

# UNITED STATES DEPARTMENT OF THE INTERIOR

## GEOLOGICAL SURVEY

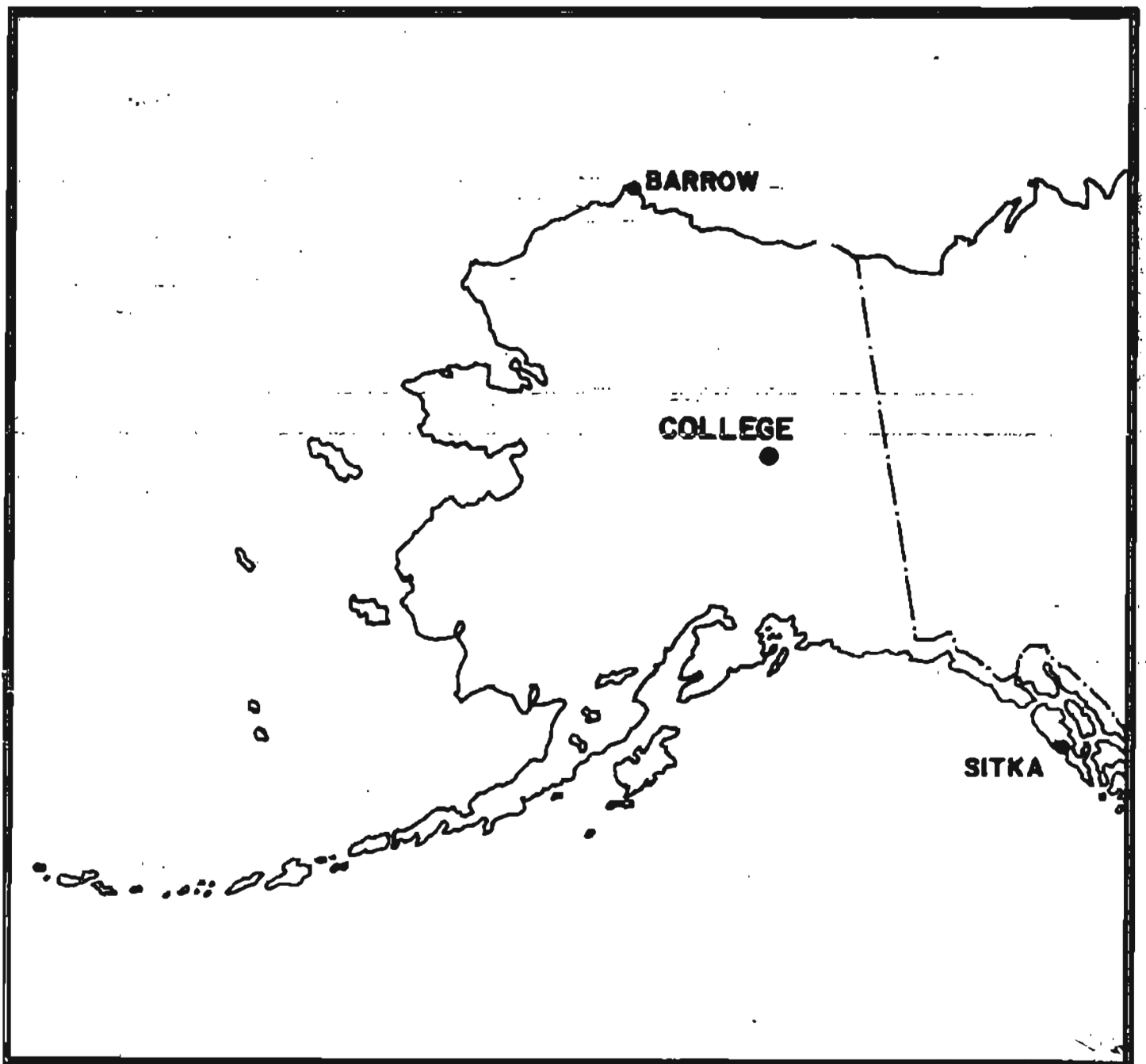
### PRELIMINARY GEOMAGNETIC DATA

### COLLEGE OBSERVATORY

### FAIRBANKS, ALASKA

SEPTEMBER 1989

OPEN FILE REPORT 89-03001



THIS REPORT WAS PREPARED UNDER THE DIRECTION OF JOHN B TOWNSHEND, CHIEF OF THE COLLEGE OBSERVATORY, WITH THE ASSISTANCE OF THE OBSERVATORY STAFF MEMBERS: R.V. O'CONNELL AND CAROL ANN VARNER AND IN COOPERATION WITH THE GEOPHYSICAL INSTITUTE OF THE UNIVERSITY OF ALASKA FAIRBANKS. THE COLLEGE OBSERVATORY IS PART OF THE BRANCH OF GLOBAL SEISMOLOGY AND GEOMAGNETISM OF THE U.S. GEOLOGICAL SURVEY.

