LIGHTNING PHENOMENOLOGY NOTES
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LOCATION OF LIGHTNING ELECTROMAGNETIC SOURCES BY TIME OF ARRIVAL COMPARED TO INFERENCE FROM ELECTROMAGNETIC FIELDS, THUNDER ACOUSTICS, AND VIDEOTAPE PHOTOGRAPHS

C.E. Baum and J.P. O'Neill
Air Force Weapons Laboratory

E.L. Breen, D.L. Hall, and C.B Moore
New Mexico Institute of Mining and Technology

ABSTRACT

This paper presents data on lightning electromagnetic source location by a time-of-arrival system. The time-of-arrival locations are compared to locations obtained from the lightning electromagnetic fields, a whole-sky camera, and locations obtained from the time-of-arrival of thunder acoustic sources at a microphone array. The electromagnetic fields presented are from leader and return stroke sequences within each lightning flash.

The data were obtained during the summer of 1981 from rocket triggered and natural lightning flashes. The data were recorded in a shielded underground instrumentation room, the Kiva, on South Baldy Peak in the Magdalena Mountains near Langmuir Laboratory, New Mexico. The time-of-arrival system consisted of three omni-directional B-dot sensors with a 92 m baseline and two computer controlled time interval counters with ±20 ps resolution.

CONTENTS

I. INTRODUCTION

During the summers of 1980 and 1981, a time-of-arrival system for lightning EM source location was set up near the "iron" Kiva, a shielded instrumentation room, on South Baldy Peak near Langmuir Laboratory, New Mexico (see Fig. 1.1). Our prototype system was not debugged until after the conclusion of the 1980 summer thunderstorm season. Measurements presented in this paper are from lightning flashes during 1981.

The three time-of-arrival sensors (labelled A, B & C) are 8AL-1A B-dot sensors made by EG&G. They are mounted on 3 m square platforms and electrically connected to a 5 m square piece of ground mesh. Signals are monitored continuously at the Kiva by the computer controlled data acquisition system.

Electromagnetic field data from sensors mounted on the Kiva roof to correlate with the time-of-arrival measurements were recorded at the Kiva. The sensors and instrumentation are discussed in detail in [1,2].

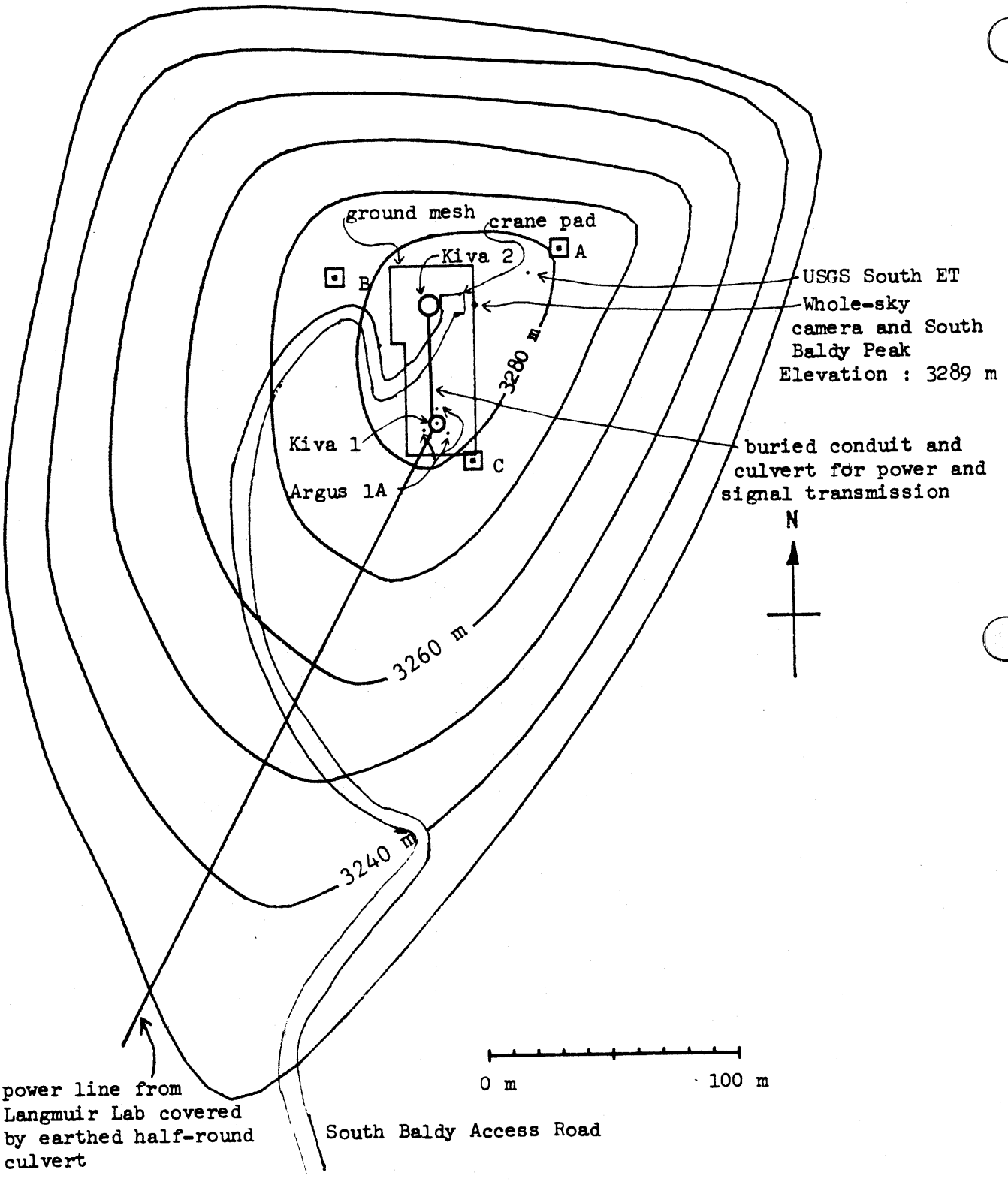


Figure 1.1 South Baldy Peak Lightning Study Area

II. TIME-OF-ARRIVAL SYSTEM CONCEPT

The time-of-arrival system (referred to as the TOA system throughout the remainder of this paper) was designed to generate and measure signals which indicate field arrival times accurately to 1 ns. The location determined by the time difference of arrival of the signals is compared to the electromagnetic source location obtained from 3 field waveform components combined with acoustic data [1,2].

Three 8AL-1A (8 axis loop) B-dot sensors have been placed at the vertices of an almost equilateral triangle with about 92 m sides. Each sensor contains 4 loop structures with octagonal symmetry and a diode network which rectifies all signals generated in the loops and drives an impedance matching transformer at the output. Each of the eight loops of the 8AL-1A has an area of Ø.2 m^2, but the equivalent area is somewhat less due to interference from the other loops. The estimated L/R response time is about 7 ns. The sensors are labelled A, northeast of the Kiva, B, northwest of the Kiva, and C, southeast and nearest the Kiva.

The other system components are two Hewlett Packard 5370A time interval counters with ±2Ø ps resoultion on single shot time interval measurements. The counters are located in the electromagnetic screen room known as th Kiva located southwest of the center of the TOA array. Large inflexible coaxial cable with a propagation loss (v/c) of Ø.85 is used to transmit the signals from the sensors to the counters. Because the sensors measure the time-of-arrival of electromagnetic signals without regard to polarization or direction of incidence of the signals, the important measurement is the first rise of each of the signals.

Initially, we designed circuitry which would find the peak level of signals from each sensor and send a pulse to the counters at the time of the peak signal. We required that the signals be greater than a preset voltage level, 2ØØ mV. After getting data from a few thunderstorms, we noticed that several measurements gave no solutions for θ and ϕ. We determined that the main problems were:

1) using a pulse generator with a rise time of ~1Øns making the TDR measurements very threshold sensitive

2) the longer cables from A and B degraded the signal rise time and gave us incorrect measurements.

We then rebuilt the circuitry so that we used the first rise of the signal as the trigger to minimize errors from rise time degradation. C signal was monitored for a threshold level (normally 1ØØ mV). If the threshold was surpassed, three comparators were enabled to test for the first rise, set to one-tenth the threshold level, of the signals from A, B, and C. Pulses were sent to the counters once the rise was detected.

The TDR measurements were done again using a Tektronix 1Ø9 (rise time <1 ns) with corrections made for signal degradation. This procedure is discussed in detail in section 6.

Comparisons of location measurements from the TOA system with locations determined from electromagnetic field waveforms follow in later sections.

III. COORDINATES FOR TIME-OF-ARRIVAL SENSORS

Figure 3.1 gives a top view of the layout of the time-of-arrival sensors in the $\vec{r} = (x,y,z)$ coordinate system. The locations of the time-of-arrival sensors designated by A, B, and C were surveyed giving the coordinates of their centers on their local ground planes as

$$\begin{aligned} \vec{r}_A &= (68.7\text{m}, -51.5\text{m}, 1.6\text{m}) \\ \vec{r}_B &= (59.4\text{m}, 39.3\text{m}, -4.5\text{m}) \\ \vec{r}_C &= (-15.1\text{m}, -14.0\text{m}, -1.7\text{m}) \end{aligned} \tag{3.1}$$

Averaging these locations gives

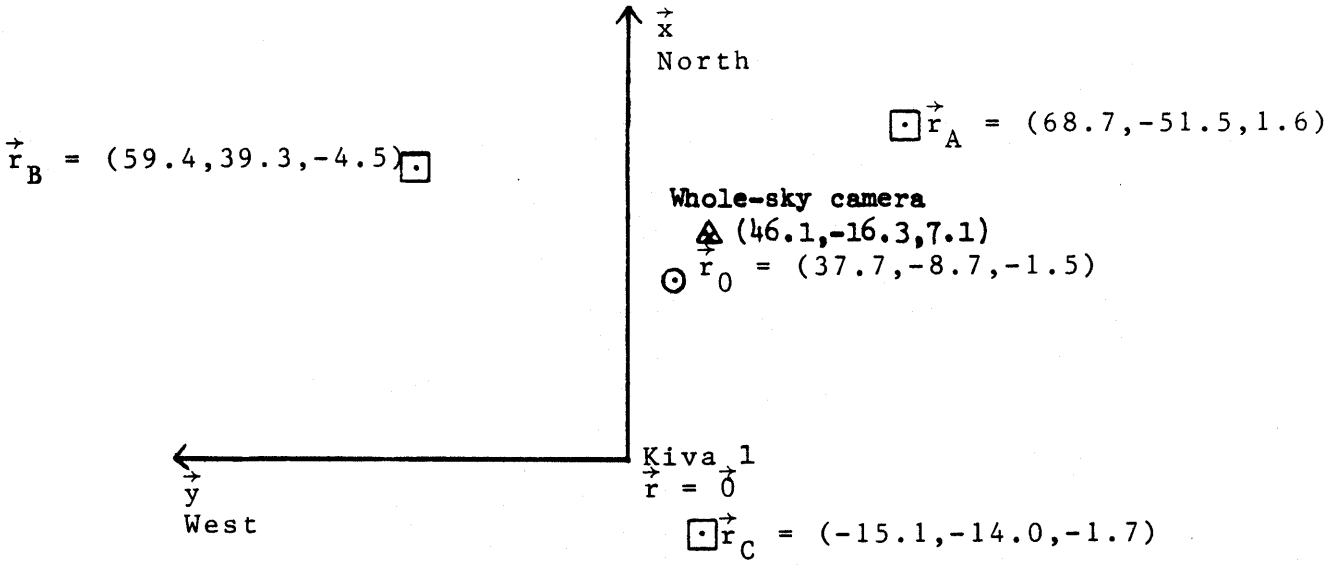
$$\begin{aligned} \vec{r}_o &= \tfrac{1}{3}[\vec{r}_A + \vec{r}_B + \vec{r}_C] = (x_o, y_o, z_o) \\ &= (37.7\text{m}, -8.7\text{m}, -1.5\text{m}) \end{aligned} \tag{3.2}$$

as the effective center of the time-of-arrival array. It is the effective center that one should consider as the approximate origin for referencing spherical polar angles which give the direction to the electromagnetic source (negative of the propagation direction).

The array is seen to be reasonably horizontal at nearly the elevation of the coordinate center (Kiva roof). The array is also very nearly an equilateral triangle (by design) by noting the lengths of the three legs as

$$\begin{aligned} |\vec{r}_A - \vec{r}_B| &= 91.5\text{m} \\ |\vec{r}_B - \vec{r}_C| &= 91.6\text{m} \\ |\vec{r}_C - \vec{r}_A| &= 91.9\text{m} \end{aligned} \tag{3.3}$$

From symmetry considerations (assuming uniformly distributed values of ϕ for each θ) a horizontal equilateral-triangular array is optimal for the case of three sensors. With a baseline of about 92m or about 307ns our angular errors (in radians) are proportional to the parameter (Δt in ns)/(307ns). With reasonably small time error (say several ns) the angular error should then be quite small, except perhaps near some special (ϕ, θ) values.



Coordinates given in meters

Figure 3.1 Coordinates for Time-of-Arrival Sensors

One can construct a unit normal to the array (positive approximately in +z direction) via

$$\vec{l}_n = \frac{[\vec{r}_A - \vec{r}_B] \times [\vec{r}_B - \vec{r}_C]}{|[\vec{r}_A - \vec{r}_B] \times [\vec{r}_B - \vec{r}_C]|}$$

$$= \frac{[\vec{r}_B - \vec{r}_C] \times [\vec{r}_C - \vec{r}_A]}{|[\vec{r}_B - \vec{r}_C] \times [\vec{r}_C - \vec{r}_A]|}$$

$$= \frac{[\vec{r}_C - \vec{r}_A] \times [\vec{r}_A - \vec{r}_B]}{|[\vec{r}_C - \vec{r}_A] \times [\vec{r}_A - \vec{r}_B]|} \qquad (3.4)$$

$$= l_{n_x}\vec{l}_x + l_{n_y}\vec{l}_y + l_{n_z}\vec{l}_z$$

$$= (-.010,\ .066,\ .998)$$

A second coordinate system can be defined based on the array and used for interpreting the signals. What we find most useful is a set of right-handed unit vectors

$$\vec{l}_X \times \vec{l}_Y = \vec{l}_Z,\ \vec{l}_Y \times \vec{l}_Z = \vec{l}_X,\ \vec{l}_Z \times \vec{l}_X = \vec{l}_Y \qquad (3.5)$$

where

$$\vec{l}_X \equiv \frac{\vec{r}_A - \vec{r}_C}{|\vec{r}_A - \vec{r}_C|}$$

$$\vec{l}_Y \equiv \vec{l}_n \times \vec{l}_X \qquad (3.6)$$

$$\vec{l}_Z \equiv \vec{l}_n$$

Let us define $\vec{r} = \vec{r}_o$ as the center of the (X, Y, Z) coordinate system. One can return to the (x, y, z) coordinate system via

$$(x,y,z) = (x_o,y_o,z_o) + (K_{n,m})\cdot(X,Y,Z) \tag{3.7}$$

$$(K_{n,m}) = \begin{pmatrix} \vec{l}_x \cdot \vec{l}_X & \vec{l}_x \cdot \vec{l}_Y & \vec{l}_x \cdot \vec{l}_Z \\ \vec{l}_y \cdot \vec{l}_X & \vec{l}_y \cdot \vec{l}_Y & \vec{l}_y \cdot \vec{l}_Z \\ \vec{l}_z \cdot \vec{l}_X & \vec{l}_z \cdot \vec{l}_Y & \vec{l}_z \cdot \vec{l}_Z \end{pmatrix}$$

≡ Kiva coordinate transformation matrix

For directions (i.e. unit vectors) such as $\vec{l}_u$ we need only use

$$(l_{u_x},l_{u_y},l_{u_z}) = (K_{n,m})\cdot(l_{u_X},l_{u_Y},l_{u_Z}) \tag{3.8}$$

An auxiliary unit vector of interest is

$$\vec{l}_B = \frac{\vec{r}_B - \vec{r}_C}{|\vec{r}_B - \vec{r}_C|} \tag{3.9}$$

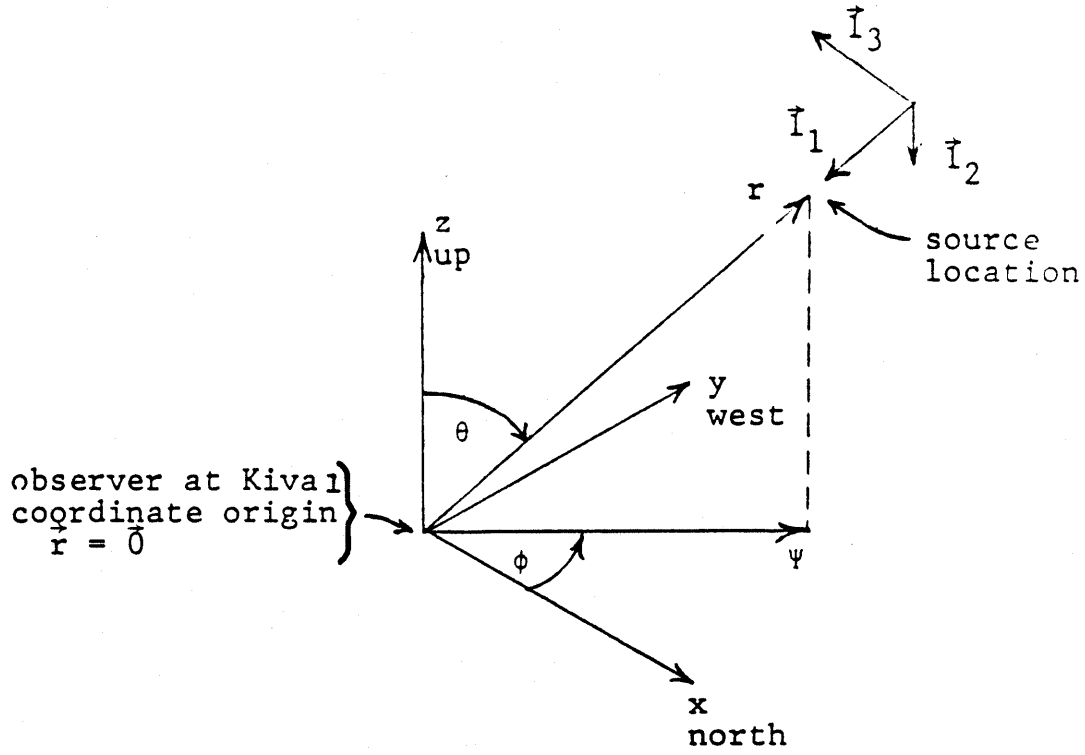
which can be written in terms of the array coordinates via

$$\vec{l}_B = (\vec{l}_B\cdot\vec{l}_X)\vec{l}_X + (\vec{l}_B\cdot\vec{l}_Y)\vec{l}_Y \tag{3.10}$$

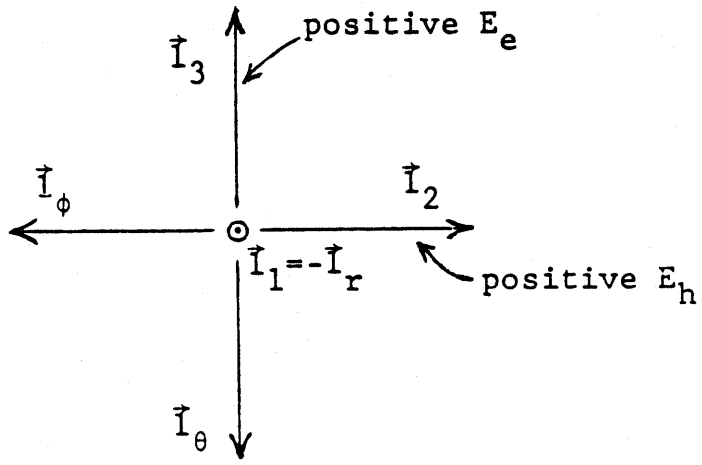
These various new quantities are computed to give

$$\vec{l}_X = (.912,\ -.408,\ .036)$$
$$\vec{l}_Y = (.410,\ .911,\ -.056)$$
$$\vec{l}_Z = (-.010,\ .066,\ .998)$$
$$\vec{l}_B = (.813,\ .582,\ -.031) \tag{3.11}$$
$$(K_{n,m}) = \begin{pmatrix} .912 & .410 & -.010 \\ -.408 & .911 & .066 \\ .036 & -.056 & .998 \end{pmatrix}$$
$$\vec{l}_B \cdot \vec{l}_X = .503$$
$$\vec{l}_B \cdot \vec{l}_Y = .865$$

Reproduced from a previous report [1,2] are the appropriate coordinates (cartesian, cylindrical, and spherical) and polarization vectors to refer the incoming electromagnetic wave to Kiva 1.



A. Coordinate systems



B. Reference directions seen by observer at $\vec{r} = \vec{0}$

Figure 3.2 Coordinates for lightning data analysis

IV. RECONSTRUCTION OF DIRECTION OF INCIDENCE

The incident wave is approximated as a plane wave of the form

$$\vec{E}_{inc}(r,t) = \vec{l}_p E_o f\left(t - \frac{\vec{l}_1 \cdot \vec{r}}{c}\right)$$

$$\vec{H}_{inc}(r,s) = \vec{l}_1 \times \vec{l}_p E_o Z_o f\left(t - \frac{\vec{l}_1 \cdot \vec{r}}{c}\right)$$

$\vec{l}_1 \equiv$ direction of incidence
(a constant unit vector)

$\vec{l}_p \equiv$ polarization (4.1)

$$\vec{l}_1 \cdot \vec{l}_p = 0$$

If we look at one position on the three indentical waveforms of $\vec{r}_A$, $\vec{r}_B$, and $\vec{r}_C$ we have

$$t - \frac{\vec{l}_1 \cdot \vec{r}}{c} = \text{constant independent of A,B,C} \qquad (4.2)$$

Since the choice of $t = 0$ is arbitrary we can choose it to be the time of wave arrival at any convenient point such as the coordinate center $\vec{r} = \vec{0}$ giving

$$\begin{aligned} ct &= \vec{l}_1 \cdot \vec{r} \\ ct_A &= \vec{l}_1 \cdot \vec{r}_A \\ ct_B &= \vec{l}_1 \cdot \vec{r}_B \\ ct_C &= \vec{l}_1 \cdot \vec{r}_C \end{aligned} \qquad (4.3)$$

Now define

$$\Delta_A \equiv \frac{c(t_A - t_C)}{|\vec{r}_A - \vec{r}_C|} = \vec{l}_1 \cdot \vec{l}_X \qquad (4.4)$$

$$\Delta_B \equiv \frac{c(t_B - t_C)}{|\vec{r}_B - \vec{r}_C|} = \vec{l}_1 \cdot \vec{l}_B$$

these being known from the relative delay measurements. Substituting for $\vec{l}_B$ we have

$$\Delta_B = (\vec{l}_B \cdot \vec{l}_X)(\vec{l}_1 \cdot \vec{l}_X) + (\vec{l}_B \cdot \vec{l}_Y)(\vec{l}_1 \cdot \vec{l}_Y) \tag{4.5}$$

We can then find the components of $\vec{l}_1$ from

$$\begin{aligned} l_{1_X} &= \vec{l}_1 \cdot \vec{l}_X = \Delta_A \\ l_{1_Y} &= \vec{l}_1 \cdot \vec{l}_Y = [\vec{l}_B \cdot \vec{l}_Y]^{-1}\left\{\Delta_B - (\vec{l}_B \cdot \vec{l}_X)\Delta_A\right\} \\ l_{1_Z} &= \vec{l}_1 \cdot \vec{l}_Z = -\left\{1-[\vec{l}_1 \cdot \vec{l}_X]^2 - [\vec{l}_1 \cdot \vec{l}_Y]^2\right\}^{1/2} \end{aligned} \tag{4.6}$$

with the minus sign chosen on the assumption that the wave is coming from above the plane of the array. Using our transformation to (x,y,z) coordinates

$$(l_{1_x}, l_{1_y}, l_{1_x}) = (K_{n,m}) \cdot (l_{1_X}, l_{1_Y}, l_{1_Z}) \tag{4.7}$$

We can now find

$$\vec{l}_r = -\vec{l}_1 \quad \text{(direction to the source)} \tag{4.8}$$

in either component form, or in terms of spherical polar angles (θ,ϕ) from

$$\begin{aligned} \theta &= \arccos(-l_{1_z}), \quad 0 \leq \theta < \pi \\ \cos(\phi) &= -l_{1_x}, \quad \sin(\phi) = -l_{1_y} \end{aligned} \tag{4.9}$$

The quadrant in which ϕ lies can be found from the signs of $\cos(\phi)$ and $\sin(\phi)$; ϕ is found by any of several inverse trigonometric functions and adjusted to lie in this quadrant.

V DELAYS FROM TIME-OF-ARRIVAL SENSORS

In computing Δ_A and Δ_B one needs the two time differences $t_A - t_C$ and $t_B - t_C$. These are measured with two delay counters which are both started by C channel, and separately stopped by A and B channels as indicated in figure 5.1. Defining

$$\begin{aligned} \Delta t_A &= \text{reading on A channel counter} \\ \Delta t_B &= \text{reading on B channel counter} \end{aligned} \tag{5.1}$$

one can compute

$$\begin{aligned} t_A - t_C &= \Delta t_A - (t_{AK} - t_{CKA}) \\ t_B - t_C &= \Delta t_B - (t_{BK} - t_{CKB}) \end{aligned} \tag{5.2}$$

where

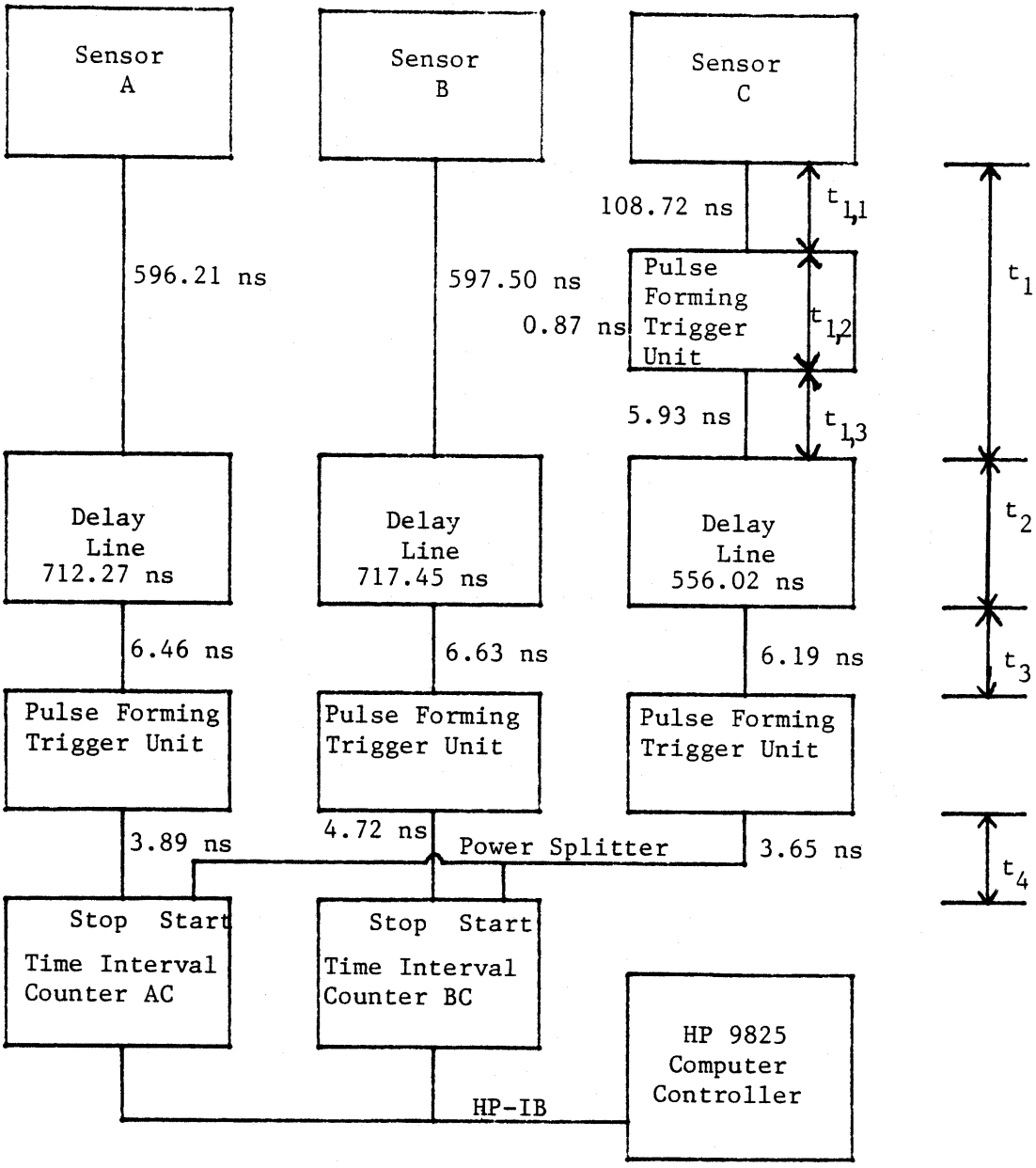
$$\begin{aligned} t_{AK} &\equiv \text{delay from sensor A to A counter stop} \\ t_{BK} &\equiv \text{delay from sensor B to B counter stop} \\ t_{CKA} &\equiv \text{delay from sensor C to A counter start} \\ t_{CKB} &\equiv \text{delay from sensor C to B counter start} \end{aligned} \tag{5.3}$$

In computing the differences of these delays for use in (5.2) one does not need to count delays common to all channels; here we neglect the internal sensor delays and the delays through the pulse-forming trigger units. Hence we have

$$\begin{aligned} t_{AK} - t_{CKA} &= (596.21\text{ns} + 712.27\text{ns} + 6.46\text{ns} + 3.89\text{ns}) - (108.72\text{ns} + \\ &\quad 0.87\text{ns} + 5.93\text{ns} + 556.02\text{ns} + 6.19\text{ns} + 3.65\text{ns}) = 637.45\text{ns} \end{aligned} \tag{5.4}$$

$$\begin{aligned} t_{BK} - t_{CKB} &= (597.50\text{ns} + 717.45\text{ns} + 6.63\text{ns} + 4.72\text{ns}) - (108.72\text{ns} + \\ &\quad 0.87\text{ns} + 5.93\text{ns} + 556.02\text{ns} + 6.19\text{ns} + 3.65\text{ns}) = 644.92\text{ns} \end{aligned}$$

Note that these delay differences are larger than the maximum free-space delay of the incident wave propagating in a direct line from $\vec{r}_A$ to $\vec{r}_C$ or $\vec{r}_B$ to $\vec{r}_C$ of about 307ns. This assures that the signal from C always arrives first to start the counters.



Time Delay ($t_1 + t_2 + t_3 + t_4$) from Sensors to Counters

t_{AK} = 1318.83 ns

t_{BK} = 1326.30 ns

$t_{CKA} = t_{CKB}$ = 681.38 ns

Figure 5.1 Delays from Time-of-Arrival Sensors

VI. TIME-OF-ARRIVAL SYSTEM CALIBRATION

Figure 6.1 shows the TOA calibration system. Calibration was done by sending a pulse to each simulator A, B, and C and comparing the actual and calculated time differences of the return signals from the sensors. Allowed errors were about 1 ns. Each pulse from the time synthesizer had a known delay so that round trip time for each channel could be calculated and compared to the readings of the time interval counters.

Operation sometimes varies from that shown by using the signal from one HV 100 pulser split three times to deliver a signal to all three simulators simultaneously. With 1300 V into the HV 100 and eight times attenuation to A, B, and C simulators, the return signal from sensor C rose in 15 ns to a peak of 170 mV. From this value, we determined that a reasonable level to determine a trigger was 100 mV and to determine the first rise of the pulse 10 mV was used.

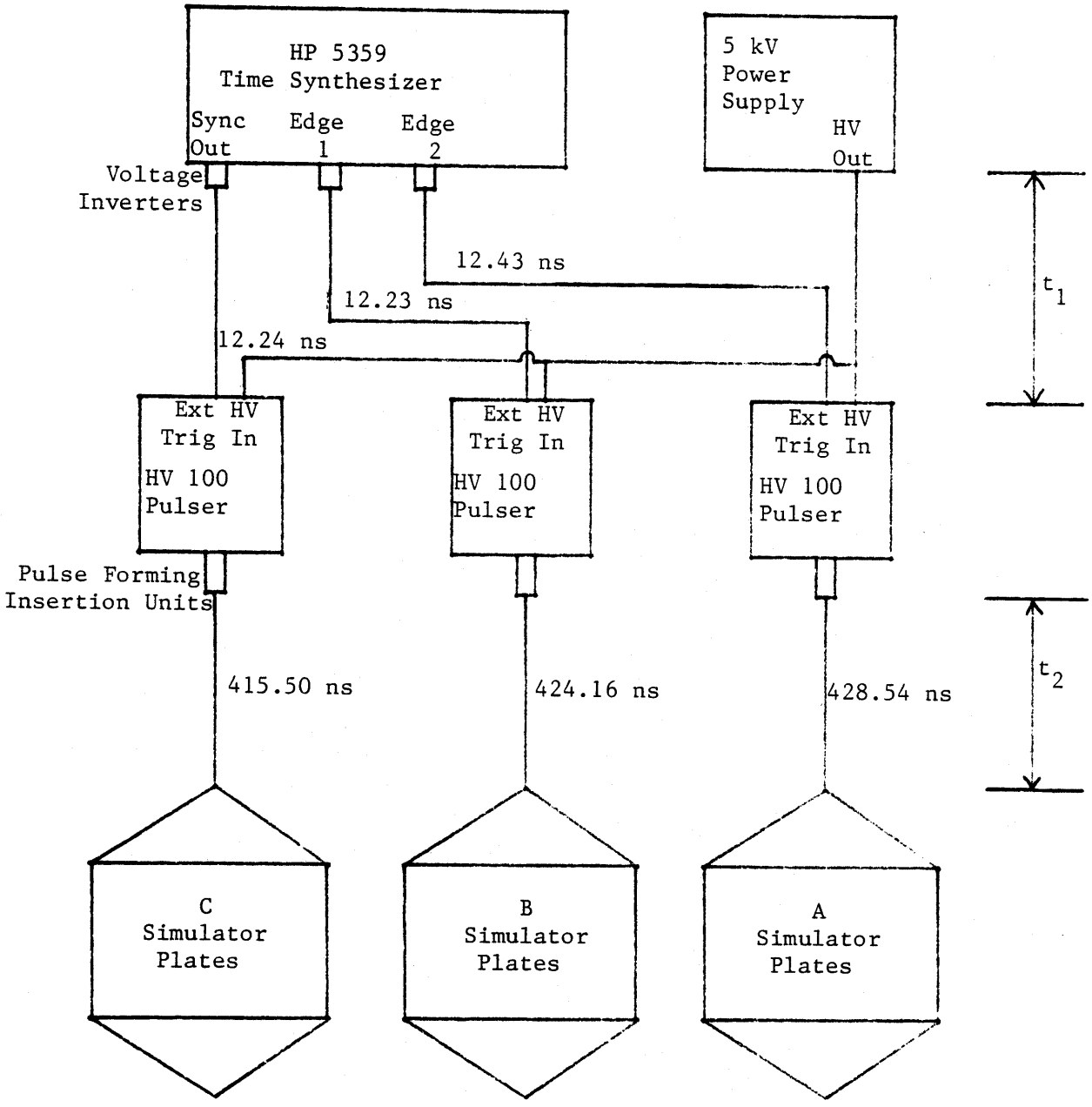
Our original cable length measurements were taken using Time Domain Reflectometry. The TDR system is shown in Fig. 6.2. We set up the TDR system and looked at the returning pulses from the long signal cables. There was some rise time degradation in the outgoing pulse and a large amount of degradation in the return pulse. Therefore, our calculated delay times from the TDR measurements were in error. See Fig. 6.3.

To correct the error, we retimed the cable lengths and included a correction factor dependent on the rise of the outgoing pulse and the fall of the return pulse. Each measurement was examined on a Tektronix 454 oscilloscope. The rise and fall times were extrapolated from the original slope of each pulse. The correction formula was then:

$$\left\{\begin{array}{c}\text{mean round trip time (ns)} \\ \text{(10k samples)}\end{array}\right\} + \left\{\frac{\text{start trigger level (V)}}{\text{slope of output pulse rise (V/ns)}}\right\}$$

$$- \left\{\frac{\text{stop trigger level (V)}}{\text{slope of return pulse fall (V/ns)}}\right\} = \text{Actual round trip time.}$$

We repeated the calibration with these new measurements and found the error to be less than 1.5 nanoseconds. A perturbation analysis indicates less than half a degree change in indicated ϕ near the horizon, and indicated θ near the zenith for such a time error. Due to other factors (such as two time delays and the fact that certain errors can lead to invalid solutions) a numerical experiment was performed which resulted in this amount of error yielding a 2° change in angle ϕ from a signal at the horizon.



Time Delay ($t_1 + t_2$) from Time Synthesizer to Simulators

A_{delay} = 440.97 ns

B_{delay} = 436.39 ns

C_{delay} = 427.74 ns

Figure 6.1 Delays from Time-of-Arrival Calibration System

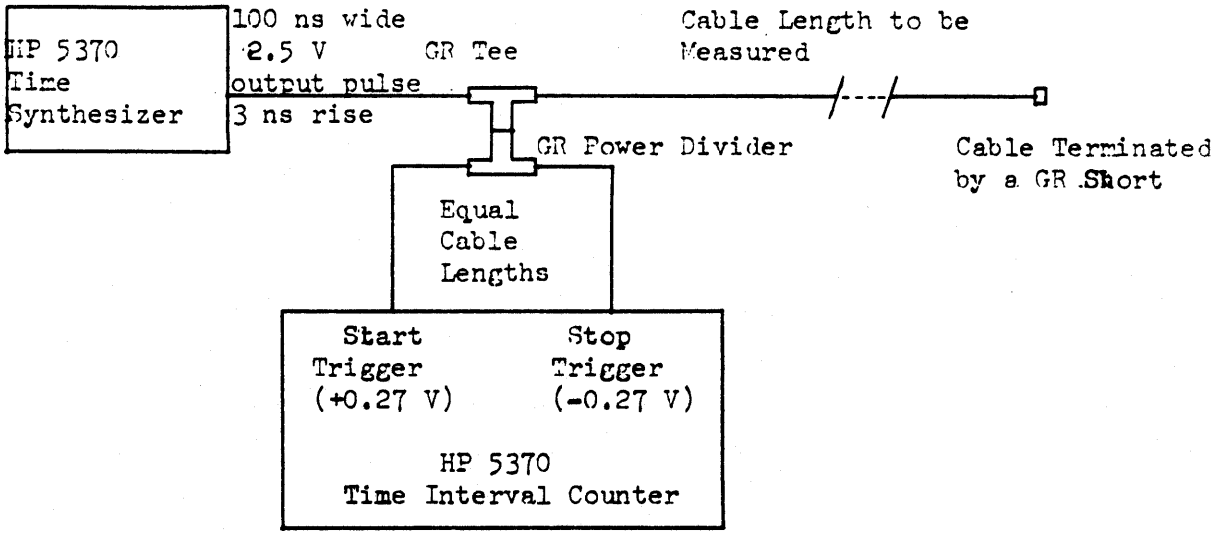


Figure 6.2 System for measuring TOA cable lengths using Time Domain Reflectometry (TDR)

Voltage to Simulators	A,B,C Trigger Level	Time Delay to Simulators (ns)			Time Delay to Counters (ns)			Differential Delay (ns)		Counter Measurements (ns)		Error (ns)	
(kV)	(mV)	A	B	C	A	B	C	A-C	B-C	A-C	B-C	AC	BC
1.2	11	541.0	636.4	427.7	1859.8	1962.7	1109.2	750.6	853.5	755.8	848.9	5.2	7.6
1.0	11	541.0	636.4	427.7	1859.8	1962.7	1109.2	750.6	853.5	760.7	851.3	10.1	2.2
1.2	22	541.0	536.4	427.7	1859.8	1862.7	1109.2	750.6	753.5	749.7	749.6	0.9	3.9
1.2	11	541.0	536.4	427.7	1859.8	1862.7	1109.2	750.6	753.5	752.4	751.9	1.8	1.6
1.3	11	441.0	436.4	427.7	1759.8	1762.7	1109.2	650.6	653.5	645.8	646.5	4.8	7.0
After new TDR 1.3	11	429.1	424.6	416.1	1737.5	1739.5	to A 1091.8 1091.7 to B	645.7	647.8	645.8	646.5	0.1	1.3

Figure 6.3 Comparison of calibration results to measured delays in TOA system

VII. TRIGGERING AND DATA PRINTOUT

To determine a TOA system trigger, the signal from sensor C is monitored. If the signal exceeds a predetermined threshold level, a +Ø.5V trigger is sent to the Biomation system. Three comparators are also enabled to determine first rise of the signals from each of the three sensors. Each signal is delayed before reaching the comparators to insure that C signal always arrives first regardless of the direction of the EM source.

When the first rise threshold (1Ø mV) is surpassed a -1 V pulse is sent to the counters. Signal C started both counters and each of the counters was stopped by either A or B signal. Trigger levels to start and stop were set at the same level since equivalent pulses were coming to the start and stop inputs.

When both counters had been stopped, the counter values and time were read by the computer and stored in an array. A millisecond timer was started and the counters were rearmed. The timer was used to accurately determine the time between triggers. The computer would accept data from up to ten triggers or wait 5ØØ ms without a trigger, before storing data on magnetic tape.

After recording the TOA data on tape, the computer would print the time and θ, ϕ angles with respect to the Kiva for each trigger. The angles are calculated using the algorithm in section 4.

All the data presented in this report were taken with a time delay from trigger to rearm of 32Ø ms. No correlation between waveform and TOA data is available except for the first trigger event because of the long time delay. The computer program has been changed so that the trigger-rearm delay is now 85 ms. This should allow two waveform data grabs for every TOA data grab.

The system has not been used with the new timing. If this does not work satisfactorily, the Biomations will be armed and triggered externally with the TOA system. In this case, each Biomation data window will correlate with new TOA angles.

VIII. MULTIPLE DATA WINDOWS FOR ELECTROMAGNETIC WAVEFORMS

A previous paper [1,2] has discussed in some detail the measurement of two components of the horizontal magnetic field and the single-component vertical electric field on the ground plane at the top of the Kiva. These waveforms are analyzed to find, for each of the larger individual pulses in the waveforms, a relationship between θ and ϕ where (θ,ϕ) describes the direction of arrival. As in Fig. 8.1, a polar plot with $\sin(\theta)$ as radius and ϕ as azimuth gives the relationship between θ and ϕ as a straight line. Intersections of such lines are used to estimate (θ,ϕ) for such pulses. The reader is referred to [1,2] for the details of this procedure. In the previous paper only single 20 μs data windows were obtained during each lightning flash. In this paper, we present records with four such data windows obtained during a single flash, thereby showing some of the progression of the fast-transient lightning characteristics through the flash.

Figure 8.2 gives a diagram of the data acquisition system. Data is digitized at a rate of 100 MHz by the Biomation waveform analyzers which are controlled by an HP 9825 computer. Two kilobyte shift registers within the waveform analyzers limit the data window to 20 μs. The data is transferred to the computer and then stored on a floppy disk. Difficulties in data transfers to the computer limited us to take only one set of data from the three waveform analyzers during 1979. Computer memory limitations would allow only two sets of data per lightning flash to be taken.

The data transfer problems were solved and an additional 46 kilobytes of memory were added to the 9825. This enabled us to get 20 μs of data from four different strokes within each lightning flash, or a total of 80 μs of data. The minimum separation between each of the four data windows is 40 ms.

The waveform analyzers continuously monitored signals from the three electromagnetic sensors. When a trigger occurred on the TOA system (from station C, the station nearest the Kiva) the waveform analyzers were triggered by a +0.5 V pulse. The digitized data were transferred to buffer memory of the 9825 using DMA (Direct Memory Access). In addition, the time of triggering in ms was transferred to the 9825. The waveform analyzers were then rearmed for another trigger. The time from a trigger until rearming was 40 ms.

Data could be dumped to the 9825 three times; the fourth data set would circulate through the waveform analyzer shift registers until the buffers could be cleared. They were then transferred to the 9825. Data from the 9825 was stored on a floppy disk for later analysis. Storing data from 4 data windows took 12 seconds. The system was then rearmed and ready to accept a trigger from another lightning flash.

If a trigger did not occur within 500 ms of the previous one, all data acquired up to that time (1, 2, or 3 data sets) would be stored on

a floppy disk. The system again was rearmed and awaited the next event.

Interesting progressions of events and data which we had not seen with only one data set per lightning flash have been obtained. Some of this data is presented in a later section.

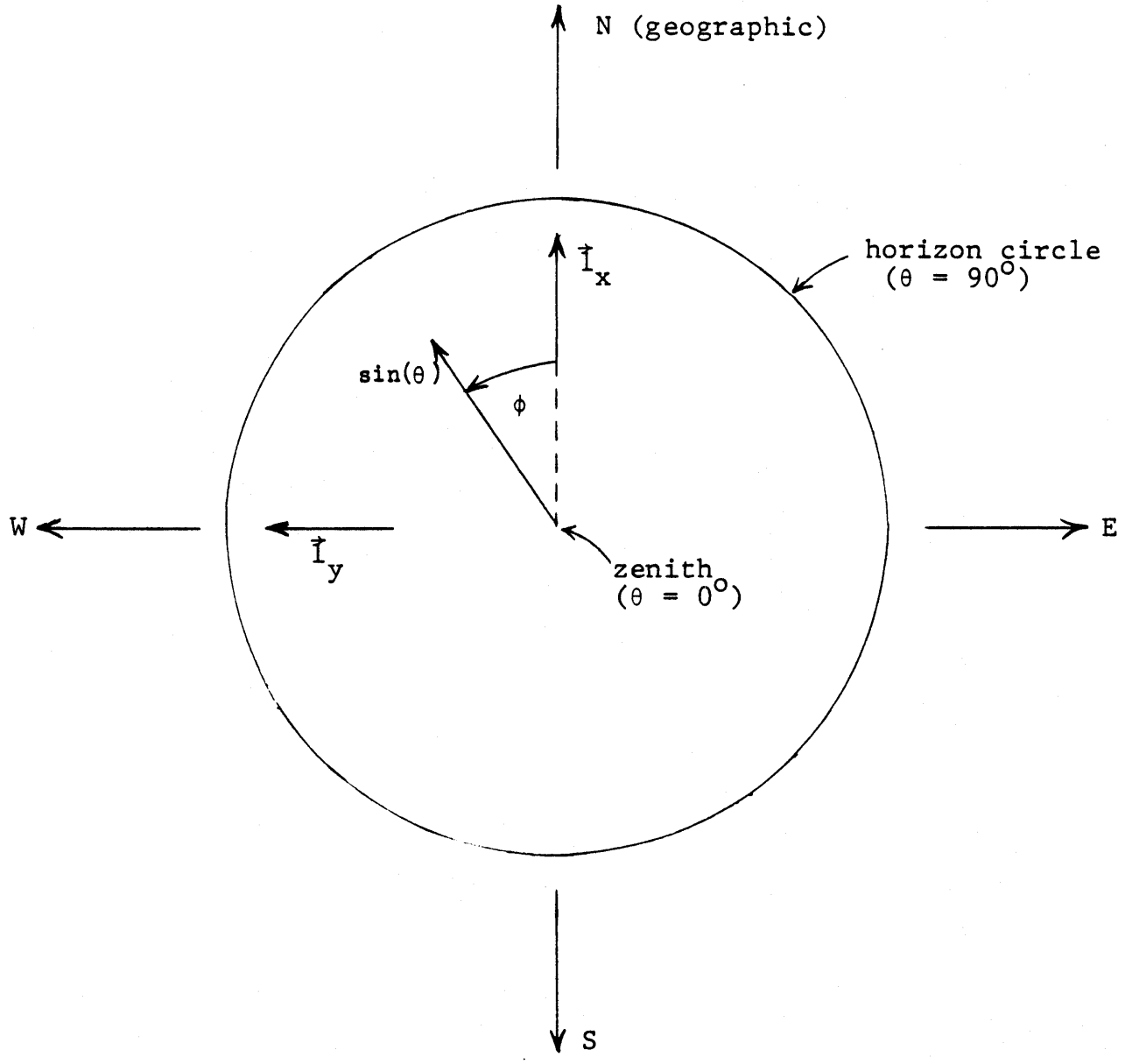


Figure 8.1 Polar plot for determining direction to source

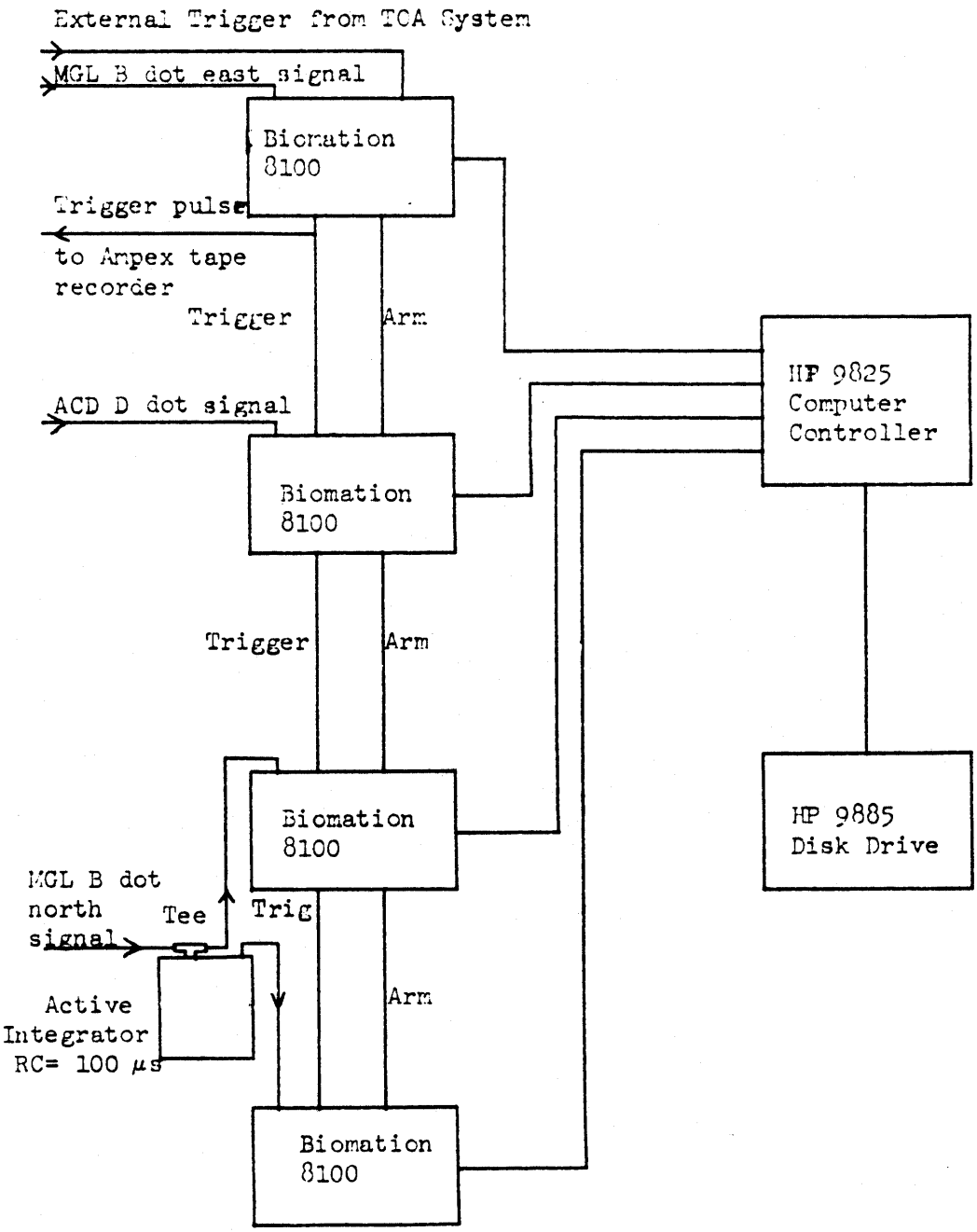


Figure 8.2 Kiva electromagnetic waveform data acquisition system

IX. RELATIONSHIP OF THE VARIOUS MEASUREMENTS OF ANGLE OF ARRIVAL

A tabulation of the θ, ϕ source locations for both TOA and waveform solutions is given in Figures 1Ø.n.8 where n is the nth subsection. The range(r) used to determine the waveform source locations is found using the method in [1,2]. The range for each TOA event, E_n is estimated from the closest approach of the θ, ϕ direction line to the flash as determined from the acoustic locations in Figures 1Ø.n.5. When no acoustic locations were available, the same value of r was used for the TOA and waveform solutions.

Coordinates of the various origins are given in the (x,y,z) coordinate system in Figure 3.1. Section 4 describes the method of finding the TOA solutions with reference to $\vec{r}_o$, the center of the TOA array.

To return to the (x,y,z) coordinate system and determine θ, ϕ with respect to the Kiva, we use equations 3.7 and 4.9. The same procedure is used to find the TOA solution with respect to the whole-sky camera (WSC) substituting $(\vec{r}_{WSC} - \vec{r}_o)$ for $\vec{r}_o$.

In transforming the waveform solution origin from the Kiva to the whole-sky camera, (r,θ,ϕ) values are changed to (x,y,z) added to $\vec{r}_{WSC}$, and then the new θ,ϕ found using 4.9.

X. DATA SETS FROM LIGHTNING FLASHES

Data from eight selected lightning discharges are presented in this section. The techniques discussed in [1,2] have been applied to the waveform data. The algorithm dicussed in the previous section has been applied to azimuth and elevation angle solutions from the waveform and TOA data for the figures which superpose all the solutions with respect to a single origin. Each data set forms a subsection 10.n for n = 1,2,...8. After the discussion in each subsection, there are figures appropriate to the subsection labelled as 10.n... . Each data set has been named according to the type of lightning waveform recorded. Each data set may contain up to 5 discrete trigger occurrences with data from each trigger subdivided into events. Each trigger is denoted by time of occurrence in ms and the events within each trigger (length of 20 μs) are denoted by time of occurrence in μs. Figures from derivative waveforms are labelled A.1, A.2,... with the numbers corresponding to trigger event. Figures from waveform data are labelled B.1, B.2,... . The tabular data is labelled so that a.m corresponds to the mth event in the first trigger event. Similarly b.m is the mth event within the second trigger event, etc.

In all figures TOA events are denoted E_n and biomation trigger events are denoted $E_{n,m}$ where n ranges from 1 to 5 events per lightning flash and m denotes the number of solutions from each 20 μs data window.

For each subsection n, figures are:

Fig. 10.n.	1.A.1 A.2 A.3 A.4	Derivative fields from ...
Fig. 10.n.	1.B.1 B.2 B.3 B.4	Fields from ...
Fig. 10.n.	2.	Time history of waveform and TOA events from ...
Fig. 10.n.	3.a.1 . . . a.m b.1 . . . b.m c.1 . . . c.m d.1 . . . d.m	Digital data from event ...
Fig. 10.n.	4.a	Slow electric field change & thunder microphone record from ...
Fig. 10.n.	4.b	Slow electric field change & biomation trigger marks superposed on the electric field change record from ...
Fig. 10.n.	5	Acoustic location of ...
Fig. 10.n.	6.A.1 A.2 A.3 A.4	$\sin(\theta),\phi$ contours for ... derivative waveform
Fig. 10.n.	6.B.1 B.2 B.3 B.4	$\sin(\theta),\phi$ contours for ... waveform

Fig. 10.n.	7	Whole-sky videotape photograph of ... from Kiva
Fig. 10.n.	8	Tabulation of θ, ϕ values for waveform and TOA solutions with origin at different locations
Fig. 10.n.	9.A.1	Tabulation of peak values for each event from derivative waveform set for ...
	A.2	
	A.3	
	A.4	
Fig. 10.n.	9.B.1	Tabulation of peak values for each event from waveform set for ...
	B.2	
	B.3	
	B.4	
Fig. 10.n.	10.A.1	$d\vec{T}/dt$ for ...
	A.2	
	A.3	
	A.4	
Fig. 10.n.	10.B.1	$\vec{T}$ for ...
	B.2	
	B.3	
	B.4	

10.1 ROCKET TRIGGERED LIGHTNING

Our first data set is from rocket triggered lightning. No TOA events were recorded from this flash. The 4 derivative waveforms in Figures 10.1.1.A.1-4 show an interesting progression of events, first leader-like behavior and then 3 return strokes. Notice the leader-like breakdown pulses preceeding the event 12.2 in Figure 10 1.1.A.2. The field waveforms are shown in Figures 10.1.1.B.1-4. The time separation of the 4 waveform events is shown in Figure 10.1.2.

A horizontal range of 433 m is determined from the slow antenna and thunder waveforms in Figure 10.1.3. This range is used along with the azimuth and elevation angle solutions to determine the electromagnetic source locations shown on the acoustic reconstruction, Figure 10.1.4. Only a few acoustic source locations were found from the thunder so the lightning channel is not well defined. The rocket launcher is located very near the ground point of the strike. Since the launcher is below the Kiva horizon, it is not surprising that the EM sources do not agree completely with the acoustics.

All of the θ, ϕ solutions using the Kiva as their origin shown in the polar plots in Figures 10.1.6.A and 10.1.6.B have been translated to an origin of the whole sky camera. These solutions are tabulated in Figure 10.1.8 and plotted on a polar plot superposed on a whole sky videotape photograph of the lightning flash (Figure 10.1.7). The solutions at the horizon show fair agreement with the channel ($\pm 5^{\circ}$). While event 2,1 deviates only about 5° from the visible part of the channel, it could be from branching within the cloud. The distortion on the photograph was caused by the lightning flash.

The tabulated Υ values and plots are Figures 10.1.9.A.1 through 10.1.10.B.4. Events 1,1 and 2,1 are plotted the vectors tail to head and $\vec{v}_{eff} \uparrow\downarrow \vec{J}$ assuming a leader or negative streamer. In the case of rocket triggered lightning, these streamers may also be propagating upward in which the effective streamer reconstructions will have the opposite sense. The remaining events are plotted with $\vec{v}_{eff} \uparrow\uparrow \vec{J}$ assuming positive streamers.

Rocket triggered lightning is initiated by an upward going streamer (positive) from the enhanced field at the tip of the rocket. In order to distinguish between the leader-like behavior and return stroke behavior the distinction has been made as in natural lightning: negative streamers correspond to leader strokes and positive streamers to return strokes.

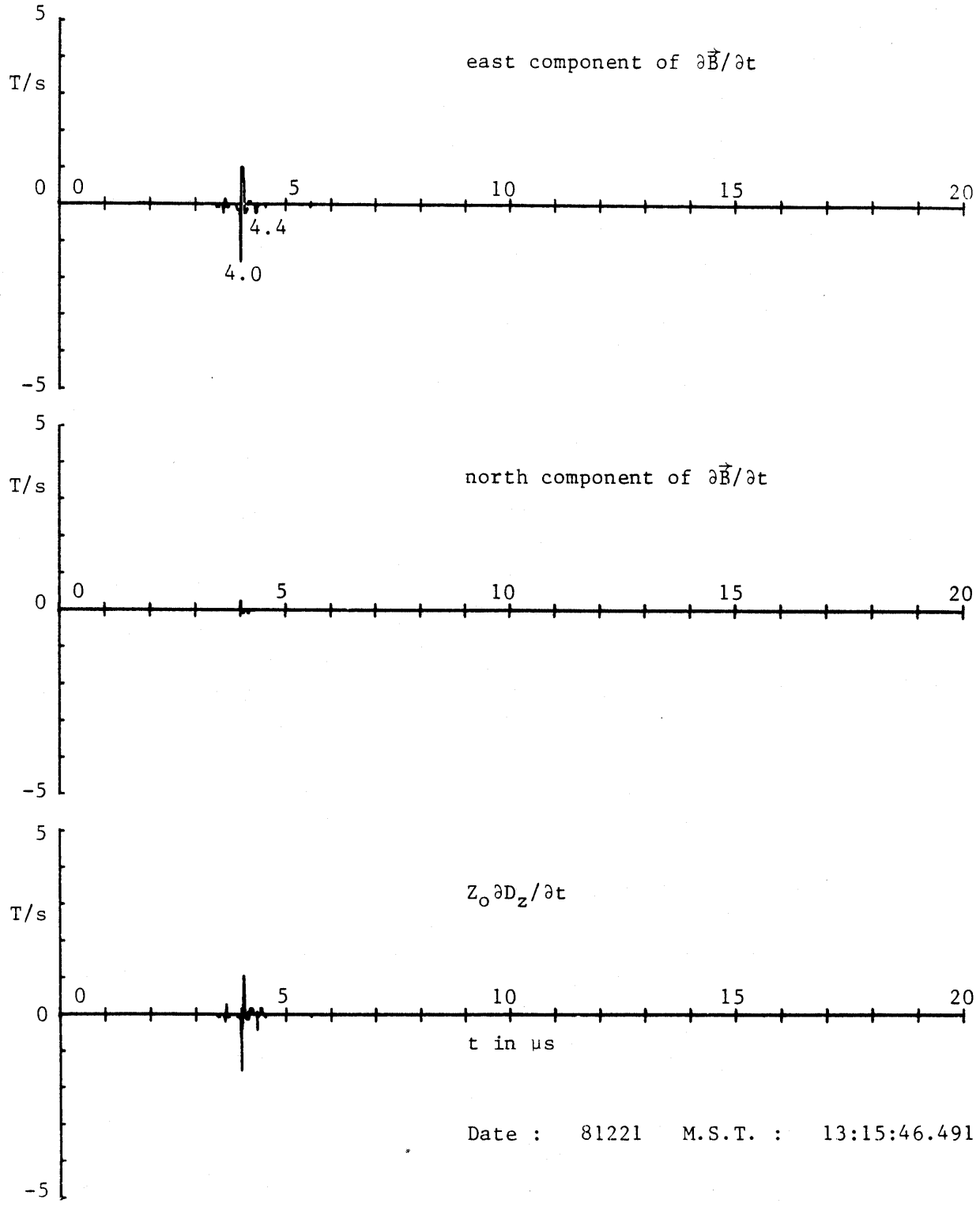


Figure 10.1.1.A.1 Derivative fields from rocket triggered lightning

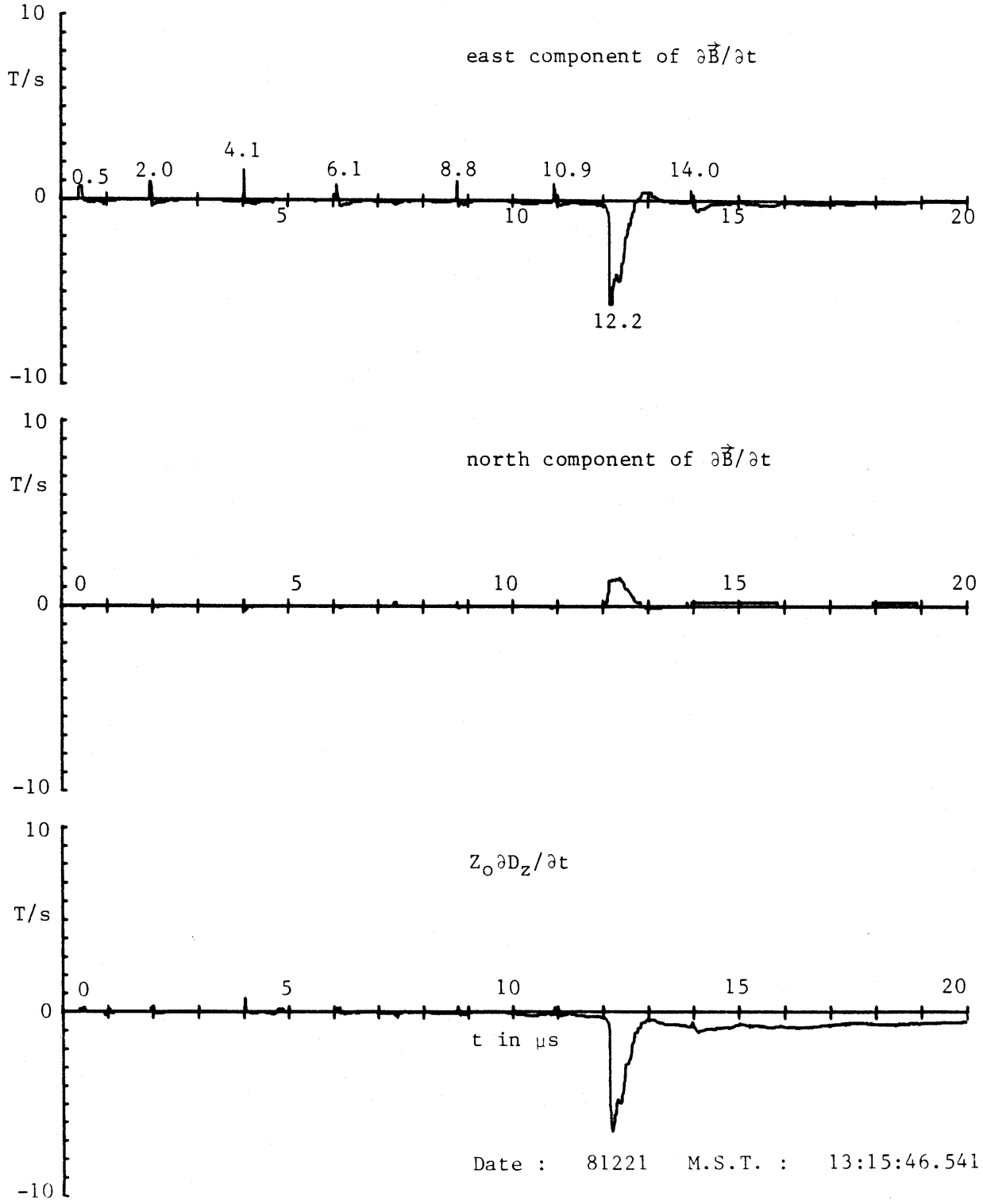


Figure 10.1.1.A.2 Derivative fields from rocket triggered lightning

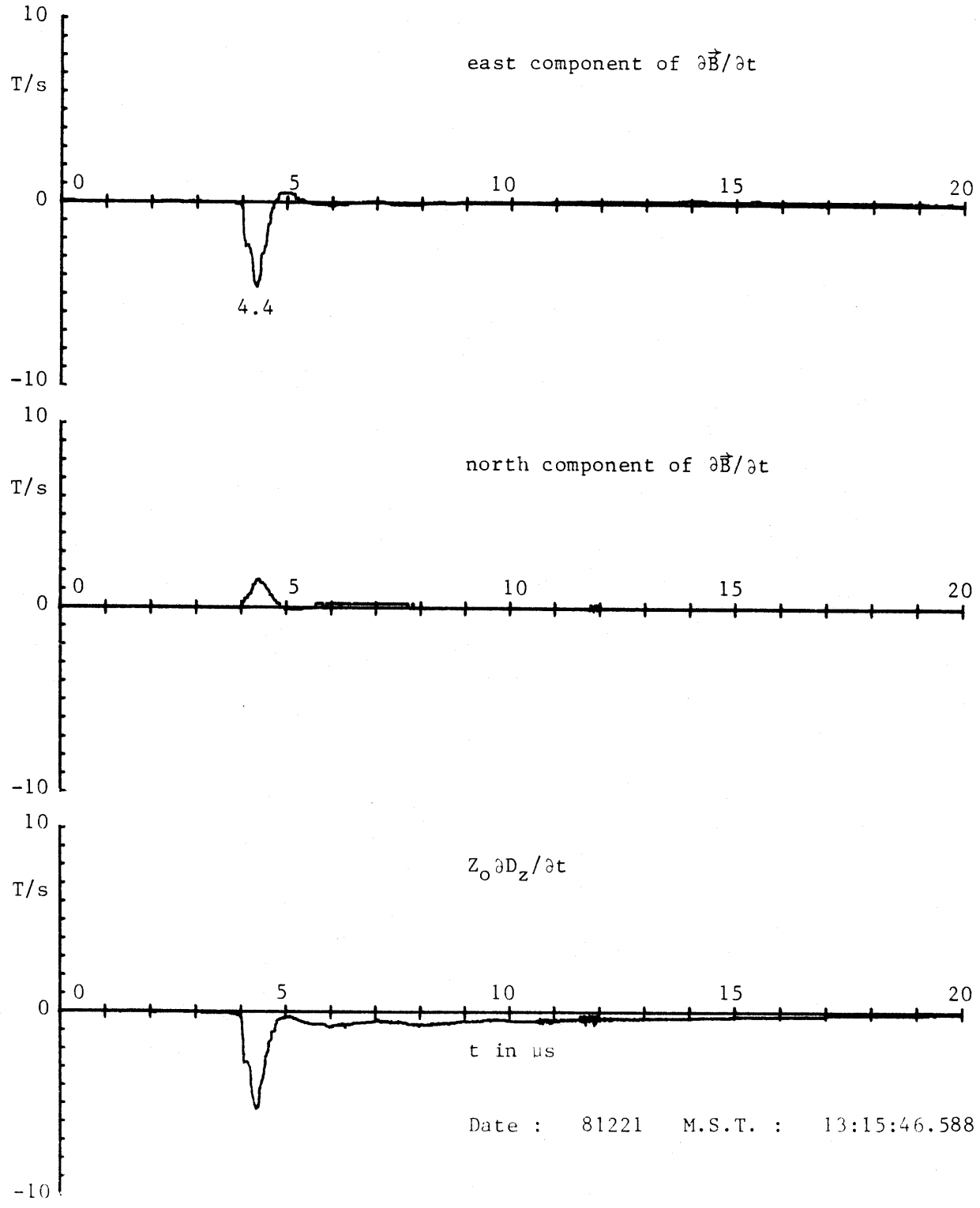


Figure 10.1.1.A.3 Derivative fields from rocket triggered lightning

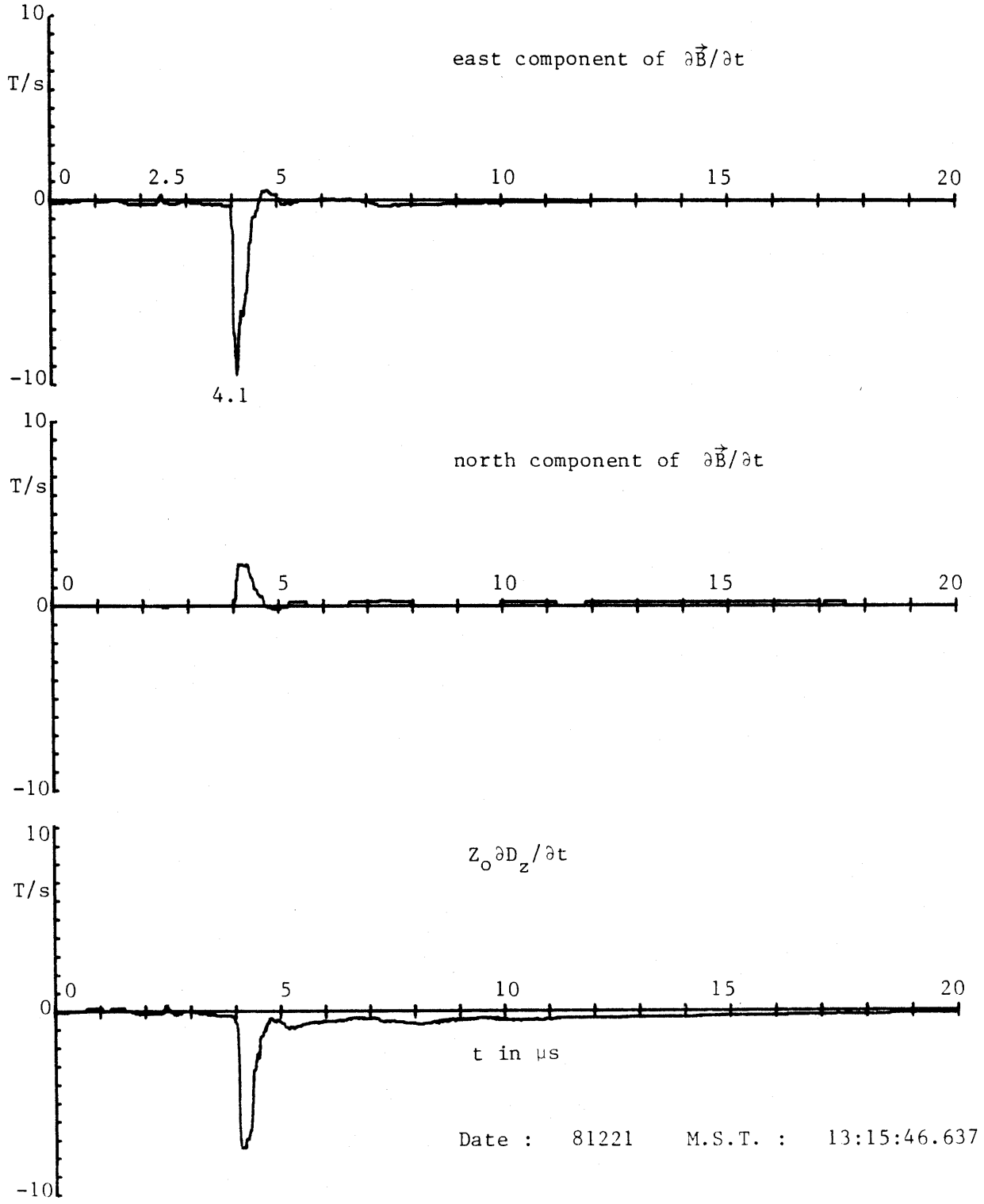


Figure 10.1.1.A.4 Derivative fields from rocket triggered lightning

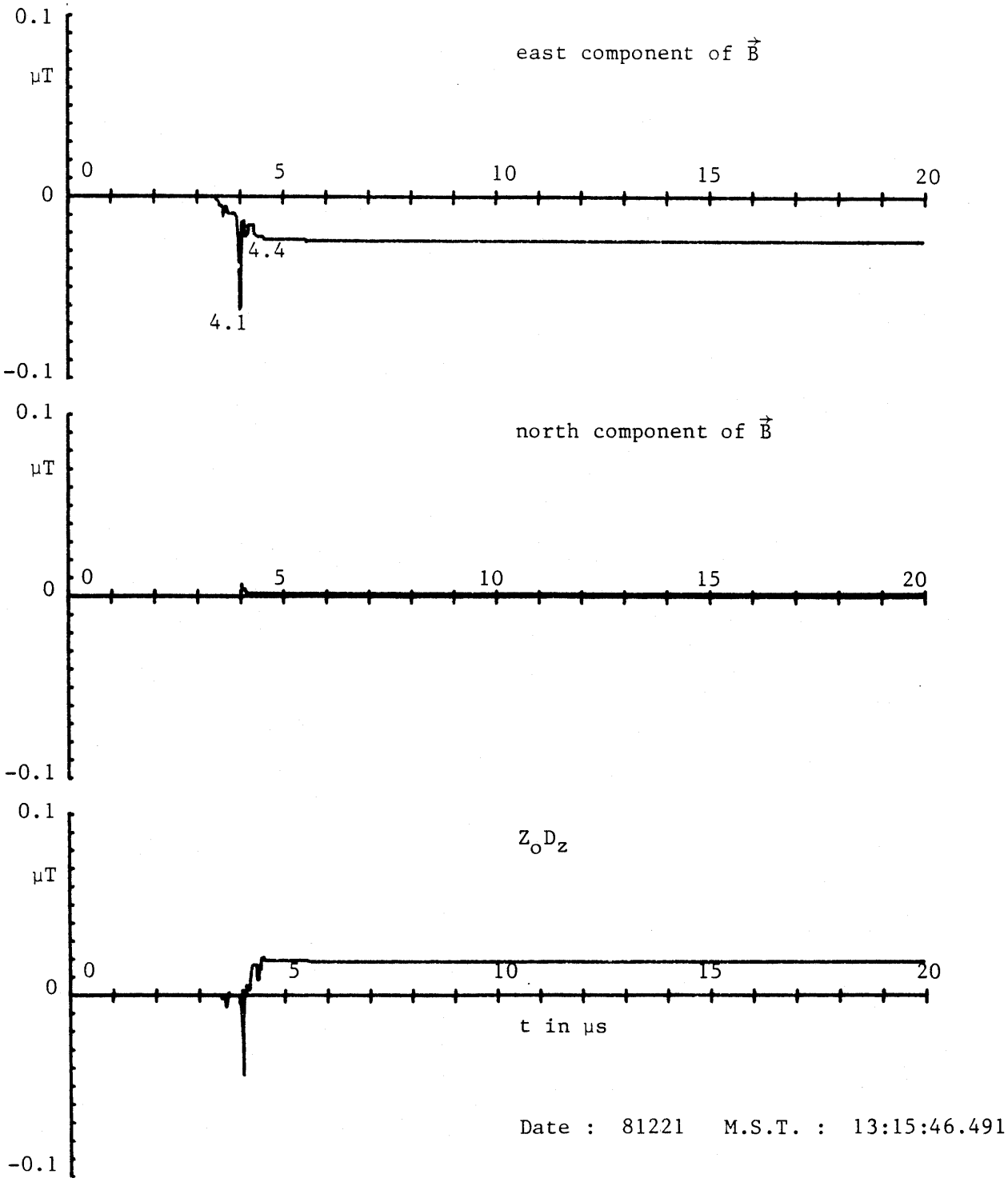


Figure 10.1.1.B.1 Fields from rocket triggered lightning

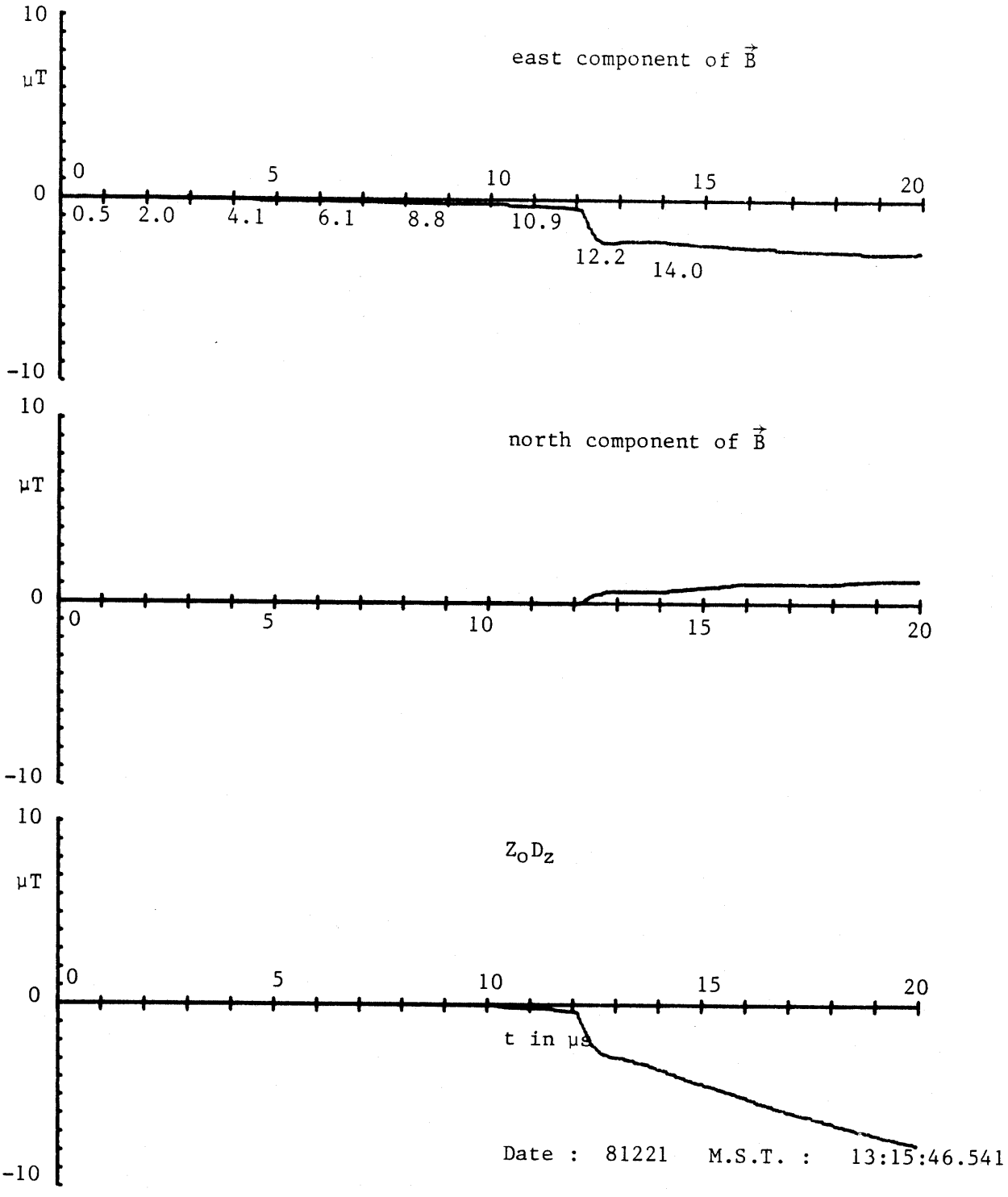


Figure 10.1.1.B.2 Fields from rocket triggered lightning

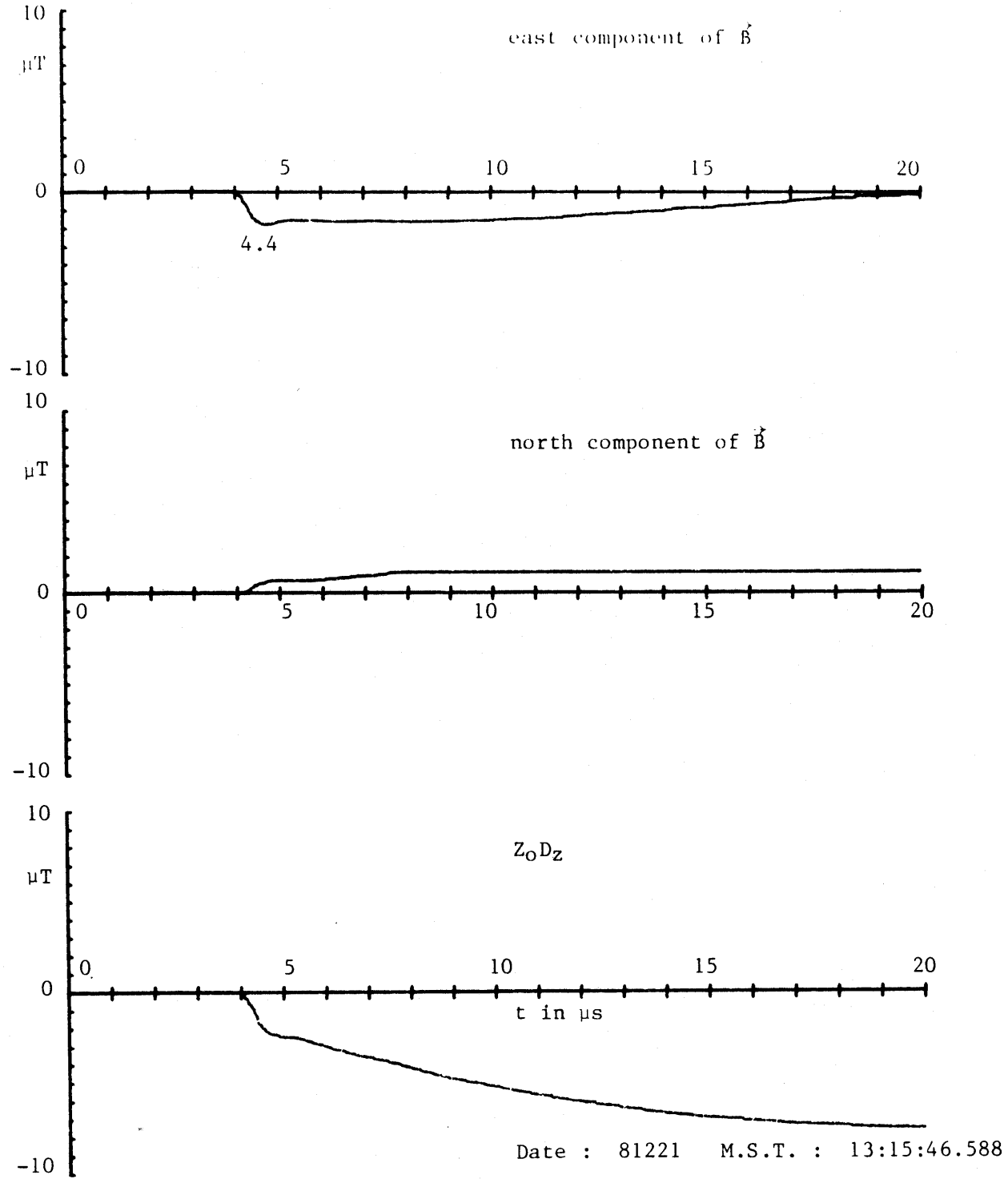


Figure 10.1.1.B.3 Fields from rocket triggered lightning

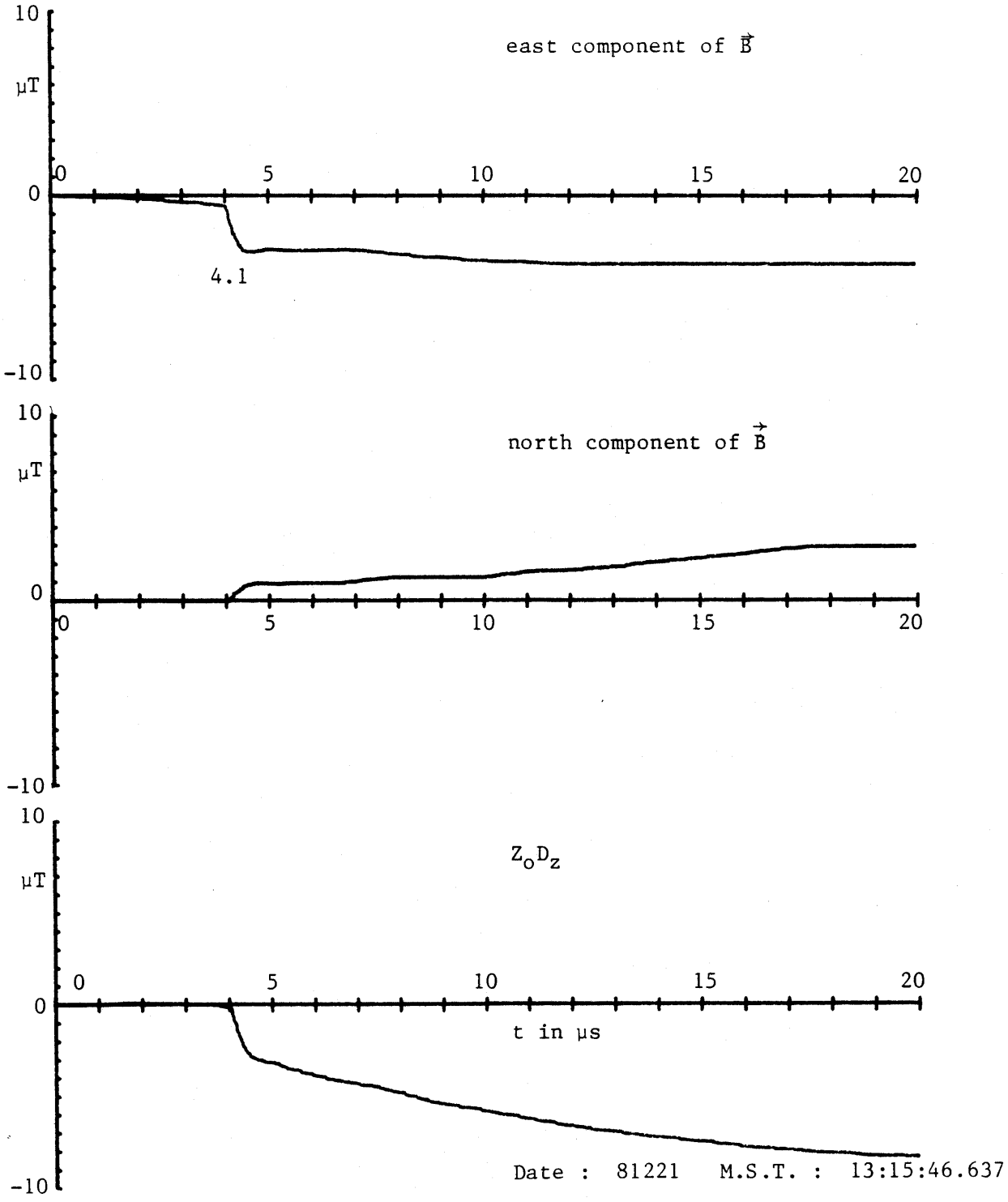


Figure 10.1.1.B.4 Fields from rocket triggered lightning

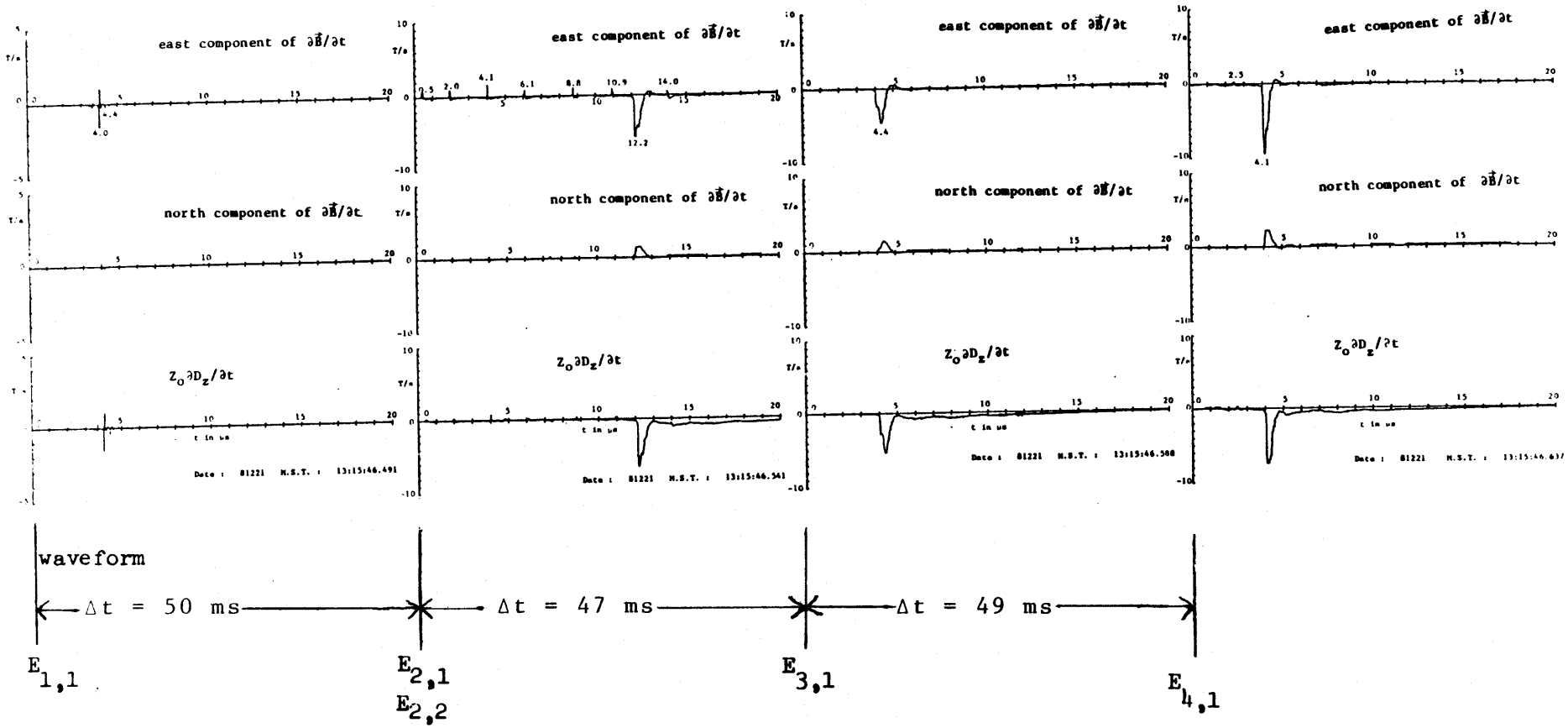


Figure 10.1.2 Time history of waveform and TOA events from rocket triggered lightning

Figure 10.1.3.a.1 Digital data for event 4.0

[ ] = baseline which is subtracted for peaks and numerical integration

Yeardate: 81221 Time: 13:15:46.491 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
3.92	-0.391	-0.156	-0.059	0.000	-0.000	0.000
3.93	-0.391	-0.156	-0.059	0.000	-0.000	0.000
3.94	-0.469	-0.156	-0.059	-0.001	-0.000	0.000
3.95	-0.469	-0.156	-0.059	-0.002	-0.000	0.000
3.96	-0.469	-0.156	-0.118	-0.002	-0.000	-0.001
3.97	-0.547	-0.156	-0.118	-0.004	-0.000	-0.001
3.98	-0.547	-0.156	-0.118	-0.005	-0.000	-0.002
3.99	-0.547	-0.156	-0.177	-0.007	-0.000	-0.003
4.00	-0.703	-0.156	-0.177	-0.010	-0.000	-0.004
4.01	-1.250	-0.156	-0.177	-0.019	-0.000	-0.005
4.02	-1.875	-0.156	-0.412	-0.034	-0.000	-0.009
4.03	-1.953	-0.156	-0.648	-0.049	-0.000	-0.015
4.04	-0.703	0.078	-0.943	-0.052	0.002	-0.024
4.05	-0.313	0.078	-1.590	-0.052	0.005	-0.039
4.06	0.547	0.078	-0.471	-0.042	0.007	-0.043
4.07	0.625	-0.156	0.059	-0.032	0.007	-0.042
4.08	0.625	-0.156	0.943	-0.022	0.007	-0.032
4.09	0.313	-0.234	1.001	-0.015	0.006	-0.021
4.10	0.234	-0.234	0.943	-0.009	0.005	-0.011
4.11	0.000	-0.234	0.707	-0.005	0.005	-0.004
4.12	-0.313	-0.234	0.471	-0.004	0.004	0.002
4.13	-0.391	-0.156	0.236	-0.004	0.004	0.005

Figure 10.1.3.a.2 Digital data for event 4.4

[ ] = baseline which is subtracted for peaks and numerical integration

Yeardate: 81221 Time: 13:15:46.491 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
4.35	-0.391	-0.156	-0.059	0.000	-0.000	0.000
4.36	-0.391	-0.156	-0.059	0.000	-0.000	0.000
4.37	-0.625	-0.156	-0.059	-0.002	-0.000	0.000
4.38	-0.625	-0.156	-0.118	-0.005	-0.000	-0.001
4.39	-0.391	-0.156	-0.412	-0.005	-0.000	-0.004
4.40	-0.391	-0.156	-0.471	-0.005	-0.000	-0.008
4.41	-0.469	-0.156	0.000	-0.005	-0.000	-0.008
4.42	-0.469	-0.156	-0.059	-0.006	-0.000	-0.008
4.43	-0.391	-0.156	-0.118	-0.006	-0.000	-0.008
4.44	-0.391	-0.156	-0.059	-0.006	-0.000	-0.008
4.45	-0.391	-0.156	-0.059	-0.006	-0.000	-0.008
4.46	-0.391	-0.156	0.118	-0.006	-0.000	-0.006
4.47	-0.391	-0.156	0.118	-0.006	-0.000	-0.005
4.48	-0.391	-0.156	0.118	-0.006	-0.000	-0.003
4.49	-0.391	-0.156	0.118	-0.006	-0.000	-0.001
4.50	-0.391	-0.156	0.118	-0.006	-0.000	0.001

Figure 10.1.3.b.1 Digital data for event 0.5

[ ] = baseline which is subtracted for peaks and numerical integration

Yeardate: 81221 Time: 13:15:46.541 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
0.43	-0.156	-0.156	-0.059	-0.000	-0.000	0.000
0.44	0.156	-0.156	0.118	0.003	-0.000	0.002
0.45	0.313	-0.156	0.118	0.008	-0.000	0.004
0.46	0.313	-0.156	0.177	0.012	-0.000	0.006
0.47	0.234	-0.156	0.177	0.016	-0.000	0.008
0.48	0.000	-0.234	0.236	0.018	-0.001	0.011
0.49	-0.313	-0.313	0.236	0.016	-0.002	0.014
0.50	-0.391	-0.313	0.236	0.014	-0.004	0.017
0.51	-0.469	-0.313	0.059	0.011	-0.005	0.018
0.52	-0.469	-0.234	0.059	0.008	-0.006	0.019
0.53	-0.469	-0.156	0.000	0.005	-0.006	0.020
0.54	-0.469	-0.156	-0.059	0.002	-0.006	0.020
0.55	-0.469	-0.156	-0.059	-0.002	-0.006	0.020

Figure 10.1.3.b.2 Digital data for event 2.0

[ ] = baseline which is subtracted for peaks and numerical integration

Yeardate: 81221 Time: 13:15:46.541 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
1.95	-0.078	-0.156	-0.059	-0.000	-0.000	0.000
1.96	0.234	-0.156	-0.059	0.003	-0.000	0.000
1.97	0.547	-0.156	-0.059	0.009	-0.000	0.000
1.98	0.547	-0.156	0.177	0.016	-0.000	0.002
1.99	0.547	-0.156	0.177	0.022	-0.000	0.005
2.00	0.313	-0.156	0.295	0.026	-0.000	0.008
2.01	0.234	-0.234	0.295	0.029	-0.001	0.012
2.02	-0.313	-0.234	0.295	0.027	-0.002	0.015
2.03	-0.625	-0.313	0.236	0.021	-0.003	0.018
2.04	-0.703	-0.313	0.059	0.015	-0.005	0.019
2.05	-0.703	-0.313	0.000	0.009	-0.006	0.020
2.06	-0.703	-0.234	-0.118	0.002	-0.007	0.019
2.07	-0.703	-0.078	-0.118	-0.004	-0.006	0.019
2.08	-0.625	-0.156	-0.118	-0.009	-0.006	0.018
2.09	-0.625	-0.156	-0.118	-0.015	-0.006	0.018
2.10	-0.625	-0.156	-0.118	-0.020	-0.006	0.017
2.11	-0.547	-0.156	-0.118	-0.025	-0.006	0.017
2.12	-0.547	-0.156	-0.118	-0.030	-0.006	0.016
2.13	-0.547	-0.156	-0.118	-0.034	-0.006	0.016
2.14	-0.547	-0.234	-0.118	-0.039	-0.007	0.015
2.15	-0.547	-0.156	-0.118	-0.044	-0.007	0.015
2.16	-0.547	-0.156	-0.118	-0.048	-0.007	0.014
2.17	-0.547	-0.156	-0.118	-0.053	-0.007	0.013
2.18	-0.547	-0.156	-0.118	-0.058	-0.007	0.013
2.19	-0.547	-0.156	-0.118	-0.063	-0.007	0.012
2.20	-0.547	-0.156	-0.118	-0.067	-0.007	0.012
2.21	-0.547	-0.156	-0.118	-0.072	-0.007	0.011
2.22	-0.547	-0.156	-0.118	-0.077	-0.007	0.011
2.23	-0.547	-0.156	-0.118	-0.081	-0.007	0.010
2.24	-0.547	-0.156	-0.118	-0.086	-0.007	0.009
2.25	-0.547	-0.156	-0.059	-0.091	-0.007	0.009
2.26	-0.547	-0.156	-0.059	-0.095	-0.007	0.009
2.27	-0.547	-0.156	-0.059	-0.100	-0.007	0.009

Figure 10.1.3.b.3 Digital data for event 4.1

[ ] = baseline which is subtracted for peaks and numerical integration

Yeardate: 81221 Time: 13:15:46.541 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
4.03	[-0.313]	-0.156	-0.059	0.000	-0.000	0.000
4.04	1.172	[-0.156]	-0.059	0.015	-0.000	0.000
4.05	1.250	0.156	[-0.059]	0.030	0.003	0.000
4.06	0.547	0.156	0.530	0.039	0.006	0.006
4.07	0.000	-0.234	0.707	0.042	0.005	0.014
4.08	-0.391	-0.391	0.059	0.041	0.003	0.015
4.09	-0.391	-0.391	0.059	0.041	0.001	0.016
4.10	-0.547	-0.313	0.059	0.038	-0.001	0.017
4.11	-0.547	-0.313	0.000	0.036	-0.002	0.018
4.12	-0.547	-0.234	-0.059	0.034	-0.003	0.018
4.13	-0.547	-0.234	-0.059	0.031	-0.004	0.018
4.14	-0.547	-0.156	-0.059	0.029	-0.004	0.018
4.15	-0.469	-0.156	-0.059	0.027	-0.004	0.018
4.16	-0.469	-0.156	-0.059	0.026	-0.004	0.018
4.17	-0.469	-0.156	-0.118	0.024	-0.004	0.017
4.18	-0.547	-0.156	-0.118	0.022	-0.004	0.017
4.19	-0.547	-0.156	-0.118	0.020	-0.004	0.016
4.20	-0.547	-0.156	-0.118	0.017	-0.004	0.015
4.21	-0.625	-0.156	-0.118	0.014	-0.004	0.015
4.22	-0.625	-0.234	-0.118	0.011	-0.005	0.014
4.23	-0.625	-0.156	-0.118	0.008	-0.005	0.014
4.24	-0.625	-0.156	-0.118	0.005	-0.005	0.013
4.25	-0.547	-0.156	-0.118	0.002	-0.005	0.012
4.26	-0.547	-0.156	-0.118	0.000	-0.005	0.012
4.27	-0.547	-0.156	-0.118	-0.002	-0.005	0.011
4.28	-0.547	-0.156	-0.118	-0.005	-0.005	0.011
4.29	-0.625	-0.156	-0.118	-0.008	-0.005	0.010
4.30	-0.625	-0.156	-0.118	-0.011	-0.005	0.009
4.31	-0.625	-0.156	-0.118	-0.014	-0.005	0.009
4.32	-0.625	-0.156	-0.118	-0.017	-0.005	0.008
4.33	-0.547	-0.156	-0.059	-0.019	-0.005	0.008
4.34	-0.547	-0.156	-0.059	-0.022	-0.005	0.008

Figure 10.1.3.b.4 Digital data for event 6.1

[ ] = baseline which is subtracted for peaks and numerical integration

Yeardate: 81221 Time: 13:15:46.541 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
6.09	-0.078	-0.156	-0.059	-0.000	-0.000	0.000
6.10	0.234	-0.156	-0.059	0.003	-0.000	0.000
6.11	0.313	-0.156	0.118	0.007	-0.000	0.002
6.12	0.391	-0.156	0.118	0.012	-0.000	0.004
6.13	0.469	-0.156	0.177	0.017	-0.000	0.006
6.14	0.391	-0.156	0.236	0.022	-0.000	0.009
6.15	0.000	-0.156	0.236	0.023	-0.000	0.012
6.16	-0.313	-0.156	0.236	0.020	-0.000	0.015
6.17	-0.391	-0.234	0.059	0.017	-0.001	0.016
6.18	-0.625	-0.234	0.000	0.012	-0.002	0.017
6.19	-0.703	-0.234	-0.118	0.005	-0.002	0.016
6.20	-0.703	-0.234	-0.118	-0.001	-0.003	0.015
6.21	-0.703	-0.234	-0.118	-0.007	-0.004	0.015
6.22	-0.703	-0.234	-0.118	-0.013	-0.005	0.014
6.23	-0.703	-0.156	-0.118	-0.020	-0.005	0.014
6.24	-0.625	-0.156	-0.118	-0.025	-0.005	0.013
6.25	-0.625	-0.156	-0.118	-0.030	-0.005	0.012
6.26	-0.625	-0.156	-0.118	-0.036	-0.005	0.012
6.27	-0.625	-0.156	-0.177	-0.041	-0.005	0.011
6.28	-0.625	-0.156	-0.177	-0.047	-0.005	0.009
6.29	-0.625	-0.156	-0.177	-0.052	-0.005	0.008
6.30	-0.625	-0.156	-0.118	-0.058	-0.005	0.008
6.31	-0.625	-0.156	-0.118	-0.063	-0.005	0.007
6.32	-0.547	-0.156	-0.118	-0.068	-0.005	0.007
6.33	-0.547	-0.156	-0.118	-0.073	-0.005	0.006
6.34	-0.547	-0.156	-0.118	-0.077	-0.005	0.005
6.35	-0.625	-0.156	-0.118	-0.083	-0.005	0.005
6.36	-0.625	-0.156	-0.118	-0.088	-0.005	0.004
6.37	-0.625	-0.156	-0.118	-0.094	-0.005	0.004
6.38	-0.625	-0.156	-0.118	-0.099	-0.005	0.003
6.39	-0.625	-0.156	-0.118	-0.105	-0.005	0.002
6.40	-0.547	-0.156	-0.118	-0.109	-0.005	0.002
6.41	-0.547	-0.156	-0.118	-0.114	-0.005	0.001
6.42	-0.547	-0.156	-0.059	-0.119	-0.005	0.001
6.43	-0.547	-0.156	-0.059	-0.123	-0.005	0.001

Figure 10.1.3.b.5 Digital data for event 8.8

[ ] = baseline which is subtracted for peaks and numerical integration

Yeardate: 81221 Time: 13:15:46.541 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
8.75	-0.313	-0.156	-0.118	0.000	-0.000	0.000
8.76	0.313	-0.156	-0.118	0.006	-0.000	0.000
8.77	0.625	-0.156	-0.059	0.016	-0.000	0.001
8.78	0.625	-0.156	0.177	0.025	-0.000	0.004
8.79	0.000	0.078	0.295	0.028	0.002	0.008
8.80	-0.078	-0.156	0.295	0.030	0.002	0.012
8.81	-0.625	-0.234	0.059	0.027	0.002	0.014
8.82	-0.703	-0.234	-0.177	0.023	0.001	0.013
8.83	-0.391	-0.234	-0.236	0.023	-0.000	0.012
8.84	-0.391	-0.234	-0.236	0.022	-0.001	0.011
8.85	-0.469	-0.156	-0.177	0.020	-0.001	0.010
8.86	-0.469	-0.156	0.000	0.019	-0.001	0.011
8.87	-0.469	-0.156	-0.059	0.017	-0.001	0.012
8.88	-0.469	-0.156	-0.118	0.016	-0.001	0.012
8.89	-0.469	-0.156	-0.118	0.014	-0.001	0.012
8.90	-0.547	-0.156	-0.118	0.012	-0.001	0.012
8.91	-0.547	-0.156	-0.177	0.009	-0.001	0.011
8.92	-0.625	-0.156	-0.177	0.006	-0.001	0.011
8.93	-0.625	-0.156	-0.177	0.003	-0.001	0.010
8.94	-0.625	-0.156	-0.177	0.000	-0.001	0.009
8.95	-0.625	-0.156	-0.177	-0.003	-0.001	0.009
8.96	-0.625	-0.156	-0.177	-0.006	-0.001	0.008
8.97	-0.547	-0.156	-0.177	-0.008	-0.001	0.008
8.98	-0.547	-0.156	-0.177	-0.011	-0.001	0.007
8.99	-0.547	-0.156	-0.177	-0.013	-0.001	0.007
9.00	-0.547	-0.156	-0.177	-0.015	-0.001	0.006
9.01	-0.547	-0.156	-0.118	-0.018	-0.001	0.006
9.02	-0.547	-0.156	-0.118	-0.020	-0.001	0.006

Figure 10.1.3.b.6 Digital data for event 10.9

[ ] = baseline which is subtracted for peaks and numerical integration

Yeardate: 81221 Time: 13:15:46.541 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
10.90	[-0.313]	[-0.234]	-0.177	0.000	-0.000	0.000
10.91	0.313	-0.156	[-0.177]	0.006	0.001	0.000
10.92	0.547	-0.156	-0.118	0.015	0.002	0.001
10.93	0.313	-0.156	0.177	0.021	0.002	0.004
10.94	0.234	-0.156	0.236	0.027	0.003	0.008
10.95	0.000	-0.156	0.236	0.030	0.004	0.012
10.96	-0.078	-0.156	0.059	0.032	0.005	0.015
10.97	-0.391	-0.156	-0.177	0.031	0.005	0.015
10.98	-0.391	-0.156	-0.177	0.031	0.006	0.015
10.99	-0.625	-0.156	-0.177	0.027	0.007	0.015
11.00	-0.625	-0.156	-0.177	0.024	0.008	0.015
11.01	-0.625	-0.156	-0.177	0.021	0.009	0.015
11.02	-0.625	-0.156	-0.177	0.018	0.009	0.015
11.03	-0.625	-0.156	-0.236	0.015	0.010	0.014
11.04	-0.625	-0.156	-0.236	0.012	0.011	0.014
11.05	-0.625	-0.156	-0.236	0.009	0.012	0.013
11.06	-0.625	-0.156	-0.236	0.006	0.012	0.012
11.07	-0.625	-0.156	-0.236	0.002	0.013	0.012
11.08	-0.625	-0.156	-0.236	-0.001	0.014	0.011
11.09	-0.625	-0.156	-0.236	-0.004	0.015	0.011
11.10	-0.625	-0.156	-0.236	-0.007	0.016	0.010
11.11	-0.625	-0.156	-0.236	-0.010	0.016	0.009
11.12	-0.625	-0.156	-0.236	-0.013	0.017	0.009
11.13	-0.625	-0.156	-0.236	-0.016	0.018	0.008
11.14	-0.547	-0.156	-0.177	-0.019	0.019	0.008
11.15	-0.547	-0.156	-0.177	-0.021	0.019	0.008

Figure 10.1.3.b.7 Digital data for event 12.2

[ ] = baseline which is subtracted for peaks and numerical integration

Yeardate: 81221 Time: 13:15:46.541 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
12.05	-0.625	-0.156	-0.412	0.000	-0.000	-0.000
12.06	-0.703	-0.156	-0.412	-0.001	-0.000	-0.000
12.07	-0.703	-0.156	-0.412	-0.002	-0.000	-0.000
12.08	-0.703	0.078	-0.471	-0.002	0.002	-0.001
12.09	-0.703	0.078	-0.471	-0.003	0.005	-0.001
12.10	-0.781	0.078	-0.471	-0.005	0.007	-0.002
12.11	-0.938	0.156	-0.530	-0.008	0.010	-0.003
12.12	-1.016	0.547	-0.589	-0.012	0.017	-0.005
12.13	-1.328	0.625	-0.884	-0.019	0.025	-0.009
12.14	-2.578	0.703	-0.943	-0.038	0.034	-0.015
12.15	-4.375	0.938	-1.826	-0.076	0.045	-0.029
12.16	-4.688	1.016	-3.711	-0.116	0.056	-0.062
12.17	-5.078	1.094	-5.125	-0.161	0.069	-0.109
12.18	-5.938	1.250	-5.125	-0.214	0.083	-0.156
12.19	-6.016	1.250	-6.067	-0.268	0.097	-0.213
12.20	-6.016	1.250	-6.539	-0.322	0.111	-0.274
12.21	-6.016	1.250	-6.362	-0.376	0.125	-0.333
12.22	-6.016	1.250	-6.539	-0.430	0.139	-0.395
12.23	-5.938	1.328	-6.539	-0.483	0.154	-0.456
12.24	-5.703	1.328	-6.539	-0.534	0.169	-0.517
12.25	-5.391	1.328	-6.480	-0.581	0.184	-0.578
12.26	-5.078	1.250	-6.126	-0.626	0.198	-0.635
12.27	-4.688	1.250	-5.655	-0.666	0.212	-0.688
12.28	-4.688	1.250	-5.184	-0.707	0.226	-0.735
12.29	-4.453	1.328	-5.125	-0.745	0.241	-0.782
12.30	-4.375	1.328	-4.948	-0.783	0.255	-0.828
12.31	-4.375	1.328	-4.889	-0.820	0.270	-0.872
12.32	-4.375	1.328	-4.889	-0.858	0.285	-0.917
12.33	-4.453	1.328	-4.771	-0.896	0.300	-0.961
12.34	-4.688	1.328	-4.830	-0.937	0.315	-1.005
12.35	-4.688	1.328	-4.830	-0.977	0.330	-1.049
12.36	-4.766	1.328	-4.948	-1.019	0.344	-1.095
12.37	-4.766	1.328	-4.948	-1.060	0.359	-1.140
12.38	-4.766	1.406	-5.007	-1.102	0.375	-1.186
12.39	-4.688	1.406	-5.007	-1.142	0.391	-1.232
12.40	-4.688	1.328	-5.007	-1.183	0.405	-1.278
12.41	-4.453	1.328	-4.948	-1.221	0.420	-1.323
12.42	-4.375	1.250	-4.889	-1.259	0.434	-1.368
12.43	-4.141	1.250	-4.654	-1.294	0.448	-1.410
12.44	-3.828	1.172	-4.418	-1.326	0.462	-1.450
12.45	-3.750	1.172	-4.241	-1.357	0.475	-1.489
12.46	-3.672	1.172	-3.947	-1.388	0.488	-1.524
12.47	-3.438	1.094	-3.770	-1.416	0.501	-1.558
12.48	-3.203	1.094	-3.534	-1.441	0.513	-1.589
12.49	-3.125	1.016	-3.475	-1.466	0.525	-1.619

Figure 10.1.3.b.7 Digital data for event 12.2 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
12.50	-2.891	0.938	-3.240	-1.489	0.536	-1.648
12.51	-2.578	0.938	-3.063	-1.509	0.547	-1.674
12.52	-2.500	0.859	-3.004	-1.527	0.557	-1.700
12.53	-2.344	0.859	-2.886	-1.545	0.567	-1.725
12.54	-2.188	0.781	-2.828	-1.560	0.576	-1.749
12.55	-1.953	0.781	-2.828	-1.573	0.586	-1.773
12.56	-1.953	0.781	-2.769	-1.587	0.595	-1.797
12.57	-1.641	0.703	-2.651	-1.597	0.604	-1.819
12.58	-1.719	0.703	-2.592	-1.608	0.612	-1.841
12.59	-1.719	0.625	-2.533	-1.619	0.620	-1.862
12.60	-1.719	0.625	-2.533	-1.630	0.628	-1.883
12.61	-1.641	0.547	-2.533	-1.640	0.635	-1.905
12.62	-1.328	0.547	-2.356	-1.647	0.642	-1.924
12.63	-1.328	0.547	-2.121	-1.654	0.649	-1.941
12.64	-1.328	0.547	-1.885	-1.661	0.656	-1.956
12.65	-1.250	0.469	-1.826	-1.667	0.662	-1.970
12.66	-1.250	0.391	-1.708	-1.673	0.668	-1.983
12.67	-1.016	0.391	-1.708	-1.677	0.673	-1.996
12.68	-0.938	0.391	-1.414	-1.680	0.679	-2.006
12.69	-0.938	0.313	-1.414	-1.684	0.683	-2.016
12.70	-0.703	0.313	-1.355	-1.684	0.688	-2.025
12.71	-0.703	0.234	-1.355	-1.685	0.692	-2.035
12.72	-0.625	0.234	-1.178	-1.685	0.696	-2.043
12.73	-0.547	0.234	-1.178	-1.684	0.700	-2.050
12.74	-0.469	0.156	-1.178	-1.683	0.703	-2.058
12.75	-0.469	0.156	-1.178	-1.681	0.706	-2.065
12.76	-0.391	0.078	-1.119	-1.679	0.708	-2.073
12.77	-0.313	0.078	-1.060	-1.676	0.711	-2.079
12.78	-0.313	0.078	-1.001	-1.673	0.713	-2.085
12.79	-0.313	0.078	-0.884	-1.670	0.715	-2.090
12.80	-0.313	0.078	-0.884	-1.666	0.718	-2.094
12.81	-0.234	0.078	-0.884	-1.663	0.720	-2.099
12.82	-0.234	0.078	-0.884	-1.659	0.722	-2.104
12.83	-0.156	0.078	-0.648	-1.654	0.725	-2.106
12.84	-0.156	0.078	-0.648	-1.649	0.727	-2.109
12.85	-0.156	-0.156	-0.648	-1.645	0.727	-2.111
12.86	-0.156	-0.156	-0.648	-1.640	0.727	-2.113
12.87	-0.156	-0.156	-0.648	-1.635	0.727	-2.116
12.88	-0.156	-0.156	-0.648	-1.630	0.727	-2.118
12.89	0.078	-0.156	-0.589	-1.623	0.727	-2.120
12.90	0.078	-0.156	-0.589	-1.616	0.727	-2.122
12.91	0.078	-0.156	-0.589	-1.609	0.727	-2.123
12.92	0.078	-0.156	-0.589	-1.602	0.727	-2.125
12.93	0.078	-0.156	-0.589	-1.595	0.727	-2.127
12.94	0.078	-0.156	-0.530	-1.588	0.727	-2.128
12.95	0.078	-0.156	-0.530	-1.581	0.727	-2.129
12.96	0.078	-0.234	-0.530	-1.574	0.726	-2.130
12.97	0.078	-0.234	-0.471	-1.567	0.726	-2.131
12.98	0.078	-0.234	-0.471	-1.560	0.725	-2.132
12.99	0.078	-0.234	-0.471	-1.553	0.724	-2.132
13.00	0.078	-0.234	-0.471	-1.546	0.723	-2.133

Figure 10.1.3.b.7 Digital data for event 12.2 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
13.01	0.078	-0.234	-0.471	-1.539	0.722	-2.133
13.02	0.078	-0.234	-0.530	-1.532	0.722	-2.135
13.03	0.078	-0.234	-0.471	-1.525	0.721	-2.135
13.04	0.078	-0.234	-0.471	-1.518	0.720	-2.136
13.05	0.078	-0.234	-0.471	-1.511	0.719	-2.136
13.06	0.078	-0.234	-0.471	-1.504	0.718	-2.137
13.07	0.078	-0.234	-0.471	-1.497	0.718	-2.137
13.08	0.078	-0.234	-0.471	-1.490	0.717	-2.138
13.09	-0.156	-0.234	-0.471	-1.485	0.716	-2.139
13.10	-0.156	-0.234	-0.471	-1.480	0.715	-2.139
13.11	-0.156	-0.234	-0.471	-1.476	0.715	-2.140
13.12	-0.156	-0.234	-0.471	-1.471	0.714	-2.140
13.13	-0.156	-0.234	-0.471	-1.466	0.713	-2.141
13.14	-0.156	-0.234	-0.471	-1.462	0.712	-2.142
13.15	-0.156	-0.234	-0.530	-1.457	0.711	-2.143
13.16	-0.156	-0.234	-0.530	-1.452	0.711	-2.144
13.17	-0.156	-0.234	-0.530	-1.448	0.710	-2.145
13.18	-0.234	-0.234	-0.530	-1.444	0.709	-2.146
13.19	-0.234	-0.234	-0.589	-1.440	0.708	-2.148
13.20	-0.234	-0.234	-0.589	-1.436	0.708	-2.150
13.21	-0.234	-0.234	-0.589	-1.432	0.707	-2.152
13.22	-0.234	-0.234	-0.589	-1.428	0.706	-2.153
13.23	-0.313	-0.234	-0.589	-1.425	0.705	-2.155
13.24	-0.313	-0.234	-0.589	-1.422	0.704	-2.157
13.25	-0.313	-0.234	-0.589	-1.419	0.704	-2.159
13.26	-0.313	-0.234	-0.648	-1.416	0.703	-2.161
13.27	-0.313	-0.234	-0.648	-1.413	0.702	-2.163
13.28	-0.313	-0.234	-0.648	-1.409	0.701	-2.166
13.29	-0.313	-0.234	-0.648	-1.406	0.700	-2.168
13.30	-0.313	-0.234	-0.648	-1.403	0.700	-2.171
13.31	-0.313	-0.156	-0.648	-1.400	0.700	-2.173
13.32	-0.313	-0.156	-0.648	-1.397	0.700	-2.175
13.33	-0.313	-0.156	-0.648	-1.394	0.700	-2.178
13.34	-0.391	-0.156	-0.648	-1.391	0.700	-2.180
13.35	-0.391	-0.156	-0.707	-1.389	0.700	-2.183
13.36	-0.391	-0.156	-0.707	-1.387	0.700	-2.186
13.37	-0.391	-0.156	-0.707	-1.384	0.700	-2.189
13.38	-0.391	-0.156	-0.707	-1.382	0.700	-2.192
13.39	-0.391	-0.156	-0.707	-1.380	0.700	-2.195
13.40	-0.391	-0.156	-0.707	-1.377	0.700	-2.198
13.41	-0.391	-0.156	-0.707	-1.375	0.700	-2.201
13.42	-0.391	-0.156	-0.707	-1.373	0.700	-2.204
13.43	-0.391	-0.156	-0.707	-1.370	0.700	-2.207
13.44	-0.391	-0.156	-0.707	-1.368	0.700	-2.209
13.45	-0.391	-0.156	-0.707	-1.366	0.700	-2.212
13.46	-0.391	-0.156	-0.707	-1.363	0.700	-2.215
13.47	-0.391	-0.156	-0.707	-1.361	0.700	-2.218
13.48	-0.469	-0.156	-0.707	-1.359	0.700	-2.221
13.49	-0.469	-0.156	-0.707	-1.358	0.700	-2.224
13.50	-0.469	-0.156	-0.707	-1.356	0.700	-2.227
13.51	-0.469	-0.156	-0.707	-1.355	0.700	-2.230

Figure 10.1.3.b.7 Digital data for event 12.2 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
13.52	-0.469	-0.156	-0.707	-1.353	0.700	-2.233
13.53	-0.391	-0.156	-0.707	-1.351	0.700	-2.236
13.54	-0.391	-0.156	-0.707	-1.348	0.700	-2.239
13.55	-0.469	-0.156	-0.707	-1.347	0.700	-2.242
13.56	-0.391	-0.156	-0.707	-1.345	0.700	-2.245
13.57	-0.469	-0.156	-0.707	-1.343	0.700	-2.248
13.58	-0.469	-0.156	-0.707	-1.341	0.700	-2.251
13.59	-0.391	-0.156	-0.707	-1.339	0.700	-2.254
13.60	-0.469	-0.156	-0.707	-1.338	0.700	-2.257
13.61	-0.391	-0.156	-0.707	-1.335	0.700	-2.260
13.62	-0.391	-0.156	-0.707	-1.333	0.700	-2.263
13.63	-0.391	-0.156	-0.707	-1.330	0.700	-2.265
13.64	-0.391	-0.156	-0.707	-1.328	0.700	-2.268
13.65	-0.391	-0.156	-0.707	-1.326	0.700	-2.271
13.66	-0.469	-0.156	-0.707	-1.324	0.700	-2.274
13.67	-0.469	-0.156	-0.707	-1.323	0.700	-2.277
13.68	-0.469	-0.156	-0.766	-1.321	0.700	-2.281
13.69	-0.469	-0.156	-0.766	-1.320	0.700	-2.284
13.70	-0.469	-0.156	-0.766	-1.318	0.700	-2.288
13.71	-0.469	-0.156	-0.766	-1.316	0.700	-2.291
13.72	-0.469	-0.156	-0.766	-1.315	0.700	-2.295
13.73	-0.469	-0.156	-0.766	-1.313	0.700	-2.299
13.74	-0.469	-0.156	-0.766	-1.312	0.700	-2.302
13.75	-0.469	-0.156	-0.766	-1.310	0.700	-2.306
13.76	-0.469	-0.156	-0.766	-1.309	0.700	-2.309
13.77	-0.469	-0.156	-0.766	-1.307	0.700	-2.313
13.78	-0.469	-0.156	-0.766	-1.305	0.700	-2.316
13.79	-0.469	-0.156	-0.766	-1.304	0.700	-2.320
13.80	-0.469	-0.156	-0.766	-1.302	0.700	-2.323
13.81	-0.469	-0.156	-0.766	-1.301	0.700	-2.327
13.82	-0.469	-0.156	-0.766	-1.299	0.700	-2.330
13.83	-0.469	-0.156	-0.766	-1.298	0.700	-2.334
13.84	-0.469	-0.156	-0.766	-1.296	0.700	-2.337
13.85	-0.469	-0.156	-0.825	-1.295	0.700	-2.342
13.86	-0.469	-0.156	-0.825	-1.293	0.700	-2.346
13.87	-0.469	-0.156	-0.825	-1.291	0.700	-2.350
13.88	-0.469	-0.156	-0.825	-1.290	0.700	-2.354
13.89	-0.469	-0.156	-0.825	-1.288	0.700	-2.358

Figure 10.1.3.b.8 Digital data for event 14.0

[ ] = baseline which is subtracted for peaks and numerical integration

Yeardate: 81221 Time: 13:15:46.541 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
13.96	[-0.234]	-0.156	-0.707	-0.000	-0.000	0.000
13.97	0.156	-0.156	[-0.707]	0.004	-0.000	0.000
13.98	-0.234	[-0.156]	-0.766	0.004	-0.000	-0.001
13.99	-0.234	0.078	-0.589	0.004	0.002	0.001
14.00	-0.234	0.078	-0.648	0.004	0.005	0.001
14.01	-0.313	0.078	-0.884	0.003	0.007	-0.001
14.02	-0.313	0.078	-0.943	0.002	0.009	-0.003
14.03	-0.391	0.078	-0.884	0.001	0.012	-0.005
14.04	-0.625	0.078	-0.884	-0.003	0.014	-0.006

Figure 10.1.3.c.1 Digital data for event 4.4

[ ] = baseline which is subtracted for peaks and numerical integration

Yeardate: 81221 Time: 13:15:46.588 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
3.99	[-0.547]	[-0.156]	[-0.236]	0.000	-0.000	0.000
4.00	-0.547	-0.156	-0.236	0.000	-0.000	0.000
4.01	-0.547	-0.156	-0.236	0.000	-0.000	0.000
4.02	-0.625	-0.156	-0.236	-0.001	-0.000	0.000
4.03	-0.625	-0.156	-0.295	-0.002	-0.000	-0.001
4.04	-0.703	-0.156	-0.353	-0.003	-0.000	-0.002
4.05	-1.250	-0.156	-0.353	-0.010	-0.000	-0.003
4.06	-1.953	-0.156	-0.412	-0.024	-0.000	-0.005
4.07	-2.188	0.078	-0.648	-0.041	0.002	-0.009
4.08	-2.500	0.156	-1.355	-0.060	0.005	-0.020
4.09	-2.813	0.234	-2.297	-0.083	0.009	-0.041
4.10	-2.813	0.234	-2.297	-0.105	0.013	-0.061
4.11	-2.813	0.313	-2.356	-0.128	0.018	-0.082
4.12	-2.734	0.391	-2.828	-0.150	0.023	-0.108
4.13	-2.734	0.391	-2.828	-0.172	0.029	-0.134
4.14	-2.734	0.391	-2.769	-0.194	0.034	-0.160
4.15	-2.734	0.391	-2.769	-0.216	0.040	-0.185
4.16	-2.734	0.391	-2.769	-0.237	0.045	-0.210
4.17	-2.734	0.391	-2.769	-0.259	0.051	-0.236
4.18	-2.734	0.469	-2.828	-0.281	0.057	-0.261
4.19	-2.813	0.469	-2.828	-0.304	0.063	-0.287
4.20	-2.891	0.547	-2.828	-0.327	0.070	-0.313
4.21	-2.969	0.547	-2.828	-0.352	0.077	-0.339
4.22	-3.125	0.547	-2.945	-0.377	0.084	-0.366
4.23	-3.438	0.625	-3.063	-0.406	0.092	-0.395
4.24	-3.516	0.625	-3.181	-0.436	0.100	-0.424
4.25	-3.750	0.625	-3.299	-0.468	0.108	-0.455
4.26	-4.063	0.703	-3.534	-0.503	0.116	-0.488
4.27	-4.141	0.781	-3.770	-0.539	0.126	-0.523
4.28	-4.375	0.859	-4.006	-0.577	0.136	-0.561
4.29	-4.453	0.938	-4.241	-0.616	0.147	-0.601
4.30	-4.688	0.938	-4.477	-0.658	0.158	-0.643
4.31	-4.688	1.094	-4.654	-0.699	0.170	-0.687
4.32	-4.844	1.094	-4.713	-0.742	0.183	-0.732
4.33	-4.922	1.094	-4.948	-0.786	0.195	-0.779
4.34	-5.000	1.172	-5.066	-0.830	0.209	-0.827
4.35	-5.000	1.172	-5.184	-0.875	0.222	-0.877
4.36	-5.000	1.250	-5.243	-0.919	0.236	-0.927
4.37	-5.000	1.250	-5.184	-0.964	0.250	-0.977
4.38	-5.000	1.328	-5.360	-1.009	0.265	-1.028
4.39	-4.922	1.328	-5.360	-1.052	0.280	-1.079
4.40	-4.844	1.406	-5.419	-1.095	0.295	-1.131
4.41	-4.688	1.406	-5.360	-1.137	0.311	-1.182
4.42	-4.453	1.406	-5.302	-1.176	0.326	-1.233
4.43	-4.375	1.406	-5.125	-1.214	0.342	-1.282

Figure 10.1.3.c.1 Digital data for event 4.4 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
4.44	-4.141	1.406	-5.007	-1.250	0.358	-1.329
4.45	-4.063	1.328	-4.889	-1.285	0.373	-1.376
4.46	-3.750	1.328	-4.713	-1.317	0.387	-1.421
4.47	-3.516	1.328	-4.654	-1.347	0.402	-1.465
4.48	-3.438	1.250	-4.418	-1.376	0.416	-1.507
4.49	-3.438	1.250	-4.241	-1.405	0.430	-1.547
4.50	-3.203	1.250	-4.006	-1.431	0.444	-1.584
4.51	-3.125	1.172	-3.947	-1.457	0.458	-1.621
4.52	-2.891	1.172	-3.770	-1.480	0.471	-1.657
4.53	-2.813	1.094	-3.534	-1.503	0.483	-1.690
4.54	-2.813	1.094	-3.475	-1.526	0.496	-1.722
4.55	-2.578	1.016	-3.299	-1.546	0.508	-1.753
4.56	-2.500	1.016	-3.063	-1.566	0.519	-1.781
4.57	-2.266	1.016	-3.004	-1.583	0.531	-1.809
4.58	-2.188	0.938	-2.828	-1.599	0.542	-1.835
4.59	-2.188	0.859	-2.592	-1.616	0.552	-1.858
4.60	-1.953	0.859	-2.533	-1.630	0.562	-1.881
4.61	-1.641	0.859	-2.474	-1.641	0.572	-1.904
4.62	-1.641	0.859	-2.415	-1.651	0.583	-1.925
4.63	-1.563	0.781	-2.297	-1.662	0.592	-1.946
4.64	-1.406	0.703	-2.121	-1.670	0.601	-1.965
4.65	-1.328	0.703	-2.062	-1.678	0.609	-1.983
4.66	-1.250	0.625	-1.885	-1.685	0.617	-2.000
4.67	-1.094	0.625	-1.826	-1.691	0.625	-2.016
4.68	-1.016	0.547	-1.826	-1.695	0.632	-2.031
4.69	-0.938	0.547	-1.708	-1.699	0.639	-2.046
4.70	-0.703	0.547	-1.590	-1.701	0.646	-2.060
4.71	-0.703	0.469	-1.473	-1.702	0.652	-2.072
4.72	-0.625	0.391	-1.414	-1.703	0.658	-2.084
4.73	-0.625	0.391	-1.178	-1.704	0.663	-2.093
4.74	-0.547	0.391	-1.178	-1.704	0.669	-2.103
4.75	-0.469	0.391	-1.237	-1.703	0.674	-2.113
4.76	-0.391	0.313	-1.119	-1.701	0.679	-2.122
4.77	-0.313	0.234	-1.119	-1.699	0.683	-2.130
4.78	-0.234	0.234	-1.119	-1.696	0.687	-2.139
4.79	-0.234	0.156	-0.884	-1.693	0.690	-2.146
4.80	-0.156	0.156	-0.825	-1.689	0.693	-2.152
4.81	-0.156	0.156	-0.766	-1.685	0.696	-2.157
4.82	-0.156	0.078	-0.707	-1.681	0.698	-2.162
4.83	-0.156	0.078	-0.707	-1.677	0.701	-2.166
4.84	-0.156	0.078	-0.648	-1.673	0.703	-2.170
4.85	0.078	0.078	-0.648	-1.667	0.705	-2.174
4.86	0.078	0.078	-0.530	-1.661	0.708	-2.177
4.87	0.156	0.078	-0.471	-1.654	0.710	-2.180
4.88	0.156	0.078	-0.471	-1.647	0.712	-2.182
4.89	0.156	-0.156	-0.471	-1.640	0.712	-2.184
4.90	0.156	-0.156	-0.471	-1.633	0.712	-2.187
4.91	0.156	-0.156	-0.471	-1.626	0.712	-2.189
4.92	0.156	-0.156	-0.412	-1.619	0.712	-2.191
4.93	0.156	-0.156	-0.412	-1.612	0.712	-2.193
4.94	0.156	-0.156	-0.412	-1.605	0.712	-2.194

Figure 10.1.3.c.1 Digital data for event 4.4 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
4.95	0.156	-0.156	-0.412	-1.598	0.712	-2.196
4.96	0.156	-0.156	-0.412	-1.591	0.712	-2.198
4.97	0.156	-0.156	-0.353	-1.583	0.712	-2.199
4.98	0.156	-0.156	-0.353	-1.576	0.712	-2.200
4.99	0.156	-0.234	-0.353	-1.569	0.711	-2.202
5.00	0.156	-0.234	-0.412	-1.562	0.711	-2.203
5.01	0.156	-0.234	-0.353	-1.555	0.710	-2.204
5.02	0.156	-0.234	-0.353	-1.548	0.709	-2.206
5.03	0.156	-0.234	-0.353	-1.541	0.708	-2.207
5.04	0.156	-0.234	-0.295	-1.534	0.708	-2.207
5.05	0.156	-0.234	-0.295	-1.527	0.707	-2.208
5.06	0.156	-0.234	-0.295	-1.520	0.706	-2.209
5.07	0.156	-0.234	-0.295	-1.513	0.705	-2.209
5.08	0.156	-0.234	-0.295	-1.506	0.704	-2.210
5.09	0.156	-0.234	-0.295	-1.499	0.704	-2.210
5.10	0.156	-0.234	-0.295	-1.492	0.703	-2.211
5.11	0.156	-0.234	-0.353	-1.485	0.702	-2.212
5.12	0.156	-0.234	-0.295	-1.478	0.701	-2.213
5.13	0.078	-0.234	-0.295	-1.472	0.700	-2.213
5.14	0.078	-0.234	-0.295	-1.465	0.700	-2.214
5.15	0.078	-0.234	-0.295	-1.459	0.699	-2.214
5.16	0.078	-0.234	-0.353	-1.453	0.698	-2.216
5.17	0.078	-0.234	-0.353	-1.447	0.697	-2.217
5.18	0.078	-0.234	-0.353	-1.440	0.697	-2.218
5.19	0.078	-0.234	-0.353	-1.434	0.696	-2.219
5.20	0.078	-0.234	-0.353	-1.428	0.695	-2.220
5.21	0.078	-0.234	-0.353	-1.422	0.694	-2.221
5.22	0.078	-0.234	-0.353	-1.415	0.693	-2.223
5.23	-0.156	-0.234	-0.353	-1.412	0.693	-2.224
5.24	-0.156	-0.234	-0.412	-1.408	0.692	-2.226
5.25	-0.156	-0.234	-0.412	-1.404	0.691	-2.227
5.26	-0.156	-0.234	-0.412	-1.400	0.690	-2.229
5.27	-0.156	-0.234	-0.412	-1.396	0.690	-2.231
5.28	-0.156	-0.234	-0.412	-1.392	0.689	-2.233
5.29	-0.156	-0.234	-0.412	-1.388	0.688	-2.234
5.30	-0.234	-0.234	-0.412	-1.385	0.687	-2.236
5.31	-0.234	-0.234	-0.471	-1.382	0.686	-2.239
5.32	-0.234	-0.234	-0.471	-1.379	0.686	-2.241
5.33	-0.234	-0.234	-0.471	-1.376	0.685	-2.243
5.34	-0.234	-0.234	-0.530	-1.372	0.684	-2.246
5.35	-0.234	-0.234	-0.530	-1.369	0.683	-2.249
5.36	-0.234	-0.234	-0.530	-1.366	0.682	-2.252
5.37	-0.234	-0.234	-0.530	-1.363	0.682	-2.255
5.38	-0.234	-0.234	-0.530	-1.360	0.681	-2.258
5.39	-0.313	-0.234	-0.530	-1.358	0.680	-2.261
5.40	-0.313	-0.234	-0.589	-1.355	0.679	-2.264
5.41	-0.313	-0.156	-0.589	-1.353	0.679	-2.268
5.42	-0.313	-0.156	-0.589	-1.351	0.679	-2.271
5.43	-0.313	-0.156	-0.589	-1.348	0.679	-2.275
5.44	-0.313	-0.156	-0.589	-1.346	0.679	-2.279
5.45	-0.391	-0.156	-0.648	-1.344	0.679	-2.283

Figure 10.1.3.c.1 Digital data for event 4.4 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
5.46	-0.391	-0.156	-0.648	-1.343	0.679	-2.287
5.47	-0.391	-0.156	-0.648	-1.341	0.679	-2.291
5.48	-0.391	-0.156	-0.648	-1.340	0.679	-2.295
5.49	-0.391	-0.156	-0.648	-1.338	0.679	-2.299
5.50	-0.391	-0.156	-0.648	-1.337	0.679	-2.303
5.51	-0.391	-0.156	-0.648	-1.335	0.679	-2.307
5.52	-0.391	-0.156	-0.648	-1.333	0.679	-2.311
5.53	-0.391	-0.156	-0.648	-1.332	0.679	-2.316
5.54	-0.391	-0.156	-0.648	-1.330	0.679	-2.320
5.55	-0.391	-0.156	-0.648	-1.329	0.679	-2.324
5.56	-0.391	-0.156	-0.648	-1.327	0.679	-2.328
5.57	-0.391	-0.156	-0.707	-1.326	0.679	-2.333
5.58	-0.391	-0.156	-0.648	-1.324	0.679	-2.337
5.59	-0.391	-0.156	-0.707	-1.322	0.679	-2.342
5.60	-0.469	-0.156	-0.707	-1.322	0.679	-2.346
5.61	-0.469	-0.156	-0.707	-1.321	0.679	-2.351
5.62	-0.469	-0.156	-0.707	-1.320	0.679	-2.356
5.63	-0.469	-0.156	-0.707	-1.319	0.679	-2.360
5.64	-0.469	-0.156	-0.707	-1.319	0.679	-2.365

Figure 10.1.3.d.1 Digital data for event 2.5

[ ] = baseline which is subtracted for peaks and numerical integration

Yeardate: 81221 Time: 13:15:46.637 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
2.43	[-0.313]	[-0.156]	[-0.118]	0.000	-0.000	0.000
2.44	-0.078	-0.156	-0.118	0.002	-0.000	0.000
2.45	-0.078	-0.156	-0.059	0.005	-0.000	0.001
2.46	0.078	-0.234	0.118	0.009	-0.001	0.003
2.47	0.078	-0.234	0.177	0.013	-0.002	0.006
2.48	0.078	-0.234	0.295	0.016	-0.002	0.010
2.49	0.078	-0.234	0.295	0.020	-0.003	0.014
2.50	0.078	-0.234	0.295	0.024	-0.004	0.018
2.51	-0.156	-0.234	0.295	0.026	-0.005	0.022
2.52	-0.156	-0.234	0.236	0.027	-0.005	0.026
2.53	-0.234	-0.234	0.236	0.028	-0.006	0.029
2.54	-0.313	-0.234	0.118	0.028	-0.007	0.032
2.55	-0.391	-0.234	0.059	0.027	-0.008	0.034
2.56	-0.391	-0.234	0.000	0.027	-0.009	0.035
2.57	-0.391	-0.234	-0.059	0.026	-0.009	0.035
2.58	-0.391	-0.234	-0.118	0.025	-0.010	0.035
2.59	-0.391	-0.234	-0.059	0.024	-0.011	0.036
2.60	-0.391	-0.156	-0.059	0.024	-0.011	0.037
2.61	-0.391	-0.156	-0.059	0.023	-0.011	0.037
2.62	-0.391	-0.156	-0.118	0.022	-0.011	0.037
2.63	-0.391	-0.156	-0.118	0.021	-0.011	0.037
2.64	-0.469	-0.156	-0.118	0.020	-0.011	0.037
2.65	-0.469	-0.156	-0.177	0.018	-0.011	0.037
2.66	-0.469	-0.156	-0.177	0.017	-0.011	0.036
2.67	-0.469	-0.156	-0.236	0.015	-0.011	0.035
2.68	-0.469	-0.156	-0.236	0.013	-0.011	0.034
2.69	-0.469	-0.156	-0.236	0.012	-0.011	0.032
2.70	-0.469	-0.156	-0.236	0.010	-0.011	0.031
2.71	-0.469	-0.156	-0.236	0.009	-0.011	0.030
2.72	-0.469	-0.156	-0.236	0.007	-0.011	0.029
2.73	-0.469	-0.156	-0.236	0.006	-0.011	0.028
2.74	-0.469	-0.156	-0.177	0.004	-0.011	0.027
2.75	-0.469	-0.156	-0.177	0.003	-0.011	0.027
2.76	-0.469	-0.156	-0.177	0.001	-0.011	0.026
2.77	-0.469	-0.156	-0.177	-0.001	-0.011	0.025
2.78	-0.469	-0.156	-0.177	-0.002	-0.011	0.025

Figure 10.1.3.d.2 Digital data for event 4.1

[ ] = baseline which is subtracted for peaks and numerical integration

Yeardate: 81221 Time: 13:15:46.637 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
4.01	[-0.625]	-0.156	-0.353	0.000	-0.000	-0.000
4.02	-0.703	-0.156	[-0.353]	-0.001	-0.000	-0.000
4.03	-0.703	-0.156	-0.471	-0.002	-0.000	-0.001
4.04	-0.859	[-0.156]	-0.471	-0.004	-0.000	-0.002
4.05	-1.250	0.078	-0.530	-0.010	0.002	-0.004
4.06	-1.875	0.078	-0.707	-0.023	0.005	-0.008
4.07	-2.500	0.156	-0.943	-0.041	0.008	-0.014
4.08	-5.078	0.313	-1.826	-0.086	0.012	-0.028
4.09	-7.500	1.172	-2.769	-0.155	0.026	-0.052
4.10	-7.500	1.250	-5.596	-0.223	0.040	-0.105
4.11	-8.750	1.250	-7.010	-0.305	0.054	-0.171
4.12	-9.375	1.875	-7.481	-0.392	0.074	-0.243
4.13	-9.375	1.875	-7.481	-0.480	0.094	-0.314
4.14	-9.688	1.875	-7.481	-0.570	0.115	-0.385
4.15	-9.453	2.109	-7.481	-0.659	0.137	-0.457
4.16	-9.375	2.109	-7.481	-0.746	0.160	-0.528
4.17	-8.828	2.109	-7.481	-0.828	0.183	-0.599
4.18	-8.203	2.031	-7.481	-0.904	0.205	-0.670
4.19	-7.578	2.109	-7.481	-0.973	0.227	-0.742
4.20	-6.953	2.109	-7.481	-1.037	0.250	-0.813
4.21	-6.875	2.109	-7.481	-1.099	0.273	-0.884
4.22	-6.719	2.109	-7.481	-1.160	0.295	-0.956
4.23	-6.563	2.109	-7.481	-1.220	0.318	-1.027
4.24	-6.250	2.109	-7.481	-1.276	0.341	-1.098
4.25	-6.250	2.109	-7.481	-1.332	0.363	-1.169
4.26	-6.250	2.109	-7.069	-1.388	0.386	-1.237
4.27	-6.328	2.031	-7.010	-1.445	0.408	-1.303
4.28	-6.484	2.031	-6.951	-1.504	0.430	-1.369
4.29	-6.484	2.031	-6.951	-1.563	0.451	-1.435
4.30	-6.406	2.031	-7.010	-1.620	0.473	-1.502
4.31	-6.250	2.031	-7.010	-1.677	0.495	-1.568
4.32	-6.094	2.031	-7.010	-1.731	0.517	-1.635
4.33	-5.938	2.031	-6.774	-1.784	0.539	-1.699
4.34	-5.703	2.109	-6.598	-1.835	0.562	-1.761
4.35	-5.313	2.109	-6.539	-1.882	0.584	-1.823
4.36	-5.000	2.031	-6.126	-1.926	0.606	-1.881
4.37	-4.453	1.875	-5.832	-1.964	0.626	-1.936
4.38	-4.375	1.797	-5.184	-2.002	0.646	-1.984
4.39	-4.141	1.641	-4.889	-2.037	0.664	-2.029
4.40	-4.063	1.563	-4.418	-2.071	0.681	-2.070
4.41	-3.750	1.563	-4.182	-2.102	0.698	-2.108
4.42	-3.203	1.563	-4.065	-2.128	0.716	-2.146
4.43	-2.891	1.484	-3.770	-2.151	0.732	-2.180
4.44	-2.578	1.406	-3.299	-2.170	0.748	-2.209
4.45	-2.500	1.328	-3.240	-2.189	0.762	-2.238

Figure 10.1.3.d.2 Digital data for event 4.1 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
4.46	-2.188	1.172	-3.063	-2.205	0.776	-2.265
4.47	-1.953	1.172	-3.004	-2.218	0.789	-2.292
4.48	-1.641	1.094	-2.828	-2.228	0.801	-2.316
4.49	-1.641	1.016	-2.769	-2.238	0.813	-2.341
4.50	-1.328	0.938	-2.769	-2.245	0.824	-2.365
4.51	-1.250	0.938	-2.651	-2.252	0.835	-2.388
4.52	-1.172	0.859	-2.769	-2.257	0.845	-2.412
4.53	-1.172	0.781	-2.533	-2.263	0.855	-2.434
4.54	-1.094	0.781	-2.356	-2.267	0.864	-2.454
4.55	-1.094	0.703	-2.592	-2.272	0.873	-2.476
4.56	-1.094	0.703	-2.356	-2.277	0.881	-2.496
4.57	-0.938	0.625	-2.121	-2.280	0.889	-2.514
4.58	-0.938	0.625	-2.062	-2.283	0.897	-2.531
4.59	-0.859	0.547	-1.649	-2.285	0.904	-2.544
4.60	-0.859	0.547	-1.590	-2.288	0.911	-2.556
4.61	-0.781	0.469	-1.414	-2.289	0.917	-2.567
4.62	-0.625	0.391	-1.414	-2.289	0.923	-2.577
4.63	-0.469	0.391	-1.355	-2.288	0.928	-2.587
4.64	-0.313	0.391	-1.178	-2.284	0.933	-2.596
4.65	-0.313	0.391	-1.178	-2.281	0.939	-2.604
4.66	-0.078	0.391	-1.178	-2.276	0.944	-2.612
4.67	-0.078	0.313	-1.119	-2.270	0.949	-2.620
4.68	0.078	0.234	-0.943	-2.263	0.953	-2.626
4.69	0.078	0.156	-1.119	-2.256	0.956	-2.633
4.70	0.156	0.156	-1.060	-2.248	0.959	-2.640
4.71	0.156	0.078	-1.001	-2.241	0.962	-2.647
4.72	0.313	0.078	-0.884	-2.231	0.964	-2.652
4.73	0.234	-0.156	-0.825	-2.223	0.964	-2.657
4.74	0.234	-0.156	-0.707	-2.214	0.964	-2.661
4.75	0.234	-0.156	-0.648	-2.205	0.964	-2.663
4.76	0.313	-0.156	-0.707	-2.196	0.964	-2.667
4.77	0.234	-0.156	-0.648	-2.188	0.964	-2.670
4.78	0.234	-0.156	-0.471	-2.179	0.964	-2.671
4.79	0.313	-0.234	-0.471	-2.170	0.963	-2.672
4.80	0.313	-0.234	-0.471	-2.160	0.962	-2.674
4.81	0.313	-0.234	-0.471	-2.151	0.962	-2.675
4.82	0.313	-0.234	-0.412	-2.141	0.961	-2.675
4.83	0.313	-0.234	-0.412	-2.132	0.960	-2.676
4.84	0.313	-0.234	-0.471	-2.123	0.959	-2.677
4.85	0.313	-0.234	-0.471	-2.113	0.958	-2.678
4.86	0.313	-0.234	-0.530	-2.104	0.958	-2.680
4.87	0.234	-0.234	-0.530	-2.095	0.957	-2.682
4.88	0.234	-0.234	-0.530	-2.087	0.956	-2.684
4.89	0.156	-0.313	-0.530	-2.079	0.954	-2.685
4.90	0.156	-0.313	-0.589	-2.071	0.953	-2.688
4.91	0.078	-0.313	-0.648	-2.064	0.951	-2.691
4.92	0.078	-0.313	-0.648	-2.057	0.950	-2.694
4.93	0.078	-0.313	-0.648	-2.050	0.948	-2.697
4.94	0.078	-0.313	-0.589	-2.043	0.947	-2.699
4.95	0.078	-0.313	-0.589	-2.036	0.945	-2.701
4.96	0.078	-0.313	-0.530	-2.029	0.944	-2.703

Figure 10.1.3.d.2 Digital data for event 4.1 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
4.97	0.078	-0.313	-0.530	-2.022	0.942	-2.705
4.98	0.078	-0.313	-0.530	-2.015	0.940	-2.707
4.99	0.078	-0.313	-0.530	-2.008	0.939	-2.708
5.00	0.078	-0.313	-0.589	-2.001	0.937	-2.711
5.01	0.078	-0.313	-0.589	-1.994	0.936	-2.713
5.02	0.078	-0.313	-0.589	-1.987	0.934	-2.715
5.03	0.078	-0.313	-0.648	-1.980	0.933	-2.718
5.04	0.078	-0.313	-0.648	-1.973	0.931	-2.721
5.05	-0.156	-0.313	-0.648	-1.968	0.929	-2.724
5.06	-0.156	-0.313	-0.648	-1.963	0.928	-2.727
5.07	-0.156	-0.313	-0.648	-1.959	0.926	-2.730
5.08	-0.156	-0.313	-0.648	-1.954	0.925	-2.733
5.09	-0.156	-0.234	-0.707	-1.949	0.924	-2.737
5.10	-0.156	-0.234	-0.707	-1.945	0.923	-2.740
5.11	-0.234	-0.234	-0.707	-1.941	0.922	-2.744
5.12	-0.234	-0.234	-0.707	-1.937	0.922	-2.747
5.13	-0.313	-0.234	-0.766	-1.934	0.921	-2.751
5.14	-0.391	-0.234	-0.766	-1.931	0.920	-2.756
5.15	-0.391	-0.234	-0.825	-1.929	0.919	-2.760
5.16	-0.391	-0.234	-0.884	-1.927	0.918	-2.766
5.17	-0.469	-0.234	-0.943	-1.925	0.918	-2.771
5.18	-0.469	-0.234	-0.943	-1.923	0.917	-2.777
5.19	-0.469	-0.234	-0.943	-1.922	0.916	-2.783
5.20	-0.469	-0.234	-1.001	-1.920	0.915	-2.790
5.21	-0.469	-0.234	-1.001	-1.919	0.915	-2.796
5.22	-0.469	-0.234	-1.001	-1.917	0.914	-2.803
5.23	-0.391	-0.234	-1.001	-1.915	0.913	-2.809
5.24	-0.391	-0.156	-0.943	-1.913	0.913	-2.815
5.25	-0.391	-0.156	-0.943	-1.910	0.913	-2.821
5.26	-0.313	-0.156	-0.943	-1.907	0.913	-2.827
5.27	-0.313	-0.156	-0.884	-1.904	0.913	-2.832
5.28	-0.313	-0.156	-0.884	-1.901	0.913	-2.837
5.29	-0.391	0.078	-0.943	-1.898	0.915	-2.843
5.30	-0.391	0.078	-0.943	-1.896	0.918	-2.849
5.31	-0.391	0.078	-0.943	-1.894	0.920	-2.855
5.32	-0.391	0.078	-1.001	-1.891	0.922	-2.862
5.33	-0.391	0.078	-1.001	-1.889	0.925	-2.868
5.34	-0.469	0.078	-1.001	-1.888	0.927	-2.875
5.35	-0.469	0.078	-1.001	-1.886	0.929	-2.881
5.36	-0.469	0.078	-1.001	-1.884	0.932	-2.888
5.37	-0.469	0.078	-1.001	-1.883	0.934	-2.894
5.38	-0.391	0.078	-0.943	-1.880	0.936	-2.900
5.39	-0.391	0.078	-0.884	-1.878	0.939	-2.905
5.40	-0.391	0.078	-0.884	-1.876	0.941	-2.911
5.41	-0.313	0.078	-0.825	-1.873	0.943	-2.915
5.42	-0.313	0.078	-0.825	-1.870	0.946	-2.920
5.43	-0.313	0.078	-0.825	-1.866	0.948	-2.925
5.44	-0.313	0.078	-0.825	-1.863	0.950	-2.929
5.45	-0.313	0.078	-0.825	-1.860	0.953	-2.934
5.46	-0.313	0.078	-0.825	-1.857	0.955	-2.939
5.47	-0.313	0.078	-0.825	-1.854	0.957	-2.944

Figure 10.1.3.d.2 Digital data for event 4.1 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
5.48	-0.313	0.078	-0.825	-1.851	0.960	-2.948
5.49	-0.313	0.078	-0.825	-1.848	0.962	-2.953
5.50	-0.313	0.078	-0.825	-1.845	0.964	-2.958
5.51	-0.313	0.078	-0.766	-1.841	0.967	-2.962
5.52	-0.313	0.078	-0.766	-1.838	0.969	-2.966
5.53	-0.234	0.078	-0.766	-1.834	0.971	-2.970
5.54	-0.234	0.078	-0.766	-1.830	0.974	-2.974
5.55	-0.234	0.078	-0.766	-1.827	0.976	-2.978
5.56	-0.234	0.078	-0.766	-1.823	0.979	-2.983
5.57	-0.234	0.078	-0.766	-1.819	0.981	-2.987
5.58	-0.234	0.078	-0.766	-1.815	0.983	-2.991
5.59	-0.234	0.078	-0.766	-1.811	0.986	-2.995
5.60	-0.234	0.078	-0.766	-1.807	0.988	-2.999
5.61	-0.234	0.078	-0.707	-1.803	0.990	-3.003
5.62	-0.234	0.078	-0.707	-1.799	0.993	-3.006
5.63	-0.234	0.078	-0.707	-1.795	0.995	-3.010
5.64	-0.234	0.078	-0.707	-1.791	0.997	-3.013
5.65	-0.234	0.078	-0.707	-1.788	1.000	-3.017
5.66	-0.234	0.078	-0.707	-1.784	1.002	-3.020
5.67	-0.234	-0.156	-0.707	-1.780	1.002	-3.024
5.68	-0.234	-0.156	-0.707	-1.776	1.002	-3.027
5.69	-0.234	-0.156	-0.707	-1.772	1.002	-3.031
5.70	-0.234	-0.156	-0.707	-1.768	1.002	-3.034
5.71	-0.234	-0.156	-0.707	-1.764	1.002	-3.038
5.72	-0.234	-0.156	-0.648	-1.760	1.002	-3.041
5.73	-0.234	-0.156	-0.648	-1.756	1.002	-3.044
5.74	-0.234	-0.156	-0.648	-1.752	1.002	-3.047
5.75	-0.234	-0.156	-0.648	-1.748	1.002	-3.050
5.76	-0.234	-0.156	-0.648	-1.745	1.002	-3.053
5.77	-0.234	-0.156	-0.648	-1.741	1.002	-3.056
5.78	-0.234	-0.156	-0.648	-1.737	1.002	-3.059
5.79	-0.234	-0.156	-0.648	-1.733	1.002	-3.062
5.80	-0.234	-0.156	-0.648	-1.729	1.002	-3.065
5.81	-0.234	-0.156	-0.648	-1.725	1.002	-3.067
5.82	-0.234	-0.156	-0.648	-1.721	1.002	-3.070
5.83	-0.234	-0.156	-0.648	-1.717	1.002	-3.073
5.84	-0.234	-0.156	-0.648	-1.713	1.002	-3.076
5.85	-0.234	-0.156	-0.648	-1.709	1.002	-3.079
5.86	-0.234	-0.156	-0.707	-1.705	1.002	-3.083
5.87	-0.234	-0.156	-0.707	-1.702	1.002	-3.086
5.88	-0.234	-0.156	-0.707	-1.698	1.002	-3.090
5.89	-0.234	-0.156	-0.707	-1.694	1.002	-3.093
5.90	-0.234	-0.156	-0.707	-1.690	1.002	-3.097
5.91	-0.234	-0.156	-0.648	-1.686	1.002	-3.100
5.92	-0.234	-0.156	-0.648	-1.682	1.002	-3.103
5.93	-0.234	-0.156	-0.648	-1.678	1.002	-3.106
5.94	-0.234	-0.156	-0.648	-1.674	1.002	-3.109
5.95	-0.234	-0.156	-0.648	-1.670	1.002	-3.112
5.96	-0.234	-0.156	-0.648	-1.666	1.002	-3.115
5.97	-0.156	-0.156	-0.648	-1.662	1.002	-3.118
5.98	-0.156	-0.156	-0.648	-1.657	1.002	-3.121

Figure 10.1.3.d.2 Digital data for event 4.1 (continued)

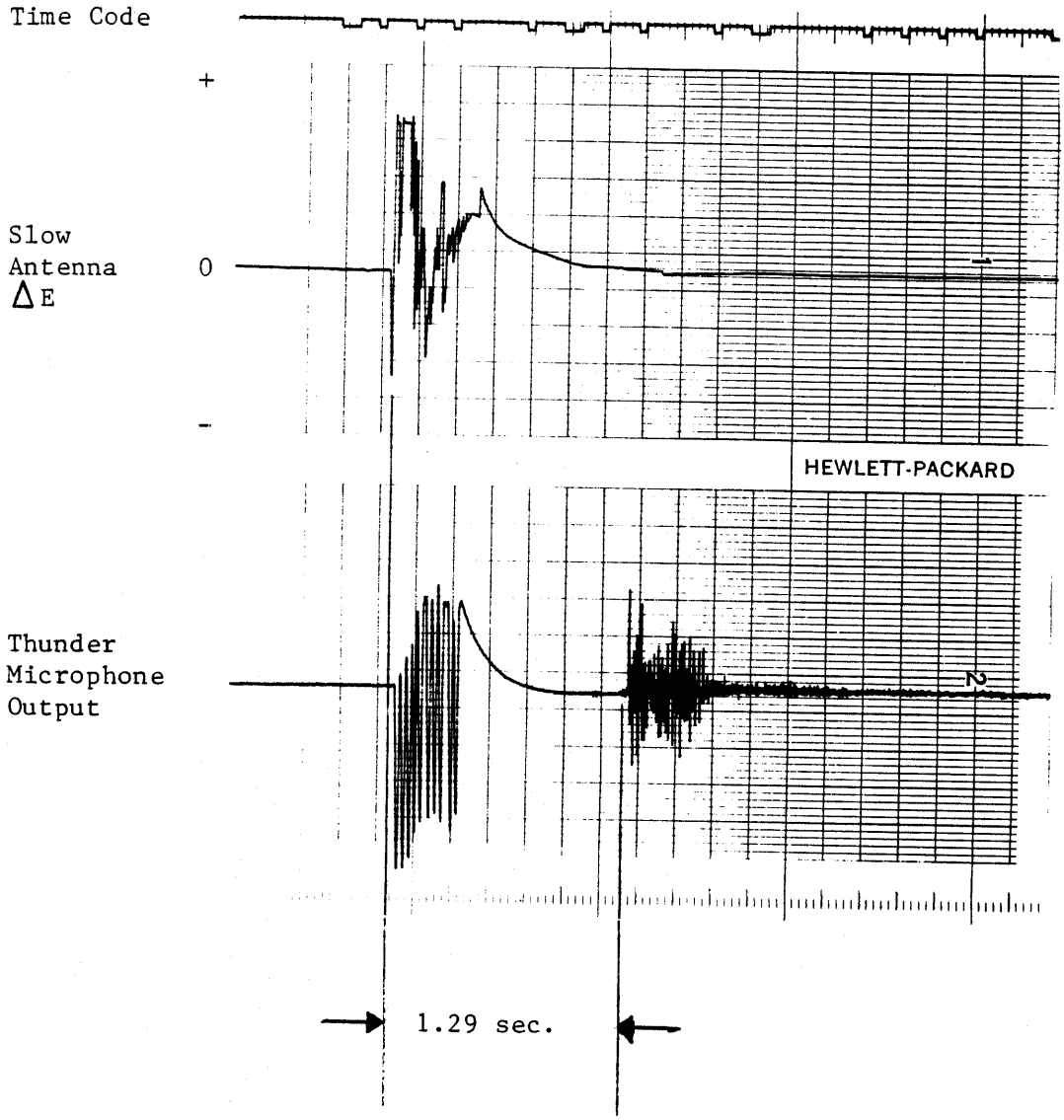
Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
5.99	-0.156	-0.156	-0.589	-1.652	1.002	-3.123
6.00	-0.156	-0.156	-0.589	-1.648	1.002	-3.125
6.01	-0.156	-0.156	-0.589	-1.643	1.002	-3.128
6.02	-0.156	-0.156	-0.589	-1.638	1.002	-3.130
6.03	-0.156	-0.156	-0.589	-1.634	1.002	-3.132
6.04	-0.156	-0.156	-0.589	-1.629	1.002	-3.135
6.05	-0.156	-0.156	-0.589	-1.624	1.002	-3.137
6.06	-0.156	-0.156	-0.589	-1.620	1.002	-3.139
6.07	-0.156	-0.156	-0.589	-1.615	1.002	-3.142
6.08	-0.156	-0.156	-0.589	-1.610	1.002	-3.144
6.09	-0.156	-0.156	-0.589	-1.605	1.002	-3.147
6.10	-0.234	-0.156	-0.589	-1.602	1.002	-3.149
6.11	-0.234	-0.156	-0.589	-1.598	1.002	-3.151
6.12	-0.156	-0.156	-0.589	-1.593	1.002	-3.154
6.13	-0.156	-0.156	-0.589	-1.588	1.002	-3.156
6.14	-0.156	-0.156	-0.589	-1.584	1.002	-3.158
6.15	-0.156	-0.156	-0.589	-1.579	1.002	-3.161
6.16	-0.156	-0.156	-0.589	-1.574	1.002	-3.163
6.17	-0.156	-0.156	-0.589	-1.570	1.002	-3.165
6.18	-0.156	-0.156	-0.589	-1.565	1.002	-3.168
6.19	-0.156	-0.156	-0.589	-1.560	1.002	-3.170
6.20	-0.156	-0.156	-0.589	-1.555	1.002	-3.172
6.21	-0.156	-0.156	-0.589	-1.551	1.002	-3.175
6.22	-0.156	-0.156	-0.589	-1.546	1.002	-3.177
6.23	-0.156	-0.156	-0.589	-1.541	1.002	-3.180
6.24	-0.156	-0.156	-0.589	-1.537	1.002	-3.182
6.25	-0.234	-0.156	-0.589	-1.533	1.002	-3.184
6.26	-0.156	-0.156	-0.589	-1.528	1.002	-3.187
6.27	-0.156	-0.156	-0.589	-1.523	1.002	-3.189
6.28	-0.156	-0.156	-0.589	-1.519	1.002	-3.191
6.29	-0.156	-0.156	-0.589	-1.514	1.002	-3.194
6.30	-0.156	-0.156	-0.530	-1.509	1.002	-3.195
6.31	-0.156	-0.156	-0.530	-1.505	1.002	-3.197
6.32	-0.156	-0.156	-0.530	-1.500	1.002	-3.199
6.33	-0.234	-0.156	-0.530	-1.496	1.002	-3.201
6.34	-0.234	-0.156	-0.530	-1.492	1.002	-3.203
6.35	-0.234	-0.156	-0.530	-1.488	1.002	-3.204
6.36	-0.234	-0.156	-0.530	-1.484	1.002	-3.206
6.37	-0.234	-0.156	-0.530	-1.480	1.002	-3.208
6.38	-0.234	-0.156	-0.589	-1.477	1.002	-3.210
6.39	-0.234	-0.156	-0.589	-1.473	1.002	-3.213
6.40	-0.234	-0.156	-0.530	-1.469	1.002	-3.214
6.41	-0.234	-0.156	-0.589	-1.465	1.002	-3.217
6.42	-0.234	-0.156	-0.589	-1.461	1.002	-3.219
6.43	-0.234	-0.156	-0.589	-1.457	1.002	-3.221
6.44	-0.234	-0.156	-0.530	-1.453	1.002	-3.223
6.45	-0.234	-0.156	-0.530	-1.449	1.002	-3.225
6.46	-0.234	-0.156	-0.530	-1.445	1.002	-3.227
6.47	-0.234	-0.156	-0.530	-1.441	1.002	-3.229
6.48	-0.234	-0.156	-0.530	-1.438	1.002	-3.230
6.49	-0.234	-0.156	-0.530	-1.434	1.002	-3.232

Figure 10.1.3.d.2 Digital data for event 4.1 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
6.50	-0.234	-0.156	-0.530	-1.430	1.002	-3.234
6.51	-0.234	-0.156	-0.530	-1.426	1.002	-3.236
6.52	-0.234	-0.156	-0.530	-1.422	1.002	-3.237
6.53	-0.234	-0.156	-0.471	-1.418	1.002	-3.239
6.54	-0.156	-0.156	-0.471	-1.413	1.002	-3.240
6.55	-0.234	-0.156	-0.471	-1.409	1.002	-3.241
6.56	-0.234	-0.156	-0.471	-1.405	1.002	-3.242
6.57	-0.156	-0.156	-0.412	-1.401	1.002	-3.243
6.58	-0.156	-0.156	-0.471	-1.396	1.002	-3.244
6.59	-0.156	-0.156	-0.530	-1.391	1.002	-3.246
6.60	-0.156	-0.156	-0.412	-1.387	1.002	-3.246
6.61	-0.156	-0.156	-0.471	-1.382	1.002	-3.247
6.62	-0.156	-0.156	-0.471	-1.377	1.002	-3.249
6.63	-0.156	0.078	-0.412	-1.373	1.004	-3.249
6.64	-0.156	0.078	-0.412	-1.368	1.006	-3.250
6.65	-0.156	0.078	-0.412	-1.363	1.009	-3.250
6.66	-0.156	0.078	-0.412	-1.359	1.011	-3.251
6.67	-0.156	0.078	-0.412	-1.354	1.013	-3.252
6.68	-0.156	0.078	-0.412	-1.349	1.016	-3.252
6.69	-0.156	0.078	-0.412	-1.345	1.018	-3.253
6.70	-0.156	0.078	-0.412	-1.340	1.020	-3.253
6.71	-0.234	0.078	-0.412	-1.336	1.023	-3.254
6.72	-0.234	0.078	-0.412	-1.332	1.025	-3.255
6.73	-0.234	0.078	-0.412	-1.328	1.027	-3.255
6.74	-0.234	0.078	-0.412	-1.324	1.030	-3.256
6.75	-0.234	0.078	-0.412	-1.320	1.032	-3.256
6.76	-0.234	0.078	-0.412	-1.316	1.034	-3.257
6.77	-0.234	0.078	-0.412	-1.313	1.037	-3.258
6.78	-0.234	0.078	-0.412	-1.309	1.039	-3.258
6.79	-0.234	0.078	-0.471	-1.305	1.041	-3.259
6.80	-0.234	0.078	-0.471	-1.301	1.044	-3.261
6.81	-0.234	0.078	-0.412	-1.297	1.046	-3.261
6.82	-0.234	0.078	-0.412	-1.293	1.049	-3.262
6.83	-0.234	0.078	-0.412	-1.289	1.051	-3.262
6.84	-0.234	0.078	-0.412	-1.285	1.053	-3.263
6.85	-0.234	0.078	-0.412	-1.281	1.056	-3.263
6.86	-0.234	0.078	-0.471	-1.277	1.058	-3.265
6.87	-0.234	0.078	-0.471	-1.273	1.060	-3.266
6.88	-0.234	0.078	-0.412	-1.270	1.063	-3.266
6.89	-0.234	0.078	-0.412	-1.266	1.065	-3.267
6.90	-0.234	0.078	-0.471	-1.262	1.067	-3.268
6.91	-0.234	0.078	-0.471	-1.258	1.070	-3.269
6.92	-0.234	0.078	-0.471	-1.254	1.072	-3.271
6.93	-0.313	0.078	-0.471	-1.251	1.074	-3.272
6.94	-0.313	0.078	-0.471	-1.248	1.077	-3.273
6.95	-0.313	0.078	-0.471	-1.245	1.079	-3.274
6.96	-0.313	0.078	-0.471	-1.241	1.081	-3.275
6.97	-0.313	0.078	-0.471	-1.238	1.084	-3.276
6.98	-0.313	0.078	-0.471	-1.235	1.086	-3.278
6.99	-0.313	0.078	-0.471	-1.232	1.088	-3.279
7.00	-0.313	0.078	-0.471	-1.229	1.091	-3.280

Figure 10.1.3.d.2 Digital data for event 4.1 (continued)

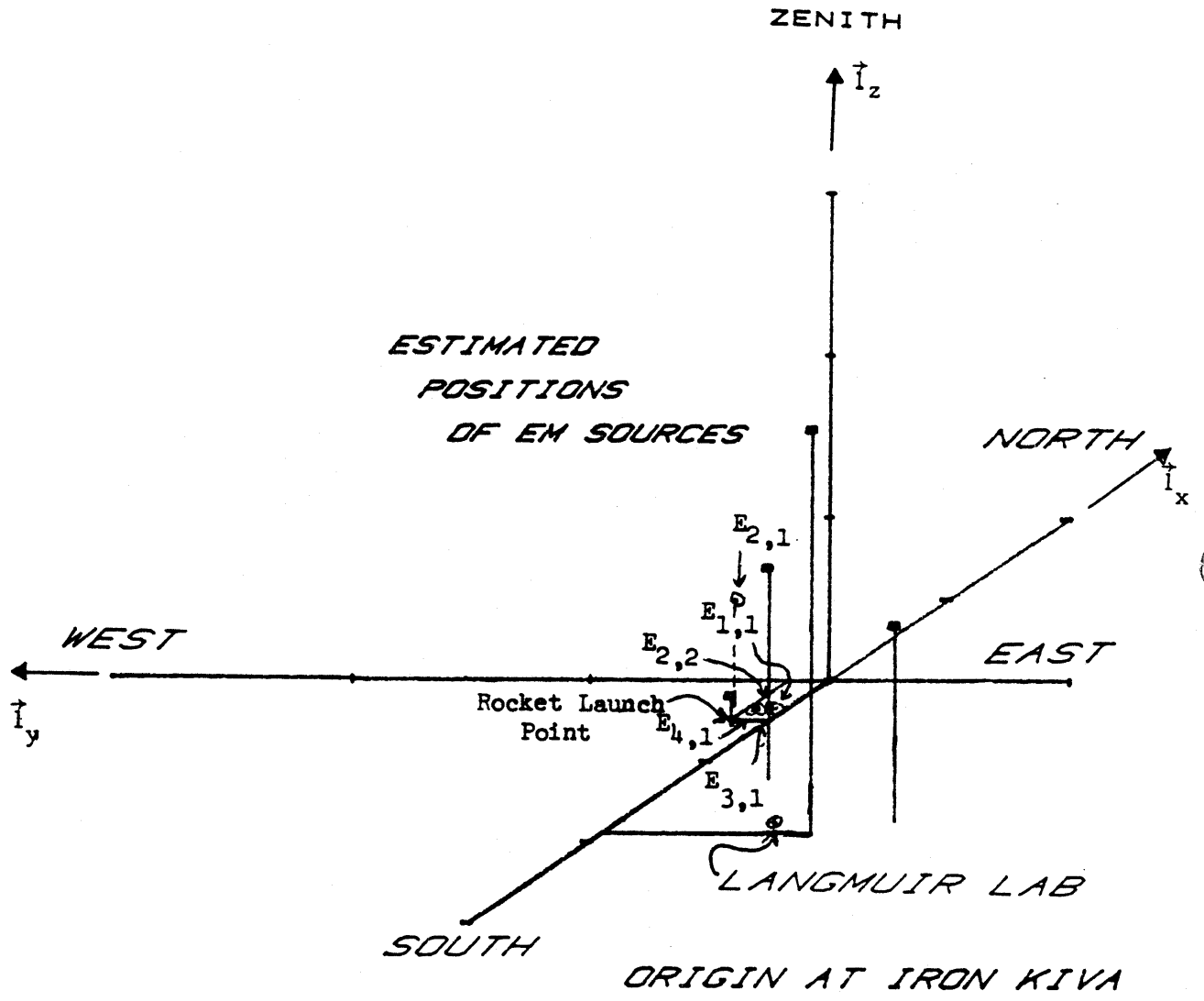
Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
7.01	-0.313	0.078	-0.471	-1.226	1.093	-3.281
7.02	-0.313	0.078	-0.471	-1.223	1.095	-3.282
7.03	-0.313	0.078	-0.471	-1.220	1.098	-3.284
7.04	-0.313	0.078	-0.471	-1.216	1.100	-3.285
7.05	-0.313	0.078	-0.471	-1.213	1.102	-3.286
7.06	-0.313	0.078	-0.412	-1.210	1.105	-3.287
7.07	-0.313	0.078	-0.412	-1.207	1.107	-3.287
7.08	-0.313	0.078	-0.412	-1.204	1.109	-3.288
7.09	-0.313	0.078	-0.412	-1.201	1.112	-3.288
7.10	-0.313	0.078	-0.412	-1.198	1.114	-3.289
7.11	-0.391	0.078	-0.412	-1.195	1.116	-3.290
7.12	-0.391	0.078	-0.412	-1.193	1.119	-3.290
7.13	-0.391	0.078	-0.412	-1.191	1.121	-3.291
7.14	-0.391	0.078	-0.412	-1.188	1.123	-3.291
7.15	-0.391	0.078	-0.471	-1.186	1.126	-3.292
7.16	-0.391	0.078	-0.471	-1.184	1.128	-3.294
7.17	-0.391	0.078	-0.471	-1.181	1.130	-3.295
7.18	-0.391	0.078	-0.471	-1.179	1.133	-3.296
7.19	-0.391	0.078	-0.471	-1.177	1.135	-3.297
7.20	-0.391	0.078	-0.471	-1.174	1.137	-3.298
7.21	-0.469	0.078	-0.471	-1.173	1.140	-3.300
7.22	-0.469	0.078	-0.530	-1.171	1.142	-3.301
7.23	-0.469	0.078	-0.530	-1.170	1.145	-3.303
7.24	-0.469	0.078	-0.530	-1.168	1.147	-3.305
7.25	-0.469	0.078	-0.530	-1.166	1.149	-3.307
7.26	-0.469	0.078	-0.530	-1.165	1.152	-3.308
7.27	-0.469	0.078	-0.530	-1.163	1.154	-3.310
7.28	-0.469	0.078	-0.589	-1.162	1.156	-3.313
7.29	-0.547	0.156	-0.589	-1.161	1.159	-3.315
7.30	-0.547	0.156	-0.589	-1.160	1.162	-3.317
7.31	-0.547	0.156	-0.589	-1.159	1.166	-3.320
7.32	-0.547	0.156	-0.589	-1.159	1.169	-3.322
7.33	-0.547	0.156	-0.589	-1.158	1.172	-3.324
7.34	-0.547	0.156	-0.589	-1.157	1.175	-3.327
7.35	-0.547	0.156	-0.648	-1.156	1.178	-3.330
7.36	-0.547	0.156	-0.648	-1.155	1.181	-3.333
7.37	-0.547	0.156	-0.648	-1.155	1.184	-3.336



horizontal range = 433 m

Date : 81221 M.S.T. : 13:15:46

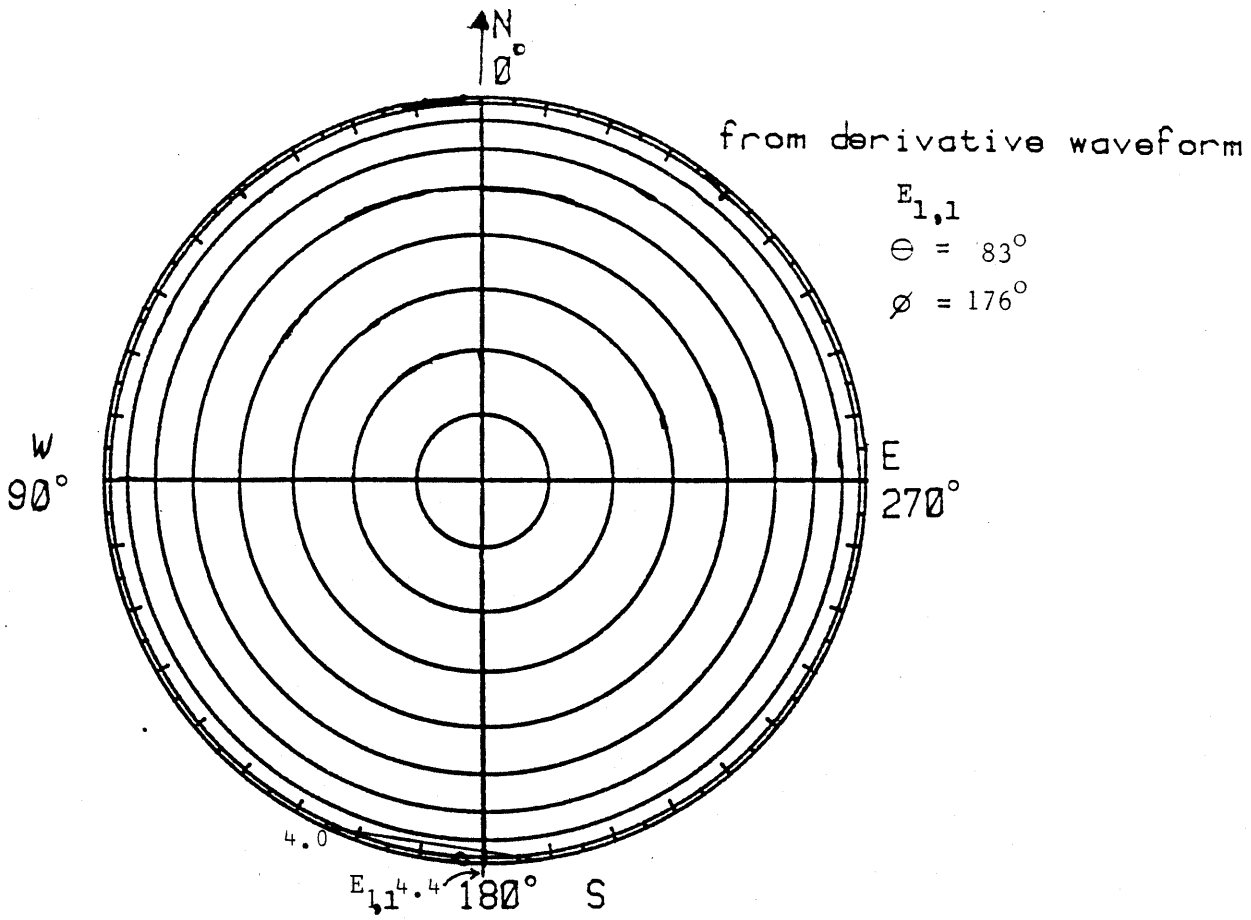
Figure 10.1.4 Slow electric field change and thunder microphone record from rocket triggered lightning



ticks on axes at 1 km intervals

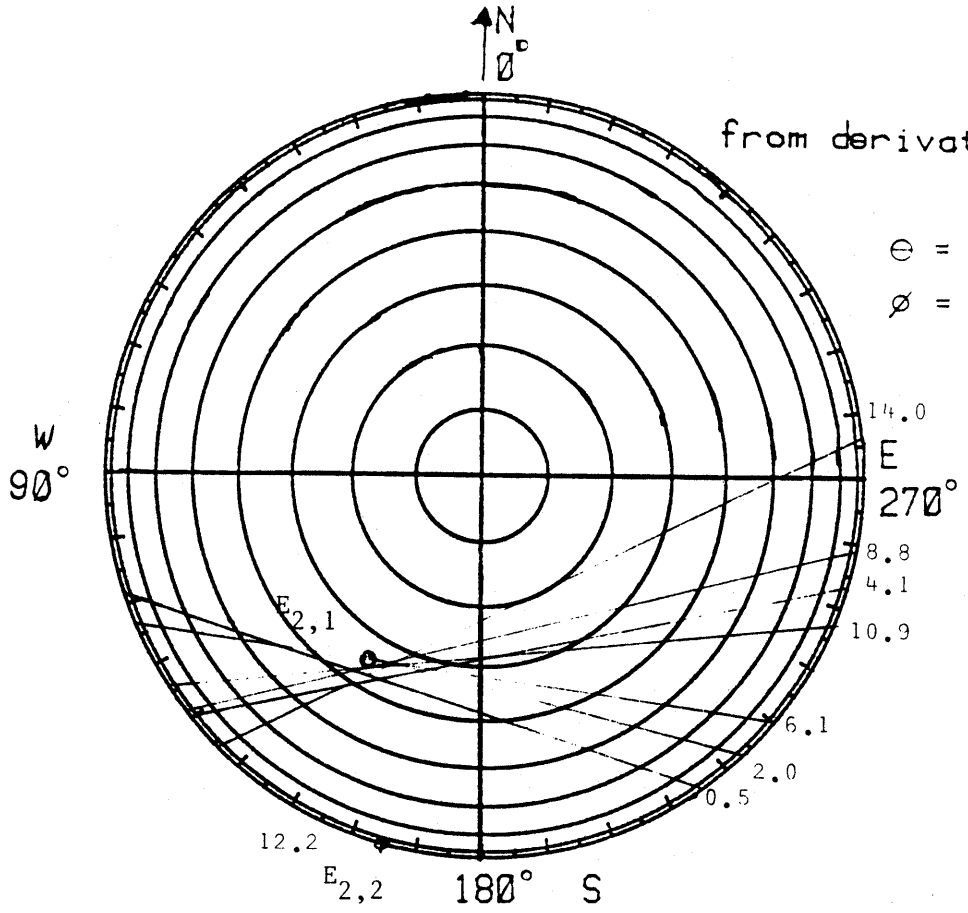
Date : 81221 M.S.T. : 13:15:46

Figure 10.1.5 Acoustic location of rocket triggered lightning



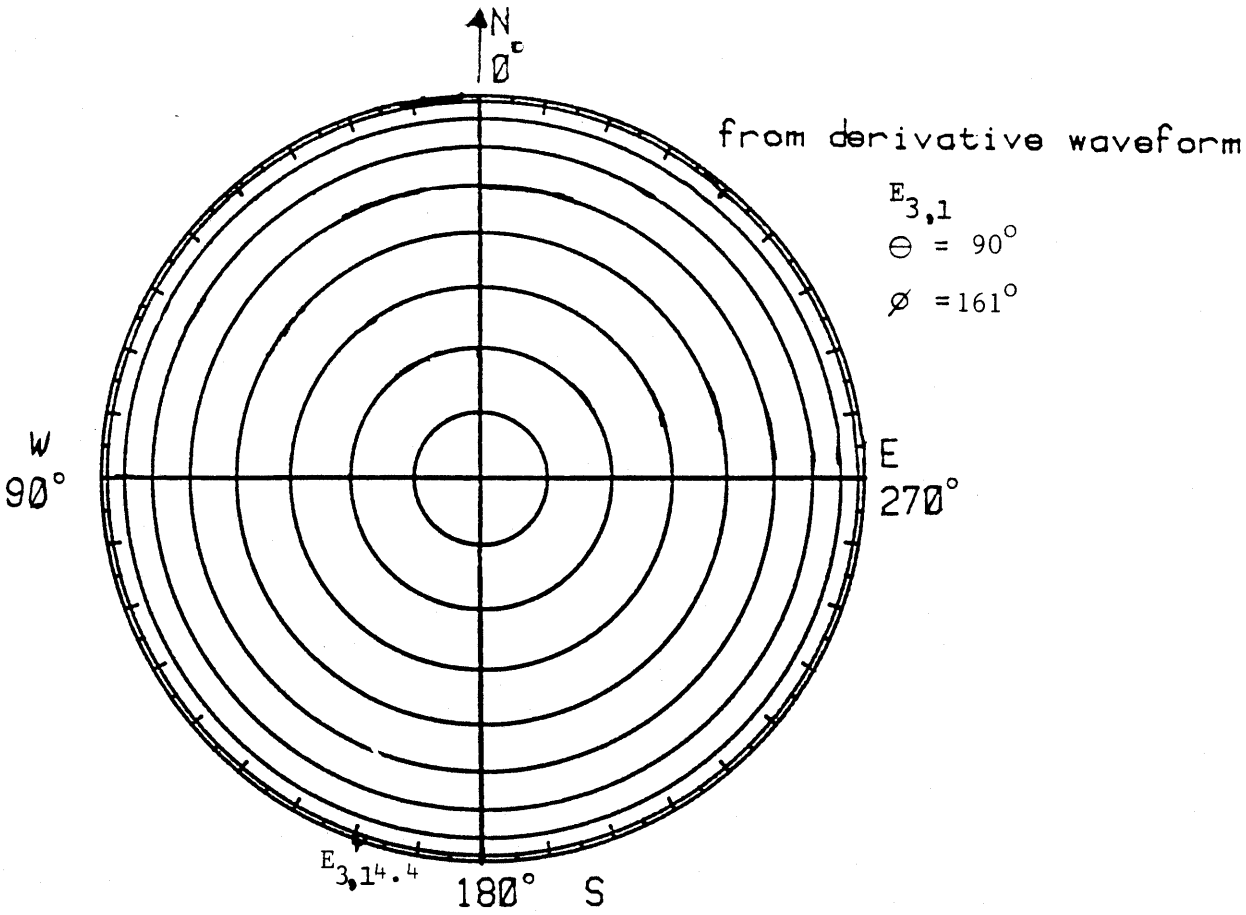
Date : 81221 M.S.T. : 13:15:46.491

Figure 10.1.6.A.1 sin(θ),ϕ contours for rocket triggered lightning derivative waveform



