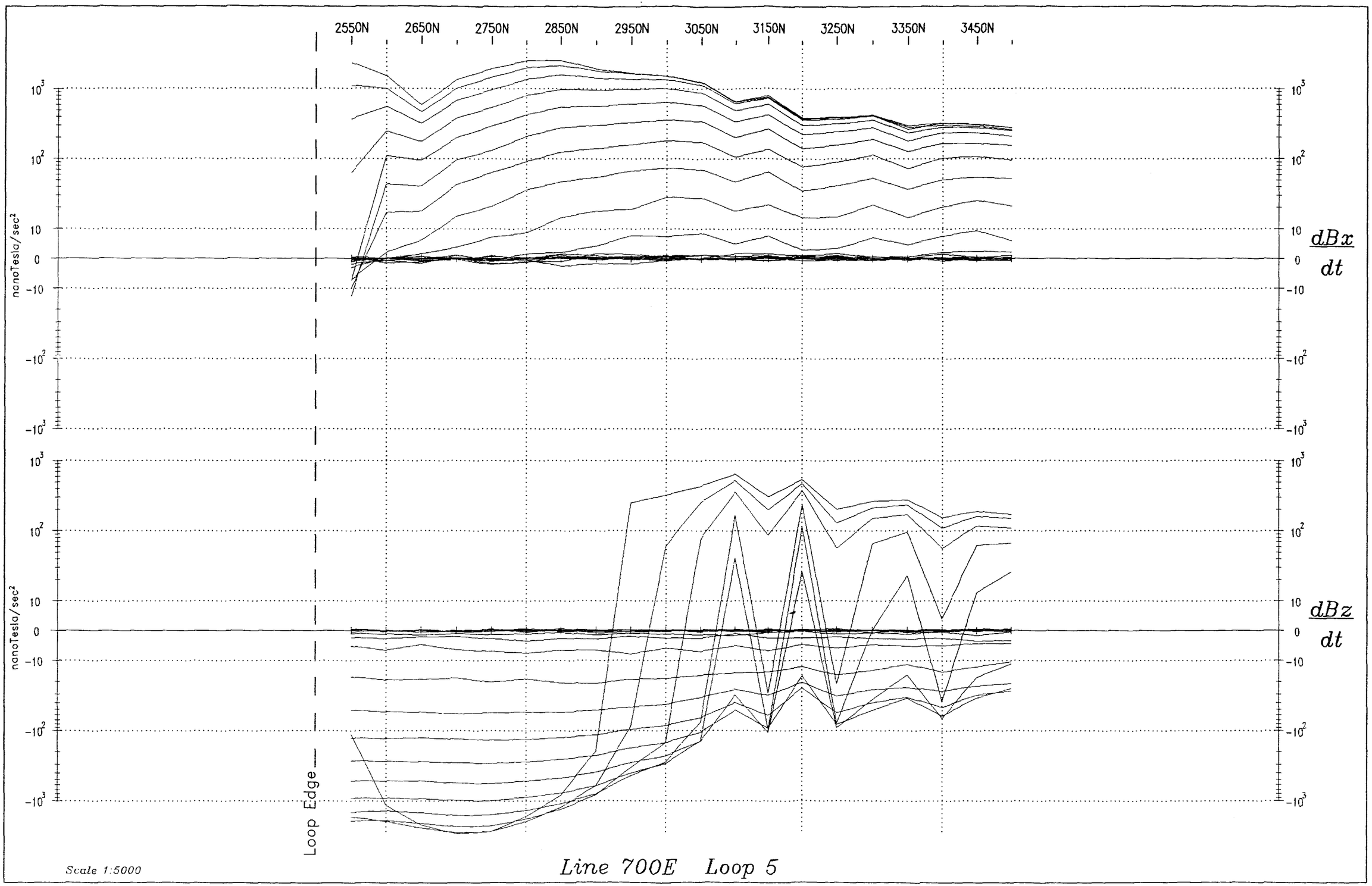
Line 8200E Loop 4

Grid F-G

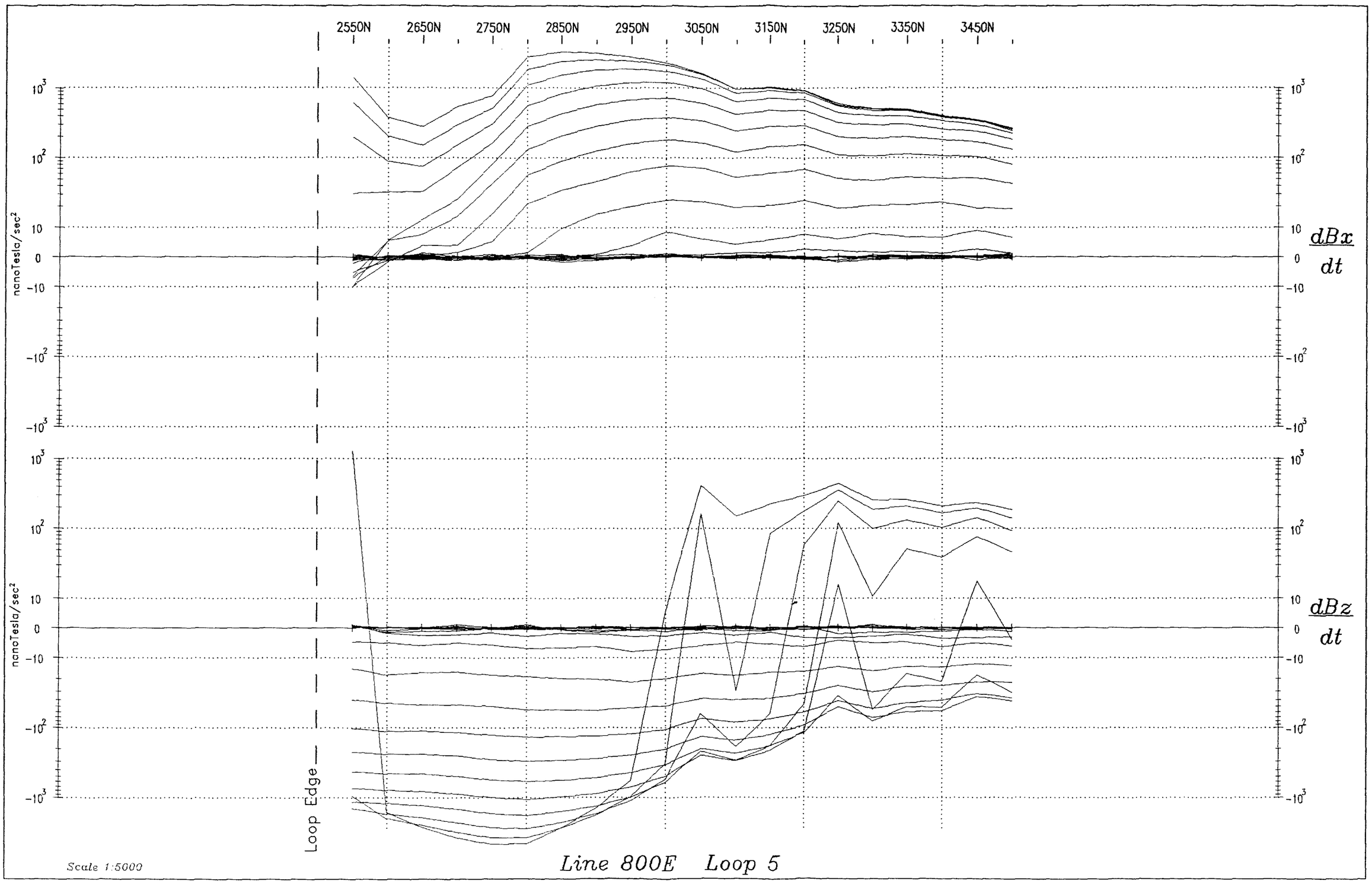


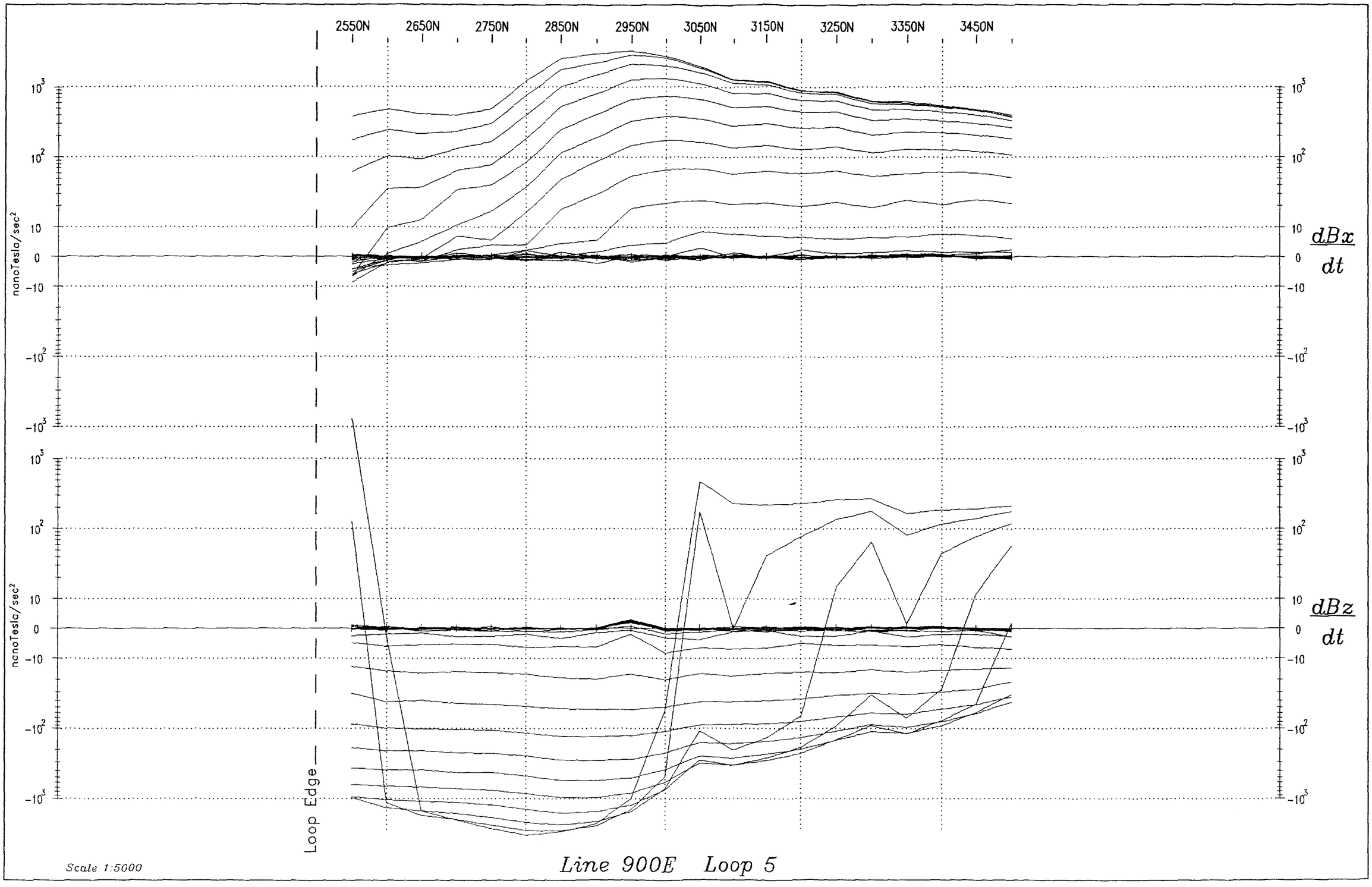
Scale 1:5000

Line 600E Loop 5

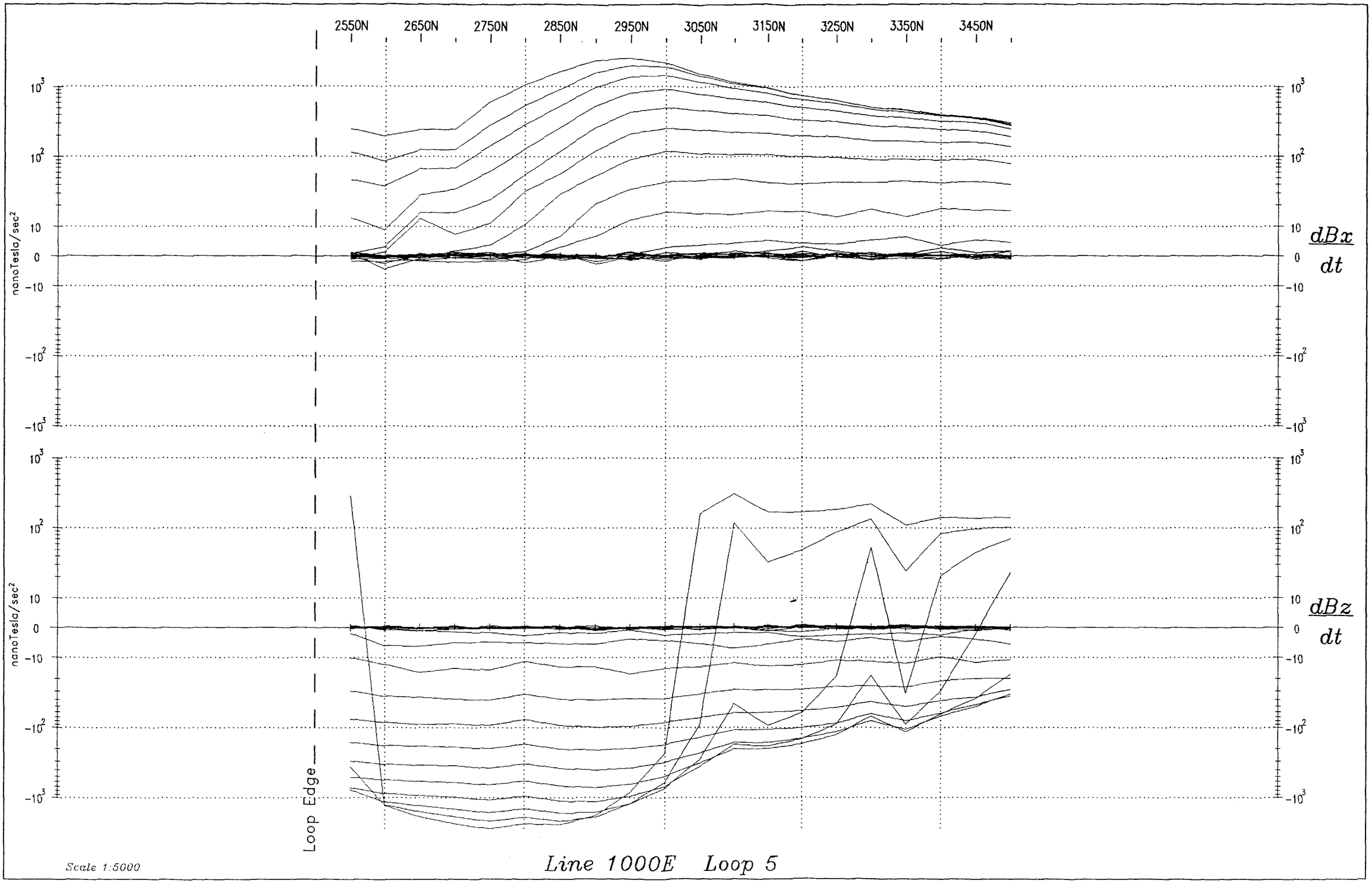


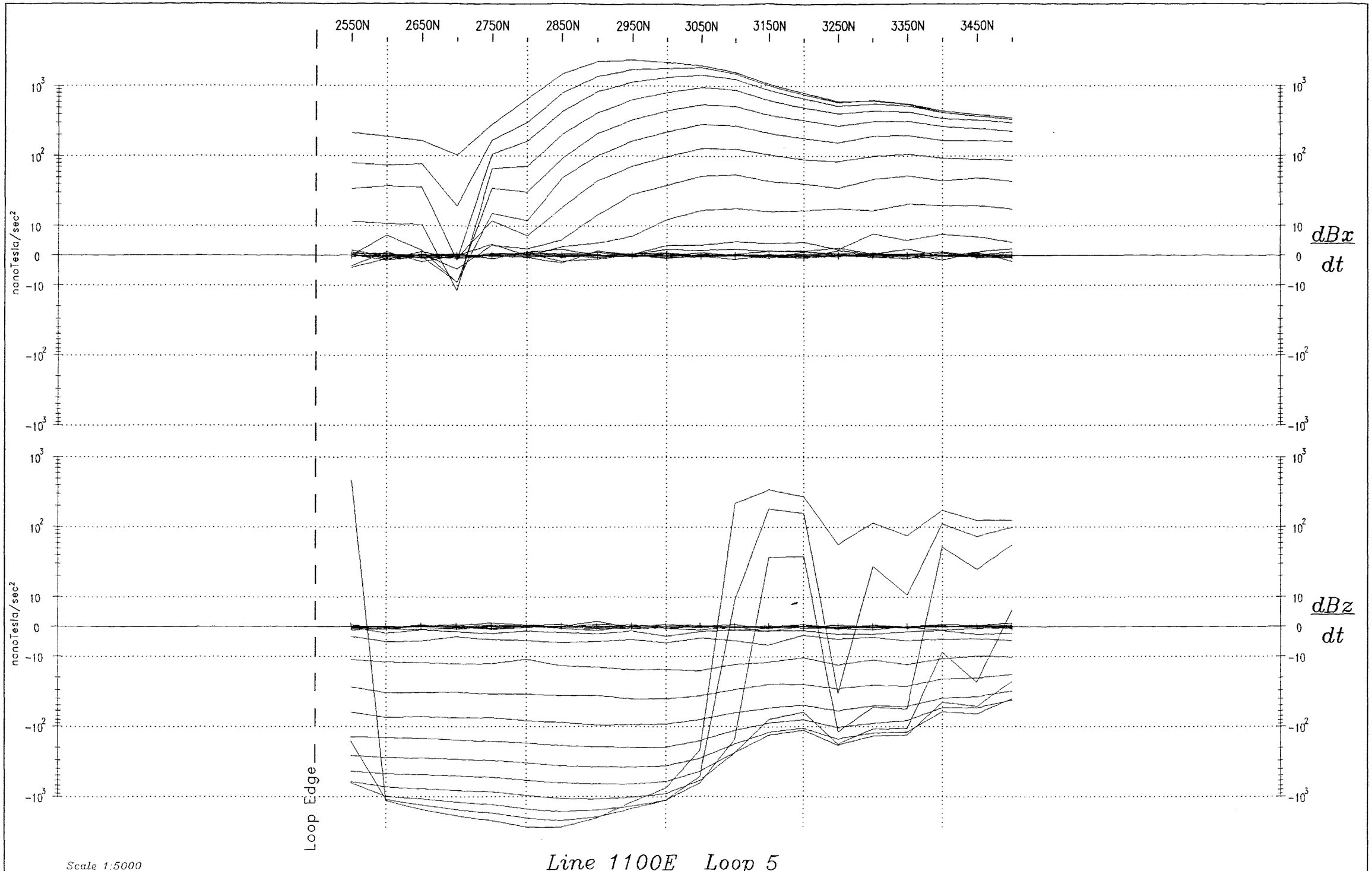
Line 700E Loop 5

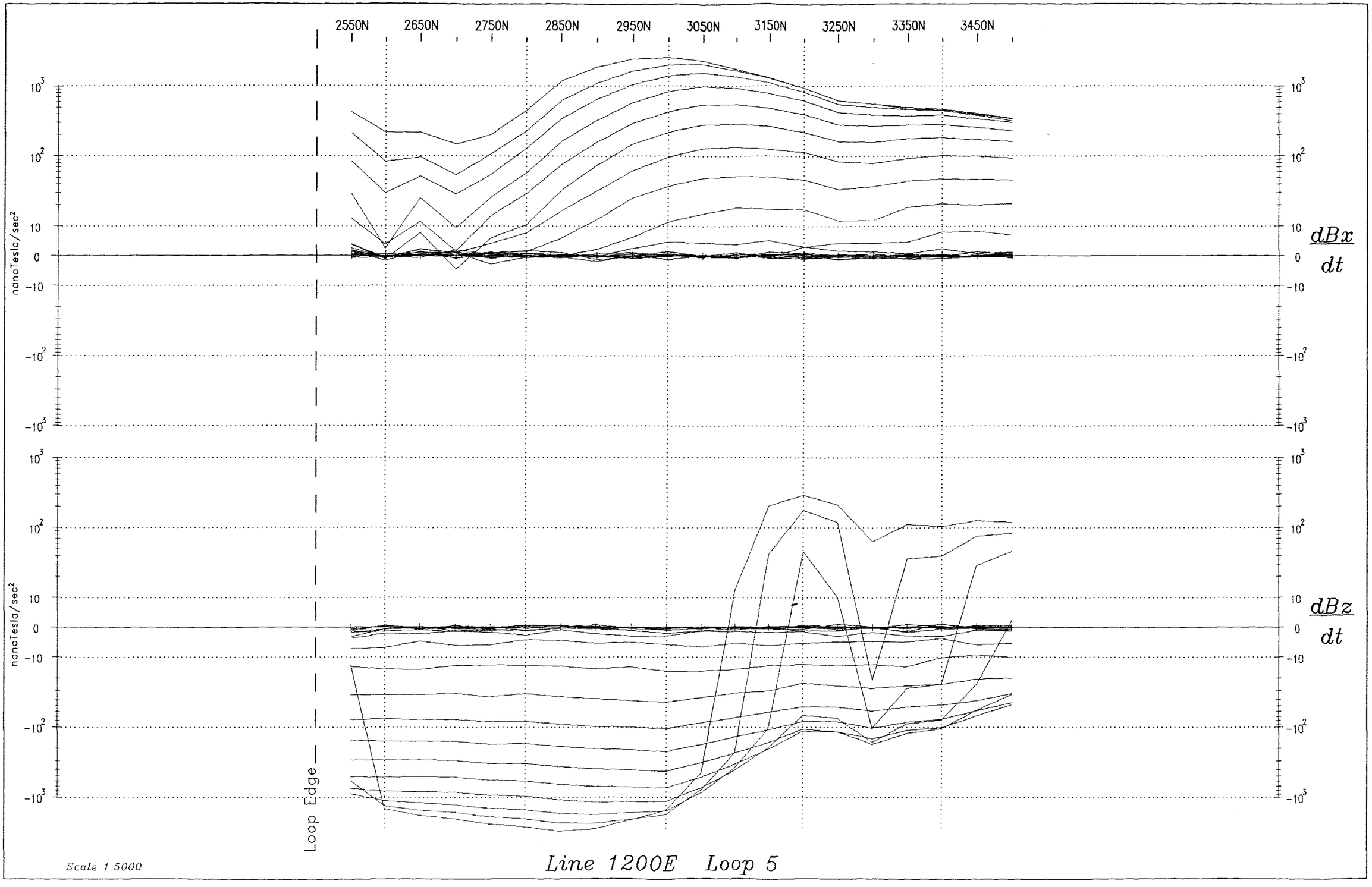

2550N
2650N
2750N
2850N
2950N
3050N
3150N
3250N
3350N
3450N
nanoTesla/sec²
dBx/dt
dBz/dt
Loop Edge
Scale 1:5000
Line 800E Loop 5



Line 900E Loop 5


2550N
2650N
2750N
2850N
2950N
3050N
3150N
3250N
3350N
3450N
nanoTesla/sec²
dBx/dt
dBz/dt
Loop Edge
Scale 1:5000
Line 1000E Loop 5


2550N
2650N
2750N
2850N
2950N
3050N
3150N
3250N
3350N
3450N
nanoTesla/sec²
$\frac{dBx}{dt}$
$\frac{dBz}{dt}$
Loop Edge
Scale 1:5000
Line 1100E Loop 5


2550N
2650N
2750N
2850N
2950N
3050N
3150N
3250N
3350N
3450N
nanoTesla/sec²
$\frac{dBx}{dt}$
$\frac{dBz}{dt}$
Loop Edge
Scale 1:5000
Line 1200E Loop 5

2550N 2650N 2750N 2850N 2950N 3050N 3150N 3250N 3350N 3450N

nanoTesla/sec²

10^3 10^2 10 0 -10 -10^2 -10^3

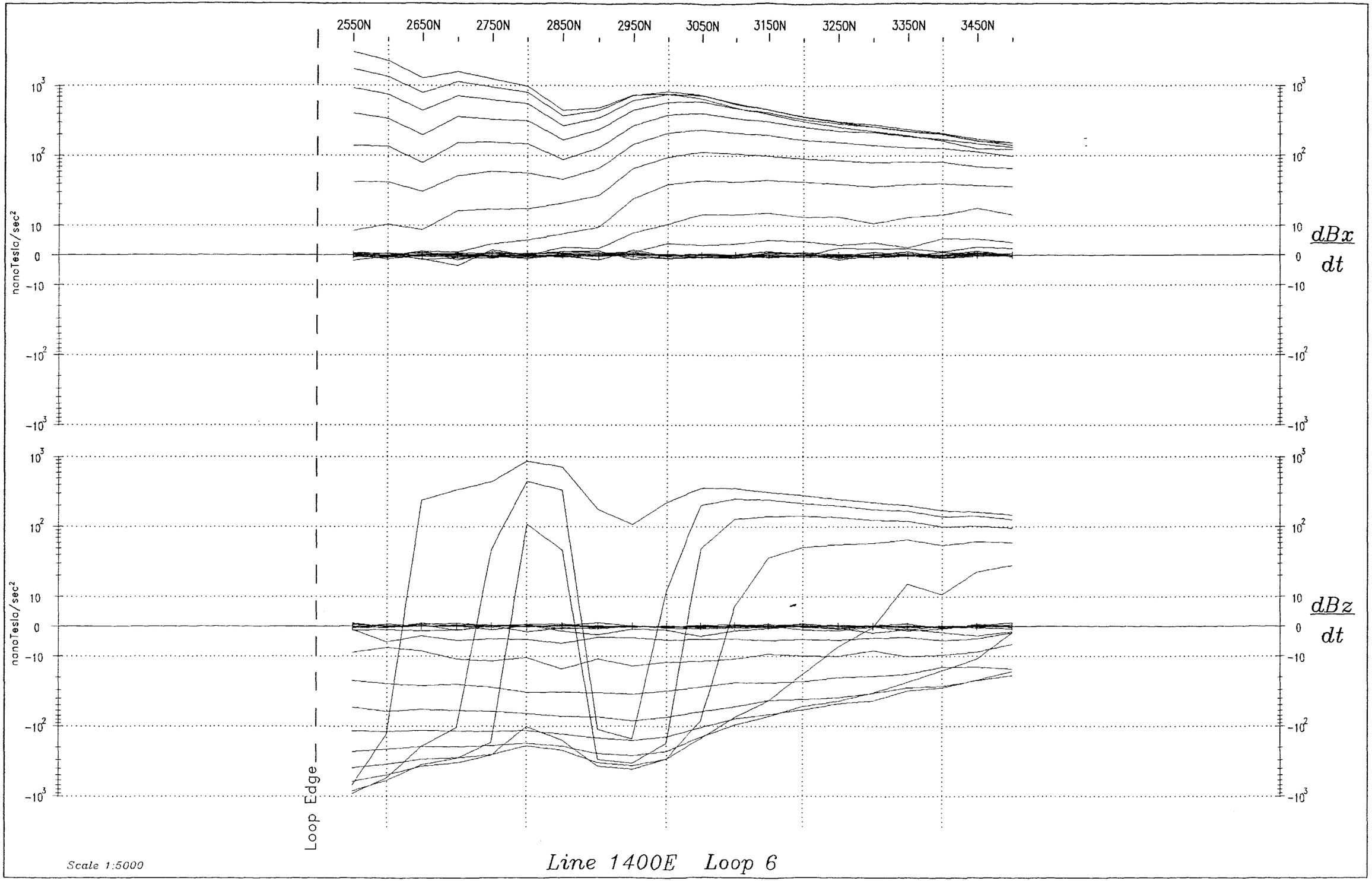
$\frac{dBx}{dt}$

Loop Edge

$\frac{dBz}{dt}$

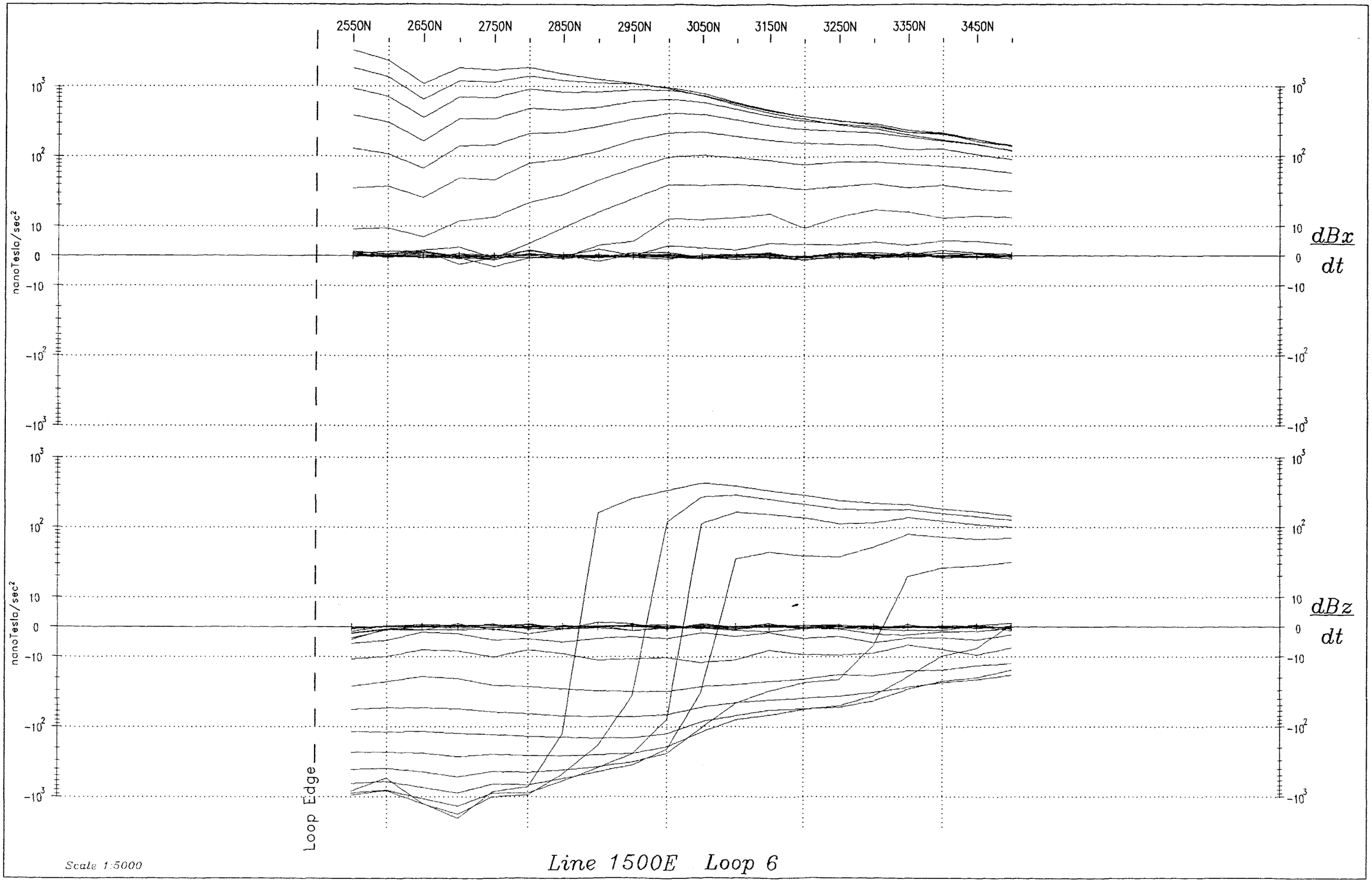
Scale 1:5000

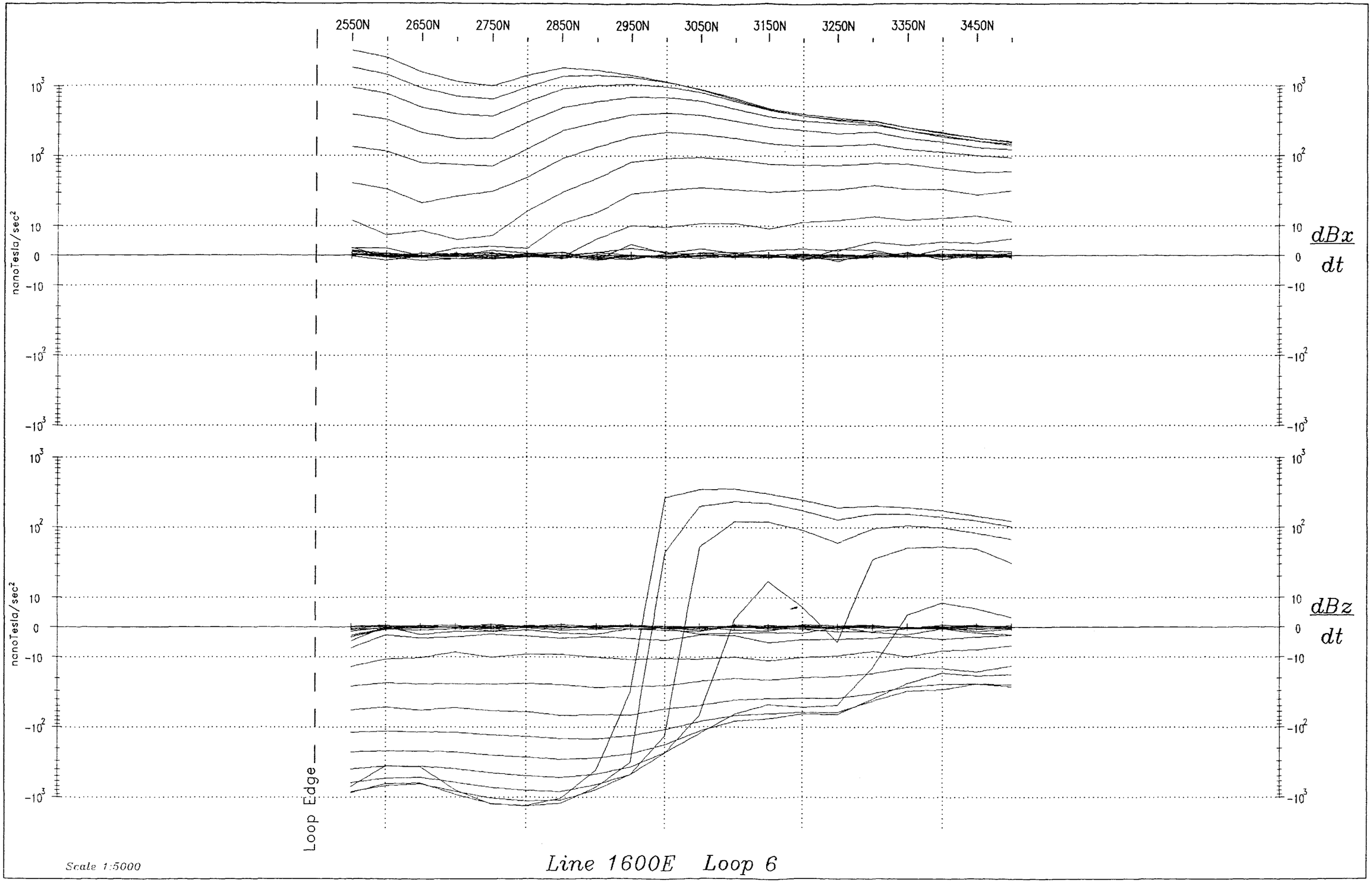
Line 1300E Loop 5

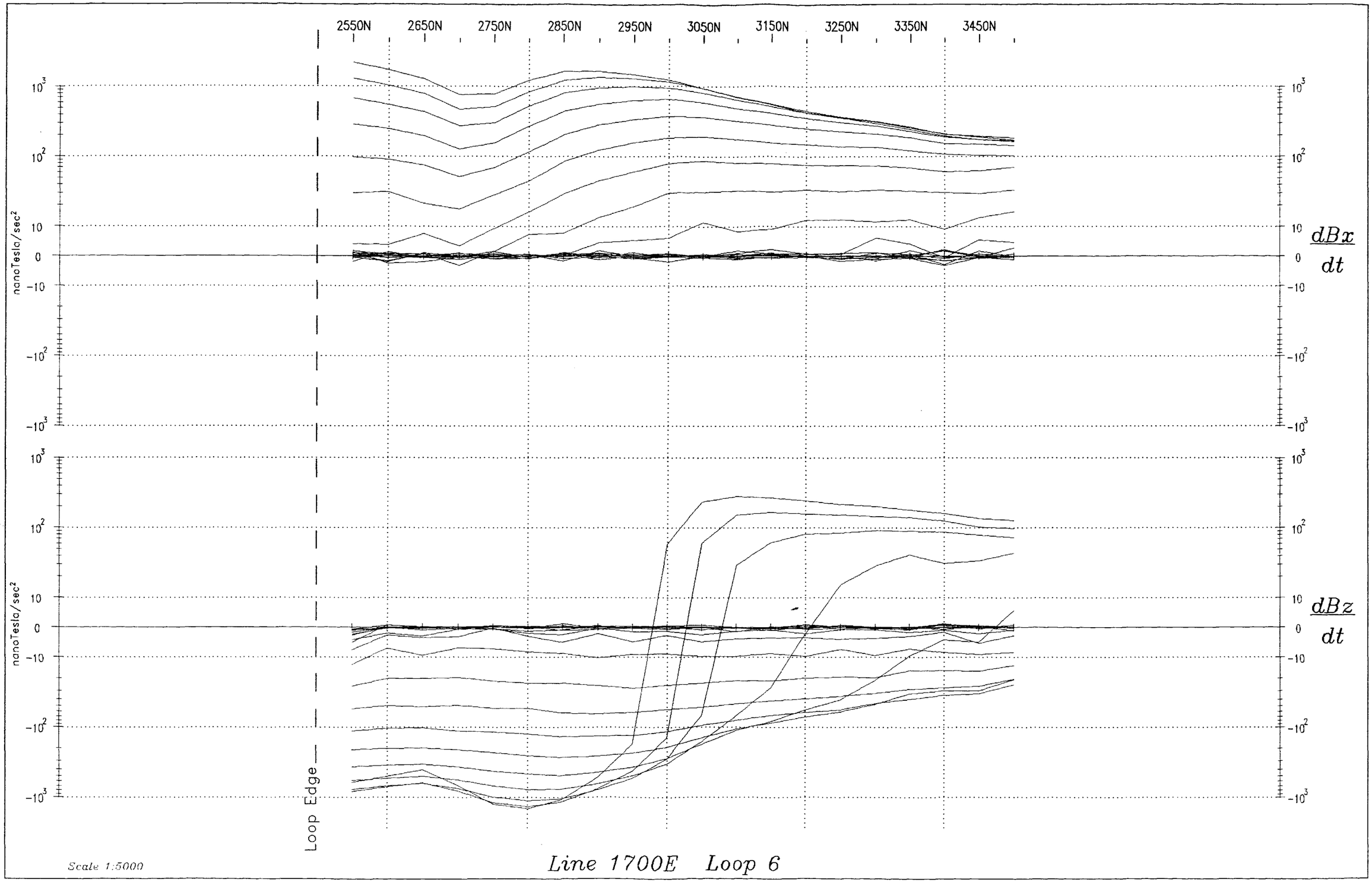


Scale 1:5000

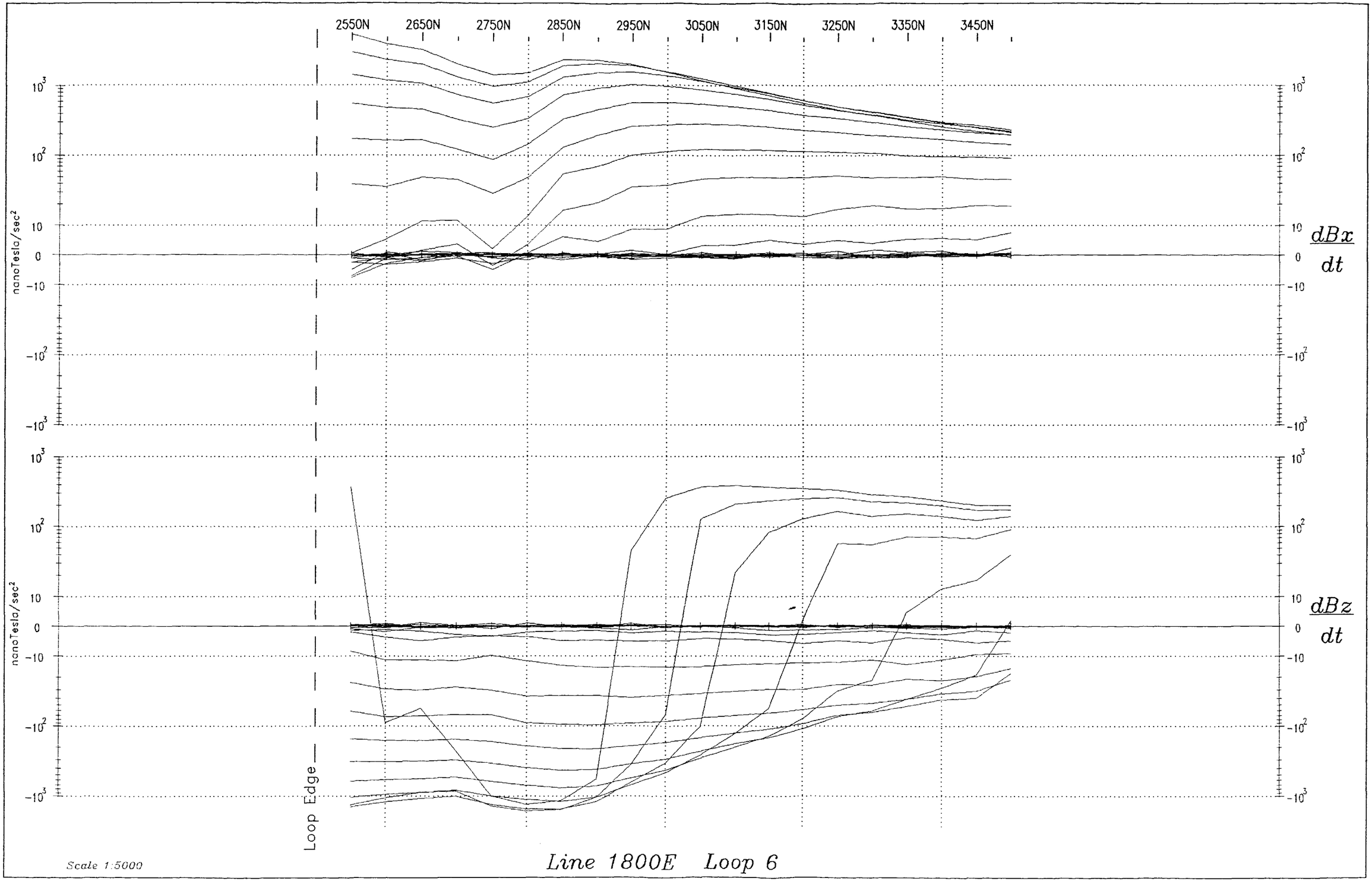
Line 1400E Loop 6

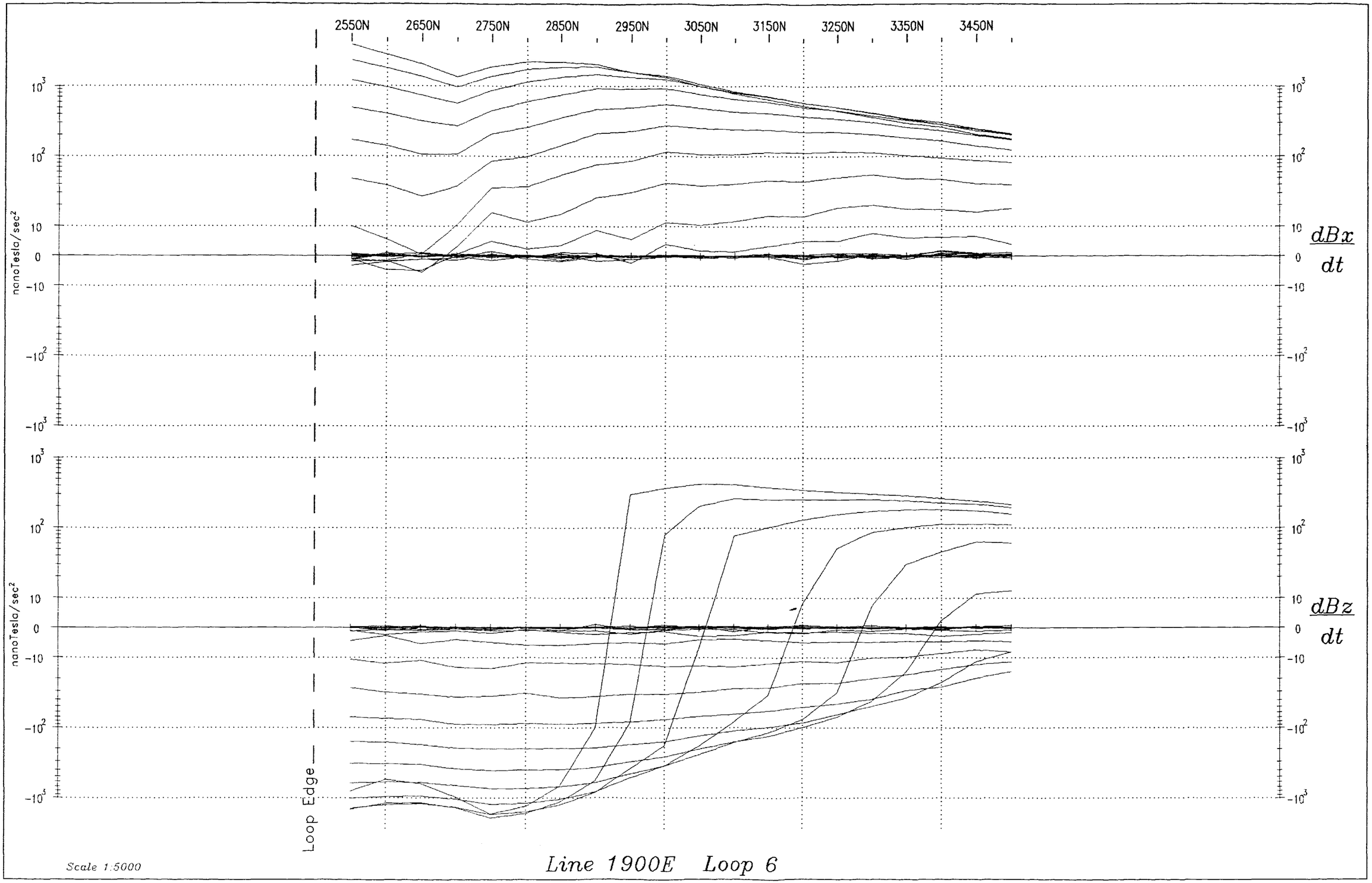

2550N
2650N
2750N
2850N
2950N
3050N
3150N
3250N
3350N
3450N
nanoTesla/sec²
$\frac{dBx}{dt}$
$\frac{dBz}{dt}$
Loop Edge
Scale 1:5000
Line 1500E Loop 6