Explanation of Data and Reports

Magnetic Activity Report

Principal Magnetic Storms

Preliminary Calibration Data and Monthly Mean Absolute Values

Magnetogram Hourly Scalings - Five Quietest Days

Sample Format for Normal and Storm Magnetograms

Normal Magnetograms

Storm Magnetograms (When Normal is too disturbed to read)

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# COLLEGE OBSERVATORY PRELIMINARY GEOMAGNETIC DATA

## INTRODUCTION

The preliminary geomagnetic data included here is made available to scientific personnel and organizations as part of a cooperative effort and on a data exchange basis because of the early need by some users. The data is copied from original forms processed at the observatory; therefore, it should be regarded as preliminary. Inquiries about this report or about the College Observatory should be addressed to:

Chief, College Observatory  
U.S. Geological Survey  
800 Yukon Drive  
Fairbanks, Alaska 99775-5180

Requests for copies of the magnetograms except for the current month should be addressed to:

World Data Center A  
NOAA DB3m 325 Broadway  
Boulder, Colorado 80303

## OBSERVATORY LOCATION

The College Observatory, operated by the U.S. Geological Survey, is located at the University of Alaska, Fairbanks, Alaska. It is near the auroral zone and the northern limit of the world's greatest earthquake belt, the Circum-Pacific Seismic Belt. Although the observatory's basic operation is in geomagnetism and seismology, it cooperates with the other scientists and organizations in areas where the facility and personnel can be of service.

The observatory is one of three operated by the USGS in Alaska. The others are located at Barrow and Sitka.

The position of the observatory site is:

Geographic Latitude.....64° 51.6'N  
Geographic Longitude.....147° 50.2'W  
Geomagnetic Latitude.....+64.6°  
Geomagnetic Longitude....+258.5°  
Elevation.....200 meters

## EXPLANATION OF DATA & REPORTS

### Available Data & Reports:

Normal and storm magnetograms and appropriate calibration data are processed at the observatory and are available for analysis or copying. Magnetic Activity Report (K-Indices & AK values), Principal Magnetic Storms Report, and Magnetogram Hourly Scalings for the five quietest days of the month are also available.

### Magnetic Activity

The K-Index: The K-Index is a logarithmic measurement of the range of the most disturbed component (D or H) of the geomagnetic field for eight intervals 0000-0300, 0300-0600...2100-2400 UT. It is a measure of the difference between the highest and lowest deviation from a smooth curve to be expected for a component on a magnetically quiet day, within a three hour interval.

The Equivalent Daily Amplitude, AK: The K-Index is converted into an equivalent range, ak, which is near the center of the limiting gamma ranges for a given K. The average of the eight values is called equivalent daily amplitude AK. The unit 10<sup>-7</sup> has been chosen so as not to give the illusion of an accuracy not justified.

The schedule for converting gamma range to K, and K to ak is as follows:

<u>Gamma Range</u>	<u>K-Index</u>	<u>ak</u>
0< 25	0	0
25< 50	1	3
50< 100	2	7
100< 200	3	15
200< 350	4	27
350< 800	5	48
800< 1000	6	80
1000< 1850	7	140
1850< 2500	8	240
2500+	9	400 (10 <sup>7</sup> )

### Principal Magnetic Storms

Gradual and sudden commencement magnetic disturbances with at least one K-Index of 5 or greater, which are believed to be part of a world-wide disturbance, are classified as principal magnetic storms. The time of the storm beginning and ending; direction and amplitude of sudden commencement; period of maximum activity; and storm range are reported. Monthly reports of these data are forwarded to the World-Data Center A in Boulder, Colorado.

### Magnetogram Hourly Scalings

Magnetogram hourly scalings are averaged for successive periods of one hour for the D, H, and Z elements. The value in the column headed "01" is the average for the hour beginning 0000 and ending 0100. Note that the values on the scaling sheet are in tenths of mm with the decimal point omitted. The user of these scalings should keep in mind that the tabular values are hourly means and if one is interested in the detailed morphology of the magnetic field, refer directly to the magnetogram.

### Magnetograms

The normal magnetograms in this report are reproduced at about one-third the size of the originals. Preliminary base-line values and scale values adopted for use with the original magnetograms are included. For days when the magnetic field is too disturbed for the normal magnetogram to be readable, storm magnetograms are reproduced.

### Absolutes, Base-lines and Scale Values

To determine the absolute value of the magnetic field from the hourly means or from point scalings the following equations should be used:

$$D = B_D + d S_D; H = B_H + h S_H; Z = B_Z + z S_Z$$

where D, H and Z are absolute values;  
B<sub>D</sub>, B<sub>H</sub> and B<sub>Z</sub> are base-line values;  
S<sub>D</sub>, S<sub>H</sub> and S<sub>Z</sub> are scale values;  
and d, h and z are scalings in millimeters.