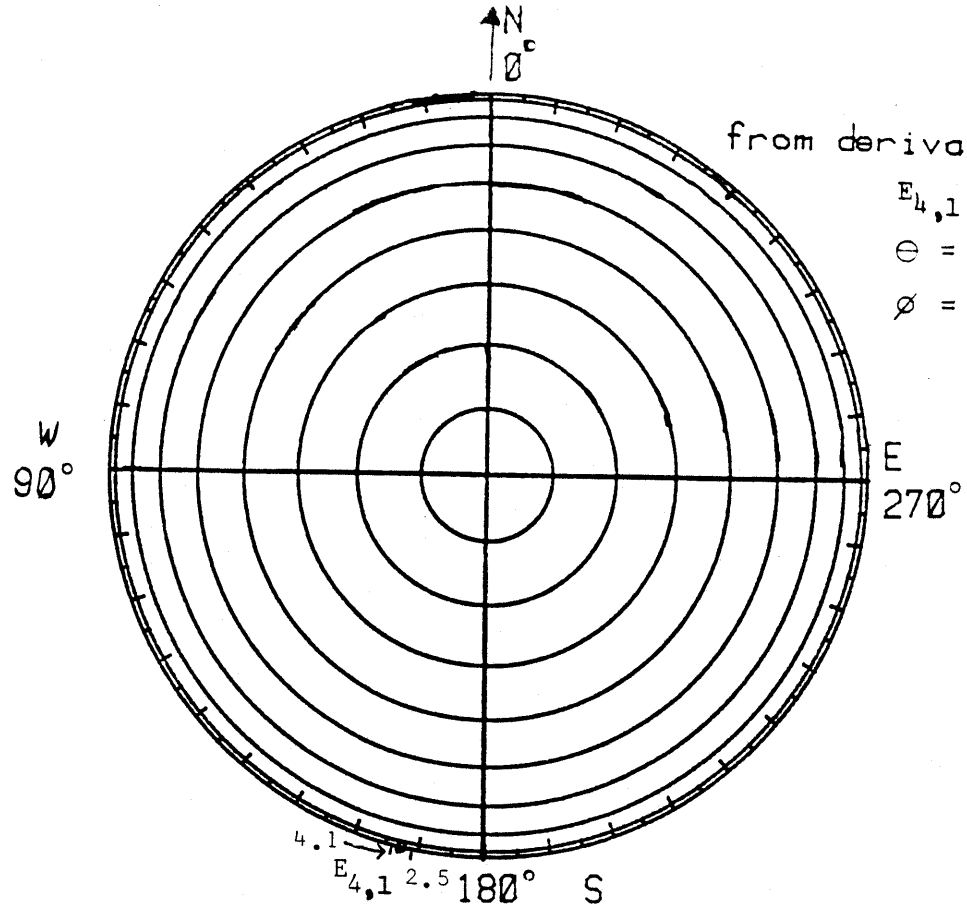
Date : 81221 M.S.T. : 13:15:46.541

Figure [illegible] $\sin(\theta),\phi$ contours for rocket triggered lightning derivative waveform



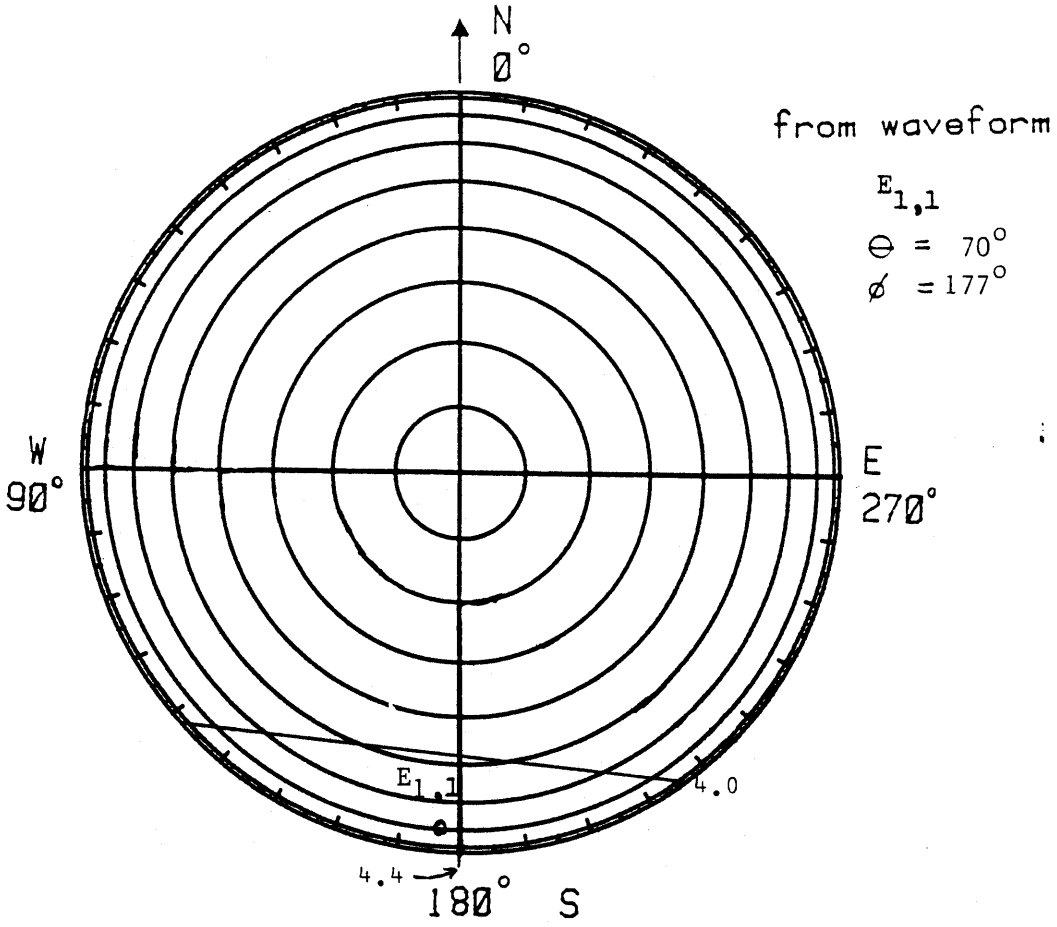
Date : 81221 M.S.T. : 13:15:46.588

Figure 10.1.6.A.3 $\sin(\theta),\phi$ contours for rocket triggered lightning derivative waveform



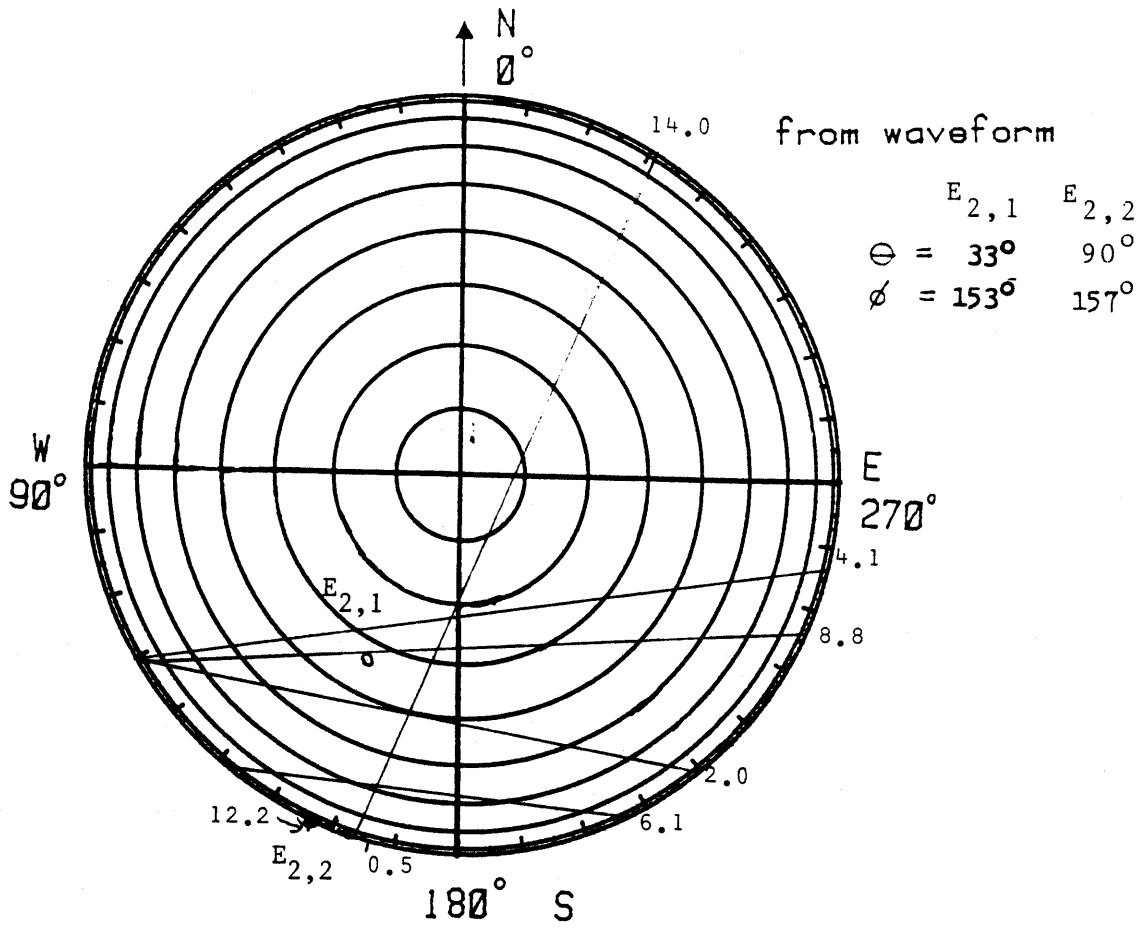
Date : 81221 G.M.S.T. : 13:15:46.637

Figure 5.4.6.A.4 $\sin(\theta),\phi$ contours for rocket triggered lightning derivative waveform



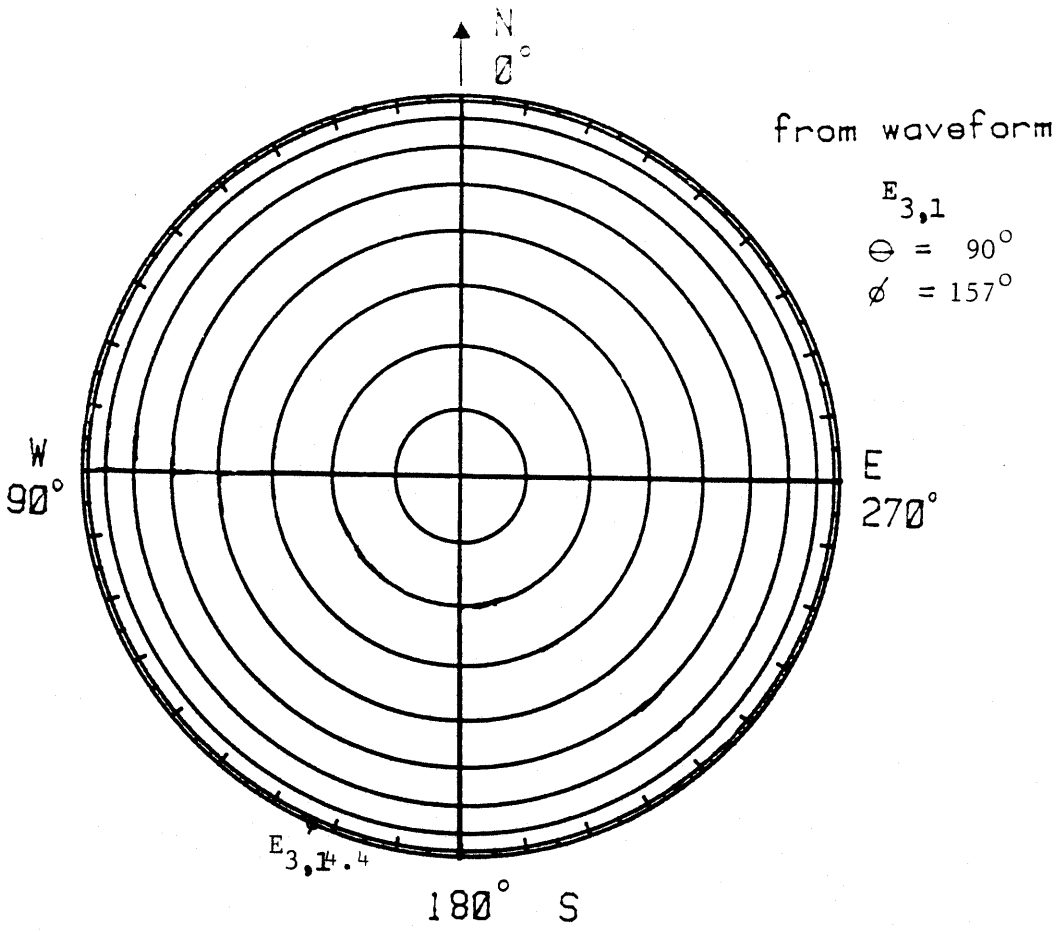
Date : 81221 M.I.T. : 13:15:46.491

Figure 10.1.6.B.1 $\sin(\theta),\phi$ contours for rocket triggered lightning waveform



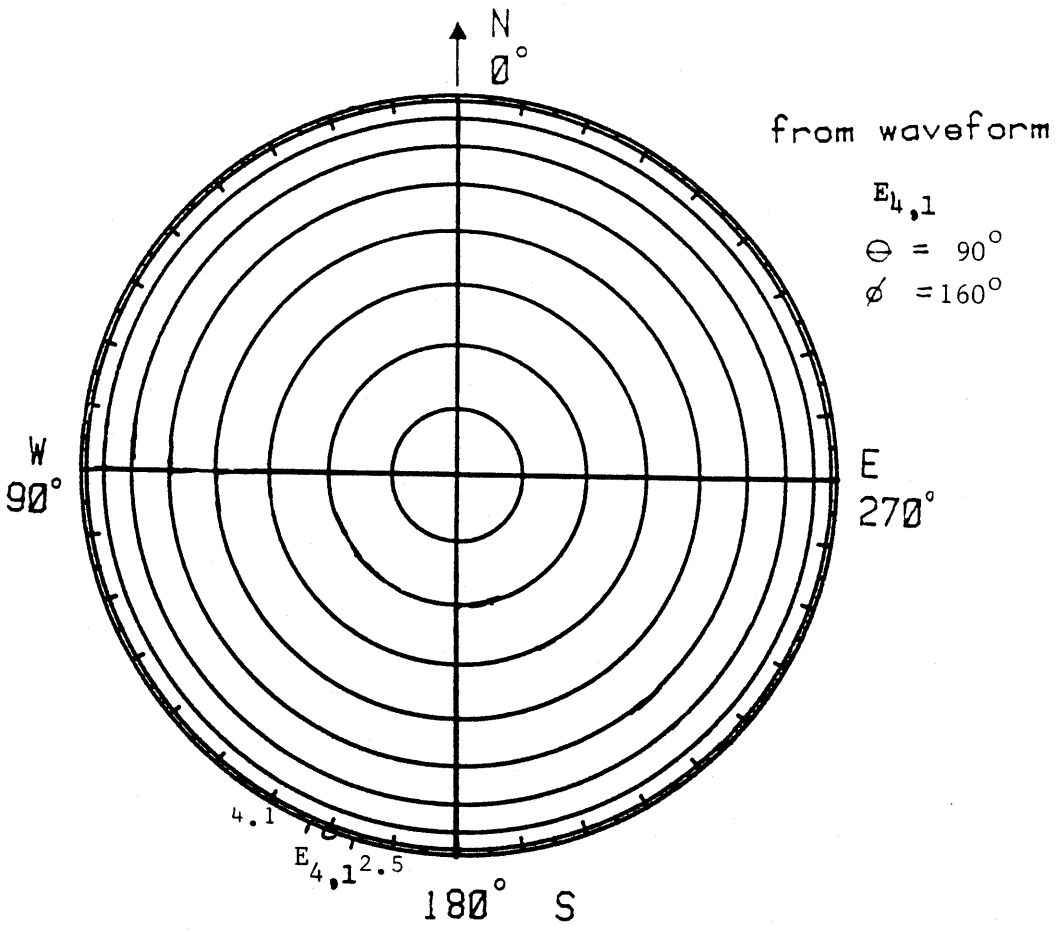
Date : 81221 M.S.T. : 13:15:46.541

Figure 10.1.6.B.2 $\sin(\theta),\phi$ contours for rocket triggered lightning waveform



Date : 81221 M.S.T. : 13:15:46.588

Figure 10.1.6.E.3 sin(θ),ϕ contours for rocket triggered lightning waveform



Date : 81221 M.S.T. : 13:15:46.637

Figure 10.1.6.B.4 $\sin(\theta),\phi$ contours for rocket triggered lightning waveform

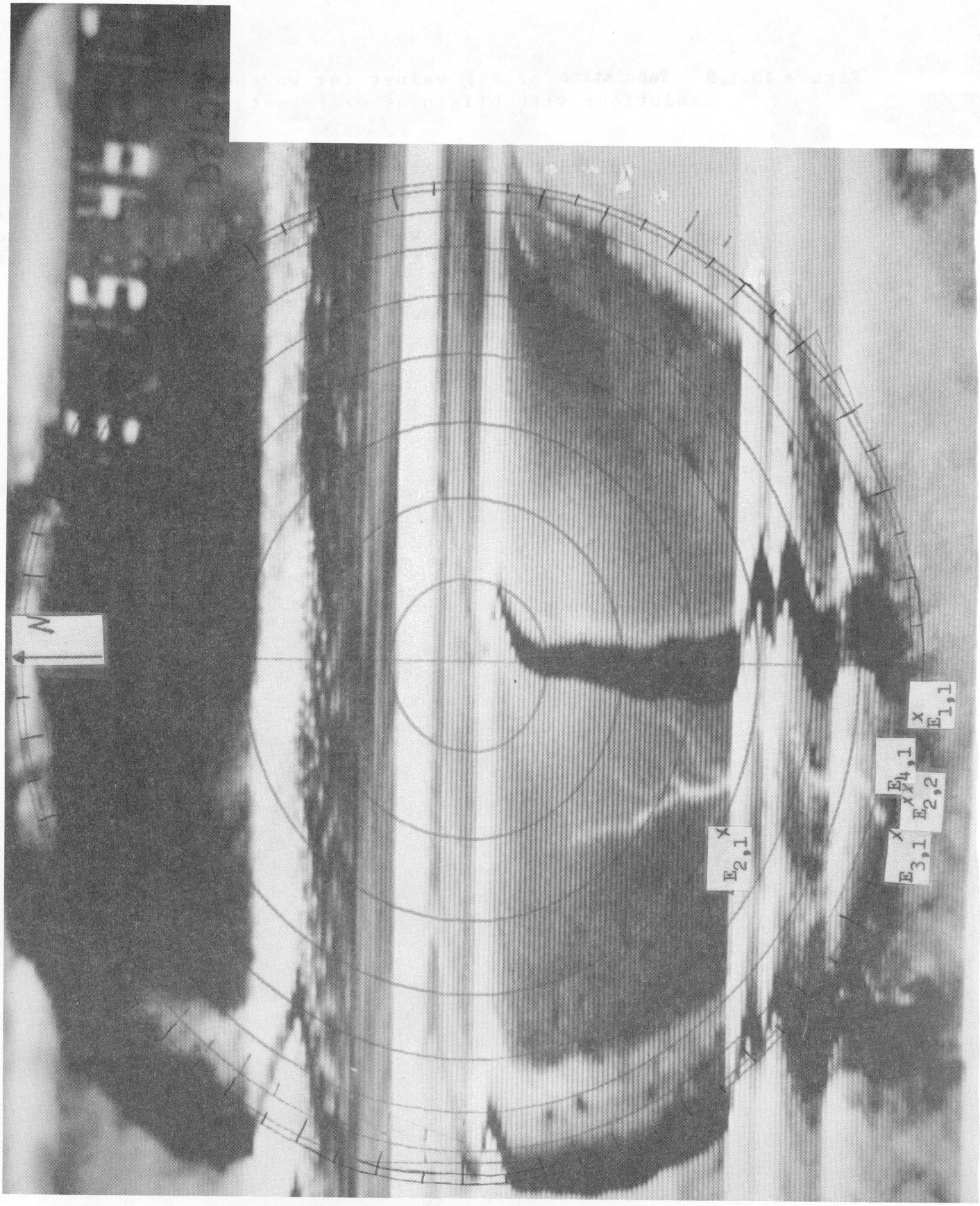


Figure 10.1.7 Whole-sky videotape photograph of rocket triggered lightning from Kiva

Figure **10.1.8** **Tabulation** of θ, ϕ values for waveform and TOA solutions with origin at different locations

Yeardate : 81221 M.S.T. : 1315.46

Event		TOA	waveform	r TOA (meters)	r waveform (meters)	TOA origin at Kiva	TOA origin at WSC	waveform origin at WSC
1	θ		83°		436			85°
	ϕ		176°					174°
2,1	θ		34°		774			40°
	ϕ		149°					151°
2,2	θ		90°		433			90°
	ϕ		165°					165°
3	θ		90°		433			90°
	ϕ		161°					161°
4	θ		90°		433			90°
	ϕ		167°					166°

Figure **10.1.9.A.1** Tabulation of peak values for each event from derivative waveform set for rocket triggered lightning

Yeardate: 81221 M.S.T.: 131546.491

ϕ = 176° ; θ = 83° ; r = 436 m

Event Number	Time (μs)	$Z_o \Delta\partial D_z/\partial t$ (T/s)	$\Delta\partial B_E/\partial t$ (T/s)	$\Delta\partial B_N/\partial t$ (T/s)	$\Delta\partial B_h/\partial t$ (T/s)	$\Delta\partial B_e/\partial t$ (T/s)	$\lvert\Delta\partial\vec{B}/\partial t\rvert$ (T/s)
4.0	4.03	-1.53	-1.56	0.23	0.06	-0.79	0.79
4.4	4.40	-0.41	-0.23	0.00	-0.01	-0.12	0.12

CALCULATED VALUES FOR $\partial\vec{T}/\partial t$

Event Number	$\partial T_2/\partial t$ (10^{15} Am/s^2)	$\partial T_3/\partial t$ (10^{15} Am/s^2)	$\lvert\partial\vec{T}/\partial t\rvert$ (10^{15} Am/s^2)	α (deg)
4.0	-81	1030	1034	5
4.4	11	153	153	356

Figure **10.1.9.A.2** Tabulation of peak values for each event from derivative waveform set for rocket triggered lightning

Yeardate: 81221 M.S.T.: 131546.541 Set 2

ϕ = 165° ; θ = 90° ; r = 433 m

Event Number	Time (μs)	$Z_o \Delta\partial D_z/\partial t$ (T/s)	$\Delta\partial B_E/\partial t$ (T/s)	$\Delta\partial B_N/\partial t$ (T/s)	$\Delta\partial B_h/\partial t$ (T/s)	$\Delta\partial B_e/\partial t$ (T/s)	$\lvert\Delta\partial\vec{B}/\partial t\rvert$ (T/s)
12.2	12.20	-6.13	-5.39	1.48	0.02	-2.80	2.80

CALCULATED VALUES FOR $\partial\vec{T}/\partial t$

Event Number	$\partial T_2/\partial t$ (10^{15} Am/s^2)	$\partial T_3/\partial t$ (10^{15} Am/s^2)	$\lvert\partial\vec{T}/\partial t\rvert$ (10^{15} Am/s^2)	α (deg)
12.2	-25	3632	3632	0

Figure 10.1.9.A.2 Tabulation of peak values for each event from derivative waveform set for rocket triggered lightning

Yeardate: 81221 G.M.S.T.: 131546.541 Set 1

ϕ = 149.0° ± 1.9°; θ = 34.0° ± 2.9°; r = 774 m

Event Number	Time (μs)	$Z_o \Delta\partial D_z/\partial t$ (T/s)	$\Delta\partial B_E/\partial t$ (T/s)	$\Delta\partial B_N/\partial t$ (T/s)	$\Delta\partial B_h/\partial t$ (T/s)	$\Delta\partial B_e/\partial t$ (T/s)	$\lvert\Delta\partial\vec{B}/\partial t\rvert$ (T/s)
0.5	0.46	0.30	0.47	-0.16	0.06	0.24	0.25
2.0	1.99	0.35	0.63	-0.16	0.11	0.31	0.33
4.1	4.05	0.77	1.56	0.31	0.65	0.59	0.88
6.1	6.13	0.30	0.55	-0.08	0.13	0.25	0.29
8.8	8.78	0.41	0.94	0.23	0.41	0.34	0.54
10.9	10.92	0.41	0.86	0.08	0.31	0.35	0.46
14.0	13.97	0.12	0.39	0.23	0.24	0.11	0.26

CALCULATED VALUES FOR $\partial\vec{T}/\partial t$

Event Number	$\partial T_2/\partial t$ (10^{15} Am/s^2)	$\partial T_3/\partial t$ (10^{15} Am/s^2)	$\lvert\partial\vec{T}/\partial t\rvert$ (10^{15} Am/s^2)	α (deg)
0.5	-150	-561	581	165
2.0	-262	-716	763	160
4.1	-1503	-1369	2033	132
6.1	-301	-591	663	153
8.8	-958	-794	1244	130
10.9	-714	-810	1080	139
14.0	-562	-248	615	114

Figure **10.1.9.A.3** Tabulation of peak values for each event from derivative waveform set for rocket triggered lightning

Yeardate: 81221 N.S.T.: 131546.588

$\phi = 101^{o}$; $\theta = 90^{o}$; r = 433 m

Event Number	Time (μs)	$Z_o \Delta\partial D_z/\partial t$ (T/s)	$\Delta\partial B_E/\partial t$ (T/s)	$\Delta\partial B_N/\partial t$ (T/s)	$\Delta\partial B_h/\partial t$ (T/s)	$\Delta\partial B_e/\partial t$ (T/s)	$\lvert\Delta\partial\vec{B}/\partial t\rvert$ (T/s)
4.4	4.40	-5.18	-4.45	1.56	0.00	-2.36	2.36

CALCULATED VALUES FOR $\partial\vec{T}/\partial t$

Event Number	$\partial T_2/\partial t$ (10^{15} Am/s^2)	$\partial T_3/\partial t$ (10^{15} Am/s^2)	$\lvert\partial\vec{T}/\partial t\rvert$ (10^{15} Am/s^2)	α (deg)
4.4	0	3065	3065	360

Figure **10.1.9.A.4** Tabulation of peak values for each event from derivative waveform set for rocket triggered lightning

Yeardate: 81221 N.S.T.: 131546.637

$\phi = 167^{o}$; $\theta = 90^{o}$; r = 433 m

Event Number	Time (μs)	$Z_o \Delta\partial D_z/\partial t$ (T/s)	$\Delta\partial B_E/\partial t$ (T/s)	$\Delta\partial B_N/\partial t$ (T/s)	$\Delta\partial B_h/\partial t$ (T/s)	$\Delta\partial B_e/\partial t$ (T/s)	$\lvert\Delta\partial\vec{B}/\partial t\rvert$ (T/s)
2.5	2.48	0.47	0.39	-0.08	0.00	0.20	0.20
4.1	4.14	-9.34	-9.06	2.27	0.00	-4.67	4.67

CALCULATED VALUES FOR $\partial\vec{T}/\partial t$

Event Number	$\partial T_2/\partial t$ (10^{15} Am/s^2)	$\partial T_3/\partial t$ (10^{15} Am/s^2)	$\lvert\partial\vec{T}/\partial t\rvert$ (10^{15} Am/s^2)	α (deg)
2.5	0	-259	259	180
4.1	0	6066	6066	360

Figure **10.1.9.B.1** Tabulation of peak values for each event from waveform set for rocket triggered lightning

Yeardate: 81221 M.S.T.: 131546.491

$\phi = 177^{o}$, $\theta = 70^{o}$; r = 461 m

Event Number	Time (μs)	$Z_o \Delta D_z$ (μT)	ΔB_E (μT)	ΔB_N (μT)	ΔB_h (μT)	ΔB_e (μT)	$\lvert\Delta\vec{B}\rvert$ (μT)
4.0	4.03	-0.04	-0.05	0.01	0.00	-0.03	0.03
4.4	4.41	-0.01	-0.01	0.00	-0.00	-0.00	0.00

CALCULATED VALUES FOR $\overline{I_t}.\vec{T}$

Event Number	T_2 (10^9 Am/s)	T_3 (10^9 Am/s)	$\lvert\vec{T}\rvert$ (10^9 Am/s)	α (deg)
4.0	-5	36	36	7
4.4	1	3	3	351

Figure **10.1.9.B.2** Tabulation of peak values for each event from waveform set for rocket triggered lightning

Yeardate: 81221 M.S.T.: 131546.541 Set 2

$\phi = 157^{o}$; $\theta = 90^{o}$; r = 433 m

Event Number	Time (μs)	$Z_o \Delta D_z$ (μT)	ΔB_E (μT)	ΔB_N (μT)	ΔB_h (μT)	ΔB_e (μT)	$\lvert\Delta\vec{B}\rvert$ (μT)
12.2	12.20	-2.13	-1.69	0.73	0.01	-0.92	0.92

CALCULATED VALUES FOR $\overline{I_t}.\vec{T}$

Event Number	T_2 (10^9 Am/s)	T_3 (10^9 Am/s)	$\lvert\vec{T}\rvert$ (10^9 Am/s)	α (deg)
12.2	-7	1192	1192	0

Figure **10.1.9.B.2** Tabulation of peak values for each event from waveform set for rocket triggered lightning

Yeardate: 81221 M.S.T.: 131546.541 Set 1

ϕ = 153.0° ± 7.1° ; θ = 33.0° ± 7.6° ; r = 795 m

Event Number	Time (μs)	$Z_o \Delta D_z$ (μT)	ΔB_E (μT)	ΔB_N (μT)	ΔB_h (μT)	ΔB_e (μT)	$\lvert\Delta\vec{B}\rvert$ (μT)
0.5	0.50	0.02	0.02	-0.00	0.00	0.01	0.01
2.0	2.01	0.02	0.03	-0.01	0.00	0.01	0.01
4.1	4.08	0.02	0.04	0.01	0.01	0.02	0.02
6.1	6.13	0.02	0.02	-0.00	0.00	0.01	0.01
8.8	8.80	0.01	0.03	0.00	0.01	0.01	0.02
10.9	10.92	0.02	0.03	0.01	0.01	0.01	0.02
14.0	14.01	0.00	0.00	0.01	0.00	-0.00	0.00

CALCULATED VALUES FOR $\vec{I}_t \cdot \vec{T}$

Event Number	T_2 (10^9 Am/s)	T_3 (10^9 Am/s)	$\lvert\vec{T}\rvert$ (10^9 Am/s)	α (deg)
0.5	-5	-19	20	165
2.0	-11	-31	33	161
4.1	-34	-40	53	140
6.1	-10	-22	25	155
8.8	-22	-31	38	145
10.9	-26	-30	40	139
14.0	-11	1	11	87

Figure **10.1.9.B.3** Tabulation of peak values for each event from waveform set for rocket triggered lightning

Yeardate: 81221 M.S.T.: 131546.588

ϕ = 157° ; θ = 90° ; r = 433 m

Event Number	Time (μs)	$Z_o \Delta D_z$ (μT)	ΔB_E (μT)	ΔB_N (μT)	ΔB_h (μT)	ΔB_e (μT)	$\lvert\Delta\vec{B}\rvert$ (μT)
4.4	4.40	-2.18	-1.70	0.71	0.00	-0.92	0.92

CALCULATED VALUES FOR $\vec{I}_t \cdot \vec{T}$

Event Number	T_2 (10^9 Am/s)	T_3 (10^9 Am/s)	$\lvert\vec{T}\rvert$ (10^9 Am/s)	α (deg)
4.4	0	1199	1199	360

Figure **10.1.9.B.4** Tabulation of peak values for each event from waveform set for rocket triggered lightning

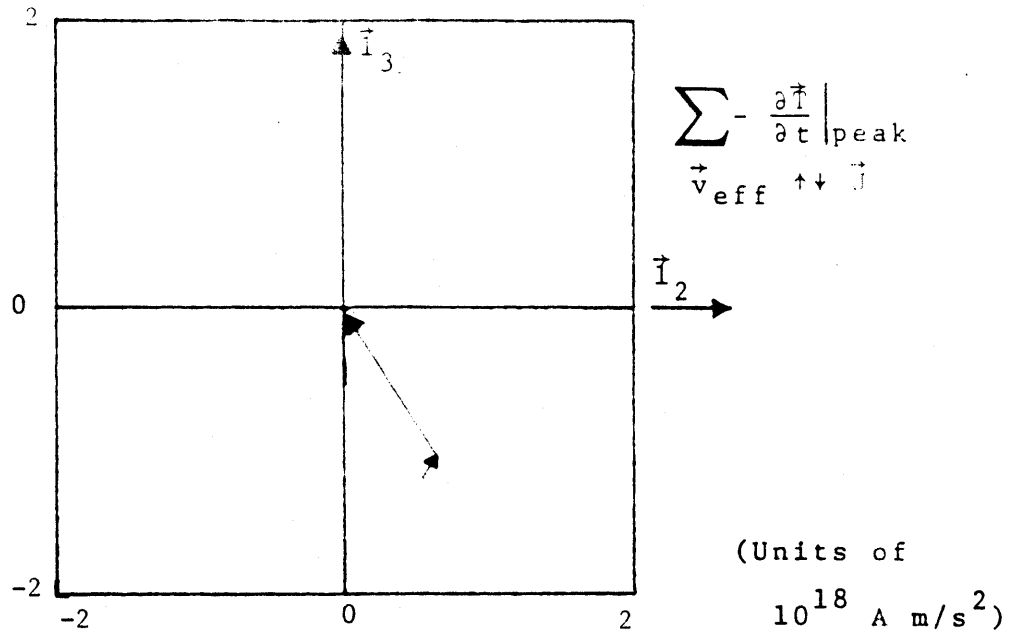
Yeardate: 81221 M.S.T.: 131546.637

ϕ = 160° ; θ = 90° ; r = 433 m

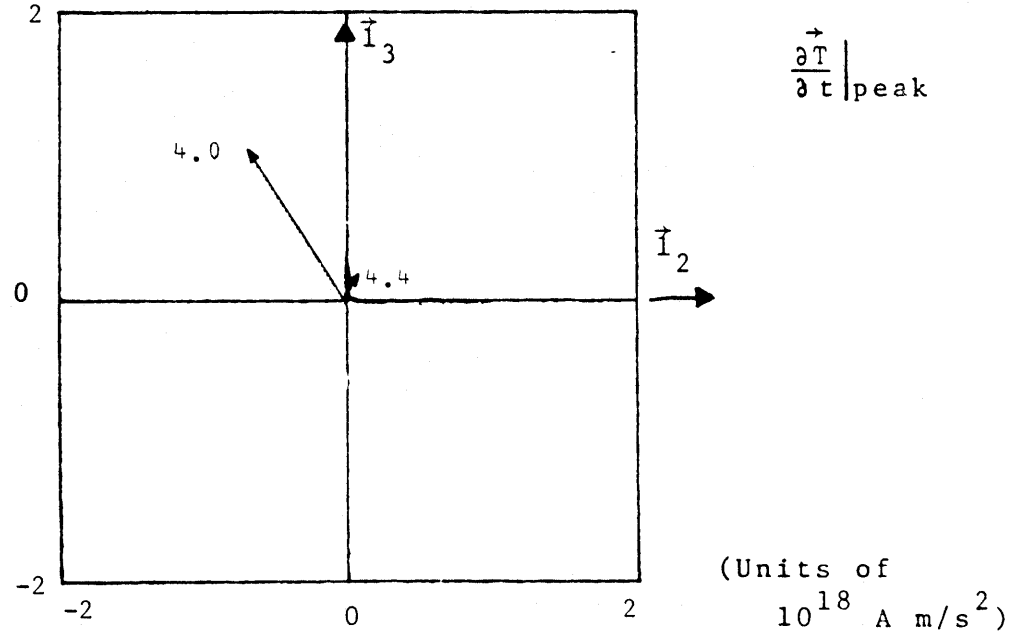
Event Number	Time (μs)	$Z_o \Delta D_z$ (μT)	ΔB_E (μT)	ΔB_N (μT)	ΔB_h (μT)	ΔB_e (μT)	$\lvert\Delta\vec{B}\rvert$ (μT)
2.5	2.48	0.04	0.03	-0.01	0.00	0.01	0.01
4.1	4.14	-2.68	-2.29	0.96	0.00	-1.24	1.24

CALCULATED VALUES FOR $\vec{I}_t \cdot \vec{T}$

Event Number	T_2 (10^9 Am/s)	T_3 (10^9 Am/s)	$\lvert\vec{T}\rvert$ (10^9 Am/s)	α (deg)
2.5	0	-19	19	180
4.1	0	1611	1611	360



Effective reconstruction of negative streamer

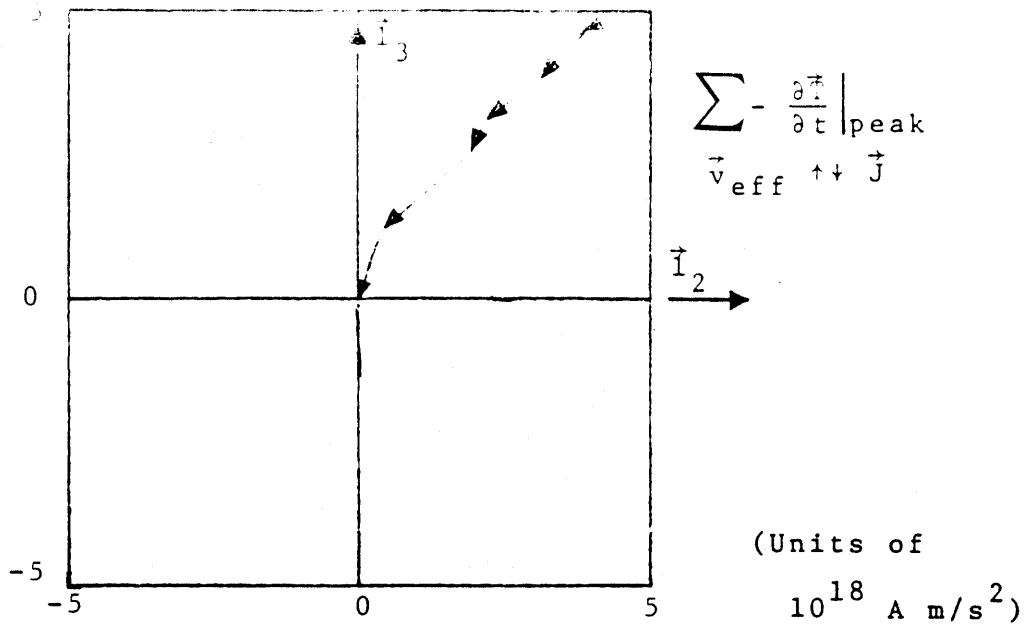


Peaks of $\partial \vec{T}/\partial t$

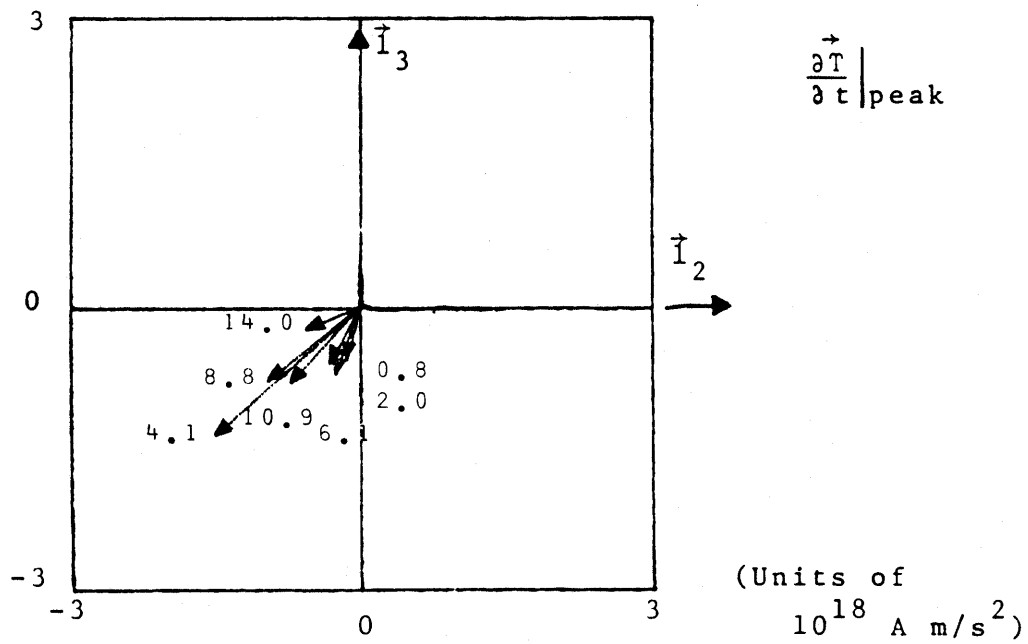
$\phi = 176^o$ $\theta = 83^o$ r = 436 m

Date: 81221 M.S.T.: 13:15:46.491

Figure 10.1.10.A.1 $\partial \vec{T}/\partial t$ for rocket triggered lightning



A. Effective reconstruction of negative streamer

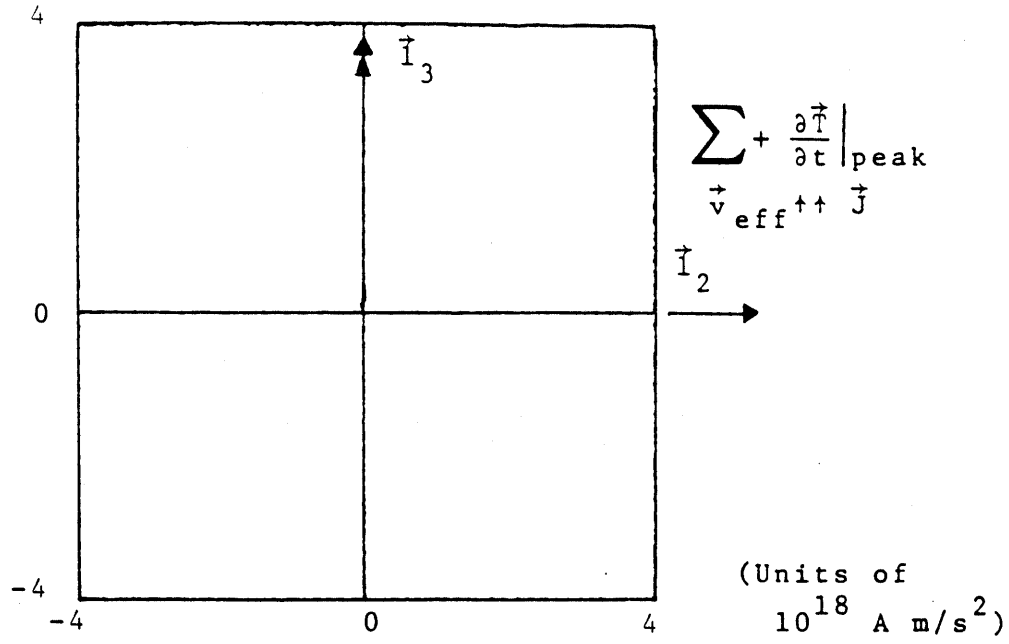


B. Peaks of $\partial\vec{T}/\partial t$

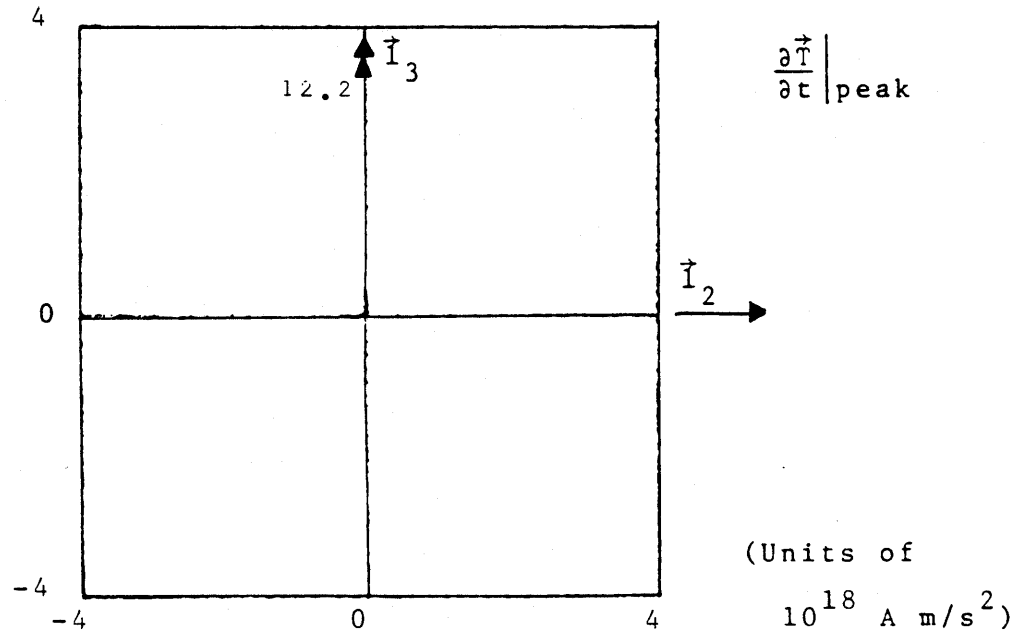
$\phi = 149^o$ $\theta = 34^o$ r = 774 m Set 1

Date: 81221 M.S.T.: 13:15:46.541

Figure 10.1.10.A.2 $\partial\vec{T}/\partial t$ for rocket triggered lightning



Effective reconstruction of positive streamer

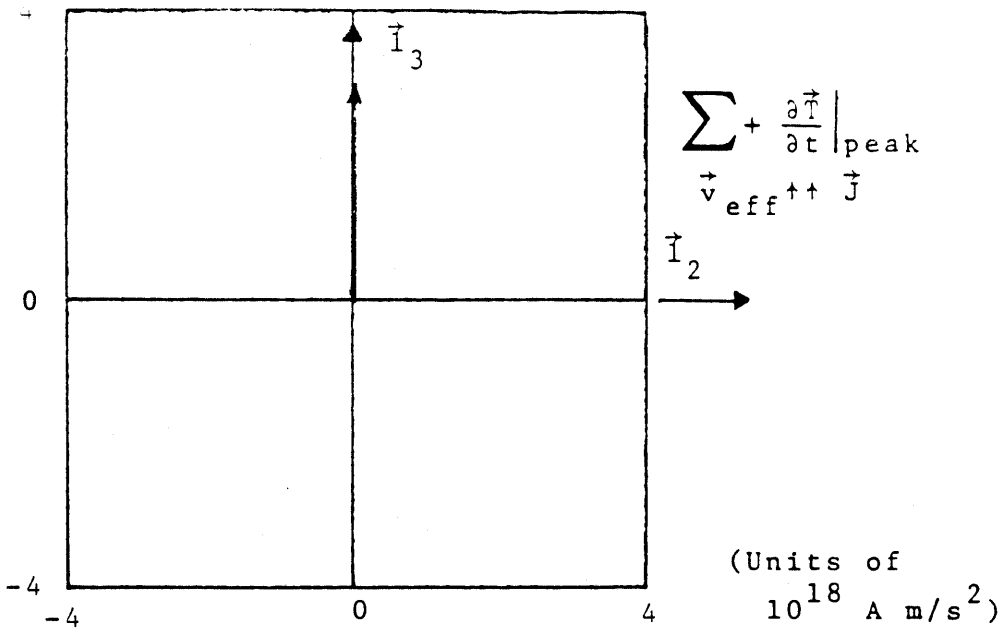


Peaks of $\partial \vec{I}/\partial t$

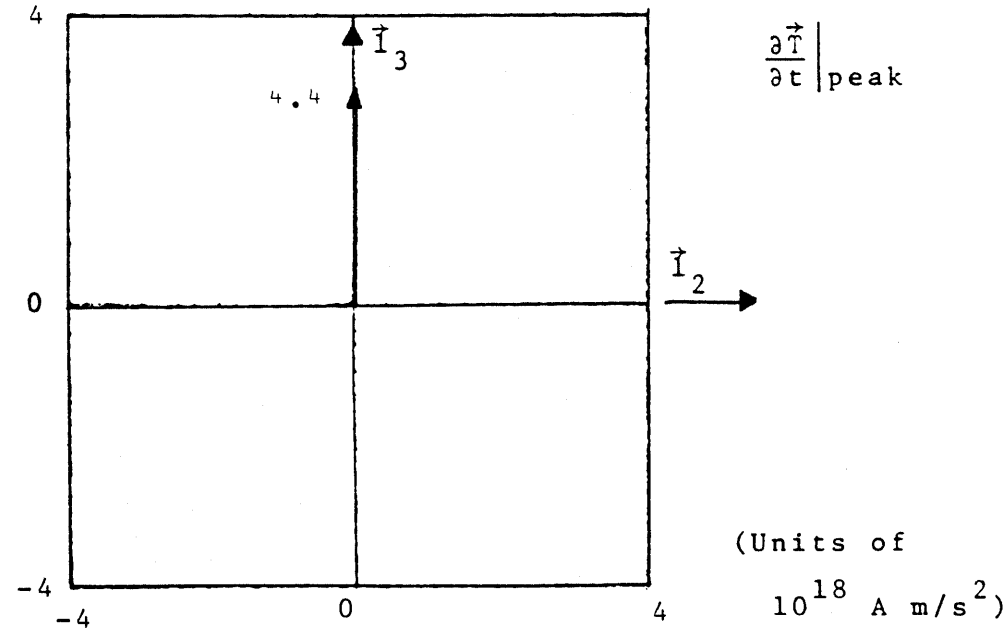
$\phi = 165^{o}$ $\theta = 90^{o}$ r = 433 m Set 2

Date: 81221 M.S.T.: 13:15:46.541

Figure 10.1.10.A.2 $\partial \vec{I}/\partial t$ for rocket triggered lightning



Effective reconstruction of positive streamer

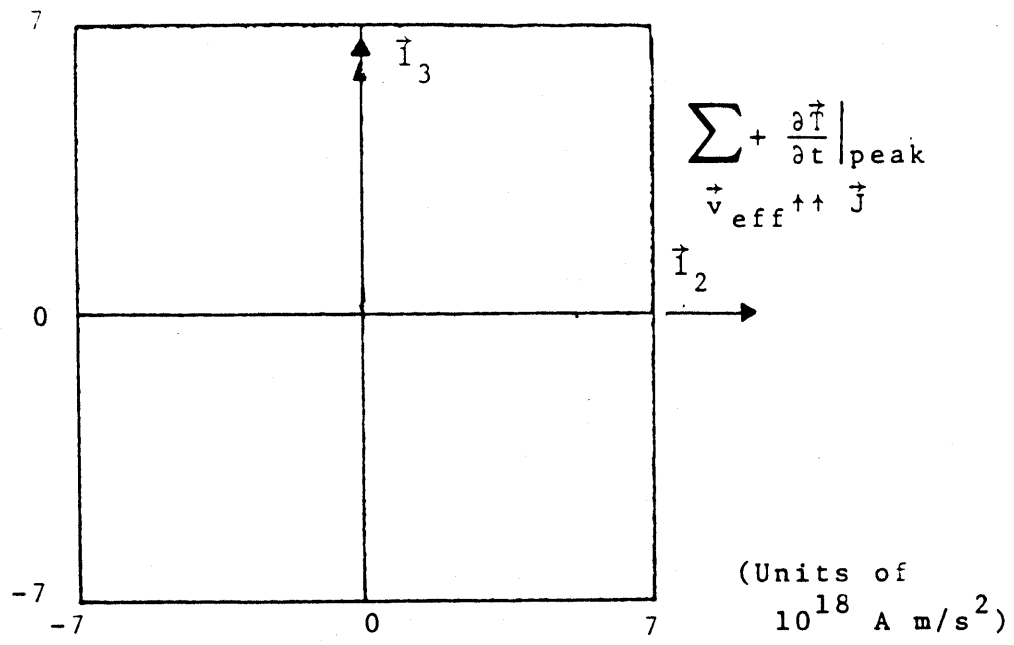


Peaks of $\partial\vec{I}/\partial t$

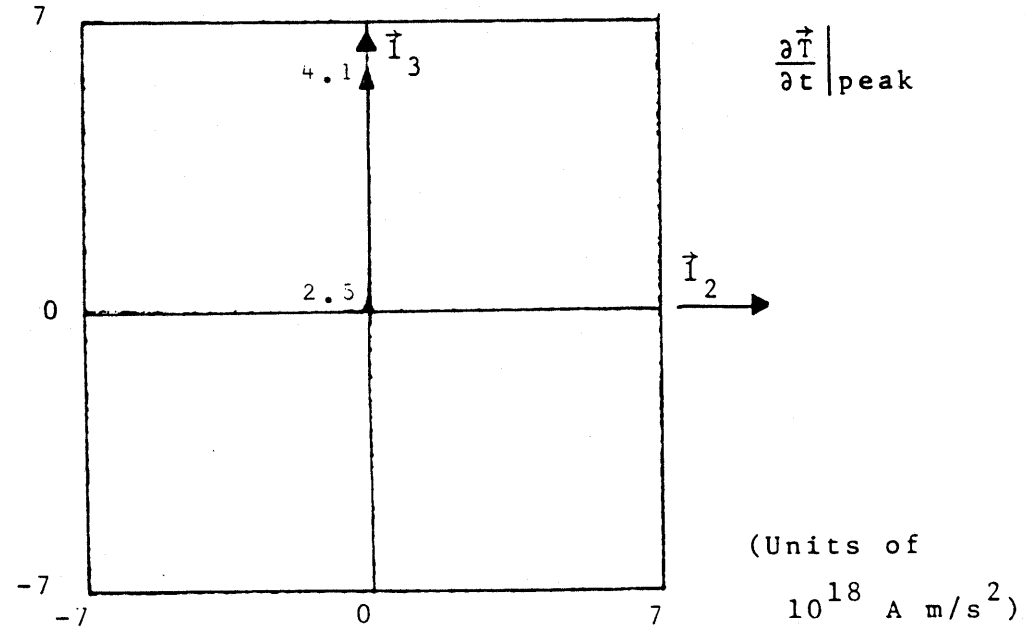
ϕ = 161° θ = 90° r = 433 m

Date: 81221 M.S.T.: 13:15:46.588

Figure 10.1.10.A.3 $\partial\vec{I}/\partial t$ for rocket triggered lightning



Effective reconstruction of positive streamer

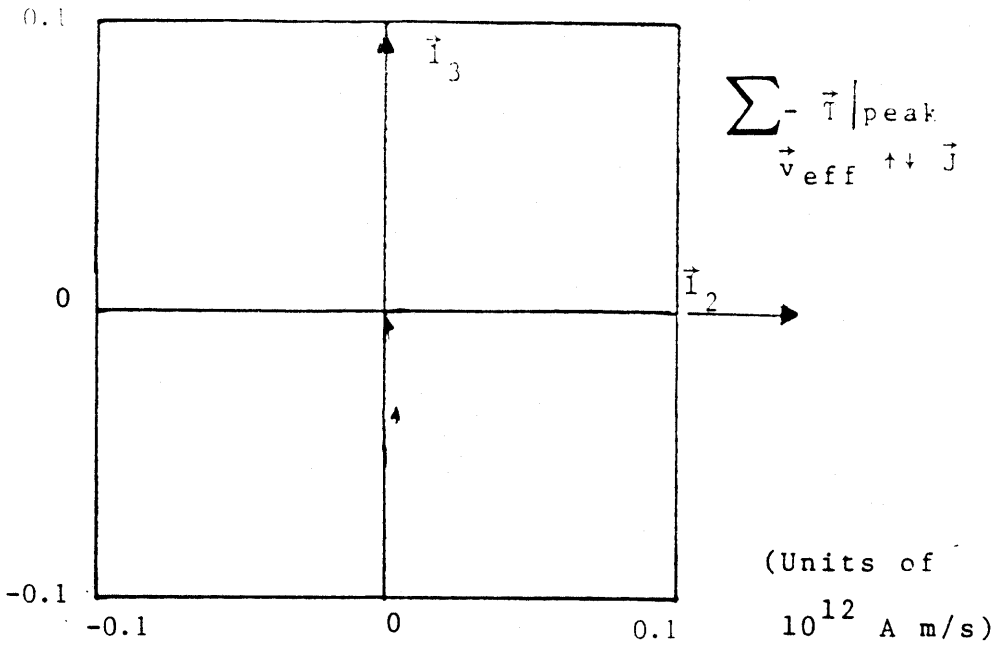


Peaks of $\partial \vec{I}/\partial t$

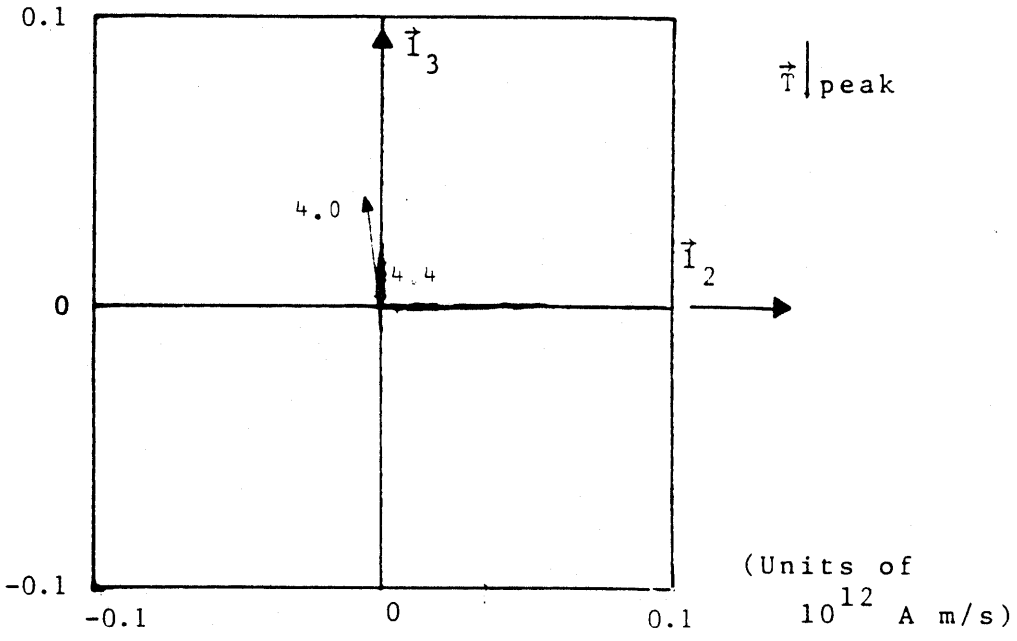
$\phi = 167^o$ $\theta = 90^o$ r = 433 m

Date: 81221 M.S.T.: 13:15:46.637

Figure 10.1.10.A.4 $\partial \vec{I}/\partial t$ for rocket triggered lightning



Effective reconstruction of negative streamer

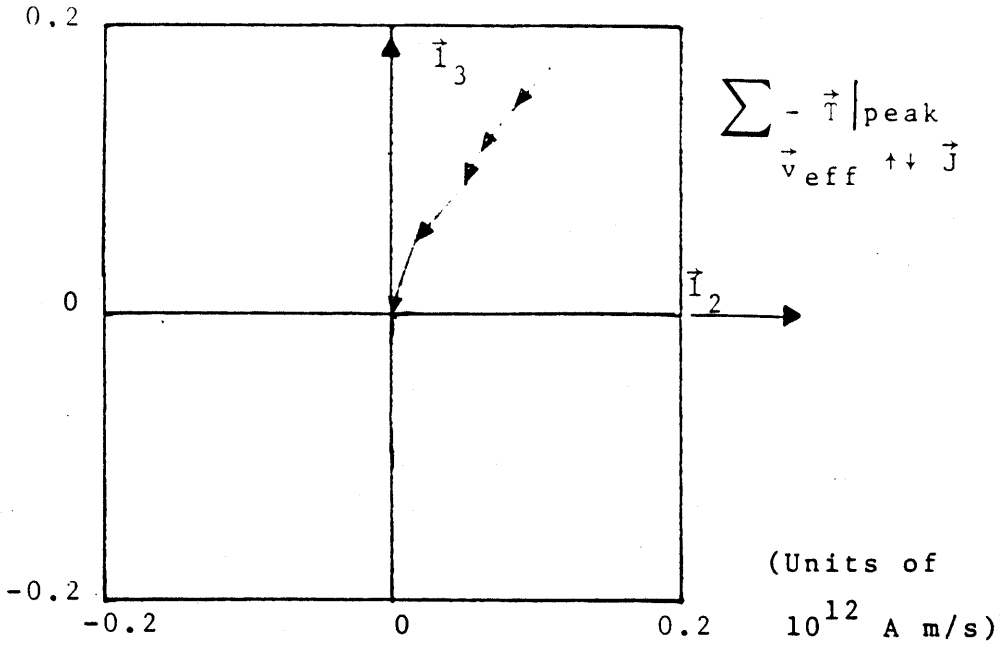


Peaks of $\vec{T}$

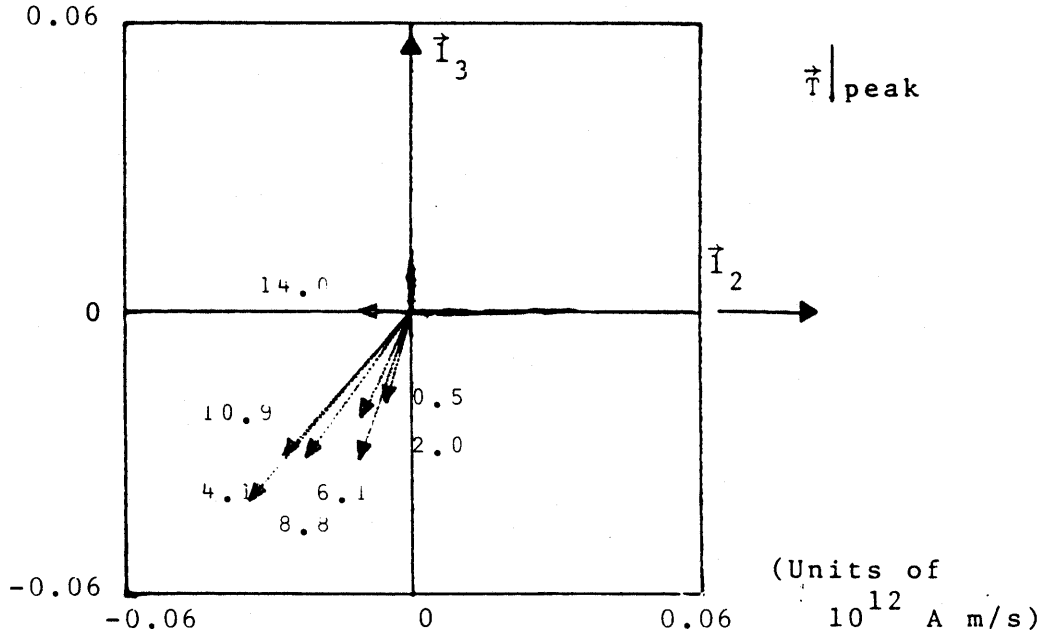
$\phi = 177^{\circ}$ $\theta = 70^{\circ}$ r = 461 m

Date: 81221 M.S.T.: 13:15:46.491

Figure 10.1.10.B.1 $\vec{T}$ for rocket triggered lightning



A. Effective reconstruction of negative streamer

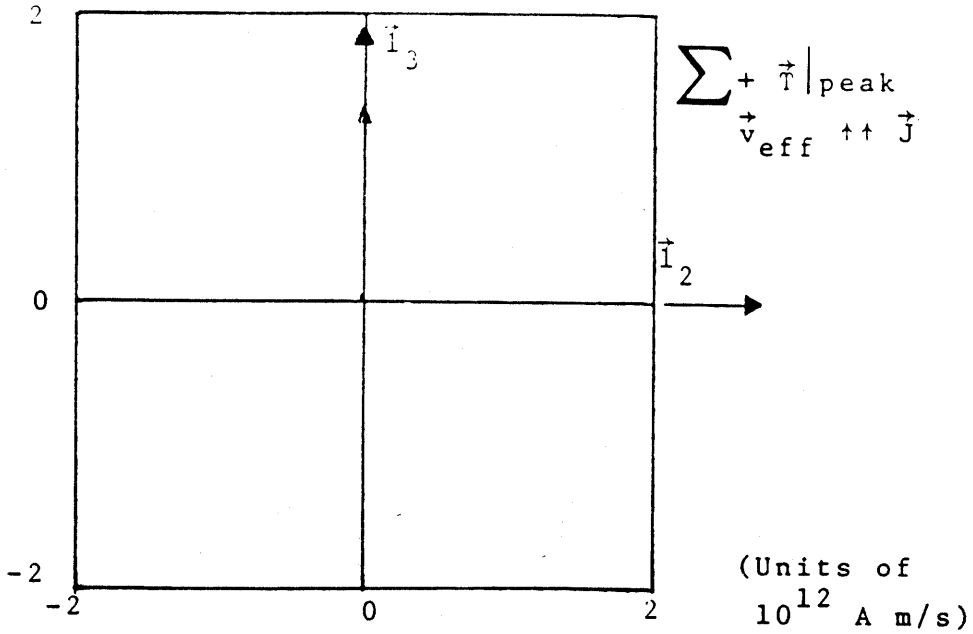


B. Peaks of $\vec{T}$

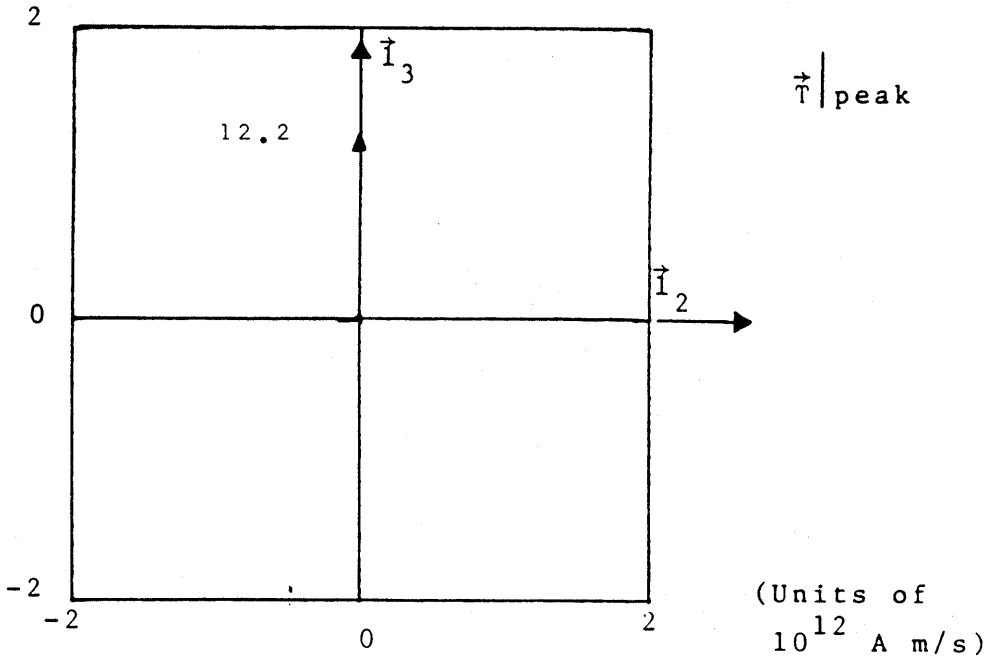
ϕ = 153° θ = 33° r = 795 m Set 1

Date: 81221 M.S.T.: 13:15:46.541

Figure 10.1.10.B.2 $\vec{T}$ for rocket triggered lightning



Effective reconstruction of positive streamer

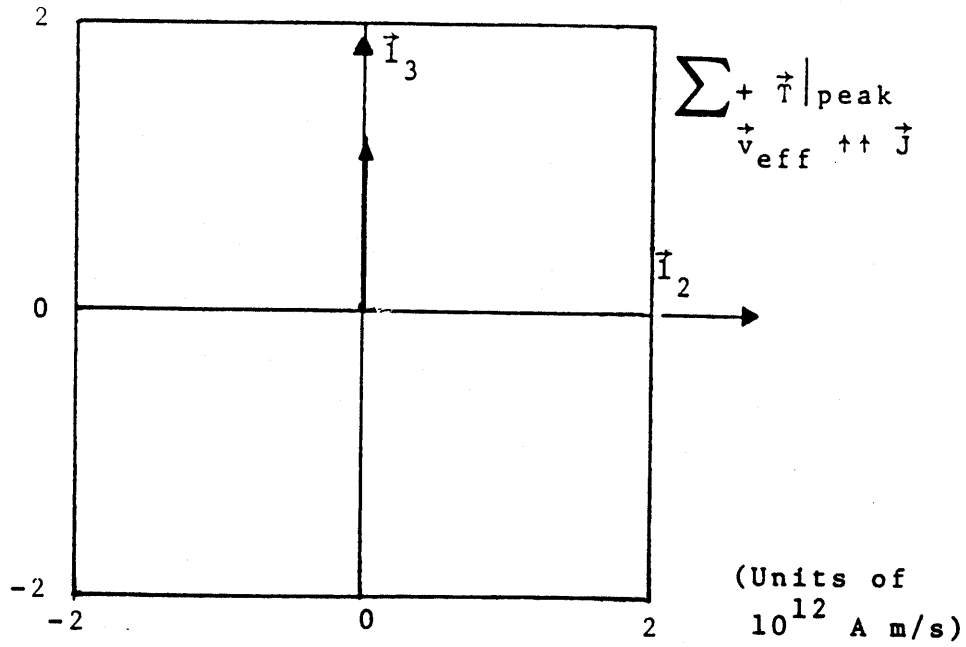


Peaks of $\vec{T}$

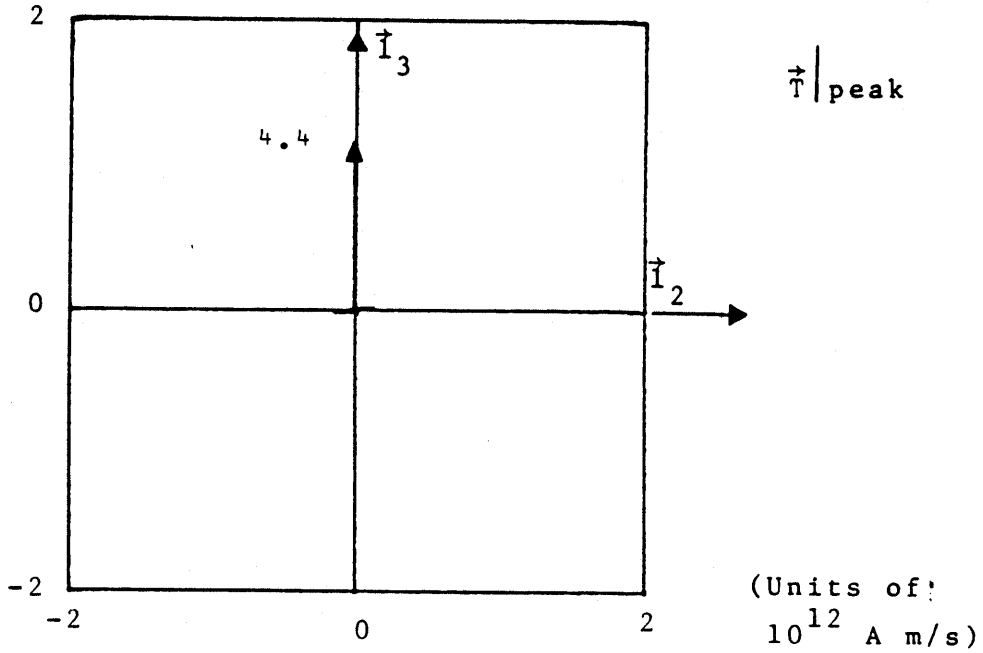
ϕ = 157° θ = 90° r = 433 m Set 2

Date: 81221 M.S.T.: 13:15:46.541

Figure 10.1.10.B.2 $\vec{T}$ for rocket triggered lightning



Effective reconstruction of positive streamer

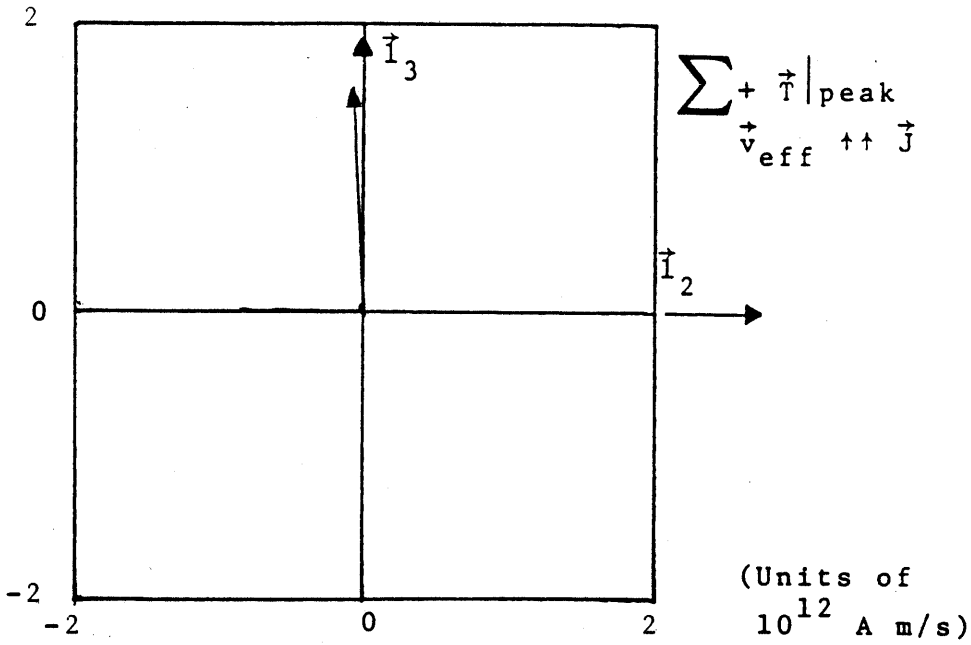


Peaks of $\vec{T}$

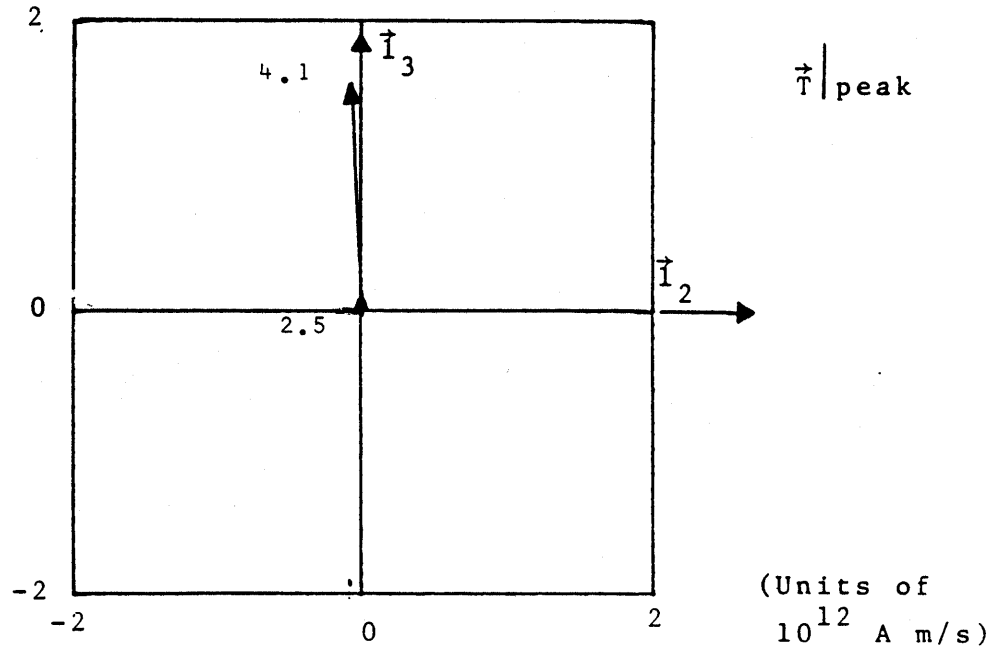
$\phi = 157^{o}$ $\theta = 90^{o}$ r = 433 m

Date: 81221 M.S.T.: 13:15:46.588

Figure 10.1.10.B.3 $\vec{T}$ for rocket triggered lightning



Effective reconstruction of positive streamer



Peaks of $\vec{T}$

$\phi = 160^{\circ}$ $\theta = 90^{\circ}$ r = 433 m

Date: 81221 M.S.T.: 13:15:46.637

Figure 10.1.10.B.4 $\vec{T}$ for rocket triggered lightning

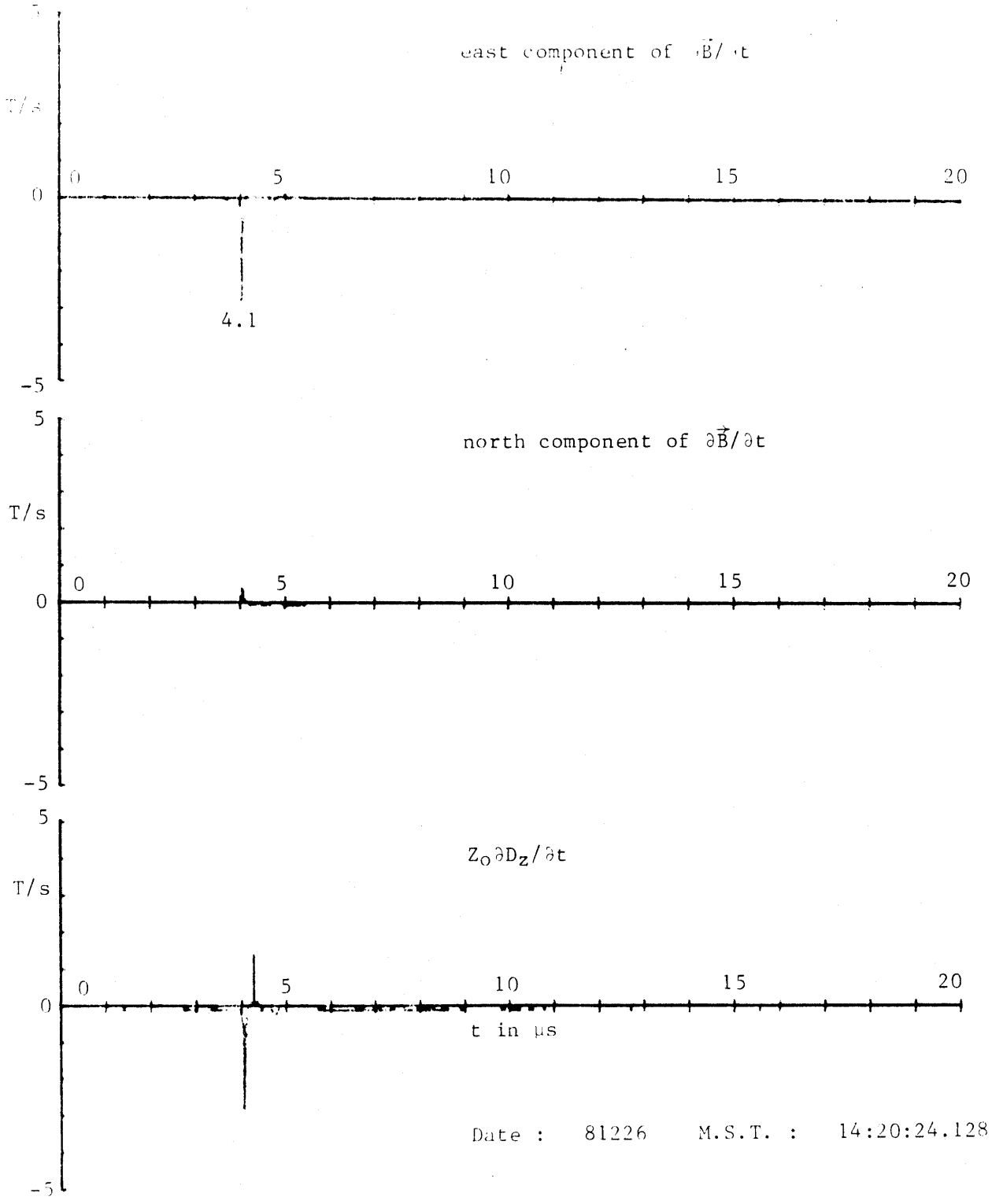
10.2 ROCKET TRIGGERED LIGHTNING

The second data set is also rocket triggered lightning with no TOA solutions and 4 waveform events. The progression of events in this case is 3 leader events and 1 return stroke. The events which occurred at 14:20:24 168 and 14:20:24.208 show behavior which we have seen on other rocket triggered flashes. The breakdown processes are separated by a μs and become successively larger in amplitude.

Figure 10.2.4.b shows where the Biomation trigger marks have occurred with respect to the slow electric field change. The first trigger clearly happened during the initial leader. The slow antenna electronics output was saturated at the time when the second and third trigger occurred. The fourth trigger occurred during some part of a return stroke later in the flash.

The locations of the EM sources on the acoustic locations seems to indicate that the range of 341 m is too small. An increase by a factor of 2 would be more nearly correct. The EM source locations do not correspond to any visible part of the channel on the whole-sky photograph, varying from about 5^{o} to 30^{o} from the main channel. This may be due in part to branching of the channel.

Figures 10.2.9... list values of the fields, their components, and $\vec{\Upsilon}$, a designation which can be interpreted as Iv_{eff} [1,2]. Event 9.3 in Fig. 10.2.9.B.4 shows Υ being 4.1×10^{12} Am/s. Assuming a propagation velocity of 10^{8} m/s, peak current for this pulse is 41 kA. This event did not coincide with the first return stroke.



Derivative fields from rocket triggered lightning

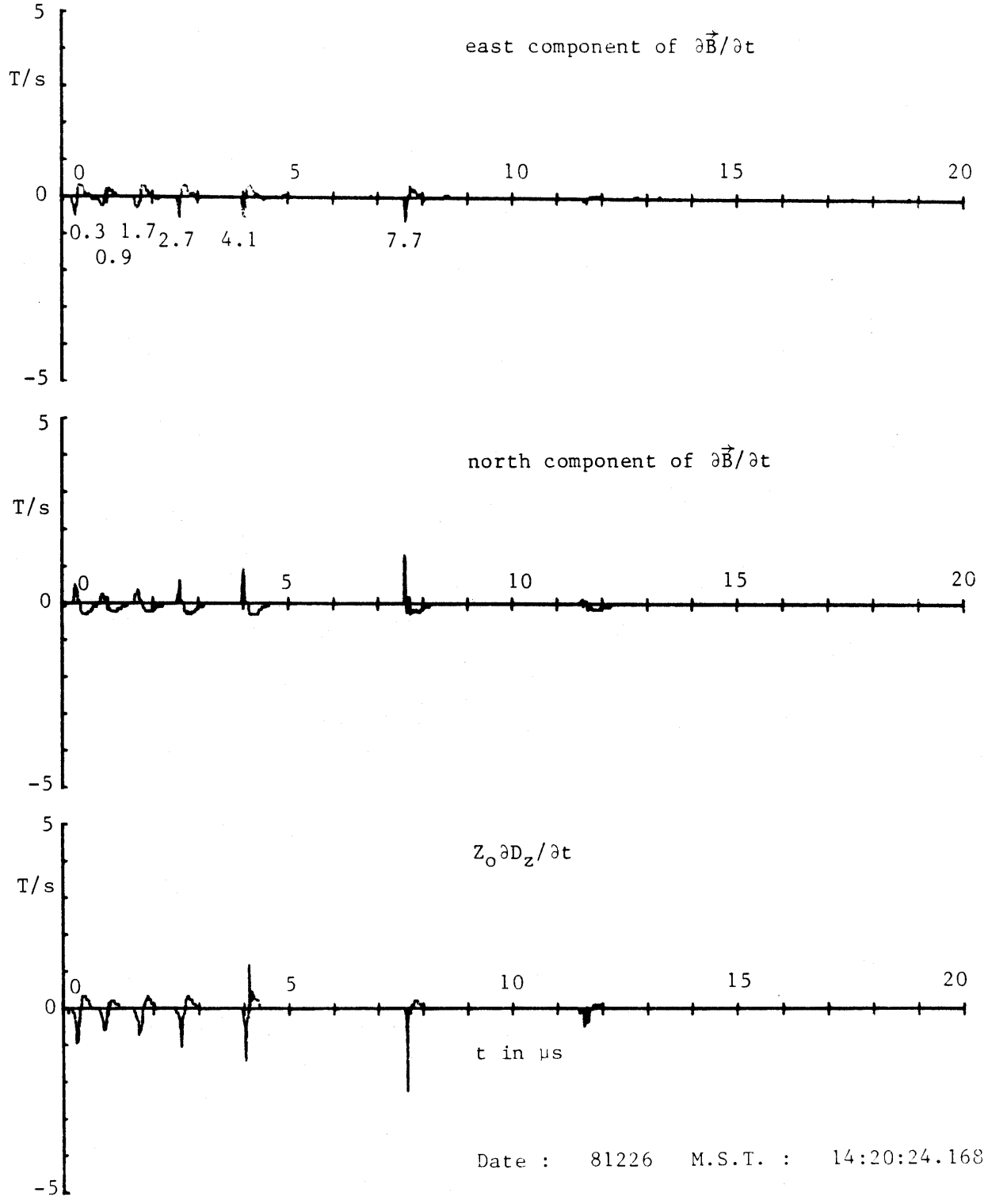


Figure 10.2.1.A.2 Derivative fields from rocket triggered lightning

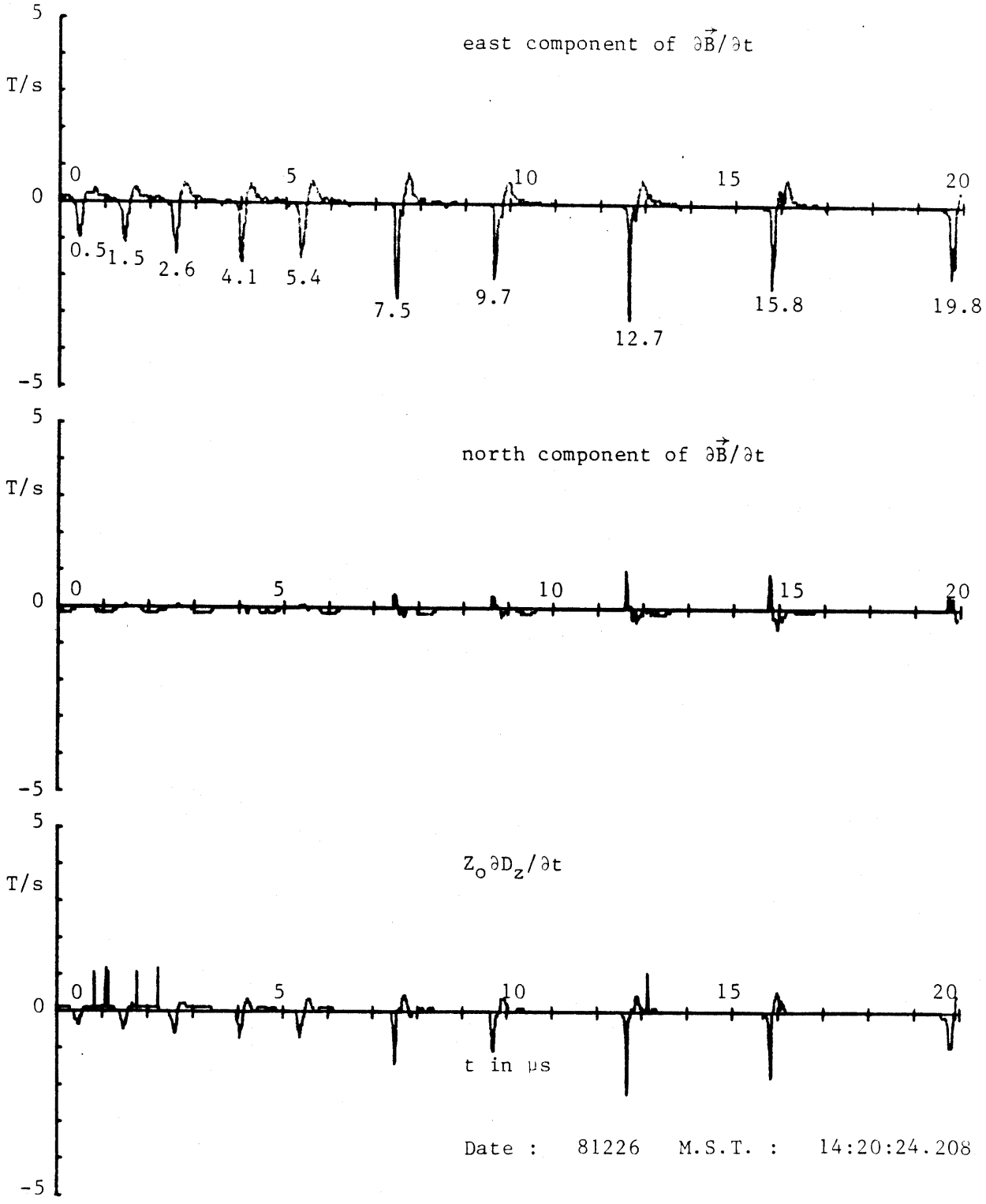


Figure 10.2.1.A.3 Derivative fields from rocket triggered lightning

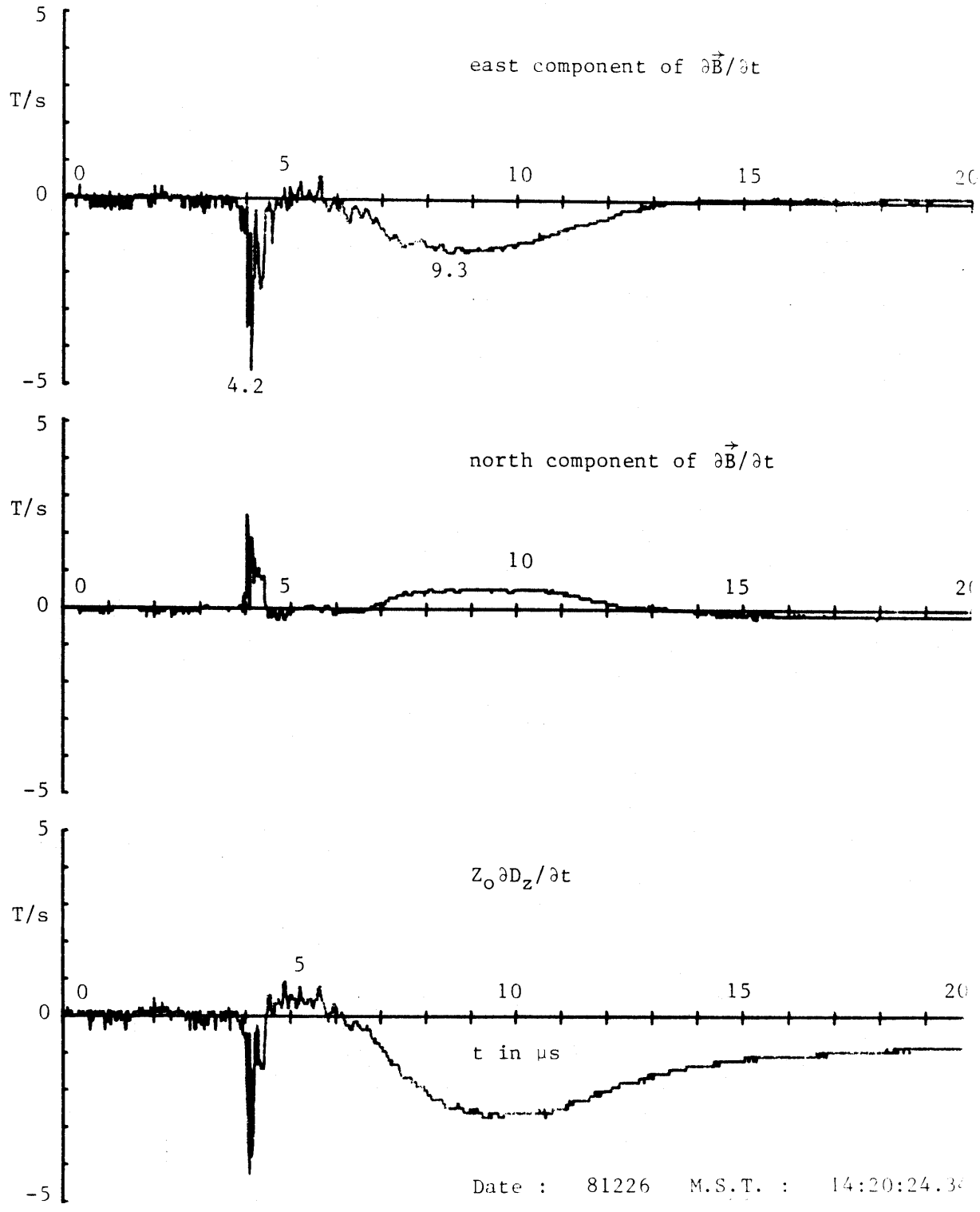


Figure 10.2.1.A.4 Derivative fields from rocket triggered lightning

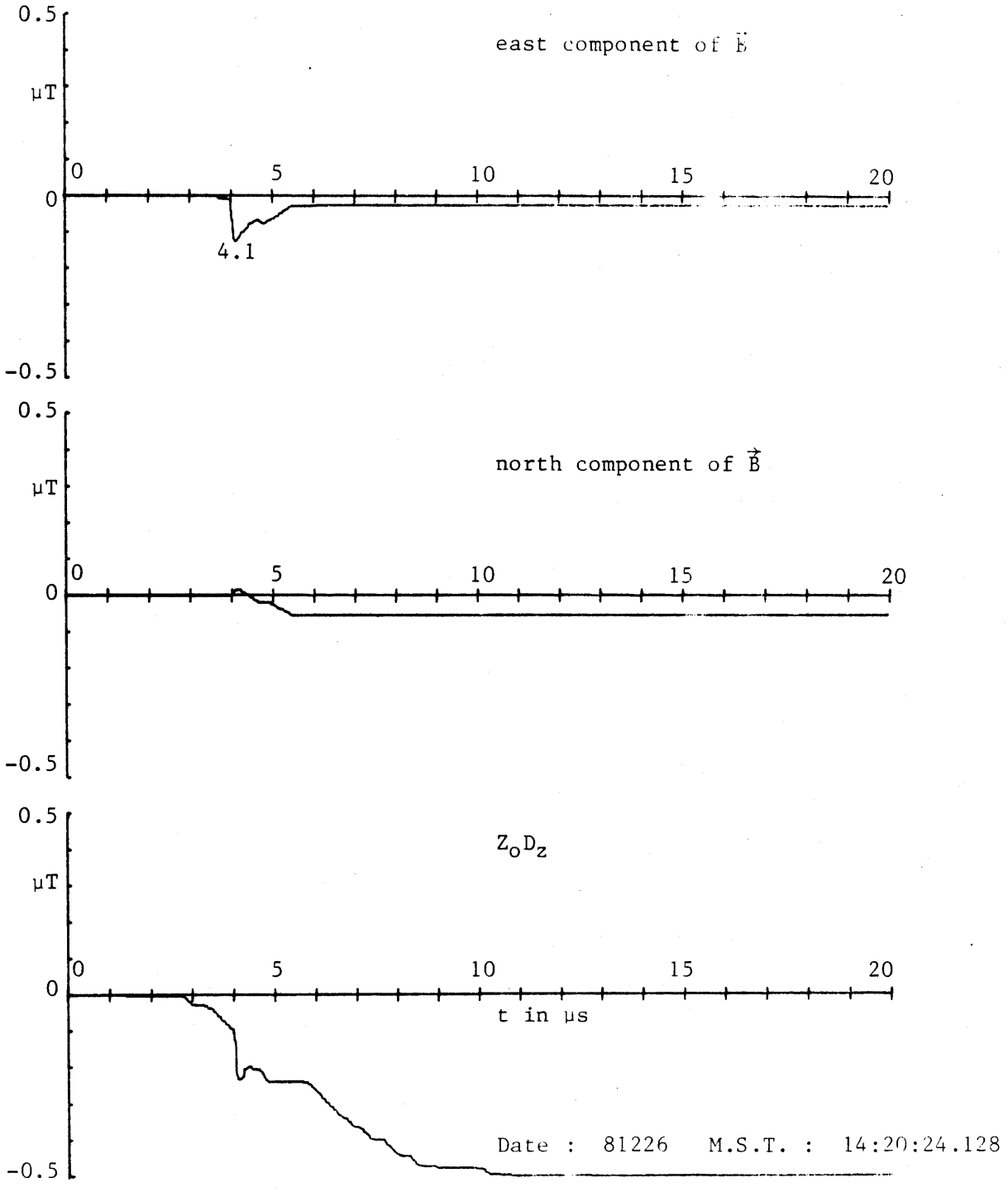


Figure 10.2.1.E.1 Fields from rocket triggered lightning

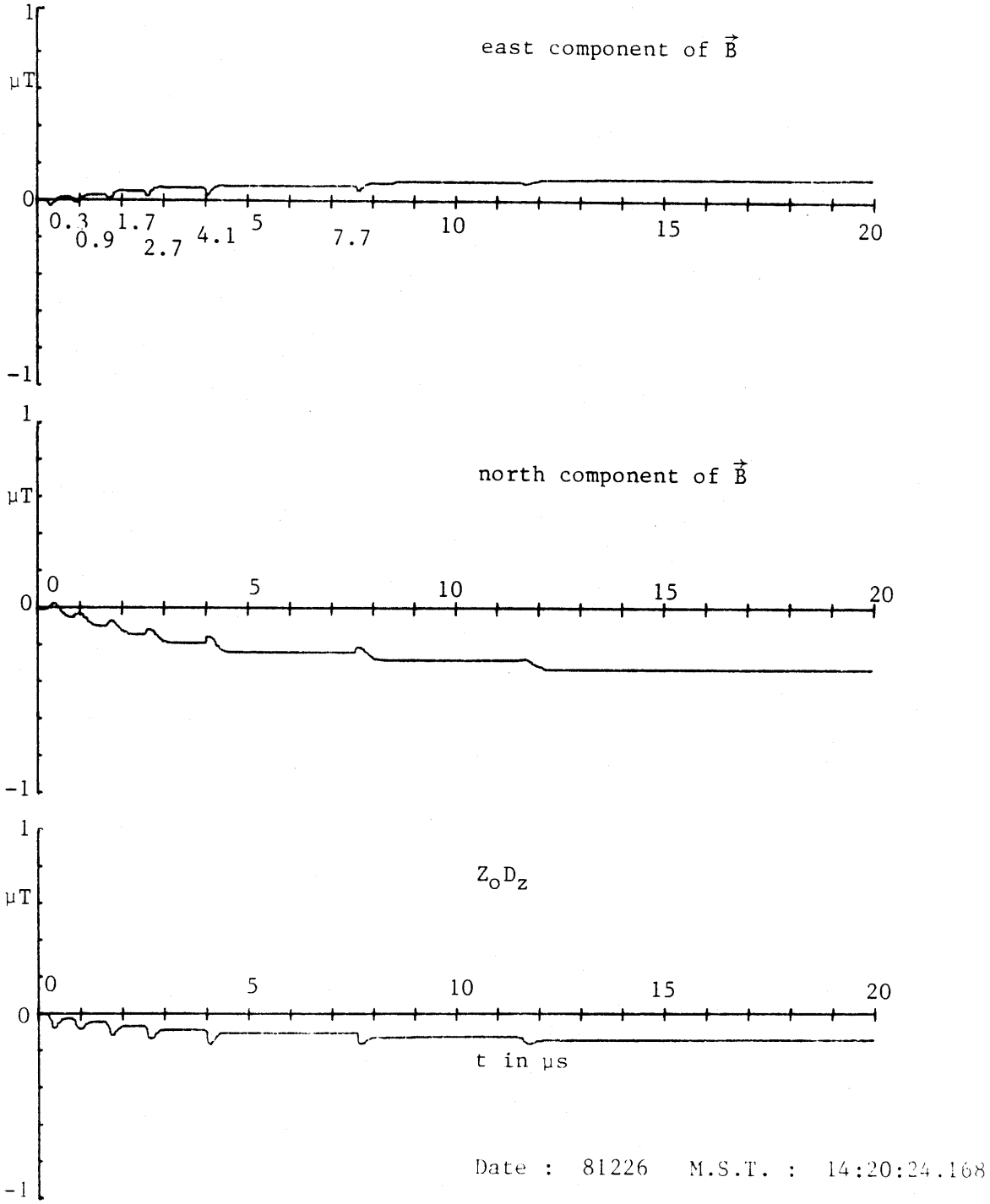


Figure 10.2.1.5.2 [illegible] rod lightning

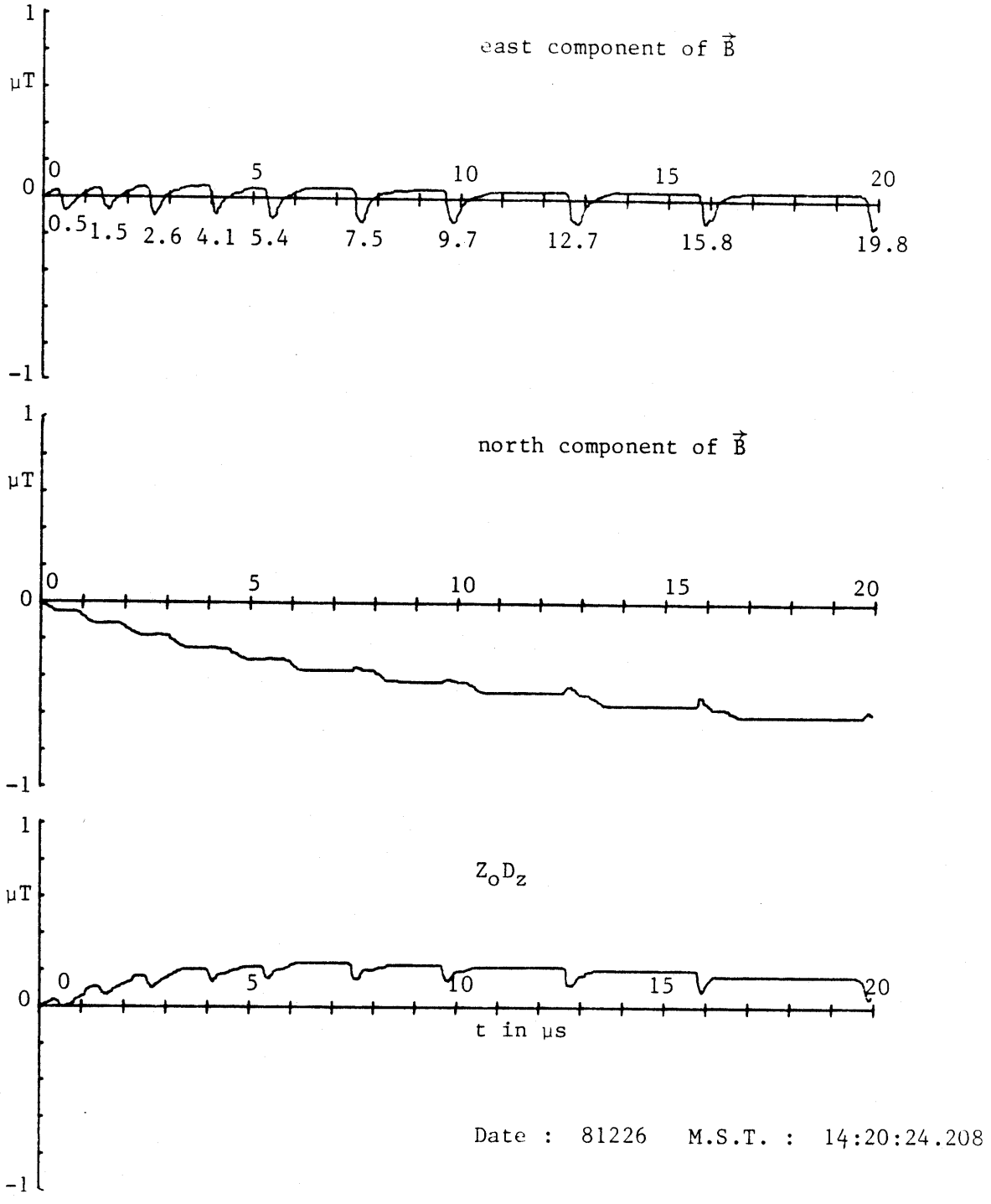


Figure 10.2.1.B.3 Fields from rocket triggered lightning

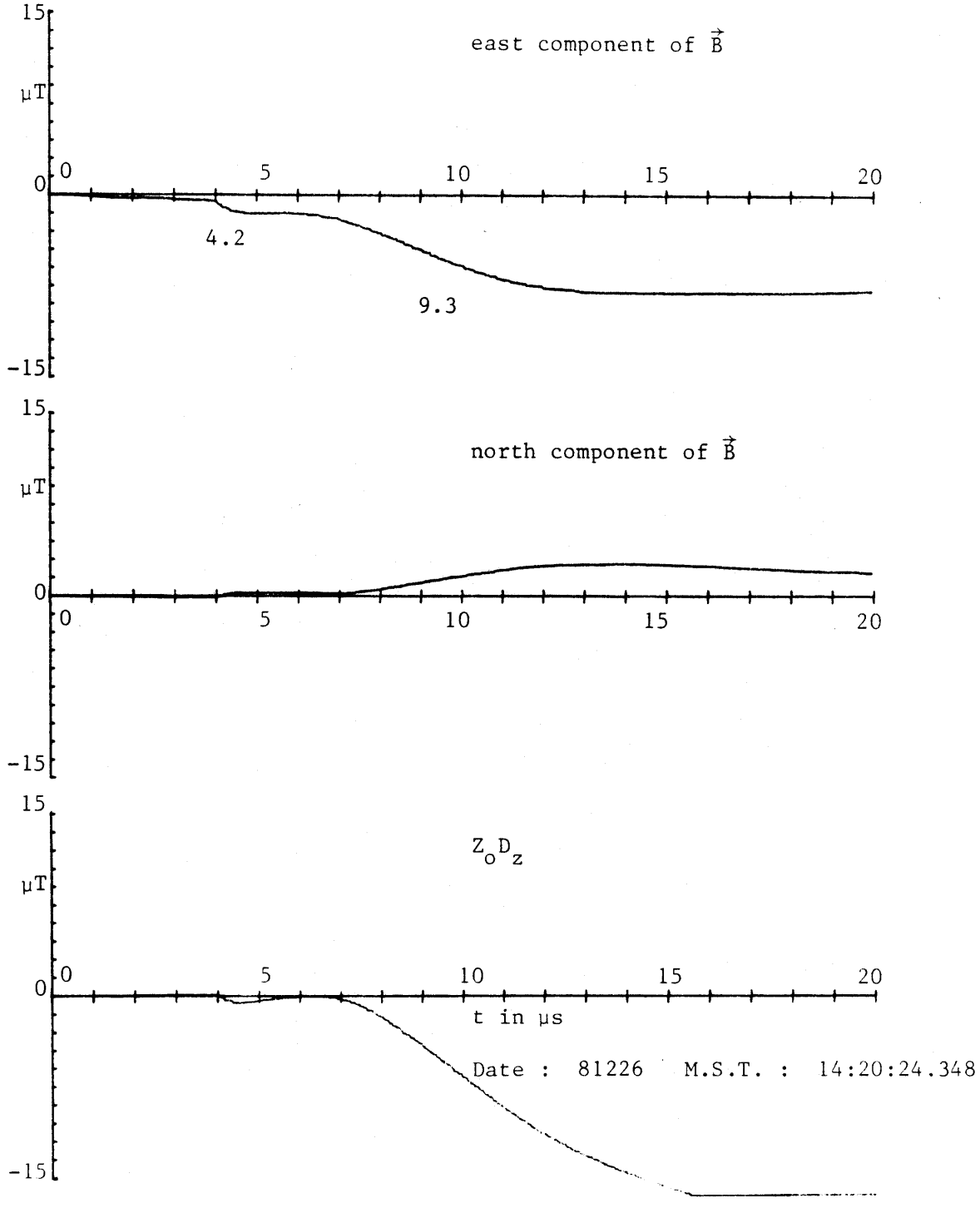


Figure 10.2.1.B.4 Fields from rocket triggered lightning

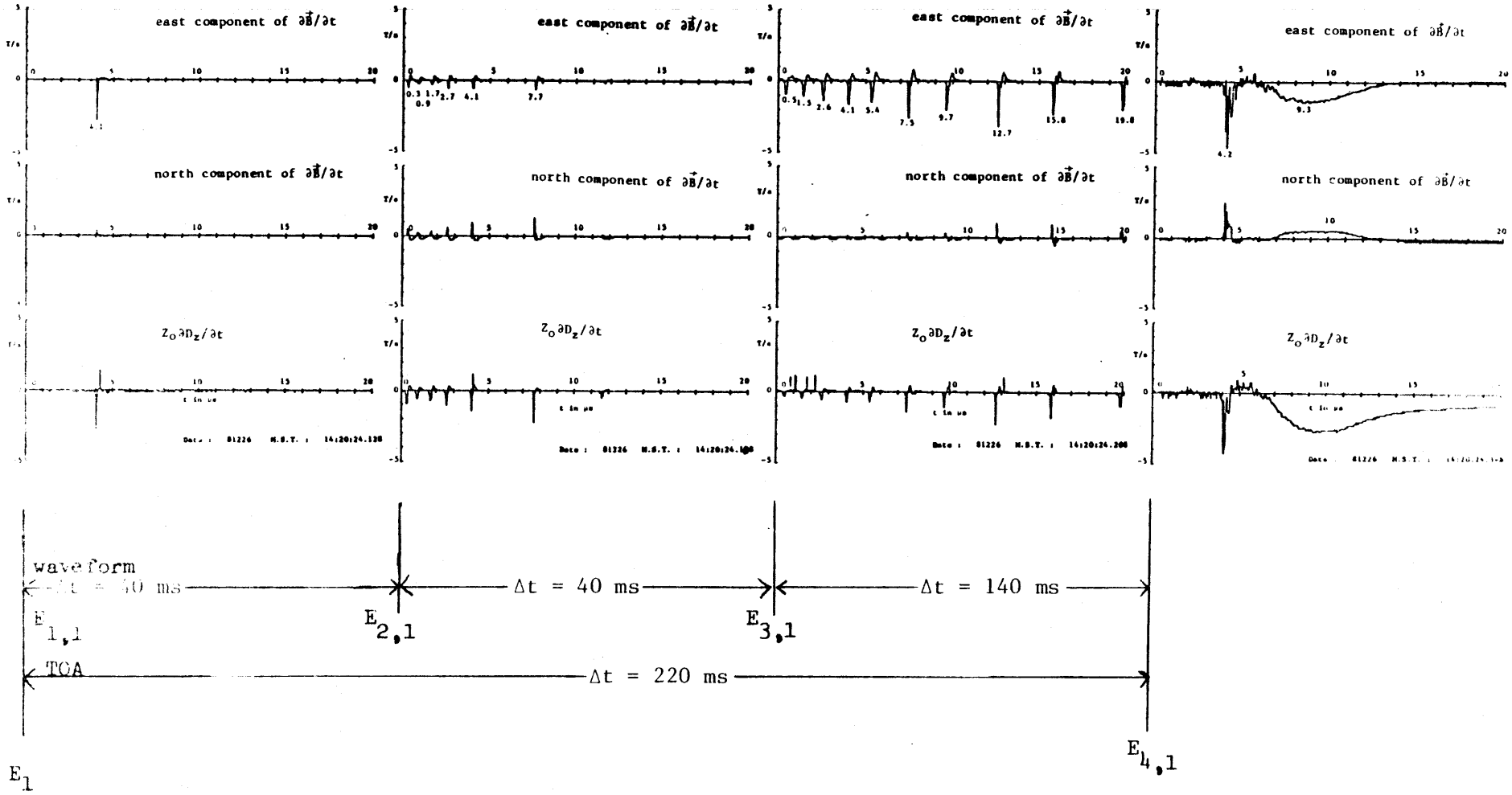


Figure 10.2.2 Time history of waveform and TOA events from rocket triggered lightning

Figure 10.2.3.a.1 Digital data for event 4.1

[ ] = baseline which is subtracted for peaks and numerical integration

Yeardate: 81226 Time: 14:20:24.128 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
4.02	-0.391	-0.078	-0.118	0.000	-0.000	0.000
4.03	[-0.391]	-0.078	-0.118	0.000	-0.000	0.000
4.04	-0.625	-0.078	[-0.118]	-0.002	-0.000	0.000
4.05	-0.703	[-0.078]	-0.236	-0.005	-0.000	-0.001
4.06	-2.500	0.000	-0.471	-0.027	0.001	-0.005
4.07	-3.125	0.313	-1.767	-0.054	0.005	-0.021
4.08	-2.578	0.313	-2.710	-0.076	0.009	-0.047
4.09	-1.875	0.313	-2.828	-0.091	0.012	-0.074
4.10	-1.250	0.234	-1.885	-0.099	0.016	-0.092
4.11	-0.703	0.000	-0.943	-0.102	0.016	-0.100
4.12	-0.625	0.000	-0.825	-0.105	0.017	-0.107
4.13	-0.625	0.000	-0.589	-0.107	0.018	-0.112
4.14	-0.391	-0.078	-0.471	-0.107	0.018	-0.115
4.15	-0.313	-0.078	-0.353	-0.106	0.018	-0.118
4.16	-0.234	-0.078	-0.118	-0.105	0.018	-0.118
4.17	-0.234	-0.078	0.000	-0.103	0.018	-0.117
4.18	-0.234	-0.078	0.000	-0.101	0.018	-0.115
4.19	-0.156	-0.078	0.000	-0.099	0.018	-0.114
4.20	-0.156	-0.078	0.000	-0.097	0.018	-0.113
4.21	-0.156	-0.078	0.118	-0.094	0.018	-0.111
4.22	-0.156	-0.078	0.118	-0.092	0.018	-0.108
4.23	-0.156	-0.156	0.118	-0.090	0.017	-0.106
4.24	-0.156	-0.156	0.118	-0.087	0.016	-0.104
4.25	-0.156	-0.156	0.118	-0.085	0.016	-0.101
4.26	-0.156	-0.156	0.118	-0.083	0.015	-0.099
4.27	-0.156	-0.156	0.118	-0.080	0.014	-0.097
4.28	-0.156	-0.156	0.118	-0.078	0.013	-0.094
4.29	-0.156	-0.156	0.118	-0.076	0.012	-0.092
4.30	-0.156	-0.156	0.118	-0.073	0.012	-0.089
4.31	-0.156	-0.156	0.118	-0.071	0.011	-0.087
4.32	-0.156	-0.156	0.118	-0.069	0.010	-0.085
4.33	-0.234	-0.156	1.414	-0.067	0.009	-0.069
4.34	-0.234	-0.156	0.118	-0.066	0.009	-0.067
4.35	-0.234	-0.156	0.118	-0.064	0.008	-0.065
4.36	-0.234	-0.156	0.118	-0.062	0.007	-0.062
4.37	-0.234	-0.156	0.118	-0.061	0.006	-0.060
4.38	-0.234	-0.156	0.000	-0.059	0.005	-0.059
4.39	-0.156	-0.156	0.000	-0.057	0.005	-0.058
4.40	-0.156	-0.156	0.118	-0.055	0.004	-0.055
4.41	-0.156	-0.156	0.118	-0.052	0.003	-0.053
4.42	-0.156	-0.156	0.000	-0.050	0.002	-0.052
4.43	-0.156	-0.156	0.000	-0.047	0.002	-0.051
4.44	-0.156	-0.156	0.000	-0.045	0.001	-0.049
4.45	-0.156	-0.156	-0.118	-0.043	-0.000	-0.049
4.46	-0.156	-0.156	-0.118	-0.040	-0.001	-0.049

Figure 10.2.3.a.1 Digital data for event 4.1 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
4.47	-0.156	-0.156	-0.118	-0.038	-0.002	-0.049
4.48	-0.156	-0.156	-0.118	-0.036	-0.002	-0.049
4.49	-0.156	-0.156	-0.118	-0.033	-0.003	-0.049
4.50	-0.234	-0.156	-0.118	-0.032	-0.004	-0.049
4.51	-0.234	-0.156	-0.118	-0.030	-0.005	-0.049
4.52	-0.234	-0.156	0.000	-0.029	-0.006	-0.048
4.53	-0.234	-0.156	0.000	-0.027	-0.006	-0.047
4.54	-0.234	-0.156	0.000	-0.026	-0.007	-0.046
4.55	-0.234	-0.156	0.000	-0.024	-0.008	-0.045
4.56	-0.234	-0.156	0.000	-0.022	-0.009	-0.043
4.57	-0.234	-0.156	0.000	-0.021	-0.009	-0.042
4.58	-0.234	-0.156	0.000	-0.019	-0.010	-0.041
4.59	-0.234	-0.156	0.000	-0.018	-0.011	-0.040
4.60	-0.234	-0.156	0.000	-0.016	-0.012	-0.039
4.61	-0.234	-0.156	0.000	-0.015	-0.013	-0.038
4.62	-0.234	-0.156	0.000	-0.013	-0.013	-0.036
4.63	-0.234	-0.156	0.000	-0.011	-0.014	-0.035
4.64	-0.234	-0.156	0.000	-0.010	-0.015	-0.034
4.65	-0.234	-0.156	0.000	-0.008	-0.016	-0.033
4.66	-0.234	-0.156	0.000	-0.007	-0.016	-0.032
4.67	-0.234	-0.156	0.000	-0.005	-0.017	-0.031
4.68	-0.313	-0.156	0.000	-0.004	-0.018	-0.029
4.69	-0.391	-0.156	0.000	-0.004	-0.019	-0.028
4.70	-0.391	-0.078	-0.118	-0.004	-0.019	-0.028
4.71	-0.391	-0.078	-0.118	-0.004	-0.019	-0.028
4.72	-0.391	-0.078	-0.118	-0.004	-0.019	-0.028
4.73	-0.391	-0.078	-0.236	-0.004	-0.019	-0.029
4.74	-0.391	-0.078	-0.236	-0.004	-0.019	-0.030
4.75	-0.391	-0.078	-0.236	-0.004	-0.019	-0.032

Figure 10.2.3.b.1 Digital data for event 0.3

[ ] = baseline which is subtracted for peaks and numerical integration

Yeardate: 81226 Time: 14:20:24.168 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
0.22	-0.391	-0.078	0.000	0.000	-0.000	0.000
0.23	-0.391	-0.078	0.000	0.000	-0.000	0.000
0.24	-0.391	-0.078	-0.118	0.000	-0.000	-0.001
0.25	-0.469	-0.078	-0.118	-0.001	-0.000	-0.002
0.26	-0.547	-0.078	-0.118	-0.002	-0.000	-0.004
0.27	-0.547	0.000	-0.236	-0.004	0.001	-0.006
0.28	-0.625	0.000	-0.236	-0.006	0.002	-0.008
0.29	-0.703	0.156	-0.353	-0.009	0.004	-0.012
0.30	-0.859	0.313	-0.471	-0.014	0.008	-0.016
0.31	-0.938	0.313	-0.707	-0.019	0.012	-0.024
0.32	-0.859	0.469	-0.943	-0.024	0.017	-0.033
0.33	-0.781	0.391	-0.943	-0.028	0.022	-0.042
0.34	-0.625	0.313	-0.943	-0.030	0.026	-0.052
0.35	-0.391	0.234	-0.825	-0.030	0.029	-0.060
0.36	-0.313	0.234	-0.707	-0.030	0.032	-0.067
0.37	-0.313	0.000	-0.471	-0.029	0.033	-0.072
0.38	-0.078	0.000	-0.353	-0.026	0.034	-0.075
0.39	-0.078	0.000	0.000	-0.023	0.034	-0.075
0.40	-0.078	-0.078	0.000	-0.019	0.034	-0.075
0.41	-0.078	-0.078	0.000	-0.016	0.034	-0.075
0.42	-0.078	-0.078	0.118	-0.013	0.034	-0.074
0.43	-0.078	-0.156	0.118	-0.010	0.034	-0.073
0.44	-0.078	-0.234	0.236	-0.007	0.032	-0.071
0.45	-0.078	-0.313	0.353	-0.004	0.030	-0.067
0.46	-0.078	-0.313	0.353	-0.001	0.027	-0.064
0.47	-0.078	-0.391	0.353	0.002	0.024	-0.060
0.48	-0.078	-0.391	0.353	0.006	0.021	-0.057
0.49	-0.156	-0.391	0.353	0.008	0.018	-0.053
0.50	-0.156	-0.391	0.353	0.010	0.015	-0.049
0.51	-0.234	-0.391	0.353	0.012	0.012	-0.046
0.52	-0.234	-0.391	0.353	0.013	0.009	-0.042
0.53	-0.234	-0.391	0.353	0.015	0.005	-0.039
0.54	-0.313	-0.391	0.236	0.016	0.002	-0.037
0.55	-0.313	-0.391	0.236	0.017	-0.001	-0.034
0.56	-0.313	-0.391	0.236	0.017	-0.004	-0.032
0.57	-0.391	-0.391	0.236	0.017	-0.007	-0.029
0.58	-0.313	-0.391	0.236	0.018	-0.010	-0.027
0.59	-0.313	-0.391	0.118	0.019	-0.013	-0.026
0.60	-0.313	-0.391	0.118	0.020	-0.016	-0.025
0.61	-0.313	-0.313	0.118	0.020	-0.019	-0.024
0.62	-0.313	-0.313	0.118	0.021	-0.021	-0.022
0.63	-0.313	-0.313	0.118	0.022	-0.023	-0.021
0.64	-0.313	-0.313	0.118	0.023	-0.026	-0.020
0.65	-0.391	-0.313	0.000	0.023	-0.028	-0.020

Figure 10.2.3.b.2 Digital data for event 0.9

[ ] = baseline which is subtracted for peaks and numerical integration

Yeardate: 81226 Time: 14:20:24.168 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
0.81	[-0.391]	-0.078	0.000	0.000	-0.000	0.000
0.82	-0.469	-0.078	[0.000]	-0.001	-0.000	0.000
0.83	-0.469	-0.078	-0.118	-0.002	-0.000	-0.001
0.84	-0.469	-0.078	-0.118	-0.002	-0.000	-0.002
0.85	-0.547	-0.078	-0.118	-0.004	-0.000	-0.004
0.86	-0.547	[-0.078]	-0.118	-0.005	-0.000	-0.005
0.87	-0.547	0.000	-0.236	-0.007	0.001	-0.007
0.88	-0.625	0.000	-0.236	-0.009	0.002	-0.009
0.89	-0.625	0.156	-0.353	-0.012	0.004	-0.013
0.90	-0.625	0.156	-0.471	-0.014	0.006	-0.018
0.91	-0.625	0.156	-0.589	-0.016	0.009	-0.024
0.92	-0.625	0.156	-0.589	-0.019	0.011	-0.029
0.93	-0.625	0.156	-0.589	-0.021	0.013	-0.035
0.94	-0.625	0.156	-0.589	-0.023	0.016	-0.041
0.95	-0.469	0.078	-0.589	-0.024	0.017	-0.047
0.96	-0.391	0.000	-0.471	-0.024	0.018	-0.052
0.97	-0.313	0.000	-0.353	-0.023	0.019	-0.055
0.98	-0.313	0.000	-0.353	-0.023	0.020	-0.059
0.99	-0.234	0.000	-0.236	-0.021	0.020	-0.061
1.00	-0.234	0.000	-0.118	-0.019	0.021	-0.062
1.01	-0.156	-0.078	0.000	-0.017	0.021	-0.062
1.02	-0.156	-0.078	0.000	-0.015	0.021	-0.062
1.03	-0.156	-0.078	0.000	-0.012	0.021	-0.062
1.04	-0.156	-0.234	0.118	-0.010	0.020	-0.061
1.05	-0.156	-0.234	0.118	-0.008	0.018	-0.060
1.06	-0.156	-0.234	0.236	-0.005	0.016	-0.058
1.07	-0.156	-0.234	0.236	-0.003	0.015	-0.055
1.08	-0.156	-0.234	0.236	-0.001	0.013	-0.053
1.09	-0.156	-0.234	0.236	0.002	0.012	-0.051
1.10	-0.234	-0.234	0.236	0.003	0.010	-0.048
1.11	-0.234	-0.234	0.236	0.005	0.009	-0.046
1.12	-0.234	-0.313	0.236	0.006	0.006	-0.044
1.13	-0.234	-0.313	0.236	0.008	0.004	-0.041
1.14	-0.234	-0.313	0.236	0.010	0.002	-0.039
1.15	-0.234	-0.313	0.236	0.011	-0.001	-0.037
1.16	-0.313	-0.313	0.236	0.012	-0.003	-0.034
1.17	-0.313	-0.313	0.236	0.013	-0.006	-0.032
1.18	-0.313	-0.313	0.236	0.013	-0.008	-0.029
1.19	-0.313	-0.313	0.118	0.014	-0.010	-0.028
1.20	-0.313	-0.313	0.118	0.015	-0.013	-0.027
1.21	-0.313	-0.313	0.118	0.016	-0.015	-0.026
1.22	-0.313	-0.313	0.118	0.017	-0.018	-0.025
1.23	-0.313	-0.313	0.118	0.017	-0.020	-0.024
1.24	-0.391	-0.313	0.118	0.017	-0.022	-0.022
1.25	-0.391	-0.313	0.118	0.017	-0.025	-0.021
1.26	-0.391	-0.234	0.118	0.017	-0.026	-0.020
1.27	-0.391	-0.234	0.000	0.017	-0.028	-0.020

Figure 10.2.3.b.3 Digital data for event 1.7

[ ] = baseline which is subtracted for peaks and numerical integration

Yeardate: 81226 **Time:** 14:20:24.168 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
1.57	[-0.391]	[-0.078]	0.000	0.000	-0.000	[illegible]
1.58	-0.391	-0.078	[0.000]	0.000	-0.000	[illegible]
1.59	-0.391	-0.078	-0.118	0.000	-0.000	[illegible]
1.60	-0.391	-0.078	-0.118	0.000	-0.000	[illegible]
1.61	-0.391	-0.078	-0.118	0.000	-0.000	[illegible]
1.62	-0.469	-0.078	-0.118	-0.001	-0.000	-0.005
1.63	-0.469	-0.078	-0.118	-0.002	-0.000	-0.006
1.64	-0.469	0.000	-0.236	-0.002	0.001	-0.008
1.65	-0.547	0.000	-0.236	-0.004	0.002	-0.011
1.66	-0.625	0.000	-0.236	-0.006	0.002	-0.013
1.67	-0.703	0.156	-0.353	-0.009	0.005	-0.016
1.68	-0.703	0.234	-0.471	-0.012	0.008	-0.021
1.69	-0.703	0.234	-0.471	-0.016	0.011	-0.026
1.70	-0.703	0.313	-0.707	-0.019	0.015	-0.033
1.71	-0.703	0.313	-0.707	-0.022	0.019	-0.040
1.72	-0.625	0.234	-0.707	-0.024	0.022	-0.047
1.73	-0.547	0.234	-0.707	-0.026	0.025	-0.054
1.74	-0.469	0.000	-0.589	-0.026	0.026	-0.060
1.75	-0.313	0.000	-0.471	-0.026	0.027	-0.065
1.76	-0.313	0.000	-0.353	-0.025	0.027	-0.068
1.77	-0.156	-0.078	-0.353	-0.023	0.027	-0.072
1.78	-0.078	-0.078	-0.118	-0.019	0.027	-0.073
1.79	-0.078	-0.078	0.000	-0.016	0.027	-0.073
1.80	-0.078	-0.078	0.000	-0.013	0.027	-0.073
1.81	-0.078	-0.156	0.118	-0.010	0.027	-0.072
1.82	-0.078	-0.234	0.118	-0.007	0.025	-0.071
1.83	-0.078	-0.234	0.236	-0.004	0.023	-0.068
1.84	-0.078	-0.234	0.236	-0.001	0.022	-0.066
1.85	-0.078	-0.313	0.236	0.002	0.019	-0.064
1.86	-0.078	-0.313	0.353	0.006	0.017	-0.060
1.87	-0.078	-0.313	0.353	0.009	0.015	-0.057
1.88	-0.156	-0.313	0.353	0.011	0.012	-0.053
1.89	-0.156	-0.313	0.353	0.013	0.010	-0.049
1.90	-0.234	-0.313	0.353	0.015	0.008	-0.046
1.91	-0.234	-0.313	0.236	0.017	0.005	-0.044
1.92	-0.234	-0.313	0.236	0.019	0.003	-0.042
1.93	-0.313	-0.313	0.236	0.019	0.000	-0.039
1.94	-0.313	-0.313	0.236	0.020	-0.002	-0.037
1.95	-0.313	-0.313	0.236	0.021	-0.004	-0.035
1.96	-0.313	-0.313	0.236	0.022	-0.007	-0.032
1.97	-0.313	-0.313	0.236	0.022	-0.009	-0.030
1.98	-0.391	-0.313	0.118	0.022	-0.011	-0.029
1.99	-0.391	-0.313	0.118	0.022	-0.014	-0.028
2.00	-0.391	-0.313	0.118	0.023	-0.016	-0.026
2.01	-0.391	-0.313	0.118	0.023	-0.018	-0.025
2.02	-0.391	-0.313	0.118	0.023	-0.021	-0.024
2.03	-0.391	-0.313	0.118	0.023	-0.023	-0.023
2.04	-0.391	-0.313	0.118	0.023	-0.025	-0.022
2.05	-0.391	-0.234	0.000	0.023	-0.027	-0.022

Figure 10.2.3.b.4 Digital data for event 2.7

[ ] = baseline which is subtracted for peaks and numerical integration

Yeardate: 81226 Time: 14:20:24.168 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
2.51	[-0.391]	[-0.078]	[0.000]	0.000	-0.000	0.000
2.52	-0.391	-0.078	-0.118	0.000	-0.000	-0.001
2.53	-0.391	-0.078	-0.118	0.000	-0.000	-0.002
2.54	-0.391	-0.078	-0.118	0.000	-0.000	-0.004
2.55	-0.391	-0.078	-0.118	0.000	-0.000	-0.005
2.56	-0.469	0.000	-0.118	-0.001	0.001	-0.006
2.57	-0.547	0.000	-0.236	-0.002	0.002	-0.008
2.58	-0.625	0.156	-0.236	-0.005	0.004	-0.011
2.59	-0.625	0.156	-0.471	-0.007	0.006	-0.015
2.60	-0.703	0.234	-0.471	-0.010	0.009	-0.020
2.61	-0.938	0.313	-0.589	-0.016	0.013	-0.026
2.62	-0.938	0.547	-0.707	-0.021	0.020	-0.033
2.63	-0.703	0.547	-0.825	-0.024	0.026	-0.041
2.64	-0.625	0.234	-0.943	-0.027	0.029	-0.051
2.65	-0.391	0.000	-1.060	-0.027	0.030	-0.061
2.66	-0.391	0.000	-0.471	-0.027	0.030	-0.066
2.67	-0.391	0.000	-0.353	-0.026	0.031	-0.070
2.68	-0.313	-0.078	-0.236	-0.026	0.031	-0.072
2.69	-0.078	-0.078	-0.118	-0.023	0.031	-0.073
2.70	-0.078	-0.078	-0.118	-0.019	0.031	-0.074
2.71	-0.078	-0.078	0.000	-0.016	0.031	-0.074
2.72	-0.078	-0.078	0.118	-0.013	0.031	-0.073
2.73	-0.078	-0.078	0.118	-0.010	0.031	-0.072
2.74	-0.078	-0.234	0.236	-0.007	0.030	-0.070
2.75	-0.078	-0.313	0.236	-0.004	0.027	-0.067
2.76	-0.078	-0.313	0.236	-0.001	0.025	-0.065
2.77	-0.078	-0.313	0.353	0.002	0.023	-0.061
2.78	-0.078	-0.391	0.353	0.006	0.019	-0.058
2.79	-0.156	-0.391	0.353	0.008	0.016	-0.054
2.80	-0.156	-0.391	0.353	0.010	0.013	-0.051
2.81	-0.234	-0.313	0.353	0.012	0.011	-0.047
2.82	-0.234	-0.313	0.353	0.013	0.009	-0.044
2.83	-0.234	-0.313	0.236	0.015	0.006	-0.041
2.84	-0.234	-0.313	0.236	0.017	0.004	-0.039
2.85	-0.313	-0.391	0.236	0.017	0.001	-0.037
2.86	-0.313	-0.391	0.236	0.018	-0.002	-0.034
2.87	-0.313	-0.391	0.236	0.019	-0.006	-0.032
2.88	-0.313	-0.391	0.236	0.020	-0.009	-0.029
2.89	-0.313	-0.391	0.118	0.020	-0.012	-0.028
2.90	-0.313	-0.391	0.118	0.021	-0.015	-0.027
2.91	-0.313	-0.313	0.118	0.022	-0.017	-0.026
2.92	-0.313	-0.313	0.118	0.023	-0.020	-0.025
2.93	-0.313	-0.313	0.118	0.024	-0.022	-0.024
2.94	-0.313	-0.313	0.118	0.024	-0.024	-0.022
2.95	-0.391	-0.313	0.000	0.024	-0.026	-0.022
2.96	-0.391	-0.313	0.000	0.024	-0.029	-0.022

Figure 10.2.3.b.5 Digital data for event 4.1

[ ] = baseline which is subtracted for peaks and numerical integration

Yeardate: 81226 Time: 14:20:24.168 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
3.98	-0.391	-0.078	0.000	0.000	-0.000	0.000
3.99	-0.391	-0.078	0.000	0.000	-0.000	0.000
4.00	-0.469	0.000	-0.118	-0.001	0.001	-0.001
4.01	-0.547	0.234	-0.118	-0.002	0.004	-0.002
4.02	-0.703	0.547	-0.236	-0.005	0.010	-0.005
4.03	-0.938	0.859	-0.471	-0.011	0.020	-0.009
4.04	-0.938	0.781	-0.943	-0.016	0.028	-0.019
4.05	-0.938	0.547	-1.414	-0.022	0.034	-0.033
4.06	-0.938	0.234	-1.414	-0.027	0.037	-0.047
4.07	-0.781	0.000	-1.296	-0.031	0.038	-0.060
4.08	-0.703	0.000	-0.825	-0.034	0.039	-0.068
4.09	-0.625	-0.078	-0.471	-0.037	0.039	-0.073
4.10	-0.391	-0.078	-0.353	-0.037	0.039	-0.077
4.11	-0.313	-0.078	-0.236	-0.036	0.039	-0.079
4.12	-0.078	-0.078	-0.236	-0.033	0.039	-0.081
4.13	-0.078	-0.078	-0.118	-0.030	0.039	-0.082
4.14	-0.078	-0.078	0.000	-0.026	0.039	-0.082
4.15	-0.078	-0.078	1.178	-0.023	0.039	-0.071
4.16	-0.078	-0.313	0.118	-0.020	0.037	-0.070
4.17	-0.078	-0.391	0.236	-0.017	0.034	-0.067
4.18	-0.078	-0.391	0.236	-0.014	0.030	-0.065
4.19	-0.078	-0.391	0.236	-0.011	0.027	-0.062
4.20	-0.078	-0.391	0.353	-0.008	0.024	-0.059
4.21	-0.078	-0.391	0.471	-0.005	0.021	-0.054
4.22	-0.078	-0.391	0.471	-0.001	0.018	-0.049
4.23	-0.156	-0.391	0.353	0.001	0.015	-0.046
4.24	-0.156	-0.391	0.353	0.003	0.012	-0.042
4.25	-0.234	-0.391	0.353	0.005	0.009	-0.039
4.26	-0.234	-0.391	0.236	0.006	0.005	-0.037
4.27	-0.313	-0.391	0.236	0.007	0.002	-0.034
4.28	-0.313	-0.391	0.236	0.008	-0.001	-0.032
4.29	-0.313	-0.391	0.236	0.009	-0.004	-0.029
4.30	-0.313	-0.391	0.236	0.009	-0.007	-0.027
4.31	-0.313	-0.391	0.236	0.010	-0.010	-0.025
4.32	-0.313	-0.391	0.236	0.011	-0.013	-0.022
4.33	-0.313	-0.391	0.236	0.012	-0.016	-0.020
4.34	-0.313	-0.391	0.236	0.013	-0.020	-0.018
4.35	-0.313	-0.391	0.118	0.013	-0.023	-0.016
4.36	-0.313	-0.391	0.118	0.014	-0.026	-0.015
4.37	-0.313	-0.313	0.118	0.015	-0.028	-0.014
4.38	-0.391	-0.313	0.118	0.015	-0.031	-0.013
4.39	-0.391	-0.313	0.118	0.015	-0.033	-0.012
4.40	-0.391	-0.234	0.000	0.015	-0.034	-0.012
4.41	-0.391	-0.234	0.000	0.015	-0.036	-0.012
4.42	-0.469	-0.234	0.000	0.014	-0.038	-0.012

Figure 10.2.3.b.6 Digital data for event 7.7

[ ] = baseline which is subtracted for peaks and numerical integration

Yeardate: 81226 Time: 14:20:24.168 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
7.60	-0.391	-0.078	0.000	0.000	-0.000	0.000
7.61	-0.391	-0.078	0.000	0.000	-0.000	0.000
7.62	-0.391	1.172	-0.118	0.000	0.012	-0.001
7.63	-0.625	1.250	-0.118	-0.002	0.026	-0.002
7.64	-1.016	0.625	-0.118	-0.009	0.033	-0.004
7.65	-0.938	0.000	-0.589	-0.014	0.034	-0.009
7.66	-0.703	-0.078	-1.885	-0.017	0.034	-0.028
7.67	-0.703	-0.313	-2.238	-0.020	0.031	-0.051
7.68	-0.625	-0.234	-0.943	-0.023	0.030	-0.060
7.69	-0.625	-0.078	-0.353	-0.025	0.030	-0.064
7.70	-0.547	-0.078	0.000	-0.027	0.030	-0.064
7.71	-0.469	-0.234	0.000	-0.027	0.028	-0.064
7.72	-0.313	0.078	0.000	-0.027	0.030	-0.064
7.73	-0.313	0.078	-0.118	-0.026	0.031	-0.065
7.74	-0.078	-0.078	-0.118	-0.023	0.031	-0.066
7.75	-0.078	-0.078	0.000	-0.019	0.031	-0.066
7.76	-0.078	-0.313	0.000	-0.016	0.029	-0.066
7.77	-0.156	-0.313	0.118	-0.014	0.027	-0.065
7.78	-0.156	-0.391	0.118	-0.012	0.023	-0.064
7.79	-0.156	-0.313	0.118	-0.009	0.021	-0.062
7.80	-0.156	-0.313	0.118	-0.007	0.019	-0.061
7.81	-0.234	-0.313	0.236	-0.005	0.016	-0.059
7.82	-0.156	-0.313	0.236	-0.003	0.014	-0.057
7.83	-0.156	-0.234	0.236	-0.001	0.012	-0.054
7.84	-0.156	-0.234	0.236	0.002	0.011	-0.052
7.85	-0.156	-0.313	0.236	0.004	0.009	-0.049
7.86	-0.156	-0.313	0.236	0.006	0.006	-0.047
7.87	-0.234	-0.313	0.236	0.008	0.004	-0.045
7.88	-0.234	-0.313	0.236	0.009	0.002	-0.042
7.89	-0.313	-0.234	0.236	0.010	-0.000	-0.040
7.90	-0.313	-0.313	0.236	0.011	-0.002	-0.038
7.91	-0.313	-0.313	0.118	0.012	-0.005	-0.037
7.92	-0.313	-0.313	0.118	0.013	-0.007	-0.035
7.93	-0.313	-0.313	0.118	0.013	-0.009	-0.034
7.94	-0.313	-0.313	0.118	0.014	-0.012	-0.033
7.95	-0.313	-0.313	0.118	0.015	-0.014	-0.032
7.96	-0.313	-0.313	0.118	0.016	-0.016	-0.031
7.97	-0.313	-0.313	0.118	0.017	-0.019	-0.029
7.98	-0.313	-0.234	0.118	0.017	-0.020	-0.028
7.99	-0.313	-0.234	0.118	0.018	-0.022	-0.027
8.00	-0.391	-0.234	0.000	0.018	-0.023	-0.027
8.01	-0.391	-0.234	0.000	0.018	-0.025	-0.027
8.02	-0.391	-0.234	0.000	0.018	-0.027	-0.027
8.03	-0.391	-0.234	0.000	0.018	-0.028	-0.027

Figure 10.2.3.c.1 Digital data for event 0.5

= baseline which is subtracted for peaks and numerical integration

Yeardate: 81226 Time: 14:20:24.208 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
0.34	-0.391	-0.156	0.000	0.000	-0.000	0.000
0.35	-0.391	-0.156	0.000	0.000	-0.000	0.000
0.36	-0.391	-0.156	0.000	0.000	-0.000	0.000
0.37	-0.547	-0.156	0.000	-0.002	-0.000	0.000
0.38	-0.625	-0.156	0.000	-0.004	-0.000	0.000
0.39	-0.625	-0.156	0.000	-0.006	-0.000	0.000
0.40	-0.703	-0.156	0.000	-0.009	-0.000	0.000
0.41	-0.703	-0.078	-0.118	-0.012	0.001	-0.001
0.42	-0.859	-0.078	-0.118	-0.017	0.002	-0.002
0.43	-0.938	-0.078	-0.118	-0.023	0.002	-0.004
0.44	-1.016	-0.078	-0.236	-0.029	0.003	-0.006
0.45	-1.016	-0.078	-0.236	-0.035	0.004	-0.008
0.46	-1.250	-0.078	-0.236	-0.044	0.005	-0.011
0.47	-1.250	-0.078	-0.236	-0.052	0.005	-0.013
0.48	-1.250	-0.078	-0.353	-0.061	0.006	-0.016
0.49	-1.250	-0.078	-0.353	-0.069	0.007	-0.020
0.50	-1.016	-0.078	-0.353	-0.076	0.008	-0.024
0.51	-0.938	-0.078	-0.353	-0.081	0.009	-0.027
0.52	-0.703	-0.078	-0.353	-0.084	0.009	-0.031
0.53	-0.703	-0.078	-0.236	-0.087	0.010	-0.033
0.54	-0.703	-0.078	-0.236	-0.091	0.011	-0.035
0.55	-0.625	-0.078	-0.118	-0.093	0.012	-0.037
0.56	-0.391	-0.078	-0.118	-0.093	0.012	-0.038
0.57	-0.313	-0.078	-0.118	-0.092	0.013	-0.039
0.58	-0.078	-0.078	-0.118	-0.089	0.014	-0.040
0.59	-0.078	-0.078	0.000	-0.086	0.015	-0.040
0.60	-0.078	-0.078	0.000	-0.083	0.016	-0.040
0.61	-0.078	-0.078	0.118	-0.080	0.016	-0.039
0.62	-0.078	-0.078	0.118	-0.076	0.017	-0.038
0.63	-0.078	-0.078	0.118	-0.073	0.018	-0.037
0.64	-0.078	-0.078	0.118	-0.070	0.019	-0.035
0.65	-0.078	-0.078	0.118	-0.067	0.019	-0.034
0.66	-0.078	-0.078	0.118	-0.064	0.020	-0.033
0.67	-0.078	-0.078	0.118	-0.061	0.021	-0.032
0.68	-0.078	-0.078	0.118	-0.058	0.022	-0.031
0.69	-0.078	-0.078	0.118	-0.055	0.023	-0.029
0.70	-0.078	-0.078	0.118	-0.051	0.023	-0.028
0.71	-0.078	-0.078	0.118	-0.048	0.024	-0.027
0.72	-0.078	-0.078	0.118	-0.045	0.025	-0.026
0.73	-0.078	-0.078	0.118	-0.042	0.026	-0.025
0.74	-0.078	-0.078	0.118	-0.039	0.026	-0.024
0.75	-0.078	-0.078	0.118	-0.036	0.027	-0.022
0.76	-0.078	-0.078	0.118	-0.033	0.028	-0.021
0.77	-0.078	-0.078	0.118	-0.030	0.029	-0.020
0.78	-0.078	-0.078	0.118	-0.026	0.030	-0.019
0.79	-0.078	-0.078	0.118	-0.023	0.030	-0.018

Figure 10.2.3.c.1 Digital data for event 0.5 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
0.80	-0.078	-0.078	0.118	-0.020	0.031	-0.016
0.81	0.000	-0.078	0.118	-0.016	0.032	-0.015
0.82	0.078	-0.078	0.118	-0.012	0.033	-0.014
0.83	0.000	-0.078	0.118	-0.008	0.033	-0.013
0.84	0.000	-0.078	0.118	-0.004	0.034	-0.012
0.85	0.000	-0.156	0.118	0.000	0.034	-0.011
0.86	-0.078	-0.156	1.060	0.003	0.034	0.000
0.87	-0.078	-0.234	0.118	0.006	0.033	0.001
0.88	-0.156	-0.234	0.118	0.009	0.033	0.002
0.89	-0.156	-0.234	0.118	0.011	0.032	0.004
0.90	-0.156	-0.156	0.118	0.013	0.032	0.005

Figure 10.2.3.c.2 Digital data for event 1.5

( ) = baseline which is subtracted for peaks and numerical integration

Yeardate: 81226 Time: 14:20:24.208 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
1.32	-0.313	-0.078	0.000	0.000	-0.000	0.000
1.33	-0.313	-0.078	0.000	0.000	-0.000	0.000
1.34	-0.391	-0.078	0.000	-0.001	-0.000	0.000
1.35	-0.391	-0.078	0.000	-0.002	-0.000	0.000
1.36	-0.469	-0.078	0.000	-0.003	-0.000	0.000
1.37	-0.547	-0.078	0.000	-0.005	-0.000	0.000
1.38	-0.547	-0.078	0.000	-0.008	-0.000	0.000
1.39	-0.547	-0.078	0.000	-0.010	-0.000	0.000
1.40	-0.625	-0.078	0.000	-0.013	-0.000	0.000
1.41	-0.703	-0.078	0.000	-0.017	-0.000	0.000
1.42	-0.938	-0.078	0.000	-0.023	-0.000	0.000
1.43	-1.016	-0.078	-0.118	-0.030	-0.000	-0.001
1.44	-1.250	-0.078	-0.118	-0.040	-0.000	-0.002
1.45	-1.328	-0.078	-0.236	-0.050	-0.000	-0.005
1.46	-1.406	-0.078	-0.353	-0.061	-0.000	-0.008
1.47	-1.328	-0.078	-0.353	-0.071	-0.000	-0.012
1.48	-1.250	-0.078	-0.471	-0.080	-0.000	-0.016
1.49	-1.016	-0.078	-0.471	-0.087	-0.000	-0.021
1.50	-1.016	-0.078	-0.471	-0.094	-0.000	-0.026
1.51	-1.016	0.000	-0.353	-0.101	0.001	-0.029
1.52	-0.703	0.000	-0.353	-0.105	0.002	-0.033
1.53	-0.703	0.000	-0.353	-0.109	0.002	-0.037
1.54	-0.625	-0.078	-0.353	-0.112	0.002	-0.040
1.55	-0.625	-0.078	-0.236	-0.116	0.002	-0.042
1.56	-0.391	-0.078	-0.236	-0.116	0.002	-0.045
1.57	-0.313	-0.078	-0.118	-0.116	0.002	-0.046
1.58	-0.234	-0.078	0.000	-0.115	0.002	-0.046
1.59	-0.234	-0.078	0.000	-0.115	0.002	-0.046
1.60	-0.156	-0.078	0.000	-0.113	0.002	-0.046
1.61	-0.156	-0.078	0.118	-0.112	0.002	-0.045
1.62	0.078	-0.078	0.118	-0.108	0.002	-0.044
1.63	0.078	-0.078	0.118	-0.104	0.002	-0.042
1.64	0.078	-0.078	0.118	-0.100	0.002	-0.041
1.65	0.078	-0.078	0.118	-0.096	0.002	-0.040
1.66	0.078	-0.078	0.118	-0.092	0.002	-0.039
1.67	0.078	-0.078	0.118	-0.088	0.002	-0.038
1.68	0.078	-0.078	0.236	-0.084	0.002	-0.035
1.69	0.078	-0.078	0.236	-0.080	0.002	-0.033
1.70	0.078	-0.078	0.118	-0.076	0.002	-0.032
1.71	0.078	-0.078	0.118	-0.072	0.002	-0.031
1.72	0.000	-0.078	0.118	-0.069	0.002	-0.029
1.73	0.078	-0.078	0.118	-0.065	0.002	-0.028
1.74	0.000	-0.078	0.118	-0.062	0.002	-0.027
1.75	0.000	-0.078	0.118	-0.059	0.002	-0.026
1.76	0.000	-0.078	0.118	-0.056	0.002	-0.025

Figure 10.2.3.c.2 Digital data for event 1.5 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
1.77	-0.156	-0.078	0.118	-0.054	0.002	-0.024
1.78	-0.156	-0.078	0.118	-0.053	0.002	-0.022
1.79	-0.156	-0.078	1.060	-0.051	0.002	-0.012
1.80	-0.156	-0.078	0.118	-0.050	0.002	-0.011
1.81	-0.156	-0.078	0.118	-0.048	0.002	-0.009
1.82	-0.156	-0.078	0.118	-0.047	0.002	-0.008
1.83	-0.156	-0.078	0.118	-0.045	0.002	-0.007
1.84	-0.156	-0.078	0.118	-0.043	0.002	-0.006
1.85	-0.156	-0.078	0.118	-0.042	0.002	-0.005
1.86	-0.156	-0.156	0.118	-0.040	0.001	-0.004
1.87	-0.156	-0.156	0.118	-0.039	0.001	-0.002
1.88	-0.156	-0.156	0.118	-0.037	-0.000	-0.001
1.89	-0.156	-0.156	0.118	-0.036	-0.001	0.000
1.90	-0.156	-0.156	0.118	-0.034	-0.002	0.001
1.91	-0.156	-0.156	0.118	-0.032	-0.003	0.002
1.92	-0.156	-0.234	0.118	-0.031	-0.004	0.003
1.93	-0.156	-0.234	0.118	-0.029	-0.006	0.005
1.94	-0.156	-0.234	0.118	-0.028	-0.007	0.006
1.95	-0.156	-0.234	0.118	-0.026	-0.009	0.007
1.96	-0.156	-0.234	0.118	-0.025	-0.011	0.008
1.97	-0.156	-0.234	0.118	-0.023	-0.012	0.009
1.98	-0.156	-0.234	0.118	-0.021	-0.014	0.010
1.99	-0.234	-0.234	0.118	-0.021	-0.015	0.012
2.00	-0.234	-0.234	0.118	-0.020	-0.017	0.013
2.01	-0.234	-0.234	0.118	-0.019	-0.018	0.014
2.02	-0.234	-0.234	0.118	-0.018	-0.020	0.015
2.03	-0.234	-0.234	0.118	-0.018	-0.022	0.016
2.04	-0.234	-0.234	0.118	-0.017	-0.023	0.017
2.05	-0.234	-0.234	0.118	-0.016	-0.025	0.019
2.06	-0.234	-0.234	0.118	-0.015	-0.026	0.020
2.07	-0.234	-0.234	0.118	-0.014	-0.028	0.021
2.08	-0.234	-0.234	0.118	-0.014	-0.029	0.022
2.09	-0.234	-0.234	0.118	-0.013	-0.031	0.023
2.10	-0.234	-0.234	0.118	-0.012	-0.032	0.025
2.11	-0.234	-0.234	0.118	-0.011	-0.034	0.026
2.12	-0.234	-0.234	0.118	-0.010	-0.036	0.027
2.13	-0.234	-0.234	0.118	-0.010	-0.037	0.028
2.14	-0.234	-0.234	0.118	-0.009	-0.039	0.029
2.15	-0.156	-0.234	0.118	-0.007	-0.040	0.030
2.16	-0.156	-0.234	0.118	-0.006	-0.042	0.032
2.17	-0.156	-0.234	0.118	-0.004	-0.043	0.033
2.18	-0.156	-0.234	0.118	-0.003	-0.045	0.034
2.19	-0.156	-0.234	0.118	-0.001	-0.047	0.035
2.20	-0.156	-0.234	0.118	0.001	-0.048	0.036
2.21	-0.156	-0.234	0.118	0.002	-0.050	0.038

Figure 10.2.3.c.3 Digital data for event 2.6

( ) = baseline which is subtracted for peaks and numerical integration

Yeardate: 81226 Time: 14:20:24.208 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
2.47	-0.391	-0.078	0.000	0.000	-0.000	0.000
2.48	(-0.391)	-0.078	0.000	0.000	-0.000	0.000
2.49	-0.469	-0.078	0.000	-0.001	-0.000	0.000
2.50	-0.547	-0.078	0.000	-0.002	-0.000	0.000
2.51	-0.625	-0.078	(0.000)	-0.005	-0.000	0.000
2.52	-0.703	-0.078	-0.118	-0.008	-0.000	-0.001
2.53	-0.703	-0.078	-0.118	-0.011	-0.000	-0.002
2.54	-1.016	-0.078	-0.118	-0.017	-0.000	-0.004
2.55	-1.250	-0.078	-0.118	-0.026	-0.000	-0.005
2.56	-1.250	-0.078	-0.236	-0.034	-0.000	-0.007
2.57	-1.328	-0.078	-0.236	-0.044	-0.000	-0.009
2.58	-1.563	-0.078	-0.353	-0.055	-0.000	-0.013
2.59	-1.641	-0.078	-0.353	-0.068	-0.000	-0.016
2.60	-1.719	-0.078	-0.471	-0.081	-0.000	-0.021
2.61	-1.641	-0.078	-0.471	-0.094	-0.000	-0.026
2.62	-1.563	-0.078	-0.589	-0.105	-0.000	-0.032
2.63	-1.328	-0.078	-0.589	-0.115	-0.000	-0.038
2.64	-1.250	-0.078	-0.589	-0.123	-0.000	-0.044
2.65	-1.016	-0.078	-0.589	-0.130	-0.000	-0.049
2.66	-0.938	(-0.078)	-0.471	-0.135	-0.000	-0.054
2.67	-0.625	0.000	-0.353	-0.137	0.001	-0.058
2.68	-0.078	0.000	-0.353	-0.134	0.002	-0.061
2.69	-0.078	0.000	-0.236	-0.131	0.002	-0.064
2.70	-0.078	0.000	0.000	-0.128	0.003	-0.064
2.71	-0.078	0.000	0.000	-0.125	0.004	-0.064
2.72	-0.078	-0.078	0.118	-0.122	0.004	-0.062
2.73	0.000	-0.078	0.118	-0.118	0.004	-0.061
2.74	0.078	-0.078	0.118	-0.113	0.004	-0.060
2.75	0.156	-0.078	0.236	-0.108	0.004	-0.058
2.76	0.156	-0.078	0.236	-0.102	0.004	-0.055
2.77	0.156	-0.078	0.236	-0.097	0.004	-0.053
2.78	0.234	-0.078	0.236	-0.091	0.004	-0.051
2.79	0.234	-0.078	0.236	-0.084	0.004	-0.048
2.80	0.234	-0.078	0.236	-0.078	0.004	-0.046
2.81	0.156	-0.078	0.236	-0.073	0.004	-0.044
2.82	0.156	-0.078	0.236	-0.067	0.004	-0.041
2.83	0.156	-0.078	0.236	-0.062	0.004	-0.039
2.84	0.156	-0.078	0.236	-0.056	0.004	-0.037
2.85	0.156	-0.078	0.236	-0.051	0.004	-0.034
2.86	0.078	-0.078	0.236	-0.046	0.004	-0.032
2.87	0.078	-0.078	0.236	-0.041	0.004	-0.029
2.88	0.078	-0.078	0.118	-0.037	0.004	-0.028
2.89	0.078	-0.078	0.118	-0.032	0.004	-0.027
2.90	0.078	-0.078	0.118	-0.027	0.004	-0.026
2.91	0.078	-0.078	0.118	-0.022	0.004	-0.025

Figure 10.2.3.c.3 Digital data for event 2.6 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
2.92	0.078	-0.078	0.118	-0.018	0.004	-0.024
2.93	0.000	-0.078	0.118	-0.014	0.004	-0.022
2.94	0.000	-0.078	0.118	-0.010	0.004	-0.021
2.95	-0.078	-0.078	0.118	-0.007	0.004	-0.020
2.96	-0.156	-0.156	0.118	-0.005	0.003	-0.019
2.97	-0.156	-0.156	0.118	-0.002	0.002	-0.018
2.98	-0.156	-0.156	0.118	0.000	0.001	-0.016
2.99	-0.156	-0.078	0.118	0.003	0.001	-0.015
3.00	-0.156	-0.078	0.118	0.005	0.001	-0.014
3.01	-0.156	-0.078	0.118	0.007	0.001	-0.013
3.02	-0.156	-0.156	0.118	0.010	0.001	-0.012
3.03	-0.156	-0.234	0.118	0.012	-0.001	-0.011
3.04	-0.156	-0.234	0.118	0.014	-0.002	-0.009
3.05	-0.156	-0.234	0.118	0.017	-0.004	-0.008
3.06	-0.156	-0.234	0.118	0.019	-0.006	-0.007
3.07	-0.156	-0.234	0.118	0.021	-0.007	-0.006
3.08	-0.156	-0.234	0.118	0.024	-0.009	-0.005
3.09	-0.156	-0.234	0.118	0.026	-0.010	-0.004
3.10	-0.156	-0.234	0.118	0.028	-0.012	-0.002
3.11	-0.156	-0.234	0.118	0.031	-0.013	-0.001
3.12	-0.156	-0.234	0.118	0.033	-0.015	0.000
3.13	-0.234	-0.234	0.118	0.035	-0.016	0.001

Figure 10.2.3.c.4 Digital data for event 4.1

(oval) = baseline which is subtracted for peaks and numerical integration

Yeardate: 81226 Time: 14:20:24.208 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
3.94	-0.391	-0.078	0.000	0.000	-0.000	0.000
3.95	(-0.391)	-0.078	0.000	0.000	-0.000	0.000
3.96	-0.469	-0.078	0.000	-0.001	-0.000	0.000
3.97	-0.547	-0.078	0.000	-0.002	-0.000	0.000
3.98	-0.625	-0.078	0.000	-0.005	-0.000	0.000
3.99	-0.703	-0.078	(0.000)	-0.008	-0.000	0.000
4.00	-0.781	-0.078	-0.118	-0.012	-0.000	-0.001
4.01	-1.016	-0.078	-0.118	-0.018	-0.000	-0.002
4.02	-1.250	-0.078	-0.236	-0.027	-0.000	-0.005
4.03	-1.563	(-0.078)	-0.236	-0.038	-0.000	-0.007
4.04	-1.875	0.000	-0.353	-0.053	0.001	-0.011
4.05	-1.953	0.000	-0.471	-0.069	0.002	-0.015
4.06	-1.875	0.000	-0.707	-0.084	0.002	-0.022
4.07	-1.641	0.000	-0.707	-0.096	0.003	-0.029
4.08	-1.563	0.000	-0.707	-0.108	0.004	-0.037
4.09	-1.328	-0.078	-0.589	-0.117	0.004	-0.042
4.10	-1.250	-0.078	-0.589	-0.126	0.004	-0.048
4.11	-0.938	-0.078	-0.471	-0.131	0.004	-0.053
4.12	-0.703	-0.078	-0.353	-0.134	0.004	-0.057
4.13	-0.625	-0.078	-0.353	-0.137	0.004	-0.060
4.14	-0.391	-0.078	-0.353	-0.137	0.004	-0.064
4.15	-0.313	-0.078	-0.236	-0.136	0.004	-0.066
4.16	-0.078	-0.078	-0.118	-0.133	0.004	-0.067
4.17	-0.078	-0.078	0.000	-0.130	0.004	-0.067
4.18	0.000	-0.078	0.118	-0.126	0.004	-0.066
4.19	0.000	-0.078	0.118	-0.122	0.004	-0.065
4.20	0.078	-0.234	0.236	-0.117	0.002	-0.062
4.21	0.078	-0.234	0.353	-0.112	0.001	-0.059
4.22	0.156	-0.234	0.353	-0.107	-0.001	-0.055
4.23	0.234	-0.234	0.353	-0.101	-0.002	-0.052
4.24	0.234	-0.156	0.353	-0.094	-0.003	-0.048
4.25	0.234	-0.156	0.353	-0.088	-0.004	-0.045
4.26	0.234	-0.078	0.353	-0.082	-0.004	-0.041
4.27	0.234	-0.078	0.236	-0.076	-0.004	-0.039
4.28	0.156	-0.078	0.236	-0.070	-0.004	-0.037
4.29	0.078	-0.078	0.236	-0.065	-0.004	-0.034
4.30	0.078	-0.078	0.236	-0.061	-0.004	-0.032
4.31	0.078	-0.078	0.236	-0.056	-0.004	-0.029
4.32	0.078	-0.078	0.118	-0.051	-0.004	-0.028
4.33	0.078	-0.078	0.118	-0.047	-0.004	-0.027
4.34	0.078	-0.078	0.118	-0.042	-0.004	-0.026
4.35	-0.156	-0.078	0.118	-0.040	-0.004	-0.025
4.36	-0.156	-0.078	0.118	-0.037	-0.004	-0.024
4.37	-0.156	-0.078	0.000	-0.035	-0.004	-0.024
4.38	-0.078	-0.078	0.000	-0.032	-0.004	-0.024

Figure 10.2.3.c.4 Digital data for event 4.1 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
4.39	-0.078	-0.078	0.000	-0.029	-0.004	-0.024
4.40	-0.078	-0.078	0.000	-0.026	-0.004	-0.024
4.41	-0.078	-0.078	0.000	-0.022	-0.004	-0.024
4.42	-0.156	-0.078	0.000	-0.020	-0.004	-0.024
4.43	-0.156	-0.078	0.000	-0.018	-0.004	-0.024
4.44	-0.234	-0.078	0.000	-0.016	-0.004	-0.024
4.45	-0.234	-0.078	0.000	-0.015	-0.004	-0.024
4.46	-0.234	-0.078	0.000	-0.013	-0.004	-0.024
4.47	-0.234	-0.078	0.000	-0.012	-0.004	-0.024
4.48	-0.234	-0.078	0.000	-0.010	-0.004	-0.024
4.49	-0.234	-0.156	0.118	-0.008	-0.005	-0.022
4.50	-0.234	-0.234	0.118	-0.007	-0.006	-0.021
4.51	-0.234	-0.234	0.118	-0.005	-0.008	-0.020
4.52	-0.234	-0.234	0.118	-0.004	-0.009	-0.019
4.53	-0.156	-0.234	0.118	-0.001	-0.011	-0.018
4.54	-0.156	-0.234	0.118	0.001	-0.013	-0.016
4.55	-0.156	-0.234	0.118	0.003	-0.014	-0.015

Figure 10.2.3.c.5 Digital data for event 5.4

(oval) = baseline which is subtracted for peaks and numerical integration

Yeardate: 81226 Time: 14:20:24.208 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
5.29	-0.391	-0.078	0.000	0.000	-0.000	0.000
5.30	-0.391	-0.078	0.000	0.000	-0.000	0.000
5.31	-0.547	-0.078	0.000	-0.002	-0.000	0.000
5.32	-0.703	-0.078	0.000	-0.005	-0.000	0.000
5.33	-0.938	-0.078	0.000	-0.010	-0.000	0.000
5.34	-1.016	-0.078	-0.118	-0.016	-0.000	-0.001
5.35	-1.328	-0.078	-0.236	-0.026	-0.000	-0.004
5.36	-1.563	-0.078	-0.236	-0.037	-0.000	-0.006
5.37	-1.641	-0.078	-0.471	-0.050	-0.000	-0.011
5.38	-1.797	0.000	-0.471	-0.064	0.001	-0.015
5.39	-1.719	0.000	-0.589	-0.077	0.002	-0.021
5.40	-1.563	0.000	-0.707	-0.089	0.002	-0.028
5.41	-1.484	0.000	-0.589	-0.100	0.003	-0.034
5.42	-1.406	0.000	-0.589	-0.110	0.004	-0.040
5.43	-1.250	0.000	-0.471	-0.119	0.005	-0.045
5.44	-1.094	-0.078	-0.471	-0.126	0.005	-0.049
5.45	-1.016	-0.078	-0.353	-0.132	0.005	-0.053
5.46	-0.938	-0.078	-0.353	-0.137	0.005	-0.057
5.47	-0.703	-0.078	-0.236	-0.141	0.005	-0.059
5.48	-0.625	-0.078	-0.236	-0.143	0.005	-0.061
5.49	-0.391	0.000	-0.118	-0.143	0.005	-0.062
5.50	-0.313	0.000	-0.118	-0.142	0.006	-0.064
5.51	-0.313	-0.078	-0.118	-0.141	0.006	-0.065
5.52	-0.078	-0.078	0.000	-0.138	0.006	-0.065
5.53	-0.078	-0.078	0.118	-0.135	0.006	-0.064
5.54	0.000	-0.078	0.118	-0.131	0.006	-0.062
5.55	0.078	-0.156	0.236	-0.126	0.005	-0.060
5.56	0.078	-0.156	0.353	-0.122	0.005	-0.057
5.57	0.156	-0.156	0.353	-0.116	0.004	-0.053
5.58	0.313	-0.156	0.353	-0.109	0.003	-0.049
5.59	0.313	-0.078	0.353	-0.102	0.003	-0.046
5.60	0.313	-0.078	0.353	-0.095	0.003	-0.042
5.61	0.313	-0.078	0.353	-0.088	0.003	-0.039
5.62	0.313	-0.078	0.353	-0.081	0.003	-0.035
5.63	0.313	-0.078	0.353	-0.074	0.003	-0.032
5.64	0.234	-0.078	0.353	-0.068	0.003	-0.028
5.65	0.234	-0.078	0.353	-0.062	0.003	-0.025
5.66	0.156	-0.078	0.236	-0.056	0.003	-0.022
5.67	0.156	-0.078	0.236	-0.051	0.003	-0.020
5.68	0.156	-0.078	0.118	-0.045	0.003	-0.019
5.69	0.078	-0.078	0.118	-0.040	0.003	-0.018
5.70	0.078	-0.078	0.118	-0.036	0.003	-0.016
5.71	0.078	-0.078	0.118	-0.031	0.003	-0.015
5.72	0.078	-0.078	0.118	-0.026	0.003	-0.014
5.73	0.000	-0.078	0.000	-0.022	0.003	-0.014

Figure 10.2.3.c.5 Digital data for event 5.4 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
5.74	0.000	-0.078	0.000	-0.019	0.003	-0.014
5.75	0.000	-0.078	0.000	-0.015	0.003	-0.014
5.76	-0.078	-0.078	0.000	-0.012	0.003	-0.014
5.77	-0.078	-0.078	0.000	-0.008	0.003	-0.014
5.78	-0.156	-0.078	0.000	-0.006	0.003	-0.014
5.79	-0.156	-0.078	0.000	-0.004	0.003	-0.014
5.80	-0.156	-0.078	0.000	-0.001	0.003	-0.014
5.81	-0.156	-0.078	0.000	0.001	0.003	-0.014
5.82	-0.234	-0.078	0.000	0.003	0.003	-0.014
5.83	-0.234	-0.078	0.000	0.004	0.003	-0.014
5.84	-0.234	-0.156	0.000	0.006	0.002	-0.014
5.85	-0.234	-0.156	0.118	0.007	0.001	-0.013
5.86	-0.234	-0.234	0.118	0.009	-0.000	-0.012
5.87	-0.234	-0.234	0.118	0.010	-0.002	-0.011
5.88	-0.156	-0.234	0.118	0.013	-0.003	-0.009
5.89	-0.156	-0.234	0.118	0.015	-0.005	-0.008
5.90	-0.156	-0.234	0.118	0.017	-0.006	-0.007
5.91	-0.156	-0.234	0.118	0.020	-0.008	-0.006
5.92	-0.156	-0.234	0.118	0.022	-0.009	-0.005
5.93	-0.156	-0.234	0.118	0.024	-0.011	-0.004
5.94	-0.156	-0.234	0.118	0.027	-0.013	-0.002
5.95	-0.156	-0.234	0.118	0.029	-0.014	-0.001
5.96	-0.156	-0.234	0.118	0.032	-0.016	0.000
5.97	-0.234	-0.234	0.118	0.033	-0.017	0.001

Figure 10.2.3.c.6 Digital data for event 7.5

(-0.391) = baseline which is subtracted for peaks and numerical integration

Yeardate: 81226 Time: 14:20:24.208 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
7.43	-0.391	-0.078	0.000	0.000	-0.000	0.000
7.44	(-0.391)	-0.078	0.000	0.000	-0.000	0.000
7.45	-0.625	-0.078	0.000	-0.002	-0.000	0.000
7.46	-0.703	-0.078	0.000	-0.005	-0.000	0.000
7.47	-1.016	-0.078	-0.118	-0.012	-0.000	-0.001
7.48	-1.875	0.000	-0.236	-0.027	0.001	-0.004
7.49	-2.500	0.234	-0.353	-0.048	0.004	-0.007
7.50	-2.813	0.234	-0.471	-0.072	0.007	-0.012
7.51	-2.891	0.313	-0.943	-0.097	0.011	-0.021
7.52	-2.578	0.234	-1.296	-0.119	0.014	-0.034
7.53	-1.953	0.234	-1.414	-0.134	0.017	-0.048
7.54	-1.328	0.000	-1.296	-0.144	0.018	-0.061
7.55	-0.938	0.000	-0.943	-0.149	0.019	-0.071
7.56	-0.625	0.000	-0.825	-0.152	0.020	-0.079
7.57	-0.625	-0.078	-0.471	-0.154	0.020	-0.084
7.58	-0.625	-0.078	-0.353	-0.156	0.020	-0.087
7.59	-0.469	-0.234	0.000	-0.157	0.018	-0.087
7.60	-0.547	-0.234	0.000	-0.159	0.016	-0.087
7.61	-0.625	-0.156	0.000	-0.161	0.016	-0.087
7.62	-0.625	-0.078	0.118	-0.163	0.016	-0.086
7.63	-0.625	-0.078	0.118	-0.166	0.016	-0.085
7.64	-0.391	-0.078	0.000	-0.166	0.016	-0.085
7.65	-0.313	-0.078	0.000	-0.165	0.016	-0.085
7.66	-0.078	-0.078	0.000	-0.162	0.016	-0.085
7.67	-0.078	-0.078	0.000	-0.159	0.016	-0.085
7.68	0.000	-0.234	0.118	-0.155	0.014	-0.084
7.69	0.234	-0.313	0.118	-0.148	0.012	-0.082
7.70	0.234	-0.313	0.353	-0.142	0.009	-0.079
7.71	0.234	-0.313	0.353	-0.136	0.007	-0.075
7.72	0.313	-0.313	0.471	-0.129	0.005	-0.071
7.73	0.313	-0.234	0.471	-0.122	0.003	-0.066
7.74	0.469	-0.156	0.353	-0.113	0.002	-0.062
7.75	0.469	-0.078	0.353	-0.105	0.002	-0.059
7.76	0.547	-0.078	0.471	-0.095	0.002	-0.054
7.77	0.547	-0.078	0.471	-0.086	0.002	-0.049
7.78	0.547	-0.078	0.353	-0.076	0.002	-0.046
7.79	0.469	-0.078	0.353	-0.068	0.002	-0.042
7.80	0.391	-0.078	0.236	-0.060	0.002	-0.040
7.81	0.391	-0.078	0.236	-0.052	0.002	-0.038
7.82	0.313	-0.078	0.118	-0.045	0.002	-0.037
7.83	0.234	-0.078	0.118	-0.039	0.002	-0.035
7.84	0.000	-0.078	0.118	-0.035	0.002	-0.034
7.85	0.000	-0.078	0.000	-0.031	0.002	-0.034
7.86	0.000	-0.078	0.000	-0.027	0.002	-0.034
7.87	-0.078	-0.078	-0.118	-0.024	0.002	-0.035

Figure 10.2.3.c.6 Digital data for event 7.5 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
7.88	-0.078	-0.078	-0.118	-0.021	0.002	-0.037
7.89	-0.078	-0.078	-0.118	-0.018	0.002	-0.038
7.90	-0.078	-0.078	-0.118	-0.015	0.002	-0.039
7.91	-0.078	-0.078	0.000	-0.012	0.002	-0.039
7.92	-0.078	-0.078	0.000	-0.008	0.002	-0.039
7.93	-0.078	-0.078	0.000	-0.005	0.002	-0.039
7.94	-0.156	-0.078	0.000	-0.003	0.002	-0.039
7.95	-0.156	-0.078	0.000	-0.001	0.002	-0.039
7.96	-0.234	-0.078	0.000	0.001	0.002	-0.039
7.97	-0.234	-0.078	0.000	0.003	0.002	-0.039
7.98	-0.234	-0.078	0.000	0.004	0.002	-0.039
7.99	-0.234	-0.234	0.000	0.006	0.001	-0.039
8.00	-0.234	-0.234	0.000	0.007	-0.001	-0.039
8.01	-0.234	-0.234	0.000	0.009	-0.002	-0.039

Figure 10.2.3.c.7 Digital data for event 9.7

( ) = baseline which is subtracted for peaks and numerical integration

Yeardate: 81226 Time: 14:20:24.208 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
9.61	-0.391	-0.078	0.000	0.000	-0.000	0.000
9.62	-0.391	-0.078	0.000	0.000	-0.000	0.000
9.63	-0.469	-0.078	0.000	-0.001	-0.000	0.000
9.64	-0.625	-0.078	0.000	-0.003	-0.000	0.000
9.65	-1.016	-0.078	0.000	-0.009	-0.000	0.000
9.66	-1.875	0.000	-0.118	-0.024	0.001	-0.001
9.67	-2.266	0.234	-0.236	-0.043	0.004	-0.004
9.68	-2.344	0.234	-0.471	-0.062	0.007	-0.008
9.69	-2.188	0.234	-0.943	-0.080	0.010	-0.018
9.70	-1.953	0.234	-1.060	-0.096	0.013	-0.028
9.71	-1.641	0.000	-1.060	-0.109	0.014	-0.039
9.72	-1.250	0.000	-1.060	-0.117	0.015	-0.049
9.73	-1.016	0.000	-0.825	-0.123	0.016	-0.058
9.74	-0.938	0.000	-0.471	-0.129	0.016	-0.062
9.75	-0.859	0.000	-0.471	-0.134	0.017	-0.067
9.76	-0.781	0.000	-0.353	-0.137	0.018	-0.071
9.77	-0.703	0.000	-0.353	-0.141	0.019	-0.074
9.78	-0.703	-0.078	-0.353	-0.144	0.019	-0.078
9.79	-0.703	-0.078	-0.118	-0.147	0.019	-0.079
9.80	-0.625	-0.078	-0.118	-0.149	0.019	-0.080
9.81	-0.625	-0.078	-0.118	-0.151	0.019	-0.081
9.82	-0.625	-0.078	0.000	-0.154	0.019	-0.081
9.83	-0.625	-0.078	0.000	-0.156	0.019	-0.081
9.84	-0.391	-0.078	0.000	-0.156	0.019	-0.081
9.85	-0.313	-0.078	0.000	-0.155	0.019	-0.081
9.86	-0.078	-0.313	0.000	-0.152	0.016	-0.081
9.87	-0.078	-0.234	0.118	-0.149	0.015	-0.080
9.88	-0.078	-0.234	0.118	-0.146	0.013	-0.079
9.89	0.000	-0.234	0.353	-0.142	0.012	-0.075
9.90	0.000	-0.234	0.353	-0.138	0.010	-0.072
9.91	0.078	-0.234	0.353	-0.133	0.009	-0.068
9.92	0.078	-0.234	0.353	-0.129	0.007	-0.065
9.93	0.156	-0.156	0.353	-0.123	0.006	-0.061
9.94	0.234	-0.156	0.353	-0.117	0.005	-0.058
9.95	0.313	-0.156	0.353	-0.110	0.005	-0.054
9.96	0.313	-0.156	0.353	-0.103	0.004	-0.051
9.97	0.313	-0.156	0.353	-0.096	0.003	-0.047
9.98	0.313	-0.156	0.353	-0.089	0.002	-0.044
9.99	0.313	-0.156	0.236	-0.082	0.002	-0.041
10.00	0.313	-0.156	0.236	-0.075	0.001	-0.039
10.01	0.313	-0.156	0.236	-0.068	-0.000	-0.037
10.02	0.234	-0.078	0.236	-0.062	-0.000	-0.034
10.03	0.234	-0.078	0.118	-0.055	-0.000	-0.033
10.04	0.078	-0.078	0.118	-0.051	-0.000	-0.032
10.05	0.000	-0.078	0.118	-0.047	-0.000	-0.031