2550N
2650N
2750N
2850N
2950N
3050N
3150N
3250N
3350N
3450N
nanoTesla/sec²
10^3
10^2
10
0
-10
-10^2
-10^3
$\frac{dBx}{dt}$
$\frac{dBz}{dt}$
Loop Edge
Scale 1:5000
Line 1600E Loop 6

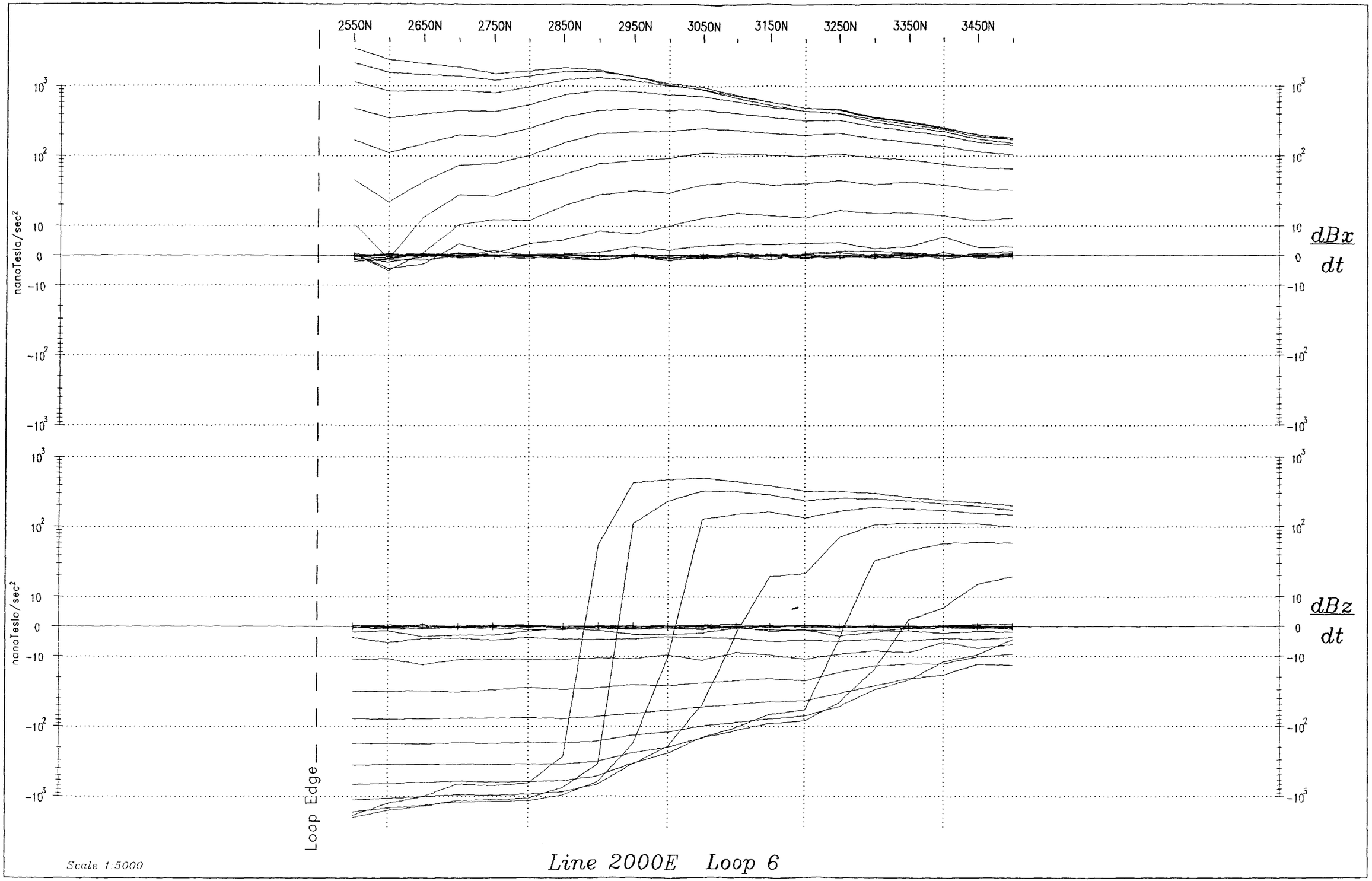


Line 1700E Loop 6

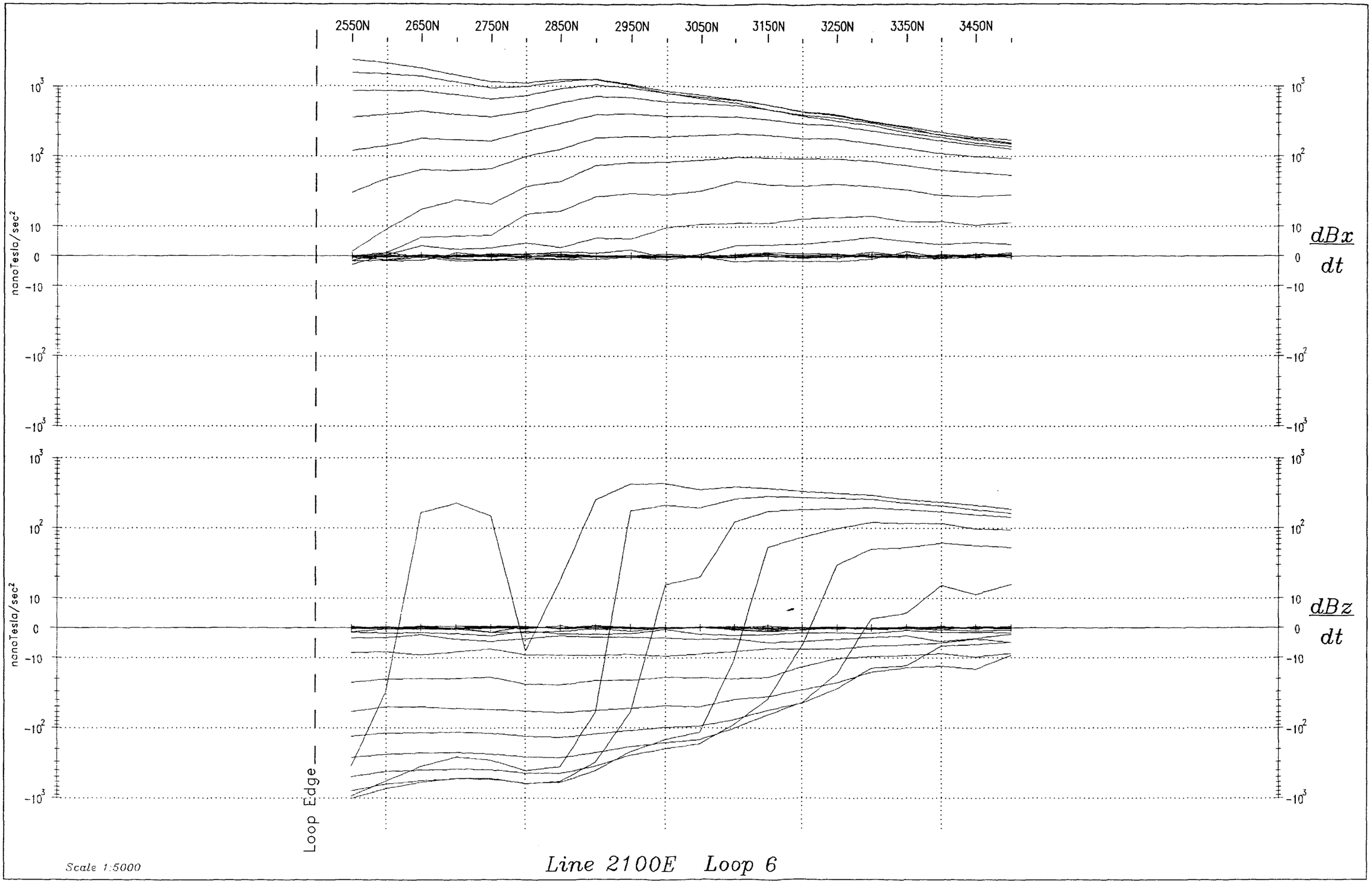

2550N
2650N
2750N
2850N
2950N
3050N
3150N
3250N
3350N
3450N
nanoTesla/sec²
$\frac{dBx}{dt}$
$\frac{dBz}{dt}$
Loop Edge
Scale 1:5000
Line 1800E Loop 6



Line 1900E Loop 6



Line 2000E Loop 6



Line 2100E Loop 6

binder # 2

Appendix II: Data Profiles; Linear Scale dBx/dt Logarithmic Scale Fraser Filter dBz/Dt

Pulse Electromagnetic Survey
for
Teck Exploration Limited
Montcalm Project
February - March 1997

Crone Geophysics & Exploration Ltd.

Grid E

650N 750N 850N 950N 1050N 1150N 1250N 1350N 1450N 1550N 1650N 1750N 1850N

nanoTesla/sec²

300 200 100 0 -100

$\frac{dBx}{dt}$

Linear Scale of dBx/dt
Channels 6 – 15

50 metre Fraser Filter

10^3 10^2 10 0 -10 -10^2 -10^3

Loop Edge

$\frac{dBz}{dt}$

Fraser Filter of dBz/dt
lin–log scale

Scale 1:5000

Line 1100W Loop 3

500N 600N 700N 800N 900N 1000N 1100N 1200N 1300N 1400N 1500N 1600N 1700N 1800N

nanoTesla/sec²

300 200 100 0 -100

$\frac{dBx}{dt}$

Linear Scale of dBx/dt
Channels 6 – 15

50 metre Fraser Filter

10^3 10^2 10 0 -10 -10^2 -10^3

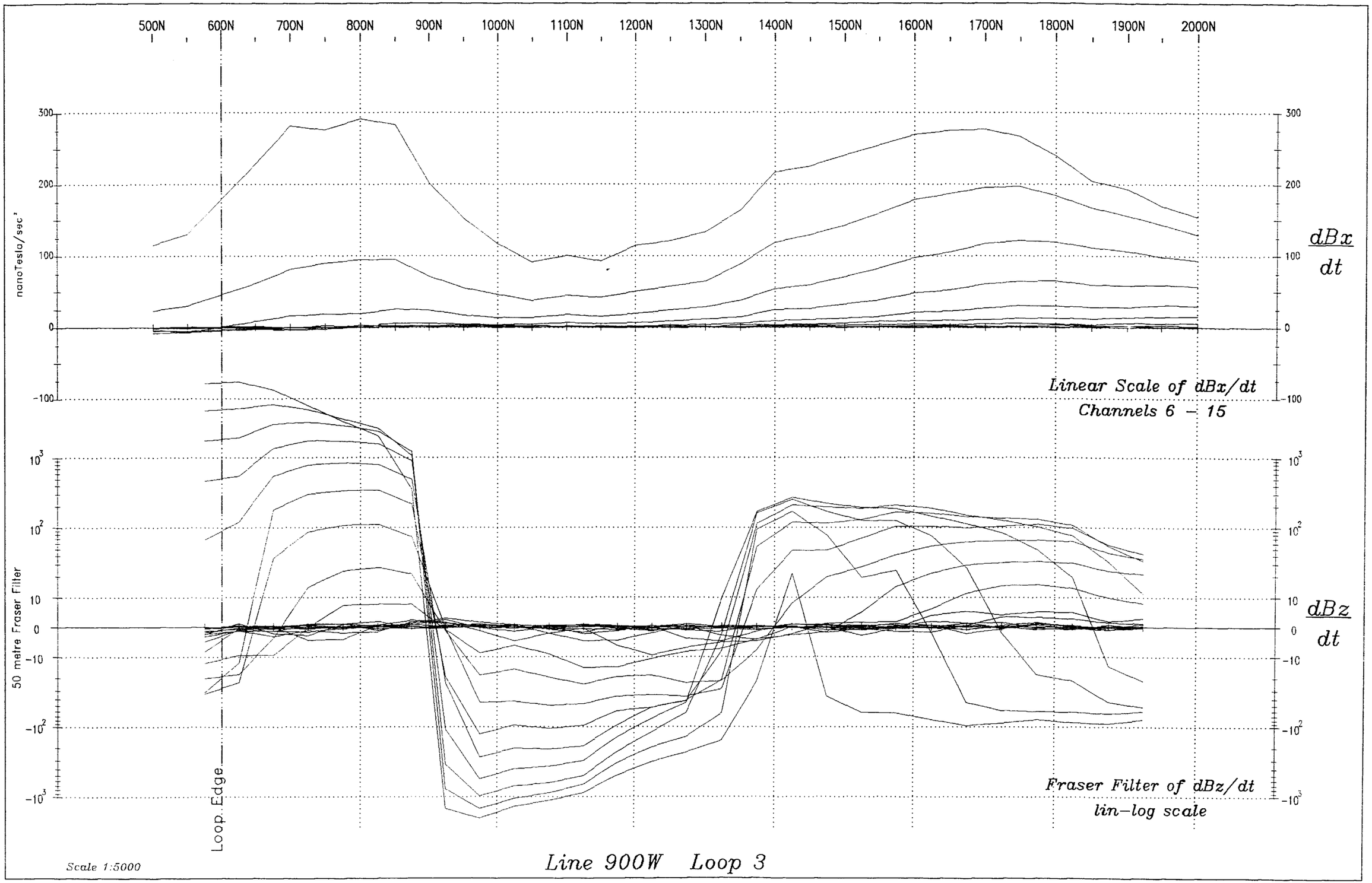
$\frac{dBz}{dt}$

Fraser Filter of dBz/dt
lin–log scale

Loop Edge

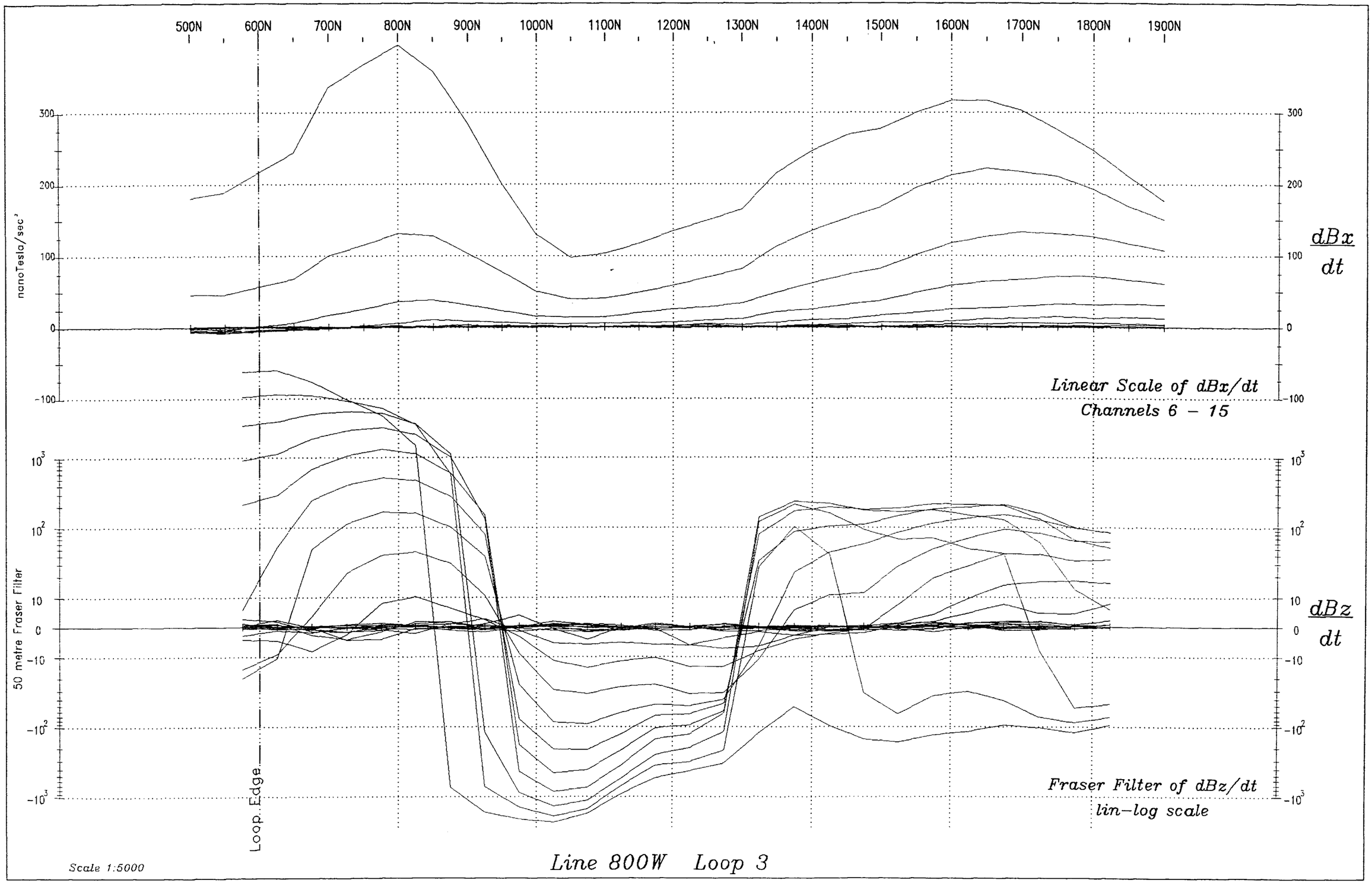
Scale 1:5000

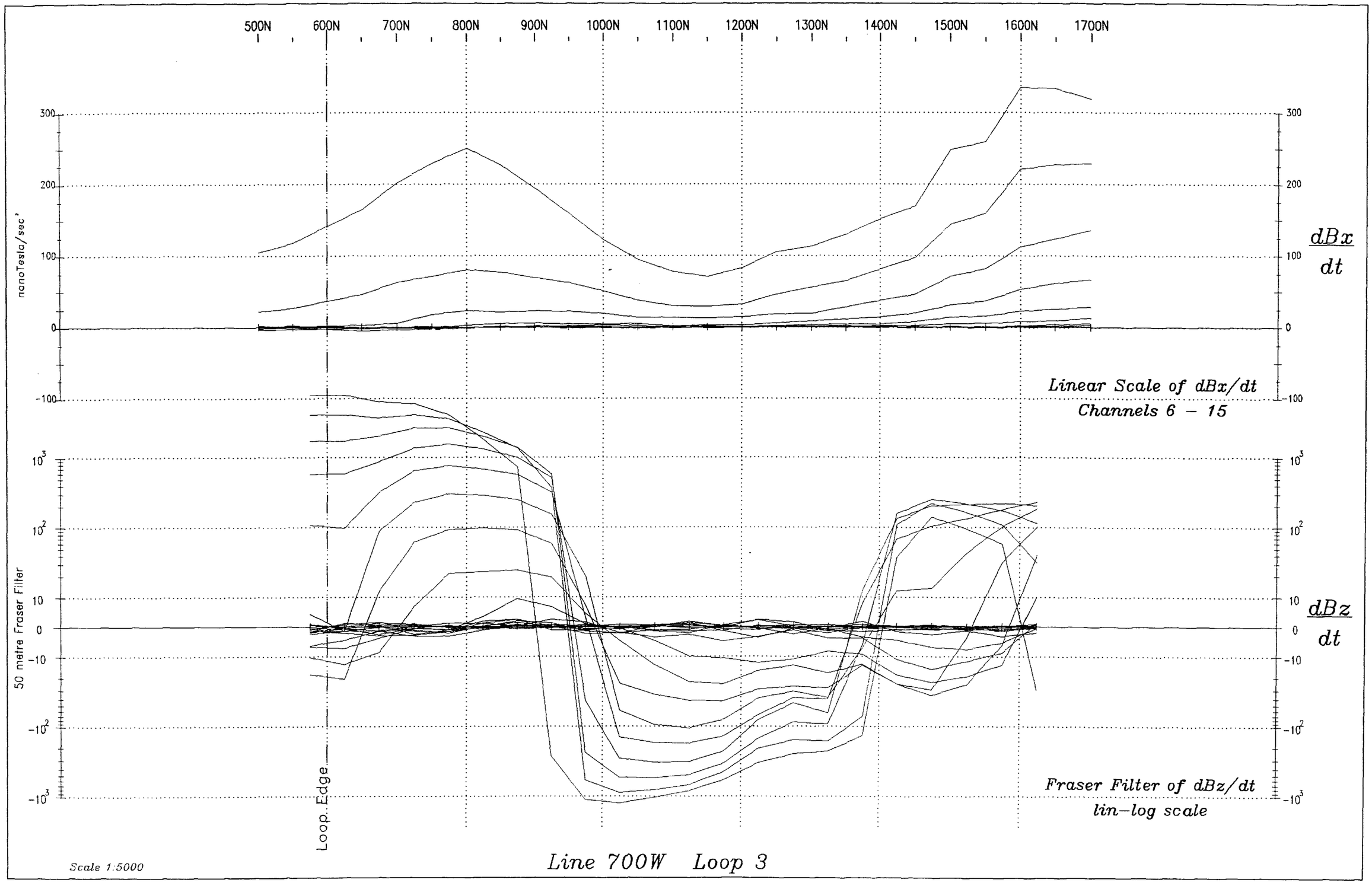
Line 1000W Loop 3



Scale 1:5000

Line 900W Loop 3


500N
600N
700N
800N
900N
1000N
1100N
1200N
1300N
1400N
1500N
1600N
1700N
1800N
1900N
nanoTesla/sec²
300
200
100
0
-100
dBx/dt
Linear Scale of dBx/dt
Channels 6 – 15
10³
10²
10
0
-10
-10²
-10³
50 metre Fraser Filter
Loop Edge
dBz/dt
Fraser Filter of dBz/dt
lin–log scale
Scale 1:5000
Line 800W Loop 3


500N
600N
700N
800N
900N
1000N
1100N
1200N
1300N
1400N
1500N
1600N
1700N
nanoTesla/sec
300
200
100
0
-100
dBx/dt
Linear Scale of dBx/dt
Channels 6 - 15
50 metre Fraser Filter
10^3
10^2
10
0
-10
-10^2
-10^3
dBz/dt
Fraser Filter of dBz/dt
lin-log scale
Loop Edge
Scale 1:5000
Line 700W Loop 3

500N 600N 700N 800N 900N 1000N 1100N 1200N 1300N 1400N 1500N

nanoTesla/sec²

300 200 100 0 -100

$\frac{dBx}{dt}$

Linear Scale of dBx/dt
Channels 6 – 15

50 metre Fraser Filter

10^3 10^2 10 0 -10 -10^2 -10^3

$\frac{dBz}{dt}$

Fraser Filter of dBz/dt
lin–log scale

Loop Edge

Scale 1:5000

Line 600W Loop 3

500N 600N 700N 800N 900N 1000N 1100N 1200N 1300N 1400N

nanoTesla/sec²

300 200 100 0 -100

$\frac{dBx}{dt}$

Linear Scale of dBx/dt
Channels 6 – 15

50 metre Fraser Filter

10^3 10^2 10 0 -10 -10^2 -10^3

$\frac{dBz}{dt}$

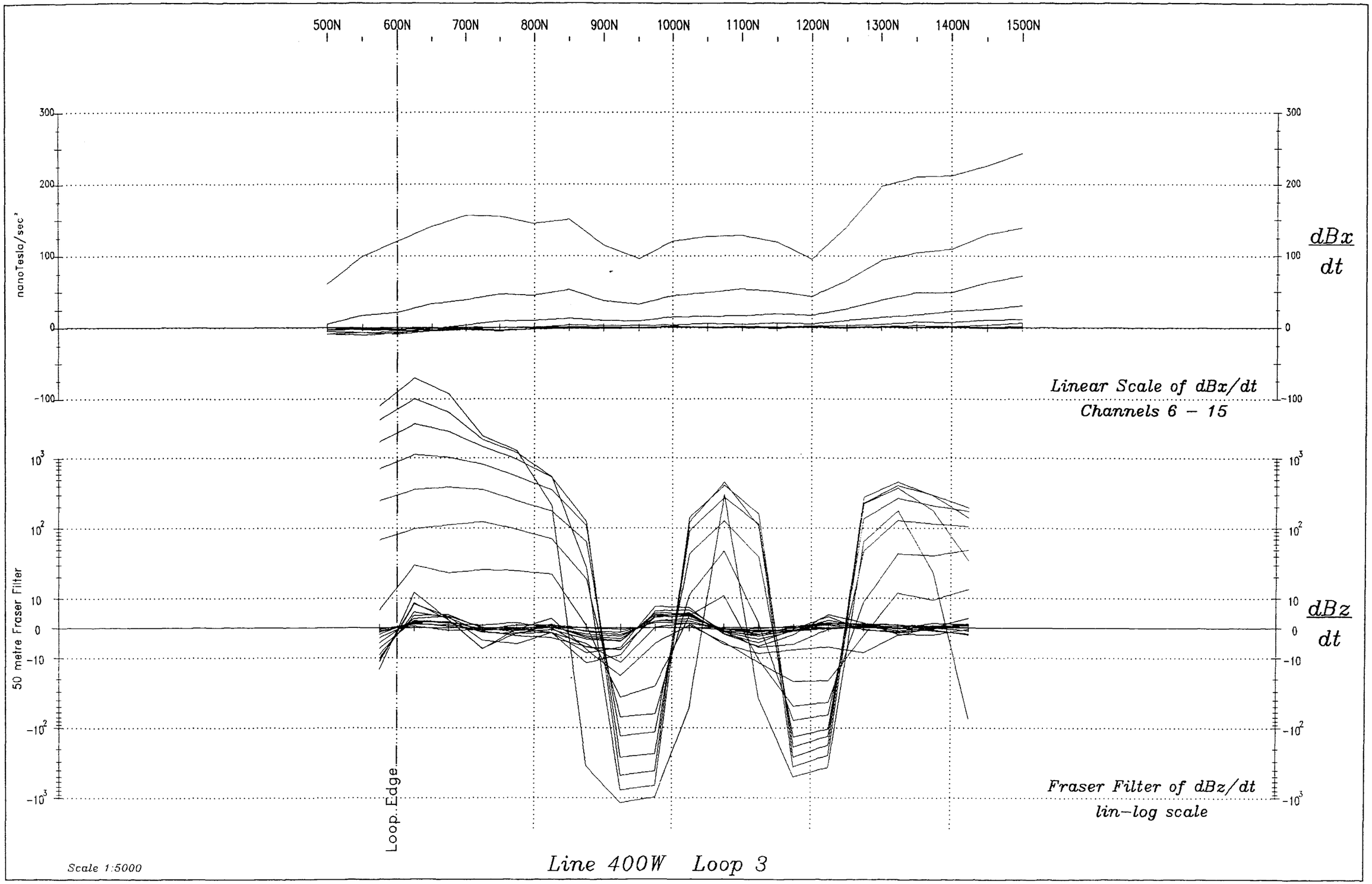
Fraser Filter of dBz/dt
lin–log scale

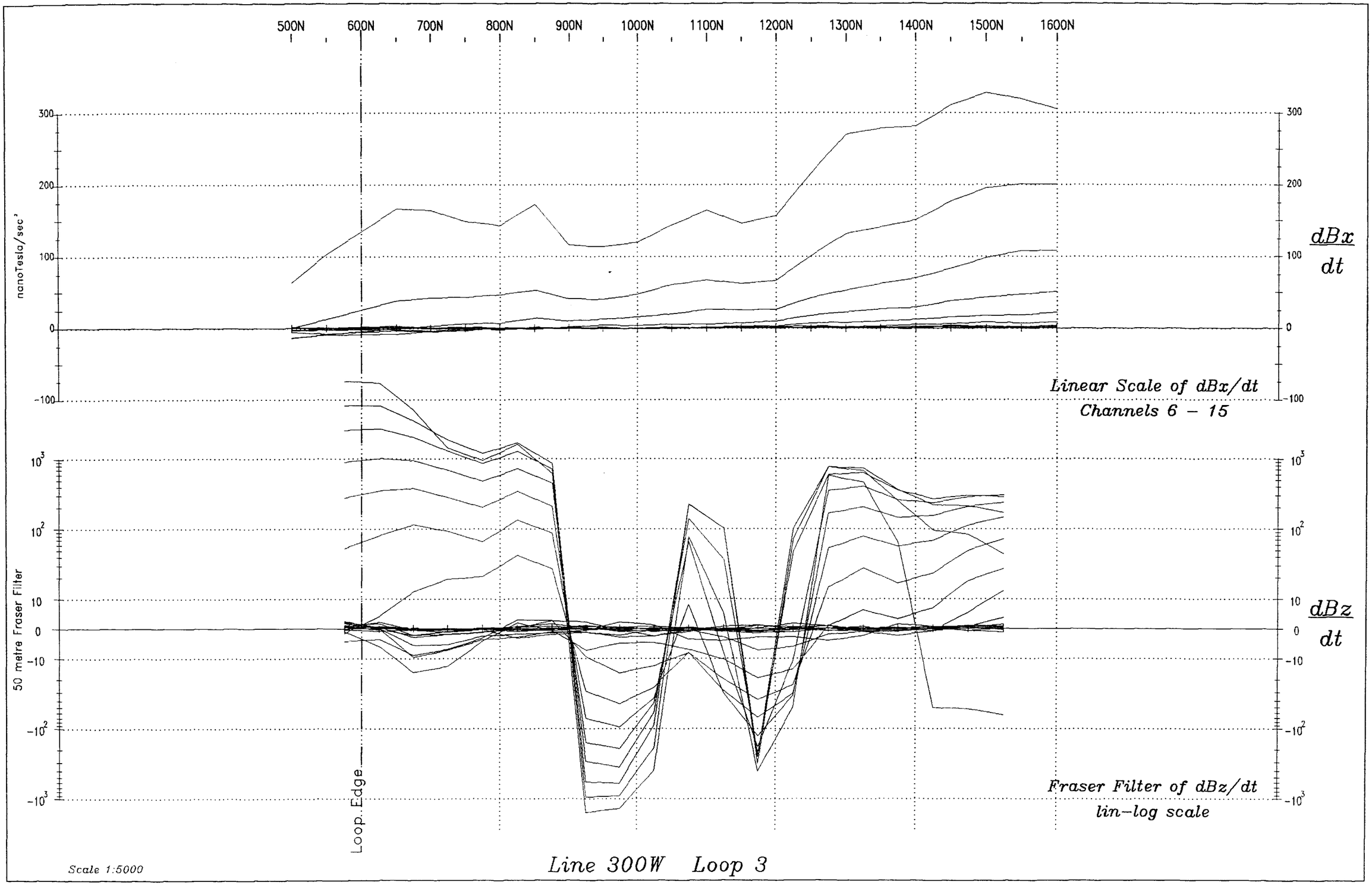
Loop Edge

Loop Edge

Scale 1:5000

Line 500W Loop 3


500N
600N
700N
800N
900N
1000N
1100N
1200N
1300N
1400N
1500N
300
200
100
0
-100
nanoTesla/sec²
dBx/dt
Linear Scale of dBx/dt
Channels 6 – 15
10³
10²
10
0
-10
-10²
-10³
50 metre Fraser Filter
dBz/dt
Loop Edge
Fraser Filter of dBz/dt
lin–log scale
Scale 1:5000
Line 400W Loop 3


500N
600N
700N
800N
900N
1000N
1100N
1200N
1300N
1400N
1500N
1600N
300
200
100
0
-100
nanoTesla/sec²
dBx/dt
Linear Scale of dBx/dt
Channels 6 – 15
10³
10²
10
0
-10
-10²
-10³
50 metre Fraser Filter
dBz/dt
Fraser Filter of dBz/dt
lin–log scale
Loop Edge
Scale 1:5000
Line 300W Loop 3