College, Alaska

**MAGNETIC ACTIVITY**  
(Greenwich civil time, counted from midnight to midnight)

MONTH AND YEAR

SEPTEMBER 1989

DATE	K-INDICES								SUM	A <sub>k</sub>	TIME SCALE ON MAGNETOGRAMS		
	00-03	03-06	06-09	09-12	12-15	15-18	18-21	21-24			20 mm/hr		
1	3	2	3	4	3	2	0	0	17	11	SUDDEN COMMENCEMENTS		
2	2	0	1	5	5	5	1	1	20	20	d	b	m
3	2	3	3	2	1	2	1	2	16	08	4	00	26
4	5	5	6	5	4	2	1	2	30	34	15	00	46
5	4	5	6	6	2	1	2	2	28	32	30	17	17
6	2	2	2	3	5	4	3	2	23	17	POSSIBLE SOLAR-FLARE EFFECTS BASED ON INSPECTION OF GRAMS ALONE (WITHOUT REFERENCE TO DATA FROM OTHER SOURCES)		
7	2	2	4	5	5	6	4	2	30	31			
8	3	3	3	6	3	3	1	2	24	21			
9	2	2	1	1	4	3	3	2	18	11			
10	3	3	3	2	3	4	3	1	22	14			
11	1	0	0	0	1	0	1	1	04	02			
12	2	3	4	3	3	3	0	2	20	13			
13	2	1	1	1	1	2	2	1	11	05			
14	2	1	3	3	1	0	0	0	10	05			
15	3	4	3	2	5	6	5	4	32	33			
16	4	6	6	3	4	4	2	2	31	34			
17	1	0	3	1	1	1	2	3	12	06			
18	3	3	3	4	3	4	5	5	30	26			
19	5	4	6	6	4	2	2	1	30	35			
20	1	2	1	1	1	1	1	1	09	04			
21	2	2	4	5	4	1	1	2	21	16			
22	2	1	5	6	6	5	4	2	31	38			
23	2	1	0	0	0	1	1	2	07	03			
24	1	0	0	1	4	2	2	1	11	06			
25	0	0	1	3	1	1	0	0	06	03			
26	0	1	5	6	5	7	6	4	34	53			
27	3	2	1	0	1	0	0	1	08	04			
28	2	1	0	3	3	2	2	1	14	07			
29	2	1	0	0	1	2	1	1	08	03			
30	2	2	1	1	3	3	3	3	18	10			
31													

K SCALE USED: LOWER LIMIT FOR K <sub>p</sub> 9..... CURRENT SCALE VALUE..... LOWER LIMIT FOR K <sub>p</sub> 9.....	D	H	Z	(mm)
	675.7	322.2		(γ/mm)
	3.69	7.75		(to nearest 10γ)
	2490	2500		

SCALINGS AND COMPUTATIONS HAVE BEEN CHECKED.

APPROVED John B. Townshend, Chief

- 3 -

OBSERVER IN CHARGE

PRINCIPAL MAGNETIC STORMS  
COLLEGE OBSERVATORY, COLLEGE, ALASKA

Data from Individual Observations:

SEPTEMBER 19 89

USE-A FOR SOLAR-TERRRESTRIAL PHYSICS  
ENVIRONMENTAL DATA SERVICE, NOAA  
BOULDER, COLORADO 80508 U.S.A.

Obs. & letter IAGA code	Geomag. lat.	Commencement		SC - amplitudes			Max. 3 hr - index K			Ranges			UT End		
		day	hr min (UT)	type	D(')	H(Y)	Z(Y)	day	(3 hr - period)	K	D(')	H(Y)	Z(Y)	day	hr
CO	64.6 N	4	0026	SC*	+22	-85	+27	4	3	6	116	1065	595	4	14
		15	0046	SC	-7	+90	-	16	2,3	6	214	1320	565	16	19
		18	17XX	..				19	3,4	6	162	980	530	19	14
		26	05XX	..				26	6	7	282	1615	990	26	22
		30	1717	SC	+7	+81	+5	1	3,4,5,6	5	108	720	510	1	17

## NORMAL MAGNETOGRAPH

COMPONENT	PERIOD		CALIBRATION		
	FROM	TO	SCALE VALUE		BASE LINE
D	0001 UT, 9-1-89	2400 UT, 9-30-89	1.0'/mm	3.7γ/mm	26° 51.21 E
H	0001 UT, 9-1-89	2400 UT, 9-19-89	7.75 γ/mm		12643 γ
	0001 UT, 9-20-89	2400 UT, 9-30-89	(SAME)		12641 γ
Z	0001 UT, 9-1-89	(SAME)	7.70 γ/mm		55204 γ
	(SAME)	(SAME)	(SAME)		55202 γ

## STORM MAGNETOGRAPH

COMPONENT	PERIOD		CALIBRATION	
	FROM	TO	SCALE VALUE	
D	0001 U.T., 9-1-89	2400 U.T., 9-30-89	7.9'/mm	29.4 γ/mm
H	(SAME)	(SAME)	43.5 γ/mm	
Z	(SAME)	(SAME)	48.7 γ/mm	

The College Observatory has used several absolute instruments and different observing piers since it began operations in 1948. To avoid artificial secular shifts in the absolute values published when instruments were changed, corrections were applied to provide continuity in the data from the time the Observatory began operating. For many years the instruments used for observing absolute values have had zero correction. Effective with the May 1989 Preliminary Data Report, in accordance with a directive issued by the USGS Branch of Global Seismology and Geomagnetism analysis personnel, these longstanding corrections are discontinued and all data listed (D, H & Z) are for the position at absolute pier 1a and without any corrections applied. The net effect of these changes is as follows:

Declination (D): No Change  
 Horizontal Intensity (H): -5γ; i.e., H absolute and baseline values are 5γ less than previously reported.  
 Vertical Intensity (Z): +33γ; i.e., Z absolute and baseline values are 33γ higher than previously reported.

## MONTHLY MEAN ABSOLUTE VALUES\*

D	H	Z
27° 01.1' E	12783 γ	55352 γ

\* COMPUTED FROM FIVE QUIETEST DAYS DURING MONTH.  
 DATE USED: SEPT 11, 23, 25, 27, 29.