Figure 10.2.3.c.7 Digital data for event 9.7 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
10.06	0.000	-0.078	0.118	-0.043	-0.000	-0.029
10.07	0.000	-0.078	0.000	-0.039	-0.000	-0.029
10.08	0.000	-0.078	0.000	-0.035	-0.000	-0.029
10.09	0.000	-0.078	0.000	-0.031	-0.000	-0.029
10.10	-0.078	-0.078	0.000	-0.028	-0.000	-0.029
10.11	-0.078	-0.078	0.000	-0.025	-0.000	-0.029
10.12	-0.078	-0.078	0.000	-0.022	-0.000	-0.029
10.13	-0.078	-0.078	0.000	-0.019	-0.000	-0.029
10.14	-0.078	-0.078	0.000	-0.015	-0.000	-0.029
10.15	-0.156	-0.078	0.000	-0.013	-0.000	-0.029
10.16	-0.156	-0.078	0.000	-0.011	-0.000	-0.029
10.17	-0.156	-0.078	0.000	-0.008	-0.000	-0.029
10.18	-0.156	-0.078	0.000	-0.006	-0.000	-0.029
10.19	-0.156	-0.156	0.000	-0.004	-0.001	-0.029
10.20	-0.156	-0.156	0.000	-0.001	-0.002	-0.029
10.21	-0.156	-0.156	0.000	0.001	-0.002	-0.029
10.22	-0.234	-0.156	0.000	0.003	-0.003	-0.029

Figure 10.2.3.c.8 Digital data for event 12.7

(oval) = baseline which is subtracted for peaks and numerical integration

Yeardate: 81226 Time: 14:20:24.208 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
12.58	-0.391	-0.078	0.000	0.000	-0.000	0.000
12.59	-0.391	-0.078	0.000	0.000	-0.000	0.000
12.60	-0.469	-0.078	-0.118	-0.001	-0.000	-0.001
12.61	-0.547	0.000	-0.118	-0.002	0.001	-0.002
12.62	-0.703	0.234	-0.118	-0.005	0.004	-0.004
12.63	-1.250	0.625	-0.118	-0.014	0.011	-0.005
12.64	-2.500	0.938	-0.236	-0.035	0.021	-0.007
12.65	-3.203	0.625	-0.471	-0.063	0.028	-0.012
12.66	-3.438	0.234	-0.825	-0.094	0.031	-0.020
12.67	-2.500	0.000	-1.767	-0.115	0.032	-0.038
12.68	-1.328	0.000	-2.238	-0.124	0.033	-0.060
12.69	-0.703	0.000	-1.767	-0.127	0.034	-0.078
12.70	-0.625	0.000	-0.825	-0.130	0.034	-0.086
12.71	-0.703	-0.078	-0.353	-0.133	0.034	-0.090
12.72	-0.625	-0.078	-0.353	-0.135	0.034	-0.093
12.73	-0.625	-0.078	-0.236	-0.137	0.034	-0.095
12.74	-0.391	0.000	-0.236	-0.137	0.035	-0.098
12.75	-0.391	0.000	-0.118	-0.137	0.036	-0.099
12.76	-0.391	-0.313	-0.118	-0.137	0.034	-0.100
12.77	-0.469	-0.391	0.000	-0.138	0.030	-0.100
12.78	-0.547	-0.391	0.000	-0.140	0.027	-0.100
12.79	-0.625	-0.391	0.118	-0.142	0.024	-0.099
12.80	-0.703	-0.313	0.118	-0.145	0.022	-0.098
12.81	-0.625	-0.234	0.118	-0.148	0.020	-0.097
12.82	-0.625	-0.234	0.118	-0.150	0.019	-0.095
12.83	-0.469	-0.078	0.118	-0.151	0.019	-0.094
12.84	-0.469	-0.156	0.118	-0.151	0.018	-0.093
12.85	-0.078	-0.234	0.118	-0.148	0.016	-0.092
12.86	-0.078	-0.391	0.118	-0.145	0.013	-0.091
12.87	0.000	-0.391	0.118	-0.141	0.010	-0.090
12.88	0.156	-0.469	0.353	-0.136	0.006	-0.086
12.89	0.156	-0.391	0.353	-0.130	0.003	-0.082
12.90	0.156	-0.313	0.471	-0.125	0.001	-0.078
12.91	0.156	-0.313	0.471	-0.119	-0.002	-0.073
12.92	0.234	-0.234	0.471	-0.113	-0.003	-0.068
12.93	0.313	-0.234	0.471	-0.106	-0.005	-0.064
12.94	0.313	-0.234	0.353	-0.099	-0.006	-0.060
12.95	0.391	-0.234	0.236	-0.091	-0.008	-0.058
12.96	0.391	-0.234	0.236	-0.083	-0.009	-0.055
12.97	0.313	-0.234	0.236	-0.076	-0.011	-0.053
12.98	0.313	-0.234	0.236	-0.069	-0.013	-0.051
12.99	0.234	-0.156	0.236	-0.063	-0.013	-0.048
13.00	0.234	-0.156	0.118	-0.057	-0.014	-0.047
13.01	0.234	-0.078	0.118	-0.051	-0.014	-0.046
13.02	0.156	-0.078	0.118	-0.045	-0.014	-0.045

Figure 10.2.3.c.8 Digital data for event 12.7 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
13.03	0.000	-0.078	0.118	-0.041	-0.014	-0.044
13.04	0.000	-0.078	0.000	-0.037	-0.014	-0.044
13.05	-0.078	-0.078	0.000	-0.034	-0.014	-0.044
13.06	-0.078	-0.078	0.000	-0.031	-0.014	-0.044
13.07	-0.078	-0.078	0.000	-0.028	-0.014	-0.044
13.08	0.000	-0.078	0.000	-0.024	-0.014	-0.044
13.09	0.000	-0.156	0.000	-0.020	-0.015	-0.044
13.10	0.000	-0.156	0.000	-0.016	-0.016	-0.044
13.11	0.000	-0.156	0.118	-0.012	-0.016	-0.042
13.12	0.000	-0.078	0.118	-0.008	-0.016	-0.041
13.13	0.000	-0.078	0.118	-0.004	-0.016	-0.040
13.14	-0.156	-0.078	0.118	-0.002	-0.016	-0.039
13.15	-0.156	-0.078	0.118	0.000	-0.016	-0.038
13.16	-0.156	-0.078	1.060	0.003	-0.016	-0.027
13.17	-0.156	-0.156	0.000	0.005	-0.017	-0.027

Figure 10.2.3.c.9 Digital data for event 15.8

(oval) = baseline which is subtracted for peaks and numerical integration

Yeardate: 81226 Time: 14:20:24.208 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
15.75	-0.391	-0.078	0.000	0.000	-0.000	0.000
15.76	-0.391	-0.078	0.000	0.000	-0.000	0.000
15.77	-0.469	0.000	-0.118	-0.001	0.001	-0.001
15.78	-0.547	0.234	-0.118	-0.002	0.004	-0.002
15.79	-0.703	0.313	-0.118	-0.005	0.008	-0.004
15.80	-1.016	0.625	-0.118	-0.012	0.015	-0.005
15.81	-1.328	0.859	-0.236	-0.021	0.024	-0.007
15.82	-1.953	0.859	-0.471	-0.037	0.034	-0.012
15.83	-2.578	0.859	-0.825	-0.059	0.043	-0.020
15.84	-2.578	0.625	-0.943	-0.080	0.050	-0.029
15.85	-2.266	0.313	-1.414	-0.099	0.054	-0.044
15.86	-1.953	0.000	-1.767	-0.115	0.055	-0.061
15.87	-1.641	0.000	-1.767	-0.127	0.055	-0.079
15.88	-1.328	-0.313	-1.296	-0.137	0.053	-0.092
15.89	-1.016	-0.313	-0.943	-0.143	0.051	-0.101
15.90	-0.703	-0.313	-0.825	-0.146	0.048	-0.110
15.91	-0.391	-0.313	-0.471	-0.146	0.046	-0.114
15.92	-0.313	-0.313	-0.353	-0.145	0.044	-0.118
15.93	-0.313	-0.313	0.000	-0.144	0.041	-0.118
15.94	-0.078	-0.313	0.118	-0.141	0.039	-0.117
15.95	-0.078	-0.313	0.118	-0.138	0.037	-0.115
15.96	0.078	-0.391	0.353	-0.134	0.034	-0.112
15.97	0.078	-0.469	0.471	-0.129	0.030	-0.107
15.98	0.078	-0.547	0.471	-0.124	0.025	-0.102
15.99	0.156	-0.625	0.471	-0.119	0.020	-0.098
16.00	0.078	-0.469	0.589	-0.114	0.016	-0.092
16.01	0.078	-0.391	0.589	-0.109	0.012	-0.086
16.02	-0.234	-0.313	0.589	-0.108	0.010	-0.080
16.03	-0.313	-0.313	0.589	-0.107	0.008	-0.074
16.04	-0.313	-0.234	0.471	-0.106	0.006	-0.070
16.05	-0.313	-0.234	0.471	-0.105	0.005	-0.065
16.06	-0.078	-0.234	0.236	-0.102	0.003	-0.062
16.07	-0.156	-0.313	0.118	-0.100	0.001	-0.061
16.08	-0.156	-0.391	0.236	-0.098	-0.002	-0.059
16.09	0.156	-0.391	0.236	-0.092	-0.006	-0.057
16.10	0.234	-0.391	0.236	-0.086	-0.009	-0.054
16.11	0.234	-0.313	0.236	-0.080	-0.011	-0.052
16.12	0.313	-0.234	0.353	-0.073	-0.013	-0.048
16.13	0.313	-0.234	0.353	-0.065	-0.014	-0.045
16.14	0.313	-0.234	0.236	-0.058	-0.016	-0.042
16.15	0.391	-0.234	0.236	-0.051	-0.017	-0.040
16.16	0.469	-0.156	0.236	-0.042	-0.018	-0.038
16.17	0.469	-0.156	0.118	-0.033	-0.019	-0.037
16.18	0.391	-0.156	0.118	-0.026	-0.020	-0.035
16.19	0.313	-0.156	0.118	-0.019	-0.020	-0.034

Figure 10.2.3.c.9 Digital data for event 15.8 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
16.20	0.234	-0.156	0.118	-0.012	-0.021	-0.033
16.21	0.234	-0.078	0.118	-0.006	-0.021	-0.032
16.22	0.000	-0.078	0.000	-0.002	-0.021	-0.032
16.23	0.000	-0.078	0.000	0.002	-0.021	-0.032
16.24	0.000	-0.078	0.000	0.006	-0.021	-0.032

Figure 10.2.3.c.10 Digital data for event 19.8

( ) = baseline which is subtracted for peaks and numerical integration

Yeardate: 81226 Time: 14:20:24.208 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
19.70	-0.469	-0.078	-0.118	0.000	-0.000	0.000
19.71	(-0.469)	-0.078	-0.118	0.000	-0.000	0.000
19.72	-0.547	(-0.078)	-0.118	-0.001	-0.000	0.000
19.73	-0.547	0.000	-0.118	-0.002	0.001	0.000
19.74	-0.703	0.000	-0.118	-0.004	0.002	0.000
19.75	-0.938	0.000	(-0.118)	-0.009	0.002	0.000
19.76	-1.328	0.234	-0.236	-0.017	0.005	-0.001
19.77	-2.266	0.313	-0.236	-0.035	0.009	-0.002
19.78	-2.188	0.313	-0.471	-0.052	0.013	-0.006
19.79	-1.641	0.313	-0.825	-0.064	0.017	-0.013
19.80	-1.563	0.234	-0.943	-0.075	0.020	-0.021
19.81	-1.406	0.000	-0.943	-0.084	0.021	-0.029
19.82	-1.406	0.000	-0.825	-0.094	0.022	-0.036
19.83	-1.875	0.000	-0.825	-0.108	0.023	-0.044
19.84	-1.953	0.000	-0.825	-0.123	0.023	-0.051
19.85	-1.953	0.000	-0.825	-0.137	0.024	-0.058
19.86	-1.328	0.234	-0.825	-0.146	0.027	-0.065
19.87	-0.703	0.234	-0.943	-0.148	0.030	-0.073
19.88	-0.391	0.000	-0.825	-0.148	0.031	-0.080
19.89	-0.391	0.000	-0.353	-0.147	0.032	-0.082
19.90	-0.391	-0.078	-0.353	-0.146	0.032	-0.085
19.91	-0.313	-0.078	0.000	-0.144	0.032	-0.084
19.92	-0.078	-0.313	0.000	-0.141	0.030	-0.082
19.93	-0.078	-0.313	-0.118	-0.137	0.027	-0.082
19.94	-0.078	-0.391	0.118	-0.133	0.024	-0.080
19.95	-0.078	-0.313	0.236	-0.129	0.022	-0.077
19.96	0.078	-0.313	0.236	-0.123	0.019	-0.073
19.97	0.078	-0.313	0.236	-0.118	0.017	-0.069
19.98	0.078	-0.313	0.353	-0.112	0.015	-0.065
19.99	0.078	-0.313	0.471	-0.107	0.012	-0.059
20.00	0.078	-0.313	0.471	-0.101	0.010	-0.053
20.01	0.078	-0.313	0.471	-0.096	0.008	-0.047
20.02	0.078	-0.391	0.471	-0.091	0.005	-0.041
20.03	0.078	-0.391	0.471	-0.085	0.002	-0.035
20.04	0.078	-0.469	0.471	-0.080	-0.002	-0.029
20.05	0.156	-0.391	0.471	-0.073	-0.006	-0.023
20.06	0.234	-0.391	0.353	-0.066	-0.009	-0.019
20.07	0.234	-0.313	0.353	-0.059	-0.011	-0.014
20.08	0.156	-0.313	0.353	-0.053	-0.013	-0.009
20.09	0.156	-0.313	0.353	-0.047	-0.016	-0.005
20.10	0.234	-0.234	0.353	-0.040	-0.017	0.000
20.11	0.234	-0.234	0.353	-0.033	-0.019	0.005
20.12	0.234	-0.234	0.236	-0.026	-0.020	0.008
20.13	0.234	-0.234	0.236	-0.019	-0.022	0.012
20.14	0.234	-0.234	0.236	-0.012	-0.023	0.015
20.15	0.234	-0.234	0.118	-0.005	-0.025	0.018
20.16	0.234	-0.234	0.118	0.002	-0.027	0.020

Figure 10.2.3.d.1 Digital data for event 4.2

( ) = baseline which is subtracted for peaks and numerical integration

Yeardate: 81226 Time: 14:20:24.348 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
3.84	-0.625	-0.078	0.589	0.000	-0.000	0.000
3.85	-0.625	-0.078	0.589	0.000	-0.000	0.000
3.86	-0.625	-0.078	0.471	0.000	-0.000	-0.001
3.87	-0.625	-0.078	0.471	0.000	-0.000	-0.002
3.88	-0.625	-0.078	0.353	0.000	-0.000	-0.005
3.89	-0.703	-0.078	0.353	-0.001	-0.000	-0.007
3.90	-1.016	-0.078	0.353	-0.005	-0.000	-0.009
3.91	-0.703	0.000	0.353	-0.005	0.001	-0.012
3.92	-0.625	-0.078	0.236	-0.005	0.001	-0.015
3.93	-1.250	-0.078	0.118	-0.012	0.001	-0.020
3.94	-1.250	-0.078	0.353	-0.018	0.001	-0.022
3.95	-0.625	0.000	0.236	-0.018	0.002	-0.026
3.96	-0.703	-0.156	0.000	-0.019	0.001	-0.032
3.97	-1.016	0.000	0.471	-0.023	0.002	-0.033
3.98	-0.703	0.234	0.118	-0.023	0.005	-0.038
3.99	-0.703	0.234	0.118	-0.024	0.008	-0.042
4.00	-0.938	0.234	0.000	-0.027	0.011	-0.048
4.01	-1.250	0.000	0.000	-0.034	0.012	-0.054
4.02	-1.328	0.000	0.000	-0.041	0.012	-0.060
4.03	-1.016	0.313	0.000	-0.045	0.016	-0.066
4.04	-0.703	0.234	-0.353	-0.045	0.020	-0.075
4.05	-0.625	0.234	-0.353	-0.045	0.023	-0.085
4.06	-2.500	0.234	0.000	-0.064	0.026	-0.091
4.07	-3.125	0.547	-0.353	-0.089	0.032	-0.100
4.08	-3.828	0.625	-0.353	-0.121	0.039	-0.110
4.09	-1.328	2.422	-1.767	-0.128	0.064	-0.133
4.10	-1.328	2.422	-2.710	-0.135	0.089	-0.166
4.11	-2.500	-0.078	-3.770	-0.154	0.089	-0.210
4.12	-3.750	0.547	0.000	-0.185	0.095	-0.216
4.13	-2.578	1.250	0.000	-0.205	0.109	-0.221
4.14	-1.328	1.797	-1.767	-0.212	0.127	-0.245
4.15	-2.500	1.797	-2.710	-0.230	0.146	-0.278
4.16	-5.000	1.172	-0.943	-0.274	0.159	-0.293
4.17	-4.453	0.938	-0.943	-0.313	0.169	-0.309
4.18	-3.828	1.172	-2.710	-0.345	0.181	-0.342
4.19	-2.891	1.797	-3.299	-0.367	0.200	-0.381
4.20	-2.578	1.250	-2.710	-0.387	0.213	-0.413
4.21	-2.500	0.625	-1.885	-0.405	0.220	-0.438
4.22	-2.188	0.859	-1.767	-0.421	0.230	-0.462
4.23	-1.328	1.172	-1.414	-0.428	0.242	-0.482
4.24	-1.016	1.250	-0.943	-0.432	0.255	-0.497
4.25	-0.938	0.938	-0.825	-0.435	0.266	-0.511
4.26	-0.703	0.859	-0.471	-0.436	0.275	-0.522
4.27	-0.703	0.859	0.000	-0.437	0.284	-0.528
4.28	-0.938	0.938	0.000	-0.440	0.294	-0.534

Figure **10.2.3.d.1** Digital data for event 4.2 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
4.29	-1.250	0.938	0.118	-0.446	0.305	-0.538
4.30	-1.563	0.859	0.236	-0.455	0.314	-0.542
4.31	-1.953	0.781	0.236	-0.469	0.323	-0.545
4.32	-2.266	0.859	0.118	-0.485	0.332	-0.550
4.33	-2.500	0.938	-0.236	-0.504	0.342	-0.558
4.34	-2.500	1.016	-0.471	-0.523	0.353	-0.569
4.35	-2.578	1.016	-0.825	-0.542	0.364	-0.583
4.36	-2.734	0.859	-0.707	-0.563	0.373	-0.596
4.37	-2.813	0.781	-0.825	-0.585	0.382	-0.610
4.38	-2.813	0.781	-0.825	-0.607	0.391	-0.624
4.39	-2.734	0.703	-0.943	-0.628	0.398	-0.640
4.40	-2.578	0.703	-0.825	-0.648	0.406	-0.654
4.41	-2.500	0.703	-0.943	-0.666	0.414	-0.669
4.42	-2.266	0.703	-0.943	-0.683	0.422	-0.684
4.43	-1.875	0.781	-0.943	-0.695	0.430	-0.700
4.44	-1.250	0.781	-0.943	-0.702	0.439	-0.715
4.45	-1.172	0.781	-0.825	-0.707	0.448	-0.729
4.46	-0.938	0.781	-0.353	-0.710	0.456	-0.739
4.47	-0.703	0.625	-0.118	-0.711	0.463	-0.746
4.48	-0.703	0.313	-0.118	-0.712	0.467	-0.753
4.49	-0.703	0.234	0.236	-0.713	0.470	-0.756
4.50	-0.703	0.000	0.471	-0.713	0.471	-0.757
4.51	-0.625	-0.078	0.589	-0.713	0.471	-0.757
4.52	-0.703	-0.313	0.589	-0.714	0.469	-0.757
4.53	-0.625	-0.156	0.825	-0.714	0.468	-0.755
4.54	-0.547	-0.156	0.825	-0.713	0.467	-0.753
4.55	-0.469	-0.156	0.943	-0.712	0.466	-0.749
4.56	-0.469	-0.078	0.943	-0.710	0.466	-0.746
4.57	-0.547	-0.078	1.060	-0.709	0.466	-0.741
4.58	-0.703	-0.078	1.060	-0.710	0.466	-0.736
4.59	-0.938	-0.078	1.060	-0.713	0.466	-0.732
4.60	-1.250	-0.078	0.943	-0.720	0.466	-0.728
4.61	-1.328	-0.313	0.825	-0.727	0.464	-0.726
4.62	-1.563	-0.313	0.707	-0.736	0.462	-0.724
4.63	-1.563	-0.313	0.707	-0.745	0.459	-0.723
4.64	-1.328	-0.313	0.589	-0.752	0.457	-0.723
4.65	-1.016	-0.313	0.471	-0.756	0.455	-0.724
4.66	-0.703	-0.234	0.471	-0.757	0.453	-0.726
4.67	-0.625	-0.234	0.589	-0.757	0.451	-0.726
4.68	-0.391	-0.156	0.589	-0.755	0.451	-0.726
4.69	-0.469	-0.078	0.825	-0.753	0.451	-0.723
4.70	-0.469	-0.078	0.825	-0.752	0.451	-0.721
4.71	-0.469	-0.078	0.825	-0.750	0.451	-0.719
4.72	-0.469	-0.234	0.825	-0.748	0.449	-0.716
4.73	-0.469	-0.234	0.825	-0.747	0.448	-0.714
4.74	-0.469	-0.391	0.825	-0.745	0.444	-0.712
4.75	-0.469	-0.391	0.825	-0.744	0.441	-0.709
4.76	-0.547	-0.391	0.825	-0.743	0.438	-0.707
4.77	-0.547	-0.391	0.943	-0.742	0.435	-0.703
4.78	-0.547	-0.313	0.943	-0.741	0.433	-0.700
4.79	-0.547	-0.313	0.825	-0.741	0.430	-0.697

Figure 10.2.3.d.1 Digital data for event 4.2 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
4.80	-0.547	-0.078	0.825	-0.740	0.430	-0.695
4.81	-0.625	-0.078	0.825	-0.740	0.430	-0.693
4.82	-0.625	-0.078	0.825	-0.740	0.430	-0.690
4.83	-0.625	-0.078	0.825	-0.740	0.430	-0.688
4.84	-0.391	-0.078	0.707	-0.738	0.430	-0.687
4.85	-0.313	-0.078	0.825	-0.734	0.430	-0.684
4.86	-0.313	-0.078	0.825	-0.731	0.430	-0.682
4.87	-0.234	-0.234	0.943	-0.727	0.429	-0.679
4.88	-0.078	-0.234	1.060	-0.722	0.427	-0.674
4.89	-0.078	-0.313	1.178	-0.716	0.425	-0.668
4.90	-0.156	-0.391	1.296	-0.712	0.422	-0.661
4.91	-0.234	-0.391	1.414	-0.708	0.419	-0.653
4.92	-0.391	-0.391	1.414	-0.705	0.415	-0.644
4.93	-0.625	-0.391	1.414	-0.705	0.412	-0.636
4.94	-0.703	-0.313	1.060	-0.706	0.410	-0.631
4.95	-0.703	-0.313	0.943	-0.707	0.408	-0.628
4.96	-0.625	-0.234	0.943	-0.707	0.406	-0.624
4.97	-0.625	-0.078	0.707	-0.707	0.406	-0.623
4 98	-0.391	-0.078	0.707	-0.705	0.406	-0.622
4.99	-0.313	-0.078	0.707	-0.702	0.406	-0.621
5.00	-0.078	-0.078	0.707	-0.696	0.406	-0.620
5.01	-0.078	-0.078	0.825	-0.691	0.406	-0.617
5.02	-0.078	-0.078	0.943	-0.685	0.406	-0.614
5.03	-0.078	-0.078	1.060	-0.680	0.406	-0.609
5.04	-0.078	-0.078	1.060	-0.674	0.406	-0.604
5.05	-0.234	-0.078	1.060	-0.670	0.406	-0.600
5.06	-0.313	-0.078	1.060	-0.667	0.406	-0.595
5.07	-0.313	-0.078	1.060	-0.664	0.406	-0.590
5.08	-0.313	-0.078	0.943	-0.661	0.406	-0.587
5.09	-0.313	-0.078	0.943	-0.658	0.406	-0.583
5.10	-0.313	-0.078	0.943	-0.655	0.406	-0.580
5.11	-0.313	-0.156	0.943	-0.652	0.405	-0.576
5.12	-0.313	-0.078	0.943	-0.648	0.405	-0.572
5.13	-0.391	-0.078	0.943	-0.646	0.405	-0.569
5.14	-0.391	-0.078	0.943	-0.644	0.405	-0.565
5.15	-0.469	-0.078	0.943	-0.642	0.405	-0.562
5.16	-0.469	-0.078	0.943	-0.641	0.405	-0.558
5.17	-0.469	-0.078	0.825	-0.639	0.405	-0.556
5.18	-0.391	-0.078	0.707	-0.637	0.405	-0.555
5.19	-0.313	-0.078	0.707	-0.634	0.405	-0.554
5.20	-0.078	-0.078	0.825	-0.628	0.405	-0.551
5.21	-0.078	-0.078	0.825	-0.623	0.405	-0.549
5.22	0.000	-0.078	0.943	-0.616	0.405	-0.545
5.23	0.078	-0.078	1.060	-0.609	0.405	-0.541
5.24	0.078	-0.078	1.178	-0.602	0.405	-0.535
5.25	0.078	-0.078	1.296	-0.595	0.405	-0.528
5.26	0.078	-0.078	1.296	-0.588	0.405	-0.521
5.27	-0.156	-0.078	1.296	-0.584	0.405	-0.514
5.28	-0.234	-0.078	1.178	-0.580	0.405	-0.508
5.29	-0.313	-0.078	1.178	-0.577	0.405	-0.502
5.30	-0.391	-0.078	0.943	-0.574	0.405	-0.498

Figure **10.2.3.d.1** Digital data for event 4.2 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
5.31	-0.391	-0.078	0.943	-0.572	0.405	-0.495
5.32	-0.391	-0.078	0.943	-0.570	0.405	-0.491
5.33	-0.391	-0.078	0.825	-0.567	0.405	-0.489
5.34	-0.391	-0.078	0.825	-0.565	0.405	-0.486
5.35	-0.391	-0.078	0.825	-0.563	0.405	-0.484
5.36	-0.391	-0.078	0.825	-0.560	0.405	-0.482
5.37	-0.391	-0.078	0.825	-0.558	0.405	-0.479
5.38	-0.313	-0.078	0.825	-0.555	0.405	-0.477
5.39	-0.313	-0.078	0.825	-0.552	0.405	-0.475
5.40	-0.313	0.000	0.825	-0.548	0.406	-0.472
5.41	-0.313	0.000	0.825	-0.545	0.407	-0.470
5.42	-0.156	0.000	0.825	-0.541	0.408	-0.468
5.43	-0.156	0.000	0.825	-0.536	0.408	-0.465
5.44	-0.156	0.000	0.943	-0.531	0.409	-0.462
5.45	-0.156	0.000	0.943	-0.527	0.410	-0.458
5.46	-0.156	0.000	0.943	-0.522	0.411	-0.455
5.47	-0.234	0.000	0.943	-0.518	0.412	-0.451
5.48	-0.313	0.000	0.943	-0.515	0.412	-0.448
5.49	-0.391	0.000	0.943	-0.513	0.413	-0.444
5.50	-0.391	0.000	0.825	-0.510	0.414	-0.442
5.51	-0.469	0.000	0.707	-0.509	0.415	-0.441
5.52	-0.469	0.000	0.707	-0.507	0.415	-0.439
5.53	-0.469	0.000	0.707	-0.505	0.416	-0.438
5.54	-0.391	0.000	0.707	-0.503	0.417	-0.437
5.55	-0.391	-0.078	0.707	-0.501	0.417	-0.436
5.56	-0.313	-0.078	0.825	-0.498	0.417	-0.433
5.57	-0.313	-0.078	0.825	-0.495	0.417	-0.431
5.58	-0.313	-0.078	0.943	-0.491	0.417	-0.428
5.59	-0.313	-0.078	0.943	-0.488	0.417	-0.424
5.60	-0.234	-0.078	0.943	-0.484	0.417	-0.420
5.61	-0.156	-0.078	0.943	-0.480	0.417	-0.417
5.62	-0.078	-0.078	0.943	-0.474	0.417	-0.413
5.63	0.078	-0.078	0.943	-0.467	0.417	-0.410
5.64	0.156	-0.078	1.060	-0.459	0.417	-0.405
5.65	0.234	-0.078	1.060	-0.451	0.417	-0.400
5.66	0.234	-0.078	1.178	-0.442	0.417	-0.395
5.67	0.234	-0.078	1.296	-0.434	0.417	-0.387
5.68	0.234	-0.078	1.296	-0.425	0.417	-0.380
5.69	0.000	-0.156	1.296	-0.419	0.416	-0.373
5.70	-0.078	-0.156	1.296	-0.413	0.415	-0.366
5.71	-0.313	-0.156	1.178	-0.410	0.415	-0.360
5.72	-0.313	-0.156	1.060	-0.407	0.414	-0.356
5.73	-0.391	-0.156	1.060	-0.405	0.413	-0.351
5.74	-0.391	-0.156	0.943	-0.402	0.412	-0.347
5.75	-0.469	-0.156	0.943	-0.401	0.411	-0.344
5.76	-0.469	-0.078	0.825	-0.399	0.411	-0.342
5.77	-0.469	-0.078	0.825	-0.398	0.411	-0.339
5.78	-0.469	-0.078	0.825	-0.396	0.411	-0.337
5.79	-0.469	0.000	0.825	-0.395	0.412	-0.334
5.80	-0.469	0.000	0.707	-0.393	0.413	-0.333
5.81	-0.547	0.000	0.707	-0.392	0.414	-0.332

Figure **10.2.3.d.1** Digital data for event 4.2 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
5.82	-0.625	0.000	0.707	-0.392	0.415	-0.331
5.83	-0.625	0.000	0.589	-0.392	0.415	-0.331
5.84	-0.703	0.000	0.589	-0.393	0.416	-0.331
5.85	-0.703	0.000	0.471	-0.394	0.417	-0.332
5.86	-0.703	0.000	0.471	-0.395	0.418	-0.333
5.87	-0.703	0.000	0.471	-0.395	0.418	-0.334
5.88	-0.703	0.000	0.353	-0.396	0.419	-0.337
5.89	-0.703	-0.078	0.353	-0.397	0.419	-0.339
5.90	-0.703	-0.078	0.471	-0.398	0.419	-0.340
5.91	-0.625	-0.078	0.471	-0.398	0.419	-0.342
5.92	-0.625	-0.078	0.471	-0.398	0.419	-0.343
5.93	-0.547	-0.078	0.589	-0.397	0.419	-0.343
5.94	-0.547	-0.078	0.589	-0.396	0.419	-0.343
5.95	-0.469	-0.078	0.589	-0.395	0.419	-0.343
5.96	-0.469	-0.156	0.589	-0.393	0.418	-0.343
5.97	-0.391	-0.234	0.589	-0.391	0.417	-0.343
5.98	-0.313	-0.234	0.707	-0.388	0.415	-0.342
5.99	-0.313	-0.234	0.707	-0.384	0.414	-0.340
6.00	-0.313	-0.234	0.825	-0.381	0.412	-0.338

Figure 10.2.3.d.2 Digital data for event 9.3

= baseline which is subtracted for peaks and numerical integration

Yeardate: 81226 Time: 14:20:24.348 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
6.02	-0.391	-0.156	0.825	0.000	-0.000	-0.000
6.03	-0.391	-0.156	0.825	0.000	-0.000	-0.000
6.04	-0.625	-0.156	0.825	-0.002	-0.000	-0.000
6.05	-0.625	-0.156	0.707	-0.005	-0.000	-0.001
6.06	-0.625	-0.156	0.707	-0.007	-0.000	-0.002
6.07	-0.703	-0.156	0.471	-0.010	-0.000	-0.006
6.08	-0.703	-0.156	0.471	-0.013	-0.000	-0.009
6.09	-0.625	-0.156	0.471	-0.016	-0.000	-0.013
6.10	-0.625	-0.156	0.471	-0.018	-0.000	-0.017
6.11	-0.547	-0.156	0.471	-0.019	-0.000	-0.020
6.12	-0.469	-0.156	0.471	-0.020	-0.000	-0.024
6.13	-0.469	-0.156	0.471	-0.021	-0.000	-0.027
6.14	-0.469	-0.156	0.471	-0.022	-0.000	-0.031
6.15	-0.469	-0.156	0.471	-0.023	-0.000	-0.034
6.16	-0.469	-0.156	0.589	-0.023	-0.000	-0.037
6.17	-0.469	-0.156	0.589	-0.024	-0.000	-0.039
6.18	-0.547	-0.156	0.589	-0.026	-0.000	-0.041
6.19	-0.547	-0.156	0.589	-0.027	-0.000	-0.044
6.20	-0.625	-0.156	0.471	-0.030	-0.000	-0.047
6.21	-0.703	-0.156	0.471	-0.033	-0.000	-0.051
6.22	-0.781	-0.156	0.471	-0.037	-0.000	-0.054
6.23	-0.781	-0.156	0.353	-0.041	-0.000	-0.059
6.24	-0.859	-0.156	0.353	-0.045	-0.000	-0.064
6.25	-0.859	-0.156	0.353	-0.050	-0.000	-0.068
6.26	-0.859	-0.156	0.236	-0.055	-0.000	-0.074
6.27	-0.938	-0.156	0.236	-0.060	-0.000	-0.080
6.28	-0.938	-0.156	0.236	-0.066	-0.000	-0.086
6.29	-0.938	-0.156	0.236	-0.071	-0.000	-0.092
6.30	-1.016	-0.156	0.236	-0.077	-0.000	-0.098
6.31	-1.016	-0.156	0.236	-0.083	-0.000	-0.104
6.32	-1.016	-0.156	0.236	-0.090	-0.000	-0.110
6.33	-0.938	-0.156	0.236	-0.095	-0.000	-0.116
6.34	-0.938	-0.156	0.118	-0.101	-0.000	-0.123
6.35	-0.938	-0.156	0.118	-0.106	-0.000	-0.130
6.36	-0.781	-0.156	0.118	-0.110	-0.000	-0.137
6.37	-0.781	-0.156	0.118	-0.114	-0.000	-0.144
6.38	-0.703	-0.156	0.118	-0.117	-0.000	-0.151
6.39	-0.703	-0.156	0.118	-0.120	-0.000	-0.158
6.40	-0.625	-0.156	0.118	-0.123	-0.000	-0.165
6.41	-0.625	-0.156	0.236	-0.125	-0.000	-0.171
6.42	-0.547	-0.156	0.236	-0.126	-0.000	-0.177
6.43	-0.547	-0.156	0.236	-0.128	-0.000	-0.183
6.44	-0.547	-0.156	0.353	-0.130	-0.000	-0.187
6.45	-0.547	-0.156	0.353	-0.131	-0.000	-0.192
6.46	-0.547	-0.156	0.353	-0.133	-0.000	-0.197

Figure 10.2.3.d.2 Digital data for event 9.3 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
6.47	-0.547	-0.156	0.353	-0.134	-0.000	-0.202
6.48	-0.547	-0.156	0.353	-0.136	-0.000	-0.206
6.49	-0.625	-0.156	0.353	-0.138	-0.000	-0.211
6.50	-0.625	-0.156	0.353	-0.140	-0.000	-0.216
6.51	-0.703	-0.156	0.353	-0.144	-0.000	-0.220
6.52	-0.703	-0.156	0.353	-0.147	-0.000	-0.225
6.53	-0.703	-0.156	0.353	-0.150	-0.000	-0.230
6.54	-0.781	-0.156	0.236	-0.154	-0.000	-0.236
6.55	-0.859	-0.156	0.236	-0.158	-0.000	-0.242
6.56	-0.859	-0.156	0.236	-0.163	-0.000	-0.248
6.57	-0.859	-0.156	0.236	-0.168	-0.000	-0.253
6.58	-0.859	-0.156	0.236	-0.172	-0.000	-0.259
6.59	-0.859	-0.156	0.118	-0.177	-0.000	-0.266
6.60	-0.859	-0.156	0.118	-0.182	-0.000	-0.274
6.61	-0.859	-0.156	0.118	-0.186	-0.000	-0.281
6.62	-0.781	-0.156	0.118	-0.190	-0.000	-0.288
6.63	-0.781	-0.156	0.118	-0.194	-0.000	-0.295
6.64	-0.703	-0.156	0.118	-0.197	-0.000	-0.302
6.65	-0.703	-0.156	0.118	-0.201	-0.000	-0.309
6.66	-0.625	-0.156	0.118	-0.203	-0.000	-0.316
6.67	-0.625	-0.156	0.118	-0.205	-0.000	-0.323
6.68	-0.625	-0.078	0.118	-0.208	0.001	-0.330
6.69	-0.625	-0.078	0.118	-0.210	0.001	-0.337
6.70	-0.625	-0.078	0.118	-0.212	0.002	-0.344
6.71	-0.625	-0.078	0.118	-0.215	0.003	-0.351
6.72	-0.703	-0.078	0.236	-0.218	0.004	-0.357
6.73	-0.703	-0.078	0.236	-0.221	0.005	-0.363
6.74	-0.703	-0.078	0.118	-0.224	0.005	-0.370
6.75	-0.781	-0.078	0.118	-0.228	0.006	-0.377
6.76	-0.781	-0.078	0.118	-0.232	0.007	-0.384
6.77	-0.781	-0.078	0.118	-0.236	0.008	-0.391
6.78	-0.859	-0.078	0.118	-0.240	0.008	-0.398
6.79	-0.938	-0.078	0.118	-0.246	0.009	-0.406
6.80	-0.938	-0.078	0.000	-0.251	0.010	-0.414
6.81	-0.938	0.000	0.000	-0.257	0.012	-0.422
6.82	-1.016	0.000	0.000	-0.263	0.013	-0.430
6.83	-1.016	0.000	0.000	-0.269	0.015	-0.439
6.84	-1.016	0.000	0.000	-0.275	0.016	-0.447
6.85	-1.016	0.000	-0.118	-0.282	0.018	-0.456
6.86	-1.016	0.000	-0.118	-0.288	0.019	-0.466
6.87	-0.938	0.000	-0.118	-0.293	0.021	-0.475
6.88	-0.938	0.000	-0.118	-0.299	0.022	-0.484
6.89	-0.938	0.000	-0.236	-0.304	0.024	-0.495
6.90	-0.938	0.000	-0.236	-0.310	0.026	-0.506
6.91	-0.859	0.000	-0.118	-0.315	0.027	-0.515
6.92	-0.859	0.078	-0.118	-0.319	0.029	-0.525
6.93	-0.859	0.078	-0.118	-0.324	0.032	-0.534
6.94	-0.938	0.078	-0.236	-0.329	0.034	-0.545
6.95	-0.938	0.078	-0.236	-0.335	0.036	-0.555
6.96	-1.016	0.078	-0.236	-0.341	0.039	-0.566
6.97	-1.016	0.078	-0.236	-0.347	0.041	-0.576

Figure **10.2.3.d.2** Digital data for event 9.3 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
6.98	-1.094	0.078	-0.236	-0.354	0.044	-0.587
6.99	-1.094	0.078	-0.236	-0.361	0.046	-0.598
7.00	-1.172	0.078	-0.236	-0.369	0.048	-0.608
7.01	-1.172	0.078	-0.236	-0.377	0.051	-0.619
7.02	-1.172	0.078	-0.353	-0.385	0.053	-0.631
7.03	-1.172	0.078	-0.353	-0.393	0.055	-0.642
7.04	-1.172	0.078	-0.353	-0.400	0.058	-0.654
7.05	-1.172	0.000	-0.353	-0.408	0.059	-0.666
7.06	-1.172	0.000	-0.353	-0.416	0.061	-0.678
7.07	-1.172	0.000	-0.353	-0.424	0.062	-0.690
7.08	-1.250	0.000	-0.353	-0.432	0.064	-0.701
7.09	-1.250	0.000	-0.353	-0.441	0.065	-0.713
7.10	-1.250	0.000	-0.471	-0.450	0.067	-0.726
7.11	-1.250	0.078	-0.471	-0.458	0.069	-0.739
7.12	-1.328	0.078	-0.471	-0.468	0.072	-0.752
7.13	-1.328	0.078	-0.471	-0.477	0.074	-0.765
7.14	-1.328	0.078	-0.471	-0.486	0.076	-0.778
7.15	-1.328	0.156	-0.471	-0.496	0.079	-0.791
7.16	-1.328	0.156	-0.589	-0.505	0.083	-0.805
7.17	-1.406	0.156	-0.589	-0.515	0.086	-0.819
7.18	-1.406	0.156	-0.589	-0.525	0.089	-0.833
7.19	-1.406	0.156	-0.707	-0.535	0.092	-0.849
7.20	-1.406	0.156	-0.707	-0.546	0.095	-0.864
7.21	-1.484	0.234	-0.707	-0.557	0.099	-0.879
7.22	-1.406	0.234	-0.707	-0.567	0.103	-0.895
7.23	-1.406	0.234	-0.707	-0.577	0.107	-0.910
7.24	-1.406	0.234	-0.707	-0.587	0.111	-0.925
7.25	-1.406	0.234	-0.825	-0.597	0.115	-0.942
7.26	-1.406	0.234	-0.825	-0.607	0.118	-0.958
7.27	-1.406	0.234	-0.707	-0.617	0.122	-0.974
7.28	-1.406	0.234	-0.707	-0.628	0.126	-0.989
7.29	-1.406	0.234	-0.825	-0.638	0.130	-1.005
7.30	-1.406	0.234	-0.825	-0.648	0.134	-1.022
7.31	-1.328	0.234	-0.825	-0.657	0.138	-1.038
7.32	-1.328	0.234	-0.825	-0.667	0.142	-1.055
7.33	-1.328	0.234	-0.825	-0.676	0.146	-1.071
7.34	-1.328	0.234	-0.825	-0.685	0.150	-1.088
7.35	-1.328	0.234	-0.825	-0.695	0.154	-1.104
7.36	-1.328	0.234	-0.825	-0.704	0.157	-1.121
7.37	-1.328	0.234	-0.825	-0.714	0.161	-1.137
7.38	-1.406	0.234	-0.825	-0.724	0.165	-1.154
7.39	-1.406	0.234	-0.825	-0.734	0.169	-1.170
7.40	-1.406	0.234	-0.825	-0.744	0.173	-1.187
7.41	-1.484	0.313	-0.825	-0.755	0.178	-1.203
7.42	-1.484	0.313	-0.825	-0.766	0.182	-1.220
7.43	-1.484	0.313	-0.943	-0.777	0.187	-1.237
7.44	-1.484	0.313	-0.943	-0.788	0.192	-1.255
7.45	-1.563	0.313	-0.943	-0.799	0.197	-1.273
7.46	-1.563	0.313	-0.943	-0.811	0.201	-1.291
7.47	-1.641	0.313	-0.943	-0.824	0.206	-1.308
7.48	-1.641	0.313	-1.060	-0.836	0.211	-1.327

Figure 10.2.3.d.2 Digital data for event 9.3 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
7.49	-1.641	0.313	-1.060	-0.849	0.215	-1.346
7.50	-1.641	0.313	-1.060	-0.861	0.220	-1.365
7.51	-1.641	0.313	-1.178	-0.874	0.225	-1.385
7.52	-1.641	0.313	-1.178	-0.886	0.229	-1.405
7.53	-1.641	0.391	-1.178	-0.899	0.235	-1.425
7.54	-1.641	0.313	-1.178	-0.911	0.239	-1.445
7.55	-1.641	0.313	-1.178	-0.924	0.244	-1.465
7.56	-1.641	0.391	-1.178	-0.936	0.250	-1.485
7.57	-1.641	0.391	-1.178	-0.949	0.255	-1.505
7.58	-1.641	0.391	-1.178	-0.961	0.261	-1.525
7.59	-1.641	0.391	-1.178	-0.974	0.266	-1.545
7.60	-1.563	0.391	-1.178	-0.985	0.271	-1.565
7.61	-1.563	0.391	-1.178	-0.997	0.277	-1.585
7.62	-1.563	0.391	-1.178	-1.009	0.282	-1.605
7.63	-1.563	0.313	-1.178	-1.020	0.287	-1.625
7.64	-1.563	0.313	-1.178	-1.032	0.292	-1.645
7.65	-1.563	0.313	-1.178	-1.044	0.296	-1.665
7.66	-1.563	0.313	-1.178	-1.056	0.301	-1.685
7.67	-1.563	0.313	-1.178	-1.067	0.306	-1.705
7.68	-1.563	0.313	-1.178	-1.079	0.311	-1.725
7.69	-1.563	0.313	-1.178	-1.091	0.315	-1.745
7.70	-1.563	0.313	-1.178	-1.102	0.320	-1.765
7.71	-1.563	0.313	-1.178	-1.114	0.325	-1.785
7.72	-1.563	0.313	-1.296	-1.126	0.329	-1.807
7.73	-1.484	0.313	-1.296	-1.137	0.334	-1.828
7.74	-1.484	0.313	-1.296	-1.148	0.339	-1.849
7.75	-1.484	0.391	-1.296	-1.159	0.344	-1.870
7.76	-1.484	0.391	-1.296	-1.170	0.350	-1.891
7.77	-1.484	0.391	-1.296	-1.181	0.355	-1.913
7.78	-1.484	0.391	-1.296	-1.192	0.360	-1.934
7.79	-1.484	0.391	-1.296	-1.202	0.366	-1.955
7.80	-1.484	0.391	-1.296	-1.213	0.371	-1.976
7.81	-1.484	0.391	-1.414	-1.224	0.377	-1.999
7.82	-1.484	0.391	-1.414	-1.235	0.382	-2.021
7.83	-1.484	0.391	-1.414	-1.246	0.388	-2.043
7.84	-1.484	0.391	-1.414	-1.257	0.393	-2.066
7.85	-1.484	0.391	-1.414	-1.268	0.399	-2.088
7.86	-1.484	0.391	-1.414	-1.279	0.404	-2.111
7.87	-1.484	0.391	-1.414	-1.290	0.410	-2.133
7.88	-1.484	0.391	-1.414	-1.301	0.415	-2.155
7.89	-1.484	0.391	-1.414	-1.312	0.421	-2.178
7.90	-1.406	0.391	-1.414	-1.322	0.426	-2.200
7.91	-1.406	0.391	-1.414	-1.332	0.432	-2.223
7.92	-1.406	0.391	-1.414	-1.342	0.437	-2.245
7.93	-1.484	0.391	-1.414	-1.353	0.442	-2.267
7.94	-1.484	0.391	-1.414	-1.364	0.448	-2.290
7.95	-1.484	0.391	-1.414	-1.375	0.453	-2.312
7.96	-1.484	0.391	-1.414	-1.386	0.459	-2.334
7.97	-1.484	0.391	-1.414	-1.397	0.464	-2.357
7.98	-1.484	0.313	-1.414	-1.408	0.469	-2.379
7.99	-1.484	0.391	-1.414	-1.419	0.475	-2.402

Figure 10.2.3.d.2 Digital data for event 9.3 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
8.00	-1.563	0.313	-1.532	-1.431	0.479	-2.425
8.01	-1.563	0.391	-1.532	-1.442	0.485	-2.449
8.02	-1.563	0.391	-1.532	-1.454	0.490	-2.472
8.03	-1.641	0.391	-1.532	-1.466	0.496	-2.496
8.04	-1.641	0.391	-1.532	-1.479	0.501	-2.519
8.05	-1.641	0.391	-1.532	-1.491	0.507	-2.543
8.06	-1.641	0.391	-1.649	-1.504	0.512	-2.568
8.07	-1.641	0.391	-1.649	-1.516	0.517	-2.593
8.08	-1.641	0.469	-1.649	-1.529	0.524	-2.617
8.09	-1.641	0.469	-1.649	-1.541	0.530	-2.642
8.10	-1.641	0.469	-1.649	-1.554	0.536	-2.667
8.11	-1.641	0.469	-1.649	-1.566	0.542	-2.691
8.12	-1.641	0.469	-1.649	-1.579	0.549	-2.716
8.13	-1.641	0.469	-1.649	-1.591	0.555	-2.741
8.14	-1.641	0.469	-1.649	-1.604	0.561	-2.766
8.15	-1.641	0.469	-1.767	-1.616	0.567	-2.792
8.16	-1.641	0.469	-1.767	-1.629	0.574	-2.818
8.17	-1.641	0.469	-1.767	-1.641	0.580	-2.843
8.18	-1.641	0.469	-1.767	-1.654	0.586	-2.869
8.19	-1.641	0.469	-1.767	-1.666	0.592	-2.895
8.20	-1.641	0.469	-1.767	-1.679	0.599	-2.921
8.21	-1.719	0.391	-1.767	-1.692	0.604	-2.947
8.22	-1.641	0.391	-1.767	-1.705	0.610	-2.973
8.23	-1.719	0.391	-1.767	-1.718	0.615	-2.999
8.24	-1.719	0.391	-1.767	-1.731	0.621	-3.025
8.25	-1.641	0.391	-1.767	-1.744	0.626	-3.051
8.26	-1.641	0.391	-1.767	-1.756	0.631	-3.077
8.27	-1.641	0.391	-1.767	-1.769	0.637	-3.103
8.28	-1.641	0.391	-1.767	-1.781	0.642	-3.129
8.29	-1.641	0.391	-1.767	-1.794	0.648	-3.155
8.30	-1.563	0.391	-1.767	-1.805	0.653	-3.180
8.31	-1.563	0.391	-1.767	-1.817	0.659	-3.206
8.32	-1.563	0.391	-1.767	-1.829	0.664	-3.232
8.33	-1.563	0.391	-1.767	-1.841	0.670	-3.258
8.34	-1.563	0.391	-1.767	-1.852	0.675	-3.284
8.35	-1.563	0.391	-1.767	-1.864	0.681	-3.310
8.36	-1.563	0.391	-1.767	-1.876	0.686	-3.336
8.37	-1.563	0.391	-1.767	-1.887	0.692	-3.362
8.38	-1.641	0.391	-1.767	-1.900	0.697	-3.388
8.39	-1.641	0.391	-1.767	-1.912	0.703	-3.414
8.40	-1.719	0.391	-1.767	-1.926	0.708	-3.440
8.41	-1.719	0.391	-1.767	-1.939	0.713	-3.466
8.42	-1.719	0.391	-1.767	-1.952	0.719	-3.492
8.43	-1.719	0.391	-1.885	-1.965	0.724	-3.519
8.44	-1.797	0.469	-1.885	-1.980	0.731	-3.546
8.45	-1.797	0.469	-1.885	-1.994	0.737	-3.573
8.46	-1.797	0.469	-2.003	-2.008	0.743	-3.601
8.47	-1.797	0.469	-2.003	-2.022	0.749	-3.629
8.48	-1.797	0.469	-2.003	-2.036	0.756	-3.658
8.49	-1.797	0.469	-2.003	-2.050	0.762	-3.686
8.50	-1.797	0.469	-2.003	-2.064	0.768	-3.714

Figure 10.2.3.d.2 Digital data for event 9.3 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
8.51	-1.797	0.469	-2.003	-2.078	0.774	-3.743
8.52	-1.797	0.469	-2.003	-2.092	0.781	-3.771
8.53	-1.797	0.469	-2.003	-2.106	0.787	-3.799
8.54	-1.797	0.469	-2.003	-2.120	0.793	-3.827
8.55	-1.797	0.469	-2.003	-2.134	0.799	-3.856
8.56	-1.797	0.469	-2.003	-2.148	0.806	-3.884
8.57	-1.797	0.469	-2.003	-2.162	0.812	-3.912
8.58	-1.797	0.469	-2.003	-2.176	0.818	-3.940
8.59	-1.797	0.469	-2.003	-2.190	0.824	-3.969
8.60	-1.797	0.469	-2.003	-2.204	0.831	-3.997
8.61	-1.797	0.469	-2.003	-2.219	0.837	-4.025
8.62	-1.797	0.469	-2.003	-2.233	0.843	-4.054
8.63	-1.797	0.469	-2.003	-2.247	0.849	-4.082
8.64	-1.719	0.469	-2.003	-2.260	0.856	-4.110
8.65	-1.719	0.469	-2.003	-2.273	0.862	-4.138
8.66	-1.719	0.391	-2.003	-2.287	0.867	-4.167
8.67	-1.719	0.391	-2.003	-2.300	0.873	-4.195
8.68	-1.641	0.391	-2.003	-2.312	0.878	-4.223
8.69	-1.641	0.391	-2.003	-2.325	0.884	-4.252
8.70	-1.641	0.391	-2.003	-2.337	0.889	-4.280
8.71	-1.641	0.391	-1.885	-2.350	0.895	-4.307
8.72	-1.641	0.391	-1.885	-2.362	0.900	-4.334
8.73	-1.641	0.391	-1.885	-2.375	0.906	-4.361
8.74	-1.641	0.391	-1.885	-2.387	0.911	-4.388
8.75	-1.641	0.391	-1.885	-2.400	0.917	-4.415
8.76	-1.641	0.391	-1.885	-2.412	0.922	-4.442
8.77	-1.641	0.391	-1.885	-2.425	0.927	-4.469
8.78	-1.641	0.391	-2.003	-2.437	0.933	-4.498
8.79	-1.719	0.469	-2.003	-2.451	0.939	-4.526
8.80	-1.719	0.469	-2.003	-2.464	0.945	-4.554
8.81	-1.719	0.469	-2.003	-2.477	0.952	-4.583
8.82	-1.641	0.469	-2.003	-2.490	0.958	-4.611
8.83	-1.719	0.469	-2.003	-2.503	0.964	-4.639
8.84	-1.719	0.469	-2.003	-2.516	0.970	-4.667
8.85	-1.719	0.469	-2.003	-2.529	0.977	-4.696
8.86	-1.719	0.469	-2.003	-2.543	0.983	-4.724
8.87	-1.719	0.469	-2.121	-2.556	0.989	-4.753
8.88	-1.797	0.469	-2.121	-2.570	0.995	-4.783
8.89	-1.797	0.469	-2.121	-2.584	1.002	-4.812
8.90	-1.797	0.469	-2.121	-2.598	1.008	-4.842
8.91	-1.719	0.469	-2.121	-2.611	1.014	-4.871
8.92	-1.719	0.469	-2.121	-2.625	1.020	-4.901
8.93	-1.797	0.469	-2.121	-2.639	1.027	-4.930
8.94	-1.797	0.469	-2.121	-2.653	1.033	-4.960
8.95	-1.797	0.469	-2.121	-2.667	1.039	-4.989
8.96	-1.797	0.469	-2.121	-2.681	1.045	-5.019
8.97	-1.719	0.469	-2.121	-2.694	1.052	-5.048
8.98	-1.719	0.469	-2.121	-2.707	1.058	-5.077
8.99	-1.719	0.469	-2.121	-2.721	1.064	-5.107
9.00	-1.719	0.469	-2.121	-2.734	1.070	-5.136
9.01	-1.719	0.469	-2.003	-2.747	1.077	-5.165

Figure 10.2.3.d.2 Digital data for event 9.3 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
9.02	-1.719	0.469	-2.121	-2.761	1.083	-5.194
9.03	-1.719	0.469	-2.121	-2.774	1.089	-5.224
9.04	-1.719	0.469	-2.121	-2.787	1.095	-5.253
9.05	-1.719	0.469	-2.121	-2.800	1.102	-5.282
9.06	-1.719	0.469	-2.121	-2.814	1.108	-5.312
9.07	-1.719	0.469	-2.121	-2.827	1.114	-5.341
9.08	-1.719	0.469	-2.121	-2.840	1.120	-5.371
9.09	-1.719	0.469	-2.003	-2.854	1.127	-5.399
9.10	-1.719	0.469	-2.003	-2.867	1.133	-5.427
9.11	-1.719	0.469	-2.121	-2.880	1.139	-5.457
9.12	-1.719	0.469	-2.003	-2.893	1.145	-5.485
9.13	-1.719	0.469	-2.121	-2.907	1.152	-5.515
9.14	-1.719	0.469	-2.003	-2.920	1.158	-5.543
9.15	-1.719	0.469	-2.003	-2.933	1.164	-5.571
9.16	-1.719	0.469	-2.003	-2.946	1.170	-5.599
9.17	-1.641	0.469	-2.003	-2.959	1.177	-5.628
9.18	-1.641	0.469	-2.121	-2.971	1.183	-5.657
9.19	-1.641	0.469	-2.121	-2.984	1.189	-5.687
9.20	-1.719	0.469	-2.121	-2.997	1.195	-5.716
9.21	-1.719	0.469	-2.121	-3.011	1.202	-5.746
9.22	-1.719	0.469	-2.121	-3.024	1.208	-5.775
9.23	-1.719	0.469	-2.121	-3.037	1.214	-5.804
9.24	-1.719	0.469	-2.121	-3.050	1.220	-5.834
9.25	-1.719	0.469	-2.121	-3.064	1.227	-5.863
9.26	-1.719	0.469	-2.121	-3.077	1.233	-5.893
9.27	-1.719	0.469	-2.121	-3.090	1.239	-5.922
9.28	-1.719	0.469	-2.121	-3.103	1.245	-5.952
9.29	-1.719	0.469	-2.238	-3.117	1.252	-5.982
9.30	-1.719	0.469	-2.238	-3.130	1.258	-6.013
9.31	-1.719	0.469	-2.238	-3.143	1.264	-6.044
9.32	-1.719	0.469	-2.238	-3.157	1.270	-6.074
9.33	-1.719	0.469	-2.238	-3.170	1.277	-6.105
9.34	-1.719	0.469	-2.238	-3.183	1.283	-6.136
9.35	-1.719	0.469	-2.238	-3.196	1.289	-6.166
9.36	-1.719	0.469	-2.238	-3.210	1.295	-6.197
9.37	-1.719	0.469	-2.238	-3.223	1.302	-6.227
9.38	-1.719	0.469	-2.238	-3.236	1.308	-6.258
9.39	-1.719	0.469	-2.238	-3.250	1.314	-6.289
9.40	-1.719	0.469	-2.238	-3.263	1.320	-6.319
9.41	-1.641	0.469	-2.238	-3.275	1.326	-6.350
9.42	-1.641	0.469	-2.238	-3.288	1.333	-6.381
9.43	-1.719	0.469	-2.238	-3.301	1.339	-6.411
9.44	-1.641	0.469	-2.121	-3.314	1.345	-6.441
9.45	-1.641	0.469	-2.121	-3.326	1.351	-6.470
9.46	-1.641	0.391	-2.238	-3.339	1.357	-6.501
9.47	-1.719	0.391	-2.238	-3.352	1.362	-6.531
9.48	-1.719	0.469	-2.121	-3.365	1.369	-6.561
9.49	-1.641	0.469	-2.238	-3.378	1.375	-6.592
9.50	-1.641	0.469	-2.121	-3.390	1.381	-6.621
9.51	-1.641	0.469	-2.121	-3.403	1.387	-6.650
9.52	-1.641	0.469	-2.121	-3.415	1.394	-6.680

Figure 10.2.3.d.2 Digital data for event 9.3 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
9.53	-1.641	0.469	-2.121	-3.428	1.400	-6.709
9.54	-1.641	0.469	-2.121	-3.440	1.406	-6.739
9.55	-1.641	0.469	-2.121	-3.453	1.412	-6.768
9.56	-1.641	0.469	-2.121	-3.465	1.419	-6.798
9.57	-1.641	0.469	-2.121	-3.478	1.425	-6.827
9.58	-1.641	0.469	-2.121	-3.490	1.431	-6.857
9.59	-1.641	0.469	-2.121	-3.503	1.437	-6.886
9.60	-1.641	0.469	-2.121	-3.515	1.444	-6.916
9.61	-1.641	0.469	-2.121	-3.528	1.450	-6.945
9.62	-1.641	0.469	-2.121	-3.540	1.456	-6.974
9.63	-1.641	0.469	-2.121	-3.553	1.462	-7.004
9.64	-1.641	0.469	-2.238	-3.565	1.469	-7.035
9.65	-1.641	0.469	-2.238	-3.578	1.475	-7.065
9.66	-1.641	0.469	-2.238	-3.590	1.481	-7.096
9.67	-1.641	0.469	-2.238	-3.603	1.487	-7.126
9.68	-1.641	0.469	-2.238	-3.615	1.494	-7.157
9.69	-1.719	0.469	-2.238	-3.628	1.500	-7.188
9.70	-1.719	0.469	-2.238	-3.642	1.506	-7.218
9.71	-1.641	0.469	-2.238	-3.654	1.512	-7.249
9.72	-1.641	0.469	-2.238	-3.667	1.519	-7.280
9.73	-1.641	0.469	-2.238	-3.679	1.525	-7.310
9.74	-1.641	0.469	-2.238	-3.692	1.531	-7.341
9.75	-1.641	0.469	-2.238	-3.704	1.537	-7.372
9.76	-1.641	0.469	-2.238	-3.717	1.544	-7.402
9.77	-1.641	0.469	-2.238	-3.729	1.550	-7.433
9.78	-1.641	0.469	-2.121	-3.742	1.556	-7.462
9.79	-1.563	0.469	-2.121	-3.753	1.562	-7.492
9.80	-1.563	0.469	-2.121	-3.765	1.569	-7.521
9.81	-1.563	0.469	-2.121	-3.777	1.575	-7.551
9.82	-1.563	0.391	-2.121	-3.788	1.580	-7.580
9.83	-1.563	0.391	-2.121	-3.800	1.586	-7.610
9.84	-1.563	0.391	-2.121	-3.812	1.591	-7.639
9.85	-1.563	0.391	-2.121	-3.824	1.597	-7.668
9.86	-1.563	0.391	-2.121	-3.835	1.602	-7.698
9.87	-1.563	0.391	-2.121	-3.847	1.608	-7.727
9.88	-1.563	0.391	-2.121	-3.859	1.613	-7.757
9.89	-1.563	0.391	-2.121	-3.870	1.619	-7.786
9.90	-1.563	0.391	-2.121	-3.882	1.624	-7.816
9.91	-1.563	0.391	-2.121	-3.894	1.629	-7.845
9.92	-1.563	0.391	-2.121	-3.906	1.635	-7.875
9.93	-1.641	0.391	-2.121	-3.918	1.640	-7.904
9.94	-1.641	0.391	-2.121	-3.931	1.646	-7.934
9.95	-1.641	0.391	-2.121	-3.943	1.651	-7.963
9.96	-1.641	0.391	-2.121	-3.956	1.657	-7.992
9.97	-1.563	0.391	-2.121	-3.967	1.662	-8.022
9.98	-1.641	0.469	-2.121	-3.980	1.669	-8.051
9.99	-1.641	0.469	-2.121	-3.992	1.675	-8.081
10.00	-1.563	0.469	-2.121	-4.004	1.681	-8.110
10.01	-1.563	0.469	-2.121	-4.016	1.687	-8.140
10.02	-1.563	0.469	-2.121	-4.027	1.694	-8.169
10.03	-1.563	0.469	-2.121	-4.039	1.700	-8.199

Figure 10.2.3.d.2 Digital data for event 9.3 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
10.04	-1.484	0.469	-2.121	-4.050	1.706	-8.228
10.05	-1.484	0.469	-2.121	-4.061	1.712	-8.258
10.06	-1.484	0.469	-2.121	-4.072	1.719	-8.287
10.07	-1.484	0.469	-2.121	-4.083	1.725	-8.316
10.08	-1.484	0.469	-2.121	-4.094	1.731	-8.346
10.09	-1.484	0.469	-2.121	-4.105	1.737	-8.375
10.10	-1.484	0.469	-2.121	-4.116	1.744	-8.405
10.11	-1.484	0.469	-2.121	-4.127	1.750	-8.434
10.12	-1.484	0.469	-2.121	-4.138	1.756	-8.464
10.13	-1.484	0.469	-2.121	-4.148	1.762	-8.493
10.14	-1.484	0.469	-2.121	-4.159	1.768	-8.523
10.15	-1.484	0.469	-2.121	-4.170	1.775	-8.552
10.16	-1.484	0.469	-2.121	-4.181	1.781	-8.582
10.17	-1.484	0.469	-2.121	-4.192	1.787	-8.611
10.18	-1.484	0.469	-2.121	-4.203	1.793	-8.640
10.19	-1.484	0.469	-2.121	-4.214	1.800	-8.670
10.20	-1.484	0.469	-2.121	-4.225	1.806	-8.699
10.21	-1.484	0.469	-2.121	-4.236	1.812	-8.729
10.22	-1.484	0.469	-2.121	-4.247	1.818	-8.758
10.23	-1.484	0.469	-2.121	-4.258	1.825	-8.788
10.24	-1.484	0.469	-2.121	-4.269	1.831	-8.817
10.25	-1.484	0.469	-2.121	-4.280	1.837	-8.847
10.26	-1.484	0.469	-2.121	-4.291	1.843	-8.876
10.27	-1.484	0.469	-2.121	-4.302	1.850	-8.906
10.28	-1.484	0.469	-2.121	-4.312	1.856	-8.935
10.29	-1.484	0.469	-2.121	-4.323	1.862	-8.965
10.30	-1.484	0.469	-2.121	-4.334	1.868	-8.994
10.31	-1.484	0.469	-2.121	-4.345	1.875	-9.023
10.32	-1.484	0.469	-2.121	-4.356	1.881	-9.053
10.33	-1.484	0.469	-2.121	-4.367	1.887	-9.082
10.34	-1.484	0.469	-2.121	-4.378	1.893	-9.112
10.35	-1.484	0.469	-2.121	-4.389	1.900	-9.141
10.36	-1.484	0.469	-2.121	-4.400	1.906	-9.171
10.37	-1.484	0.469	-2.121	-4.411	1.912	-9.200
10.38	-1.484	0.469	-2.121	-4.422	1.918	-9.230
10.39	-1.484	0.469	-2.121	-4.433	1.925	-9.259
10.40	-1.484	0.469	-2.121	-4.444	1.931	-9.289
10.41	-1.406	0.469	-2.121	-4.454	1.937	-9.318
10.42	-1.406	0.469	-2.121	-4.464	1.943	-9.347
10.43	-1.406	0.469	-2.121	-4.474	1.950	-9.377
10.44	-1.406	0.469	-2.121	-4.484	1.956	-9.406
10.45	-1.406	0.469	-2.121	-4.494	1.962	-9.436
10.46	-1.406	0.469	-2.121	-4.505	1.968	-9.465
10.47	-1.406	0.469	-2.121	-4.515	1.975	-9.495
10.48	-1.406	0.469	-2.121	-4.525	1.981	-9.524
10.49	-1.406	0.469	-2.121	-4.535	1.987	-9.554
10.50	-1.406	0.469	-2.121	-4.545	1.993	-9.583
10.51	-1.406	0.469	-2.121	-4.555	2.000	-9.613
10.52	-1.250	0.469	-2.121	-4.564	2.006	-9.642
10.53	-1.328	0.469	-2.121	-4.573	2.012	-9.671
10.54	-1.328	0.469	-2.121	-4.583	2.018	-9.701

Figure 10.2.3.d.2 Digital data for event 9.3 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
10.55	-1.328	0.469	-2.003	-4.592	2.025	-9.729
10.56	-1.328	0.469	-2.121	-4.601	2.031	-9.759
10.57	-1.328	0.469	-2.121	-4.611	2.037	-9.788
10.58	-1.406	0.469	-2.121	-4.621	2.043	-9.818
10.59	-1.328	0.469	-2.121	-4.630	2.050	-9.847
10.60	-1.328	0.469	-2.121	-4.640	2.056	-9.876
10.61	-1.328	0.469	-2.121	-4.649	2.062	-9.906
10.62	-1.328	0.469	-2.121	-4.658	2.068	-9.935
10.63	-1.328	0.469	-2.121	-4.668	2.075	-9.965
10.64	-1.328	0.469	-2.121	-4.677	2.081	-9.994
10.65	-1.328	0.469	-2.121	-4.687	2.087	-10.024
10.66	-1.328	0.469	-2.121	-4.696	2.093	-10.053
10.67	-1.328	0.469	-2.121	-4.705	2.100	-10.083
10.68	-1.328	0.469	-2.003	-4.715	2.106	-10.111
10.69	-1.328	0.391	-2.121	-4.724	2.111	-10.140
10.70	-1.328	0.391	-2.238	-4.733	2.117	-10.171
10.71	-1.328	0.469	-2.238	-4.743	2.123	-10.202
10.72	-1.328	0.391	-2.121	-4.752	2.129	-10.231
10.73	-1.328	0.391	-2.121	-4.762	2.134	-10.261
10.74	-1.328	0.391	-2.121	-4.771	2.139	-10.290
10.75	-1.328	0.391	-2.121	-4.780	2.145	-10.320
10.76	-1.250	0.391	-2.121	-4.789	2.150	-10.349
10.77	-1.250	0.391	-2.121	-4.797	2.156	-10.378
10.78	-1.250	0.391	-2.121	-4.806	2.161	-10.408
10.79	-1.250	0.391	-2.121	-4.815	2.167	-10.437
10.80	-1.250	0.391	-2.121	-4.823	2.172	-10.467
10.81	-1.250	0.469	-2.121	-4.832	2.178	-10.496
10.82	-1.250	0.469	-2.121	-4.840	2.185	-10.526
10.83	-1.250	0.469	-2.121	-4.849	2.191	-10.555
10.84	-1.250	0.469	-2.003	-4.858	2.197	-10.583
10.85	-1.250	0.391	-2.003	-4.866	2.203	-10.612
10.86	-1.250	0.391	-2.003	-4.875	2.208	-10.640
10.87	-1.250	0.391	-2.003	-4.883	2.214	-10.668
10.88	-1.250	0.391	-2.003	-4.892	2.219	-10.697
10.89	-1.250	0.391	-2.003	-4.901	2.225	-10.725
10.90	-1.250	0.391	-2.003	-4.909	2.230	-10.753
10.91	-1.250	0.391	-2.003	-4.918	2.235	-10.781
10.92	-1.250	0.391	-2.003	-4.926	2.241	-10.810
10.93	-1.172	0.391	-2.003	-4.934	2.246	-10.838
10.94	-1.250	0.391	-2.003	-4.943	2.252	-10.866
10.95	-1.250	0.391	-2.003	-4.951	2.257	-10.894
10.96	-1.172	0.391	-2.003	-4.959	2.263	-10.923
10.97	-1.250	0.391	-2.003	-4.968	2.268	-10.951
10.98	-1.172	0.391	-2.003	-4.975	2.274	-10.979
10.99	-1.172	0.391	-2.003	-4.983	2.279	-11.008
11.00	-1.172	0.391	-2.003	-4.991	2.285	-11.036
11.01	-1.172	0.391	-2.003	-4.999	2.290	-11.064
11.02	-1.172	0.391	-2.003	-5.007	2.296	-11.092
11.03	-1.172	0.391	-2.003	-5.015	2.301	-11.121
11.04	-1.172	0.391	-2.003	-5.022	2.307	-11.149
11.05	-1.172	0.391	-2.003	-5.030	2.312	-11.177

Figure 10.2.3.d.2 Digital data for event 9.3 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
11.06	-1.172	0.391	-2.003	-5.038	2.317	-11.206
11.07	-1.172	0.391	-2.003	-5.046	2.323	-11.234
11.08	-1.172	0.391	-2.003	-5.054	2.328	-11.262
11.09	-1.172	0.313	-2.003	-5.061	2.333	-11.290
11.10	-1.094	0.313	-2.003	-5.068	2.338	-11.319
11.11	-1.172	0.391	-2.003	-5.076	2.343	-11.347
11.12	-1.172	0.391	-2.003	-5.084	2.349	-11.375
11.13	-1.094	0.313	-2.003	-5.091	2.353	-11.403
11.14	-1.172	0.391	-1.885	-5.099	2.359	-11.431
11.15	-1.094	0.391	-1.885	-5.106	2.364	-11.458
11.16	-1.094	0.391	-1.885	-5.113	2.370	-11.485
11.17	-1.094	0.391	-1.885	-5.120	2.375	-11.512
11.18	-1.094	0.313	-2.003	-5.127	2.380	-11.540
11.19	-1.094	0.313	-1.885	-5.134	2.385	-11.567
11.20	-1.094	0.313	-1.885	-5.141	2.389	-11.594
11.21	-1.094	0.313	-1.885	-5.148	2.394	-11.621
11.22	-1.094	0.313	-1.885	-5.155	2.399	-11.649
11.23	-1.094	0.313	-1.885	-5.162	2.403	-11.676
11.24	-1.094	0.313	-1.885	-5.169	2.408	-11.703
11.25	-1.094	0.313	-1.767	-5.176	2.413	-11.729
11.26	-1.094	0.313	-1.885	-5.183	2.417	-11.756
11.27	-1.094	0.313	-1.885	-5.190	2.422	-11.783
11.28	-1.094	0.313	-1.885	-5.197	2.427	-11.810
11.29	-1.016	0.313	-1.885	-5.203	2.431	-11.837
11.30	-1.016	0.313	-1.767	-5.210	2.436	-11.863
11.31	-1.016	0.313	-1.767	-5.216	2.441	-11.889
11.32	-1.016	0.313	-1.767	-5.222	2.446	-11.915
11.33	-1.016	0.313	-1.767	-5.228	2.450	-11.941
11.34	-1.016	0.313	-1.767	-5.235	2.455	-11.967
11.35	-1.016	0.313	-1.767	-5.241	2.460	-11.993
11.36	-1.016	0.313	-1.767	-5.247	2.464	-12.019
11.37	-1.016	0.313	-1.767	-5.253	2.469	-12.044
11.38	-1.016	0.313	-1.767	-5.260	2.474	-12.070
11.39	-1.016	0.313	-1.767	-5.266	2.478	-12.096
11.40	-1.016	0.313	-1.767	-5.272	2.483	-12.122
11.41	-1.016	0.313	-1.767	-5.278	2.488	-12.148
11.42	-1.016	0.313	-1.767	-5.285	2.492	-12.174
11.43	-1.016	0.313	-1.767	-5.291	2.497	-12.200
11.44	-1.016	0.313	-1.767	-5.297	2.502	-12.226
11.45	-1.016	0.234	-1.767	-5.303	2.506	-12.252
11.46	-1.016	0.234	-1.767	-5.310	2.510	-12.278
11.47	-1.016	0.234	-1.767	-5.316	2.513	-12.304
11.48	-1.016	0.234	-1.767	-5.322	2.517	-12.330
11.49	-1.016	0.234	-1.767	-5.328	2.521	-12.356
11.50	-1.016	0.234	-1.767	-5.335	2.525	-12.381
11.51	-1.016	0.234	-1.767	-5.341	2.529	-12.407
11.52	-1.016	0.234	-1.767	-5.347	2.533	-12.433
11.53	-1.016	0.234	-1.767	-5.353	2.537	-12.459
11.54	-1.016	0.234	-1.767	-5.360	2.541	-12.485
11.55	-1.016	0.234	-1.767	-5.366	2.545	-12.511
11.56	-1.016	0.234	-1.767	-5.372	2.549	-12.537

Figure 10.2.3.d.2 Digital data for event 9.3 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
11.57	-1.016	0.234	-1.767	-5.378	2.553	-12.563
11.58	-1.016	0.234	-1.767	-5.385	2.556	-12.589
11.59	-1.016	0.234	-1.767	-5.391	2.560	-12.615
11.60	-0.938	0.234	-1.767	-5.396	2.564	-12.641
11.61	-0.938	0.234	-1.767	-5.402	2.568	-12.667
11.62	-0.938	0.234	-1.767	-5.407	2.572	-12.693
11.63	-0.938	0.234	-1.767	-5.413	2.576	-12.718
11.64	-0.938	0.234	-1.767	-5.418	2.580	-12.744
11.65	-0.938	0.234	-1.649	-5.424	2.584	-12.769
11.66	-0.938	0.234	-1.649	-5.429	2.588	-12.794
11.67	-0.938	0.156	-1.649	-5.435	2.591	-12.819
11.68	-0.938	0.156	-1.649	-5.440	2.594	-12.843
11.69	-0.938	0.156	-1.649	-5.446	2.597	-12.868
11.70	-0.938	0.156	-1.649	-5.451	2.600	-12.893
11.71	-0.938	0.156	-1.649	-5.456	2.603	-12.918
11.72	-0.938	0.156	-1.649	-5.462	2.606	-12.942
11.73	-0.938	0.156	-1.649	-5.467	2.610	-12.967
11.74	-0.938	0.156	-1.649	-5.473	2.613	-12.992
11.75	-0.938	0.156	-1.649	-5.478	2.616	-13.017
11.76	-0.938	0.156	-1.649	-5.484	2.619	-13.041
11.77	-0.938	0.156	-1.532	-5.489	2.622	-13.065
11.78	-0.938	0.156	-1.532	-5.495	2.625	-13.088
11.79	-0.938	0.156	-1.532	-5.500	2.628	-13.112
11.80	-0.859	0.156	-1.532	-5.505	2.631	-13.136
11.81	-0.859	0.156	-1.649	-5.510	2.634	-13.160
11.82	-0.859	0.156	-1.649	-5.514	2.638	-13.185
11.83	-0.859	0.156	-1.532	-5.519	2.641	-13.209
11.84	-0.859	0.156	-1.532	-5.524	2.644	-13.232
11.85	-0.859	0.156	-1.649	-5.528	2.647	-13.257
11.86	-0.859	0.156	-1.532	-5.533	2.650	-13.280
11.87	-0.859	0.156	-1.532	-5.538	2.653	-13.304
11.88	-0.859	0.156	-1.649	-5.542	2.656	-13.329
11.89	-0.859	0.156	-1.649	-5.547	2.659	-13.354
11.90	-0.859	0.156	-1.532	-5.552	2.663	-13.377
11.91	-0.859	0.156	-1.532	-5.556	2.666	-13.401
11.92	-0.859	0.156	-1.532	-5.561	2.669	-13.424
11.93	-0.859	0.156	-1.532	-5.566	2.672	-13.448
11.94	-0.859	0.156	-1.532	-5.570	2.675	-13.471
11.95	-0.859	0.156	-1.532	-5.575	2.678	-13.495
11.96	-0.859	0.156	-1.532	-5.580	2.681	-13.518
11.97	-0.859	0.156	-1.532	-5.584	2.684	-13.542
11.98	-0.859	0.156	-1.532	-5.589	2.688	-13.566
11.99	-0.859	0.156	-1.532	-5.594	2.691	-13.589
12.00	-0.859	0.156	-1.532	-5.599	2.694	-13.613
12.01	-0.859	0.078	-1.532	-5.603	2.696	-13.636
12.02	-0.859	0.078	-1.532	-5.608	2.698	-13.660
12.03	-0.859	0.078	-1.532	-5.613	2.701	-13.683
12.04	-0.781	0.078	-1.532	-5.616	2.703	-13.707
12.05	-0.781	0.078	-1.532	-5.620	2.706	-13.731
12.06	-0.781	0.078	-1.532	-5.624	2.708	-13.754
12.07	-0.781	0.078	-1.532	-5.628	2.710	-13.778

Figure 10.2.3.d.2 Digital data for event 9.3 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
12.08	-0.781	0.078	-1.532	-5.632	2.713	-13.801
12.09	-0.781	0.078	-1.532	-5.636	2.715	-13.825
12.10	-0.781	0.078	-1.532	-5.640	2.717	-13.848
12.11	-0.781	0.078	-1.532	-5.644	2.720	-13.872
12.12	-0.781	0.078	-1.532	-5.648	2.722	-13.896
12.13	-0.781	0.078	-1.532	-5.652	2.724	-13.919
12.14	-0.781	0.078	-1.414	-5.656	2.727	-13.941
12.15	-0.781	0.078	-1.414	-5.659	2.729	-13.964
12.16	-0.781	0.078	-1.414	-5.663	2.731	-13.986
12.17	-0.781	0.078	-1.414	-5.667	2.734	-14.009
12.18	-0.781	0.078	-1.414	-5.671	2.736	-14.031
12.19	-0.781	0.078	-1.414	-5.675	2.738	-14.053
12.20	-0.781	0.078	-1.414	-5.679	2.741	-14.076
12.21	-0.703	0.078	-1.414	-5.682	2.743	-14.098
12.22	-0.703	0.078	-1.414	-5.685	2.745	-14.121
12.23	-0.703	0.078	-1.414	-5.688	2.748	-14.143
12.24	-0.703	0.078	-1.414	-5.691	2.750	-14.165
12.25	-0.703	0.078	-1.414	-5.695	2.752	-14.188
12.26	-0.703	0.000	-1.414	-5.698	2.754	-14.210
12.27	-0.703	0.000	-1.414	-5.701	2.755	-14.233
12.28	-0.703	0.000	-1.414	-5.704	2.757	-14.255
12.29	-0.703	0.000	-1.414	-5.707	2.759	-14.277
12.30	-0.703	0.000	-1.414	-5.710	2.760	-14.300
12.31	-0.703	0.000	-1.414	-5.713	2.762	-14.322
12.32	-0.625	0.000	-1.414	-5.716	2.763	-14.344
12.33	-0.703	0.000	-1.414	-5.719	2.765	-14.367
12.34	-0.625	0.000	-1.414	-5.721	2.766	-14.389
12.35	-0.625	0.000	-1.296	-5.723	2.768	-14.410
12.36	-0.625	0.000	-1.296	-5.726	2.770	-14.432
12.37	-0.625	0.000	-1.296	-5.728	2.771	-14.453
12.38	-0.625	0.000	-1.296	-5.730	2.773	-14.474
12.39	-0.625	0.000	-1.296	-5.733	2.774	-14.495
12.40	-0.625	0.000	-1.296	-5.735	2.776	-14.516
12.41	-0.625	0.000	-1.296	-5.737	2.777	-14.538
12.42	-0.625	0.000	-1.296	-5.740	2.779	-14.559
12.43	-0.625	0.000	-1.296	-5.742	2.780	-14.580
12.44	-0.625	0.000	-1.296	-5.744	2.782	-14.601
12.45	-0.625	0.000	-1.296	-5.747	2.784	-14.623
12.46	-0.625	0.000	-1.296	-5.749	2.785	-14.644
12.47	-0.625	0.000	-1.296	-5.751	2.787	-14.665
12.48	-0.625	0.000	-1.296	-5.754	2.788	-14.686
12.49	-0.625	0.000	-1.296	-5.756	2.790	-14.707
12.50	-0.625	0.000	-1.296	-5.759	2.791	-14.729
12.51	-0.625	0.000	-1.296	-5.761	2.793	-14.750
12.52	-0.625	0.000	-1.296	-5.763	2.794	-14.771
12.53	-0.625	0.000	-1.296	-5.766	2.796	-14.792
12.54	-0.625	0.000	-1.296	-5.768	2.798	-14.813
12.55	-0.625	0.000	-1.296	-5.770	2.799	-14.835
12.56	-0.625	0.000	-1.296	-5.773	2.801	-14.856
12.57	-0.625	0.000	-1.296	-5.775	2.802	-14.877
12.58	-0.625	0.000	-1.296	-5.777	2.804	-14.898

Figure 10.2.3.d.2 Digital data for event 9.3 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
12.59	-0.625	0.000	-1.296	-5.780	2.805	-14.919
12.60	-0.625	0.000	-1.296	-5.782	2.807	-14.941
12.61	-0.625	0.000	-1.296	-5.784	2.809	-14.962
12.62	-0.625	0.000	-1.296	-5.787	2.810	-14.983
12.63	-0.625	0.000	-1.296	-5.789	2.812	-15.004
12.64	-0.625	0.000	-1.296	-5.791	2.813	-15.026
12.65	-0.625	0.000	-1.296	-5.794	2.815	-15.047
12.66	-0.625	0.000	-1.296	-5.796	2.816	-15.068
12.67	-0.625	0.000	-1.296	-5.798	2.818	-15.089
12.68	-0.625	0.000	-1.296	-5.801	2.819	-15.110
12.69	-0.547	0.000	-1.296	-5.802	2.821	-15.132
12.70	-0.547	0.000	-1.296	-5.804	2.823	-15.153
12.71	-0.547	0.000	-1.296	-5.805	2.824	-15.174
12.72	-0.625	0.000	-1.296	-5.808	2.826	-15.195
12.73	-0.547	0.000	-1.296	-5.809	2.827	-15.216
12.74	-0.625	0.000	-1.296	-5.812	2.829	-15.238
12.75	-0.625	0.000	-1.178	-5.814	2.830	-15.258
12.76	-0.391	0.000	-1.178	-5.814	2.832	-15.278
12.77	-0.547	0.000	-1.178	-5.815	2.833	-15.298
12.78	-0.547	0.000	-1.178	-5.817	2.835	-15.318
12.79	-0.469	0.000	-1.178	-5.818	2.837	-15.338
12.80	-0.547	0.000	-1.178	-5.819	2.838	-15.358
12.81	-0.547	0.000	-1.178	-5.821	2.840	-15.378
12.82	-0.547	0.000	-1.178	-5.822	2.841	-15.398
12.83	-0.547	0.000	-1.178	-5.824	2.843	-15.418
12.84	-0.547	0.000	-1.296	-5.826	2.844	-15.439
12.85	-0.547	0.000	-1.296	-5.827	2.846	-15.460
12.86	-0.469	0.000	-1.178	-5.828	2.848	-15.480
12.87	-0.469	0.000	-1.178	-5.829	2.849	-15.500
12.88	-0.547	0.000	-1.178	-5.830	2.851	-15.520
12.89	-0.547	0.000	-1.178	-5.832	2.852	-15.540
12.90	-0.547	-0.078	-1.178	-5.833	2.853	-15.560
12.91	-0.547	-0.078	-1.178	-5.835	2.854	-15.581
12.92	-0.547	-0.078	-1.178	-5.836	2.855	-15.601
12.93	-0.547	-0.078	-1.178	-5.838	2.855	-15.621
12.94	-0.547	-0.078	-1.178	-5.840	2.856	-15.641
12.95	-0.469	0.000	-1.060	-5.840	2.858	-15.659
12.96	-0.469	0.078	-1.060	-5.841	2.860	-15.678
12.97	-0.469	0.078	-1.060	-5.842	2.862	-15.697
12.98	-0.469	0.000	-1.060	-5.843	2.864	-15.716
12.99	-0.469	0.000	-1.178	-5.843	2.865	-15.736
13.00	-0.469	-0.078	-1.060	-5.844	2.866	-15.755
13.01	-0.469	-0.078	-1.060	-5.845	2.867	-15.774
13.02	-0.469	-0.078	-1.178	-5.846	2.868	-15.794
13.03	-0.469	-0.078	-1.060	-5.847	2.869	-15.813
13.04	-0.469	-0.078	-1.060	-5.847	2.869	-15.831
13.05	-0.469	-0.078	-1.060	-5.848	2.870	-15.850
13.06	-0.469	0.000	-1.178	-5.849	2.872	-15.870
13.07	-0.469	0.000	-1.060	-5.850	2.873	-15.889
13.08	-0.469	0.000	-1.060	-5.850	2.875	-15.908
13.09	-0.469	0.000	-1.060	-5.851	2.876	-15.927

Figure 10.2.3.d.2. Digital data for event 9.3 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
13.10	-0.391	0.000	-1.060	-5.851	2.878	-15.946
13.11	-0.391	-0.078	-1.060	-5.851	2.879	-15.965
13.12	-0.391	-0.078	-1.060	-5.851	2.879	-15.983
13.13	-0.391	-0.078	-1.060	-5.851	2.880	-16.002
13.14	-0.469	-0.078	-1.060	-5.852	2.881	-16.021
13.15	-0.469	-0.078	-1.060	-5.853	2.882	-16.040
13.16	-0.469	-0.078	-1.060	-5.854	2.883	-16.059
13.17	-0.469	0.000	-1.060	-5.854	2.884	-16.078
13.18	-0.469	0.000	-1.060	-5.855	2.886	-16.097
13.19	-0.469	0.000	-1.060	-5.856	2.887	-16.115
13.20	-0.391	0.000	-1.060	-5.856	2.889	-16.134
13.21	-0.391	0.000	-1.060	-5.856	2.890	-16.153
13.22	-0.391	0.000	-1.060	-5.856	2.892	-16.172
13.23	-0.391	-0.078	-1.060	-5.856	2.893	-16.191
13.24	-0.469	-0.078	-1.060	-5.857	2.894	-16.210
13.25	-0.469	-0.078	-1.060	-5.857	2.894	-16.229
13.26	-0.469	-0.078	-1.060	-5.858	2.895	-16.247
13.27	-0.469	-0.078	-1.060	-5.859	2.896	-16.266
13.28	-0.469	-0.078	-1.060	-5.860	2.897	-16.285
13.29	-0.469	0.000	-1.060	-5.861	2.898	-16.304
13.30	-0.391	0.000	-1.060	-5.861	2.900	-16.323
13.31	-0.391	0.000	-1.060	-5.861	2.901	-16.342
13.32	-0.391	0.000	-1.060	-5.861	2.903	-16.361
13.33	-0.391	-0.078	-1.060	-5.861	2.904	-16.379
13.34	-0.391	-0.078	-1.060	-5.861	2.904	-16.398
13.35	-0.391	-0.078	-1.060	-5.861	2.905	-16.417
13.36	-0.391	-0.078	-1.060	-5.861	2.906	-16.436
13.37	-0.391	-0.078	-1.060	-5.861	2.907	-16.455
13.38	-0.391	-0.078	-1.060	-5.861	2.908	-16.474
13.39	-0.391	-0.078	-0.943	-5.861	2.908	-16.491
13.40	-0.391	-0.078	-0.943	-5.861	2.909	-16.509
13.41	-0.391	-0.078	-0.943	-5.861	2.910	-16.527
13.42	-0.391	-0.078	-0.943	-5.861	2.911	-16.544
13.43	-0.391	-0.078	-0.943	-5.860	2.911	-16.562
13.44	-0.391	-0.078	-0.943	-5.860	2.912	-16.580
13.45	-0.391	-0.078	-0.943	-5.860	2.913	-16.597
13.46	-0.391	-0.078	-0.943	-5.860	2.914	-16.615
13.47	-0.391	-0.078	-0.943	-5.860	2.915	-16.633
13.48	-0.391	-0.078	-0.943	-5.860	2.915	-16.650
13.49	-0.391	-0.078	-0.943	-5.860	2.916	-16.668
13.50	-0.391	-0.078	-0.943	-5.860	2.917	-16.686
13.51	-0.391	-0.078	-0.943	-5.860	2.918	-16.703
13.52	-0.391	-0.078	-0.943	-5.860	2.918	-16.721
13.53	-0.391	-0.078	-0.943	-5.860	2.919	-16.739
13.54	-0.391	-0.078	-0.943	-5.860	2.920	-16.756
13.55	-0.391	-0.078	-0.943	-5.860	2.921	-16.774
13.56	-0.391	-0.078	-0.943	-5.860	2.922	-16.792
13.57	-0.391	-0.078	-0.943	-5.860	2.922	-16.809
13.58	-0.391	-0.078	-0.943	-5.860	2.923	-16.827
13.59	-0.391	-0.078	-0.943	-5.860	2.924	-16.845
13.60	-0.391	-0.078	-0.943	-5.860	2.925	-16.863

Figure 10.2.3.d.2 Digital data for event 9.3 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
13.61	-0.391	-0.078	-0.943	-5.860	2.925	-16.880
13.62	-0.391	-0.078	-0.943	-5.860	2.926	-16.898
13.63	-0.391	-0.078	-0.943	-5.860	2.927	-16.916
13.64	-0.391	-0.078	-0.943	-5.860	2.928	-16.933
13.65	-0.391	-0.078	-0.943	-5.860	2.929	-16.951
13.66	-0.391	-0.078	-0.943	-5.860	2.929	-16.969
13.67	-0.391	-0.078	-0.943	-5.860	2.930	-16.986
13.68	-0.391	-0.078	-0.943	-5.860	2.931	-17.004
13.69	-0.391	-0.078	-0.943	-5.860	2.932	-17.022
13.70	-0.391	-0.078	-0.943	-5.860	2.932	-17.039
13.71	-0.391	-0.078	-0.943	-5.860	2.933	-17.057
13.72	-0.391	-0.078	-0.943	-5.860	2.934	-17.075
13.73	-0.391	-0.078	-0.943	-5.860	2.935	-17.092
13.74	-0.391	-0.078	-0.943	-5.860	2.936	-17.110
13.75	-0.391	-0.078	-0.943	-5.860	2.936	-17.128
13.76	-0.391	-0.078	-0.943	-5.860	2.937	-17.145
13.77	-0.391	-0.078	-0.943	-5.860	2.938	-17.163
13.78	-0.391	-0.078	-0.825	-5.860	2.939	-17.179
13.79	-0.391	-0.078	-0.825	-5.860	2.939	-17.196
13.80	-0.391	-0.078	-0.825	-5.860	2.940	-17.212
13.81	-0.391	-0.078	-0.825	-5.860	2.941	-17.229
13.82	-0.391	-0.078	-0.825	-5.860	2.942	-17.245
13.83	-0.391	-0.078	-0.825	-5.860	2.943	-17.262
13.84	-0.391	-0.078	-0.825	-5.860	2.943	-17.278
13.85	-0.391	-0.078	-0.825	-5.860	2.944	-17.295
13.86	-0.391	-0.078	-0.825	-5.860	2.945	-17.311
13.87	-0.391	-0.078	-0.825	-5.860	2.946	-17.328
13.88	-0.391	-0.078	-0.825	-5.860	2.946	-17.344
13.89	-0.391	-0.078	-0.825	-5.860	2.947	-17.361
13.90	-0.391	-0.078	-0.825	-5.860	2.948	-17.377
13.91	-0.391	-0.078	-0.825	-5.860	2.949	-17.394
13.92	-0.391	-0.078	-0.825	-5.860	2.950	-17.410
13.93	-0.391	-0.078	-0.825	-5.860	2.950	-17.427
13.94	-0.391	-0.078	-0.825	-5.860	2.951	-17.443
13.95	-0.391	-0.078	-0.825	-5.860	2.952	-17.460
13.96	-0.391	-0.156	-0.825	-5.860	2.952	-17.476
13.97	-0.313	-0.156	-0.825	-5.860	2.952	-17.493
13.98	-0.313	-0.156	-0.825	-5.859	2.952	-17.509
13.99	-0.313	-0.156	-0.825	-5.858	2.952	-17.526
14.00	-0.313	-0.078	-0.825	-5.857	2.953	-17.542
14.01	-0.313	-0.078	-0.825	-5.856	2.953	-17.559
14.02	-0.313	-0.078	-0.825	-5.856	2.954	-17.575
14.03	-0.313	-0.078	-0.825	-5.855	2.955	-17.592
14.04	-0.313	-0.078	-0.825	-5.854	2.956	-17.608
14.05	-0.313	-0.078	-0.825	-5.853	2.957	-17.625
14.06	-0.313	-0.078	-0.825	-5.852	2.957	-17.641
14.07	-0.313	-0.156	-0.825	-5.852	2.957	-17.658
14.08	-0.313	-0.156	-0.825	-5.851	2.957	-17.674
14.09	-0.313	-0.156	-0.825	-5.850	2.957	-17.691
14.10	-0.313	-0.156	-0.825	-5.849	2.957	-17.707
14.11	-0.313	-0.078	-0.825	-5.849	2.958	-17.724

Figure 10.2.3.d.2 Digital data for event 9.3 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
14.12	-0.313	-0.078	-0.825	-5.848	2.959	-17.740
14.13	-0.313	-0.078	-0.825	-5.847	2.960	-17.757
14.14	-0.313	-0.078	-0.825	-5.846	2.960	-17.773
14.15	-0.313	-0.078	-0.825	-5.845	2.961	-17.790
14.16	-0.313	-0.078	-0.825	-5.845	2.962	-17.806
14.17	-0.313	-0.078	-0.825	-5.844	2.963	-17.823
14.18	-0.313	-0.156	-0.825	-5.843	2.963	-17.839
14.19	-0.313	-0.156	-0.825	-5.842	2.963	-17.856
14.20	-0.313	-0.156	-0.825	-5.841	2.963	-17.872
14.21	-0.313	-0.156	-0.825	-5.841	2.963	-17.889
14.22	-0.313	-0.078	-0.825	-5.840	2.964	-17.905
14.23	-0.313	-0.078	-0.825	-5.839	2.964	-17.922
14.24	-0.313	-0.078	-0.825	-5.838	2.965	-17.938
14.25	-0.313	-0.078	-0.825	-5.838	2.966	-17.955
14.26	-0.313	-0.078	-0.825	-5.837	2.967	-17.971
14.27	-0.313	-0.078	-0.825	-5.836	2.967	-17.988
14.28	-0.313	-0.078	-0.825	-5.835	2.968	-18.004
14.29	-0.313	-0.078	-0.825	-5.834	2.969	-18.021
14.30	-0.313	-0.078	-0.825	-5.834	2.970	-18.037
14.31	-0.313	-0.078	-0.825	-5.833	2.971	-18.054
14.32	-0.313	-0.156	-0.825	-5.832	2.971	-18.070
14.33	-0.313	-0.156	-0.825	-5.831	2.971	-18.087
14.34	-0.313	-0.156	-0.825	-5.830	2.971	-18.103
14.35	-0.313	-0.156	-0.825	-5.830	2.971	-18.120
14.36	-0.313	-0.156	-0.825	-5.829	2.971	-18.136
14.37	-0.313	-0.156	-0.825	-5.828	2.971	-18.153
14.38	-0.313	-0.078	-0.825	-5.827	2.971	-18.169
14.39	-0.391	-0.078	-0.707	-5.827	2.972	-18.185
14.40	-0.313	-0.078	-0.707	-5.827	2.973	-18.200
14.41	-0.313	-0.078	-0.707	-5.826	2.974	-18.215
14.42	-0.313	-0.234	-0.707	-5.825	2.973	-18.231
14.43	-0.313	-0.234	-0.707	-5.824	2.972	-18.246
14.44	-0.313	-0.234	-0.707	-5.823	2.971	-18.261
14.45	-0.313	-0.234	-0.707	-5.823	2.971	-18.277
14.46	-0.313	-0.234	-0.825	-5.822	2.970	-18.293
14.47	-0.391	-0.156	-0.707	-5.822	2.970	-18.308
14.48	-0.313	-0.156	-0.825	-5.821	2.970	-18.325
14.49	-0.313	-0.078	-0.825	-5.820	2.971	-18.341
14.50	-0.313	-0.078	-0.707	-5.819	2.971	-18.357
14.51	-0.313	-0.078	-0.707	-5.819	2.972	-18.372
14.52	-0.313	-0.078	-0.707	-5.818	2.973	-18.387
14.53	-0.313	-0.234	-0.707	-5.817	2.972	-18.403
14.54	-0.313	-0.234	-0.707	-5.816	2.971	-18.418
14.55	-0.313	-0.234	-0.707	-5.816	2.971	-18.433
14.56	-0.313	-0.234	-0.707	-5.815	2.970	-18.449
14.57	-0.313	-0.234	-0.707	-5.814	2.969	-18.464
14.58	-0.313	-0.156	-0.707	-5.813	2.969	-18.479
14.59	-0.313	-0.156	-0.707	-5.812	2.969	-18.495
14.60	-0.313	-0.156	-0.707	-5.812	2.969	-18.510
14.61	-0.313	-0.078	-0.707	-5.811	2.970	-18.525
14.62	-0.313	-0.078	-0.707	-5.810	2.971	-18.540

Figure 10.2.3.d.2 Digital data for event 9.3 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
14.63	-0.313	-0.078	-0.707	-5.809	2.971	-18.556
14.64	-0.313	-0.156	-0.707	-5.808	2.971	-18.571
14.65	-0.313	-0.234	-0.707	-5.808	2.970	-18.586
14.66	-0.313	-0.234	-0.707	-5.807	2.970	-18.602
14.67	-0.313	-0.234	-0.707	-5.806	2.969	-18.617
14.68	-0.313	-0.234	-0.707	-5.805	2.968	-18.632
14.69	-0.313	-0.234	-0.707	-5.805	2.967	-18.648
14.70	-0.313	-0.156	-0.707	-5.804	2.967	-18.663
14.71	-0.313	-0.156	-0.707	-5.803	2.967	-18.678
14.72	-0.313	-0.156	-0.707	-5.802	2.967	-18.694
14.73	-0.313	-0.156	-0.707	-5.801	2.967	-18.709
14.74	-0.313	-0.156	-0.707	-5.801	2.967	-18.724
14.75	-0.313	-0.156	-0.707	-5.800	2.967	-18.740
14.76	-0.313	-0.234	-0.707	-5.799	2.967	-18.755
14.77	-0.313	-0.234	-0.707	-5.798	2.966	-18.770
14.78	-0.313	-0.234	-0.707	-5.797	2.965	-18.786
14.79	-0.313	-0.234	-0.707	-5.797	2.964	-18.801
14.80	-0.313	-0.234	-0.707	-5.796	2.963	-18.816
14.81	-0.313	-0.156	-0.707	-5.795	2.963	-18.832
14.82	-0.313	-0.156	-0.707	-5.794	2.963	-18.847
14.83	-0.313	-0.156	-0.707	-5.794	2.963	-18.862
14.84	-0.313	-0.156	-0.707	-5.793	2.963	-18.878
14.85	-0.313	-0.156	-0.707	-5.792	2.963	-18.893
14.86	-0.313	-0.156	-0.707	-5.791	2.963	-18.908
14.87	-0.313	-0.156	-0.707	-5.790	2.963	-18.923
14.88	-0.313	-0.156	-0.707	-5.790	2.963	-18.939
14.89	-0.313	-0.234	-0.707	-5.789	2.963	-18.954
14.90	-0.313	-0.234	-0.707	-5.788	2.962	-18.969
14.91	-0.313	-0.234	-0.707	-5.787	2.961	-18.985
14.92	-0.313	-0.234	-0.707	-5.787	2.960	-19.000
14.93	-0.313	-0.156	-0.707	-5.786	2.960	-19.015
14.94	-0.313	-0.156	-0.707	-5.785	2.960	-19.031
14.95	-0.313	-0.156	-0.707	-5.784	2.960	-19.046
14.96	-0.313	-0.156	-0.707	-5.783	2.960	-19.061
14.97	-0.313	-0.156	-0.707	-5.783	2.960	-19.077
14.98	-0.313	-0.156	-0.707	-5.782	2.960	-19.092
14.99	-0.313	-0.234	-0.707	-5.781	2.959	-19.107
15.00	-0.313	-0.234	-0.707	-5.780	2.959	-19.123

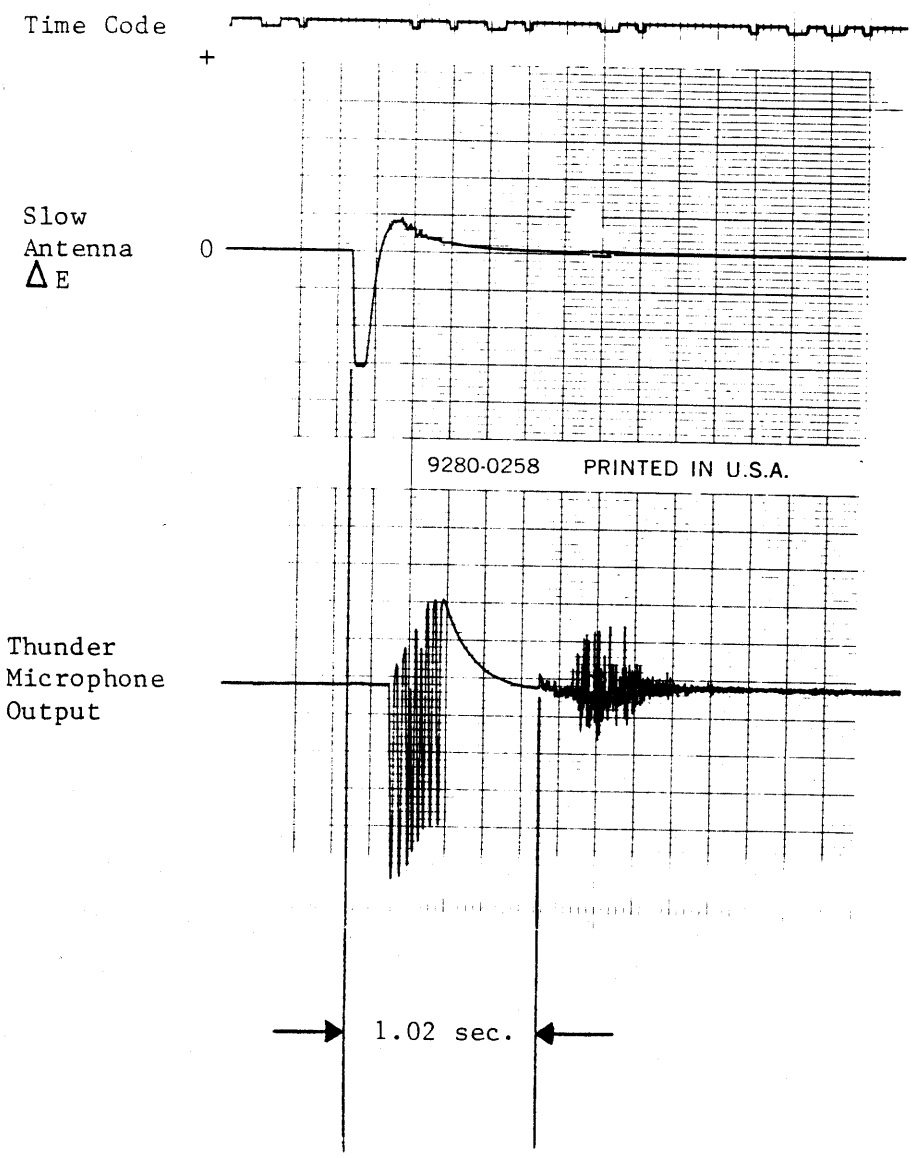


Figure 10.2.4.a Slow electric field change and thunder microphone record from rocket triggered lightning

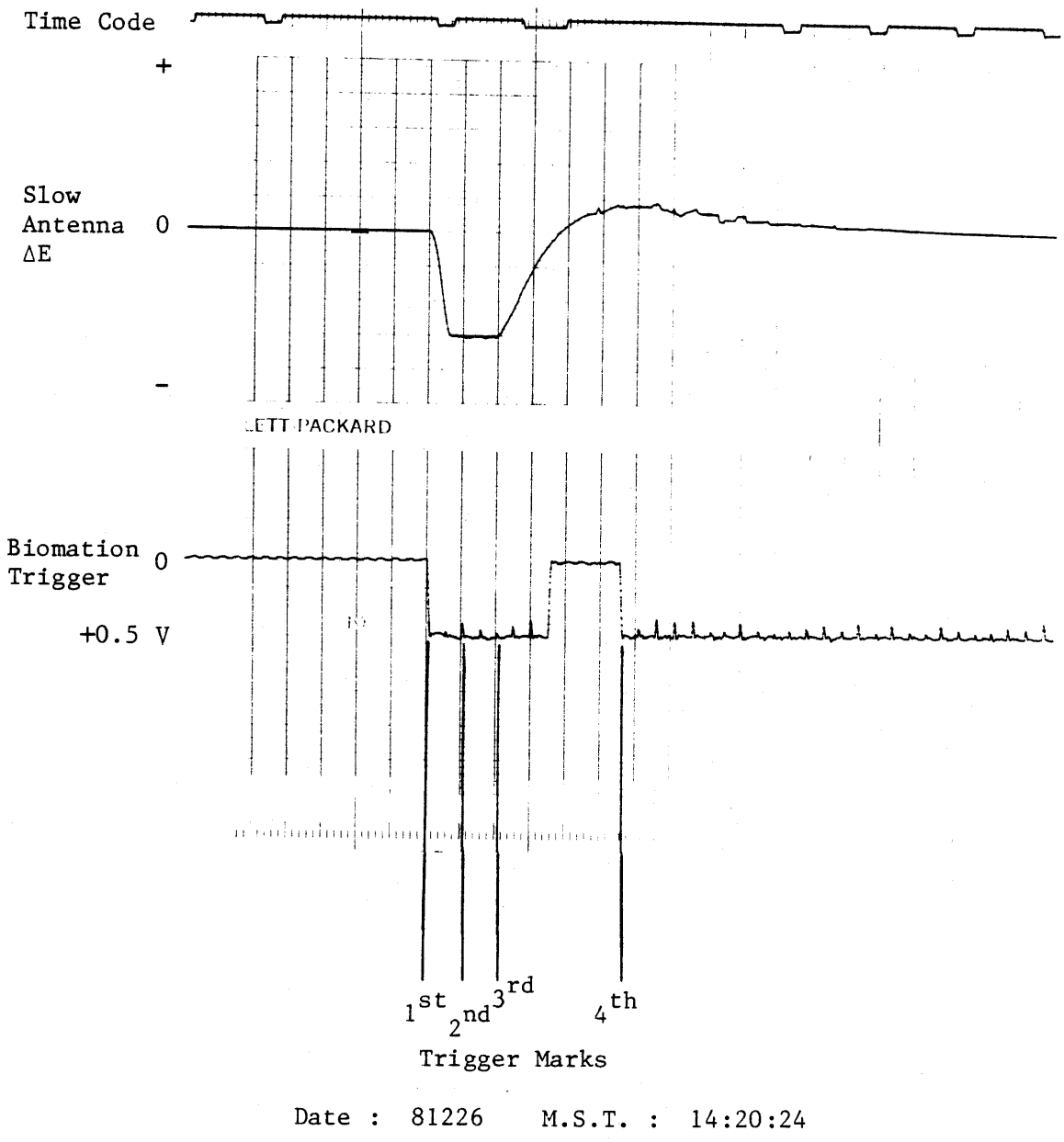
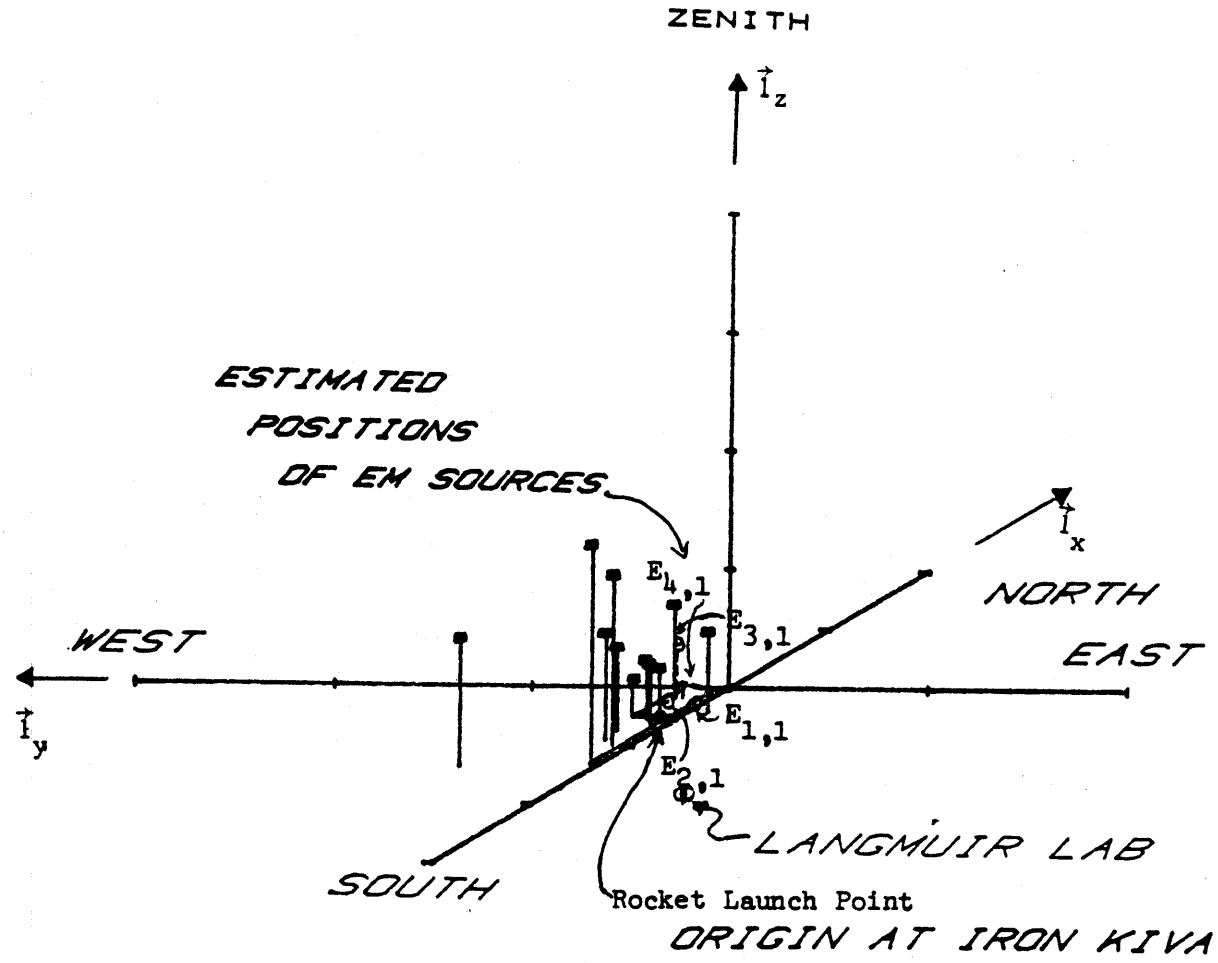


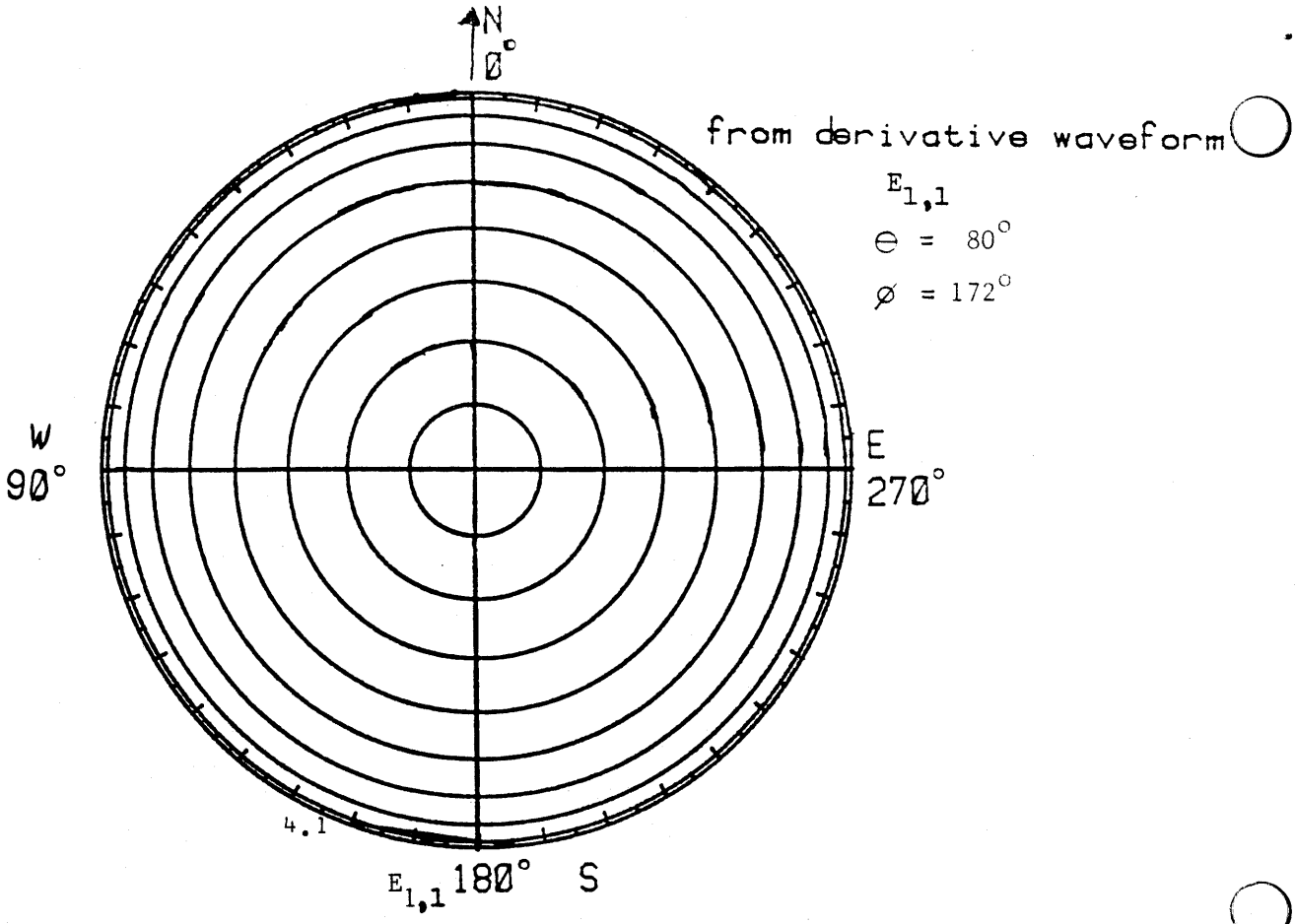
Figure 10.2.4.b Slow electric field change and biomation trigger marks superposed on the electric field change record from rocket triggered lightning



ticks on axes at 1 km intervals

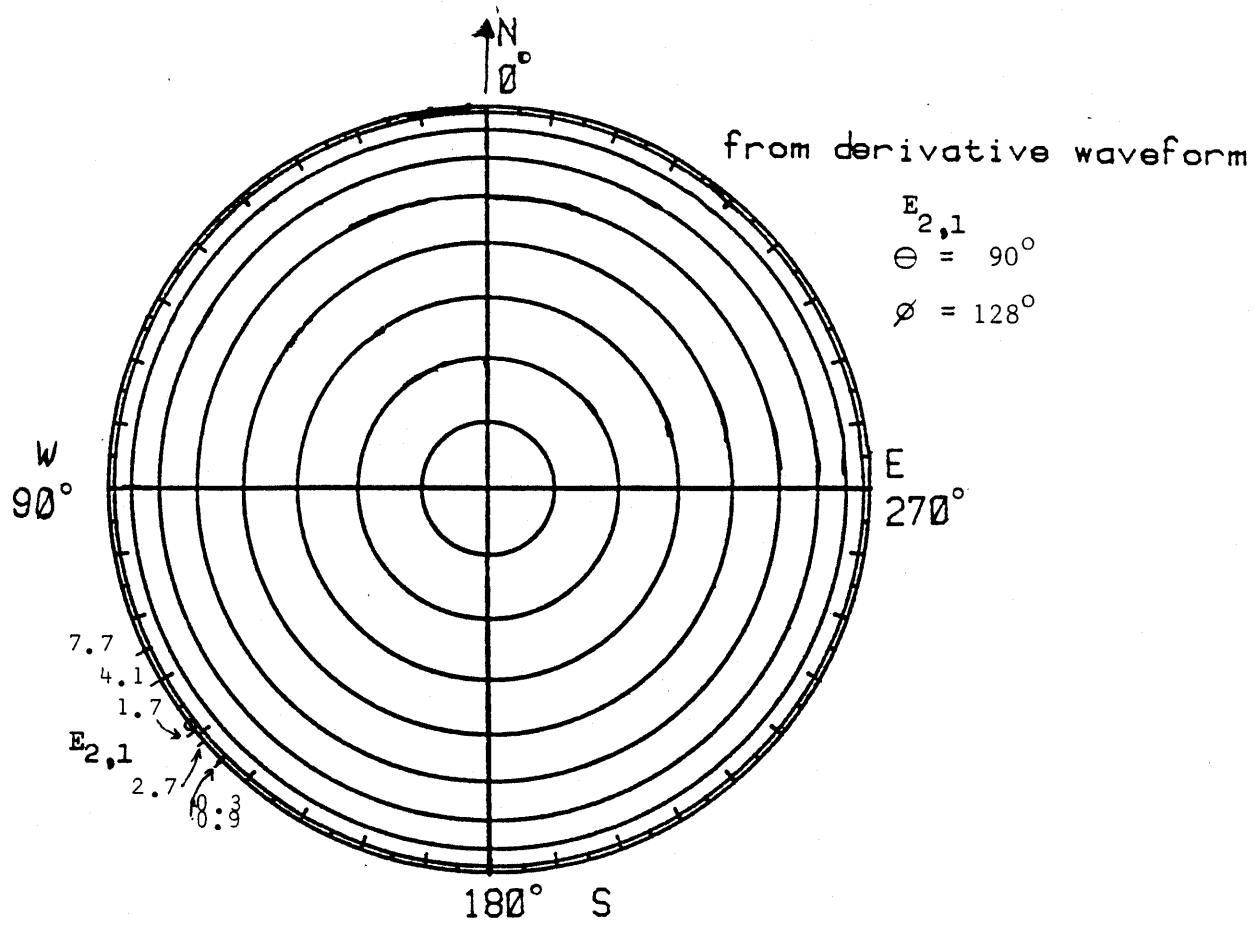
Date : 81226 M.S.T. : 14:20:24

Figure 10.2.5 Acoustic location of rocket triggered lightning



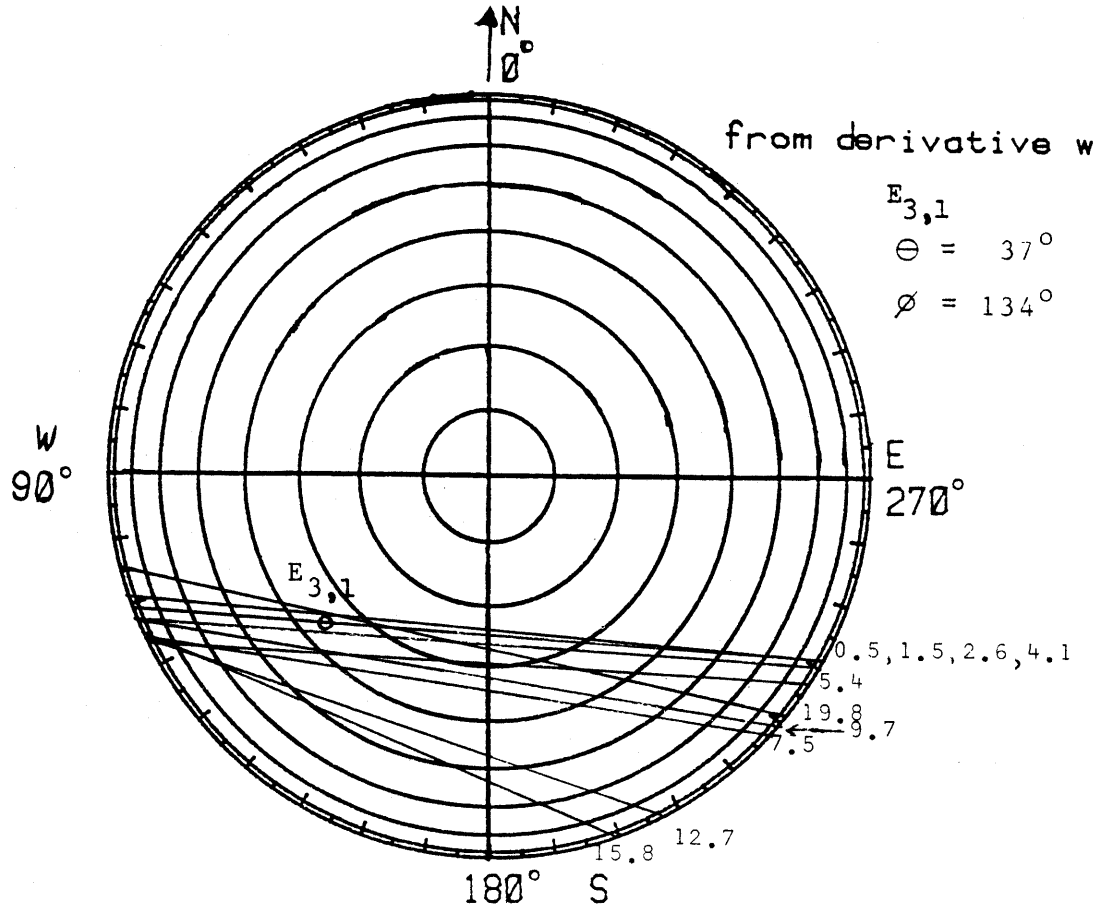
Date : 81226 M.S.T. : 14:20:24.128

Figure 10.2.6.A.1 $\sin(\theta),\phi$ contours for rocket triggered lightning derivative waveform



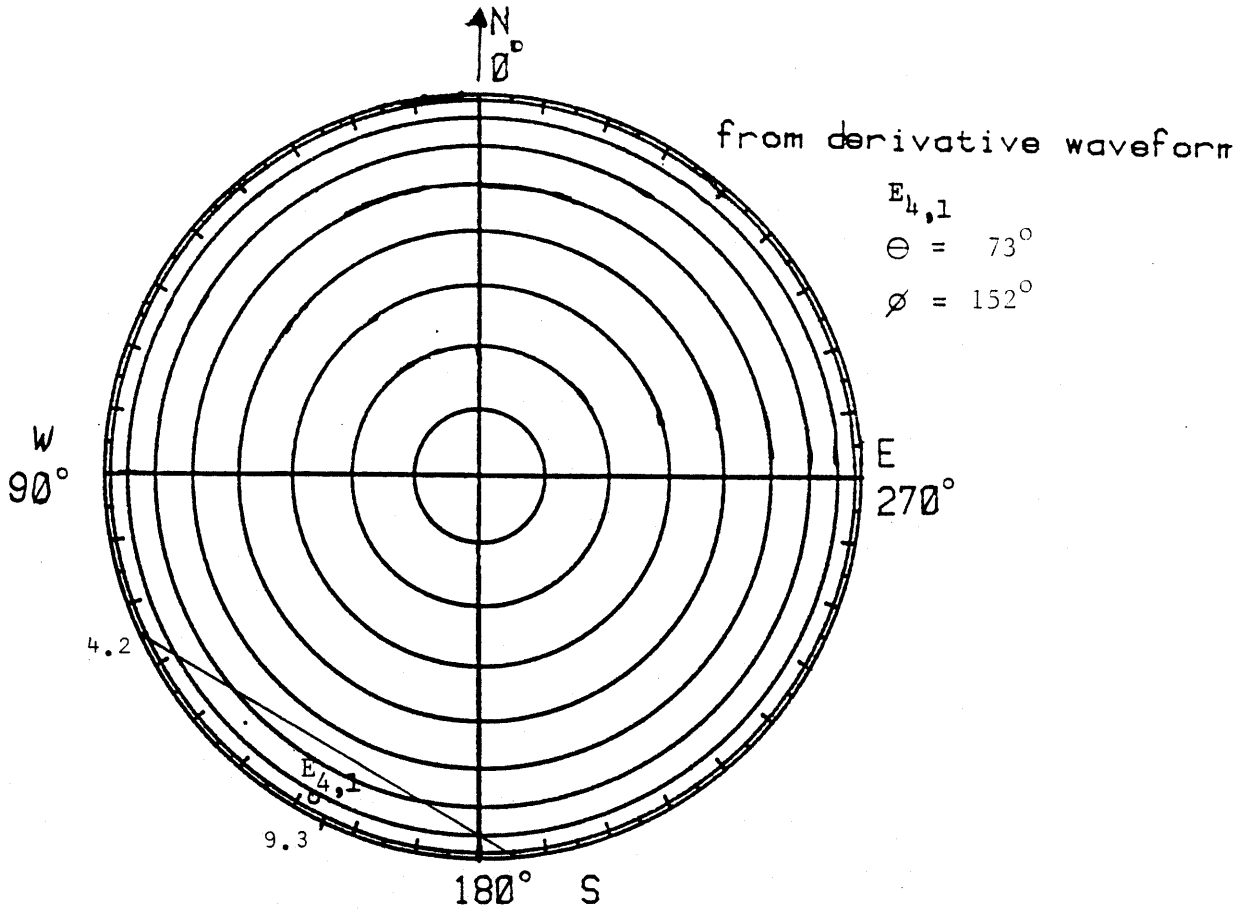
Date : 81226 M.S.T. : 14:20:24.168

Figure 10.2.6.A.2 sin(θ),ϕ contours for rocket triggered lightning derivative wavform



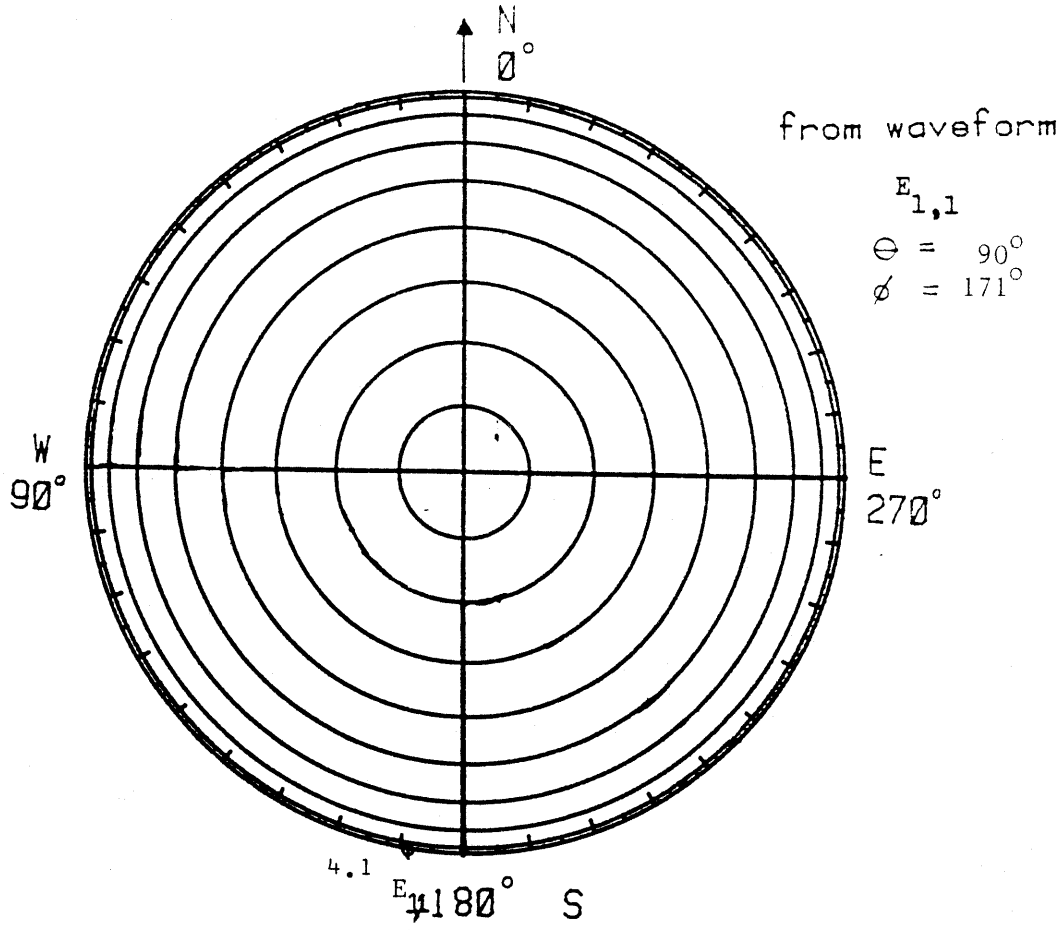
Date : 81226 M.S.T. : 14:20:24.208

Figure 10.2.6.A.3 **sin(θ),ϕ contours for rocket triggered lightning derivative waveform**



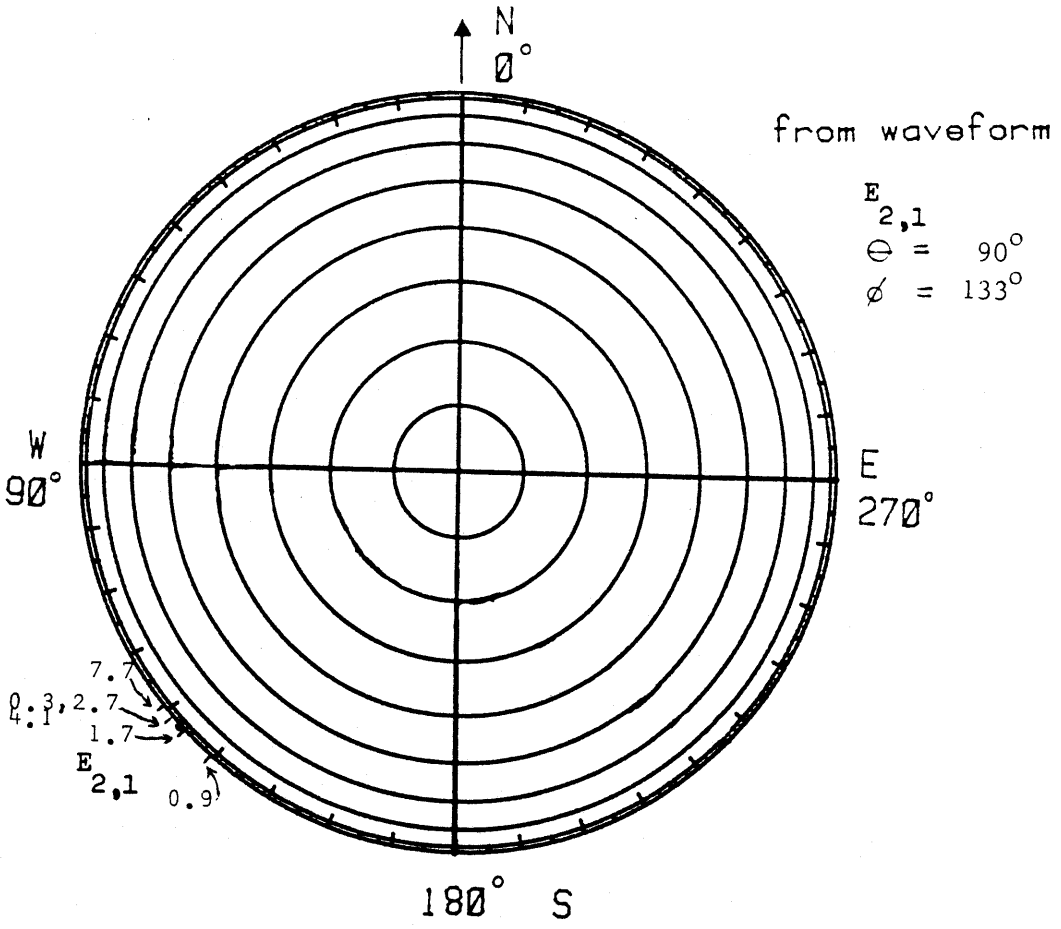
Date : 81226 M.S.T. : 14:20:24.348

Figure 10.2.6.A.4 $\sin(\theta),\phi$ contours for rocket triggered lightning derivative waveform



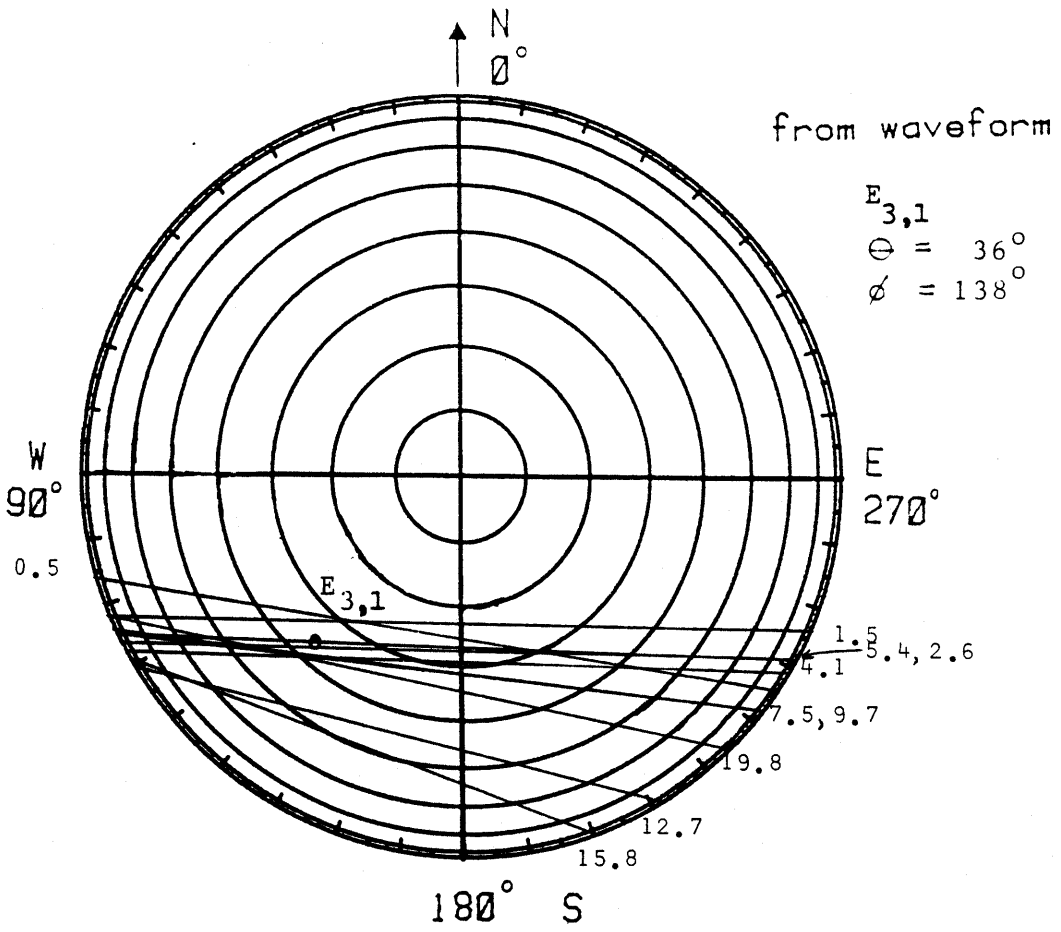
Date : 81226 M.S.T. : 14:20:24.128

Figure 10.2.6.B.1 sin(θ),ϕ contours for rocket triggered lightning waveform



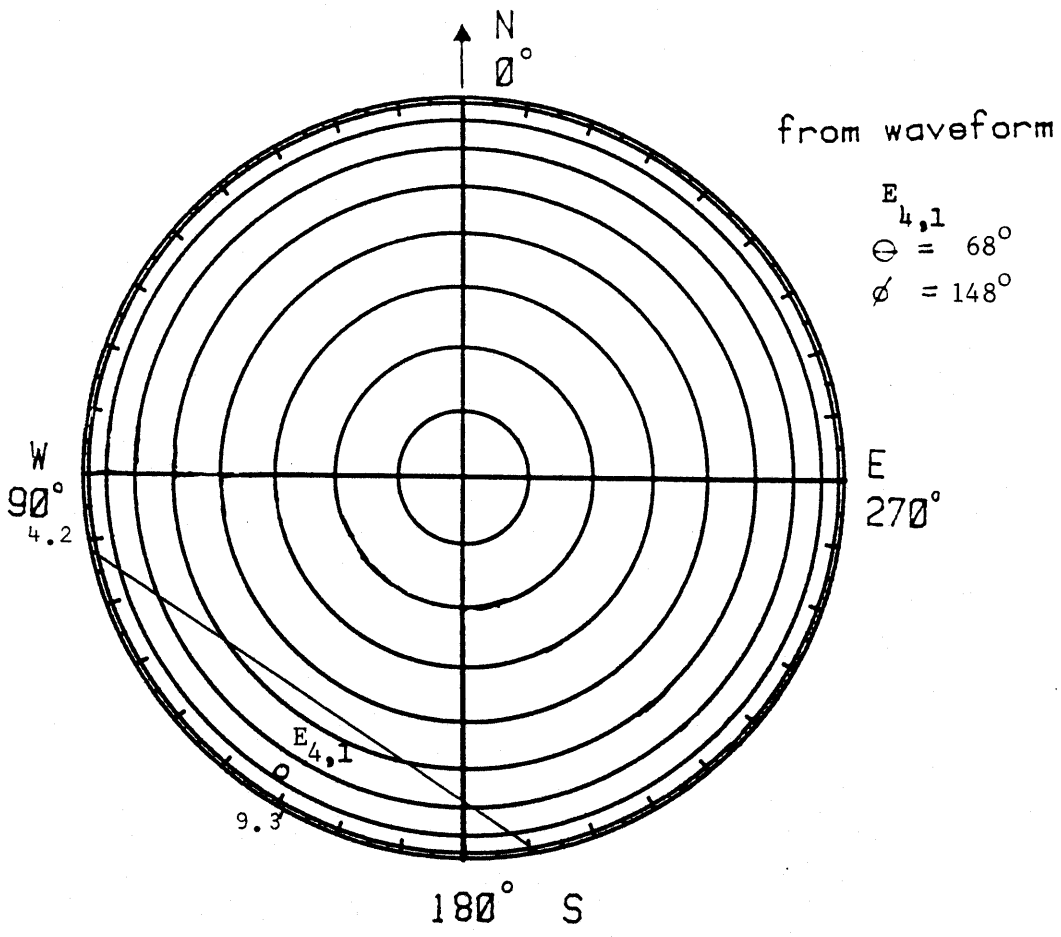
Date : 81226 M.S.T. : 14:20:24.168

Figure 10.2.6.B.2 sin(θ),ϕ contours for rocket triggered lightning waveform



Date : 81226 M.S.T. : 14:20:24.208

Figure 10.2.6.B.3 sin(θ),ϕ contours for rocket triggered lightning waveform



Date : 81226 M.S.T. : 14:20:24.348

Figure 10.2.6.B.4 sin(θ),ϕ contours for rocket triggered lightning waveform

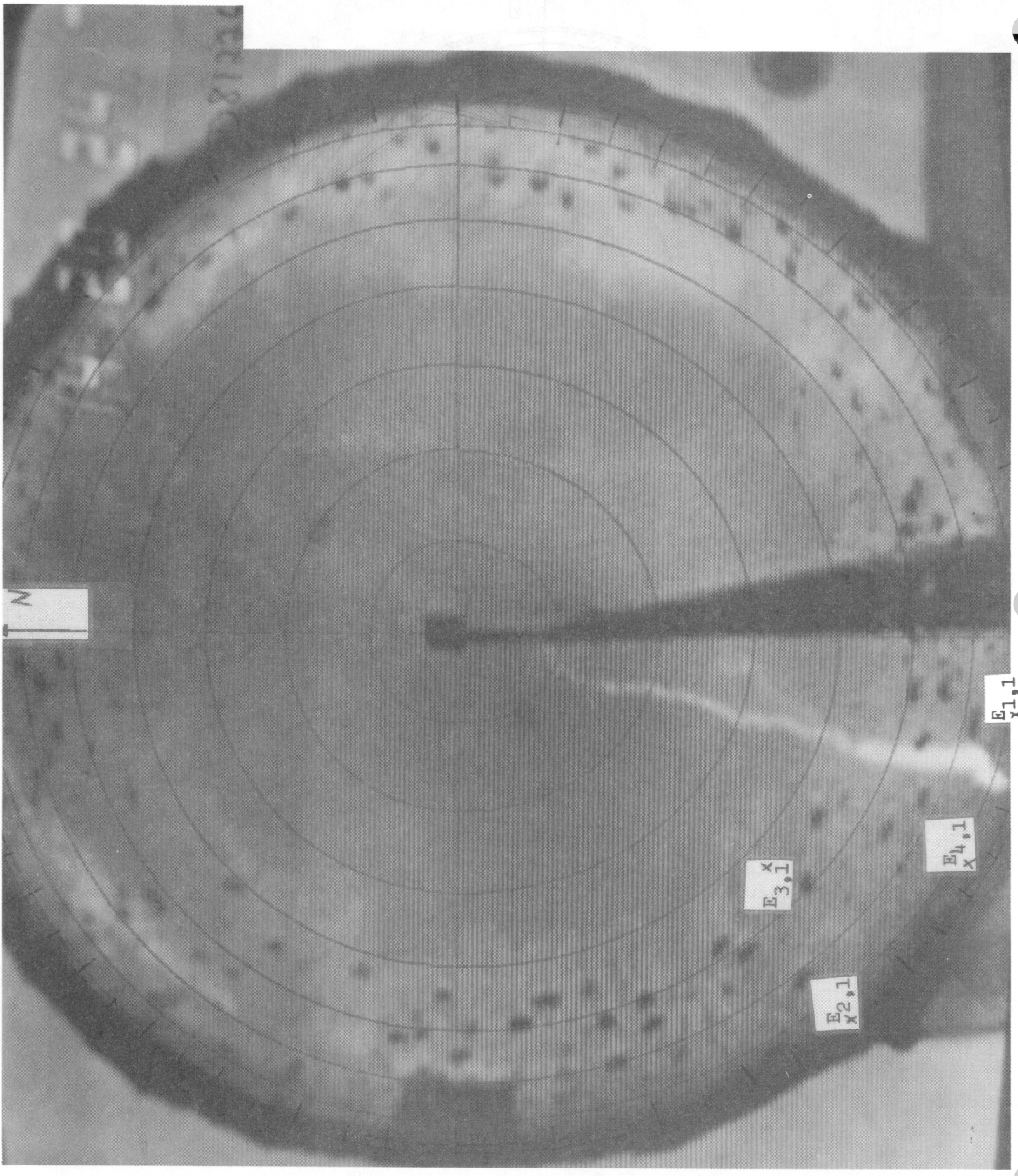


Figure 10.2.7 Whole-sky videotape photograph of rocket triggered lightning from Kiva

Figure 10.2.8 **Tabulation** of θ, ϕ values for waveform and TOA solutions with origin at different locations

Yeardate : 81226 M.S.T. : 1420.24

Event		TOA	waveform	r TOA (meters)	r waveform (meters)	TOA origin at Kiva	TOA origin at WSC	waveform origin at WSC
1	θ		80°		346			82°
	ϕ		172°					171°
2	θ		90°		341			90°
	ϕ		128°					132°
3	θ		37°		567			43°
	ϕ		134°					139°
4	θ		73°		357			76°
	ϕ		152°					153°

Figure **10.2.9.A.1** Tabulation of peak values for each event from derivative waveform set for rocket triggered lightning

Yeardate: 81226 M.S.T.:142024.128

ϕ = 172° ; θ = 80° ; r = 346 m

Event Number	Time (μs)	$Z_o \Delta\partial D_z/\partial t$ (T/s)	$\Delta\partial B_E/\partial t$ (T/s)	$\Delta\partial B_N/\partial t$ (T/s)	$\Delta\partial B_h/\partial t$ (T/s)	$\Delta\partial B_e/\partial t$ (T/s)	$\lvert\Delta\partial\vec{B}/\partial t\rvert$ (T/s)
4.1	4.07	-2.71	-2.73	0.39	0.00	-1.38	1.38

CALCULATED VALUES FOR $\partial\vec{T}/\partial t$

Event Number	$\partial T_2/\partial t$ (10^{15} Am/s^2)	$\partial T_3/\partial t$ (10^{15} Am/s^2)	$\lvert\partial\vec{T}/\partial t\rvert$ (10^{15} Am/s^2)	α (deg)
4.1	-3	1434	1434	0

Figure **10.2.9.A.2** Tabulation of peak values for each event from derivative waveform set for rocket triggered lightning

Yeardate: 81226 M.S.T.:142024.168

ϕ = 128° ; θ = 90° ; r = 341 m

Event Number	Time (μs)	$Z_o \Delta\partial D_z/\partial t$ (T/s)	$\Delta\partial B_E/\partial t$ (T/s)	$\Delta\partial B_N/\partial t$ (T/s)	$\Delta\partial B_h/\partial t$ (T/s)	$\Delta\partial B_e/\partial t$ (T/s)	$\lvert\Delta\partial\vec{B}/\partial t\rvert$ (T/s)
0.3	0.32	-0.94	-0.55	0.55	0.00	-0.38	0.38
0.9	0.91	-0.59	-0.23	0.23	0.00	-0.16	0.16
1.7	1.70	-0.71	-0.31	0.39	0.00	-0.25	0.25
2.7	2.65	-1.06	-0.55	0.63	0.00	-0.41	0.41
4.1	4.05	-1.41	-0.55	0.94	0.00	-0.54	0.54
7.7	7.67	-2.24	-0.63	1.33	0.00	-0.72	0.72

CALCULATED VALUES FOR $\partial\vec{T}/\partial t$

Event Number	$\partial T_2/\partial t$ (10^{15} Am/s^2)	$\partial T_3/\partial t$ (10^{15} Am/s^2)	$\lvert\partial\vec{T}/\partial t\rvert$ (10^{15} Am/s^2)	α (deg)
0.3	0	393	393	360
0.9	0	168	168	180
1.7	0	256	256	360
2.7	0	424	424	360
4.1	0	550	550	360
7.7	0	732	732	360

Figure 10.2.9.A.3 Tabulation of peak values for each event from derivative waveform set for rocket triggered lightning

Yeardate : 81226 M.S.T. : 142024.208

ϕ = 134.0° + 4.7°; θ = 37.0° + 7.5°; r = 567 m

Event Number	Time (μs)	$Z_o \Delta\partial D_z/\partial t$ (T/s)	$\Delta\partial B_E/\partial t$ (T/s)	$\Delta\partial B_N/\partial t$ (T/s)	$\Delta\partial B_h/\partial t$ (T/s)	$\Delta\partial B_e/\partial t$ (T/s)	$\lvert\Delta\partial\vec{B}/\partial t\rvert$ (T/s)
0.5	0.46	-0.35	-0.86	0.08	-0.35	-0.33	0.48
1.5	1.46	-0.47	-1.09	0.08	-0.46	-0.41	0.61
2.6	2.60	-0.59	-1.33	0.08	-0.56	-0.49	0.75
4.1	4.05	-0.71	-1.56	0.08	-0.67	-0.57	0.88
5.4	5.38	-0.71	-1.41	0.08	-0.60	-0.52	0.79
7.5	7.51	-1.41	-2.50	0.39	-0.96	-1.01	1.39
9.7	9.68	-1.06	-1.95	0.31	-0.74	-0.79	1.09
12.7	12.66	-2.24	-3.05	1.02	-0.93	-1.42	1.70
15.8	15.83	-1.77	-2.19	0.94	-0.58	-1.10	1.24
19.8	19.77	-0.83	-1.80	0.39	-0.64	-0.76	1.00

CALCULATED VALUES FOR $\partial\vec{T}/\partial t$

Event Number	$\partial T_2/\partial t$ (10^{15} Am/s^2)	$\partial T_3/\partial t$ (10^{15} Am/s^2)	$\lvert\partial\vec{T}/\partial t\rvert$ (10^{15} Am/s^2)	α (deg)
0.5	600	555	817	313
1.5	779	693	1043	312
2.6	959	832	1269	311
4.1	1138	970	1495	310
5.4	1019	878	1345	311
7.5	1625	1715	2363	317
9.7	1264	1344	1845	317
12.7	1581	2420	2891	327
15.8	982	1864	2107	332
19.8	1087	1300	1694	320

Figure 10.2.9.A.4 Tabulation of peak values for each event from derivative waveform set for rocket triggered lightning

Yeardate: 81226 M.S.T.: 142024.348

$\phi = 152^{o}$; $\theta = 73^{o}$; r = 357 m

Event Number	Time (μs)	$Z_o \Delta\partial D_z/\partial t$ (T/s)	$\Delta\partial B_E/\partial t$ (T/s)	$\Delta\partial B_N/\partial t$ (T/s)	$\Delta\partial B_h/\partial t$ (T/s)	$\Delta\partial B_e/\partial t$ (T/s)	$\lvert\Delta\partial\vec{B}/\partial t\rvert$ (T/s)
4.2	4.16	-4.12	-4.38	2.50	0.26	-2.52	2.53
9.3	9.29	-3.06	-1.48	0.70	-0.13	-0.82	0.83

CALCULATED VALUES FOR $\partial\vec{T}/\partial t$

Event Number	$\partial T_2/\partial t$ (10^{15} Am/s^2)	$\partial T_3/\partial t$ (10^{15} Am/s^2)	$\lvert\partial\vec{T}/\partial t\rvert$ (10^{15} Am/s^2)	α (deg)
4.2	-281	2694	2709	6
9.3	139	877	888	351

Figure **10.2.9.B.1** Tabulation of peak values for each event from waveform set for rocket triggered lightning

Yeardate: 81226 M.S.T.:142024.128

$\phi = 171^{o}$; $\theta = 90^{o}$; r = 341 m

Event Number	Time (μs)	$Z_o \Delta D_s$ (μT)	ΔB_E (μT)	ΔB_N (μT)	ΔB_h (μT)	ΔB_e (μT)	$\lvert\Delta\vec{B}\rvert$ (μT)
4.1	4.07	-0.12	-0.11	0.02	0.00	-0.05	0.05

CALCULATED VALUES FOR $\vec{I}_t . \hat{T}$

Event Number	T_2 (10^9 Am/s)	T_3 (10^9 Am/s)	$\lvert\vec{T}\rvert$ (10^9 Am/s)	α (deg)
4.1	0	55	55	360

Figure **10.2.9.B.2** Tabulation of peak values for each event from waveform set for rocket triggered lightning

Yeardate: 81226 M.S.T.:142024.168

$\phi = 133^{o}$; $\theta = 90^{o}$; r = 341 m

Event Number	Time (μs)	$Z_o \Delta D_s$ (μT)	ΔB_E (μT)	ΔB_N (μT)	ΔB_h (μT)	ΔB_e (μT)	$\lvert\Delta\vec{B}\rvert$ (μT)
0.3	0.32	-0.08	-0.03	0.03	0.00	-0.02	0.02
0.9	0.91	-0.06	-0.02	0.02	0.00	-0.02	0.02
1.7	1.70	-0.07	-0.03	0.03	0.00	-0.02	0.02
2.7	2.70	-0.07	-0.03	0.03	0.00	-0.02	0.02
4.1	4.13	-0.08	-0.04	0.04	0.00	-0.03	0.03
7.7	7.69	-0.06	-0.03	0.03	0.00	-0.02	0.02

CALCULATED VALUES FOR $\vec{I}_t . \hat{T}$

Event Number	T_2 (10^9 Am/s)	T_3 (10^9 Am/s)	$\lvert\vec{T}\rvert$ (10^9 Am/s)	α (deg)
0.3	0	23	23	360
0.9	0	16	16	360
1.7	0	19	19	360
2.7	0	21	21	360
4.1	0	27	27	360
7.7	0	22	22	360

Figure 10.2.9.B.3 Tabulation of peak values for each event from waveform set for rocket triggered lightning

Yeardate: 81226 M.S.T.: 142024.208

$\phi = 138.0^{o} + 4.8^{o}$; $\theta = 36.0^{o} + 5.6^{o}$; r = 580 m

Event Number	Time (μs)	$Z_o \Delta D_z$ (μT)	ΔB_E (μT)	ΔB_N (μT)	ΔB_h (μT)	ΔB_e (μT)	$\lvert\Delta\vec{B}\rvert$ (μT)
0.5	0.46	-0.04	-0.09	0.02	-0.03	-0.04	0.05
1.5	1.46	-0.05	-0.12	0.00	-0.05	-0.04	0.06
2.6	2.60	-0.06	-0.14	0.00	-0.06	-0.05	0.08
4.1	4.13	-0.07	-0.14	0.00	-0.05	-0.05	0.08
5.4	5.38	-0.07	-0.14	0.01	-0.06	-0.05	0.08
7.5	7.51	-0.09	-0.17	0.02	-0.06	-0.07	0.09
9.7	9.68	-0.08	-0.16	0.02	-0.06	-0.06	0.09
12.7	12.73	-0.10	-0.14	0.03	-0.04	-0.06	0.07
15.8	15.83	-0.12	-0.15	0.06	-0.04	-0.07	0.08
19.8	19.77	-0.09	-0.15	0.03	-0.05	-0.07	0.08

CALCULATED VALUES FOR $\vec{I}_t . \vec{T}$

Event Number	T_2 (10^9 Am/s)	T_3 (10^9 Am/s)	$\lvert\vec{T}\rvert$ (10^9 Am/s)	α (deg)
0.5	55	69	88	321
1.5	82	76	112	313
2.6	96	90	132	313
4.1	95	91	132	314
5.4	99	95	137	314
7.5	103	119	158	319
9.7	97	112	148	319
12.7	71	108	130	327
15.8	61	126	140	334
19.8	81	114	140	325

Figure **10.2.9.B.4** Tabulation of peak values for each event from waveform set for rocket triggered lightning

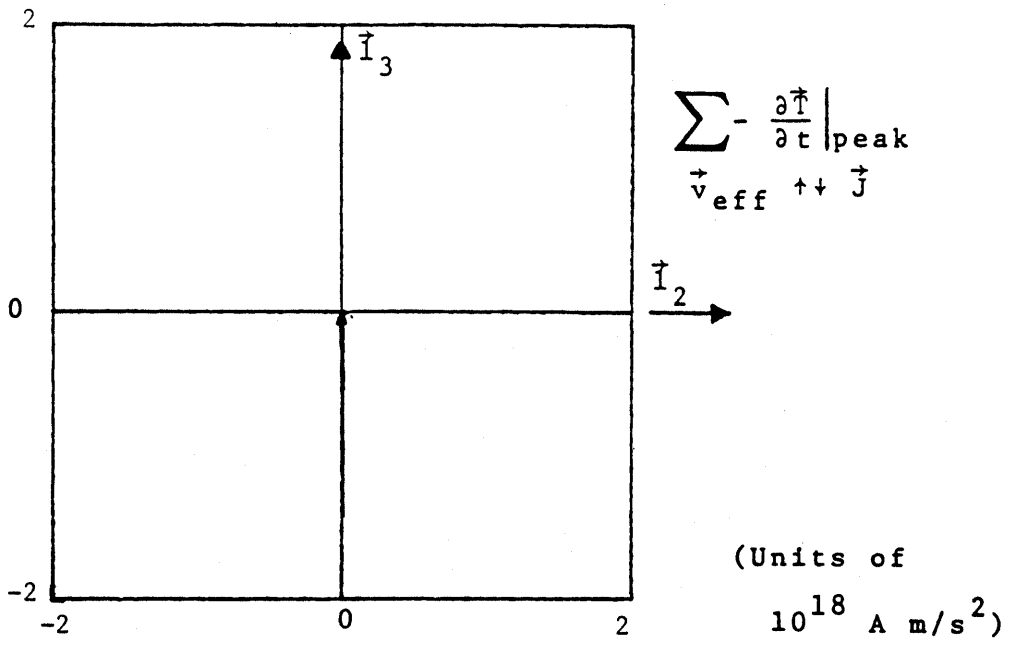
Yeardate: 81226 N.S.T.:142024.343

$\phi = 148^{o}$; $\theta = 68^{o}$; r = 368 m

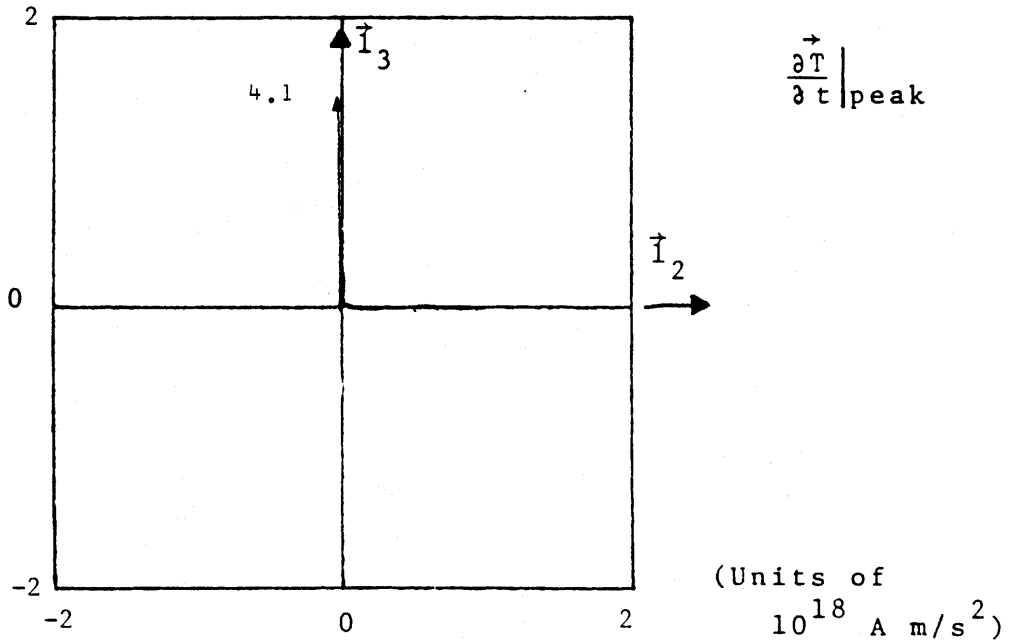
Event Number	Time (μs)	$Z_o \Delta D_z$ (μT)	ΔB_E (μT)	ΔB_N (μT)	ΔB_h (μT)	ΔB_e (μT)	$\lvert\Delta\vec{B}\rvert$ (μT)
4.2	4.16	-0.61	-0.71	0.47	0.03	-0.43	0.43
9.3	9.29	-18.23	-6.48	3.63	-0.48	-3.71	3.74

CALCULATED VALUES FOR $\vec{I}_t . \vec{T}$

Event Number	T_2 (10^9 Am/s)	T_3 (10^9 Am/s)	$\lvert\vec{T}\rvert$ (10^9 Am/s)	α (deg)
4.2	-32	471	472	4
9.3	526	4093	4127	353



Effective reconstruction of negative streamer

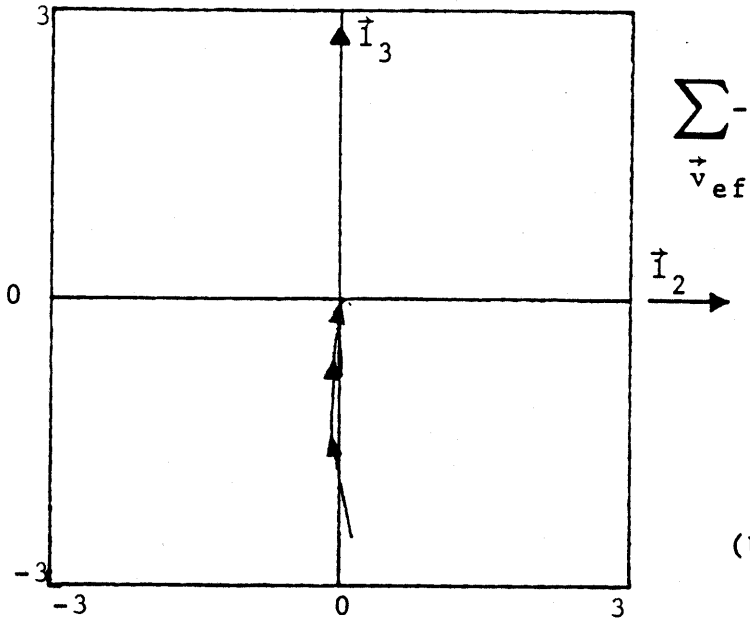


Peaks of $\partial\vec{T}/\partial t$

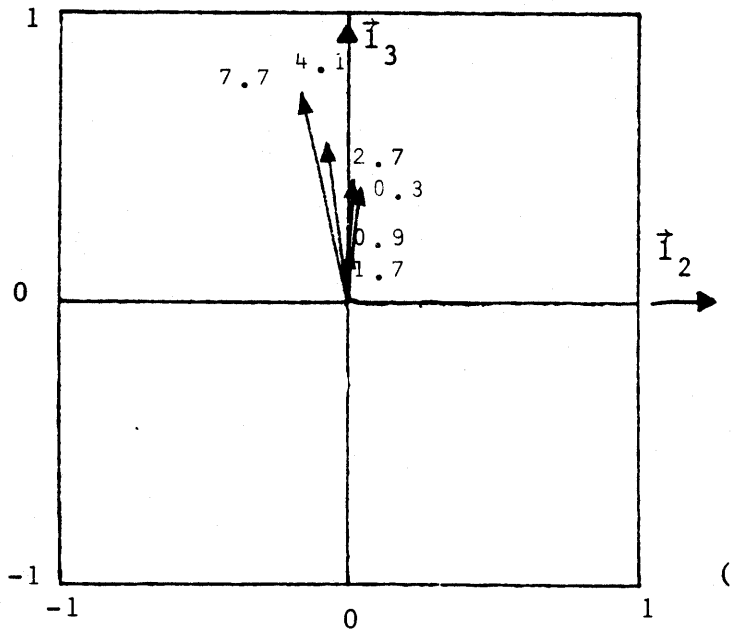
ϕ = 172° θ = 80° r = 346 m

Date: 81226 M.S.T.: 14:20:24.128

Figure 10.2.10.A.1 $\partial\vec{T}/\partial t$ for rocket triggered lightning



Effective reconstruction of negative streamer

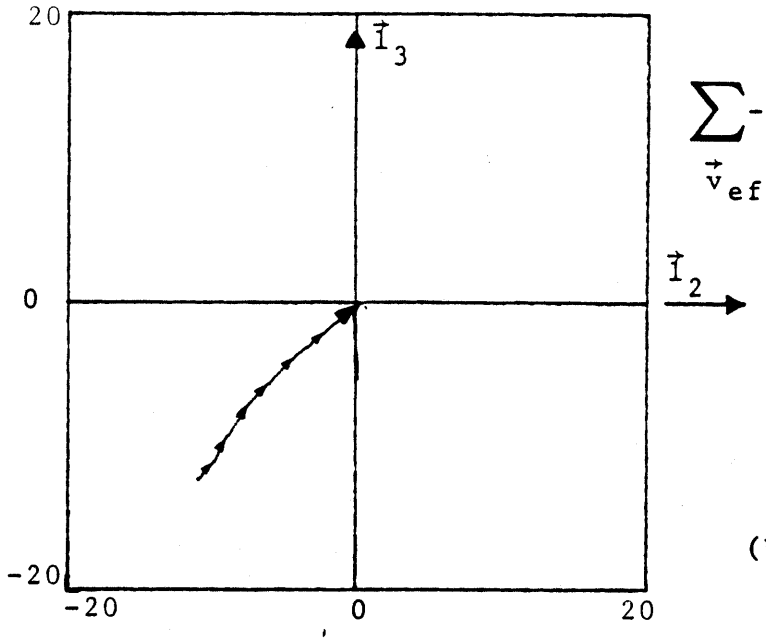


Peaks of $\partial \vec{I}/\partial t$

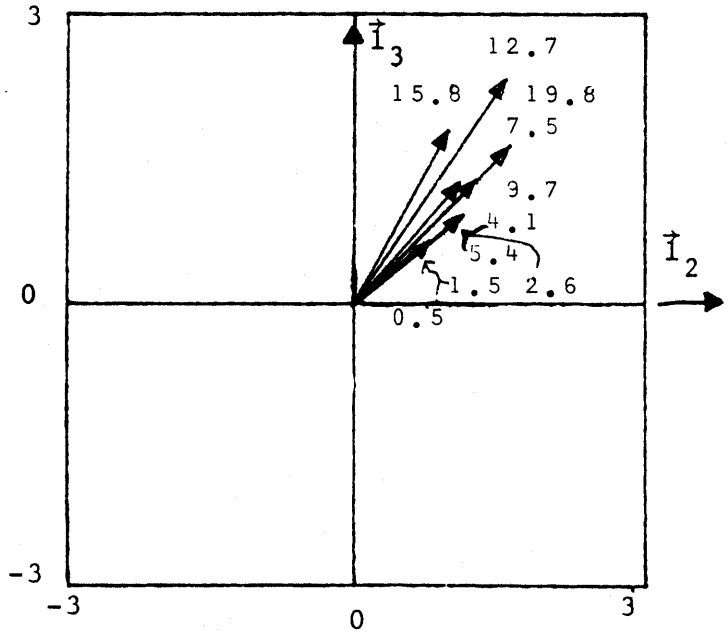
$\phi = 128^o$ $\theta = 90^o$ r = 341 m

Date: 81226 M.S.T.: 14:20:24.168

Figure 10.2.10.A.2 $\partial \vec{I}/\partial t$ for rocket triggered lightning



Effective reconstruction of negative streamer

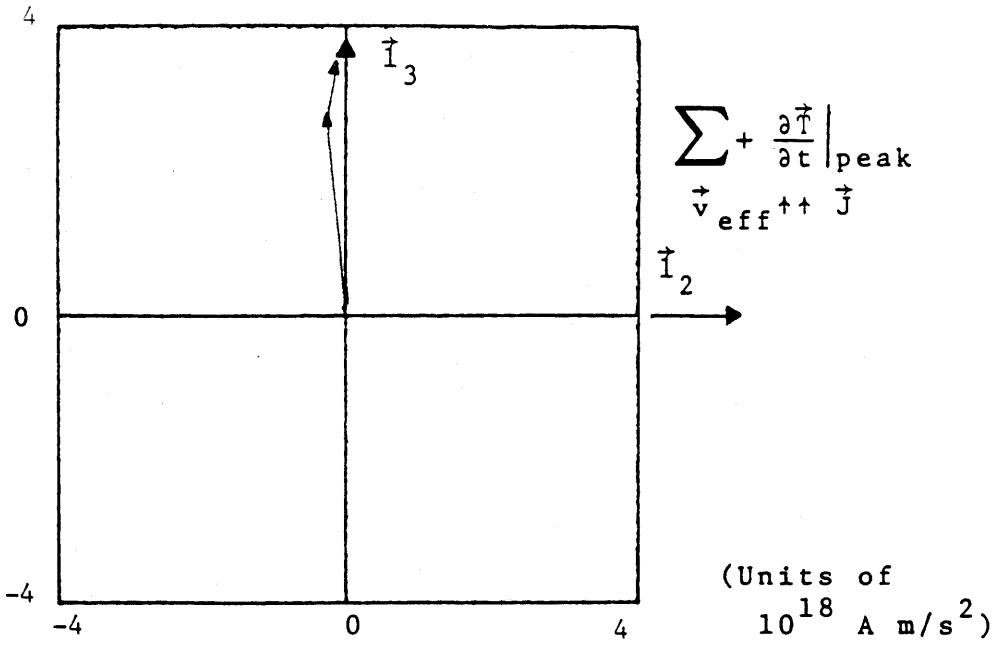


Peaks of $\partial\vec{T}/\partial t$

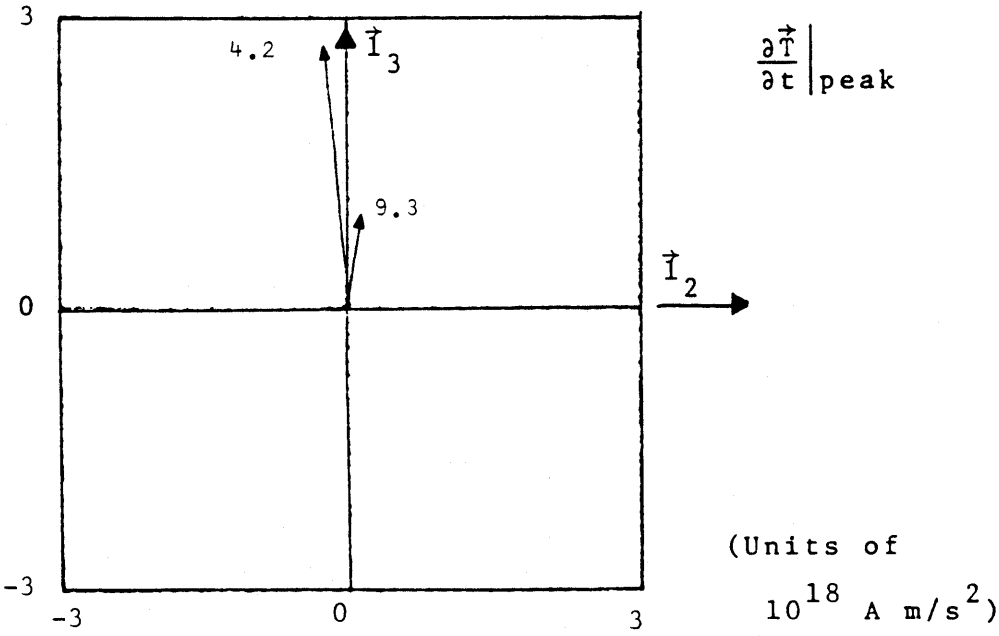
$\phi = 134^\circ$ $\theta = 37^\circ$ r = 567 m

Date: 81226 M.S.T.: 14:20:24.208

Figure 10.2.10.A.3 $\partial\vec{T}/\partial t$ for rocket triggered lightning



Effective reconstruction of positive streamer

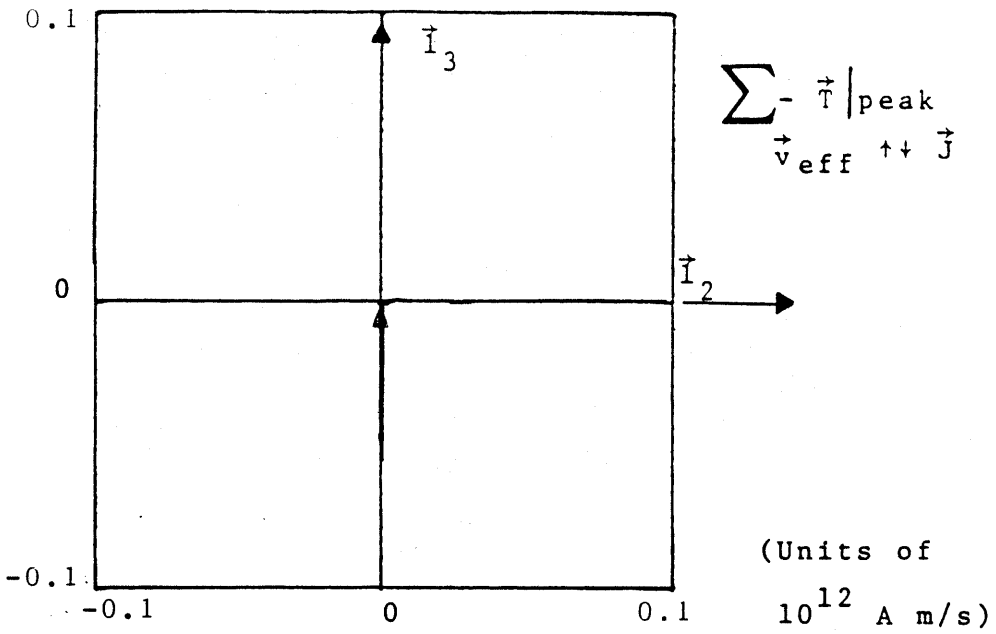


Peaks of $\partial\vec{I}/\partial t$

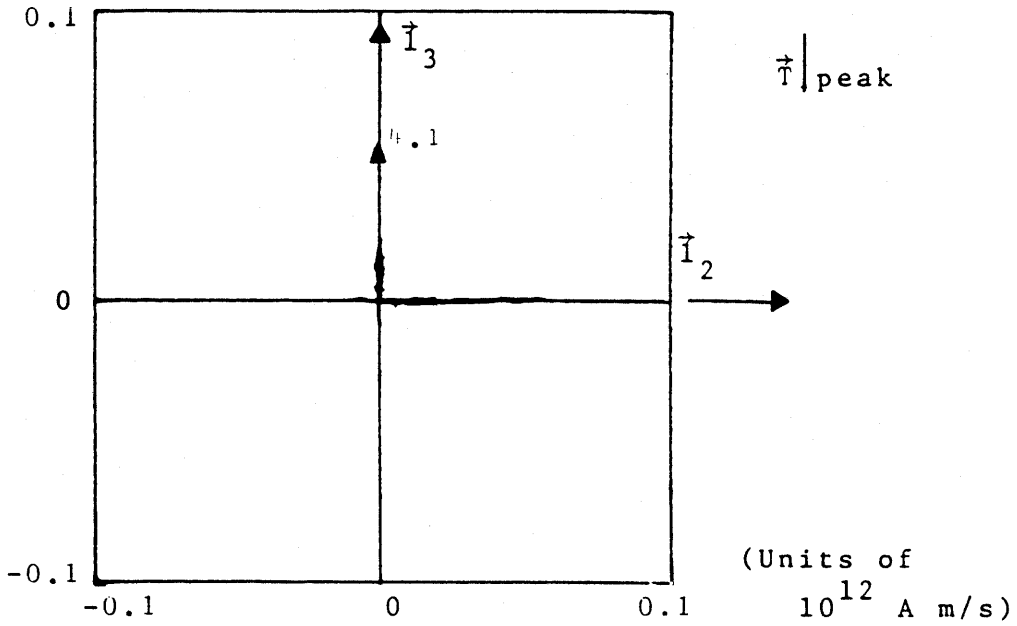
ϕ = 152° θ = 73° r = 357 m

Date: 81226 M.S.T.: 14:20:24.348

Figure 10.2.10.A.4 $\partial\vec{I}/\partial t$ for rocket triggered lightning



Effective reconstruction of negative streamer

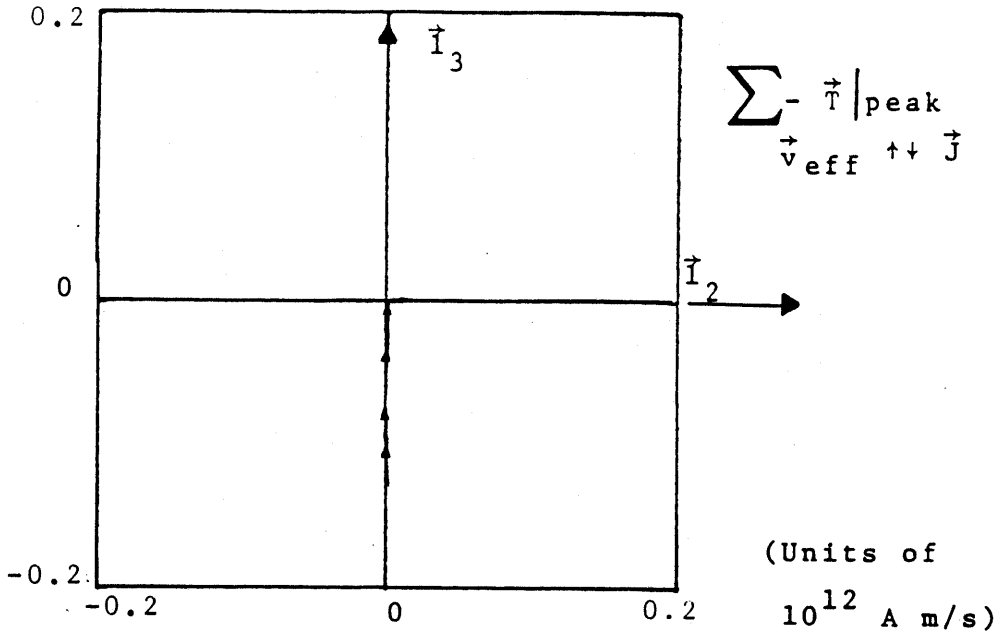


Peaks of $\vec{T}$

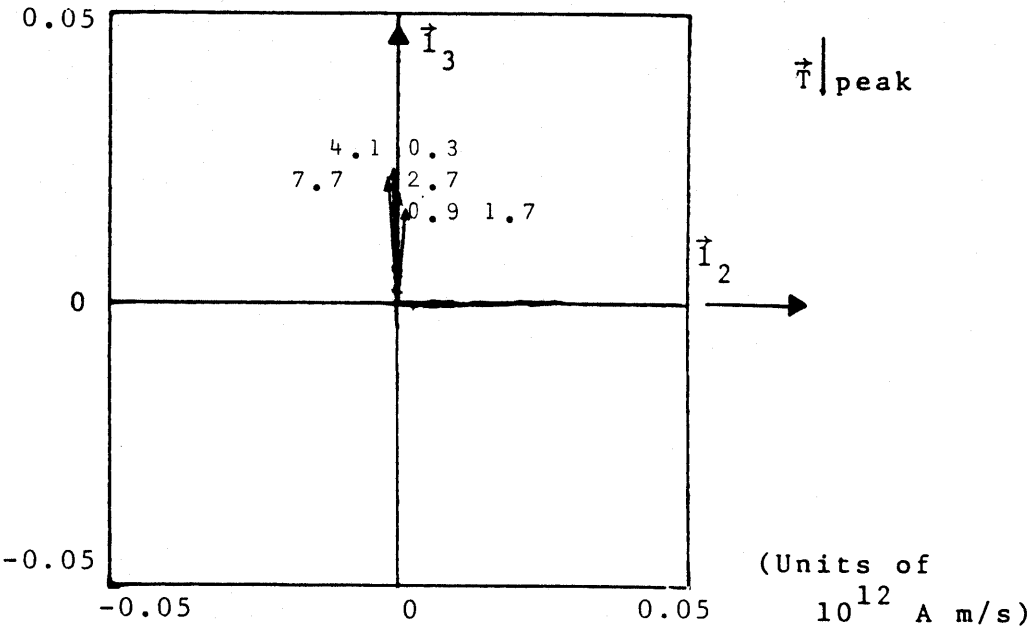
ϕ = 171° θ = 90° r = 341 m

Date: 81226 M.S.T.: 14:20:24.128

Figure 10.2.10.B.1 $\vec{T}$ for rocket triggered lightning



Effective reconstruction of negative streamer

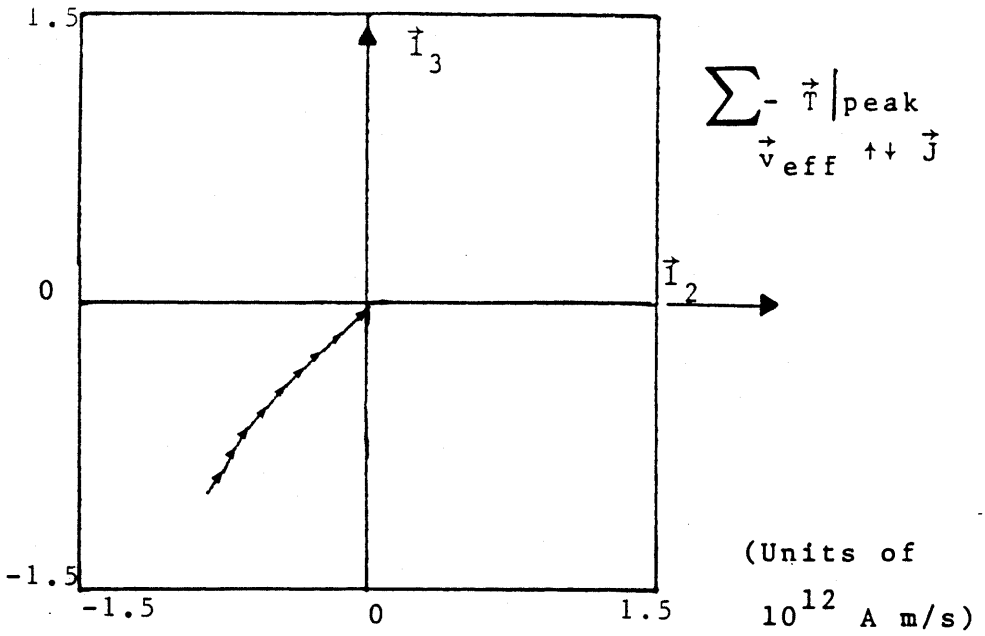


Peaks of $\vec{T}$

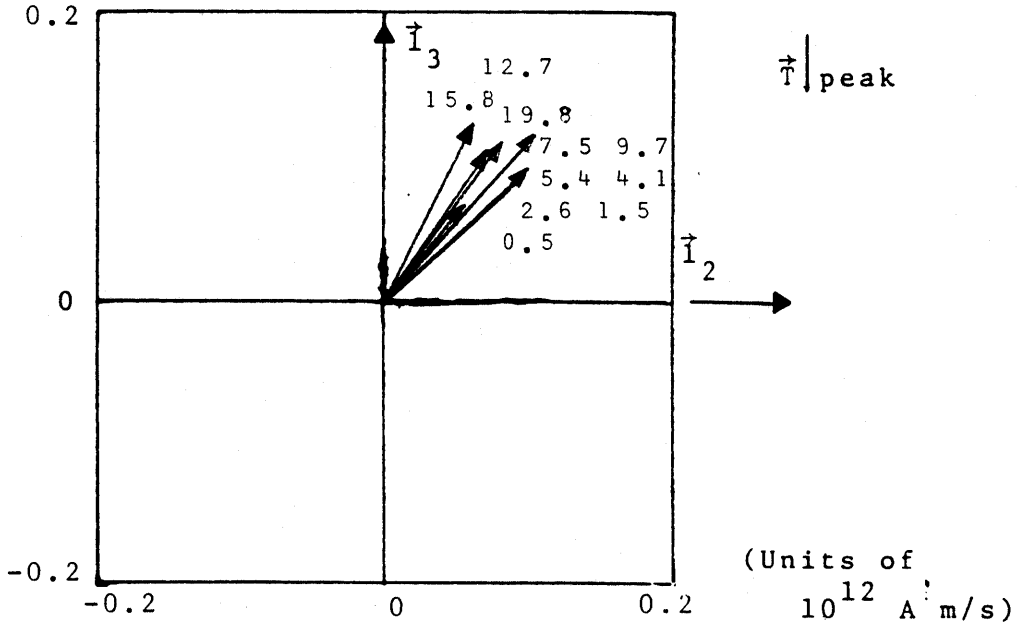
ϕ = 133° θ = 90° r = 341 m

Date: 81226 M.S.T.: 14:20:24.168

Figure 10.2.10.B.2 $\vec{T}$ for rocket triggered lightning



Effective reconstruction of negative streamer

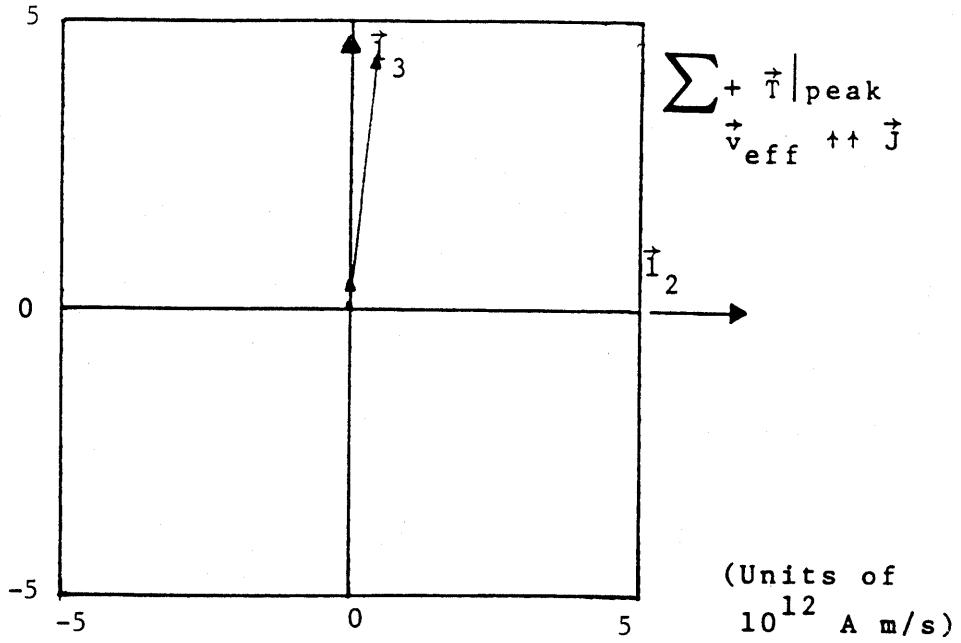


Peaks of $\vec{T}$

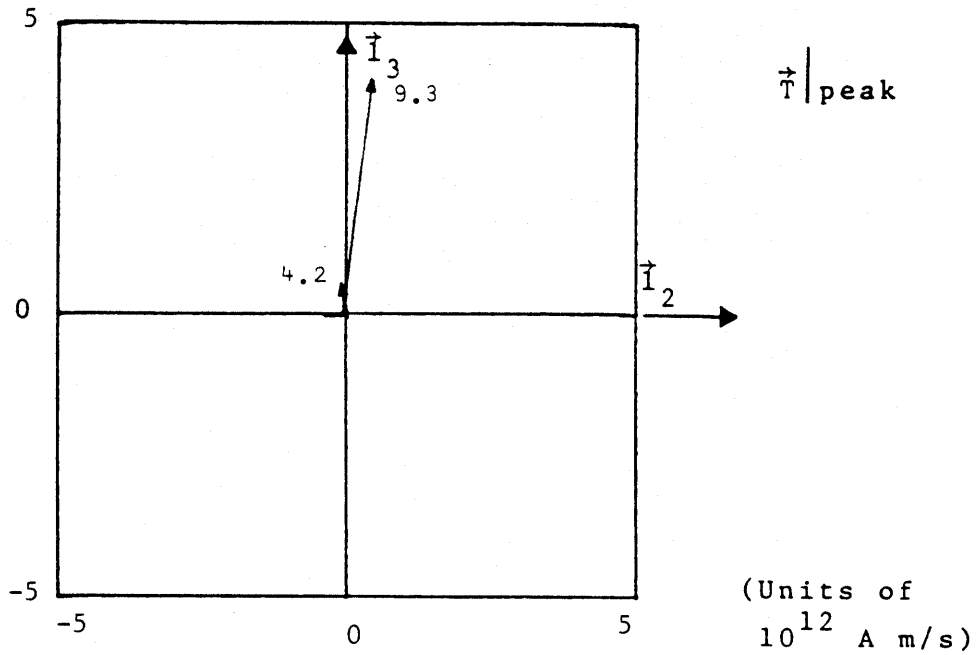
$\phi = 138^{o}$ $\theta = 36^{o}$ r = 580 m

Date: 81226 M.S.T.: 14:20:24.208

Figure 10.2.10.B.3 $\vec{T}$ for rocket triggered lightning



Effective reconstruction of positive streamer



Peaks of $\vec{T}$

$\phi = 148^{o}$ $\theta = 68^{o}$ r = 368 m

Date: 81226 M.S.T.: 14:20:24.348

Figure 10.2.10.B.4 $\vec{T}$ for rocket triggered lightning

10.3 DISTANT RETURN STROKE

Our next example is labelled "distant return stroke." There were two waveform events and 1 TOA event recorded from this lightning flash. The TOA event is coincident in time with the first waveform event.