500N 600N 700N 800N 900N 1000N 1100N 1200N 1300N 1400N

nanoTesla/sec²

300 200 100 0 -100

$\frac{dBx}{dt}$

Linear Scale of dBx/dt
Channels 6 – 15

50 metre Fraser Filter

10^3 10^2 10 0 -10 -10^2 -10^3

$\frac{dBz}{dt}$

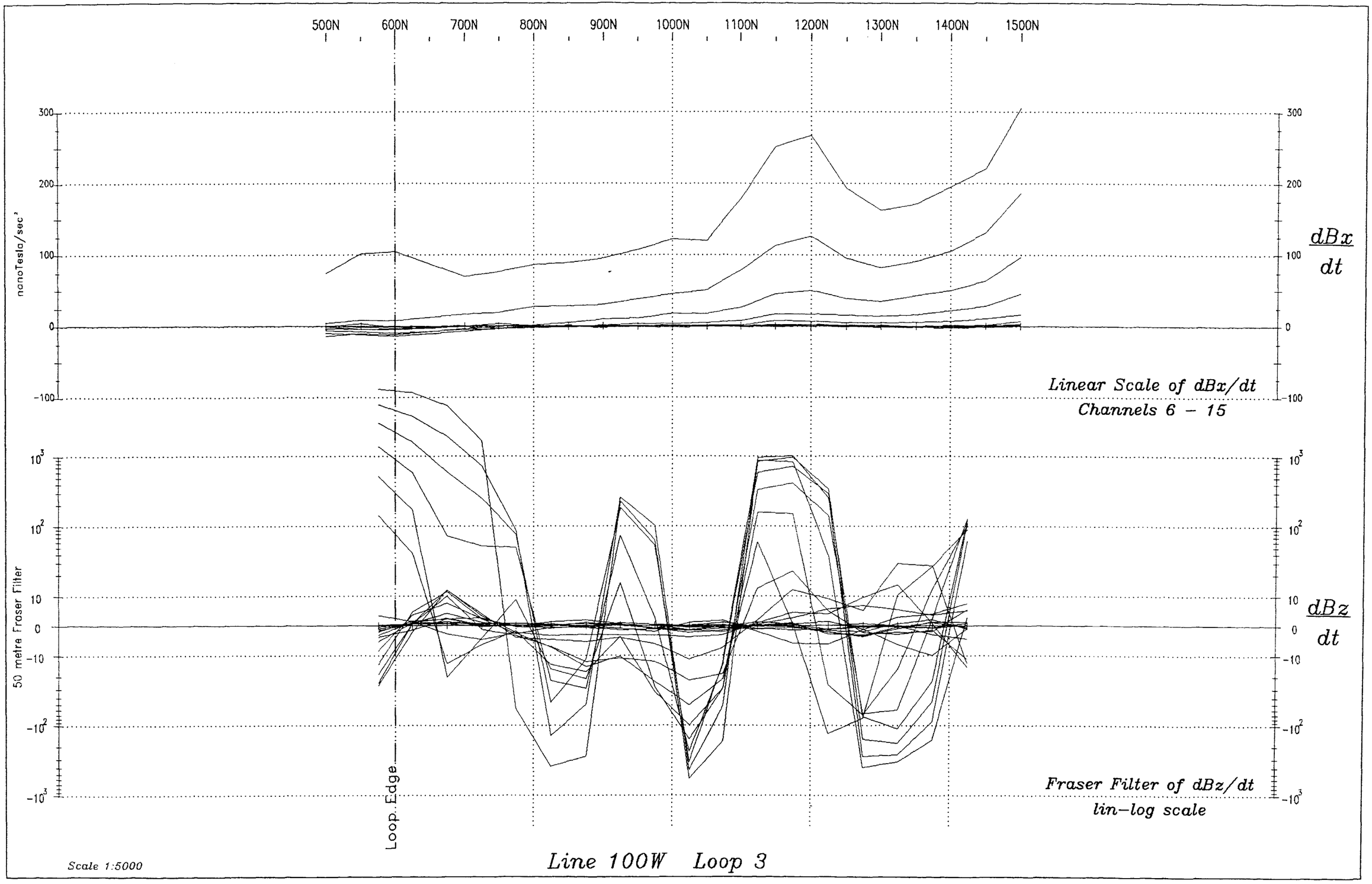
Fraser Filter of dBz/dt
lin–log scale

Loop Edge

Loop Edge

Scale 1:5000

Line 200W Loop 3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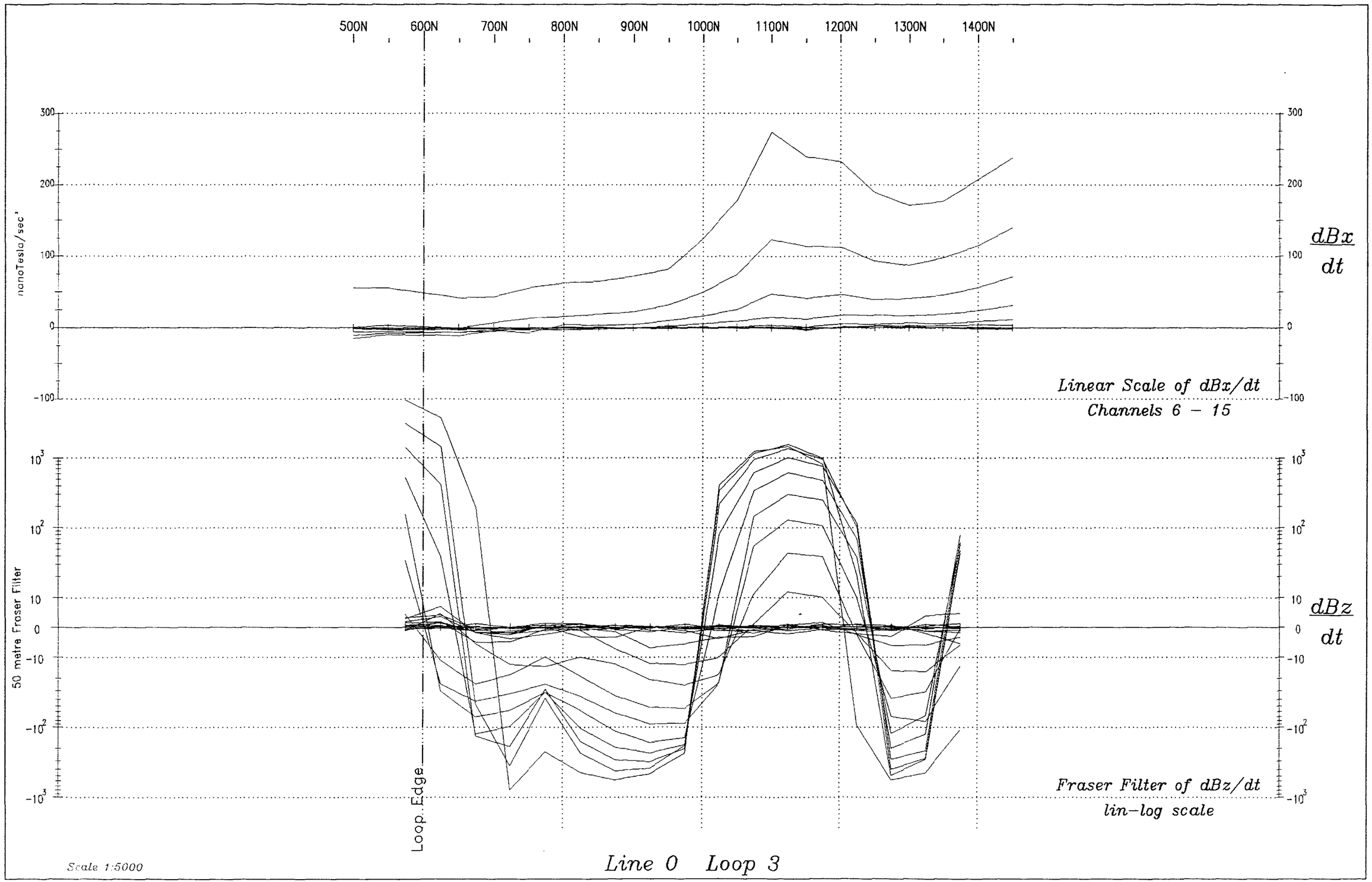
600N
700N
800N
900N
1000N
1100N
1200N
1300N
1400N
1500N
nanoTesla/sec²
300
200
100
0
-100
dBx/dt
Linear Scale of dBx/dt
Channels 6 - 15
10³
10²
10
0
-10
-10²
-10³
50 metre Fraser Filter
dBz/dt
Fraser Filter of dBz/dt
lin-log scale
Loop Edge
Scale 1:5000
Line 100W Loop 3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600N
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800N
900N
1000N
1100N
1200N
1300N
1400N
300
200
100
0
-100
nanoTesla/sec
dBx/dt
Linear Scale of dBx/dt
Channels 6 - 15
10³
10²
10
0
-10
-10²
-10³
50 metre Fraser Filter
dBz/dt
Fraser Filter of dBz/dt
lin-log scale
Loop Edge
Loop Edge
Scale 1:5000
Line 0 Loop 3

650N 750N 850N 950N 1050N 1150N 1250N 1350N 1450N 1550N 1650N

nanoTesla/sec²

300 200 100 0 -100

$\frac{dBx}{dt}$

Linear Scale of dBx/dt
Channels 6 – 15

50 metre Fraser Filter

10^3 10^2 10 0 -10 -10^2 -10^3

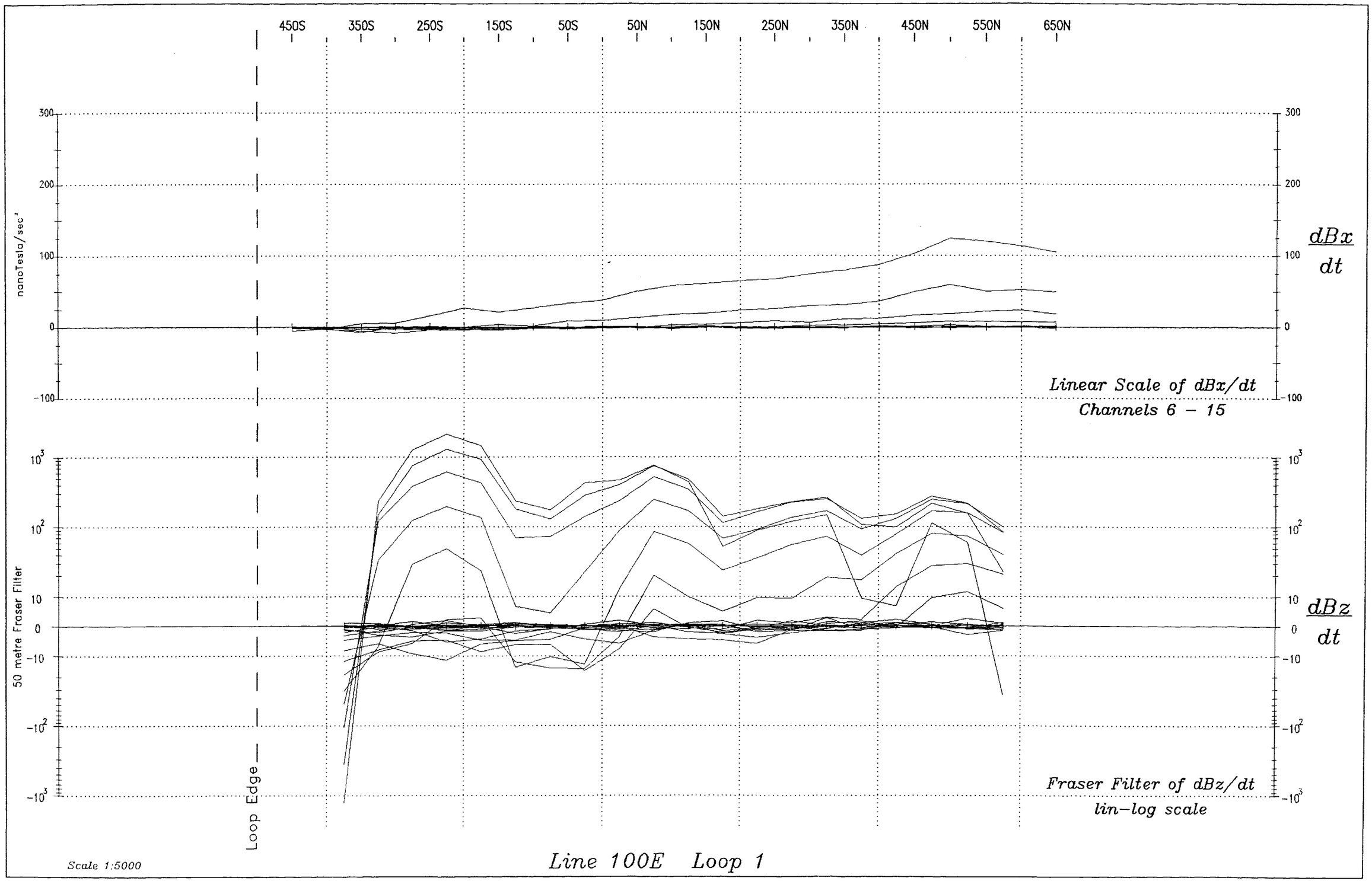
$\frac{dBz}{dt}$

Fraser Filter of dBz/dt
lin–log scale

Loop Edge

Scale 1:5000

Line 100E Loop 2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350S
250S
150S
50S
50N
150N
250N
350N
450N
550N
650N
300
200
100
0
-100
nanoTesla/sec²
dBx/dt
Linear Scale of dBx/dt
Channels 6 – 15
10³
10²
10
0
-10
-10²
-10³
50 metre Fraser Filter
dBz/dt
Fraser Filter of dBz/dt
lin–log scale
Loop Edge
Scale 1:5000
Line 100E Loop 1

650N 750N 850N 950N 1050N 1150N 1250N 1350N 1450N 1550N

300 200 100 0 -100

nanoTesla/sec²

$\frac{dBx}{dt}$

Linear Scale of dBx/dt
Channels 6 – 15

10^3 10^2 10 0 -10 -10^2 -10^3

50 metre Fraser Filter

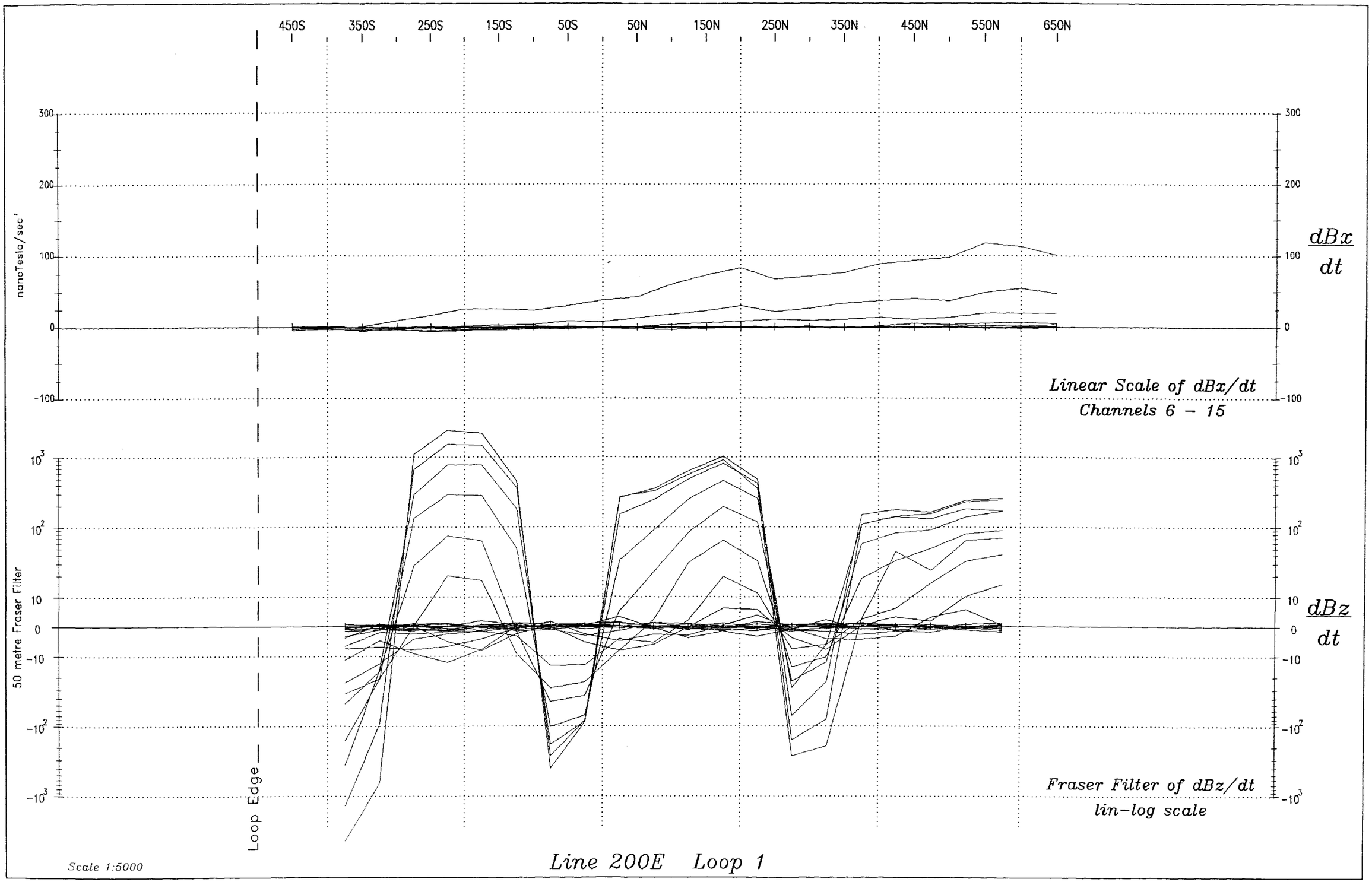
$\frac{dBz}{dt}$

Loop Edge

Fraser Filter of dBz/dt
lin–log scale

Scale 1:5000

Line 200E Loop 2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250S
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50S
50N
150N
250N
350N
450N
550N
650N
300
200
100
0
-100
nanoTesla/sec²
dBx/dt
Linear Scale of dBx/dt
Channels 6 - 15
10³
10²
10
0
-10
-10²
-10³
50 metre Fraser Filter
Loop Edge
dBz/dt
Fraser Filter of dBz/dt
lin-log scale
Scale 1:5000
Line 200E Loop 1

650N 750N 850N 950N 1050N 1150N 1250N 1350N 1450N 1550N 1650N 1750N 1850N 1950N

nanoTesla/sec

300 200 100 0 -100

$\frac{dBx}{dt}$

Linear Scale of dBx/dt
Channels 6 – 15

50 metre Fraser Filter

10^3 10^2 10 0 -10 -10^2 -10^3

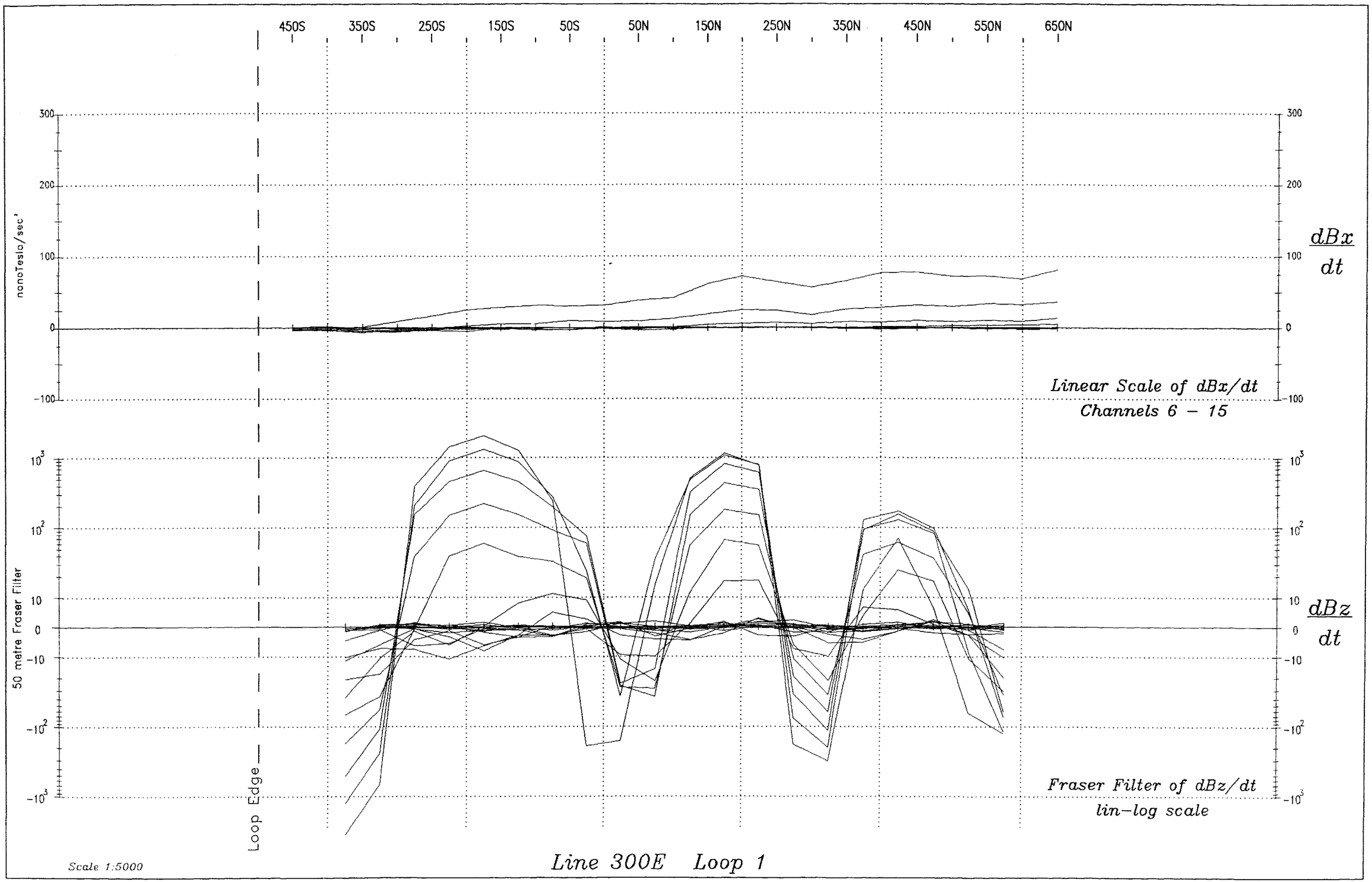
$\frac{dBz}{dt}$

Fraser Filter of dBz/dt
lin–log scale

Loop Edge

Scale 1:5000

Line 300E Loop 2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350S
250S
150S
50S
50N
150N
250N
350N
450N
550N
650N
300
200
100
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-100
nanoTesla/sec
dBx/dt
Linear Scale of dBx/dt
Channels 6 - 15
10^3
10^2
10
0
-10
-10^2
-10^3
50 metre Fraser Filter
dBz/dt
Fraser Filter of dBz/dt
lin-log scale
Loop Edge
Scale 1:5000
Line 300E Loop 1

650N 750N 850N 950N 1050N 1150N 1250N 1350N 1450N 1550N 1650N 1750N

nanoTesla/sec²

300 200 100 0 -100

$\frac{dBx}{dt}$

Linear Scale of dBx/dt
Channels 6 – 15

50 metre Fraser Filter

10^3 10^2 10 0 -10 -10^2 -10^3

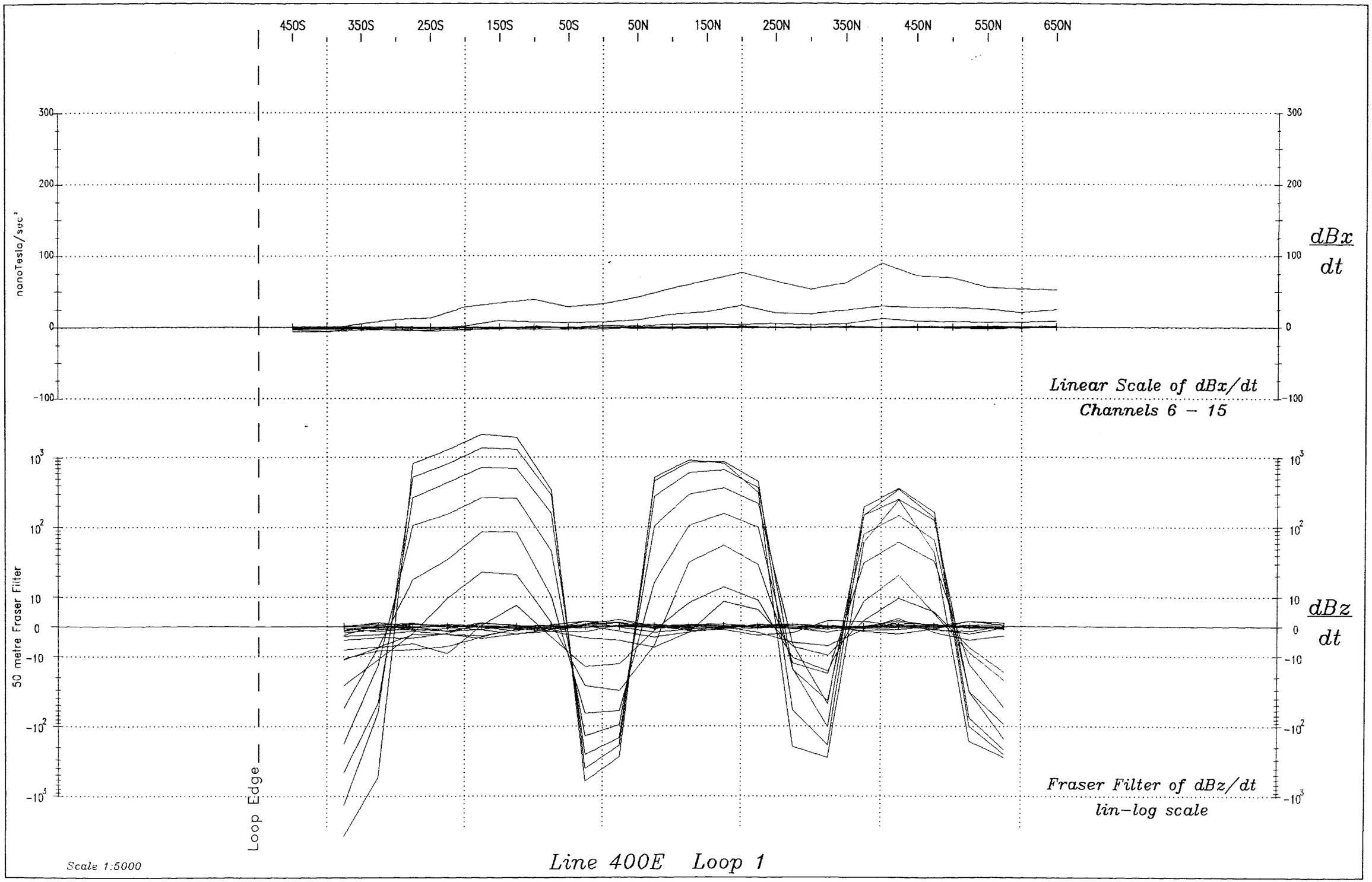
$\frac{dBz}{dt}$

Fraser Filter of dBz/dt
lin–log scale

Loop Edge

Scale 1:5000

Line 400E Loop 2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350S
250S
150S
50S
50N
150N
250N
350N
450N
550N
650N
300
200
100
0
-100
nanoTesla/sec²
dBx/dt
Linear Scale of dBx/dt
Channels 6 – 15
10³
10²
10
0
-10
-10²
-10³
50 metre Fraser Filter
dBz/dt
Fraser Filter of dBz/dt
lin–log scale
Loop Edge
Scale 1:5000
Line 400E Loop 1

650N 750N 850N 950N 1050N 1150N 1250N 1350N 1450N 1550N 1650N 1750N 1850N

nanoTesla/sec²

300 200 100 0 -100

$\frac{dBx}{dt}$

Linear Scale of dBx/dt
Channels 6 – 15

50 metre Fraser Filter

10^3 10^2 10 0 -10 -10^2 -10^3

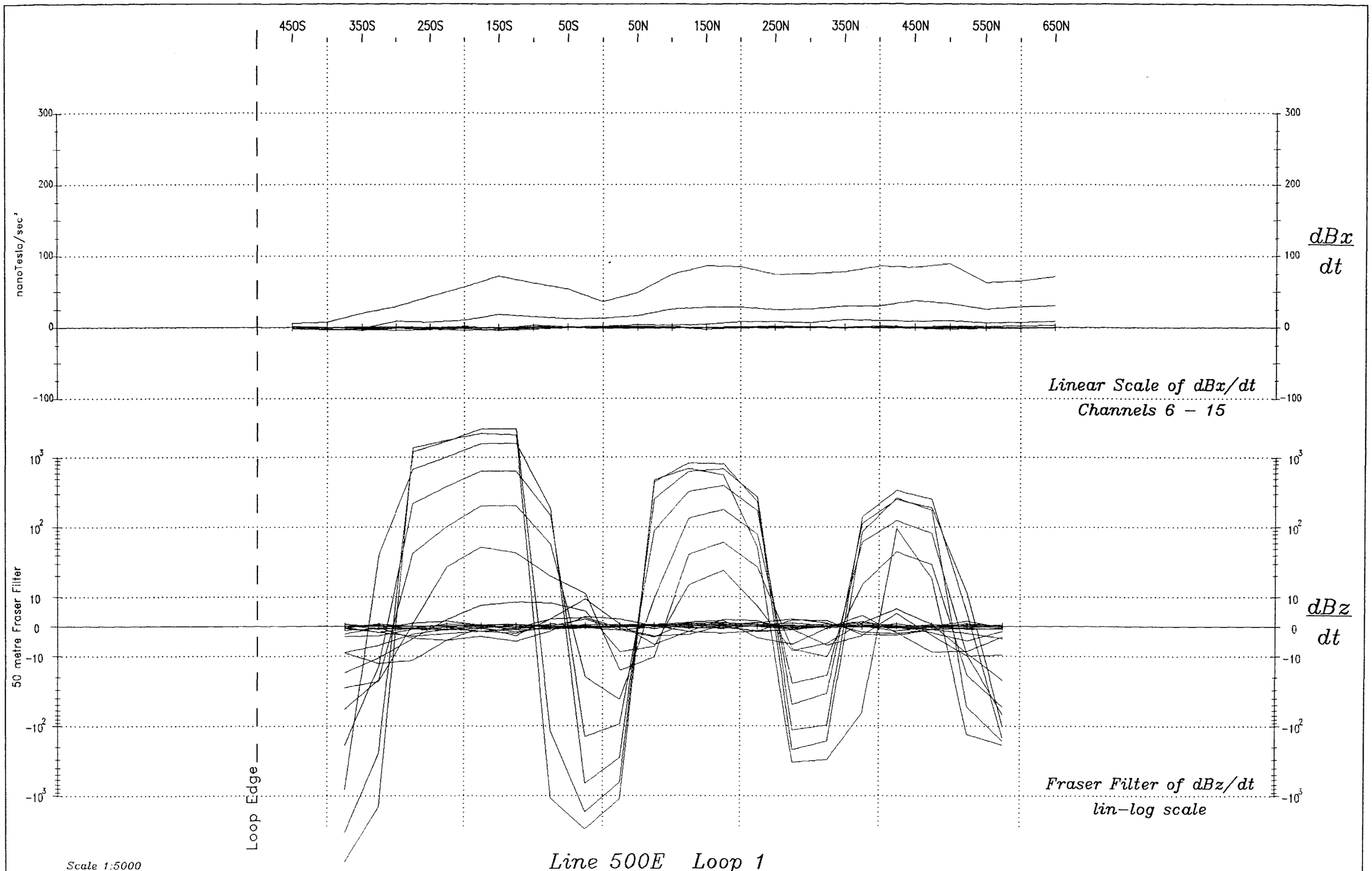
$\frac{dBz}{dt}$

Fraser Filter of dBz/dt
lin–log scale

Loop Edge

Scale 1:5000

Line 500E Loop 2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150N
250N
350N
450N
550N
650N
300
200
100
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-100
nanoTesla/sec
dBx/dt
Linear Scale of dBx/dt
Channels 6 – 15
10^3
10^2
10
0
-10
-10^2
-10^3
50 metre Fraser Filter
dBz/dt
Fraser Filter of dBz/dt
lin–log scale
Loop Edge
Scale 1:5000
Line 500E Loop 1

650N 750N 850N 950N 1050N 1150N 1250N 1350N 1450N 1550N 1650N 1750N 1850N 1950N

nanoTesla/sec²

300 200 100 0 -100

$\frac{dBx}{dt}$

Linear Scale of dBx/dt
Channels 6 – 15

50 metre Fraser Filter

10^3 10^2 10 0 -10 -10^2 -10^3

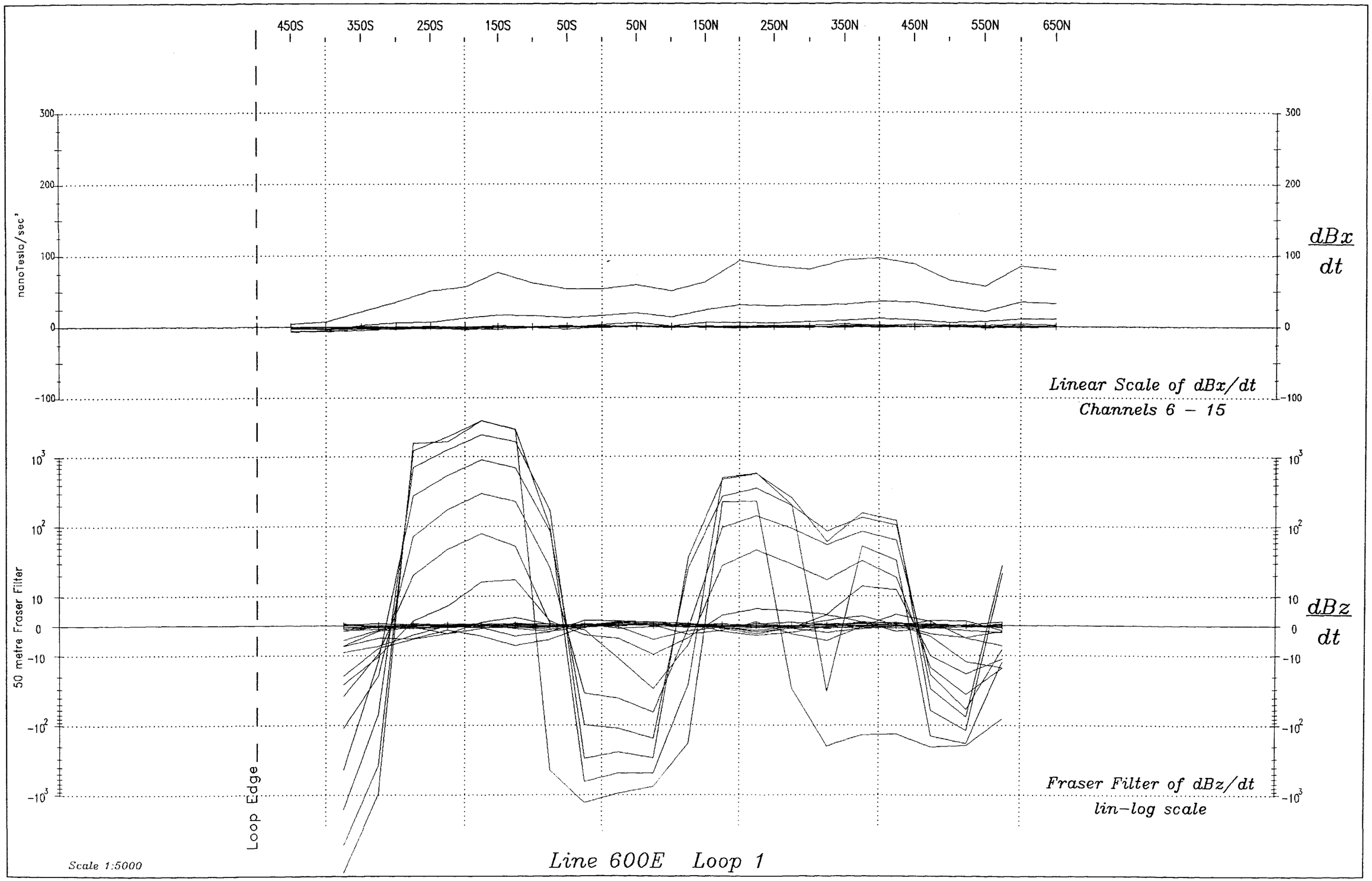
$\frac{dBz}{dt}$

Fraser Filter of dBz/dt
lin–log scale

Loop Edge

Scale 1:5000

Line 600E Loop 2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350S
250S
150S
50S
50N
150N
250N
350N
450N
550N
650N
300
200
100
0
-100
nanoTesla/sec²
dBx/dt
Linear Scale of dBx/dt
Channels 6 – 15
10³
10²
10
0
-10
-10²
-10³
50 metre Fraser Filter
dBz/dt
Fraser Filter of dBz/dt
lin–log scale
Loop Edge
Scale 1:5000
Line 600E Loop 1

650N 750N 850N 950N 1050N 1150N 1250N 1350N 1450N 1550N 1650N 1750N 1850N 1950N 2050N

nanoTesla/sec²

300 200 100 0 -100

$\frac{dBx}{dt}$

Linear Scale of dBx/dt
Channels 6 – 15

50 metre Fraser Filter

10^3 10^2 10 0 -10 -10^2 -10^3

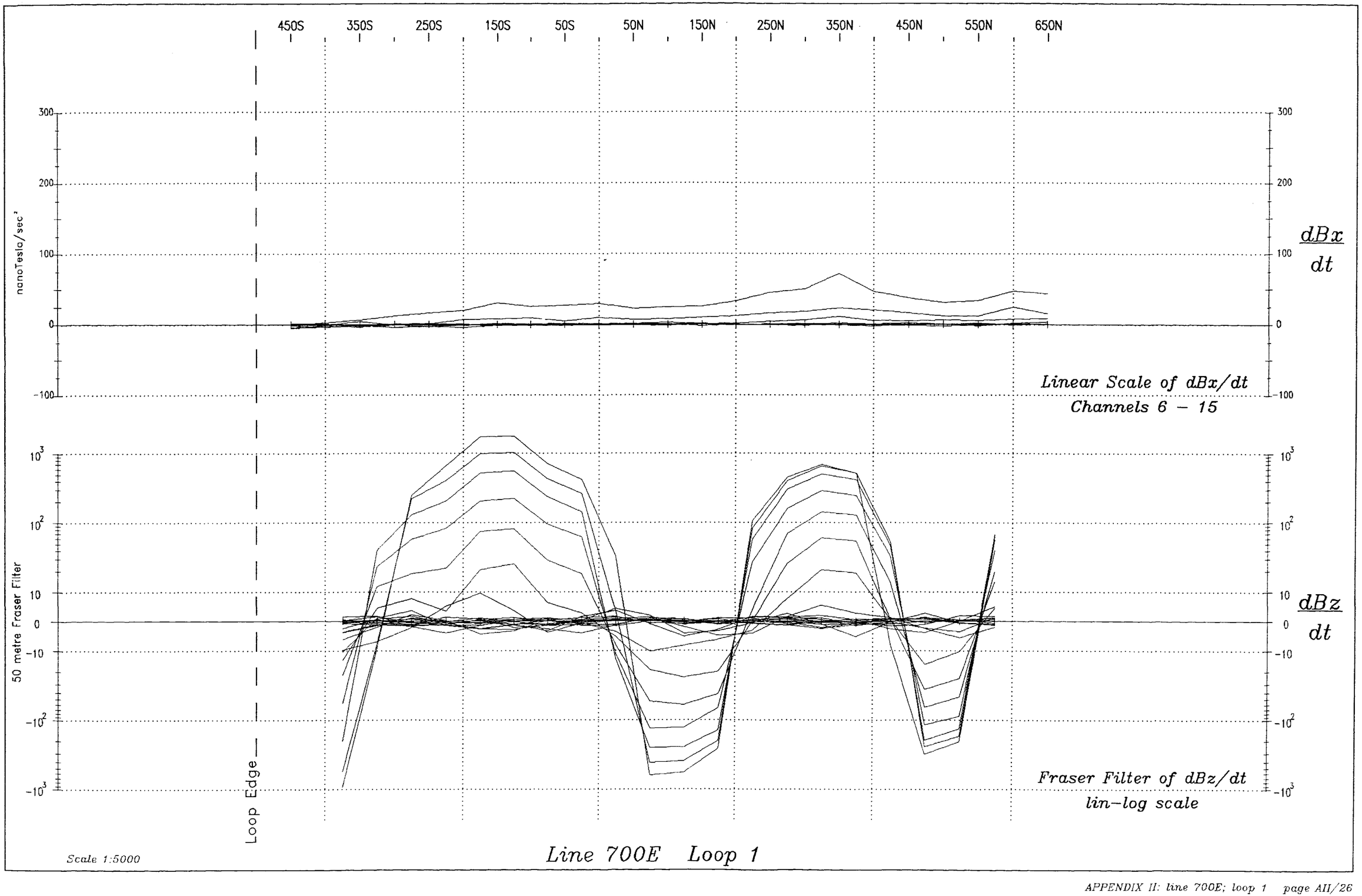
$\frac{dBz}{dt}$

Fraser Filter of dBz/dt
lin–log scale

Loop Edge

Scale 1:5000

Line 700E Loop 2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350S
250S
150S
50S
50N
150N
250N
350N
450N
550N
650N
300
200
100
0
-100
nanoTesla/sec²
dBx/dt
Linear Scale of dBx/dt
Channels 6 – 15
10³
10²
10
0
-10
-10²
-10³
50 metre Fraser Filter
dBz/dt
Fraser Filter of dBz/dt
lin–log scale
Loop Edge
Scale 1:5000
Line 700E Loop 1

650N 750N 850N 950N 1050N 1150N 1250N 1350N 1450N 1550N 1650N 1750N 1850N 1950N

nanoTesla/sec

300 200 100 0 -100

$\frac{dBx}{dt}$

Linear Scale of dBx/dt
Channels 6 – 15

50 metre Fraser Filter

10^3 10^2 10 0 -10 -10^2 -10^3

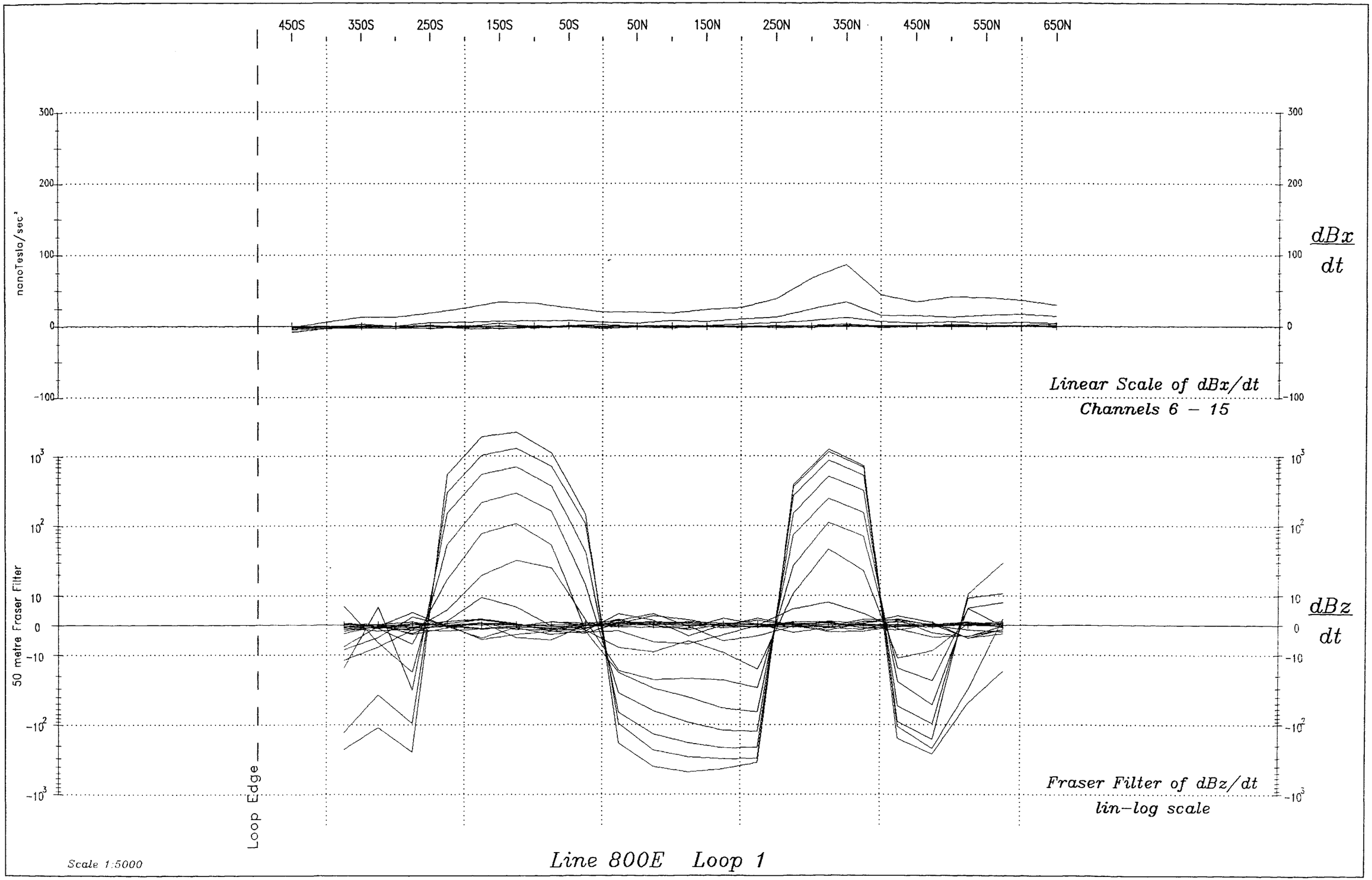
$\frac{dBz}{dt}$

Fraser Filter of dBz/dt
lin–log scale

Loop Edge

Scale 1:5000

Line 800E Loop 2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250S
150S
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150N
250N
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450N
550N
650N
300
200
100
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-100
nanoTesla/sec²
dBx/dt
Linear Scale of dBx/dt
Channels 6 – 15
10³
10²
10
0
-10
-10²
-10³
50 metre Fraser Filter
dBz/dt
Fraser Filter of dBz/dt
lin–log scale
Loop Edge
Scale 1:5000
Line 800E Loop 1