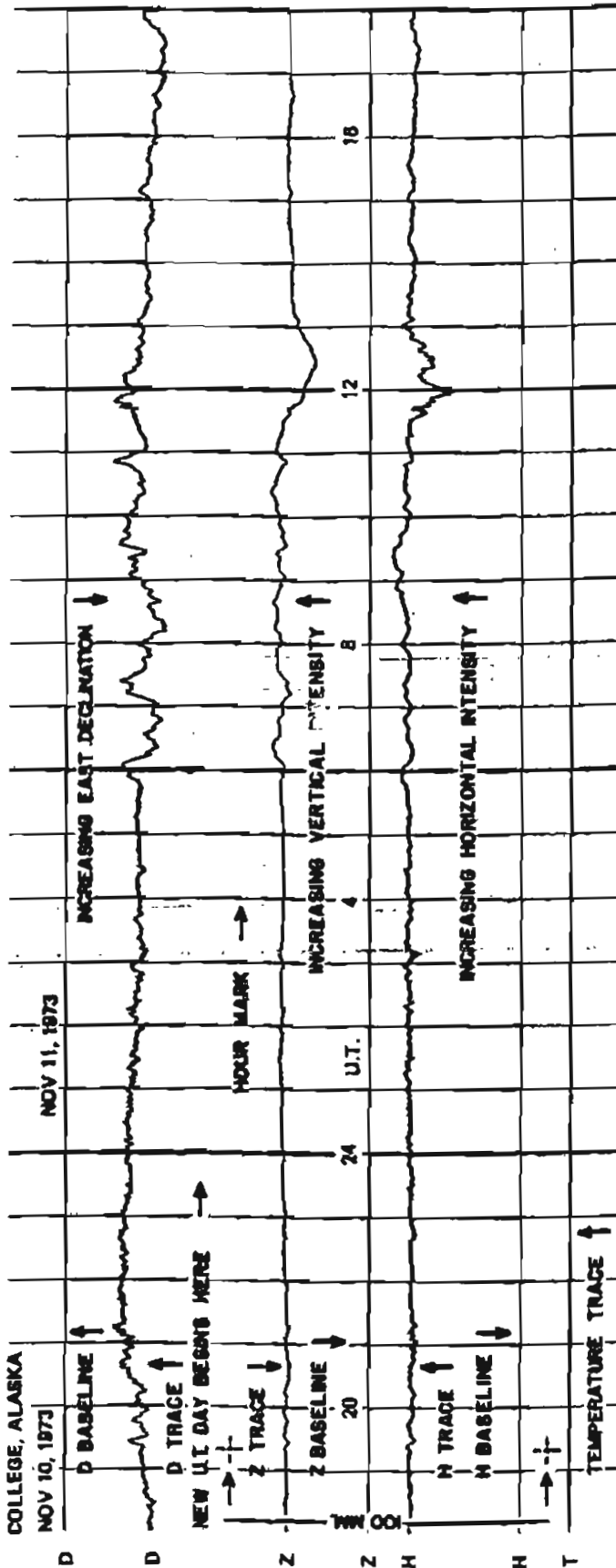
MAGNETOGRAM HOURLY SCALINGS - FIVE QUIETEST DAYS  
(UNIVERSAL TIME)

Values are in tenths of an and are averages for successive five periods of one hour beginning at midnight. Skewage corrections have been applied. Negative values in red with bars.

COMMENT	B					H					Z					COMMENT
	DAY					DAY					DAY					
	11	23	25	27	29	11	23	25	27	29	11	23	25	27	29	
01	53	75	50	-10	19	160	186	169	276	149	207	203	220	249	217	
02	30	71	31	-20	31	188	170	169	253	159	209	202	218	273	210	
03	61	30	30	4	40	165	171	170	205	179	219	200	219	305	200	
04	60	69	41	38	49	170	180	171	232	183	204	196	217	296	199	
05	67	70	58	83	61	172	186	179	210	188	196	193	195	289	203	
06	69	69	70	86	60	181	197	190	178	188	186	192	195	249	201	
07	77	73	78	80	71	190	189	193	184	188	185	191	196	237	198	
08	84	73	81	80	72	191	190	197	187	190	184	191	191	226	196	
09	89	78	82	71	84	195	197	205	190	189	180	195	202	220	199	
10	91	90	191	88	86	199	196	210	179	191	180	194	125	220	198	
11	92	102	82	89	100	203	195	187	173	196	179	194	123	210	196	
12	89	111	134	91	103	203	188	184	173	203	186	191	170	209	190	
13	127	115	142	100	110	192	194	171	164	200	183	186	144	198	190	
14	141	118	129	97	124	191	192	160	170	201	183	188	142	199	183	
15	143	128	139	102	129	191	189	158	171	198	187	190	150	204	185	
16	163	139	149	111	151	182	182	174	170	180	185	195	151	209	191	
17	175	153	151	143	182	176	180	190	172	150	181	195	169	211	196	
18	172	150	153	170	220	166	178	200	170	108	180	195	185	213	156	
19	181	135	150	172	199	154	178	184	160	160	184	192	185	207	114	
20	131	120	121	165	190	150	179	184	153	167	183	184	180	201	145	
21	119	112	92	134	160	151	183	190	142	170	188	181	178	190	163	
22	120	114	100	99	116	152	189	180	136	170	194	180	183	188	172	
23	90	102	101	70	91	147	190	171	144	170	190	180	186	190	181	
24	74	95	100	57	60	151	174	166	153	170	182	184	187	197	180	
DAILY SUM	2478	2432	2455	2100	2499	4220	4453	4352	4365	4243	4535	4552	4311	5390	4463	
DAILY MEAN	103	101	102	88	104	176	186	181	182	177	189	191	180	225	186	
MEAN											194					