Figures 10.3.1.A.1 and 10.3.1.A.2 exhibit return stroke characteristics. The second data window shows a periodic waveform occurring every 3.5 μs. The time separation for these two events 718 ms, is an order of magnitude greater than the separation of many of the events in other data sets.

The acoustic location plot does not give a good indication where the lightning flash may have come to ground. The range of 3773 m may not be too accurate in this case. This was a distant stroke and not visible through the clouds to the whole-sky camera. No visible comparison can be made.

The first waveform event and TOA event differ in position by 12^{o} azimuth when calculated from derivative data. Field waveform data yields a better agreement to within 3^{o}. Part of this error comes from large changes in ϕ at the horizon for very small time differences between the TOA channels. In general, we have found that derivative waveform data is more accurate in determining source locations.

Event 4.3 in Fig. 10.3.9.B.1 lists Υ as 6.5×10^{12} Am/s. Peak current for this pulse is 65 kA. This is the maximum current value we have seen in this data analysis. Unfortunately, no Biomation trigger is available to determine in which part of the discharge this event occurred.

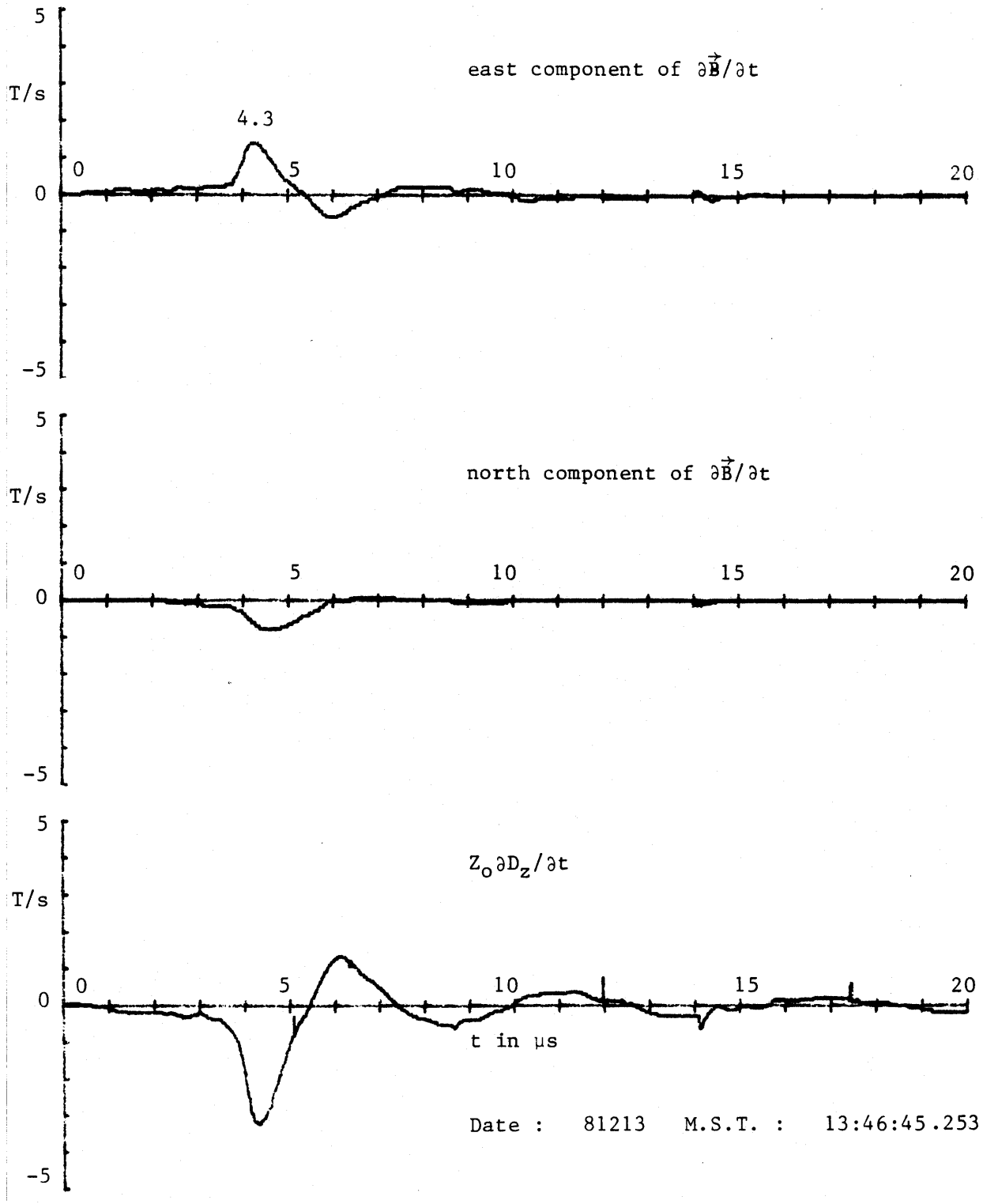


Figure 10.3.1.A.1 Derivative fields from distant return stroke

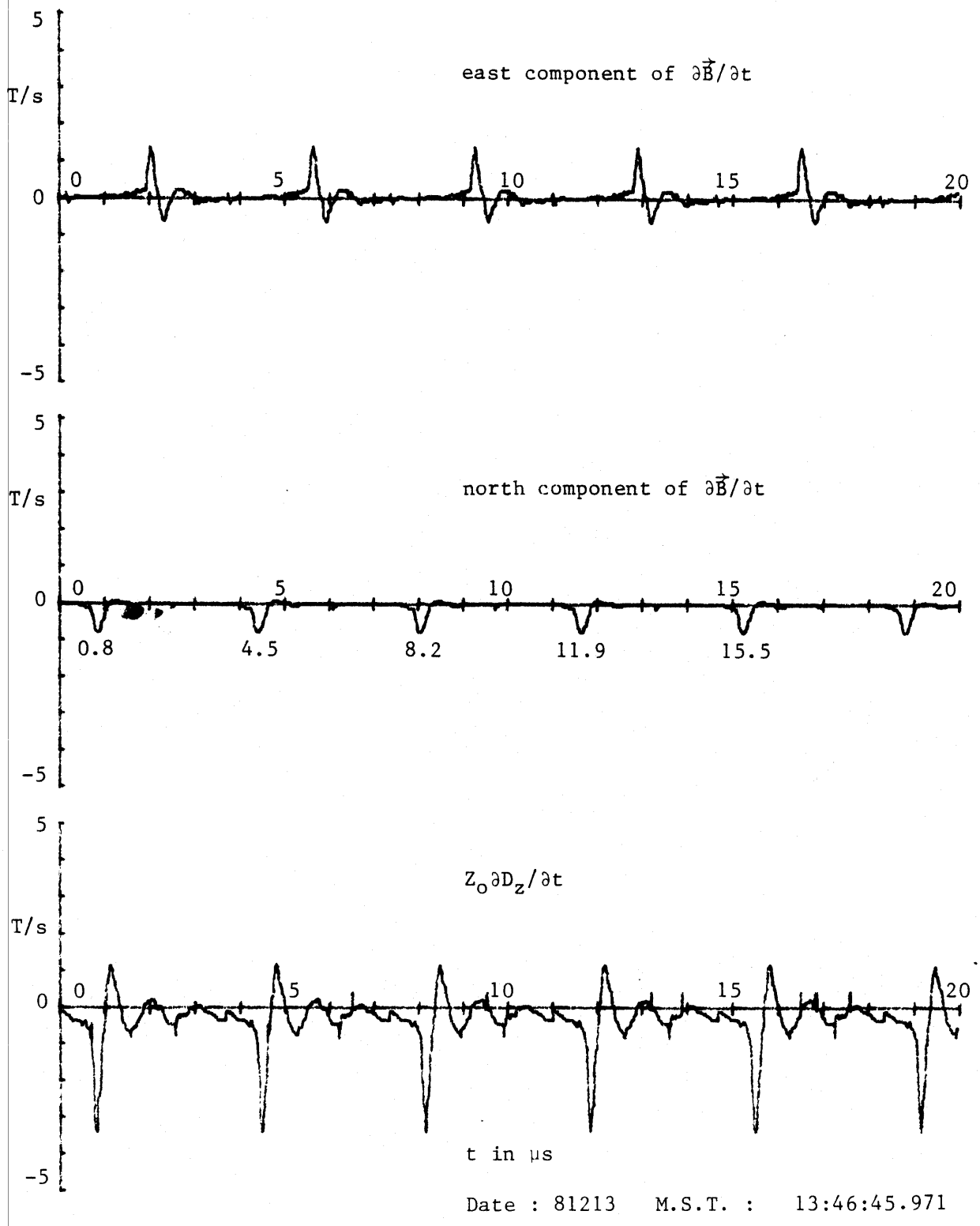


Figure 10.3.1.A.2 Derivative fields from distant return stroke

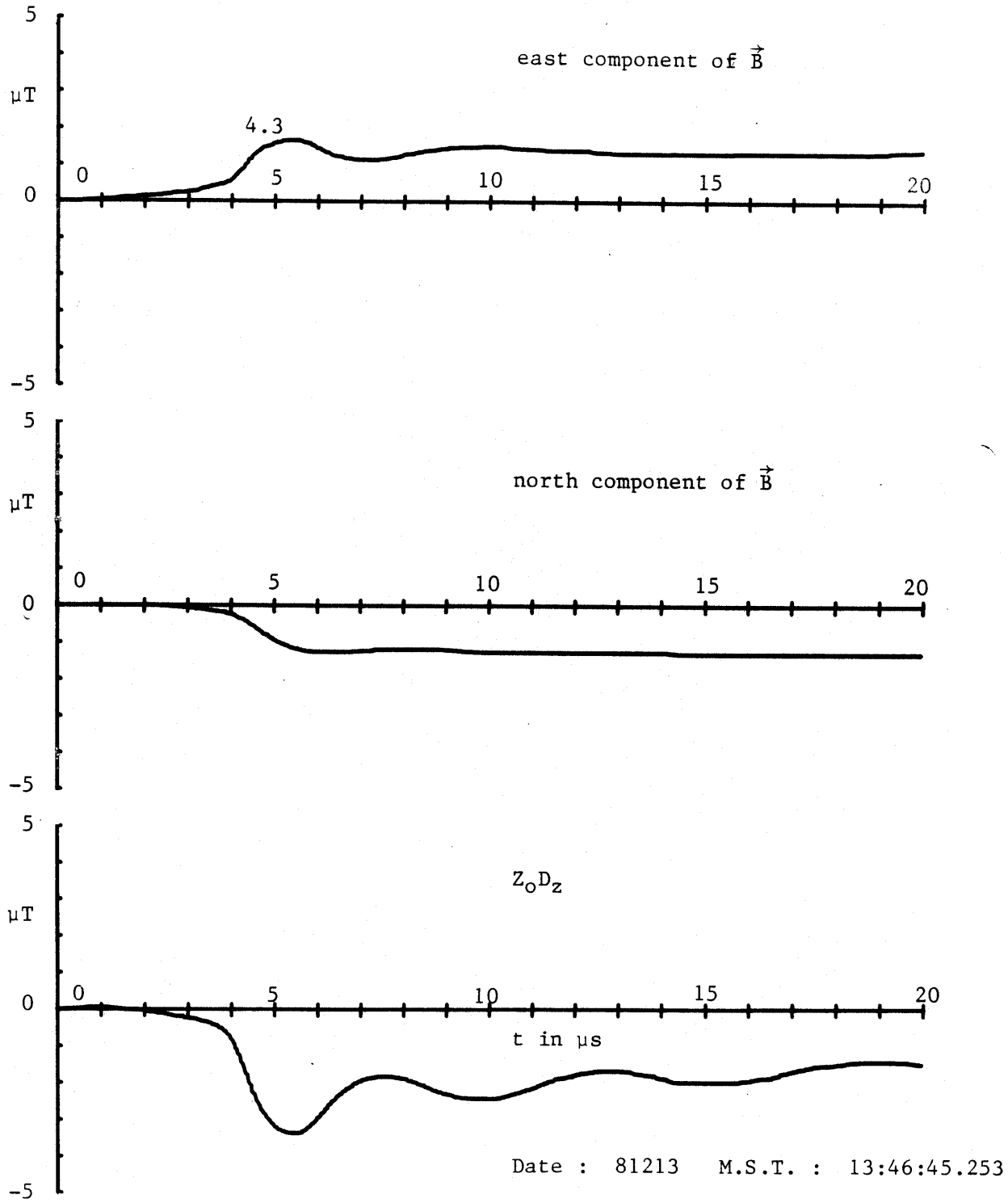


Figure 10.3.1.B.1 Fields from distant return stroke

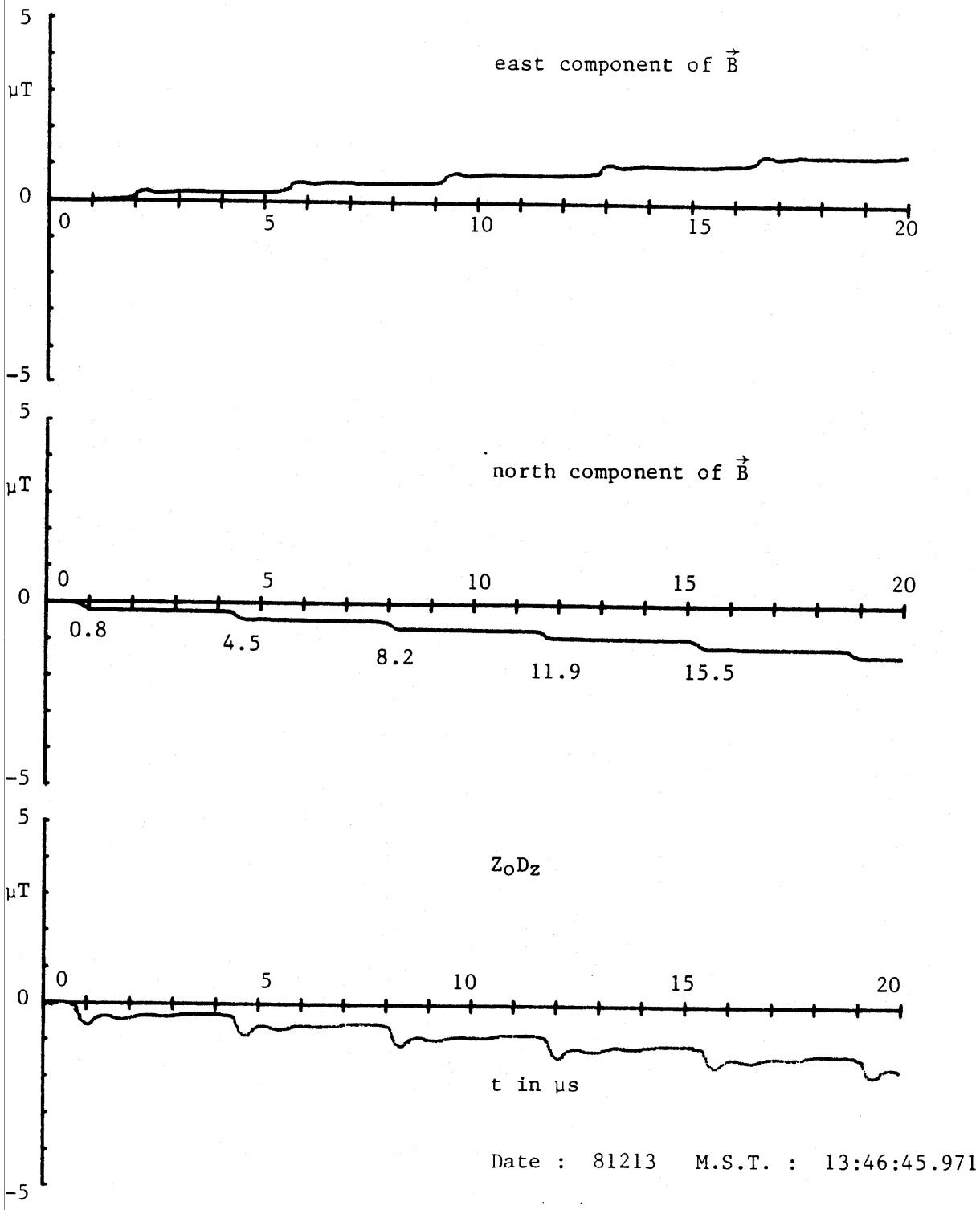


Figure 10.3.1.B.2 Fields from distant return stroke

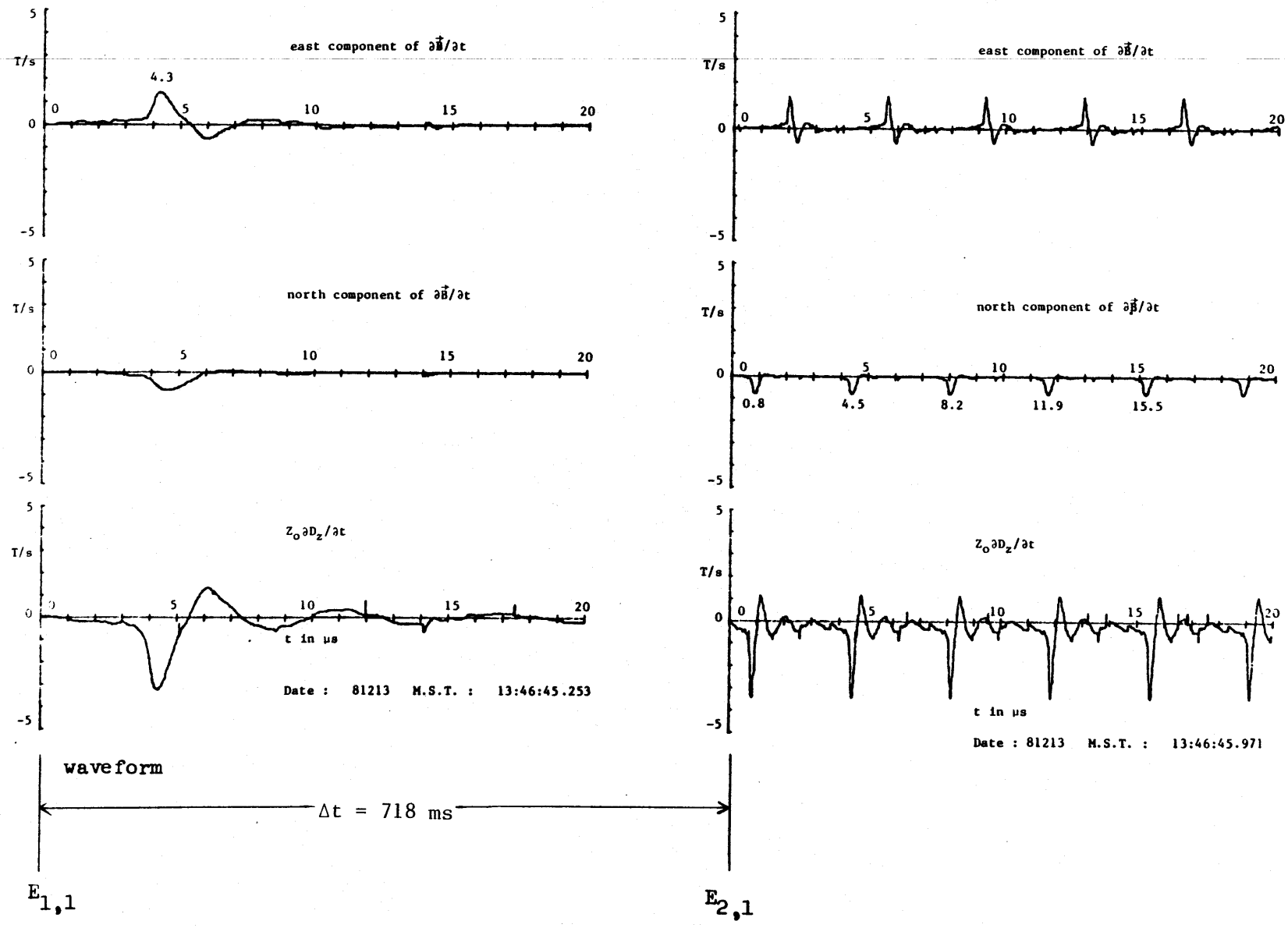


Figure 10.3.2 Time history of waveform and TOA events from distant return stroke

Figure 10.3.3.a.1 Digital data for event 4.3

[ ] = baseline which is subtracted for peaks and numerical integration

Yeardate: 81213 Time: 13:46:45.253 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
3.19	-0.078	-0.234	-0.353	-0.000	-0.000	-0.000
3.20	-0.078	-0.234	-0.412	-0.000	-0.000	-0.001
3.21	-0.078	-0.234	-0.412	-0.000	-0.000	-0.001
3.22	-0.078	-0.234	-0.412	-0.000	-0.000	-0.002
3.23	-0.078	-0.234	-0.412	-0.000	-0.000	-0.002
3.24	-0.078	-0.234	-0.412	-0.000	-0.000	-0.003
3.25	-0.078	-0.234	-0.412	-0.000	-0.000	-0.004
3.26	-0.078	-0.234	-0.412	-0.000	-0.000	-0.004
3.27	-0.078	-0.234	-0.412	-0.000	-0.000	-0.005
3.28	-0.078	-0.234	-0.412	-0.000	-0.000	-0.005
3.29	-0.078	-0.234	-0.412	-0.000	-0.000	-0.006
3.30	-0.078	-0.234	-0.412	-0.000	-0.000	-0.007
3.31	-0.078	-0.234	-0.471	-0.000	-0.000	-0.008
3.32	-0.078	-0.234	-0.471	-0.000	-0.000	-0.009
3.33	-0.078	-0.234	-0.471	-0.000	-0.000	-0.010
3.34	-0.078	-0.234	-0.471	-0.000	-0.000	-0.011
3.35	-0.078	-0.234	-0.471	-0.000	-0.000	-0.012
3.36	-0.078	-0.234	-0.471	-0.000	-0.000	-0.014
3.37	-0.078	-0.234	-0.471	-0.000	-0.000	-0.015
3.38	-0.078	-0.234	-0.471	-0.000	-0.000	-0.016
3.39	-0.078	-0.234	-0.471	-0.000	-0.000	-0.017
3.40	-0.078	-0.234	-0.471	-0.000	-0.000	-0.018
3.41	-0.078	-0.234	-0.471	-0.000	-0.000	-0.020
3.42	-0.078	-0.234	-0.471	-0.000	-0.000	-0.021
3.43	-0.078	-0.234	-0.471	-0.000	-0.000	-0.022
3.44	-0.078	-0.234	-0.471	-0.000	-0.000	-0.023
3.45	-0.078	-0.234	-0.471	-0.000	-0.000	-0.024
3.46	-0.078	-0.234	-0.471	-0.000	-0.000	-0.025
3.47	-0.078	-0.234	-0.471	-0.000	-0.000	-0.027
3.48	-0.078	-0.234	-0.471	-0.000	-0.000	-0.028
3.49	-0.078	-0.234	-0.471	-0.000	-0.000	-0.029
3.50	-0.078	-0.234	-0.471	-0.000	-0.000	-0.030
3.51	-0.078	-0.234	-0.471	-0.000	-0.000	-0.031
3.52	-0.078	-0.234	-0.530	-0.000	-0.000	-0.033
3.53	-0.078	-0.234	-0.530	-0.000	-0.000	-0.035
3.54	-0.078	-0.234	-0.530	-0.000	-0.000	-0.037
3.55	-0.078	-0.234	-0.530	-0.000	-0.000	-0.038
3.56	-0.078	-0.234	-0.530	-0.000	-0.000	-0.040
3.57	-0.078	-0.234	-0.530	-0.000	-0.000	-0.042
3.58	-0.078	-0.234	-0.530	-0.000	-0.000	-0.044
3.59	-0.078	-0.234	-0.530	-0.000	-0.000	-0.046
3.60	-0.078	-0.234	-0.589	-0.000	-0.000	-0.048
3.61	-0.078	-0.234	-0.589	-0.000	-0.000	-0.050
3.62	-0.078	-0.234	-0.589	-0.000	-0.000	-0.053
3.63	-0.078	-0.234	-0.589	-0.000	-0.000	-0.055

Figure 10.3.3.a.1 Digital data for event 4.3 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
3.64	-0.078	-0.234	-0.648	-0.000	-0.000	-0.058
3.65	-0.078	-0.234	-0.648	-0.000	-0.000	-0.061
3.66	-0.078	-0.234	-0.648	-0.000	-0.000	-0.064
3.67	-0.078	-0.234	-0.648	-0.000	-0.000	-0.067
3.68	0.000	-0.234	-0.648	0.001	-0.000	-0.070
3.69	0.000	-0.234	-0.707	0.001	-0.000	-0.073
3.70	0.000	-0.234	-0.707	0.002	-0.000	-0.077
3.71	0.000	-0.234	-0.707	0.003	-0.000	-0.080
3.72	0.000	-0.234	-0.707	0.004	-0.000	-0.084
3.73	0.000	-0.234	-0.766	0.005	-0.000	-0.088
3.74	0.000	-0.234	-0.766	0.005	-0.000	-0.092
3.75	0.000	-0.234	-0.766	0.006	-0.000	-0.096
3.76	0.000	-0.234	-0.766	0.007	-0.000	-0.100
3.77	0.000	-0.234	-0.825	0.008	-0.000	-0.105
3.78	0.000	-0.234	-0.825	0.009	-0.000	-0.110
3.79	0.000	-0.313	-0.825	0.009	-0.001	-0.115
3.80	0.000	-0.313	-0.884	0.010	-0.002	-0.120
3.81	0.000	-0.313	-0.884	0.011	-0.003	-0.125
3.82	0.000	-0.313	-0.943	0.012	-0.003	-0.131
3.83	0.078	-0.313	-0.943	0.013	-0.004	-0.137
3.84	0.078	-0.313	-1.001	0.015	-0.005	-0.143
3.85	0.078	-0.313	-1.001	0.016	-0.006	-0.150
3.86	0.156	-0.313	-1.001	0.019	-0.007	-0.156
3.87	0.156	-0.313	-1.001	0.021	-0.007	-0.163
3.88	0.156	-0.313	-1.060	0.023	-0.008	-0.170
3.89	0.156	-0.313	-1.060	0.026	-0.009	-0.177
3.90	0.156	-0.391	-1.119	0.028	-0.010	-0.185
3.91	0.234	-0.391	-1.178	0.031	-0.012	-0.193
3.92	0.234	-0.391	-1.237	0.034	-0.014	-0.202
3.93	0.234	-0.391	-1.237	0.037	-0.015	-0.211
3.94	0.313	-0.391	-1.296	0.041	-0.017	-0.220
3.95	0.313	-0.391	-1.355	0.045	-0.018	-0.230
3.96	0.313	-0.391	-1.355	0.049	-0.020	-0.240
3.97	0.313	-0.391	-1.414	0.053	-0.021	-0.251
3.98	0.391	-0.391	-1.473	0.058	-0.023	-0.262
3.99	0.469	-0.391	-1.532	0.063	-0.025	-0.274
4.00	0.469	-0.391	-1.649	0.069	-0.026	-0.287
4.01	0.469	-0.391	-1.649	0.074	-0.028	-0.300
4.02	0.547	-0.391	-1.767	0.080	-0.029	-0.314
4.03	0.547	-0.469	-1.885	0.087	-0.032	-0.329
4.04	0.547	-0.469	-1.885	0.093	-0.034	-0.344
4.05	0.625	-0.469	-2.062	0.100	-0.036	-0.361
4.06	0.625	-0.469	-2.121	0.107	-0.039	-0.379
4.07	0.703	-0.469	-2.121	0.115	-0.041	-0.397
4.08	0.703	-0.469	-2.238	0.123	-0.043	-0.416
4.09	0.703	-0.469	-2.297	0.130	-0.046	-0.435
4.10	0.859	-0.547	-2.356	0.140	-0.049	-0.455
4.11	0.859	-0.547	-2.415	0.149	-0.052	-0.476
4.12	0.859	-0.547	-2.533	0.158	-0.055	-0.498
4.13	0.938	-0.547	-2.592	0.169	-0.058	-0.520
4.14	0.938	-0.547	-2.592	0.179	-0.061	-0.542

Figure 10.3.3.a.1 Digital data for event 4.3(continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
4.15	0.938	-0.547	-2.828	0.189	-0.064	-0.567
4.16	0.938	-0.625	-2.769	0.199	-0.068	-0.591
4.17	0.938	-0.625	-2.828	0.209	-0.072	-0.616
4.18	1.016	-0.625	-3.004	0.220	-0.076	-0.643
4.19	1.016	-0.625	-3.004	0.231	-0.080	-0.669
4.20	1.016	-0.625	-3.004	0.242	-0.084	-0.696
4.21	1.094	-0.625	-3.004	0.254	-0.088	-0.722
4.22	1.094	-0.703	-3.063	0.265	-0.093	-0.749
4.23	1.094	-0.703	-3.122	0.277	-0.097	-0.777
4.24	1.094	-0.703	-3.181	0.289	-0.102	-0.805
4.25	1.094	-0.703	-3.181	0.301	-0.107	-0.833
4.26	1.094	-0.703	-3.240	0.312	-0.111	-0.862
4.27	1.094	-0.703	-3.240	0.324	-0.116	-0.891
4.28	1.094	-0.703	-3.240	0.336	-0.121	-0.920
4.29	1.094	-0.703	-3.240	0.348	-0.125	-0.949
4.30	1.094	-0.703	-3.240	0.359	-0.130	-0.978
4.31	1.094	-0.703	-3.299	0.371	-0.135	-1.007
4.32	1.094	-0.781	-3.299	0.383	-0.140	-1.037
4.33	1.094	-0.781	-3.299	0.394	-0.146	-1.066
4.34	1.094	-0.781	-3.299	0.406	-0.151	-1.096
4.35	1.094	-0.781	-3.299	0.418	-0.157	-1.125
4.36	1.094	-0.781	-3.299	0.430	-0.162	-1.154
4.37	1.094	-0.781	-3.299	0.441	-0.168	-1.184
4.38	1.094	-0.781	-3.240	0.453	-0.173	-1.213
4.39	1.094	-0.781	-3.240	0.465	-0.179	-1.242
4.40	1.094	-0.781	-3.299	0.476	-0.184	-1.271
4.41	1.094	-0.781	-3.240	0.488	-0.190	-1.300
4.42	1.016	-0.859	-3.240	0.499	-0.196	-1.329
4.43	1.016	-0.859	-3.240	0.510	-0.202	-1.358
4.44	1.016	-0.859	-3.240	0.521	-0.208	-1.387
4.45	1.016	-0.859	-3.181	0.532	-0.215	-1.415
4.46	1.016	-0.859	-3.181	0.543	-0.221	-1.443
4.47	1.016	-0.859	-3.122	0.554	-0.227	-1.471
4.48	0.938	-0.859	-3.122	0.564	-0.233	-1.499
4.49	0.859	-0.859	-3.122	0.573	-0.240	-1.526
4.50	0.859	-0.859	-3.122	0.583	-0.246	-1.554
4.51	0.938	-0.859	-3.122	0.593	-0.252	-1.582
4.52	0.859	-0.859	-3.063	0.602	-0.258	-1.609
4.53	0.859	-0.859	-3.004	0.612	-0.265	-1.635
4.54	0.859	-0.859	-2.886	0.621	-0.271	-1.661
4.55	0.859	-0.859	-2.886	0.630	-0.277	-1.686
4.56	0.859	-0.859	-2.945	0.640	-0.283	-1.712
4.57	0.859	-0.859	-2.886	0.649	-0.290	-1.737
4.58	0.781	-0.859	-2.828	0.658	-0.296	-1.762
4.59	0.781	-0.859	-2.886	0.666	-0.302	-1.787
4.60	0.703	-0.859	-2.828	0.674	-0.308	-1.812
4.61	0.703	-0.859	-2.769	0.682	-0.315	-1.836
4.62	0.703	-0.859	-2.769	0.690	-0.321	-1.860
4.63	0.703	-0.859	-2.592	0.697	-0.327	-1.883
4.64	0.625	-0.859	-2.592	0.705	-0.333	-1.905
4.65	0.625	-0.859	-2.592	0.712	-0.340	-1.927

Figure 10.3.3.a.1 Digital data for event 4.3(continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
4.66	0.625	-0.859	-2.592	0.719	-0.346	-1.950
4.67	0.625	-0.859	-2.533	0.726	-0.352	-1.972
4.68	0.625	-0.859	-2.356	0.733	-0.358	-1.992
4.69	0.547	-0.859	-2.356	0.739	-0.365	-2.012
4.70	0.547	-0.859	-2.356	0.745	-0.371	-2.032
4.71	0.547	-0.859	-2.356	0.751	-0.377	-2.052
4.72	0.547	-0.859	-2.356	0.758	-0.383	-2.072
4.73	0.547	-0.859	-2.297	0.764	-0.390	-2.091
4.74	0.547	-0.859	-2.238	0.770	-0.396	-2.110
4.75	0.469	-0.859	-2.180	0.776	-0.402	-2.128
4.76	0.469	-0.859	-2.180	0.781	-0.408	-2.147
4.77	0.469	-0.859	-2.121	0.787	-0.415	-2.164
4.78	0.391	-0.859	-2.121	0.791	-0.421	-2.182
4.79	0.391	-0.859	-2.062	0.796	-0.427	-2.199
4.80	0.391	-0.859	-1.944	0.801	-0.433	-2.215
4.81	0.391	-0.859	-2.003	0.805	-0.440	-2.231
4.82	0.313	-0.859	-1.944	0.809	-0.446	-2.247
4.83	0.313	-0.859	-1.885	0.813	-0.452	-2.263
4.84	0.313	-0.859	-1.826	0.817	-0.458	-2.277
4.85	0.234	-0.859	-1.767	0.820	-0.465	-2.292
4.86	0.234	-0.859	-1.767	0.823	-0.471	-2.306
4.87	0.234	-0.859	-1.708	0.826	-0.477	-2.319
4.88	0.234	-0.859	-1.708	0.829	-0.483	-2.333
4.89	0.234	-0.781	-1.649	0.833	-0.489	-2.346
4.90	0.234	-0.781	-1.590	0.836	-0.494	-2.358
4.91	0.234	-0.781	-1.590	0.839	-0.500	-2.371
4.92	0.156	-0.781	-1.532	0.841	-0.505	-2.382
4.93	0.156	-0.781	-1.532	0.844	-0.511	-2.394
4.94	0.156	-0.781	-1.473	0.846	-0.516	-2.405
4.95	0.156	-0.781	-1.473	0.848	-0.522	-2.417
4.96	0.156	-0.781	-1.414	0.851	-0.527	-2.427
4.97	0.156	-0.781	-1.355	0.853	-0.533	-2.437
4.98	0.078	-0.781	-1.355	0.854	-0.538	-2.447
4.99	0.078	-0.781	-1.355	0.856	-0.544	-2.457
5.00	0.078	-0.781	-1.296	0.858	-0.549	-2.467
5.01	0.078	-0.781	-1.237	0.859	-0.555	-2.475
5.02	0.078	-0.781	-1.237	0.861	-0.560	-2.484
5.03	0.000	-0.781	-1.178	0.861	-0.566	-2.493
5.04	0.000	-0.703	-1.119	0.862	-0.570	-2.500
5.05	0.000	-0.703	-1.119	0.863	-0.575	-2.508
5.06	0.000	-0.703	-1.060	0.864	-0.580	-2.515
5.07	0.000	-0.703	-1.001	0.865	-0.584	-2.521
5.08	0.000	-0.703	-0.884	0.865	-0.589	-2.527
5.09	0.000	-0.703	-0.943	0.866	-0.594	-2.533
5.10	0.000	-0.703	-1.001	0.867	-0.598	-2.539
5.11	0.000	-0.703	-0.884	0.868	-0.603	-2.544
5.12	-0.078	-0.703	-0.884	0.868	-0.608	-2.550
5.13	-0.078	-0.703	-0.353	0.868	-0.612	-2.550
5.14	-0.078	-0.625	-0.884	0.868	-0.616	-2.555
5.15	-0.078	-0.625	-0.825	0.868	-0.620	-2.560
5.16	-0.078	-0.625	-0.766	0.868	-0.624	-2.564

Figure 10.3.3.a.1 Digital data for event 4.3(continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
5.17	-0.078	-0.625	-0.707	0.868	-0.628	-2.567
5.18	-0.078	-0.625	-0.707	0.868	-0.632	-2.571
5.19	-0.078	-0.625	-0.648	0.868	-0.636	-2.574
5.20	-0.078	-0.625	-0.648	0.868	-0.640	-2.577
5.21	-0.078	-0.625	-0.648	0.868	-0.644	-2.580
5.22	-0.156	-0.625	-0.589	0.867	-0.648	-2.582
5.23	-0.156	-0.625	-0.530	0.866	-0.652	-2.584
5.24	-0.156	-0.625	-0.530	0.865	-0.655	-2.586
5.25	-0.156	-0.625	-0.530	0.865	-0.659	-2.587
5.26	-0.156	-0.625	-0.530	0.864	-0.663	-2.589
5.27	-0.156	-0.625	-0.530	0.863	-0.667	-2.591
5.28	-0.156	-0.625	-0.471	0.862	-0.671	-2.592
5.29	-0.234	-0.547	-0.471	0.861	-0.674	-2.593
5.30	-0.234	-0.547	-0.471	0.859	-0.677	-2.595
5.31	-0.234	-0.547	-0.412	0.858	-0.680	-2.595
5.32	-0.234	-0.547	-0.412	0.856	-0.684	-2.596
5.33	-0.234	-0.547	-0.353	0.854	-0.687	-2.596
5.34	-0.234	-0.547	-0.353	0.853	-0.690	-2.596
5.35	-0.234	-0.547	-0.353	0.851	-0.693	-2.596
5.36	-0.234	-0.469	-0.295	0.850	-0.695	-2.595
5.37	-0.234	-0.469	-0.295	0.848	-0.698	-2.595
5.38	-0.234	-0.469	-0.295	0.847	-0.700	-2.594
5.39	-0.313	-0.469	-0.236	0.844	-0.702	-2.593
5.40	-0.313	-0.469	-0.236	0.842	-0.705	-2.592
5.41	-0.313	-0.469	-0.236	0.840	-0.707	-2.590
5.42	-0.313	-0.469	-0.177	0.837	-0.709	-2.589
5.43	-0.313	-0.469	-0.177	0.835	-0.712	-2.587
5.44	-0.391	-0.469	-0.118	0.832	-0.714	-2.585
5.45	-0.391	-0.469	-0.118	0.829	-0.716	-2.582
5.46	-0.391	-0.469	-0.118	0.825	-0.719	-2.580
5.47	-0.391	-0.469	-0.059	0.822	-0.721	-2.577
5.48	-0.391	-0.469	-0.059	0.819	-0.724	-2.574
5.49	-0.391	-0.469	-0.059	0.816	-0.726	-2.571
5.50	-0.391	-0.469	0.000	0.813	-0.728	-2.568
5.51	-0.469	-0.469	0.000	0.809	-0.731	-2.564
5.52	-0.469	-0.391	0.059	0.805	-0.732	-2.560
5.53	-0.469	-0.391	0.059	0.801	-0.734	-2.556
5.54	-0.469	-0.391	0.059	0.797	-0.735	-2.552
5.55	-0.469	-0.391	0.177	0.793	-0.737	-2.546
5.56	-0.469	-0.391	0.177	0.790	-0.738	-2.541
5.57	-0.547	-0.391	0.177	0.785	-0.740	-2.536
5.58	-0.547	-0.391	0.177	0.780	-0.742	-2.530
5.59	-0.547	-0.391	0.236	0.775	-0.743	-2.525
5.60	-0.547	-0.391	0.236	0.771	-0.745	-2.519
5.61	-0.625	-0.391	0.295	0.765	-0.746	-2.512
5.62	-0.625	-0.313	0.295	0.760	-0.747	-2.506
5.63	-0.625	-0.313	0.353	0.754	-0.748	-2.499
5.64	-0.625	-0.313	0.412	0.749	-0.749	-2.491
5.65	-0.625	-0.313	0.412	0.743	-0.749	-2.483
5.66	-0.625	-0.313	0.412	0.738	-0.750	-2.476
5.67	-0.703	-0.313	0.471	0.732	-0.751	-2.467

Figure 10.3.3.a.1 Digital data for event 4.3(continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
5.68	-0.703	-0.313	0.471	0.725	-0.752	-2.459
5.69	-0.703	-0.313	0.530	0.719	-0.753	-2.450
5.70	-0.703	-0.313	0.530	0.713	-0.753	-2.442
5.71	-0.703	-0.313	0.589	0.707	-0.754	-2.432
5.72	-0.703	-0.313	0.589	0.700	-0.755	-2.423
5.73	-0.703	-0.234	0.648	0.694	-0.755	-2.413
5.74	-0.781	-0.234	0.648	0.687	-0.755	-2.403
5.75	-0.781	-0.234	0.648	0.680	-0.755	-2.393
5.76	-0.781	-0.234	0.707	0.673	-0.755	-2.382
5.77	-0.781	-0.234	0.707	0.666	-0.755	-2.372
5.78	-0.781	-0.234	0.766	0.659	-0.755	-2.360
5.79	-0.781	-0.234	0.766	0.652	-0.755	-2.349
5.80	-0.781	-0.234	0.766	0.645	-0.755	-2.338
5.81	-0.781	-0.234	0.825	0.638	-0.755	-2.326
5.82	-0.859	-0.234	0.825	0.630	-0.755	-2.314
5.83	-0.859	-0.234	0.825	0.622	-0.755	-2.303
5.84	-0.859	-0.234	0.884	0.615	-0.755	-2.290
5.85	-0.859	-0.234	0.884	0.607	-0.755	-2.278
5.86	-0.859	-0.156	0.884	0.599	-0.754	-2.266
5.87	-0.859	-0.156	0.943	0.591	-0.753	-2.253
5.88	-0.859	-0.156	0.943	0.583	-0.753	-2.240
5.89	-0.859	-0.156	1.001	0.575	-0.752	-2.226
5.90	-0.938	-0.156	1.001	0.567	-0.751	-2.213
5.91	-0.938	-0.156	1.001	0.558	-0.750	-2.199
5.92	-0.938	-0.078	1.060	0.550	-0.749	-2.185
5.93	-0.938	-0.078	1.060	0.541	-0.747	-2.171
5.94	-0.938	-0.078	1.060	0.532	-0.746	-2.157
5.95	-0.938	-0.078	1.119	0.524	-0.744	-2.142
5.96	-0.938	-0.078	1.119	0.515	-0.742	-2.127
5.97	-0.938	-0.078	1.119	0.507	-0.741	-2.112
5.98	-0.938	-0.078	1.178	0.498	-0.739	-2.097
5.99	-0.938	-0.078	1.178	0.489	-0.738	-2.082
6.00	-0.938	-0.078	1.178	0.481	-0.736	-2.066
6.01	-0.938	-0.078	1.178	0.472	-0.735	-2.051
6.02	-0.938	-0.078	1.178	0.464	-0.733	-2.036
6.03	-0.938	-0.078	1.178	0.455	-0.732	-2.021
6.04	-0.938	-0.078	1.237	0.447	-0.730	-2.005
6.05	-0.938	-0.078	1.237	0.438	-0.728	-1.989
6.06	-0.938	-0.078	1.237	0.429	-0.727	-1.973
6.07	-0.938	-0.078	1.237	0.421	-0.725	-1.957
6.08	-0.938	-0.078	1.237	0.412	-0.724	-1.941
6.09	-0.938	-0.078	1.237	0.404	-0.722	-1.925
6.10	-0.938	-0.078	1.237	0.395	-0.721	-1.909
6.11	-0.938	-0.078	1.296	0.386	-0.719	-1.893
6.12	-0.938	-0.078	1.296	0.378	-0.718	-1.876
6.13	-0.938	-0.078	1.296	0.369	-0.716	-1.860
6.14	-0.938	-0.078	1.296	0.361	-0.714	-1.843
6.15	-0.938	-0.078	1.296	0.352	-0.713	-1.827
6.16	-0.938	-0.078	1.296	0.343	-0.711	-1.810
6.17	-0.859	-0.078	1.296	0.336	-0.710	-1.794
6.18	-0.859	-0.078	1.296	0.328	-0.708	-1.777

Figure 10.3.3.a.1 Digital data for event 4.3 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
6.19	-0.859	-0.078	1.296	0.320	-0.707	-1.761
6.20	-0.859	-0.078	1.296	0.312	-0.705	-1.744
6.21	-0.859	-0.078	1.296	0.304	-0.703	-1.728
6.22	-0.859	-0.078	1.296	0.296	-0.702	-1.711
6.23	-0.859	-0.078	1.296	0.289	-0.700	-1.695
6.24	-0.859	-0.078	1.296	0.281	-0.699	-1.678
6.25	-0.859	-0.078	1.237	0.273	-0.697	-1.662
6.26	-0.781	-0.078	1.237	0.266	-0.696	-1.647
6.27	-0.781	-0.078	1.237	0.259	-0.694	-1.631
6.28	-0.781	-0.078	1.237	0.252	-0.693	-1.615
6.29	-0.781	-0.078	1.237	0.245	-0.691	-1.599
6.30	-0.781	-0.078	1.237	0.238	-0.689	-1.583
6.31	-0.781	-0.078	1.178	0.231	-0.688	-1.568
6.32	-0.781	-0.078	1.178	0.224	-0.686	-1.552
6.33	-0.781	-0.078	1.178	0.217	-0.685	-1.537
6.34	-0.781	-0.078	1.178	0.210	-0.683	-1.522
6.35	-0.781	-0.078	1.119	0.203	-0.682	-1.507
6.36	-0.781	-0.078	1.119	0.196	-0.680	-1.492
6.37	-0.781	-0.078	1.178	0.189	-0.679	-1.477
6.38	-0.703	-0.078	1.001	0.182	-0.677	-1.463
6.39	-0.703	-0.078	1.119	0.176	-0.675	-1.449
6.40	-0.703	-0.078	1.178	0.170	-0.674	-1.433
6.41	-0.703	-0.078	1.119	0.164	-0.672	-1.419
6.42	-0.703	-0.078	1.060	0.157	-0.671	-1.405
6.43	-0.625	-0.078	1.060	0.152	-0.669	-1.390
6.44	-0.625	0.000	1.001	0.146	-0.667	-1.377
6.45	-0.625	0.000	1.060	0.141	-0.665	-1.363
6.46	-0.625	0.000	1.060	0.136	-0.662	-1.349
6.47	-0.625	0.000	1.060	0.130	-0.660	-1.334
6.48	-0.625	0.000	1.001	0.125	-0.657	-1.321
6.49	-0.625	0.000	0.943	0.119	-0.655	-1.308
6.50	-0.625	0.000	0.943	0.114	-0.653	-1.295
6.51	-0.625	0.000	0.943	0.108	-0.650	-1.282
6.52	-0.625	0.000	0.943	0.103	-0.648	-1.269
6.53	-0.625	0.000	0.943	0.097	-0.646	-1.256
6.54	-0.625	0.000	0.943	0.092	-0.643	-1.243
6.55	-0.625	0.000	0.884	0.086	-0.641	-1.231
6.56	-0.625	0.000	0.884	0.081	-0.639	-1.218
6.57	-0.547	0.000	0.884	0.076	-0.636	-1.206
6.58	-0.547	0.000	0.884	0.071	-0.634	-1.194
6.59	-0.547	0.000	0.825	0.067	-0.632	-1.182
6.60	-0.547	0.000	0.825	0.062	-0.629	-1.170
6.61	-0.547	0.000	0.825	0.057	-0.627	-1.158
6.62	-0.547	0.000	0.825	0.053	-0.625	-1.147
6.63	-0.547	0.000	0.825	0.048	-0.622	-1.135
6.64	-0.547	0.000	0.825	0.043	-0.620	-1.123
6.65	-0.547	0.000	0.766	0.039	-0.618	-1.112
6.66	-0.547	0.000	0.766	0.034	-0.615	-1.101
6.67	-0.469	0.000	0.766	0.030	-0.613	-1.090
6.68	-0.469	0.000	0.766	0.026	-0.611	-1.078
6.69	-0.469	0.000	0.766	0.022	-0.608	-1.067

Figure 10.3.3.a.1 Digital data for event 4.3 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
6.70	-0.469	0.000	0.707	0.018	-0.606	-1.057
6.71	-0.469	0.000	0.707	0.014	-0.604	-1.046
6.72	-0.469	0.000	0.707	0.010	-0.601	-1.035
6.73	-0.469	0.000	0.707	0.007	-0.599	-1.025
6.74	-0.469	0.000	0.707	0.003	-0.597	-1.014
6.75	-0.469	0.000	0.707	-0.001	-0.594	-1.004
6.76	-0.469	0.000	0.648	-0.005	-0.592	-0.994
6.77	-0.469	0.000	0.648	-0.009	-0.590	-0.984
6.78	-0.469	0.000	0.648	-0.013	-0.587	-0.974
6.79	-0.469	0.000	0.648	-0.017	-0.585	-0.964
6.80	-0.469	0.000	0.648	-0.021	-0.583	-0.954
6.81	-0.469	0.000	0.648	-0.025	-0.580	-0.943
6.82	-0.469	0.000	0.648	-0.029	-0.578	-0.933
6.83	-0.469	0.000	0.589	-0.032	-0.576	-0.924
6.84	-0.391	0.000	0.589	-0.036	-0.573	-0.915
6.85	-0.391	0.000	0.589	-0.039	-0.571	-0.905
6.86	-0.391	0.000	0.589	-0.042	-0.569	-0.896
6.87	-0.391	0.000	0.589	-0.045	-0.566	-0.886
6.88	-0.391	0.000	0.589	-0.048	-0.564	-0.877
6.89	-0.391	0.000	0.589	-0.051	-0.562	-0.868
6.90	-0.391	0.000	0.589	-0.054	-0.559	-0.858
6.91	-0.391	0.000	0.530	-0.057	-0.557	-0.849
6.92	-0.391	0.000	0.530	-0.061	-0.555	-0.840
6.93	-0.391	0.000	0.530	-0.064	-0.552	-0.832
6.94	-0.391	0.000	0.530	-0.067	-0.550	-0.823
6.95	-0.391	0.000	0.530	-0.070	-0.548	-0.814
6.96	-0.391	0.000	0.471	-0.073	-0.545	-0.806
6.97	-0.391	0.000	0.471	-0.076	-0.543	-0.797
6.98	-0.391	0.000	0.471	-0.079	-0.540	-0.789
6.99	-0.391	0.000	0.471	-0.083	-0.538	-0.781
7.00	-0.391	0.000	0.471	-0.086	-0.536	-0.773
7.01	-0.391	0.000	0.471	-0.089	-0.533	-0.765
7.02	-0.391	0.000	0.412	-0.092	-0.531	-0.757
7.03	-0.391	0.000	0.412	-0.095	-0.529	-0.749
7.04	-0.391	0.000	0.412	-0.098	-0.526	-0.742
7.05	-0.391	0.000	0.412	-0.101	-0.524	-0.734
7.06	-0.313	0.000	0.412	-0.104	-0.522	-0.726
7.07	-0.313	0.000	0.412	-0.106	-0.519	-0.719
7.08	-0.313	0.000	0.353	-0.108	-0.517	-0.712
7.09	-0.313	0.000	0.353	-0.111	-0.515	-0.704
7.10	-0.313	0.000	0.353	-0.113	-0.512	-0.697
7.11	-0.313	0.000	0.353	-0.115	-0.510	-0.690
7.12	-0.313	0.000	0.353	-0.118	-0.508	-0.683
7.13	-0.313	0.000	0.353	-0.120	-0.505	-0.676
7.14	-0.313	0.000	0.295	-0.122	-0.503	-0.670
7.15	-0.313	0.000	0.295	-0.125	-0.501	-0.663
7.16	-0.313	0.000	0.295	-0.127	-0.498	-0.657
7.17	-0.313	0.000	0.236	-0.129	-0.496	-0.651
7.18	-0.313	0.000	0.236	-0.132	-0.494	-0.645
7.19	-0.313	0.000	0.236	-0.134	-0.491	-0.639
7.20	-0.313	0.000	0.236	-0.136	-0.489	-0.633

Figure 10.3.3.a.1 Digital data for event 4.3 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
7.21	-0.313	0.000	0.236	-0.139	-0.487	-0.627
7.22	-0.234	0.000	0.177	-0.140	-0.484	-0.622
7.23	-0.234	0.000	0.177	-0.142	-0.482	-0.617
7.24	-0.234	0.000	0.177	-0.143	-0.480	-0.611
7.25	-0.234	0.000	0.177	-0.145	-0.477	-0.606
7.26	-0.234	0.000	0.177	-0.147	-0.475	-0.601
7.27	-0.234	0.000	0.118	-0.148	-0.473	-0.596
7.28	-0.234	0.000	0.118	-0.150	-0.470	-0.591
7.29	-0.234	0.000	0.118	-0.151	-0.468	-0.587
7.30	-0.234	0.000	0.118	-0.153	-0.466	-0.582
7.31	-0.234	0.000	0.118	-0.154	-0.463	-0.577
7.32	-0.234	0.000	0.059	-0.156	-0.461	-0.573
7.33	-0.156	0.000	0.059	-0.157	-0.459	-0.569
7.34	-0.156	0.000	0.059	-0.158	-0.456	-0.565
7.35	-0.156	0.000	0.059	-0.158	-0.454	-0.561
7.36	-0.156	0.000	0.000	-0.159	-0.452	-0.557
7.37	-0.156	0.000	0.000	-0.160	-0.449	-0.554
7.38	-0.156	0.000	0.000	-0.161	-0.447	-0.550
7.39	-0.156	0.000	0.000	-0.161	-0.445	-0.547
7.40	-0.156	0.000	0.000	-0.162	-0.442	-0.543
7.41	-0.156	0.000	0.000	-0.163	-0.440	-0.540
7.42	-0.156	-0.078	-0.059	-0.164	-0.438	-0.537
7.43	-0.156	-0.078	-0.059	-0.165	-0.437	-0.534
7.44	-0.156	-0.078	-0.059	-0.165	-0.435	-0.531
7.45	-0.156	-0.078	-0.118	-0.166	-0.434	-0.528
7.46	-0.156	-0.078	-0.118	-0.167	-0.432	-0.526
7.47	-0.078	-0.078	-0.118	-0.167	-0.431	-0.524
7.48	-0.078	-0.078	-0.118	-0.167	-0.429	-0.521
7.49	-0.078	-0.078	-0.118	-0.167	-0.427	-0.519
7.50	-0.078	-0.078	-0.118	-0.167	-0.426	-0.517
7.51	-0.078	-0.078	-0.118	-0.167	-0.424	-0.514
7.52	-0.078	-0.078	-0.177	-0.167	-0.423	-0.513
7.53	-0.078	-0.078	-0.177	-0.167	-0.421	-0.511
7.54	-0.078	-0.078	-0.177	-0.167	-0.420	-0.509
7.55	-0.078	-0.078	-0.177	-0.167	-0.418	-0.507
7.56	-0.078	-0.078	-0.177	-0.167	-0.416	-0.506
7.57	-0.078	-0.078	-0.177	-0.167	-0.415	-0.504
7.58	-0.078	-0.078	-0.177	-0.167	-0.413	-0.502
7.59	-0.078	-0.078	-0.236	-0.167	-0.412	-0.501
7.60	-0.078	-0.078	-0.236	-0.167	-0.410	-0.500
7.61	-0.078	-0.078	-0.236	-0.167	-0.409	-0.499
7.62	-0.078	-0.078	-0.236	-0.167	-0.407	-0.497
7.63	-0.078	-0.078	-0.236	-0.167	-0.406	-0.496
7.64	-0.078	-0.078	-0.236	-0.167	-0.404	-0.495
7.65	-0.078	-0.078	-0.236	-0.167	-0.402	-0.494
7.66	-0.078	-0.078	-0.295	-0.167	-0.401	-0.493
7.67	-0.078	-0.078	-0.295	-0.167	-0.399	-0.493
7.68	-0.078	-0.078	-0.295	-0.167	-0.398	-0.492
7.69	-0.078	-0.078	-0.295	-0.167	-0.396	-0.491
7.70	-0.078	-0.078	-0.295	-0.167	-0.395	-0.491
7.71	-0.078	-0.078	-0.295	-0.167	-0.393	-0.490

Figure 10.3.3.a.1 Digital data for event 4.3 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
7.72	-0.078	-0.078	-0.295	-0.167	-0.392	-0.490
7.73	-0.078	-0.078	-0.295	-0.167	-0.390	-0.489
7.74	-0.078	-0.078	-0.295	-0.167	-0.388	-0.489
7.75	-0.078	-0.078	-0.295	-0.167	-0.387	-0.488
7.76	-0.078	-0.078	-0.353	-0.167	-0.385	-0.488
7.77	-0.078	-0.078	-0.353	-0.167	-0.384	-0.488

Figure 10.3.3.b.1 Digital data for event 0.e

(oval) = baseline which is subtracted for peaks and numerical integration

Yeardate: 81213 Time: 13:46:45.971 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
0.62	0.000	-0.234	-0.295	0.000	-0.000	0.000
0.63	0.000	-0.234	-0.412	0.000	-0.000	-0.001
0.64	0.078	-0.234	-0.412	0.001	-0.000	-0.002
0.65	0.156	-0.234	-0.471	0.002	-0.000	-0.004
0.66	0.313	-0.234	-0.471	0.005	-0.000	-0.006
0.67	0.469	-0.234	-0.471	0.010	-0.000	-0.008
0.68	0.625	-0.234	-0.471	0.016	-0.000	-0.009
0.69	0.859	-0.234	-0.530	0.025	-0.000	-0.012
0.70	1.016	-0.234	-0.530	0.035	-0.000	-0.014
0.71	1.094	-0.234	-0.648	0.046	-0.000	-0.018
0.72	1.094	-0.234	-0.707	0.057	-0.000	-0.022
0.73	1.094	-0.313	-0.766	0.068	-0.001	-0.026
0.74	1.094	-0.313	-0.353	0.079	-0.002	-0.027
0.75	1.016	-0.391	-1.001	0.089	-0.003	-0.034
0.76	0.938	-0.391	-1.237	0.098	-0.005	-0.044
0.77	0.859	-0.469	-1.414	0.107	-0.007	-0.055
0.78	0.703	-0.547	-1.885	0.114	-0.010	-0.071
0.79	0.625	-0.625	-2.238	0.120	-0.014	-0.090
0.80	0.547	-0.703	-2.592	0.126	-0.019	-0.113
0.81	0.391	-0.703	-3.004	0.130	-0.024	-0.140
0.82	0.234	-0.781	-3.181	0.132	-0.029	-0.169
0.83	0.234	-0.859	-3.240	0.134	-0.035	-0.198
0.84	0.156	-0.859	-3.299	0.136	-0.041	-0.228
0.85	0.078	-0.859	-3.240	0.137	-0.048	-0.258
0.86	0.000	-0.859	-3.122	0.137	-0.054	-0.286
0.87	-0.078	-0.859	-3.063	0.136	-0.060	-0.314
0.88	-0.078	-0.859	-2.828	0.135	-0.067	-0.339
0.89	-0.156	-0.859	-2.592	0.134	-0.073	-0.362
0.90	-0.234	-0.859	-2.356	0.131	-0.079	-0.383
0.91	-0.234	-0.859	-2.297	0.129	-0.085	-0.403
0.92	-0.313	-0.781	-2.121	0.126	-0.091	-0.421
0.93	-0.391	-0.781	-1.885	0.122	-0.096	-0.437
0.94	-0.469	-0.781	-1.649	0.117	-0.102	-0.450
0.95	-0.625	-0.703	-1.473	0.111	-0.106	-0.462
0.96	-0.703	-0.625	-1.296	0.104	-0.110	-0.472
0.97	-0.703	-0.625	-1.119	0.097	-0.114	-0.481
0.98	-0.781	-0.625	-0.884	0.089	-0.118	-0.486
0.99	-0.859	-0.547	-0.766	0.081	-0.121	-0.491
1.00	-0.938	-0.547	-0.589	0.071	-0.124	-0.494
1.01	-0.938	-0.469	-0.530	0.062	-0.127	-0.496
1.02	-0.938	-0.469	-0.353	0.053	-0.129	-0.497
1.03	-0.938	-0.391	-0.295	0.043	-0.131	-0.497
1.04	-0.938	-0.391	-0.118	0.034	-0.132	-0.495
1.05	-0.859	-0.313	-0.059	0.025	-0.133	-0.493
1.06	-0.859	-0.313	0.059	0.017	-0.134	-0.489

Figure 10.3.3.b.1 Digital data for event 0.8 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
1.07	-0.781	-0.234	0.295	0.009	-0.134	-0.483
1.08	-0.781	-0.234	0.412	0.001	-0.134	-0.476
1.09	-0.625	-0.156	0.589	-0.005	-0.133	-0.467
1.10	-0.625	-0.078	0.766	-0.012	-0.131	-0.457
1.11	-0.625	-0.078	0.884	-0.018	-0.130	-0.445
1.12	-0.547	-0.078	1.001	-0.023	-0.128	-0.432
1.13	-0.547	-0.078	1.119	-0.029	-0.127	-0.418
1.14	-0.469	-0.078	1.178	-0.033	-0.125	-0.403
1.15	-0.469	-0.078	1.237	-0.038	-0.124	-0.388
1.16	-0.469	-0.078	1.296	-0.043	-0.122	-0.372
1.17	-0.391	-0.078	1.296	-0.047	-0.121	-0.356
1.18	-0.391	-0.078	1.296	-0.051	-0.119	-0.340
1.19	-0.391	0.000	1.237	-0.054	-0.117	-0.325
1.20	-0.313	0.000	1.178	-0.058	-0.114	-0.310
1.21	-0.313	0.000	1.178	-0.061	-0.112	-0.295
1.22	-0.313	0.000	1.060	-0.064	-0.110	-0.282
1.23	-0.234	0.000	0.943	-0.066	-0.107	-0.270
1.24	-0.234	0.000	0.884	-0.069	-0.105	-0.258
1.25	-0.156	0.000	0.825	-0.070	-0.103	-0.247
1.26	-0.156	0.000	0.766	-0.072	-0.100	-0.236
1.27	-0.156	0.000	0.707	-0.073	-0.098	-0.226
1.28	-0.078	0.000	0.648	-0.074	-0.096	-0.216
1.29	-0.078	0.000	0.589	-0.075	-0.093	-0.208
1.30	-0.078	0.000	0.530	-0.076	-0.091	-0.199
1.31	-0.078	0.000	0.471	-0.076	-0.089	-0.192
1.32	-0.078	0.000	0.412	-0.077	-0.086	-0.185
1.33	-0.078	0.000	0.412	-0.078	-0.084	-0.178
1.34	-0.078	0.000	0.353	-0.079	-0.082	-0.171
1.35	-0.078	0.000	0.236	-0.079	-0.079	-0.166
1.36	-0.078	-0.078	0.177	-0.080	-0.078	-0.161
1.37	-0.078	-0.078	0.118	-0.081	-0.076	-0.157
1.38	-0.078	-0.078	0.059	-0.082	-0.075	-0.153
1.39	-0.078	-0.078	0.000	-0.083	-0.073	-0.150
1.40	-0.078	-0.078	-0.118	-0.083	-0.071	-0.149
1.41	-0.078	-0.078	-0.177	-0.084	-0.069	-0.148
1.42	-0.078	-0.078	-0.177	-0.085	-0.068	-0.147
1.43	-0.078	-0.078	-0.236	-0.086	-0.066	-0.146
1.44	-0.078	-0.078	-0.295	-0.087	-0.065	-0.146
1.45	-0.078	-0.078	-0.353	-0.087	-0.063	-0.147
1.46	-0.078	-0.078	-0.353	-0.088	-0.062	-0.147
1.47	-0.078	-0.078	-0.353	-0.089	-0.060	-0.148
1.48	-0.078	-0.078	-0.412	-0.090	-0.059	-0.149
1.49	-0.156	-0.078	-0.412	-0.091	-0.057	-0.150
1.50	-0.234	-0.078	-0.412	-0.094	-0.055	-0.151
1.51	-0.234	-0.078	-0.471	-0.096	-0.054	-0.153
1.52	-0.234	-0.078	-0.471	-0.098	-0.052	-0.155
1.53	-0.234	-0.078	-0.530	-0.101	-0.051	-0.157
1.54	-0.156	-0.078	-0.530	-0.102	-0.049	-0.160
1.55	-0.156	-0.078	-0.530	-0.104	-0.048	-0.162
1.56	-0.156	-0.078	-0.589	-0.105	-0.046	-0.165

Figure 10.3.3.b.1 Digital data for event 0.3 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
1.57	-0.156	-0.078	-0.589	-0.107	-0.045	-0.168
1.58	-0.156	-0.156	-0.589	-0.108	-0.044	-0.171
1.59	-0.156	-0.156	-0.589	-0.110	-0.043	-0.174
1.60	-0.156	-0.156	-0.589	-0.112	-0.042	-0.177
1.61	-0.234	-0.156	-0.589	-0.114	-0.041	-0.180
1.62	-0.234	-0.156	-0.707	-0.116	-0.041	-0.184
1.63	-0.234	-0.156	-0.648	-0.119	-0.040	-0.187
1.64	-0.313	-0.156	-0.530	-0.122	-0.039	-0.190
1.65	-0.313	-0.156	-0.471	-0.125	-0.038	-0.191
1.66	-0.313	-0.156	-0.412	-0.128	-0.038	-0.192
1.67	-0.313	-0.156	-0.412	-0.131	-0.037	-0.194
1.68	-0.313	-0.156	-0.471	-0.134	-0.036	-0.195
1.69	-0.313	-0.156	-0.471	-0.137	-0.035	-0.197
1.70	-0.313	-0.156	-0.412	-0.140	-0.034	-0.198
1.71	-0.313	-0.156	-0.412	-0.144	-0.034	-0.200
1.72	-0.391	-0.156	-0.412	-0.147	-0.033	-0.201
1.73	-0.391	-0.156	-0.412	-0.151	-0.032	-0.202
1.74	-0.391	-0.156	-0.353	-0.155	-0.031	-0.202
1.75	-0.391	-0.156	-0.295	-0.159	-0.031	-0.202
1.76	-0.469	-0.156	-0.295	-0.164	-0.030	-0.202
1.77	-0.469	-0.156	-0.236	-0.169	-0.029	-0.202
1.78	-0.469	-0.078	-0.177	-0.173	-0.027	-0.201
1.79	-0.469	-0.078	-0.177	-0.178	-0.026	-0.199
1.80	-0.469	-0.078	-0.177	-0.183	-0.024	-0.198
1.81	-0.469	-0.078	-0.177	-0.187	-0.023	-0.197
1.82	-0.391	-0.078	-0.118	-0.191	-0.021	-0.195
1.83	-0.391	-0.078	-0.118	-0.195	-0.020	-0.194
1.84	-0.391	-0.078	-0.059	-0.199	-0.018	-0.191
1.85	-0.391	-0.078	-0.059	-0.203	-0.016	-0.189
1.86	-0.391	-0.078	0.000	-0.207	-0.015	-0.186
1.87	-0.391	-0.078	0.059	-0.211	-0.013	-0.182
1.88	-0.391	-0.078	0.118	-0.215	-0.012	-0.178
1.89	-0.391	-0.078	0.177	-0.219	-0.010	-0.174
1.90	-0.391	-0.078	0.177	-0.222	-0.009	-0.169
1.91	-0.391	-0.078	0.177	-0.226	-0.007	-0.164
1.92	-0.391	-0.078	0.236	-0.230	-0.006	-0.159
1.93	-0.391	-0.078	0.236	-0.234	-0.004	-0.153
1.94	-0.391	-0.078	0.236	-0.238	-0.002	-0.148
1.95	-0.391	-0.078	0.236	-0.242	-0.001	-0.143
1.96	-0.391	-0.078	0.236	-0.246	0.001	-0.138
1.97	-0.391	-0.078	0.236	-0.250	0.002	-0.132

Figure 10.3.3.b.2 Digital data for event 4.5

= baseline which is subtracted for peaks and numerical integration

Yeardate: 81213 Time: 13:46:45.971 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
4.29	0.000	-0.234	-0.236	0.000	-0.000	0.000
4.30	0.000	-0.313	-0.236	0.000	-0.001	0.000
4.31	0.156	-0.313	-0.295	0.002	-0.002	-0.001
4.32	0.234	-0.391	-0.412	0.004	-0.003	-0.002
4.33	0.313	-0.391	-0.412	0.007	-0.005	-0.004
4.34	0.547	-0.469	-0.471	0.013	-0.007	-0.006
4.35	0.703	-0.547	-0.471	0.020	-0.010	-0.009
4.36	0.938	-0.625	-0.471	0.029	-0.014	-0.011
4.37	1.016	-0.703	-0.471	0.039	-0.019	-0.014
4.38	1.094	-0.703	-0.530	0.050	-0.023	-0.016
4.39	1.094	-0.781	-0.530	0.061	-0.029	-0.019
4.40	1.094	-0.781	-0.589	0.072	-0.034	-0.023
4.41	1.016	-0.859	-0.707	0.082	-0.041	-0.028
4.42	0.938	-0.859	-0.766	0.091	-0.047	-0.033
4.43	0.859	-0.859	-0.884	0.100	-0.053	-0.039
4.44	0.781	-0.859	-1.001	0.108	-0.059	-0.047
4.45	0.625	-0.859	-1.237	0.114	-0.066	-0.057
4.46	0.547	-0.859	-1.414	0.120	-0.072	-0.069
4.47	0.469	-0.859	-1.885	0.124	-0.078	-0.085
4.48	0.391	-0.859	-2.356	0.128	-0.084	-0.107
4.49	0.234	-0.781	-2.769	0.130	-0.090	-0.132
4.50	0.234	-0.781	-3.063	0.133	-0.095	-0.160
4.51	0.156	-0.781	-3.240	0.134	-0.101	-0.190
4.52	0.078	-0.703	-3.299	0.135	-0.106	-0.221
4.53	0.000	-0.703	-3.240	0.135	-0.110	-0.251
4.54	-0.078	-0.625	-3.240	0.134	-0.114	-0.281
4.55	-0.078	-0.625	-3.122	0.134	-0.118	-0.310
4.56	-0.156	-0.625	-2.886	0.132	-0.122	-0.336
4.57	-0.234	-0.547	-2.886	0.130	-0.125	-0.363
4.58	-0.234	-0.469	-2.592	0.127	-0.127	-0.386
4.59	-0.313	-0.469	-2.356	0.124	-0.130	-0.408
4.60	-0.391	-0.469	-2.180	0.120	-0.132	-0.427
4.61	-0.469	-0.391	-1.944	0.116	-0.134	-0.444
4.62	-0.547	-0.313	-1.767	0.110	-0.135	-0.459
4.63	-0.625	-0.313	-1.590	0.104	-0.135	-0.473
4.64	-0.703	-0.234	-1.355	0.097	-0.135	-0.484
4.65	-0.781	-0.234	-1.237	0.089	-0.135	-0.494
4.66	-0.859	-0.234	-0.353	0.080	-0.135	-0.495
4.67	-0.859	-0.156	-0.825	0.072	-0.135	-0.501
4.68	-0.938	-0.078	-0.648	0.063	-0.133	-0.505
4.69	-0.938	-0.078	-0.530	0.053	-0.131	-0.508
4.70	-0.938	-0.078	-0.412	0.044	-0.130	-0.510
4.71	-0.938	-0.078	-0.295	0.034	-0.128	-0.511
4.72	-0.938	-0.078	-0.118	0.025	-0.127	-0.509
4.73	-0.859	-0.078	0.000	0.016	-0.125	-0.507

Figure 10.3.3.b.2 Digital data for event 4.5 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
4.74	-0.781	-0.078	0.177	0.009	-0.124	-0.503
4.75	-0.781	-0.078	0.236	0.001	-0.122	-0.498
4.76	-0.703	-0.078	0.412	-0.006	-0.120	-0.492
4.77	-0.625	0.000	0.589	-0.013	-0.118	-0.483
4.78	-0.625	0.000	0.707	-0.019	-0.116	-0.474
4.79	-0.625	0.000	0.825	-0.025	-0.113	-0.463
4.80	-0.547	0.000	0.943	-0.030	-0.111	-0.452
4.81	-0.469	0.000	1.060	-0.035	-0.109	-0.439
4.82	-0.469	0.000	1.178	-0.040	-0.106	-0.425
4.83	-0.469	0.000	1.237	-0.045	-0.104	-0.410
4.84	-0.469	0.000	1.296	-0.049	-0.102	-0.394
4.85	-0.391	0.000	1.296	-0.053	-0.099	-0.379
4.86	-0.391	0.000	1.296	-0.057	-0.097	-0.364
4.87	-0.391	0.000	1.237	-0.061	-0.095	-0.349
4.88	-0.391	0.000	1.119	-0.065	-0.092	-0.336
4.89	-0.313	0.000	1.178	-0.068	-0.090	-0.321
4.90	-0.313	0.000	1.060	-0.071	-0.088	-0.308
4.91	-0.234	0.000	0.943	-0.074	-0.085	-0.297
4.92	-0.234	0.000	0.884	-0.076	-0.083	-0.285
4.93	-0.156	0.000	0.825	-0.078	-0.081	-0.275
4.94	-0.156	0.000	0.766	-0.079	-0.078	-0.265
4.95	-0.156	-0.078	0.707	-0.081	-0.077	-0.255
4.96	-0.078	-0.078	0.648	-0.081	-0.075	-0.247
4.97	-0.078	-0.078	0.589	-0.082	-0.074	-0.238
4.98	-0.078	-0.078	0.589	-0.083	-0.072	-0.230
4.99	-0.078	-0.078	0.530	-0.084	-0.071	-0.222
5.00	-0.078	-0.078	0.471	-0.085	-0.069	-0.215
5.01	-0.078	-0.078	0.412	-0.085	-0.067	-0.209
5.02	-0.078	-0.078	0.353	-0.086	-0.066	-0.203
5.03	-0.078	-0.078	0.295	-0.087	-0.064	-0.198
5.04	-0.078	-0.078	0.236	-0.088	-0.063	-0.193
5.05	-0.078	-0.078	0.118	-0.088	-0.061	-0.189
5.06	-0.078	-0.078	0.059	-0.089	-0.059	-0.186
5.07	-0.078	-0.078	0.000	-0.090	-0.058	-0.184
5.08	-0.078	-0.078	-0.118	-0.091	-0.056	-0.183
5.09	-0.078	-0.078	-0.118	-0.092	-0.055	-0.181
5.10	-0.078	-0.078	-0.177	-0.092	-0.053	-0.181
5.11	-0.078	-0.078	-0.236	-0.093	-0.052	-0.181
5.12	-0.078	-0.078	-0.295	-0.094	-0.050	-0.181
5.13	-0.078	-0.078	-0.295	-0.095	-0.049	-0.182
5.14	-0.078	-0.078	-0.353	-0.095	-0.047	-0.183
5.15	-0.078	-0.078	-0.353	-0.096	-0.045	-0.184
5.16	-0.078	-0.078	-0.412	-0.097	-0.044	-0.186
5.17	-0.156	-0.156	-0.412	-0.099	-0.043	-0.188
5.18	-0.234	-0.156	-0.412	-0.101	-0.042	-0.190
5.19	-0.234	-0.156	-0.471	-0.103	-0.042	-0.192
5.20	-0.234	-0.156	-0.471	-0.106	-0.041	-0.194
5.21	-0.234	-0.156	-0.471	-0.108	-0.040	-0.197
5.22	-0.156	-0.156	-0.530	-0.110	-0.039	-0.200
5.23	-0.156	-0.156	-0.530	-0.111	-0.038	-0.202
5.24	-0.156	-0.156	-0.589	-0.113	-0.038	-0.206
5.25	-0.156	-0.156	-0.589	-0.114	-0.037	-0.210

Figure 10.3.3.b.2 Digital data for event 4.5 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
5.26	-0.156	-0.156	-0.589	-0.116	-0.036	-0.213
5.27	-0.156	-0.156	-0.589	-0.117	-0.035	-0.217
5.28	-0.156	-0.156	-0.589	-0.119	-0.035	-0.220
5.29	-0.234	-0.156	-0.589	-0.121	-0.034	-0.224
5.30	-0.234	-0.156	-0.648	-0.124	-0.033	-0.228
5.31	-0.234	-0.156	-0.648	-0.126	-0.032	-0.232
5.32	-0.313	-0.156	-0.530	-0.129	-0.031	-0.235
5.33	-0.313	-0.156	-0.471	-0.132	-0.031	-0.237
5.34	-0.313	-0.156	-0.412	-0.135	-0.030	-0.239
5.35	-0.313	-0.156	-0.412	-0.138	-0.029	-0.241
5.36	-0.313	-0.156	-0.471	-0.142	-0.028	-0.243
5.37	-0.313	-0.156	-0.412	-0.145	-0.028	-0.245
5.38	-0.313	-0.078	-0.412	-0.148	-0.026	-0.247
5.39	-0.313	-0.078	-0.412	-0.151	-0.024	-0.248
5.40	-0.391	-0.078	-0.412	-0.155	-0.023	-0.250
5.41	-0.391	-0.078	-0.412	-0.159	-0.021	-0.252
5.42	-0.391	-0.078	-0.353	-0.163	-0.020	-0.253
5.43	-0.391	-0.078	-0.295	-0.167	-0.018	-0.254
5.44	-0.469	-0.078	-0.295	-0.171	-0.017	-0.254
5.45	-0.469	-0.078	-0.236	-0.176	-0.015	-0.254
5.46	-0.469	-0.078	-0.177	-0.181	-0.013	-0.254
5.47	-0.469	-0.078	-0.177	-0.185	-0.012	-0.253
5.48	-0.469	-0.078	-0.177	-0.190	-0.010	-0.252
5.49	-0.469	-0.078	-0.177	-0.195	-0.009	-0.252
5.50	-0.391	-0.078	-0.118	-0.199	-0.007	-0.251
5.51	-0.391	-0.078	-0.118	-0.203	-0.006	-0.250
5.52	-0.391	-0.078	-0.059	-0.206	-0.004	-0.248
5.53	-0.391	-0.078	-0.059	-0.210	-0.003	-0.246
5.54	-0.391	-0.078	0.000	-0.214	-0.001	-0.244
5.55	-0.391	-0.078	0.118	-0.218	0.001	-0.240
5.56	-0.391	-0.078	0.118	-0.222	0.002	-0.237

Figure 10.3.3.b.3 Digital data for event 8.2

(oval) = baseline which is subtracted for peaks and numerical integration

Yeardate: 81213 Time: 13:46:45.971 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
7.95	0.000	-0.391	-0.236	0.000	0.000	0.000
7.96	0.000	-0.391	-0.236	0.000	0.000	0.000
7.97	0.156	-0.469	-0.295	0.002	-0.001	-0.001
7.98	0.234	-0.547	-0.353	0.004	-0.002	-0.002
7.99	0.391	-0.625	-0.412	0.008	-0.005	-0.004
8.00	0.547	-0.703	-0.412	0.013	-0.008	-0.005
8.01	0.859	-0.703	-0.471	0.022	-0.011	-0.008
8.02	0.938	-0.781	-0.471	0.031	-0.015	-0.010
8.03	1.094	-0.781	-0.471	0.042	-0.019	-0.012
8.04	1.094	-0.859	-0.530	0.053	-0.023	-0.015
8.05	1.094	-0.859	-0.530	0.064	-0.028	-0.018
8.06	1.094	-0.859	-0.589	0.075	-0.033	-0.022
8.07	1.016	-0.859	-0.707	0.085	-0.037	-0.026
8.08	0.938	-0.859	-0.766	0.095	-0.042	-0.032
8.09	0.859	-0.859	-0.884	0.103	-0.047	-0.038
8.10	0.781	-0.859	-1.001	0.111	-0.052	-0.046
8.11	0.625	-0.859	-1.237	0.117	-0.056	-0.056
8.12	0.547	-0.781	-1.414	0.123	-0.060	-0.068
8.13	0.469	-0.781	-1.885	0.127	-0.064	-0.084
8.14	0.391	-0.703	-2.297	0.131	-0.067	-0.105
8.15	0.234	-0.703	-2.592	0.134	-0.070	-0.128
8.16	0.156	-0.625	-3.004	0.135	-0.073	-0.156
8.17	0.078	-0.625	-3.181	0.136	-0.075	-0.185
8.18	0.000	-0.625	-3.299	0.136	-0.077	-0.216
8.19	0.000	-0.547	-3.299	0.136	-0.079	-0.247
8.20	-0.078	-0.469	-3.240	0.135	-0.080	-0.277
8.21	-0.078	-0.469	-3.122	0.134	-0.080	-0.306
8.22	-0.156	-0.469	-3.004	0.133	-0.081	-0.333
8.23	-0.234	-0.391	-2.828	0.130	-0.081	-0.359
8.24	-0.234	-0.391	-2.592	0.128	-0.081	-0.383
8.25	-0.391	-0.313	-2.356	0.124	-0.080	-0.404
8.26	-0.391	-0.313	-2.238	0.120	-0.080	-0.424
8.27	-0.469	-0.234	-2.062	0.116	-0.078	-0.442
8.28	-0.625	-0.234	-1.767	0.109	-0.076	-0.458
8.29	-0.703	-0.156	-1.590	0.102	-0.074	-0.471
8.30	-0.703	-0.078	-1.355	0.095	-0.071	-0.482
8.31	-0.781	-0.078	-1.178	0.088	-0.068	-0.492
8.32	-0.859	-0.078	-0.943	0.079	-0.065	-0.499
8.33	-0.859	-0.078	-0.825	0.070	-0.062	-0.505
8.34	-0.938	-0.078	-0.648	0.061	-0.058	-0.509
8.35	-0.938	-0.078	-0.530	0.052	-0.055	-0.512
8.36	-0.938	-0.078	-0.412	0.042	-0.052	-0.514
8.37	-0.938	-0.078	-0.236	0.033	-0.049	-0.514
8.38	-0.859	-0.078	-0.118	0.024	-0.046	-0.512
8.39	-0.859	0.000	0.000	0.016	-0.042	-0.510

Figure 10.3.3.b.3 Digital data for event 8.2 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
8.40	-0.781	0.000	0.177	0.008	-0.038	-0.506
8.41	-0.781	0.000	0.295	0.000	-0.034	-0.501
8.42	-0.703	0.000	0.471	-0.007	-0.030	-0.493
8.43	-0.625	0.000	0.648	-0.013	-0.026	-0.485
8.44	-0.625	0.000	0.766	-0.020	-0.022	-0.475
8.45	-0.547	0.000	0.884	-0.025	-0.019	-0.463
8.46	-0.547	0.000	1.001	-0.030	-0.015	-0.451
8.47	-0.469	0.000	1.119	-0.035	-0.011	-0.437
8.48	-0.469	0.000	1.178	-0.040	-0.007	-0.423
8.49	-0.469	0.000	1.237	-0.045	-0.003	-0.409
8.50	-0.391	0.000	1.296	-0.048	0.001	-0.393
8.51	-0.391	0.000	1.296	-0.052	0.005	-0.378
8.52	-0.391	0.000	1.296	-0.056	0.009	-0.363
8.53	-0.391	0.000	1.237	-0.060	0.013	-0.348
8.54	-0.313	0.000	1.119	-0.063	0.017	-0.334
8.55	-0.313	0.000	1.119	-0.066	0.021	-0.321
8.56	-0.313	-0.078	1.060	-0.070	0.024	-0.308
8.57	-0.234	-0.078	0.943	-0.072	0.027	-0.296
8.58	-0.234	-0.078	0.884	-0.074	0.030	-0.285
8.59	-0.156	-0.078	0.825	-0.076	0.033	-0.274
8.60	-0.156	-0.078	0.766	-0.077	0.036	-0.264
8.61	-0.078	-0.078	0.707	-0.078	0.039	-0.255
8.62	-0.078	-0.078	0.648	-0.079	0.042	-0.246
8.63	-0.078	-0.078	0.589	-0.080	0.046	-0.238
8.64	-0.078	-0.078	0.589	-0.081	0.049	-0.229
8.65	-0.078	-0.078	0.530	-0.081	0.052	-0.222
8.66	-0.078	-0.078	0.471	-0.082	0.055	-0.215
8.67	-0.078	-0.078	0.412	-0.083	0.058	-0.208
8.68	-0.078	-0.078	0.353	-0.084	0.061	-0.202
8.69	-0.078	-0.078	0.295	-0.085	0.064	-0.197
8.70	-0.078	-0.078	0.236	-0.085	0.067	-0.192
8.71	-0.078	-0.078	0.177	-0.086	0.071	-0.188
8.72	-0.078	-0.078	0.118	-0.087	0.074	-0.185
8.73	-0.078	-0.078	0.059	-0.088	0.077	-0.182
8.74	-0.078	-0.078	-0.059	-0.088	0.080	-0.180
8.75	-0.078	-0.078	-0.118	-0.089	0.083	-0.179
8.76	-0.078	-0.078	-0.177	-0.090	0.086	-0.178
8.77	-0.078	-0.078	-0.236	-0.091	0.089	-0.178
8.78	-0.078	-0.156	-0.236	-0.092	0.092	-0.178
8.79	-0.078	-0.156	-0.295	-0.092	0.094	-0.179
8.80	-0.078	-0.156	-0.353	-0.093	0.096	-0.180
8.81	-0.078	-0.156	-0.353	-0.094	0.099	-0.181

Figure 10.3.3.b.4 Digital data for event 11.9

(0.000) (-0.234) (-0.295) = baseline which is subtracted for peaks and numerical integration

Yeardate: 81213 Time: 13:46:45.971 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
11.51	0.000	-0.234	-0.295	0.000	-0.000	0.000
11.52	0.000	-0.234	-0.295	0.000	-0.000	0.000
11.53	0.078	-0.313	-0.295	0.001	-0.001	0.000
11.54	0.156	-0.313	-0.295	0.002	-0.002	0.000
11.55	0.313	-0.391	-0.353	0.005	-0.003	-0.001
11.56	0.469	-0.391	-0.353	0.010	-0.005	-0.001
11.57	0.625	-0.469	-0.412	0.016	-0.007	-0.002
11.58	0.859	-0.547	-0.353	0.025	-0.010	-0.003
11.59	0.938	-0.625	-0.353	0.034	-0.014	-0.003
11.60	1.094	-0.703	-0.295	0.045	-0.019	-0.003
11.61	1.094	-0.703	-0.295	0.056	-0.023	-0.003
11.62	1.094	-0.781	-0.295	0.067	-0.029	-0.003
11.63	1.094	-0.781	-0.236	0.078	-0.034	-0.003
11.64	1.016	-0.859	-0.236	0.088	-0.041	-0.002
11.65	0.859	-0.859	-0.295	0.097	-0.047	-0.002
11.66	0.781	-0.859	-0.353	0.105	-0.053	-0.003
11.67	0.703	-0.859	-0.412	0.112	-0.059	-0.004
11.68	0.547	-0.859	-0.412	0.117	-0.066	-0.005
11.69	0.547	-0.859	-0.471	0.123	-0.072	-0.007
11.70	0.391	-0.859	-0.471	0.127	-0.078	-0.009
11.71	0.234	-0.859	-0.471	0.129	-0.084	-0.011
11.72	0.234	-0.781	-0.530	0.131	-0.090	-0.013
11.73	0.156	-0.781	-0.530	0.133	-0.095	-0.015
11.74	0.078	-0.703	-0.589	0.134	-0.100	-0.018
11.75	0.000	-0.703	-0.707	0.134	-0.105	-0.022
11.76	-0.078	-0.625	-0.766	0.133	-0.109	-0.027
11.77	-0.078	-0.625	-0.943	0.132	-0.113	-0.033
11.78	-0.156	-0.625	-1.001	0.130	-0.117	-0.041
11.79	-0.234	-0.547	-1.296	0.128	-0.120	-0.051
11.80	-0.234	-0.469	-1.532	0.126	-0.122	-0.063
11.81	-0.313	-0.469	-2.062	0.123	-0.124	-0.081
11.82	-0.391	-0.469	-2.356	0.119	-0.127	-0.101
11.83	-0.469	-0.391	-2.769	0.114	-0.128	-0.126
11.84	-0.547	-0.391	-3.004	0.109	-0.130	-0.153
11.85	-0.625	-0.313	-3.240	0.102	-0.131	-0.182
11.86	-0.703	-0.313	-3.299	0.095	-0.131	-0.212
11.87	-0.781	-0.234	-3.299	0.088	-0.131	-0.243
11.88	-0.859	-0.234	-3.240	0.079	-0.131	-0.272
11.89	-0.859	-0.156	-3.122	0.070	-0.131	-0.300
11.90	-0.938	-0.078	-2.886	0.061	-0.129	-0.326
11.91	-0.938	-0.078	-2.886	0.052	-0.127	-0.352
11.92	-0.938	-0.078	-2.592	0.042	-0.126	-0.375
11.93	-0.938	-0.078	-2.356	0.033	-0.124	-0.396
11.94	-0.859	-0.078	-2.180	0.024	-0.123	-0.414
11.95	-0.859	-0.078	-2.003	0.016	-0.121	-0.432

Figure 10.3.3.b.4 Digital data for event 11.9 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
11.96	-0.781	-0.078	-1.767	0.008	-0.120	-0.446
11.97	-0.781	-0.078	-1.532	0.000	-0.118	-0.459
11.98	-0.703	-0.078	-1.355	-0.007	-0.117	-0.469
11.99	-0.625	0.000	-1.119	-0.013	-0.114	-0.478
12.00	-0.625	0.000	-1.001	-0.020	-0.112	-0.485
12.01	-0.547	0.000	-0.766	-0.025	-0.110	-0.489
12.02	-0.547	0.000	-0.648	-0.030	-0.107	-0.493
12.03	-0.469	0.000	-0.530	-0.035	-0.105	-0.495
12.04	-0.469	0.000	-0.412	-0.040	-0.103	-0.496
12.05	-0.469	0.000	-0.295	-0.045	-0.100	-0.496
12.06	-0.391	0.000	-0.177	-0.048	-0.098	-0.495
12.07	-0.391	0.000	-0.059	-0.052	-0.096	-0.493
12.08	-0.391	0.000	0.059	-0.056	-0.093	-0.489
12.09	-0.391	0.000	0.236	-0.060	-0.091	-0.484
12.10	-0.313	0.000	0.412	-0.063	-0.089	-0.477
12.11	-0.313	0.000	0.589	-0.066	-0.086	-0.468
12.12	-0.313	0.000	0.707	-0.070	-0.084	-0.458
12.13	-0.234	0.000	0.825	-0.072	-0.081	-0.447
12.14	-0.234	0.000	0.943	-0.074	-0.079	-0.434
12.15	-0.156	0.000	1.060	-0.076	-0.077	-0.421
12.16	-0.156	-0.078	1.178	-0.077	-0.075	-0.406
12.17	-0.156	-0.078	1.237	-0.079	-0.074	-0.391
12.18	-0.078	-0.078	1.296	-0.079	-0.072	-0.375
12.19	-0.078	-0.078	1.296	-0.080	-0.071	-0.359
12.20	-0.078	-0.078	1.296	-0.081	-0.069	-0.343
12.21	-0.078	-0.078	1.237	-0.082	-0.067	-0.328
12.22	-0.078	-0.078	1.119	-0.082	-0.066	-0.314
12.23	-0.078	-0.078	1.119	-0.083	-0.064	-0.299
12.24	-0.078	-0.078	1.060	-0.084	-0.063	-0.286
12.25	-0.078	-0.078	0.943	-0.085	-0.061	-0.274
12.26	-0.078	-0.078	0.884	-0.086	-0.060	-0.262
12.27	-0.078	-0.078	0.825	-0.086	-0.058	-0.251
12.28	-0.078	-0.078	0.766	-0.087	-0.057	-0.240
12.29	-0.078	-0.078	0.707	-0.088	-0.055	-0.230
12.30	-0.078	-0.078	0.648	-0.089	-0.053	-0.221
12.31	-0.078	-0.078	0.589	-0.090	-0.052	-0.212
12.32	-0.078	-0.078	0.589	-0.090	-0.050	-0.203
12.33	-0.078	-0.078	0.530	-0.091	-0.049	-0.195
12.34	-0.078	-0.078	0.471	-0.092	-0.047	-0.187
12.35	-0.078	-0.078	0.412	-0.093	-0.046	-0.180
12.36	-0.078	-0.078	0.353	-0.093	-0.044	-0.173
12.37	-0.078	-0.078	0.236	-0.094	-0.043	-0.168
12.38	-0.078	-0.156	0.177	-0.095	-0.042	-0.163
12.39	-0.156	-0.156	0.118	-0.097	-0.041	-0.159
12.40	-0.234	-0.156	0.059	-0.099	-0.040	-0.156
12.41	-0.234	-0.156	0.000	-0.101	-0.039	-0.153
12.42	-0.234	-0.156	-0.118	-0.104	-0.038	-0.151
12.43	-0.234	-0.156	-0.177	-0.106	-0.038	-0.150
12.44	-0.156	-0.156	-0.177	-0.107	-0.037	-0.149
12.45	-0.156	-0.156	-0.236	-0.109	-0.036	-0.148
12.46	-0.156	-0.156	-0.295	-0.111	-0.035	-0.148

Figure 10.3.3.b.4 Digital data for event 11.9 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
12.47	-0.156	-0.156	-0.295	-0.112	-0.035	-0.148
12.48	-0.156	-0.156	-0.353	-0.114	-0.034	-0.149
12.49	-0.156	-0.156	-0.353	-0.115	-0.033	-0.149
12.50	-0.156	-0.156	-0.412	-0.117	-0.032	-0.151
12.51	-0.234	-0.156	-0.412	-0.119	-0.031	-0.152
12.52	-0.234	-0.156	-0.412	-0.122	-0.031	-0.153
12.53	-0.234	-0.156	-0.471	-0.124	-0.030	-0.155
12.54	-0.313	-0.156	-0.471	-0.127	-0.029	-0.157
12.55	-0.313	-0.156	-0.530	-0.130	-0.028	-0.159
12.56	-0.313	-0.156	-0.530	-0.133	-0.028	-0.161
12.57	-0.313	-0.156	-0.530	-0.136	-0.027	-0.164
12.58	-0.313	-0.156	-0.589	-0.140	-0.026	-0.167
12.59	-0.313	-0.078	-0.589	-0.143	-0.024	-0.169
12.60	-0.313	-0.078	-0.589	-0.146	-0.023	-0.172
12.61	-0.313	-0.078	-0.589	-0.149	-0.021	-0.175
12.62	-0.391	-0.078	-0.589	-0.153	-0.020	-0.178
12.63	-0.391	-0.078	-0.648	-0.157	-0.018	-0.182
12.64	-0.391	-0.078	-0.707	-0.161	-0.017	-0.186
12.65	-0.391	-0.078	-0.589	-0.165	-0.015	-0.189
12.66	-0.469	-0.078	-0.530	-0.169	-0.014	-0.191
12.67	-0.469	-0.078	-0.471	-0.174	-0.012	-0.193
12.68	-0.469	-0.078	-0.412	-0.179	-0.010	-0.194
12.69	-0.469	-0.078	-0.412	-0.183	-0.009	-0.195
12.70	-0.469	-0.078	-0.471	-0.188	-0.007	-0.197
12.71	-0.469	-0.078	-0.412	-0.193	-0.006	-0.198
12.72	-0.469	-0.078	-0.412	-0.197	-0.004	-0.199
12.73	-0.391	-0.078	-0.412	-0.201	-0.003	-0.201
12.74	-0.391	-0.078	-0.412	-0.205	-0.001	-0.202
12.75	-0.391	-0.078	-0.353	-0.209	0.000	-0.202

Figure 10.3.3.b.5 Digital data for event 15.5

= baseline which is subtracted for peaks and numerical integration

Yeardate: 81213 Time: 13:46:45.971 M.S.T.

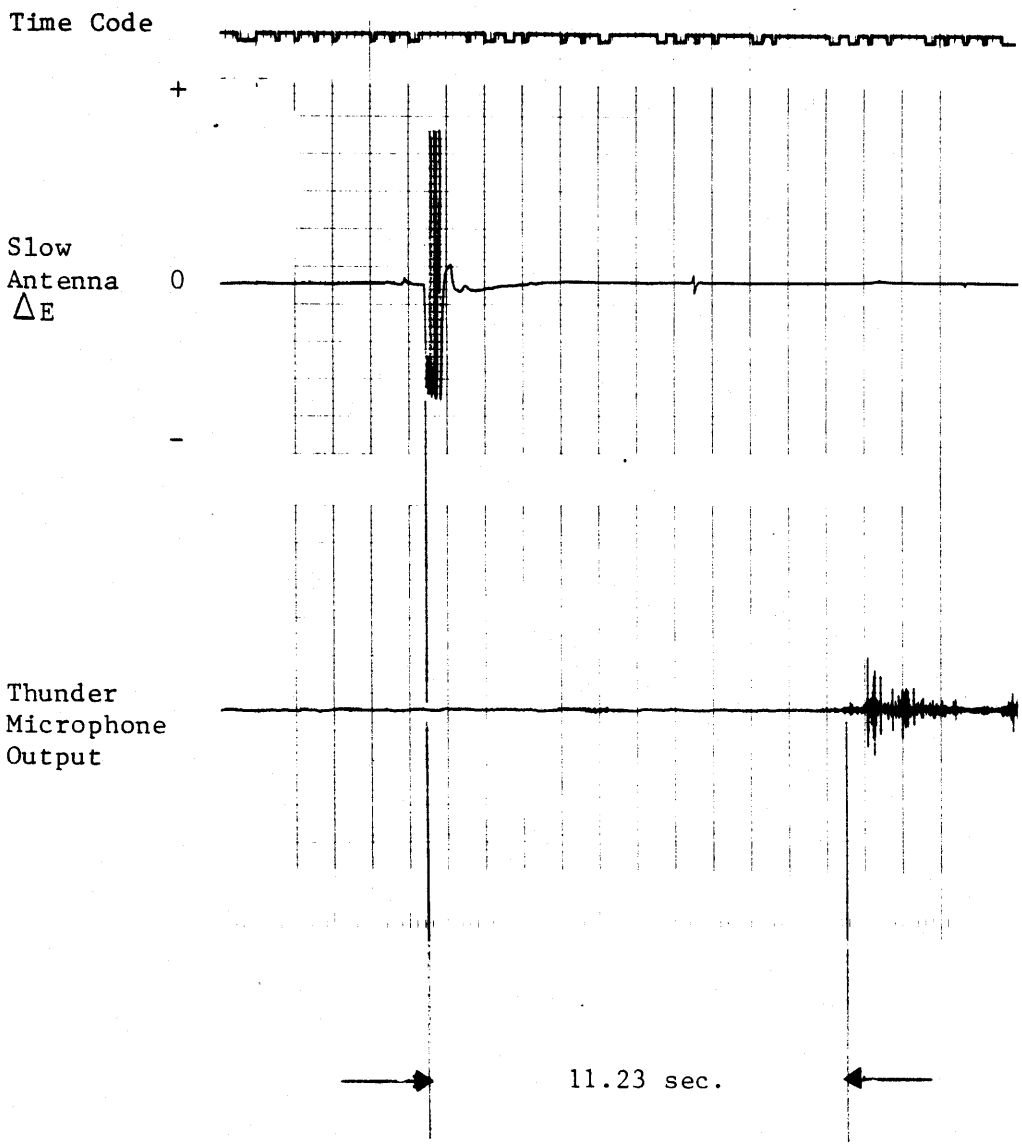
Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
15.10	0.000	-0.234	-0.236	0.000	-0.000	0.000
15.11	0.000	-0.234	-0.236	0.000	-0.000	0.000
15.12	0.156	-0.313	-0.236	0.002	-0.001	0.000
15.13	0.234	-0.313	-0.236	0.004	-0.002	0.000
15.14	0.469	-0.391	-0.236	0.009	-0.003	0.000
15.15	0.625	-0.391	-0.295	0.015	-0.005	-0.001
15.16	0.859	-0.469	-0.295	0.023	-0.007	-0.001
15.17	0.938	-0.547	-0.236	0.033	-0.010	-0.001
15.18	1.094	-0.625	-0.295	0.044	-0.014	-0.002
15.19	1.094	-0.703	-0.295	0.055	-0.019	-0.002
15.20	1.094	-0.703	-0.353	0.066	-0.023	-0.003
15.21	1.094	-0.781	-0.353	0.077	-0.029	-0.005
15.22	1.016	-0.781	-0.412	0.087	-0.034	-0.006
15.23	0.859	-0.859	-0.353	0.095	-0.041	-0.008
15.24	0.859	-0.859	-0.353	0.104	-0.047	-0.009
15.25	0.703	-0.859	-0.353	0.111	-0.053	-0.010
15.26	0.625	-0.859	-0.295	0.117	-0.059	-0.011
15.27	0.547	-0.859	-0.295	0.123	-0.066	-0.011
15.28	0.391	-0.859	-0.295	0.127	-0.072	-0.012
15.29	0.234	-0.859	-0.236	0.129	-0.078	-0.012
15.30	0.234	-0.859	-0.295	0.131	-0.084	-0.012
15.31	0.156	-0.781	-0.353	0.133	-0.090	-0.013
15.32	0.000	-0.781	-0.412	0.133	-0.095	-0.015
15.33	0.000	-0.781	-0.412	0.133	-0.101	-0.017
15.34	-0.078	-0.703	-0.471	0.132	-0.106	-0.019
15.35	-0.078	-0.703	-0.471	0.131	-0.110	-0.022
15.36	-0.156	-0.625	-0.471	0.130	-0.114	-0.024
15.37	-0.234	-0.625	-0.471	0.127	-0.118	-0.026
15.38	-0.234	-0.625	-0.530	0.125	-0.122	-0.029
15.39	-0.313	-0.547	-0.589	0.122	-0.125	-0.033
15.40	-0.391	-0.469	-0.707	0.118	-0.127	-0.038
15.41	-0.469	-0.469	-0.766	0.113	-0.130	-0.043
15.42	-0.547	-0.469	-0.884	0.108	-0.132	-0.049
15.43	-0.625	-0.391	-1.001	0.102	-0.134	-0.057
15.44	-0.703	-0.313	-1.178	0.095	-0.135	-0.066
15.45	-0.781	-0.313	-1.414	0.087	-0.135	-0.078
15.46	-0.859	-0.234	-1.767	0.078	-0.135	-0.094
15.47	-0.859	-0.234	-2.121	0.070	-0.135	-0.112
15.48	-0.938	-0.234	-2.592	0.060	-0.135	-0.136
15.49	-0.938	-0.156	-3.004	0.051	-0.135	-0.164
15.50	-0.938	-0.078	-3.181	0.041	-0.133	-0.193
15.51	-0.938	-0.078	-3.240	0.032	-0.131	-0.223
15.52	-0.859	-0.078	-3.299	0.023	-0.130	-0.254
15.53	-0.859	-0.078	-3.299	0.015	-0.128	-0.284
15.54	-0.781	-0.078	-3.181	0.007	-0.127	-0.314

Figure 10.3.3.b.5 Digital data for event 15.5 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
15.55	-0.781	-0.078	-3.063	-0.001	-0.125	-0.342
15.56	-0.703	-0.078	-2.886	-0.008	-0.124	-0.369
15.57	-0.625	-0.078	-2.592	-0.014	-0.122	-0.392
15.58	-0.625	-0.078	-2.356	-0.020	-0.120	-0.413
15.59	-0.625	0.000	-2.180	-0.027	-0.118	-0.433
15.60	-0.547	0.000	-2.003	-0.032	-0.116	-0.450
15.61	-0.469	0.000	-1.767	-0.037	-0.113	-0.466
15.62	-0.469	0.000	-1.590	-0.041	-0.111	-0.479
15.63	-0.469	0.000	-1.355	-0.046	-0.109	-0.490
15.64	-0.391	0.000	-1.237	-0.050	-0.106	-0.500
15.65	-0.391	0.000	-1.001	-0.054	-0.104	-0.508
15.66	-0.391	0.000	-0.884	-0.058	-0.102	-0.515
15.67	-0.391	0.000	-0.707	-0.062	-0.099	-0.519
15.68	-0.313	0.000	-0.530	-0.065	-0.097	-0.522
15.69	-0.313	0.000	-0.471	-0.068	-0.095	-0.525
15.70	-0.313	0.000	-0.353	-0.071	-0.092	-0.526
15.71	-0.234	0.000	-0.236	-0.073	-0.090	-0.526
15.72	-0.234	0.000	-0.118	-0.075	-0.088	-0.525
15.73	-0.156	0.000	0.000	-0.077	-0.085	-0.522
15.74	-0.156	0.000	0.177	-0.078	-0.083	-0.518
15.75	-0.078	0.000	0.353	-0.079	-0.081	-0.512
15.76	-0.078	-0.078	0.471	-0.080	-0.079	-0.505
15.77	-0.078	-0.078	0.648	-0.081	-0.078	-0.496
15.78	-0.078	-0.078	0.825	-0.082	-0.076	-0.486
15.79	-0.078	-0.078	0.943	-0.082	-0.074	-0.474
15.80	-0.078	-0.078	1.060	-0.083	-0.073	-0.461
15.81	-0.078	-0.078	1.178	-0.084	-0.071	-0.447
15.82	-0.078	-0.078	1.237	-0.085	-0.070	-0.432
15.83	-0.078	-0.078	1.237	-0.086	-0.068	-0.417
15.84	-0.078	-0.078	1.296	-0.086	-0.067	-0.402
15.85	-0.078	-0.078	1.296	-0.087	-0.065	-0.387
15.86	-0.078	-0.078	1.237	-0.088	-0.064	-0.372
15.87	-0.078	-0.078	1.178	-0.089	-0.062	-0.358
15.88	-0.078	-0.078	1.178	-0.089	-0.060	-0.344
15.89	-0.078	-0.078	1.060	-0.090	-0.059	-0.331
15.90	-0.078	-0.078	1.001	-0.091	-0.057	-0.318
15.91	-0.078	-0.078	0.943	-0.092	-0.056	-0.307
15.92	-0.078	-0.078	0.884	-0.093	-0.054	-0.295
15.93	-0.078	-0.078	0.825	-0.093	-0.053	-0.285
15.94	-0.078	-0.078	0.766	-0.094	-0.051	-0.275
15.95	-0.078	-0.078	0.707	-0.095	-0.050	-0.265
15.96	-0.078	-0.078	0.648	-0.096	-0.048	-0.257
15.97	-0.156	-0.078	0.589	-0.097	-0.046	-0.248
15.98	-0.234	-0.156	0.530	-0.100	-0.046	-0.241
15.99	-0.234	-0.156	0.471	-0.102	-0.045	-0.234
16.00	-0.234	-0.156	0.412	-0.104	-0.044	-0.227
16.01	-0.234	-0.156	0.353	-0.107	-0.043	-0.221
16.02	-0.156	-0.156	0.295	-0.108	-0.042	-0.216
16.03	-0.156	-0.156	0.236	-0.110	-0.042	-0.211
16.04	-0.156	-0.156	0.177	-0.111	-0.041	-0.207
16.05	-0.156	-0.156	0.118	-0.113	-0.040	-0.203

Figure 10.3.3.b.5 Digital data for event 15.5 (continued)

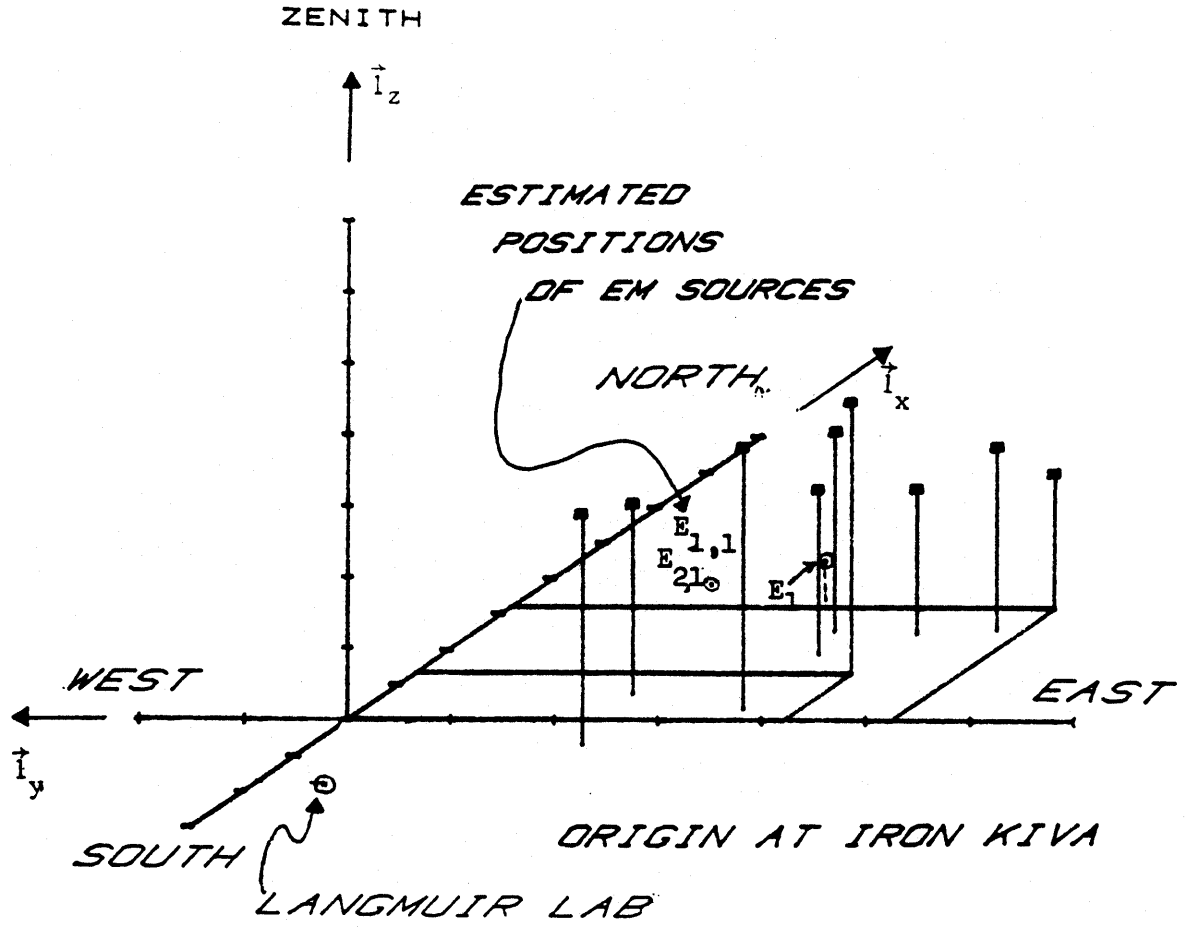
Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
16.06	-0.156	-0.156	0.000	-0.114	-0.039	-0.201
16.07	-0.156	-0.156	0.000	-0.116	-0.039	-0.199
16.08	-0.156	-0.156	-0.118	-0.118	-0.038	-0.198
16.09	-0.156	-0.156	-0.177	-0.119	-0.037	-0.197
16.10	-0.234	-0.156	-0.236	-0.121	-0.036	-0.197
16.11	-0.234	-0.156	-0.236	-0.124	-0.035	-0.197
16.12	-0.234	-0.156	-0.295	-0.126	-0.035	-0.198
16.13	-0.313	-0.156	-0.295	-0.129	-0.034	-0.198
16.14	-0.313	-0.156	-0.353	-0.132	-0.033	-0.199
16.15	-0.313	-0.156	-0.412	-0.136	-0.032	-0.201
16.16	-0.313	-0.156	-0.412	-0.139	-0.032	-0.203
16.17	-0.313	-0.156	-0.412	-0.142	-0.031	-0.205
16.18	-0.313	-0.156	-0.412	-0.145	-0.030	-0.206
16.19	-0.313	-0.078	-0.471	-0.148	-0.028	-0.209
16.20	-0.313	-0.078	-0.471	-0.151	-0.027	-0.211
16.21	-0.391	-0.078	-0.530	-0.155	-0.025	-0.214
16.22	-0.391	-0.078	-0.530	-0.159	-0.024	-0.217
16.23	-0.391	-0.078	-0.589	-0.163	-0.022	-0.220
16.24	-0.469	-0.078	-0.589	-0.168	-0.021	-0.224
16.25	-0.469	-0.078	-0.589	-0.172	-0.019	-0.227
16.26	-0.469	-0.078	-0.589	-0.177	-0.018	-0.231
16.27	-0.469	-0.078	-0.589	-0.182	-0.016	-0.235
16.28	-0.469	-0.078	-0.589	-0.186	-0.014	-0.238
16.29	-0.469	-0.078	-0.648	-0.191	-0.013	-0.242
16.30	-0.469	-0.078	-0.707	-0.196	-0.011	-0.247
16.31	-0.391	-0.078	-0.530	-0.200	-0.010	-0.250
16.32	-0.391	-0.078	-0.530	-0.203	-0.008	-0.253
16.33	-0.391	-0.078	-0.471	-0.207	-0.007	-0.255
16.34	-0.391	-0.078	-0.412	-0.211	-0.005	-0.257
16.35	-0.391	-0.078	-0.471	-0.215	-0.004	-0.259
16.36	-0.391	-0.078	-0.471	-0.219	-0.002	-0.262
16.37	-0.391	-0.078	-0.412	-0.223	-0.000	-0.263
16.38	-0.391	-0.078	-0.412	-0.227	0.001	-0.265



horizontal range = 3773 m

Date : 81213 M.S.T. : 13:46:45

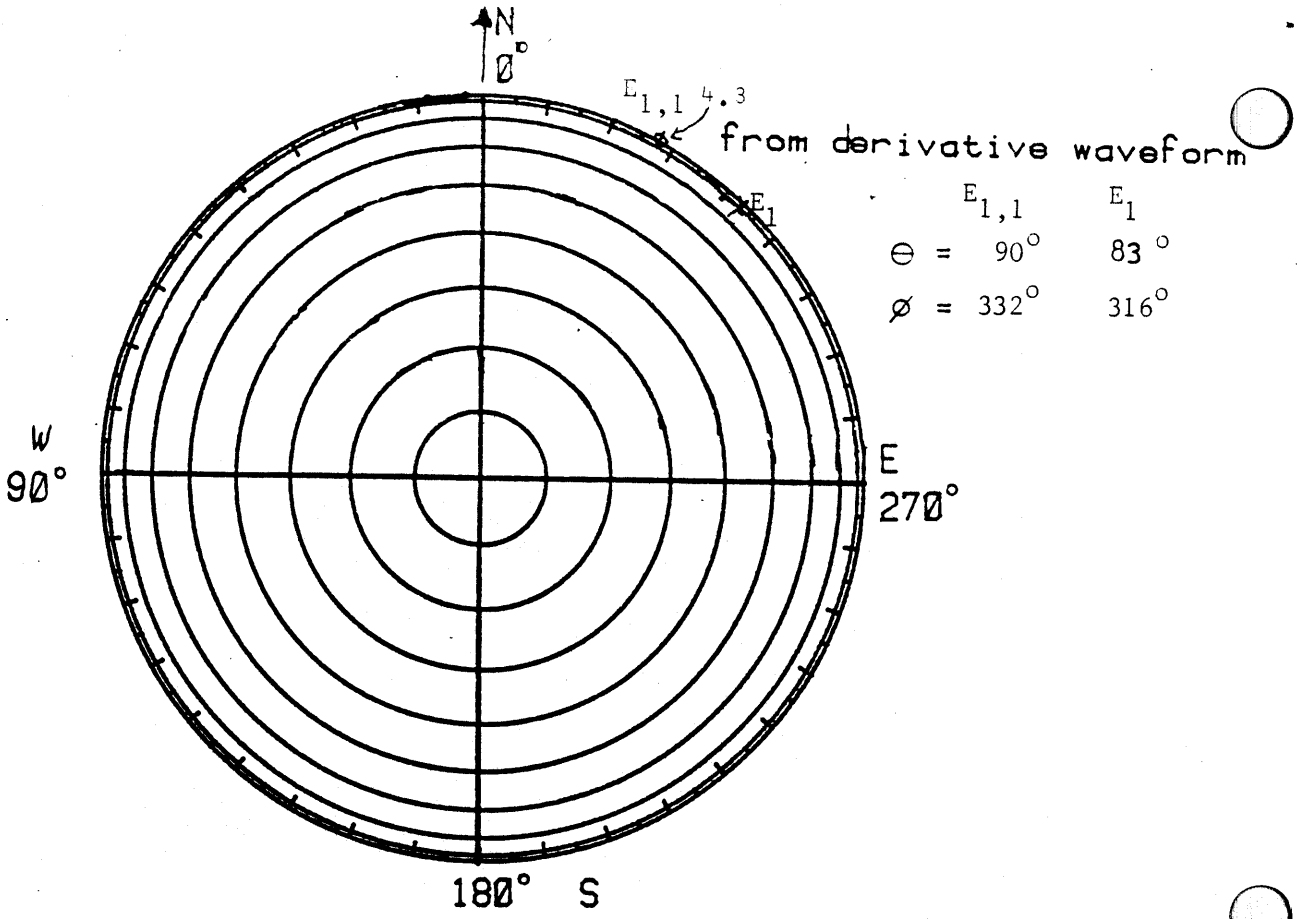
Figure 10.3.4 Slow electric field change and thunder microphone record from distant return stroke



ticks on axes at 1 km intervals

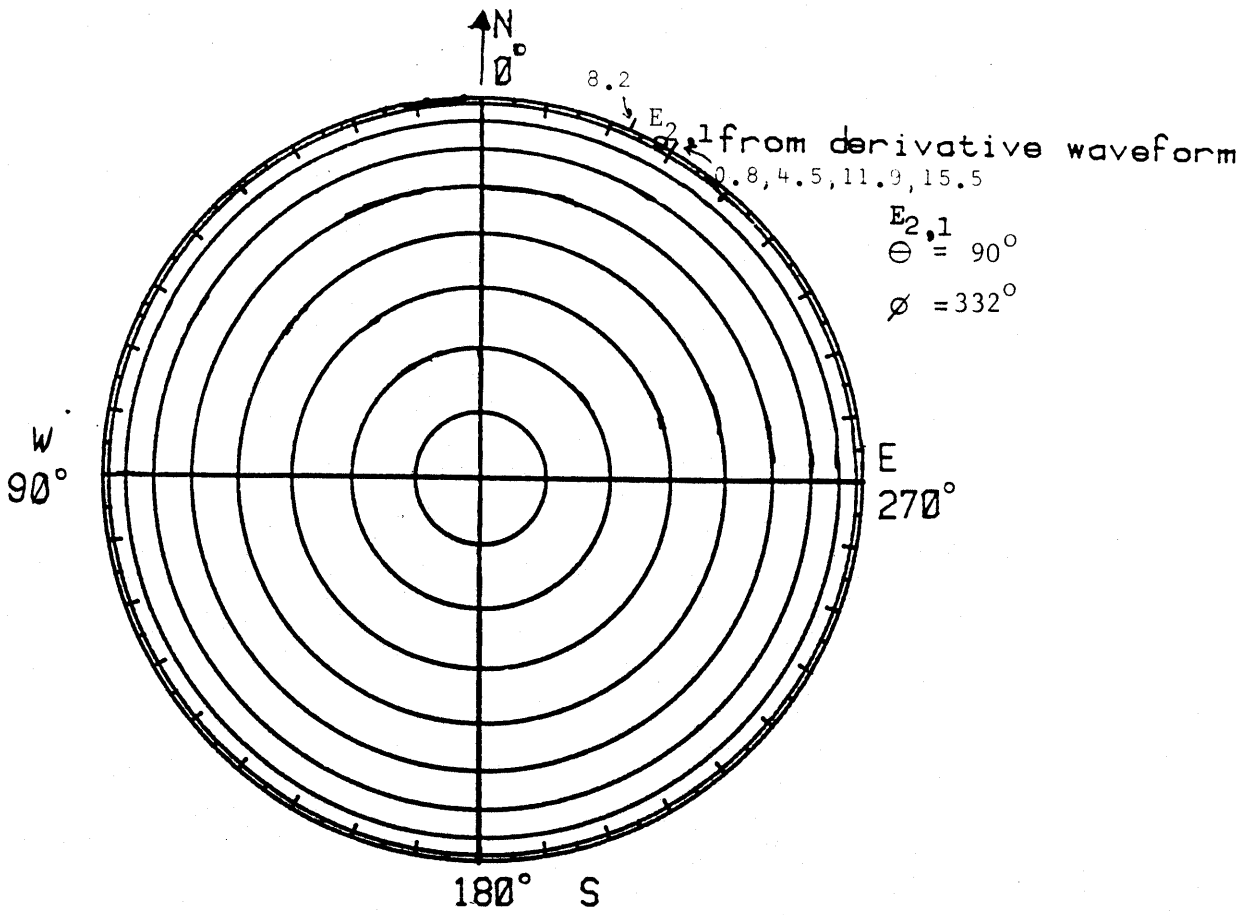
Date : 81213 M.S.T. : 13:46:45

Figure 10.3.5 Acoustic location of distant return stroke



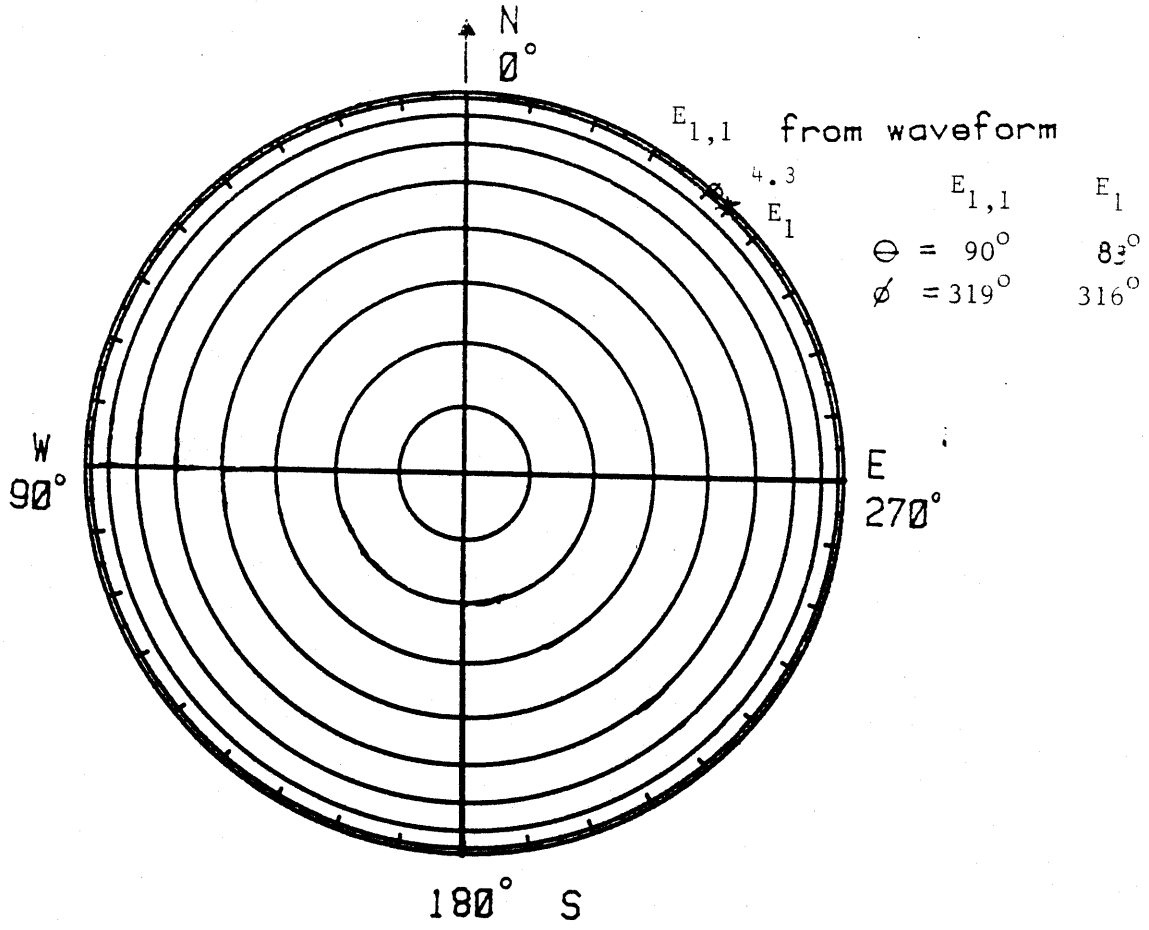
Date : 81213 M.S.T. : 13:46:45.253

Figure 10.3.6.A.1 sin(θ),φ contours for distant return stroke derivative waveform



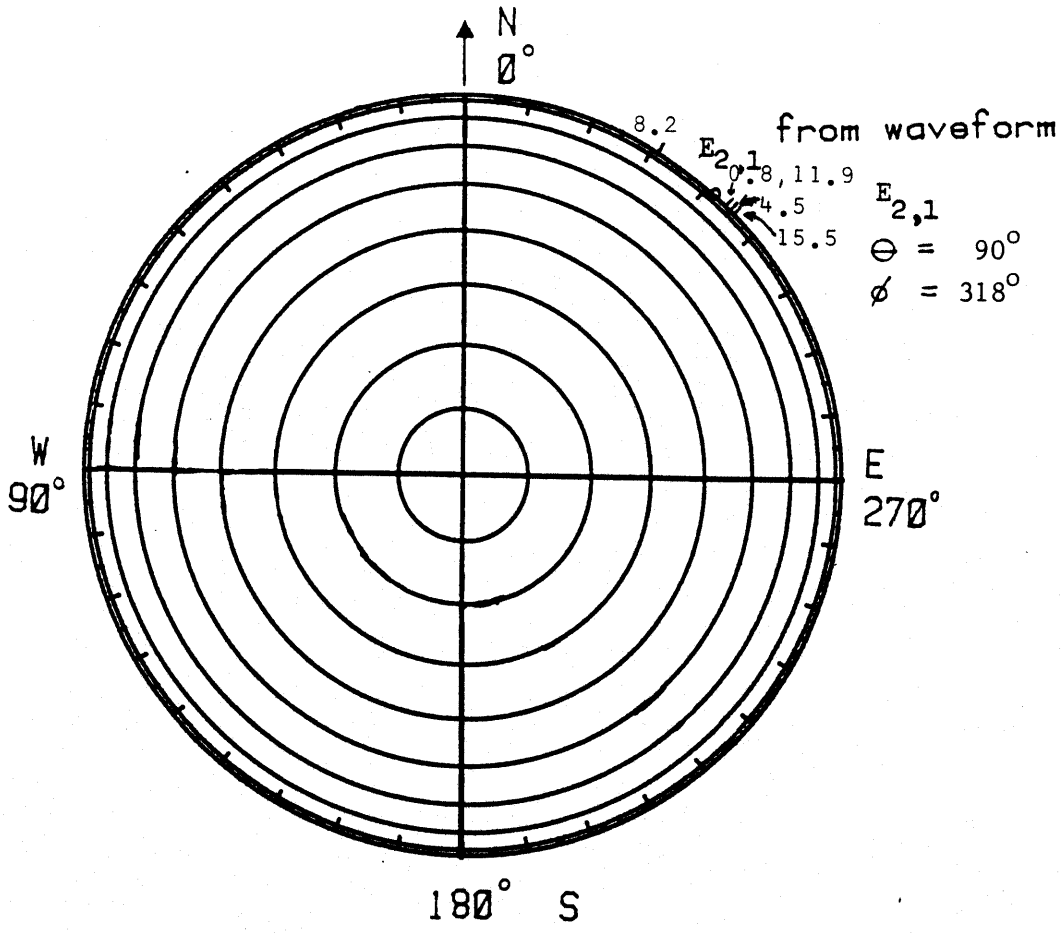
Date : 81213 M.S.T. : 13:46:45.971

Figure 10.3.6.A.2 $\sin(\theta)$,ϕ contours for distant return stroke derivative waveform



Date : 81213 M.S.T. : 13:46:45.253

Figure 10.3.6.B.1 sin(θ),ϕ contours for distant return stroke waveform



Date : 81213 M.S.T. : 13:46:45.971

Figure 10.3.6.B.2 $\sin(\theta),\phi$ contours for distant return stroke waveform

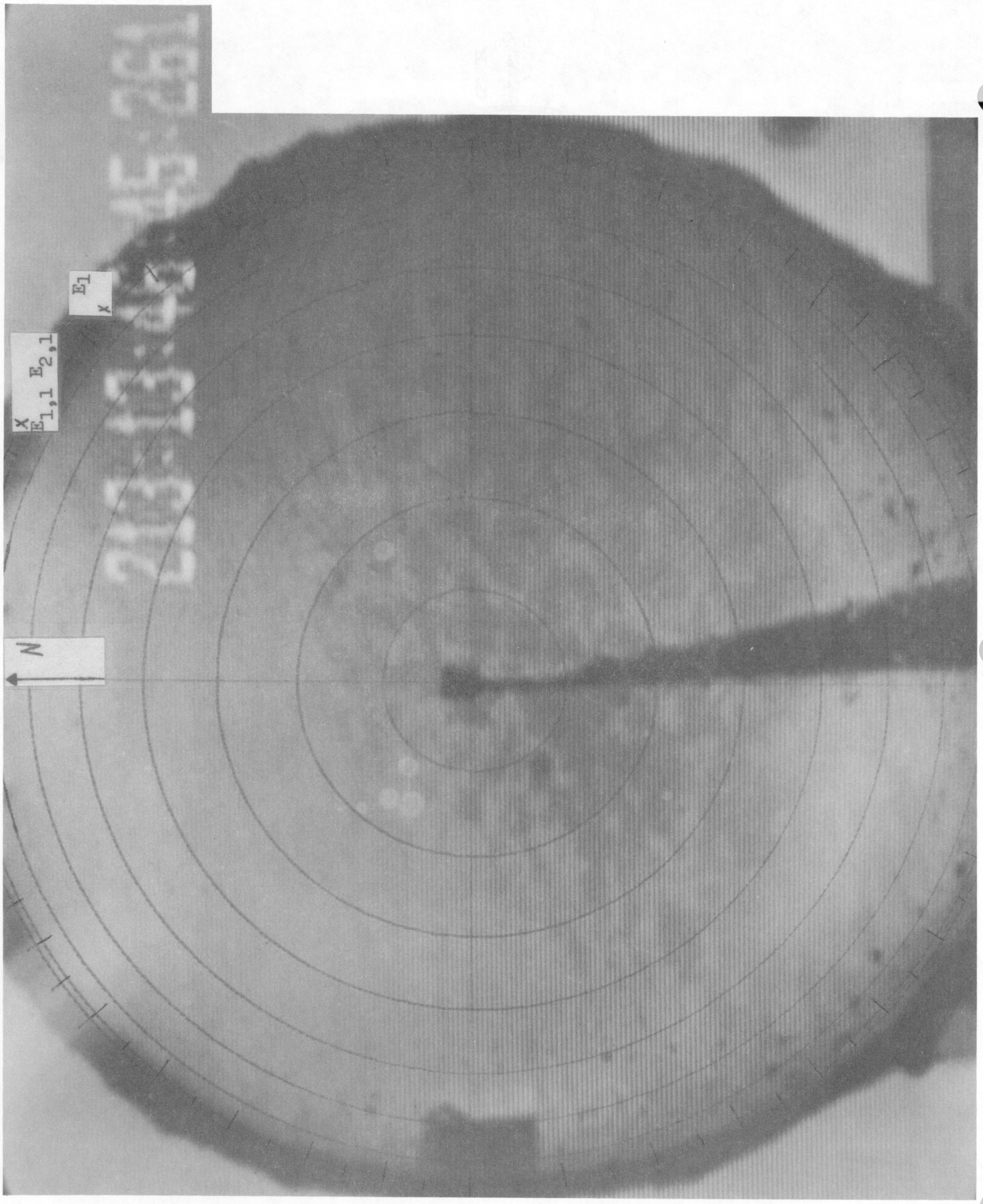


Figure 10.3.7 Whole-sky videotape photograph from Kiva (no visible lightning)

Figure **10.3.8** **Tabulation** of θ, ϕ values for waveform and TOA solutions with origin at different locations

Yeardate : 81213 M.S.T. : 1346.45

Event		TOA	waveform	r TOA (meters)	r waveform (meters)	TOA origin at Kiva	TOA origin at WSC	waveform origin at WSC
1	θ	83.3°	90°	5620	3773	83.4°	83.4°	90°
	ϕ	316.2°	332°			316.5°	316.2°	332°
2	θ		90°		3773			90°
	ϕ		332°					332°

Figure **10.3.9.A.1** Tabulation of peak values for each event from derivative waveform set for distant return stroke

Yeardate: 81213 M.S.T.:134645.253

$\phi = 332^{o}$; $\theta = 90^{o}$; r = 3773 m

Event Number	Time (μs)	$Z_o \Delta\partial D_z/\partial t$ (T/s)	$\Delta\partial B_E/\partial t$ (T/s)	$\Delta\partial B_N/\partial t$ (T/s)	$\Delta\partial B_h/\partial t$ (T/s)	$\Delta\partial B_e/\partial t$ (T/s)	$\lvert\Delta\partial\vec{B}/\partial t\rvert$ (T/s)
4.3	4.31	-2.95	1.17	-0.63	0.00	-0.66	0.66

CALCULATED VALUES FOR $\partial\vec{T}/\partial t$

Event Number	$\partial T_2/\partial t$ (10^{15} Am/s^2)	$\partial T_3/\partial t$ (10^{15} Am/s^2)	$\lvert\partial\vec{T}/\partial t\rvert$ (10^{15} Am/s^2)	α (deg)
4.3	0	7517	7517	360

Figure 10.3.9.A.2 Tabulation of peak values for each event from derivative waveform set for distant return stroke

Yeardate: 81213 M.S.T.:134645.971

$\phi = 332^{o}$; $\theta = 90^{o}$; r = 3773 m

Event Number	Time (μs)	$Z_o \Delta\partial D_z/\partial t$ (T/s)	$\Delta\partial B_E/\partial t$ (T/s)	$\Delta\partial B_N/\partial t$ (T/s)	$\Delta\partial B_h/\partial t$ (T/s)	$\Delta\partial B_e/\partial t$ (T/s)	$\lvert\Delta\partial\vec{B}/\partial t\rvert$ (T/s)
0.8	0.84	-3.00	1.09	-0.63	0.00	-0.63	0.63
4.5	4.52	-3.06	1.09	-0.63	0.00	-0.63	0.63
8.2	8.18	-3.06	1.09	-0.47	0.00	-0.59	0.59
11.9	11.86	-3.00	1.09	-0.63	0.00	-0.63	0.63
15.5	15.52	-3.06	1.09	-0.63	0.00	-0.63	0.63

CALCULATED VALUES FOR $\partial\vec{T}/\partial t$

Event Number	$\partial T_2/\partial t$ (10^{15} Am/s^2)	$\partial T_3/\partial t$ (10^{15} Am/s^2)	$\lvert\partial\vec{T}/\partial t\rvert$ (10^{15} Am/s^2)	α (deg)
0.8	0	7127	7127	360
4.5	0	7127	7127	360
8.2	0	6710	6710	360
11.9	0	7127	7127	360
15.5	0	7127	7127	360

Figure **10.3.9.B.1** Tabulation of peak values for each event from waveform set for distant return stroke

Yeardate: 81213 M.S.T.:134645.253

$\phi = 319^{o}$; $\theta = 90^{o}$; r =3773 m

Event Number	Time (μs)	$Z_o \Delta D_s$ (μT)	ΔB_E (μT)	ΔB_N (μT)	ΔB_h (μT)	ΔB_e (μT)	$\lvert\Delta\vec{B}\rvert$ (μT)
4.3	4.31	-2.60	0.87	-0.76	0.00	-0.58	0.58

CALCULATED VALUES FOR $\overline{I}_t . \vec{T}$

Event Number	T_2 (10^9 Am/s)	T_3 (10^9 Am/s)	$\lvert\vec{T}\rvert$ (10^9 Am/s)	α (deg)
4.3	0	6511	6511	360

Figure **10.3.9.B.2** Tabulation of peak values for each event from waveform set for distant return stroke

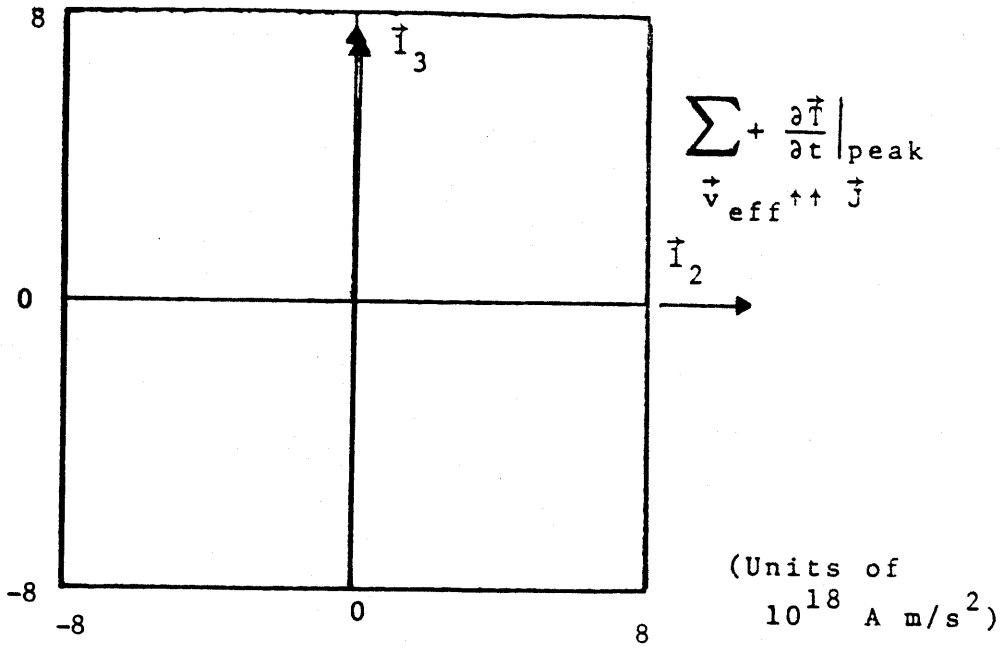
Yeardate: 81213 M.S.T.:134645.971

$\phi = 318^{o}$; $\theta = 90^{o}$; r =3773 m

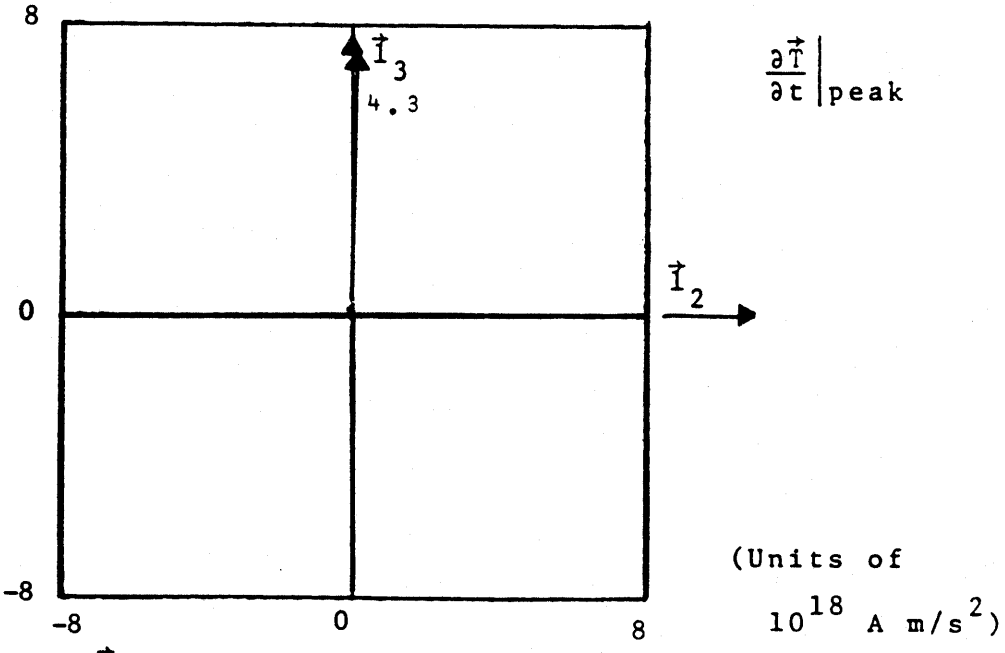
Event Number	Time (μs)	$Z_o \Delta D_s$ (μT)	ΔB_E (μT)	ΔB_N (μT)	ΔB_h (μT)	ΔB_e (μT)	$\lvert\Delta\vec{B}\rvert$ (μT)
0.8	0.84	-0.50	0.14	-0.13	0.00	-0.10	0.10
4.5	4.52	-0.51	0.14	-0.14	0.00	-0.10	0.10
8.2	8.18	-0.51	0.14	-0.08	0.00	-0.08	0.08
11.9	11.86	-0.50	0.13	-0.13	0.00	-0.09	0.09
15.5	15.52	-0.53	0.13	-0.14	0.00	-0.09	0.09

CALCULATED VALUES FOR $\overline{I}_t . \vec{T}$

Event Number	T_2 (10^9 Am/s)	T_3 (10^9 Am/s)	$\lvert\vec{T}\rvert$ (10^9 Am/s)	α (deg)
0.8	0	1084	1084	180
4.5	0	1079	1079	360
8.2	0	879	879	360
11.9	0	1060	1060	360
15.5	0	1071	1071	360



Effective reconstruction of positive streamer

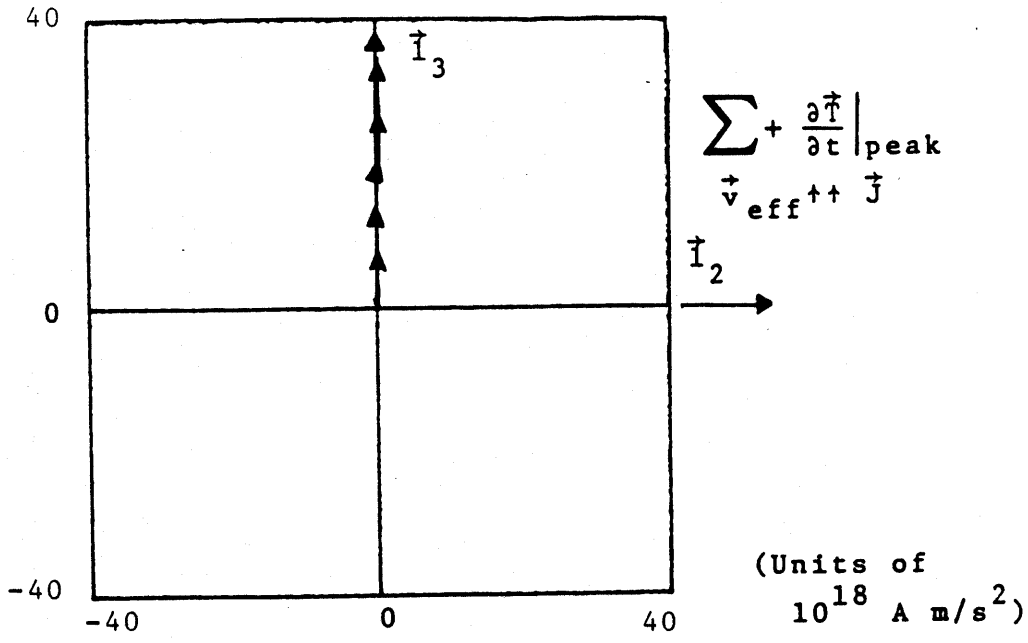


Peaks of $\partial\vec{I}/\partial t$

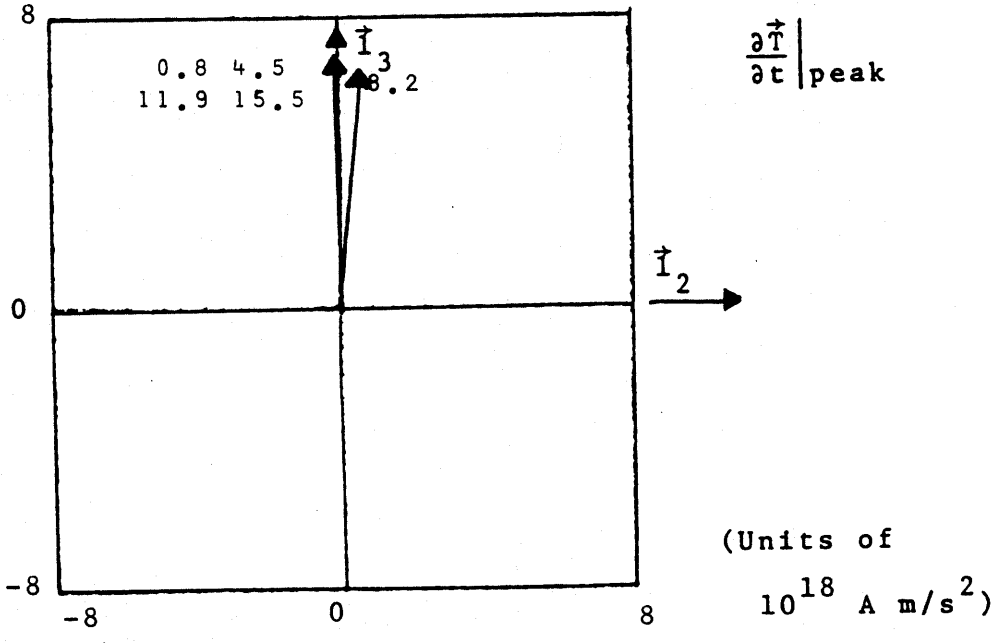
$\phi = 332^\circ$ $\theta = 90^\circ$ r = 3773 m

Date: 81213 M.S.T.: 13:46:45.253

Figure 10.3.10.A.1 $\partial\vec{I}/\partial t$ for distant return stroke



Effective reconstruction of positive streamer

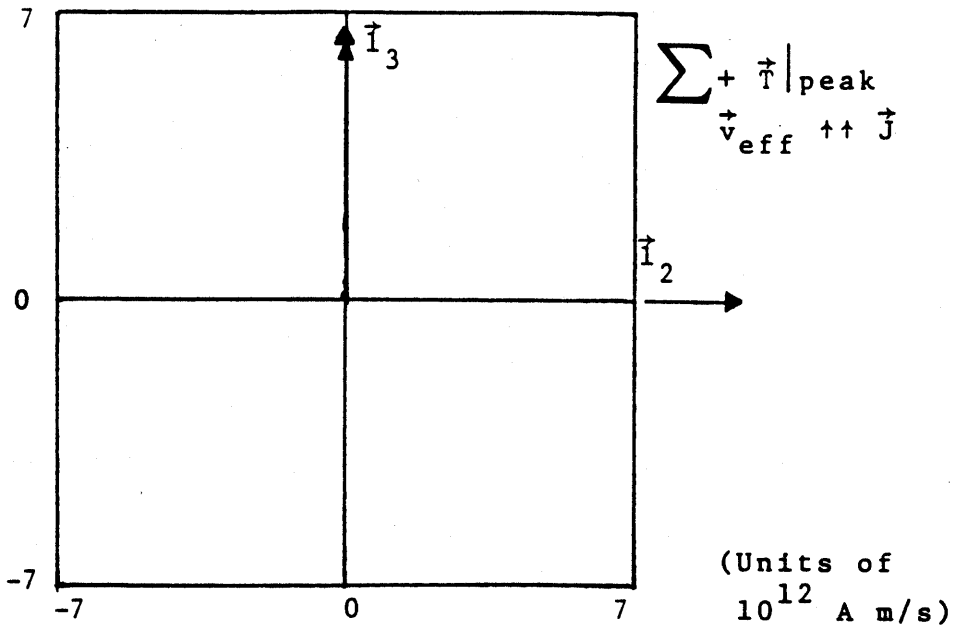


Peaks of $\partial \vec{T}/\partial t$

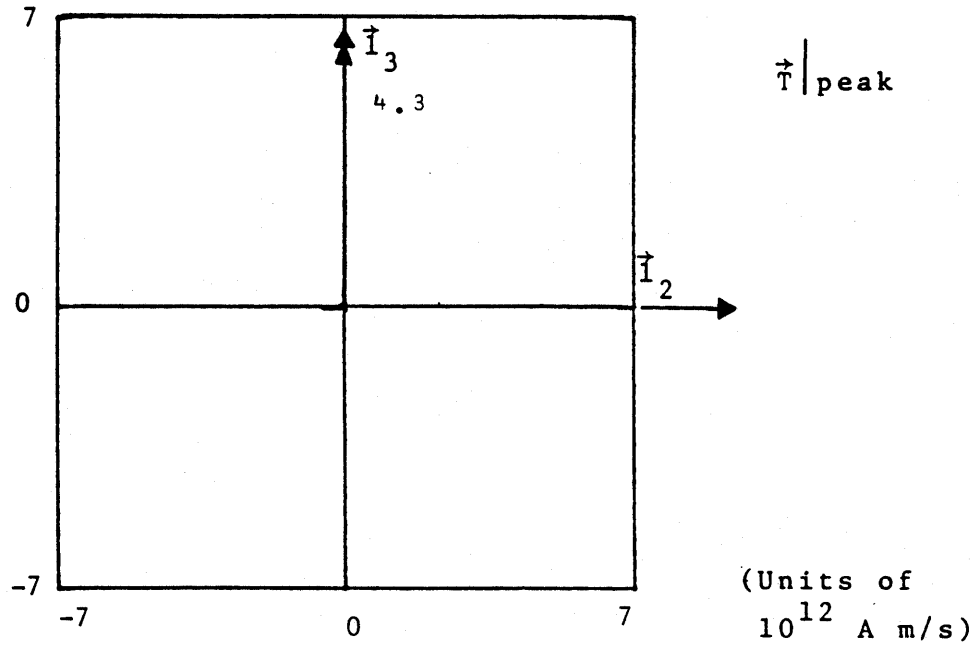
$\phi = 332^\circ$ $\theta = 90^\circ$ r = 3773 m

Date: 81213 M.S.T.: 13:36:45.971

Figure 10.3.10.A.2 $\partial \vec{T}/\partial t$ for distant return stroke



Effective reconstruction of positive streamer

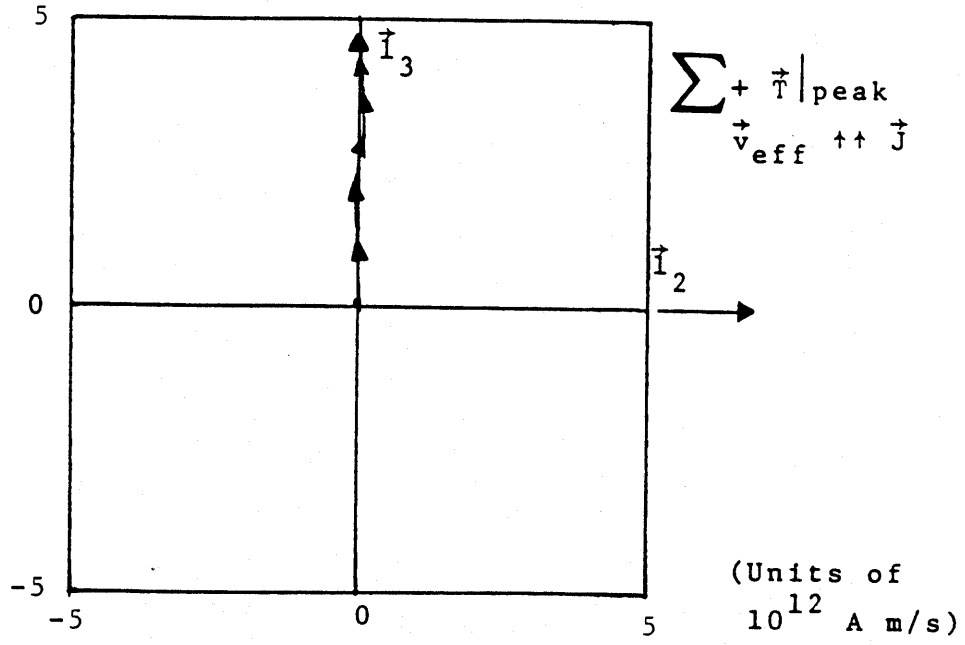


Peaks of $\vec{T}$

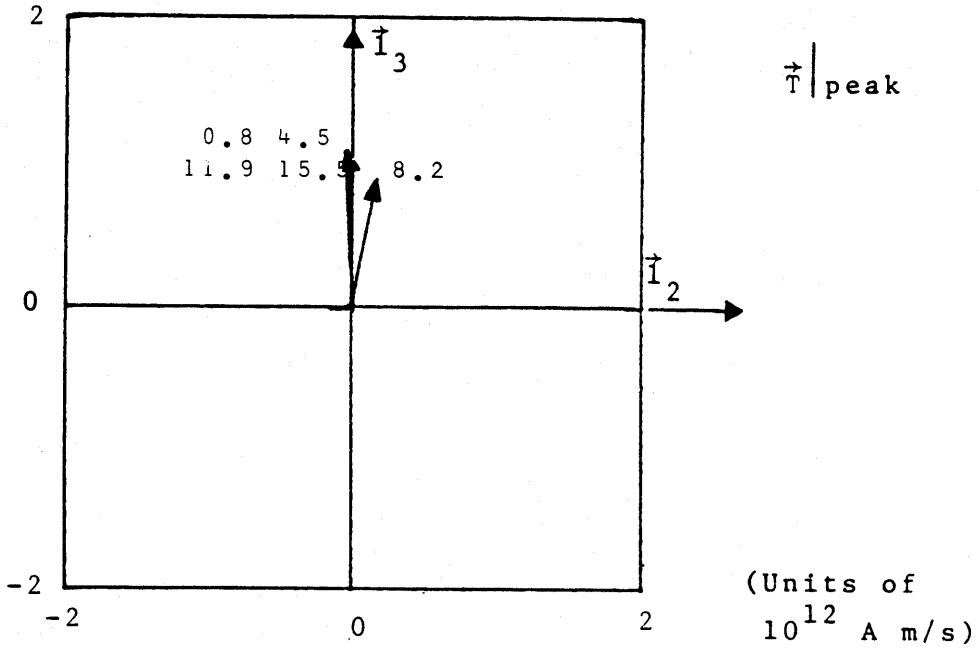
$\phi = 319^{\circ}$ $\theta = 90^{\circ}$ r = 3773 m

Date: 81213 M.S.T.: 13:46:45.253

Figure 10.3.10.B.1 $\vec{T}$ for distant return stroke



Effective reconstruction of positive streamer



Peaks of $\vec{T}$

$\phi = 318^{o}$ $\theta = 90^{o}$ r = 3773 m

Date: 81213 M.S.T.: 13:46:45.971

Figure 10.3.10.B.2 $\vec{T}$ for distant return stroke

10.4 DISTANT RETURN STROKE

This data set is another example of a distant return stroke with two waveform events and one TOA event.

The derivative waveforms look similar to leader impulses, but when the data has been numerically integrated the waveforms are characteristic of return strokes. Another reason for naming this example as a return stroke is shown in Fig. 10.4.4.b. The trigger marks have occurred after the initial leader which did not cause a large enough field change for the sensors to detect. Data from distant flashes are largely from return strokes.

No acoustic locations were able to be determined because we were unable to separate the thunder from individual flashes. The electromagnetic sources are plotted with reference to the Kiva in Fig. 10.4.5. There is no visible lightning on the whole-sky camera photograph so a location comparison is not available from either acoustics or video. The waveform events and the TOA event give locations agreeing to about 15^{0}.