650N 750N 850N 950N 1050N 1150N 1250N 1350N 1450N 1550N 1650N 1750N 1850N 1950N

nanoTesla/sec²

300 200 100 0 -100

$\frac{dBx}{dt}$

Linear Scale of dBx/dt
Channels 6 – 15

50 metre Fraser Filter

10^3 10^2 10 0 -10 -10^2 -10^3

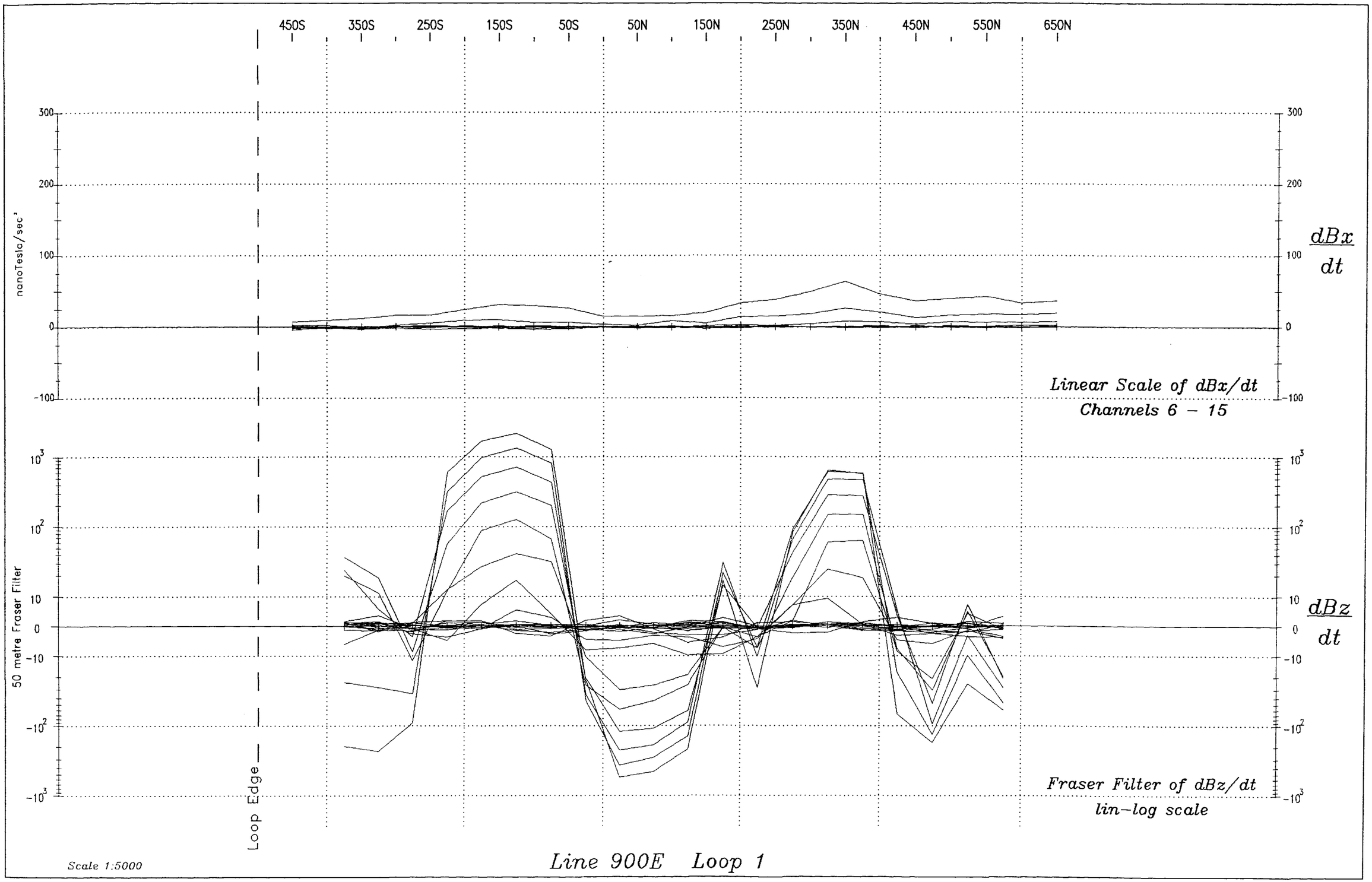
$\frac{dBz}{dt}$

Fraser Filter of dBz/dt
lin–log scale

Loop Edge

Scale 1:5000

Line 900E Loop 2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350S
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50N
150N
250N
350N
450N
550N
650N
300
200
100
0
-100
nanoTesla/sec
dBx/dt
Linear Scale of dBx/dt
Channels 6 - 15
10^3
10^2
10
0
-10
-10^2
-10^3
50 metre Fraser Filter
dBz/dt
Loop Edge
Fraser Filter of dBz/dt
lin-log scale
Scale 1:5000
Line 900E Loop 1

650N 750N 850N 950N 1050N 1150N 1250N 1350N 1450N 1550N 1650N 1750N 1850N 1950N

nanoTesla/sec²

300 200 100 0 -100

$\frac{dBx}{dt}$

Linear Scale of dBx/dt
Channels 6 – 15

50 metre Fraser Filter

10^3 10^2 10 0 -10 -10^2 -10^3

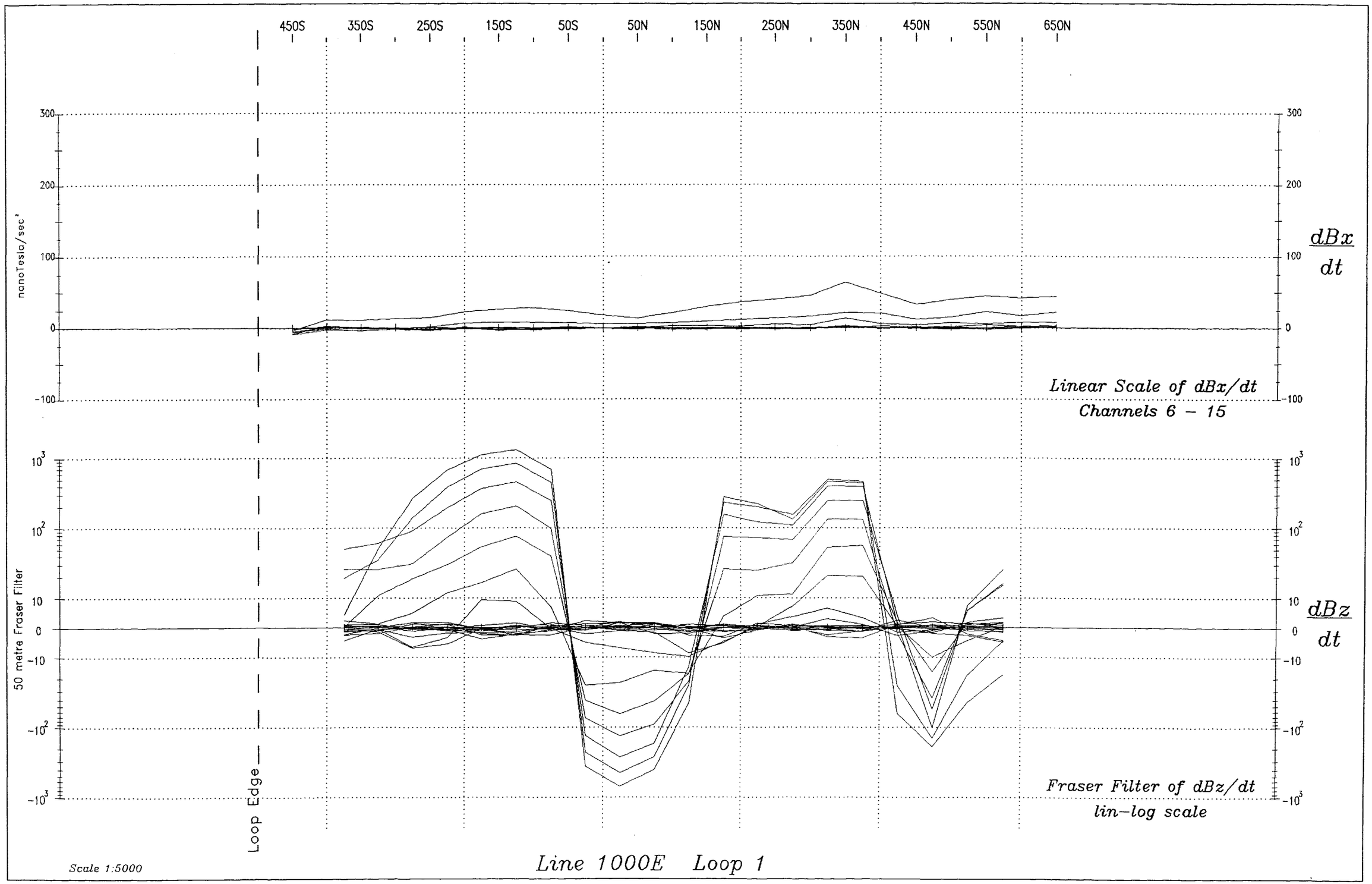
$\frac{dBz}{dt}$

Fraser Filter of dBz/dt
lin–log scale

Loop Edge

Scale 1:5000

Line 1000E Loop 2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350S
250S
150S
50S
50N
150N
250N
350N
450N
550N
650N
300
200
100
0
-100
nanoTesla/sec
dBx/dt
Linear Scale of dBx/dt
Channels 6 - 15
10^3
10^2
10
0
-10
-10^2
-10^3
50 metre Fraser Filter
dBz/dt
Fraser Filter of dBz/dt
lin-log scale
Loop Edge
Scale 1:5000
Line 1000E Loop 1

650N 750N 850N 950N 1050N 1150N 1250N 1350N 1450N 1550N 1650N 1750N 1850N

nanoTesla/sec

300 200 100 0 -100

$\frac{dBx}{dt}$

Linear Scale of dBx/dt
Channels 6 – 15

50 metre Fraser Filter

10^3 10^2 10 0 -10 -10^2 -10^3

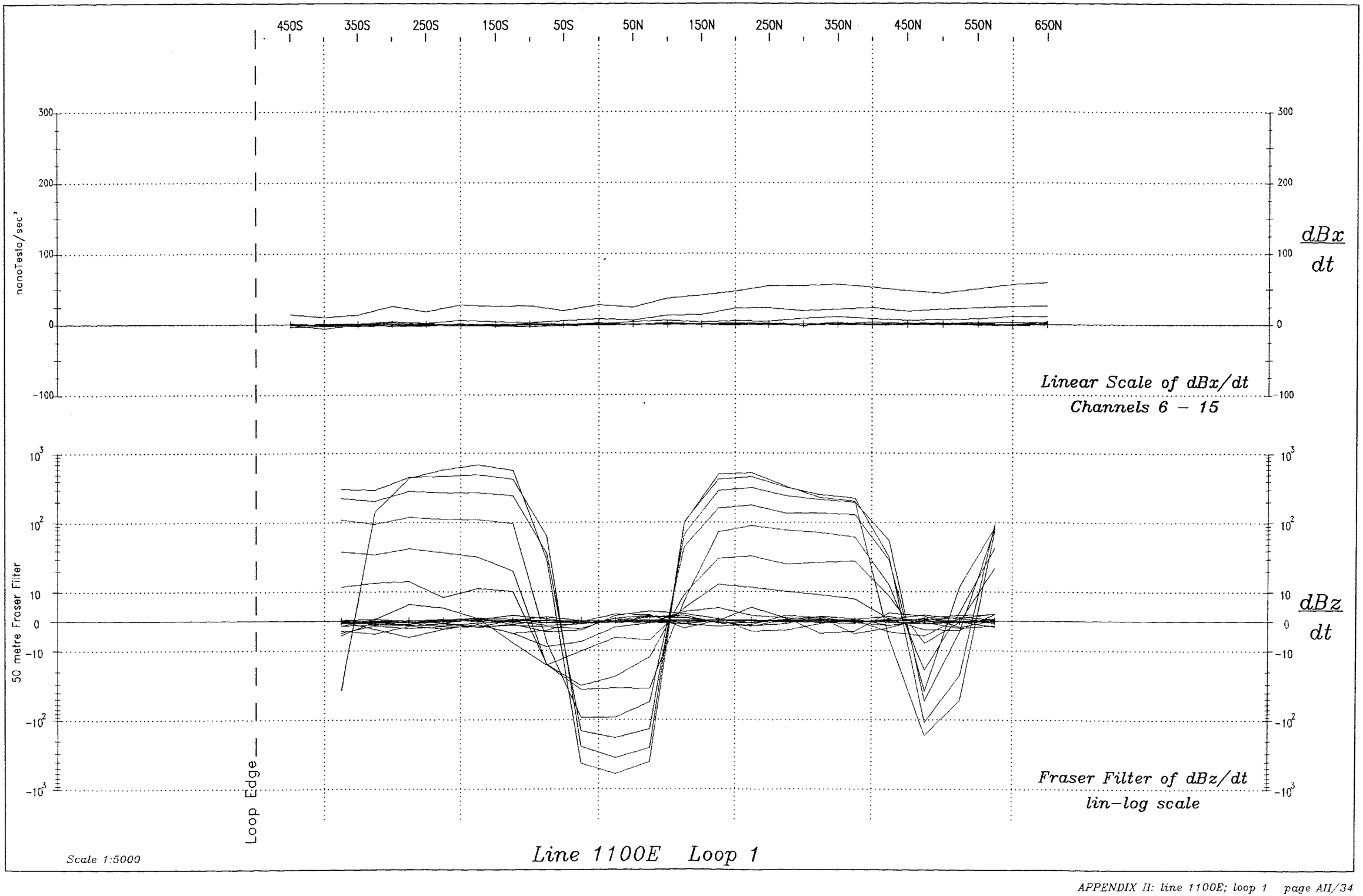
$\frac{dBz}{dt}$

Fraser Filter of dBz/dt
lin–log scale

Loop Edge

Scale 1:5000

Line 1100E Loop 2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350S
250S
150S
50S
50N
150N
250N
350N
450N
550N
650N
300
200
100
0
-100
nanoTesla/sec²
dBx/dt
Linear Scale of dBx/dt
Channels 6 – 15
10³
10²
10
0
-10
-10²
-10³
50 metre Fraser Filter
dBz/dt
Loop Edge
Fraser Filter of dBz/dt
lin–log scale
Scale 1:5000
Line 1100E Loop 1

650N 750N 850N 950N 1050N 1150N 1250N 1350N 1450N 1550N 1650N 1750N 1850N 1950N

nanoTesla/sec²

300 200 100 0 -100

$\frac{dBx}{dt}$

Linear Scale of dBx/dt
Channels 6 – 15

50 metre Fraser Filter

10^3 10^2 10 0 -10 -10^2 -10^3

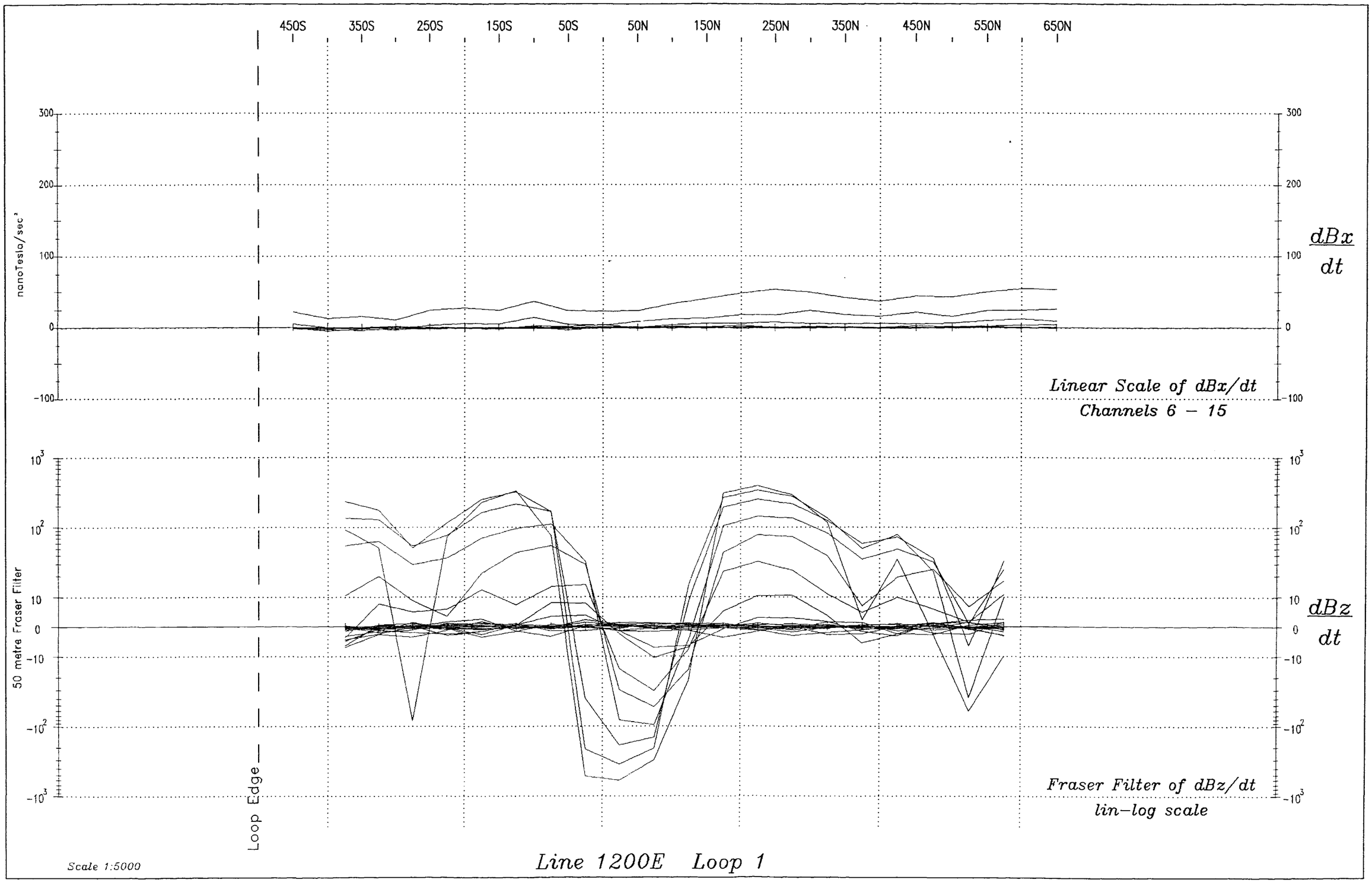
$\frac{dBz}{dt}$

Fraser Filter of dBz/dt
lin–log scale

Loop Edge

Scale 1:5000

Line 1200E Loop 2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350S
250S
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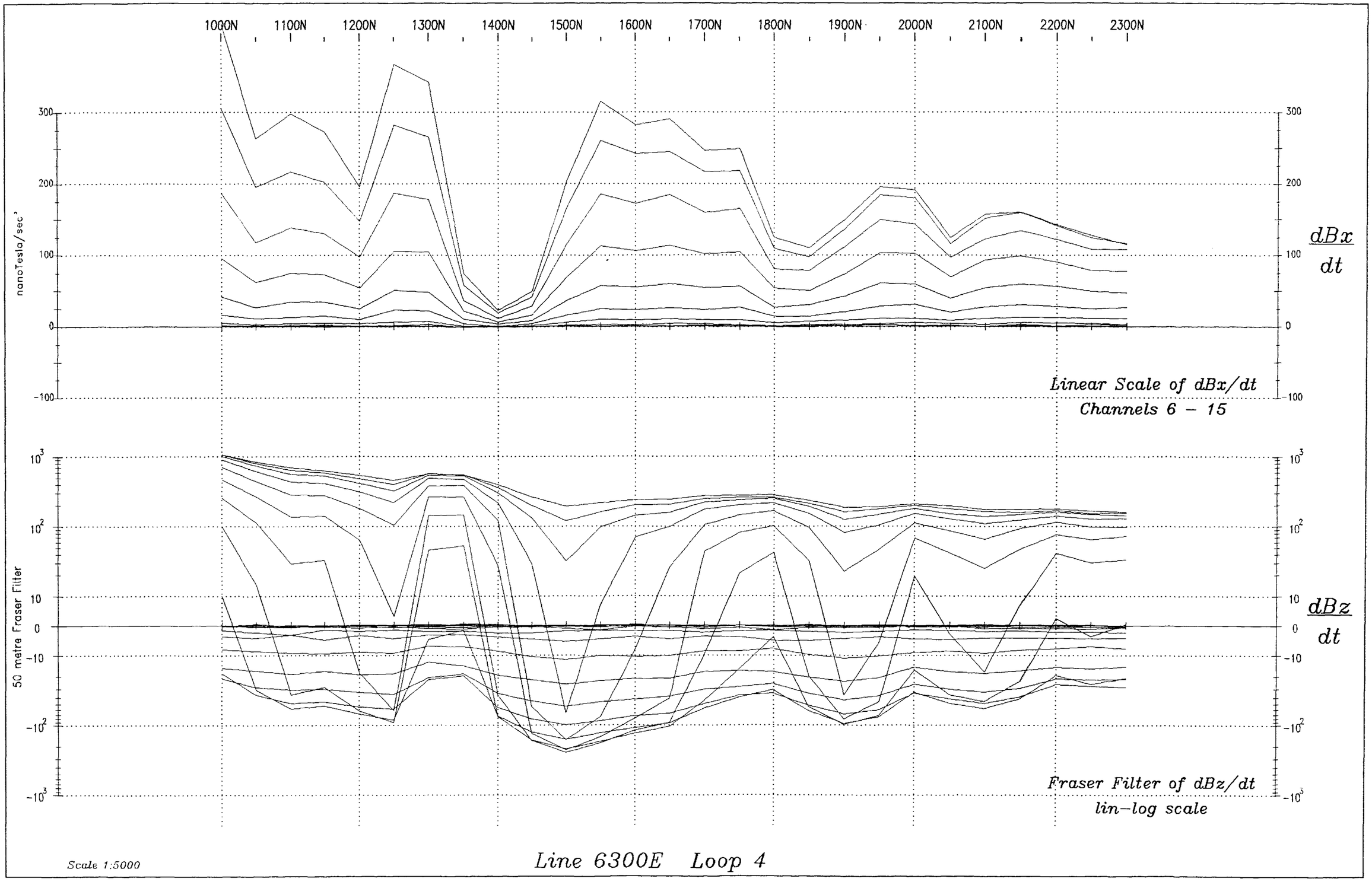
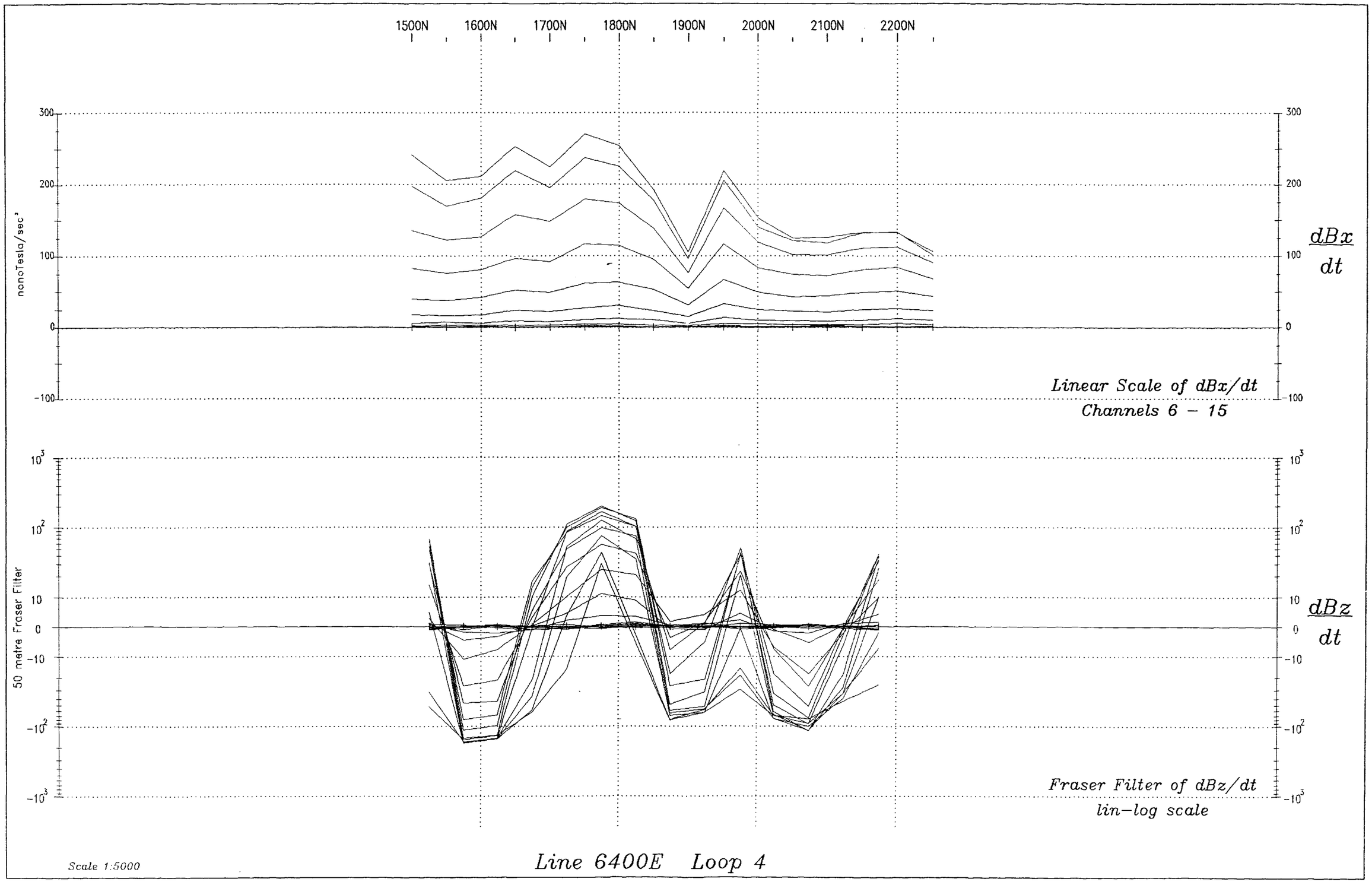
50S
50N
150N
250N
350N
450N
550N
650N
300
200
100
0
-100
nanoTesla/sec²
dBx/dt
Linear Scale of dBx/dt
Channels 6 – 15
10³
10²
10
0
-10
-10²
-10³
50 metre Fraser Filter
dBz/dt
Fraser Filter of dBz/dt
lin–log scale
Loop Edge
Scale 1:5000
Line 1200E Loop 1