Scaled *AYO* Checked *CAV*

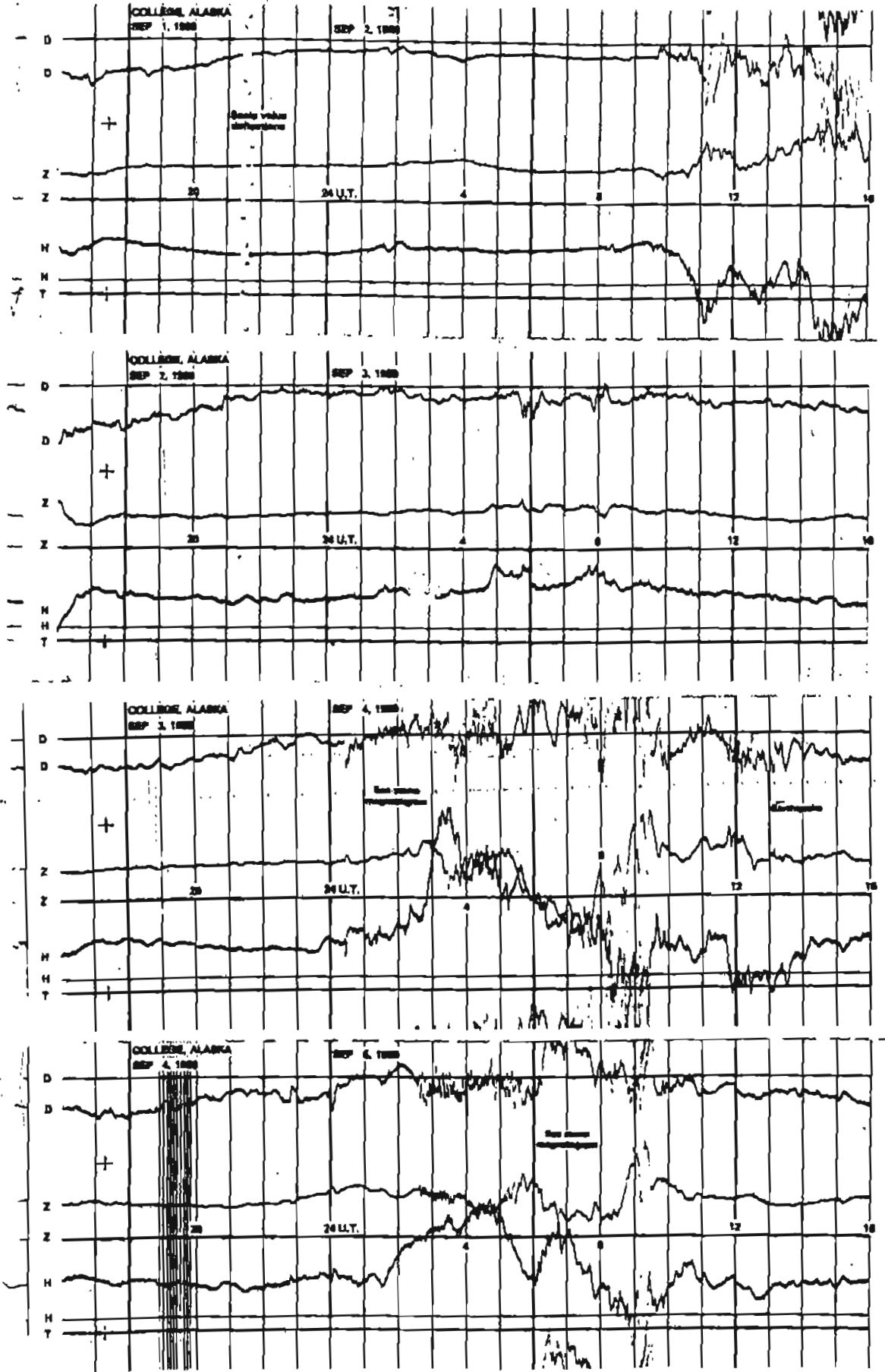
# FORMAT FOR NORMAL & STORM MAGNETOGRAMS (SAMPLE ONLY)