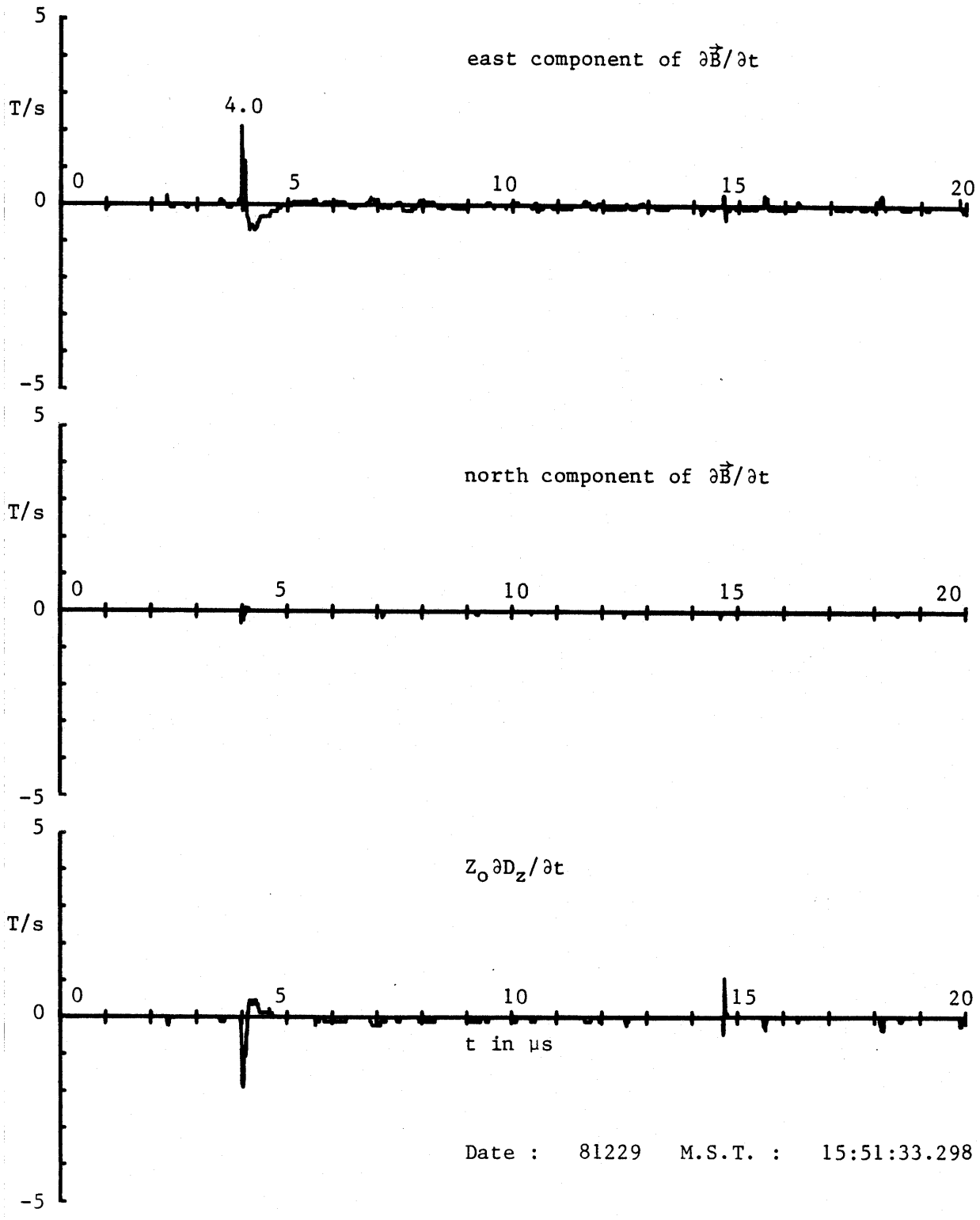


Figure 10.4.1.A.1 Derivative fields from distant return stroke

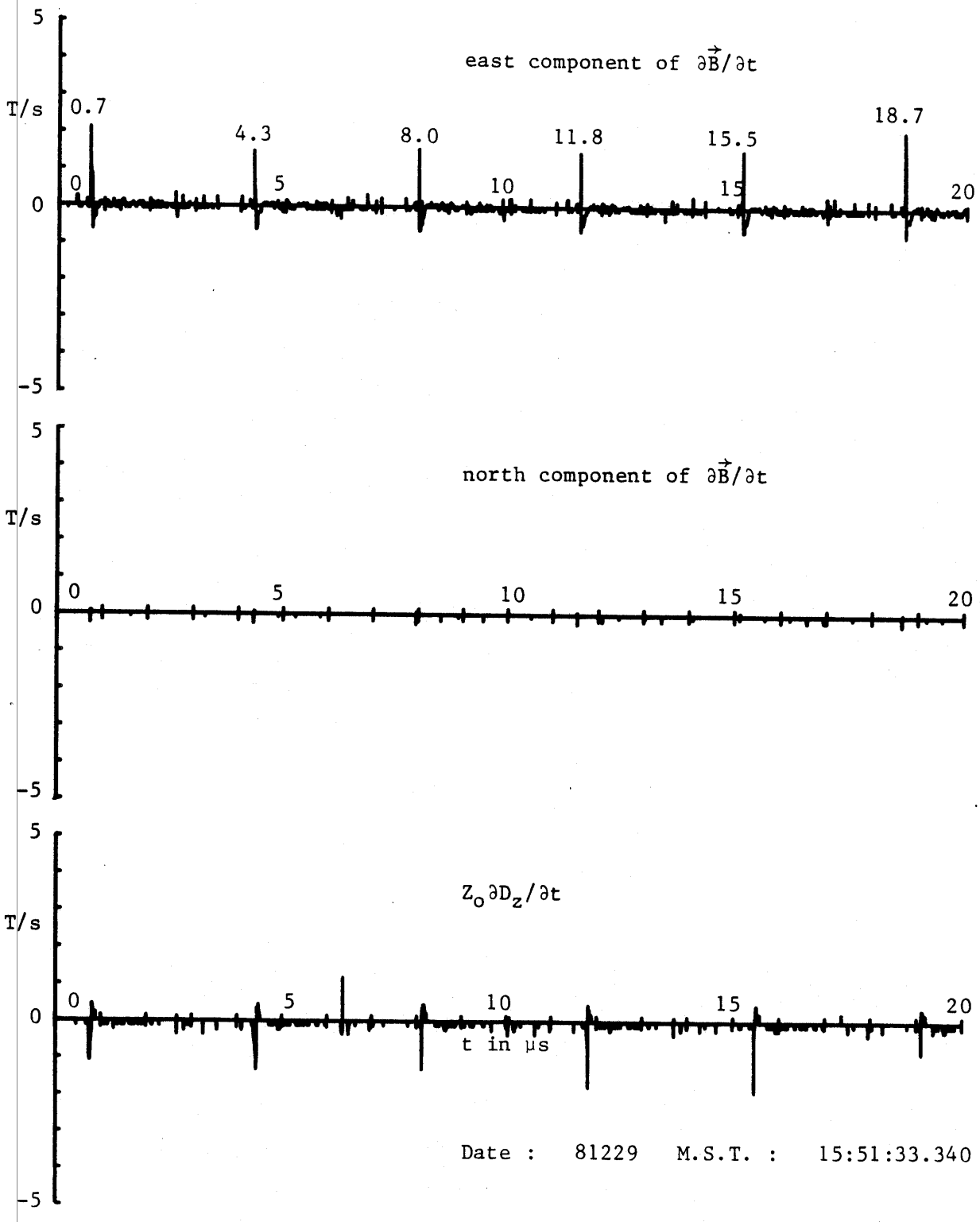


Figure 10.4.1.A.2 Derivative fields from distant return stroke

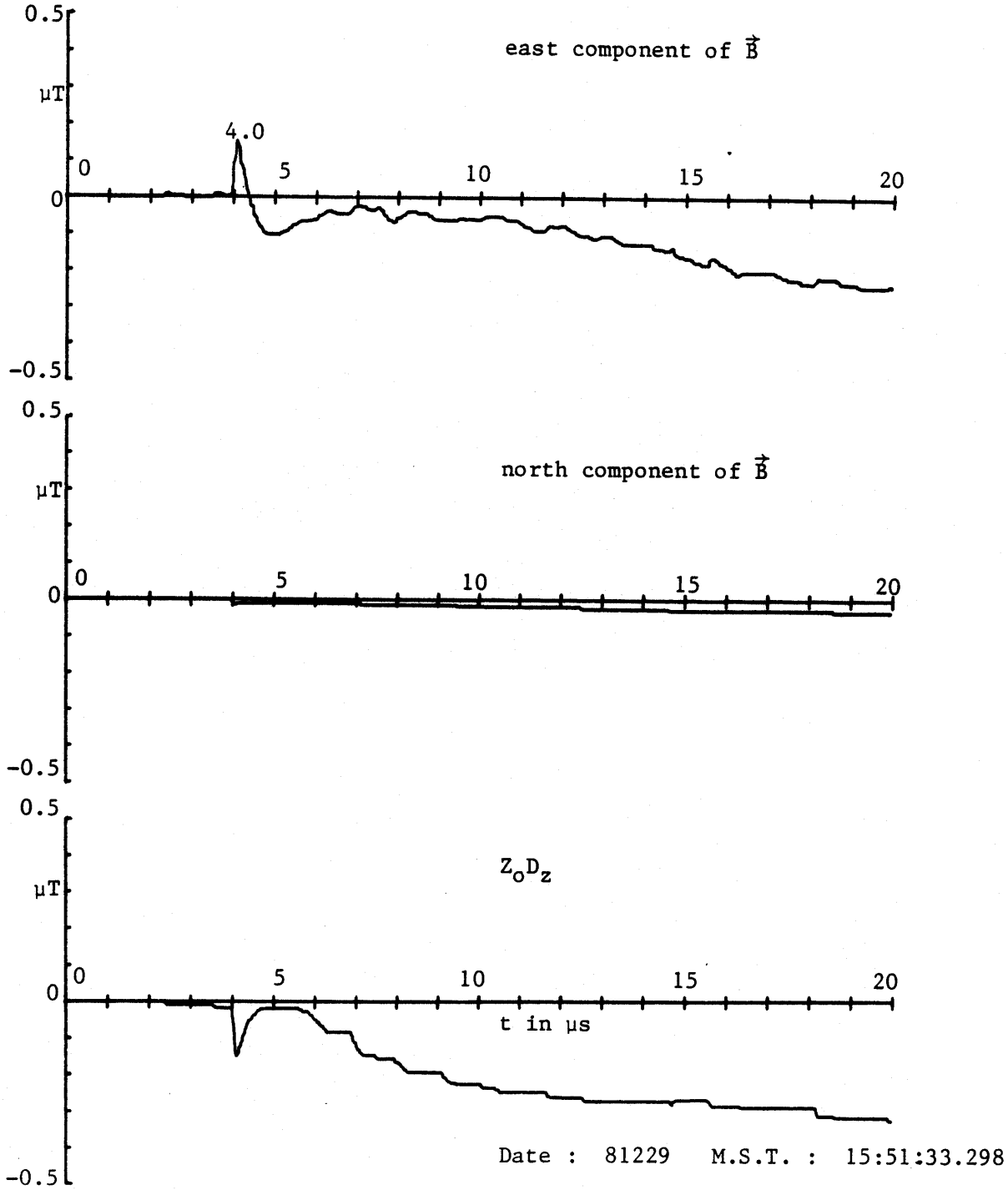


Figure 10.4.1.B.1 Fields from distant return stroke

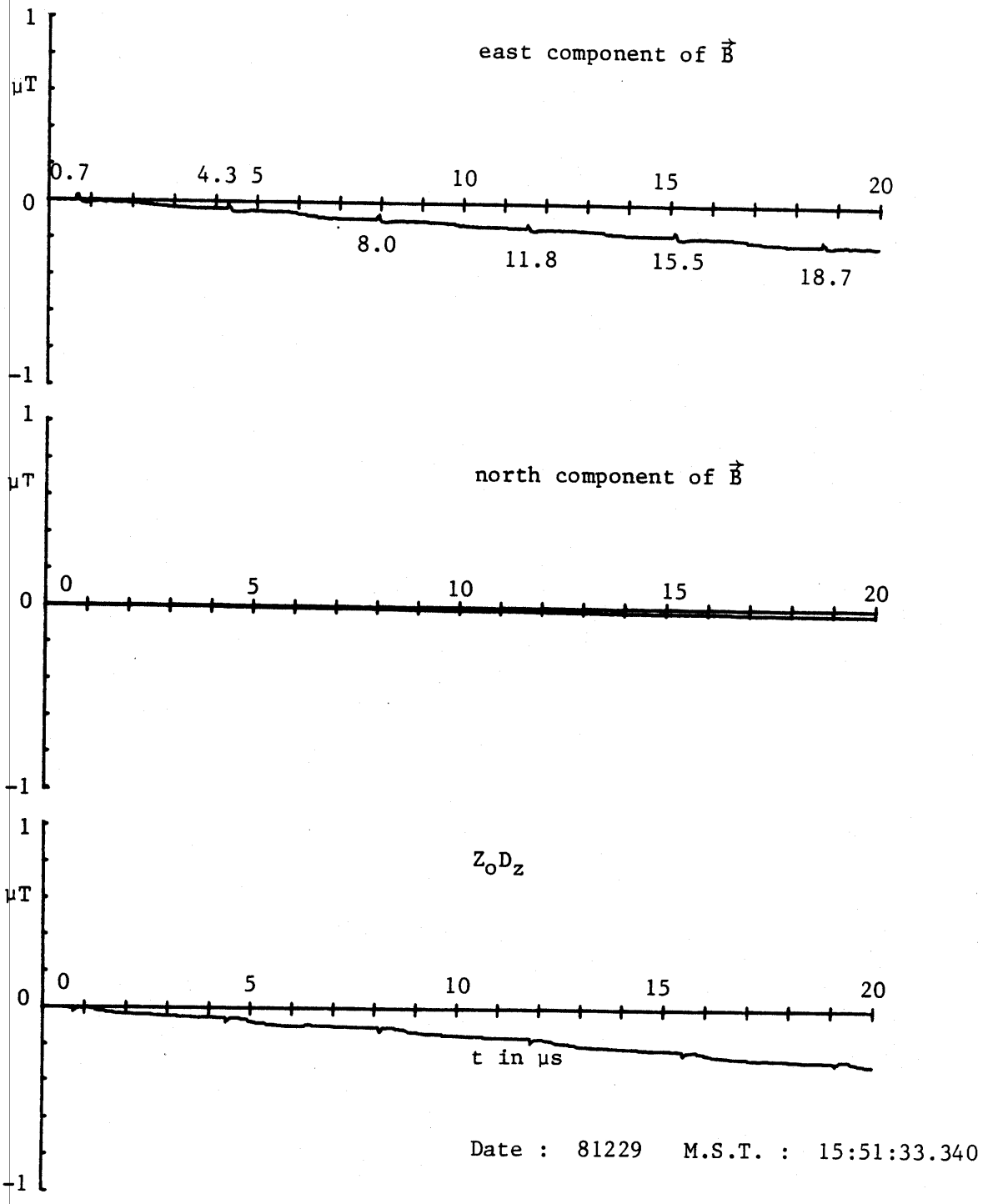


Figure 10.4.1.B.2 Fields from distant return stroke

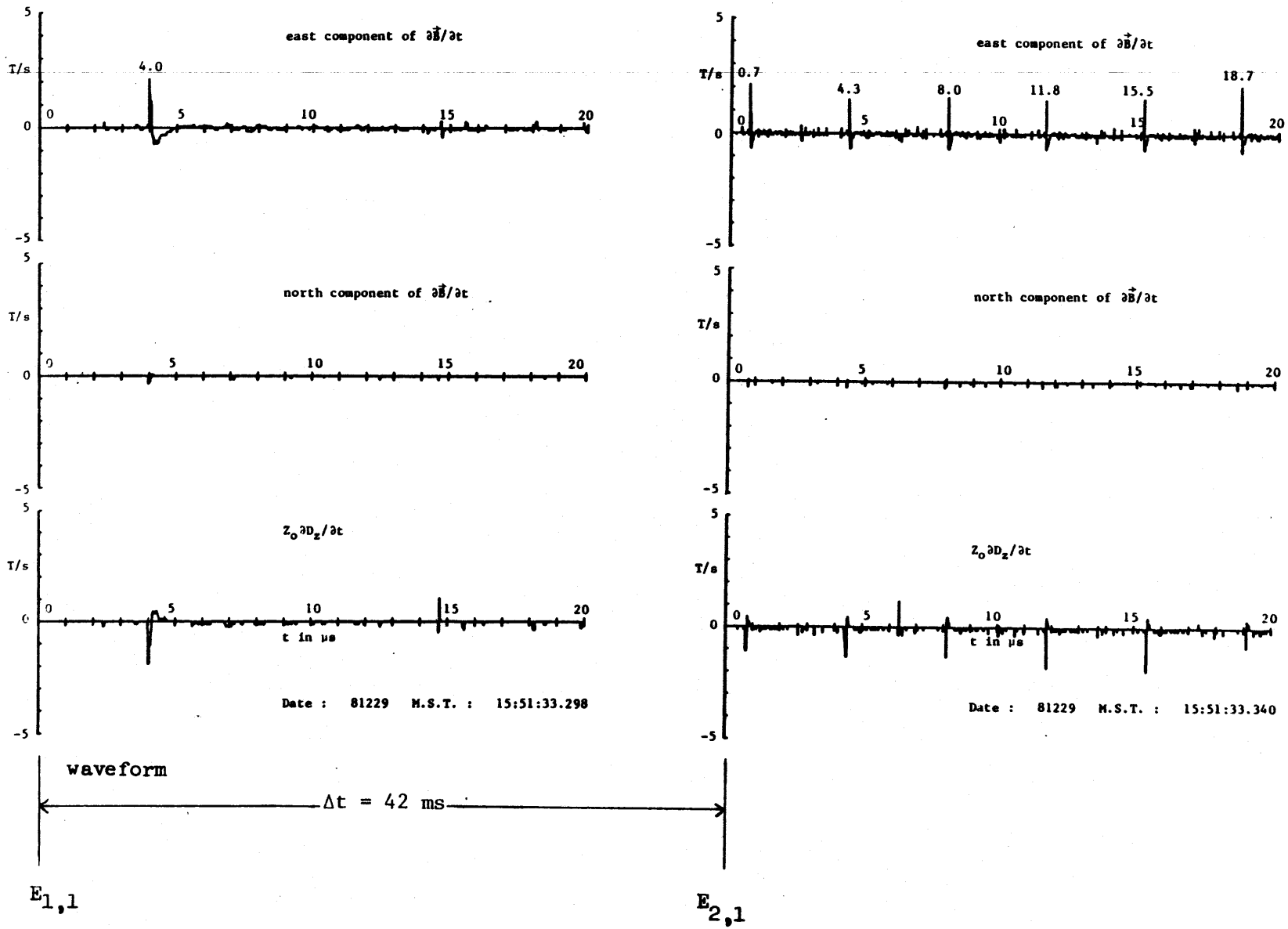


Figure 10.4.2 Time history of waveform and TOA events from distant return stroke

Figure 10.4.3.a.1 Digital data for event 4.0

(-0.156) = baseline which is subtracted for peaks and numerical integration

Yeardate: 81229 Time: 15:51:33.298 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
3.99	(-0.156)	-0.078	0.000	-0.000	-0.000	0.000
4.00	0.547	-0.078	(0.000)	0.007	-0.000	0.000
4.01	1.797	(-0.078)	-0.118	0.027	-0.000	-0.001
4.02	1.797	-0.391	-0.236	0.046	-0.003	-0.004
4.03	1.250	-0.313	-0.471	0.060	-0.005	-0.008
4.04	1.172	-0.313	-1.767	0.073	-0.008	-0.026
4.05	0.547	-0.313	-1.885	0.080	-0.010	-0.045
4.06	0.547	-0.313	-1.296	0.087	-0.013	-0.058
4.07	0.547	-0.078	-1.296	0.095	-0.013	-0.071
4.08	0.625	-0.078	-0.825	0.102	-0.013	-0.079
4.09	0.859	-0.156	-0.825	0.112	-0.013	-0.087
4.10	0.625	-0.078	-0.825	0.120	-0.013	-0.095
4.11	0.547	-0.156	-0.825	0.127	-0.014	-0.104
4.12	0.000	-0.156	-0.943	0.129	-0.015	-0.113
4.13	-0.391	0.000	-1.060	0.127	-0.014	-0.124
4.14	-0.625	0.000	-0.471	0.122	-0.013	-0.128
4.15	-0.703	0.000	0.000	0.116	-0.013	-0.128
4.16	-0.859	0.000	0.118	0.109	-0.012	-0.127
4.17	-0.938	0.000	0.118	0.102	-0.011	-0.126
4.18	-1.016	0.000	0.353	0.093	-0.010	-0.123
4.19	-0.938	0.000	0.353	0.085	-0.009	-0.119
4.20	-0.938	-0.078	0.353	0.077	-0.009	-0.115
4.21	-0.938	-0.078	0.471	0.069	-0.009	-0.111
4.22	-0.859	-0.078	0.353	0.062	-0.009	-0.107
4.23	-0.859	-0.078	0.353	0.055	-0.009	-0.104
4.24	-0.859	-0.078	0.471	0.048	-0.009	-0.099
4.25	-0.859	-0.078	0.353	0.041	-0.009	-0.095
4.26	-0.938	-0.078	0.353	0.034	-0.009	-0.092
4.27	-0.938	-0.078	0.353	0.026	-0.009	-0.088
4.28	-0.938	-0.078	0.353	0.018	-0.009	-0.085
4.29	-0.938	-0.078	0.353	0.010	-0.009	-0.081
4.30	-0.938	-0.078	0.353	0.002	-0.009	-0.078
4.31	-1.016	-0.078	0.353	-0.006	-0.009	-0.074
4.32	-0.938	-0.078	0.471	-0.014	-0.009	-0.070
4.33	-0.938	-0.078	0.471	-0.022	-0.009	-0.065
4.34	-0.938	-0.078	0.471	-0.030	-0.009	-0.060
4.35	-0.938	-0.078	0.471	-0.038	-0.009	-0.055
4.36	-0.859	-0.078	0.353	-0.045	-0.009	-0.052
4.37	-0.781	-0.078	0.353	-0.051	-0.009	-0.048
4.38	-0.781	-0.078	0.353	-0.057	-0.009	-0.045
4.39	-0.781	-0.078	0.353	-0.063	-0.009	-0.041
4.40	-0.703	-0.078	0.353	-0.069	-0.009	-0.038
4.41	-0.703	-0.078	0.236	-0.074	-0.009	-0.035
4.42	-0.703	-0.078	0.236	-0.080	-0.009	-0.033
4.43	-0.625	-0.078	0.118	-0.084	-0.009	-0.032

Figure 10.4.3.a.1 Digital data for event 4.0 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
4.44	-0.625	-0.078	0.118	-0.089	-0.009	-0.031
4.45	-0.625	-0.078	0.118	-0.094	-0.009	-0.029
4.46	-0.625	-0.078	0.118	-0.099	-0.009	-0.028
4.47	-0.625	-0.078	0.118	-0.103	-0.009	-0.027
4.48	-0.625	-0.078	0.118	-0.108	-0.009	-0.026
4.49	-0.625	-0.078	0.118	-0.113	-0.009	-0.025
4.50	-0.625	-0.078	0.118	-0.117	-0.009	-0.024
4.51	-0.625	-0.078	0.118	-0.122	-0.009	-0.022
4.52	-0.625	-0.078	0.118	-0.127	-0.009	-0.021
4.53	-0.625	-0.078	0.118	-0.131	-0.009	-0.020
4.54	-0.625	-0.078	0.118	-0.136	-0.009	-0.019
4.55	-0.625	-0.078	0.118	-0.141	-0.009	-0.018
4.56	-0.625	-0.078	0.118	-0.146	-0.009	-0.017
4.57	-0.625	-0.078	0.118	-0.150	-0.009	-0.016
4.58	-0.625	-0.078	0.118	-0.155	-0.009	-0.014
4.59	-0.625	-0.078	0.118	-0.160	-0.009	-0.013
4.60	-0.625	-0.078	0.118	-0.164	-0.009	-0.012
4.61	-0.625	-0.078	0.118	-0.169	-0.009	-0.011
4.62	-0.625	-0.078	0.118	-0.174	-0.009	-0.010
4.63	-0.547	-0.078	0.118	-0.178	-0.009	-0.009
4.64	-0.547	-0.078	0.118	-0.182	-0.009	-0.007
4.65	-0.547	-0.078	0.236	-0.186	-0.009	-0.005
4.66	-0.547	-0.078	0.118	-0.189	-0.009	-0.004
4.67	-0.469	-0.078	0.118	-0.193	-0.009	-0.003
4.68	-0.469	-0.078	0.118	-0.196	-0.009	-0.002
4.69	-0.469	-0.078	0.118	-0.199	-0.009	-0.000
4.70	-0.469	-0.078	0.118	-0.202	-0.009	0.001
4.71	-0.469	-0.078	0.000	-0.205	-0.009	0.001

Figure 10.4.3.b.1 Digital data for event 0.7

(-0.313) = baseline which is subtracted for peaks and numerical integration

Yeardate: 81229 Time: 15:51:33.340 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
0.70	(-0.313)	-0.078	-0.118	0.000	-0.000	0.000
0.71	-0.234	-0.078	(-0.118)	0.001	-0.000	0.000
0.72	1.797	-0.078	0.000	0.022	-0.000	0.001
0.73	0.547	-0.078	0.000	0.030	-0.000	0.002
0.74	-0.625	-0.078	0.000	0.027	-0.000	0.004
0.75	-0.938	-0.078	0.000	0.021	-0.000	0.005
0.76	-0.859	(-0.078)	0.000	0.016	-0.000	0.006
0.77	-0.938	-0.313	0.000	0.009	-0.002	0.007
0.78	-0.781	-0.078	-0.236	0.005	-0.002	0.006
0.79	-0.703	0.000	-0.825	0.001	-0.002	-0.001
0.80	-0.625	-0.078	-1.060	-0.002	-0.002	-0.011
0.81	-0.625	-0.078	0.353	-0.005	-0.002	-0.006
0.82	-0.625	-0.078	0.471	-0.009	-0.002	0.000
0.83	-0.547	-0.078	0.353	-0.011	-0.002	0.005
0.84	-0.469	-0.078	0.471	-0.012	-0.002	0.011
0.85	-0.469	-0.078	0.353	-0.014	-0.002	0.015
0.86	-0.391	-0.078	0.118	-0.015	-0.002	0.018
0.87	-0.391	-0.078	0.236	-0.016	-0.002	0.021
0.88	-0.313	-0.078	0.118	-0.016	-0.002	0.024
0.89	-0.313	-0.078	0.236	-0.016	-0.002	0.027
0.90	-0.313	-0.078	0.118	-0.016	-0.002	0.029

Figure 10.4.3.b.2 Digital data for event 4.3

⬭ = baseline which is subtracted for peaks and numerical integration

Yeardate: 81229 Time: 15:51:33.340 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
4.32	-0.313	-0.078	0.000	0.000	-0.000	0.000
4.33	-0.313	-0.078	0.000	0.000	-0.000	0.000
4.34	1.172	-0.078	0.000	0.015	-0.000	0.000
4.35	0.859	-0.078	0.000	0.027	-0.000	0.000
4.36	-0.625	-0.078	0.000	0.023	-0.000	0.000
4.37	-0.938	-0.313	-0.118	0.017	-0.002	-0.001
4.38	-0.859	-0.156	-0.118	0.012	-0.003	-0.002
4.39	-0.938	0.000	0.000	0.006	-0.002	-0.002
4.40	-0.859	-0.078	0.000	0.000	-0.002	-0.002
4.41	-0.703	-0.078	0.000	-0.004	-0.002	-0.002
4.42	-0.625	-0.078	0.000	-0.007	-0.002	-0.002
4.43	-0.625	-0.078	0.000	-0.010	-0.002	-0.002
4.44	-0.625	-0.078	0.000	-0.013	-0.002	-0.002
4.45	-0.547	-0.078	-0.118	-0.016	-0.002	-0.004
4.46	-0.469	-0.078	-1.296	-0.017	-0.002	-0.016
4.47	-0.469	-0.078	-1.060	-0.019	-0.002	-0.027
4.48	-0.391	-0.078	0.353	-0.019	-0.002	-0.024
4.49	-0.391	-0.078	0.353	-0.020	-0.002	-0.020
4.50	-0.313	-0.078	0.353	-0.020	-0.002	-0.016
4.51	-0.313	-0.078	0.471	-0.020	-0.002	-0.012
4.52	-0.313	-0.078	0.353	-0.020	-0.002	-0.008
4.53	-0.313	-0.078	0.236	-0.020	-0.002	-0.006
4.54	-0.234	-0.078	0.236	-0.019	-0.002	-0.004
4.55	-0.234	-0.078	0.118	-0.019	-0.002	-0.002
4.56	-0.234	-0.078	0.118	-0.018	-0.002	-0.001
4.57	-0.234	-0.078	0.118	-0.017	-0.002	0.000

Figure 10.4.3.b.3 Digital data for event 8.0

(-0.313) = baseline which is subtracted for peaks and numerical integration

Yeardate: 81229 Time: 15:51:33.340 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
7.94	-0.313	-0.078	0.000	0.000	-0.000	0.000
7.95	(-0.313)	-0.078	0.000	0.000	-0.000	0.000
7.96	-0.234	-0.078	0.000	0.001	-0.000	0.000
7.97	1.250	-0.078	0.000	0.016	-0.000	0.000
7.98	0.859	(-0.078)	0.000	0.028	-0.000	0.000
7.99	-0.703	-0.313	0.000	0.024	-0.002	0.000
8.00	-0.938	-0.156	0.000	0.018	-0.003	0.000
8.01	-0.938	0.000	0.000	0.012	-0.002	0.000
8.02	-0.938	-0.078	0.000	0.006	-0.002	0.000
8.03	-0.781	-0.078	0.000	0.001	-0.002	0.000
8.04	-0.625	-0.078	0.000	-0.002	-0.002	0.000
8.05	-0.625	-0.078	(0.000)	-0.005	-0.002	0.000
8.06	-0.625	-0.078	-0.118	-0.009	-0.002	-0.001
8.07	-0.625	-0.078	0.000	-0.012	-0.002	-0.001
8.08	-0.547	-0.078	0.000	-0.014	-0.002	-0.001
8.09	-0.469	-0.078	0.000	-0.016	-0.002	-0.001
8.10	-0.469	-0.078	0.000	-0.017	-0.002	-0.001
8.11	-0.391	-0.078	0.000	-0.018	-0.002	-0.001
8.12	-0.313	-0.078	0.000	-0.018	-0.002	-0.001
8.13	-0.313	-0.078	0.000	-0.018	-0.002	-0.001
8.14	-0.313	-0.078	-0.236	-0.018	-0.002	-0.004
8.15	-0.313	-0.078	-1.296	-0.018	-0.002	-0.016
8.16	-0.313	-0.078	-0.943	-0.018	-0.002	-0.026
8.17	-0.234	-0.078	0.353	-0.017	-0.002	-0.022
8.18	-0.234	-0.078	0.353	-0.016	-0.002	-0.019
8.19	-0.234	-0.078	0.471	-0.015	-0.002	-0.014
8.20	-0.234	-0.078	0.471	-0.015	-0.002	-0.009
8.21	-0.234	-0.078	0.353	-0.014	-0.002	-0.006
8.22	-0.234	-0.078	0.118	-0.013	-0.002	-0.005
8.23	-0.234	-0.078	0.236	-0.012	-0.002	-0.002
8.24	-0.234	-0.078	0.236	-0.012	-0.002	0.000
8.25	-0.234	-0.078	0.118	-0.011	-0.002	0.001
8.26	-0.156	-0.078	0.236	-0.009	-0.002	0.004
8.27	-0.313	-0.078	0.000	-0.009	-0.002	0.004
8.28	-0.313	-0.078	0.000	-0.009	-0.002	0.004
8.29	-0.313	-0.078	0.000	-0.009	-0.002	0.004
8.30	-0.313	-0.078	0.000	-0.009	-0.002	0.004
8.31	-0.313	-0.078	0.000	-0.009	-0.002	0.004
8.32	-0.313	-0.078	0.000	-0.009	-0.002	0.004
8.33	-0.313	-0.078	0.000	-0.009	-0.002	0.004
8.34	-0.234	-0.078	0.000	-0.008	-0.002	0.004
8.35	-0.234	-0.078	0.000	-0.008	-0.002	0.004

Figure 10.4.3.b.4 Digital data for event 11.8

(-0.313) = baseline which is subtracted for peaks and numerical integration

Yeardate: 81229 Time: 15:51:33.340 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
11.53	(-0.313)	-0.078	0.000	0.000	-0.000	0.000
11.54	-0.234	-0.078	0.000	0.001	-0.000	0.000
11.55	1.172	-0.078	0.000	0.016	-0.000	0.000
11.56	0.859	(-0.078)	0.000	0.027	-0.000	0.000
11.57	-0.625	-0.313	0.000	0.024	-0.002	0.000
11.58	-0.938	-0.156	0.000	0.018	-0.003	0.000
11.59	-0.938	0.000	0.000	0.012	-0.002	0.000
11.60	-0.938	-0.078	0.000	0.006	-0.002	0.000
11.61	-0.781	-0.078	0.000	0.001	-0.002	0.000
11.62	-0.625	-0.078	0.000	-0.002	-0.002	0.000
11.63	-0.625	-0.078	0.000	-0.005	-0.002	0.000
11.64	-0.625	-0.078	0.000	-0.009	-0.002	0.000
11.65	-0.625	-0.078	0.000	-0.012	-0.002	0.000
11.66	-0.469	-0.078	0.000	-0.013	-0.002	0.000
11.67	-0.469	-0.078	0.000	-0.015	-0.002	0.000
11.68	-0.391	-0.078	0.000	-0.016	-0.002	0.000
11.69	-0.391	-0.078	0.000	-0.016	-0.002	0.000
11.70	-0.313	-0.078	0.000	-0.016	-0.002	0.000
11.71	-0.313	-0.078	0.000	-0.016	-0.002	0.000
11.72	-0.313	-0.078	(0.000)	-0.016	-0.002	0.000
11.73	-0.313	-0.078	-0.118	-0.016	-0.002	-0.001
11.74	-0.313	-0.078	0.000	-0.016	-0.002	-0.001
11.75	-0.234	-0.078	0.000	-0.016	-0.002	-0.001
11.76	-0.234	-0.078	0.000	-0.015	-0.002	-0.001
11.77	-0.234	-0.078	0.000	-0.014	-0.002	-0.001
11.78	-0.234	-0.078	0.000	-0.013	-0.002	-0.001
11.79	-0.234	-0.078	0.000	-0.012	-0.002	-0.001
11.80	-0.234	-0.078	0.000	-0.012	-0.002	-0.001
11.81	-0.234	-0.078	-1.767	-0.011	-0.002	-0.019
11.82	-0.234	-0.078	-0.825	-0.010	-0.002	-0.027
11.83	-0.156	-0.078	0.236	-0.008	-0.002	-0.025
11.84	-0.313	-0.078	0.471	-0.008	-0.002	-0.020
11.85	-0.313	-0.078	0.353	-0.008	-0.002	-0.016
11.86	-0.313	-0.078	0.353	-0.008	-0.002	-0.013
11.87	-0.313	-0.078	0.353	-0.008	-0.002	-0.009
11.88	-0.313	-0.078	0.236	-0.008	-0.002	-0.007
11.89	-0.313	-0.078	0.118	-0.008	-0.002	-0.006
11.90	-0.313	-0.078	0.118	-0.008	-0.002	-0.005
11.91	-0.234	-0.078	0.118	-0.008	-0.002	-0.004
11.92	-0.234	-0.078	0.118	-0.007	-0.002	-0.002
11.93	-0.234	-0.078	0.000	-0.006	-0.002	-0.002
11.94	-0.234	-0.078	0.000	-0.005	-0.002	-0.002
11.95	-0.313	-0.078	0.000	-0.005	-0.002	-0.002

Figure 10.4.3.b.5 Digital data for event 15.5

(oval) = baseline which is subtracted for peaks and numerical integration

Yeardate: 81229 Time: 15:51:33.340 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
15.08	-0.313	-0.078	0.000	0.000	-0.000	0.000
15.09	-0.313	-0.078	0.000	0.000	-0.000	0.000
15.10	-0.234	-0.078	0.000	0.001	-0.000	0.000
15.11	1.250	-0.078	0.000	0.016	-0.000	0.000
15.12	0.625	-0.078	0.000	0.026	-0.000	0.000
15.13	-0.625	-0.078	0.000	0.023	-0.000	0.000
15.14	-0.938	-0.156	0.000	0.016	-0.001	0.000
15.15	-0.938	0.000	0.000	0.010	-0.000	0.000
15.16	-0.938	-0.078	0.000	0.004	-0.000	0.000
15.17	-0.781	-0.078	0.000	-0.001	-0.000	0.000
15.18	-0.703	-0.078	-0.118	-0.005	-0.000	-0.001
15.19	-0.625	-0.078	-0.118	-0.008	-0.000	-0.002
15.20	-0.625	-0.078	0.000	-0.011	-0.000	-0.002
15.21	-0.625	-0.078	0.000	-0.014	-0.000	-0.002
15.22	-0.547	-0.078	0.000	-0.016	-0.000	-0.002
15.23	-0.469	-0.078	0.000	-0.018	-0.000	-0.002
15.24	-0.469	-0.078	0.000	-0.019	-0.000	-0.002
15.25	-0.391	-0.078	0.000	-0.020	-0.000	-0.002
15.26	-0.313	-0.078	0.000	-0.020	-0.000	-0.002
15.27	-0.313	-0.078	0.000	-0.020	-0.000	-0.002
15.28	-0.313	-0.078	0.000	-0.020	-0.000	-0.002
15.29	-0.313	-0.078	0.000	-0.020	-0.000	-0.002
15.30	-0.313	-0.078	0.000	-0.020	-0.000	-0.002
15.31	-0.234	-0.078	0.000	-0.019	-0.000	-0.002
15.32	-0.234	-0.078	0.000	-0.019	-0.000	-0.002
15.33	-0.234	-0.078	0.000	-0.018	-0.000	-0.002
15.34	-0.234	-0.078	0.000	-0.017	-0.000	-0.002
15.35	-0.234	-0.078	0.000	-0.016	-0.000	-0.002
15.36	-0.234	-0.078	0.000	-0.015	-0.000	-0.002
15.37	-0.234	-0.078	0.000	-0.015	-0.000	-0.002
15.38	-0.234	-0.078	0.000	-0.014	-0.000	-0.002
15.39	-0.234	-0.078	-0.118	-0.013	-0.000	-0.004
15.40	-0.313	-0.078	-0.118	-0.013	-0.000	-0.005
15.41	-0.313	-0.078	0.000	-0.013	-0.000	-0.005
15.42	-0.313	-0.078	0.000	-0.013	-0.000	-0.005
15.43	-0.313	-0.078	0.000	-0.013	-0.000	-0.005
15.44	-0.313	-0.078	0.000	-0.013	-0.000	-0.005
15.45	-0.313	-0.078	0.000	-0.013	-0.000	-0.005
15.46	-0.313	-0.078	0.000	-0.013	-0.000	-0.005
15.47	-0.234	-0.078	0.000	-0.012	-0.000	-0.005
15.48	-0.234	-0.078	-1.885	-0.012	-0.000	-0.024
15.49	-0.234	-0.078	-0.825	-0.011	-0.000	-0.032
15.50	-0.234	-0.078	0.118	-0.010	-0.000	-0.031
15.51	-0.313	-0.078	0.353	-0.010	-0.000	-0.027
15.52	-0.313	-0.078	0.353	-0.010	-0.000	-0.024

Figure 10.4.3.b.5 Digital data for event 15.5 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
15.53	-0.391	-0.078	0.471	-0.011	-0.000	-0.019
15.54	-0.313	-0.078	0.353	-0.011	-0.000	-0.015
15.55	-0.313	-0.078	0.236	-0.011	-0.000	-0.013
15.56	-0.313	-0.078	0.118	-0.011	-0.000	-0.012
15.57	-0.313	-0.078	0.118	-0.011	-0.000	-0.011
15.58	-0.313	-0.078	0.236	-0.011	-0.000	-0.008
15.59	-0.313	-0.078	0.236	-0.011	-0.000	-0.006
15.60	-0.234	-0.078	0.000	-0.010	-0.000	-0.006
15.61	-0.156	-0.078	0.000	-0.008	-0.000	-0.006
15.62	-0.156	-0.078	0.000	-0.007	-0.000	-0.006
15.63	-0.234	-0.078	0.000	-0.006	-0.000	-0.006
15.64	-0.313	-0.078	0.000	-0.006	-0.000	-0.006

Figure 10.4.3.b.6 Digital data for event 18.7

(oval) = baseline which is subtracted for peaks and numerical integration

Yeardate: 81229 Time: 15:51:33.340 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
18.65	-0.313	-0.078	0.000	0.000	-0.000	0.000
18.66	-0.313	-0.078	0.000	0.000	-0.000	0.000
18.67	1.797	-0.078	0.000	0.021	-0.000	0.000
18.68	0.547	-0.313	0.000	0.030	-0.002	0.000
18.69	0.000	-0.078	0.000	0.033	-0.002	0.000
18.70	-1.016	0.000	0.000	0.026	-0.002	0.000
18.71	-0.859	-0.078	0.000	0.020	-0.002	0.000
18.72	-0.938	-0.078	0.000	0.014	-0.002	0.000
18.73	-0.938	-0.078	0.000	0.008	-0.002	0.000
18.74	-0.703	-0.078	0.000	0.004	-0.002	0.000
18.75	-0.625	-0.078	0.000	0.001	-0.002	0.000
18.76	-0.625	-0.078	0.000	-0.002	-0.002	0.000
18.77	-0.625	-0.078	0.000	-0.005	-0.002	0.000
18.78	-0.547	-0.078	0.000	-0.008	-0.002	0.000
18.79	-0.469	-0.078	0.000	-0.009	-0.002	0.000
18.80	-0.469	-0.078	0.000	-0.011	-0.002	0.000
18.81	-0.391	-0.078	0.000	-0.012	-0.002	0.000
18.82	-0.391	-0.078	0.000	-0.012	-0.002	0.000
18.83	-0.313	-0.078	0.000	-0.012	-0.002	0.000
18.84	-0.313	-0.078	-0.118	-0.012	-0.002	-0.001
18.85	-0.313	-0.078	0.000	-0.012	-0.002	-0.001
18.86	-0.313	-0.078	0.000	-0.012	-0.002	-0.001
18.87	-0.234	-0.078	0.000	-0.012	-0.002	-0.001
18.88	-0.234	-0.078	0.000	-0.011	-0.002	-0.001
18.89	-0.234	-0.078	0.000	-0.010	-0.002	-0.001
18.90	-0.234	-0.078	0.000	-0.009	-0.002	-0.001
18.91	-0.234	-0.078	0.000	-0.008	-0.002	-0.001
18.92	-0.234	-0.078	0.000	-0.008	-0.002	-0.001
18.93	-0.234	-0.078	0.000	-0.007	-0.002	-0.001
18.94	-0.234	-0.078	0.000	-0.006	-0.002	-0.001
18.95	-0.156	-0.078	0.000	-0.005	-0.002	-0.001
18.96	-0.313	-0.078	0.000	-0.005	-0.002	-0.001
18.97	-0.313	-0.078	0.000	-0.005	-0.002	-0.001
18.98	-0.313	-0.078	0.000	-0.005	-0.002	-0.001
18.99	-0.313	-0.078	0.000	-0.005	-0.002	-0.001
19.00	-0.313	-0.078	0.000	-0.005	-0.002	-0.001
19.01	-0.313	-0.078	0.000	-0.005	-0.002	-0.001
19.02	-0.313	-0.078	0.000	-0.004	-0.002	-0.001
19.03	-0.234	-0.078	0.000	-0.004	-0.002	-0.001
19.04	-0.234	-0.078	0.000	-0.003	-0.002	-0.001
19.05	-0.234	-0.078	-0.118	-0.002	-0.002	-0.002
19.06	-0.234	-0.078	-0.118	-0.001	-0.002	-0.004
19.07	-0.313	-0.078	0.000	-0.001	-0.002	-0.004
19.08	-0.313	-0.078	0.000	-0.001	-0.002	-0.004
19.09	-0.391	-0.078	0.000	-0.002	-0.002	-0.004

Figure 10.4.3.b.6 Digital data for event 18.7 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
19.10	-0.313	-0.078	0.000	-0.002	-0.002	-0.004
19.11	-0.313	-0.078	0.000	-0.002	-0.002	-0.004
19.12	-0.313	-0.078	0.000	-0.002	-0.002	-0.004
19.13	-0.313	-0.078	-0.471	-0.002	-0.002	-0.008
19.14	-0.313	-0.078	-0.825	-0.002	-0.002	-0.016
19.15	-0.313	-0.078	0.000	-0.002	-0.002	-0.016
19.16	-0.234	-0.078	0.353	-0.001	-0.002	-0.013
19.17	-0.156	-0.078	0.353	0.000	-0.002	-0.009
19.18	-0.234	-0.078	0.353	0.001	-0.002	-0.006
19.19	-0.234	-0.078	0.353	0.002	-0.002	-0.002
19.20	-0.313	-0.078	0.236	0.002	-0.002	0.000
19.21	-0.391	-0.078	0.118	0.001	-0.002	0.001

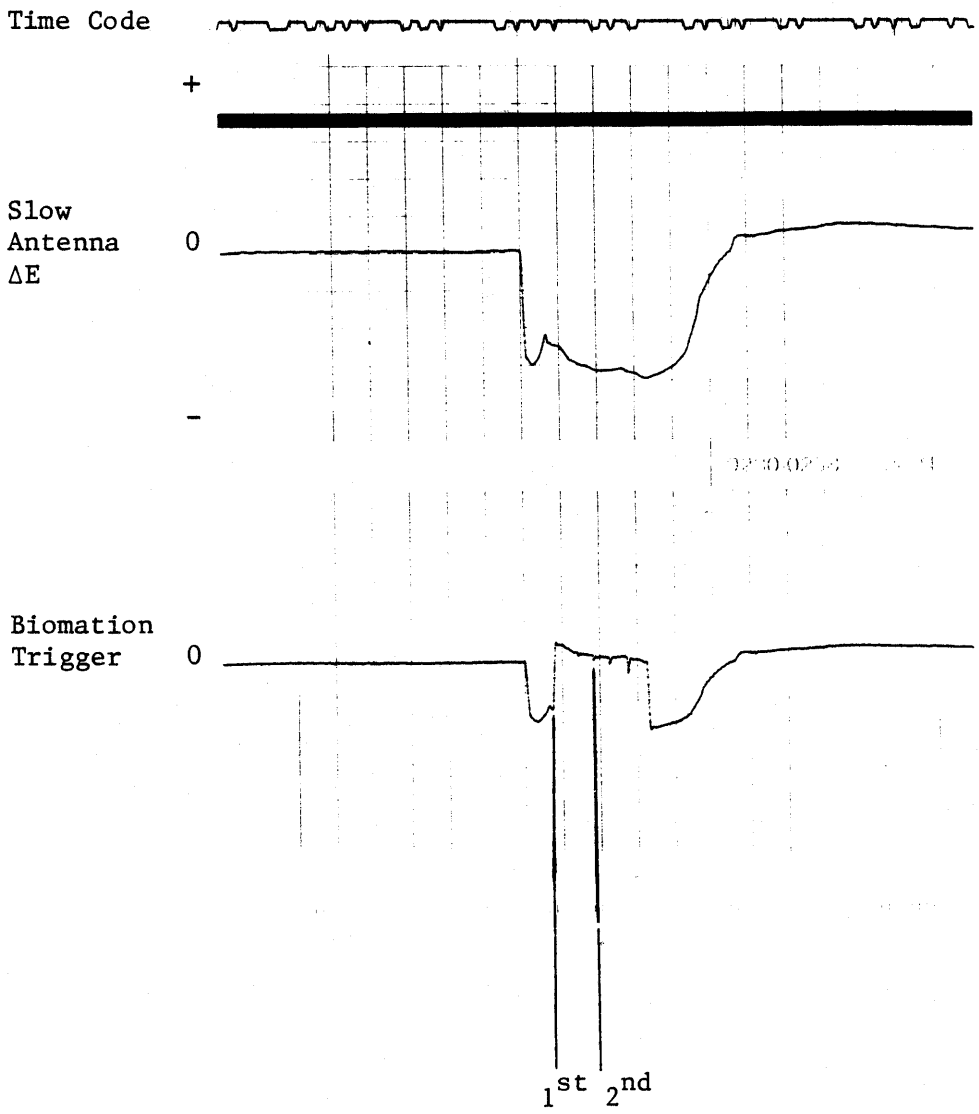


Figure 10.4.4.a Slow electric field change and biomation trigger marks superposed on the electric field change record from distant return stroke

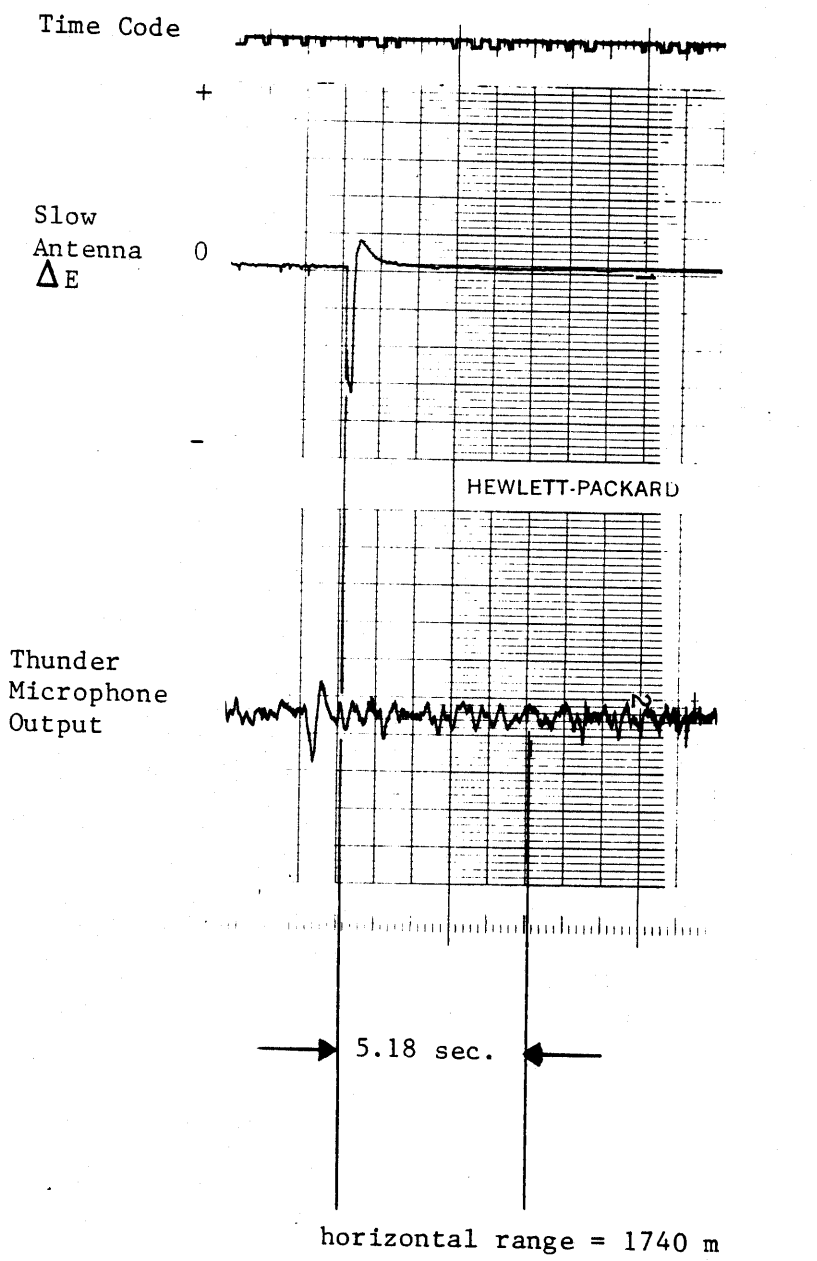
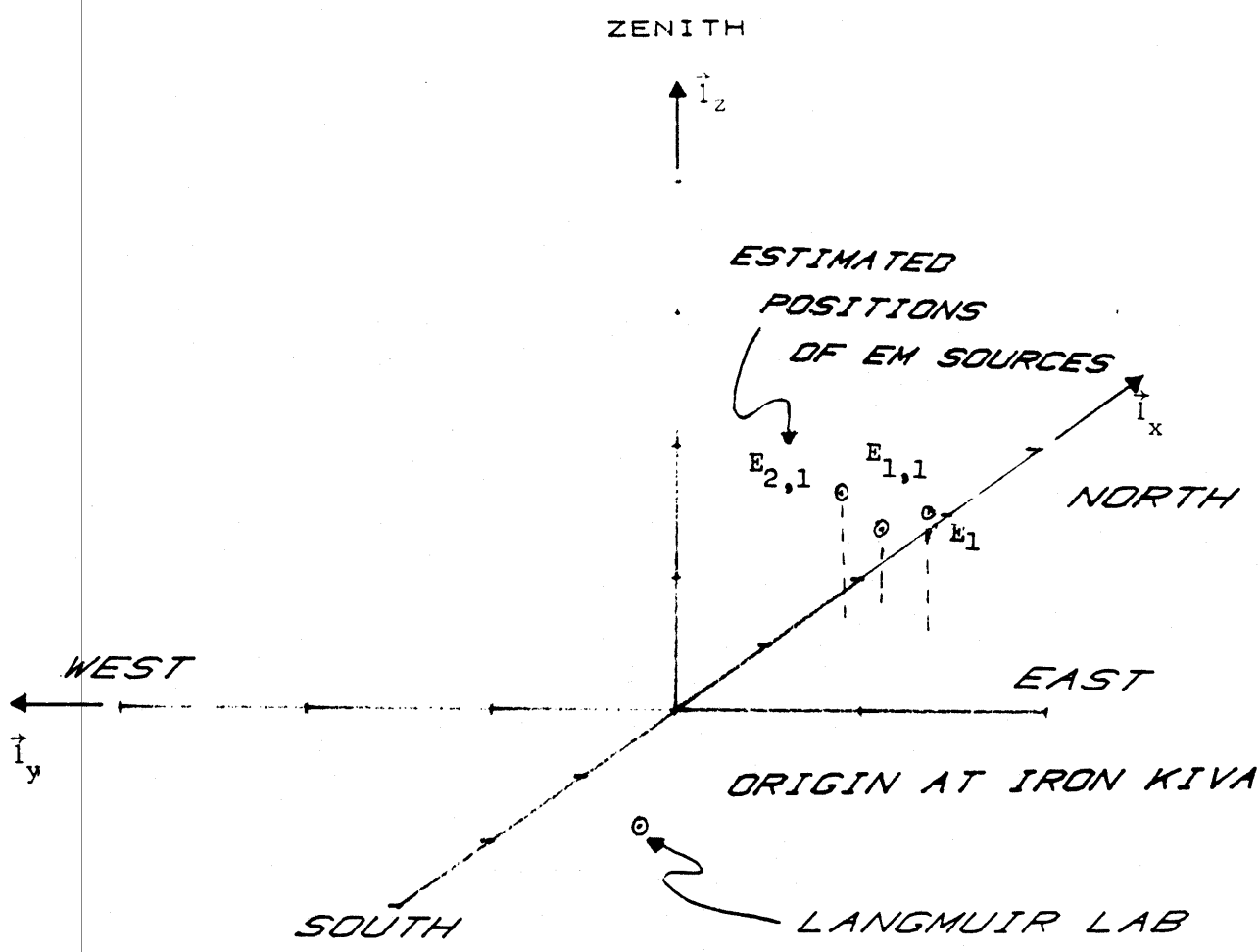


Figure 10.4.4.b Slow electric field change and thunder microphone record from distant return stroke

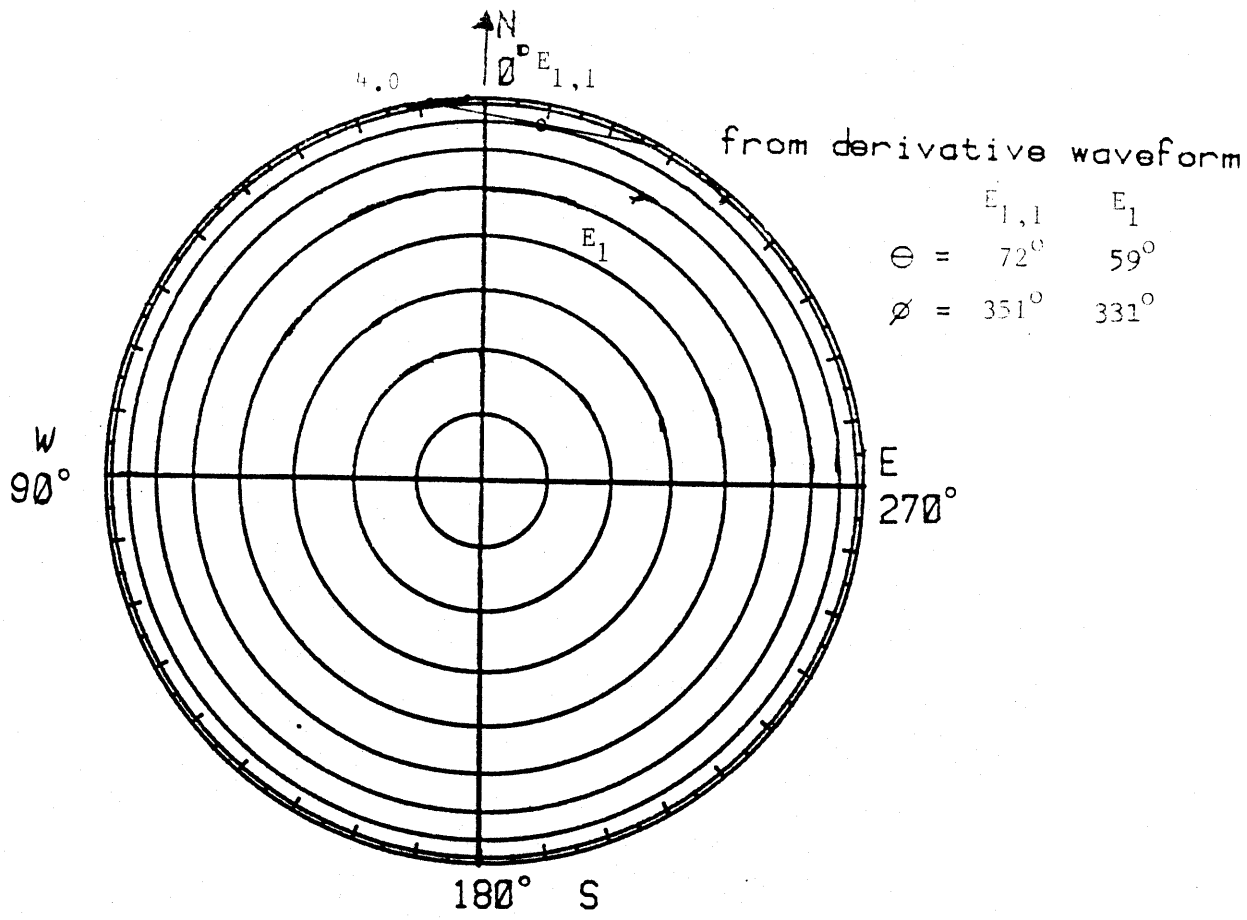


ticks on axes at 1 km intervals

Date : 81229 M.S.T. : 15:51:33

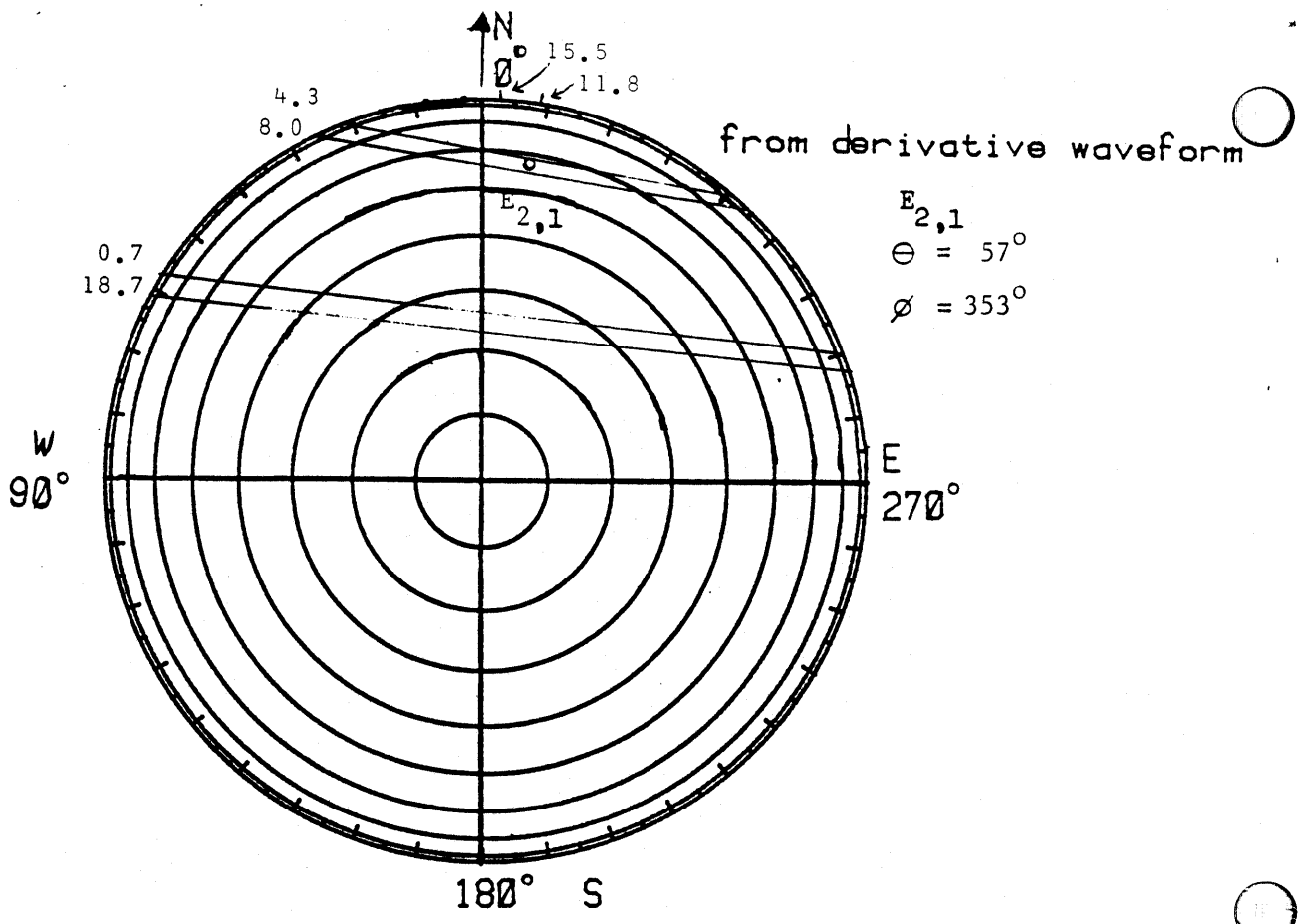
No acoustic locations are available for this stroke. There were too many lightning strokes within the same time frame to separate the thunder from each stroke.

Figure 10.4.5 Acoustic location of distant return stroke



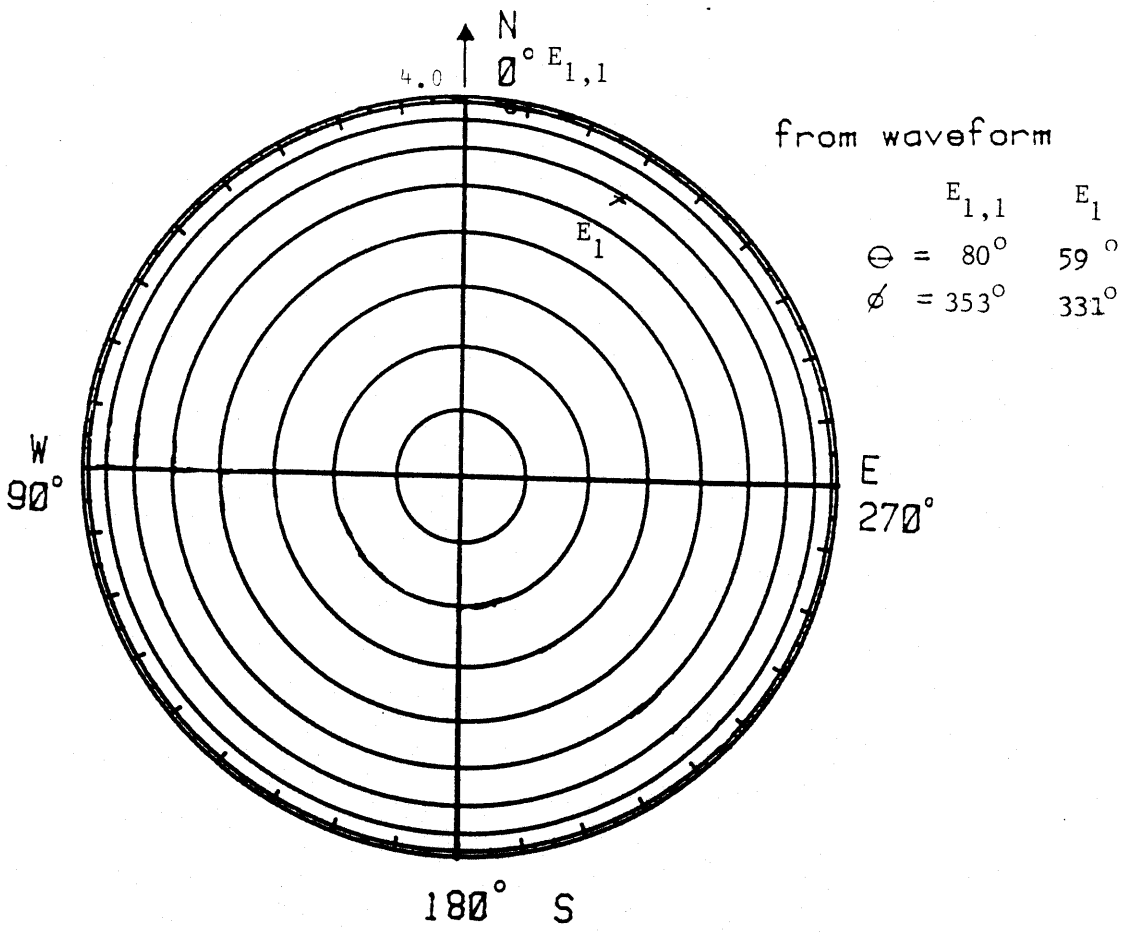
Date : 81229 M.S.T. : 15:51:33.298

Figure 10.4.6.A.1 $\sin(\theta),\phi$ contours for distant return stroke derivative waveform



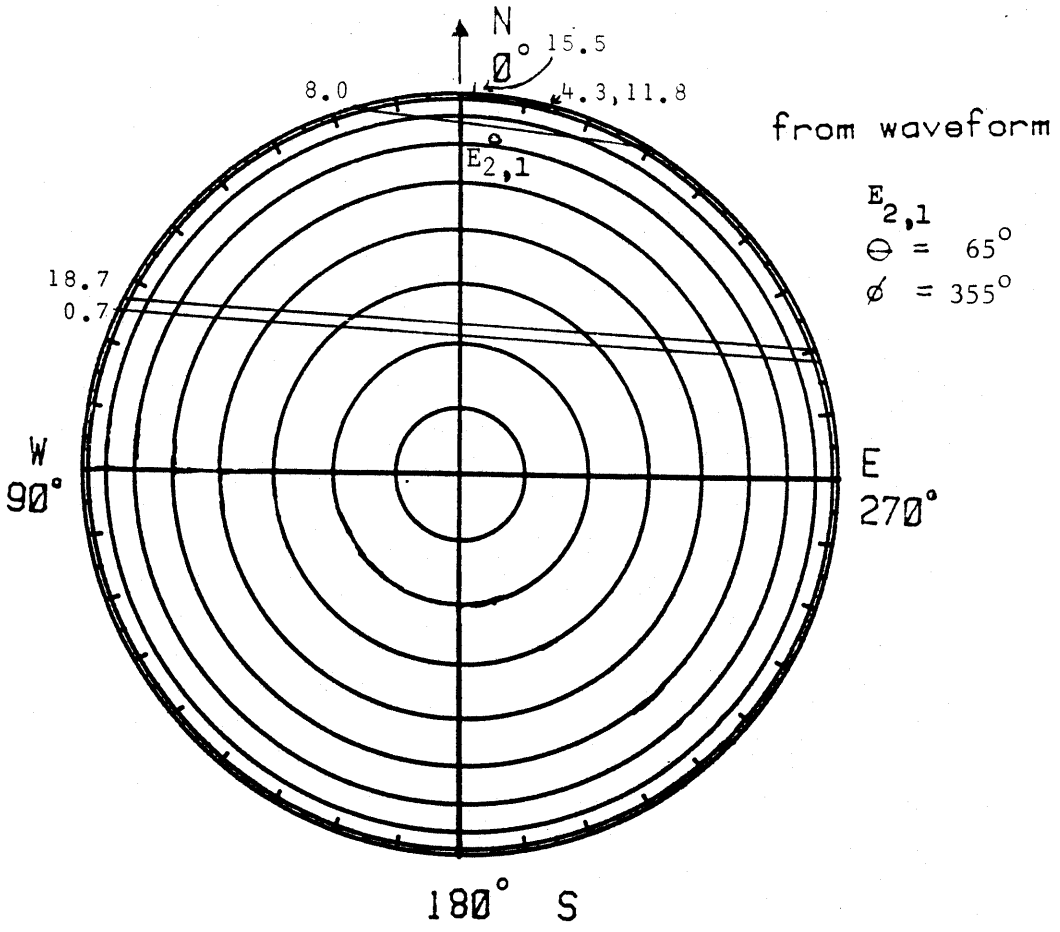
Date : 81229 M.S.T. : 15:51:33.340

Figure 10.4.6.A.2 $\sin(\theta),\phi$ contours for distant return stroke derivative waveform



Date : 81228 M.S.T. : 15:51:33.298

Figure 10.4.6.B.1 $\sin(\theta),\phi$ contours for distant return stroke waveform



Date : 81229 M.S.T. : 15:51:33.340

Figure 10.4.6.B.2 sin(θ),ϕ contours for distant return stroke waveform

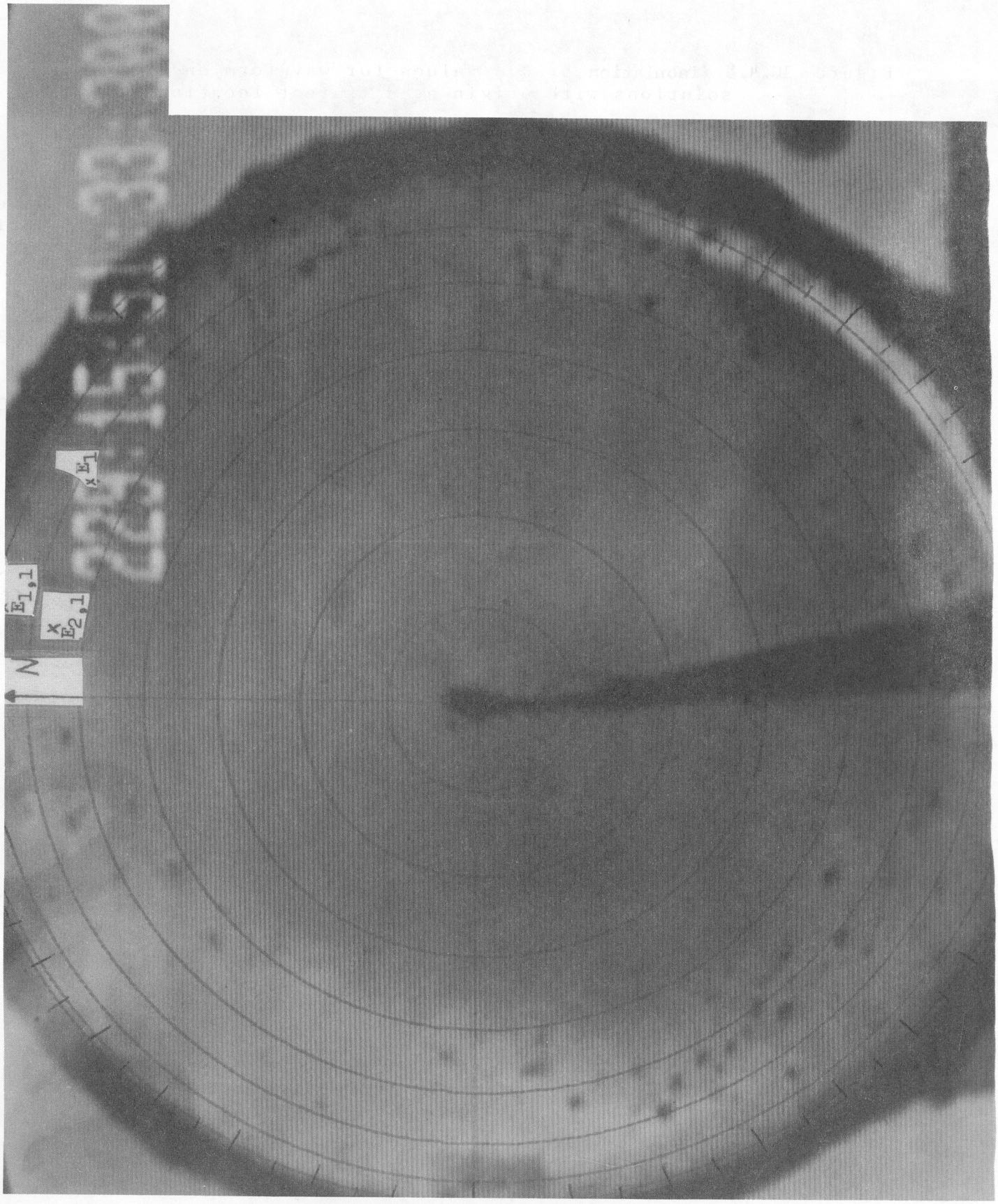


Figure 10.4.7 Whole-sky videotape photograph from Kiva(no visible lightning)

Figure 10.4.8 Tabulation of θ,φ values for waveform and TOA solutions with origin at different locations

Yeardate : 81229 M.S.T. : 1551.33

Event		TOA	waveform	r TOA (meters)	r waveform (meters)	TOA origin at Kiva	TOA origin at WSC	waveform origin at WSC
1	θ	58.1°	72°	1740	1830	58.8°	58.1°	72°
	φ	330.2°	351°			330.6°	330.3°	351°
2	θ		57°		2075			56°
	φ		353°					353°

Figure **10.4.9.A.1** Tabulation of peak values for each event from derivative waveform set for distant return stroke

Yeardate: 81229 M.S.T.:155133.298

$\phi = 351^{o}$; $\theta = 72^{o}$; r = 1830 m

Event Number	Time (μs)	$Z_o \Delta\partial D_z/\partial t$ (T/s)	$\Delta\partial B_E/\partial t$ (T/s)	$\Delta\partial B_N/\partial t$ (T/s)	$\Delta\partial B_h/\partial t$ (T/s)	$\Delta\partial B_e/\partial t$ (T/s)	$\lvert\Delta\partial\vec{B}/\partial t\rvert$ (T/s)
4.0	4.01	-1.89	1.95	-0.31	0.01	-0.99	0.99

CALCULATED VALUES FOR $\partial\vec{T}/\partial t$

Event Number	$\partial T_2/\partial t$ (10^{15} Am/s^2)	$\partial T_3/\partial t$ (10^{15} Am/s^2)	$\lvert\partial\vec{T}/\partial t\rvert$ (10^{15} Am/s^2)	α (deg)
4.0	-32	5428	5428	0

Figure **10.4.9.A.2** Tabulation of peak values for each event from derivative waveform set for distant return stroke

Yeardate: 81229 M.S.T.:155133.340

$\phi = 353^{o}$; $\theta = 57^{o}$; r = 2075 m

Event Number	Time (μs)	$Z_o \Delta\partial D_z/\partial t$ (T/s)	$\Delta\partial B_E/\partial t$ (T/s)	$\Delta\partial B_N/\partial t$ (T/s)	$\Delta\partial B_h/\partial t$ (T/s)	$\Delta\partial B_e/\partial t$ (T/s)	$\lvert\Delta\partial\vec{B}/\partial t\rvert$ (T/s)
0.7	0.72	-0.94	2.11	-0.24	-0.02	-1.06	1.06
4.3	4.34	-1.30	1.49	-0.24	0.05	-0.75	0.75
8.0	7.97	-1.30	1.56	-0.24	0.04	-0.79	0.79
11.8	11.81	-1.77	1.49	-0.24	0.05	-0.75	0.75
15.5	15.48	-1.89	1.56	-0.08	-0.10	-0.78	0.79
18.7	18.67	-0.83	2.11	-0.24	-0.02	-1.06	1.06

CALCULATED VALUES FOR $\partial\vec{T}/\partial t$

Event Number	$\partial T_2/\partial t$ (10^{15} Am/s^2)	$\partial T_3/\partial t$ (10^{15} Am/s^2)	$\lvert\partial\vec{T}/\partial t\rvert$ (10^{15} Am/s^2)	α (deg)
0.7	137	6607	6608	359
4.3	-299	4676	4686	4
8.0	-244	4917	4923	3
11.8	-299	4676	4686	4
15.5	646	4857	4900	352
18.7	137	6607	6608	359

Figure **10.4.9.B.1** Tabulation of peak values for each event from waveform set for distant return stroke

Yeardate: 81229 M.S.T.:155133.298

$\phi = 353^{o}$; $\theta = 80^{o}$, r =1767 m

Event Number	Time (μs)	$Z_o \Delta D_s$ (μT)	ΔB_E (μT)	ΔB_N (μT)	ΔB_h (μT)	ΔB_e (μT)	$\lvert\Delta\vec{B}\rvert$ (μT)
4.0	4.01	-0.13	0.13	-0.02	-0.00	-0.06	0.06

CALCULATED VALUES FOR $\vec{I}_t . \hat{T}$

Event Number	T_2 (10^9 Am/s)	T_3 (10^9 Am/s)	$\lvert\vec{T}\rvert$ (10^9 Am/s)	α (deg)
4.0	2	344	344	360

Figure **10.4.9.B.2** Tabulation of peak values for each event from waveform set for distant return stroke

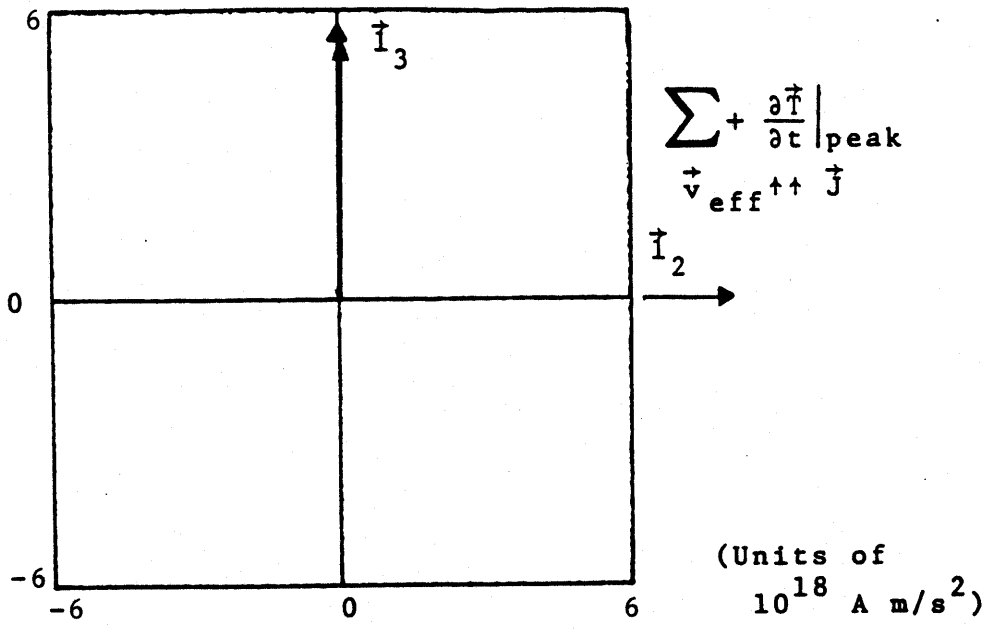
Yeardate: 81229 M.S.T.:155133.340

$\phi = 355^{o}$; $\theta = 65^{o}$; r =1920 m

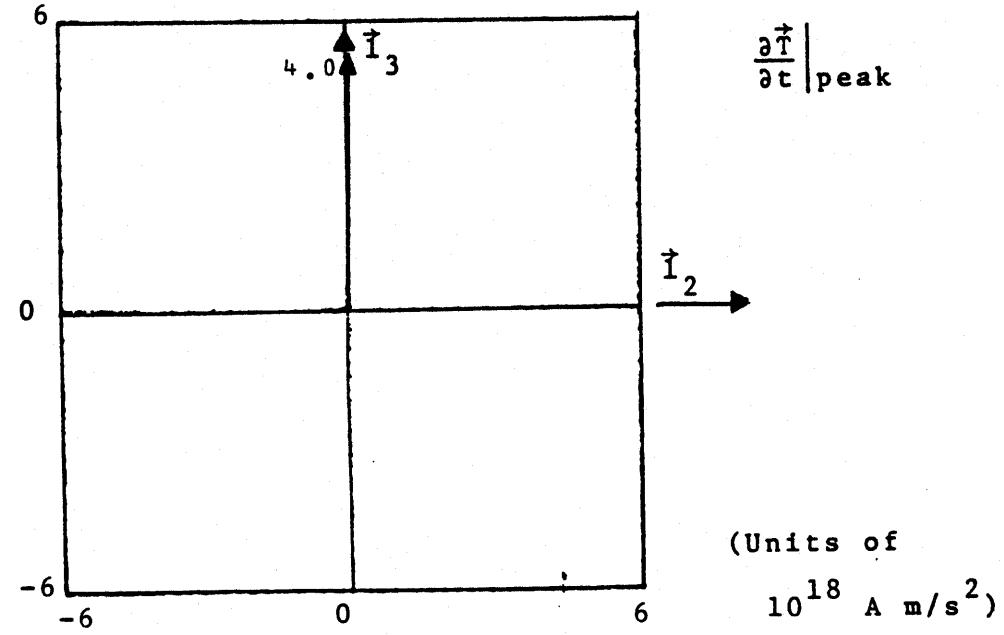
Event Number	Time (μs)	$Z_o \Delta D_s$ (μT)	ΔB_E (μT)	ΔB_N (μT)	ΔB_h (μT)	ΔB_e (μT)	$\lvert\Delta\vec{B}\rvert$ (μT)
0.7	0.73	-0.01	0.03	-0.00	-0.00	-0.02	0.02
4.3	4.34	-0.03	0.03	-0.00	0.00	-0.01	0.01
8.0	7.98	-0.03	0.03	-0.00	0.00	-0.01	0.01
11.8	11.82	-0.03	0.03	-0.00	0.00	-0.01	0.01
15.5	15.49	-0.03	0.03	-0.00	-0.00	-0.01	0.01
18.7	18.69	-0.01	0.03	-0.00	-0.00	-0.02	0.02

CALCULATED VALUES FOR $\vec{I}_t . \hat{T}$

Event Number	T_2 (10^9 Am/s)	T_3 (10^9 Am/s)	$\lvert\vec{T}\rvert$ (10^9 Am/s)	α (deg)
0.7	4	87	87	357
4.3	-4	78	78	3
8.0	-4	81	81	3
11.8	-4	78	78	3
15.5	9	75	75	353
18.7	6	95	95	356



Effective reconstruction of positive streamer

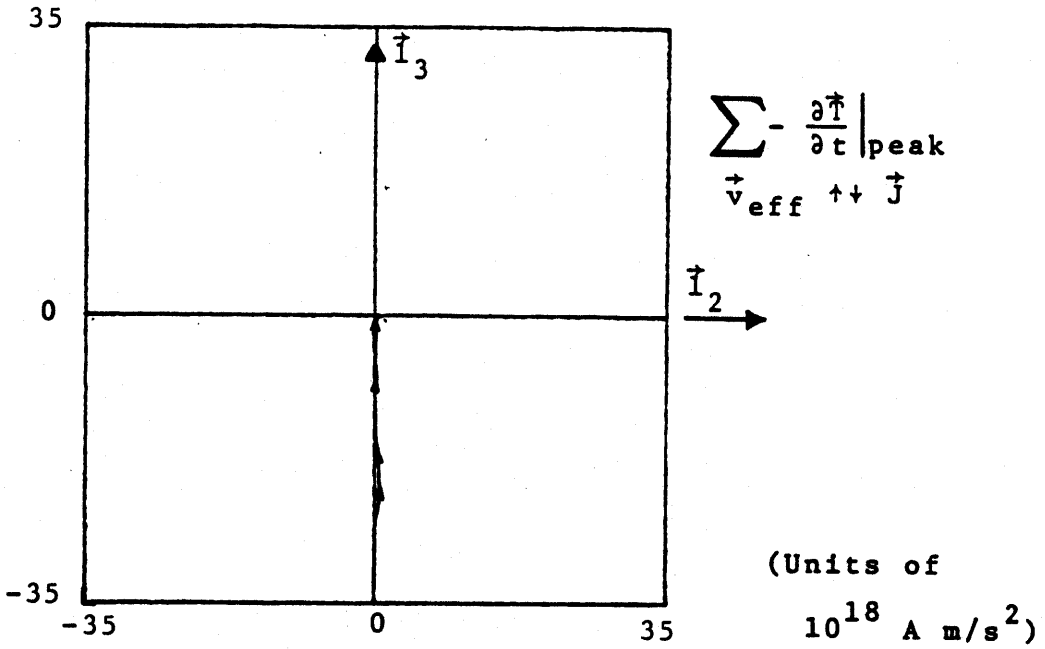


Peaks of $\partial \vec{I}/\partial t$

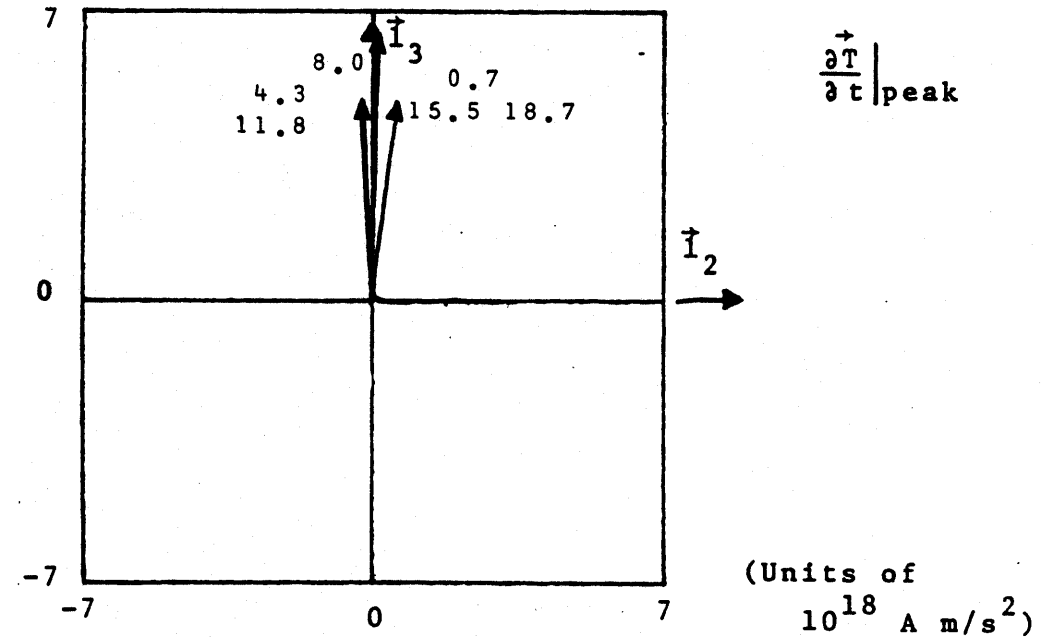
$\phi = 351^o$ $\theta = 72^o$ r = 1830 m

Date: 81229 M.S.T.: 15:51:33.298

Figure 10.4.10.A.1 $\partial \vec{I}/\partial t$ for distant return stroke



Effective reconstruction of negative streamer

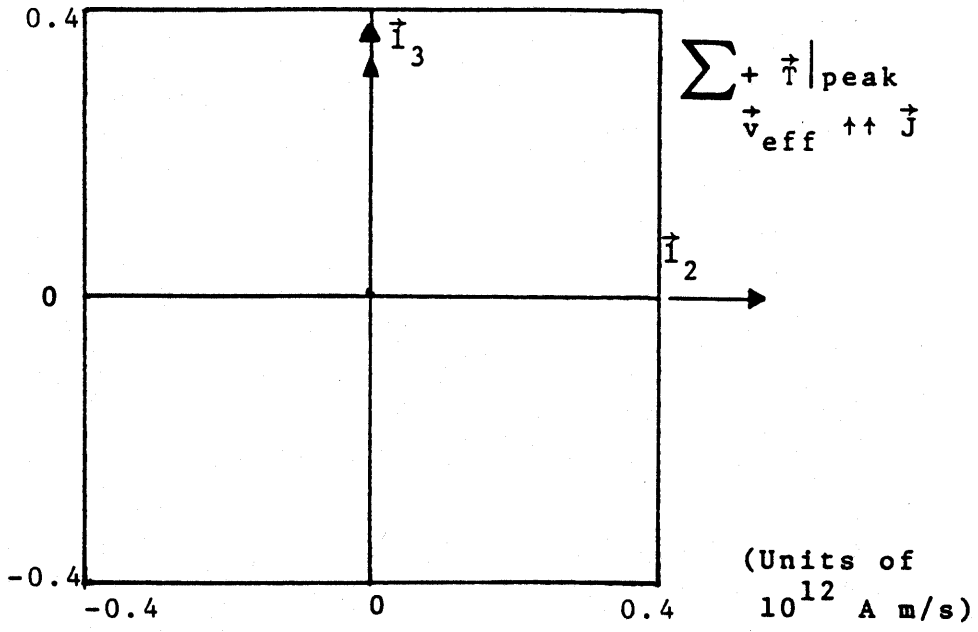


Peaks of $\partial\vec{T}/\partial t$

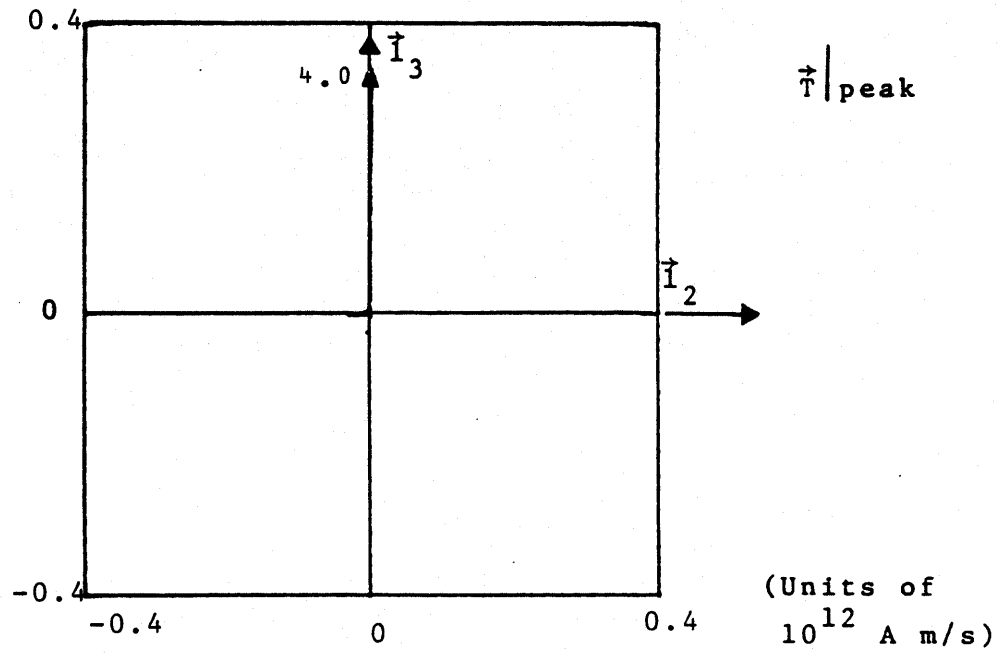
ϕ = 353° θ = 57° r = 2075 m

Date: 81229 M.S.T.: 15:51:33.340

Figure 10.4.10.A.2 $\partial\vec{T}/\partial t$ for distant return stroke



Effective reconstruction of positive streamer

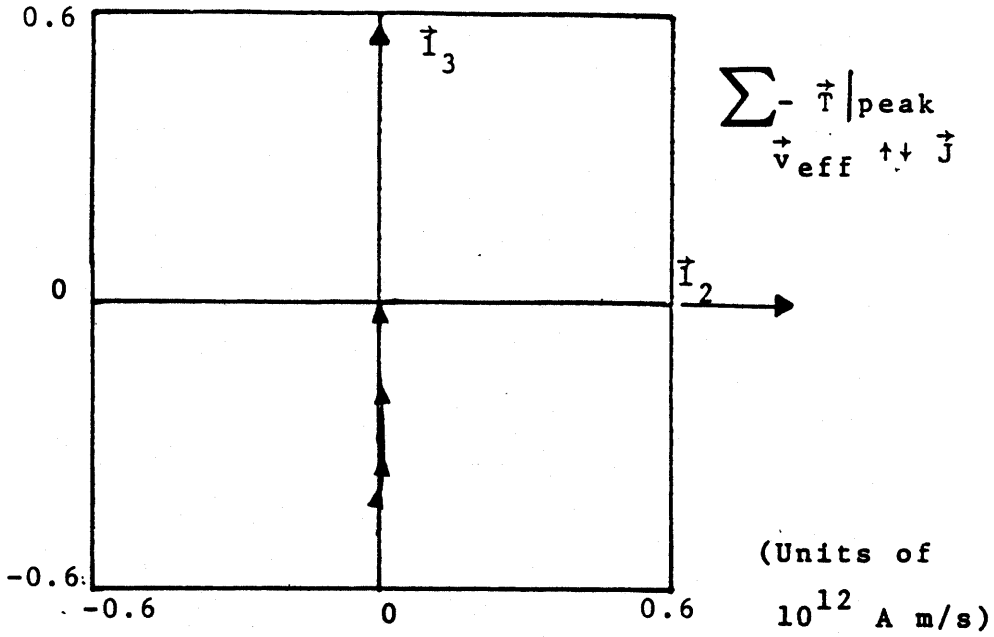


Peaks of $\vec{T}$

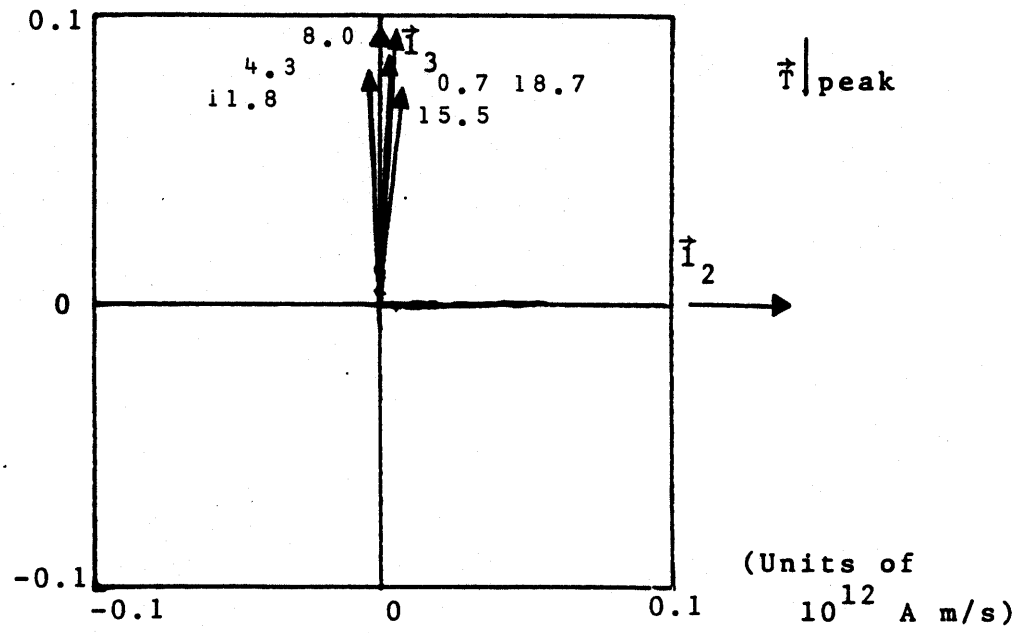
$\phi = 353^{\circ}$ $\theta = 80^{\circ}$ r = 1767 m

Date: 81229 M.S.T.: 15:51:33.298

Figure 10.4.10.B.1 $\vec{T}$ for distant return stroke



Effective reconstruction of negative streamer



Peaks of $\vec{T}$

$\phi = 355^{o}$ $\theta = 65^{o}$ r = 1920 m

Date: 81229 M.S.T.: 15:51:33.340

Figure 10.4.10.B.2 $\vec{T}$ for distant return stroke

10.5 DISTANT LEADER

Our next example has been classified as a distant leader. There were 4 waveform events and 2 TOA events associated with this flash.

The derivative waveform events look similar to the data in section 10.4. The field waveforms are considerably smaller in amplitude so that this appears to be data from a leader stroke. The large ramping seen in the waveform data is due to the frequent 1 or 2 bit level changes in the derivative data. No Biomation trigger marks were recorded to show from which part of the flash each event occurred.

This example has some unusual characteristics. Looking at the determination of $E_{1,1}$ only one contour has been used in Fig. 10.5.6.A.1 and E_1 from the TOA is only a few degrees from this contour. This indicates the TOA direction as quite accurate, more so than the waveform method, at least in this case. The acoustic data are in general also in greater agreement with the TOA data, as is the video photograph.

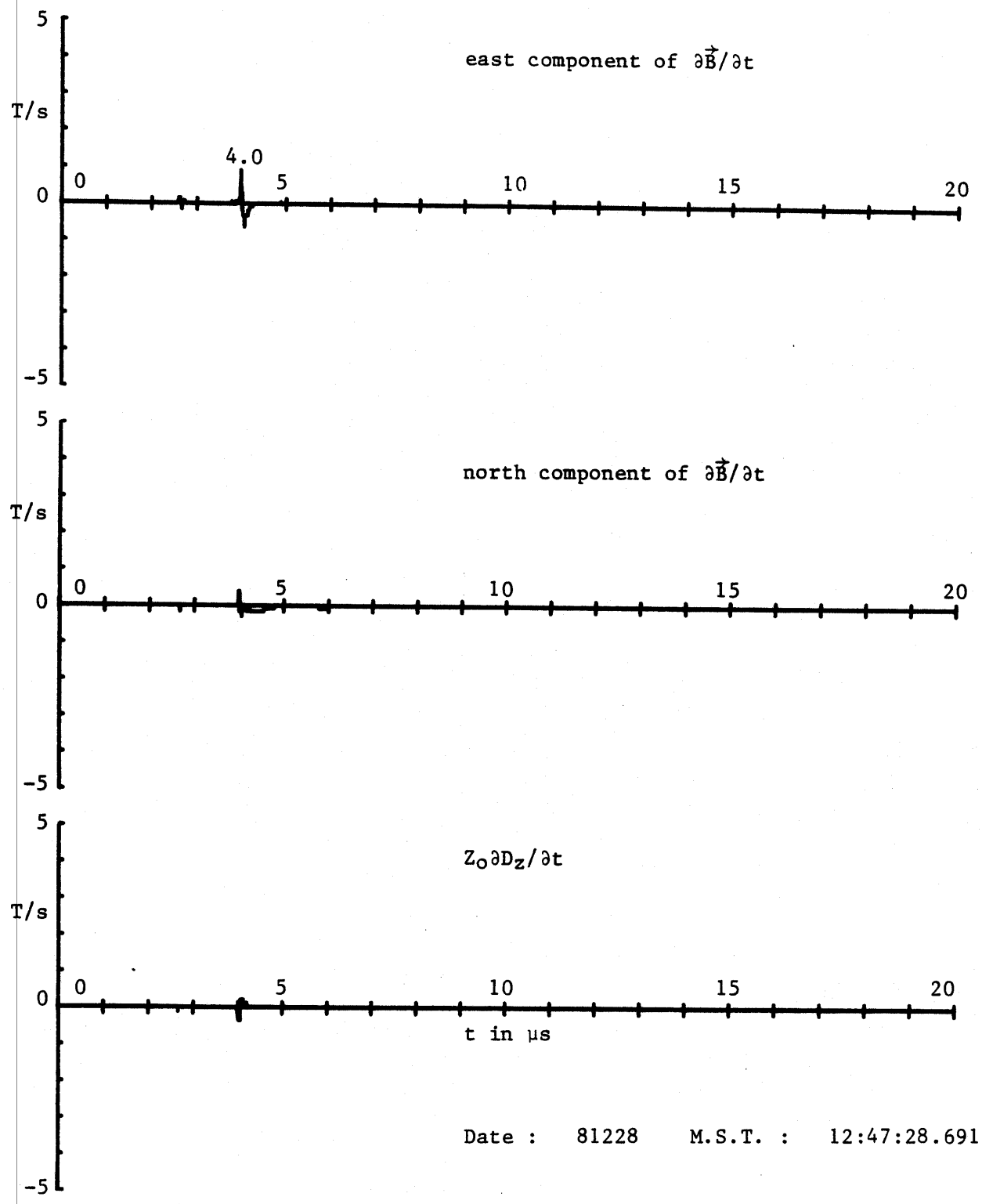


Figure 10.5.1.A.1 Derivative fields from distant leader

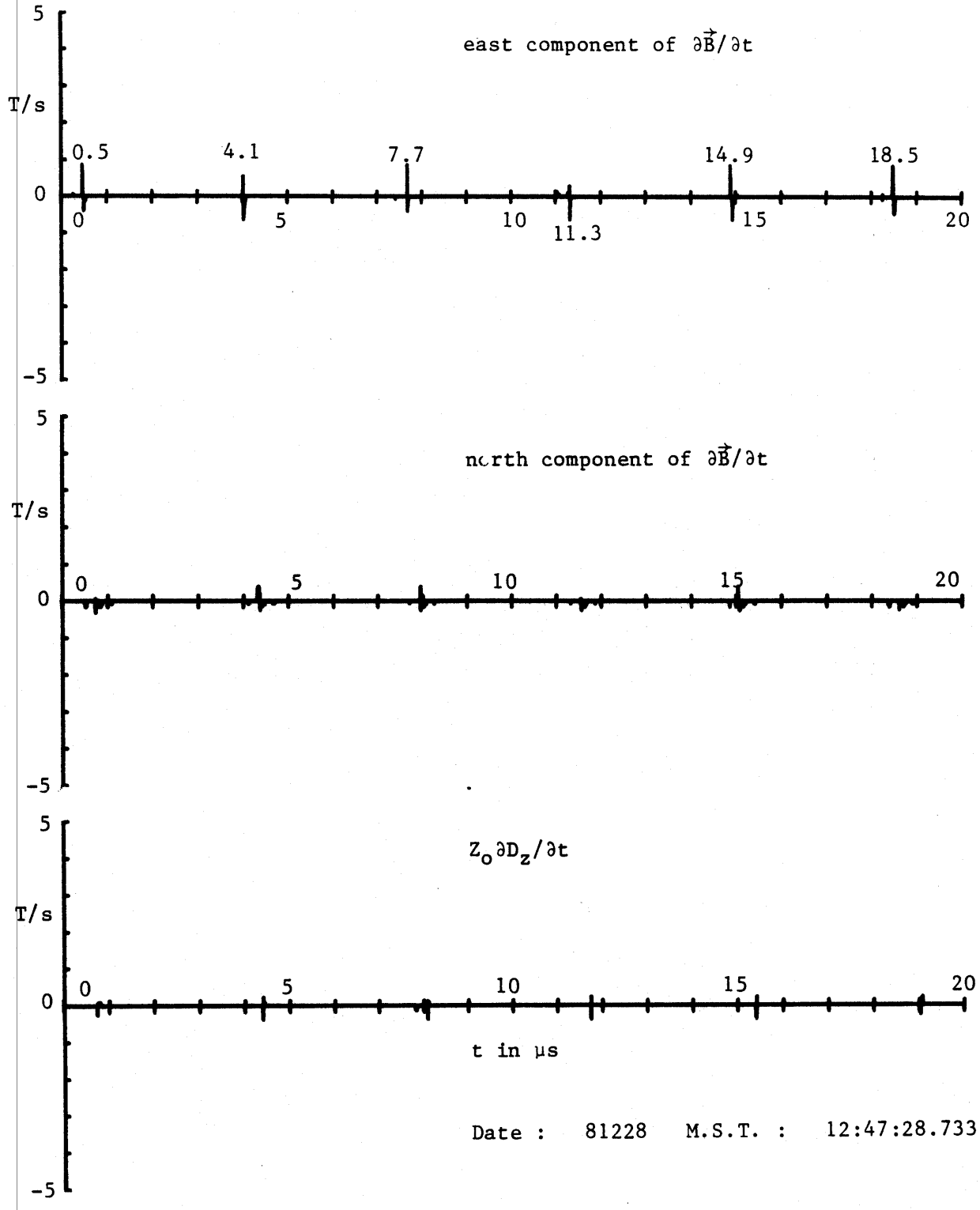


Figure 10.5.1.A.2 Derivative fields from distant leader

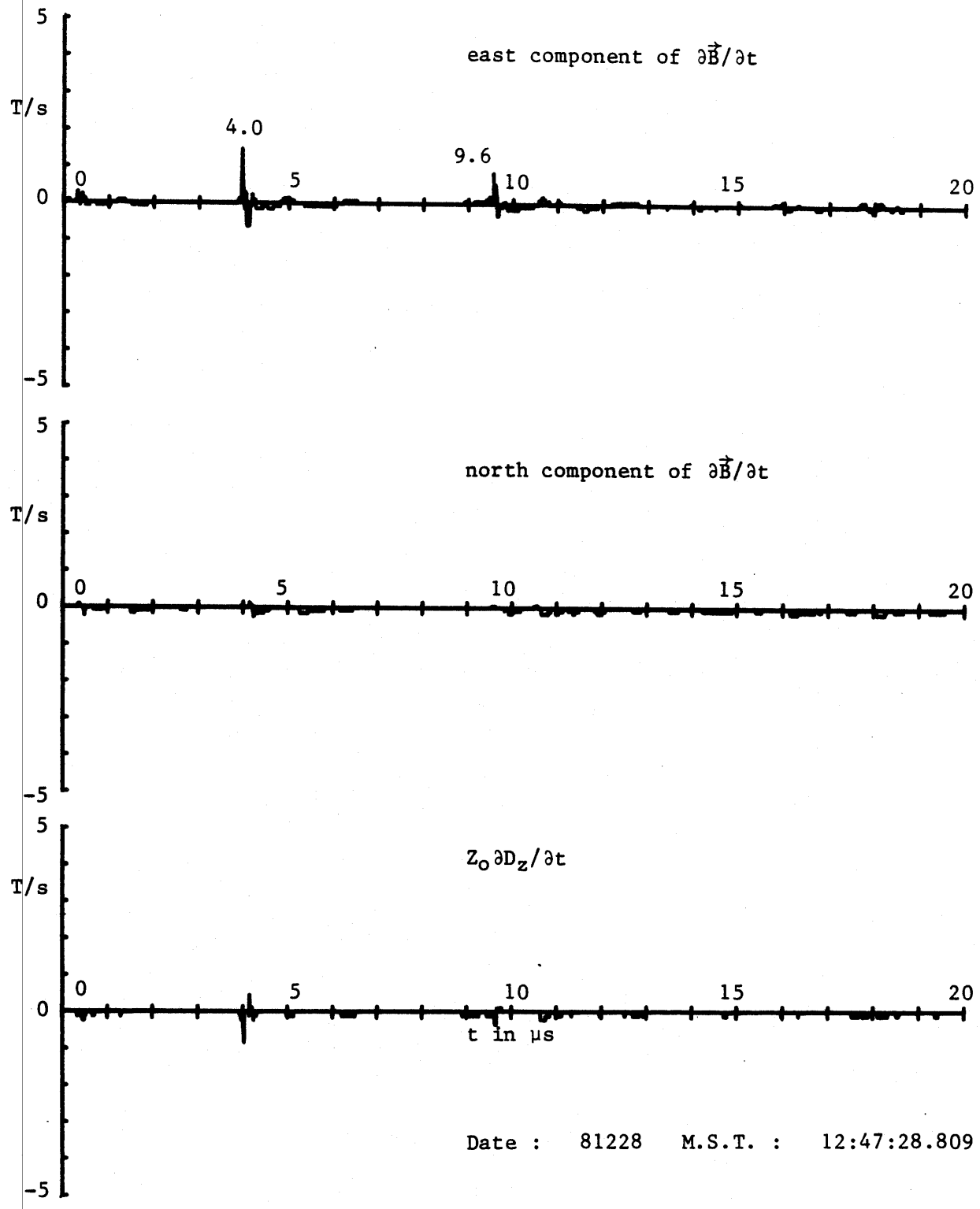


Figure 10.5.1.A.3 Derivative fields from distant leader

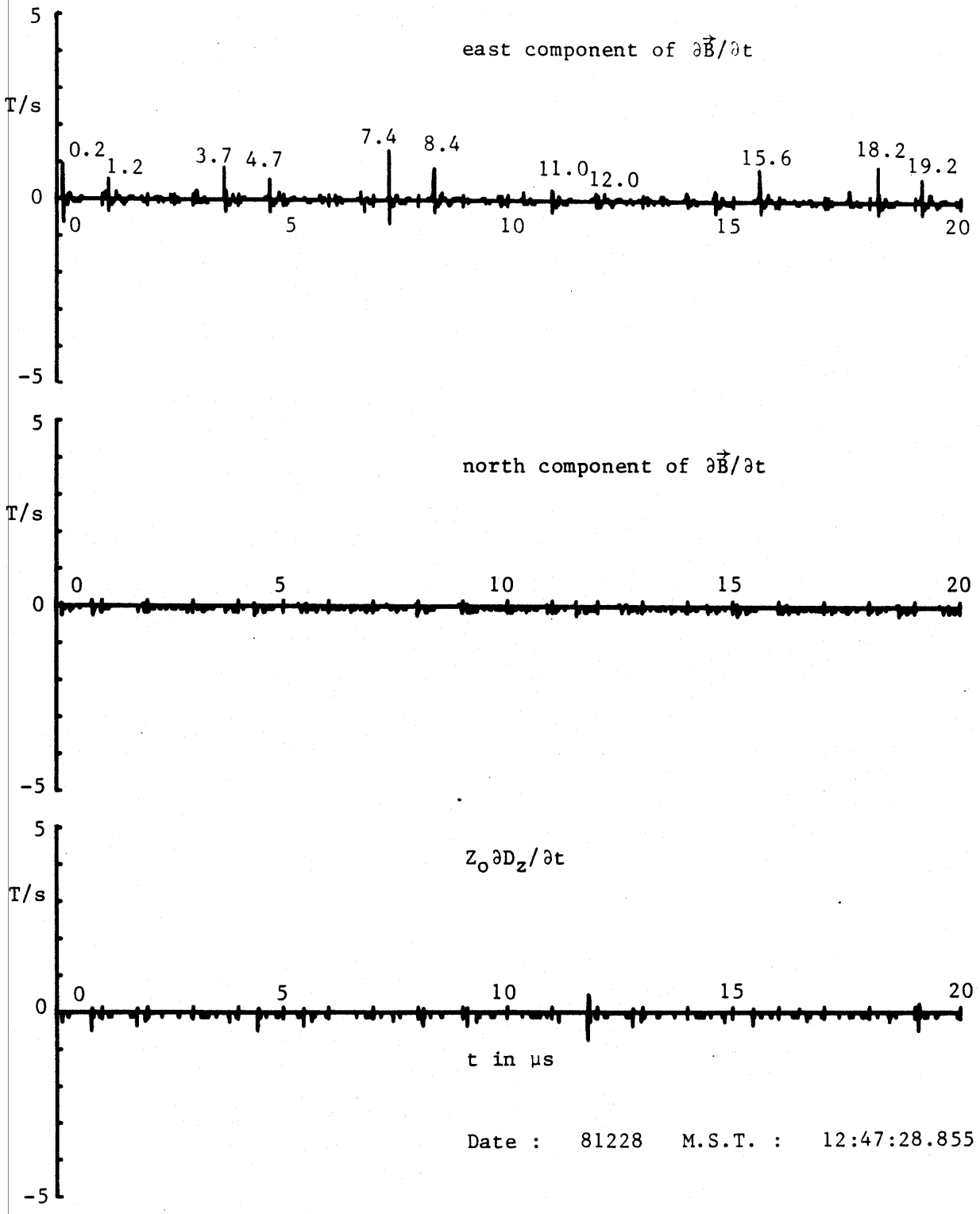


Figure 10.5.1.A.4 Derivative fields from distant leader

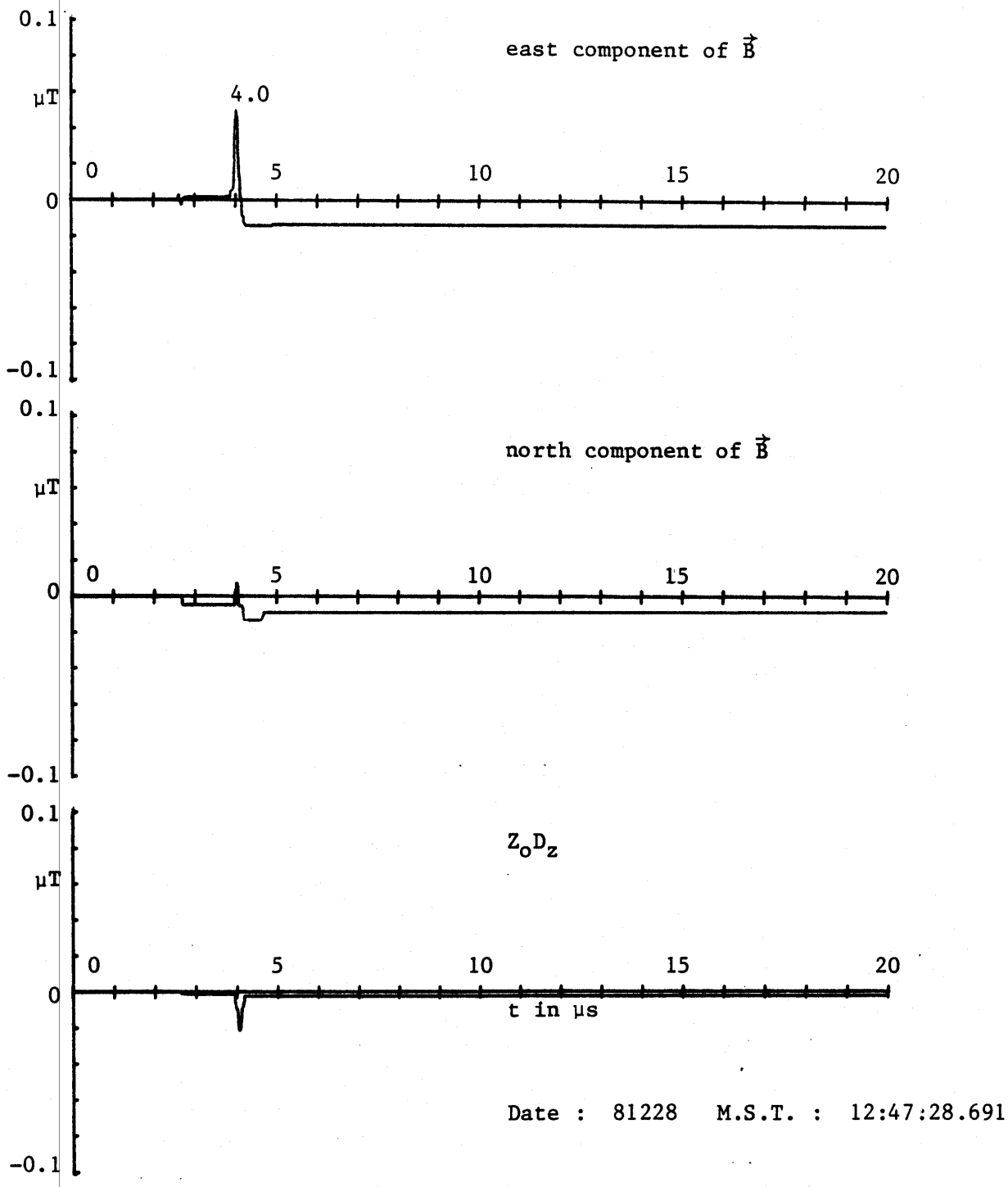


Figure 10.5.1.B.1 Fields from distant leader

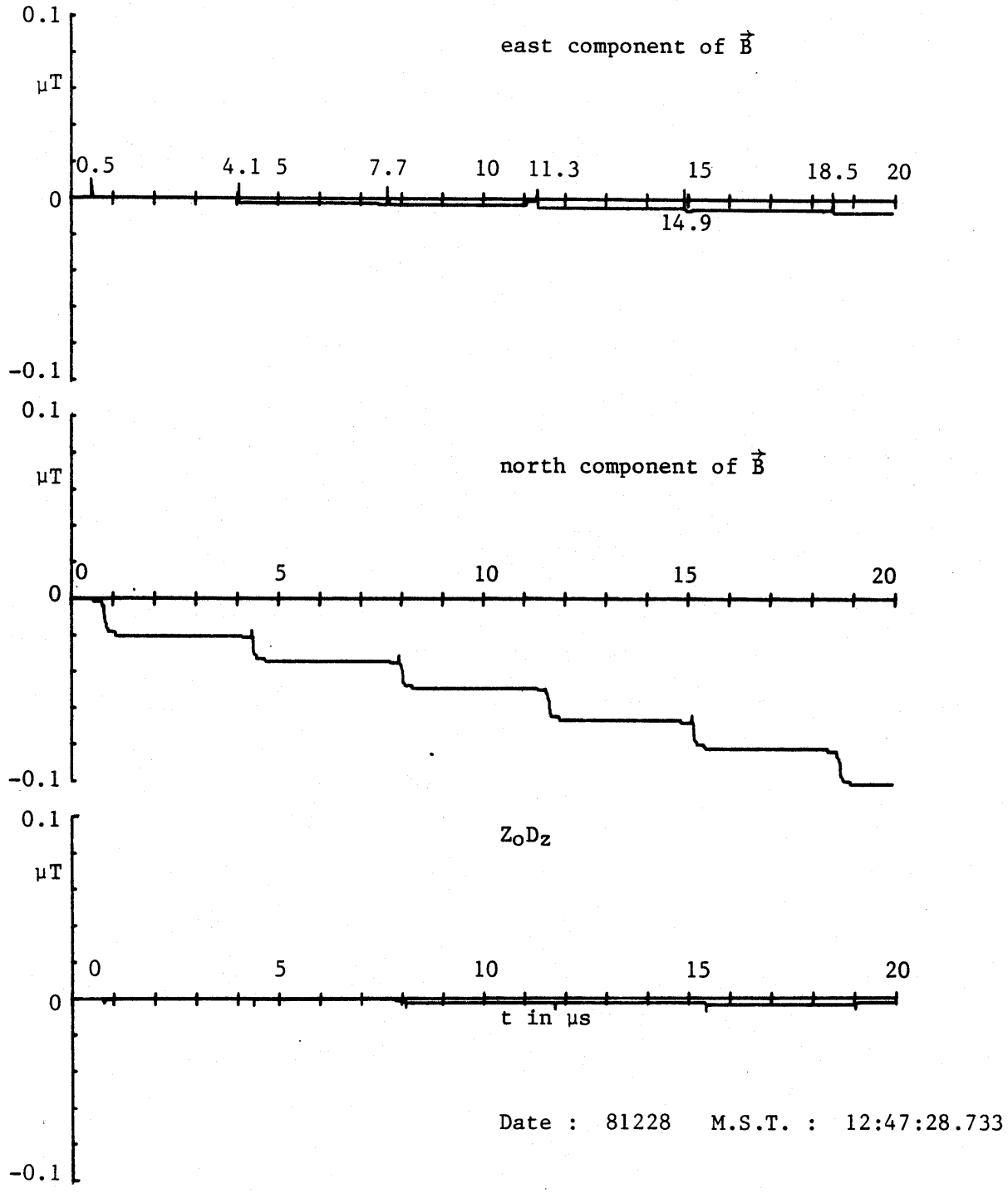


Figure 10.5.1.B.2 Fields from distant leader

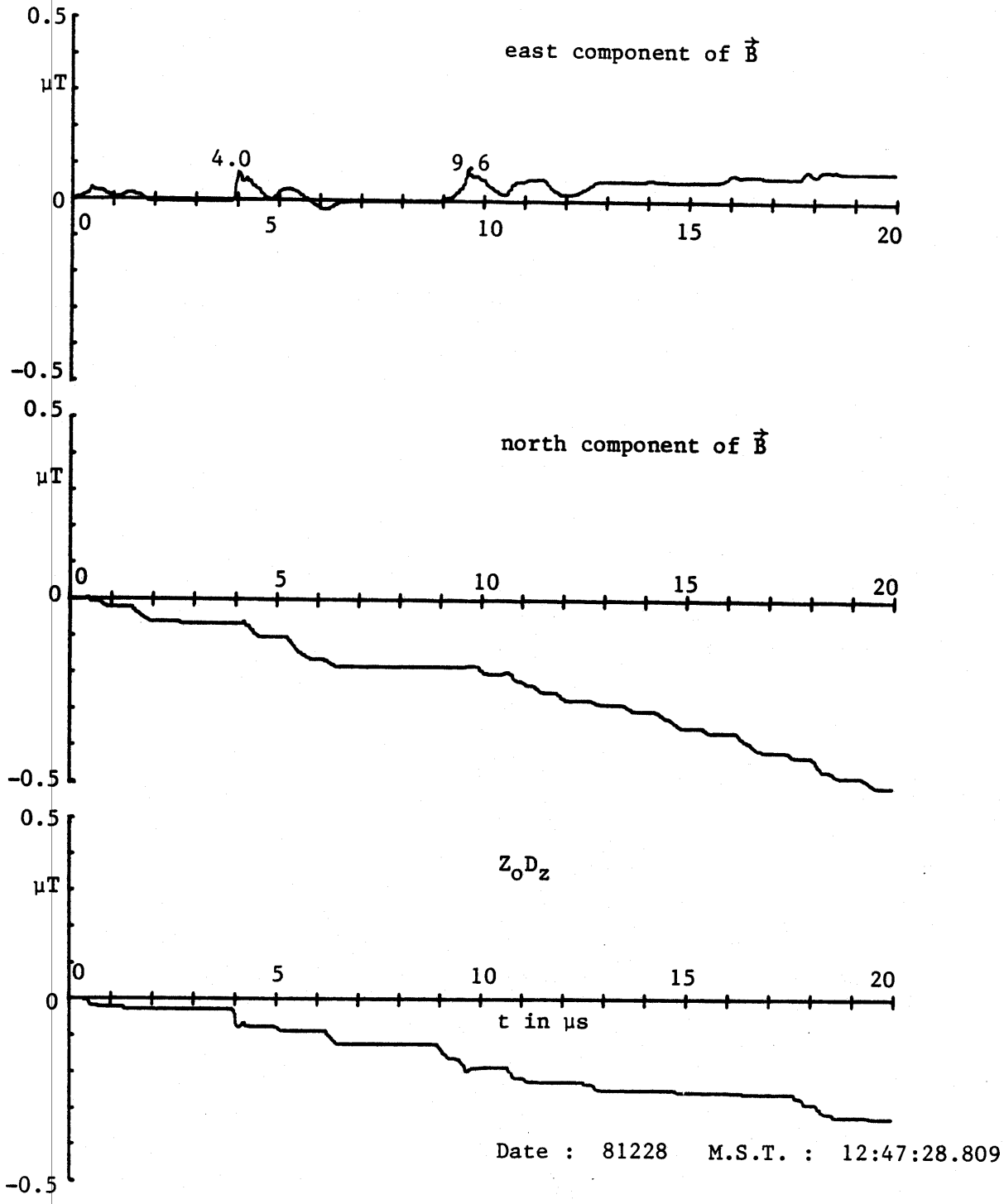


Figure 10.5.1.B.3 Fields from distant leader

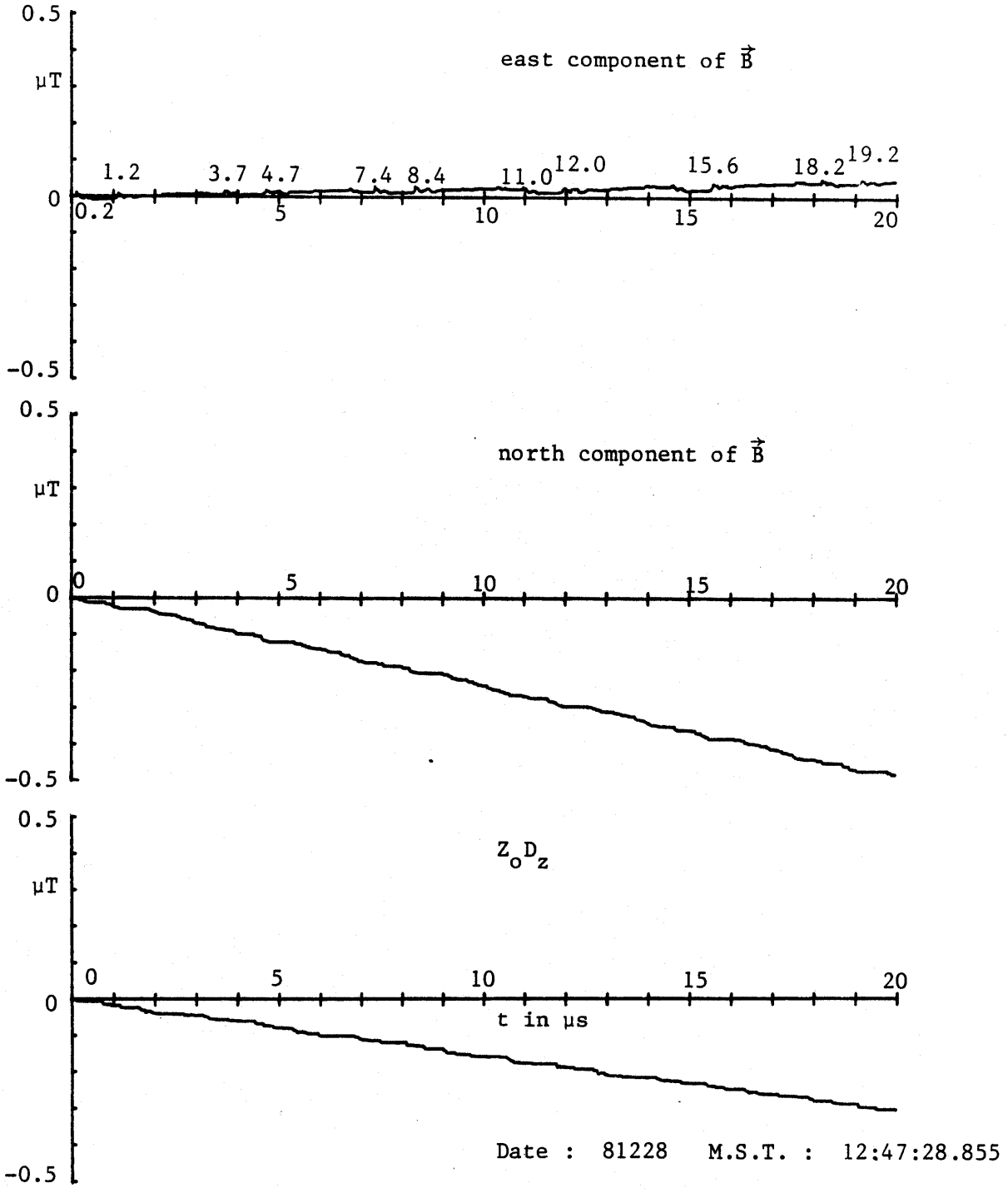


Figure 10.5.1.B.4 Fields from distant leader

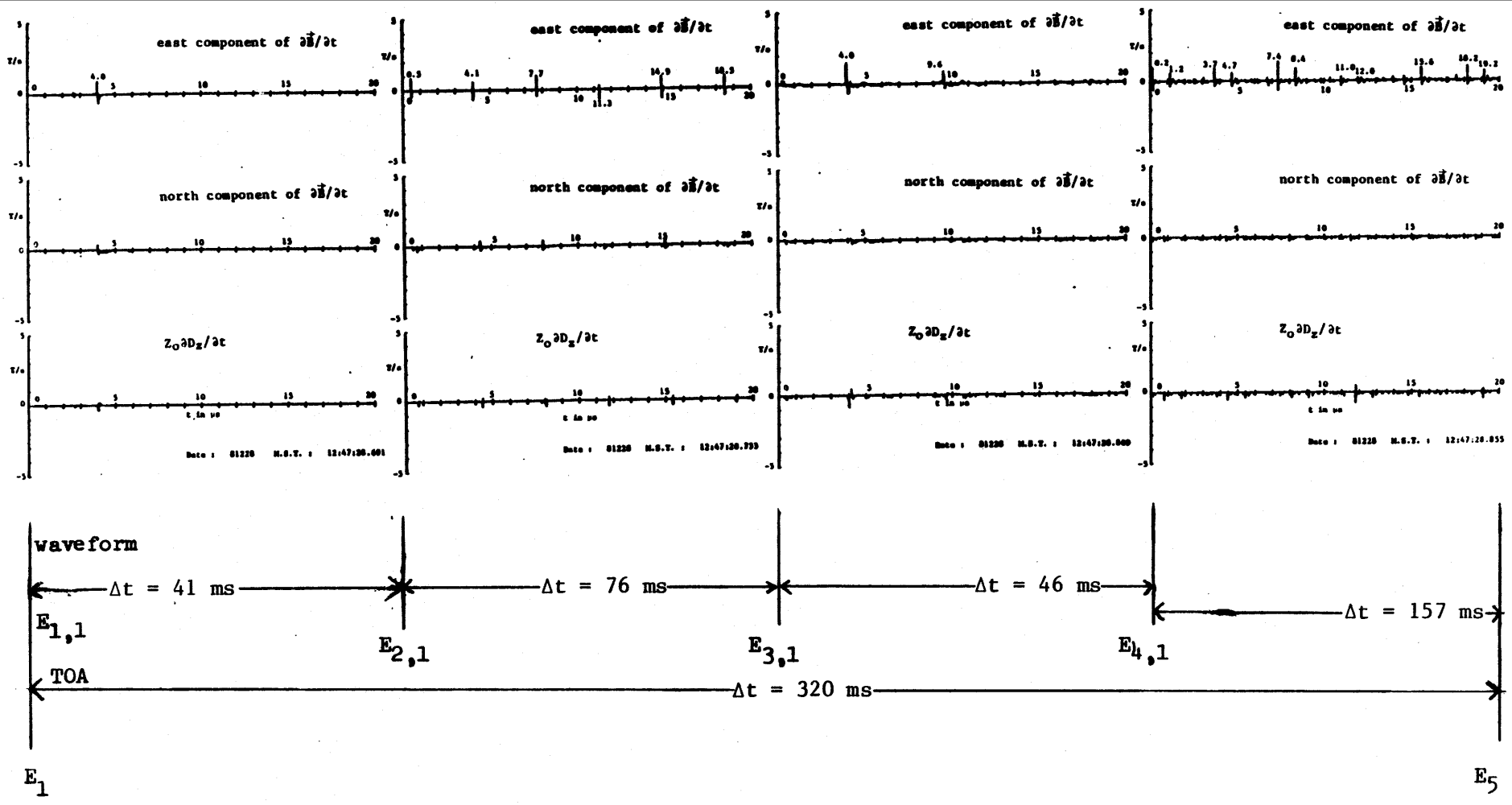


Figure 10.5.2 Time history of waveform and TOA events from distant leader

Figure 10.5.3.a.1 Digital data for event 4.0

( ) = baseline which is subtracted for peaks and numerical integration

Yeardate: 81228 Time: 12:47:28.691 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
3.98	-0.156	-0.078	0.000	-0.000	-0.000	0.000
3.99	-0.156	-0.078	0.000	-0.000	-0.000	0.000
4.00	0.156	-0.078	0.000	0.003	-0.000	0.000
4.01	0.547	-0.078	0.000	0.010	-0.000	0.000
4.02	0.625	0.000	-0.118	0.018	0.001	-0.001
4.03	0.547	0.313	-0.118	0.025	0.005	-0.002
4.04	0.234	0.313	-0.236	0.029	0.009	-0.005
4.05	0.000	0.234	-0.353	0.030	0.012	-0.008
4.06	-0.625	0.000	-0.353	0.026	0.012	-0.012
4.07	-0.703	-0.313	-0.353	0.020	0.010	-0.015
4.08	-0.938	-0.391	-0.353	0.012	0.007	-0.019
4.09	-0.938	-0.391	-0.118	0.005	0.004	-0.020
4.10	-0.938	-0.313	0.000	-0.003	0.002	-0.020
4.11	-0.938	-0.313	0.118	-0.011	-0.001	-0.019
4.12	-0.781	-0.078	0.118	-0.017	-0.001	-0.018
4.13	-0.703	-0.078	0.236	-0.023	-0.001	-0.015
4.14	-0.625	-0.078	0.236	-0.027	-0.001	-0.013
4.15	-0.625	-0.078	0.236	-0.032	-0.001	-0.011
4.16	-0.625	-0.078	0.118	-0.037	-0.001	-0.009
4.17	-0.547	-0.078	0.118	-0.041	-0.001	-0.008
4.18	-0.547	-0.078	0.118	-0.045	-0.001	-0.007
4.19	-0.469	-0.156	0.118	-0.048	-0.002	-0.006
4.20	-0.469	-0.234	0.118	-0.051	-0.003	-0.005
4.21	-0.391	-0.234	0.118	-0.053	-0.005	-0.004
4.22	-0.391	-0.156	0.118	-0.056	-0.006	-0.002
4.23	-0.391	-0.156	0.118	-0.058	-0.006	-0.001
4.24	-0.391	-0.156	0.000	-0.060	-0.007	-0.001
4.25	-0.391	-0.156	0.000	-0.063	-0.008	-0.001
4.26	-0.391	-0.156	0.000	-0.065	-0.009	-0.001
4.27	-0.391	-0.156	0.000	-0.067	-0.009	-0.001
4.28	-0.391	-0.234	0.000	-0.070	-0.011	-0.001
4.29	-0.313	-0.234	0.000	-0.071	-0.013	-0.001
4.30	-0.313	-0.234	0.000	-0.073	-0.014	-0.001

Figure 10.5.3.b.1 Digital data for event 0.5

( ) = baseline which is subtracted for peaks and numerical integration

Yeardate: 81228 Time: 12:47:28.733 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
0.48	-0.313	-0.078	0.000	0.000	-0.000	0.000
0.49	-0.313	-0.078	0.000	0.000	-0.000	0.000
0.50	-0.234	-0.078	0.000	0.001	-0.000	0.000
0.51	0.547	-0.078	0.000	0.009	-0.000	0.000
0.52	-0.703	-0.078	0.000	0.005	-0.000	0.000
0.53	-0.703	-0.078	0.000	0.002	-0.000	0.000
0.54	-0.469	-0.234	0.000	0.000	-0.002	0.000
0.55	-0.391	-0.078	0.000	-0.001	-0.002	0.000
0.56	-0.313	-0.078	0.000	-0.001	-0.002	0.000
0.57	-0.313	-0.078	0.000	-0.001	-0.002	0.000
0.58	-0.313	-0.078	0.000	-0.001	-0.002	0.000
0.59	-0.313	-0.078	0.000	-0.001	-0.002	0.000
0.60	-0.313	-0.078	0.000	-0.001	-0.002	0.000
0.61	-0.313	-0.078	0.000	-0.001	-0.002	0.000
0.62	-0.313	-0.078	0.000	-0.001	-0.002	0.000
0.63	-0.313	-0.078	0.000	-0.001	-0.002	0.000
0.64	-0.313	-0.078	0.000	-0.001	-0.002	0.000
0.65	-0.313	-0.078	0.000	-0.001	-0.002	0.000
0.66	-0.313	-0.078	0.000	-0.001	-0.002	0.000
0.67	-0.313	-0.078	0.000	-0.001	-0.002	0.000
0.68	-0.313	-0.078	0.000	-0.001	-0.002	0.000
0.69	-0.313	-0.078	0.000	-0.001	-0.002	0.000
0.70	-0.313	-0.078	0.000	-0.001	-0.002	0.000
0.71	-0.313	-0.078	0.000	-0.001	-0.002	0.000
0.72	-0.313	-0.078	0.000	-0.001	-0.002	0.000
0.73	-0.313	-0.078	0.000	-0.001	-0.002	0.000
0.74	-0.313	-0.078	0.000	-0.001	-0.002	0.000
0.75	-0.313	-0.078	0.000	-0.001	-0.002	0.000
0.76	-0.313	-0.078	0.000	-0.001	-0.002	0.000
0.77	-0.313	0.000	0.000	-0.001	-0.001	0.000
0.78	-0.313	-0.391	0.000	-0.001	-0.004	0.000
0.79	-0.313	-0.078	-0.236	-0.001	-0.004	-0.002
0.80	-0.313	-0.156	0.000	-0.001	-0.005	-0.002
0.81	-0.313	-0.156	0.118	-0.001	-0.006	-0.001
0.82	-0.313	-0.234	0.118	-0.001	-0.007	0.000
0.83	-0.313	-0.234	0.000	-0.001	-0.009	0.000
0.84	-0.313	-0.234	0.000	-0.001	-0.010	0.000
0.85	-0.313	-0.234	0.000	-0.001	-0.012	0.000

Figure 10.5.3.b.2 Digital data for event 4.1

(-0.313) = baseline which is subtracted for peaks and numerical integration

Yeardate: 81228 Time: 12:47:28.733 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
4.04	-0.313	-0.078	0.000	0.000	-0.000	0.000
4.05	(-0.313)	-0.078	0.000	0.000	-0.000	0.000
4.06	-0.234	-0.078	0.000	0.001	-0.000	0.000
4.07	-0.156	-0.078	0.000	0.002	-0.000	0.000
4.08	0.234	-0.078	0.000	0.008	-0.000	0.000
4.09	-0.938	-0.078	0.000	0.002	-0.000	0.000
4.10	-0.547	-0.078	0.000	-0.001	-0.000	0.000
4.11	-0.391	-0.078	0.000	-0.002	-0.000	0.000
4.12	-0.391	-0.078	0.000	-0.002	-0.000	0.000
4.13	-0.313	-0.078	0.000	-0.002	-0.000	0.000
4.14	-0.313	(-0.078)	0.000	-0.002	-0.000	0.000
4.15	-0.313	-0.156	0.000	-0.002	-0.001	0.000
4.16	-0.313	-0.078	0.000	-0.002	-0.001	0.000
4.17	-0.313	-0.078	0.000	-0.002	-0.001	0.000
4.18	-0.313	-0.078	0.000	-0.002	-0.001	0.000
4.19	-0.313	-0.078	0.000	-0.002	-0.001	0.000
4.20	-0.313	-0.078	0.000	-0.002	-0.001	0.000
4.21	-0.313	-0.078	0.000	-0.002	-0.001	0.000
4.22	-0.313	-0.078	0.000	-0.002	-0.001	0.000
4.23	-0.313	-0.078	0.000	-0.002	-0.001	0.000
4.24	-0.313	-0.078	0.000	-0.002	-0.001	0.000
4.25	-0.313	-0.078	0.000	-0.002	-0.001	0.000
4.26	-0.313	-0.078	0.000	-0.002	-0.001	0.000
4.27	-0.313	-0.078	0.000	-0.002	-0.001	0.000
4.28	-0.313	-0.078	0.000	-0.002	-0.001	0.000
4.29	-0.313	-0.078	0.000	-0.002	-0.001	0.000
4.30	-0.313	-0.078	0.000	-0.002	-0.001	0.000
4.31	-0.313	-0.078	0.000	-0.002	-0.001	0.000
4.32	-0.313	-0.078	0.000	-0.002	-0.001	0.000
4.33	-0.313	-0.078	0.000	-0.002	-0.001	0.000
4.34	-0.313	-0.078	0.000	-0.002	-0.001	0.000
4.35	-0.313	-0.078	0.000	-0.002	-0.001	0.000
4.36	-0.313	-0.078	0.000	-0.002	-0.001	0.000
4.37	-0.313	-0.078	0.000	-0.002	-0.001	0.000
4.38	-0.313	0.313	0.000	-0.002	0.003	0.000
4.39	-0.313	-0.313	0.000	-0.002	0.001	0.000
4.40	-0.313	-0.078	0.000	-0.002	0.001	0.000
4.41	-0.313	-0.234	0.000	-0.002	-0.001	0.000
4.42	-0.313	-0.156	0.000	-0.002	-0.002	0.000
4.43	-0.313	-0.234	(0.000)	-0.002	-0.003	0.000
4.44	-0.313	-0.234	-0.353	-0.002	-0.005	-0.004
4.45	-0.313	-0.234	0.000	-0.002	-0.006	-0.004
4.46	-0.313	-0.234	0.236	-0.002	-0.008	-0.001
4.47	-0.313	-0.234	0.118	-0.002	-0.009	0.000
4.48	-0.313	-0.156	0.000	-0.002	-0.010	0.000

Figure 10.5.3.b.3 Digital data for event 7.7

( ) = baseline which is subtracted for peaks and numerical integration

Yeardate: 81228 Time: 12:47:28.733 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
7.68	-0.313	-0.078	0.000	0.000	-0.000	0.000
7.69	-0.313	-0.078	0.000	0.000	-0.000	0.000
7.70	-0.234	-0.078	0.000	0.001	-0.000	0.000
7.71	0.547	-0.078	0.000	0.009	-0.000	0.000
7.72	-0.703	-0.078	0.000	0.005	-0.000	0.000
7.73	-0.625	-0.078	0.000	0.002	-0.000	0.000
7.74	-0.469	-0.078	0.000	0.001	-0.000	0.000
7.75	-0.391	-0.156	0.000	0.000	-0.001	0.000
7.76	-0.313	-0.078	0.000	0.000	-0.001	0.000
7.77	-0.313	-0.078	0.000	0.000	-0.001	0.000
7.78	-0.313	-0.078	0.000	0.000	-0.001	0.000
7.79	-0.313	-0.078	0.000	0.000	-0.001	0.000
7.80	-0.313	-0.078	0.000	0.000	-0.001	0.000
7.81	-0.313	-0.078	0.000	0.000	-0.001	0.000
7.82	-0.313	-0.078	0.000	0.000	-0.001	0.000
7.83	-0.313	-0.078	0.000	0.000	-0.001	0.000
7.84	-0.313	-0.078	0.000	0.000	-0.001	0.000
7.85	-0.313	-0.078	0.000	0.000	-0.001	0.000
7.86	-0.313	-0.078	0.000	0.000	-0.001	0.000
7.87	-0.313	-0.078	-0.118	0.000	-0.001	-0.001
7.88	-0.313	-0.078	0.000	0.000	-0.001	-0.001
7.89	-0.313	-0.078	0.000	0.000	-0.001	-0.001
7.90	-0.313	-0.078	0.000	0.000	-0.001	-0.001
7.91	-0.313	-0.078	0.000	0.000	-0.001	-0.001
7.92	-0.313	-0.078	0.000	0.000	-0.001	-0.001
7.93	-0.313	-0.078	0.000	0.000	-0.001	-0.001
7.94	-0.313	-0.078	0.000	0.000	-0.001	-0.001
7.95	-0.313	-0.078	0.000	0.000	-0.001	-0.001
7.96	-0.313	-0.078	0.000	0.000	-0.001	-0.001
7.97	-0.313	-0.078	0.000	0.000	-0.001	-0.001
7.98	-0.313	0.313	0.000	0.000	0.003	-0.001
7.99	-0.313	-0.313	0.000	0.000	0.001	-0.001
8.00	-0.313	-0.078	0.000	0.000	0.001	-0.001
8.01	-0.313	-0.234	0.000	0.000	-0.001	-0.001
8.02	-0.313	-0.156	0.000	0.000	-0.002	-0.001
8.03	-0.313	-0.234	0.000	0.000	-0.003	-0.001
8.04	-0.313	-0.234	0.000	0.000	-0.005	-0.001
8.05	-0.313	-0.234	0.000	0.000	-0.006	-0.001
8.06	-0.313	-0.234	0.000	0.000	-0.008	-0.001
8.07	-0.313	-0.234	0.000	0.000	-0.009	-0.001
8.08	-0.313	-0.156	0.000	0.000	-0.010	-0.001
8.09	-0.313	-0.156	0.000	0.000	-0.011	-0.001
8.10	-0.313	-0.156	0.000	0.000	-0.012	-0.001
8.11	-0.313	-0.156	0.000	0.000	-0.013	-0.001
8.12	-0.313	-0.156	-0.353	0.000	-0.013	-0.005

Figure 10.5.3.b.3 Digital data for event 7.7 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
8.13	-0.313	-0.078	0.118	0.000	-0.013	-0.004
8.14	-0.313	-0.078	0.118	0.000	-0.013	-0.002
8.15	-0.313	-0.078	0.000	0.000	-0.013	-0.002
8.16	-0.313	-0.078	0.000	0.000	-0.013	-0.002
8.17	-0.313	-0.078	0.000	0.000	-0.013	-0.002
8.18	-0.313	-0.078	0.000	0.000	-0.013	-0.002
8.19	-0.313	-0.078	0.000	0.000	-0.013	-0.002
8.20	-0.313	-0.078	0.000	0.000	-0.013	-0.002

Figure 10.5.3.b.4 Digital data for event 11.3

(-0.313) = baseline which is subtracted for peaks and numerical integration

Yeardate: 81228 Time: 12:47:28.733 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
11.31	(-0.313)	-0.078	(0.000)	0.000	-0.000	0.000
11.32	-0.234	-0.078	0.000	0.001	-0.000	0.000
11.33	-0.156	-0.078	0.000	0.002	-0.000	0.000
11.34	0.000	(-0.078)	0.000	0.005	-0.000	0.000
11.35	-0.938	-0.156	0.000	-0.001	-0.001	0.000
11.36	-0.625	-0.078	0.000	-0.004	-0.001	0.000
11.37	-0.391	-0.078	0.000	-0.005	-0.001	0.000
11.38	-0.313	-0.078	0.000	-0.005	-0.001	0.000
11.39	-0.313	-0.078	0.000	-0.005	-0.001	0.000
11.40	-0.313	-0.078	0.000	-0.005	-0.001	0.000
11.41	-0.313	-0.078	0.000	-0.005	-0.001	0.000
11.42	-0.313	-0.078	0.000	-0.005	-0.001	0.000
11.43	-0.313	-0.078	0.000	-0.005	-0.001	0.000
11.44	-0.313	-0.078	0.000	-0.005	-0.001	0.000
11.45	-0.313	-0.078	0.000	-0.005	-0.001	0.000
11.46	-0.313	-0.078	0.000	-0.005	-0.001	0.000
11.47	-0.313	-0.078	0.000	-0.005	-0.001	0.000
11.48	-0.313	-0.078	0.000	-0.005	-0.001	0.000
11.49	-0.313	-0.078	0.000	-0.005	-0.001	0.000
11.50	-0.313	-0.078	0.000	-0.005	-0.001	0.000
11.51	-0.313	-0.078	0.000	-0.005	-0.001	0.000
11.52	-0.313	-0.078	0.000	-0.005	-0.001	0.000
11.53	-0.313	-0.078	0.000	-0.005	-0.001	0.000
11.54	-0.313	-0.078	0.000	-0.005	-0.001	0.000
11.55	-0.313	-0.078	0.000	-0.005	-0.001	0.000
11.56	-0.313	-0.078	0.000	-0.005	-0.001	0.000
11.57	-0.313	0.000	0.000	-0.005	-0.000	0.000
11.58	-0.313	-0.313	0.000	-0.005	-0.002	0.000
11.59	-0.313	-0.078	0.000	-0.005	-0.002	0.000
11.60	-0.313	-0.078	0.000	-0.005	-0.002	0.000
11.61	-0.313	-0.156	0.000	-0.005	-0.003	0.000
11.62	-0.313	-0.234	0.000	-0.005	-0.005	0.000
11.63	-0.313	-0.234	0.000	-0.005	-0.006	0.000
11.64	-0.313	-0.234	0.000	-0.005	-0.008	0.000
11.65	-0.313	-0.234	0.000	-0.005	-0.009	0.000
11.66	-0.313	-0.234	0.000	-0.005	-0.011	0.000
11.67	-0.313	-0.234	0.000	-0.005	-0.013	0.000
11.68	-0.313	-0.156	0.000	-0.004	-0.013	0.000
11.69	-0.313	-0.156	0.000	-0.004	-0.014	0.000
11.70	-0.313	-0.156	0.000	-0.004	-0.015	0.000
11.71	-0.313	-0.156	0.000	-0.004	-0.016	0.000
11.72	-0.313	-0.078	0.000	-0.004	-0.016	0.000
11.73	-0.313	-0.078	0.000	-0.004	-0.016	0.000
11.74	-0.313	-0.078	0.000	-0.004	-0.016	0.000
11.75	-0.313	-0.078	0.000	-0.004	-0.016	0.000

Figure 10.5.3.b.4 Digital data for event 11.3 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
11.76	-0.313	-0.078	0.000	-0.004	-0.016	0.000
11.77	-0.313	-0.078	0.000	-0.004	-0.016	0.000
11.78	-0.313	-0.078	-0.353	-0.004	-0.016	-0.004
11.79	-0.313	-0.078	0.236	-0.004	-0.016	-0.001
11.80	-0.313	-0.078	0.118	-0.004	-0.016	0.000
11.81	-0.313	-0.078	0.000	-0.004	-0.016	0.000
11.82	-0.313	-0.078	0.000	-0.004	-0.016	0.000

Figure 10.5.3.b.5 Digital data for event 14.0

( ) = baseline which is subtracted for peaks and numerical integration

Yeardate: 81228 Time: 12:47:28.733 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
14.90	-0.313	-0.078	(0.000)	0.000	-0.000	0.000
14.91	(-0.313)	-0.078	0.000	0.000	-0.000	0.000
14.92	-0.234	-0.078	0.000	0.001	-0.000	0.000
14.93	-0.234	-0.078	0.000	0.002	-0.000	0.000
14.94	0.547	-0.078	0.000	0.010	-0.000	0.000
14.95	-0.938	-0.078	0.000	0.004	-0.000	0.000
14.96	-0.625	-0.078	0.000	0.001	-0.000	0.000
14.97	-0.469	-0.078	0.000	-0.001	-0.000	0.000
14.98	-0.391	-0.078	0.000	-0.002	-0.000	0.000
14.99	-0.313	-0.078	0.000	-0.002	-0.000	0.000
15.00	-0.313	-0.078	0.000	-0.002	-0.000	0.000
15.01	-0.313	-0.078	0.000	-0.002	-0.000	0.000
15.02	-0.313	-0.078	0.000	-0.001	-0.000	0.000
15.03	-0.313	-0.078	0.000	-0.001	-0.000	0.000
15.04	-0.313	-0.078	0.000	-0.001	-0.000	0.000
15.05	-0.313	-0.078	0.000	-0.001	-0.000	0.000
15.06	-0.313	-0.078	0.000	-0.001	-0.000	0.000
15.07	-0.313	-0.078	0.000	-0.001	-0.000	0.000
15.08	-0.313	-0.078	0.000	-0.001	-0.000	0.000
15.09	-0.313	-0.078	0.000	-0.001	-0.000	0.000
15.10	-0.234	(-0.078)	0.000	-0.001	-0.000	0.000
15.11	-0.313	0.313	0.000	-0.001	0.004	0.000
15.12	-0.313	-0.313	0.000	-0.001	0.002	0.000
15.13	-0.313	-0.078	0.000	-0.001	0.002	0.000
15.14	-0.313	-0.234	0.000	-0.001	-0.000	0.000
15.15	-0.313	-0.156	0.000	-0.001	-0.001	0.000
15.16	-0.313	-0.234	0.000	-0.001	-0.002	0.000
15.17	-0.313	-0.234	0.000	-0.001	-0.004	0.000
15.18	-0.313	-0.234	0.000	-0.001	-0.006	0.000
15.19	-0.313	-0.234	0.000	-0.001	-0.007	0.000
15.20	-0.313	-0.234	0.000	-0.001	-0.009	0.000
15.21	-0.313	-0.156	0.000	-0.001	-0.009	0.000
15.22	-0.313	-0.156	0.000	-0.001	-0.010	0.000
15.23	-0.313	-0.156	0.000	-0.001	-0.011	0.000
15.24	-0.313	-0.156	0.000	-0.001	-0.012	0.000
15.25	-0.313	-0.078	0.000	-0.001	-0.012	0.000
15.26	-0.313	-0.078	0.000	-0.001	-0.012	0.000
15.27	-0.313	-0.078	0.000	-0.001	-0.012	0.000
15.28	-0.313	-0.078	0.000	-0.001	-0.012	0.000
15.29	-0.313	-0.078	0.000	-0.001	-0.012	0.000
15.30	-0.313	-0.078	0.000	-0.001	-0.012	0.000
15.31	-0.313	-0.078	0.000	-0.001	-0.012	0.000
15.32	-0.313	-0.078	0.000	-0.001	-0.012	0.000
15.33	-0.313	-0.078	0.000	-0.001	-0.012	0.000
15.34	-0.313	-0.078	0.000	-0.001	-0.012	0.000

Figure 10.5.3.b.5 Digital data for event 14.0 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
15.35	-0.313	-0.078	0.000	-0.001	-0.012	0.000
15.36	-0.313	-0.078	0.000	-0.001	-0.012	0.000
15.37	-0.313	-0.078	0.000	-0.001	-0.012	0.000
15.38	-0.313	-0.078	0.000	-0.001	-0.012	0.000
15.39	-0.313	-0.078	0.000	-0.001	-0.012	0.000
15.40	-0.313	-0.078	0.000	-0.001	-0.012	0.000
15.41	-0.313	-0.078	0.000	-0.001	-0.012	0.000
15.42	-0.313	-0.156	-0.118	-0.001	-0.013	-0.001
15.43	-0.313	-0.156	-0.353	-0.001	-0.013	-0.005
15.44	-0.313	-0.078	0.236	-0.001	-0.013	-0.002
15.45	-0.313	-0.156	0.118	-0.001	-0.014	-0.001
15.46	-0.313	-0.078	0.000	-0.000	-0.014	-0.001
15.47	-0.313	-0.078	0.000	-0.000	-0.014	-0.001
15.48	-0.313	-0.078	0.000	-0.000	-0.014	-0.001
15.49	-0.313	-0.078	0.000	-0.000	-0.014	-0.001
15.50	-0.313	-0.078	0.000	-0.000	-0.014	-0.001
15.51	-0.313	-0.078	0.000	-0.000	-0.014	-0.001
15.52	-0.313	-0.078	0.000	-0.000	-0.014	-0.001
15.53	-0.313	-0.078	0.000	-0.000	-0.014	-0.001

Figure 10.5.3.b.6 Digital data for event 18.5

= baseline which is subtracted for peaks and numerical integration

Yeardate: 81228 Time: 12:47:28.733 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
18.49	-0.313	-0.078	0.000	0.000	-0.000	0.000
18.50	-0.313	-0.078	0.000	0.000	-0.000	0.000
18.51	-0.234	-0.078	0.000	0.001	-0.000	0.000
18.52	0.547	-0.078	0.000	0.009	-0.000	0.000
18.53	-0.703	-0.078	0.000	0.005	-0.000	0.000
18.54	-0.781	-0.078	0.000	0.001	-0.000	0.000
18.55	-0.469	-0.078	0.000	-0.001	-0.000	0.000
18.56	-0.391	-0.078	0.000	-0.002	-0.000	0.000
18.57	-0.313	-0.078	0.000	-0.002	-0.000	0.000
18.58	-0.313	-0.078	0.000	-0.002	-0.000	0.000
18.59	-0.313	-0.078	0.000	-0.002	-0.000	0.000
18.60	-0.313	-0.078	0.000	-0.002	-0.000	0.000
18.61	-0.313	-0.078	0.000	-0.001	-0.000	0.000
18.62	-0.313	-0.078	0.000	-0.001	-0.000	0.000
18.63	-0.313	-0.078	0.000	-0.001	-0.000	0.000
18.64	-0.313	-0.078	0.000	-0.001	-0.000	0.000
18.65	-0.313	-0.078	0.000	-0.001	-0.000	0.000
18.66	-0.313	-0.313	0.000	-0.001	-0.002	0.000
18.67	-0.313	-0.078	0.000	-0.001	-0.002	0.000
18.68	-0.313	-0.156	0.000	-0.001	-0.003	0.000
18.69	-0.313	-0.156	0.000	-0.001	-0.004	0.000
18.70	-0.313	-0.234	0.000	-0.001	-0.005	0.000
18.71	-0.313	-0.234	0.000	-0.001	-0.007	0.000
18.72	-0.313	-0.234	0.000	-0.001	-0.009	0.000
18.73	-0.313	-0.234	0.000	-0.001	-0.010	0.000
18.74	-0.313	-0.234	0.000	-0.001	-0.012	0.000
18.75	-0.313	-0.234	0.000	-0.001	-0.013	0.000
18.76	-0.313	-0.156	0.000	-0.001	-0.014	0.000
18.77	-0.313	-0.156	0.000	-0.001	-0.015	0.000
18.78	-0.313	-0.156	0.000	-0.001	-0.016	0.000
18.79	-0.313	-0.156	0.000	-0.001	-0.016	0.000
18.80	-0.313	-0.078	0.000	-0.001	-0.016	0.000
18.81	-0.313	-0.078	0.000	-0.001	-0.016	0.000
18.82	-0.313	-0.078	0.000	-0.001	-0.016	0.000
18.83	-0.313	-0.078	0.000	-0.001	-0.016	0.000
18.84	-0.313	-0.078	0.000	-0.001	-0.016	0.000
18.85	-0.313	-0.078	0.000	-0.001	-0.016	0.000
18.86	-0.313	-0.078	0.000	-0.001	-0.016	0.000
18.87	-0.313	-0.078	0.000	-0.001	-0.016	0.000
18.88	-0.313	-0.078	0.000	-0.001	-0.016	0.000
18.89	-0.313	-0.078	0.000	-0.001	-0.016	0.000
18.90	-0.313	-0.078	0.000	-0.001	-0.016	0.000
18.91	-0.313	-0.078	0.000	-0.001	-0.016	0.000
18.92	-0.313	-0.078	0.000	-0.001	-0.016	0.000
18.93	-0.313	-0.078	0.000	-0.001	-0.016	0.000

Figure 10.5.3.b.6 Digital data for event 18.5 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
18.94	-0.313	-0.078	0.000	-0.001	-0.016	0.000
18.95	-0.313	-0.078	0.000	-0.001	-0.016	0.000
18.96	-0.313	-0.078	0.000	-0.001	-0.016	0.000
18.97	-0.313	-0.156	0.000	-0.001	-0.017	0.000
18.98	-0.313	-0.156	0.000	-0.001	-0.018	0.000
18.99	-0.313	-0.078	0.000	-0.001	-0.018	0.000
19.00	-0.313	-0.078	0.000	-0.001	-0.018	0.000
19.01	-0.313	-0.078	0.000	-0.001	-0.018	0.000
19.02	-0.313	-0.078	0.000	-0.001	-0.018	0.000
19.03	-0.313	-0.078	0.000	-0.001	-0.018	0.000
19.04	-0.313	-0.078	0.000	-0.001	-0.018	0.000
19.05	-0.313	-0.078	0.000	-0.001	-0.018	0.000
19.06	-0.313	-0.078	0.000	-0.001	-0.018	0.000
19.07	-0.313	-0.078	-0.236	-0.001	-0.018	-0.002
19.08	-0.313	-0.078	0.000	-0.001	-0.018	-0.002
19.09	-0.313	-0.078	0.236	-0.001	-0.018	0.000
19.10	-0.313	-0.078	0.118	-0.001	-0.018	0.001
19.11	-0.313	-0.078	0.000	-0.001	-0.018	0.001
19.12	-0.313	-0.078	0.000	-0.001	-0.018	0.001
19.13	-0.313	-0.078	0.000	-0.001	-0.018	0.001
19.14	-0.313	-0.078	0.000	-0.001	-0.018	0.001
19.15	-0.313	-0.078	0.000	-0.001	-0.018	0.001

Figure 10.5.3.c.1 Digital data for event 4.0

⊃ = baseline which is subtracted for peaks and numerical integration

Yeardate: 81228 Time: 12:47:28.809 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
3.96	-0.156	-0.078	0.000	-0.000	-0.000	0.000
3.97	-0.156	-0.078	0.000	-0.000	-0.000	0.000
3.98	-0.078	-0.078	-0.118	0.001	-0.000	-0.001
3.99	0.547	-0.078	-0.118	0.008	-0.000	-0.002
4.00	1.172	-0.078	-0.118	0.021	-0.000	-0.004
4.01	1.172	-0.078	-0.118	0.034	-0.000	-0.005
4.02	1.016	-0.078	-0.236	0.046	-0.000	-0.007
4.03	0.625	-0.078	-0.236	0.054	-0.000	-0.009
4.04	0.000	0.000	-0.236	0.055	0.001	-0.012
4.05	0.000	0.000	-0.471	0.057	0.002	-0.016
4.06	-0.078	-0.078	-0.825	0.058	0.002	-0.025
4.07	-0.313	-0.078	-0.825	0.056	0.002	-0.033
4.08	-0.391	-0.078	-0.707	0.054	0.002	-0.040
4.09	-0.625	-0.078	-0.353	0.049	0.002	-0.044
4.10	-0.625	-0.078	-0.353	0.044	0.002	-0.047
4.11	-0.078	-0.078	-0.118	0.045	0.002	-0.048
4.12	-0.625	-0.078	0.000	0.041	0.002	-0.048
4.13	-0.938	-0.078	0.000	0.033	0.002	-0.048
4.14	-0.938	-0.078	0.000	0.025	0.002	-0.048
4.15	-0.625	-0.078	0.000	0.020	0.002	-0.048
4.16	-0.391	-0.078	0.000	0.018	0.002	-0.048
4.17	-0.391	0.000	-0.118	0.016	0.002	-0.049
4.18	-0.391	0.078	0.353	0.013	0.004	-0.046
4.19	-0.391	0.000	0.471	0.011	0.005	-0.041
4.20	-0.313	0.000	0.118	0.009	0.005	-0.040
4.21	-0.078	0.000	0.118	0.010	0.006	-0.039
4.22	-0.156	0.000	0.118	0.010	0.007	-0.038
4.23	-0.234	0.000	0.118	0.009	0.008	-0.037
4.24	-0.234	-0.078	0.118	0.009	0.008	-0.035
4.25	-0.234	-0.313	0.000	0.008	0.005	-0.035
4.26	-0.234	-0.313	0.000	0.007	0.003	-0.035
4.27	-0.234	-0.313	-0.118	0.006	0.001	-0.037
4.28	-0.313	-0.313	-0.236	0.005	-0.002	-0.039
4.29	-0.391	-0.313	-0.236	0.002	-0.004	-0.041
4.30	-0.391	-0.078	-0.236	-0.000	-0.004	-0.044

Figure 10.5.3.c.2 Digital data for event 9.6

(oval) = baseline which is subtracted for peaks and numerical integration

Yeardate: 81228 Time: 12:47:28.809 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
9.56	-0.234	-0.078	-0.118	-0.000	-0.000	0.000
9.57	(-0.234)	-0.078	-0.118	-0.000	-0.000	0.000
9.58	-0.156	-0.078	-0.118	0.001	-0.000	0.000
9.59	0.313	-0.078	-0.118	0.006	-0.000	0.000
9.60	0.547	-0.078	-0.118	0.014	-0.000	0.000
9.61	0.547	(-0.078)	-0.118	0.022	-0.000	0.000
9.62	0.313	0.000	-0.118	0.027	0.001	0.000
9.63	0.234	0.000	(-0.118)	0.032	0.002	0.000
9.64	-0.078	0.000	-0.236	0.034	0.002	-0.001
9.65	-0.391	0.000	-0.353	0.032	0.003	-0.004
9.66	-0.625	-0.078	-0.353	0.028	0.003	-0.006
9.67	-0.625	-0.078	-0.353	0.024	0.003	-0.008
9.68	-0.625	-0.078	-0.353	0.020	0.003	-0.011
9.69	-0.625	-0.078	0.000	0.016	0.003	-0.009
9.70	-0.469	-0.078	0.000	0.014	0.003	-0.008
9.71	-0.391	-0.078	0.000	0.012	0.003	-0.007
9.72	-0.391	-0.078	0.118	0.011	0.003	-0.005
9.73	-0.391	-0.078	0.118	0.009	0.003	-0.002
9.74	-0.391	-0.078	0.118	0.008	0.003	0.000
9.75	-0.391	-0.078	0.118	0.006	0.003	0.002
9.76	-0.391	-0.078	0.118	0.005	0.003	0.005
9.77	-0.391	-0.078	0.118	0.003	0.003	0.007
9.78	-0.313	-0.078	0.118	0.002	0.003	0.009
9.79	-0.313	-0.078	0.118	0.001	0.003	0.012
9.80	-0.313	-0.078	0.118	0.001	0.003	0.014
9.81	-0.313	-0.078	0.118	-0.000	0.003	0.017
9.82	-0.234	-0.078	0.118	-0.000	0.003	0.019
9.83	-0.234	-0.078	0.000	-0.000	0.003	0.020
9.84	-0.234	-0.078	0.000	-0.000	0.003	0.021
9.85	-0.313	-0.078	0.000	-0.001	0.003	0.022
9.86	-0.391	-0.156	0.000	-0.002	0.002	0.024
9.87	-0.391	-0.156	0.000	-0.004	0.002	0.025
9.88	-0.391	-0.078	0.000	-0.006	0.002	0.026
9.89	-0.391	-0.078	0.000	-0.007	0.002	0.027
9.90	-0.469	-0.078	0.000	-0.010	0.002	0.028
9.91	-0.469	-0.078	0.000	-0.012	0.002	0.030
9.92	-0.469	-0.078	0.000	-0.014	0.002	0.031
9.93	-0.391	-0.078	0.000	-0.016	0.002	0.032
9.94	-0.391	-0.078	0.000	-0.017	0.002	0.033
9.95	-0.391	-0.078	0.000	-0.019	0.002	0.034
9.96	-0.391	-0.234	0.000	-0.020	-0.000	0.035
9.97	-0.313	-0.234	0.000	-0.021	-0.002	0.037

Figure 10.5.3.d.1 Digital data for event 0.2

( ) = baseline which is subtracted for peaks and numerical integration

Yeardate: 81228 Time: 12:47:28.855 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
0.13	-0.313	-0.078	0.000	0.000	-0.000	0.000
0.14	-0.234	-0.313	-0.236	0.001	-0.002	-0.002
0.15	-0.078	-0.078	-0.118	0.003	-0.002	-0.004
0.16	0.625	-0.078	0.000	0.013	-0.002	-0.004
0.17	-0.625	-0.078	0.000	0.009	-0.002	-0.004
0.18	-0.938	-0.078	0.000	0.003	-0.002	-0.004
0.19	-0.313	-0.156	0.000	0.003	-0.003	-0.004
0.20	-0.234	-0.156	0.000	0.004	-0.004	-0.004
0.21	-0.391	-0.156	0.000	0.003	-0.005	-0.004
0.22	-0.469	-0.078	0.000	0.002	-0.005	-0.004
0.23	-0.391	-0.078	0.000	0.001	-0.005	-0.004
0.24	-0.391	-0.078	0.000	0.000	-0.005	-0.004
0.25	-0.391	-0.078	0.000	-0.001	-0.005	-0.004

Figure 10.5.3.d.2 Digital data for event 1.2

(oval) = baseline which is subtracted for peaks and numerical integration

Yeardate: 81228 Time: 12:47:28.855 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
1.11	-0.234	-0.078	0.000	-0.000	-0.000	0.000
1.12	(-0.234)	-0.078	0.000	-0.000	-0.000	0.000
1.13	-0.156	-0.078	0.000	0.001	-0.000	0.000
1.14	-0.078	-0.078	0.000	0.002	-0.000	0.000
1.15	-0.234	(-0.078)	0.000	0.002	-0.000	0.000
1.16	0.234	-0.156	0.000	0.007	-0.001	0.000
1.17	-0.625	-0.156	(0.000)	0.003	-0.002	0.000
1.18	-0.391	-0.156	-0.118	0.002	-0.002	-0.001
1.19	-0.313	-0.156	-0.118	0.001	-0.003	-0.002
1.20	-0.391	-0.156	-0.118	-0.001	-0.004	-0.004
1.21	-0.469	-0.078	-0.118	-0.003	-0.004	-0.005
1.22	-0.313	-0.078	-0.118	-0.004	-0.004	-0.006
1.23	-0.391	-0.078	0.000	-0.006	-0.004	-0.006
1.24	-0.469	-0.078	0.000	-0.008	-0.004	-0.006
1.25	-0.391	-0.078	0.000	-0.009	-0.004	-0.006

Figure 10.5.3.d.3 Digital data for event 3.7

(—) = baseline which is subtracted for peaks and numerical integration

Yeardate: 81228 Time: 12:47:28.855 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
3.70	-0.313	-0.078	0.000	0.000	-0.000	0.000
3.71	-0.313	-0.078	0.000	0.000	-0.000	0.000
3.72	-0.156	-0.078	0.000	0.002	-0.000	0.000
3.73	0.547	-0.078	0.000	0.010	-0.000	0.000
3.74	0.000	-0.078	0.000	0.013	-0.000	0.000
3.75	-0.625	-0.078	0.000	0.010	-0.000	0.000
3.76	-0.625	-0.234	0.000	0.007	-0.002	0.000
3.77	-0.078	-0.078	0.000	0.009	-0.002	0.000
3.78	-0.234	-0.078	0.000	0.010	-0.002	0.000
3.79	-0.391	-0.078	0.000	0.009	-0.002	0.000
3.80	-0.469	-0.156	0.000	0.008	-0.002	0.000
3.81	-0.391	-0.156	-0.118	0.007	-0.003	-0.001
3.82	-0.391	-0.156	0.000	0.006	-0.004	-0.001
3.83	-0.391	-0.078	0.000	0.006	-0.004	-0.001
3.84	-0.391	-0.078	-0.236	0.005	-0.004	-0.004
3.85	-0.469	-0.078	0.000	0.003	-0.004	-0.004
3.86	-0.391	-0.078	0.000	0.002	-0.004	-0.004
3.87	-0.391	-0.078	0.000	0.002	-0.004	-0.004
3.88	-0.391	-0.078	0.000	0.001	-0.004	-0.004
3.89	-0.313	-0.078	0.000	0.001	-0.004	-0.004
3.90	-0.156	-0.078	0.000	0.002	-0.004	-0.004
3.91	-0.156	-0.078	0.000	0.004	-0.004	-0.004
3.92	-0.156	-0.078	0.000	0.006	-0.004	-0.004
3.93	-0.234	-0.078	0.000	0.006	-0.004	-0.004
3.94	-0.313	-0.156	0.000	0.006	-0.005	-0.004
3.95	-0.313	-0.234	0.000	0.006	-0.006	-0.004

Figure 10.5.3.d.4 Digital data for event 4.7

= baseline which is subtracted for peaks and numerical integration

Yeardate: 81228 Time: 12:47:28.855 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
4.72	-0.156	-0.078	0.000	-0.000	-0.000	0.000
4.73	-0.156	-0.078	0.000	-0.000	-0.000	0.000
4.74	0.234	-0.078	0.000	0.004	-0.000	0.000
4.75	-0.625	-0.078	0.000	-0.001	-0.000	0.000
4.76	-0.391	-0.078	0.000	-0.003	-0.000	0.000
4.77	-0.313	-0.156	0.000	-0.005	-0.001	0.000
4.78	-0.391	-0.156	0.000	-0.007	-0.002	0.000
4.79	-0.469	-0.156	0.000	-0.010	-0.002	0.000
4.80	-0.313	-0.156	0.000	-0.012	-0.003	0.000
4.81	-0.391	-0.156	0.000	-0.014	-0.004	0.000
4.82	-0.469	-0.078	0.000	-0.017	-0.004	0.000
4.83	-0.391	-0.078	0.000	-0.020	-0.004	0.000
4.84	-0.391	-0.078	0.000	-0.022	-0.004	0.000
4.85	-0.391	-0.078	0.000	-0.024	-0.004	0.000
4.86	-0.391	-0.078	0.000	-0.027	-0.004	0.000
4.87	-0.391	-0.078	0.000	-0.029	-0.004	0.000
4.88	-0.391	-0.078	-0.118	-0.031	-0.004	-0.001
4.89	-0.313	-0.078	-0.118	-0.033	-0.004	-0.002
4.90	-0.313	-0.078	-0.118	-0.034	-0.004	-0.004
4.91	-0.234	-0.078	-0.118	-0.035	-0.004	-0.005
4.92	-0.156	-0.078	-0.118	-0.035	-0.004	-0.006
4.93	-0.078	-0.078	0.000	-0.034	-0.004	-0.006
4.94	-0.234	-0.078	0.000	-0.035	-0.004	-0.006
4.95	-0.234	-0.078	0.000	-0.036	-0.004	-0.006

Figure 10.5.3.d.5 Digital data for event 7.4

( ) = baseline which is subtracted for peaks and numerical integration

Yeardate: 81228 Time: 12:47:28.855 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
7.33	-0.313	-0.078	0.000	0.000	-0.000	0.000
7.34	-0.313	-0.078	0.000	0.000	-0.000	0.000
7.35	-0.313	0.000	0.000	0.000	0.001	0.000
7.36	-0.234	-0.078	0.000	0.001	0.001	0.000
7.37	-0.156	-0.078	0.000	0.002	0.001	0.000
7.38	1.016	-0.078	0.000	0.016	0.001	0.000
7.39	-0.313	-0.078	0.000	0.016	0.001	0.000
7.40	-0.938	-0.078	0.000	0.009	0.001	0.000
7.41	-0.391	-0.078	0.000	0.009	0.001	0.000
7.42	-0.234	-0.156	0.000	0.009	-0.000	0.000
7.43	-0.391	-0.156	0.000	0.009	-0.001	0.000
7.44	-0.469	-0.156	0.000	0.007	-0.002	0.000
7.45	-0.469	-0.078	0.000	0.006	-0.002	0.000
7.46	-0.391	-0.078	0.000	0.005	-0.002	0.000
7.47	-0.391	-0.078	-0.118	0.004	-0.002	-0.001
7.48	-0.391	-0.078	0.000	0.003	-0.002	-0.001
7.49	-0.469	-0.078	-0.118	0.002	-0.002	-0.002
7.50	-0.469	-0.078	-0.236	0.000	-0.002	-0.005
7.51	-0.391	-0.078	0.000	-0.001	-0.002	-0.005
7.52	-0.391	-0.078	0.000	-0.001	-0.002	-0.005
7.53	-0.313	-0.078	0.000	-0.001	-0.002	-0.005
7.54	-0.156	-0.078	0.000	0.000	-0.002	-0.005
7.55	-0.156	-0.156	0.000	0.002	-0.002	-0.005

Figure 10.5.3.d.6 Digital data for event 8.4

( ) = baseline which is subtracted for peaks and numerical integration

Yeardate: 81228 Time: 12:47:28.855 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
8.10	-0.313	-0.078	0.000	0.000	-0.000	0.000
8.11	-0.313	-0.078	0.000	0.000	-0.000	0.000
8.12	-0.313	-0.078	-0.118	0.000	-0.000	-0.001
8.13	-0.313	-0.078	-0.236	0.000	-0.000	-0.004
8.14	-0.313	-0.078	-0.353	0.000	-0.000	-0.007
8.15	-0.313	-0.078	0.000	0.000	-0.000	-0.007
8.16	-0.313	-0.078	0.118	0.000	-0.000	-0.006
8.17	-0.313	-0.078	0.000	0.000	-0.000	-0.006
8.18	-0.313	-0.078	-0.118	0.000	-0.000	-0.007
8.19	-0.313	-0.078	0.000	0.000	-0.000	-0.007
8.20	-0.313	-0.234	0.000	0.000	-0.002	-0.007
8.21	-0.313	-0.234	0.000	0.000	-0.003	-0.007
8.22	-0.313	-0.234	0.000	0.000	-0.005	-0.007
8.23	-0.313	-0.156	0.000	0.000	-0.005	-0.007
8.24	-0.313	-0.156	0.000	0.000	-0.006	-0.007
8.25	-0.313	-0.156	0.000	0.000	-0.007	-0.007
8.26	-0.234	-0.156	0.000	0.001	-0.008	-0.007
8.27	-0.234	-0.156	0.000	0.002	-0.009	-0.007
8.28	-0.313	-0.156	0.000	0.002	-0.009	-0.007
8.29	-0.313	-0.156	0.000	0.002	-0.010	-0.007
8.30	-0.234	-0.078	0.000	0.002	-0.010	-0.007
8.31	-0.234	-0.078	-0.118	0.003	-0.010	-0.008
8.32	-0.234	-0.078	-0.118	0.004	-0.010	-0.009
8.33	-0.234	-0.078	0.000	0.005	-0.010	-0.009
8.34	-0.156	-0.078	0.000	0.006	-0.010	-0.009
8.35	-0.156	-0.078	0.000	0.008	-0.010	-0.009
8.36	-0.234	-0.156	0.000	0.009	-0.011	-0.009
8.37	0.547	-0.156	0.000	0.017	-0.012	-0.009
8.38	-0.625	-0.156	0.000	0.014	-0.013	-0.009
8.39	-0.391	-0.156	0.000	0.013	-0.013	-0.009
8.40	-0.313	-0.078	0.000	0.013	-0.013	-0.009
8.41	-0.313	-0.078	0.000	0.013	-0.013	-0.009
8.42	-0.469	-0.078	0.000	0.012	-0.013	-0.009
8.43	-0.391	-0.078	0.000	0.011	-0.013	-0.009
8.44	-0.313	-0.078	0.000	0.011	-0.013	-0.009
8.45	-0.469	-0.078	0.000	0.010	-0.013	-0.009
8.46	-0.469	-0.078	0.000	0.008	-0.013	-0.009
8.47	-0.391	-0.078	0.000	0.007	-0.013	-0.009
8.48	-0.391	-0.078	0.000	0.006	-0.013	-0.009
8.49	-0.391	-0.078	0.000	0.006	-0.013	-0.009
8.50	-0.391	-0.078	0.000	0.005	-0.013	-0.009
8.51	-0.391	-0.078	0.000	0.004	-0.013	-0.009
8.52	-0.391	-0.078	0.000	0.003	-0.013	-0.009
8.53	-0.313	-0.078	-0.118	0.003	-0.013	-0.010

Figure 10.5.3.d.7 Digital data for event 11.0

( ) = baseline which is subtracted for peaks and numerical integration

Yeardate: 81228 Time: 12:47:28.855 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
10.88	-0.313	-0.078	0.000	0.000	-0.000	0.000
10.89	-0.313	-0.078	0.000	0.000	-0.000	0.000
10.90	-0.313	0.000	-0.118	0.000	0.001	-0.001
10.91	-0.313	-0.078	0.000	0.000	0.001	-0.001
10.92	-0.313	-0.234	0.000	0.000	-0.001	-0.001
10.93	-0.313	-0.078	0.000	0.000	-0.001	-0.001
10.94	-0.313	-0.078	0.000	0.000	-0.001	-0.001
10.95	-0.313	-0.078	0.000	0.000	-0.001	-0.001
10.96	-0.313	-0.078	0.000	0.000	-0.001	-0.001
10.97	-0.313	-0.156	0.000	0.000	-0.002	-0.001
10.98	-0.156	-0.156	0.000	0.002	-0.002	-0.001
10.99	-0.078	-0.156	0.000	0.004	-0.003	-0.001
11.00	0.000	-0.078	0.000	0.007	-0.003	-0.001
11.01	-0.625	-0.078	0.000	0.004	-0.003	-0.001
11.02	-0.625	-0.078	0.000	0.001	-0.003	-0.001
11.03	-0.078	-0.078	0.000	0.003	-0.003	-0.001
11.04	-0.313	-0.078	0.000	0.003	-0.003	-0.001
11.05	-0.469	-0.078	0.000	0.002	-0.003	-0.001
11.06	-0.469	-0.078	0.000	0.000	-0.003	-0.001
11.07	-0.391	-0.078	0.000	-0.001	-0.003	-0.001
11.08	-0.391	-0.078	0.000	-0.001	-0.003	-0.001
11.09	-0.391	-0.078	0.000	-0.002	-0.003	-0.001
11.10	-0.469	-0.156	0.000	-0.004	-0.004	-0.001

Figure 10.5.3.d.8 Digital data for event 12.0

( ) = baseline which is subtracted for peaks and numerical integration

Yeardate: 81228 Time: 12:47:28.855 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
11.73	-0.313	-0.078	0.000	0.000	-0.000	0.000
11.74	-0.313	(-0.078)	0.000	0.000	-0.000	0.000
11.75	-0.313	-0.156	0.000	0.000	-0.001	0.000
11.76	-0.313	-0.234	0.000	0.000	-0.002	0.000
11.77	-0.313	-0.234	0.000	0.000	-0.004	0.000
11.78	-0.313	-0.234	(0.000)	0.000	-0.005	0.000
11.79	-0.313	-0.156	-0.118	0.000	-0.006	-0.001
11.80	-0.313	-0.156	-0.236	0.000	-0.007	-0.004
11.81	-0.313	-0.156	-0.707	0.000	-0.008	-0.011
11.82	-0.313	-0.156	0.000	0.000	-0.009	-0.011
11.83	-0.313	-0.156	0.471	0.000	-0.009	-0.006
11.84	-0.313	-0.156	0.000	0.000	-0.010	-0.006
11.85	(-0.313)	-0.156	-0.236	0.000	-0.011	-0.008
11.86	-0.234	-0.078	0.000	0.001	-0.011	-0.008
11.87	-0.234	-0.078	0.000	0.002	-0.011	-0.008
11.88	-0.313	-0.078	0.000	0.002	-0.011	-0.008
11.89	-0.313	-0.078	0.000	0.002	-0.011	-0.008
11.90	-0.234	-0.078	0.000	0.002	-0.011	-0.008
11.91	-0.234	-0.078	0.000	0.003	-0.011	-0.008
11.92	-0.234	-0.156	0.000	0.004	-0.012	-0.008
11.93	-0.234	-0.156	0.000	0.005	-0.013	-0.008
11.94	-0.234	-0.156	0.000	0.006	-0.013	-0.008
11.95	-0.156	-0.156	0.000	0.007	-0.014	-0.008
11.96	-0.156	-0.078	0.000	0.009	-0.014	-0.008
11.97	-0.156	-0.078	0.000	0.010	-0.014	-0.008
11.98	-0.078	-0.078	-0.118	0.013	-0.014	-0.009
11.99	-0.469	-0.078	0.000	0.011	-0.014	-0.009
12.00	-0.391	-0.078	-0.118	0.010	-0.014	-0.011
12.01	-0.234	-0.078	0.000	0.011	-0.014	-0.011
12.02	-0.391	-0.078	0.000	0.010	-0.014	-0.011
12.03	-0.391	-0.078	0.000	0.010	-0.014	-0.011
12.04	-0.313	-0.078	0.000	0.010	-0.014	-0.011
12.05	-0.391	-0.078	0.000	0.009	-0.014	-0.011
12.06	-0.469	-0.078	0.000	0.007	-0.014	-0.011
12.07	-0.391	-0.078	0.000	0.006	-0.014	-0.011
12.08	-0.391	-0.078	0.000	0.006	-0.014	-0.011
12.09	-0.391	-0.078	0.000	0.005	-0.014	-0.011
12.10	-0.391	-0.078	0.000	0.004	-0.014	-0.011
12.11	-0.391	-0.078	0.000	0.003	-0.014	-0.011
12.12	-0.391	-0.078	0.000	0.003	-0.014	-0.011
12.13	-0.313	-0.078	0.000	0.003	-0.014	-0.011
12.14	-0.313	-0.078	0.000	0.003	-0.014	-0.011
12.15	-0.234	-0.078	0.000	0.003	-0.014	-0.011
12.16	-0.156	-0.078	0.000	0.005	-0.014	-0.011
12.17	-0.078	-0.078	0.000	0.007	-0.014	-0.011

Figure 10.5.3.d.9 Digital data for event 15.6

( ) = baseline which is subtracted for peaks and numerical integration

Yeardate: 81228 Time: 12:47:28.855 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
15.42	-0.313	-0.078	0.000	0.000	-0.000	0.000
15.43	-0.313	-0.078	0.000	0.000	-0.000	0.000
15.44	-0.313	-0.078	-0.118	0.000	-0.000	-0.001
15.45	-0.313	-0.078	-0.236	0.000	-0.000	-0.004
15.46	-0.313	-0.078	-0.353	0.000	-0.000	-0.007
15.47	-0.313	-0.078	0.000	0.000	-0.000	-0.007
15.48	-0.234	-0.156	0.118	0.001	-0.001	-0.006
15.49	-0.234	-0.156	-0.118	0.002	-0.002	-0.007
15.50	-0.313	-0.156	-0.118	0.002	-0.002	-0.008
15.51	-0.313	-0.156	0.000	0.002	-0.003	-0.008
15.52	-0.234	-0.156	0.000	0.002	-0.004	-0.008
15.53	-0.234	-0.078	0.000	0.003	-0.004	-0.008
15.54	-0.234	-0.078	0.000	0.004	-0.004	-0.008
15.55	-0.234	-0.078	0.000	0.005	-0.004	-0.008
15.56	-0.234	-0.078	0.000	0.006	-0.004	-0.008
15.57	-0.156	-0.078	0.000	0.007	-0.004	-0.008
15.58	-0.078	-0.078	0.000	0.009	-0.004	-0.008
15.59	-0.234	-0.078	0.000	0.010	-0.004	-0.008
15.60	0.547	-0.078	0.000	0.019	-0.004	-0.008
15.61	-0.625	-0.078	0.000	0.016	-0.004	-0.008
15.62	-0.391	-0.078	0.000	0.015	-0.004	-0.008
15.63	-0.313	-0.078	-0.118	0.015	-0.004	-0.009
15.64	-0.234	-0.078	0.000	0.016	-0.004	-0.009
15.65	-0.391	-0.078	-0.118	0.015	-0.004	-0.011
15.66	-0.391	-0.078	0.000	0.014	-0.004	-0.011
15.67	-0.313	-0.078	0.000	0.014	-0.004	-0.011
15.68	-0.391	-0.078	0.000	0.013	-0.004	-0.011
15.69	-0.469	-0.078	0.000	0.012	-0.004	-0.011
15.70	-0.391	-0.078	0.000	0.011	-0.004	-0.011
15.71	-0.391	-0.078	0.000	0.010	-0.004	-0.011
15.72	-0.391	-0.078	0.000	0.010	-0.004	-0.011
15.73	-0.391	-0.078	0.000	0.009	-0.004	-0.011
15.74	-0.391	-0.078	0.000	0.008	-0.004	-0.011
15.75	-0.313	-0.078	0.000	0.008	-0.004	-0.011
15.76	-0.313	-0.078	0.000	0.008	-0.004	-0.011
15.77	-0.234	-0.078	0.000	0.009	-0.004	-0.011
15.78	-0.156	-0.078	0.000	0.010	-0.004	-0.011
15.79	-0.078	-0.078	0.000	0.013	-0.004	-0.011
15.80	-0.234	-0.078	0.000	0.013	-0.004	-0.011

Figure 10.5.3.d.10 Digital data for event 18.2

( ) = baseline which is subtracted for peaks and numerical integration

Yeardate: 81228 Time: 12:47:28.855 M.S.T.

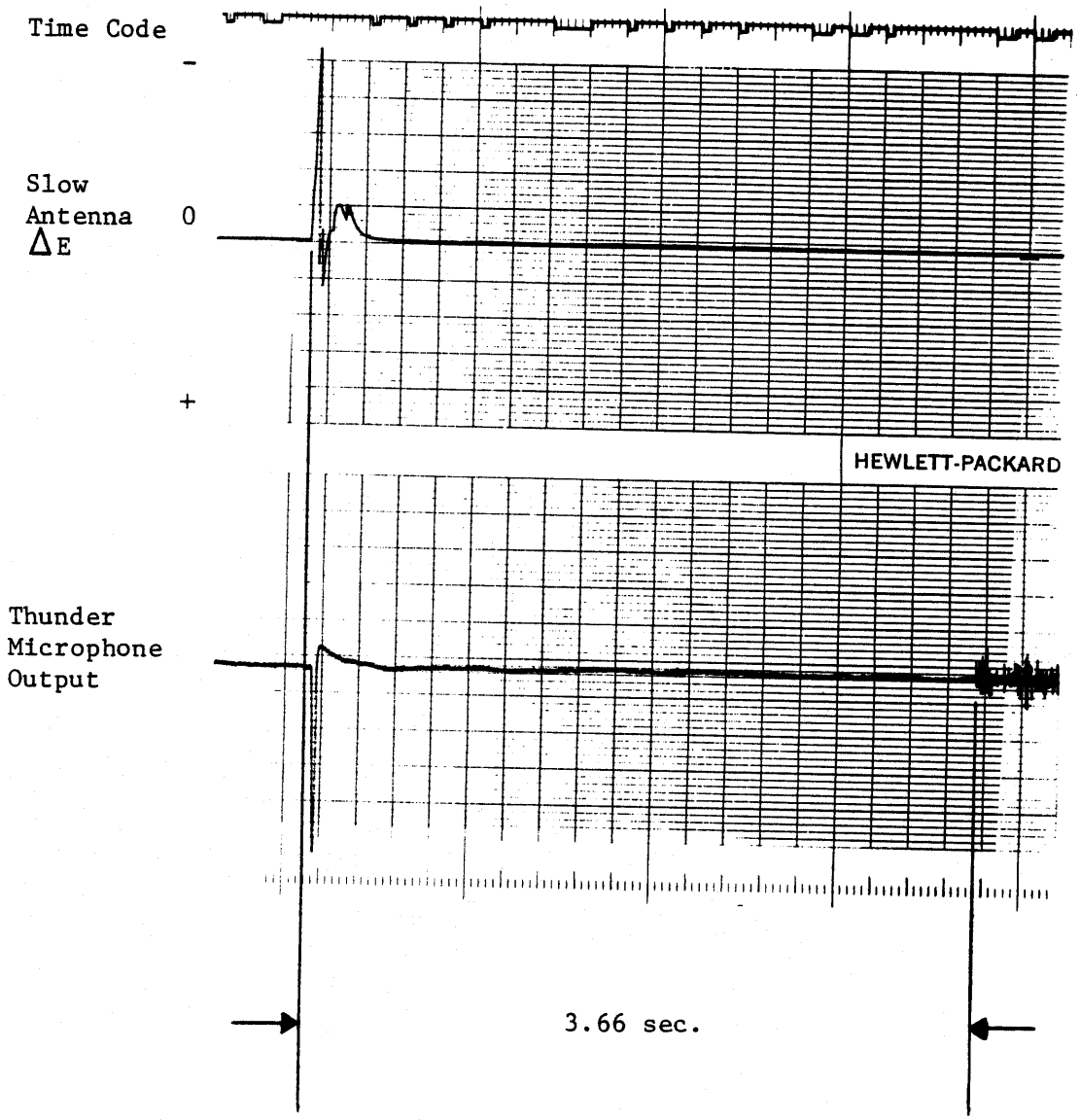
Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
18.17	-0.313	-0.078	0.000	0.000	-0.000	0.000
18.18	-0.313	-0.078	0.000	0.000	-0.000	0.000
18.19	-0.234	-0.078	-0.118	0.001	-0.000	-0.001
18.20	-0.156	-0.078	0.000	0.002	-0.000	-0.001
18.21	0.625	-0.156	0.000	0.012	-0.001	-0.001
18.22	-0.625	-0.234	0.000	0.009	-0.002	-0.001
18.23	-0.625	-0.234	0.000	0.006	-0.004	-0.001
18.24	-0.078	-0.156	0.000	0.008	-0.005	-0.001
18.25	-0.234	-0.156	0.000	0.009	-0.005	-0.001
18.26	-0.469	-0.156	0.000	0.007	-0.006	-0.001
18.27	-0.469	-0.156	0.000	0.006	-0.007	-0.001
18.28	-0.391	-0.156	0.000	0.005	-0.008	-0.001
18.29	-0.391	-0.078	0.000	0.004	-0.008	-0.001
18.30	-0.391	-0.078	0.000	0.003	-0.008	-0.001
18.31	-0.469	-0.078	0.000	0.002	-0.008	-0.001
18.32	-0.469	-0.078	0.000	0.000	-0.008	-0.001
18.33	-0.391	-0.078	0.000	-0.001	-0.008	-0.001
18.34	-0.391	-0.078	0.000	-0.001	-0.008	-0.001
18.35	-0.391	-0.078	0.000	-0.002	-0.008	-0.001

Figure 10.5.3.d.11 Digital data for event 19.2

(-0.313) = baseline which is subtracted for peaks and numerical integration

Yeardate: 81228 Time: 12:47:28.855 M.S.T.