Grid H-East



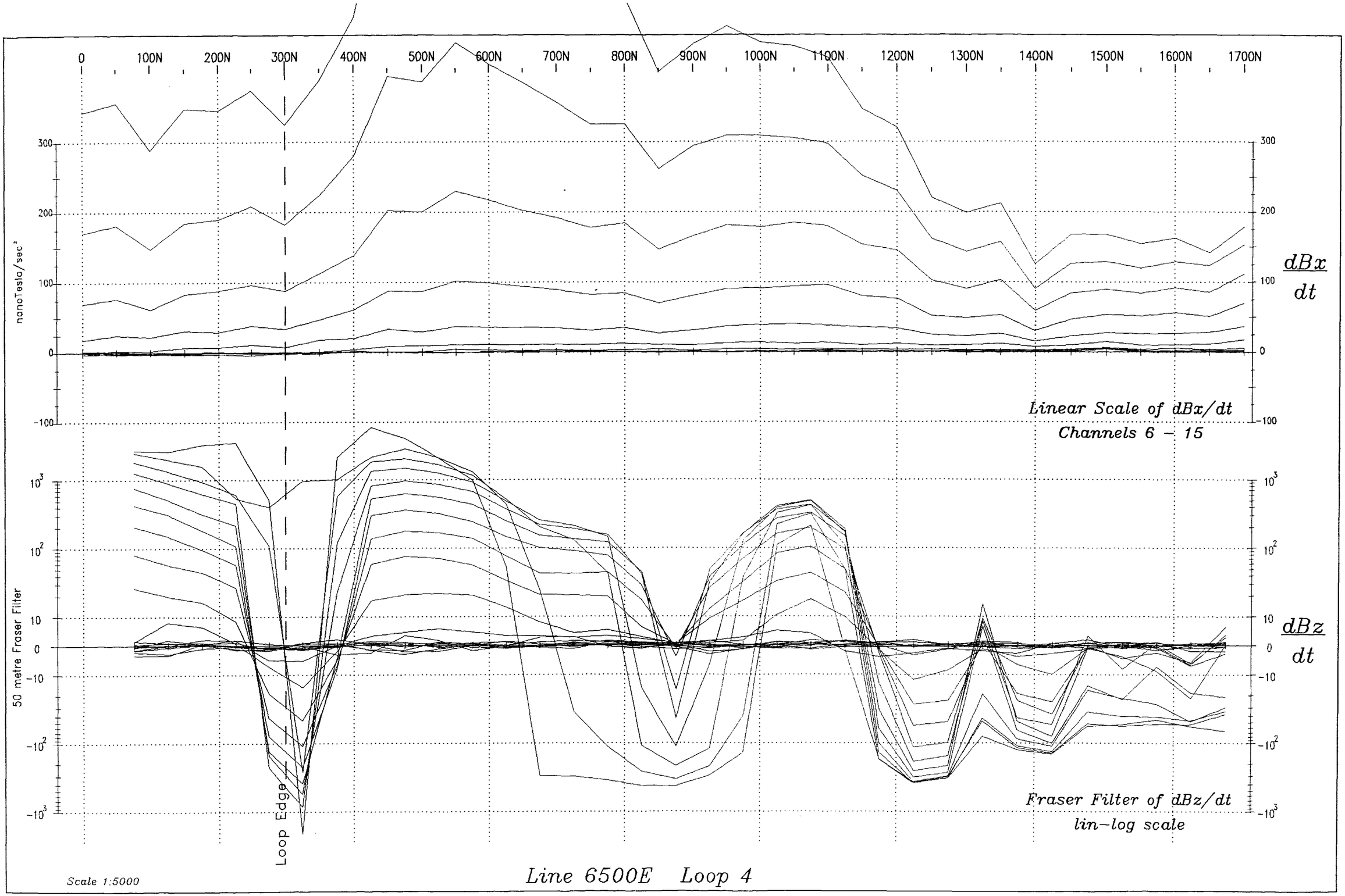
Scale 1:5000

Line 6300E Loop 4



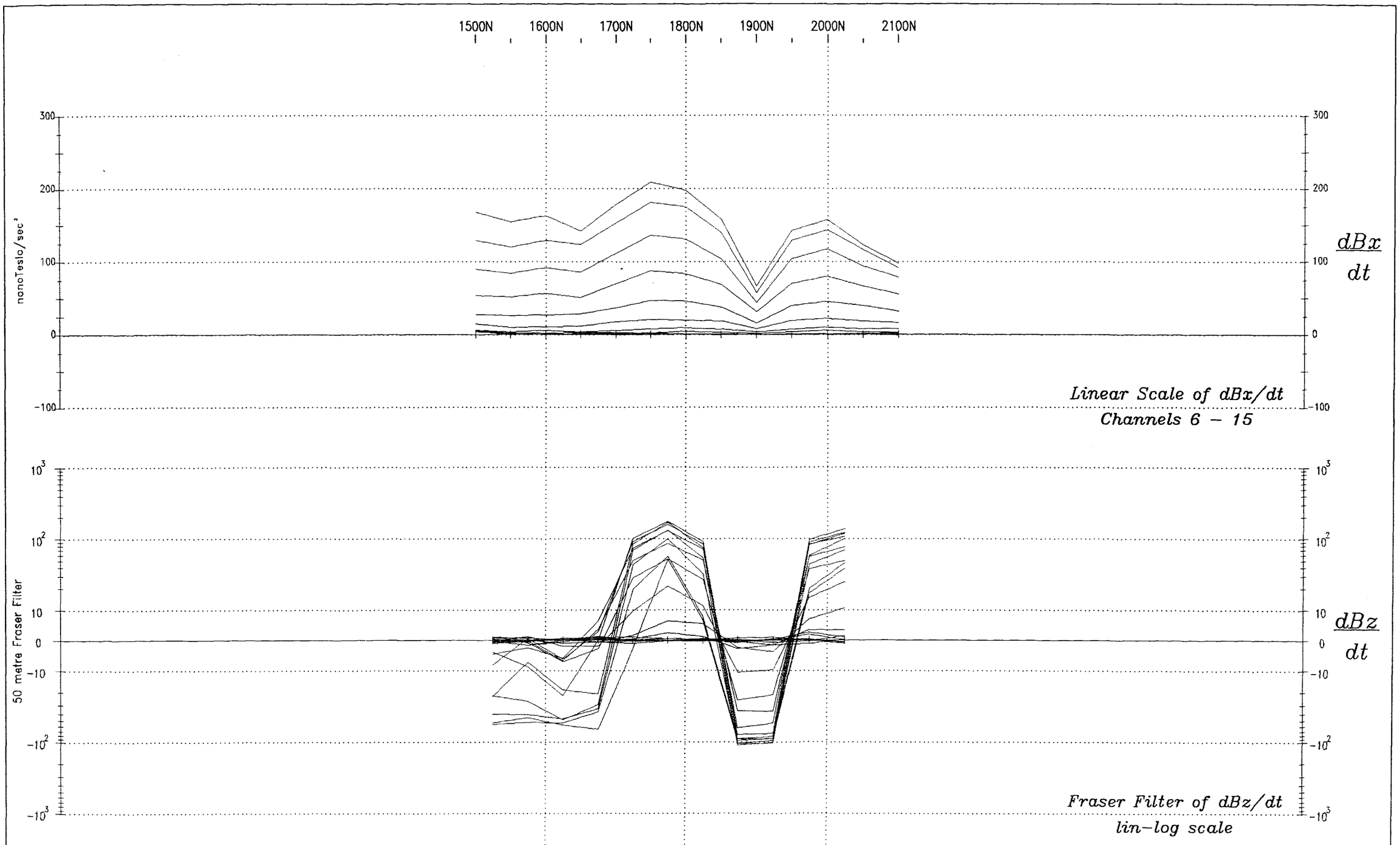
Scale 1:5000

Line 6400E Loop 4



Scale 1:5000

Line 6500E Loop 4



Scale 1:5000

Line 6500E Loop 4

0 100N 200N 300N 400N 500N 600N 700N 800N 900N 1000N 1100N 1200N 1300N 1400N 1500N 1600N 1700N

nanoTesla/sec²

300 200 100 0 -100

$\frac{dBx}{dt}$

Linear Scale of dBx/dt
Channels 6 – 15

50 metre Fraser Filter

10^3 10^2 10 0 -10 -10^2 -10^3

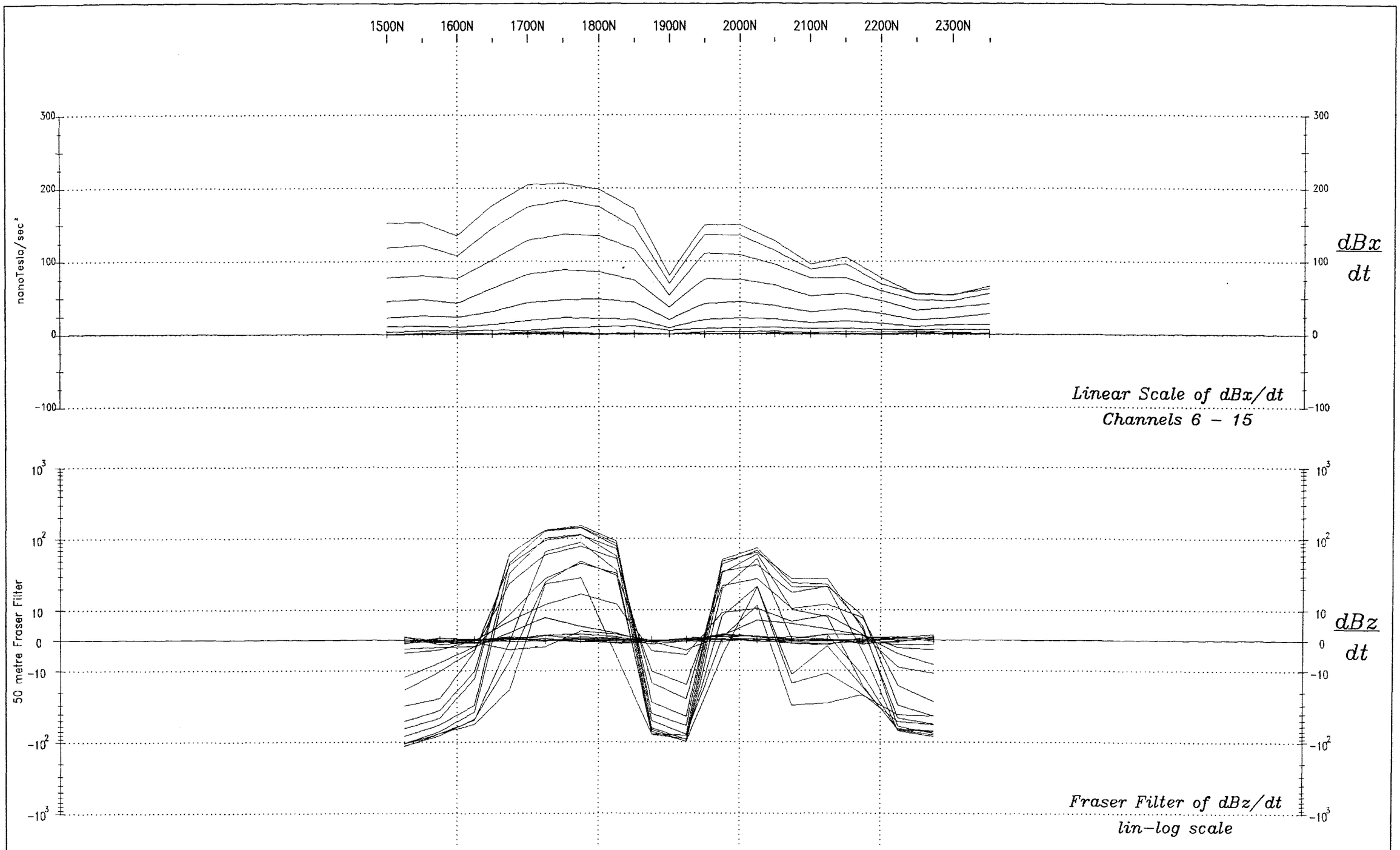
$\frac{dBz}{dt}$

Fraser Filter of dBz/dt
lin–log scale

Loop Edge

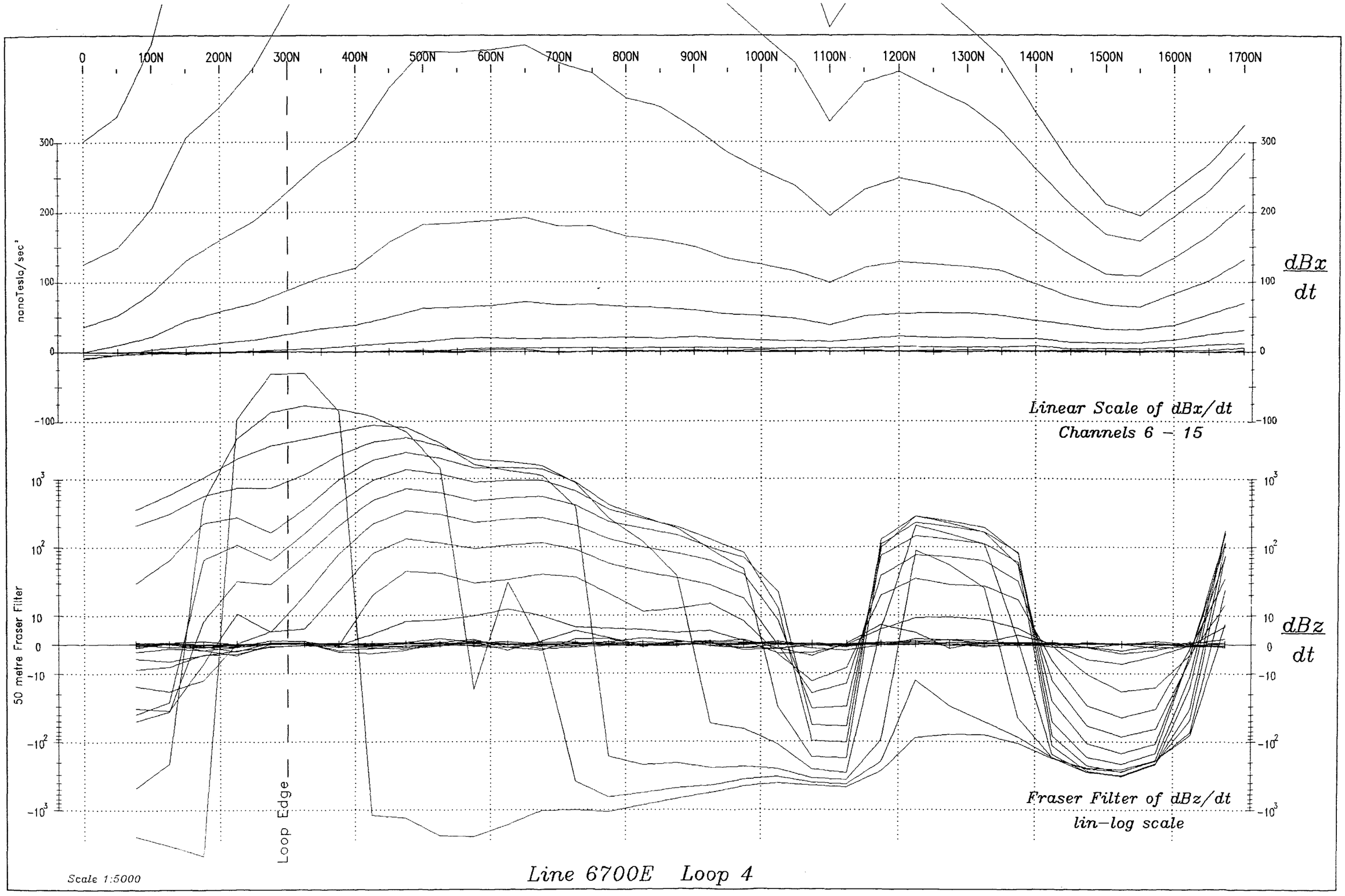
Scale 1:5000

Line 6600E Loop 4



Scale 1:5000

Line 6600E Loop 4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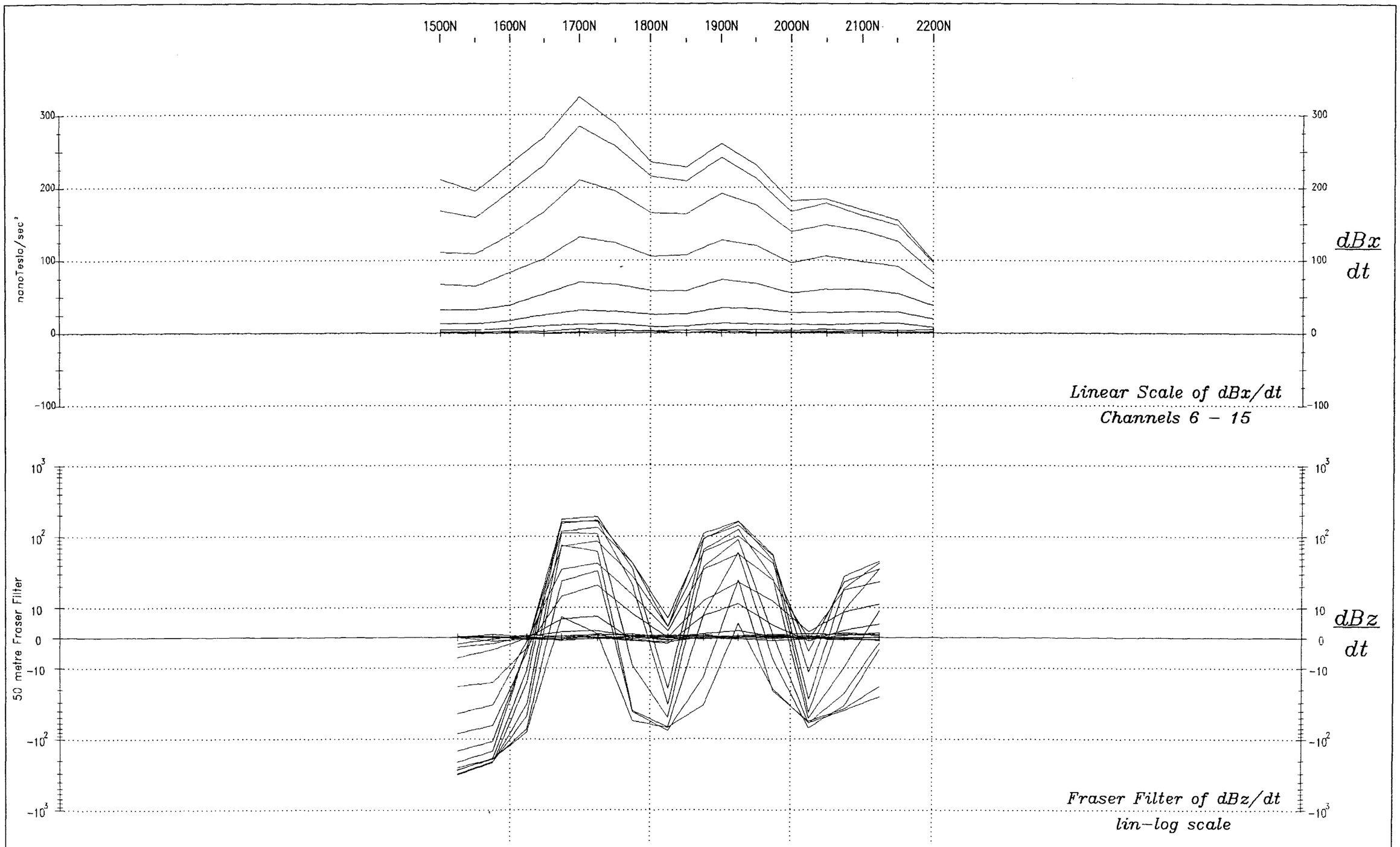
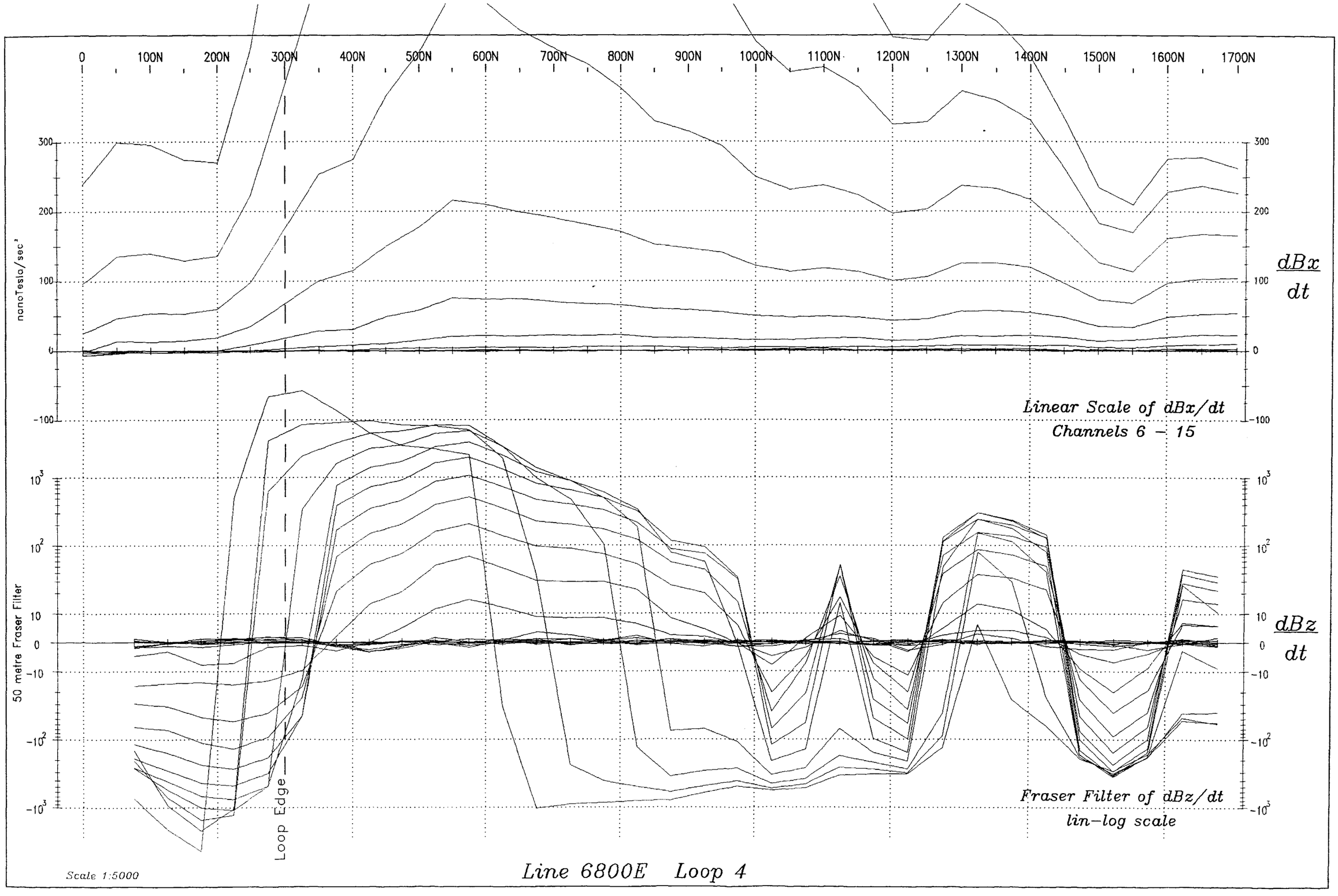
100N
200N
300N
400N
500N
600N
700N
800N
900N
1000N
1100N
1200N
1300N
1400N
1500N
1600N
1700N
nanoTesla/sec
dBx/dt
Linear Scale of dBx/dt
Channels 6 – 15
50 metre Fraser Filter
dBz/dt
Fraser Filter of dBz/dt
lin–log scale
Loop Edge
Scale 1:5000
Line 6700E Loop 4



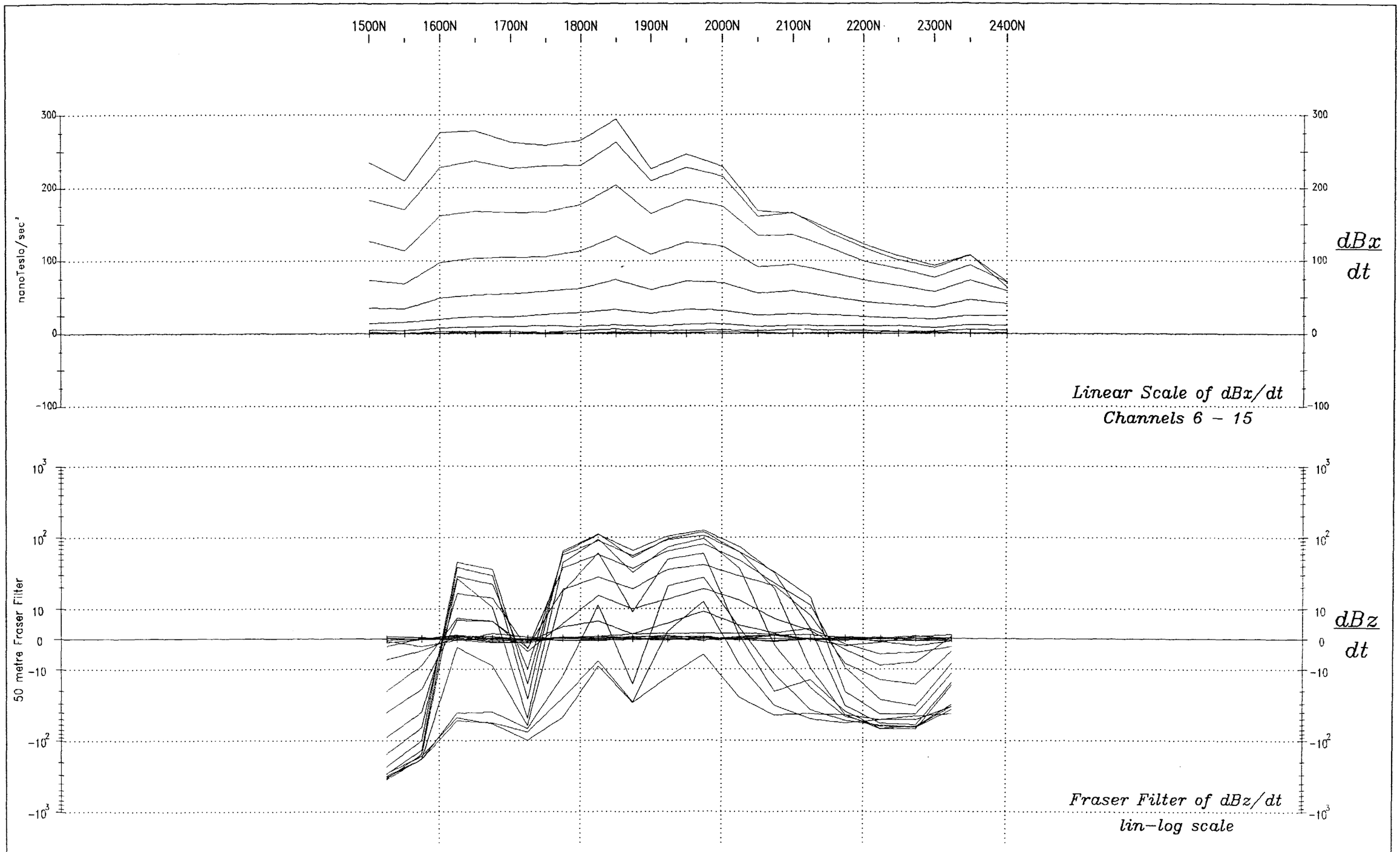
Scale 1:5000

Line 6700E Loop 4



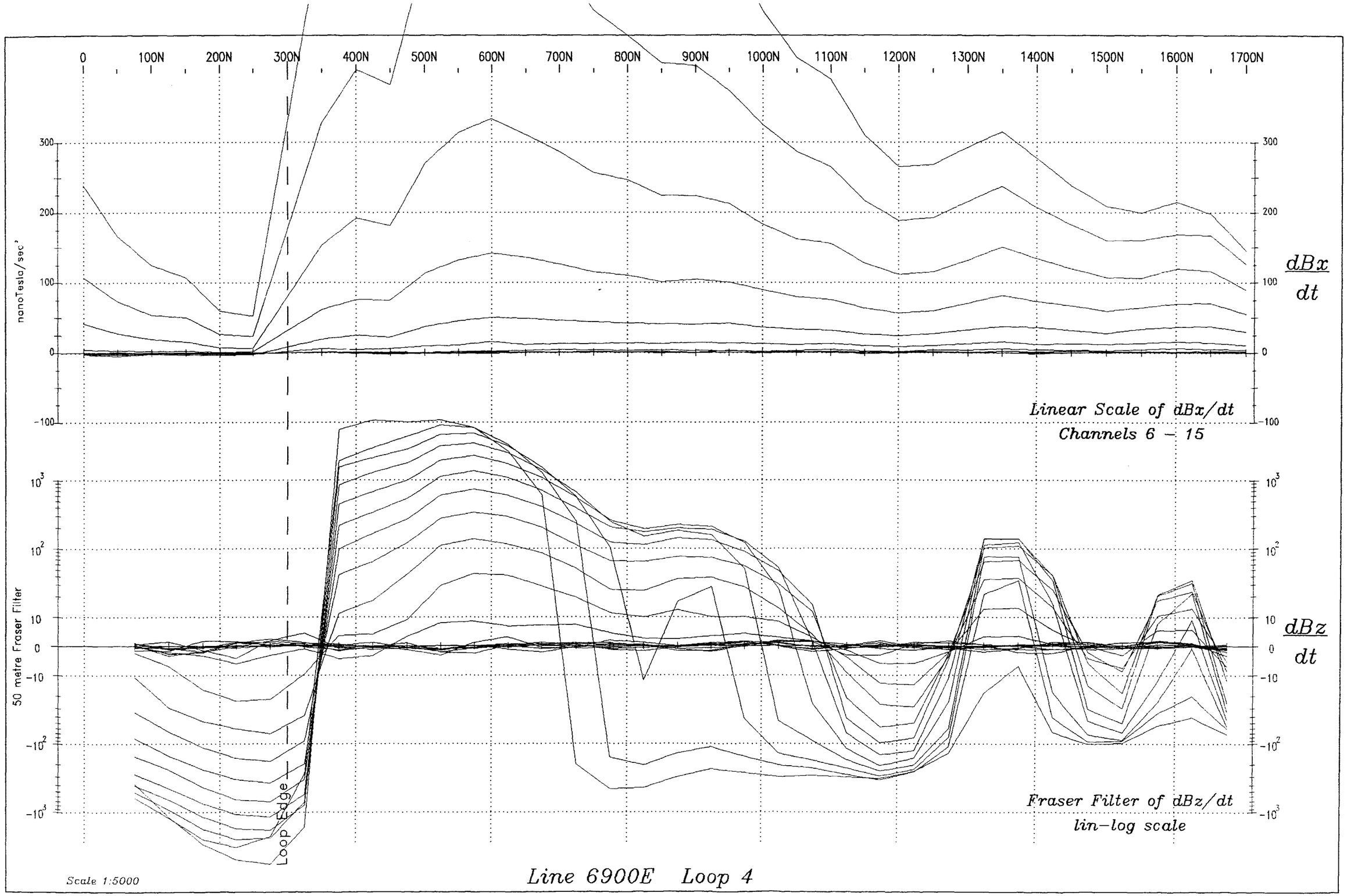
Scale 1:5000

Line 6800E Loop 4



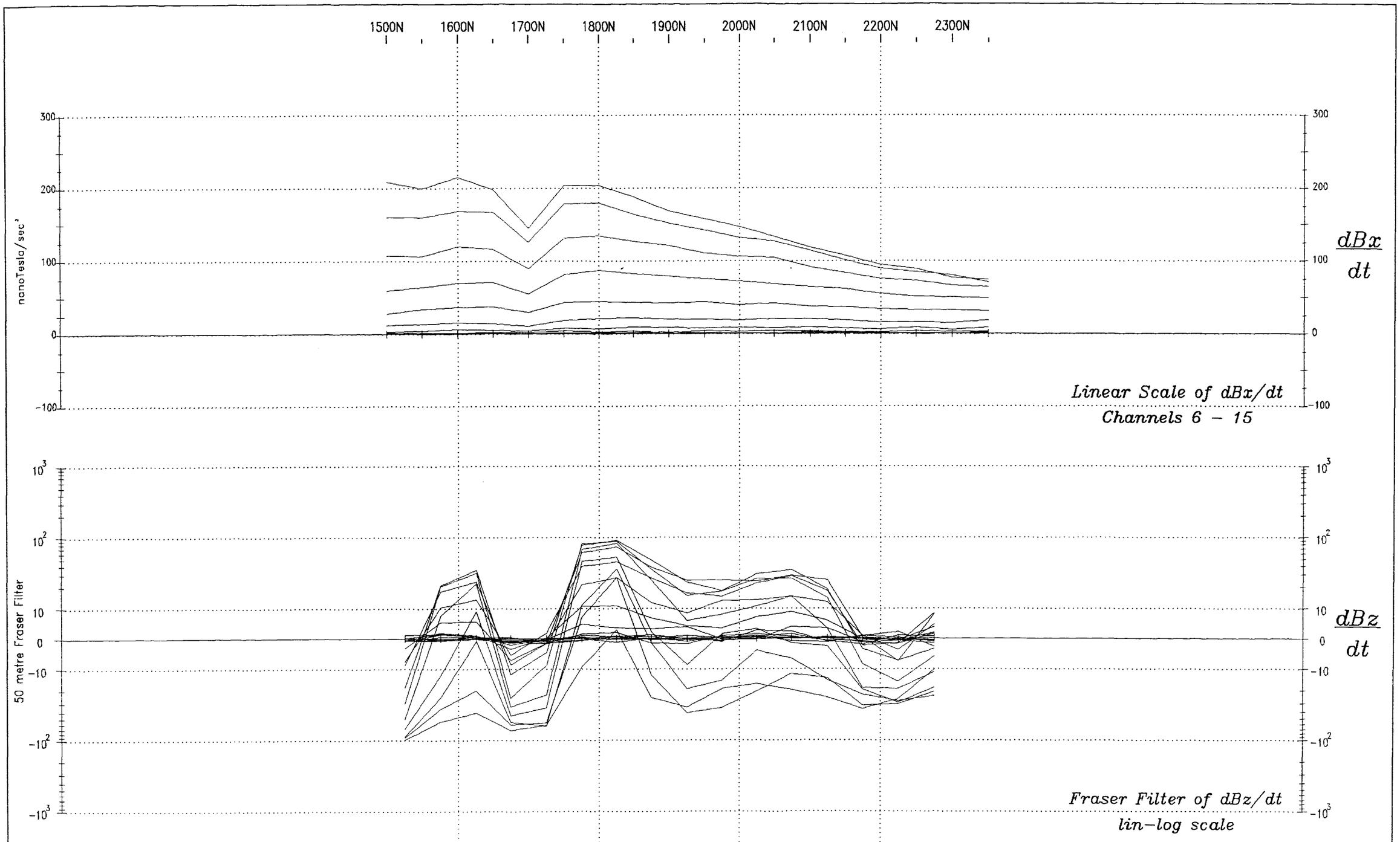
Scale 1:5000

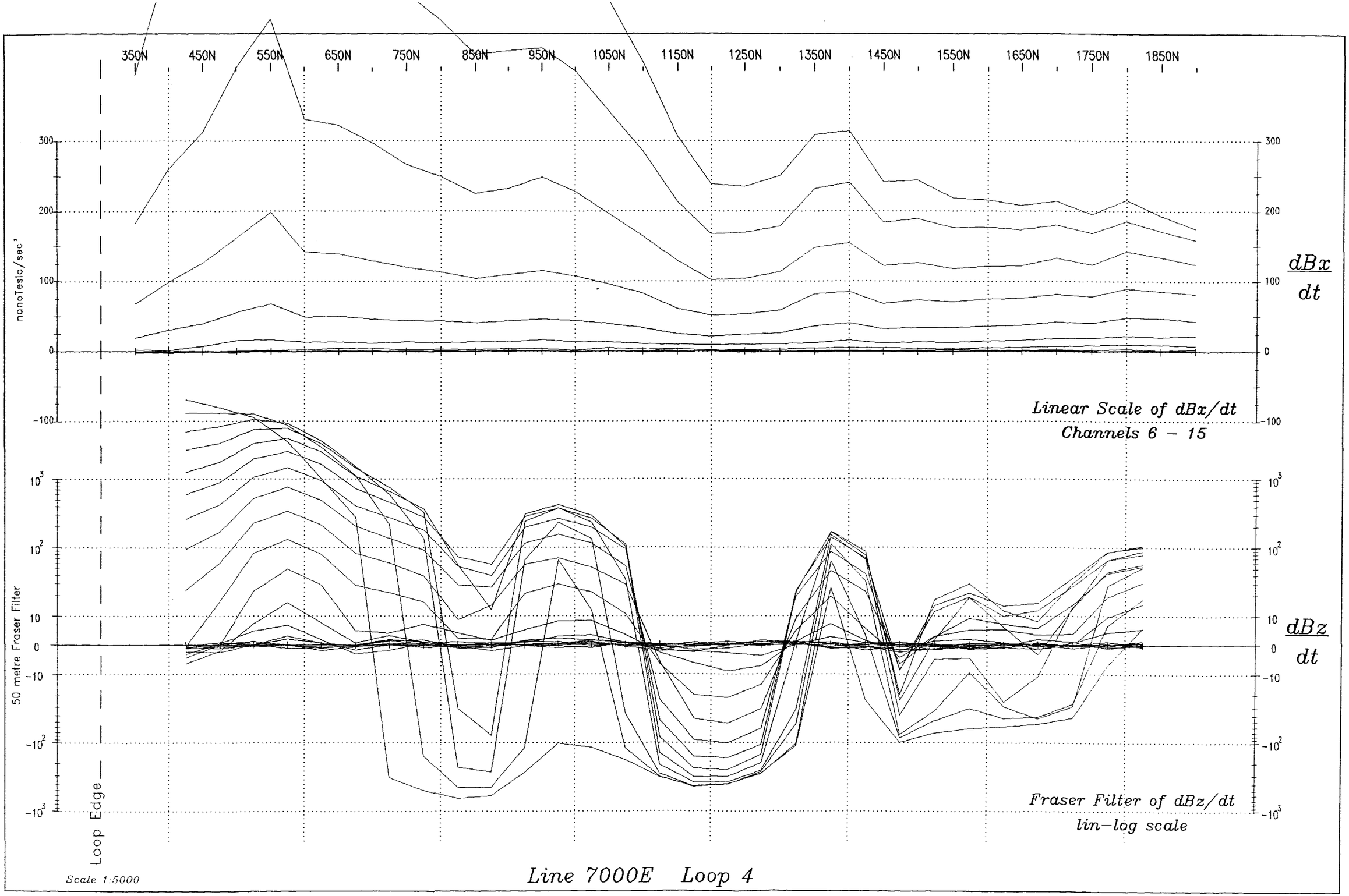
Line 6800E Loop 4



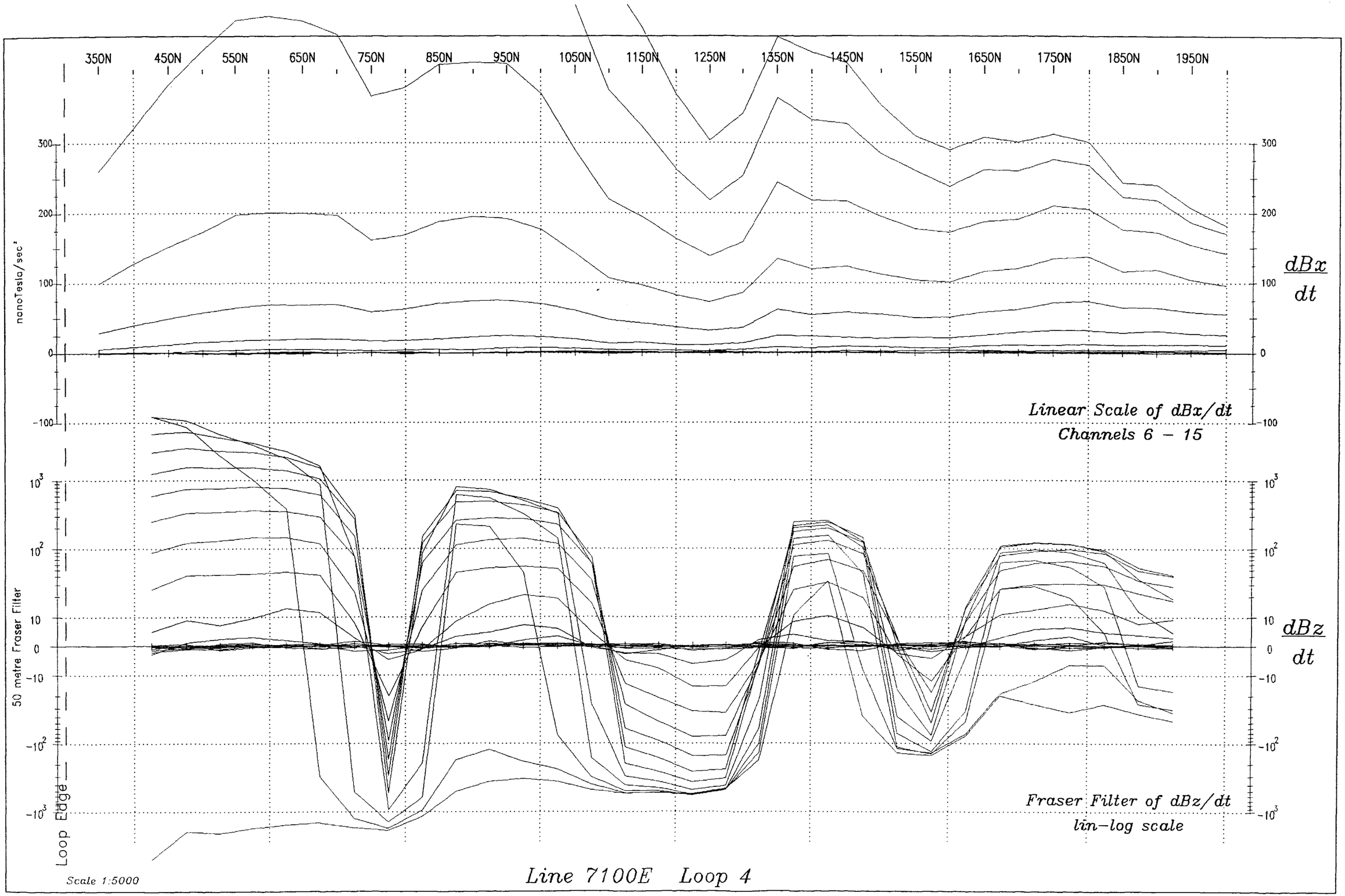
Scale 1:5000

Line 6900E Loop 4


1500N
1600N
1700N
1800N
1900N
2000N
2100N
2200N
2300N
300
200
100
0
-100
nanoTesla/sec²
dBx/dt
Linear Scale of dBx/dt
Channels 6 - 15
10³
10²
10
0
-10
-10²
-10³
50 metre Fraser Filter
dBz/dt
Fraser Filter of dBz/dt
lin-log scale
Scale 1:5000
Line 6900E Loop 4



Line 7000E Loop 4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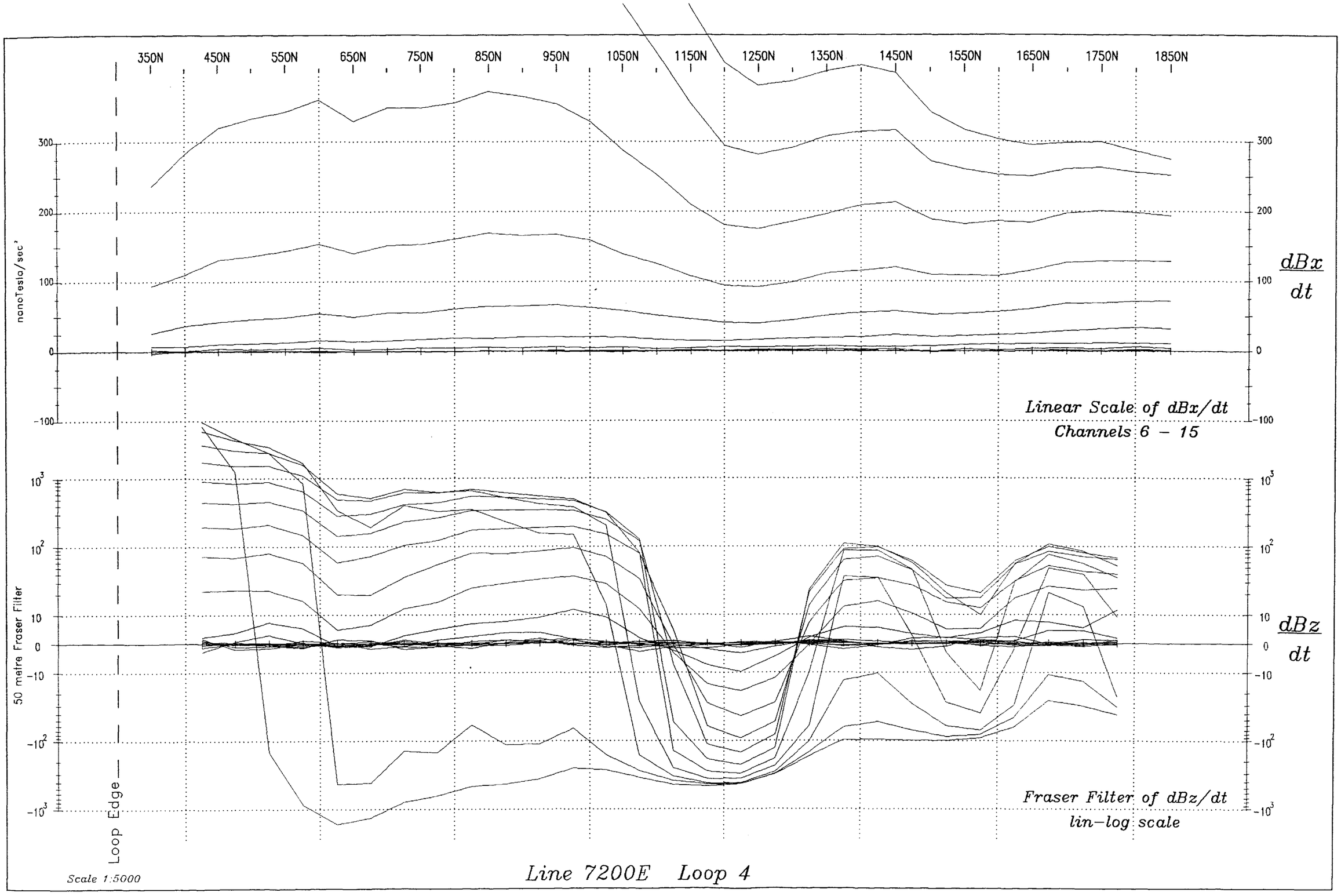
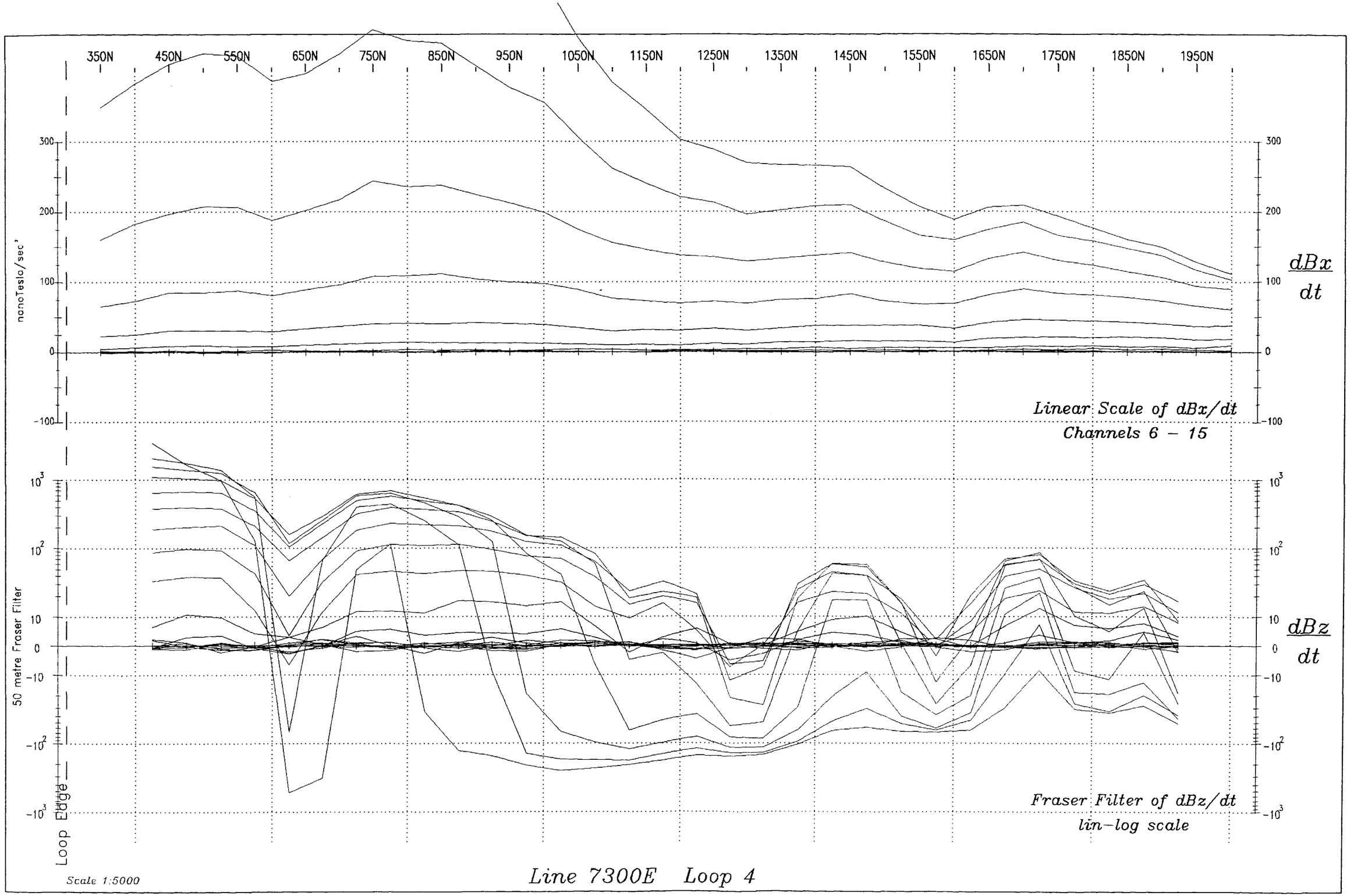
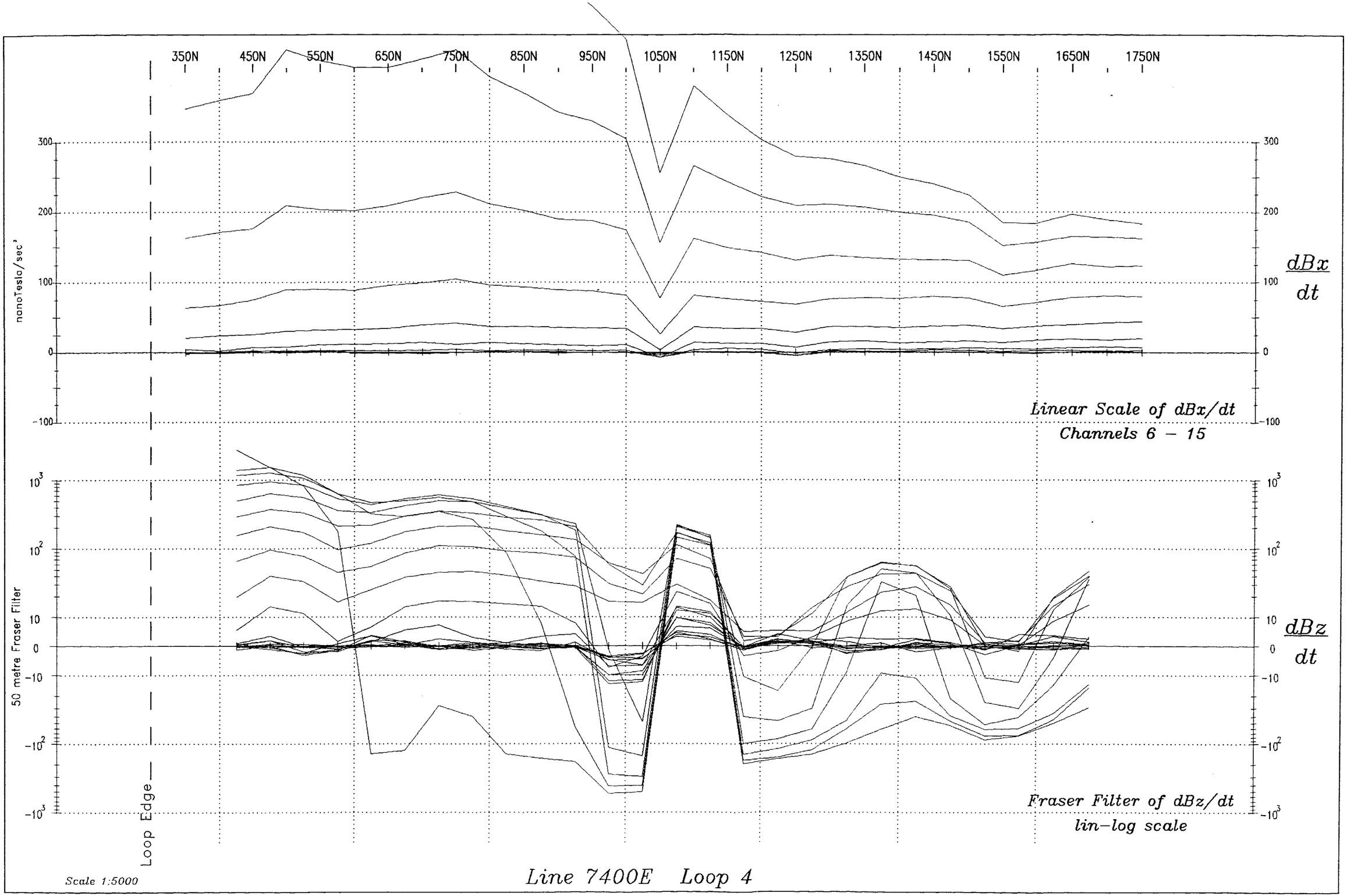
650N
750N
850N
950N
1050N
1150N
1250N
1350N
1450N
1550N
1650N
1750N
1850N
1950N
nanoTesla/sec²
300
200
100
0
-100
dBx/dt
Linear Scale of dBx/dt
Channels 6 – 15
50 metre Fraser Filter
10³
10²
10
0
-10
-10²
-10³
dBz/dt
Fraser Filter of dBz/dt
lin–log scale
Loop Edge
Scale 1:5000
Line 7100E Loop 4