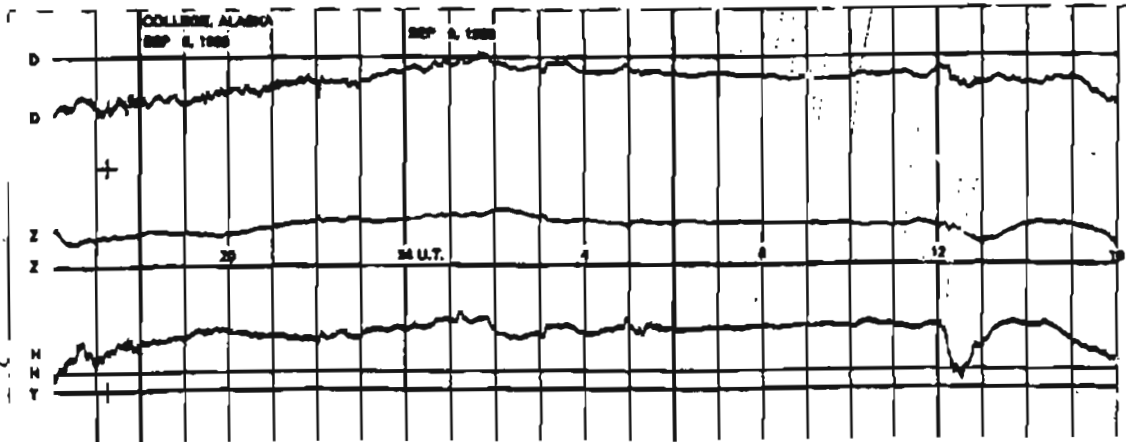
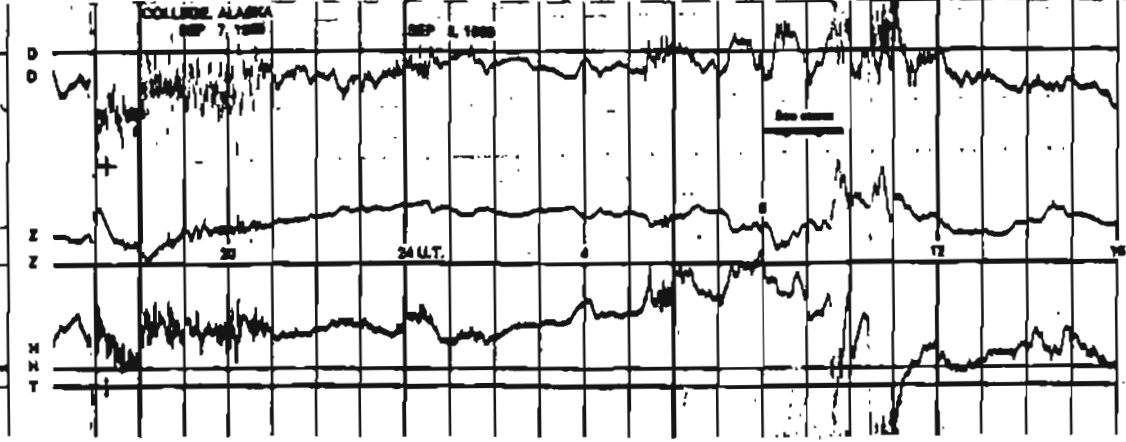
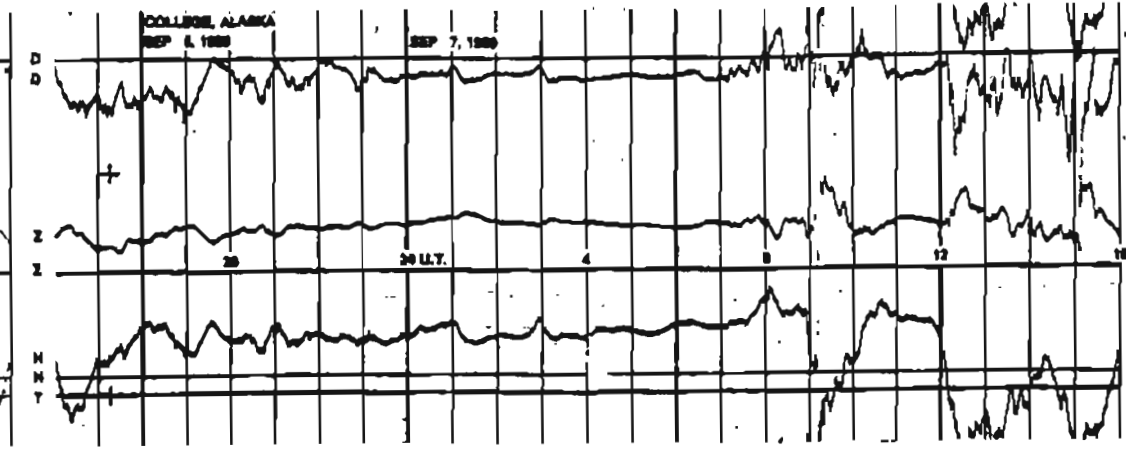
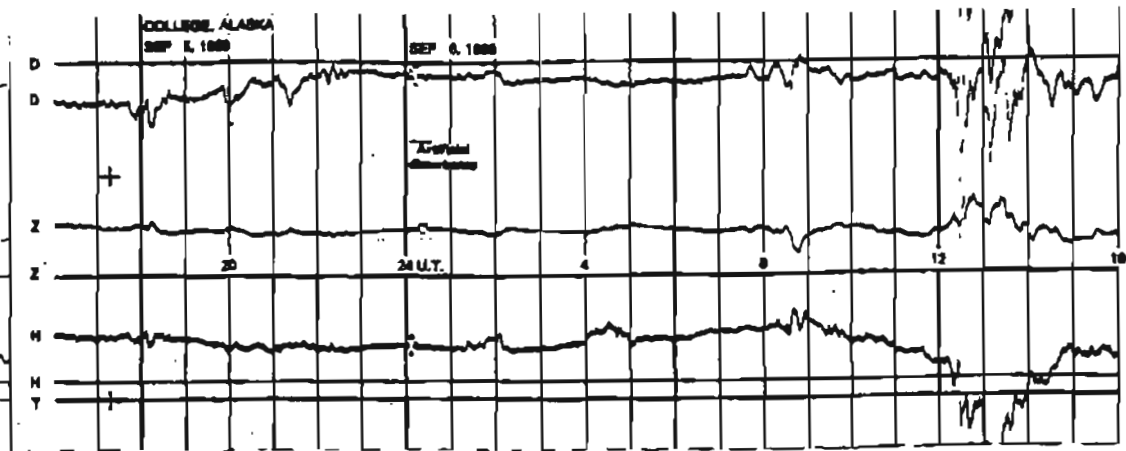
SEE PRELIMINARY CALIBRATION DATA FOR SCALE VALUES & BASELINE VALUES