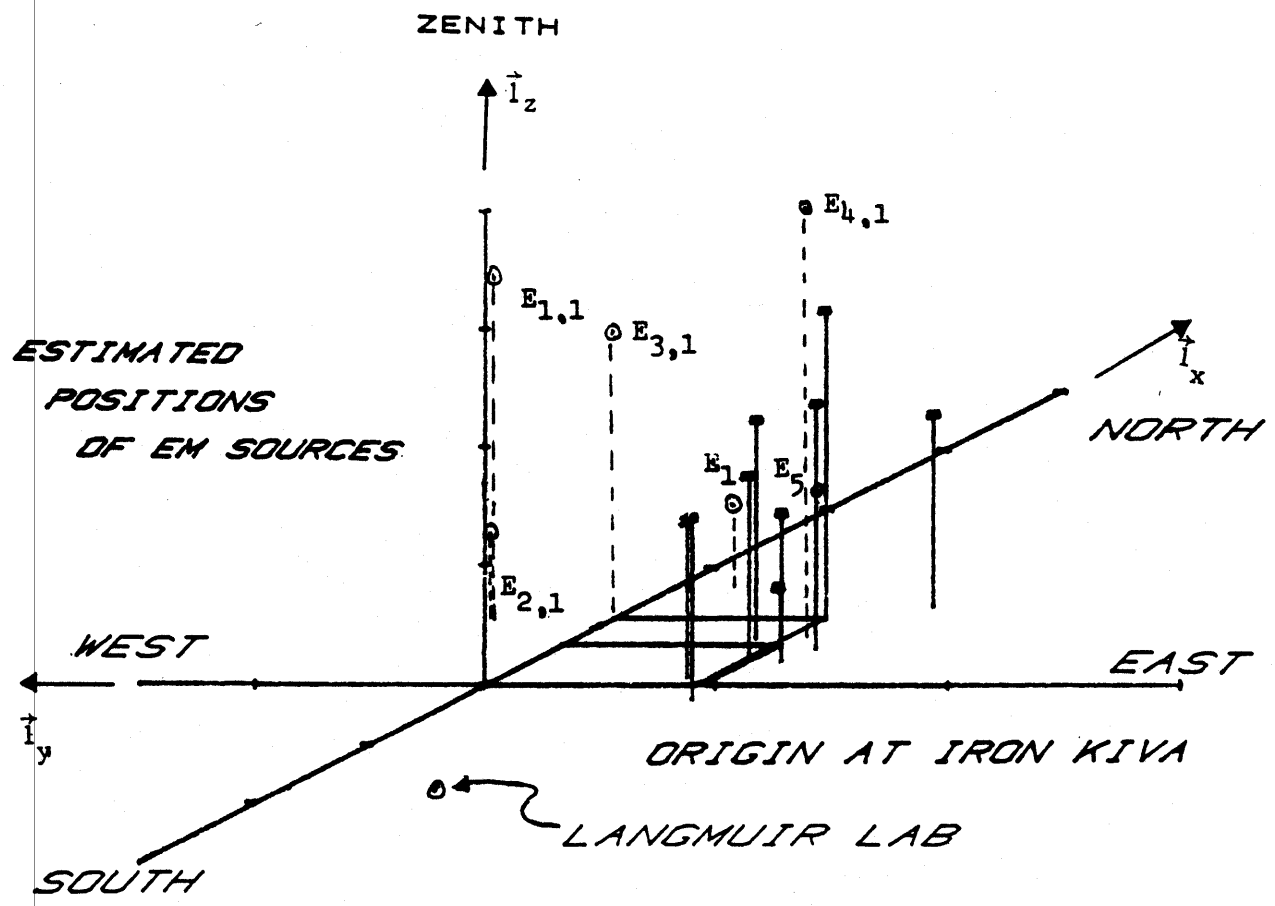
Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
19.01	-0.313	-0.078	0.000	0.000	-0.000	0.000
19.02	-0.313	(-0.078)	0.000	0.000	-0.000	0.000
19.03	-0.313	-0.156	0.000	0.000	-0.001	0.000
19.04	-0.313	-0.156	0.000	0.000	-0.002	0.000
19.05	-0.313	-0.156	0.000	0.000	-0.002	0.000
19.06	(-0.313)	-0.156	0.000	0.000	-0.003	0.000
19.07	-0.234	-0.156	0.000	0.001	-0.004	0.000
19.08	-0.234	-0.078	(0.000)	0.002	-0.004	0.000
19.09	-0.313	-0.078	-0.118	0.002	-0.004	-0.001
19.10	-0.313	-0.078	-0.471	0.002	-0.004	-0.006
19.11	-0.234	-0.078	-0.353	0.002	-0.004	-0.009
19.12	-0.234	-0.078	0.000	0.003	-0.004	-0.009
19.13	-0.234	-0.078	0.236	0.004	-0.004	-0.007
19.14	-0.234	-0.078	0.000	0.005	-0.004	-0.007
19.15	-0.156	-0.078	-0.118	0.006	-0.004	-0.008
19.16	-0.078	-0.078	0.000	0.009	-0.004	-0.008
19.17	-0.234	-0.078	0.000	0.009	-0.004	-0.008
19.18	0.313	-0.078	0.000	0.016	-0.004	-0.008
19.19	-0.625	-0.078	0.000	0.013	-0.004	-0.008
19.20	-0.391	-0.078	0.000	0.012	-0.004	-0.008
19.21	-0.313	-0.078	0.000	0.012	-0.004	-0.008
19.22	-0.313	-0.078	0.000	0.012	-0.004	-0.008
19.23	-0.469	-0.078	0.000	0.010	-0.004	-0.008
19.24	-0.391	-0.078	0.000	0.009	-0.004	-0.008
19.25	-0.391	-0.078	0.000	0.009	-0.004	-0.008
19.26	-0.469	-0.078	0.000	0.007	-0.004	-0.008
19.27	-0.469	-0.078	0.000	0.006	-0.004	-0.008
19.28	-0.391	-0.078	-0.118	0.005	-0.004	-0.009
19.29	-0.391	-0.078	0.000	0.004	-0.004	-0.009
19.30	-0.391	-0.078	-0.118	0.003	-0.004	-0.011
19.31	-0.391	-0.078	0.000	0.002	-0.004	-0.011
19.32	-0.391	-0.078	0.000	0.001	-0.004	-0.011
19.33	-0.313	-0.078	0.000	0.001	-0.004	-0.011
19.34	-0.313	-0.078	0.000	0.001	-0.004	-0.011



horizontal range = 1230 m

Date : 81228 M.S.T. : 12:47:28

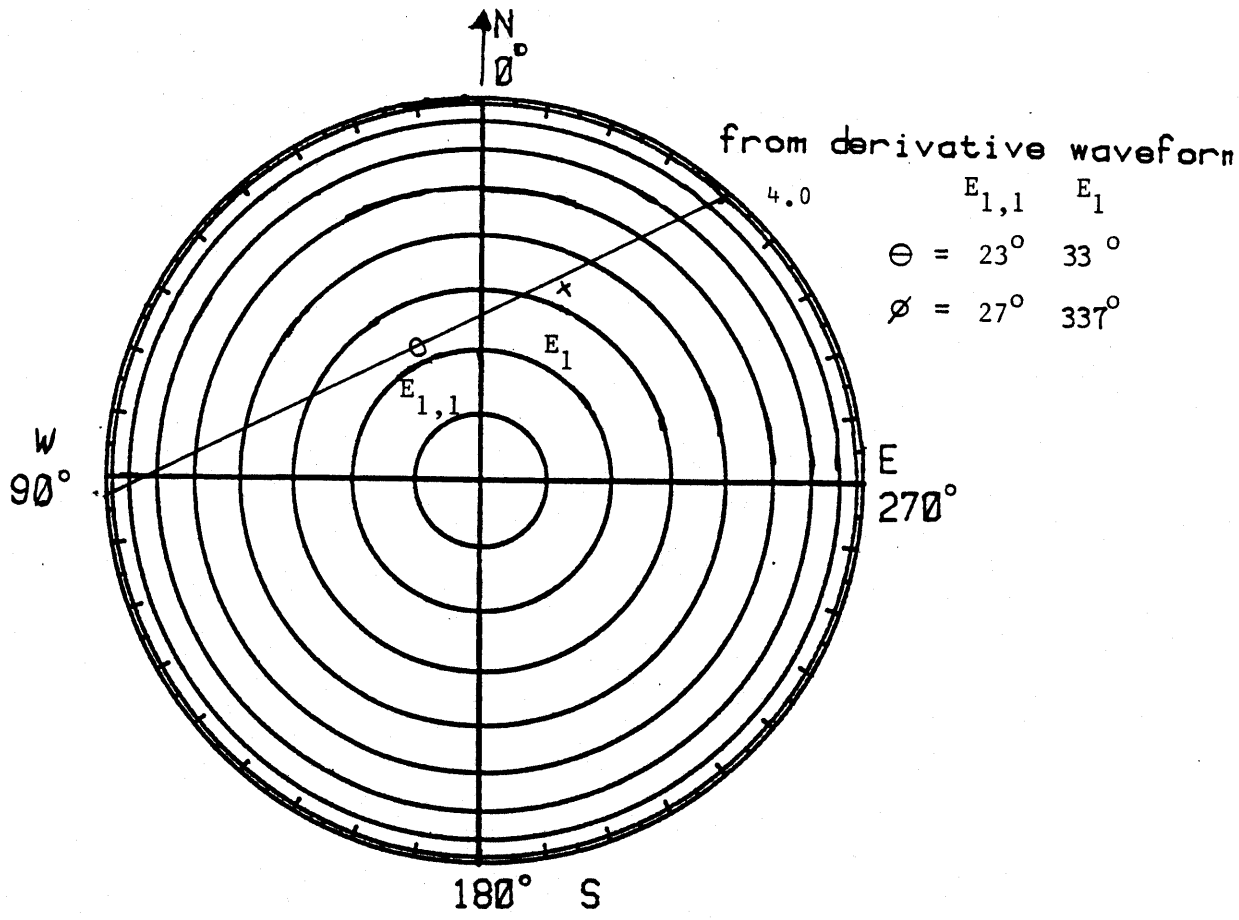
Figure 10.5.4 Slow electric field change and thunder microphone record from distant leader



ticks on axes at 1 km intervals

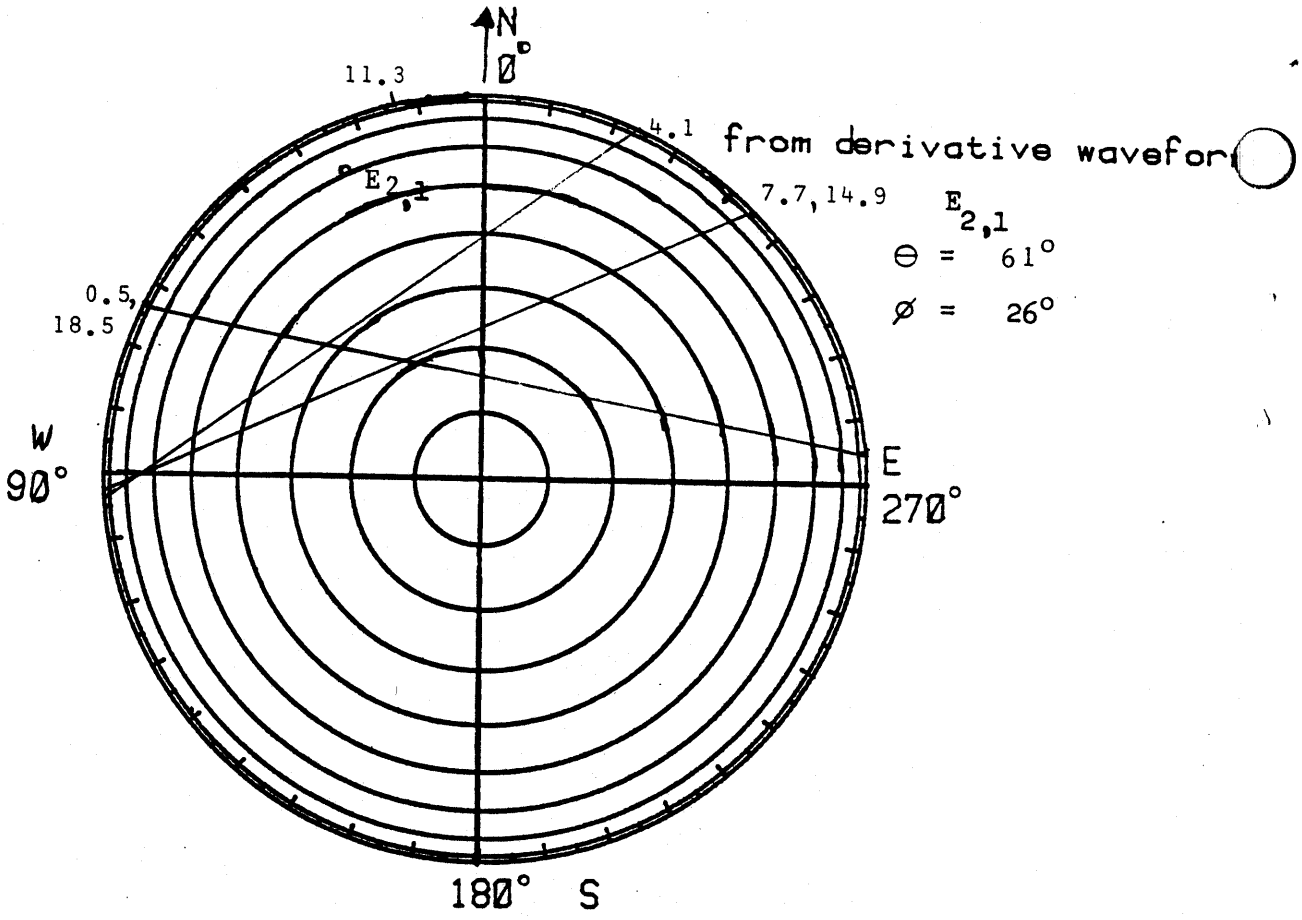
Date : 81228 M.S.T. : 12:47:28

Figure 10.5.5 Acoustic location of distant leader stroke



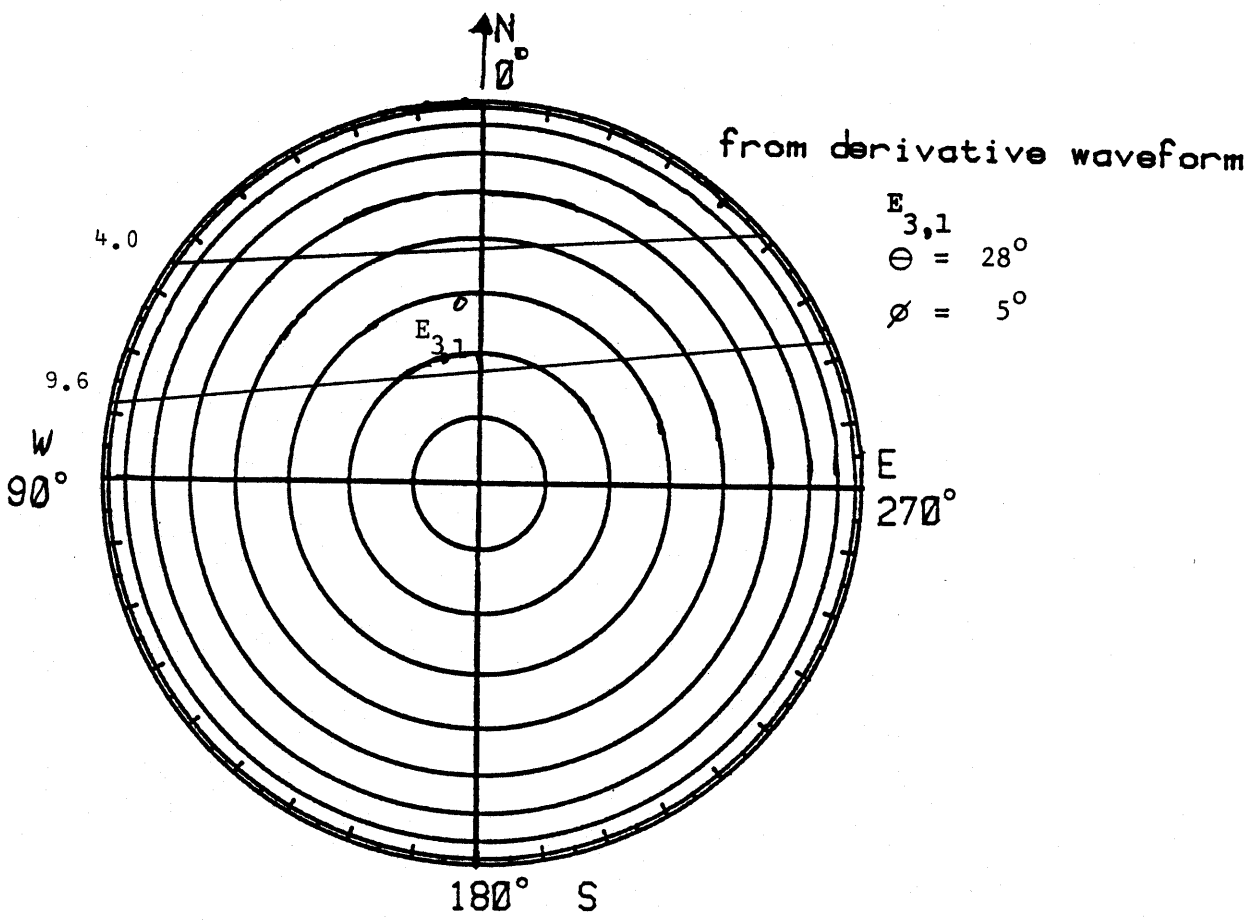
Date : 81228 M.S.T. : 12:47:28.691

Figure 10.5.6.A.1 $\sin(\theta)_{,\phi}$ contours for distant leader derivative waveform



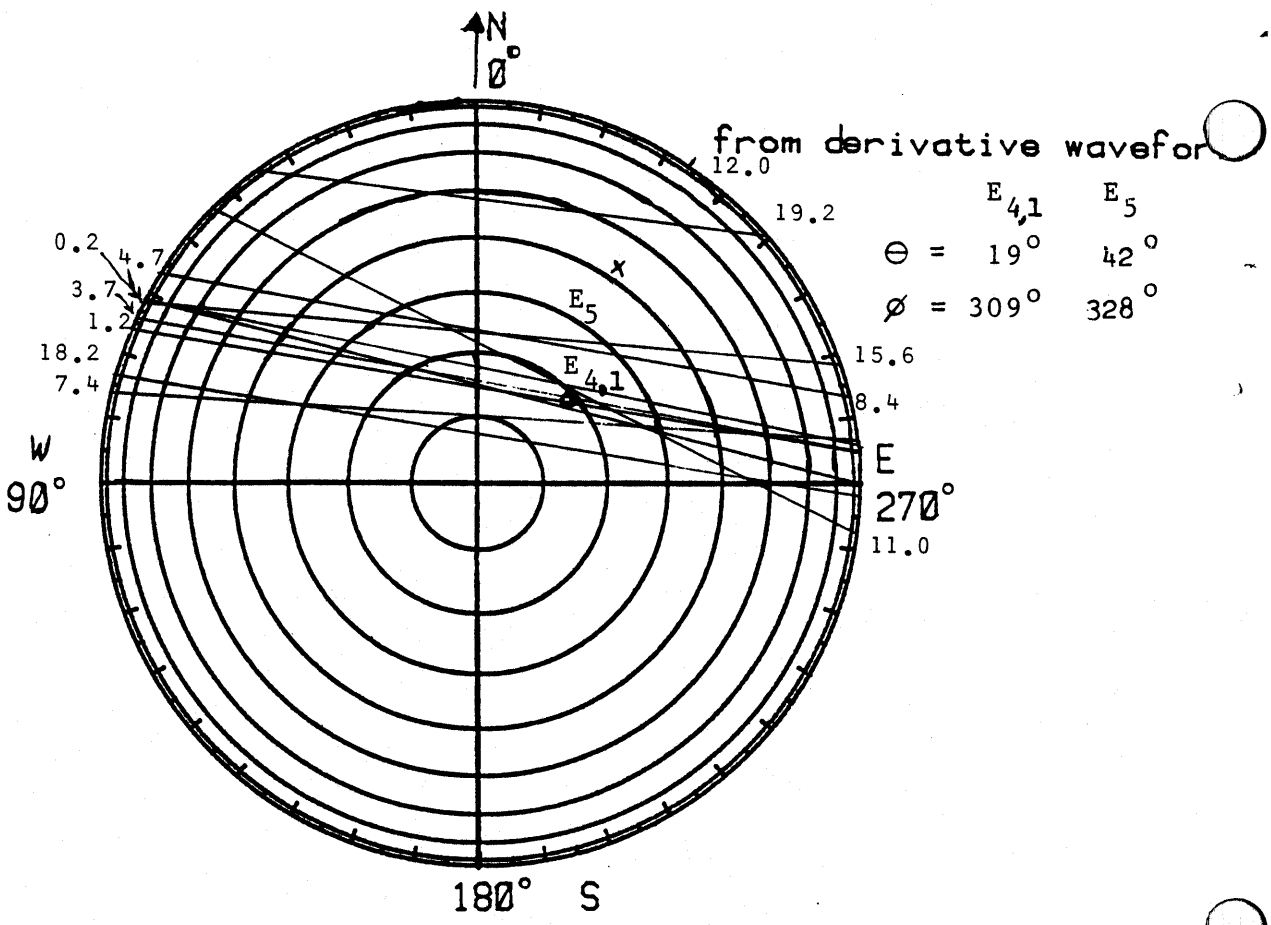
Date : 81228 M.S.T. : 12:47:28.733

Figure 10.5.6.A.2 **sin(θ),ϕ contours for distant leader derivative waveform**



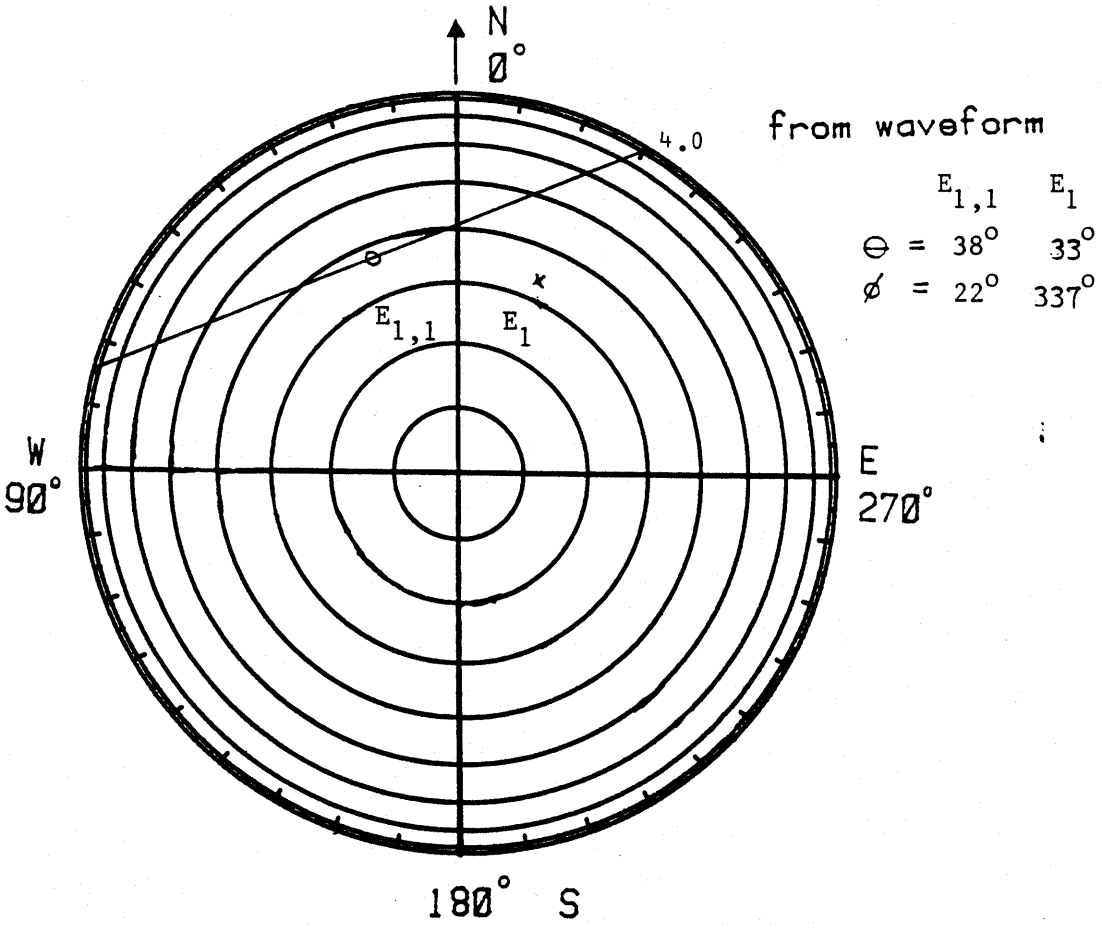
Date : 81228 M.S.T. : 12:47:28.809

Figure 10.5.6.A.3 sin(θ),ϕ contours for distant leader derivative waveform



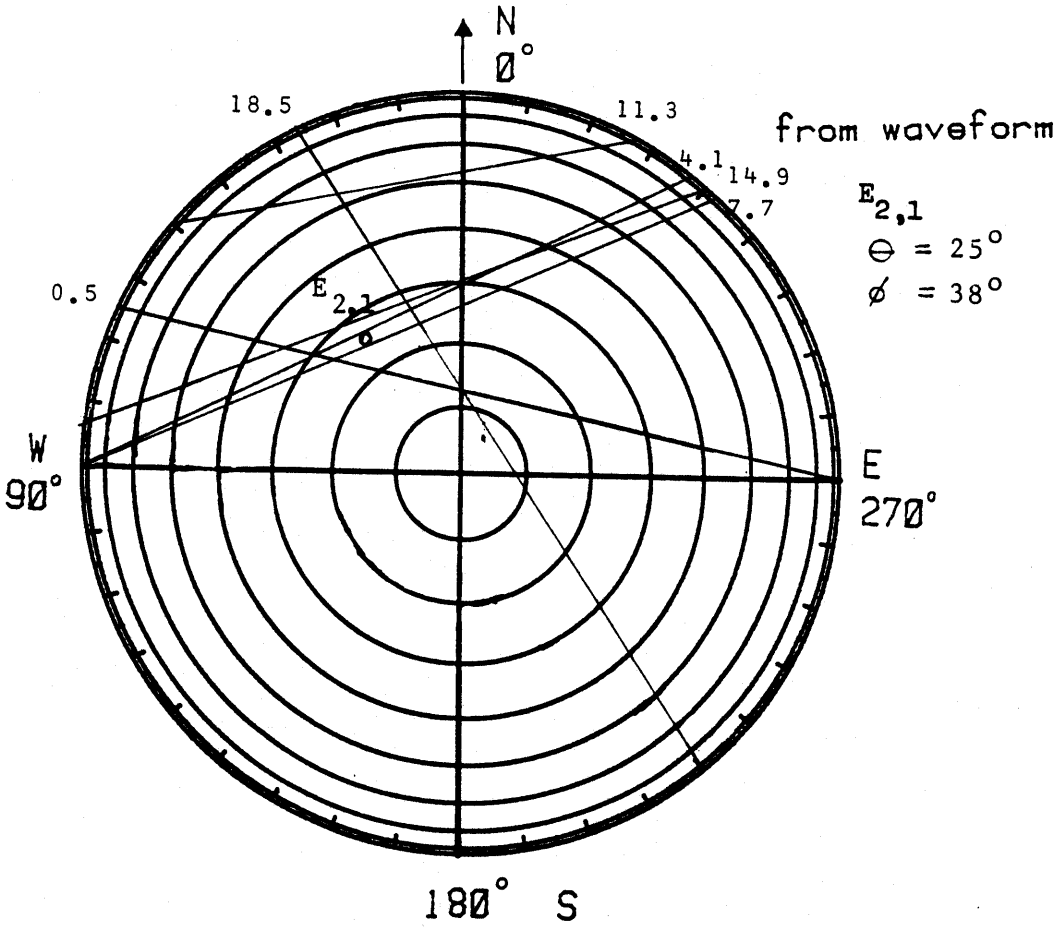
Date : 81228 M.S.T. : 12:47:28.855

Figure 10.5.6.A.4 sin(θ),ϕ contours for distant leader derivative waveform



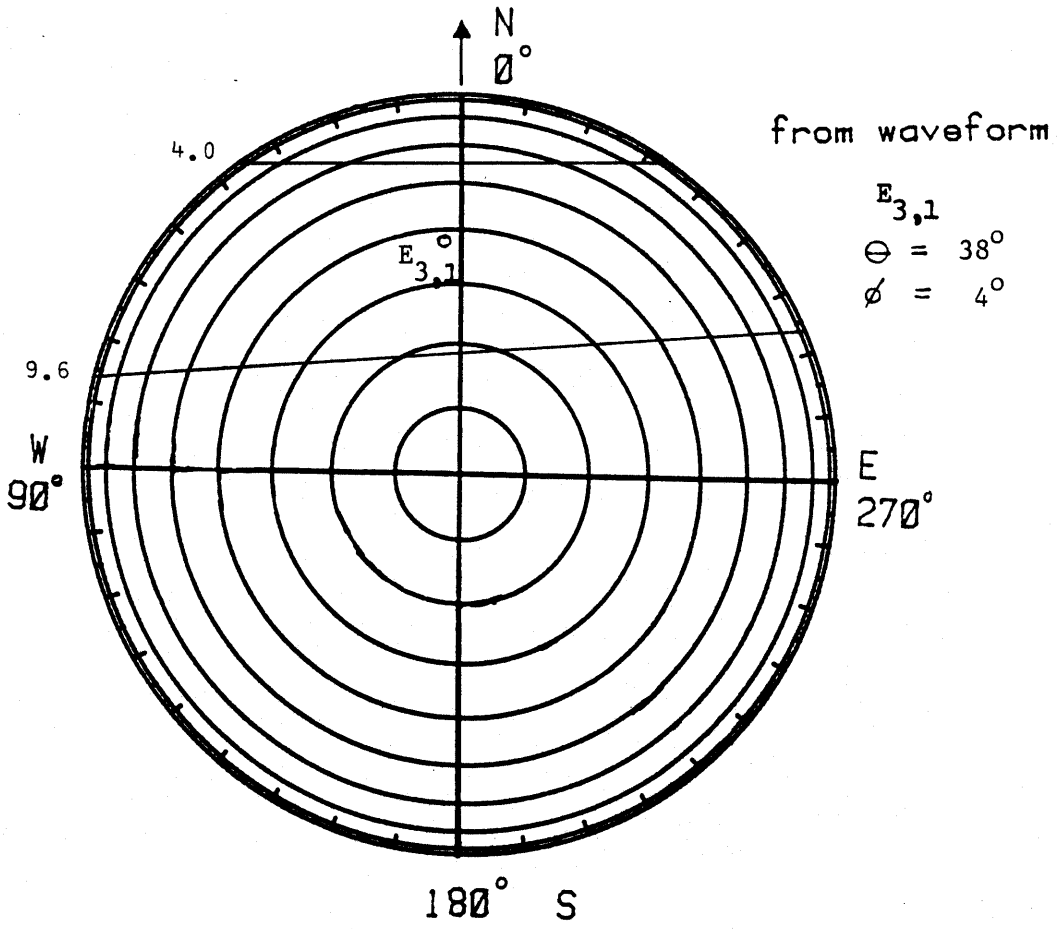
Date : 81228 M.S.T. : 12:47:28.691

Figure 10.5.6.B.1 $\sin(\theta),\phi$ contours for distant leader waveform



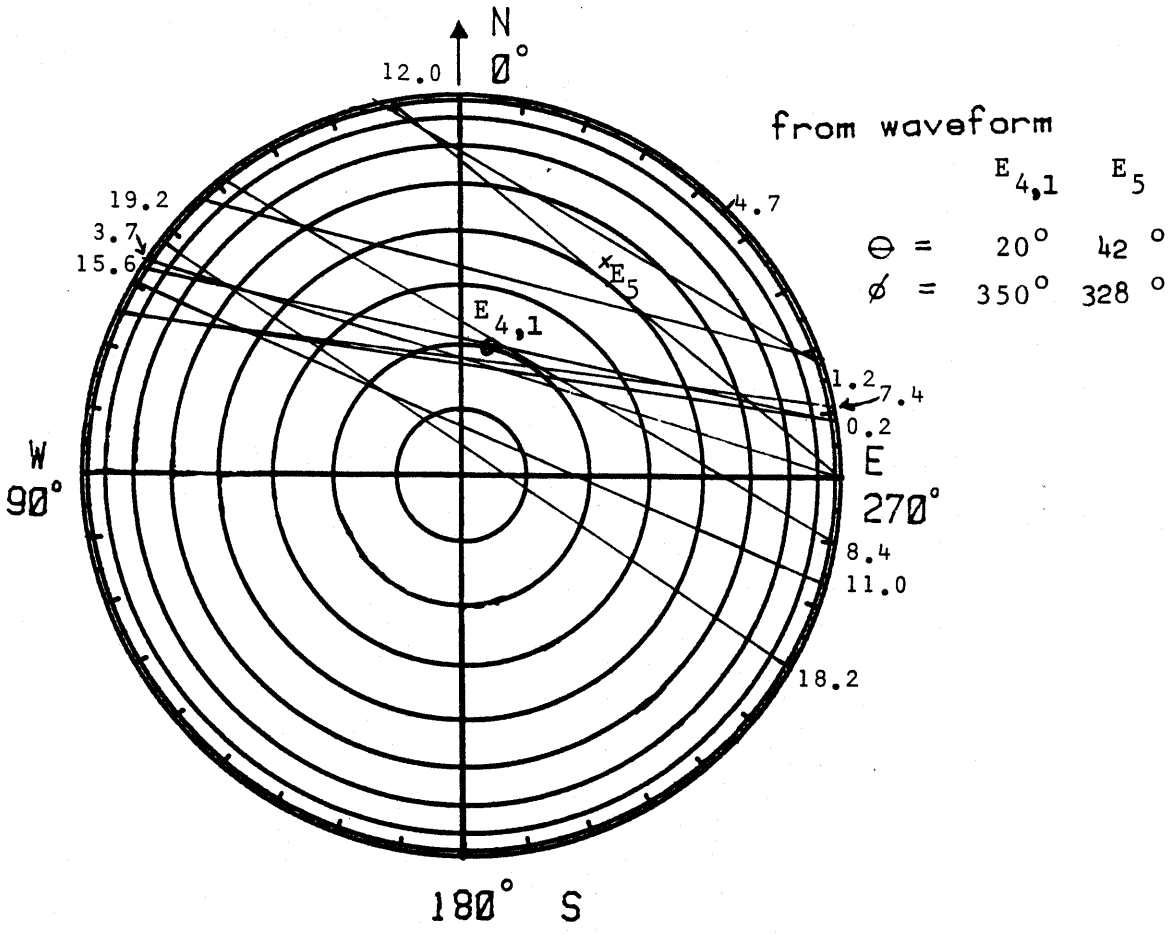
Date : 81228 M.S.T. : 12:47:28.733

Figure 10.5.6.B.2 sin(θ),φ contours for distant leader waveform



Date : 81228 M.S.T. : 12:47:28.809

Figure 10.5.6.B.3 $\sin(\theta)_{,\phi}$ contours for distant leader waveform



Date : 81228 M.S.T. : 12:47:28.855

Figure 10.5.6.B.4 sin(θ),ϕ contours for distant leader waveform

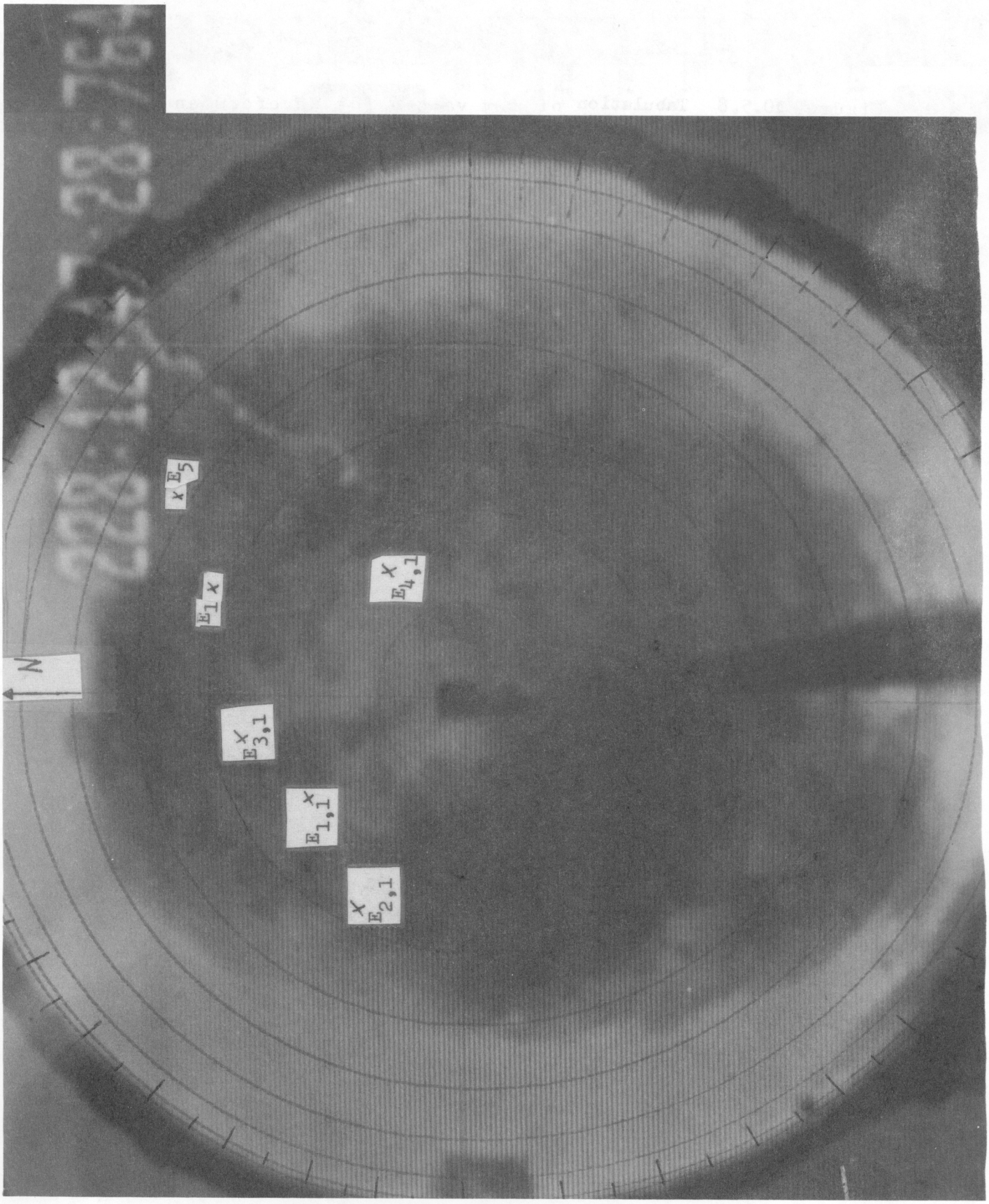


Figure 10.5.7 Whole-sky videotape photograph from Kiva

Figure **10.5.8** **Tabulation** of θ, ϕ values for waveform and TOA solutions with origin at different locations

Yeardate : 81228 M.S.T. : 1247.28

Event		TOA	waveform	r TOA (meters)	r waveform (meters)	TOA origin at Kiva	TOA origin at WSC	waveform origin at WSC
1	θ	31.5°	23°	1130	3148	33.1°	31.3°	22°
	ϕ	336.2°	27°			336.8°	336.5°	32°
2	θ		61°		1406			61°
	ϕ		26°					28°
3	θ		28°		2620			26°
	ϕ		5°					7°
4	θ		19°		3778			17°
	ϕ		309°					305°
5	θ	40.6°		1430		41.9°	40.5°	
	ϕ	327.4°				328.3°	327.6°	

Figure 10.5.9.A.1 Tabulation of peak values for each event from derivative waveform set for distant leader

Yeardate: 81228 M.S.T.:124728.691

ϕ = 27° ; θ = 23° ; r = 3148 m

Event Number	Time (μs)	$Z_o \Delta\partial D_z/\partial t$ (T/s)	$\Delta\partial B_E/\partial t$ (T/s)	$\Delta\partial B_N/\partial t$ (T/s)	$\Delta\partial B_h/\partial t$ (T/s)	$\Delta\partial B_e/\partial t$ (T/s)	$\lvert\Delta\partial\vec{B}/\partial t\rvert$ (T/s)
4.0	4.02	-0.35	0.78	0.39	0.00	-0.44	0.44

CALCULATED VALUES FOR $\partial\vec{T}/\partial t$

Event Number	$\partial T_2/\partial t$ (10^{15} Am/s^2)	$\partial T_3/\partial t$ (10^{15} Am/s^2)	$\lvert\partial\vec{T}/\partial t\rvert$ (10^{15} Am/s^2)	α (deg)
4.0	-32	4124	4124	0

Figure 10.5.9.A.2 Tabulation of peak values for each event from derivative waveform set for distant leader

Yeardate: 81228 M.S.T.:124728.733

ϕ = 61.0°+ 12.6°; θ = 26.0°+ 4.1°; r = 2806 m

Event Number	Time (μs)	$Z_o \Delta\partial D_z/\partial t$ (T/s)	$\Delta\partial B_E/\partial t$ (T/s)	$\Delta\partial B_N/\partial t$ (T/s)	$\Delta\partial B_h/\partial t$ (T/s)	$\Delta\partial B_e/\partial t$ (T/s)	$\lvert\Delta\partial\vec{B}/\partial t\rvert$ (T/s)
0.5	0.51	-0.24	0.86	-0.16	0.46	-0.14	0.48
4.1	4.08	-0.35	0.55	0.39	0.16	-0.30	0.34
7.7	7.71	-0.35	0.86	0.39	0.31	-0.38	0.49
11.3	11.34	-0.35	0.31	0.08	0.13	-0.11	0.17
14.9	14.94	-0.35	0.86	0.39	0.31	-0.38	0.49
18.5	18.52	-0.24	0.86	-0.16	0.46	-0.14	0.48

CALCULATED VALUES FOR $\partial\vec{T}/\partial t$

Event Number	$\partial T_2/\partial t$ (10^{15} Am/s^2)	$\partial T_3/\partial t$ (10^{15} Am/s^2)	$\lvert\partial\vec{T}/\partial t\rvert$ (10^{15} Am/s^2)	α (deg)
0.5	-3876	1181	4052	73
4.1	-1353	2555	2891	28
7.7	-2635	3194	4140	40
11.3	-1105	926	1441	50
14.9	-2635	3194	4140	40
18.5	-3876	1181	4052	73

Figure 10.5.9.A.3 Tabulation of peak values for each event from derivative waveform set for distant leader

Yeardate: 81228 M.S.T.: 124728.809

ϕ = 5° ; θ = 28° ; r = 2620 m

Event Number	Time (μs)	$Z_o \Delta\partial D_z/\partial t$ (T/s)	$\Delta\partial B_E/\partial t$ (T/s)	$\Delta\partial B_N/\partial t$ (T/s)	$\Delta\partial B_h/\partial t$ (T/s)	$\Delta\partial B_e/\partial t$ (T/s)	$\lvert\Delta\partial\vec{B}/\partial t\rvert$ (T/s)
4.0	4.00	-0.83	1.33	0.08	0.02	-0.66	0.67
9.6	9.60	-0.24	0.78	0.08	-0.01	-0.39	0.39

CALCULATED VALUES FOR $\partial\vec{T}/\partial t$

Event Number	$\partial T_2/\partial t$ (10^{15} Am/s^2)	$\partial T_3/\partial t$ (10^{15} Am/s^2)	$\lvert\partial\vec{T}/\partial t\rvert$ (10^{15} Am/s^2)	α (deg)
4.0	-169	5226	5229	2
9.6	43	3084	3085	359

Figure 10.5.9.A.4 Tabulation of peak values for each event from derivative waveform set for distant leader

Yeardate: 81228 M.S.T.: 124728.855

$\phi = 309.0^{\circ} + 6.2^{\circ}$; $\theta = 19.0^{\circ} + 5.8^{\circ}$; r = 3778 m

Event Number	Time (μs)	$Z_o \Delta \partial D_z/\partial t$ (T/s)	$\Delta \partial B_E/\partial t$ (T/s)	$\Delta \partial B_N/\partial t$ (T/s)	$\Delta \partial B_h/\partial t$ (T/s)	$\Delta \partial B_e/\partial t$ (T/s)	$\lvert \Delta \partial \vec{B}/\partial t \rvert$ (T/s)
0.2	0.16	-0.24	0.94	-0.24	-0.31	-0.39	0.49
1.2	1.16	-0.12	0.47	-0.08	-0.17	-0.18	0.24
3.7	3.73	-0.24	0.86	-0.16	-0.30	-0.33	0.45
4.7	4.74	-0.12	0.39	-0.08	-0.13	-0.15	0.20
7.4	7.38	-0.24	1.33	-0.08	-0.52	-0.45	0.69
8.4	8.37	-0.35	0.86	-0.16	-0.30	-0.33	0.45
11.0	11.00	-0.12	0.31	-0.16	-0.08	-0.16	0.18
12.0	11.98	-0.71	0.24	-0.16	-0.04	-0.13	0.14
15.6	15.60	-0.35	0.86	-0.08	-0.33	-0.30	0.44
18.2	18.21	-0.12	0.94	-0.16	-0.33	-0.36	0.49
19.2	19.18	-0.47	0.63	-0.08	-0.23	-0.23	0.32

CALCULATED VALUES FOR $\partial \vec{T}/\partial t$

Event Number	$\partial T_2/\partial t$ (10^{15} Am/s^2)	$\partial T_3/\partial t$ (10^{15} Am/s^2)	$\lvert \partial \vec{T}/\partial t \rvert$ (10^{15} Am/s^2)	α (deg)
0.2	3483	380	5596	322
1.2	1886	-013	2758	317
3.7	3417	3754	5077	318
4.7	1522	1734	2308	319
7.4	5896	5083	7785	311
8.4	3417	3754	5077	318
11.0	870	1803	2002	334
12.0	506	1525	1607	342
15.6	3712	3411	5041	313
18.2	3781	4032	5527	317
19.2	2622	2576	3675	314

Figure **10.5.9.B.1** Tabulation of peak values for each event from waveform set for distant leader

Yeardate: 81228 M.S.T.:124728.691

ϕ = 22° , θ = 38° ; r =1998 m

Event Number	Time (μs)	$Z_o \Delta D_z$ (μT)	ΔB_E (μT)	ΔB_N (μT)	ΔB_h (μT)	ΔB_e (μT)	$\lvert\Delta\vec{B}\rvert$ (μT)
4.0	4.02	-0.02	0.03	0.01	0.00	-0.02	0.02

CALCULATED VALUES FOR $\vec{I}_t . \vec{T}$

Event Number	T_2 (10^9 Am/s)	T_3 (10^9 Am/s)	$\lvert\vec{T}\rvert$ (10^9 Am/s)	α (deg)
4.0	-0	97	97	0

Figure **10.5.9.B.2** Tabulation of peak values for each event from waveform set for distant leader

Yeardate: 81228 M.S.T.: 124728.733

ϕ = 38.0°+ 14.5°; θ = 25.0°+ 0.9°; r = 2910 m

Event Number	Time (μs)	$Z_o \Delta D_z$ (μT)	ΔB_E (μT)	ΔB_N (μT)	ΔB_h (μT)	ΔB_e (μT)	$\lvert\Delta\vec{B}\rvert$ (μT)
0.5	0.51	-0.00	0.01	-0.00	0.00	-0.00	0.00
4.1	4.08	-0.00	0.01	0.00	0.00	-0.00	0.00
7.7	7.71	-0.00	0.01	0.00	0.00	-0.00	0.00
11.3	11.34	-0.00	0.01	0.00	0.00	-0.00	0.00
14.9	14.94	-0.01	0.01	0.00	0.00	-0.01	0.01
18.5	18.52	-0.00	0.01	-0.01	0.01	0.00	0.01

CALCULATED VALUES FOR $\vec{I}_t . \vec{T}$

Event Number	T_2 (10^9 Am/s)	T_3 (10^9 Am/s)	$\lvert\vec{T}\rvert$ (10^9 Am/s)	α (deg)
0.5	-34	26	43	53
4.1	-9	38	39	13
7.7	-12	42	43	15
11.3	-11	20	23	29
14.9	-14	45	47	18
18.5	-80	-7	80	95

Figure **10.5.9.B.3** Tabulation of peak values for each event from waveform set for distant leader

Yeardate: 81228 M.S.T.:124728.809

ϕ = 4° ; θ = 38° ; r = 1993 m

Event Number	Time (μs)	$Z_o \Delta D_z$ (μT)	ΔB_E (μT)	ΔB_N (μT)	ΔB_h (μT)	ΔB_e (μT)	$\lvert\Delta\vec{B}\rvert$ (μT)
4.0	4.00	-0.05	0.06	0.00	0.00	-0.03	0.03
9.6	9.64	-0.01	0.03	0.00	-0.00	-0.02	0.02

CALCULATED VALUES FOR $\vec{I}_t \cdot \vec{T}$

Event Number	T_2 (10^9 Am/s)	T_3 (10^9 Am/s)	$\lvert\vec{T}\rvert$ (10^9 Am/s)	α (deg)
4.0	-8	174	174	3
9.6	2	102	102	359

Figure 10.5.9.B.4 Tabulation of peak values for each event from waveform set for distant leader

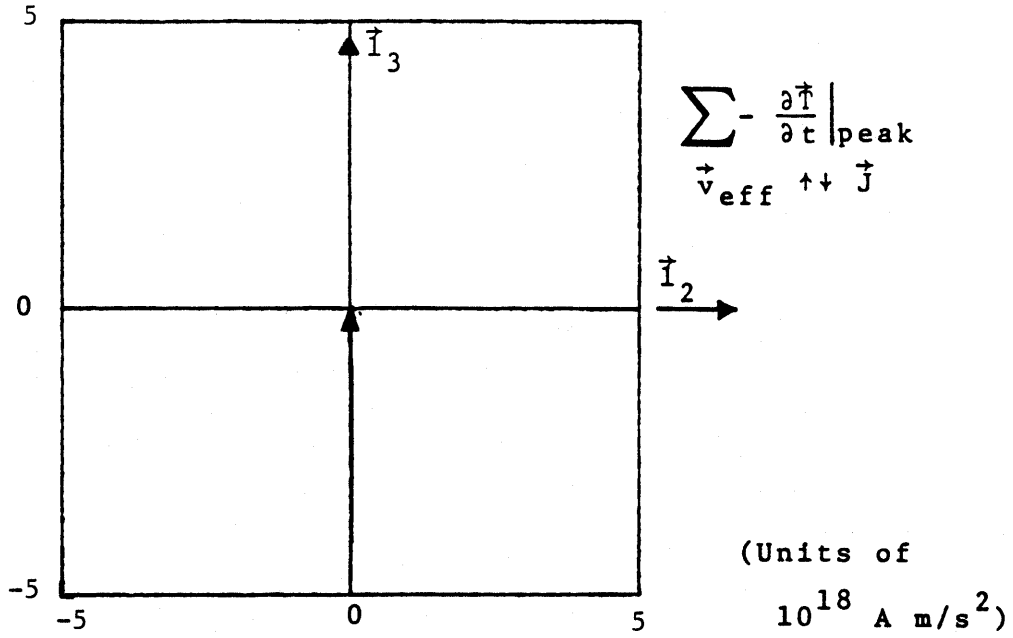
Yeardate: 81228 M.S.T.: 124728.855

$\phi = 350.0^{o} + 16.1^{o}$; $\theta = 20.0^{o} + 3.2^{o}$; r = 3596 m

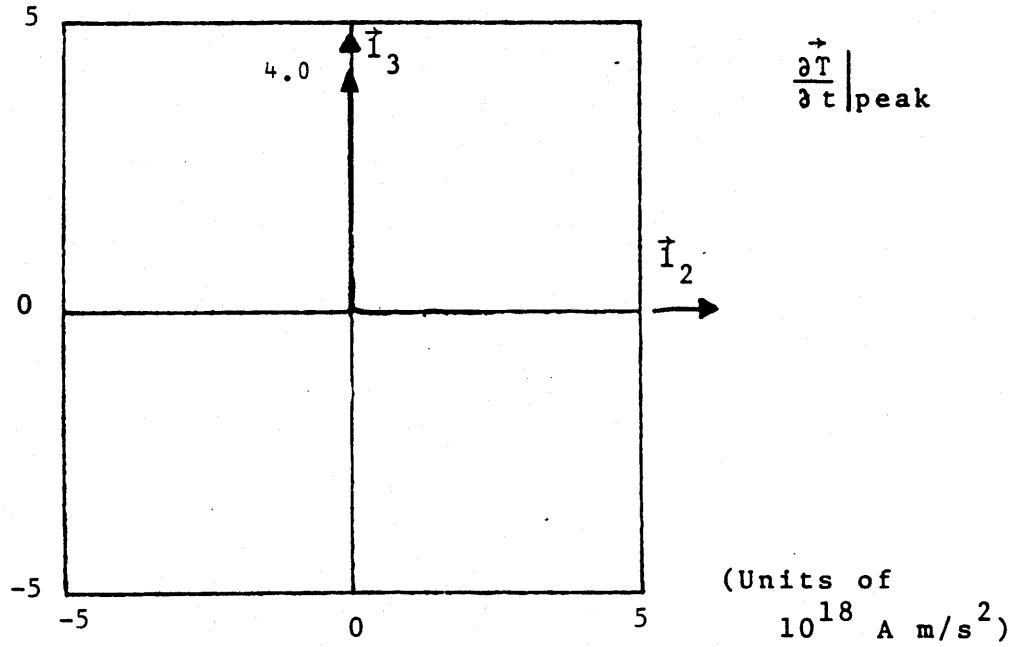
Event Number	Time (μs)	$Z_o \Delta D_z$ (μT)	ΔB_E (μT)	ΔB_N (μT)	ΔB_h (μT)	ΔB_e (μT)	$\lvert\Delta\vec{B}\rvert$ (μT)
0.2	0.16	-0.00	0.01	-0.00	-0.00	-0.01	0.01
1.2	1.16	-0.01	0.01	-0.00	0.00	-0.00	0.00
3.7	3.74	-0.00	0.01	-0.00	0.00	-0.01	0.01
4.7	4.74	-0.01	0.00	-0.00	0.00	-0.00	0.00
7.4	7.39	-0.01	0.02	-0.00	-0.00	-0.01	0.01
8.4	8.37	-0.01	0.02	-0.01	0.00	-0.01	0.01
11.0	11.00	-0.00	0.01	-0.00	0.00	-0.00	0.00
12.0	11.98	-0.01	0.01	-0.01	0.00	-0.01	0.01
15.6	15.60	-0.01	0.02	-0.00	0.00	-0.01	0.01
18.2	18.21	-0.00	0.01	-0.01	0.00	-0.01	0.01
19.2	19.18	-0.01	0.02	-0.00	0.00	-0.01	0.01

CALCULATED VALUES FOR $\vec{I}_t . \hat{T}$

Event Number	T_2 (10^9 Am/s)	T_3 (10^9 Am/s)	$\lvert\vec{T}\rvert$ (10^9 Am/s)	α (deg)
0.2	2	71	71	359
1.2	-16	41	44	21
3.7	-10	73	73	8
4.7	-19	25	31	37
7.4	5	87	87	357
8.4	-40	100	107	22
11.0	-10	40	41	14
12.0	-49	79	93	32
15.6	-4	105	105	2
18.2	-33	71	79	25
19.2	-7	89	89	4



Effective reconstruction of negative streamer



Peaks of $\partial \vec{T}/\partial t$

$\phi = 27^{\circ}$ $\theta = 23^{\circ}$ r = 3148 m

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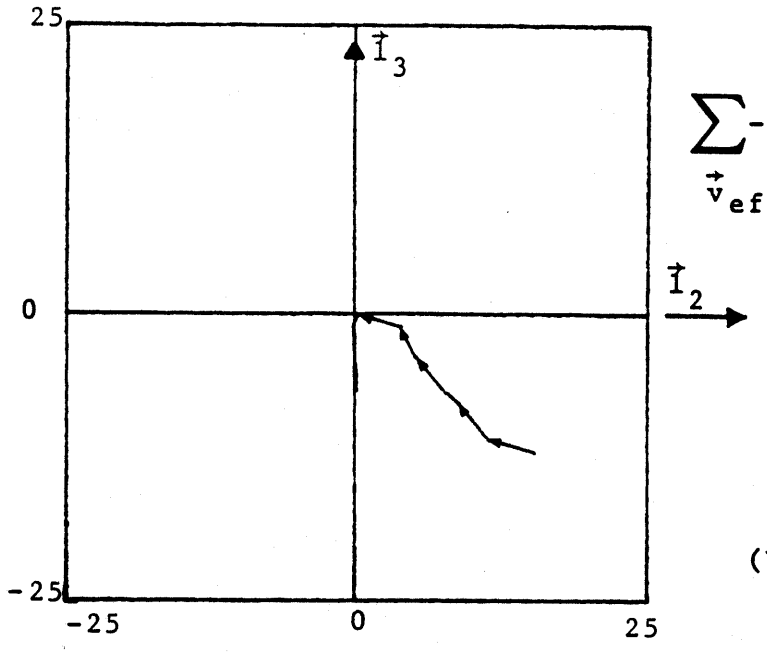
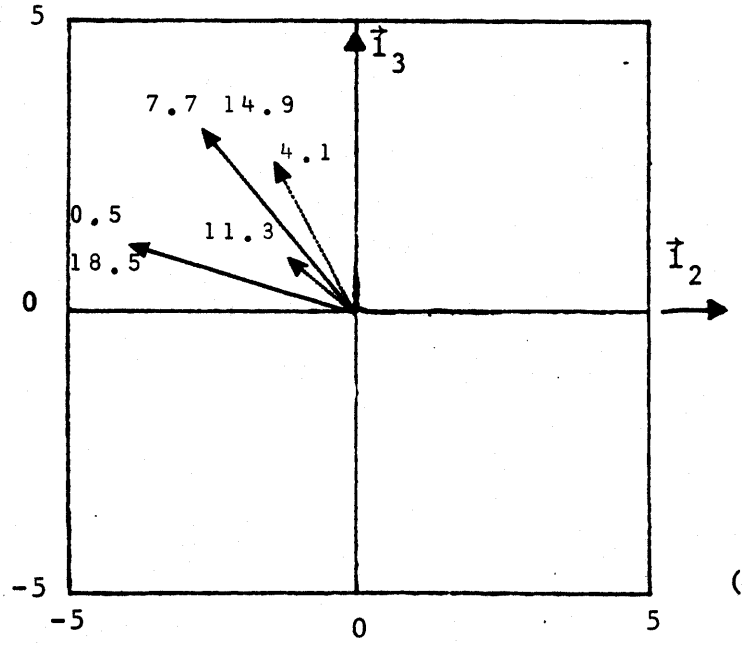
Figure 10.5.10.A.1 $\partial \vec{T}/\partial t$ for distant leader



Effective reconstruction of negative streamer



Peaks of $\partial\vec{T}/\partial t$

ϕ = 61° θ = 26° r = 2806 m

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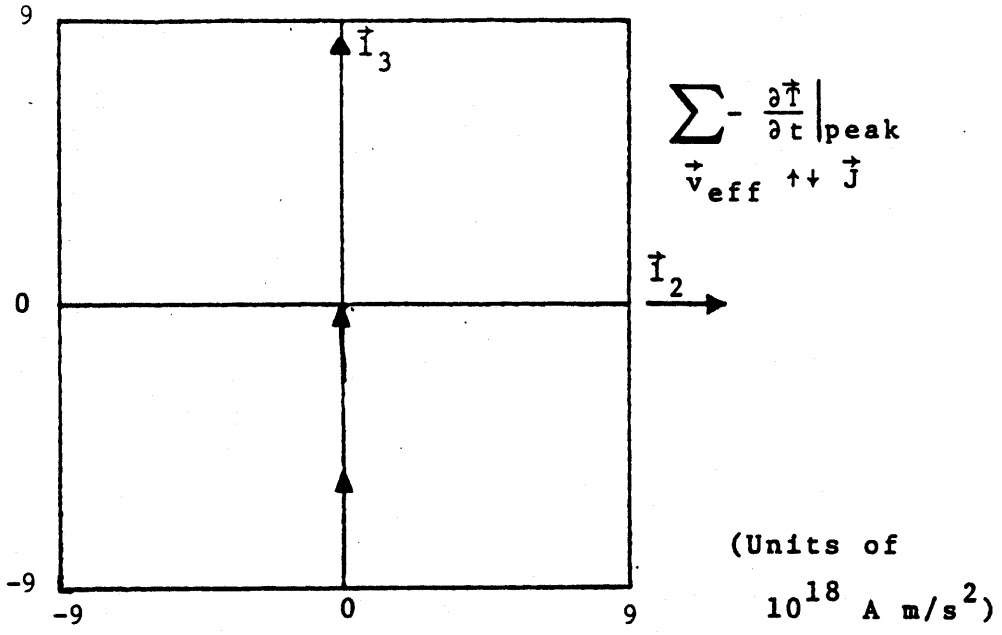
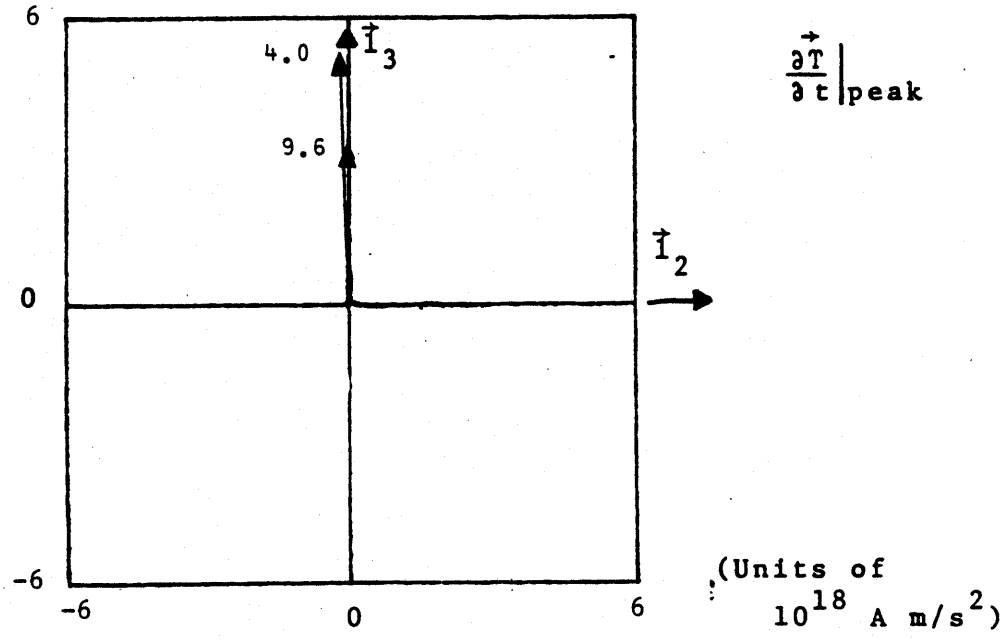
Figure 10.5.10.A.2 $\partial\vec{T}/\partial t$ for distant leader



Effective reconstruction of negative streamer.



Peaks of $\partial\vec{T}/\partial t$

$\phi = 5^o$ $\theta = 28^o$ r = 2620 m

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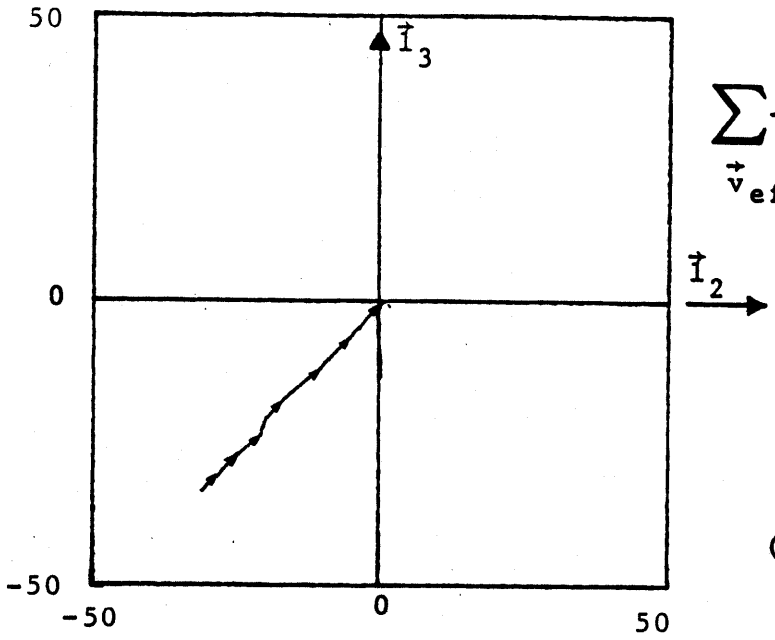
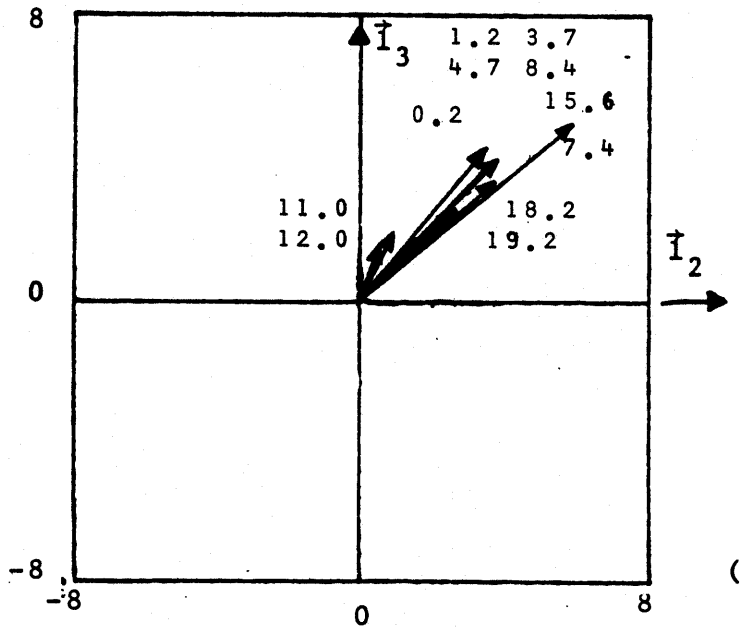
Figure 10.5.10.A.3 $\partial\vec{T}/\partial t$ for distant leader



Effective reconstruction of negative streamer



Peaks of $\partial \vec{T}/\partial t$

$\phi = 309^\circ$ $\theta = 19^\circ$ r = 3778 m

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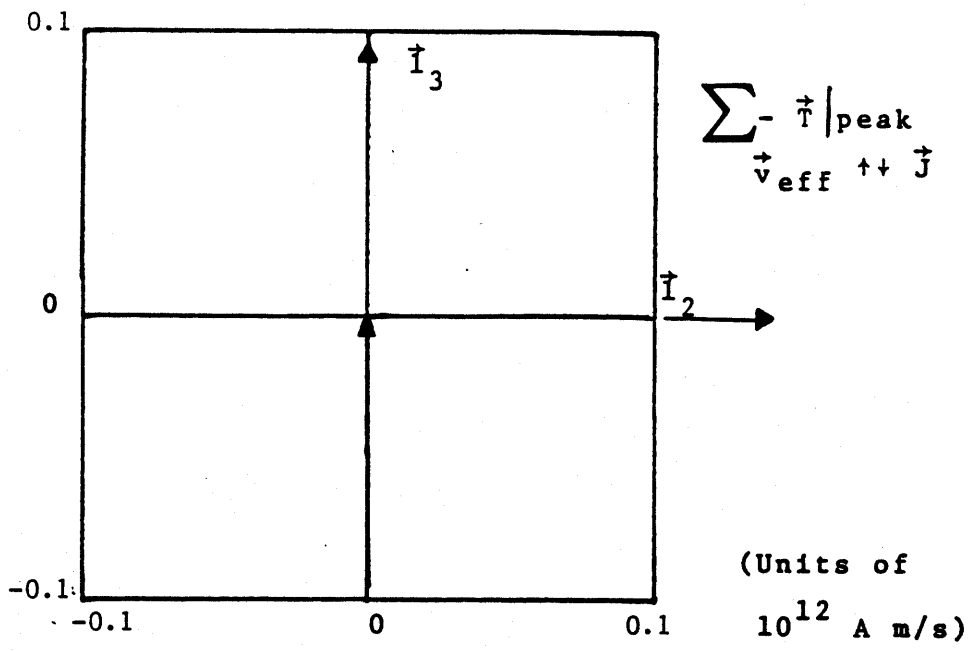
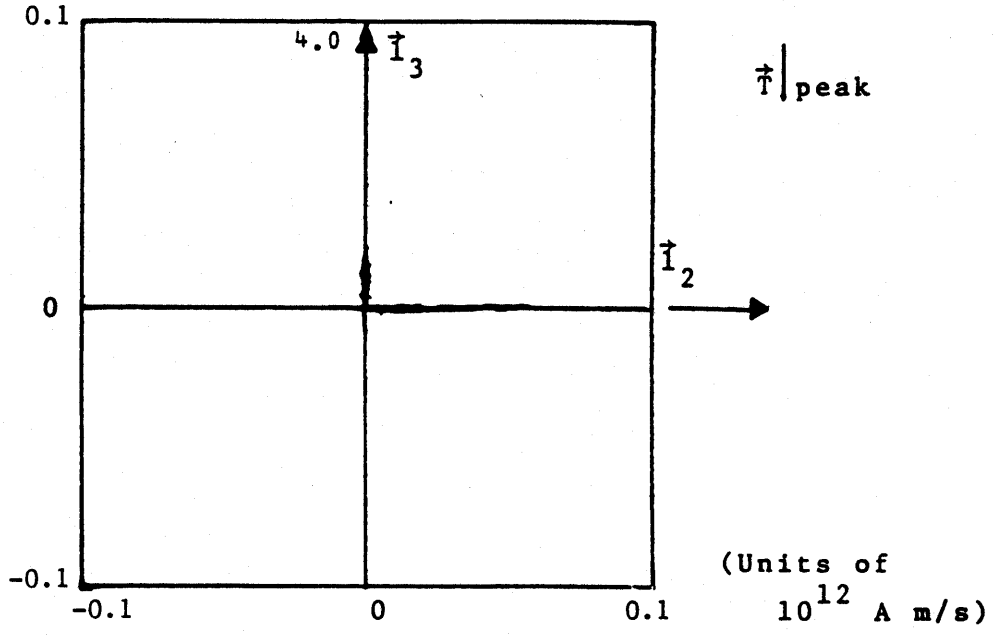
Figure 10.5.10.A.4 $\partial \vec{T}/\partial t$ for distant leader



Effective reconstruction of negative streamer



Peaks of $\vec{T}$

ϕ = 22° θ = 38° r = 1998 m

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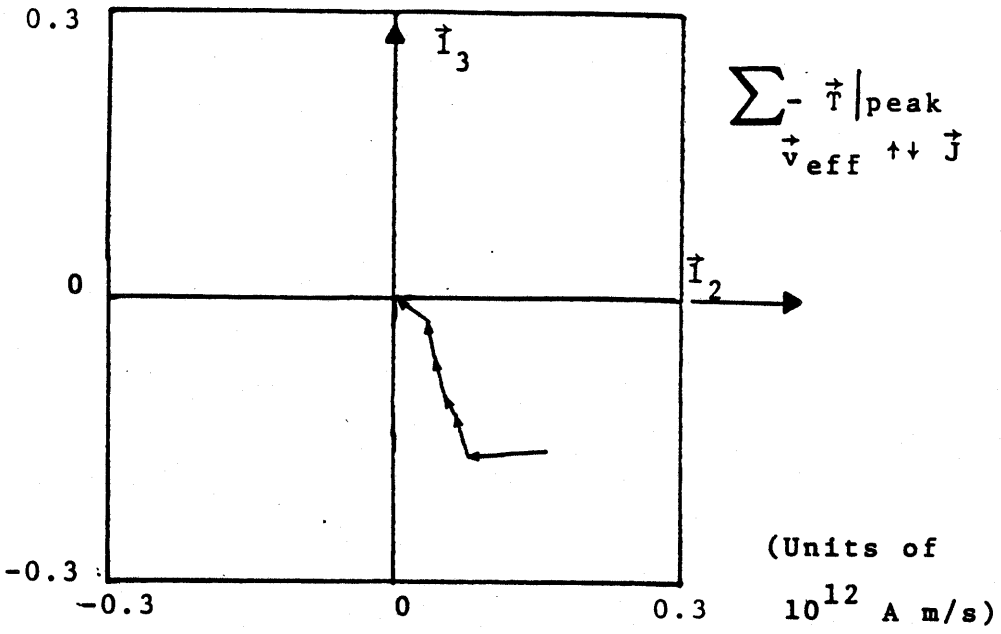
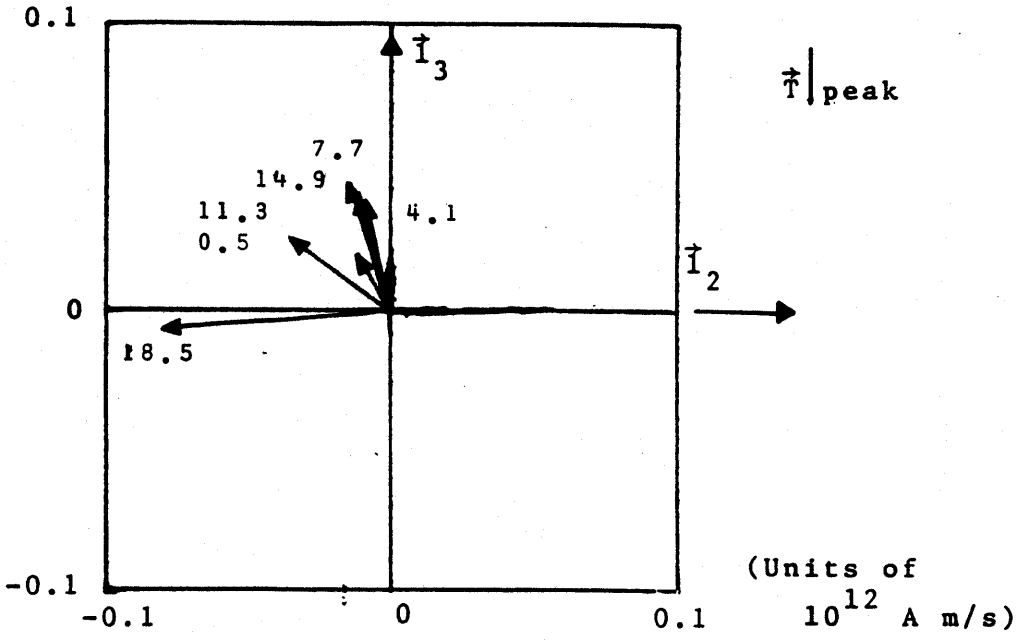
Figure 10.5.10.B.1 $\vec{T}$ for distant leader



Effective reconstruction of negative streamer



Peaks of $\vec{T}$

$\phi = 38^{\circ}$ $\theta = 25^{\circ}$ r = 2910 m

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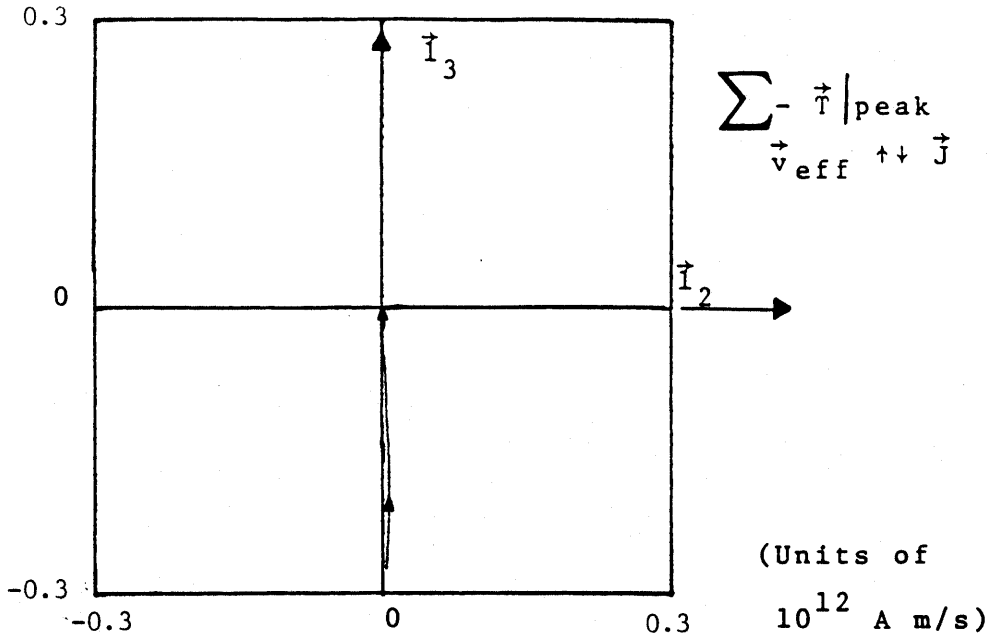
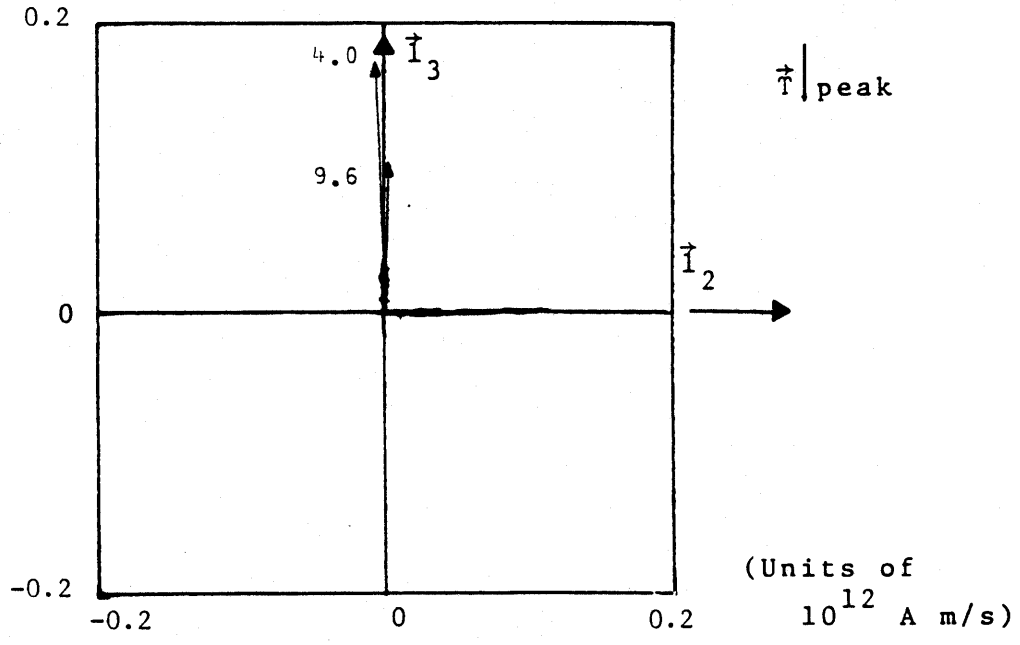
Figure 10.5.10.B.2 $\vec{T}$ for distant leader



Effective reconstruction of negative streamer



Peaks of $\vec{T}$

ϕ = 4^{o} θ = 38^{o} r = 1998 m

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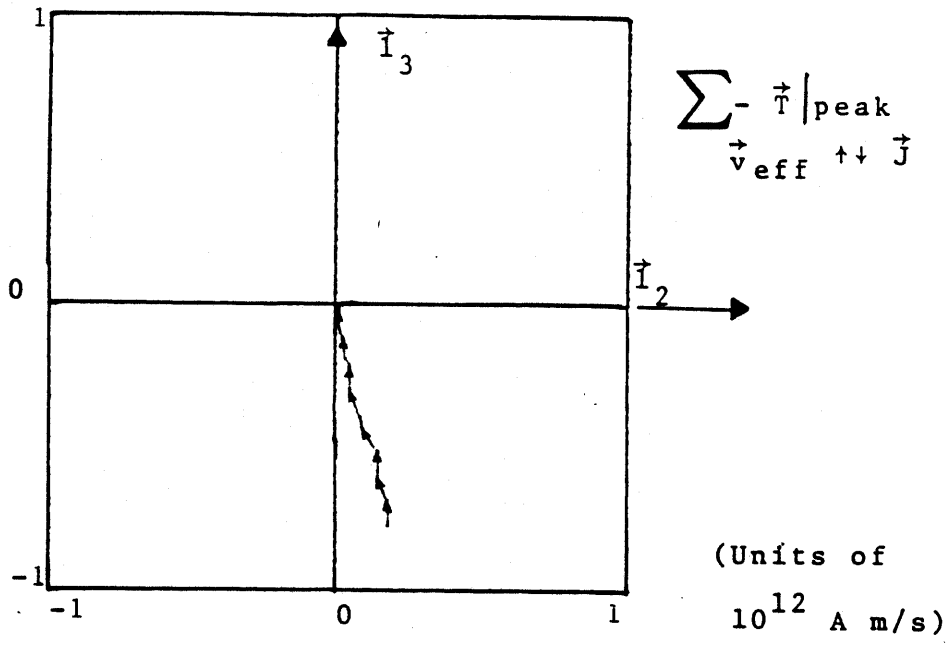
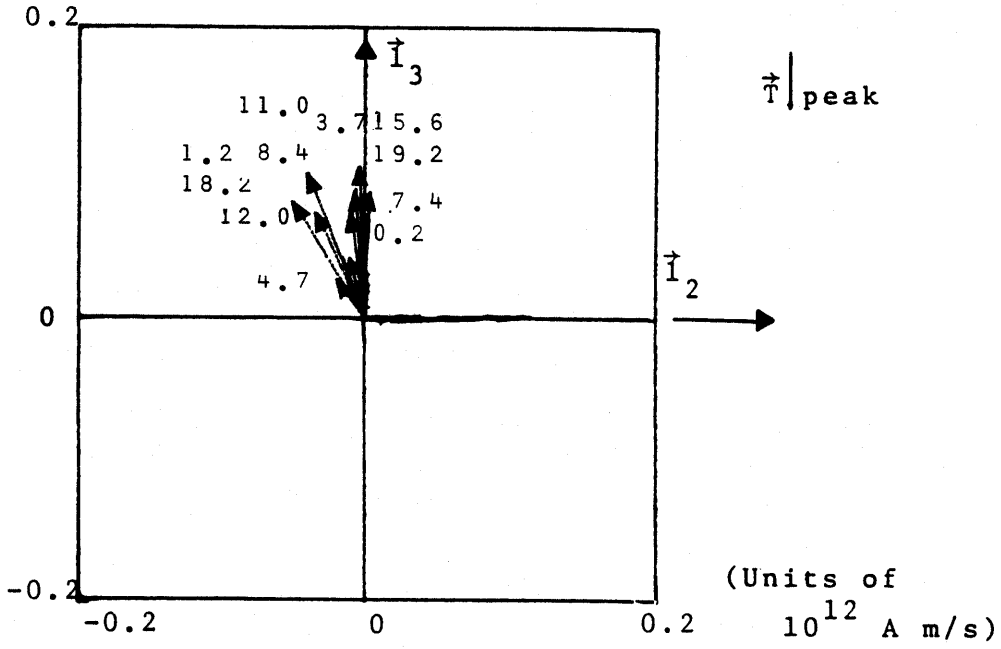
Figure 10.5.10.B.3 $\vec{T}$ for distant leader



Effective reconstruction of negative streamer



Peaks of $\vec{T}$

$\phi = 350^{\circ}$ $\theta = 20^{\circ}$ r = 3596 m

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Figure 10.5.10.B.4 $\vec{T}$ for distant leader

10.6 ROCKET TRIGGERED LIGHTNING

A sequence of leader, return stroke, return stroke, return stroke is seen in the four waveform events from this example of rocket triggered lightning. One TOA event is associated with this flash.

No Biomation trigger marks were recorded. The horizontal range of 376 m seems somewhat small. The electromagnetic sources plotted by the acoustic sources cluster near the rocket launch point. The source locations plotted on the video photograph vary somewhat from the lightning channel.

For this case the waveform method may have the zenith angle more accurate because of inaccuracies with the TOA method near the horizon.

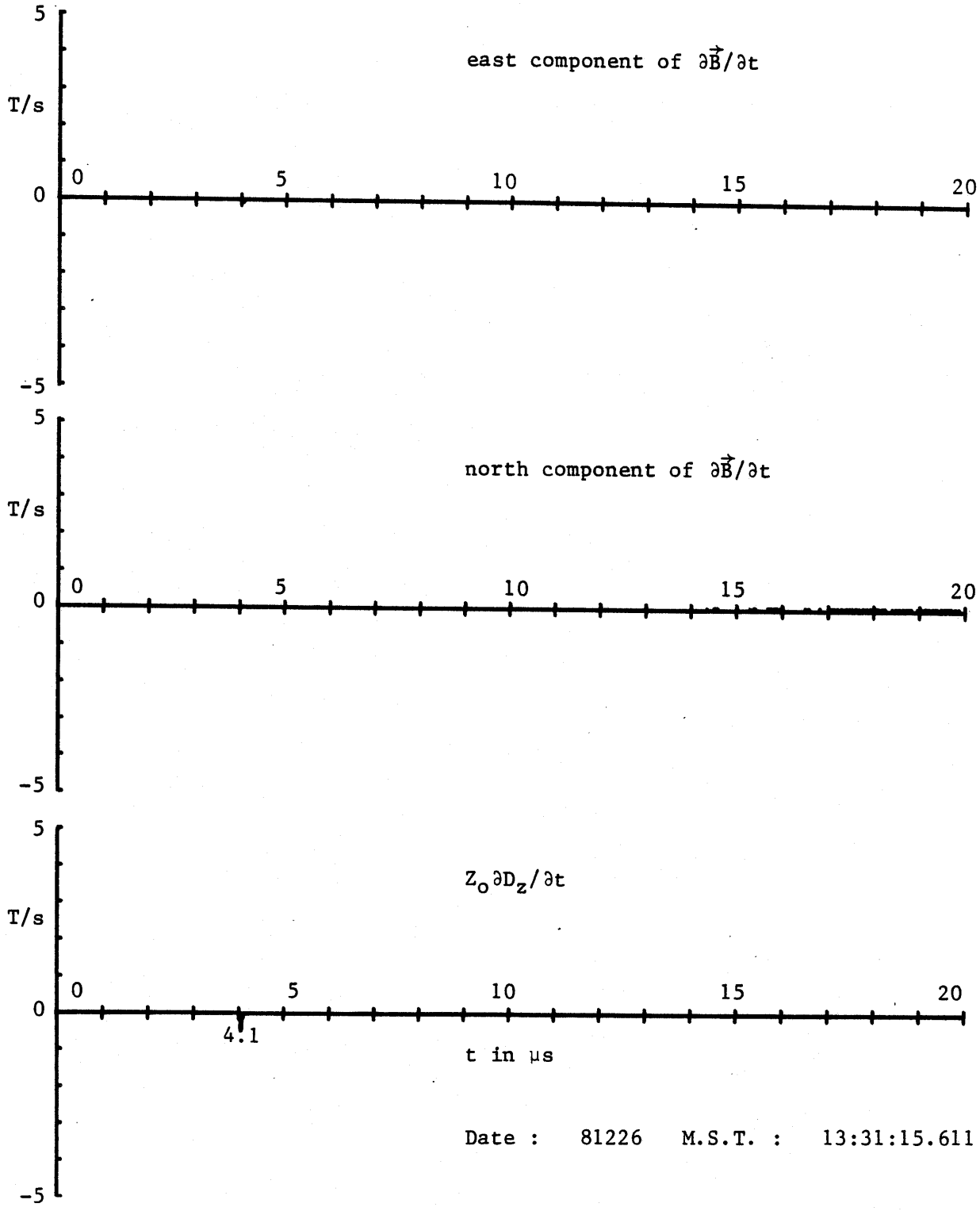


Figure 10.6.1.A.1 Derivative fields from rocket triggered lightning

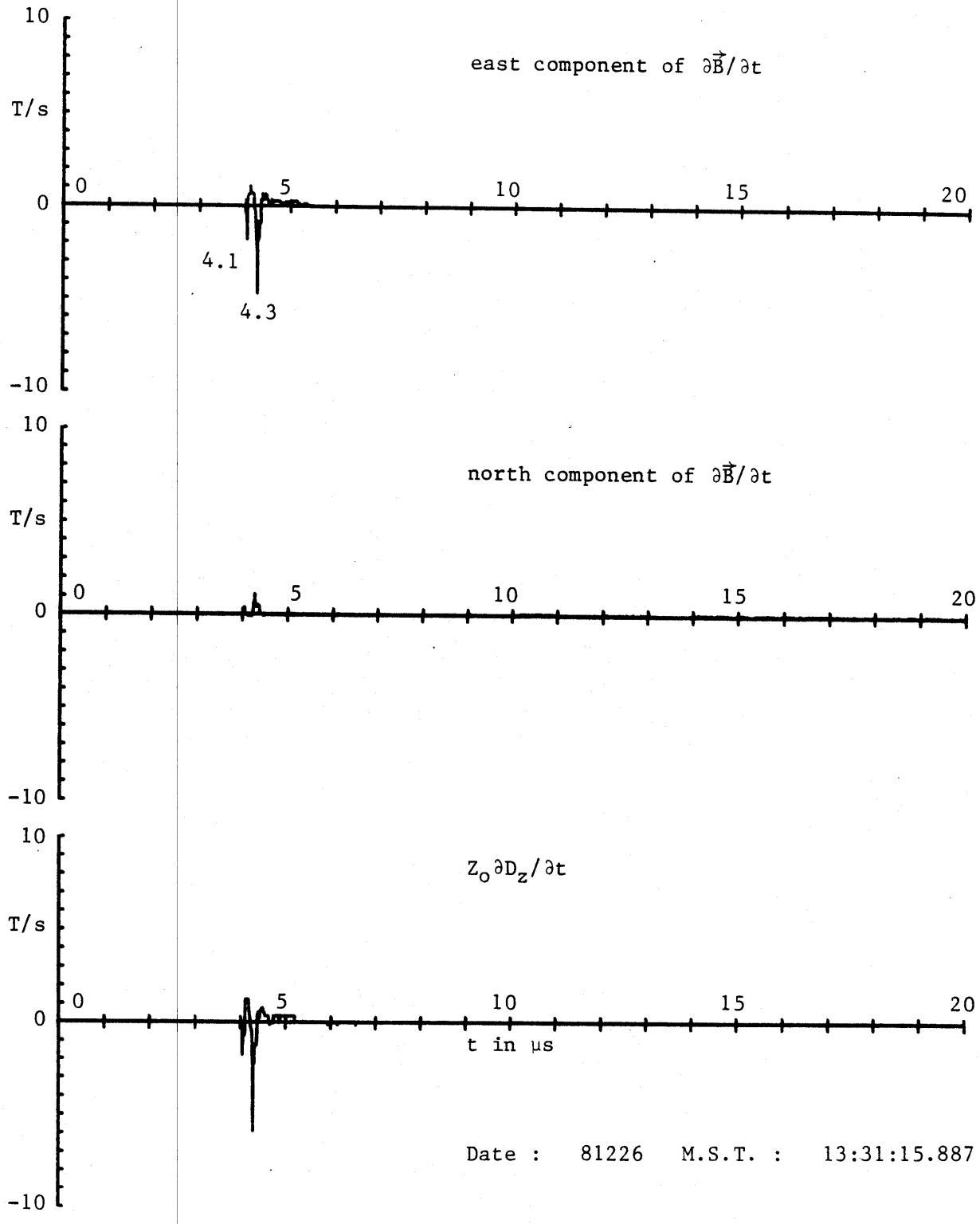


Figure 10.6.1.A.2 Derivative fields from rocket triggered lightning

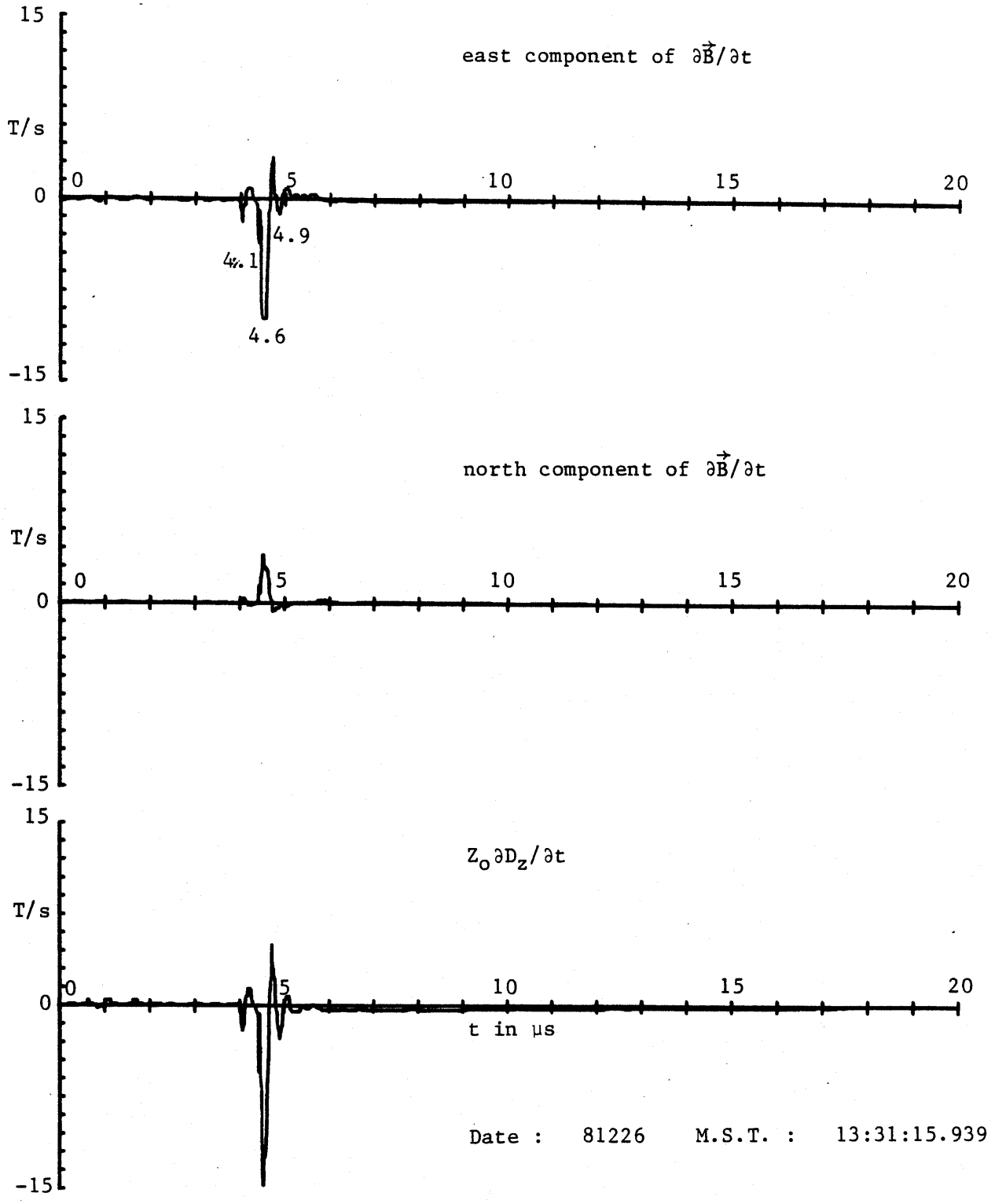


Figure 10.6.1.A.3 Derivative fields from rocket triggered lightning

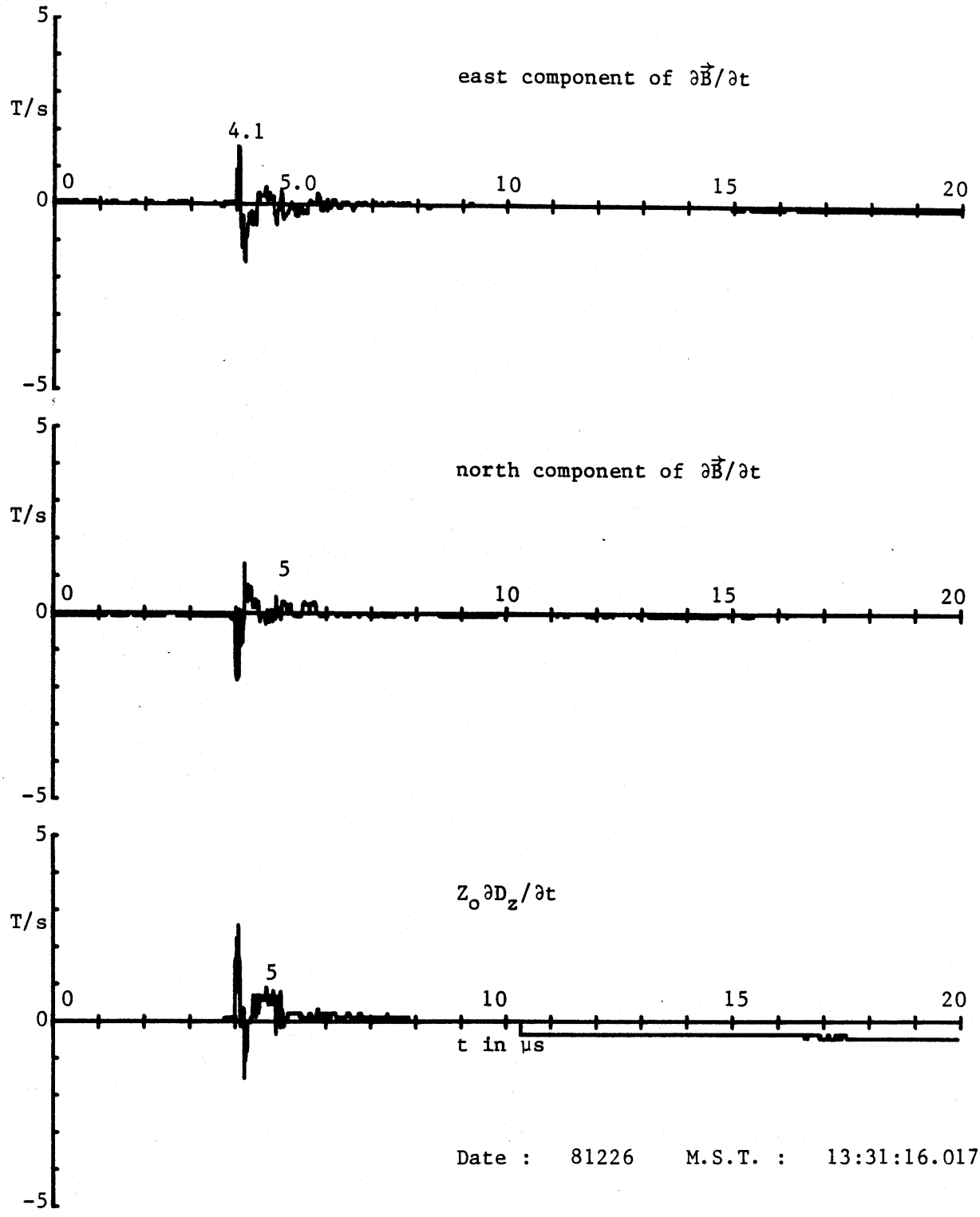


Figure 10.6.1.A.4 Derivative fields from rocket triggered lightning

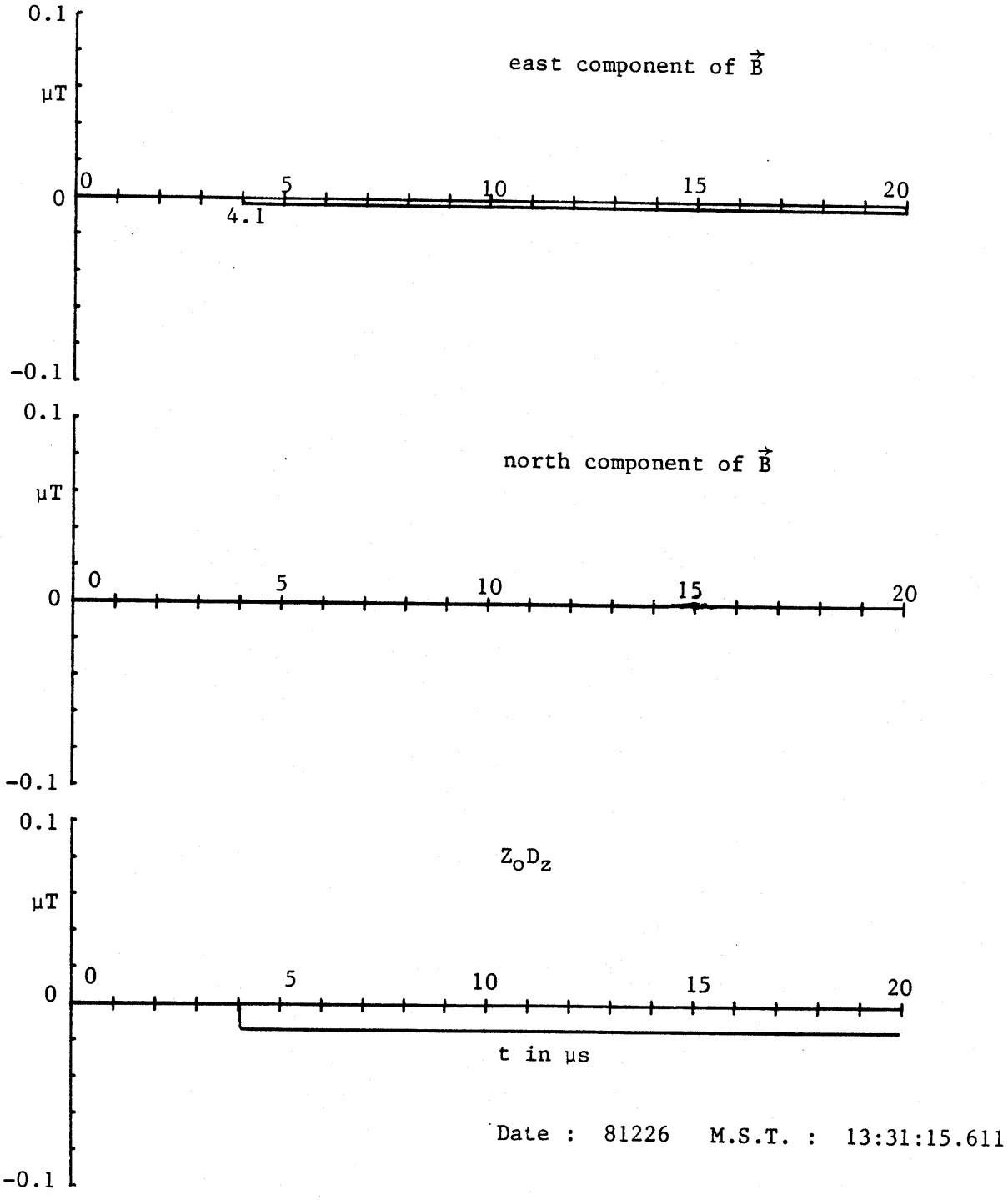


Figure 10.6.1.B.1 Fields from rocket triggered lightning

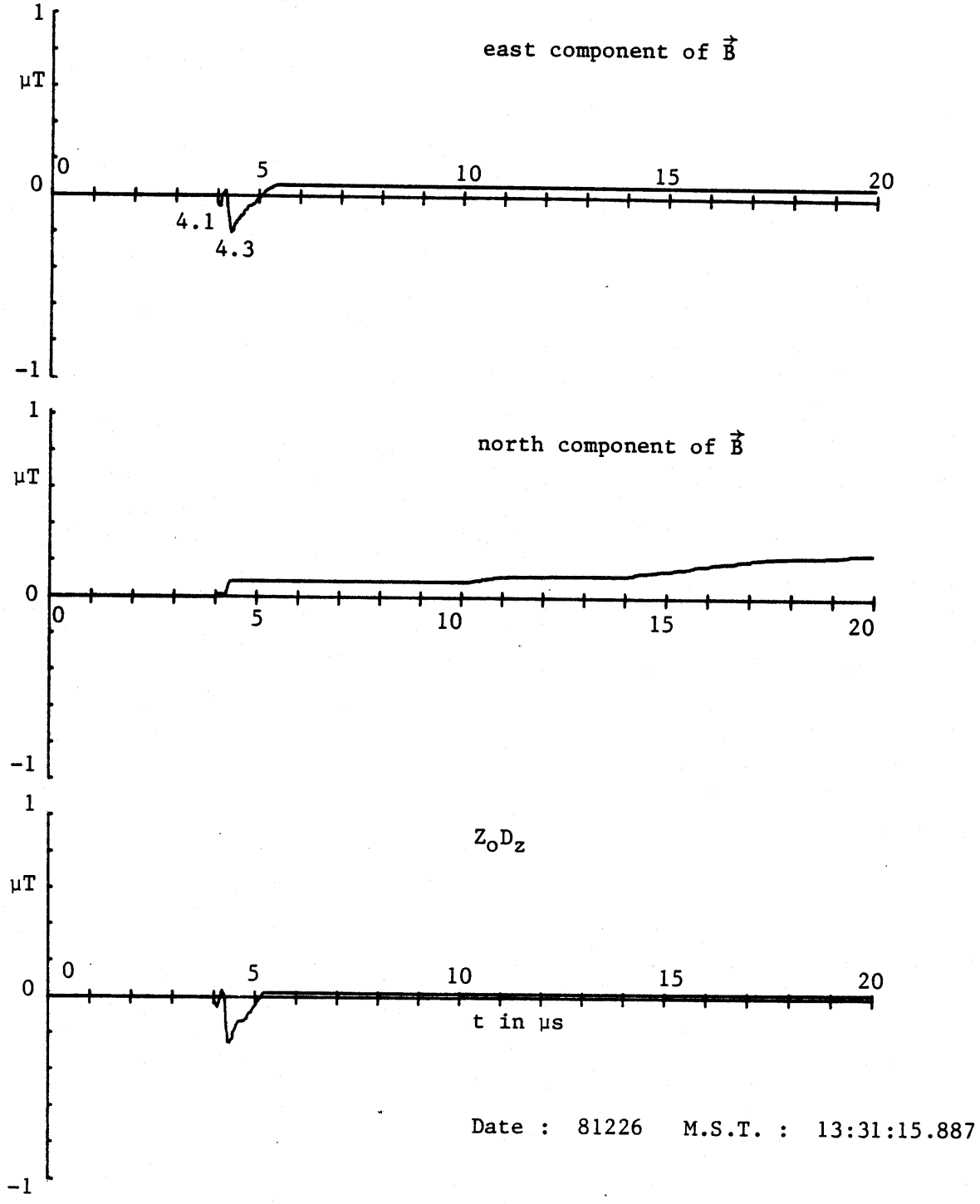


Figure 10.6.1.B.2 Fields from rocket triggered lightning

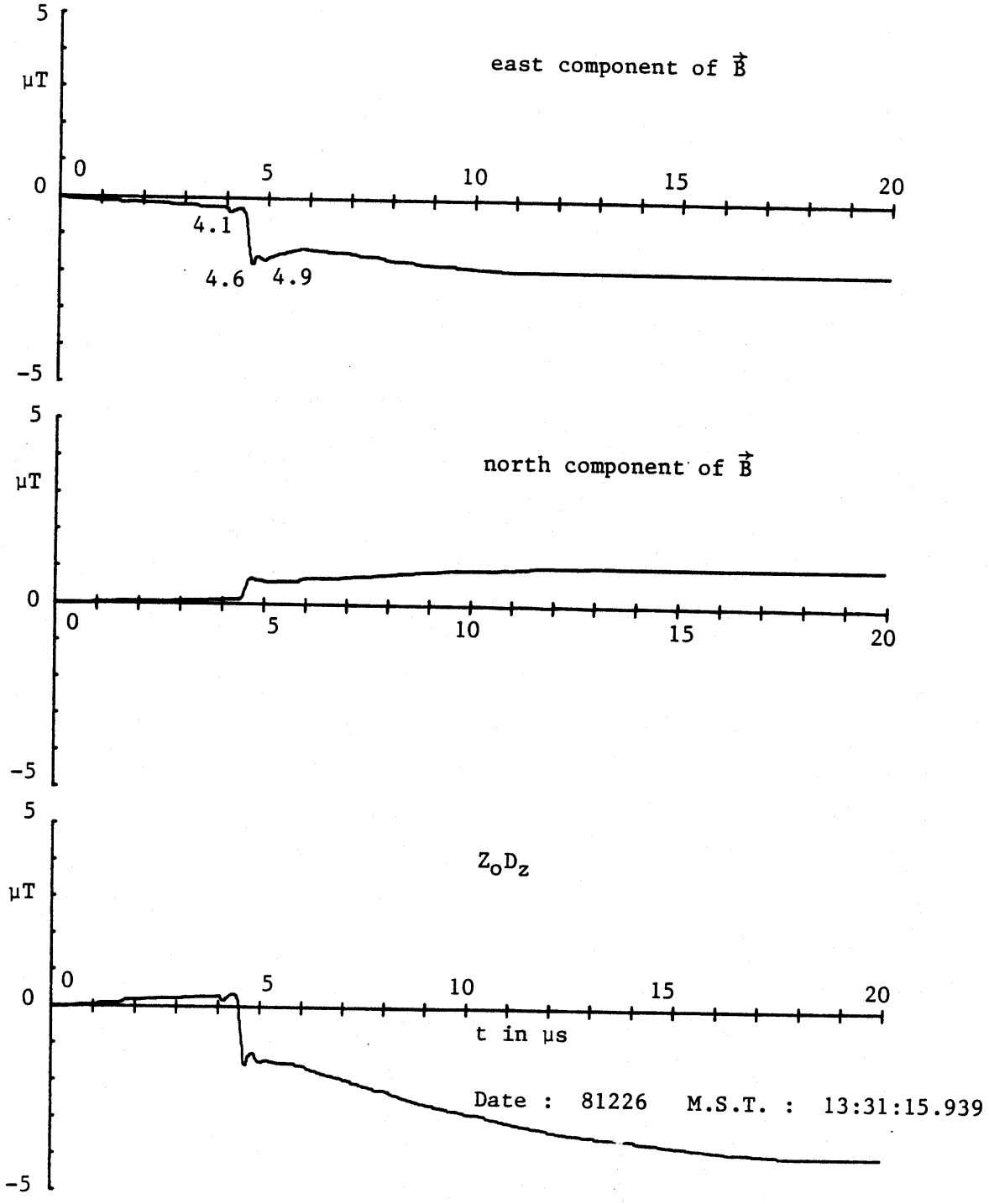


Figure 10.6.1.B.3 Fields from rocket triggered lightning

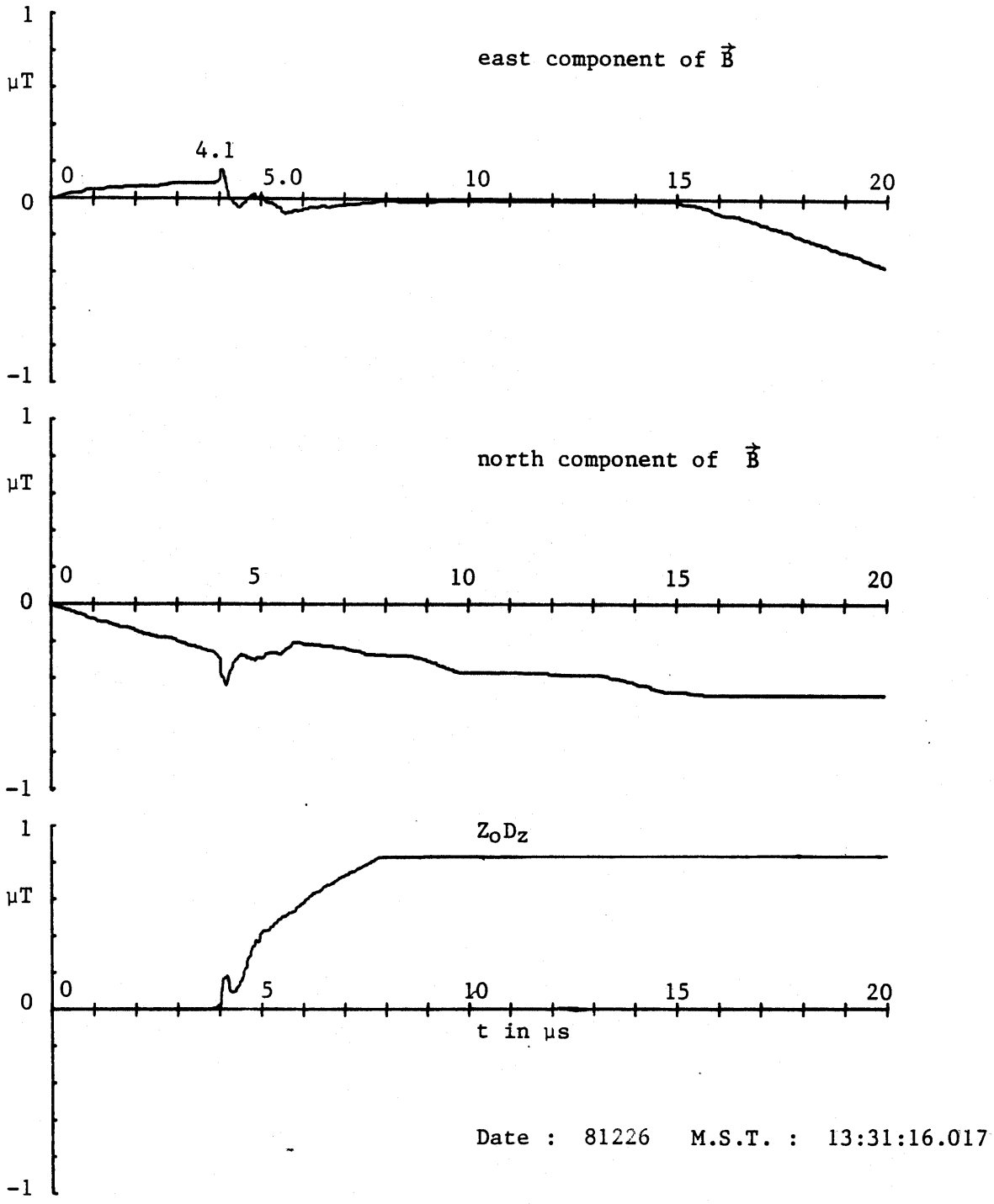


Figure 10.6.1.B.4 Fields from rocket triggered lightning

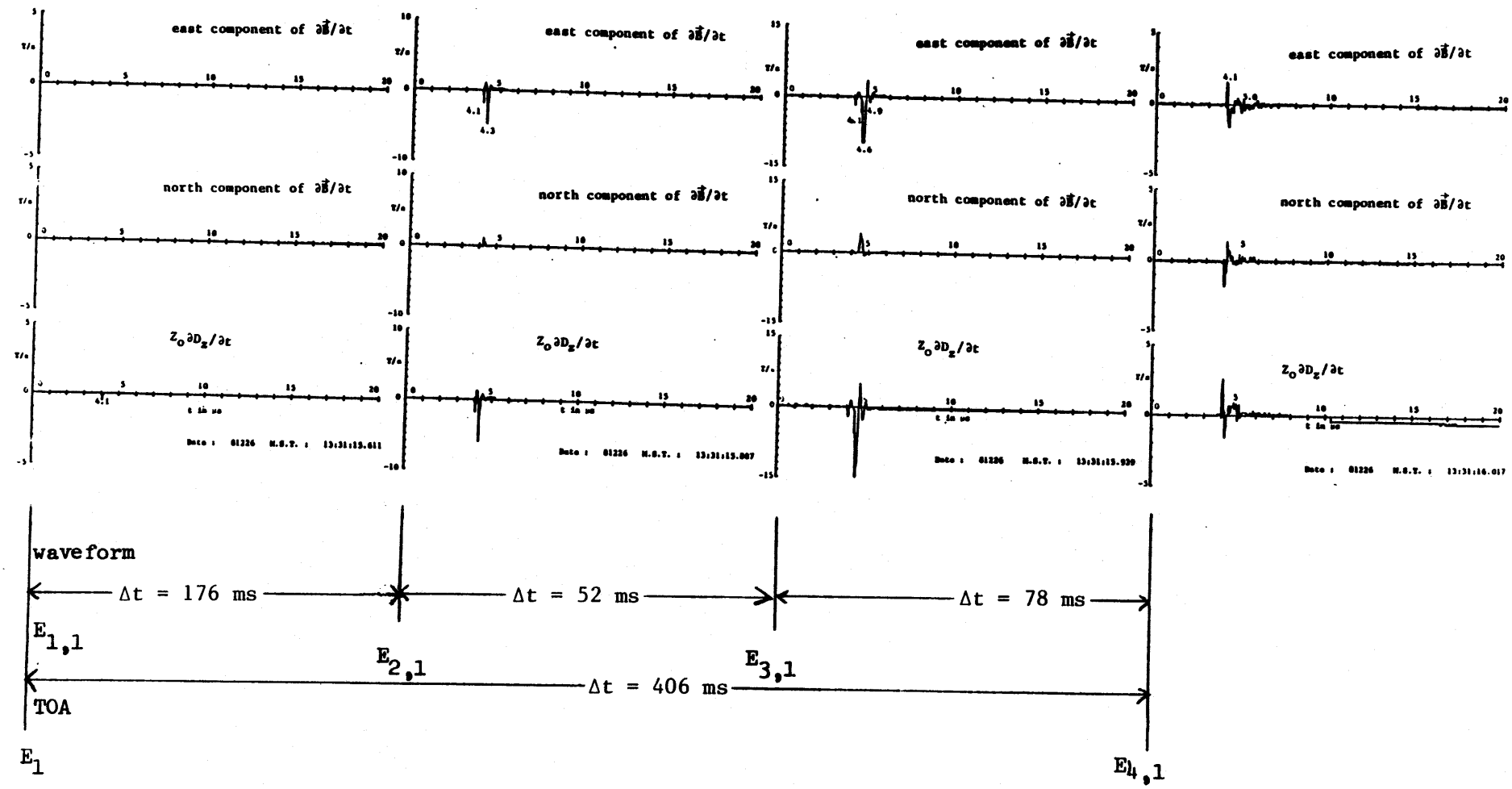


Figure 10.6.2 Time history of waveform and TOA events from rocket triggered lightning

Figure 10.6.3.a.1 Digital data for event 4.1

[ ] = baseline which is subtracted for peaks and numerical integration

Yeardate: 81226 Time: 13:31:15.611 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
4.03	-0.313	-0.234	-0.118	0.000	-0.000	0.000
4.04	-0.313	-0.234	-0.118	0.000	-0.000	0.000
4.05	-0.391	-0.234	-0.118	-0.001	-0.000	0.000
4.06	-0.391	-0.234	-0.118	-0.002	-0.000	0.000
4.07	-0.391	-0.234	-0.118	-0.002	-0.000	0.000
4.08	-0.391	-0.234	-0.589	-0.003	-0.000	-0.005
4.09	-0.313	-0.234	-0.353	-0.003	-0.000	-0.007
4.10	-0.313	-0.234	-0.353	-0.003	-0.000	-0.009
4.11	-0.313	-0.234	-0.236	-0.003	-0.000	-0.011
4.12	-0.313	-0.234	-0.236	-0.003	-0.000	-0.012
4.13	-0.313	-0.234	-0.236	-0.003	-0.000	-0.013
4.14	-0.313	-0.234	-0.236	-0.003	-0.000	-0.014
4.15	-0.313	-0.234	-0.118	-0.003	-0.000	-0.014
4.16	-0.313	-0.234	-0.118	-0.003	-0.000	-0.014
4.17	-0.313	-0.234	-0.118	-0.003	-0.000	-0.014
4.18	-0.313	-0.234	-0.118	-0.003	-0.000	-0.014
4.19	-0.313	-0.234	-0.118	-0.003	-0.000	-0.014
4.20	-0.313	-0.234	-0.118	-0.003	-0.000	-0.014
4.21	-0.313	-0.234	-0.118	-0.003	-0.000	-0.014
4.22	-0.313	-0.234	-0.118	-0.003	-0.000	-0.014
4.23	-0.313	-0.234	-0.118	-0.003	-0.000	-0.014
4.24	-0.313	-0.234	-0.118	-0.003	-0.000	-0.014
4.25	-0.313	-0.234	-0.118	-0.003	-0.000	-0.014
4.26	-0.313	-0.234	-0.118	-0.003	-0.000	-0.014
4.27	-0.313	-0.234	-0.118	-0.003	-0.000	-0.014
4.28	-0.313	-0.234	-0.118	-0.003	-0.000	-0.014
4.29	-0.313	-0.234	-0.118	-0.003	-0.000	-0.014
4.30	-0.313	-0.234	-0.118	-0.003	-0.000	-0.014

Figure 10.6.3.b.1 Digital data for event 4.1

[ ] = baseline which is subtracted for peaks and numerical integration

Yeardate: 81226 Time: 13:31:15.887 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
4.02	-0.391	-0.234	-0.118	0.000	-0.000	0.000
4.03	[-0.391]	-0.234	-0.118	0.000	-0.000	0.000
4.04	-0.625	[-0.234]	-0.118	-0.002	-0.000	0.000
4.05	-1.250	-0.156	[-0.118]	-0.011	0.001	0.000
4.06	-1.875	-0.156	-0.236	-0.026	0.002	-0.001
4.07	-2.188	0.156	-0.589	-0.044	0.005	-0.006
4.08	-1.875	0.156	-0.943	-0.059	0.009	-0.014
4.09	-0.703	0.156	-1.767	-0.062	0.013	-0.031
4.10	-0.078	0.156	-1.885	-0.059	0.017	-0.048
4.11	-0.078	-0.156	-0.825	-0.055	0.018	-0.055
4.12	0.234	-0.234	-0.825	-0.049	0.018	-0.062
4.13	0.313	-0.313	0.000	-0.042	0.017	-0.061
4.14	0.547	-0.313	0.471	-0.033	0.016	-0.055
4.15	0.625	-0.313	0.589	-0.023	0.016	-0.048
4.16	0.703	-0.313	0.825	-0.012	0.015	-0.039
4.17	0.703	-0.313	0.825	-0.001	0.014	-0.029
4.18	0.547	-0.313	1.060	0.009	0.013	-0.018
4.19	0.313	-0.313	1.178	0.016	0.012	-0.005
4.20	0.234	-0.313	1.178	0.022	0.012	0.008
4.21	0.000	-0.313	0.943	0.026	0.011	0.019
4.22	0.000	-0.313	0.589	0.030	0.010	0.026
4.23	-0.313	-0.313	0.589	0.031	0.009	0.033
4.24	-0.391	-0.313	0.471	0.031	0.009	0.039

Figure 10.6.3.b.2 Digital data for event 4.3

[ ] = baseline which is subtracted for peaks and numerical integration

Yeardate: 81226 Time: 13:31:15.887 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
4.24	[-0.391]	[-0.313]	[0.471]	0.000	0.000	0.000
4.25	-0.703	-0.234	0.118	-0.003	0.001	-0.004
4.26	-1.250	-0.234	0.118	-0.012	0.002	-0.007
4.27	-2.578	-0.234	-0.353	-0.034	0.002	-0.015
4.28	-5.078	0.391	-0.471	-0.080	0.009	-0.025
4.29	-4.453	0.859	-1.767	-0.121	0.021	-0.047
4.30	-2.578	0.859	-3.770	-0.143	0.033	-0.090
4.31	-1.250	0.547	-6.008	-0.152	0.041	-0.154
4.32	-1.875	0.234	-5.537	-0.166	0.047	-0.214
4.33	-2.188	0.234	-1.885	-0.184	0.052	-0.238
4.34	-1.953	0.313	-1.296	-0.200	0.059	-0.256
4.35	-1.328	0.234	-1.885	-0.209	0.064	-0.279
4.36	-1.328	0.234	-2.356	-0.219	0.070	-0.307
4.37	-1.328	0.156	-1.885	-0.228	0.074	-0.331
4.38	-0.625	0.313	-1.414	-0.230	0.081	-0.350
4.39	-0.078	0.234	-1.414	-0.227	0.086	-0.369
4.40	-0.078	0.234	-1.296	-0.224	0.091	-0.386
4.41	-0.078	0.000	0.000	-0.221	0.095	-0.391
4.42	0.234	-0.078	0.118	-0.215	0.097	-0.395
4.43	0.313	-0.234	0.118	-0.208	0.098	-0.398
4.44	0.234	-0.234	0.236	-0.201	0.099	-0.401
4.45	0.000	-0.234	0.471	-0.198	0.099	-0.401
4.46	0.000	-0.234	0.471	-0.194	0.100	-0.401
4.47	0.234	-0.234	0.471	-0.187	0.101	-0.401
4.48	0.234	-0.234	0.118	-0.181	0.102	-0.404
4.49	0.234	-0.234	0.471	-0.175	0.102	-0.404
4.50	0.234	-0.234	0.589	-0.169	0.103	-0.403
4.51	0.000	-0.234	0.707	-0.165	0.104	-0.400
4.52	0.000	-0.313	0.707	-0.161	0.104	-0.398
4.53	-0.078	-0.234	0.707	-0.158	0.105	-0.396
4.54	-0.078	-0.234	0.707	-0.155	0.106	-0.393
4.55	-0.156	-0.234	0.589	-0.152	0.106	-0.392
4.56	-0.234	-0.234	0.471	-0.151	0.107	-0.392
4.57	-0.313	-0.234	0.471	-0.150	0.108	-0.392
4.58	-0.313	-0.234	0.471	-0.149	0.109	-0.392
4.59	-0.313	-0.234	0.236	-0.148	0.110	-0.395
4.60	-0.313	-0.234	0.236	-0.148	0.110	-0.397
4.61	-0.078	-0.234	0.236	-0.144	0.111	-0.399
4.62	-0.078	-0.234	0.236	-0.141	0.112	-0.402
4.63	0.000	-0.234	0.236	-0.137	0.113	-0.404
4.64	-0.078	-0.234	0.236	-0.134	0.113	-0.406
4.65	-0.078	-0.234	0.236	-0.131	0.114	-0.409
4.66	-0.078	-0.234	0.236	-0.128	0.115	-0.411
4.67	-0.156	-0.234	-0.236	-0.126	0.116	-0.418
4.68	-0.156	-0.234	-0.236	-0.123	0.117	-0.425

Figure 10.6.3.b.2 Digital data for event 4.3 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
4.69	-0.078	-0.234	-0.236	-0.120	0.117	-0.432
4.70	-0.078	-0.234	-0.236	-0.117	0.118	-0.439
4.71	-0.078	-0.234	-0.236	-0.114	0.119	-0.446
4.72	-0.078	-0.234	-0.236	-0.111	0.120	-0.453
4.73	-0.078	-0.234	-0.236	-0.108	0.121	-0.461
4.74	-0.078	-0.234	-0.118	-0.104	0.121	-0.466
4.75	-0.156	-0.234	-0.118	-0.102	0.122	-0.472
4.76	-0.156	-0.234	-0.118	-0.100	0.123	-0.478
4.77	-0.156	-0.234	-0.118	-0.097	0.124	-0.484
4.78	-0.156	-0.234	0.236	-0.095	0.124	-0.486
4.79	-0.156	-0.234	0.236	-0.093	0.125	-0.489
4.80	-0.156	-0.234	0.236	-0.090	0.126	-0.491
4.81	-0.156	-0.234	0.236	-0.088	0.127	-0.493
4.82	-0.156	-0.234	0.236	-0.086	0.128	-0.496
4.83	-0.234	-0.234	0.236	-0.084	0.128	-0.498
4.84	-0.234	-0.234	0.236	-0.083	0.129	-0.501
4.85	-0.234	-0.234	0.236	-0.081	0.130	-0.503
4.86	-0.234	-0.234	0.236	-0.079	0.131	-0.505
4.87	-0.234	-0.234	0.236	-0.078	0.132	-0.508
4.88	-0.234	-0.234	0.236	-0.076	0.132	-0.510
4.89	-0.234	-0.234	0.236	-0.075	0.133	-0.512
4.90	-0.234	-0.234	0.236	-0.073	0.134	-0.515
4.91	-0.234	-0.234	0.236	-0.072	0.135	-0.517
4.92	-0.234	-0.234	-0.118	-0.070	0.136	-0.523
4.93	-0.156	-0.234	0.236	-0.068	0.136	-0.525
4.94	-0.156	-0.234	0.236	-0.065	0.137	-0.528
4.95	-0.156	-0.234	0.236	-0.063	0.138	-0.530
4.96	-0.156	-0.234	0.236	-0.061	0.139	-0.532
4.97	-0.156	-0.234	0.236	-0.058	0.139	-0.535
4.98	-0.156	-0.234	0.236	-0.056	0.140	-0.537
4.99	-0.156	-0.234	0.236	-0.054	0.141	-0.539
5.00	-0.156	-0.234	0.236	-0.051	0.142	-0.542
5.01	-0.156	-0.234	0.236	-0.049	0.143	-0.544
5.02	-0.156	-0.234	0.236	-0.046	0.144	-0.547
5.03	-0.156	-0.234	0.236	-0.044	0.144	-0.549
5.04	-0.156	-0.234	0.236	-0.042	0.145	-0.551
5.05	-0.156	-0.234	0.236	-0.039	0.146	-0.554
5.06	-0.156	-0.234	0.236	-0.037	0.147	-0.556
5.07	-0.156	-0.234	0.236	-0.035	0.148	-0.558
5.08	-0.156	-0.234	0.236	-0.032	0.148	-0.561
5.09	-0.156	-0.234	0.236	-0.030	0.149	-0.563
5.10	-0.078	-0.234	0.236	-0.027	0.150	-0.566
5.11	-0.078	-0.234	0.236	-0.024	0.151	-0.568
5.12	-0.078	-0.234	0.236	-0.020	0.151	-0.570
5.13	-0.078	-0.234	0.236	-0.017	0.152	-0.573
5.14	-0.078	-0.234	0.236	-0.014	0.153	-0.575
5.15	-0.078	-0.234	0.236	-0.011	0.154	-0.577
5.16	-0.078	-0.234	0.236	-0.008	0.155	-0.580
5.17	-0.078	-0.234	0.236	-0.005	0.155	-0.582
5.18	-0.078	-0.234	0.236	-0.002	0.156	-0.584
5.19	-0.156	-0.234	0.236	0.001	0.157	-0.587

Figure 10.6.3.c.1 Digital data for event 4.1

[ ] = baseline which is subtracted for peaks and numerical integration

Yeardate: 81226 Time: 13:31:15.939 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
3.98	-0.391	-0.234	-0.118	0.000	-0.000	0.000
3.99	[-0.391]	-0.234	[-0.118]	0.000	-0.000	0.000
4.00	-0.469	-0.234	-0.236	-0.001	-0.000	-0.001
4.01	-0.469	[-0.234]	-0.236	-0.002	-0.000	-0.002
4.02	-0.547	-0.156	-0.236	-0.003	0.001	-0.004
4.03	-0.625	-0.156	-0.236	-0.005	0.002	-0.005
4.04	-0.938	-0.156	-0.353	-0.011	0.002	-0.007
4.05	-1.250	-0.156	-0.471	-0.020	0.003	-0.011
4.06	-1.875	-0.156	-0.471	-0.034	0.004	-0.014
4.07	-2.188	-0.156	-0.825	-0.052	0.005	-0.021
4.08	-2.188	0.156	-1.414	-0.070	0.009	-0.034
4.09	-1.953	0.156	-1.885	-0.086	0.012	-0.052
4.10	-1.328	0.234	-2.238	-0.095	0.017	-0.073
4.11	-0.938	0.234	-2.238	-0.101	0.022	-0.094
4.12	-0.703	0.234	-1.885	-0.104	0.027	-0.112
4.13	-0.703	0.234	-0.943	-0.107	0.031	-0.120
4.14	-0.703	0.000	-0.825	-0.110	0.034	-0.127
4.15	-0.625	0.000	-0.707	-0.112	0.036	-0.133
4.16	-0.078	0.078	-0.707	-0.109	0.039	-0.139
4.17	0.313	0.078	-0.589	-0.102	0.042	-0.144
4.18	0.547	0.078	-0.353	-0.093	0.045	-0.146
4.19	0.625	-0.156	0.471	-0.083	0.046	-0.140
4.20	0.703	-0.234	0.943	-0.072	0.046	-0.130
4.21	0.703	-0.313	1.178	-0.061	0.045	-0.117
4.22	0.703	-0.313	1.178	-0.050	0.044	-0.104
4.23	0.703	-0.391	1.178	-0.039	0.043	-0.091
4.24	0.625	-0.391	1.178	-0.029	0.041	-0.078
4.25	0.547	-0.391	1.178	-0.019	0.040	-0.065
4.26	0.547	-0.391	1.178	-0.010	0.038	-0.052
4.27	0.469	-0.391	1.060	-0.001	0.037	-0.040
4.28	0.391	-0.391	1.060	0.006	0.035	-0.028
4.29	0.234	-0.391	1.060	0.013	0.033	-0.016
4.30	0.000	-0.391	0.943	0.017	0.032	-0.006
4.31	-0.078	-0.391	0.589	0.020	0.030	0.001
4.32	-0.313	-0.313	0.471	0.020	0.030	0.007

Figure 10.6.3.c.2 Digital data for event 4.6

[ ] = baseline which is subtracted for peaks and numerical integration

Yeardate: 81226 Time: 13:31:15.939 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
4.33	-0.391	-0.313	0.118	0.000	0.000	-0.000
4.34	-0.391	-0.313	0.118	0.000	0.000	-0.000
4.35	-0.469	-0.234	-0.118	-0.001	0.001	-0.002
4.36	-0.625	-0.234	-0.236	-0.003	0.002	-0.006
4.37	-0.703	-0.234	-0.236	-0.006	0.002	-0.009
4.38	-0.703	-0.234	-0.353	-0.009	0.003	-0.014
4.39	-0.703	-0.234	-0.471	-0.012	0.004	-0.020
4.40	-0.781	-0.234	-0.471	-0.016	0.005	-0.026
4.41	-0.781	-0.156	-0.589	-0.020	0.006	-0.033
4.42	-0.859	-0.156	-0.589	-0.025	0.008	-0.040
4.43	-1.250	-0.156	-0.707	-0.034	0.009	-0.048
4.44	-3.828	-0.156	-0.825	-0.068	0.011	-0.058
4.45	-3.828	0.156	-0.943	-0.102	0.016	-0.068
4.46	-1.250	0.469	-1.885	-0.111	0.024	-0.088
4.47	-1.328	1.172	-5.655	-0.120	0.038	-0.146
4.48	-3.125	0.859	-3.652	-0.148	0.050	-0.184
4.49	-3.203	0.547	-0.943	-0.176	0.059	-0.194
4.50	-2.578	0.625	-3.652	-0.198	0.068	-0.232
4.51	-7.500	0.703	-4.123	-0.269	0.078	-0.275
4.52	-10.000	0.703	-3.652	-0.365	0.088	-0.312
4.53	-10.000	1.250	-7.422	-0.461	0.104	-0.388
4.54	-10.000	2.422	-11.310	-0.557	0.131	-0.501
4.55	-10.000	2.813	-14.138	-0.653	0.163	-0.642
4.56	-10.000	3.672	-15.080	-0.749	0.202	-0.793
4.57	-10.000	3.750	-15.080	-0.845	0.243	-0.944
4.58	-10.000	3.047	-13.313	-0.941	0.277	-1.077
4.59	-10.000	2.734	-12.842	-1.037	0.307	-1.205
4.60	-10.000	2.734	-12.253	-1.133	0.338	-1.328
4.61	-10.000	2.500	-11.899	-1.230	0.366	-1.447
4.62	-8.750	2.500	-12.371	-1.313	0.394	-1.570
4.63	-6.953	2.734	-12.371	-1.379	0.424	-1.694
4.64	-5.078	2.734	-11.310	-1.426	0.455	-1.807
4.65	-3.750	2.500	-8.483	-1.459	0.483	-1.893
4.66	-1.328	2.422	-6.598	-1.469	0.510	-1.960
4.67	-1.016	1.797	-4.713	-1.475	0.531	-2.009
4.68	-0.703	1.172	-2.828	-1.478	0.546	-2.038
4.69	-0.391	0.859	-0.943	-1.478	0.558	-2.049
4.70	-0.313	0.703	-0.943	-1.477	0.568	-2.059
4.71	0.625	0.625	-0.471	-1.467	0.578	-2.065
4.72	1.797	0.625	-0.353	-1.445	0.587	-2.070
4.73	2.500	0.313	0.943	-1.416	0.593	-2.062
4.74	3.125	0.000	2.003	-1.381	0.596	-2.043
4.75	3.125	-0.313	3.770	-1.346	0.596	-2.006
4.76	2.500	-0.703	4.713	-1.317	0.592	-1.960
4.77	1.875	-0.938	4.830	-1.294	0.586	-1.913

Figure 10.6.3.c.2 Digital data for event 4.6 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
4.78	1.250	-0.859	3.888	-1.278	0.581	-1.876
4.79	0.625	-0.859	3.299	-1.268	0.575	-1.844
4.80	0.000	-0.859	2.828	-1.264	0.570	-1.817
4.81	-0.078	-0.781	2.003	-1.261	0.565	-1.798
4.82	-0.703	-0.703	0.943	-1.264	0.561	-1.790
4.83	-1.016	-0.625	0.471	-1.270	0.558	-1.786
4.84	-1.250	-0.625	0.118	-1.279	0.555	-1.786
4.85	-1.250	-0.547	-0.353	-1.287	0.553	-1.791

Figure 10.6.3.c.3 Digital data for event 4.9

[ ] = baseline which is subtracted for peaks and numerical integration

Yeardate: 81226 Time: 13:31:15.939 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
4.82	-0.703	-0.703	0.943	-0.000	-0.000	-0.000
4.83	-1.016	-0.625	0.471	-0.003	0.001	-0.005
4.84	-1.250	-0.625	0.118	-0.009	0.002	-0.013
4.85	-1.250	-0.547	-0.353	-0.014	0.003	-0.026
4.86	-1.016	-0.547	-0.471	-0.017	0.005	-0.040
4.87	-1.016	-0.547	-0.707	-0.020	0.006	-0.057
4.88	-1.250	-0.547	-0.707	-0.026	0.008	-0.073
4.89	-1.328	-0.547	-0.943	-0.032	0.009	-0.092
4.90	-1.563	-0.547	-1.414	-0.041	0.011	-0.116
4.91	-1.328	-0.469	-2.238	-0.047	0.013	-0.147
4.92	-1.016	-0.313	-2.710	-0.050	0.017	-0.184
4.93	-0.938	-0.313	-2.945	-0.052	0.021	-0.223
4.94	-0.625	-0.234	-2.945	-0.052	0.026	-0.262
4.95	-0.391	-0.234	-2.710	-0.048	0.030	-0.298
4.96	-0.313	-0.234	-2.356	-0.045	0.035	-0.331
4.97	-0.078	-0.313	-2.238	-0.038	0.039	-0.363
4.98	0.234	-0.391	-2.238	-0.029	0.042	-0.395
4.99	0.313	-0.391	-1.885	-0.019	0.045	-0.423
5.00	0.391	-0.469	-1.296	-0.008	0.048	-0.445
5.01	0.469	-0.469	-0.825	0.004	0.050	-0.463
5.02	0.547	-0.469	-0.471	0.016	0.052	-0.477
5.03	0.547	-0.469	-0.353	0.029	0.055	-0.490
5.04	0.625	-0.469	0.000	0.042	0.057	-0.500
5.05	0.625	-0.469	0.000	0.055	0.059	-0.509
5.06	0.625	-0.469	0.236	0.069	0.062	-0.516
5.07	0.625	-0.469	0.353	0.082	0.064	-0.522
5.08	0.547	-0.469	0.471	0.094	0.066	-0.527
5.09	0.469	-0.469	0.471	0.106	0.069	-0.531
5.10	0.469	-0.469	0.589	0.118	0.071	-0.535
5.11	0.391	-0.469	0.589	0.129	0.073	-0.539
5.12	0.391	-0.391	0.589	0.140	0.077	-0.542
5.13	0.234	-0.313	0.589	0.149	0.080	-0.546
5.14	0.000	-0.313	0.471	0.156	0.084	-0.550
5.15	0.000	-0.234	0.471	0.163	0.089	-0.555
5.16	-0.078	-0.234	0.118	0.169	0.094	-0.563
5.17	-0.234	-0.234	-0.236	0.174	0.098	-0.575
5.18	-0.234	-0.234	-0.471	0.179	0.103	-0.589
5.19	-0.234	-0.234	-0.471	0.184	0.108	-0.603
5.20	-0.156	-0.234	-0.589	0.189	0.112	-0.619
5.21	-0.156	-0.156	-0.707	0.194	0.118	-0.635
5.22	-0.156	-0.156	-0.707	0.200	0.123	-0.652
5.23	0.078	-0.156	-0.707	0.208	0.129	-0.668
5.24	0.078	-0.156	-0.707	0.216	0.134	-0.685
5.25	0.078	-0.156	-0.707	0.223	0.140	-0.701
5.26	0.078	-0.156	-0.707	0.231	0.145	-0.718

Figure 10.6.3.c.3 Digital data for event 4.9 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
5.27	0.078	-0.156	-0.707	0.239	0.151	-0.734
5.28	0.078	-0.156	-0.707	0.247	0.156	-0.751
5.29	0.078	-0.156	-0.707	0.255	0.162	-0.767
5.30	0.078	-0.156	-0.707	0.262	0.167	-0.784
5.31	0.078	-0.156	-0.707	0.270	0.173	-0.800
5.32	0.078	-0.156	-0.707	0.278	0.178	-0.817
5.33	-0.156	-0.156	-0.707	0.284	0.184	-0.833
5.34	-0.156	-0.156	-0.707	0.289	0.189	-0.850
5.35	-0.156	-0.156	-0.707	0.294	0.194	-0.866
5.36	-0.156	-0.156	-0.707	0.300	0.200	-0.883
5.37	-0.156	-0.156	-0.707	0.305	0.205	-0.899
5.38	-0.078	-0.156	-0.589	0.312	0.211	-0.915
5.39	-0.078	-0.156	-0.471	0.318	0.216	-0.929
5.40	-0.078	-0.156	-0.471	0.324	0.222	-0.943
5.41	-0.078	-0.156	-0.353	0.330	0.227	-0.956
5.42	0.000	-0.156	-0.353	0.337	0.233	-0.969
5.43	0.078	-0.156	-0.353	0.345	0.238	-0.982
5.44	0.078	-0.234	-0.353	0.353	0.243	-0.995
5.45	0.000	-0.234	-0.236	0.360	0.248	-1.006
5.46	0.000	-0.234	-0.236	0.367	0.252	-1.018
5.47	0.000	-0.234	-0.236	0.374	0.257	-1.030
5.48	-0.078	-0.234	-0.236	0.380	0.262	-1.042
5.49	-0.078	-0.234	-0.236	0.387	0.266	-1.054
5.50	-0.078	-0.234	-0.353	0.393	0.271	-1.067
5.51	-0.156	-0.234	-0.353	0.398	0.276	-1.080
5.52	-0.156	-0.234	-0.471	0.404	0.280	-1.094
5.53	-0.156	-0.234	-0.471	0.409	0.285	-1.108
5.54	-0.156	-0.234	-0.471	0.415	0.290	-1.122
5.55	-0.078	-0.156	-0.471	0.421	0.295	-1.136
5.56	-0.078	-0.156	-0.471	0.427	0.301	-1.150
5.57	-0.078	-0.156	-0.471	0.433	0.306	-1.164
5.58	0.000	-0.156	-0.471	0.441	0.312	-1.179
5.59	0.078	-0.156	-0.471	0.448	0.317	-1.193
5.60	0.078	-0.156	-0.471	0.456	0.323	-1.207
5.61	0.156	-0.156	-0.353	0.465	0.328	-1.220
5.62	0.156	-0.156	-0.353	0.473	0.333	-1.233
5.63	0.156	-0.156	-0.236	0.482	0.339	-1.245
5.64	0.156	-0.156	-0.236	0.491	0.344	-1.256
5.65	0.156	-0.156	-0.118	0.499	0.350	-1.267

Figure 10.6.3.d.1 Digital data for event 4.1

[ ] = baseline which is subtracted for peaks and numerical integration

Yeardate: 81226 Time: 13:31:16.017 M.S.T.

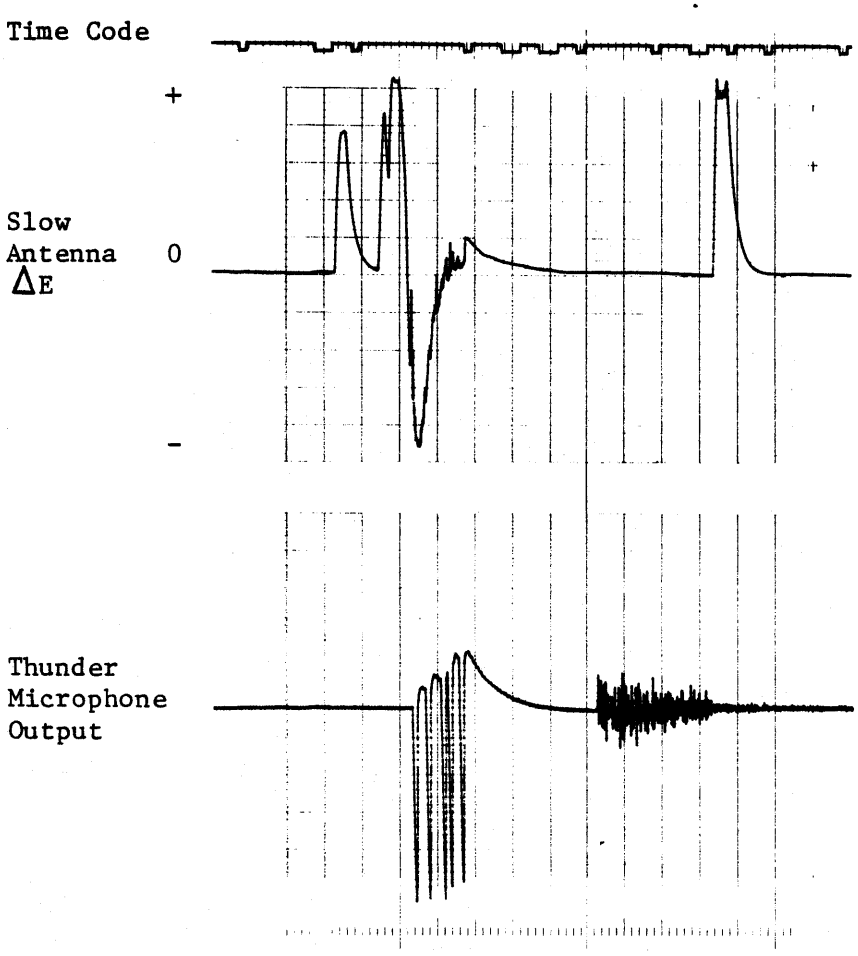
Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
4.03	[-0.313]	[-0.391]	0.471	0.000	0.000	0.000
4.04	0.313	-0.625	0.471	0.006	-0.002	0.000
4.05	0.547	-1.250	[0.471]	0.015	-0.011	0.000
4.06	-0.391	-1.875	0.943	0.014	-0.026	0.005
4.07	-0.391	-1.953	1.885	0.013	-0.041	0.019
4.08	0.234	-1.875	2.474	0.019	-0.056	0.039
4.09	1.172	-1.953	2.003	0.034	-0.072	0.054
4.10	1.172	-1.875	1.060	0.048	-0.087	0.060
4.11	0.313	-1.328	2.356	0.055	-0.096	0.079
4.12	-0.391	-0.078	2.828	0.054	-0.093	0.103
4.13	-1.016	-0.078	2.003	0.047	-0.090	0.118
4.14	-1.328	-0.625	0.589	0.037	-0.092	0.119
4.15	-1.563	-1.016	0.118	0.024	-0.098	0.115
4.16	-1.250	-0.703	0.471	0.015	-0.102	0.115
4.17	-0.703	-0.625	0.589	0.011	-0.104	0.117
4.18	-0.703	-0.938	0.118	0.007	-0.109	0.113
4.19	-1.250	-0.938	0.118	-0.002	-0.115	0.110
4.20	-1.875	-0.625	0.589	-0.018	-0.117	0.111
4.21	-1.953	-0.313	0.589	-0.034	-0.116	0.112
4.22	-1.953	1.172	0.471	-0.051	-0.101	0.112
4.23	-1.563	1.172	-0.471	-0.063	-0.085	0.103
4.24	-1.250	0.625	-0.943	-0.073	-0.075	0.088
4.25	-1.250	0.547	-1.296	-0.082	-0.066	0.071
4.26	-1.328	0.469	-0.943	-0.092	-0.057	0.057
4.27	-1.250	0.469	-0.825	-0.101	-0.048	0.044
4.28	-0.938	0.391	-0.589	-0.108	-0.041	0.033
4.29	-0.703	0.234	-0.471	-0.112	-0.034	0.024
4.30	-0.625	0.156	-0.471	-0.115	-0.029	0.014
4.31	-0.625	0.313	-0.353	-0.118	-0.022	0.006
4.32	-0.625	0.547	0.000	-0.121	-0.012	0.001
4.33	-0.625	0.625	0.118	-0.124	-0.002	-0.002
4.34	-0.625	0.625	0.236	-0.127	0.008	-0.005

Figure 10.6.3.d.2 Digital data for event 5.0

[ ] = baseline which is subtracted for peaks and numerical integration

Yeardate: 81226 Time: 13:31:16.017 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
4.87	[-0.156]	-0.391	[0.707]	-0.000	0.000	-0.000
4.88	-0.625	[-0.391]	0.825	-0.005	0.000	0.001
4.89	-0.703	-0.313	1.060	-0.010	0.001	0.005
4.90	-0.938	-0.313	0.943	-0.018	0.002	0.007
4.91	-0.938	0.234	0.589	-0.026	0.008	0.006
4.92	-0.703	0.313	0.118	-0.031	0.015	-0.000
4.93	-0.625	0.234	0.118	-0.036	0.021	-0.006
4.94	-0.625	0.234	0.000	-0.041	0.027	-0.013
4.95	-0.547	0.000	-0.118	-0.045	0.031	-0.021
4.96	-0.547	0.000	0.236	-0.048	0.035	-0.026
4.97	-0.469	0.000	0.353	-0.052	0.039	-0.029
4.98	-0.391	-0.156	0.471	-0.054	0.041	-0.032
4.99	-0.313	-0.156	0.471	-0.056	0.044	-0.034
5.00	-0.078	-0.234	0.471	-0.055	0.045	-0.037
5.01	-0.078	-0.234	0.589	-0.054	0.047	-0.038
5.02	0.000	-0.234	0.943	-0.052	0.048	-0.035
5.03	-0.078	-0.234	0.943	-0.052	0.050	-0.033
5.04	-0.078	-0.234	0.943	-0.051	0.052	-0.031
5.05	-0.391	-0.234	0.943	-0.053	0.053	-0.028
5.06	-0.625	-0.234	1.060	-0.058	0.055	-0.025
5.07	-0.703	-0.156	0.943	-0.063	0.057	-0.022
5.08	-0.781	0.156	0.589	-0.070	0.063	-0.024
5.09	-0.703	0.156	0.471	-0.075	0.068	-0.026
5.10	-0.703	0.156	0.118	-0.081	0.074	-0.032
5.11	-0.703	0.156	0.118	-0.086	0.079	-0.038
5.12	-0.703	0.156	0.236	-0.091	0.084	-0.042
5.13	-0.703	0.156	0.236	-0.097	0.090	-0.047
5.14	-0.703	0.156	0.236	-0.102	0.095	-0.052
5.15	-0.625	0.078	0.236	-0.107	0.100	-0.057
5.16	-0.625	0.078	0.236	-0.112	0.105	-0.061
5.17	-0.625	0.078	0.236	-0.116	0.109	-0.066
5.18	-0.625	0.078	0.236	-0.121	0.114	-0.071
5.19	-0.547	-0.156	0.353	-0.125	0.117	-0.074
5.20	-0.469	-0.156	0.353	-0.128	0.119	-0.078
5.21	-0.391	-0.156	0.471	-0.131	0.121	-0.080
5.22	-0.391	-0.156	0.471	-0.133	0.124	-0.083
5.23	-0.391	-0.156	0.471	-0.135	0.126	-0.085
5.24	-0.313	-0.156	0.471	-0.137	0.128	-0.087
5.25	-0.313	-0.156	0.471	-0.138	0.131	-0.090
5.26	-0.313	0.078	0.471	-0.140	0.135	-0.092
5.27	-0.391	0.078	0.471	-0.142	0.140	-0.094
5.28	-0.391	-0.156	0.471	-0.145	0.142	-0.097
5.29	-0.469	-0.156	0.471	-0.148	0.145	-0.099
5.30	-0.547	-0.156	0.471	-0.152	0.147	-0.101

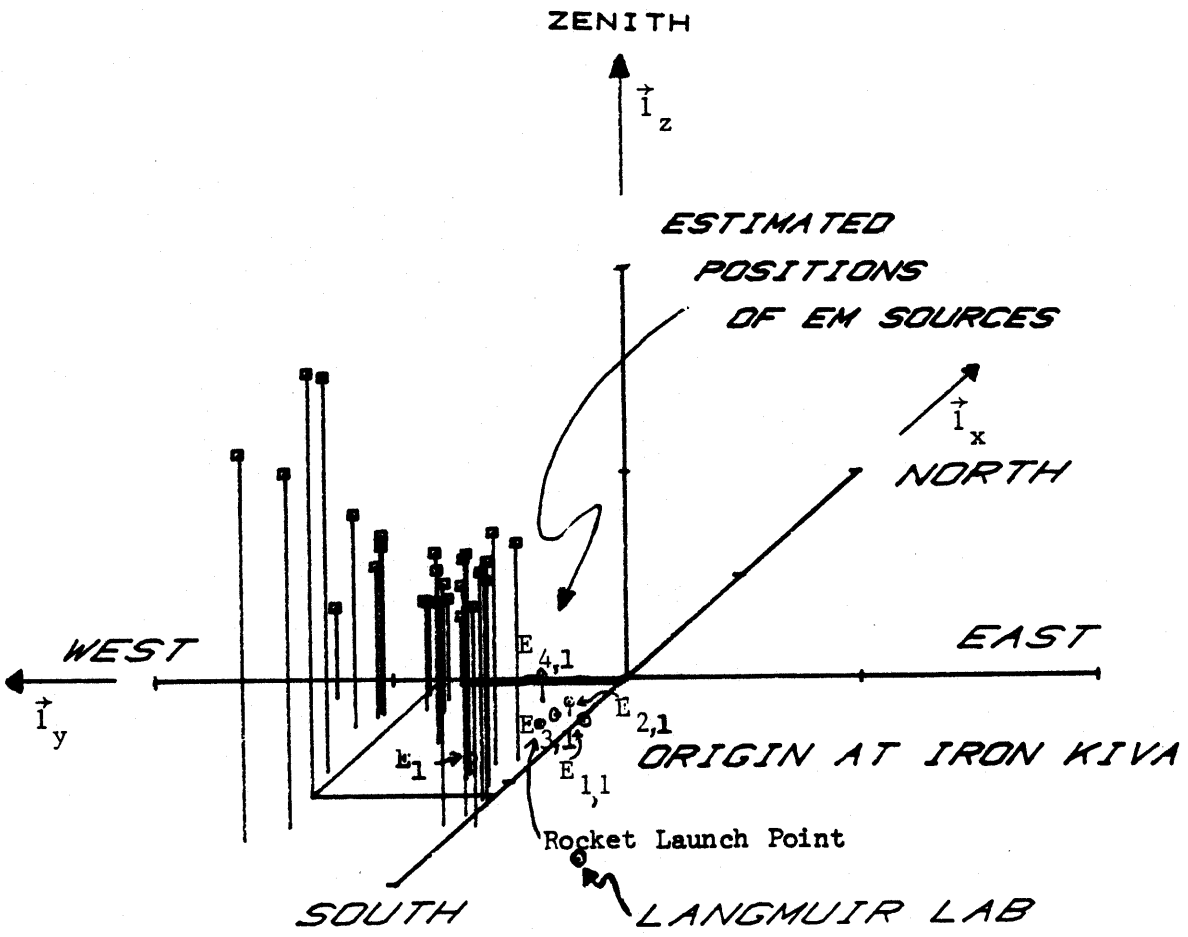


1.12 sec.

horizontal range = 376 m

Date : 81226 M.S.T. : 13:31:15

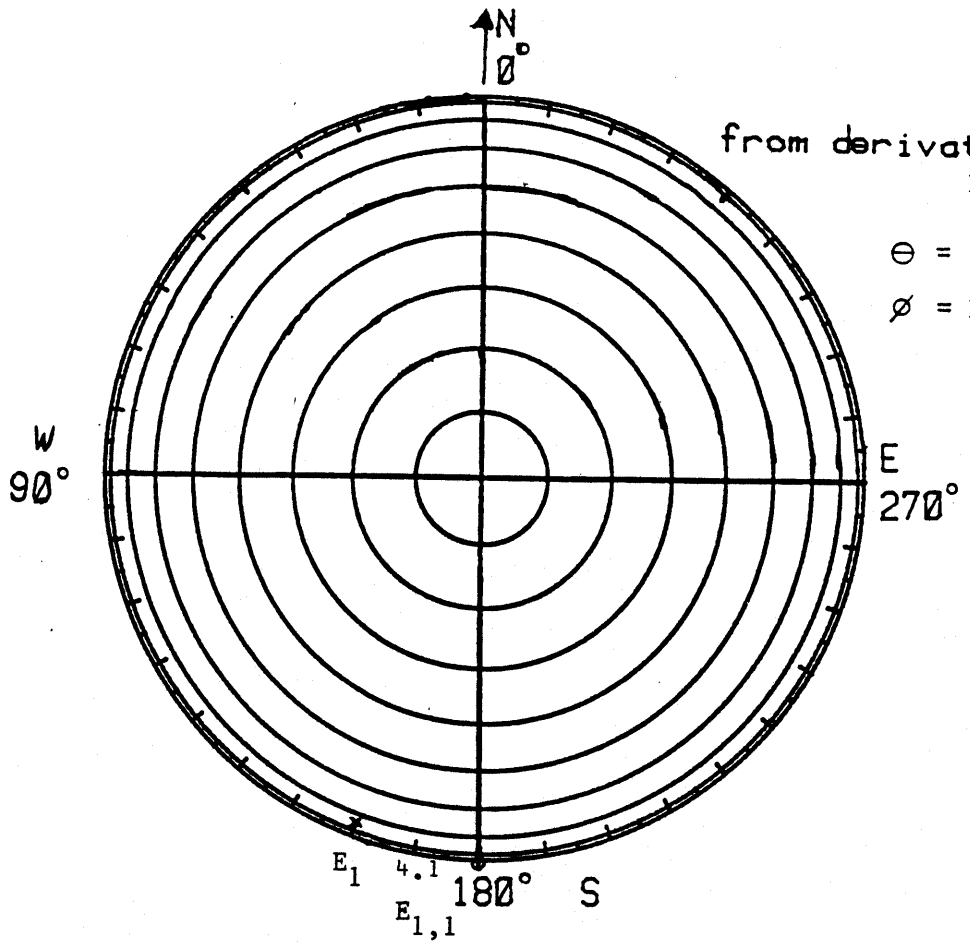
Figure 10.6.4 Slow electric field change and thunder microphone record from rocket triggered lightning



ticks on axes at 1 km intervals

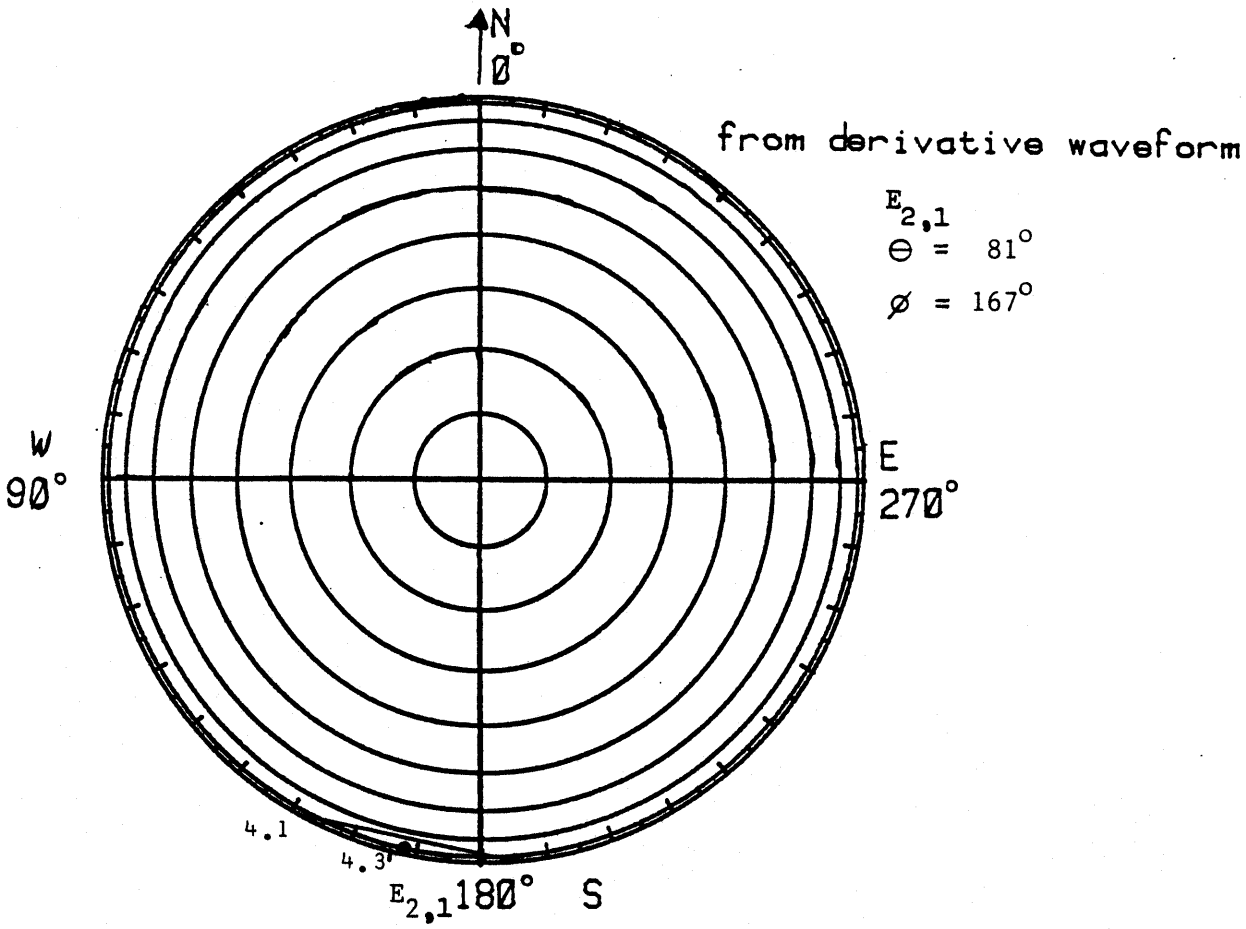
Date : 81226 M.S.T. : 13:31:15

Figure 10.6.5 Acoustic location of rocket triggered lightning



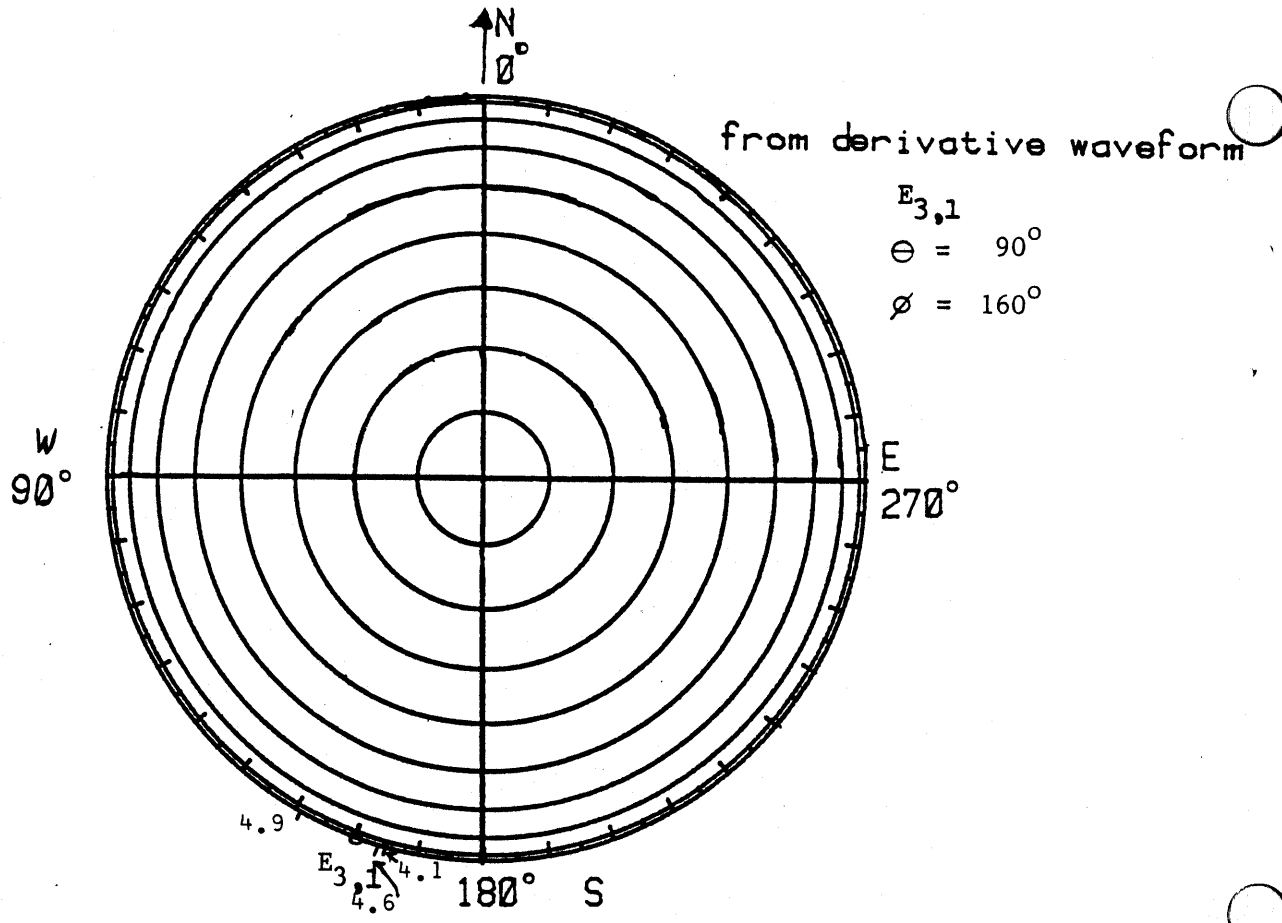
Date : 81226 M.S.T. : 13:31:15.611

Figure 10.6.6.A.1 $\sin(\theta)_{,\phi}$ contours for rocket triggered lightning derivative waveform



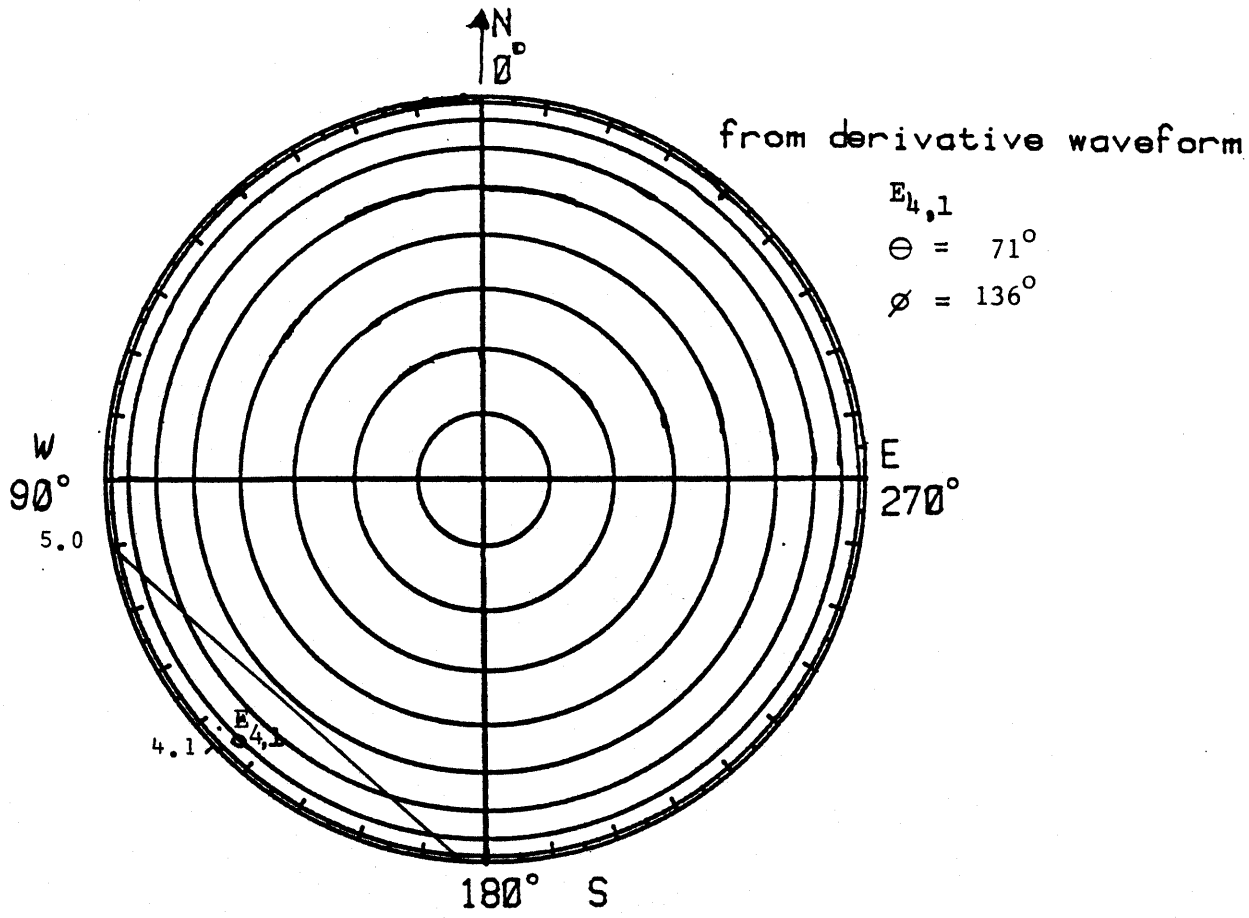
Date : 81226 M.S.T. : 13:31:15.887

Figure 10.6.6.A.2 **$\sin(\theta)$,ϕ contours for rocket triggered lightning derivative waveform**



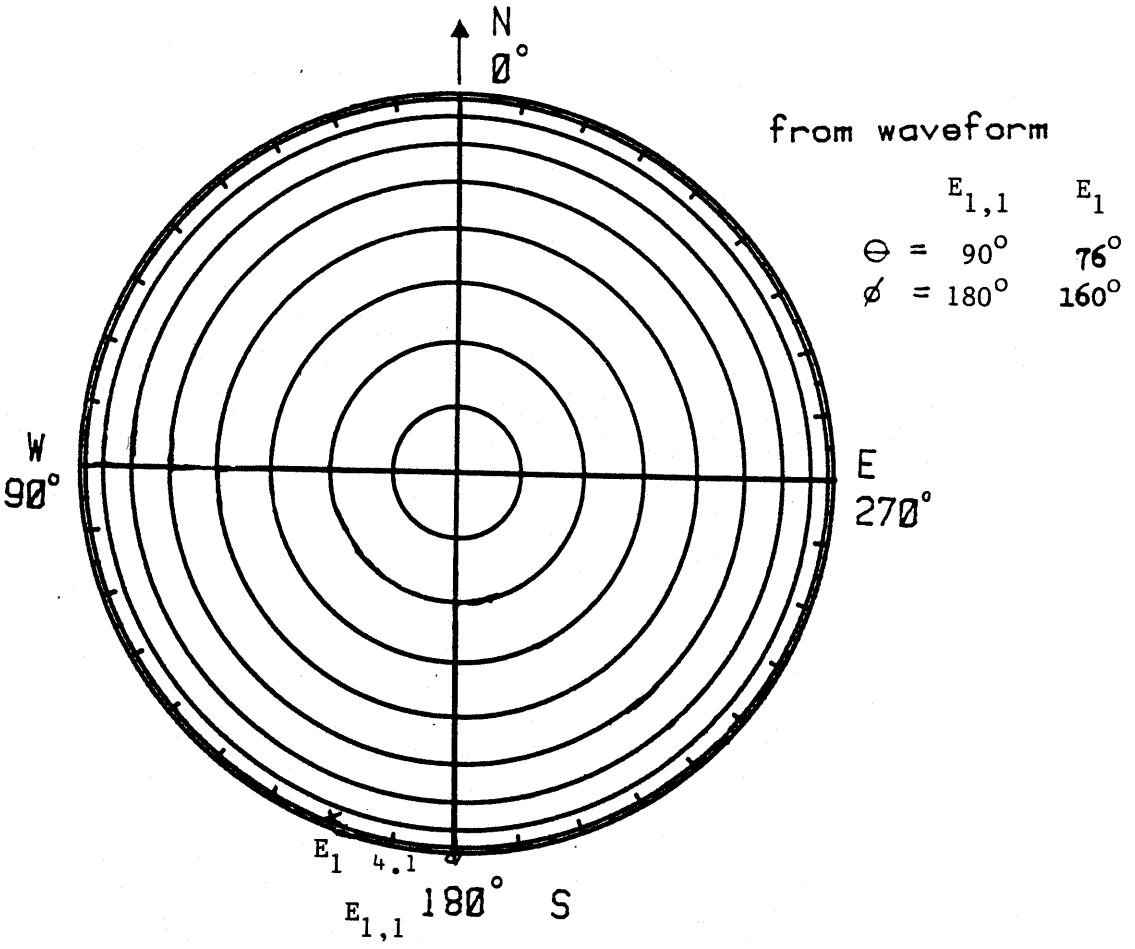
Date : 81226 M.S.T. : 13:31:15.939

Figure 10.6.6.A.3 $\sin(\theta)_{,}\phi$ contours for rocket triggered lightning derivative waveform



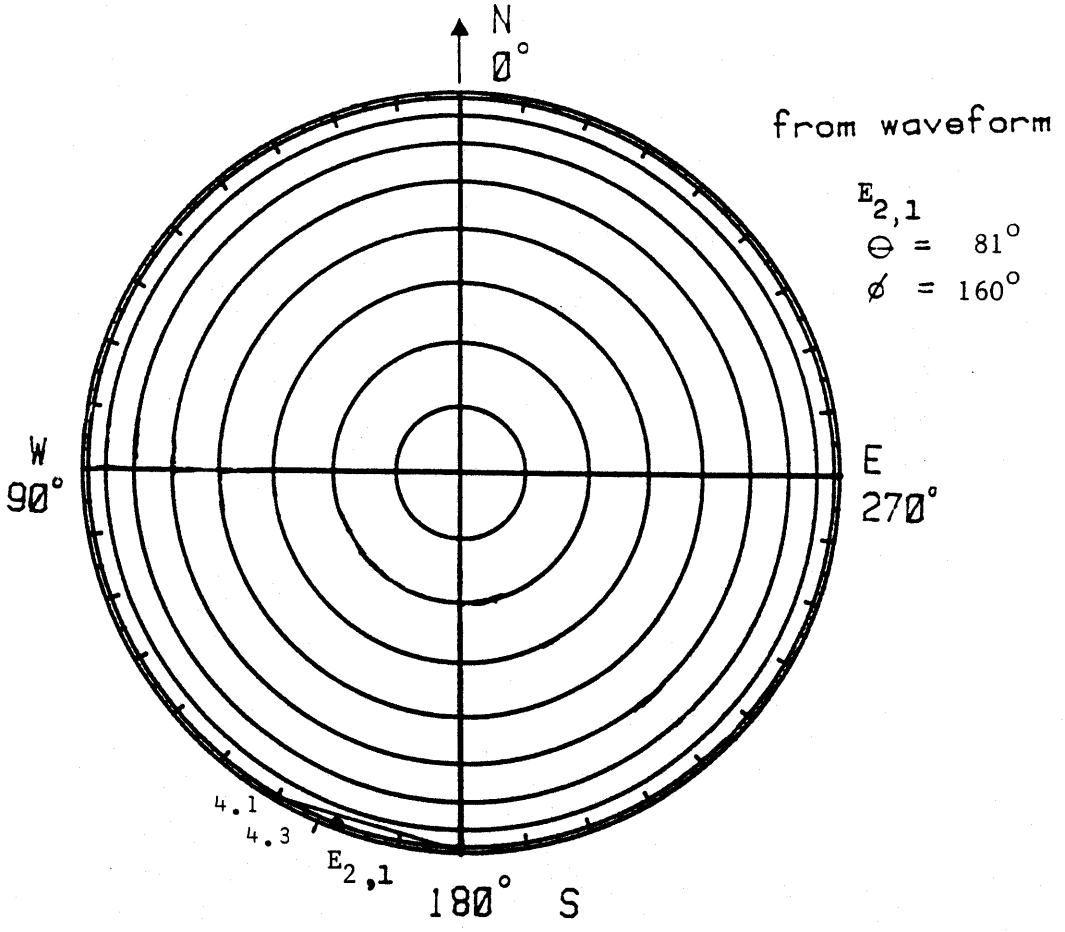
Date : 81226 M.S.T. : 13:31:16.017

Figure 10.6.6.A.4 **sin(θ),ϕ contours for rocket triggered lightning derivative waveform**



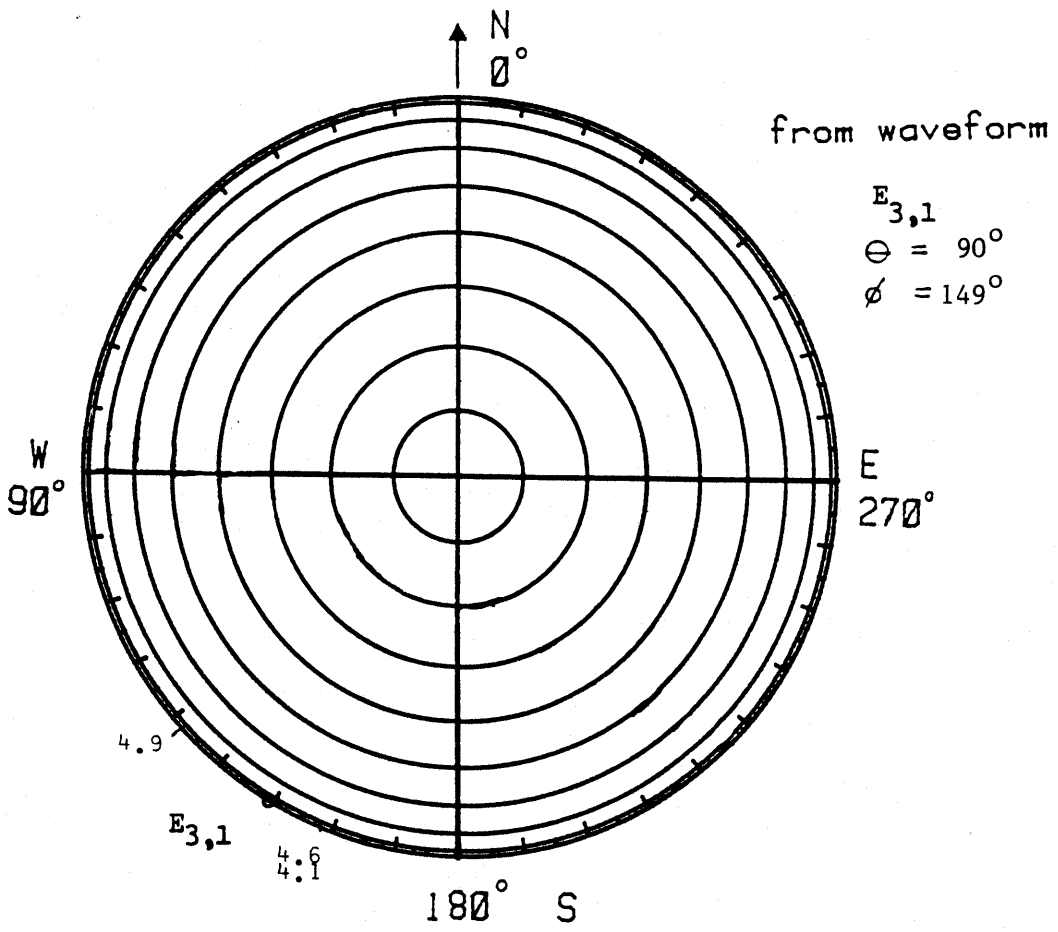
Date : 81226 M.S.T. : 13:31:15.611

Figure 10.6.4.B.1 **sin(θ),ϕ contours for rocket triggered lightning waveform**



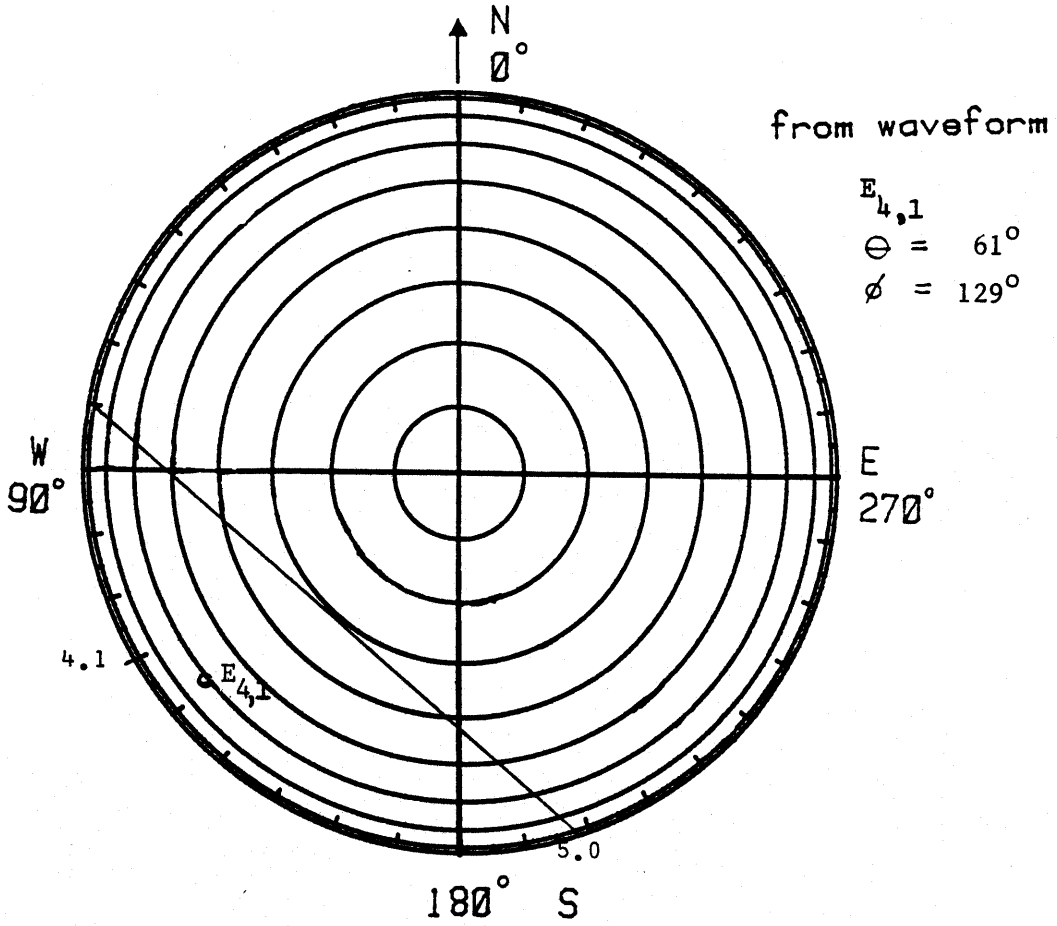
Date : 81226 M.S.T. : 13:31:15.887

Figure D.6.f.B.2 **sin(θ),ϕ contours for rocket triggered lightning waveform**



Date : 81226 M.S.T. : 13:31:15.939

Figure [illegible] sin(θ),ϕ contours for rocket triggered lightning waveform



Date : 81226 M.S.T. : 13:31:16.017

Figure 10.6.6.B.4 $\sin(\theta),\phi$ contours for rocket triggered lightning waveform