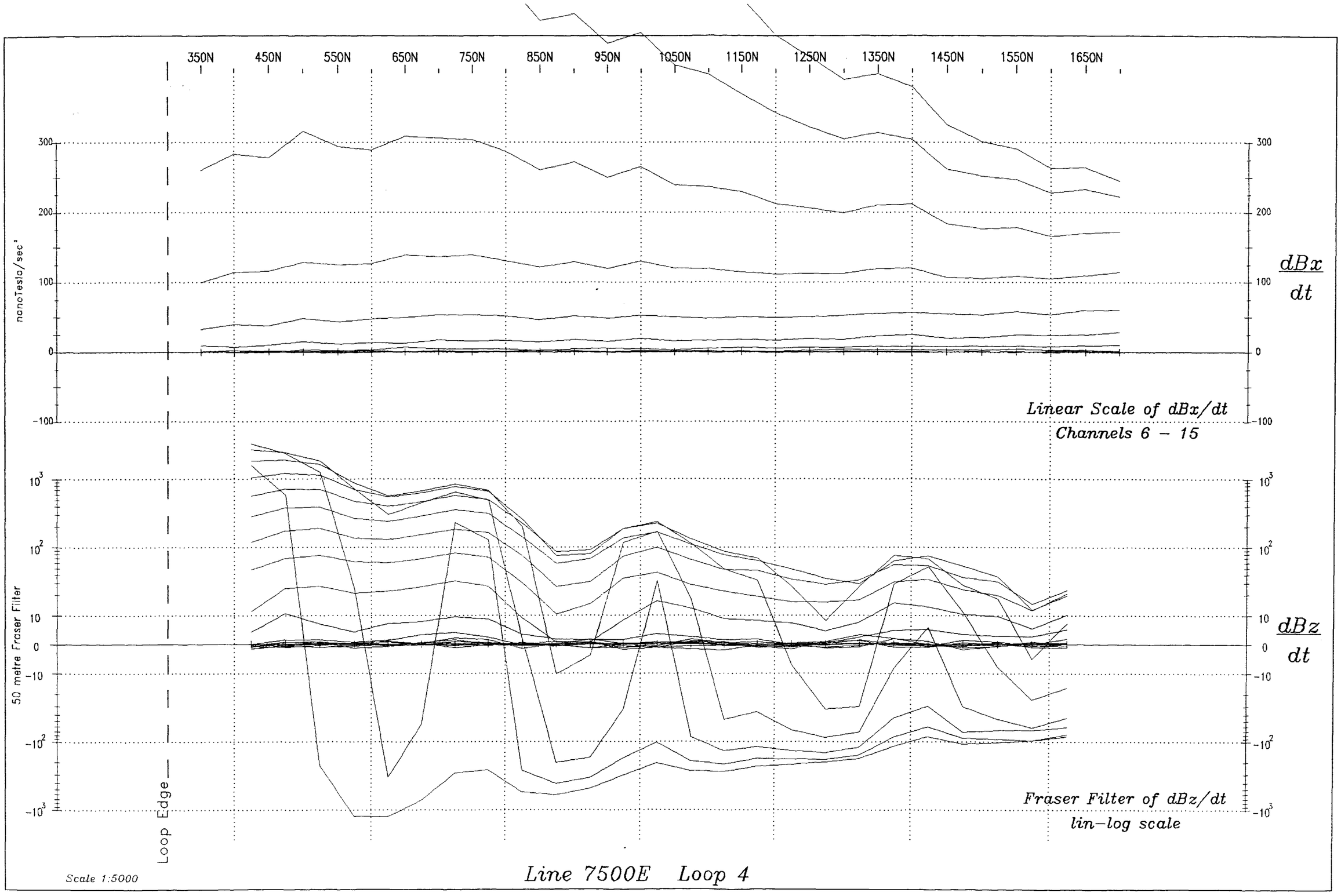
Line 7200E Loop 4



Line 7300E Loop 4



Line 7400E Loop 4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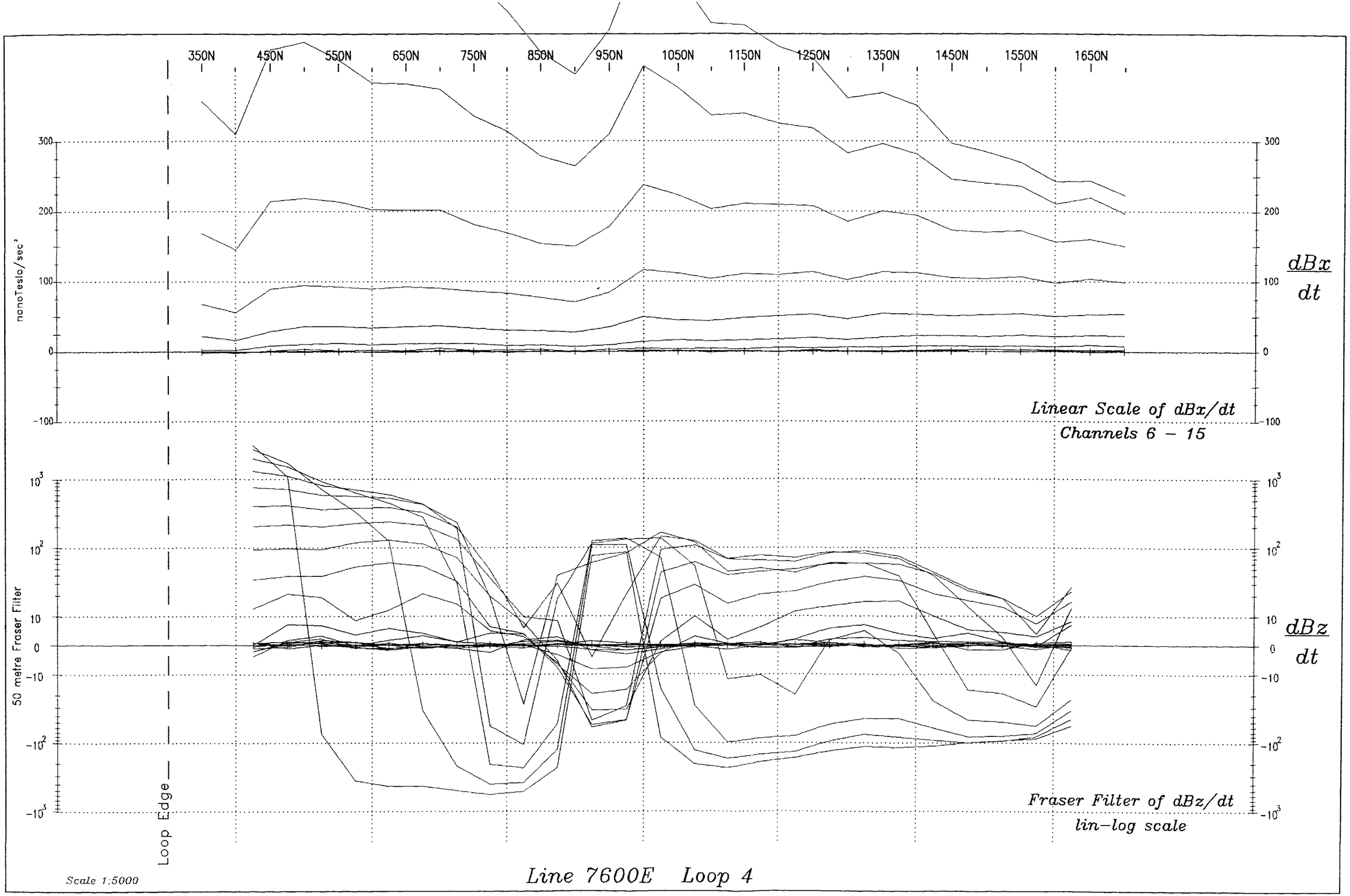
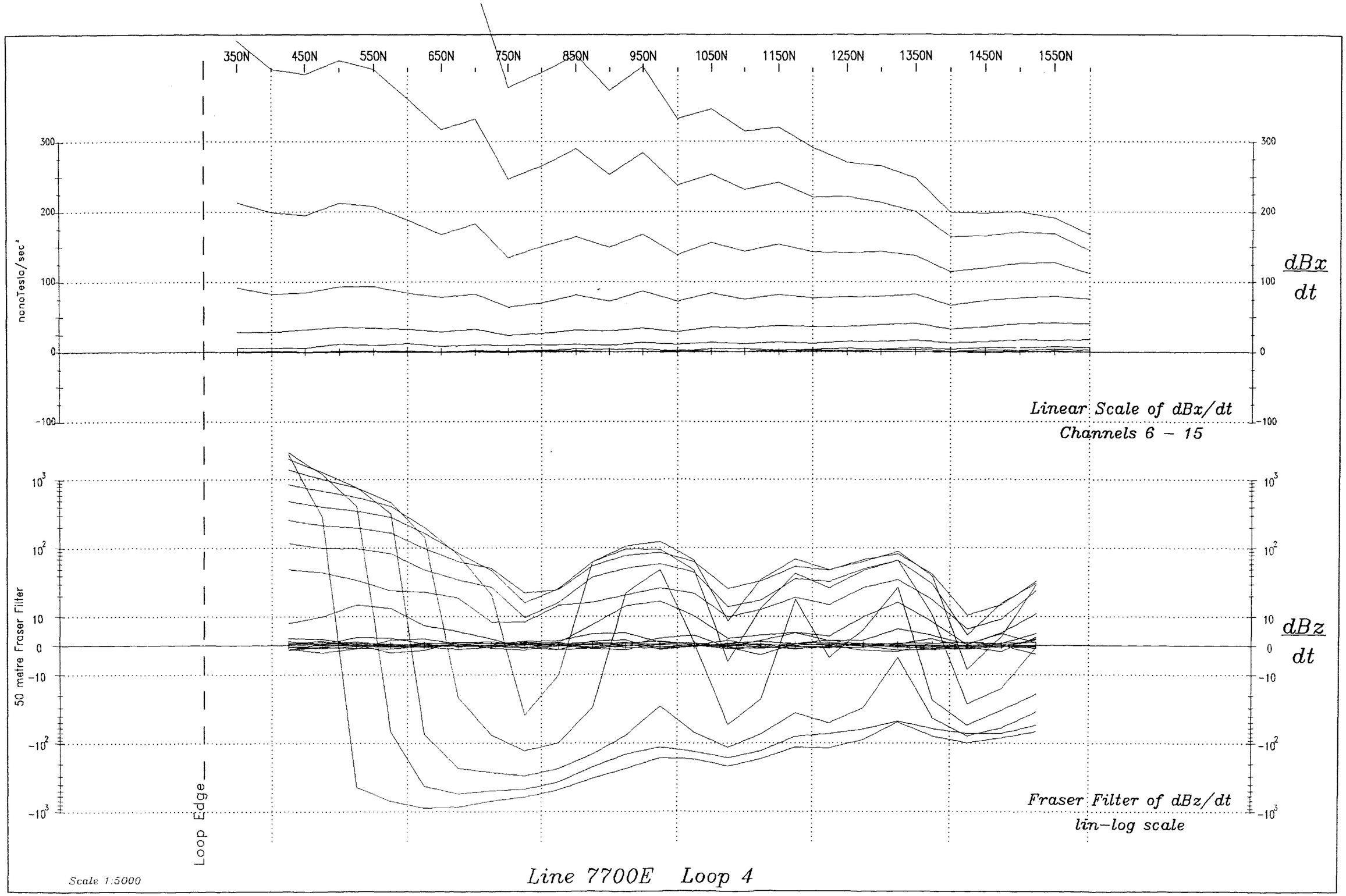
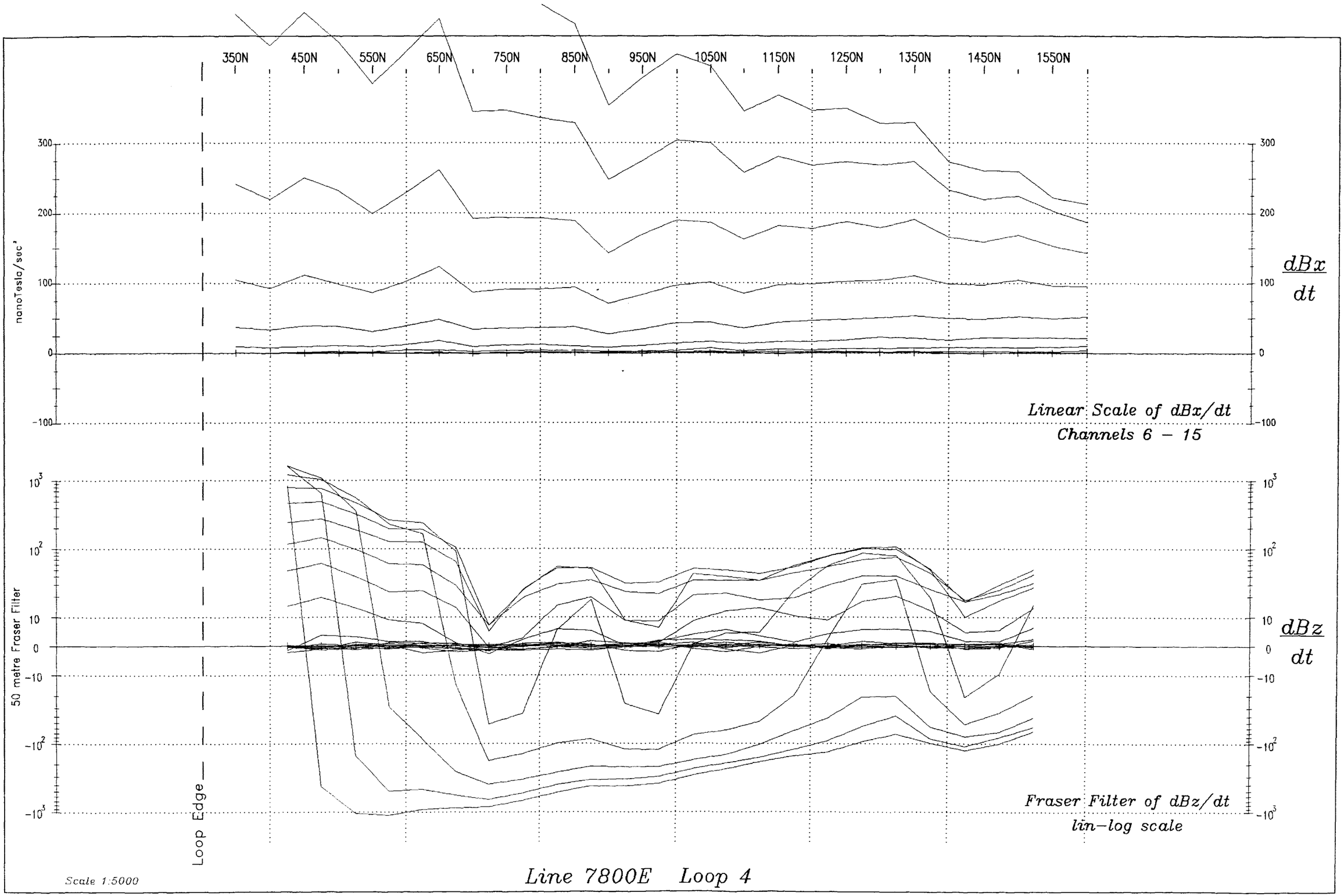
450N
550N
650N
750N
850N
950N
1050N
1150N
1250N
1350N
1450N
1550N
1650N
300
200
100
0
-100
nanoTesla/sec²
dBx/dt
Linear Scale of dBx/dt
Channels 6 – 15
10³
10²
10
0
-10
-10²
-10³
50 metre Fraser Filter
dBz/dt
Fraser Filter of dBz/dt
lin–log scale
Loop Edge
Scale 1:5000
Line 7500E Loop 4