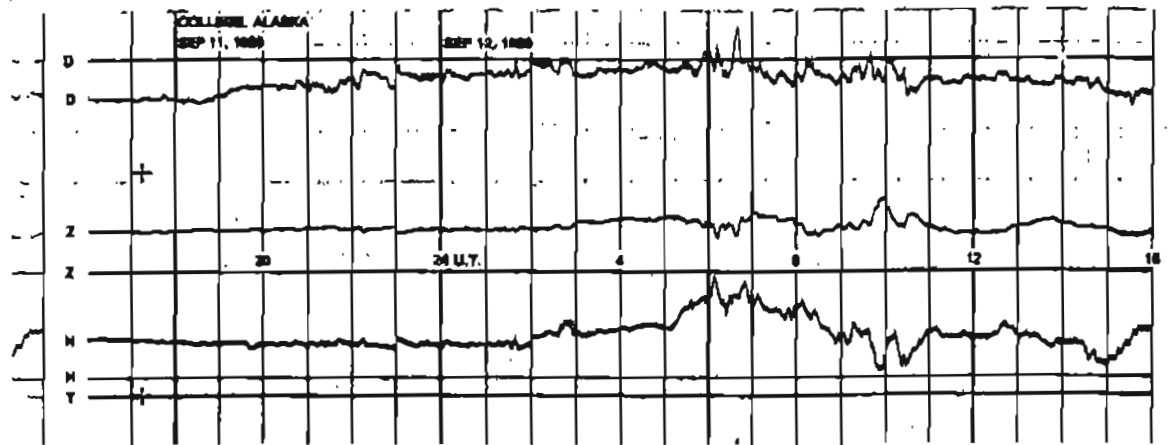
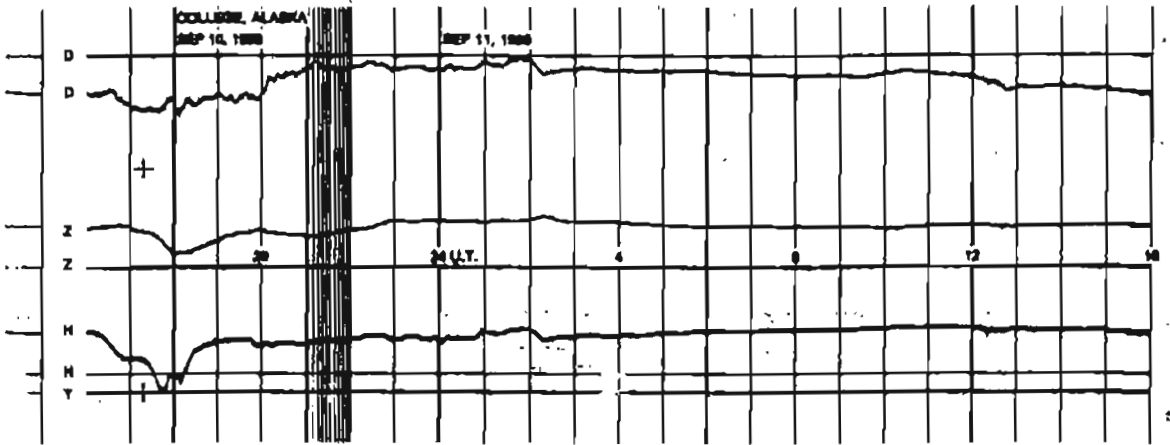
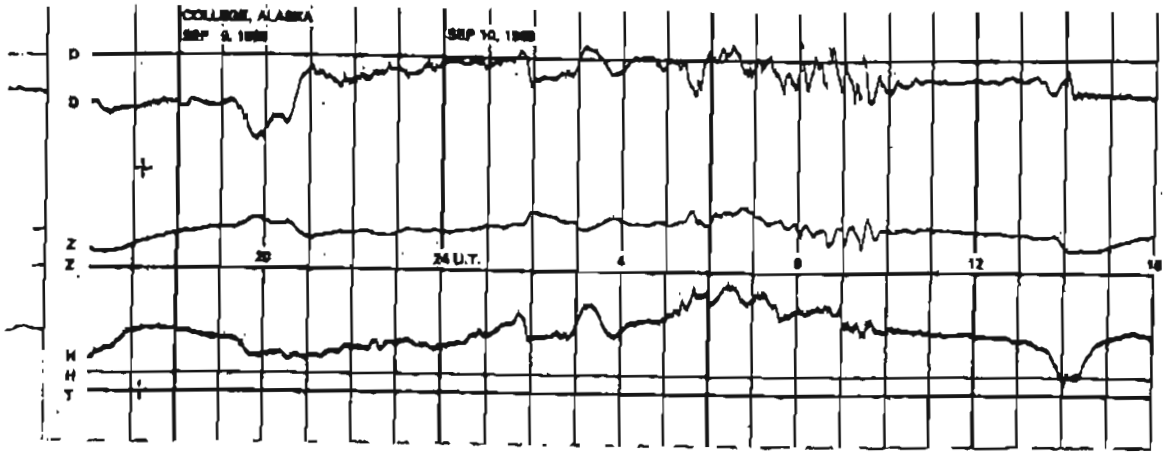
NORMAL MAGNETOGRAMS