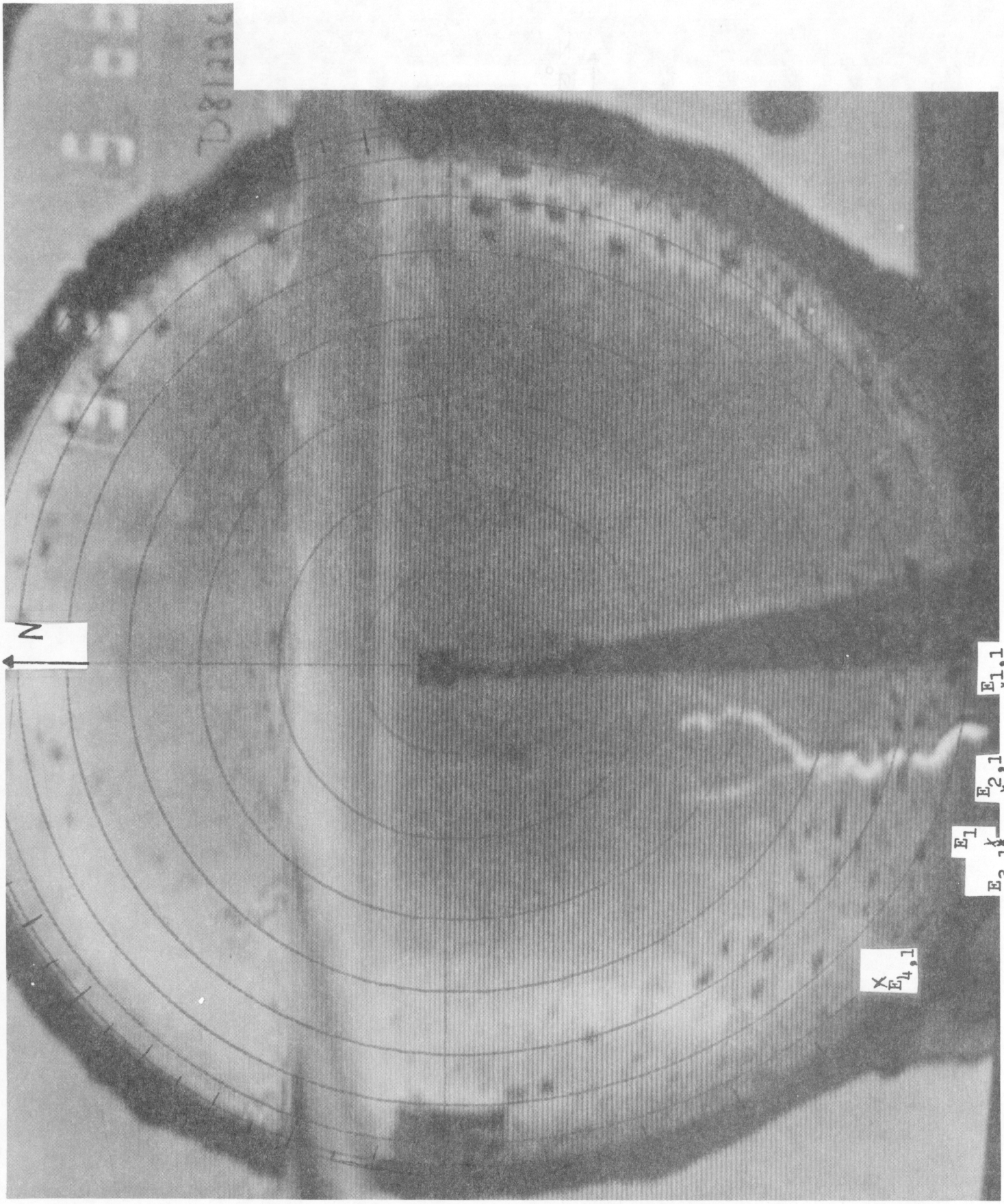


Figure 10.6.7 Whole-sky videotape photograph of rocket triggered lightning from Kiva

Figure **10.6.8** **Tabulation** of θ, ϕ values for waveform and TOA solutions with origin at different locations

Yeardate : 81226 M.S.T. : 1331.15

Event		TOA	waveform	r TOA (meters)	r waveform (meters)	TOA origin at Kiva	TOA origin at WSC	waveform origin at WSC
1	θ	77.1°	90°	900	376	75.9°	78.7°	90°
	ϕ	160.6°	180°			159.9°	159.9°	178°
2	θ		81°		381			83°
	ϕ		167°					166°
3	θ		90°		376			90°
	ϕ		160°					160°
4	θ		71°		398			74°
	ϕ		136°					139°

Figure **10.6.9.A.1** Tabulation of peak values for each event from derivative waveform set for rocket triggered lightning

Yeardate: 81226 M.S.T.:133115.611

$\phi = 180^{\circ}$; $\theta = 90^{\circ}$; r = 376 m

Event Number	Time (μs)	$Z_o \Delta\partial D_z/\partial t$ (T/s)	$\Delta\partial B_E/\partial t$ (T/s)	$\Delta\partial B_N/\partial t$ (T/s)	$\Delta\partial B_h/\partial t$ (T/s)	$\Delta\partial B_e/\partial t$ (T/s)	$\lvert\Delta\partial\vec{B}/\partial t\rvert$ (T/s)
4.1	4.08	-0.47	-0.08	0.00	0.00	-0.04	0.04

CALCULATED VALUES FOR $\partial\vec{T}/\partial t$

Event Number	$\partial T_2/\partial t$ (10^{15} Am/s^2)	$\partial T_3/\partial t$ (10^{15} Am/s^2)	$\lvert\partial\vec{T}/\partial t\rvert$ (10^{15} Am/s^2)	α (deg)
4.1	0	44	44	360

Figure **10.6.9.A.2** Tabulation of peak values for each event from derivative waveform set for rocket triggered lightning

Yeardate: 81226 M.S.T.:133115.887

$\phi = 167^{\circ}$; $\theta = 81^{\circ}$; r = 381 m

Event Number	Time (μs)	$Z_o \Delta\partial D_z/\partial t$ (T/s)	$\Delta\partial B_E/\partial t$ (T/s)	$\Delta\partial B_N/\partial t$ (T/s)	$\Delta\partial B_h/\partial t$ (T/s)	$\Delta\partial B_e/\partial t$ (T/s)	$\lvert\Delta\partial\vec{B}/\partial t\rvert$ (T/s)
4.1	4.07	-1.77	-1.80	0.39	-0.01	-0.92	0.92
4.3	4.31	-6.48	-4.69	1.17	0.04	-2.42	2.42

CALCULATED VALUES FOR $\partial\vec{T}/\partial t$

Event Number	$\partial T_2/\partial t$ (10^{15} Am/s^2)	$\partial T_3/\partial t$ (10^{15} Am/s^2)	$\lvert\partial\vec{T}/\partial t\rvert$ (10^{15} Am/s^2)	α (deg)
4.1	14	1050	1050	359
4.3	-50	2758	2759	1

Figure **10.6.9.A.3** Tabulation of peak values for each event from derivative waveform set for rocket triggered lightning

Yeardate: 81226 M.S.T.:133115.939

ϕ = 160° ; θ = 90° ; r = 376 m

Event Number	Time (μs)	$Z_o \Delta\partial D_z/\partial t$ (T/s)	$\Delta\partial B_E/\partial t$ (T/s)	$\Delta\partial B_N/\partial t$ (T/s)	$\Delta\partial B_h/\partial t$ (T/s)	$\Delta\partial B_e/\partial t$ (T/s)	$\lvert\Delta\partial \vec{B}/\partial t\rvert$ (T/s)
4.1	4.10	-2.12	-1.80	0.47	0.00	-0.92	0.92
4.6	4.57	-15.08	-14.52	4.06	0.00	-7.52	7.52
4.9	4.93	-3.89	-0.86	0.47	0.00	-0.48	0.48

CALCULATED VALUES FOR $\partial \vec{T}/\partial t$

Event Number	$\partial T_2/\partial t$ (10^{15} Am/s^2)	$\partial T_3/\partial t$ (10^{15} Am/s^2)	$\lvert\partial \vec{T}/\partial t\rvert$ (10^{15} Am/s^2)	α (deg)
4.1	0	1043	1043	360
4.6	0	8480	8480	360
4.9	0	546	546	360

Figure **10.6.9.A.4** Tabulation of peak values for each event from derivative waveform set for rocket triggered lightning

Yeardate: 81226 M.S.T.:133116.017

ϕ = 136° ; θ = 71° ; r = 398 m

Event Number	Time (μs)	$Z_o \Delta\partial D_z/\partial t$ (T/s)	$\Delta\partial B_E/\partial t$ (T/s)	$\Delta\partial B_N/\partial t$ (T/s)	$\Delta\partial B_h/\partial t$ (T/s)	$\Delta\partial B_e/\partial t$ (T/s)	$\lvert\Delta\partial \vec{B}/\partial t\rvert$ (T/s)
4.1	4.12	2.36	1.49	-1.56	-0.14	1.08	1.09
5.0	4.95	-0.83	-0.78	0.70	-0.06	-0.53	0.53

CALCULATED VALUES FOR $\partial \vec{T}/\partial t$

Event Number	$\partial T_2/\partial t$ (10^{15} Am/s^2)	$\partial T_3/\partial t$ (10^{15} Am/s^2)	$\lvert\partial \vec{T}/\partial t\rvert$ (10^{15} Am/s^2)	α (deg)
4.1	169	-1284	1295	187
5.0	67	627	631	354

Figure **10.6.9.B.1** Tabulation of peak values for each event from waveform set for rocket triggered lightning

Yeardate: 81226 M.S.T.:133115.611

$\phi = 180^{o}$; $\theta = 90^{o}$; r = 376 m

Event Number	Time (μs)	$Z_o \Delta D_s$ (μT)	ΔB_E (μT)	ΔB_N (μT)	ΔB_h (μT)	ΔB_e (μT)	$\lvert\Delta\vec{B}\rvert$ (μT)
4.1	4.14	-0.01	-0.00	0.00	0.00	-0.00	0.00

CALCULATED VALUES FOR $\vec{I}_t . \hat{\tau}$

Event Number	T_2 (10^9 Am/s)	T_3 (10^9 Am/s)	$\lvert\vec{T}\rvert$ (10^9 Am/s)	α (deg)
4.1	0	2	2	360

Figure **10.6.9.B.2** Tabulation of peak values for each event from waveform set for rocket triggered lightning

Yeardate: 81226 M.S.T.:133115.887

$\phi = 160^{o}$; $\theta = 81^{o}$; r = 381 m

Event Number	Time (μs)	$Z_o \Delta D_s$ (μT)	ΔB_E (μT)	ΔB_N (μT)	ΔB_h (μT)	ΔB_e (μT)	$\lvert\Delta\vec{B}\rvert$ (μT)
4.1	4.09	-0.06	-0.06	0.02	-0.00	-0.03	0.03
4.3	4.31	-0.40	-0.23	0.10	0.01	-0.12	0.13

CALCULATED VALUES FOR $\vec{I}_t . \hat{\tau}$

Event Number	T_2 (10^9 Am/s)	T_3 (10^9 Am/s)	$\lvert\vec{T}\rvert$ (10^9 Am/s)	α (deg)
4.1	2	37	37	356
4.3	-8	143	143	3

Figure 10.6.9.B.3 Tabulation of peak values for each event from waveform set for rocket triggered lightning

Yeardate: 81226 M.S.T.:133115.939

$\phi = 149^{o}$; $\theta = 90^{o}$; r = 376 m

Event Number	Time (μs)	$Z_o \Delta D_s$ (μT)	ΔB_E (μT)	ΔB_N (μT)	ΔB_h (μT)	ΔB_e (μT)	$\lvert\Delta\vec{B}\rvert$ (μT)
4.1	4.10	-0.15	-0.11	0.05	0.00	-0.06	0.06
4.6	4.57	-2.07	-1.48	0.59	0.00	-0.79	0.79
4.9	4.93	-0.50	-0.05	0.06	0.00	-0.04	0.04

CALCULATED VALUES FOR $\vec{I}_t . \vec{T}$

Event Number	T_2 (10^9 Am/s)	T_3 (10^9 Am/s)	$\lvert\vec{T}\rvert$ (10^9 Am/s)	α (deg)
4.1	0	68	68	360
4.6	0	887	887	360
4.9	0	42	42	360

Figure 10.6.9.B.4 Tabulation of peak values for each event from waveform set for rocket triggered lightning

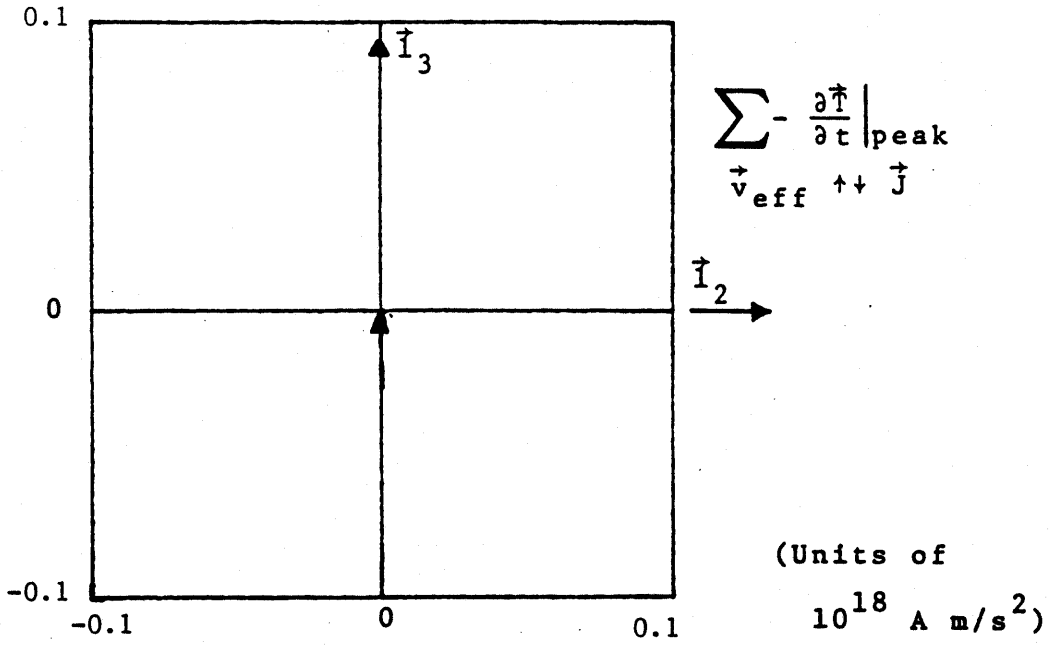
Yeardate: 81226 M.S.T.:133116.017

$\phi = 129^{o}$; $\theta = 61^{o}$; r = 430 m

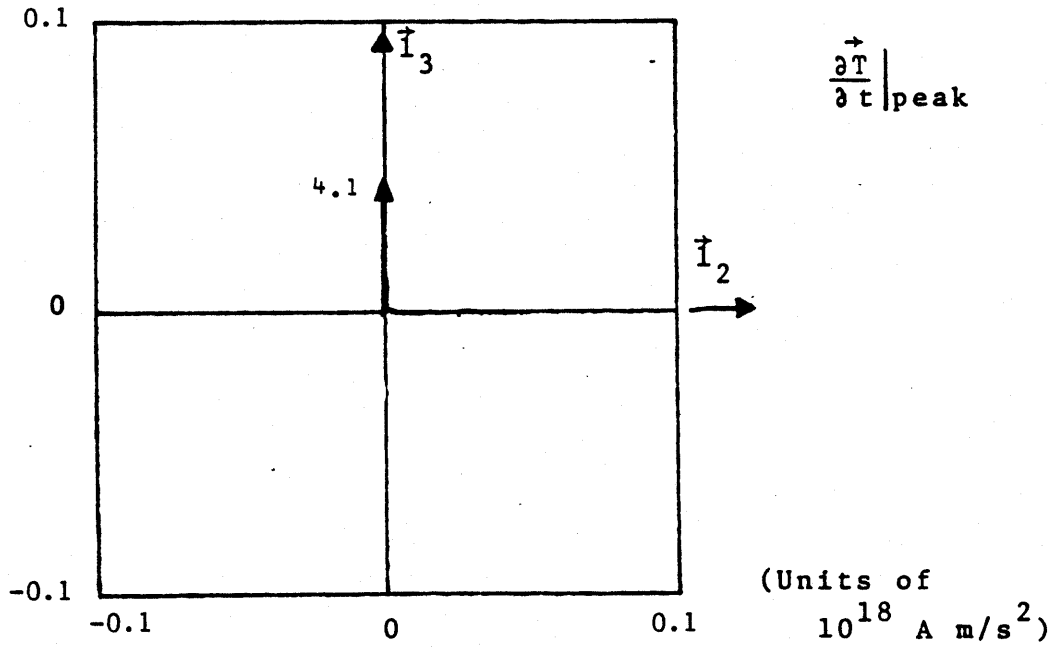
Event Number	Time (μs)	$Z_o \Delta D_s$ (μT)	ΔB_E (μT)	ΔB_N (μT)	ΔB_h (μT)	ΔB_e (μT)	$\lvert\Delta\vec{B}\rvert$ (μT)
4.1	4.14	0.12	0.06	-0.10	-0.02	0.05	0.06
5.0	4.99	-0.04	-0.06	0.05	-0.01	-0.04	0.04

CALCULATED VALUES FOR $\vec{I}_t . \vec{T}$

Event Number	T_2 (10^9 Am/s)	T_3 (10^9 Am/s)	$\lvert\vec{T}\rvert$ (10^9 Am/s)	α (deg)
4.1	24	-70	74	198
5.0	18	47	50	339



Effective reconstruction of negative streamer

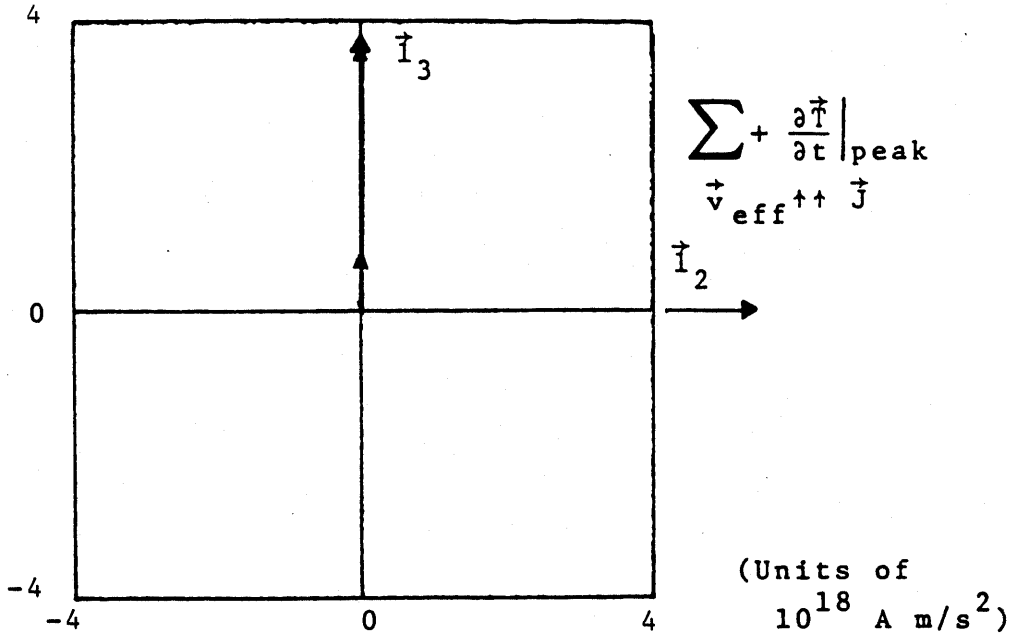


Peaks of $\partial\vec{T}/\partial t$

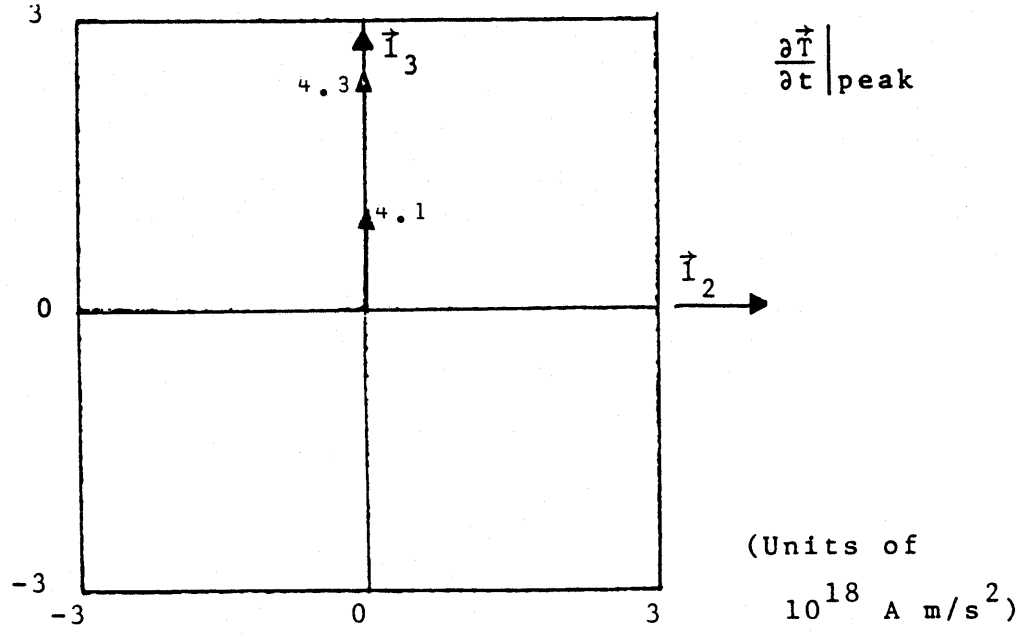
$\phi = 180^\circ$ $\theta = 90^\circ$ r = 376 m

Date: 81226 M.S.T.: 13:31:15.611

Figure 10.6.10.A.1 $\partial\vec{T}/\partial t$ for rocket triggered lightning



Effective reconstruction of positive streamer

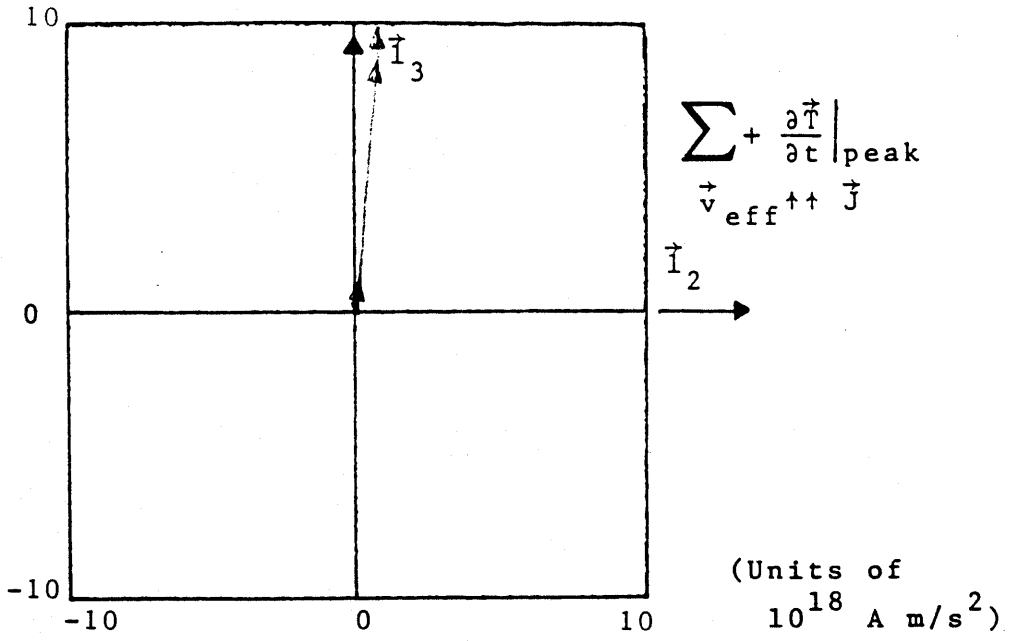


Peaks of $\partial\vec{T}/\partial t$

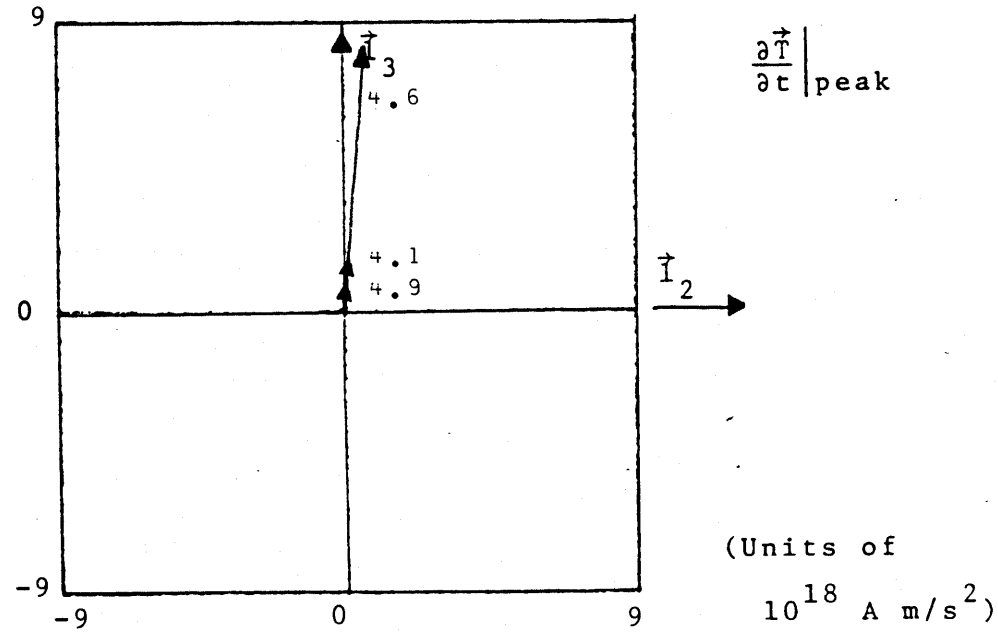
ϕ = 167° θ = 81° r = 381 m

Date: 81226 M.S.T.: 13:31:15.611

Figure 10.6.10.A.2 $\partial\vec{T}/\partial t$ for rocket triggered lightning



Effective reconstruction of positive streamer

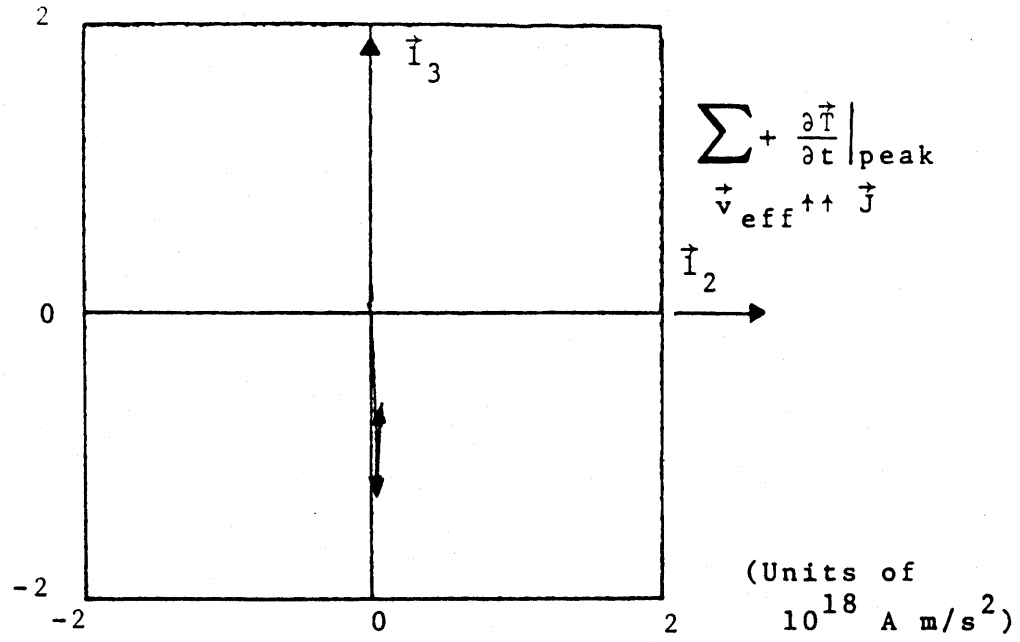


Peaks of $\partial\vec{I}/\partial t$

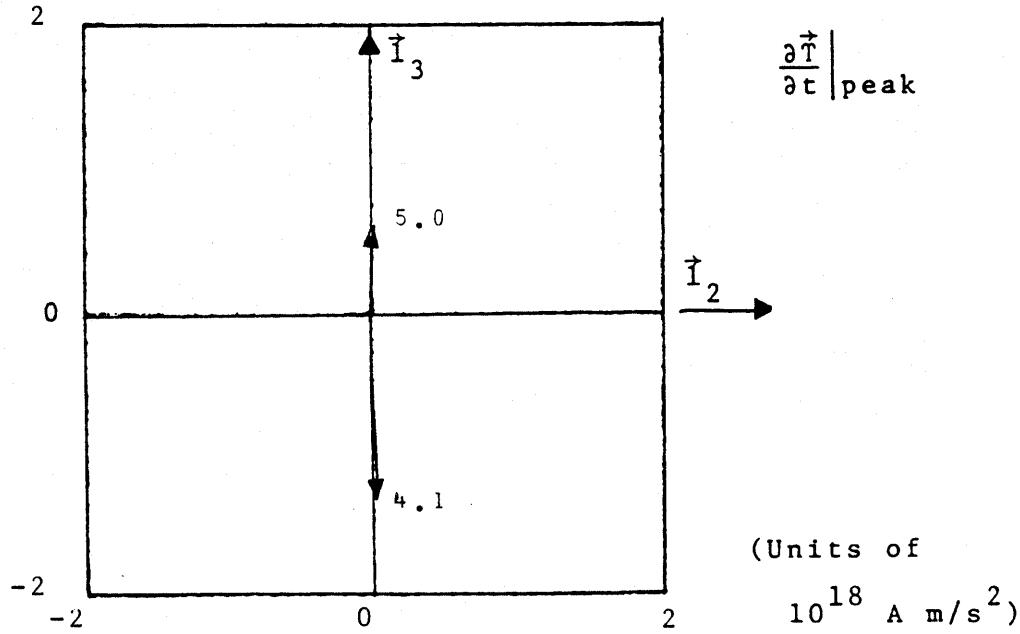
$\phi = 160^{\circ}$ $\theta = 90^{\circ}$ r = 376 m

Date: 81226 M.S.T.: 13:31:15.939

Figure 10.6.10.A.3 $\partial\vec{I}/\partial t$ for rocket triggered lightning



Effective reconstruction of positive streamer

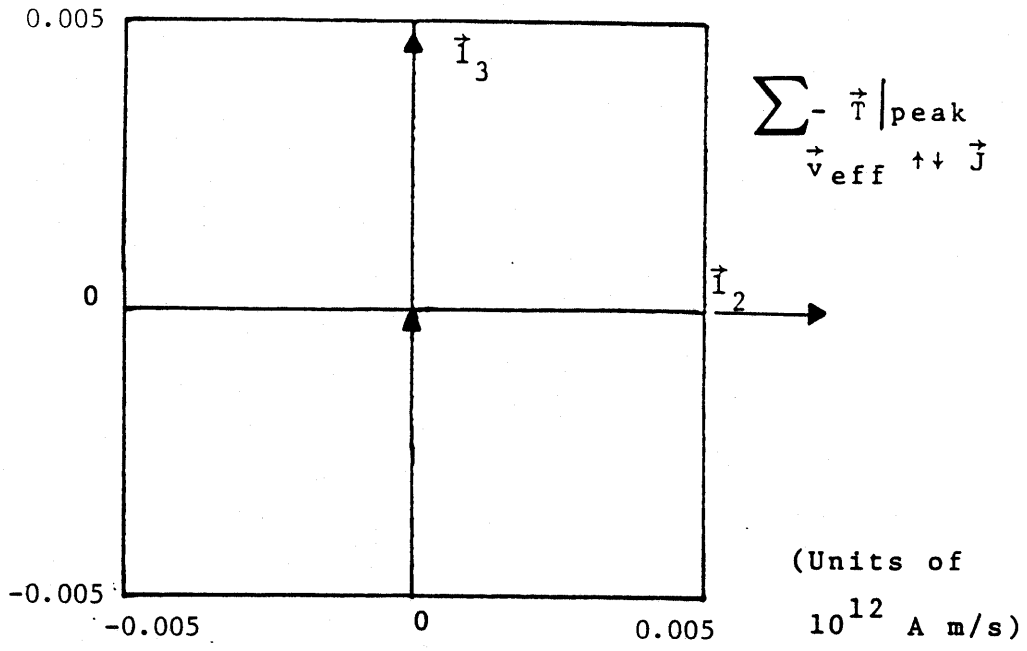


Peaks of $\partial\vec{I}/\partial t$

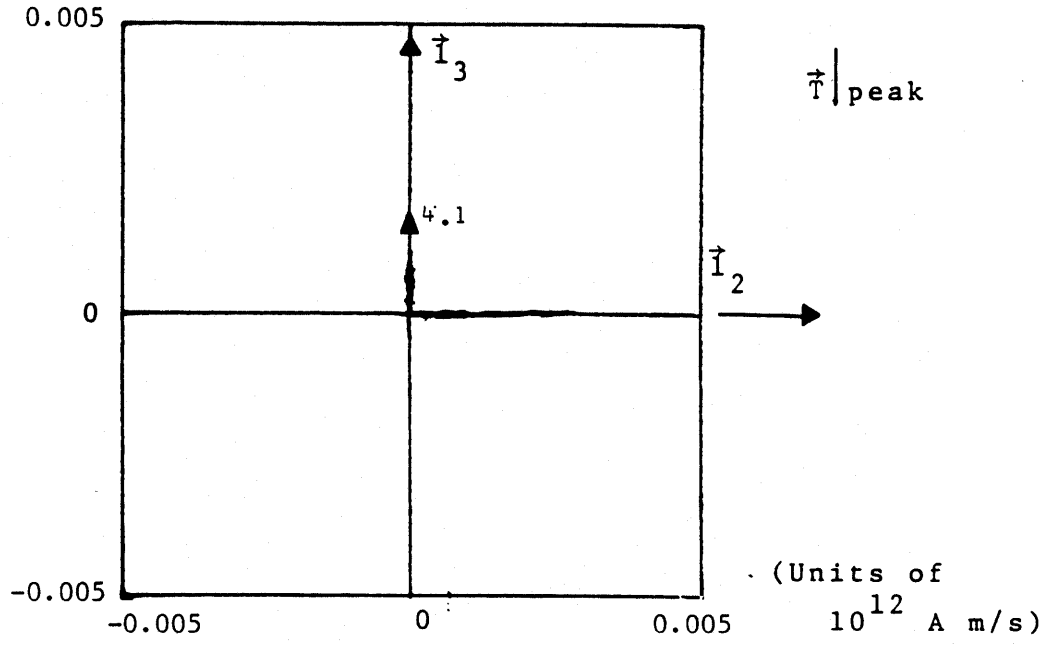
$\phi = 136^\circ$ $\theta = 71^\circ$ r = 398 m

Date: 81226 M.S.T.: 13:31:16.017

Figure 10.6.10.A.4 $\partial\vec{I}/\partial t$ for rocket triggered lightning



Effective reconstruction of negative streamer

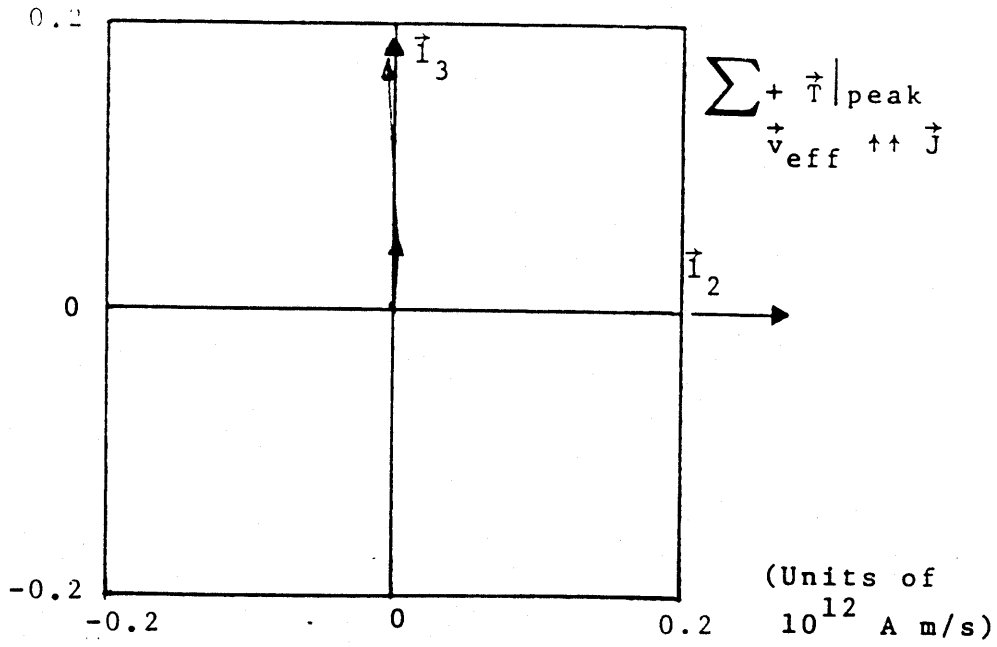


Peaks of $\vec{T}$

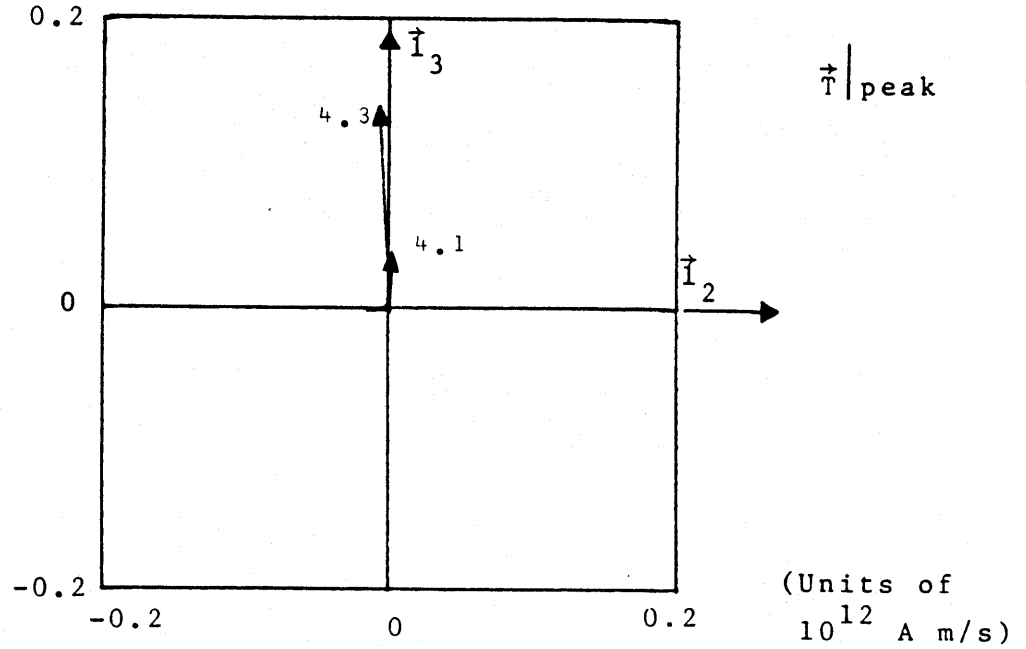
$\phi = 180^{\circ}$ $\theta = 90^{\circ}$ r = 376 m

Date: 81226 M.S.T.: 13:31:15.611

Figure 10.6.10.B.1 $\vec{T}$ for rocket triggered lightning



Effective reconstruction of positive streamer

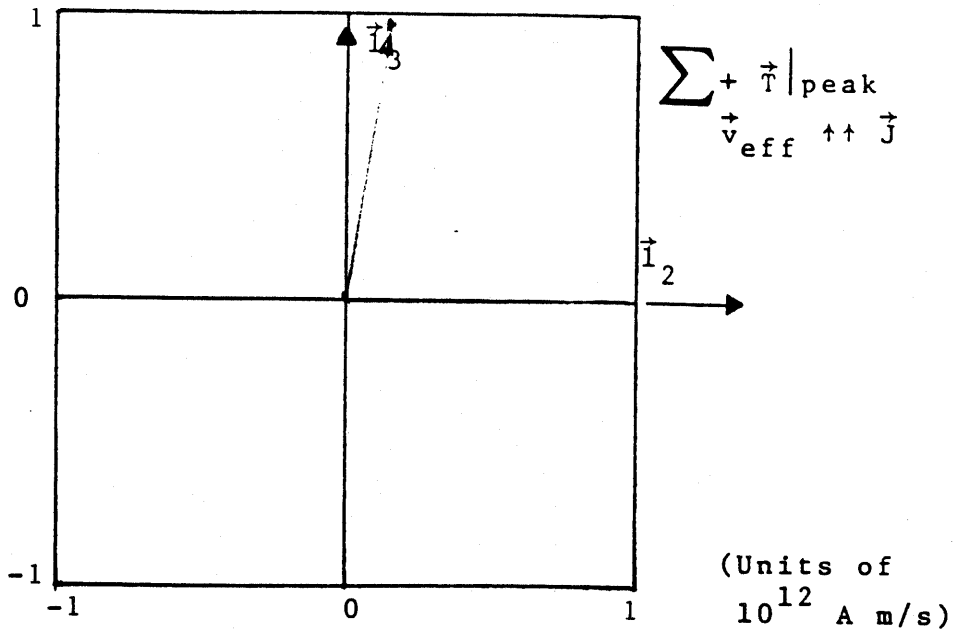


Peaks of $\vec{T}$

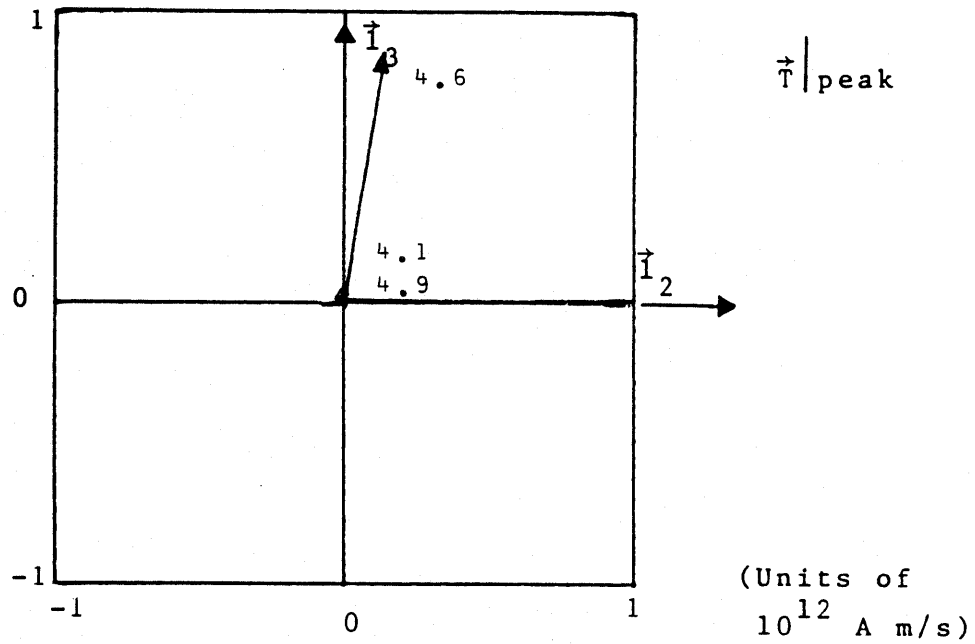
ϕ = 160° θ = 81° r = 381 m

Date: 81226 M.S.T.: 13:31:15.887

Figure 10.6.10.B.2 $\vec{T}$ for rocket triggered lightning



Effective reconstruction of positive streamer

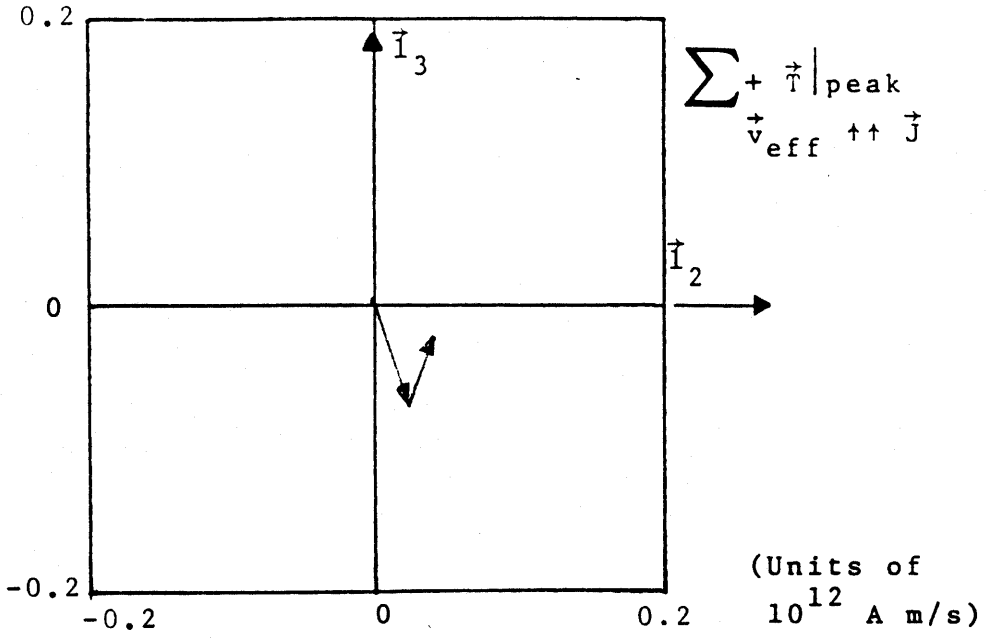


Peaks of $\vec{T}$

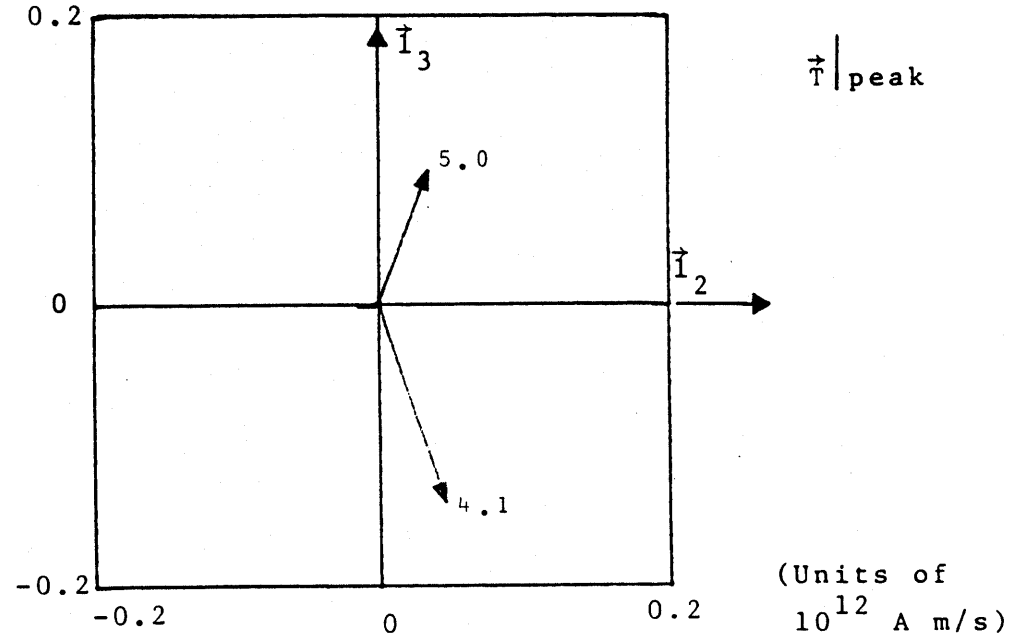
$\phi = 149^{\circ}$ $\theta = 90^{\circ}$ r = 376 m

Date: 81226 M.S.T.: 13:31:15.939

Figure 10.6.10.B.3 $\vec{T}$ for rocket triggered lightning



Effective reconstruction of positive streamer



Peaks of $\vec{T}$

$\phi = 129^{\circ}$ $\theta = 61^{\circ}$ r = 430 m

Date: 81226 M.S.T.: 13:31:16.017

Figure 10.6.10.B.4 $\vec{T}$ for rocket triggered lightning

10.7 ROCKET TRIGGERED LIGHTNING

This example of rocket triggered lightning contains 2 leader waveform events, 2 return stroke events and 2 TOA events. The leader waveforms show one main pulse and none of the successive pulses occurring a μs apart.

The Biomation trigger marks in Figure 10.7.4.b show clearly that the first event occurred during the initial leader and the final two events occurred during the return strokes.

Events 1,1 and 4,1 are located at the rocket launcher in the acoustic reconstruction. The remaining event locations seem to have the value for range too small. The agreement of the source locations with the photograph seems to be quite good, the TOA directions being within about 5° of the channel, and similarly for the waveform directions.

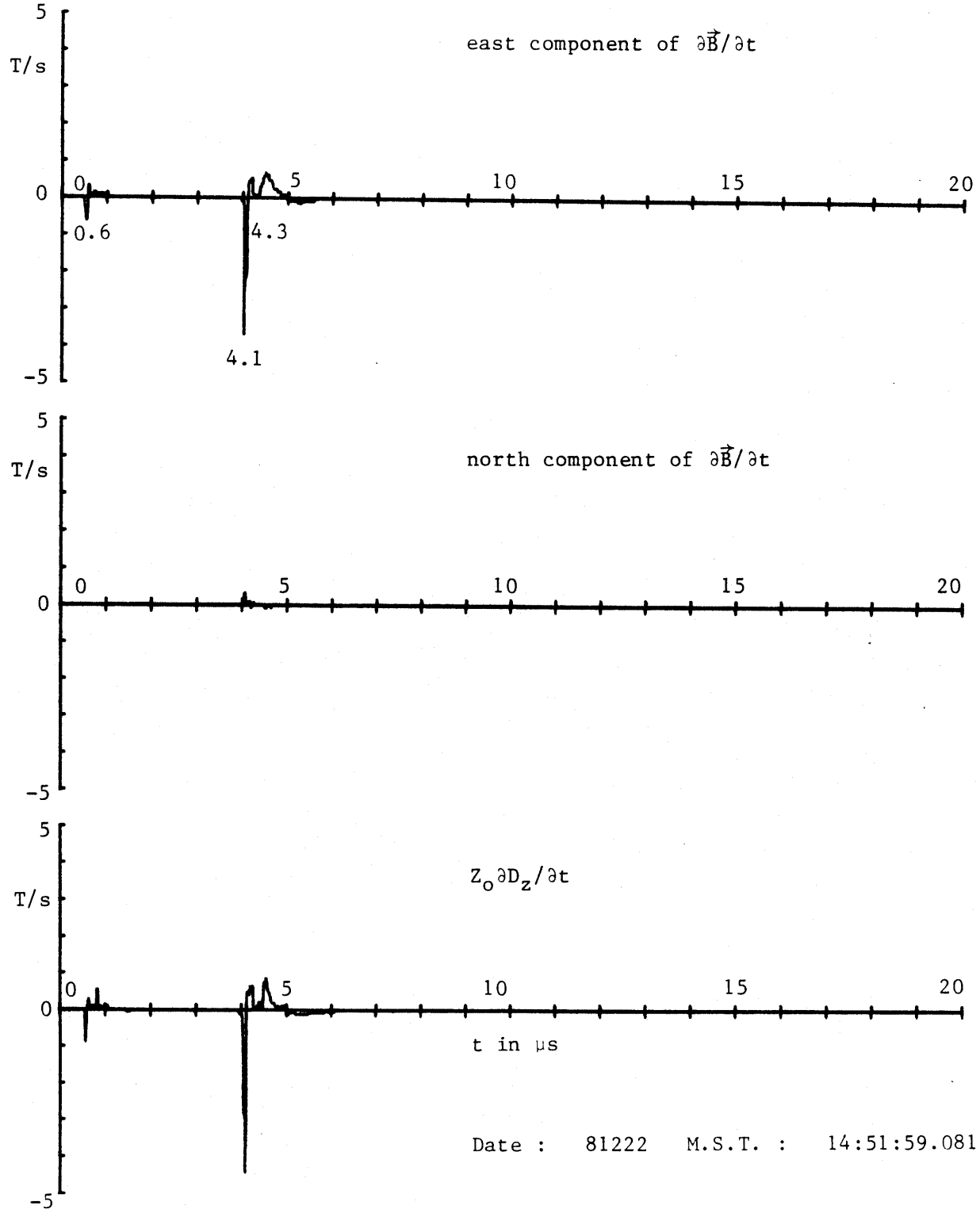


Figure 10.7.1.A.1 Derivative fields from rocket triggered lightning

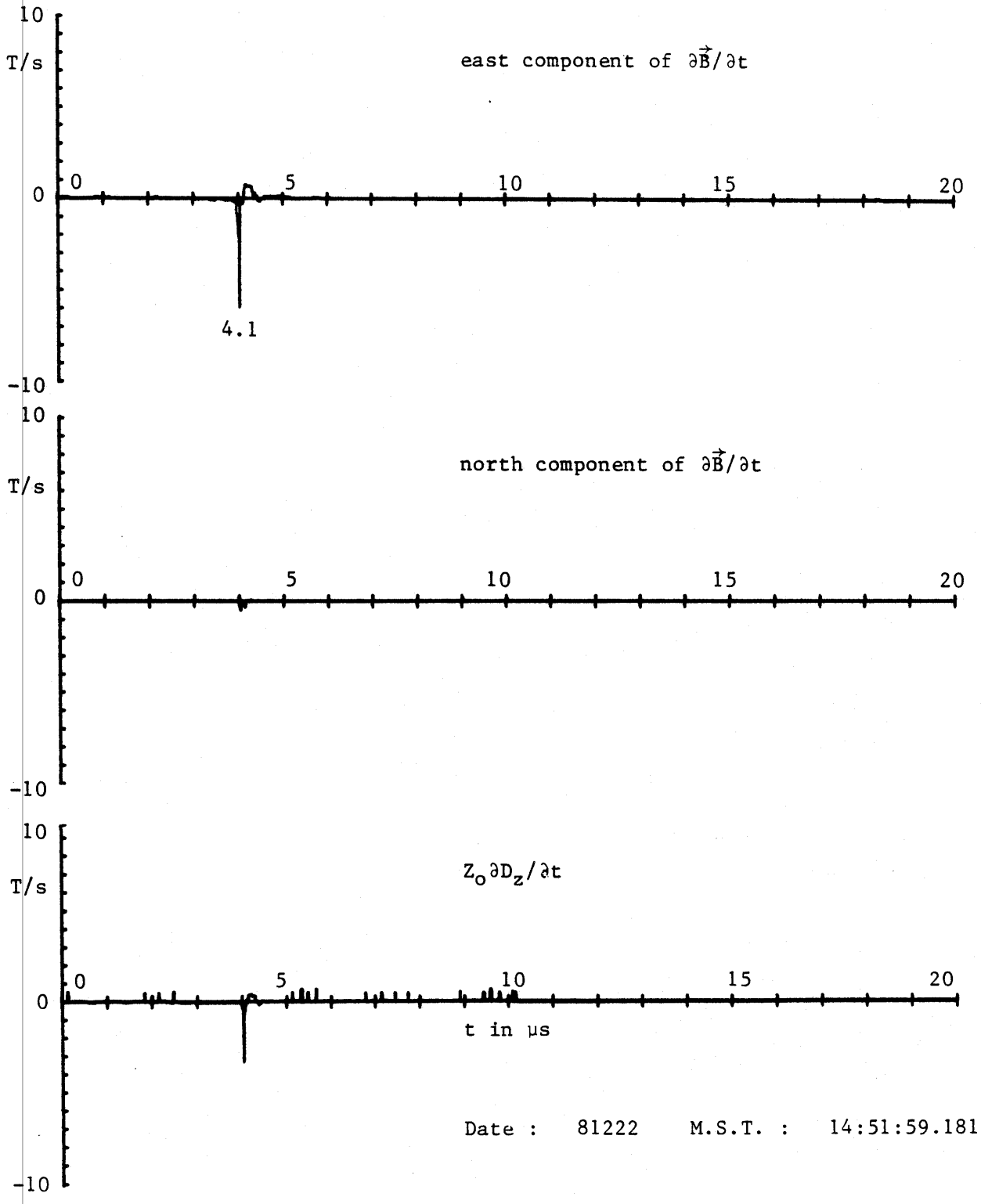


Figure 10.7.1.A.2 Derivative fields from rocket triggered lightning

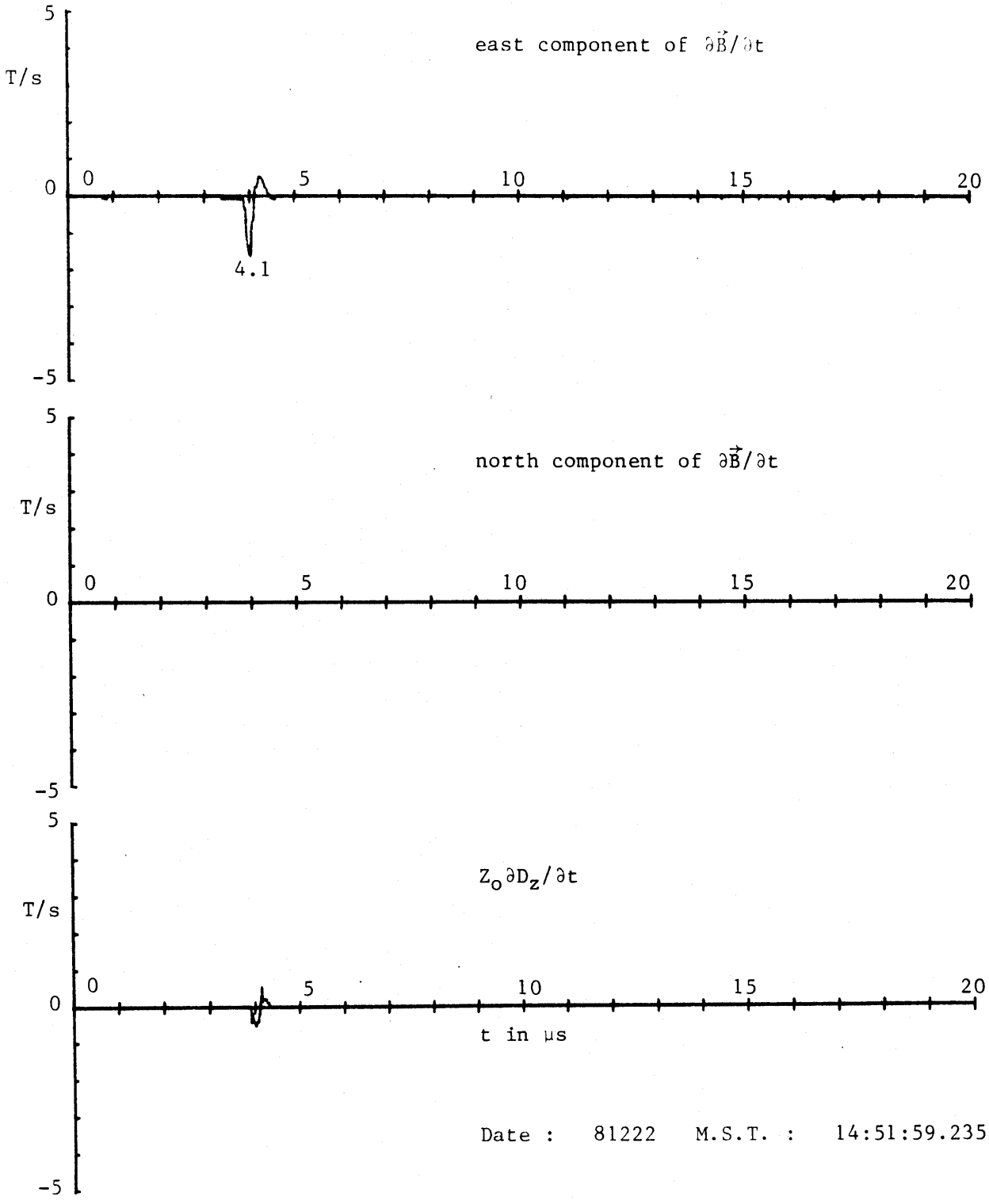


Figure 10.7.1.A.3 Derivative fields from rocket triggered lightning

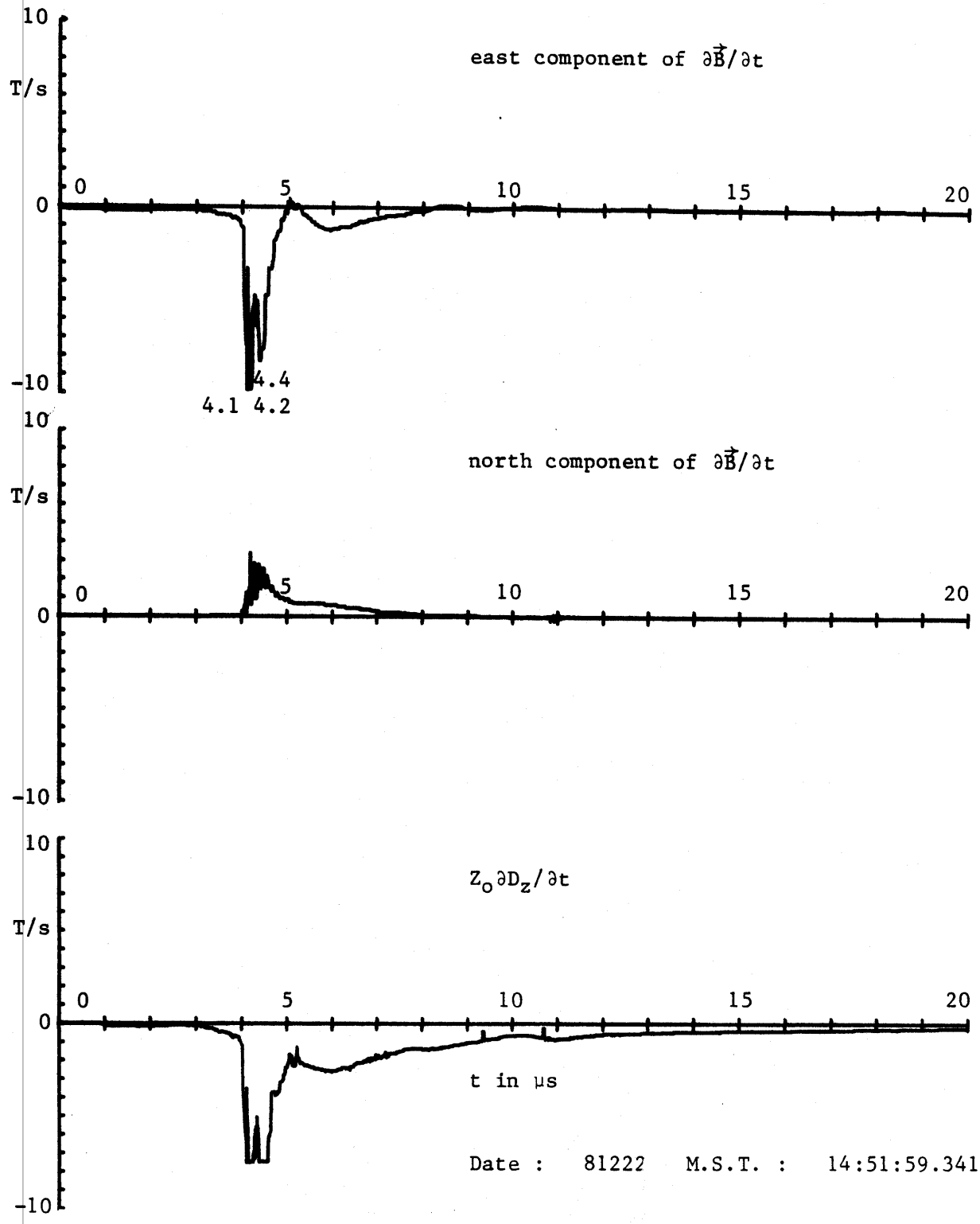


Figure 10.7.1.A.4 Derivative fields from rocket triggered lightning

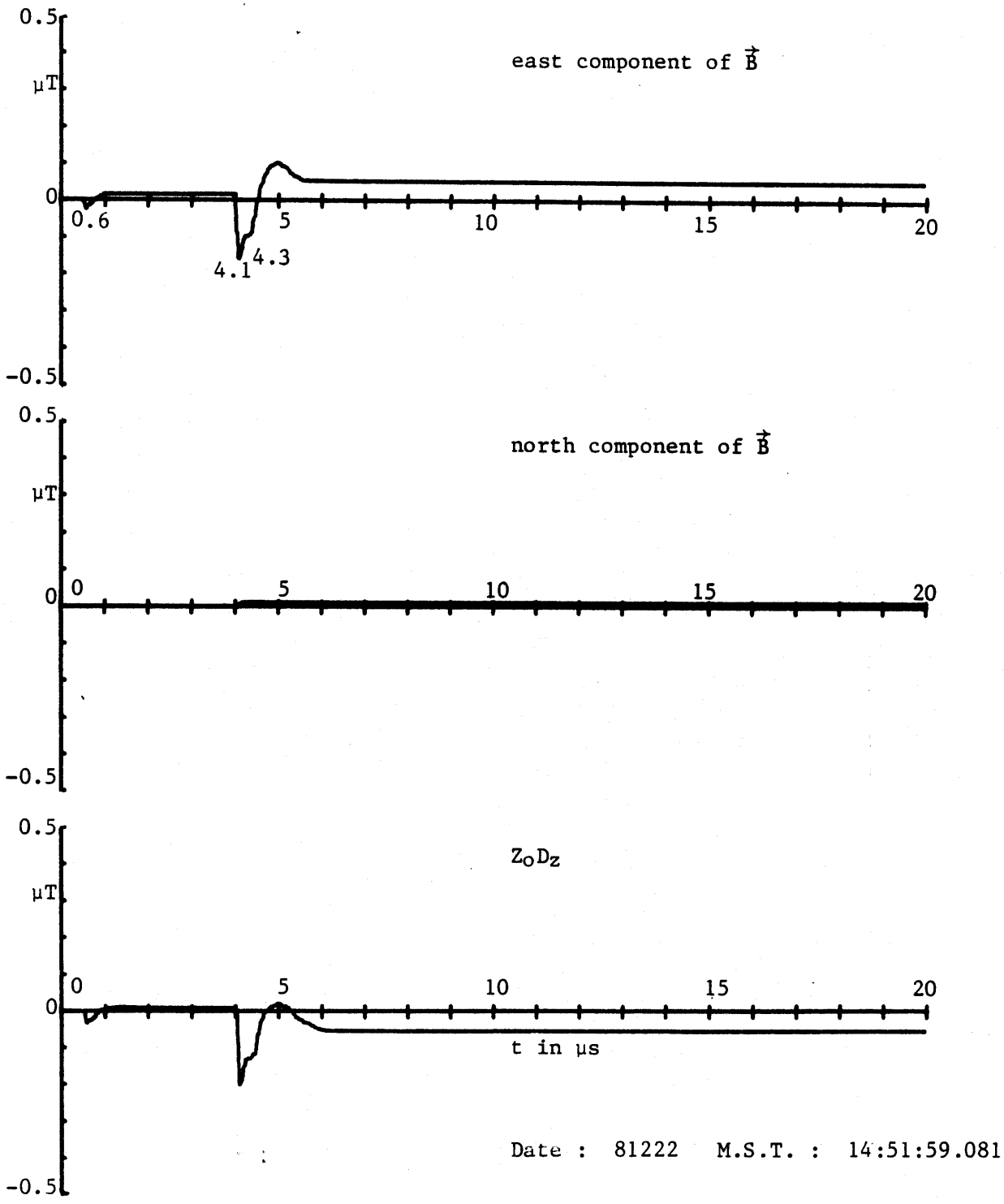


Figure 10.7.1.E.1 Fields from rocket triggered lightning

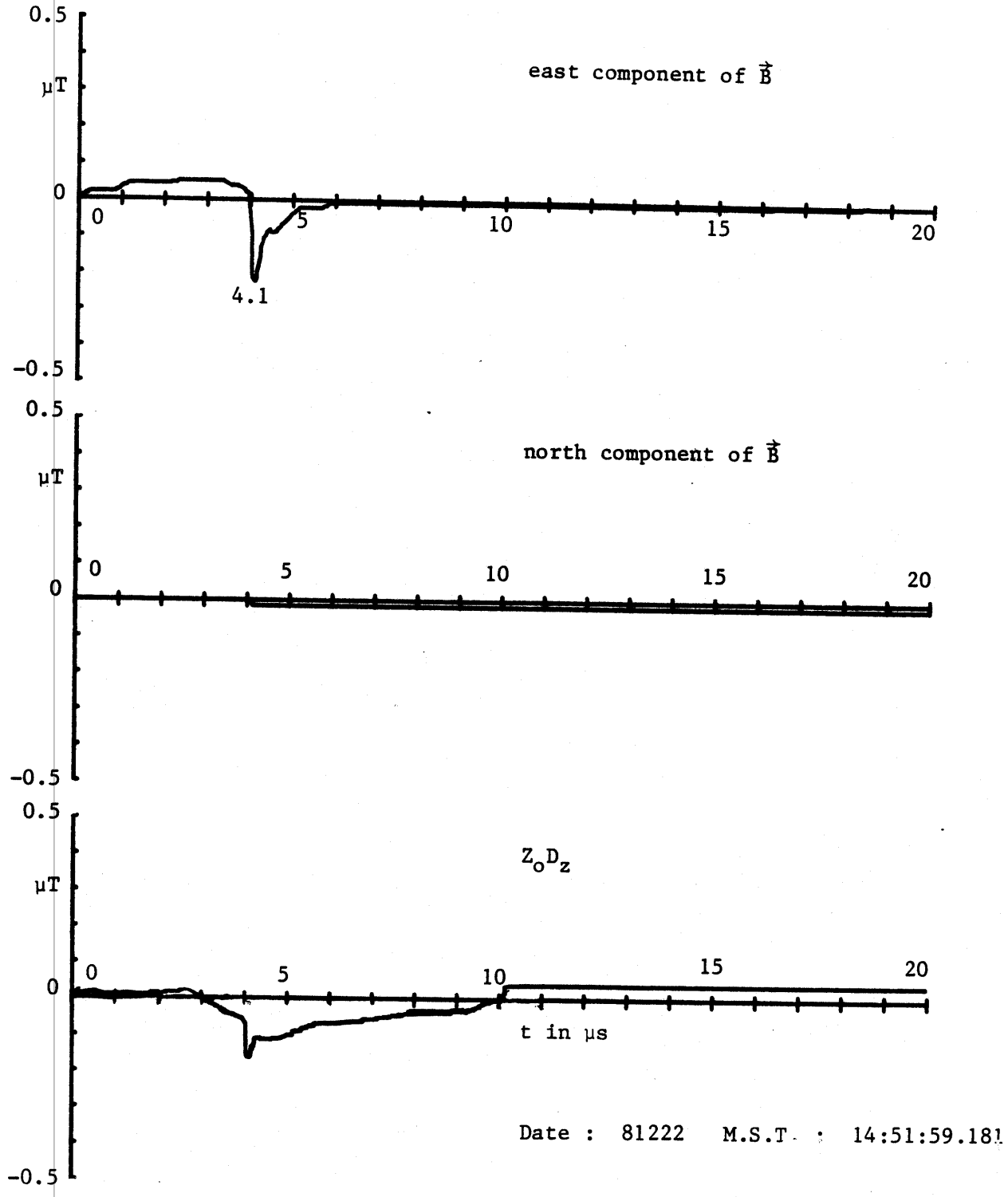


Figure 10.7.1.B.2 Fields from rocket triggered lightning

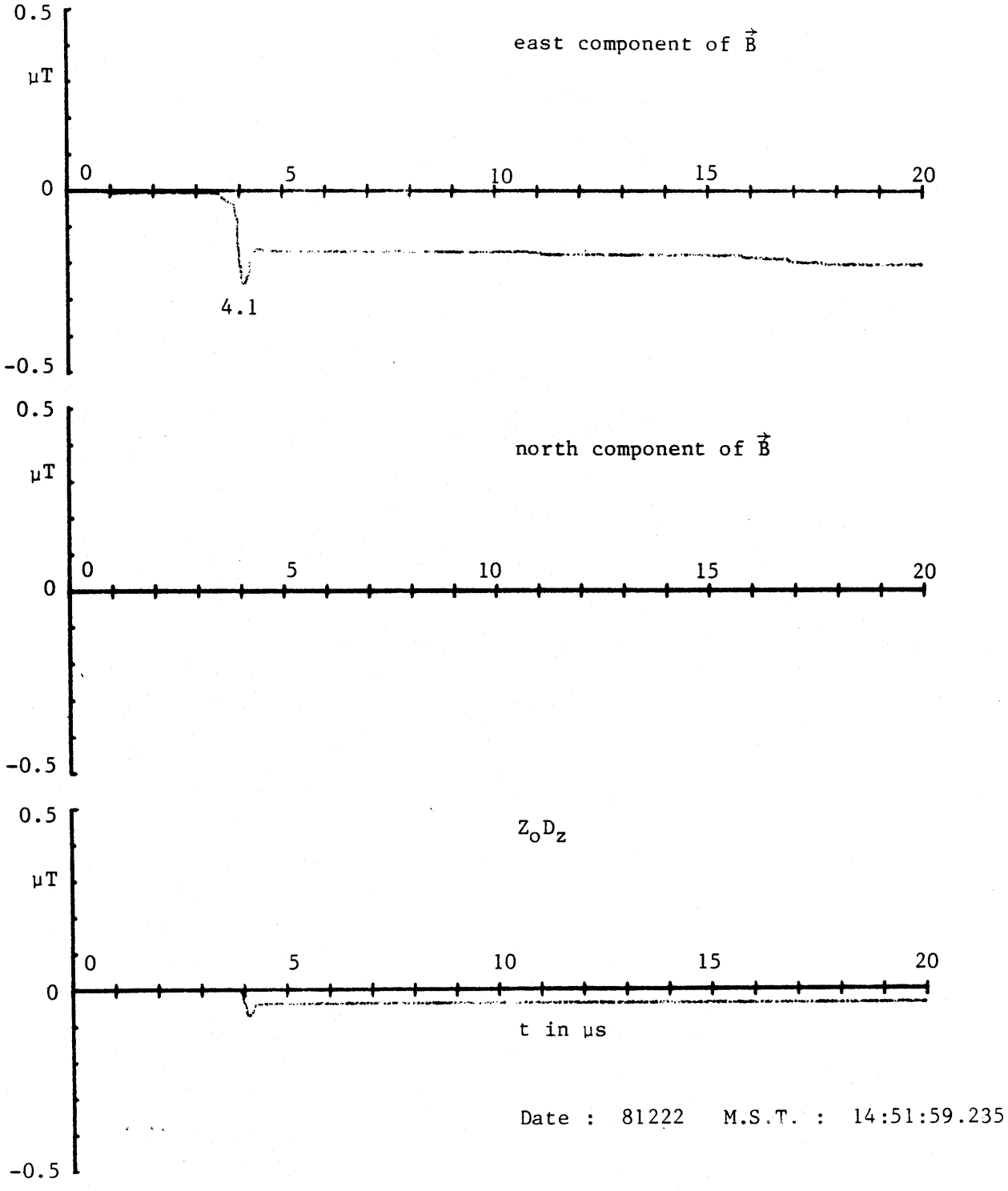


Figure 10.7.1.B.3 Fields from rocket triggered lightning

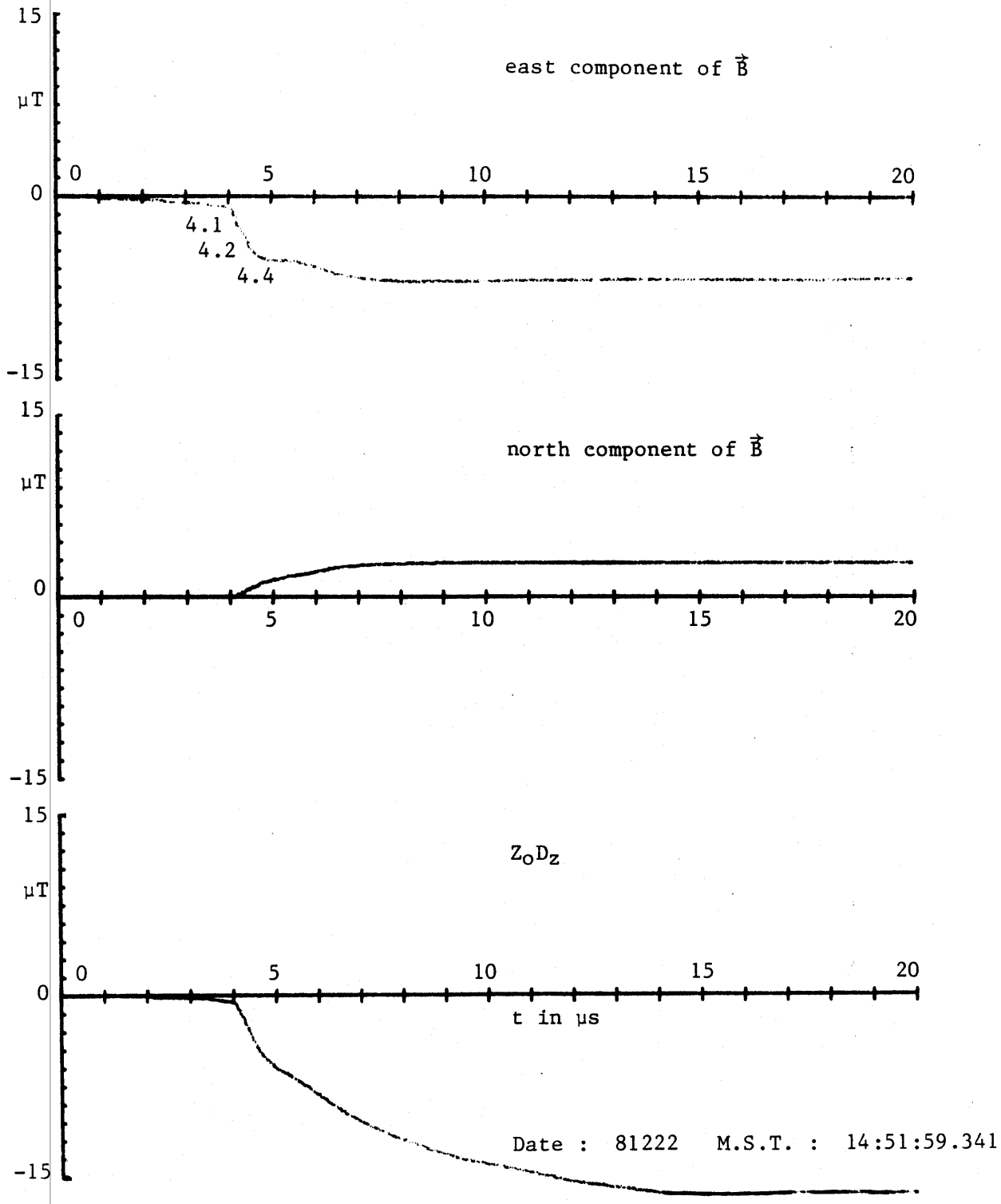


Figure 10.7.1.B.4 Fields from rocket triggered lightning

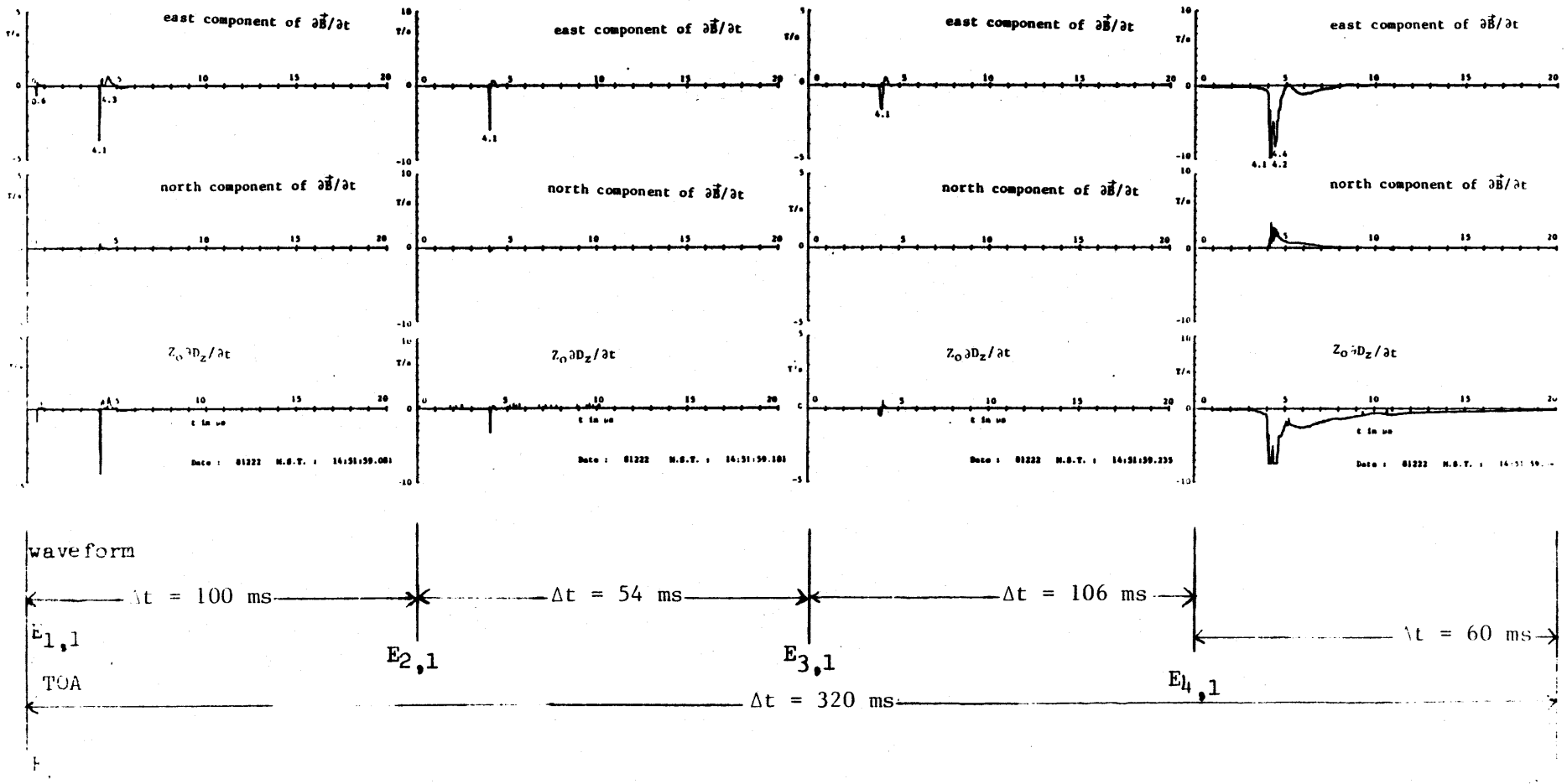


Figure 10.7.2 Time history of waveform and TOA events from rocket triggered lightning

Figure [illegible] Digital data for event 0.6

[ ] = baseline which is subtracted for peaks and numerical integration

Yeardate: 81222 Time: 14:51:59.081 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
0.52	-0.391	-0.078	0.000	0.000	-0.000	0.000
0.53	-0.391	-0.078	0.000	0.000	-0.000	0.000
0.54	-0.625	-0.078	0.000	-0.002	-0.000	0.000
0.55	-0.938	-0.078	0.000	-0.008	-0.000	0.000
0.56	-1.016	-0.078	-0.177	-0.014	-0.000	-0.002
0.57	-1.016	-0.078	-0.412	-0.020	-0.000	-0.006
0.58	-0.703	-0.078	-0.707	-0.023	-0.000	-0.013
0.59	-0.625	-0.078	-0.884	-0.026	-0.000	-0.022
0.60	-0.391	-0.078	-0.707	-0.026	-0.000	-0.029
0.61	-0.313	-0.078	-0.412	-0.025	-0.000	-0.033
0.62	-0.078	-0.078	-0.177	-0.022	-0.000	-0.035
0.63	-0.078	-0.078	0.000	-0.019	-0.000	-0.035
0.64	-0.078	-0.078	0.118	-0.016	-0.000	-0.034
0.65	-0.313	-0.078	0.295	-0.015	-0.000	-0.031
0.66	-0.313	-0.078	0.295	-0.014	-0.000	-0.028
0.67	-0.313	-0.078	0.236	-0.013	-0.000	-0.025
0.68	-0.313	-0.078	0.059	-0.012	-0.000	-0.025
0.69	-0.313	-0.078	0.118	-0.012	-0.000	-0.024
0.70	-0.313	-0.078	0.059	-0.011	-0.000	-0.023
0.71	-0.313	-0.078	0.059	-0.010	-0.000	-0.022
0.72	-0.313	-0.078	0.118	-0.009	-0.000	-0.021
0.73	-0.313	-0.078	0.059	-0.009	-0.000	-0.021
0.74	-0.313	-0.078	0.059	-0.008	-0.000	-0.020
0.75	-0.234	-0.078	0.059	-0.006	-0.000	-0.019
0.76	-0.234	-0.078	0.118	-0.005	-0.000	-0.018
0.77	-0.234	-0.078	0.118	-0.003	-0.000	-0.017
0.78	-0.234	-0.078	0.118	-0.001	-0.000	-0.016
0.79	-0.313	-0.078	0.118	-0.001	-0.000	-0.015
0.80	-0.313	-0.078	0.118	0.000	-0.000	-0.014
0.81	-0.313	-0.078	0.059	0.001	-0.000	-0.013
0.82	-0.313	-0.078	0.059	0.002	-0.000	-0.012
0.83	-0.313	-0.078	0.530	0.002	-0.000	-0.007
0.84	-0.313	-0.078	0.059	0.003	-0.000	-0.006
0.85	-0.313	-0.078	0.118	0.004	-0.000	-0.005
0.86	-0.313	-0.078	0.059	0.005	-0.000	-0.005
0.87	-0.313	-0.078	0.059	0.006	-0.000	-0.004
0.88	-0.313	-0.078	0.530	0.006	-0.000	0.001

Figure 10.7.3.a.2 Digital data for event 4.1

[ ] = baseline which is subtracted for peaks and numerical integratio

Yeardate: 81222 Time: 14:51:59.081 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
4.02	-0.469	-0.078	-0.118	0.000	-0.000	0.000
4.03	-0.469	-0.078	-0.118	0.000	-0.000	0.000
4.04	-0.547	-0.078	-0.118	-0.001	-0.000	0.000
4.05	-1.250	-0.078	-0.118	-0.009	-0.000	0.000
4.06	-2.500	-0.078	-0.177	-0.029	-0.000	-0.001
4.07	-3.750	-0.078	-0.412	-0.062	-0.000	-0.004
4.08	-4.063	0.000	-0.943	-0.098	0.001	-0.012
4.09	-3.750	0.234	-2.828	-0.130	0.004	-0.039
4.10	-2.578	0.156	-4.182	-0.152	0.006	-0.080
4.11	-1.953	0.078	-4.418	-0.166	0.008	-0.123
4.12	-0.703	0.000	-3.711	-0.169	0.009	-0.158
4.13	-0.391	0.000	-2.356	-0.168	0.009	-0.181
4.14	-0.313	-0.078	-0.943	-0.166	0.009	-0.189
4.15	-0.078	-0.078	-0.412	-0.162	0.009	-0.192
4.16	0.000	-0.078	0.000	-0.158	0.009	-0.191
4.17	0.000	-0.078	0.471	-0.153	0.009	-0.185
4.18	0.078	-0.078	0.471	-0.148	0.009	-0.179
4.19	0.078	0.000	0.412	-0.142	0.010	-0.174
4.20	0.156	0.000	0.412	-0.136	0.011	-0.168
4.21	0.078	0.000	0.412	-0.130	0.012	-0.163
4.22	0.078	0.000	0.530	-0.125	0.012	-0.157
4.23	0.078	-0.078	0.530	-0.119	0.012	-0.150
4.24	0.156	-0.078	0.530	-0.113	0.012	-0.144

Figure 10.7.3.a.3 Digital data for event 4.3

[ ] = baseline which is subtracted for peaks and numerical integration

Yeardate: 81222 Time: 14:51:59.081 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
4.24	0.156	-0.078	0.530	0.000	-0.000	0.000
4.25	0.156	-0.078	0.530	0.000	-0.000	0.000
4.26	0.078	-0.156	0.530	-0.001	-0.001	0.000
4.27	0.078	-0.078	0.648	-0.002	-0.001	0.001
4.28	-0.156	-0.078	0.648	-0.005	-0.001	0.002
4.29	-0.234	-0.078	0.589	-0.009	-0.001	0.003
4.30	-0.313	0.000	0.295	-0.013	-0.000	0.001
4.31	-0.391	0.000	0.236	-0.019	0.001	-0.002
4.32	-0.391	0.000	0.059	-0.024	0.002	-0.007
4.33	-0.391	-0.078	0.059	-0.030	0.002	-0.012
4.34	-0.313	-0.078	0.059	-0.034	0.002	-0.016
4.35	-0.313	-0.078	0.059	-0.039	0.002	-0.021
4.36	-0.313	-0.078	0.000	-0.044	0.002	-0.026
4.37	-0.313	-0.078	0.000	-0.048	0.002	-0.032
4.38	-0.313	-0.078	0.059	-0.053	0.002	-0.036
4.39	-0.313	-0.078	0.118	-0.058	0.002	-0.041
4.40	-0.234	-0.078	0.118	-0.062	0.002	-0.045
4.41	-0.078	-0.078	0.118	-0.064	0.002	-0.049
4.42	-0.078	-0.078	0.177	-0.066	0.002	-0.052
4.43	-0.078	-0.078	0.236	-0.069	0.002	-0.055
4.44	0.000	-0.078	0.236	-0.070	0.002	-0.058
4.45	0.000	-0.078	0.177	-0.072	0.002	-0.062
4.46	0.000	-0.078	0.059	-0.073	0.002	-0.067
4.47	0.000	-0.078	0.059	-0.075	0.002	-0.071
4.48	0.000	-0.078	0.059	-0.077	0.002	-0.076
4.49	0.156	-0.078	0.000	-0.076	0.002	-0.081
4.50	0.234	-0.078	0.059	-0.076	0.002	-0.086
4.51	0.234	-0.078	0.236	-0.075	0.002	-0.089
4.52	0.234	-0.078	0.295	-0.074	0.002	-0.091
4.53	0.234	-0.078	0.471	-0.073	0.002	-0.092
4.54	0.234	-0.078	0.530	-0.073	0.002	-0.092
4.55	0.313	-0.078	0.648	-0.071	0.002	-0.091
4.56	0.234	-0.156	0.766	-0.070	0.001	-0.088
4.57	0.234	-0.156	0.766	-0.069	-0.000	-0.086
4.58	0.234	-0.078	0.884	-0.069	-0.000	-0.082
4.59	0.234	-0.078	0.825	-0.068	-0.000	-0.079
4.60	0.234	-0.078	0.766	-0.067	-0.000	-0.077
4.61	0.156	-0.078	0.707	-0.067	-0.000	-0.075
4.62	0.156	-0.078	0.589	-0.067	-0.000	-0.075

Figure 10.7.3.b.1 Digital data for event 4.1

[ ] = baseline which is subtracted for peaks and numerical integration

Yeardate: 81222 Time: 14:51:59.181 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
3.99	-0.625	-0.078	0.000	0.000	-0.000	0.000
4.00	-0.625	-0.078	0.000	0.000	-0.000	0.000
4.01	-0.625	-0.078	0.000	0.000	-0.000	0.000
4.02	-0.703	-0.078	-0.059	-0.001	-0.000	-0.001
4.03	-1.250	-0.078	-0.059	-0.007	-0.000	-0.001
4.04	-2.500	-0.078	-0.059	-0.026	-0.000	-0.002
4.05	-6.250	-0.078	-0.118	-0.082	-0.000	-0.003
4.06	-6.328	-0.391	-0.412	-0.139	-0.003	-0.007
4.07	-3.828	-0.625	-1.885	-0.171	-0.009	-0.026
4.08	-2.578	-0.078	-3.240	-0.191	-0.009	-0.058
4.09	-1.875	-0.078	-2.297	-0.203	-0.009	-0.081
4.10	-0.703	-0.078	-0.943	-0.204	-0.009	-0.091
4.11	-0.391	-0.078	-0.471	-0.202	-0.009	-0.095
4.12	-0.625	-0.078	-0.177	-0.202	-0.009	-0.097
4.13	-0.703	-0.234	0.059	-0.202	-0.010	-0.097
4.14	-0.703	-0.078	0.236	-0.203	-0.010	-0.094
4.15	-0.391	-0.078	0.059	-0.201	-0.010	-0.094
4.16	-0.313	-0.391	0.000	-0.198	-0.013	-0.094
4.17	-0.313	-0.391	0.118	-0.195	-0.016	-0.092
4.18	-0.078	-0.078	0.177	-0.189	-0.016	-0.091
4.19	0.234	-0.078	0.236	-0.180	-0.016	-0.088
4.20	0.313	-0.078	0.295	-0.171	-0.016	-0.085
4.21	0.391	-0.078	0.471	-0.161	-0.016	-0.081
4.22	0.391	-0.078	0.530	-0.151	-0.016	-0.075
4.23	0.391	-0.078	0.530	-0.141	-0.016	-0.070
4.24	0.313	-0.078	0.471	-0.131	-0.016	-0.065
4.25	0.234	-0.078	0.471	-0.123	-0.016	-0.061
4.26	0.234	-0.078	0.471	-0.114	-0.016	-0.056
4.27	0.234	-0.078	0.353	-0.105	-0.016	-0.052
4.28	0.234	-0.078	0.353	-0.097	-0.016	-0.049
4.29	0.313	-0.078	0.353	-0.088	-0.016	-0.045
4.30	0.313	0.000	0.353	-0.078	-0.016	-0.042
4.31	0.313	-0.078	0.412	-0.069	-0.016	-0.038
4.32	0.313	-0.078	0.353	-0.059	-0.016	-0.034
4.33	0.234	-0.078	0.353	-0.051	-0.016	-0.031
4.34	0.234	-0.078	0.236	-0.042	-0.016	-0.028
4.35	0.000	-0.078	0.059	-0.036	-0.016	-0.028
4.36	0.000	-0.078	0.118	-0.030	-0.016	-0.027
4.37	0.000	-0.078	0.000	-0.023	-0.016	-0.027
4.38	-0.078	-0.078	0.000	-0.018	-0.016	-0.027
4.39	-0.313	-0.078	0.000	-0.015	-0.016	-0.027
4.40	-0.313	-0.078	0.000	-0.012	-0.016	-0.027
4.41	-0.313	-0.078	-0.059	-0.009	-0.016	-0.027
4.42	-0.078	-0.078	-0.118	-0.003	-0.016	-0.028
4.43	-0.078	-0.078	-0.059	0.002	-0.016	-0.029

Figure 10.7.3.c.1 Digital data for event 4.1

[ ] = baseline which is subtracted for peaks and numerical integration

Yeardate: 81222 Time: 14:51:59.235 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
3.89	[-0.391]	[-0.078]	[0.000]	0.000	-0.000	0.000
3.90	-0.391	-0.078	0.000	0.000	-0.000	0.000
3.91	-0.391	-0.078	0.000	0.000	-0.000	0.000
3.92	-0.625	-0.078	0.000	-0.002	-0.000	0.000
3.93	-1.016	-0.078	0.000	-0.009	-0.000	0.000
3.94	-1.016	-0.078	0.000	-0.015	-0.000	0.000
3.95	-0.938	-0.078	0.000	-0.020	-0.000	0.000
3.96	-0.859	-0.078	-0.177	-0.025	-0.000	-0.002
3.97	-1.016	-0.078	-0.412	-0.031	-0.000	-0.006
3.98	-1.328	-0.078	-0.236	-0.041	-0.000	-0.008
3.99	-1.641	-0.078	-0.177	-0.053	-0.000	-0.010
4.00	-1.875	-0.078	-0.236	-0.068	-0.000	-0.012
4.01	-1.875	-0.078	-0.412	-0.083	-0.000	-0.016
4.02	-1.719	-0.078	-0.412	-0.096	-0.000	-0.021
4.03	-1.797	-0.078	-0.471	-0.110	-0.000	-0.025
4.04	-1.875	-0.156	-0.530	-0.125	-0.001	-0.031
4.05	-1.953	-0.078	-0.530	-0.141	-0.001	-0.036
4.06	-1.875	-0.078	-0.530	-0.155	-0.001	-0.041
4.07	-1.563	-0.078	-0.530	-0.167	-0.001	-0.047
4.08	-1.250	-0.078	-0.530	-0.176	-0.001	-0.052
4.09	-1.016	-0.078	-0.530	-0.182	-0.001	-0.057
4.10	-0.938	-0.078	-0.530	-0.187	-0.001	-0.062
4.11	-0.938	-0.078	-0.412	-0.193	-0.001	-0.067
4.12	-0.703	-0.078	-0.295	-0.196	-0.001	-0.070
4.13	-0.625	-0.078	-0.236	-0.198	-0.001	-0.072
4.14	-0.391	-0.078	-0.177	-0.198	-0.001	-0.074
4.15	-0.391	-0.078	-0.177	-0.198	-0.001	-0.075
4.16	-0.313	-0.078	-0.059	-0.198	-0.001	-0.076
4.17	-0.078	-0.078	0.000	-0.194	-0.001	-0.076
4.18	-0.078	-0.078	0.059	-0.191	-0.001	-0.075
4.19	-0.078	-0.078	0.530	-0.188	-0.001	-0.070
4.20	0.000	-0.078	0.177	-0.184	-0.001	-0.068
4.21	0.078	-0.078	0.236	-0.180	-0.001	-0.066
4.22	0.156	-0.078	0.236	-0.174	-0.001	-0.064
4.23	0.156	-0.078	0.236	-0.169	-0.001	-0.061
4.24	0.156	-0.078	0.236	-0.163	-0.001	-0.059
4.25	0.234	-0.078	0.236	-0.157	-0.001	-0.057
4.26	0.234	-0.078	0.236	-0.151	-0.001	-0.054
4.27	0.234	-0.078	0.236	-0.144	-0.001	-0.052
4.28	0.234	-0.078	0.236	-0.138	-0.001	-0.049
4.29	0.234	-0.078	0.236	-0.132	-0.001	-0.047
4.30	0.156	-0.078	0.236	-0.126	-0.001	-0.045
4.31	0.156	-0.078	0.177	-0.121	-0.001	-0.043
4.32	0.078	-0.078	0.118	-0.116	-0.001	-0.042
4.33	0.078	-0.078	0.118	-0.112	-0.001	-0.041

Figure 10.7.3.c.1 Digital data for event 4.1 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
4.34	0.078	-0.078	0.118	-0.107	-0.001	-0.039
4.35	0.000	-0.078	0.118	-0.103	-0.001	-0.038
4.36	0.000	-0.078	0.059	-0.099	-0.001	-0.038
4.37	0.000	-0.078	0.059	-0.095	-0.001	-0.037
4.38	-0.078	-0.078	0.000	-0.092	-0.001	-0.037
4.39	-0.078	-0.078	0.000	-0.089	-0.001	-0.037
4.40	-0.156	-0.078	0.000	-0.087	-0.001	-0.037
4.41	-0.156	-0.078	0.000	-0.084	-0.001	-0.037
4.42	-0.156	-0.078	0.000	-0.082	-0.001	-0.037
4.43	-0.234	-0.078	0.000	-0.080	-0.001	-0.037
4.44	-0.234	-0.078	0.000	-0.079	-0.001	-0.037
4.45	-0.234	-0.078	0.000	-0.077	-0.001	-0.037
4.46	-0.234	-0.078	0.000	-0.076	-0.001	-0.037
4.47	-0.313	-0.078	0.000	-0.075	-0.001	-0.037
4.48	-0.313	-0.078	0.000	-0.074	-0.001	-0.037
4.49	-0.313	-0.078	0.000	-0.073	-0.001	-0.037
4.50	-0.313	-0.078	0.000	-0.072	-0.001	-0.037
4.51	-0.313	-0.078	0.000	-0.072	-0.001	-0.037
4.52	-0.313	-0.078	0.000	-0.071	-0.001	-0.037
4.53	-0.391	-0.078	0.000	-0.071	-0.001	-0.037
4.54	-0.391	-0.078	0.000	-0.071	-0.001	-0.037

Figure 10.7.3.d.1 Digital data for event 4.1

[ ] = baseline which is subtracted for peaks and numerical integration

Yeardate: 81222 Time: 14:51:59.341 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
3.97	-0.938	0.000	-0.766	0.000	0.000	0.000
3.98	-0.938	0.000	-0.766	0.000	0.000	0.000
3.99	-1.016	0.000	-0.825	-0.001	0.000	-0.001
4.00	-1.016	0.000	-0.943	-0.002	0.000	-0.002
4.01	-1.016	0.000	-0.943	-0.002	0.000	-0.004
4.02	-1.016	0.000	-0.884	-0.003	0.000	-0.005
4.03	-1.094	0.000	-0.825	-0.005	0.000	-0.006
4.04	-1.250	0.000	-0.943	-0.008	0.000	-0.008
4.05	-1.328	0.000	-1.178	-0.012	0.000	-0.012
4.06	-1.406	0.000	-1.414	-0.016	0.000	-0.018
4.07	-1.875	0.000	-1.414	-0.026	0.000	-0.025
4.08	-2.578	0.234	-1.826	-0.042	0.002	-0.035
4.09	-5.000	0.313	-2.828	-0.083	0.005	-0.056
4.10	-5.078	0.313	-4.713	-0.124	0.009	-0.095
4.11	-7.578	0.547	-6.067	-0.191	0.014	-0.148
4.12	-10.000	1.172	-7.481	-0.281	0.026	-0.216
4.13	-9.453	0.625	-7.481	-0.366	0.032	-0.283
4.14	-7.578	0.547	-7.481	-0.433	0.038	-0.350
4.15	-5.000	0.234	-7.481	-0.473	0.040	-0.417
4.16	-3.516	0.000	-5.596	-0.499	0.040	-0.465

Figure 10.7.3.d.2 Digital data for event 4.2

[ ] = baseline which is subtracted for peaks and numerical integration

Yeardate: 81222 Time: 14:51:59.341 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
4.16	[-3.516]	[0.000]	[-5.596]	0.000	0.000	-0.000
4.17	-3.828	0.313	-3.534	-0.003	0.003	0.021
4.18	-6.250	0.547	-4.123	-0.030	0.009	0.035
4.19	-8.750	0.859	-6.539	-0.083	0.017	0.026
4.20	-10.000	1.250	-7.481	-0.148	0.030	0.007
4.21	-10.000	2.422	-7.481	-0.212	0.054	-0.012
4.22	-10.000	3.125	-7.481	-0.277	0.085	-0.031
4.23	-10.000	3.359	-7.422	-0.342	0.119	-0.049
4.24	-10.000	2.500	-7.481	-0.407	0.144	-0.068
4.25	-10.000	1.250	-7.481	-0.472	0.156	-0.087
4.26	-10.000	0.625	-7.481	-0.537	0.163	-0.105
4.27	-8.750	0.547	-7.481	-0.589	0.168	-0.124
4.28	-6.328	0.625	-7.481	-0.617	0.174	-0.143
4.29	-6.016	0.938	-7.481	-0.642	0.184	-0.162
4.30	-5.625	1.250	-7.069	-0.663	0.196	-0.177
4.31	-5.000	1.875	-7.010	-0.678	0.215	-0.191
4.32	-5.625	2.734	-6.126	-0.699	0.242	-0.196
4.33	-6.250	2.813	-6.539	-0.726	0.270	-0.206
4.34	-6.563	2.500	-7.010	-0.757	0.295	-0.220
4.35	-6.328	1.797	-7.304	-0.785	0.313	-0.237
4.36	-5.703	0.938	-7.069	-0.807	0.323	-0.252
4.37	-5.313	0.859	-6.126	-0.825	0.331	-0.257
4.38	-5.234	0.859	-5.596	-0.842	0.340	-0.257

Figure 10.7.3.d.3 Digital data for event 4.4

[ ] = baseline which is subtracted for peaks and numerical integration

Yeardate: 81222 Time: 14:51:59.341 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
4.38	[-5.234]	[0.859]	[-5.596]	-0.000	0.000	-0.000
4.39	-5.625	1.172	-5.066	-0.004	0.003	0.005
4.40	-6.328	1.250	-5.596	-0.015	0.007	0.005
4.41	-7.500	1.875	-6.539	-0.038	0.017	-0.004
4.42	-8.125	2.500	-7.481	-0.066	0.034	-0.023
4.43	-8.438	2.734	-7.481	-0.098	0.052	-0.042
4.44	-8.516	2.500	-7.481	-0.131	0.069	-0.061
4.45	-8.438	1.875	-7.422	-0.163	0.079	-0.079
4.46	-8.125	1.563	-7.481	-0.192	0.086	-0.098
4.47	-7.891	1.484	-7.481	-0.219	0.092	-0.117
4.48	-7.891	1.406	-7.481	-0.245	0.098	-0.135
4.49	-7.813	1.563	-7.481	-0.271	0.105	-0.154
4.50	-7.891	1.797	-7.481	-0.298	0.114	-0.173
4.51	-7.891	2.422	-7.422	-0.324	0.130	-0.191
4.52	-7.813	2.500	-7.481	-0.350	0.146	-0.210
4.53	-6.953	2.500	-7.481	-0.367	0.163	-0.229
4.54	-6.875	2.422	-7.481	-0.384	0.178	-0.248
4.55	-6.250	1.875	-7.481	-0.394	0.188	-0.267
4.56	-5.391	1.797	-7.481	-0.395	0.198	-0.286
4.57	-5.000	1.563	-7.481	-0.393	0.205	-0.305
4.58	-5.000	1.484	-7.481	-0.391	0.211	-0.323
4.59	-4.922	1.484	-7.481	-0.388	0.217	-0.342
4.60	-4.922	1.563	-7.481	-0.384	0.224	-0.361
4.61	-4.922	1.797	-7.422	-0.381	0.234	-0.379
4.62	-4.688	1.875	-7.481	-0.376	0.244	-0.398
4.63	-4.375	2.109	-7.481	-0.367	0.256	-0.417
4.64	-4.063	1.875	-7.069	-0.356	0.267	-0.432
4.65	-3.516	1.563	-6.126	-0.338	0.274	-0.437
4.66	-3.516	1.484	-5.832	-0.321	0.280	-0.439
4.67	-3.516	1.328	-5.184	-0.304	0.284	-0.435
4.68	-3.516	1.250	-4.948	-0.287	0.288	-0.429
4.69	-3.438	1.250	-4.713	-0.269	0.292	-0.420
4.70	-3.203	1.328	-4.182	-0.249	0.297	-0.406
4.71	-3.125	1.484	-3.770	-0.227	0.303	-0.388
4.72	-2.891	1.563	-3.711	-0.204	0.310	-0.369
4.73	-2.578	1.563	-3.652	-0.177	0.317	-0.349
4.74	-2.266	1.484	-3.652	-0.148	0.324	-0.330
4.75	-2.188	1.250	-3.652	-0.117	0.327	-0.310
4.76	-1.953	1.172	-3.652	-0.085	0.331	-0.291
4.77	-1.953	1.094	-3.770	-0.052	0.333	-0.273
4.78	-1.875	1.016	-3.888	-0.018	0.335	-0.256
4.79	-1.719	1.016	-3.888	0.017	0.336	-0.239
4.80	-1.719	1.016	-3.829	0.052	0.338	-0.221
4.81	-1.719	1.094	-3.829	0.087	0.340	-0.203
4.82	-1.641	1.172	-3.770	0.123	0.343	-0.185

Figure 10.7.3.d.3 Digital data for event 4.4 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
4.83	-1.641	1.172	-3.770	0.159	0.346	-0.167
4.84	-1.563	1.172	-3.652	0.196	0.349	-0.147
4.85	-1.484	1.016	-3.652	0.233	0.351	-0.128
4.86	-1.484	1.016	-3.652	0.271	0.353	-0.108
4.87	-1.406	0.938	-3.534	0.309	0.353	-0.088
4.88	-1.328	0.938	-3.534	0.348	0.354	-0.067
4.89	-1.250	0.859	-3.475	0.388	0.354	-0.046
4.90	-1.016	0.938	-3.299	0.430	0.355	-0.023
4.91	-0.938	0.938	-3.240	0.473	0.356	0.001
4.92	-0.938	0.938	-3.122	0.516	0.356	0.025
4.93	-0.859	0.938	-3.122	0.560	0.357	0.050
4.94	-0.938	0.938	-3.122	0.603	0.358	0.075
4.95	-0.938	0.938	-3.122	0.646	0.359	0.099
4.96	-0.781	0.938	-3.004	0.690	0.360	0.125
4.97	-0.781	0.859	-3.004	0.735	0.360	0.151
4.98	-0.625	0.781	-2.769	0.781	0.359	0.180
4.99	-0.391	0.781	-2.710	0.829	0.358	0.208
5.00	-0.391	0.781	-2.592	0.878	0.357	0.239
5.01	-0.391	0.781	-2.356	0.926	0.356	0.271
5.02	-0.391	0.781	-2.356	0.975	0.356	0.303
5.03	-0.391	0.859	-2.415	1.023	0.356	0.335
5.04	-0.391	0.859	-2.356	1.072	0.356	0.368
5.05	-0.313	0.859	-2.356	1.121	0.356	0.400
5.06	-0.313	0.859	-2.121	1.170	0.356	0.435

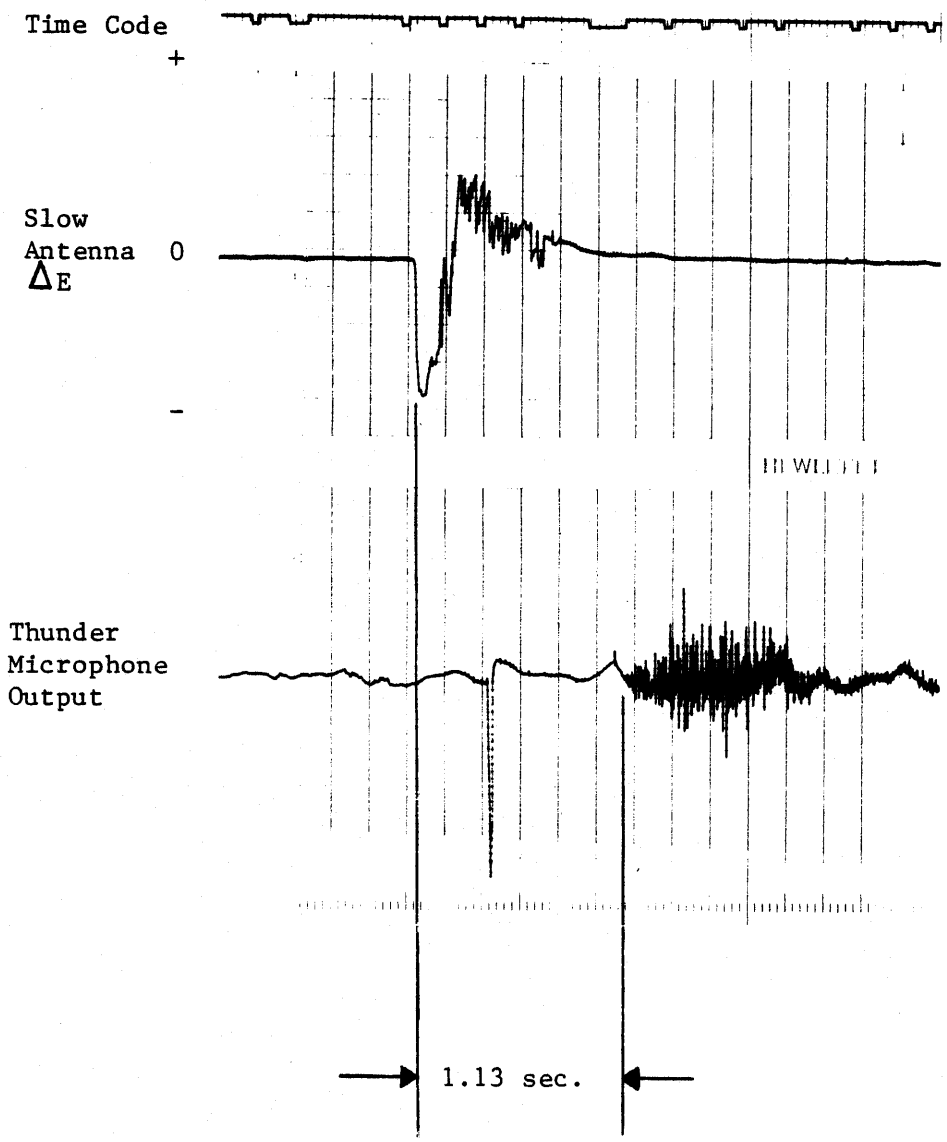


Figure 10.7.4.a Slow electric field change and thunder microphone record from rocket triggered lightning

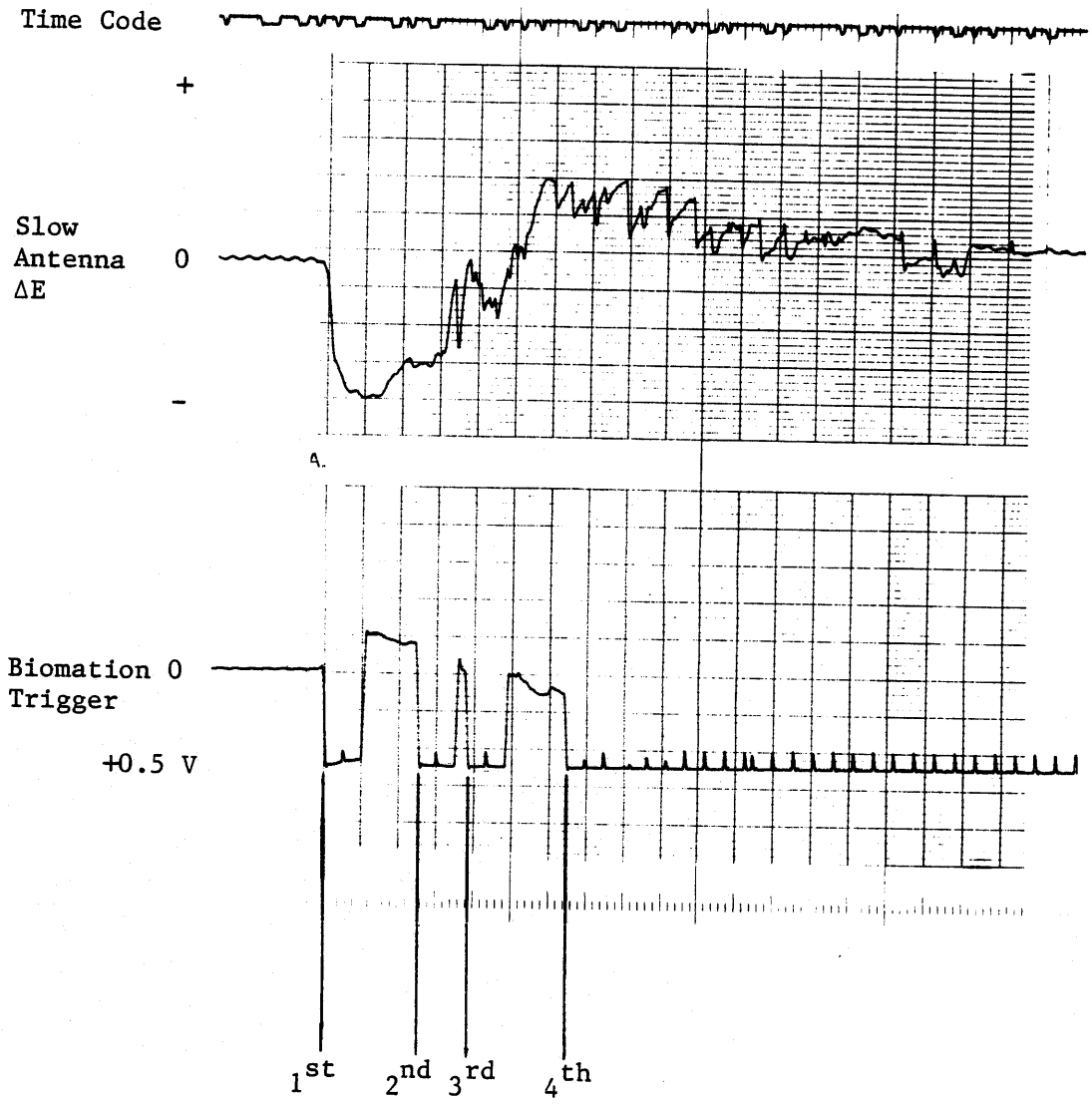
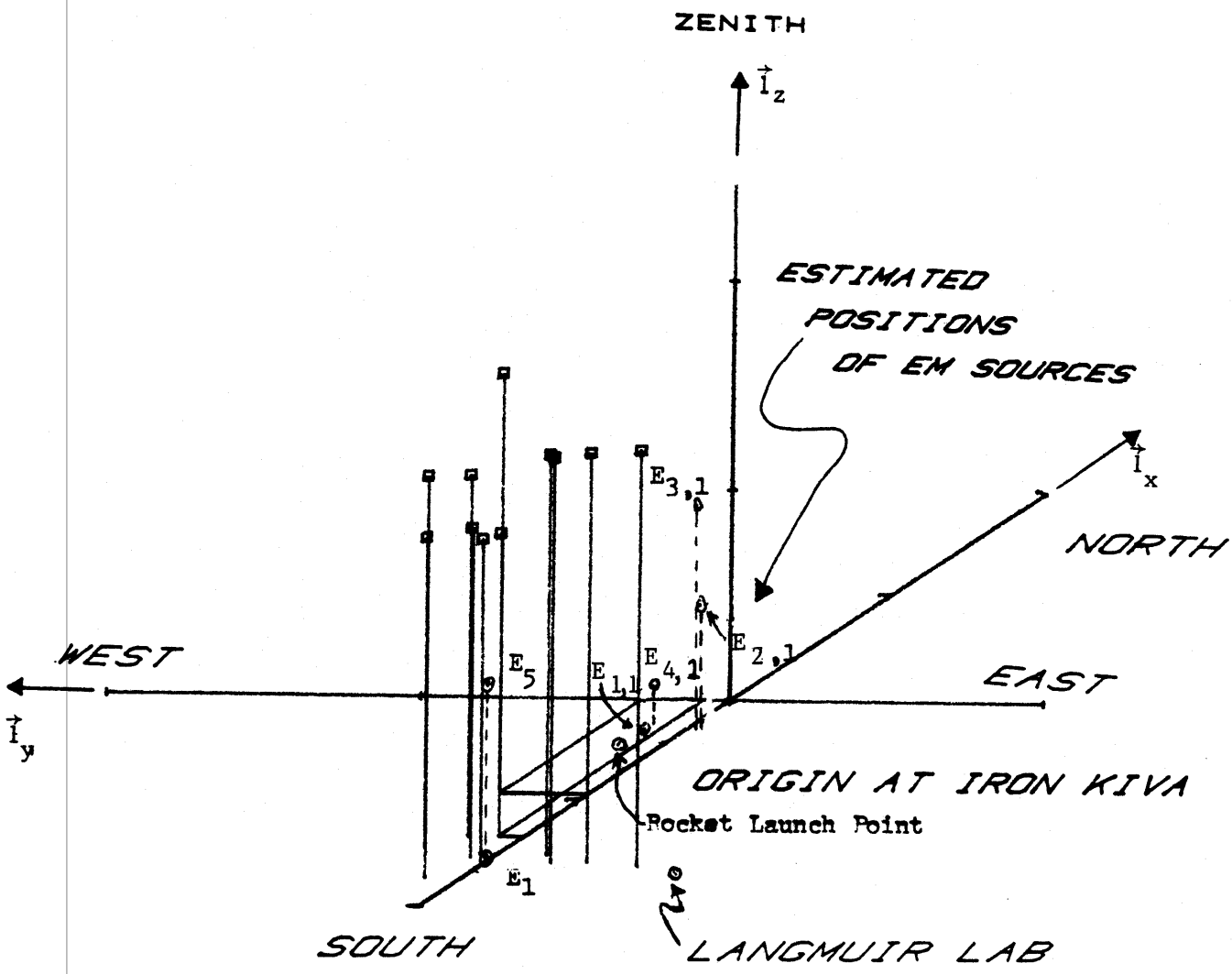


Figure 10.7.4.b Slow electric field change and biomation trigger marks superposed on the electric field change record from rocket triggered lightning



ticks on axes at 1 km intervals

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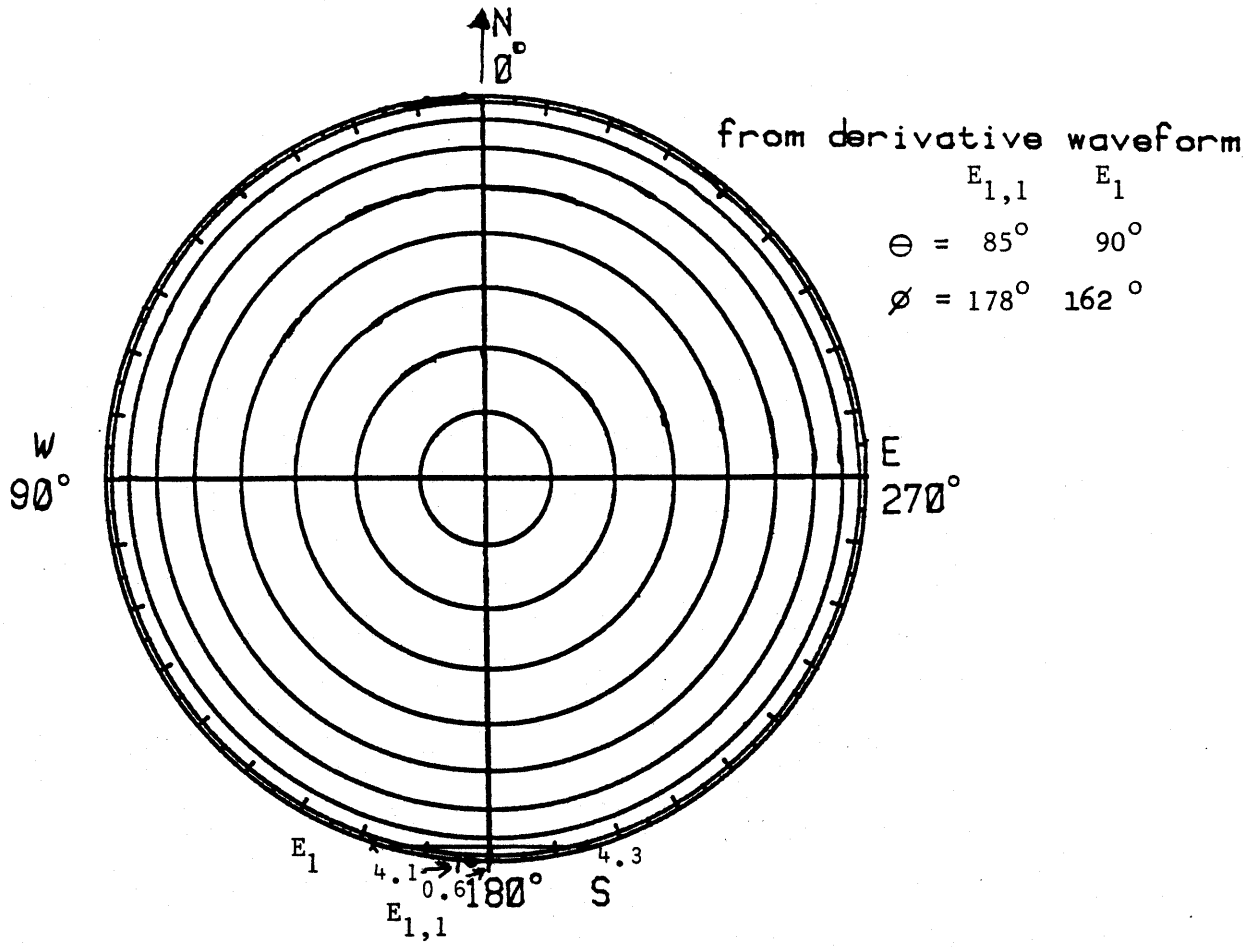
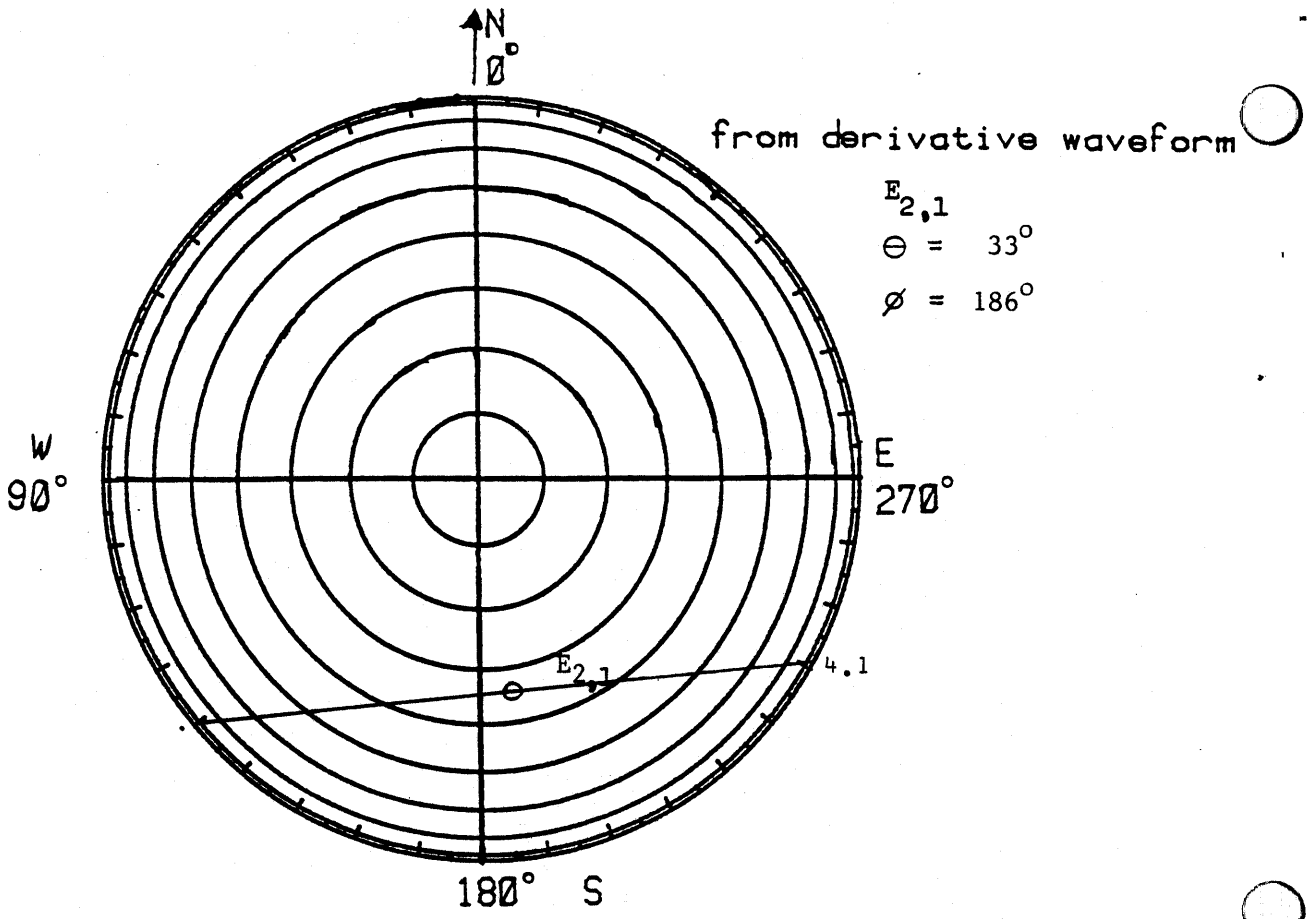
Figure 10.7.5 Acoustic location of rocket triggered lightning



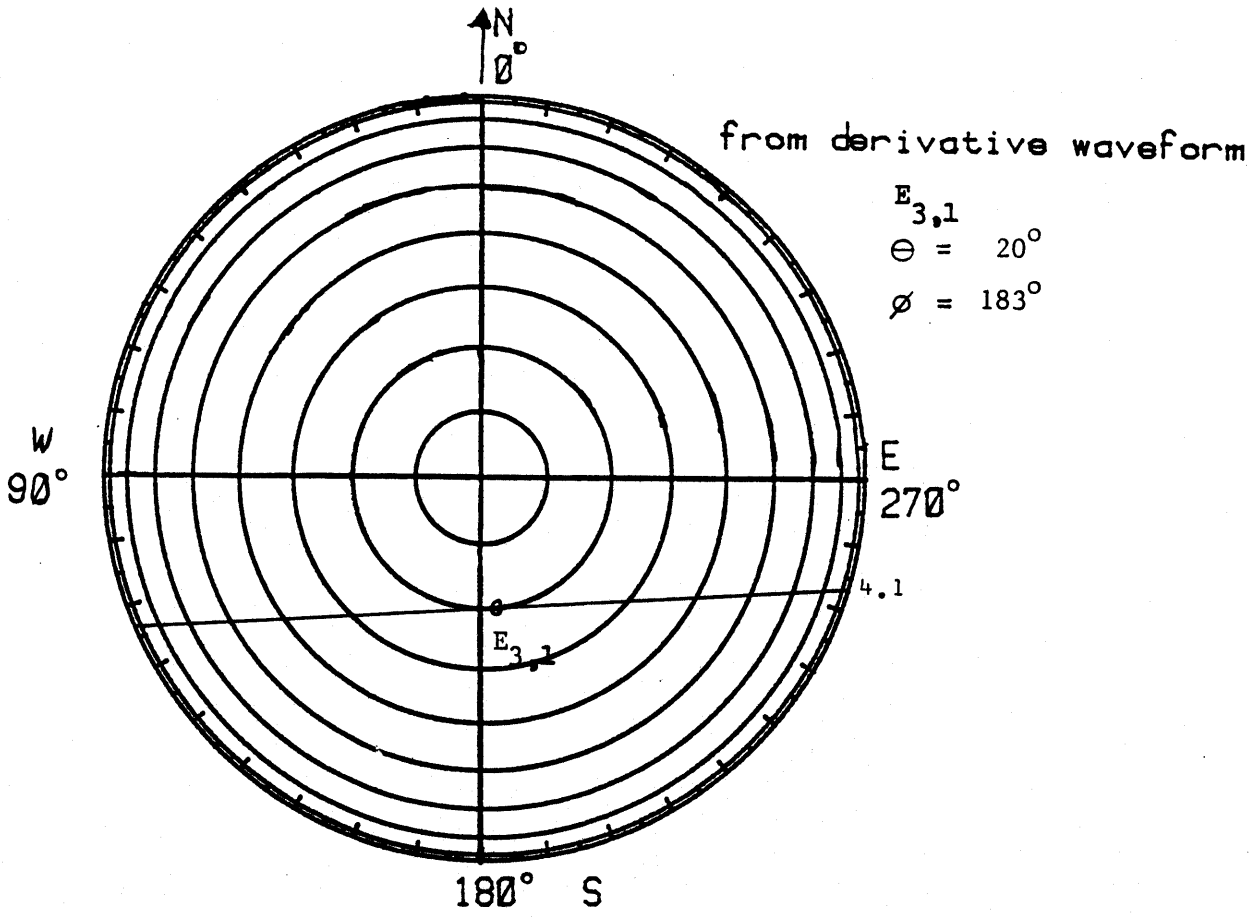
Date : 81222 M.S.T. : 14:51:59.081

Figure 10.7.6.A.1 $\sin(\theta),\phi$ contours for rocket triggered lightning derivative waveform



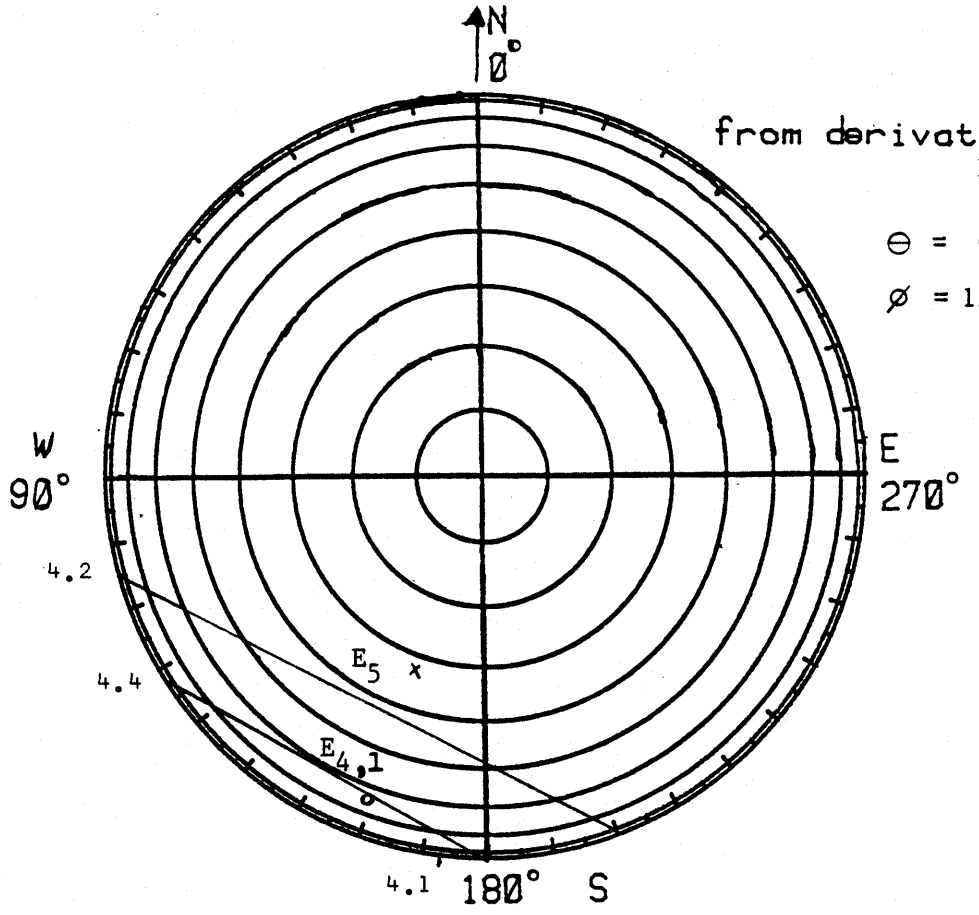
Date : 81222 M.S.T. : 14:51:59.181

Figure 10.7.6.A.2 sin(θ),ϕ contours for rocket triggered lightning derivative waveform



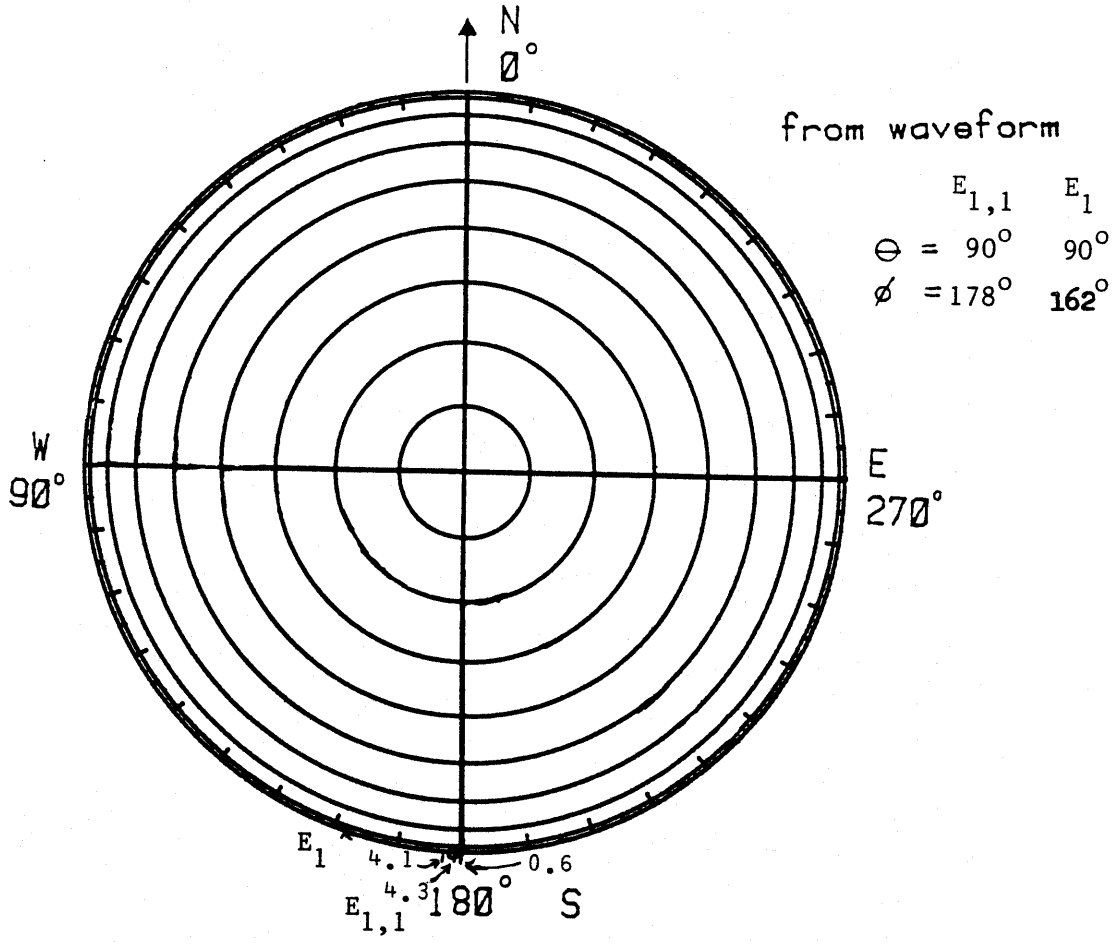
Date : 81222 M.S.T. : 14:51:59.235

Figure 10.7.6.A.3 $\sin(\theta),\phi$ contours for rocket triggered lightning derivative lightning



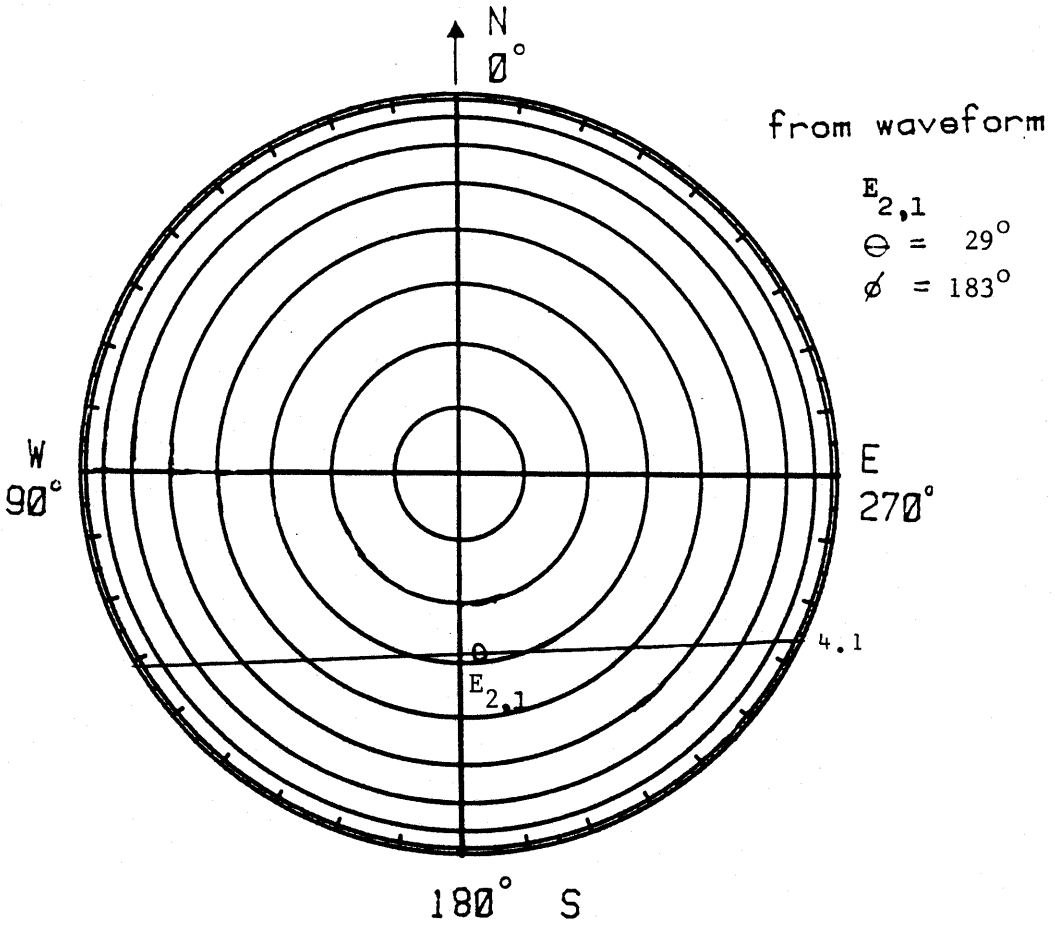
Date : 81222 M.S.T. : 14:51:59.341

Figure 10.7.6.A.4 **$\sin(\theta),\phi$ contours for rocket triggered lightning derivative waveform**



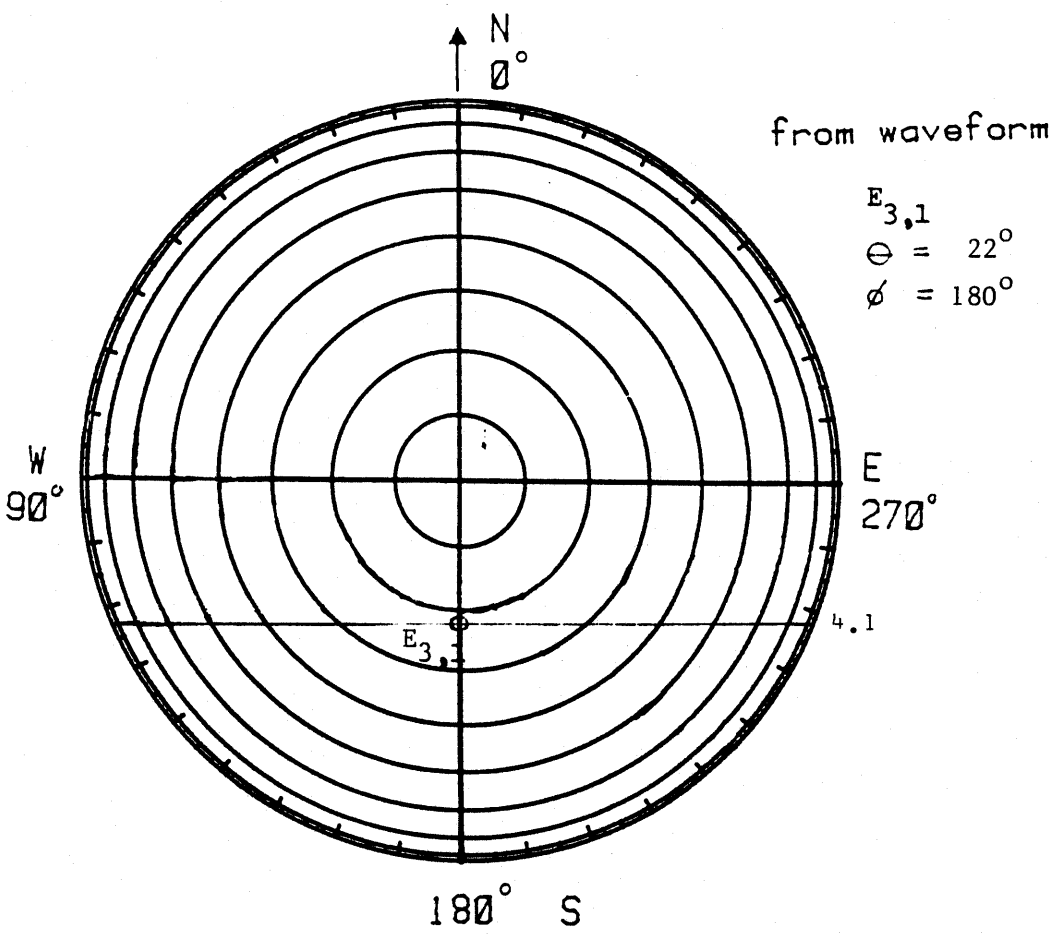
Date : 81222 M.S.T. : 14:51:59.081

Figure 10.7.6.B.1 $\sin(\theta),\phi$ contours for rocket triggered lightning waveform



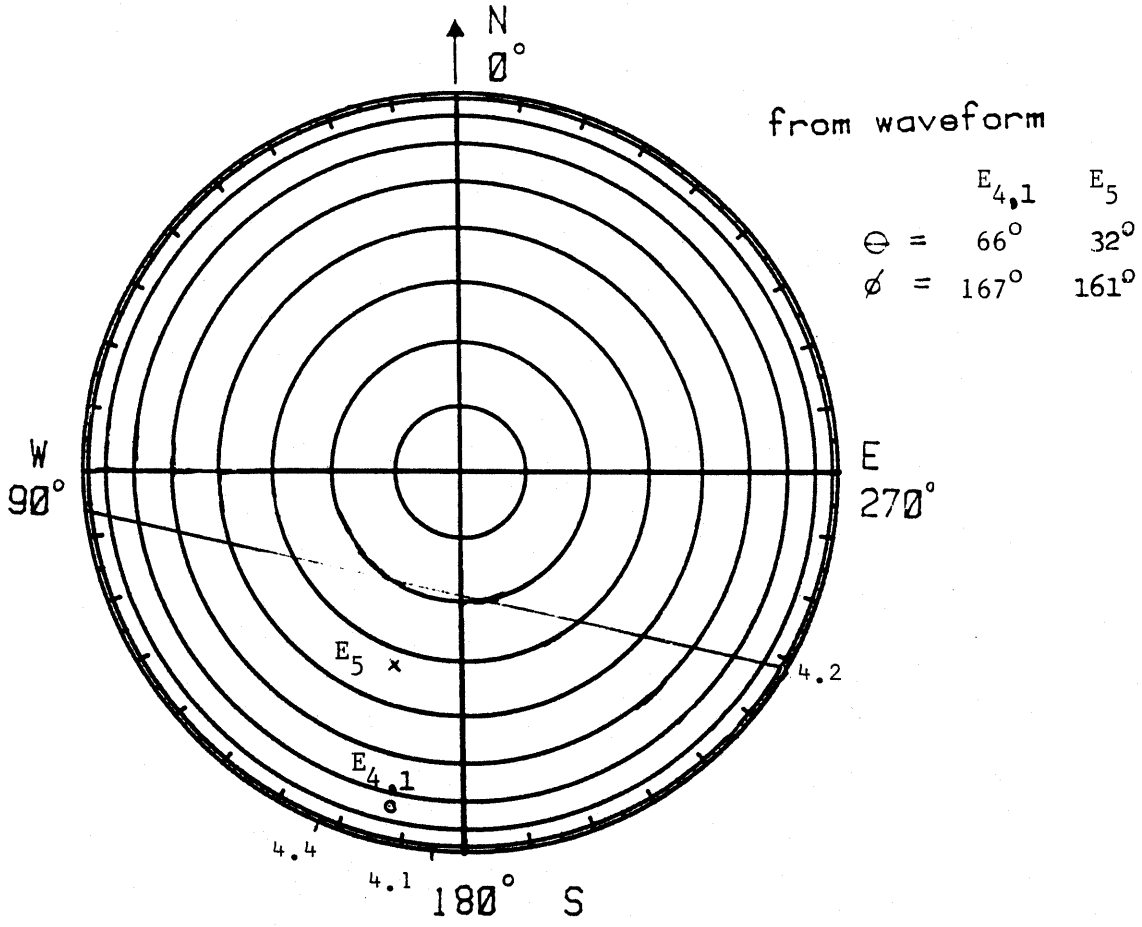
Date : 81222 M.S.T. : 14:51:59.181

Figure 7.6.B.2 sin(θ),ϕ contours for rocket triggered lightning waveform



Date : 81222 M.S.T. : 14:51:59.235

Figure 10.7.6.B.3 $\sin(\theta),\phi$ contours for rocket triggered lightning waveform



Date : 81222 M.S.T. : 14:51:59.341

Figure 10.7.6.8.4 sin(θ),ϕ contours for rocket triggered lightning waveform

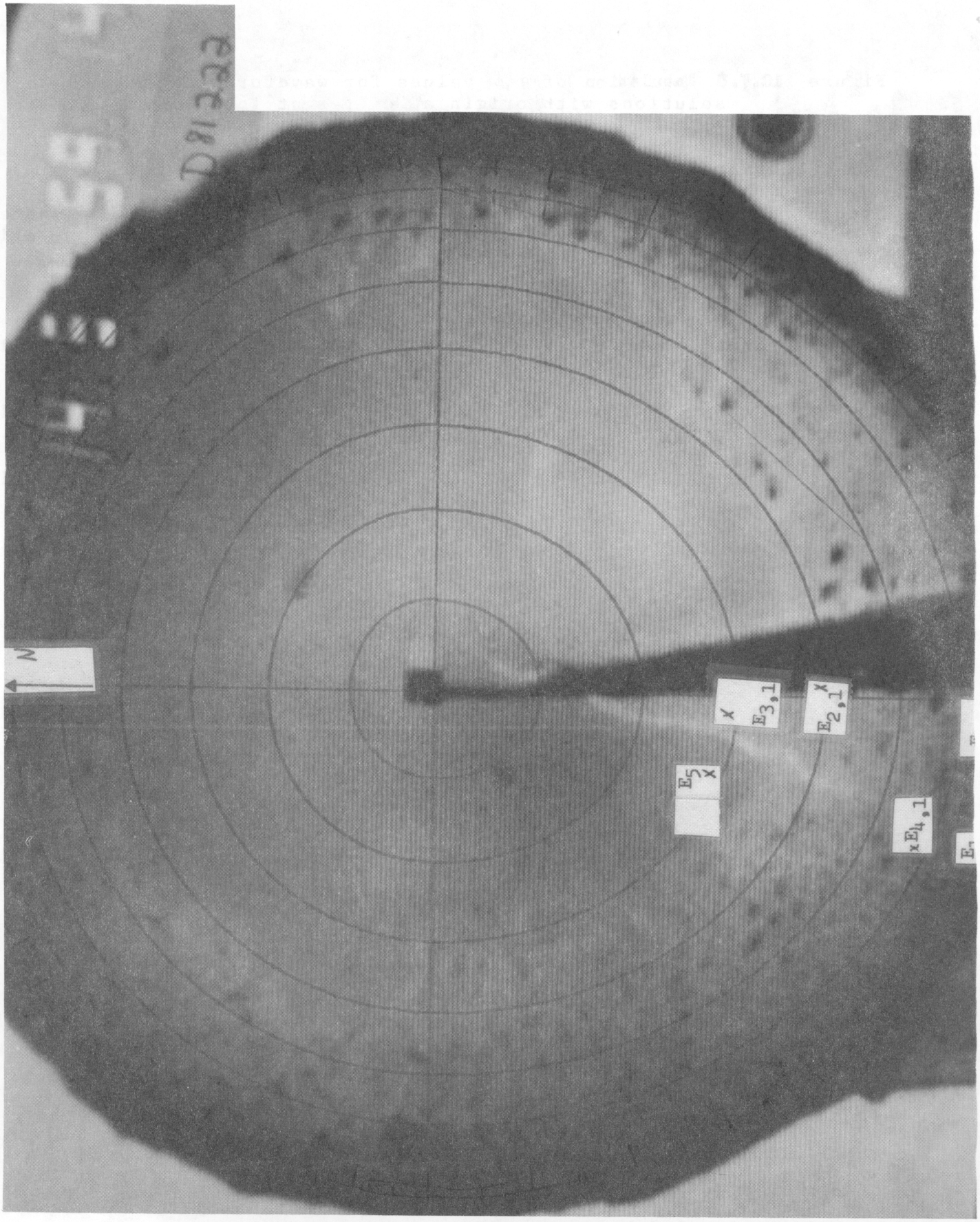


Figure 10.7.7 Whole-sky photograph of rocket triggered lightning from Kiva

Figure **10.7.8 Tabulation** of θ, ϕ values for waveform and TOA solutions with origin at different locations.

Yeardate : 81222 M.S.T. : 1451.59

Event		TOA	waveform	r TOA (meters)	r waveform (meters)	TOA origin at Kiva	TOA origin at WSC	waveform origin at WSC
1	θ	90.0°	85°	810	380	90.0°	90.0°	87°
	ϕ	162.1°	178°			161.6°	161.4°	176°
2	θ		33°		696			39°
	ϕ		186°					181°
3	θ		20°		1108			27°
	ϕ		183°					177°
4	θ		64°		422			68°
	ϕ		159°					159°
5	θ	36.5°		1520		31.7°	38.6°	
	ϕ	161.9°				160.9°	160.8°	

Figure **10.7.9.A.1** Tabulation of peak values for each event from derivative waveform set for rocket triggered lightning

Yeardate: 81222 M.S.T.:145159.081

$\phi = 178^{o}$; $\theta = 85^{o}$; r = 380 m

Event Number	Time (μs)	$Z_o \Delta\partial D_z/\partial t$ (T/s)	$\Delta\partial B_E/\partial t$ (T/s)	$\Delta\partial B_N/\partial t$ (T/s)	$\Delta\partial B_h/\partial t$ (T/s)	$\Delta\partial B_e/\partial t$ (T/s)	$\lvert\Delta\partial\vec{B}/\partial t\rvert$ (T/s)
0.6	0.59	-0.88	-0.63	0.00	-0.01	-0.31	0.31
4.1	4.11	-4.30	-3.59	0.31	0.09	-1.80	1.80
4.3	4.33	-0.53	-0.55	0.00	-0.01	-0.27	0.27

CALCULATED VALUES FOR $\partial\vec{T}/\partial t$

Event Number	$\partial T_2/\partial t$ (10^{15} Am/s^2)	$\partial T_3/\partial t$ (10^{15} Am/s^2)	$\lvert\partial\vec{T}/\partial t\rvert$ (10^{15} Am/s^2)	α (deg)
0.6	12	356	357	358
4.1	-106	2056	2059	3
4.3	11	312	312	358

Figure **10.7.9.A.2** Tabulation of peak values for each event from derivative waveform set for rocket triggered lightning

Yeardate: 81222 M.S.T.:145159.181

$\phi = 186^{o}$; $\theta = 33^{o}$; r = 696 m

Event Number	Time (μs)	$Z_o \Delta\partial D_z/\partial t$ (T/s)	$\Delta\partial B_E/\partial t$ (T/s)	$\Delta\partial B_N/\partial t$ (T/s)	$\Delta\partial B_h/\partial t$ (T/s)	$\Delta\partial B_e/\partial t$ (T/s)	$\lvert\Delta\partial\vec{B}/\partial t\rvert$ (T/s)
4.1	4.06	-3.24	-5.70	-0.55	0.03	-2.86	2.86

CALCULATED VALUES FOR $\partial\vec{T}/\partial t$

Event Number	$\partial T_2/\partial t$ (10^{15} Am/s^2)	$\partial T_3/\partial t$ (10^{15} Am/s^2)	$\lvert\partial\vec{T}/\partial t\rvert$ (10^{15} Am/s^2)	α (deg)
4.1	-65	5980	5980	1

Figure **10.7.9.A.3** Tabulation of peak values for each event from derivative waveform set for rocket triggered lightning

Yeardate: 81222 M.S.T.:145159.235

$\phi = 183^{o}$; $\theta = 20^{o}$; r = 1108 m

Event Number	Time (μs)	$Z_o \Delta\partial D_z/\partial t$ (T/s)	$\Delta\partial B_E/\partial t$ (T/s)	$\Delta\partial B_N/\partial t$ (T/s)	$\Delta\partial B_h/\partial t$ (T/s)	$\Delta\partial B_e/\partial t$ (T/s)	$\lvert\Delta\partial\vec{B}/\partial t\rvert$ (T/s)
4.1	4.05	-0.53	-1.56	-0.08	0.00	-0.78	0.78

CALCULATED VALUES FOR $\partial\vec{T}/\partial t$

Event Number	$\partial T_2/\partial t$ (10^{15} Am/s^2)	$\partial T_3/\partial t$ (10^{15} Am/s^2)	$\lvert\partial\vec{T}/\partial t\rvert$ (10^{15} Am/s^2)	α (deg)
4.1	-7	2600	2600	0

Figure **10.7.9.A.4** Tabulation of peak values for each event from derivative waveform set for rocket triggered lightning

Yeardate: 81222 M.S.T.:145159.341

$\phi = 159^{o}$; $\theta = 64^{o}$; r = 422 m

Event Number	Time (μs)	$Z_o \Delta\partial D_z/\partial t$ (T/s)	$\Delta\partial B_E/\partial t$ (T/s)	$\Delta\partial B_N/\partial t$ (T/s)	$\Delta\partial B_h/\partial t$ (T/s)	$\Delta\partial B_e/\partial t$ (T/s)	$\lvert\Delta\partial\vec{B}/\partial t\rvert$ (T/s)
4.1	4.12	-9.30	-9.06	1.17	-2.46	-4.44	5.07
4.2	4.23	-4.95	-6.48	3.36	0.93	-3.63	3.74
4.4	4.44	-3.35	-3.28	1.88	0.66	-1.87	1.98

CALCULATED VALUES FOR $\partial\vec{T}/\partial t$

Event Number	$\partial T_2/\partial t$ (10^{15} Am/s^2)	$\partial T_3/\partial t$ (10^{15} Am/s^2)	$\lvert\partial\vec{T}/\partial t\rvert$ (10^{15} Am/s^2)	α (deg)
4.1	3107	5617	6419	331
4.2	-1172	4590	4737	14
4.4	-829	2363	2504	19

Figure **10.7.9.B.1** Tabulation of peak values for each event from waveform set for rocket triggered lightning

Yeardate: 81222 M.S.T.:145159.081

$\phi = 178^{o}$; $\theta = 90^{o}$; r = 379 m

Event Number	Time (μs)	$Z_o \Delta D_z$ (μT)	ΔB_E (μT)	ΔB_N (μT)	ΔB_h (μT)	ΔB_e (μT)	$\lvert\Delta\vec{B}\rvert$ (μT)
0.6	0.62	-0.04	-0.03	0.00	0.00	-0.01	0.01
4.1	4.11	-0.19	-0.17	0.01	0.00	-0.08	0.08
4.3	4.33	-0.09	-0.08	0.00	0.00	-0.04	0.04

CALCULATED VALUES FOR $\vec{I}_t . \hat{T}$

Event Number	T_2 (10^9 Am/s)	T_3 (10^9 Am/s)	$\lvert\vec{T}\rvert$ (10^9 Am/s)	α (deg)
0.6	0	15	15	360
4.1	0	96	96	360
4.3	0	44	44	360

Figure **10.7.9.B.2** Tabulation of peak values for each event from waveform set for rocket triggered lightning

Yeardate: 81222 M.S.T.:145159.181

$\phi = 183^{o}$; $\theta = 29^{o}$; r = 782 m

Event Number	Time (μs)	$Z_o \Delta D_z$ (μT)	ΔB_E (μT)	ΔB_N (μT)	ΔB_h (μT)	ΔB_e (μT)	$\lvert\Delta\vec{B}\rvert$ (μT)
4.1	4.10	-0.10	-0.20	-0.01	0.00	-0.10	0.10

CALCULATED VALUES FOR $\vec{I}_t . \hat{T}$

Event Number	T_2 (10^9 Am/s)	T_3 (10^9 Am/s)	$\lvert\vec{T}\rvert$ (10^9 Am/s)	α (deg)
4.1	-2	239	239	1

Figure 10.7.9.B.3 Tabulation of peak values for each event from waveform set for rocket triggered lightning

Yeardate: 81222 M.S.T.:145159.235

$\phi = 180^{o}$; $\theta = 22^{o}$; r =1012 m

Event Number	Time (μs)	$Z_o \Delta D_s$ (μT)	ΔB_E (μT)	ΔB_N (μT)	ΔB_h (μT)	ΔB_e (μT)	$\lvert\Delta\vec{B}\rvert$ (μT)
4.1	4.13	-0.08	-0.20	-0.00	-0.00	-0.10	0.10

CALCULATED VALUES FOR $\overline{I_t}.\hat{T}$

Event Number	T_2 (10^9 Am/s)	T_3 (10^9 Am/s)	$\lvert\vec{T}\rvert$ (10^9 Am/s)	α (deg)
4.1	2	300	300	360

Figure 10.7.9.B.4 Tabulation of peak values for each event from waveform set for rocket triggered lightning

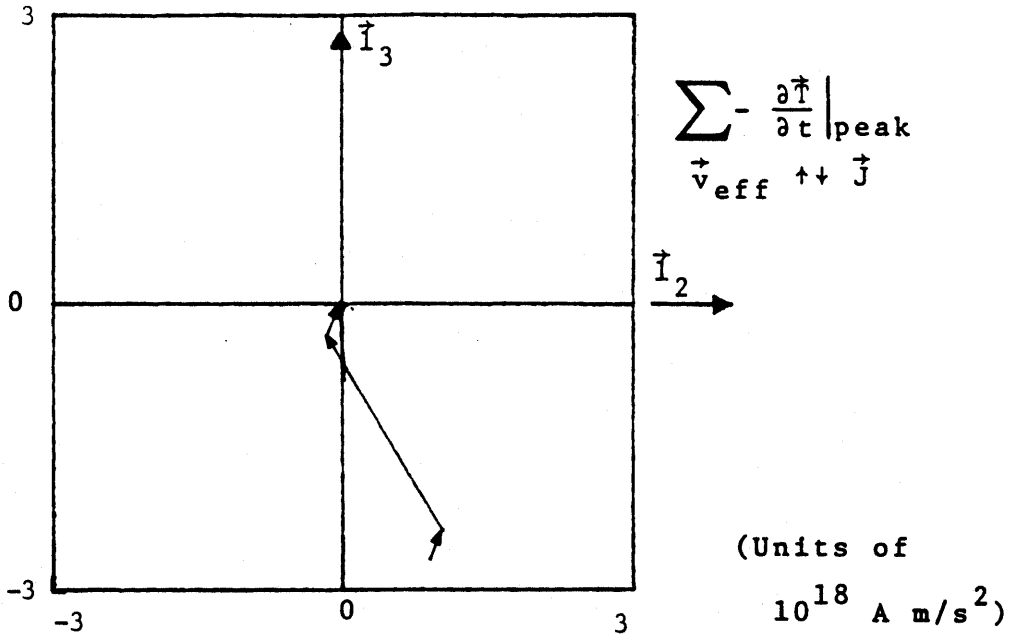
Yeardate: 81222 M.S.T.:145159.341

$\phi = 167^{o}$; $\theta = 66^{o}$; r = 415 m

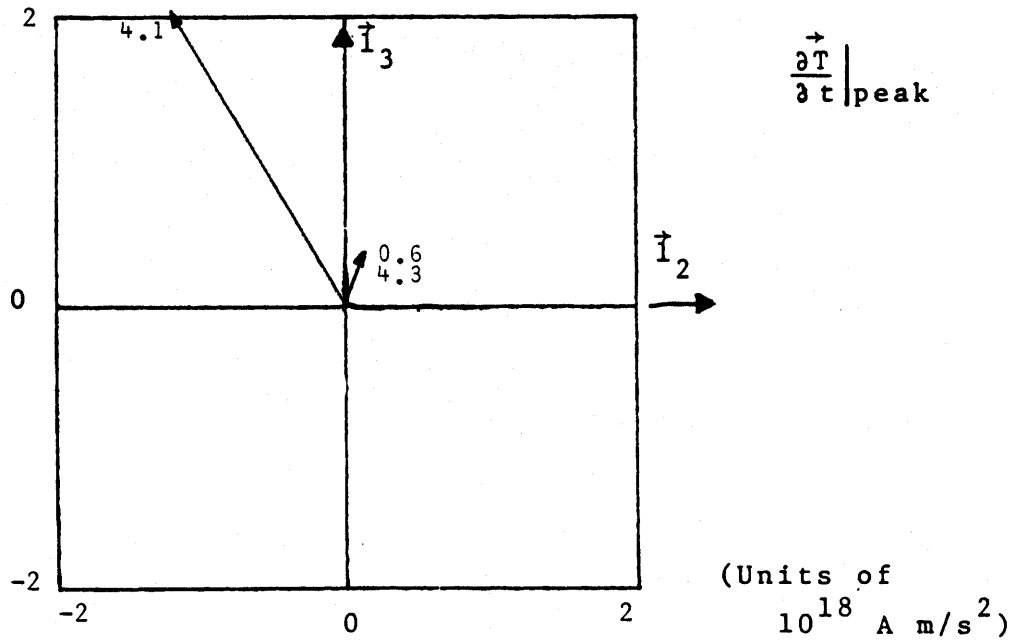
Event Number	Time (μs)	$Z_o \Delta D_s$ (μT)	ΔB_E (μT)	ΔB_N (μT)	ΔB_h (μT)	ΔB_e (μT)	$\lvert\Delta\vec{B}\rvert$ (μT)
4.1	4.12	-0.42	-0.28	0.03	-0.05	-0.14	0.15
4.2	4.23	-0.18	-0.55	0.12	-0.01	-0.28	0.28
4.4	4.44	-0.29	-0.16	0.07	0.04	-0.09	0.10

CALCULATED VALUES FOR $\overline{I_t}.\hat{T}$

Event Number	T_2 (10^9 Am/s)	T_3 (10^9 Am/s)	$\lvert\vec{T}\rvert$ (10^9 Am/s)	α (deg)
4.1	58	174	183	342
4.2	10	352	352	358
4.4	-46	109	119	23



Effective reconstruction of negative streamer

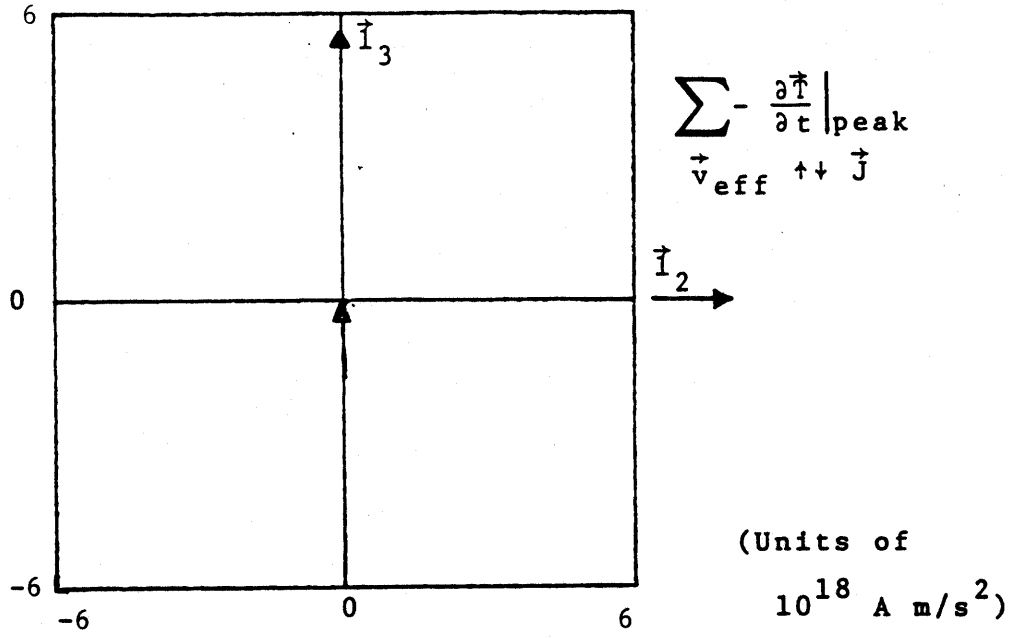


Peaks of $\partial\vec{T}/\partial t$

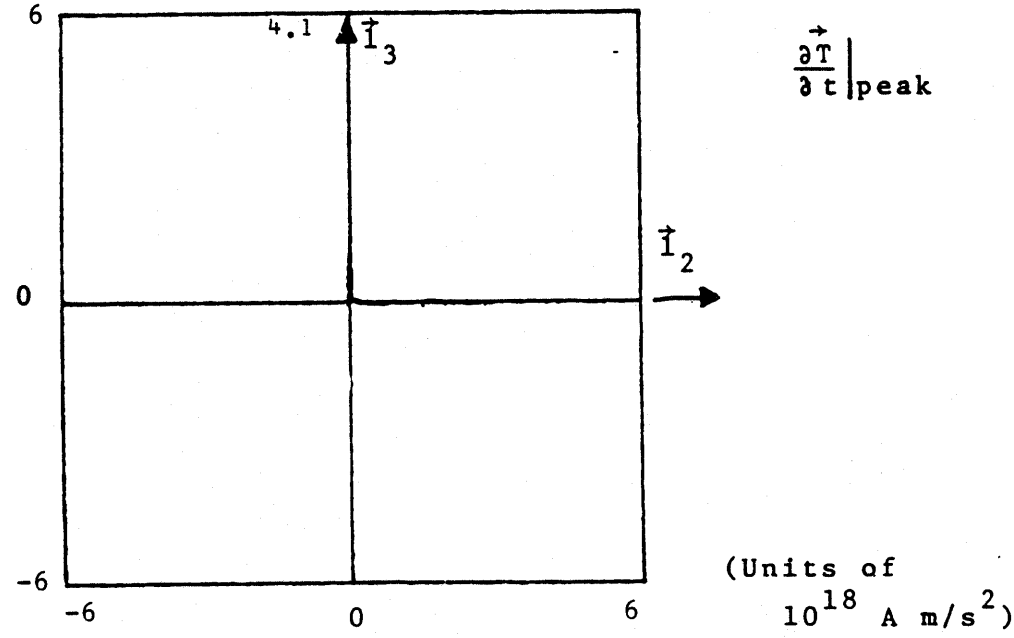
$\phi = 178^{\circ}$ $\theta = 85^{\circ}$ r = 380 m

Date: 81222 M.S.T.: 14:51:59.081

Figure 10.7.10.A.1 $\partial\vec{T}/\partial t$ for rocket triggered lightning



Effective reconstruction of negative streamer

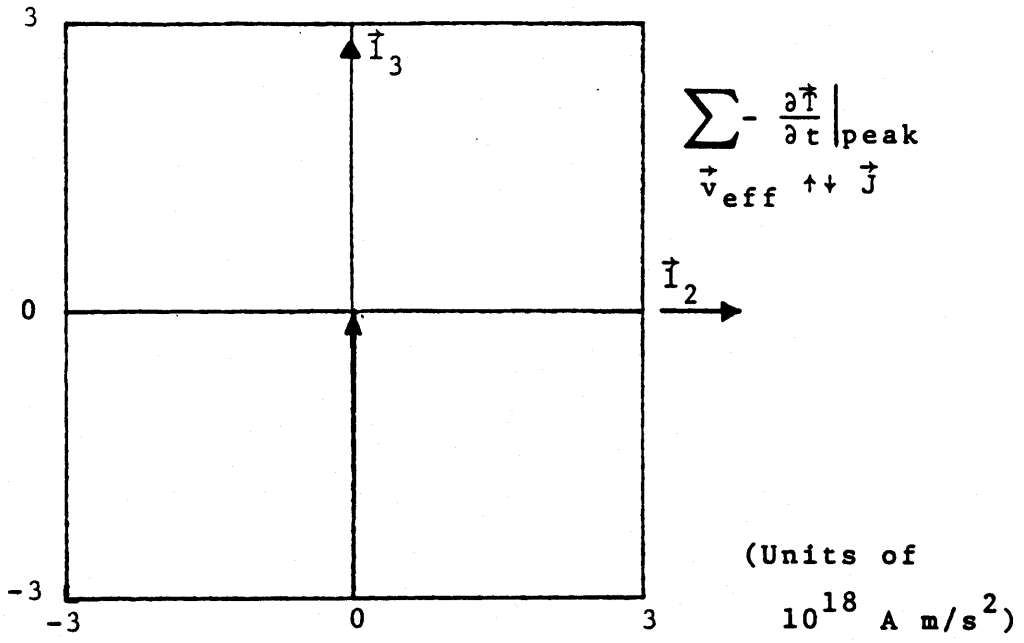


Peaks of $\partial\vec{T}/\partial t$

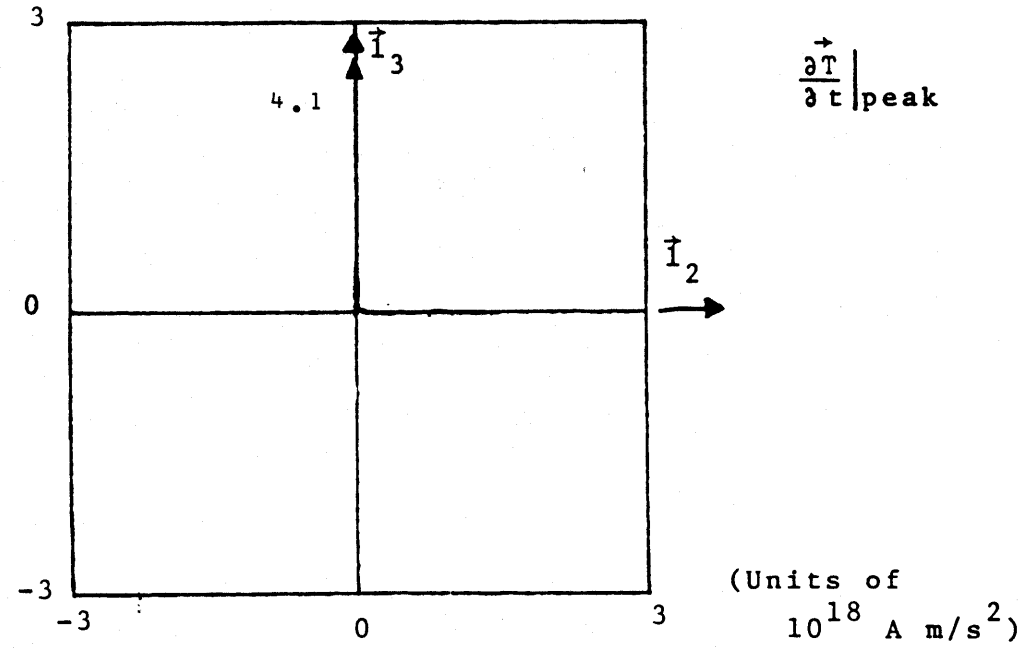
$\phi = 186^\circ$ $\theta = 33^\circ$ r = 696 m

Date: 81222 M.S.T.: 14:51:59.181

Figure 10.7.10.A.2 $\partial\vec{T}/\partial t$ for rocket triggered lightning



Effective reconstruction of negative streamer

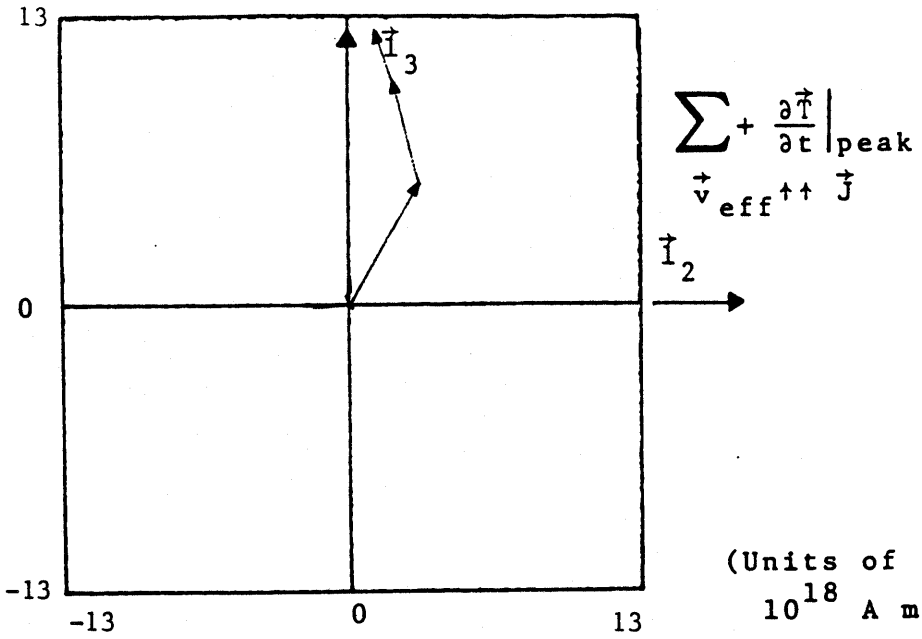


Peaks of $\partial\vec{T}/\partial t$

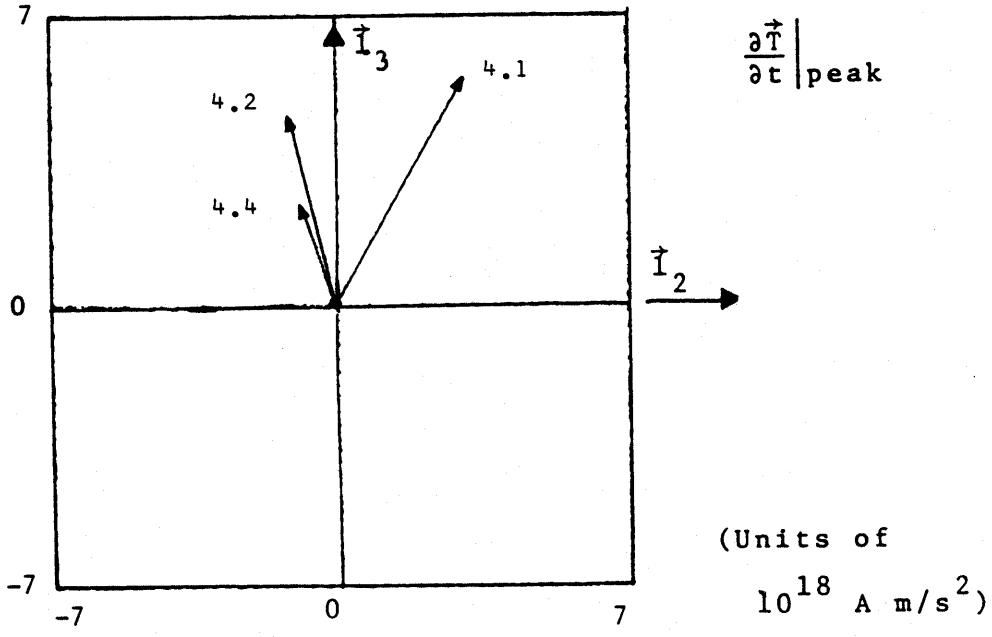
$\phi = 183^\circ$ $\theta = 20^\circ$ r = 1108 m

Date: 81222 M.S.T.: 14:51:59.235

Figure 10.7.10.A.3 $\partial\vec{T}/\partial t$ for rocket triggered lightning



Effective reconstruction of positive streamer

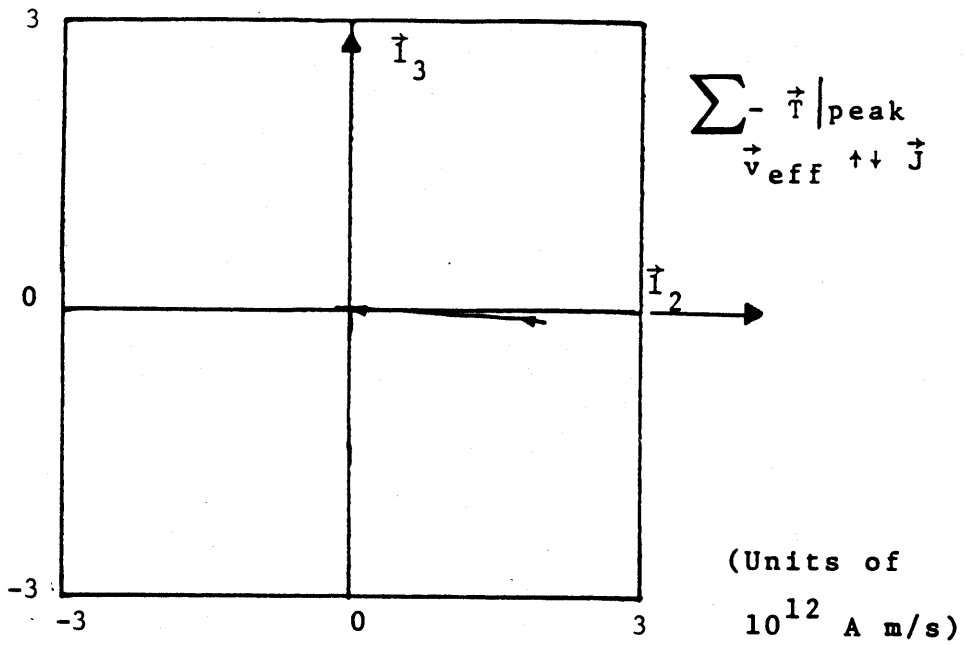


Peaks of $\partial \vec{T}/\partial t$

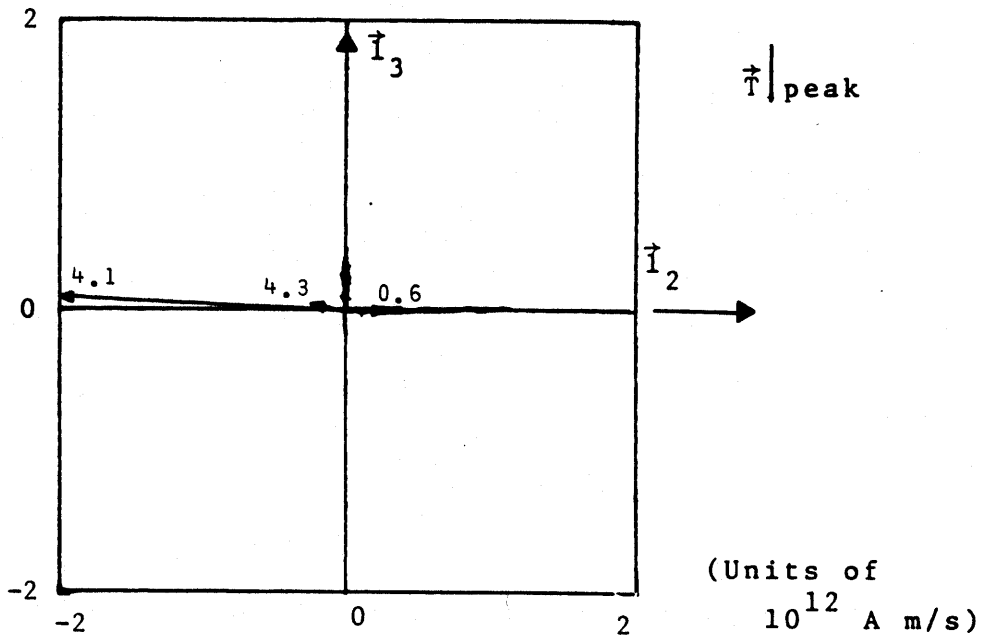
ϕ = 159° θ = 64° r = 422 m

Date: 81222 M.S.T.: 14:51:59.341

Figure 10.7.10.A.4 $\partial \vec{T}/\partial t$ for rocket triggered lightning



Effective reconstruction of negative streamer

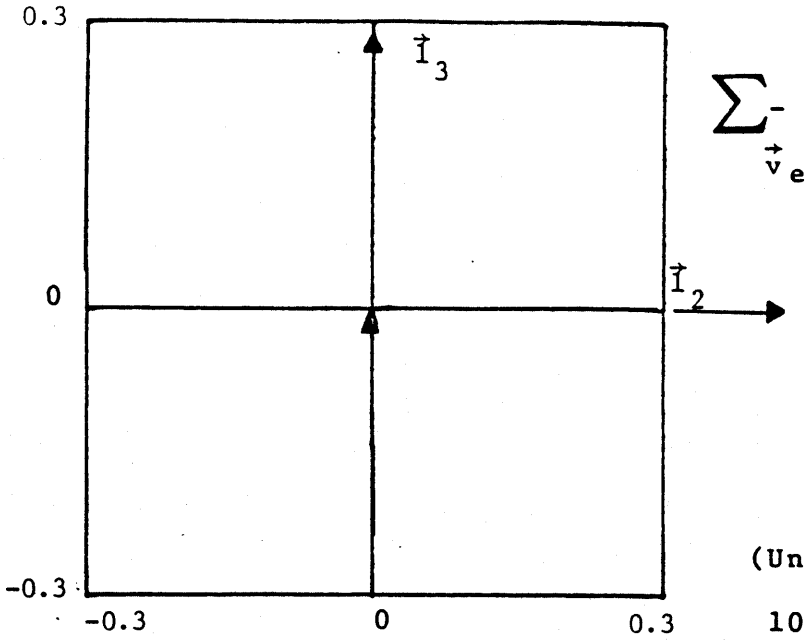


Peaks of $\vec{T}$

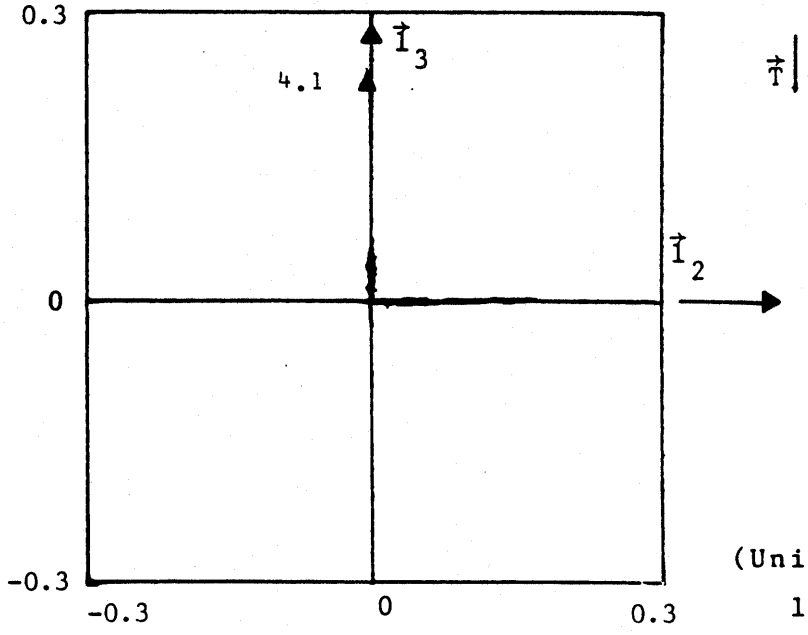
$\phi = 178^{o}$ $\theta = 90^{o}$ r = 379 m

Date: 81222 M.S.T.: 14:51:59.081

Figure 10.7.10.B.1 $\vec{T}$ for rocket triggered lightning



Effective reconstruction of negative streamer

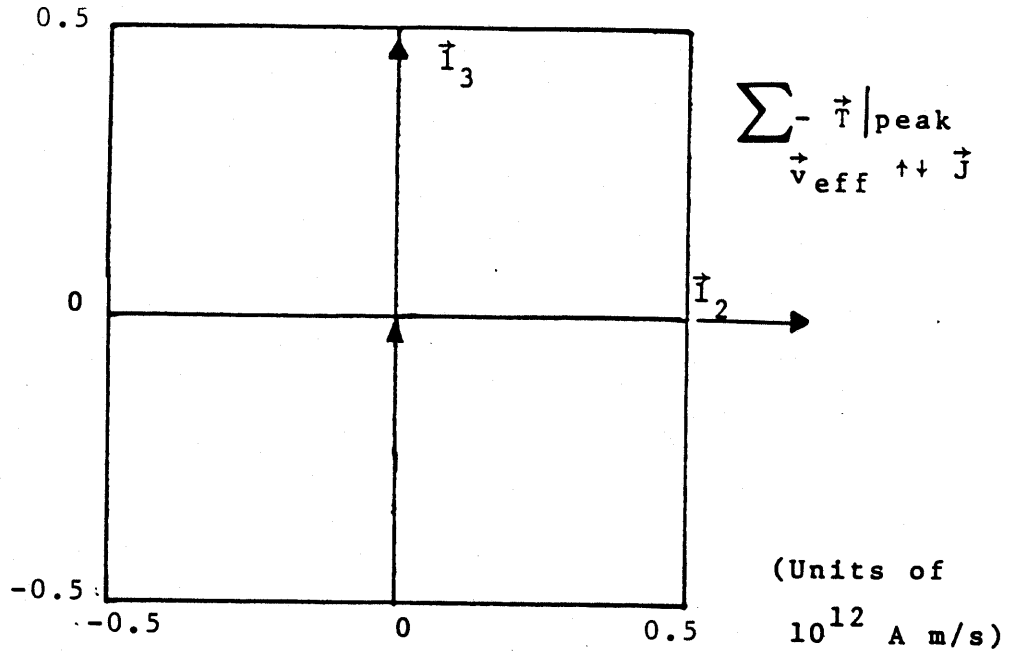


Peaks of $\vec{T}$

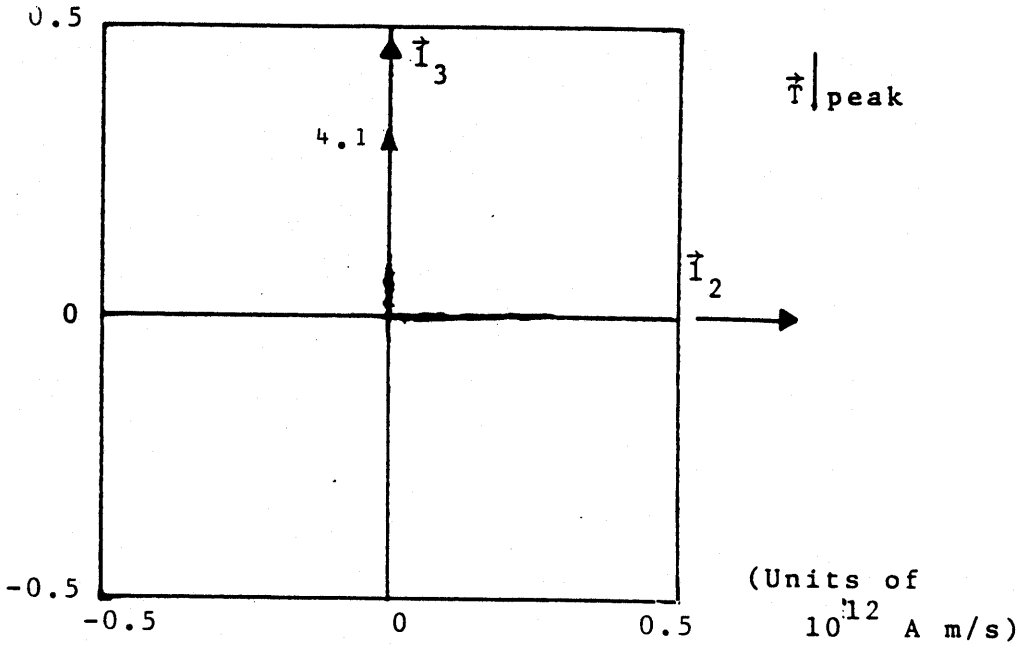
ϕ = 183° θ = 29° r = 782 m

Date. 81222 M.S.T.: 14:51:59.181

Figure 10.7.10.B.2 $\vec{T}$ for rocket triggered lightning



Effective reconstruction of negative streamer

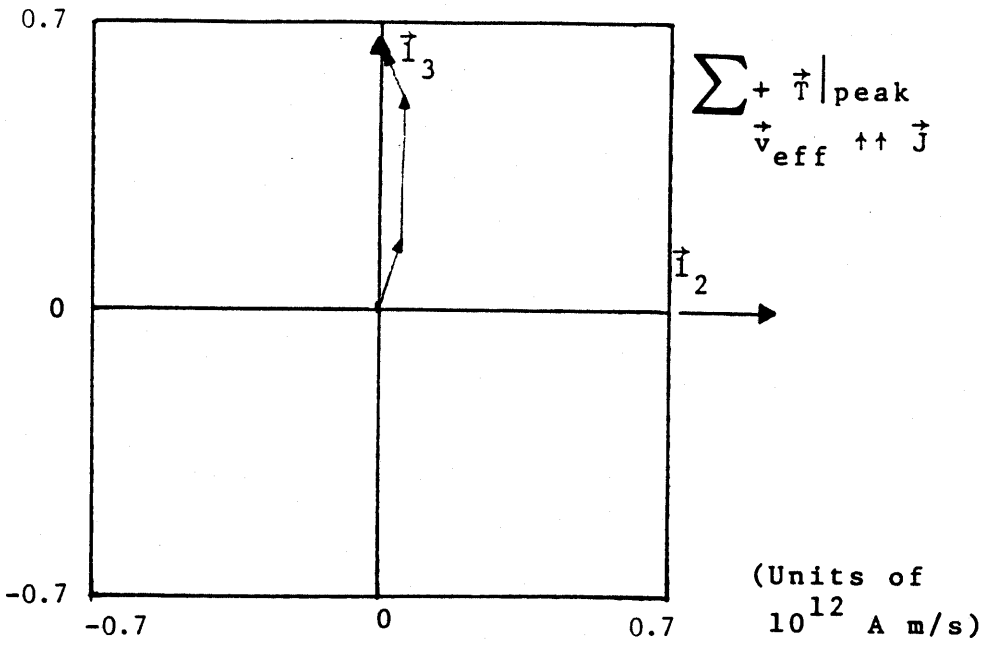


Peaks of $\vec{T}$

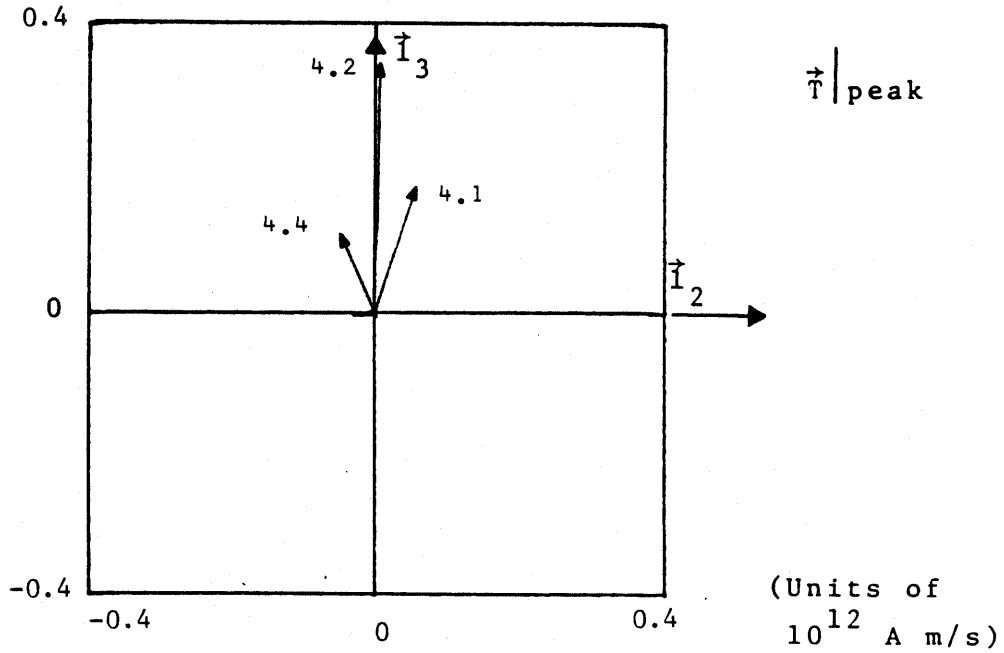
$\phi = 180^{o}$ $\theta = 22^{o}$ r = 1012 m

Date: 81222 M.S.T.: 14:51:59.235

Figure 10.7.10.B.3 $\vec{T}$ for rocket triggered lightning



Effective reconstruction of positive streamer



Peaks of $\vec{T}$

ϕ = 167^{o} θ = 66^{o} r = 415 m

Date: 81222 M.S.T.: 14:51:59.341

Figure 10.7.10.B.4 $\vec{T}$ for rocket triggered lightning

10.8 ROCKET TRIGGERED LIGHTNING

The data sequence from this rocket triggered discharge shows a return stroke, then three leaders. The triggers occurred during the early part of the stroke.