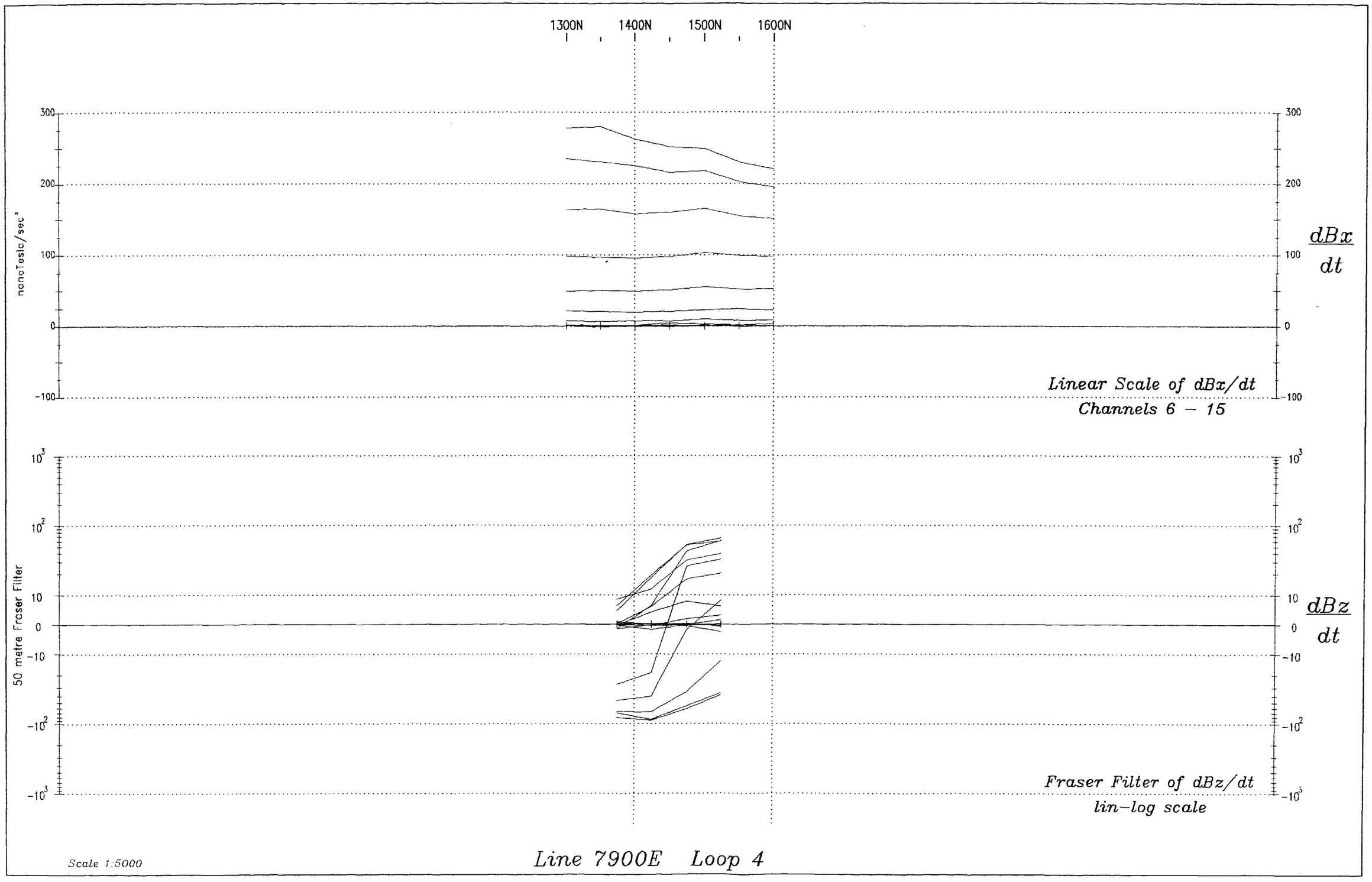
Line 7600E Loop 4



Line 7700E Loop 4

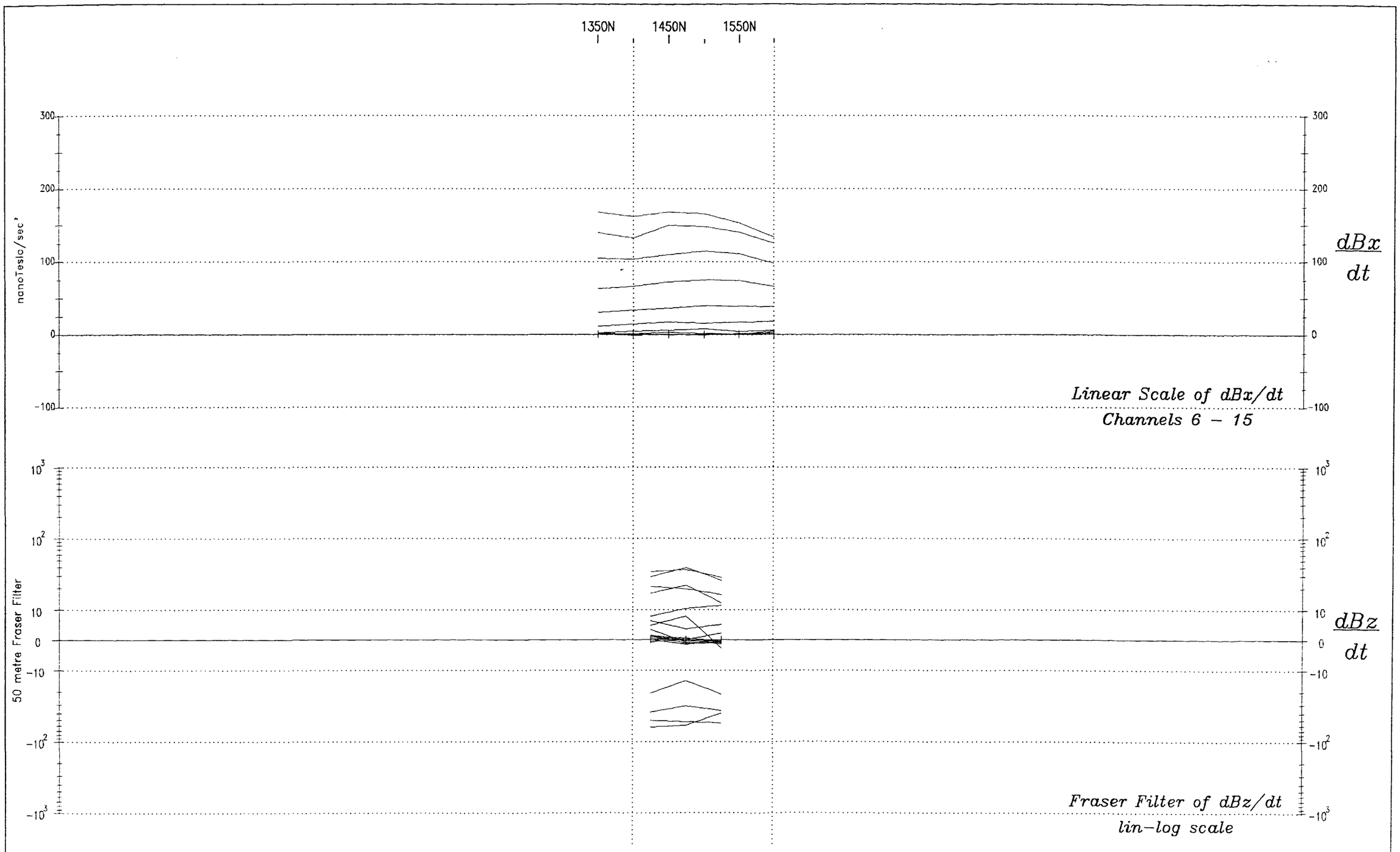


Line 7800E Loop 4



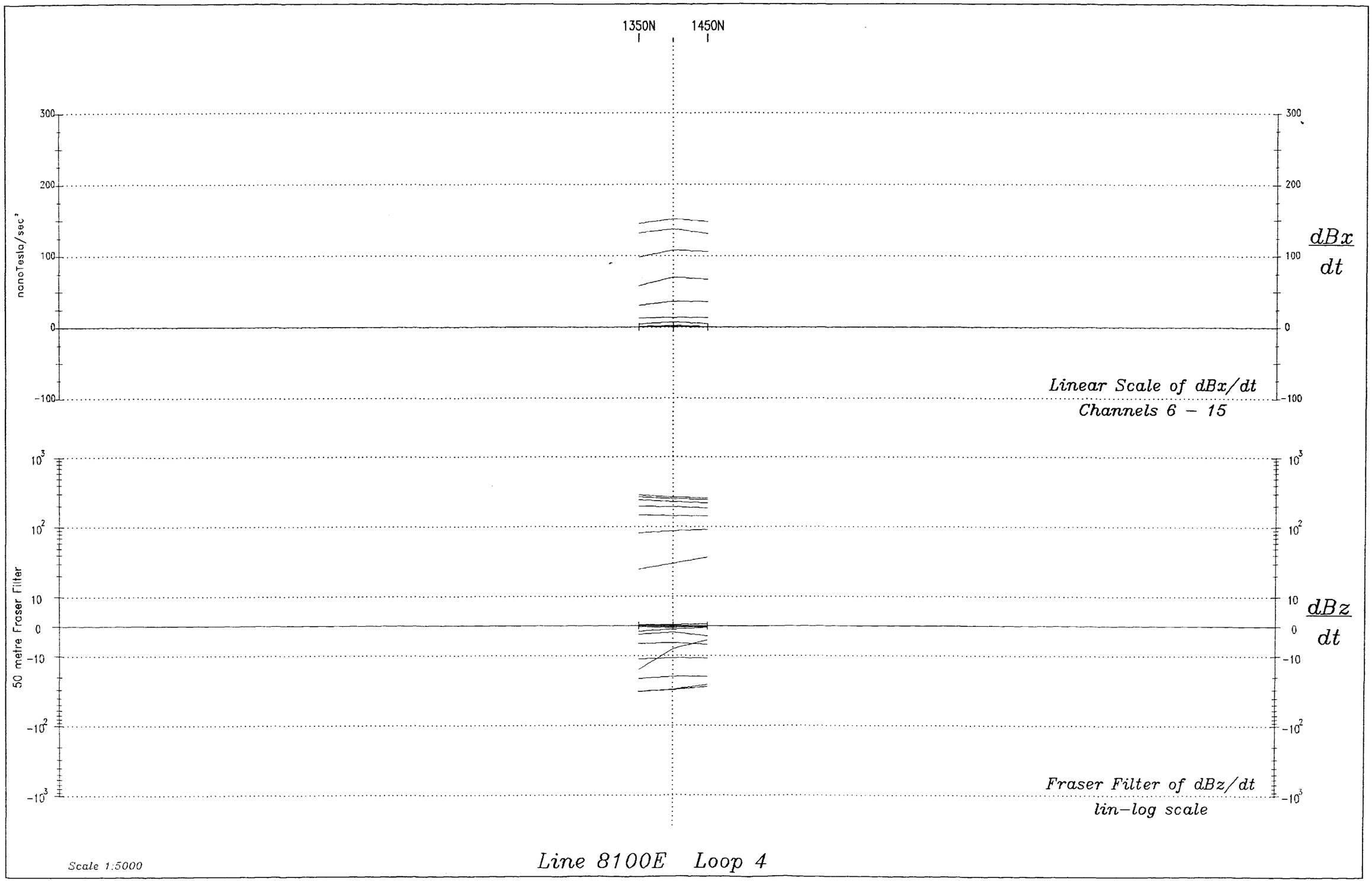
Scale 1:5000

Line 7900E Loop 4



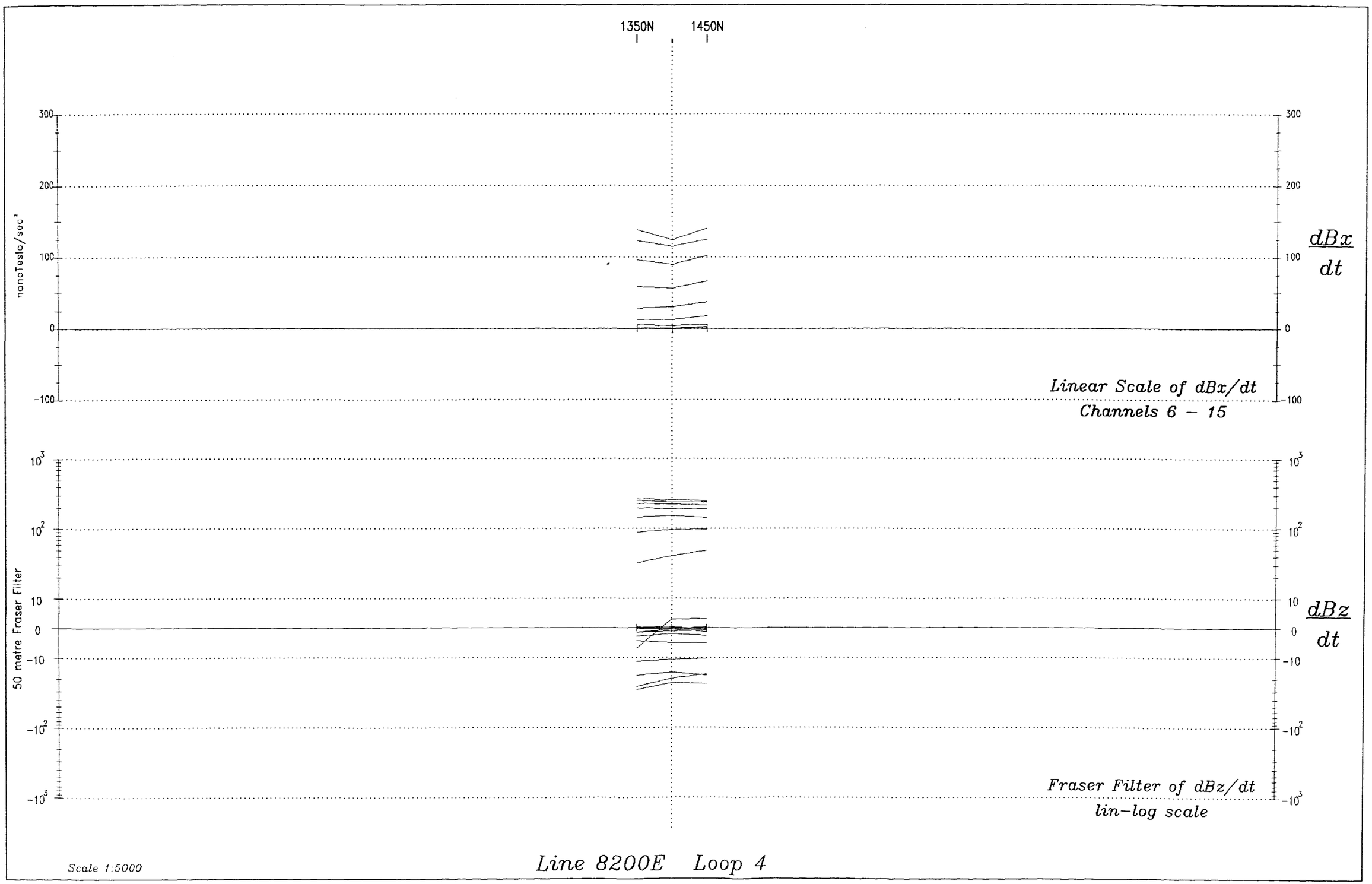
Scale 1:5000

Line 8000E Loop 4



Scale 1:5000

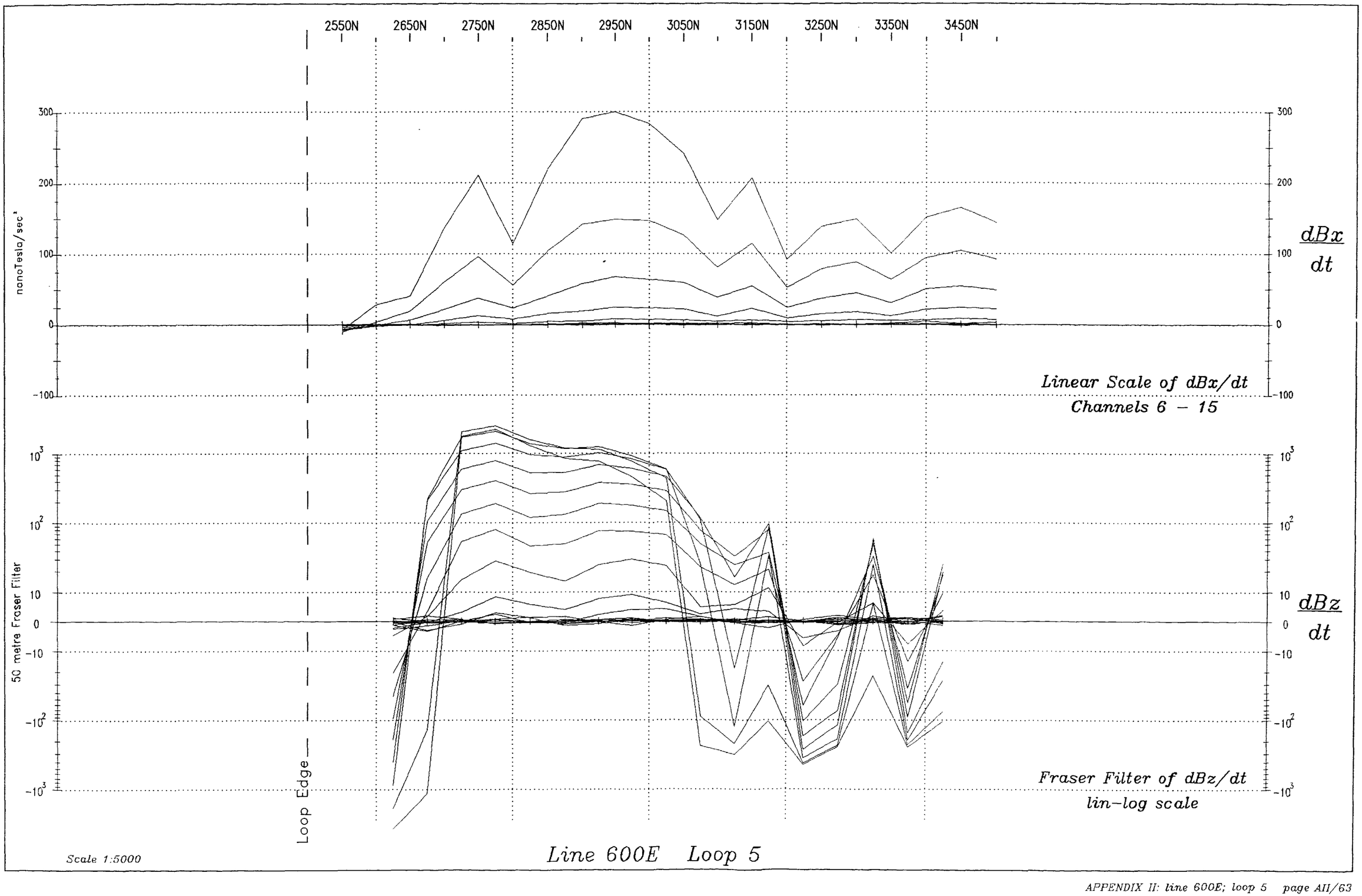
Line 8100E Loop 4



Scale 1:5000

Line 8200E Loop 4

Grid F-G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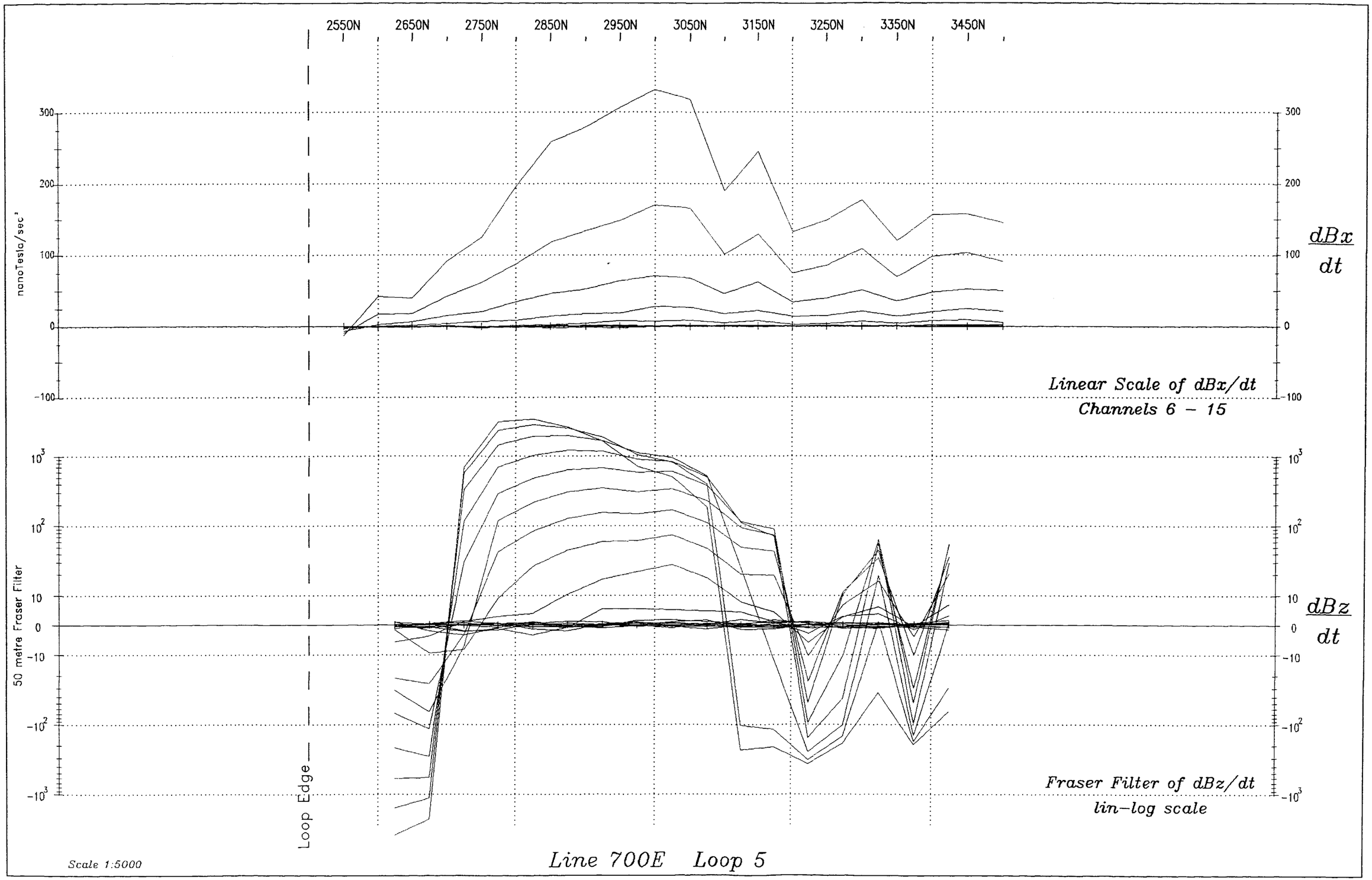
2650N
2750N
2850N
2950N
3050N
3150N
3250N
3350N
3450N
300
200
100
0
-100
nanoTesla/sec
dBx/dt
Linear Scale of dBx/dt
Channels 6 - 15
10^3
10^2
10
0
-10
-10^2
-10^3
50 metre Fraser Filter
dBz/dt
Fraser Filter of dBz/dt
lin-log scale
Loop Edge
Scale 1:5000
Line 600E Loop 5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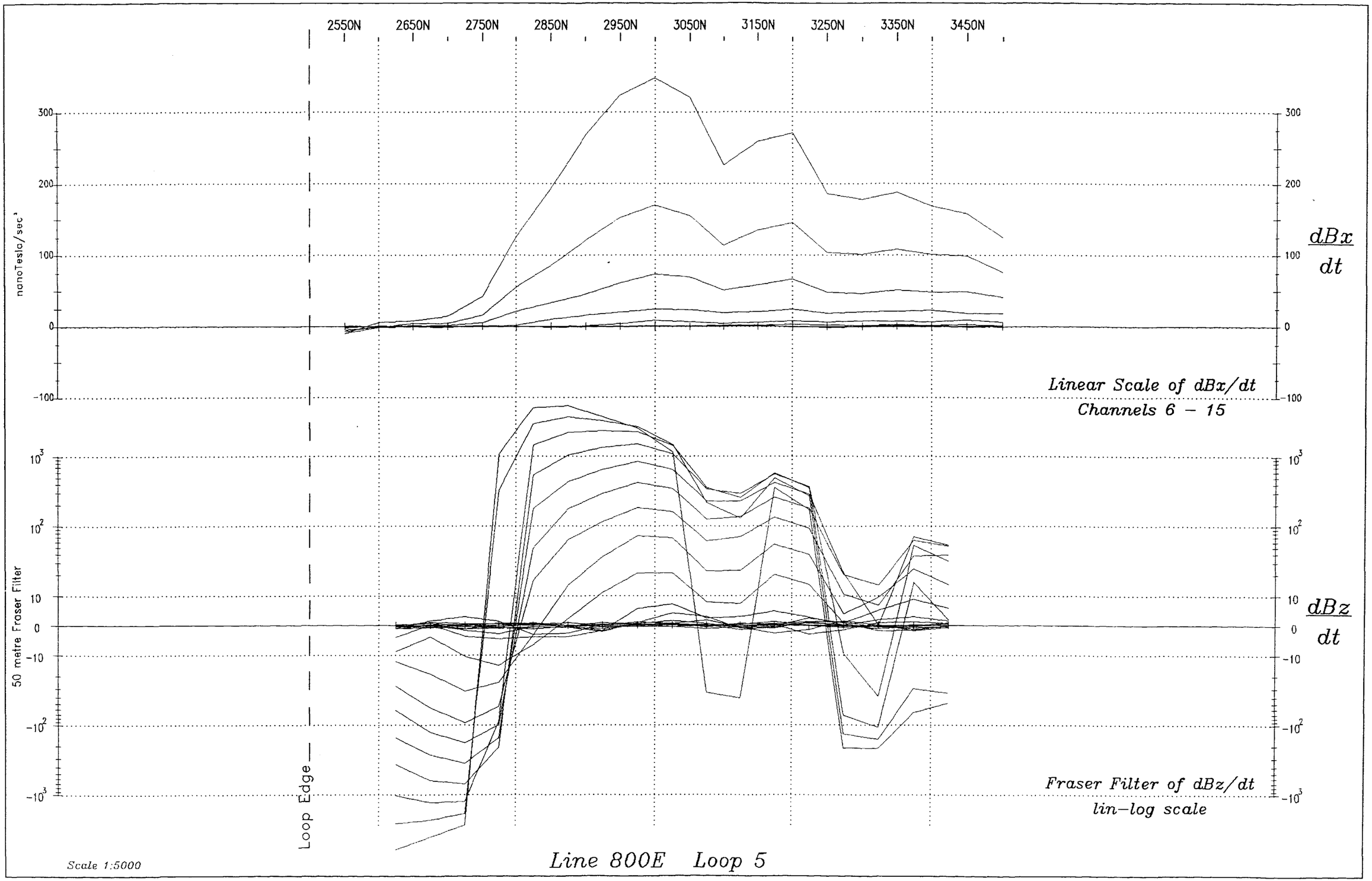
2750N
2850N
2950N
3050N
3150N
3250N
3350N
3450N
nanoTesla/sec²
300
200
100
0
-100
dBx/dt
Linear Scale of dBx/dt
Channels 6 - 15
50 metre Fraser Filter
10³
10²
10
0
-10
-10²
-10³
Loop Edge
dBz/dt
Fraser Filter of dBz/dt
lin-log scale
Scale 1:5000
Line 700E Loop 5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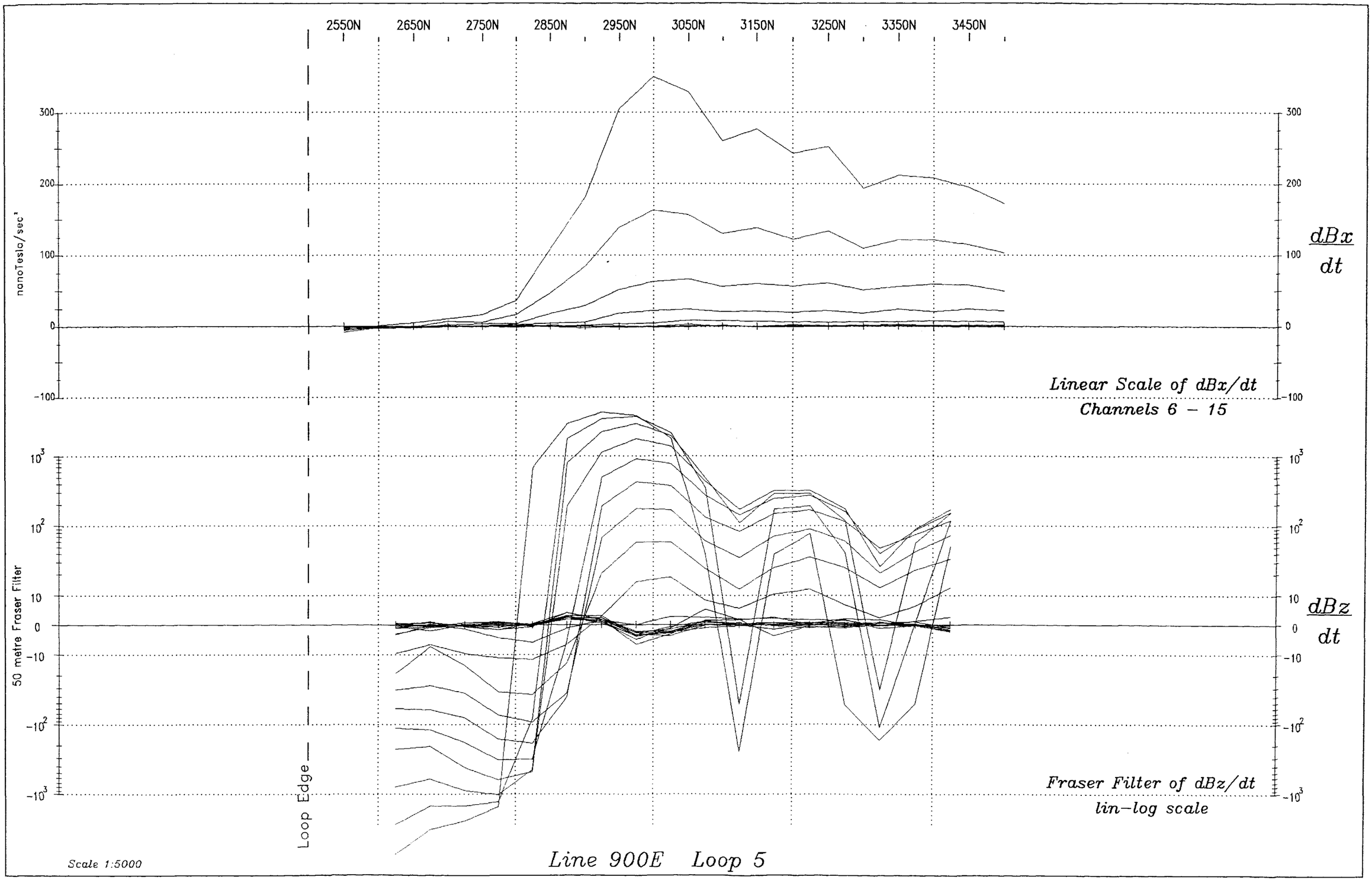
3150N
3250N
3350N
3450N
300
200
100
0
-100
nanoTesla/sec
dBx/dt
Linear Scale of dBx/dt
Channels 6 - 15
10^3
10^2
10
0
-10
-10^2
-10^3
50 metre Fraser Filter
dBz/dt
Fraser Filter of dBz/dt
lin-log scale
Loop Edge
Scale 1:5000
Line 800E Loop 5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2750N
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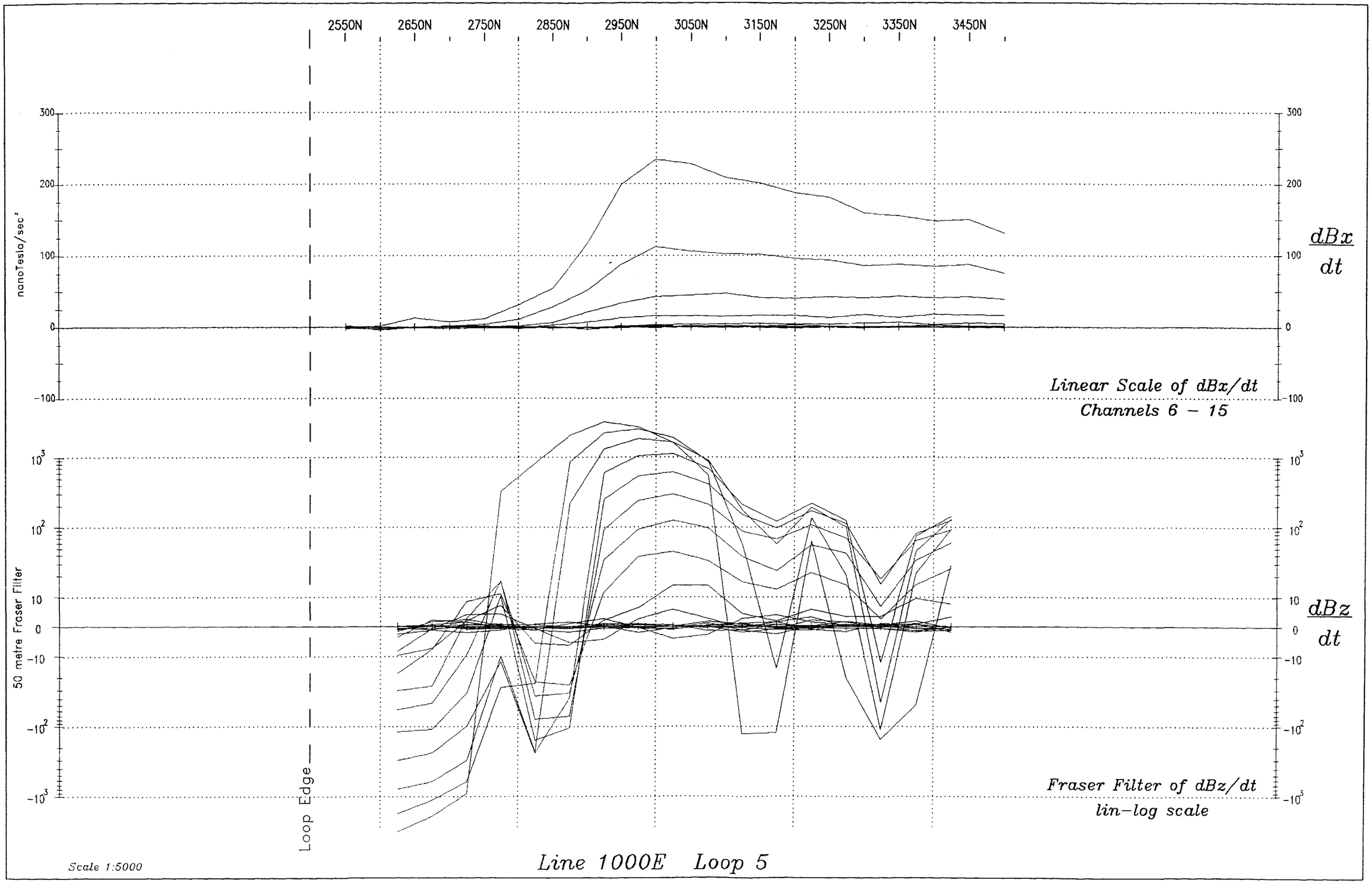
3050N
3150N
3250N
3350N
3450N
nanoTesla/sec²
300
200
100
0
-100
dBx/dt
Linear Scale of dBx/dt
Channels 6 - 15
10³
10²
10
0
-10
-10²
-10³
50 metre Fraser Filter
dBz/dt
Fraser Filter of dBz/dt
lin-log scale
Loop Edge
Scale 1:5000
Line 900E Loop 5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2950N
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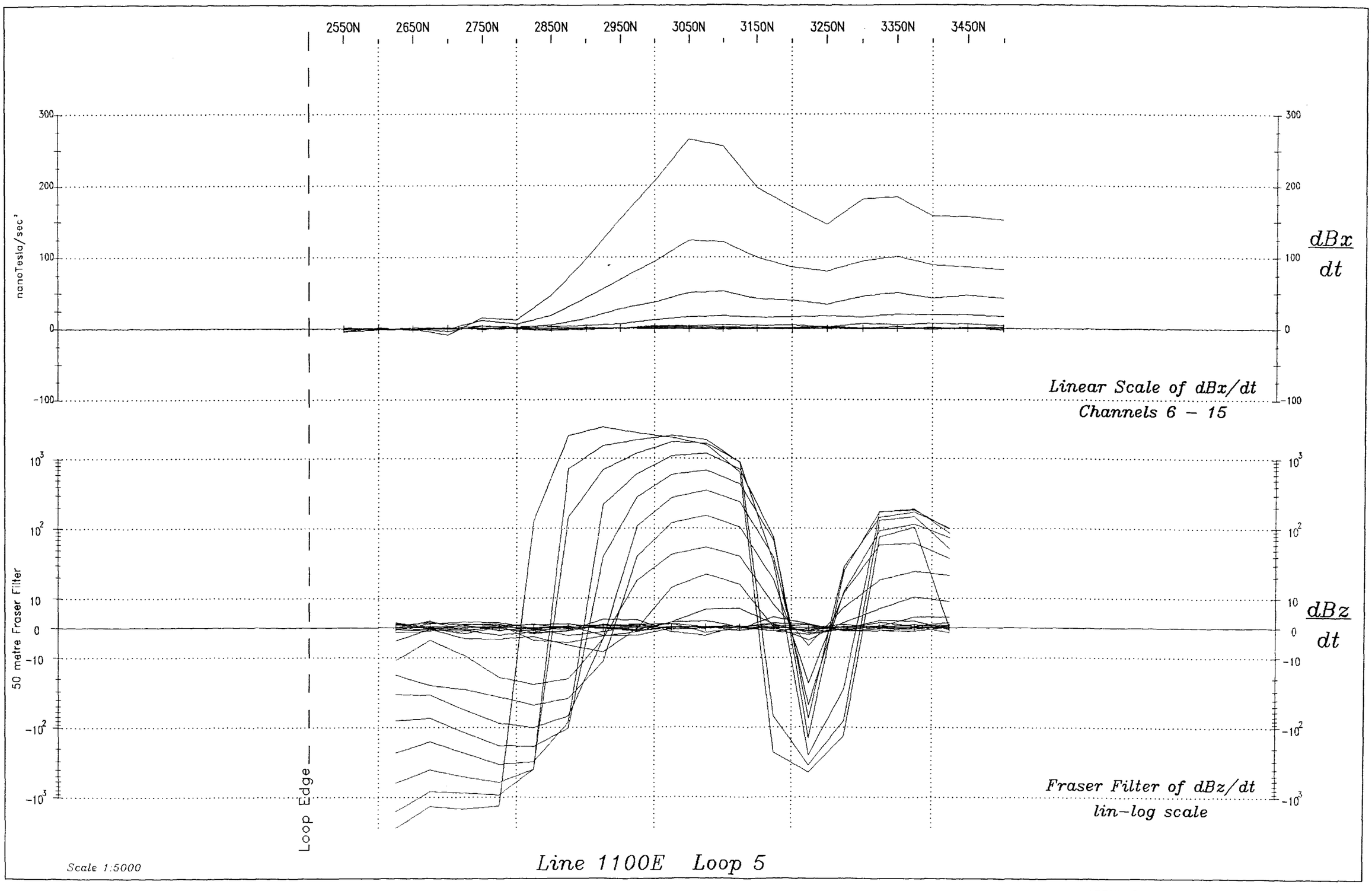
3150N
3250N
3350N
3450N
300
200
100
0
-100
nanoTesla/sec²
dBx/dt
Linear Scale of dBx/dt
Channels 6 – 15
10³
10²
10
0
-10
-10²
-10³
50 metre Fraser Filter
dBz/dt
Loop Edge
Fraser Filter of dBz/dt
lin–log scale
Scale 1:5000
Line 1000E Loop 5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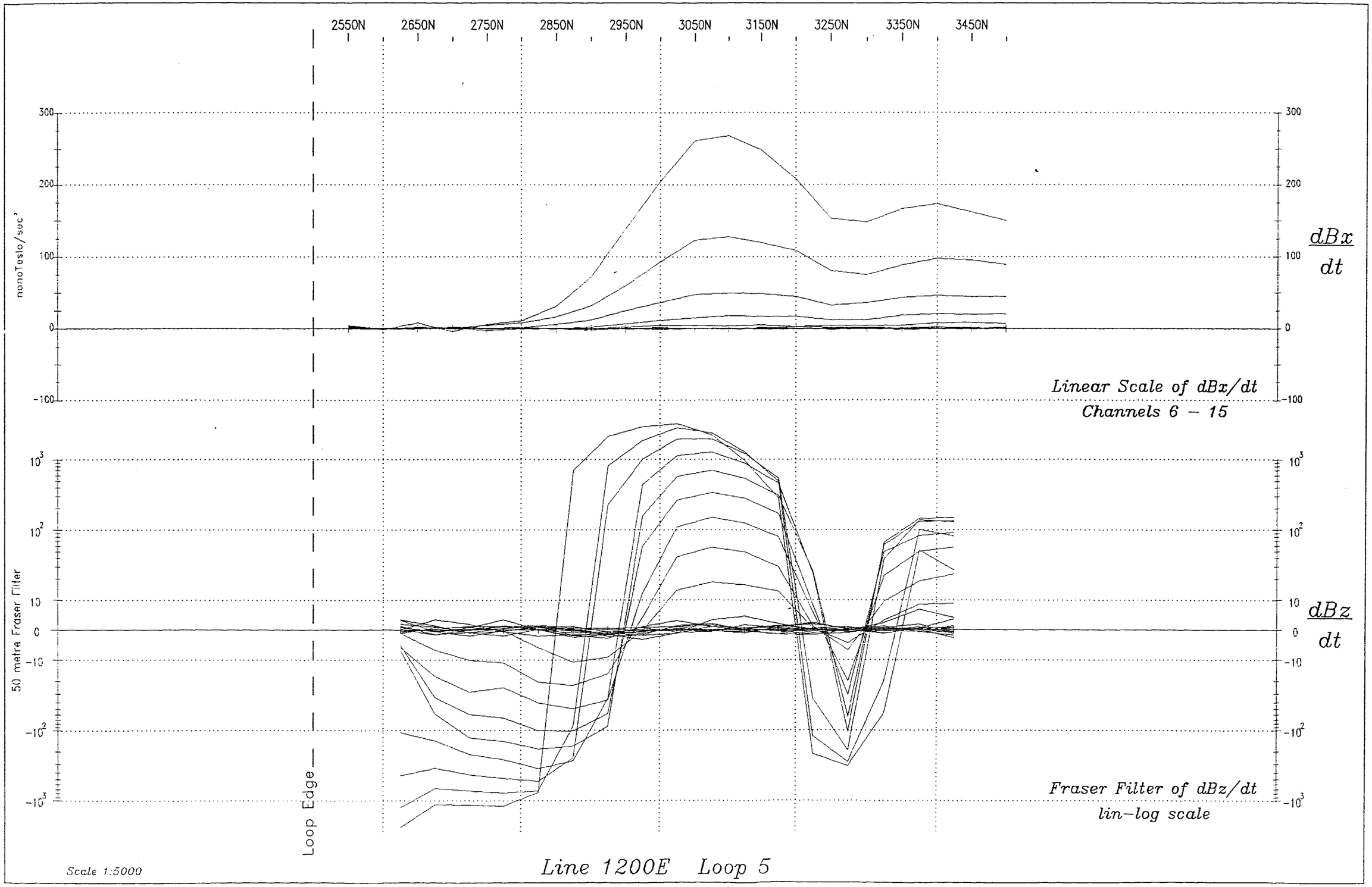
300
200
100
0
-100
nanoTesla/sec
dBx/dt
Linear Scale of dBx/dt
Channels 6 - 15
10^3
10^2
10
0
-10
-10^2
-10^3
50 metre Fraser Filter
Loop Edge
dBz/dt
Fraser Filter of dBz/dt
lin-log scale
Scale 1:5000
Line 1100E Loop 5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3250N
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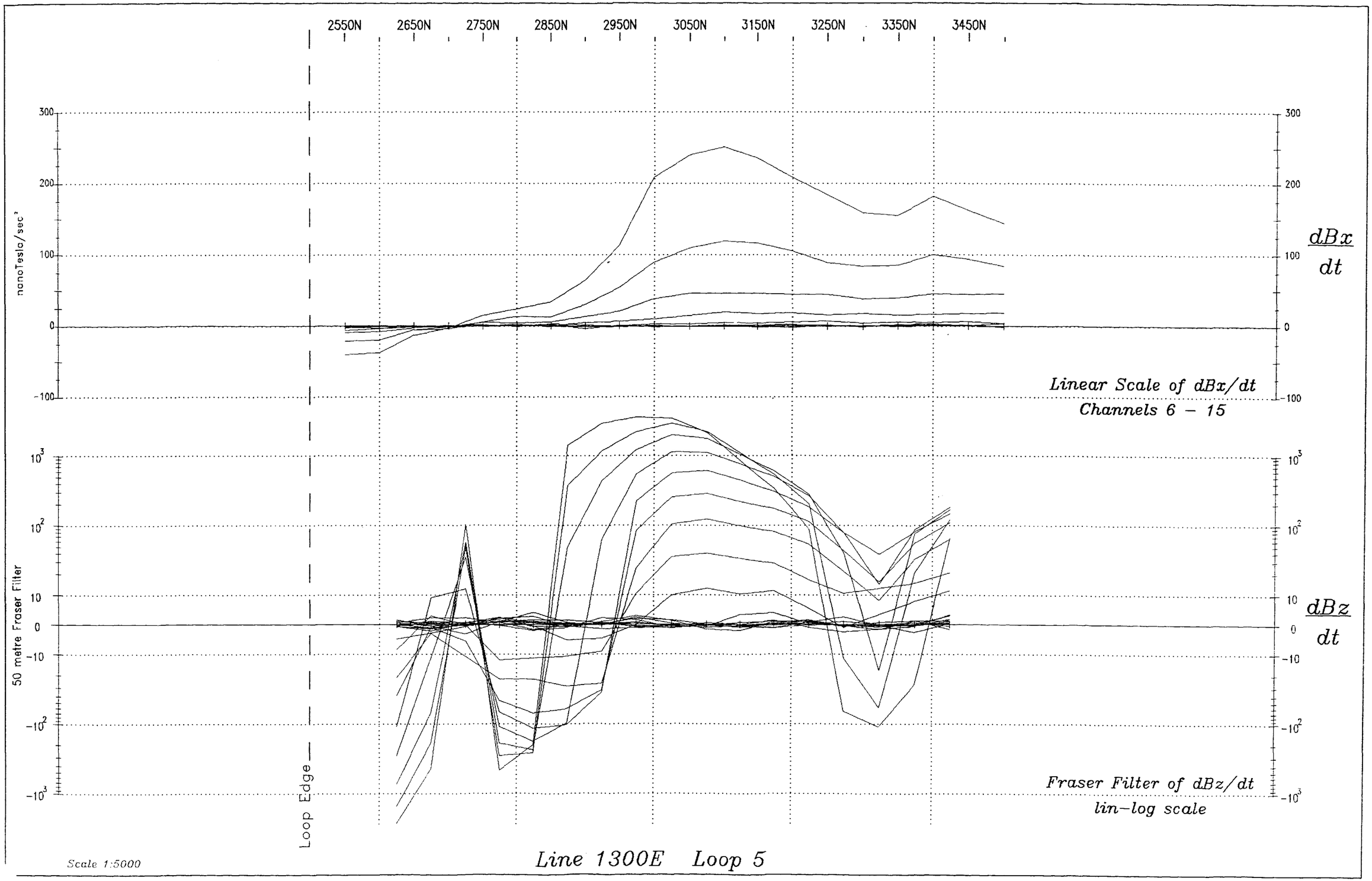
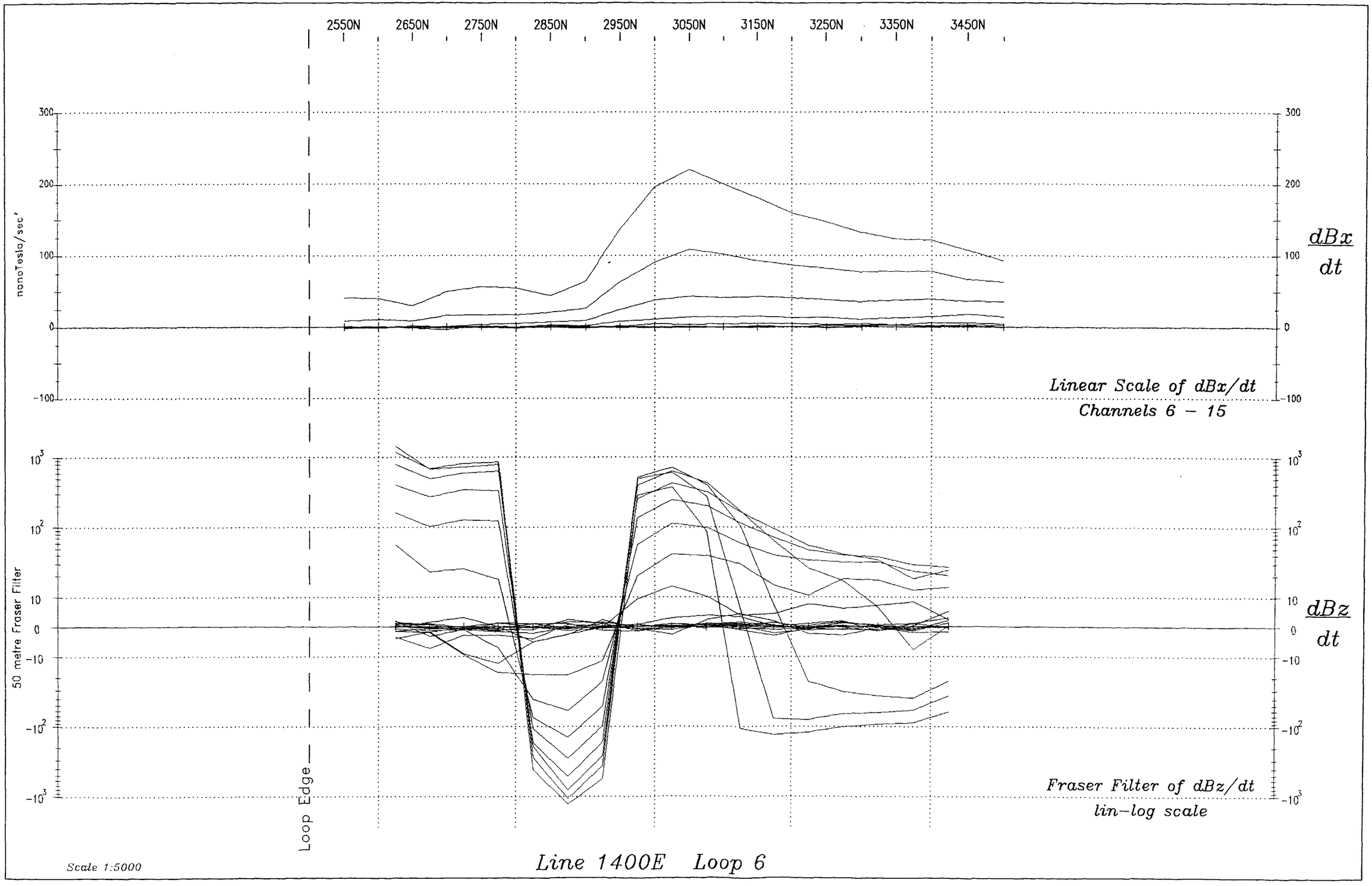
3450N
300
200
100
0
-100
nanoTesla/sec
dBx/dt
Linear Scale of dBx/dt
Channels 6 - 15
10^3
10^2
10
0
-10
-10^2
-10^3
50 metre Fraser Filter
dBz/dt
Fraser Filter of dBz/dt
lin-log scale
Loop Edge
Scale 1:5000
Line 1200E Loop 5