Solutions $E_{2,1}$ and $E_{3,1}$ shown on the whole-sky photograph agree fairly well with the visible part of the lightning channel. Similarly E_1 gives a good TOA direction to the lightning channel.

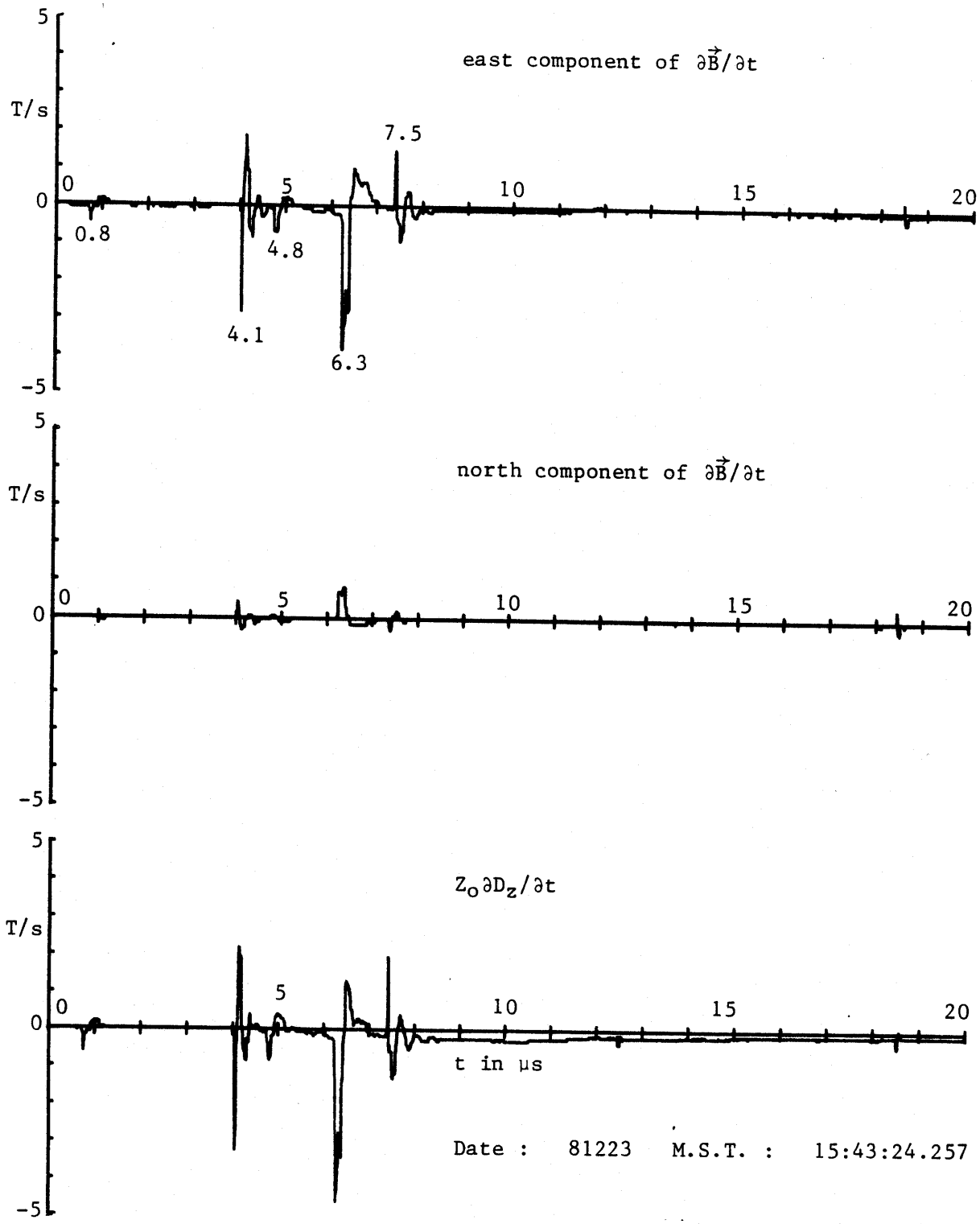


Figure 10.8.1.A.1 Derivative fields from rocket triggered lightning

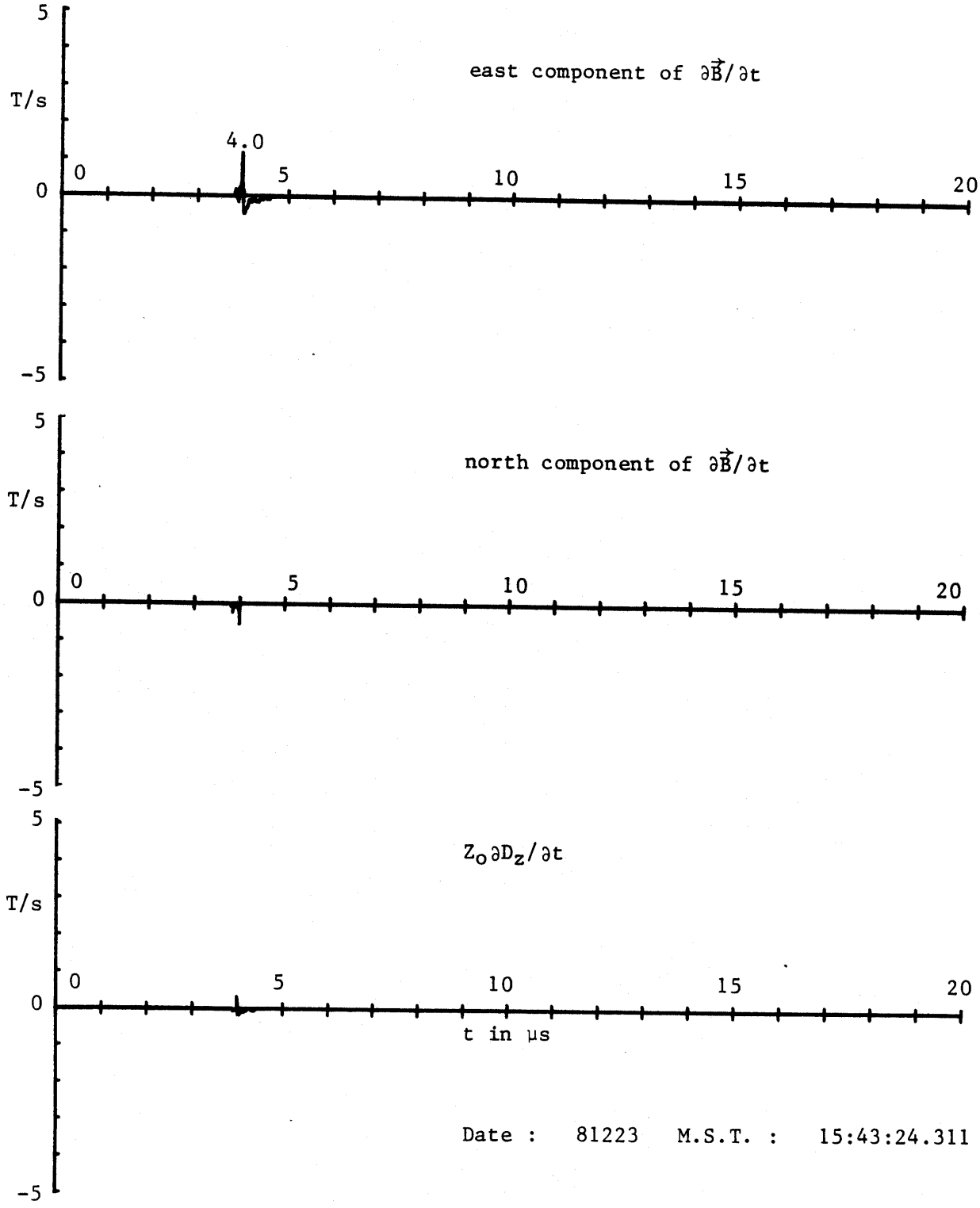


Figure 10.8.1.A.2 Derivative fields from rocket triggered lightning

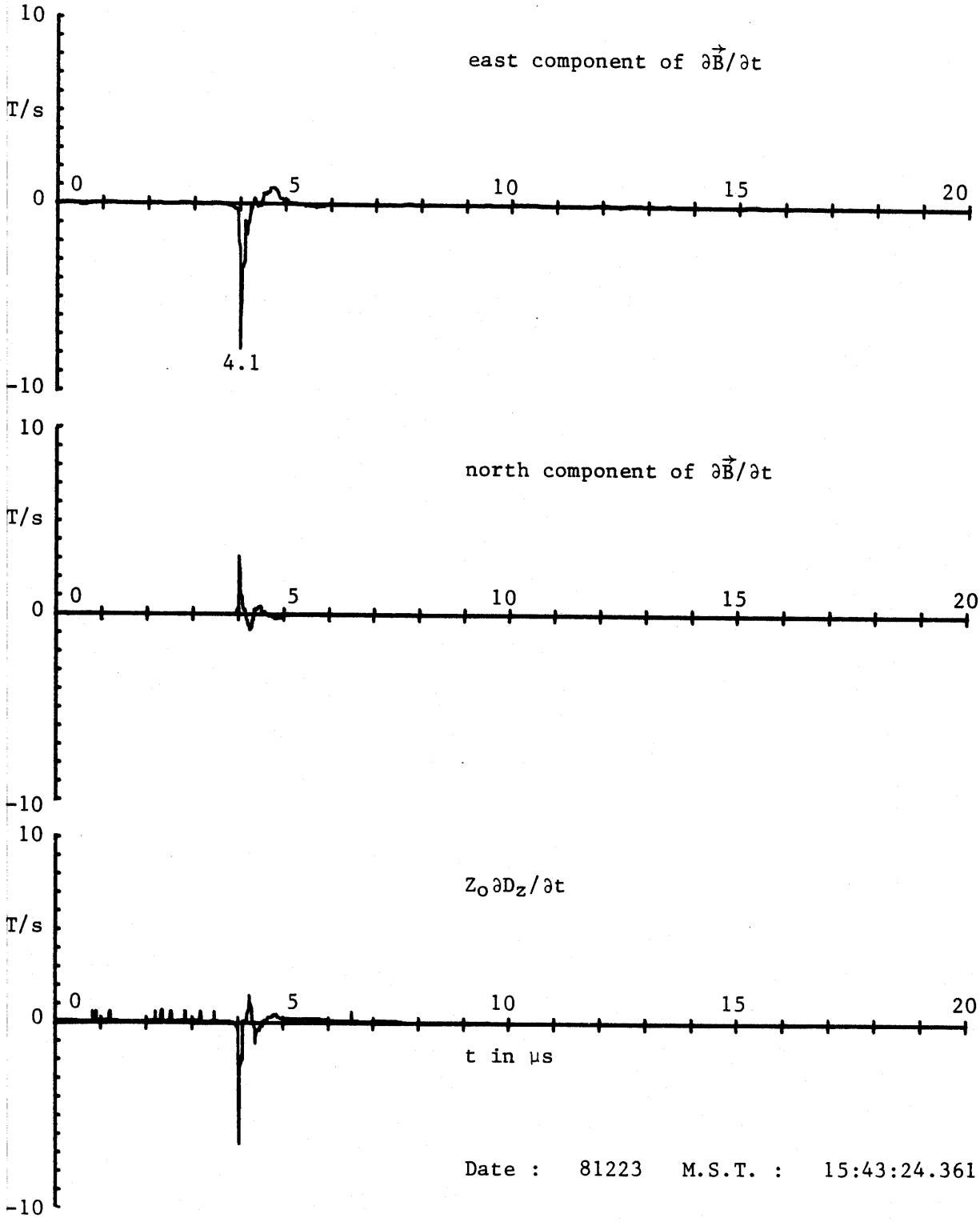


Figure 10.8.1.A.3 Derivative fields from rocket triggered lightning

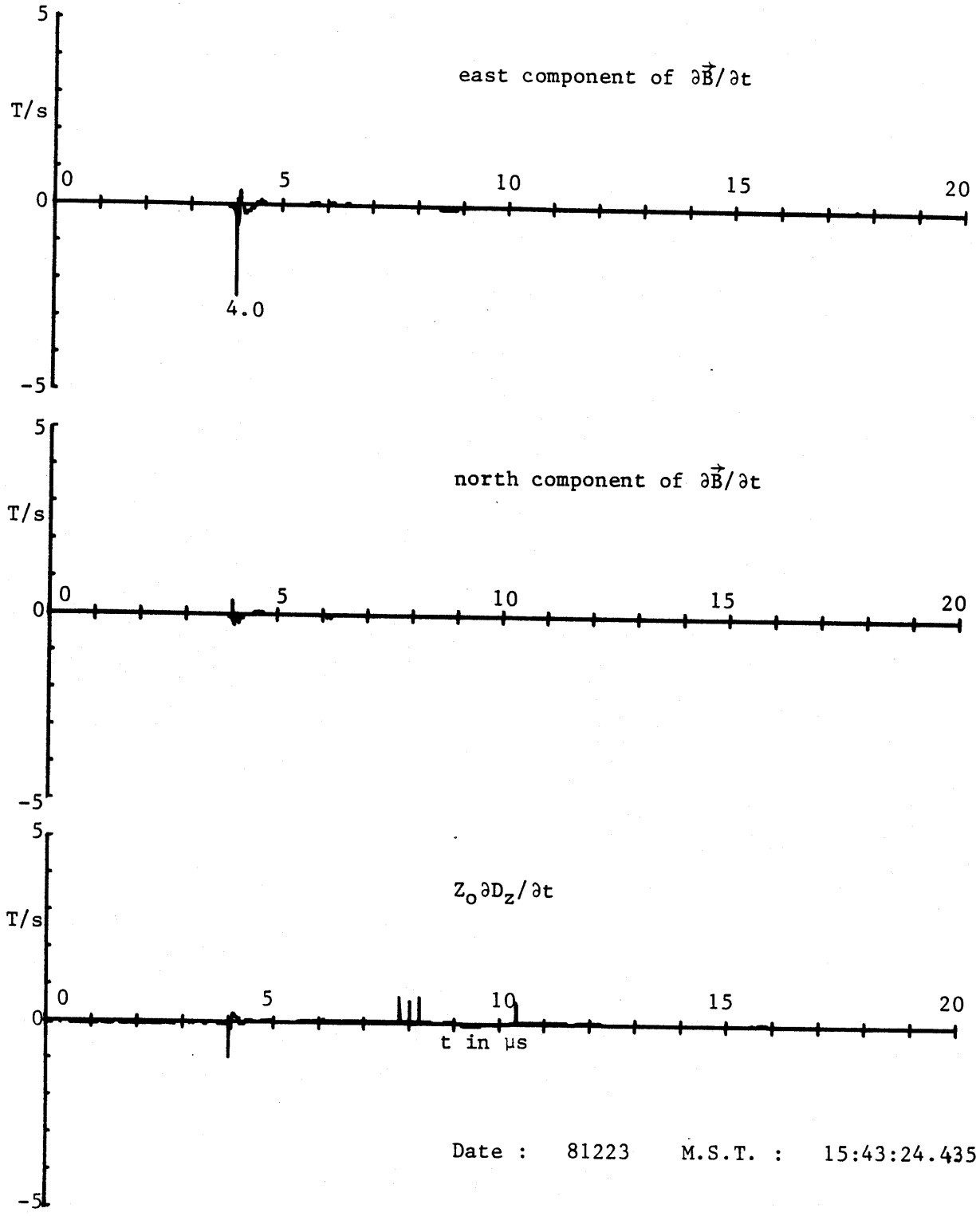


Figure 10.8.1.A.4 Derivative fields from rocket triggered lightning

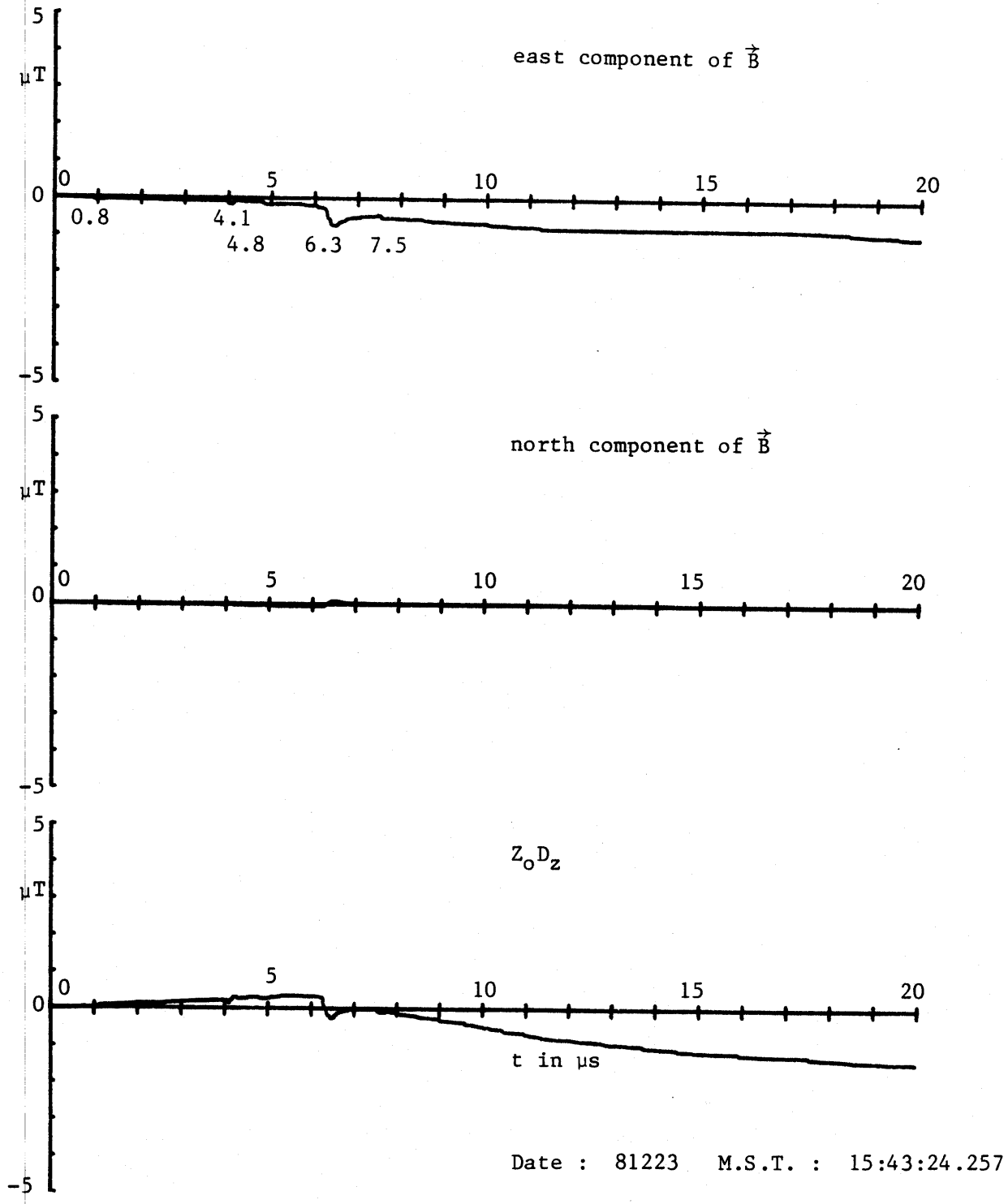


Figure 10.8.1.B.1 Fields from rocket triggered lightning

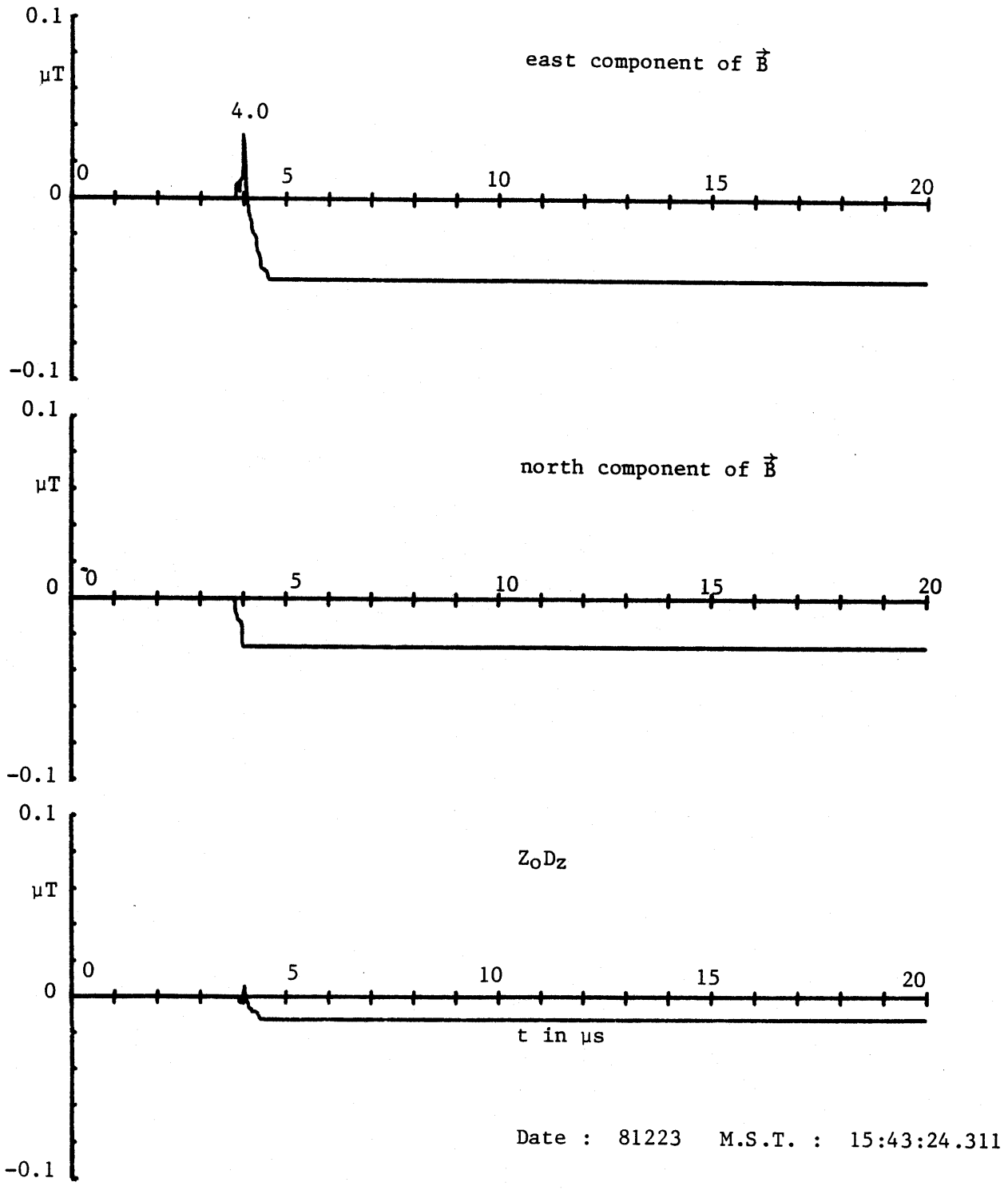


Figure 10.8.1.B.2 Fields from rocket triggered lightning

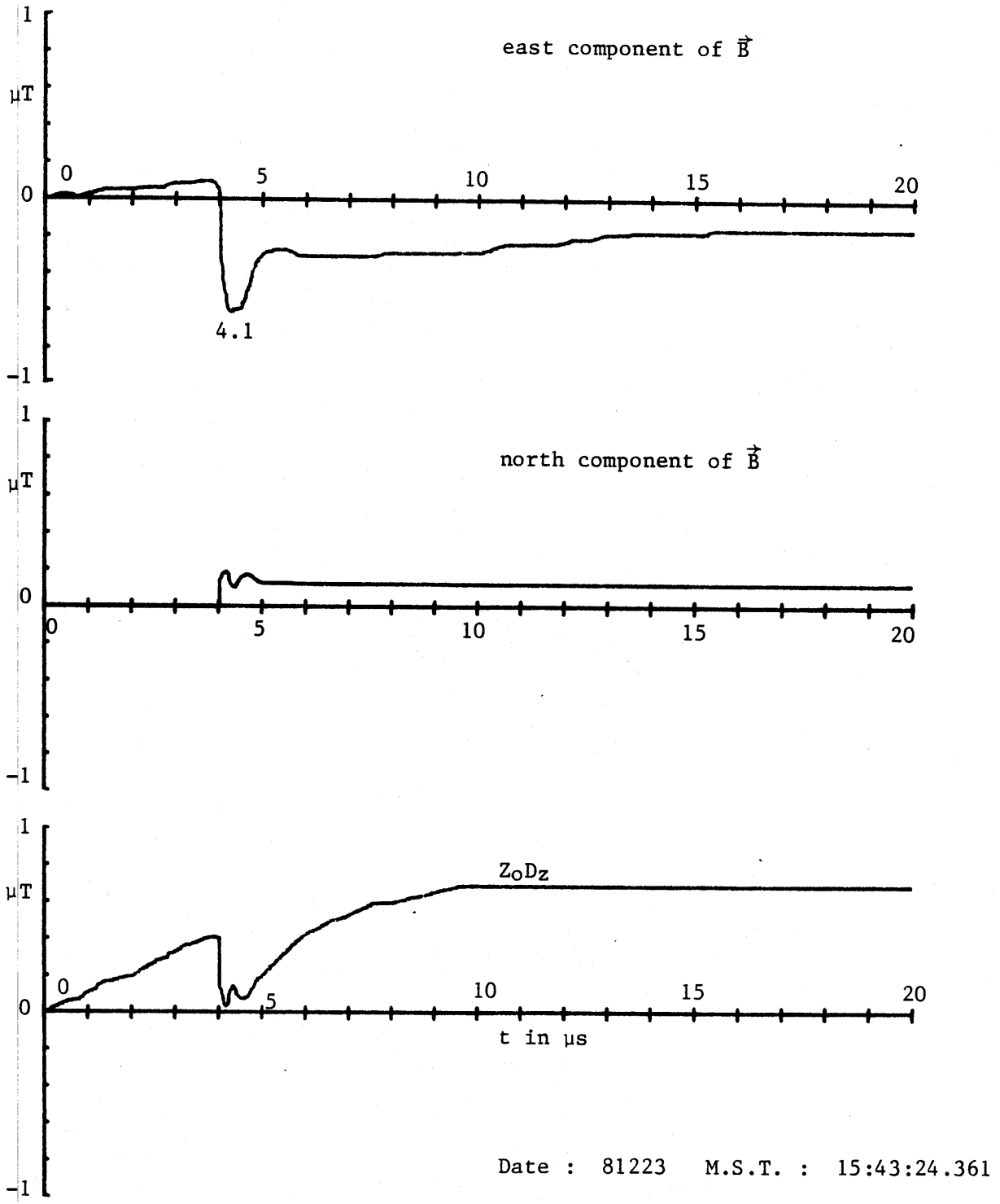


Figure 10.8.1.B.3 Fields from rocket triggered lightning

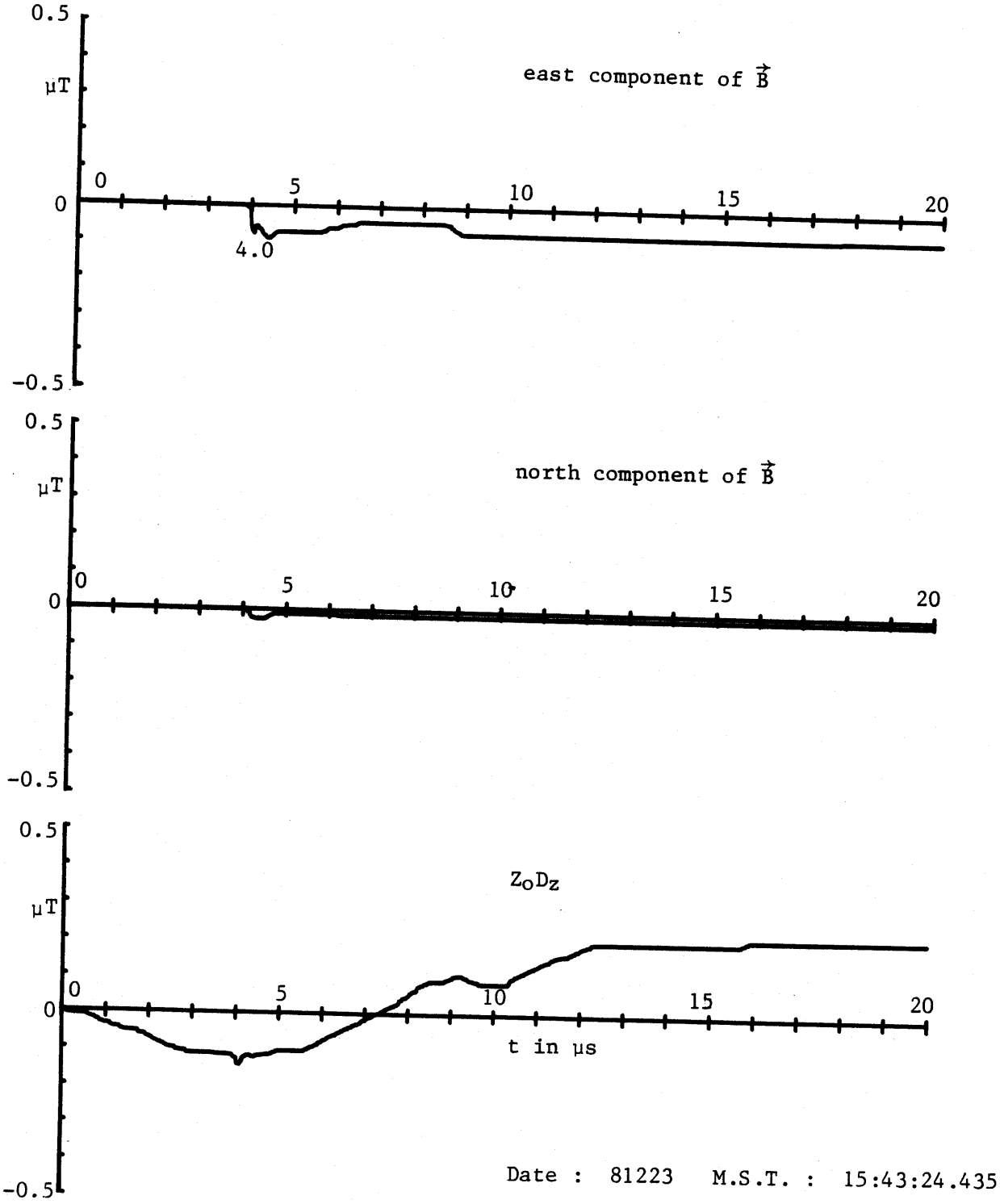


Figure 10.8.1.B.4 Fields from rocket triggered lightning

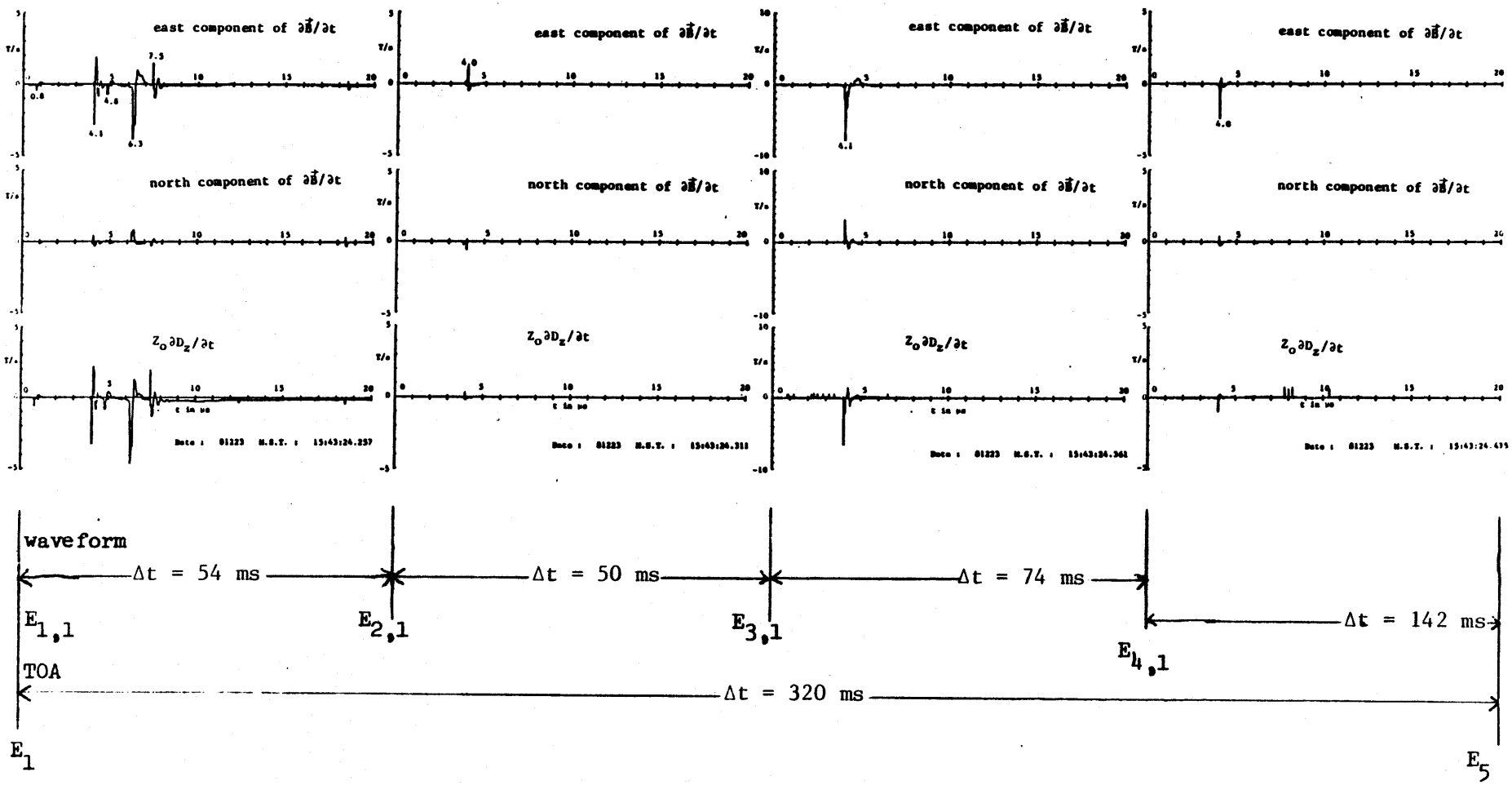


Figure 10.8.2 Time history of waveform and TOA events from rocket triggered lightning

Figure 10.8.3.a.1 Digital data for event 0.8

[ ] = baseline which is subtracted for peaks and numerical integration

Yeardate: 81223 Time: 15:43:24.257 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
0.73	-0.391	-0.078	-0.118	0.000	-0.000	0.000
0.74	-0.469	-0.078	-0.118	-0.001	-0.000	0.000
0.75	-0.547	-0.078	-0.177	-0.002	-0.000	-0.001
0.76	-0.703	-0.078	-0.236	-0.005	-0.000	-0.002
0.77	-0.781	-0.078	-0.412	-0.009	-0.000	-0.005
0.78	-0.625	-0.078	-0.648	-0.012	-0.000	-0.010
0.79	-0.625	-0.078	-0.471	-0.014	-0.000	-0.014
0.80	-0.547	-0.078	-0.412	-0.016	-0.000	-0.016
0.81	-0.469	-0.078	-0.236	-0.016	-0.000	-0.018
0.82	-0.469	-0.078	-0.236	-0.017	-0.000	-0.019
0.83	-0.391	-0.078	-0.236	-0.017	-0.000	-0.020
0.84	-0.391	-0.078	-0.177	-0.017	-0.000	-0.021
0.85	-0.391	-0.078	-0.118	-0.017	-0.000	-0.021
0.86	-0.391	-0.078	-0.118	-0.017	-0.000	-0.021
0.87	-0.391	-0.078	-0.118	-0.017	-0.000	-0.021
0.88	-0.391	-0.078	-0.118	-0.017	-0.000	-0.021
0.89	-0.391	-0.078	-0.118	-0.017	-0.000	-0.021
0.90	-0.391	-0.078	-0.118	-0.017	-0.000	-0.021
0.91	-0.391	-0.078	-0.118	-0.017	-0.000	-0.021
0.92	-0.391	-0.078	-0.118	-0.017	-0.000	-0.021
0.93	-0.313	-0.078	-0.118	-0.016	-0.000	-0.021
0.94	-0.313	-0.078	-0.059	-0.016	-0.000	-0.020
0.95	-0.313	-0.078	0.000	-0.015	-0.000	-0.019
0.96	-0.234	-0.078	0.059	-0.013	-0.000	-0.017
0.97	-0.234	-0.078	0.059	-0.012	-0.000	-0.015
0.98	-0.156	-0.078	0.118	-0.009	-0.000	-0.013
0.99	-0.156	-0.078	0.177	-0.007	-0.000	-0.010
1.00	-0.156	-0.078	0.177	-0.005	-0.000	-0.007
1.01	-0.156	-0.156	0.177	-0.002	-0.001	-0.004
1.02	-0.156	-0.078	0.177	0.000	-0.001	-0.001
1.03	-0.156	-0.078	0.177	0.002	-0.001	0.002

Figure 10.8.3.a.2 Digital data for event 4.1

[ ] = baseline which is subtracted for peaks and numerical integration

Yeardate: 81223 Time: 15:43:24.257 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
4.01	-0.313	-0.078	-0.059	0.000	-0.000	0.000
4.02	-0.313	-0.078	-0.059	0.000	-0.000	0.000
4.03	-0.313	-0.078	-0.059	0.000	-0.000	0.000
4.04	-0.391	-0.078	-0.059	-0.001	-0.000	0.000
4.05	-0.625	-0.078	-0.059	-0.004	-0.000	0.000
4.06	-1.250	-0.078	-0.118	-0.013	-0.000	-0.001
4.07	-2.500	0.234	-0.412	-0.035	0.003	-0.004
4.08	-3.125	0.313	-0.943	-0.063	0.007	-0.013
4.09	-2.578	0.391	-2.828	-0.086	0.012	-0.041
4.10	-1.328	0.234	-3.299	-0.096	0.015	-0.073
4.11	-0.078	0.000	-2.769	-0.094	0.016	-0.100
4.12	0.313	-0.078	-0.471	-0.087	0.016	-0.104
4.13	0.859	-0.313	0.471	-0.076	0.013	-0.099
4.14	0.938	-0.391	1.001	-0.063	0.010	-0.088
4.15	1.172	-0.391	1.708	-0.048	0.007	-0.071
4.16	1.484	-0.391	1.885	-0.030	0.004	-0.051
4.17	1.563	-0.391	1.885	-0.012	0.001	-0.032
4.18	1.250	-0.391	2.121	0.004	-0.002	-0.010
4.19	0.938	-0.313	2.121	0.017	-0.005	0.012

Figure 10.8.3.a.3 Digital data for event 4.8

[ ] = baseline which is subtracted for peaks and numerical integration

Yeardate: 81223 Time: 15:43:24.257 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
4.76	-0.391	-0.078	-0.059	0.000	-0.000	0.000
4.77	-0.391	-0.078	-0.059	0.000	-0.000	0.000
4.78	-0.391	-0.078	-0.059	0.000	-0.000	0.000
4.79	-0.625	-0.078	-0.059	-0.002	-0.000	0.000
4.80	-0.703	-0.078	-0.118	-0.005	-0.000	-0.001
4.81	-0.938	-0.078	-0.412	-0.011	-0.000	-0.004
4.82	-1.016	0.000	-0.648	-0.017	0.001	-0.010
4.83	-1.016	0.000	-0.884	-0.023	0.002	-0.018
4.84	-1.016	0.000	-0.825	-0.030	0.002	-0.026
4.85	-0.938	0.000	-0.825	-0.035	0.003	-0.034
4.86	-0.938	0.000	-0.766	-0.041	0.004	-0.041
4.87	-0.703	0.000	-0.766	-0.044	0.005	-0.048
4.88	-0.625	0.000	-0.471	-0.046	0.005	-0.052
4.89	-0.547	0.000	-0.412	-0.048	0.006	-0.055
4.90	-0.469	0.000	-0.295	-0.048	0.007	-0.058
4.91	-0.469	-0.078	-0.236	-0.049	0.007	-0.059
4.92	-0.391	-0.078	-0.236	-0.049	0.007	-0.061
4.93	-0.313	-0.078	-0.177	-0.048	0.007	-0.062
4.94	-0.313	-0.078	0.000	-0.048	0.007	-0.062
4.95	-0.234	-0.078	0.000	-0.046	0.007	-0.061
4.96	-0.156	-0.078	0.059	-0.044	0.007	-0.060
4.97	-0.078	-0.078	0.059	-0.041	0.007	-0.059
4.98	-0.078	-0.078	0.236	-0.037	0.007	-0.056
4.99	-0.078	-0.156	0.295	-0.034	0.006	-0.052
5.00	-0.078	-0.156	0.295	-0.031	0.005	-0.049
5.01	-0.078	-0.156	0.295	-0.028	0.005	-0.045
5.02	-0.156	-0.156	0.353	-0.026	0.004	-0.041
5.03	-0.156	-0.156	0.353	-0.023	0.003	-0.037
5.04	-0.078	-0.156	0.353	-0.020	0.002	-0.033
5.05	-0.078	-0.156	0.353	-0.017	0.002	-0.029
5.06	-0.078	-0.156	0.353	-0.014	0.001	-0.025
5.07	-0.078	-0.156	0.353	-0.011	-0.000	-0.021
5.08	-0.078	-0.156	0.295	-0.008	-0.001	-0.017
5.09	-0.078	-0.156	0.295	-0.005	-0.002	-0.014
5.10	-0.156	-0.156	0.295	-0.002	-0.002	-0.010
5.11	-0.156	-0.156	0.236	0.000	-0.003	-0.007
5.12	-0.156	-0.156	0.236	0.002	-0.004	-0.004
5.13	-0.156	-0.156	0.236	0.005	-0.005	-0.001
5.14	-0.156	-0.156	0.236	0.007	-0.006	0.002

Figure 10.8.3.a.4 Digital data for event 6.3

[ ] = baseline which is subtracted for peaks and numerical integration

Yeardate: 81223 Time: 15:43:24.257 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
6.22	-0.547	-0.078	-0.295	0.000	-0.000	0.000
6.23	-0.547	-0.078	-0.295	0.000	-0.000	0.000
6.24	-0.625	-0.078	-0.295	-0.001	-0.000	0.000
6.25	-0.703	-0.078	-0.353	-0.002	-0.000	-0.001
6.26	-0.938	0.000	-0.353	-0.006	0.001	-0.001
6.27	-1.328	0.234	-0.648	-0.014	0.004	-0.005
6.28	-3.125	0.547	-0.943	-0.040	0.010	-0.011
6.29	-4.063	0.625	-1.885	-0.075	0.017	-0.027
6.30	-4.141	0.625	-3.770	-0.111	0.024	-0.062
6.31	-3.828	0.625	-4.654	-0.144	0.031	-0.105
6.32	-3.516	0.625	-4.418	-0.173	0.038	-0.147
6.33	-3.438	0.625	-4.006	-0.202	0.045	-0.184
6.34	-3.203	0.625	-3.770	-0.229	0.052	-0.218
6.35	-2.891	0.547	-3.711	-0.252	0.059	-0.253
6.36	-2.578	0.547	-3.299	-0.273	0.065	-0.283
6.37	-2.656	0.625	-3.004	-0.294	0.072	-0.310
6.38	-2.891	0.703	-2.828	-0.317	0.080	-0.335
6.39	-3.125	0.781	-3.004	-0.343	0.088	-0.362
6.40	-3.125	0.781	-3.299	-0.369	0.097	-0.392
6.41	-2.813	0.703	-3.475	-0.391	0.105	-0.424
6.42	-2.578	0.703	-3.299	-0.412	0.112	-0.454
6.43	-2.266	0.547	-2.828	-0.429	0.119	-0.479
6.44	-1.875	0.547	-2.592	-0.442	0.125	-0.502
6.45	-1.328	0.313	-2.121	-0.450	0.129	-0.521
6.46	-0.703	0.234	-1.414	-0.452	0.132	-0.532
6.47	-0.391	0.000	-0.943	-0.450	0.133	-0.538
6.48	-0.078	0.000	-0.471	-0.445	0.134	-0.540
6.49	0.234	0.000	0.000	-0.437	0.134	-0.537
6.50	0.547	-0.078	0.471	-0.427	0.134	-0.529
6.51	0.547	-0.078	0.766	-0.416	0.134	-0.519
6.52	0.625	-0.078	1.001	-0.404	0.134	-0.506
6.53	0.625	-0.156	1.237	-0.392	0.134	-0.491
6.54	0.703	-0.234	1.237	-0.380	0.132	-0.475
6.55	0.703	-0.234	1.237	-0.367	0.130	-0.460
6.56	0.547	-0.234	1.237	-0.356	0.129	-0.445
6.57	0.547	-0.234	1.178	-0.345	0.127	-0.430
6.58	0.547	-0.234	1.001	-0.334	0.126	-0.417
6.59	0.547	-0.234	1.060	-0.323	0.124	-0.403
6.60	0.391	-0.234	1.060	-0.314	0.123	-0.390
6.61	0.391	-0.234	0.884	-0.305	0.121	-0.378
6.62	0.391	-0.234	0.943	-0.295	0.119	-0.366
6.63	0.391	-0.234	0.825	-0.286	0.118	-0.354
6.64	0.391	-0.234	0.707	-0.277	0.116	-0.344
6.65	0.313	-0.234	0.530	-0.268	0.115	-0.336
6.66	0.234	-0.234	0.471	-0.260	0.113	-0.328

Figure 10.8.3.a.4 Digital data for event 6.3 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
6.67	0.234	-0.234	0.295	-0.252	0.112	-0.323
6.68	0.234	-0.234	0.236	-0.244	0.110	-0.317
6.69	0.234	-0.234	0.059	-0.237	0.109	-0.314
6.70	0.234	-0.234	0.059	-0.229	0.107	-0.310
6.71	0.234	-0.234	0.059	-0.221	0.105	-0.307
6.72	0.234	-0.234	0.059	-0.213	0.104	-0.303
6.73	0.313	-0.234	0.059	-0.205	0.102	-0.300
6.74	0.313	-0.234	0.118	-0.196	0.101	-0.295
6.75	0.313	-0.234	0.177	-0.187	0.099	-0.291
6.76	0.313	-0.234	0.177	-0.179	0.098	-0.286
6.77	0.313	-0.234	0.177	-0.170	0.096	-0.281
6.78	0.313	-0.234	0.236	-0.162	0.094	-0.276
6.79	0.313	-0.234	0.236	-0.153	0.093	-0.271
6.80	0.313	-0.234	0.236	-0.144	0.091	-0.265
6.81	0.234	-0.234	0.236	-0.137	0.090	-0.260
6.82	0.234	-0.234	0.177	-0.129	0.088	-0.255
6.83	0.234	-0.234	0.177	-0.121	0.087	-0.251
6.84	0.156	-0.234	0.177	-0.114	0.085	-0.246
6.85	0.078	-0.234	0.177	-0.108	0.084	-0.241
6.86	0.000	-0.234	0.118	-0.102	0.082	-0.237
6.87	0.078	-0.234	0.118	-0.096	0.080	-0.233
6.88	0.000	-0.234	0.118	-0.091	0.079	-0.229
6.89	0.000	-0.234	0.177	-0.085	0.077	-0.224
6.90	-0.078	-0.234	0.177	-0.080	0.076	-0.219
6.91	-0.156	-0.156	0.177	-0.076	0.075	-0.215
6.92	-0.156	-0.156	0.118	-0.073	0.074	-0.211
6.93	-0.156	-0.156	0.118	-0.069	0.073	-0.206
6.94	-0.156	-0.156	0.118	-0.065	0.073	-0.202
6.95	-0.156	-0.156	0.118	-0.061	0.072	-0.198
6.96	-0.156	-0.156	0.118	-0.057	0.071	-0.194
6.97	-0.156	-0.156	-0.059	-0.053	0.070	-0.192
6.98	-0.156	-0.156	-0.059	-0.049	0.069	-0.189
6.99	-0.156	-0.156	-0.059	-0.045	0.069	-0.187
7.00	-0.156	-0.156	-0.059	-0.041	0.068	-0.185
7.01	-0.156	-0.156	-0.118	-0.037	0.067	-0.183
7.02	-0.234	-0.156	-0.118	-0.034	0.066	-0.181
7.03	-0.234	-0.156	-0.118	-0.031	0.066	-0.179
7.04	-0.234	-0.156	-0.177	-0.028	0.065	-0.178
7.05	-0.234	-0.156	-0.177	-0.025	0.064	-0.177
7.06	-0.234	-0.156	-0.177	-0.022	0.063	-0.176
7.07	-0.234	-0.156	-0.177	-0.019	0.062	-0.175
7.08	-0.313	-0.156	-0.177	-0.016	0.062	-0.173
7.09	-0.313	-0.156	-0.177	-0.014	0.061	-0.172
7.10	-0.313	-0.078	-0.177	-0.012	0.061	-0.171
7.11	-0.313	-0.078	-0.177	-0.009	0.061	-0.170
7.12	-0.313	-0.078	-0.177	-0.007	0.061	-0.169
7.13	-0.313	-0.078	-0.177	-0.005	0.061	-0.167
7.14	-0.313	-0.078	-0.177	-0.002	0.061	-0.166
7.15	-0.313	-0.078	-0.177	0.000	0.061	-0.165
7.16	-0.313	-0.078	-0.236	0.002	0.061	-0.164
7.17	-0.313	-0.078	-0.236	0.005	0.061	-0.164

Figure 10.8.3.a.4 Digital data for event 6.3 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
7.18	-0.313	-0.078	-0.236	0.007	0.061	-0.163
7.19	-0.313	-0.078	-0.177	0.009	0.061	-0.162
7.20	-0.313	-0.078	-0.177	0.012	0.061	-0.161
7.21	-0.313	-0.078	-0.177	0.014	0.061	-0.160
7.22	-0.313	-0.078	-0.177	0.017	0.061	-0.159
7.23	-0.313	-0.078	-0.177	0.019	0.061	-0.157
7.24	-0.313	-0.078	-0.177	0.021	0.061	-0.156
7.25	-0.313	-0.078	-0.177	0.024	0.061	-0.155
7.26	-0.391	-0.078	-0.177	0.025	0.061	-0.154
7.27	-0.391	-0.078	-0.236	0.027	0.061	-0.153
7.28	-0.391	-0.078	-0.236	0.028	0.061	-0.153
7.29	-0.391	-0.078	-0.236	0.030	0.061	-0.152
7.30	-0.391	-0.078	-0.236	0.031	0.061	-0.151
7.31	-0.391	-0.078	-0.236	0.033	0.061	-0.151
7.32	-0.391	-0.078	-0.236	0.035	0.061	-0.150
7.33	-0.391	-0.078	-0.236	0.036	0.061	-0.150
7.34	-0.391	-0.078	-0.236	0.038	0.061	-0.149
7.35	-0.391	-0.078	-0.236	0.039	0.061	-0.148
7.36	-0.391	-0.078	-0.236	0.041	0.061	-0.148
7.37	-0.391	-0.078	-0.236	0.042	0.061	-0.147
7.38	-0.391	-0.078	-0.236	0.044	0.061	-0.147
7.39	-0.391	-0.078	-0.236	0.045	0.061	-0.146
7.40	-0.313	-0.078	-0.236	0.048	0.061	-0.146
7.41	-0.313	-0.313	-0.236	0.050	0.058	-0.145
7.42	0.313	-0.391	-0.177	0.059	0.055	-0.144
7.43	1.172	-0.391	-0.177	0.076	0.052	-0.143
7.44	1.172	-0.313	0.943	0.093	0.050	-0.130
7.45	0.547	-0.078	1.885	0.104	0.050	-0.108
7.46	0.000	-0.078	1.473	0.110	0.050	-0.091
7.47	-0.625	-0.078	0.471	0.109	0.050	-0.083

Figure 10.8.3.a.5 Digital data for event 7.5

[ ] = baseline which is subtracted for peaks and numerical integration

Yeardate: 81223 Time: 15:43:24.257 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
7.38	-0.391	-0.078	-0.236	0.000	-0.000	0.000
7.39	[-0.391]	-0.078	-0.236	0.000	-0.000	0.000
7.40	-0.313	[-0.078]	-0.236	0.001	-0.000	0.000
7.41	-0.313	-0.313	[-0.236]	0.002	-0.002	0.000
7.42	0.313	-0.391	-0.177	0.009	-0.005	0.001
7.43	1.172	-0.391	-0.177	0.024	-0.009	0.001
7.44	1.172	-0.313	0.943	0.040	-0.011	0.013
7.45	0.547	-0.078	1.885	0.049	-0.011	0.034
7.46	0.000	-0.078	1.473	0.053	-0.011	0.051
7.47	-0.625	-0.078	0.471	0.051	-0.011	0.058
7.48	-0.625	-0.078	-0.412	0.048	-0.011	0.057
7.49	-0.625	0.000	-0.648	0.046	-0.010	0.052
7.50	-0.703	0.000	-0.471	0.043	-0.009	0.050
7.51	-0.781	-0.078	-0.648	0.039	-0.009	0.046
7.52	-0.781	-0.078	-0.707	0.035	-0.009	0.041
7.53	-0.859	-0.078	-0.707	0.031	-0.009	0.037
7.54	-1.016	0.000	-0.648	0.024	-0.009	0.032
7.55	-1.250	0.078	-0.884	0.016	-0.007	0.026
7.56	-1.250	0.078	-1.355	0.007	-0.005	0.015
7.57	-1.250	0.156	-1.355	-0.001	-0.003	0.004
7.58	-1.250	0.078	-1.178	-0.010	-0.002	-0.006
7.59	-1.016	0.078	-1.237	-0.016	-0.000	-0.016
7.60	-0.938	0.000	-1.237	-0.022	0.001	-0.026

Figure 10.8.3.b.1 Digital data for event 4.0

[ ] = baseline which is subtracted for peaks and numerical integration

Yeardate: 81223 Time: 15:43:24.311 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
3.93	-0.469	-0.078	-0.118	0.000	-0.000	0.000
3.94	-0.313	-0.078	-0.118	0.002	-0.000	0.000
3.95	-0.078	-0.078	-0.118	0.005	-0.000	0.000
3.96	-0.078	-0.078	-0.118	0.009	-0.000	0.000
3.97	-0.156	-0.078	-0.118	0.013	-0.000	0.000
3.98	-0.234	-0.156	-0.059	0.015	-0.001	0.001
3.99	-0.234	-0.156	-0.059	0.017	-0.002	0.001
4.00	0.547	-0.156	-0.059	0.027	-0.002	0.002
4.01	0.859	-0.234	-0.059	0.041	-0.004	0.002
4.02	0.000	-0.391	-0.059	0.045	-0.007	0.003
4.03	-0.625	-0.625	0.177	0.044	-0.013	0.006
4.04	-0.703	-0.313	0.295	0.041	-0.015	0.010
4.05	-0.781	-0.078	0.236	0.038	-0.015	0.014
4.06	-0.781	-0.078	-0.177	0.035	-0.015	0.013
4.07	-0.781	-0.078	-0.236	0.032	-0.015	0.012
4.08	-0.703	-0.078	-0.236	0.030	-0.015	0.011
4.09	-0.625	-0.078	-0.177	0.028	-0.015	0.010
4.10	-0.625	-0.078	-0.177	0.027	-0.015	0.009
4.11	-0.625	-0.078	-0.118	0.025	-0.015	0.009
4.12	-0.547	-0.078	-0.118	0.024	-0.015	0.009
4.13	-0.547	-0.078	-0.118	0.023	-0.015	0.009
4.14	-0.469	-0.078	-0.118	0.023	-0.015	0.009
4.15	-0.469	-0.078	-0.118	0.023	-0.015	0.009

Figure 10.8.3.c.1 Digital data for event 4.1

[ ] = baseline which is subtracted for peaks and numerical integration

Yeardate: 81223 Time: 15:43:24.361 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
3.96	[-0.625]	[-0.078]	[-0.118]	0.000	-0.000	0.000
3.97	-0.625	-0.078	-0.118	0.000	-0.000	0.000
3.98	-0.703	-0.078	-0.118	-0.001	-0.000	0.000
3.99	-0.703	-0.078	-0.118	-0.002	-0.000	0.000
4.00	-0.781	-0.078	-0.118	-0.003	-0.000	0.000
4.01	-0.859	-0.078	-0.177	-0.005	-0.000	-0.001
4.02	-1.250	0.000	-0.236	-0.012	0.001	-0.002
4.03	-2.500	0.234	-0.236	-0.030	0.004	-0.003
4.04	-5.000	1.172	-0.412	-0.074	0.016	-0.006
4.05	-8.125	2.500	-0.884	-0.149	0.042	-0.014
4.06	-7.578	3.047	-1.885	-0.219	0.073	-0.031
4.07	-6.328	2.891	-5.596	-0.276	0.103	-0.086
4.08	-5.625	2.422	-6.539	-0.326	0.128	-0.150
4.09	-4.453	1.563	-5.596	-0.364	0.145	-0.205
4.10	-3.750	1.250	-4.654	-0.395	0.158	-0.250
4.11	-3.750	0.938	-2.828	-0.427	0.168	-0.277
4.12	-3.750	0.859	-2.297	-0.458	0.177	-0.299
4.13	-3.516	0.313	-1.885	-0.487	0.181	-0.317
4.14	-3.125	0.234	-2.062	-0.512	0.184	-0.336
4.15	-2.500	0.234	-1.885	-0.530	0.187	-0.354
4.16	-1.328	0.156	-0.943	-0.538	0.190	-0.362
4.17	-1.250	0.156	-0.471	-0.544	0.192	-0.366
4.18	-1.328	0.156	0.000	-0.551	0.195	-0.365
4.19	-1.953	0.156	0.059	-0.564	0.197	-0.363
4.20	-1.953	-0.156	0.118	-0.577	0.196	-0.360
4.21	-1.563	-0.234	0.000	-0.587	0.194	-0.359
4.22	-1.328	-0.391	-0.059	-0.594	0.191	-0.359
4.23	-1.328	-0.625	0.177	-0.601	0.186	-0.356
4.24	-1.250	-0.703	0.471	-0.607	0.180	-0.350
4.25	-0.938	-0.625	0.530	-0.610	0.174	-0.343
4.26	-0.625	-0.625	0.648	-0.610	0.169	-0.336
4.27	-0.391	-0.703	0.648	-0.608	0.162	-0.328
4.28	-0.391	-0.938	0.648	-0.605	0.154	-0.320
4.29	-0.625	-0.938	1.001	-0.605	0.145	-0.309
4.30	-0.625	-0.859	1.414	-0.605	0.137	-0.294
4.31	-0.391	-0.859	1.237	-0.603	0.130	-0.280
4.32	-0.391	-0.859	0.943	-0.601	0.122	-0.270
4.33	-0.313	-0.781	0.943	-0.598	0.115	-0.259
4.34	-0.078	-0.391	0.766	-0.592	0.112	-0.250
4.35	0.000	-0.313	0.530	-0.586	0.109	-0.244
4.36	0.000	-0.313	0.236	-0.580	0.107	-0.240
4.37	0.000	-0.313	0.059	-0.573	0.105	-0.238
4.38	-0.156	-0.313	0.059	-0.569	0.102	-0.237
4.39	-0.391	0.000	0.000	-0.566	0.103	-0.236
4.40	-0.391	0.234	-0.236	-0.564	0.106	-0.237

Figure 10.8.3.c.1 Digital data for event 4.1 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
4.41	-0.547	0.234	-0.648	-0.563	0.109	-0.242
4.42	-0.469	0.234	-0.943	-0.562	0.112	-0.250
4.43	-0.391	0.156	-1.178	-0.559	0.115	-0.261
4.44	-0.313	0.156	-0.943	-0.556	0.117	-0.269
4.45	-0.313	0.234	-0.648	-0.553	0.120	-0.274
4.46	-0.313	0.234	-0.471	-0.550	0.123	-0.278
4.47	-0.313	0.313	-0.412	-0.547	0.127	-0.281
4.48	-0.391	0.313	-0.412	-0.545	0.131	-0.284
4.49	-0.469	0.391	-0.412	-0.543	0.136	-0.287
4.50	-0.469	0.391	-0.412	-0.541	0.141	-0.290
4.51	-0.313	0.391	-0.412	-0.538	0.145	-0.293
4.52	-0.313	0.391	-0.412	-0.535	0.150	-0.296
4.53	-0.156	0.313	-0.412	-0.530	0.154	-0.299
4.54	-0.078	0.313	-0.236	-0.525	0.158	-0.300
4.55	0.000	0.234	-0.236	-0.519	0.161	-0.301
4.56	0.156	0.234	-0.236	-0.511	0.164	-0.302
4.57	0.234	0.000	-0.177	-0.502	0.165	-0.303
4.58	0.234	0.000	-0.177	-0.494	0.166	-0.303
4.59	0.234	0.000	0.000	-0.485	0.166	-0.302
4.60	0.234	0.078	0.059	-0.477	0.168	-0.300
4.61	0.156	0.078	0.059	-0.469	0.169	-0.299
4.62	0.156	0.078	0.059	-0.461	0.171	-0.297
4.63	0.156	0.078	0.059	-0.453	0.173	-0.295
4.64	0.234	0.078	0.059	-0.445	0.174	-0.293
4.65	0.234	0.000	0.059	-0.436	0.175	-0.291
4.66	0.234	0.000	0.118	-0.427	0.176	-0.289
4.67	0.313	-0.078	0.118	-0.418	0.176	-0.287
4.68	0.313	-0.078	0.118	-0.409	0.176	-0.284
4.69	0.391	-0.156	0.118	-0.398	0.175	-0.282
4.70	0.469	-0.156	0.177	-0.388	0.174	-0.279
4.71	0.547	-0.156	0.236	-0.376	0.173	-0.276
4.72	0.547	-0.156	0.295	-0.364	0.173	-0.271
4.73	0.547	-0.156	0.295	-0.352	0.172	-0.267
4.74	0.547	-0.156	0.295	-0.341	0.171	-0.263
4.75	0.547	-0.156	0.295	-0.329	0.170	-0.259
4.76	0.547	-0.156	0.295	-0.317	0.169	-0.255
4.77	0.547	-0.234	0.295	-0.305	0.168	-0.251
4.78	0.469	-0.234	0.353	-0.295	0.166	-0.246
4.79	0.469	-0.234	0.353	-0.284	0.165	-0.241
4.80	0.391	-0.234	0.412	-0.273	0.163	-0.236
4.81	0.391	-0.234	0.412	-0.263	0.162	-0.231
4.82	0.391	-0.234	0.412	-0.253	0.160	-0.225
4.83	0.391	-0.313	0.412	-0.243	0.158	-0.220
4.84	0.391	-0.313	0.412	-0.233	0.155	-0.215
4.85	0.313	-0.313	0.412	-0.223	0.153	-0.210
4.86	0.234	-0.313	0.412	-0.215	0.151	-0.204
4.87	0.234	-0.313	0.412	-0.206	0.148	-0.199
4.88	0.000	-0.234	0.412	-0.200	0.147	-0.194
4.89	0.000	-0.234	0.353	-0.194	0.145	-0.189
4.90	0.000	-0.234	0.353	-0.188	0.144	-0.184

Figure 10.8.3.c.1 Digital data for event 4.1 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
4.91	0.000	-0.234	0.236	-0.182	0.142	-0.180
4.92	-0.078	-0.234	0.236	-0.176	0.141	-0.177
4.93	-0.078	-0.234	0.236	-0.171	0.139	-0.173
4.94	-0.078	-0.234	0.236	-0.165	0.138	-0.170
4.95	-0.078	-0.234	0.236	-0.160	0.136	-0.166
4.96	-0.078	-0.234	0.177	-0.154	0.135	-0.163
4.97	-0.156	-0.234	0.177	-0.150	0.133	-0.160
4.98	-0.156	-0.234	0.177	-0.145	0.131	-0.157
4.99	-0.156	-0.234	0.177	-0.140	0.130	-0.155
5.00	-0.234	-0.234	0.177	-0.136	0.128	-0.152
5.01	-0.234	-0.156	0.177	-0.133	0.128	-0.149
5.02	-0.234	-0.156	0.177	-0.129	0.127	-0.146
5.03	-0.234	-0.078	0.177	-0.125	0.127	-0.143
5.04	-0.234	-0.078	0.118	-0.121	0.127	-0.140
5.05	-0.234	-0.078	0.118	-0.117	0.127	-0.138
5.06	-0.156	-0.078	0.118	-0.112	0.127	-0.136
5.07	-0.156	-0.078	0.118	-0.108	0.127	-0.133
5.08	-0.156	-0.078	0.118	-0.103	0.127	-0.131
5.09	-0.156	-0.078	0.177	-0.098	0.127	-0.128
5.10	-0.234	-0.078	0.177	-0.094	0.127	-0.125
5.11	-0.234	-0.078	0.177	-0.090	0.127	-0.122
5.12	-0.313	-0.078	0.177	-0.087	0.127	-0.119
5.13	-0.313	-0.078	0.177	-0.084	0.127	-0.116
5.14	-0.313	-0.078	0.177	-0.081	0.127	-0.113
5.15	-0.313	-0.078	0.177	-0.078	0.127	-0.110
5.16	-0.313	-0.078	0.177	-0.075	0.127	-0.107
5.17	-0.313	-0.078	0.177	-0.072	0.127	-0.104
5.18	-0.313	-0.078	0.118	-0.068	0.127	-0.102
5.19	-0.313	-0.078	0.177	-0.065	0.127	-0.099
5.20	-0.313	-0.078	0.177	-0.062	0.127	-0.096
5.21	-0.313	-0.078	0.177	-0.059	0.127	-0.093
5.22	-0.313	-0.078	0.177	-0.056	0.127	-0.090
5.23	-0.313	-0.078	0.177	-0.053	0.127	-0.087
5.24	-0.313	-0.078	0.177	-0.050	0.127	-0.084
5.25	-0.313	-0.078	0.177	-0.047	0.127	-0.081
5.26	-0.313	-0.078	0.177	-0.043	0.127	-0.078
5.27	-0.313	-0.078	0.177	-0.040	0.127	-0.076
5.28	-0.313	-0.078	0.177	-0.037	0.127	-0.073
5.29	-0.313	-0.078	0.177	-0.034	0.127	-0.070
5.30	-0.391	-0.078	0.177	-0.032	0.127	-0.067
5.31	-0.391	-0.078	0.177	-0.029	0.127	-0.064
5.32	-0.391	-0.078	0.177	-0.027	0.127	-0.061
5.33	-0.391	-0.078	0.177	-0.025	0.127	-0.058
5.34	-0.391	-0.078	0.177	-0.022	0.127	-0.055
5.35	-0.391	-0.078	0.177	-0.020	0.127	-0.052
5.36	-0.391	-0.078	0.177	-0.018	0.127	-0.049
5.37	-0.391	-0.078	0.177	-0.015	0.127	-0.046
5.38	-0.391	-0.078	0.177	-0.013	0.127	-0.043
5.39	-0.391	-0.078	0.177	-0.011	0.127	-0.040
5.40	-0.391	-0.078	0.177	-0.008	0.127	-0.037

Figure 10.8.3.c.1 Digital data for event 4.1 (continued)

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
5.41	-0.391	-0.078	0.177	-0.006	0.127	-0.034
5.42	-0.391	-0.078	0.118	-0.004	0.127	-0.032
5.43	-0.391	-0.078	0.118	-0.001	0.127	-0.030
5.44	-0.391	-0.078	0.118	0.001	0.127	-0.027
5.45	-0.469	-0.078	0.177	0.003	0.127	-0.024
5.46	-0.469	-0.078	0.177	0.004	0.127	-0.021
5.47	-0.469	-0.078	0.177	0.006	0.127	-0.018
5.48	-0.469	-0.078	0.177	0.007	0.127	-0.015
5.49	-0.391	-0.078	0.177	0.010	0.127	-0.013
5.50	-0.391	-0.078	0.177	0.012	0.127	-0.010
5.51	-0.391	-0.078	0.177	0.014	0.127	-0.007
5.52	-0.391	-0.078	0.177	0.017	0.127	-0.004
5.53	-0.391	-0.078	0.177	0.019	0.127	-0.001
5.54	-0.391	-0.078	0.177	0.021	0.127	0.002
5.55	-0.391	-0.078	0.177	0.024	0.127	0.005

Figure 10.8.3.d.1 Digital data for event 4.0

[ ] = baseline which is subtracted for peaks and numerical integration

Yeardate: 81223 Time: 15:43:24.435 M.S.T.

Time (μs)	$\partial B_E/\partial t$ (T/s)	$\partial B_N/\partial t$ (T/s)	$Z_o \partial D_z/\partial t$ (T/s)	B_E (μT)	B_N (μT)	$Z_o D_z$ (μT)
4.01	[-0.625]	-0.156	-0.059	0.000	-0.000	0.000
4.02	-1.250	[-0.156]	-0.059	-0.006	-0.000	0.000
4.03	-2.813	-0.078	[-0.059]	-0.028	0.001	0.000
4.04	-1.328	-0.078	-0.118	-0.035	0.002	-0.001
4.05	-0.625	0.234	-0.353	-0.035	0.005	-0.004
4.06	-0.938	0.313	-0.943	-0.038	0.010	-0.012
4.07	-0.938	-0.313	0.000	-0.041	0.009	-0.012
4.08	-0.703	-0.391	0.059	-0.042	0.006	-0.011
4.09	-0.391	-0.313	0.000	-0.040	0.005	-0.010
4.10	-0.078	-0.078	-0.177	-0.034	0.005	-0.011
4.11	-0.078	-0.078	0.000	-0.029	0.006	-0.011
4.12	0.000	-0.234	0.059	-0.023	0.005	-0.009
4.13	0.000	-0.234	0.236	-0.016	0.005	-0.006
4.14	-0.078	-0.234	0.236	-0.011	0.004	-0.004
4.15	-0.078	-0.078	0.236	-0.005	0.005	-0.001
4.16	-0.313	-0.078	0.236	-0.002	0.005	0.002
4.17	-0.391	-0.234	0.236	0.000	0.005	0.005
4.18	-0.391	-0.313	0.177	0.002	0.003	0.008
4.19	-0.469	-0.313	0.177	0.004	0.002	0.010
4.20	-0.547	-0.234	0.177	0.005	0.001	0.012
4.21	-0.547	-0.234	0.177	0.005	-0.000	0.015

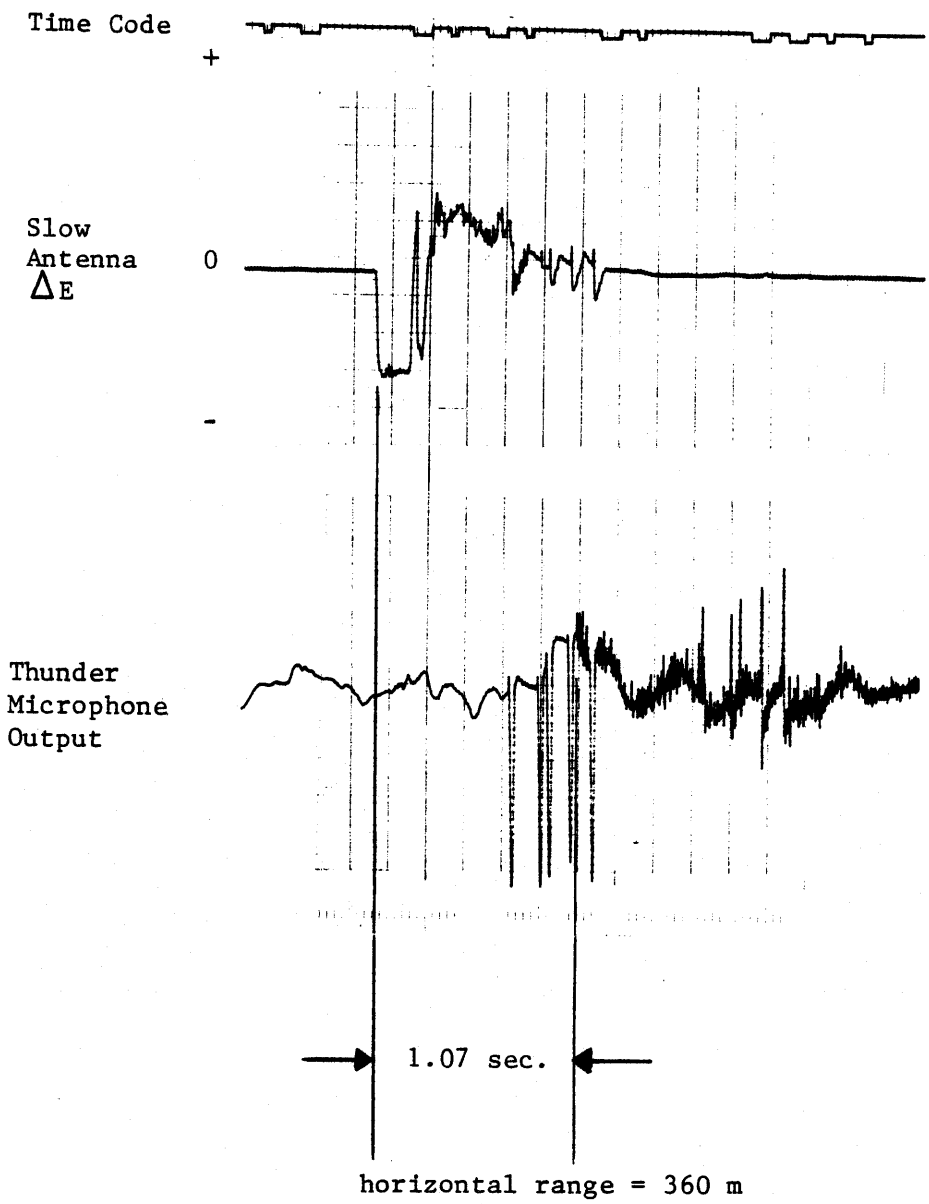


Figure 10.8.4.a Slow electric field change and thunder microphone record from rocket triggered lightning

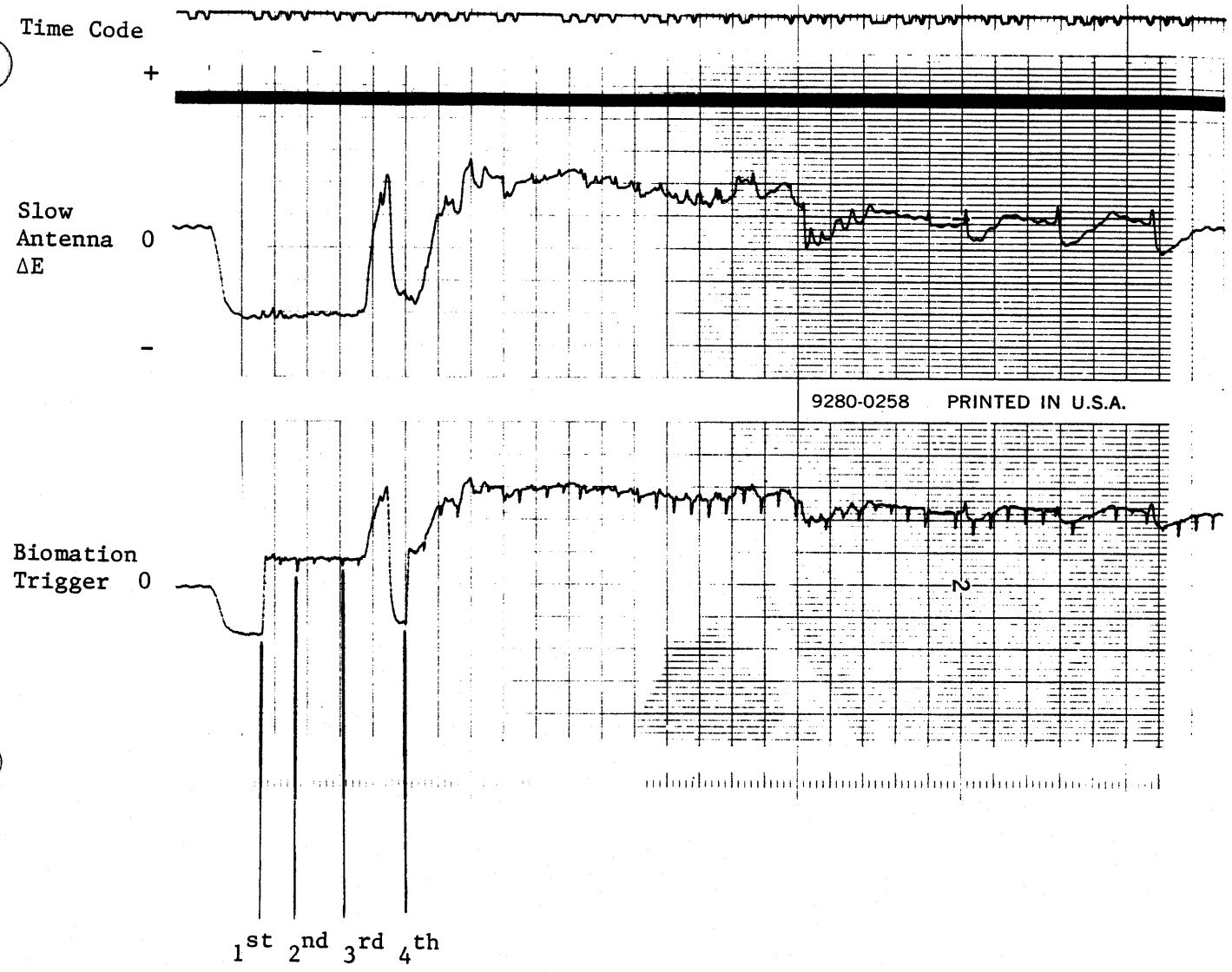


Figure 10.8.4.b Slow electric field change and biomation trigger marks superposed on the electric field change record from rocket triggered lightning

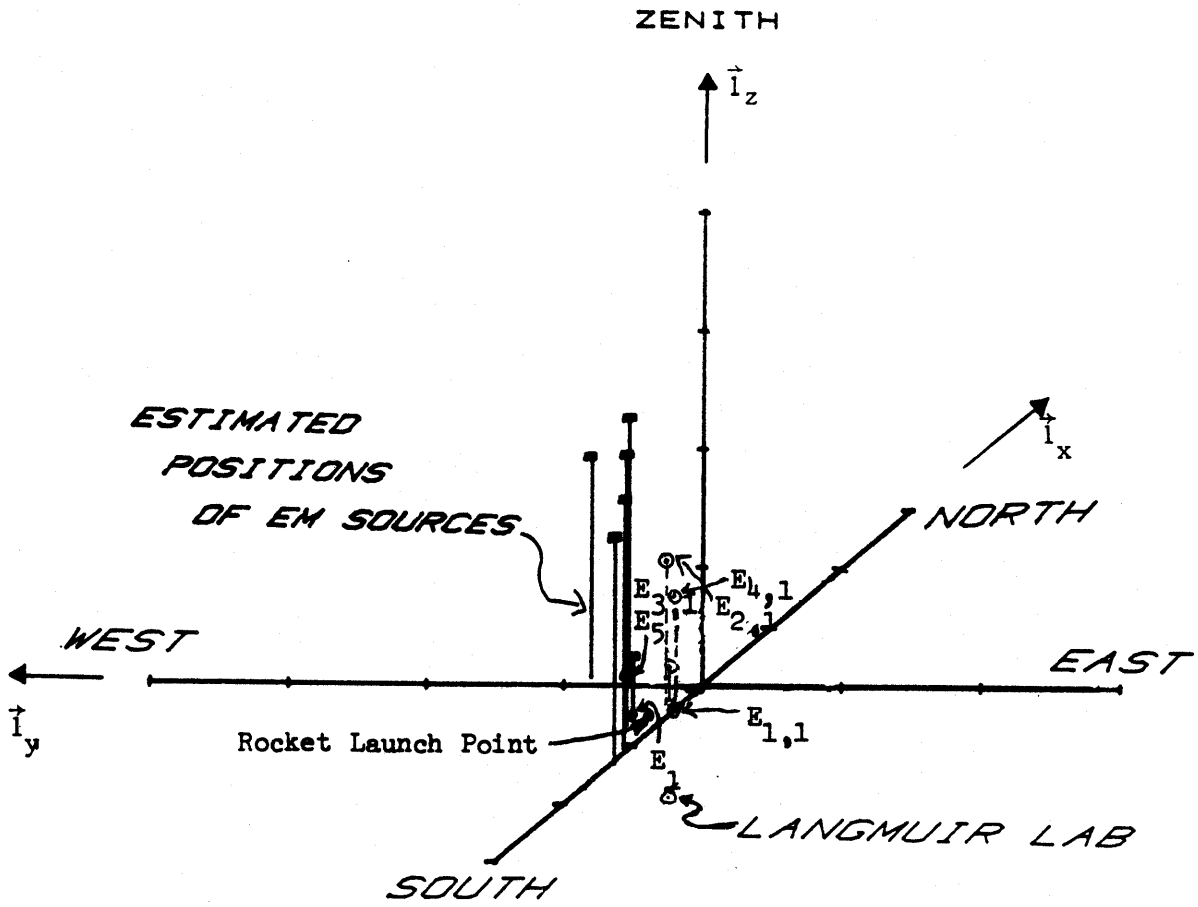
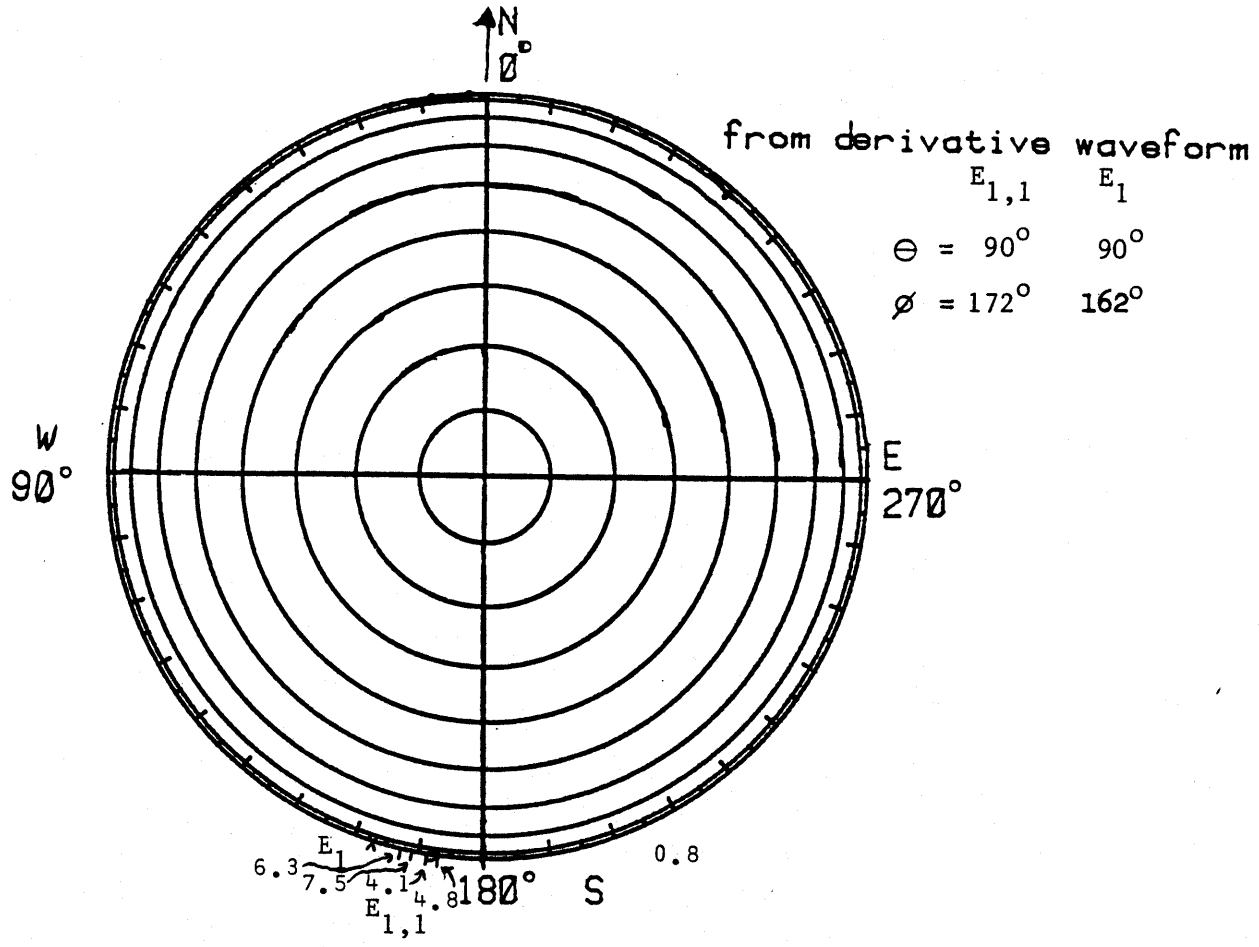
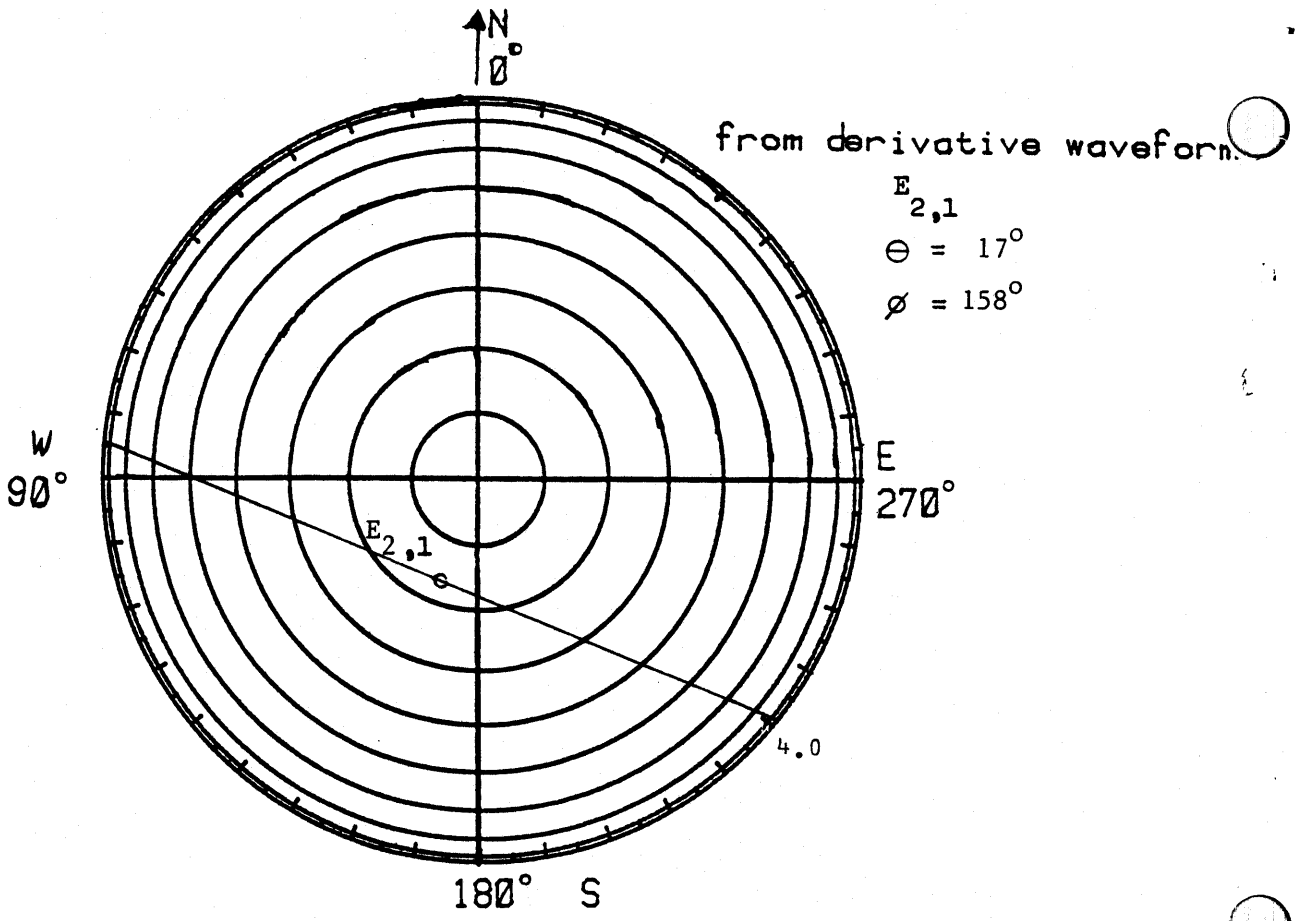


Figure 10.8.5 Acoustic location of rocket triggered lightning



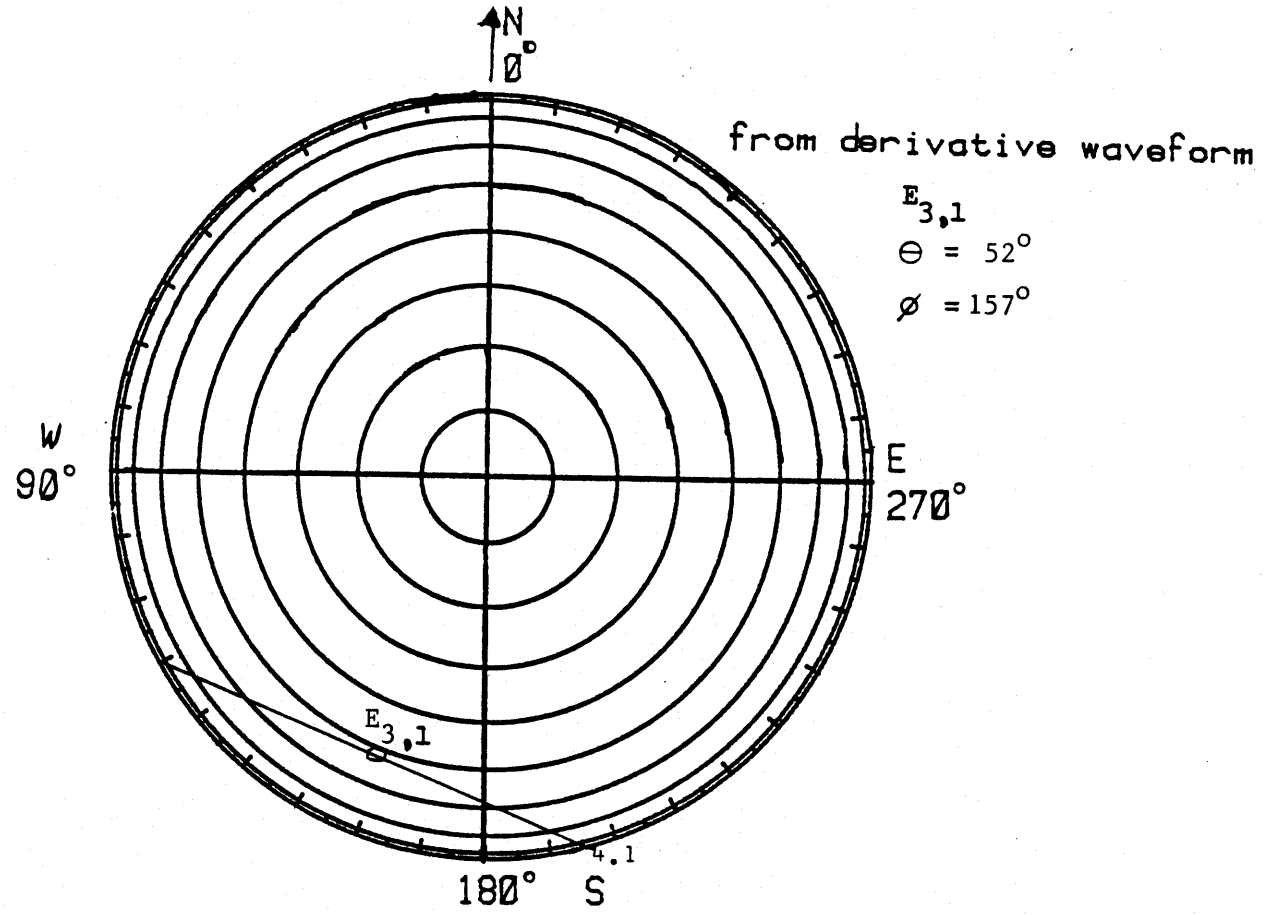
Date : 81223 M.S.T. : 15:43:24.257

Figure 10.8.6.A.1 $\sin(\theta),\phi$ contours for rocket triggered lightning derivative waveform



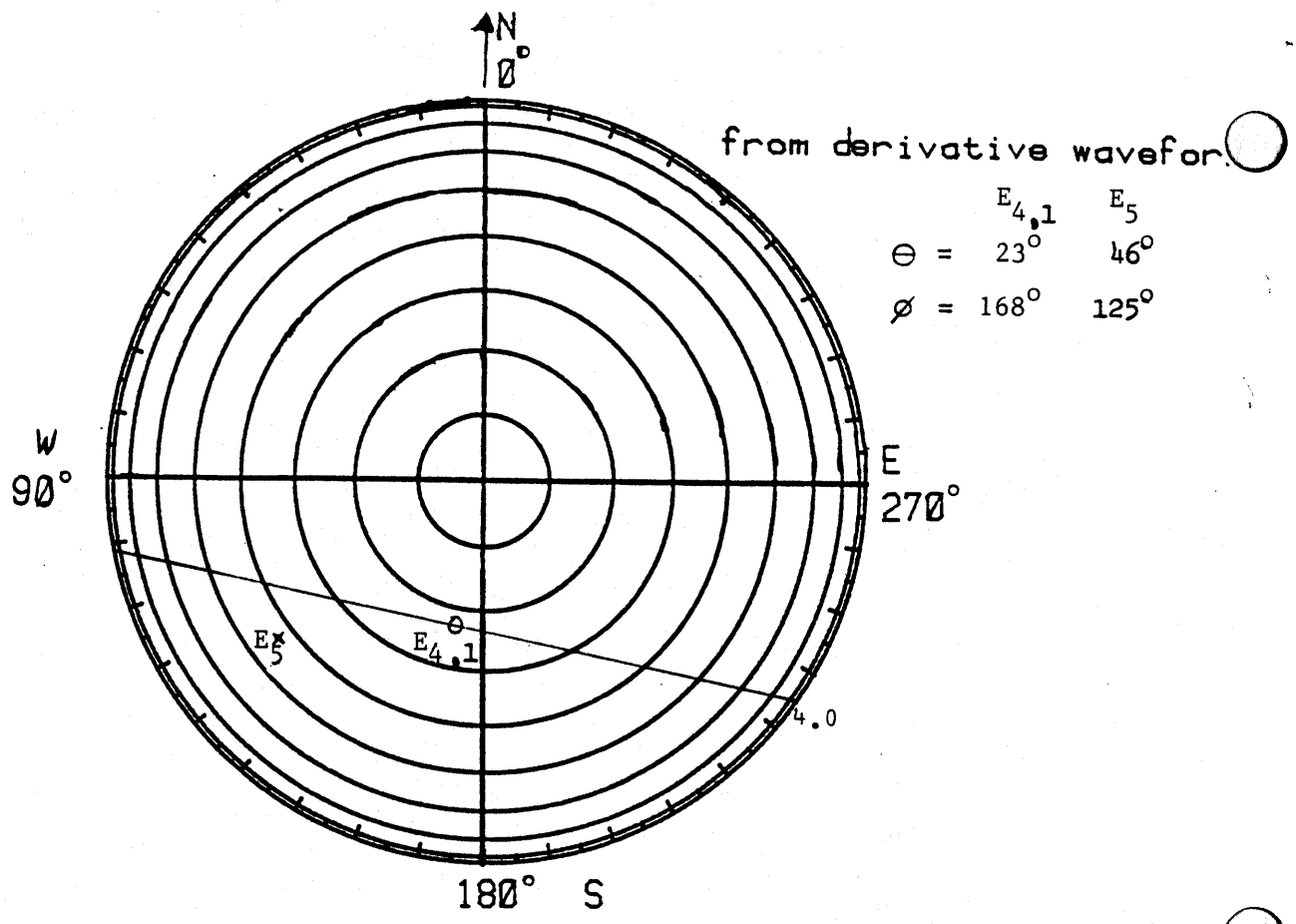
Date : 81223 M.S.T. : 15:43:24.311

Figure 10.8.6.A.2 sin(θ),ϕ contours for rocket triggered lightning derivative waveform



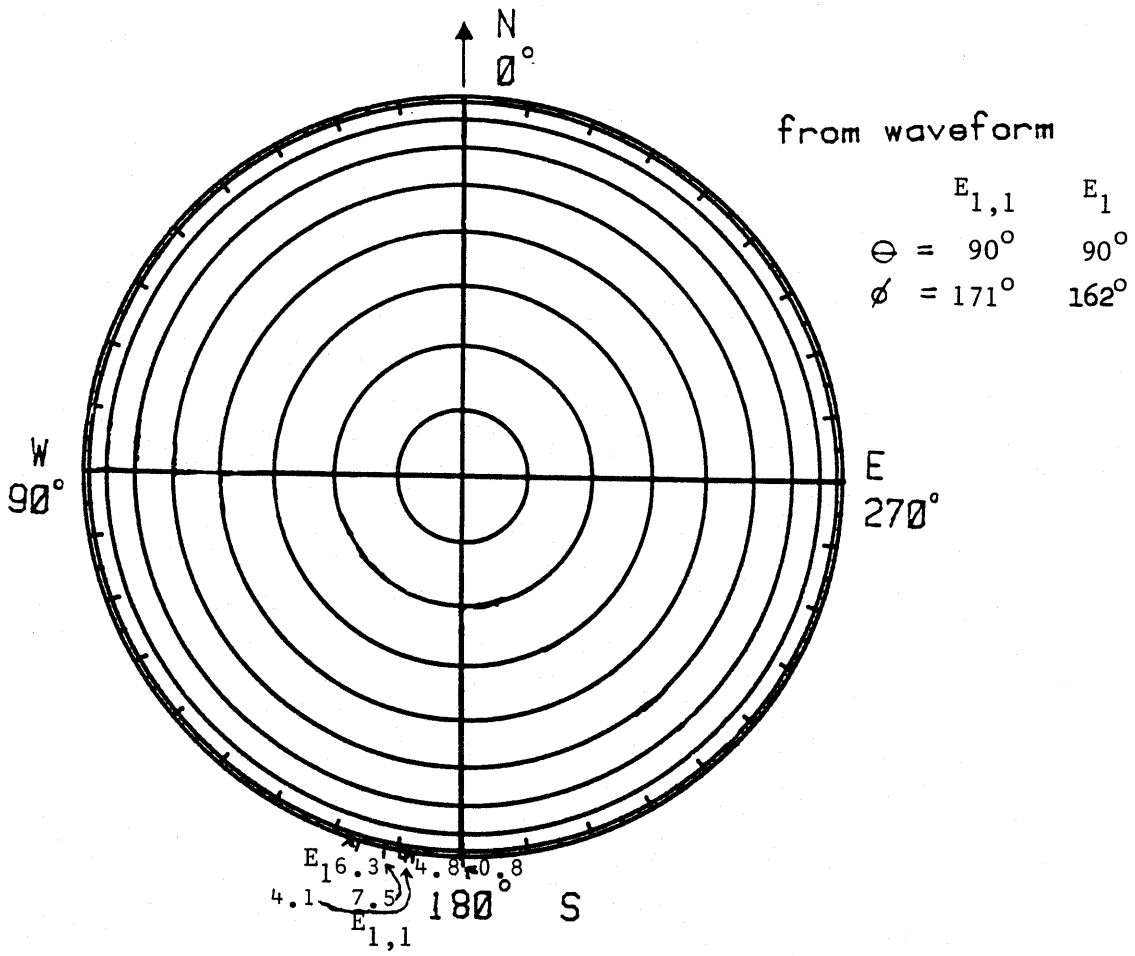
Date : 81223 M.S.T. : 15:43:24.361

Figure 10.8.6.A.3 $\sin(\theta)_{,\phi}$ contours for rocket triggered lightning derivative waveform



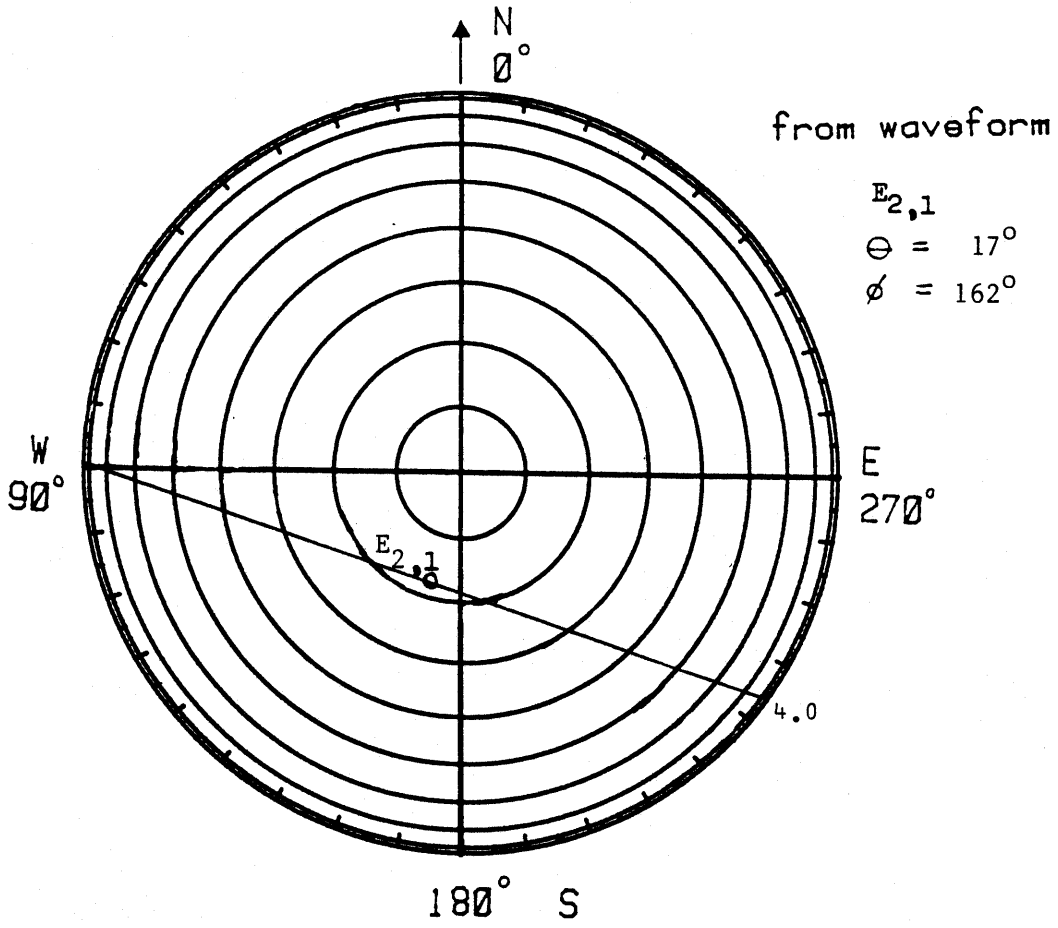
Date : 81223 M.S.T. : 15:43:24.435

Figure 10.8.6.A.4 $\sin(\theta)_{,\phi}$ contours for rocket triggered lightning derivative waveform



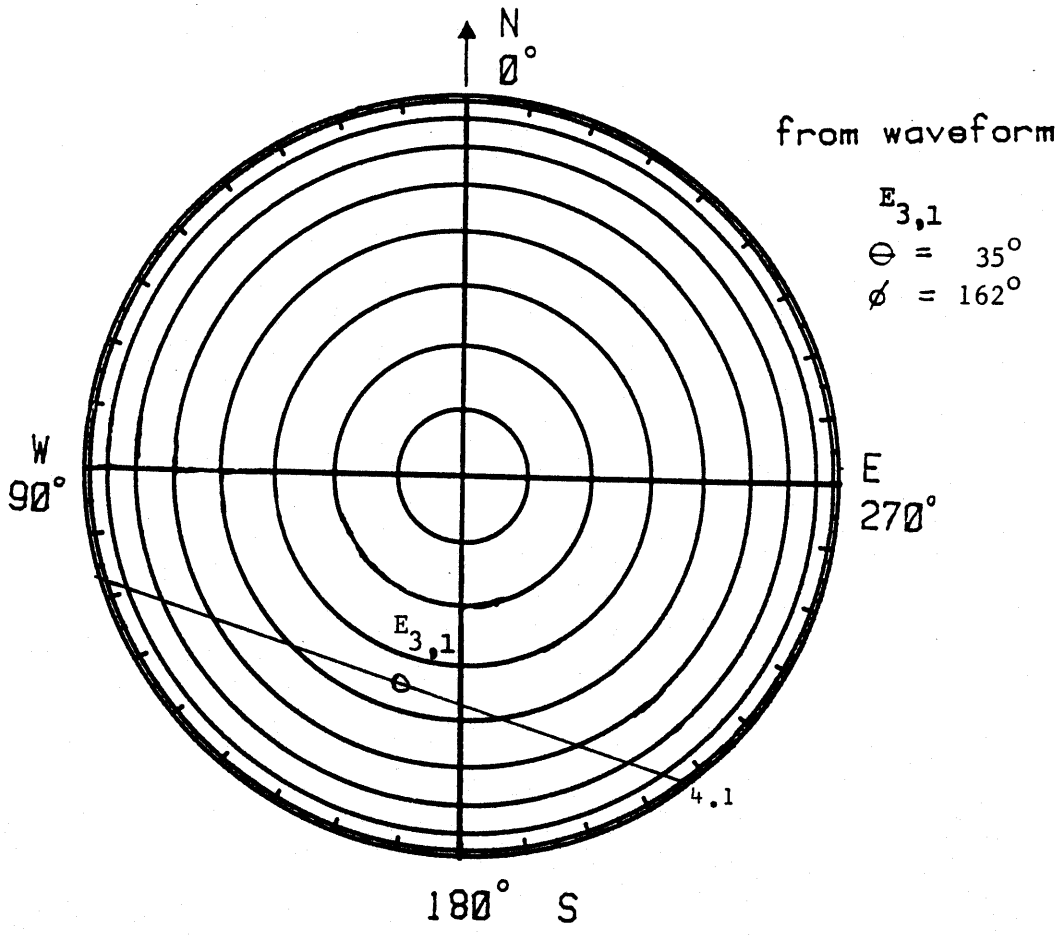
Date : 81223 M.S.T. : 15:43:24.257

Figure 10.8.6.B.1 sin(θ),ϕ contours for rocket triggered lightning waveform



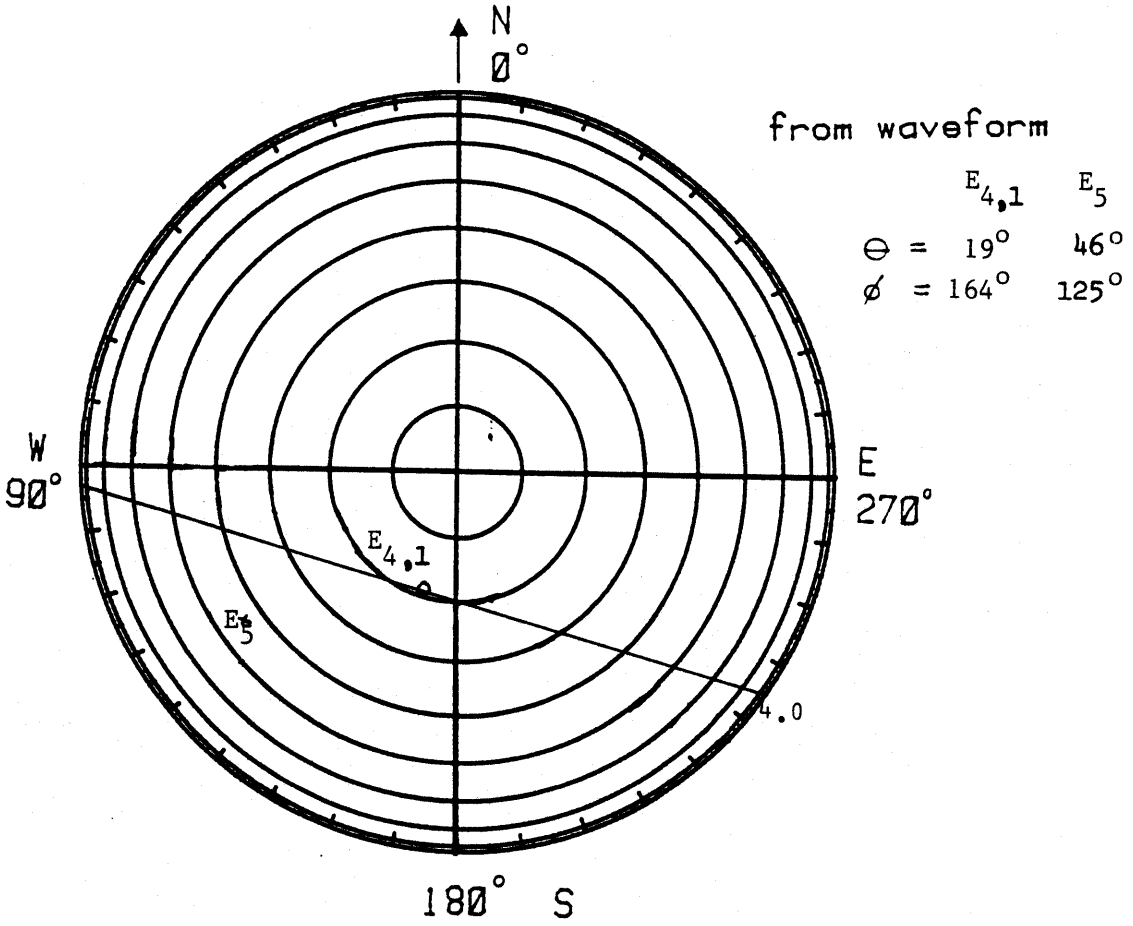
Date : 81223 M.S.T. : 15:43:24.311

Figure 10.8.6.B.2 $\sin(\theta),\phi$ contours for rocket triggered lightning waveform



Date : 81223 M.S.T. : 15:43:24.361

Figure 10.8.6.B.3 $\sin(\theta),\phi$ contours for rocket triggered lightning waveform



Date : 81223 M.S.T. : 15:43:24.435

Figure 10.8.6.B.4 $\sin(\theta),\phi$ contours for rocket triggered lightning waveform

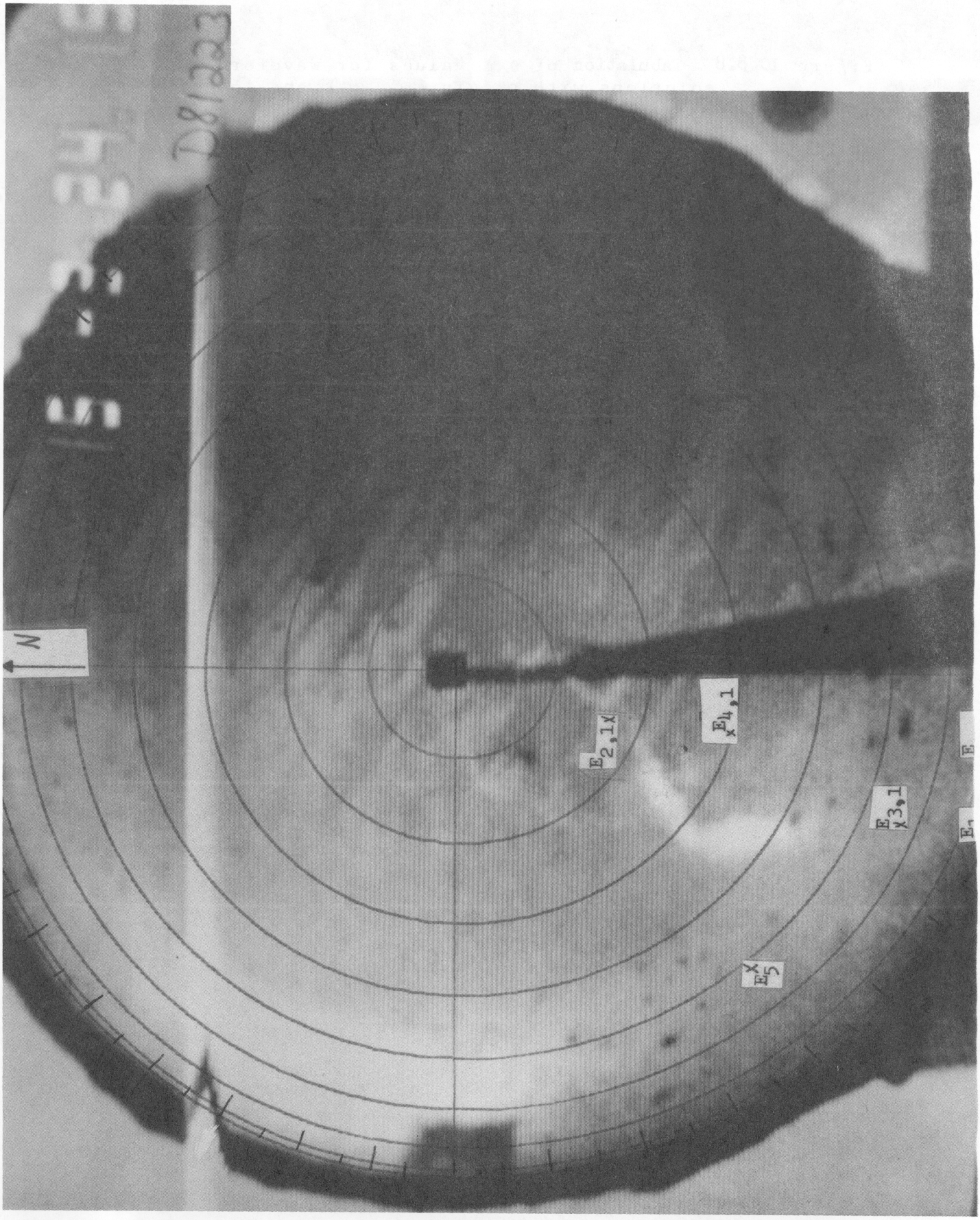


Figure 10.8.7 Whole-sky videotape photograph of rocket triggered lightning from Kiva

Figure 10.8.8 **Tabulation** of θ, ϕ values for waveform and TOA solutions with origin at different locations

Yeardate : 81223 M.S.T. : 1543.24

Event		TOA	waveform	r TOA (meters)	r waveform (meters)	TOA origin at Kiva	TOA origin at WSC	waveform origin at WSC
1	θ	90.0°	90°	530	360	90.0°	90.0°	90°
	ϕ	162.4°	172°			161.9°	161.7°	171°
2	θ		17°		1231			25°
	ϕ		158°					159°
3	θ		52°		457			57°
	ϕ		157°					158°
4	θ		23°		921			30°
	ϕ		168°					166°
5	θ	49.5°		350		46.4°	51.7°	
	ϕ	130.7°				125.4°	131.1°	

Figure **10.8.9.A.1** Tabulation of peak values for each event from derivative waveform set for rocket triggered lightning

Yeardate: 81223 M.S.T.: 154324.257

$\phi = 172^{o}$; $\theta = 90^{o}$; r = 360 m

Event Number	Time (μs)	$Z_o \Delta\partial D_z/\partial t$ (T/s)	$\Delta\partial B_E/\partial t$ (T/s)	$\Delta\partial B_N/\partial t$ (T/s)	$\Delta\partial B_h/\partial t$ (T/s)	$\Delta\partial B_e/\partial t$ (T/s)	$\lvert\Delta\partial\vec{B}/\partial t\rvert$ (T/s)
0.8	0.78	-0.53	-0.39	0.00	0.00	-0.19	0.19
4.1	4.10	-3.24	-2.81	0.47	0.00	-1.42	1.42
4.8	4.83	-0.83	-0.63	0.08	0.00	-0.31	0.31
6.3	6.31	-4.36	-3.59	0.86	0.00	-1.84	1.84
7.5	7.45	2.12	1.56	-0.31	0.00	0.80	0.80

CALCULATED VALUES FOR $\partial\vec{T}/\partial t$

Event Number	$\partial T_2/\partial t$ (10^{15} Am/s^2)	$\partial T_3/\partial t$ (10^{15} Am/s^2)	$\lvert\partial\vec{T}/\partial t\rvert$ (10^{15} Am/s^2)	α (deg)
0.8	0	209	209	360
4.1	0	1539	1539	180
4.8	0	340	340	360
6.3	0	1986	1986	360
7.5	0	-859	859	180

Figure **10.8.9.A.2** Tabulation of peak values for each event from derivative waveform set for rocket triggered lightning

Yeardate: 81223 M.S.T.: 154324.311

$\phi = 158^{o}$; $\theta = 17^{o}$; r = 1231 m

Event Number	Time (μs)	$Z_o \Delta\partial D_z/\partial t$ (T/s)	$\Delta\partial B_E/\partial t$ (T/s)	$\Delta\partial B_N/\partial t$ (T/s)	$\Delta\partial B_h/\partial t$ (T/s)	$\Delta\partial B_e/\partial t$ (T/s)	$\lvert\Delta\partial\vec{B}/\partial t\rvert$ (T/s)
4.0	4.01	0.41	1.33	-0.55	-0.01	0.72	0.72

CALCULATED VALUES FOR $\partial\vec{T}/\partial t$

Event Number	$\partial T_2/\partial t$ (10^{15} Am/s^2)	$\partial T_3/\partial t$ (10^{15} Am/s^2)	$\lvert\partial\vec{T}/\partial t\rvert$ (10^{15} Am/s^2)	α (deg)
4.0	19	-2653	2653	180

Figure **10.8.9.A.3** Tabulation of peak values for each event from derivative waveform set for rocket triggered lightning

Yeardate: 81223 M.S.T.: 154324.361

$\phi = 157^{o}$; $\theta = 52^{o}$; r = 457 m

Event Number	Time (μs)	$Z_o \Delta\partial D_z/\partial t$ (T/s)	$\Delta\partial B_E/\partial t$ (T/s)	$\Delta\partial B_N/\partial t$ (T/s)	$\Delta\partial B_h/\partial t$ (T/s)	$\Delta\partial B_e/\partial t$ (T/s)	$\lvert\Delta\partial\vec{B}/\partial t\rvert$ (T/s)
4.1	4.05	-6.42	-7.50	3.13	-0.04	-4.06	4.06

CALCULATED VALUES FOR $\partial\vec{T}/\partial t$

Event Number	$\partial T_2/\partial t$ (10^{15} Am/s^2)	$\partial T_3/\partial t$ (10^{15} Am/s^2)	$\lvert\partial\vec{T}/\partial t\rvert$ (10^{15} Am/s^2)	α (deg)
4.1	60	5568	5568	359

Figure **10.8.9.A.4** Tabulation of peak values for each event from derivative waveform set for rocket triggered lightning

Yeardate: 81223 M.S.T.: 154324.435

$\phi = 168^{o}$, $\theta = 23^{o}$; r = 921 m

Event Number	Time (μs)	$Z_o \Delta\partial D_z/\partial t$ (T/s)	$\Delta\partial B_E/\partial t$ (T/s)	$\Delta\partial B_N/\partial t$ (T/s)	$\Delta\partial B_h/\partial t$ (T/s)	$\Delta\partial B_e/\partial t$ (T/s)	$\lvert\Delta\partial\vec{B}/\partial t\rvert$ (T/s)
4.0	4.03	-0.88	-2.19	0.47	0.00	-1.12	1.12

CALCULATED VALUES FOR $\partial\vec{T}/\partial t$

Event Number	$\partial T_2/\partial t$ (10^{15} Am/s^2)	$\partial T_3/\partial t$ (10^{15} Am/s^2)	$\lvert\partial\vec{T}/\partial t\rvert$ (10^{15} Am/s^2)	α (deg)
4.0	-6	3093	3093	0

Figure 10.8.9.B.1 Tabulation of peak values for each event from waveform set for rocket triggered lightning

Yeardate: 81223 M.S.T.:154324.257

$\phi = 171^{o}$; $\theta = 90^{o}$; r = 360 m

Event Number	Time (μs)	$Z_o \Delta D_s$ (μT)	ΔB_E (μT)	ΔB_N (μT)	ΔB_h (μT)	ΔB_e (μT)	$\lvert\Delta\vec{B}\rvert$ (μT)
0.8	0.78	-0.02	-0.02	0.00	0.00	-0.01	0.01
4.1	4.10	-0.10	-0.10	0.02	0.00	-0.05	0.05
4.8	4.83	-0.06	-0.05	0.01	0.00	-0.02	0.02
6.3	6.31	-0.54	-0.45	0.13	0.00	-0.23	0.23
7.5	7.45	0.06	0.05	-0.01	0.00	0.03	0.03

CALCULATED VALUES FOR $\vec{I}_t . \hat{T}$

Event Number	T_2 (10^9 Am/s)	T_3 (10^9 Am/s)	$\lvert\vec{T}\rvert$ (10^9 Am/s)	α (deg)
0.8	0	9	9	360
4.1	0	53	53	360
4.8	0	27	27	360
6.3	0	252	252	360
7.5	0	-29	29	180

Figure 10.8.9.B.2 Tabulation of peak values for each event from waveform set for rocket triggered lightning

Yeardate: 81223 M.S.T.:154324.311

$\phi = 162^{o}$; $\theta = 17^{o}$; r =1231 m

Event Number	Time (μs)	$Z_o \Delta D_s$ (μT)	ΔB_E (μT)	ΔB_N (μT)	ΔB_h (μT)	ΔB_e (μT)	$\lvert\Delta\vec{B}\rvert$ (μT)
4.0	4.01	0.01	0.05	-0.02	-0.00	0.02	0.02

CALCULATED VALUES FOR $\vec{I}_t . \hat{T}$

Event Number	T_2 (10^9 Am/s)	T_3 (10^9 Am/s)	$\lvert\vec{T}\rvert$ (10^9 Am/s)	α (deg)
4.0	1	-88	88	180

Figure 10.8.9.B.3 Tabulation of peak values for each event from waveform set for rocket triggered lightning

Yeardate: 81223 M.S.T.:154324.361

$\phi = 162^{o}$; $\theta = 35^{o}$; r = 628 m

Event Number	Time (μs)	$Z_o \Delta D_s$ (μT)	ΔB_E (μT)	ΔB_N (μT)	ΔB_h (μT)	ΔB_e (μT)	$\lvert\Delta\vec{B}\rvert$ (μT)
4.1	4.05	-0.37	-0.61	0.20	-0.00	-0.32	0.32

CALCULATED VALUES FOR $\overline{I_t}.\hat{T}$

Event Number	T_2 (10^9 Am/s)	T_3 (10^9 Am/s)	$\lvert\vec{T}\rvert$ (10^9 Am/s)	α (deg)
4.1	1	603	603	360

Figure 10.8.9.B.4 Tabulation of peak values for each event from waveform set for rocket triggered lightning

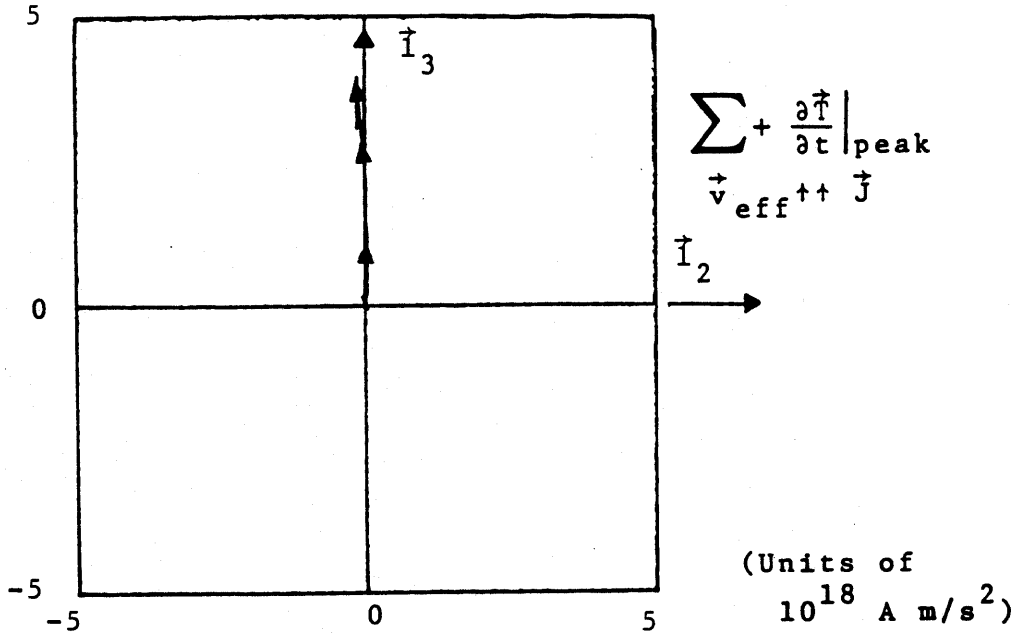
Yeardate: 81223 M.S.T.:154324.435

$\phi = 164^{o}$; $\theta = 19^{o}$; r =1106 m

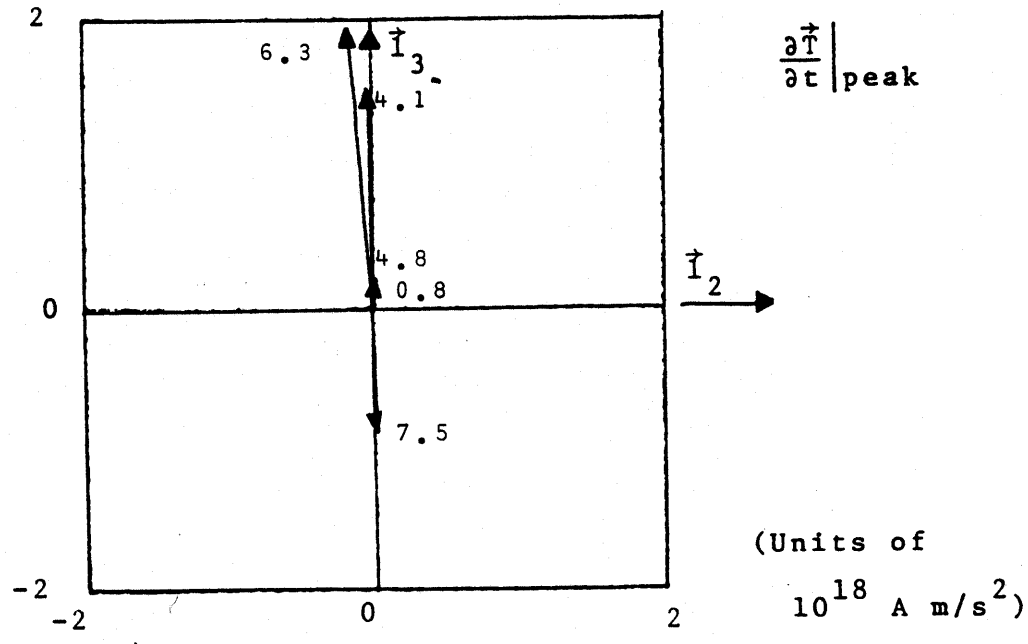
Event Number	Time (μs)	$Z_o \Delta D_s$ (μT)	ΔB_E (μT)	ΔB_N (μT)	ΔB_h (μT)	ΔB_e (μT)	$\lvert\Delta\vec{B}\rvert$ (μT)
4.0	4.03	-0.01	-0.04	0.01	-0.00	-0.02	0.02

CALCULATED VALUES FOR $\overline{I_t}.\hat{T}$

Event Number	T_2 (10^9 Am/s)	T_3 (10^9 Am/s)	$\lvert\vec{T}\rvert$ (10^9 Am/s)	α (deg)
4.0	0	60	60	360



Effective reconstruction of positive streamer

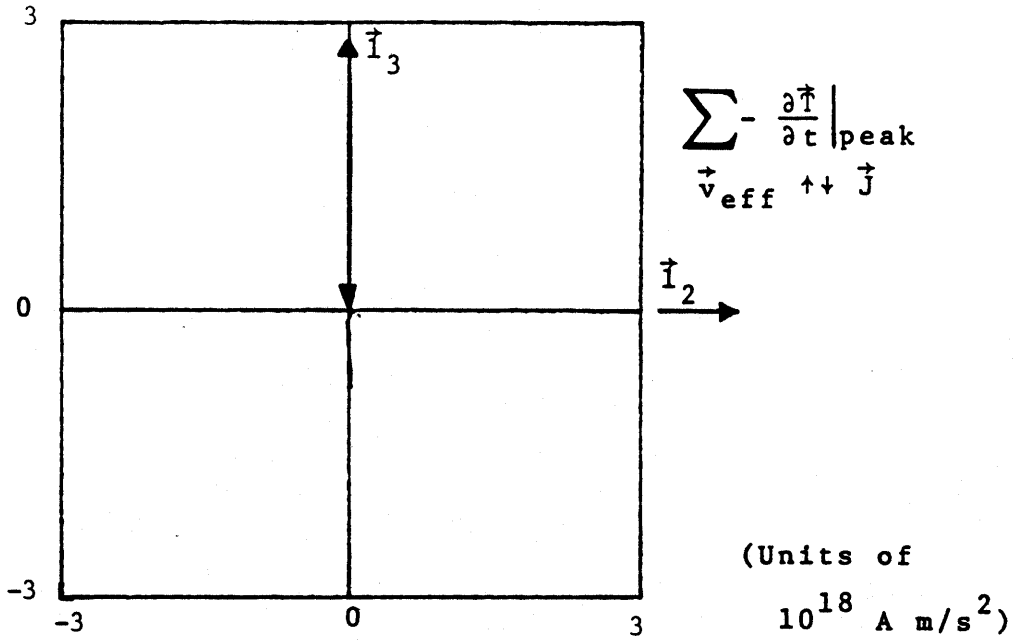


Peaks of $\partial\vec{I}/\partial t$

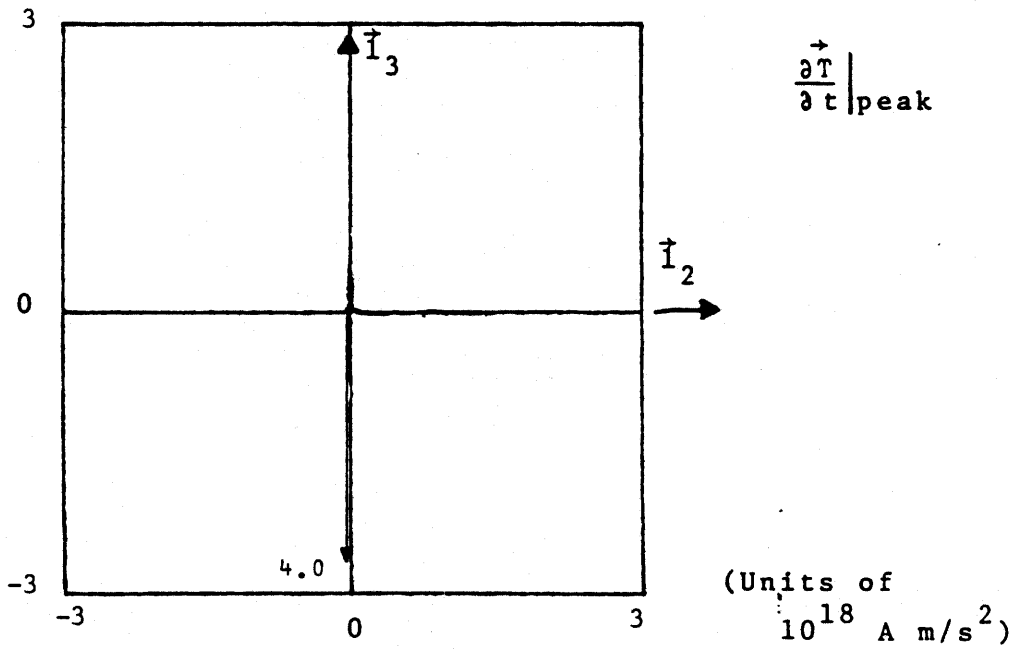
$\phi = 172^\circ$ $\theta = 90^\circ$ r = 360 m

Date: 81223 M.S.T.: 15:43:24.257

Figure 10.8.10.A.1 $\partial\vec{I}/\partial t$ for rocket triggered lightning



Effective reconstruction of negative streamer

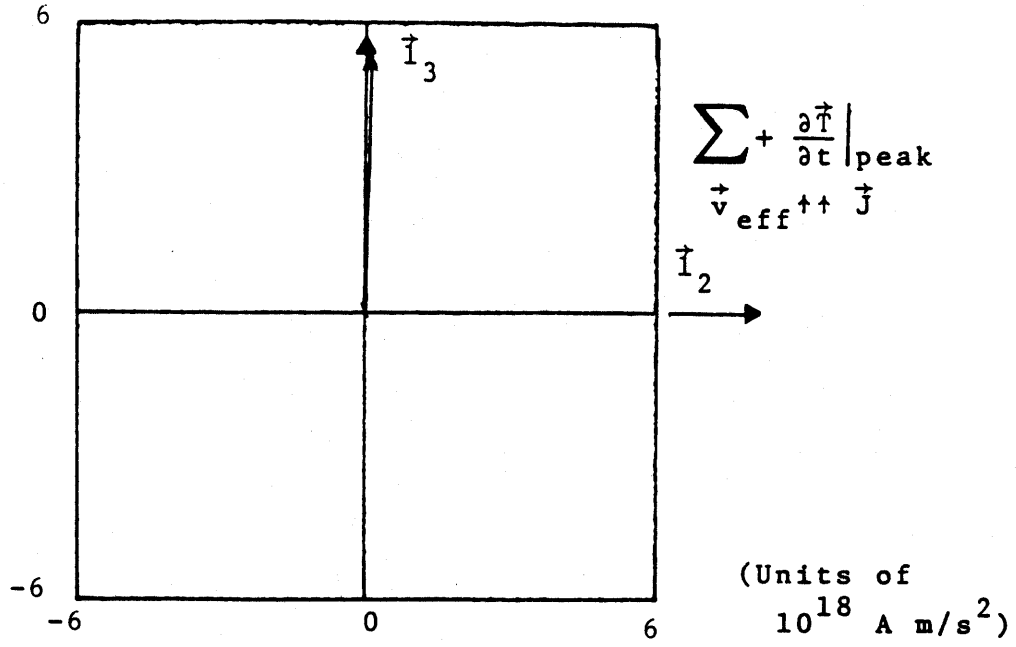


Peaks of $\partial\vec{T}/\partial t$

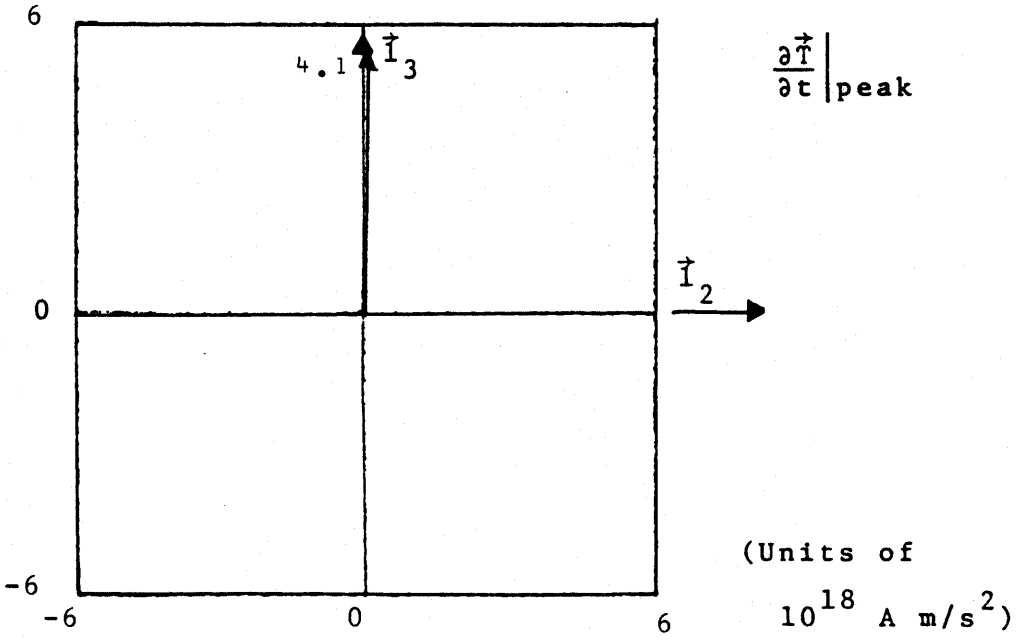
ϕ = 158° θ = 17° r = 1231 m

Date: 81223 M.S.T.: 15:43:24.311

Figure 10.8.10.A.2 $\partial\vec{T}/\partial t$ for rocket triggered lightning



Effective reconstruction of positive streamer

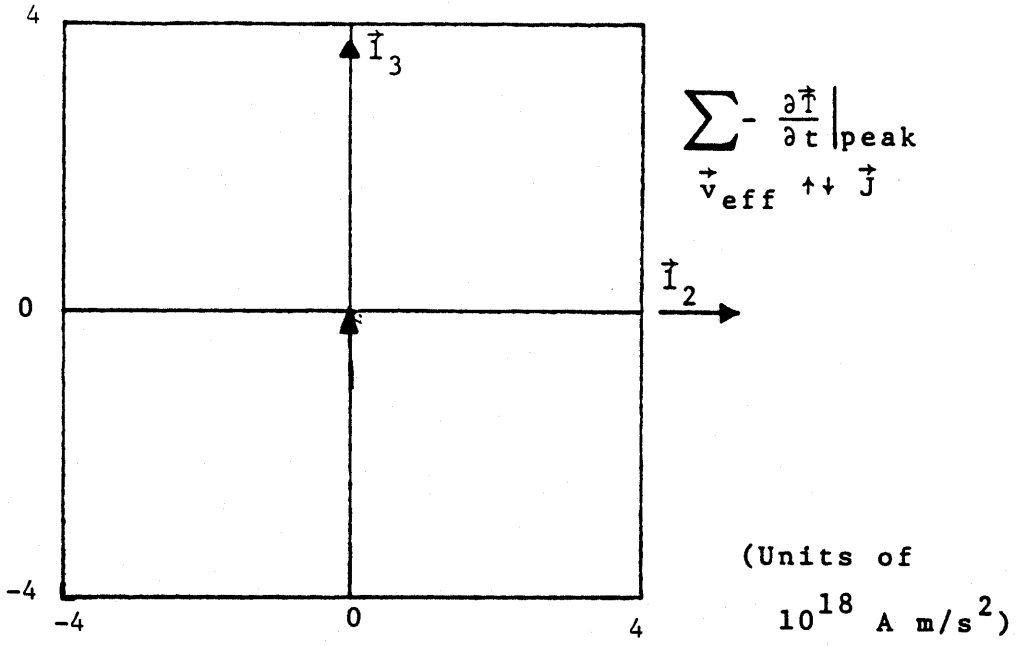


Peaks of $\partial\vec{I}/\partial t$

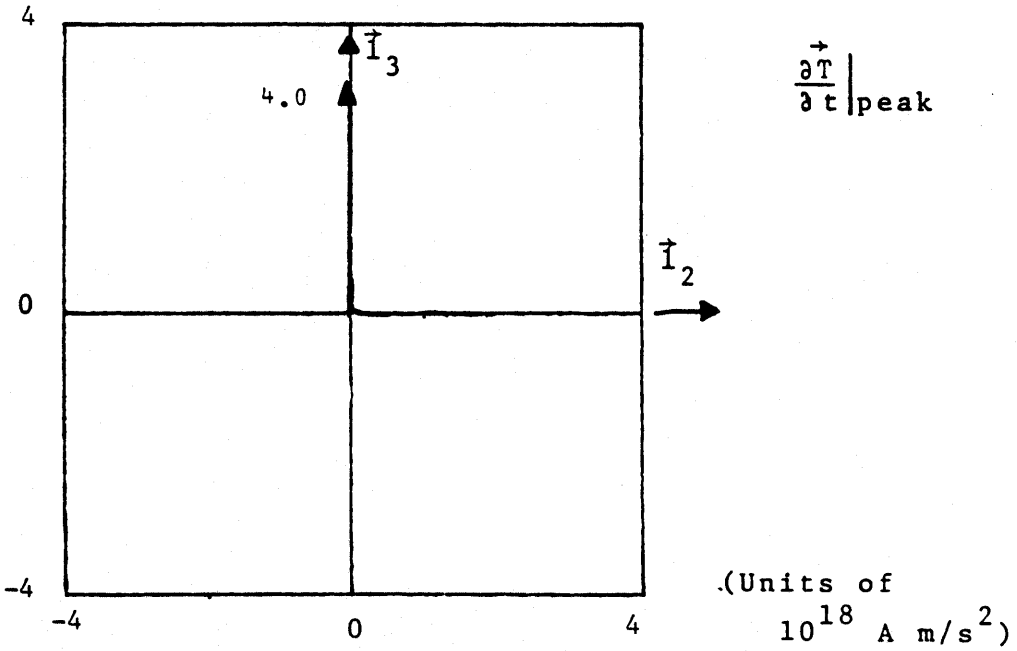
$\phi = 157^\circ$ $\theta = 52^\circ$ $r = 457$ m

Date: 81223 M.S.T.: 15:43:24.361

Figure 10.8.10.A.3 $\partial\vec{I}/\partial t$ for rocket triggered lightning



Effective reconstruction of negative streamer

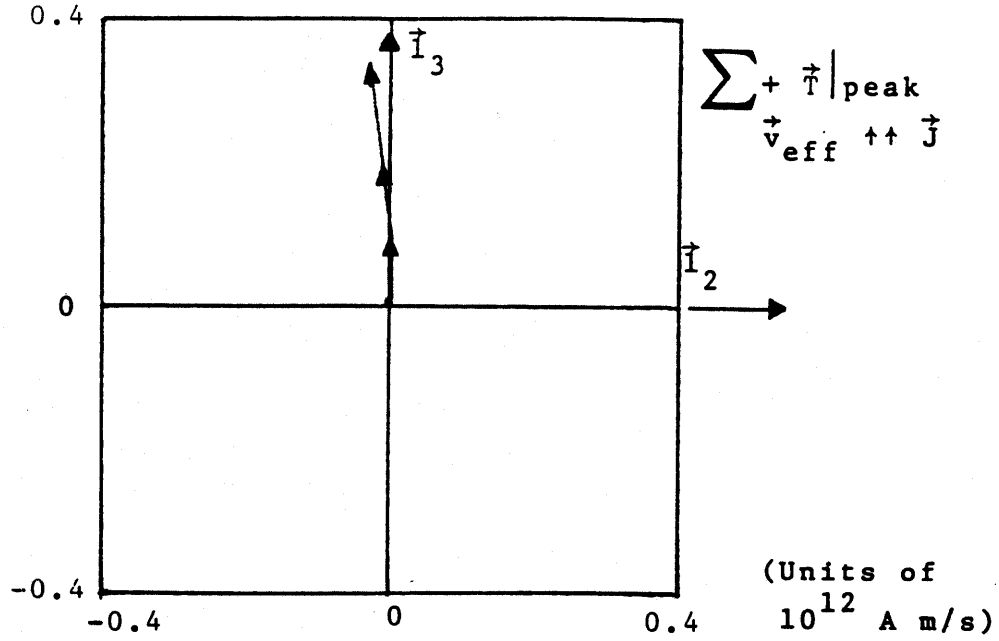


Peaks of $\partial\vec{T}/\partial t$

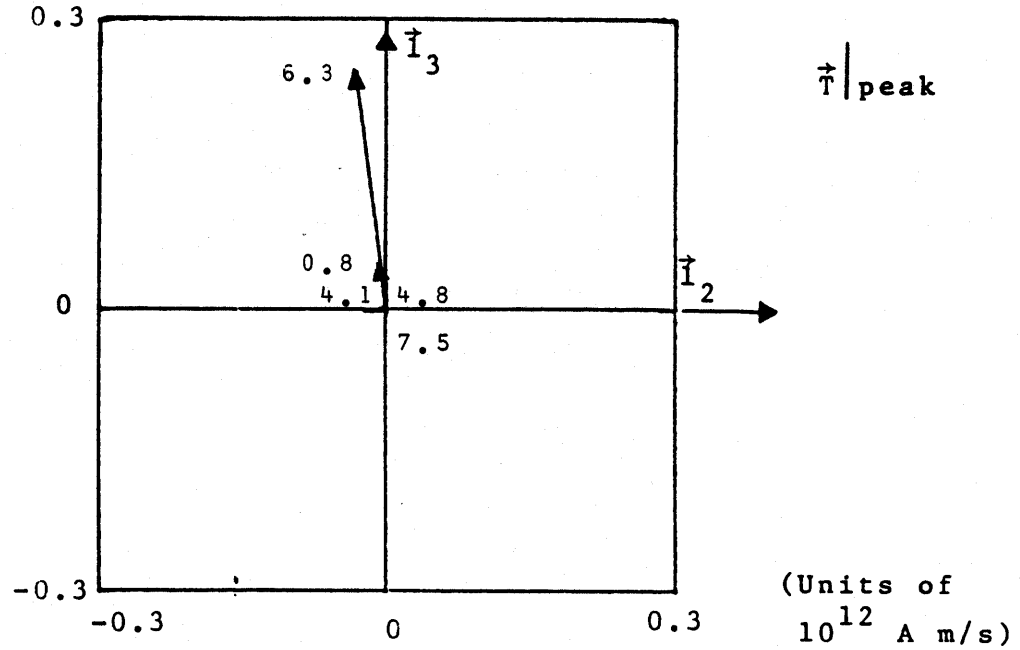
$\phi = 168^{o}$ $\theta = 23^{o}$ r = 921 m

Date: 81223 M.S.T.: 15:43:24.435

Figure 10.8.10.A.4 $\partial\vec{T}/\partial t$ for rocket triggered lightning



Effective reconstruction of positive streamer

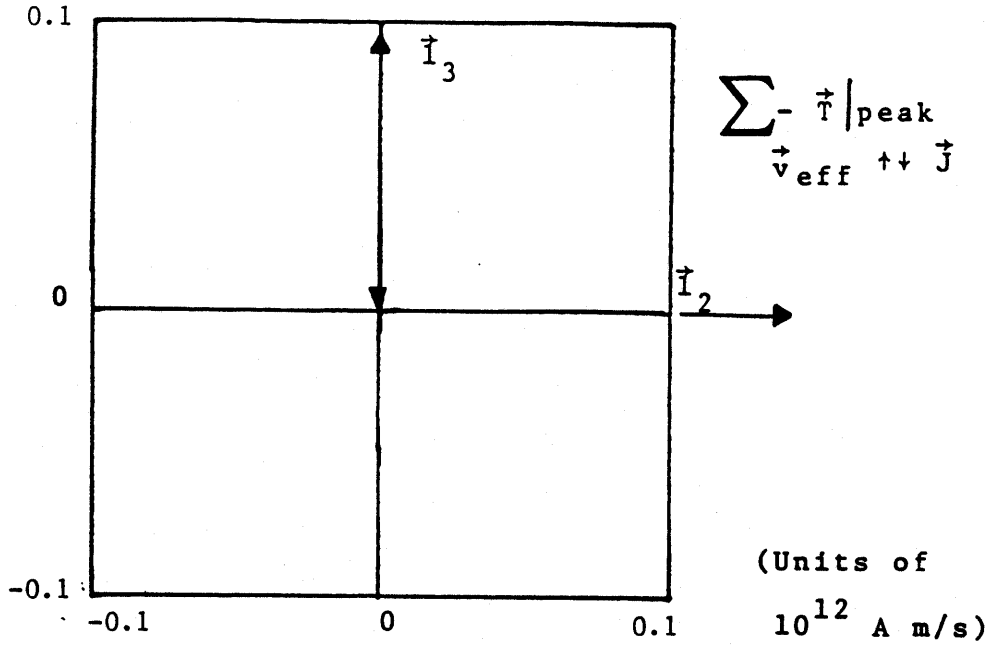


Peaks of $\vec{T}$

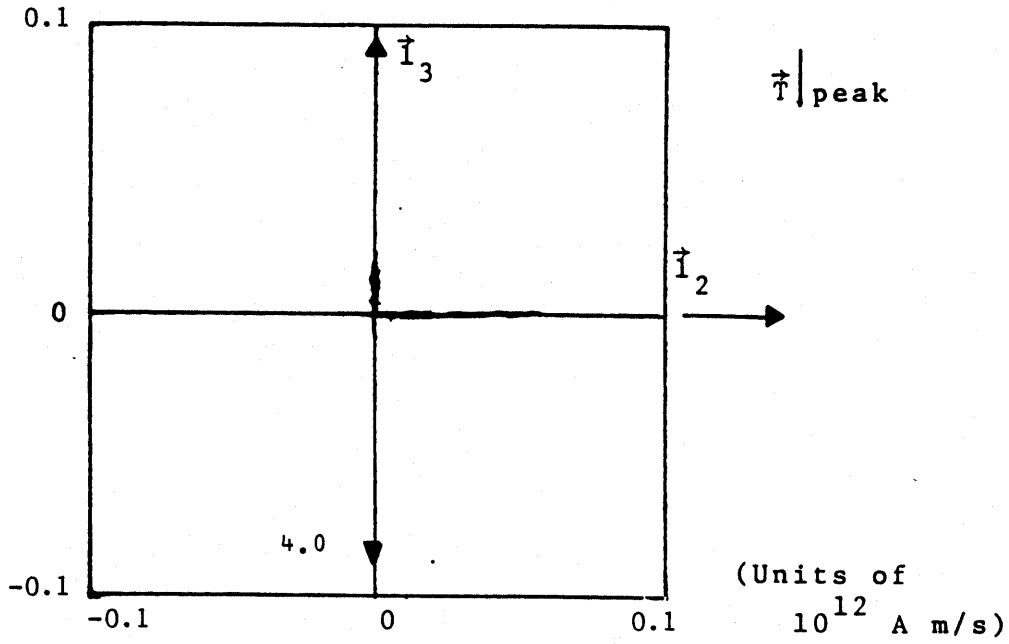
$\phi = 171^{\circ}$ $\theta = 90^{\circ}$ r = 360 m

Date: 81223 M.S.T.: 15:43:24.257

Figure 10.8.10.B.1 $\vec{T}$ for rocket triggered lightning



Effective reconstruction of negative streamer

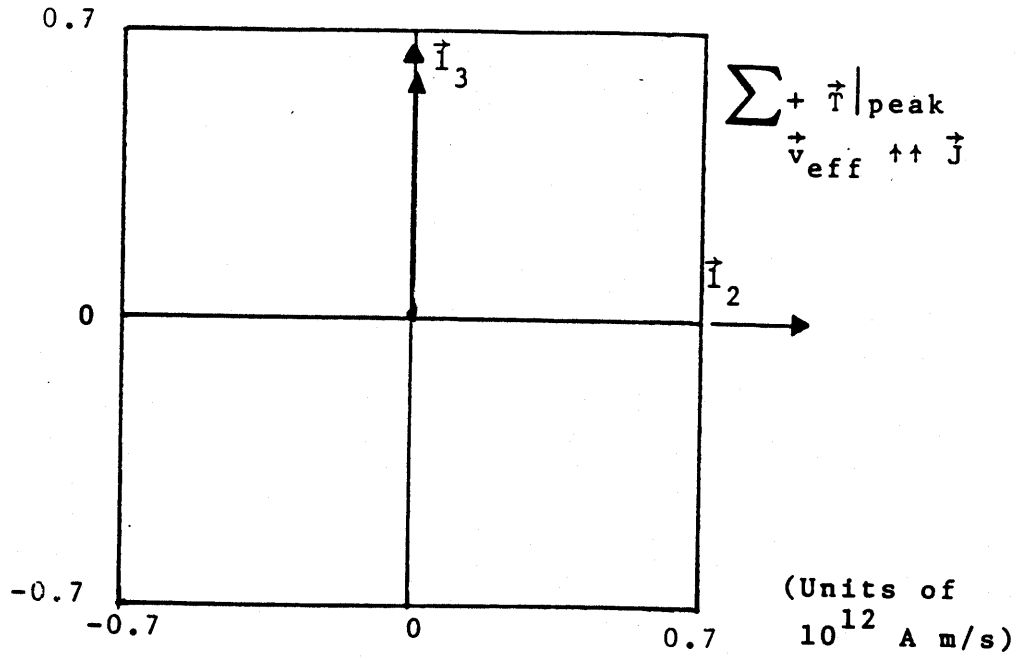


Peaks of $\vec{T}$

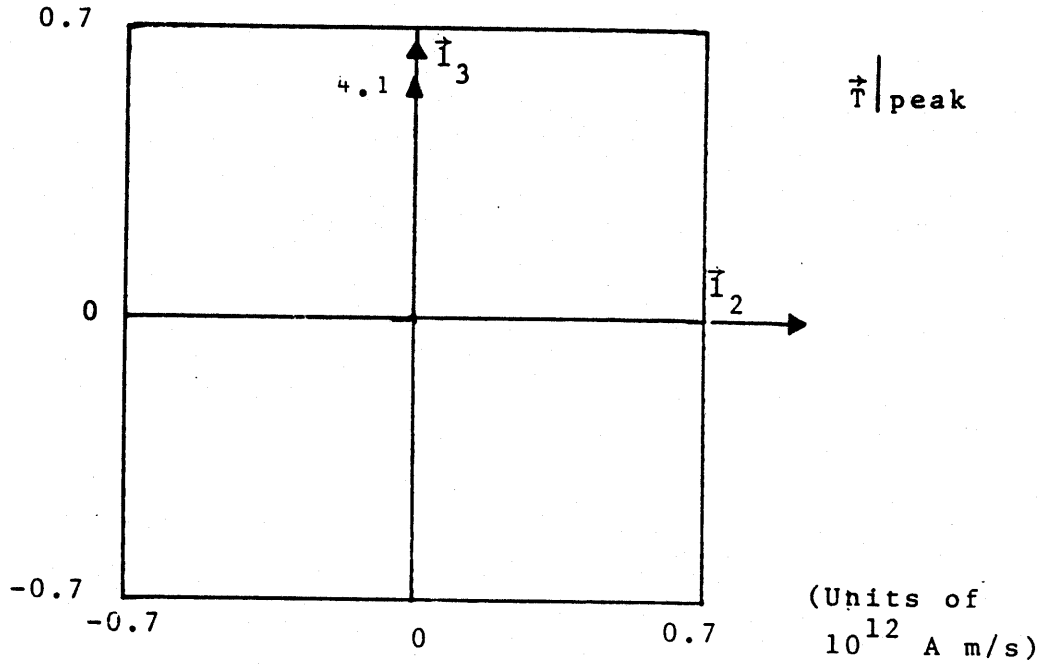
ϕ = 162° θ = 17° r = 1231 m

Date: 81223 M.S.T.: 15:43:24.311

Figure 10.8.10.B.2 $\vec{T}$ for rocket triggered lightning



Effective reconstruction of positive streamer .

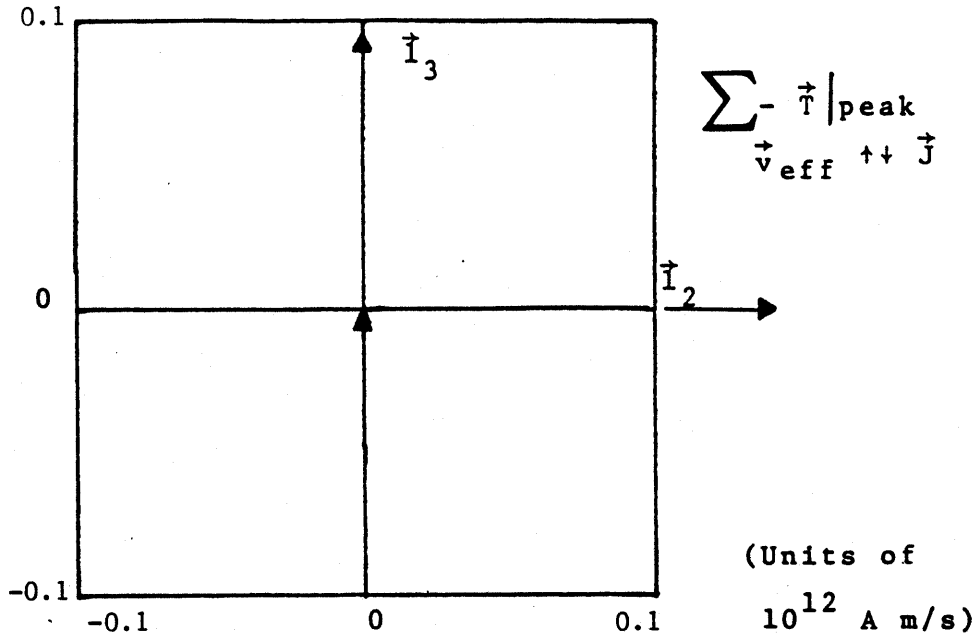


Peaks of $\vec{T}$

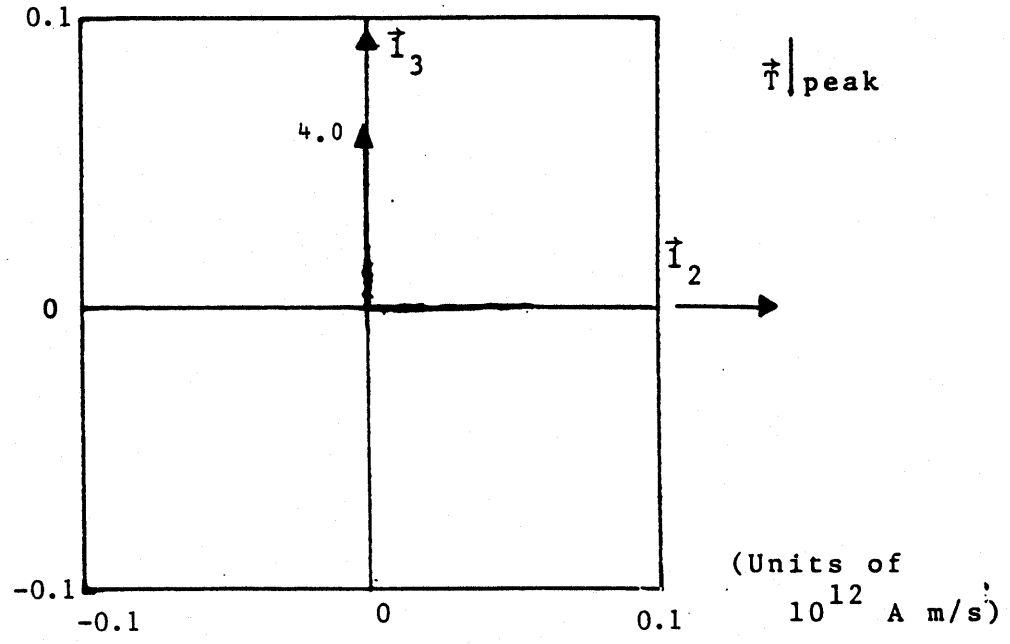
$\phi = 162^{o}$ $\theta = 35^{o}$ r = 628 m

Date: 81223 M.S.T.: 15:43:24.361

Figure 10.8.10.B.3 $\vec{T}$ for rocket triggered lightning



Effective reconstruction of negative streamer



Peaks of $\vec{T}$

ϕ = 164° θ = 19° r = 1106 m

Date: 81223 M.S.T.: 15:43:24.435

Figure 10.8.10.B.4 $\vec{T}$ for rocket triggered lightning

XI. COMPARISON OF EXPERIMENTAL RESULTS

In all examples the first solution for the TOA system (E_1) and for the Biomation system ($E_{1,1}$) should correlate. The trigger events should be the same event. E_1 and $E_{1,1}$ vary from 5° - 30° in the sense of a great circle on the unit sphere. The error in the TOA solutions is 1.5 ns or 2° and a similar error bar of 2° occurs in the Biomation solutions when there are multiple contours for finding the intersections. Examples of one contour can be found which closely approach the TOA solution (a few degrees). Two of the discharges, 10.7 and 10.8, showed a 5° azimuth separation of the two solutions. With the errors considered, these examples very nearly agree.

Only two data packages, 10.7 and 10.8, have solutions above the the horizon near the visible lightning channels. Generally, solutions near the horizon have been in good agreement with where the flash should be. The field of view of the TV camera was not large enough to see the entire whole-sky mirror. Near the rocket launch site, the picture is cut off above the horizon. Only a few of the solutions lie on the visible lightning channel. Several of the solutions above the horizon are near the channel and could be from branching within the cloud or branches which were not visible from the TV picture.

Comparison of EM source locations with acoustic sources show little agreement. All the EM sources from rocket triggered lightning are located approximately above the rocket launcher.

These eight examples seem to indicate that agreement between the acoustic and various EM location systems is not very good. However the agreement between the two EM methods (TOA and waveform) is reasonably good, being like 5° in favorable conditions.

XII. SUMMARY

In this report, we have discussed lightning EM source location using a TOA system and compared it to location by measuring the components of the electromagnetic fields [1,2] acoustic source location, and videotape photographs. In addition, we looked at multiple data windows of electromagnetic waveforms from individual lightning flashes.

Temporal characteristics of the derivative waveforms and waveforms are similar to those discussed in [1,2] for leader-like strokes and return strokes. We see a few differences comparing the multiple data windows to single data windows. Periodicity in the leader waveforms leading up to a return stroke occurs often in the multiple data windows. We have been able to obtain data on parts of the flash other than the initial leader and first return stroke. Return stroke amplitudes have been greater, up to an extrapolated 65 kA peak current for an individual pulse. (Note there may be factor of 2 errors in such extrapolation.)

Progression of the sources in time is interesting to look at. The time separation between data windows implies that we are looking at single point locations from several strokes within a flash and not the movement of charge in a single stroke in time. Faster rearming of the systems would allow us to make several measurements within each stroke.

Locations measured using the TOA system seemed to agree fairly well with the EM source locations under favorable conditions. Agreement between the EM solutions, and the video was sometimes good, but agreement of the EM solutions with the acoustics was rarely good.

It would be helpful to take data during another summer using the improved software which allows several more locations per flash to be determined. Better correlations might be possible if this were done.

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2. Baum, C.E., E.L. Breen, J.P. O'Neill, C.B. Moore, and D.L. Hall, Measurement of Electromagnetic Properties of Lightning with 10 Nanosecond Resolution, Symposium on Lightning Technology, NASA Conf. Pub. 2128, FAA-RD-80-30, April, 1980, pp. 39-82.

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4. Parker, L.W and H.W Kasemir, Airborne Warning Systems for Natural and Aircraft-Initiated Lightning, IEEE Trans. EMC, May, 1982, pp. 137-158.