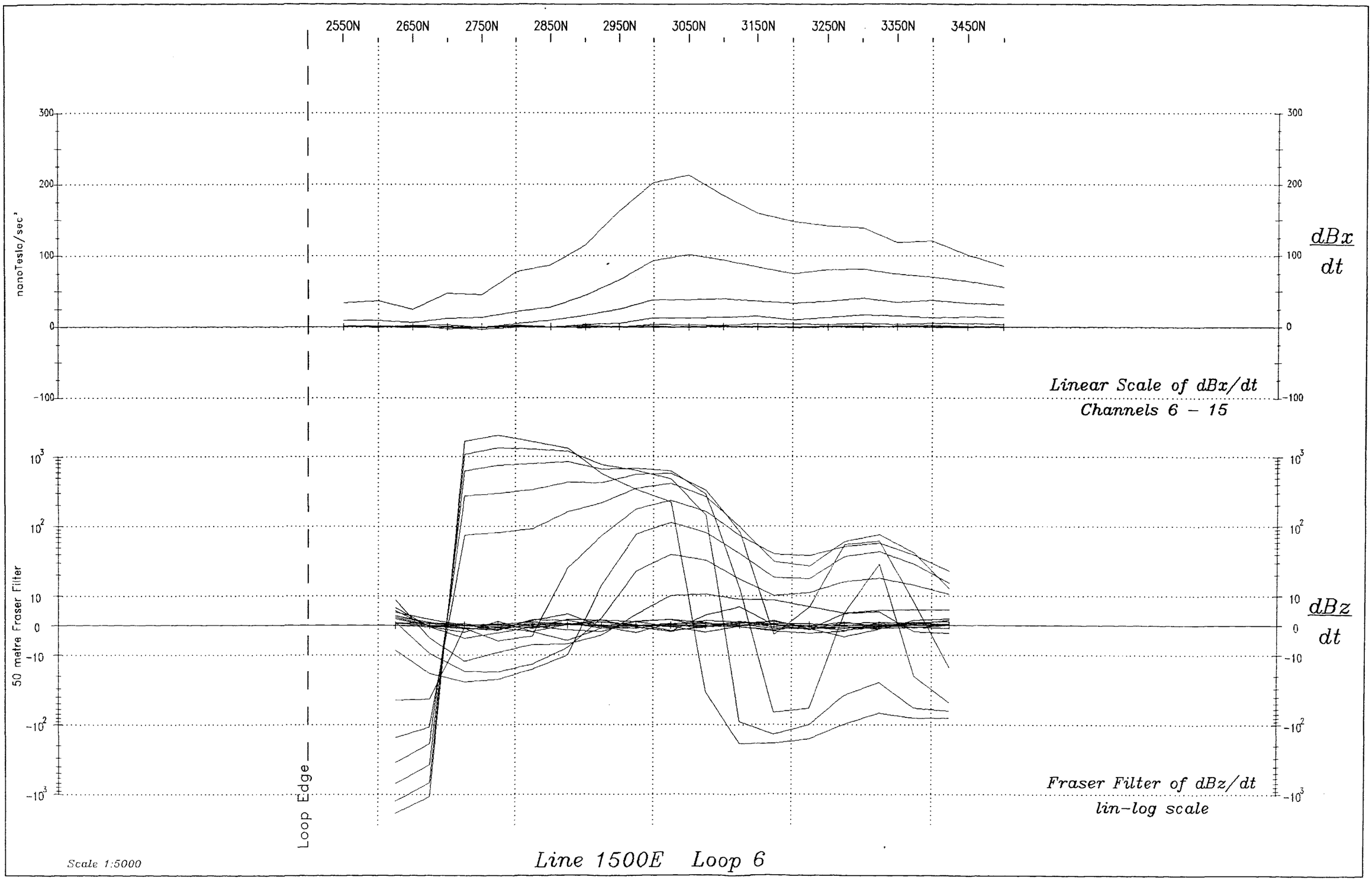


Scale 1:5000

Line 1300E Loop 5



Line 1400E Loop 6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2950N
3050N
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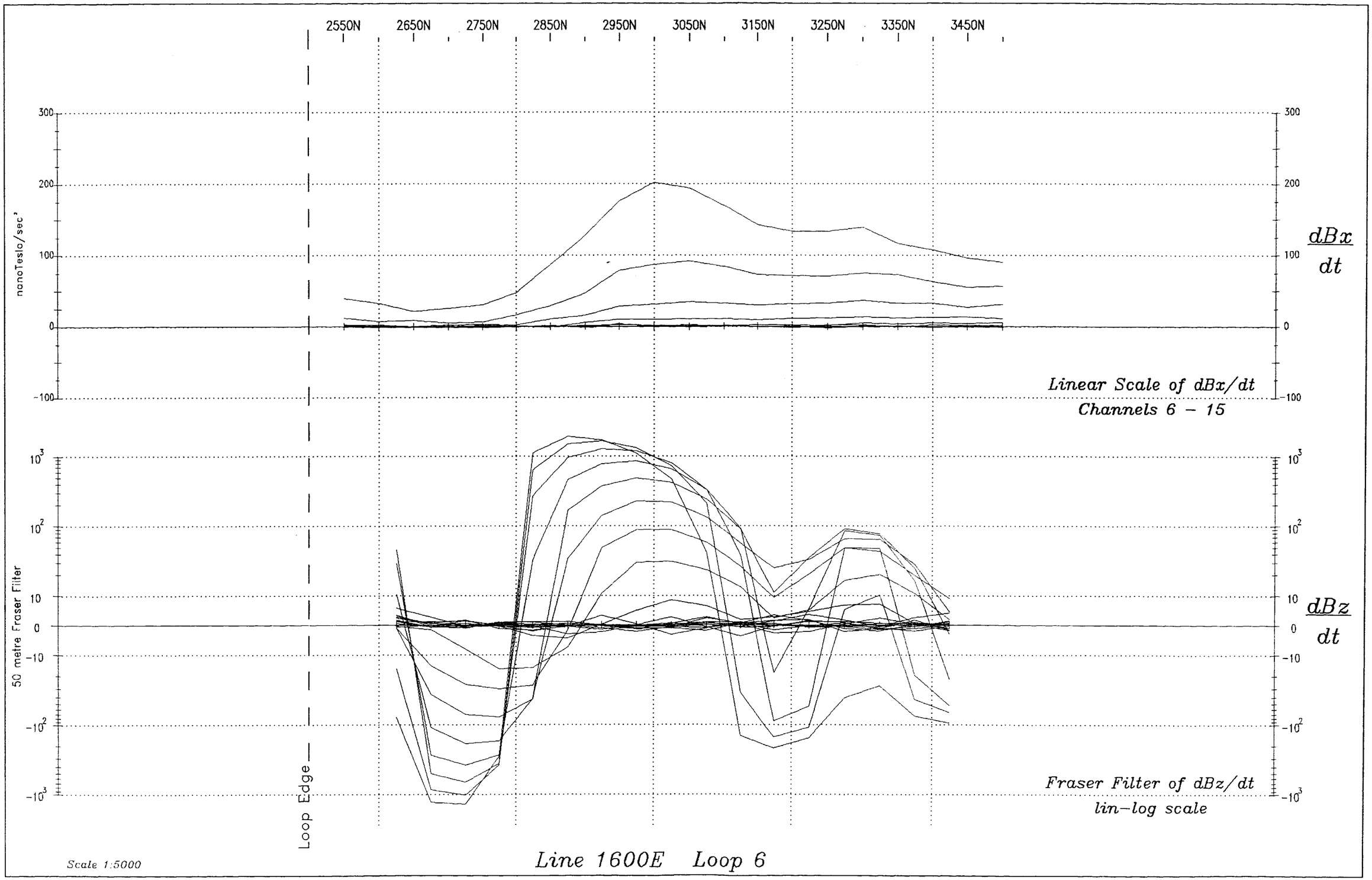
3250N
3350N
3450N
300
200
100
0
-100
nanoTesla/sec
dBx/dt
Linear Scale of dBx/dt
Channels 6 - 15
10^3
10^2
10
0
-10
-10^2
-10^3
50 metre Fraser Filter
dBz/dt
Fraser Filter of dBz/dt
lin-log scale
Loop Edge
Scale 1:5000
Line 1500E Loop 6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3050N
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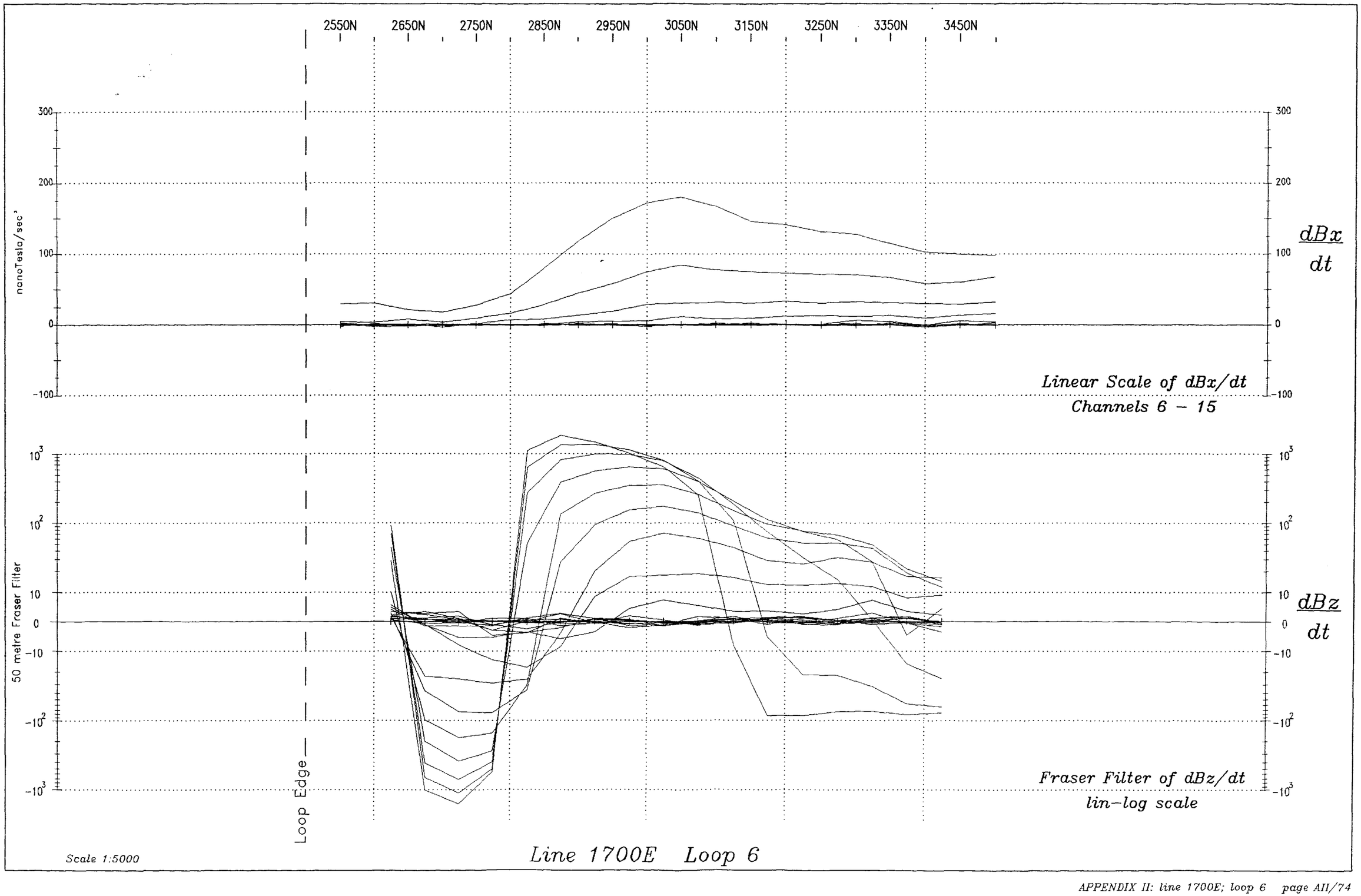
3250N
3350N
3450N
300
200
100
0
-100
nanoTesla/sec
dBx/dt
Linear Scale of dBx/dt
Channels 6 - 15
10^3
10^2
10
0
-10
-10^2
-10^3
50 metre Fraser Filter
dBz/dt
Fraser Filter of dBz/dt
lin-log scale
Loop Edge
Scale 1:5000
Line 1600E Loop 6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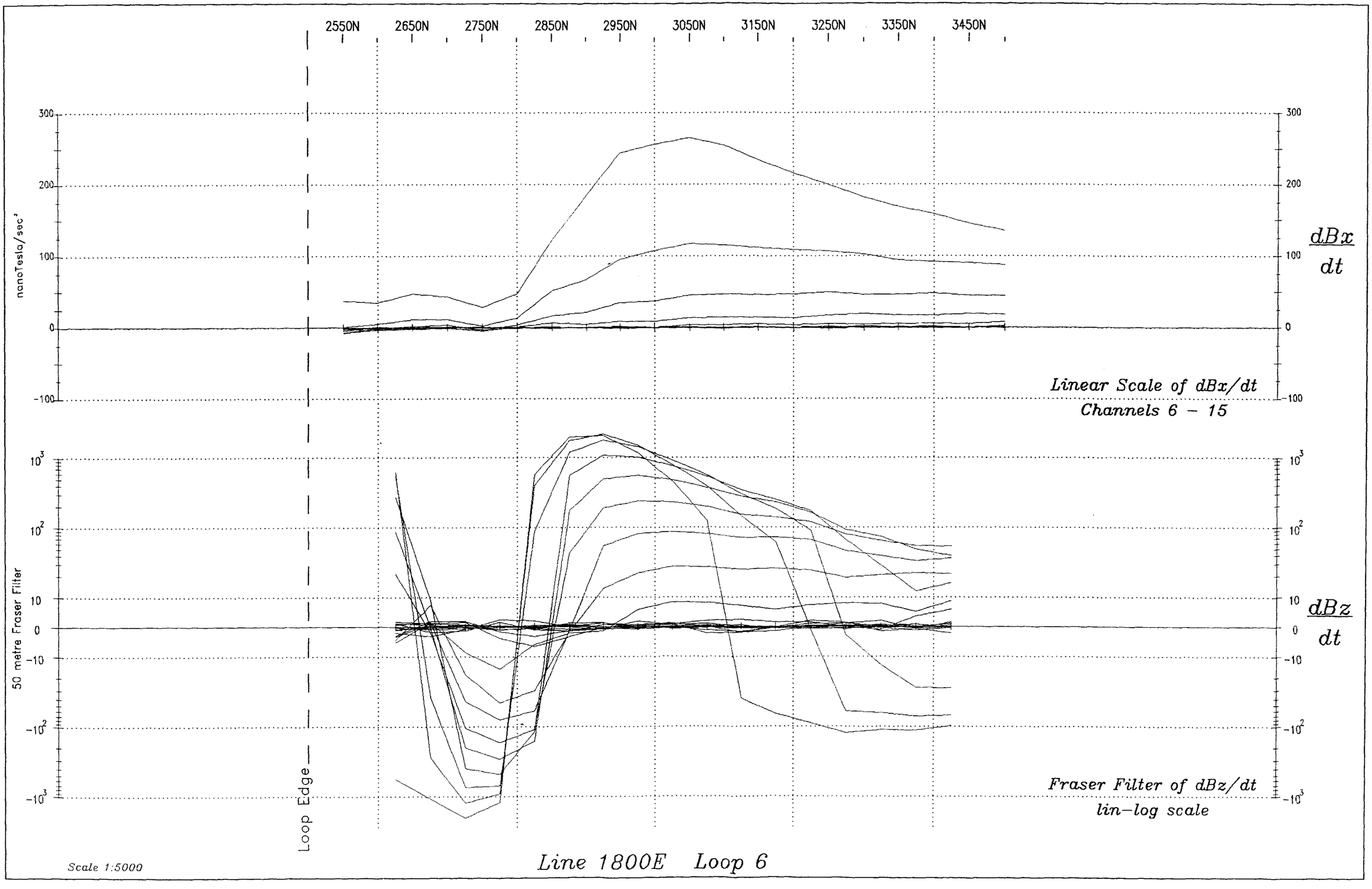
2850N
2950N
3050N
3150N
3250N
3350N
3450N
300
200
100
0
-100
nanoTesla/sec²
dBx/dt
Linear Scale of dBx/dt
Channels 6 - 15
10³
10²
10
0
-10
-10²
-10³
50 metre Fraser Filter
Loop Edge
dBz/dt
Fraser Filter of dBz/dt
lin-log scale
Scale 1:5000
Line 1700E Loop 6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2750N
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2950N
3050N
3150N
3250N
3350N
3450N
300
200
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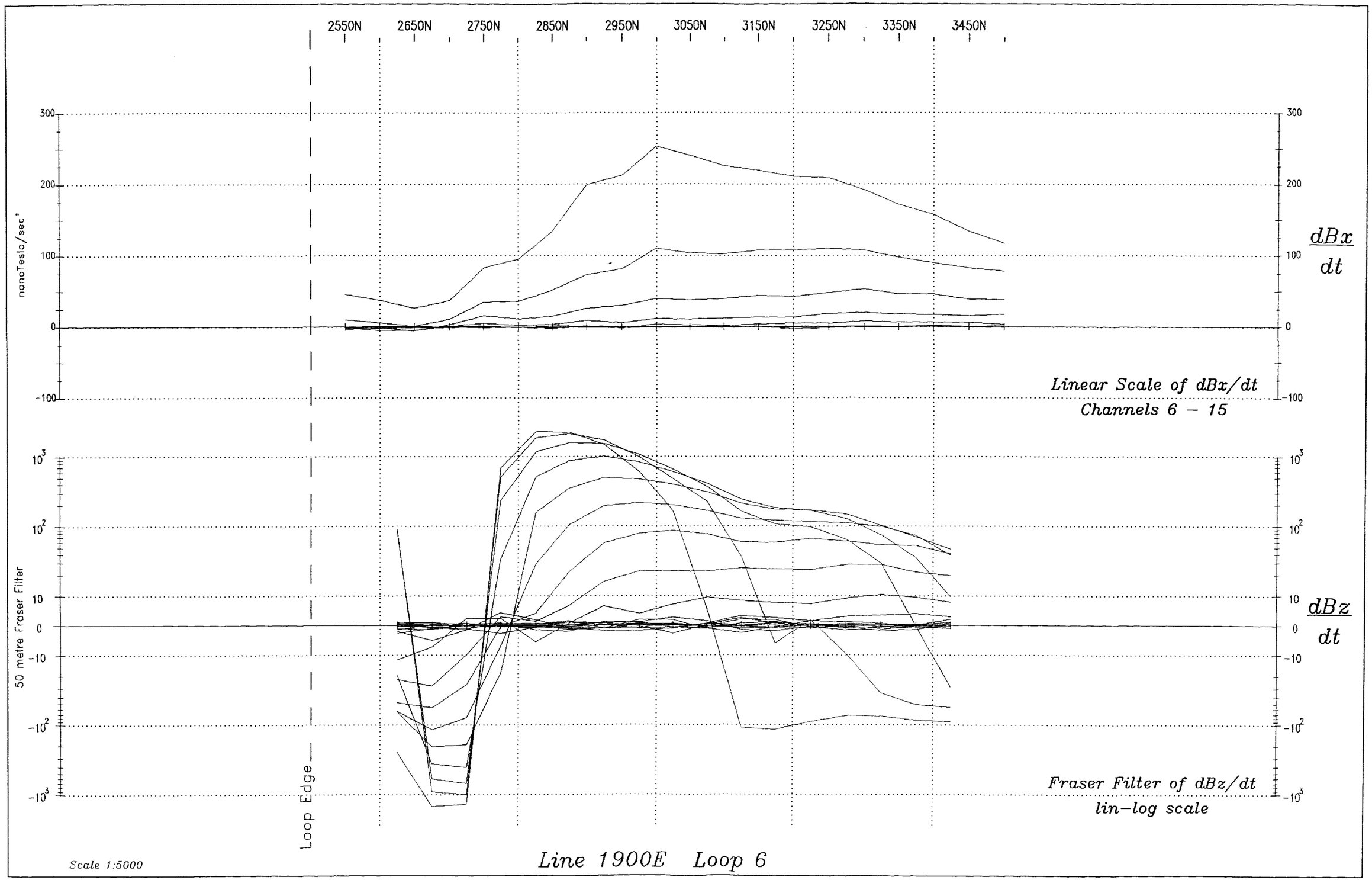
0
-100
nanoTesla/sec
dBx/dt
Linear Scale of dBx/dt
Channels 6 - 15
10^3
10^2
10
0
-10
-10^2
-10^3
50 metre Fraser Filter
dBz/dt
Fraser Filter of dBz/dt
lin-log scale
Loop Edge
Scale 1:5000
Line 1800E Loop 6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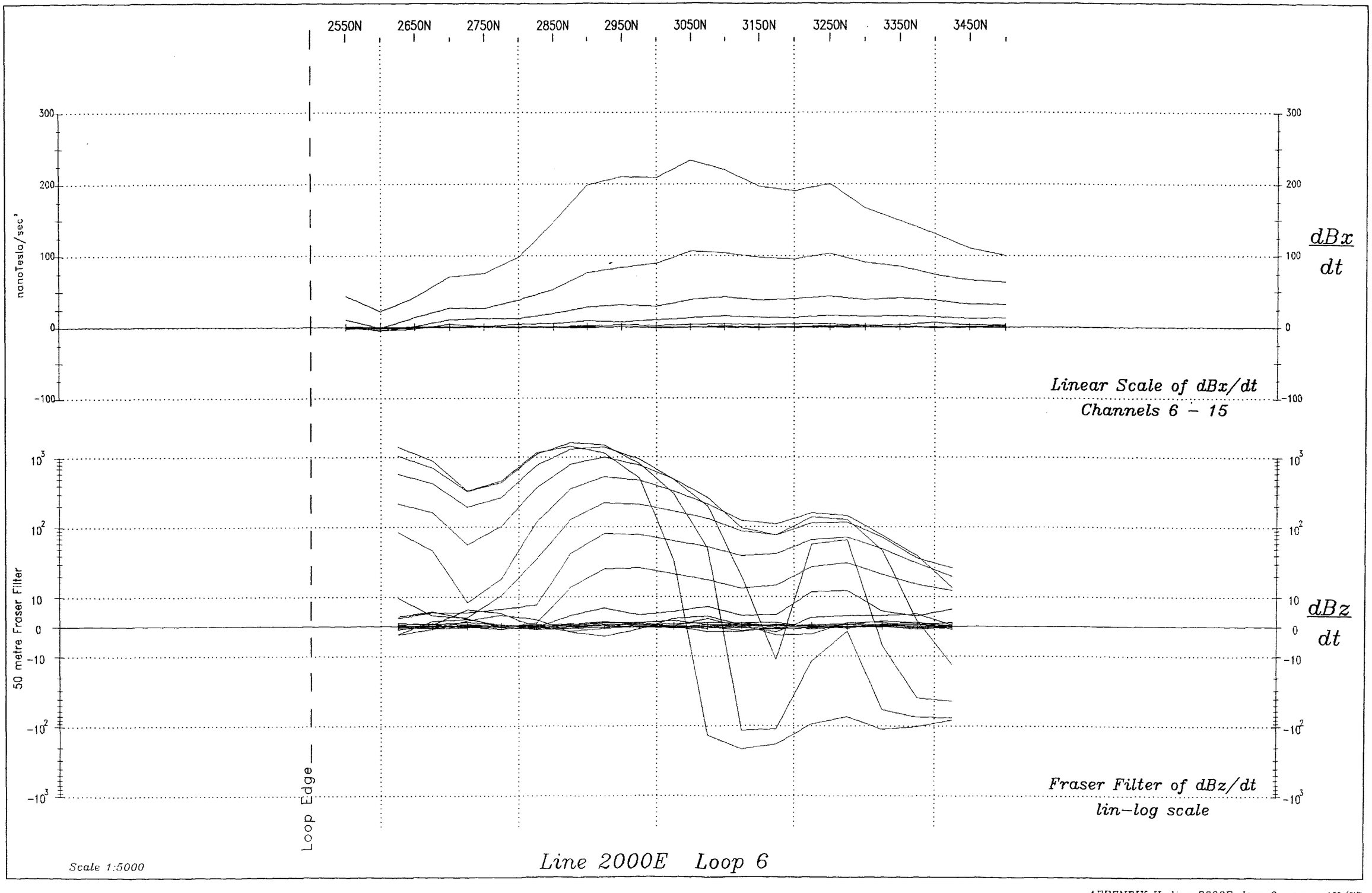
2850N
2950N
3050N
3150N
3250N
3350N
3450N
300
200
100
0
-100
nanoTesla/sec
dBx/dt
Linear Scale of dBx/dt
Channels 6 - 15
10^3
10^2
10
0
-10
-10^2
-10^3
50 metre Fraser Filter
dBz/dt
Fraser Filter of dBz/dt
lin-log scale
Loop Edge
Scale 1:5000
Line 1900E Loop 6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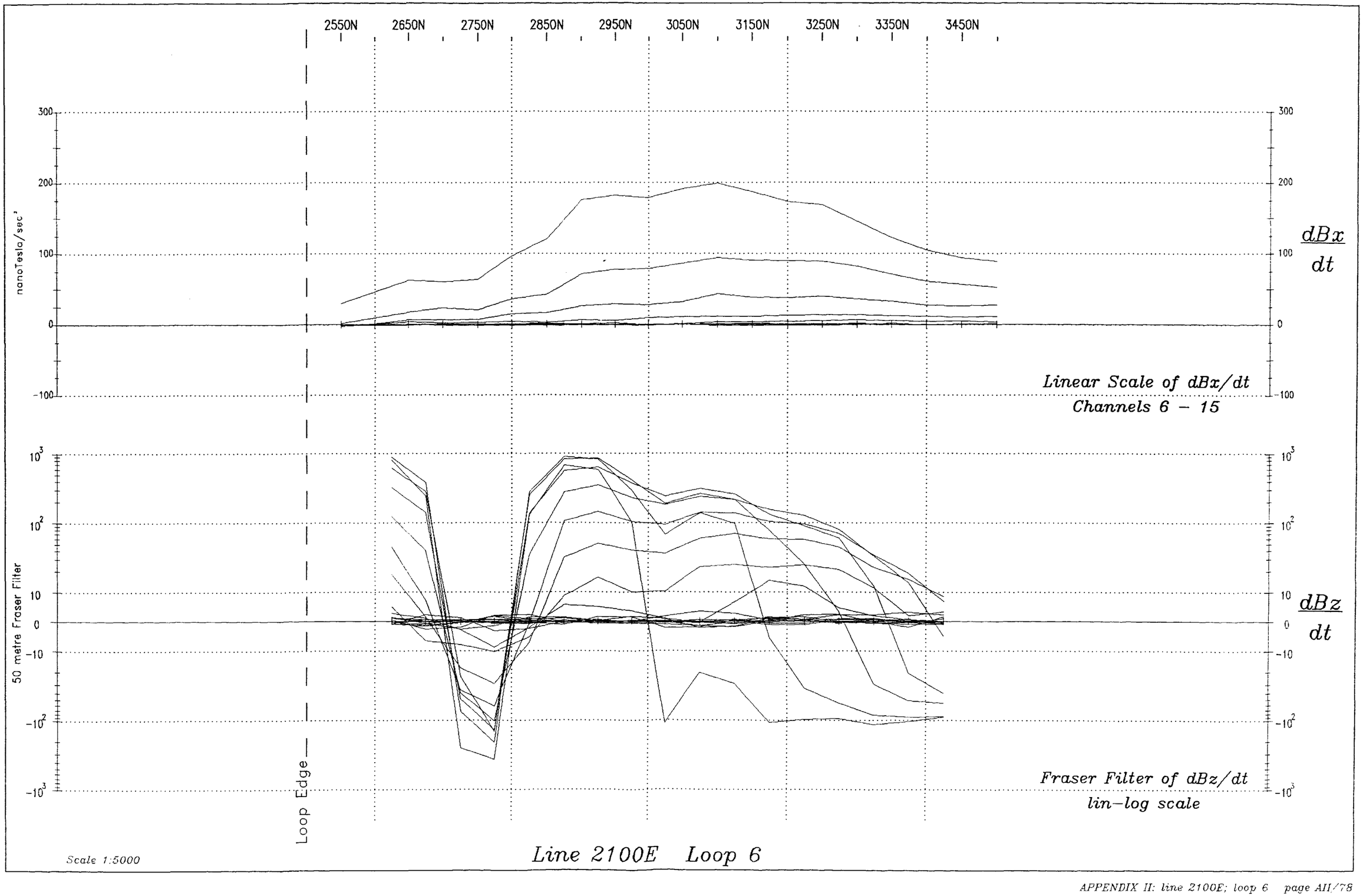
3250N
3350N
3450N
300
200
100
0
-100
nanoTesla/sec
dBx/dt
Linear Scale of dBx/dt
Channels 6 - 15
10^3
10^2
10
0
-10
-10^2
-10^3
50 metre Fraser Filter
dBz/dt
Fraser Filter of dBz/dt
lin-log scale
Loop Edge
Scale 1:5000
Line 2000E Loop 6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2650N
2750N
2850N
2950N
3050N
3150N
3250N
3350N
3450N
nanoTesla/sec²
300
200
100
0
-100
dBx/dt
Linear Scale of dBx/dt
Channels 6 - 15
10³
10²
10
0
-10
-10²
-10³
50 metre Fraser Filter
dBz/dt
Fraser Filter of dBz/dt
lin-log scale
Loop Edge
Scale 1:5000
Line 2100E Loop 6

Ontario Ministry of Northern Development and Mines

Declaration of Assessment Work Performed on Mining Land

Mining Act, Subsection 65(2) and 66(3), R.S.O. 1990

Transaction Number (office use): W9860.00739
Assessment Files Research Imaging

42B09NE2002 2.18716 MONTCALM 900

f subsections 65(2) and 66(3) of the Mining Act. Under section 8 of the eview the assessment work and correspond with the mining land holder. Recorder, Ministry of Northern Development and Mines, 6th Floor,

Instructions: - For work performed on Crown Lands before **recording** a claim, use form 0240.
- Please type or print in ink.

2.18716

1. Recorded holder(s) (Attach a list if necessary)

Name: Teck Exploration Ltd.	Client Number: 200415
Address: R.R. #5, 19 Legault Street	Telephone Number: (705) 474-5500
North Bay, Ontario, P1B 8Z4	Fax Number: (705) 474-4053
Name: Teck Corporation	Client Number: 200408
Address: 200 Burrard Street, Suite 600	Telephone Number: (604) 687-1117
Vancouver, B.C., V6C 3L9	Fax Number: (604) 687-6100

2. Type of work performed: Check (✓) and report on only ONE of the following groups for this declaration.

[X] Geotechnical: prospecting, surveys, assays and work under section 18 (regs)
[ ] Physical: drilling, stripping, trenching and associated assays
[ ] Rehabilitation

Work Type: Geophysical Survey - PEM - Mag Line Cutting		Office Use Commodity Total $ Value of Work Claimed: 73,532
Dates Work Performed: From 10 (Day) 01 (Month) 97 (Year) To 20 (Day) 03 (Month) 97 (Year)		NTS Reference
Global Positioning System Data (If available)	Township/Area: Montcalm Township	Mining Division
	M or G-Plan Number: G-1182	Resident Geologist District

Please remember to: - obtain a work permit from the Ministry of Natural Resources as required;
- provide proper notice to surface rights holders before starting work;
- complete and attach a Statement of Costs, form 0212;
- provide a map showing contiguous mining lands that are linked for assigning work;
- include two copies of your technical report.

3. Person or companies who prepared the technical report (Attach a list if necessary)

Name: Kerrie Fitzhenry	Telephone Number: (705) 474-5500
Address: R.R. #5, 19 Legault Street, North Bay, ON, P1B 8Z4	Fax Number: (705) 474-4053
Name: Crone Geophysics & Exploration Ltd.	Telephone Number: (905) 270-0096
Address: 3607 Wolfedale Road, Mississauga, Ontario	Fax Number: (905) 270-3472
Name	Telephone Number
Address	Fax Number

RECEIVED
AUG 17 1998
$100
GEOSCIENCE ASSESSMENT OFFICE

4. Certification by Recorded Holder or Agent

I, Kerrie Fitzhenry (Print Name), do hereby certify that I have personal knowledge of the facts set forth in this Declaration of Assessment Work having caused the work to be performed or witnessed the same during or after its completion and, to the best of my knowledge, the annexed report is true.

Signature of Recorded Holder or Agent: Kerrie Fitzhenry		Date: August 12, 1998
Agent's Address: 19 Legault St., R.R. #5, North Bay, ON P1B 8Z4	Telephone Number: (705) 474-5500	Fax Number: (705) 474-4053

341 (02/98)

Ontario

Ministère du Développement du Nord et des Mines

Annexe de la Déclaration d'exécution de travaux d'evaluation sur des terrains miniers

Numéro de transaction (à l'usage du bureau)
W9860.00739

2.18716

Numéro de claim. Si les travaux ont été exécutés sur d'autres terrains miniers admissibles, indiquez dans cette colonne le numéro d'emplacement figurant sur la carte des claims.	Nombre d'unités Pour les autres terrains miniers, indiquez le nombre d'hectares.	Valeur des travaux exécutés sur ce claim ou sur d'autres terrains miniers	Valeur des travaux appliquée à ce claim	Valeur des travaux affectée à d'autres claims	Réserve. Valeur des travaux qui seront répartis à une date ultérieure.
1113754	1	0	0	0	0
1113755	1	0	0	0	0
1113756	1	0	0	0	0
1113757	1	0	0	0	0
1113758	1	0	0	0	0
1113759	1	0	0	0	0
1113760	1	0	0	0	0
1113761	1	1513	0	1513	0
1113762	1	1513	0	1513	0
1113763	1	1513	0	1513	0
1113764	1	1513	0	1513	0
1113771	1	0	0	0	0
1113772	1	0	0	0	0
1113773	1	0	0	0	0
1113774	1	0	0	0	0
1113775	1	0	0	0	0
1113776	1	0	0	0	0
1113777	1	0	0	0	0
1113778	1	0	0	0	0
1113779	1	0	0	0	0
1113780	1	0	0	0	0
1113781	1	0	0	0	0
1113782	1	0	0	0	0
1113783	1	0	0	0	0
1113784	1	0	0	0	0
1113785	1	0	0	0	0
1113786	1	0	0	0	0
1113787	1	0	0	0	0
1113788	1	0	0	0	0
1113789	1	0	0	0	0
1113790	1	0	0	0	0
1113791	1	0	0	0	0
1113792	1	0	0	0	0
1113793	1	0	0	0	0
1113796	1	0	0	0	0
Total des colonnes		6052	0	6052	0

Ontario

Ministry of Northern Development and Mines

Schedule for Declaration of Assessment Work on Mining Land

Transaction Number (office use)
W9860.00739

2.18716

Mining Claim Number. Or if work was done on other eligible mining land, show in this column the location number indicated on the claim map.	Number of Claim Units. For other mining land, list hectares.	Value of work performed on this claim or other mining land	Value of work applied to this claim	Value of work assigned to other mining claims	Bank. Value of work to be distributed at a future date
1113797	1	0	0	0	0
1113798	1	0	0	0	0
1113799	1	0	0	0	0
1113800	1	0	0	0	0
1113801	1	0	0	0	0
1113802	1	0	0	0	0
1113803	1	0	0	0	0
1113804	1	0	0	0	0
1113813	1	0	0	0	0
1113814	1	0	0	0	0
1113815	1	0	0	0	0
1113816	1	0	0	0	0
1113817	1	0	0	0	0
1113818	1	0	0	0	0
1113821	1	0	0	0	0
1113822	1	0	0	0	0
1113823	1	0	0	0	0
1113824	1	0	0	0	0
1113825	1	0	0	0	0
1113826	1	0	0	0	0
1113827	1	0	0	0	0
1113828	1	0	0	0	0
1113829	1	0	0	0	0
1113830	1	0	0	0	0
1113831	1	0	0	0	0
1113832	1	0	0	0	0
1113833	1	0	0	0	0
1113834	1	0	0	0	0
1113835	1	0	0	0	0
1113836	1	0	0	0	0
1113837	1	0	0	0	0
1113838	1	0	0	0	0
1113839	1	0	0	0	0
1113840	1	0	0	0	0
1128009	1	1513	0	1513	0
Column Totals		1513	0	1513	0

Ontario

Ministry of Northern Development and Mines

Schedule for Declaration of Assessment Work on Mining Land

Transaction Number (office use)

W9860.00739

2.18716

Mining Claim Number. Or if work was done on other eligible mining land, show in this column the location number indicated on the claim map.	Number of Claim Units. For other mining land, list hectares.	Value of work performed on this claim or other mining land	Value of work applied to this claim	Value of work assigned to other mining claims	Bank. Value of work to be distributed at a future date
1128010	1	1513	0	513	1000
1128011	1	0	0	0	0
1128012	1	0	0	0	0
1128013	1	0	0	0	0
1128014	1	0	0	0	0
1128015	1	0	0	0	0
1128016	1	0	0	0	0
1128017	1	0	0	0	0
1128177	1	1513	0	1513	0
1128178	1	1513	0	1513	0
1128179	1	1513	0	1513	0
1128180	1	1513	0	1513	0
1128181	1	1513	0	1513	0
1128182	1	1513	0	1513	0
1128183	1	0	0	0	0
1128184	1	0	0	0	0
1128185	1	1513	0	1513	0
1128186	1	1513	0	1513	0
1128187	1	1513	0	1513	0
1128188	1	1513	0	1513	0
1128190	1	1513	0	1513	0
1128191	1	1513	0	1513	0
1128192	1	0	0	0	0
1128195	1	1513	0	1513	0
1128196	1	1513	0	1513	0
1128197	1	1513	0	1024	650
1128198	1	1513	0	992	682
[illegible]	1	1513	0	1513	0
1128200	1	0	0	0	0
1128201	1	0	0	0	0
1128202	1	0	0	0	0
1128203	1	0	0	0	0
1128204	1	1513	0	1513	0
1128205	1	1513	0	1513	0
1128206	1	0	0	0	0
Column Totals		30260	0	28250	2332

0290 (02/96)

Ontario

Ministry of Northern Development and Mines

Schedule for Declaration of Assessment Work on Mining Land

Transaction Number (office use)
W9860.00739

2.18716

Mining Claim Number. Or if work was done on other eligible mining land, show in this column the location number indicated on the claim map.	Number of Claim Units. For other mining land, list hectares.	Value of work performed on this claim or other mining land	Value of work applied to this claim	Value of work assigned to other mining claims	Bank. Value of work to be distributed at a future date
1128207	1	0	0	0	0
1128208	1	0	0	0	0
1128209	1	0	0	0	0
1128210	1	0	0	0	0
1128211	1	0	0	0	0
1128212	1	0	0	0	0
1128213	1	0	0	0	0
1128214	1	0	0	0	0
1128215	1	0	0	0	0
1128216	1	0	0	0	0
1128217	1	0	0	0	0
1200519	16	0	0	0	0
1200520	9	0	3600	0	0
1200521	9	0	3600	0	0
1200522	4	0	0	0	0
1200523	8	0	3200	0	0
1200524	6	0	2400	0	0
1200525	8	0	3200	0	0
1200526	16	0	6400	0	0
1200527	16	0	6400	0	0
1200528	4	0	0	0	0
1200529	16	0	0	0	0
1200530	16	0	6400	0	0
1200531	8	0	0	0	0
1200532	16	7616	6400	1216	0
1200533	16	5077	6400	0	0
1200534	8	0	3200	0	0
1200535	16	0	0	0	0
1200536	8	0	0	0	0
1200537	4	0	0	0	0
1200538	2	0	800	0	0
1200539	16	0	0	0	0
1200540	16	0	0	0	0
1200541	16	19557	6400	13157	0
1200542	16	1152	6400	0	0
Column Totals		33402	64800	14373	0

Ontario

Ministry of Northern Development and Mines

Schedule for Declaration of Assessment Work on Mining Land

Transaction Number (office use)
W9860.00739

2.18716

Mining Claim Number. Or if work was done on other eligible mining land, show in this column the location number indicated on the claim map.	Number of Claim Units. For other mining land, list hectares.	Value of work performed on this claim or other mining land	Value of work applied to this claim	Value of work assigned to other mining claims	Bank. Value of work to be distributed at a future date
1200543	8	1153	0	1153	0
1200544	8	1152	3200	1152	0
1200545	16	0	0	0	0
1200546	8	0	0	0	0
1200547	16	0	0	0	0
1200548	8	0	0	0	0
1200549	9	0	0	0	0
1200550	12	0	0	0	0
1200551	16	0	0	0	0
1200552	2	0	0	0	0
1200553	8	0	3200	0	0
1200597	1	0	0	0	0
		2305	6400	2305	0
Column Totals		73532	71200	52493	2332

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9:00
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0290 (02/96)

Ontario Ministry of Northern Development and Mines

Statement of Costs for Assessment Credit

Transaction Number (office use): W9860.00739

Personal information collected on this form is obtained under the authority of subsection 6(1) of the Assessment Work Regulation 6/96. Under section 8 of the Mining Act, the information is a public record. This information will be used to review the assessment work and correspond with the mining land holder. Questions about this collection should be directed to the Chief Mining Recorder, Ministry of Northern Development and Mines, 6th Floor, 933 Ramsey Lake Road, Sudbury, Ontario, P3E 6B5.

Work Type	Units of Work Depending on the type of work, list the number of hours/days worked, metres of drilling, kilometres of grid line, number of samples, etc.	Cost Per Unit of work	Total Cost
HPTEM survey	85.4 km	$500/km	42,700.00
Line Cutting	101.23 km	$270/km	27,332.10
		2.18716	
Associated Costs (e.g. supplies, mobilization and demobilization).			
Mob/demob - line cutting			1,000.00
HPTEM interpretation	5 days	$500/day	2,500.00
Transportation Costs			
Food and Lodging Costs			
		Total Value of Assessment Work	$73,532.10

RECEIVED
AUG 17 1998
$1.00
GEOSCIENCE ASSESSMENT OFFICE

Calculations of Filing Discounts:

1. Work filed within two years of performance is claimed at 100% of the above Total Value of Assessment Work.
2. If work is filed after two years and up to five years after performance, it can only be claimed at 50% of the Total Value of Assessment Work. If this situation applies to your claims, use the calculation below:

TOTAL VALUE OF ASSESSMENT WORK × 0.50 = Total $ value of worked claimed.

Note:
- Work older than 5 years is not eligible for credit.
- A recorded holder may be required to verify expenditures claimed in this statement of costs within 45 days of a request for verification and/or correction/clarification. If verification and/or correction/clarification is not made, the Minister may reject all or part of the assessment work submitted.

Certification verifying costs:

I, Kerrie Fitzhenry (please print full name), do hereby certify, that the amounts shown are as accurate as may reasonably be determined and the costs were incurred while conducting assessment work on the lands indicated on the accompanying Declaration of Work form as Geologist (recorded holder, agent, or state company position with signing authority) I am authorized to make this certification.

Signature	Date
Kerrie Fitzhenry	August 12, 1998

Ministry of Northern Development and Mines

Ministère du Développement du Nord et des Mines

Ontario

Geoscience Assessment Office
933 Ramsey Lake Road
6th Floor
Sudbury, Ontario
P3E 6B5

Telephone: (888) 415-9846
Fax: (877) 670-1555

Visit our website at:
www.gov.on.ca/MNDM/MINES/LANDS/mlsmnpge.htm

November 13, 1998

Kerrie Fitzhenry
TECK EXPLORATION LTD.
RR # 5, 19 LEGAULT STREET
NORTH BAY, ONTARIO
P1B 8Z4

Dear Sir or Madam:

Submission Number: 2.18716

Subject: Transaction Number(s):		**Status**
	W9860.00739	Approval After Notice

We have reviewed your Assessment Work submission with the above noted Transaction Number(s). The attached summary page(s) indicate the results of the review. WE RECOMMEND YOU READ THIS SUMMARY FOR THE DETAILS PERTAINING TO YOUR ASSESSMENT WORK.

If the status for a transaction is a 45 Day Notice, the summary will outline the reasons for the notice, and any steps you can take to remedy deficiencies. The 90-day deemed approval provision, subsection 6(7) of the Assessment Work Regulation, will no longer be in effect for assessment work which has received a 45 Day Notice. Allowable changes to your credit distribution can be made by contacting the Geoscience Assessment Office within this 45 Day period, otherwise assessment credit will be cut back and distributed as outlined in Section #6 of the Declaration of Assessment work form.

Please note any revisions must be submitted in DUPLICATE to the Geoscience Assessment Office, by the response date on the summary.

If you have any questions regarding this correspondence, please contact Lucille Jerome by e-mail at jeromel2@epo.gov.on.ca or by telephone at (705) 670-5858.

Yours sincerely,

ORIGINAL SIGNED BY
Blair Kite
Supervisor, Geoscience Assessment Office
Mining Lands Section

Correspondence ID: 13077

Copy for: Assessment Library

Work Report Assessment Results

Submission Number: 2.18716

Date Correspondence Sent: November 13, 1998 **Assessor:** Lucille Jerome

Transaction Number	First Claim Number	Township(s) / Area(s)	Status	Approval Date
W9860.00739	1113761	MONTCALM	Approval After Notice	November 13, 1998

Section:
14 Geophysical EM

The revisions outlined in the Notice dated November 6, 1998, have been corrected. Accordingly, assessment work credit has been approved as outlined on the original Declaration of Assessment Work Form accompanying this submission.

Correspondence to:

Resident Geologist
South Porcupine, ON

Assessment Files Library
Sudbury, ON

Recorded Holder(s) and/or Agent(s):

Kerrie Fitzhenry
TECK EXPLORATION LTD.
NORTH BAY, ONTARIO

TECK CORPORATION
VANCOUVER, B.C.

NOTES

400' surface rights reservation along the shores of all lakes and rivers.

THIS TWP. IS SUBJECT TO FOREST ACTIVITY IN 1995/96. FURTHER INFORMATION AVAILABLE ON FILE.

THE INFORMATION THAT APPEARS ON THIS MAP HAS BEEN COMPILED FROM VARIOUS SOURCES. AND ACCURACY IS NOT GUARANTEED. THOSE WISHING TO STAKE MINING CLAIMS SHOULD CONSULT WITH THE MINING RECORDER, MINISTRY OF

42B09NE2002 2.18716 MONTCALM 200

POULETT Tp. M.1063

BELFORD Tp. M. 657

FORTUNE Tp. M. 813

STRACHAN Tp. M. 1142

1235398
~~1207091~~
12 UNITS

P. 1204326
(16 UNITS)

1200519
(16 UNITS)

1200520
(9 UNITS)

1200521
(9 UNITS)

1200522
(4 UNITS)

~~1218905~~
(16 UNITS)

~~1218804~~
(16 UNITS)

~~1218806~~
(16 UNITS)

~~1218807~~
(16 UNITS)

~~1218903~~
(16 UNITS)

1204301
(16 UNITS)

~~1201504~~
9 UNITS

~~1201505~~
2 UNITS

~~1201503~~
15 UNITS

~~1201506~~
16 UNITS

~~1201501~~
10 UNITS

1200528
(4 UNITS)

1200527
(16 UNITS)

1200526
(16 UNITS)

1200525
(8 UNITS)

1200524
(6 UNITS)

1200523
(8 UNITS)

1200529
(16 UNITS)

1200530
(16 UNITS)

1202426
7 UNITS

~~1201507~~
12 UNITS

190174
8 UNITS

1200531
(8 UNITS)

1200532
(16 UNITS)

~~1219340~~

~~1219908~~
(9 UNITS)

1200533
(16 UNITS)

1200534
(8 UNITS)

1200539
(16 UNITS)

1200541
(16 UNITS)

1200542
(8 UNITS)

1200543

1200544
(8 UNITS)

1200545
(16 UNITS)

1200546

1200540

1200553

1200535

1200536
(8 UNITS)

2.18716
EM

2.18716
EM

F, - SUBJECT TO FORESTRY ACTIVITY IN 1993-94 GORDON CREEKS F.M.A

LEGEND

- HIGHWAY AND ROUTE No
- OTHER ROADS
- TRAILS
- SURVEYED LINES
  - TOWNSHIPS, BASE LINES ETC
  - LOTS, MINING CLAIMS, PARCELS, ETC
- UNSURVEYED LINES
  - LOT LINES
  - PARCEL BOUNDARY
  - MINING CLAIMS ETC
- RAILWAY AND RIGHT OF WAY
- UTILITY LINES
- NON-PERENNIAL STREAM
- FLOODING OR FLOODING RIGHTS
- SUBDIVISION
- ORIGINAL SHORELINE
- MARSH OR MUSKEG
- MINES

DISPOSITION OF CROWN LANDS

TYPE OF DOCUMENT	SYMBOL
PATENT, SURFACE & MINING RIGHTS	●
SURFACE RIGHTS ONLY	◒
MINING RIGHTS ONLY	◒
LEASE, SURFACE & MINING RIGHTS	■
SURFACE RIGHTS ONLY	◨
MINING RIGHTS ONLY	◨
LICENCE OF OCCUPATION	▼
CROWN LAND SALE	CS
ORDER-IN-COUNCIL	OC
RESERVATION	⊕
CANCELLED	⊗
SAND & GRAVEL	⊖

DATE OF ISSUE
NOV 13 1993
PROVINCIAL RECORDING OFFICE - SUDBURY

SCALE : 1 INCH 40 CHAINS

FEET 0 500 1000 2000 3000 4000 5000 6000
METRES 0 100 200 300 400 500 600 700 800 900 1000 1200 1400 1600 1800 2KM

ACRES	HECTARES
40	16

Received Nov. 5/82.

TOWNSHIP

MONTCALM

DISTRICT
COCHRANE

MINING DIVISION
PORCUPINE

Ministry of Natural Resources
Ontario Surveys and Mapping Branch

Date 1E 74 | Plan No. G-1182

Whitney Block
Queen's Park Toronto

400000 405000 410000 415000 420000

5395000 5390000 5385000

NORANDA
L. GERVAIS
K. FILO
FALCONBRIDGE
R. ROBITTAILLE
K. FILO
D. JONES
J. HUSSEY
BELFORD TWP.
NOVA TWP.
MONTCALM TWP.
BELFORD TWP.
OPEN
M. CARON
K. FILO
S. YOUNG
HADDINGTON RESOURCES
R. ROBITAILLE
D. LAFOREST
PLACER DOME
KRL RESOURCES
FALCONBRIDGE
OPEN
MONTCALM TWP.
STRACHAN TWP.
OPEN
OPEN
Indian Reserve
Creek
Belford
Paypeeshek
River
Falls
Groundhog
River
Montcalm Creek
Ivanhoe
Bravo Lake
Heath Lake
LAKE
ELF
DEPOSIT
GRID A
GRID B
GRID C
GRID D
GRID E
GRIDS F-G
GRID H
P1200519
P1200520
P1200521
P1200522
P1200523
P1200524
P1200525
P1200526
P1200527
P1200528
P1200529
P1200530
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P1200546
P1200547
P1200548
P1200549
P1200550
P1200551
P1200554
P1200597
B.L.Az.65°
B.L. Az.50°
TL 20W
TL 10W
TL 15W
TL 20W
TL 25W
TL 30W
TL 10N
TL 15N
TL 20N
TL 25N
TL 30N
TL 10S
TL 15S
TL 20S
TL 25S
TL 30S
TL 35S
2,18716
RECEIVED
AUG 17 1998
GEOSCIENCE ASSESSMENT OFFICE
Revised: October 1997

GRID / PROPERTY MAP
MONTCALM PROPERTY
MONTCALM, STRACHAN, NOVA, BELFORD TPs.

DATE DRAWN:	JULY 1998	SCALE: 20 000	DWG No: 7149a
DRAWN By:	BERNIE HOPKINS	JOB No: 98423/27	
APPROVED By:	K. FITZHENRY	N.T.S: 42 B/9	

TECK EXPLORATION LTD.
19 Legault Street, R.R. #1
North Bay, Ontario P1B 8Z4
Phone: (705) 474-5500 Fax: (705) 474-4053

415000E 416000E 417000E 418000E 419000E

5391000N 5390000N 5389000N 5388000N

Montcalm Creek

1113758 1113757 P479935 P437998 P452687

1113759 1113760 P393395 P437999 P437992 P437993 452691

1113762 1113761 P438000 P437994 P437995

1113763 1113764 P393400 P452684 P452685 P452686 P452689

1128177 1128178 1128179 1128195 P452688 P452687 P458298 P458299

1128182 1128184 1128183 1128181 1128180 1128196 P458305 P458304 P458303

1128185 1128186 1128187 1128188 1128191 1128197 1128198 1128199

P1200528 1128192 1128190 1128189 1128010 1128011 1128205 1128204 1128203 1128202

1128014 1128013 1128012 1128206 1128207 1128208 1128209

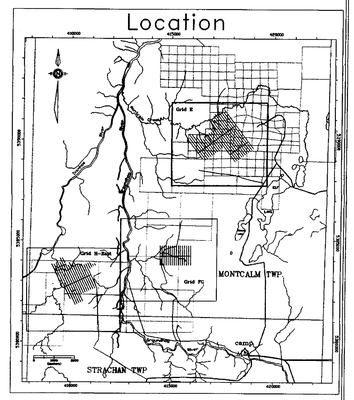
1128015 1128016 1128017 1128217 1128216 1128215 1128214

P1200526 P1200525 P1200524 P1200523

E17 E18 E19 E20 E21 E22 E23 E24 E25 E26 E27 E28 E29 E30 E31 E32

Tx Loop 1 Tx Loop 2 Tx Loop 3

Location



Legend

- Number of channels — Strong conductor location
- Number of channels — Weak conductor location
- E17 — Anomaly identification
- Conductor axis
- Claim Boundary
- 1128191 — Claim number
- Tx Loop 1 — Transmit loop location

2.18716

Scale 1:5000

50 0 50 100 150 200 (metres)

Teck Exploration Limited

Montcalm Project

Pulse Time Domain Electromagnetic Survey

Grid E

Conductor Location Map

Survey By: Crone Geophysics	Drawn By: Jim MacNeil
Date Surveyed: February 1997	Date Drawn: May 1, 1997

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