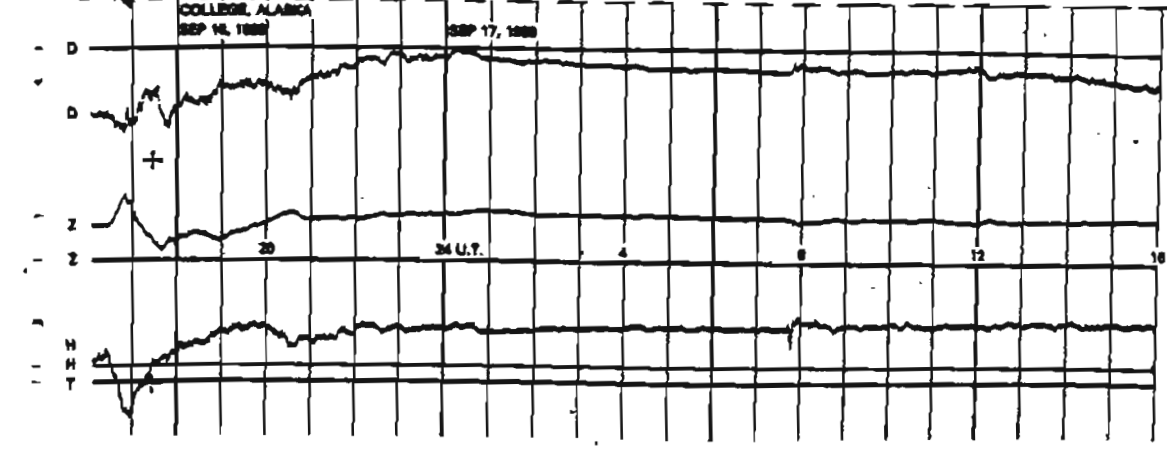
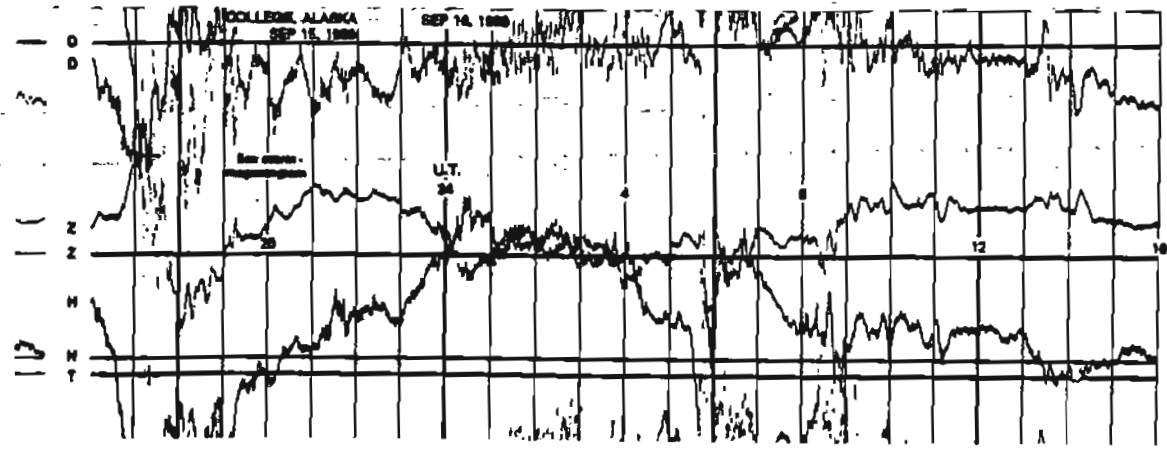
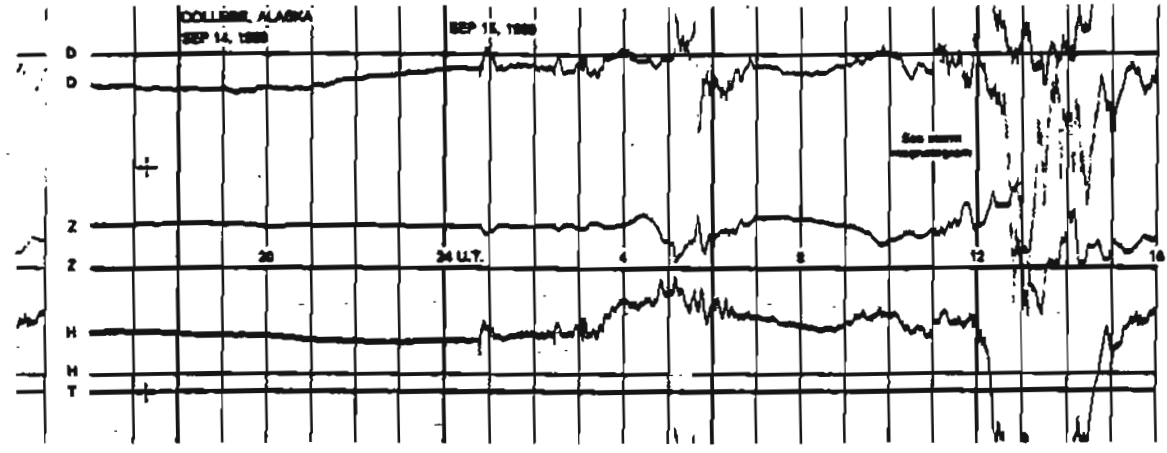
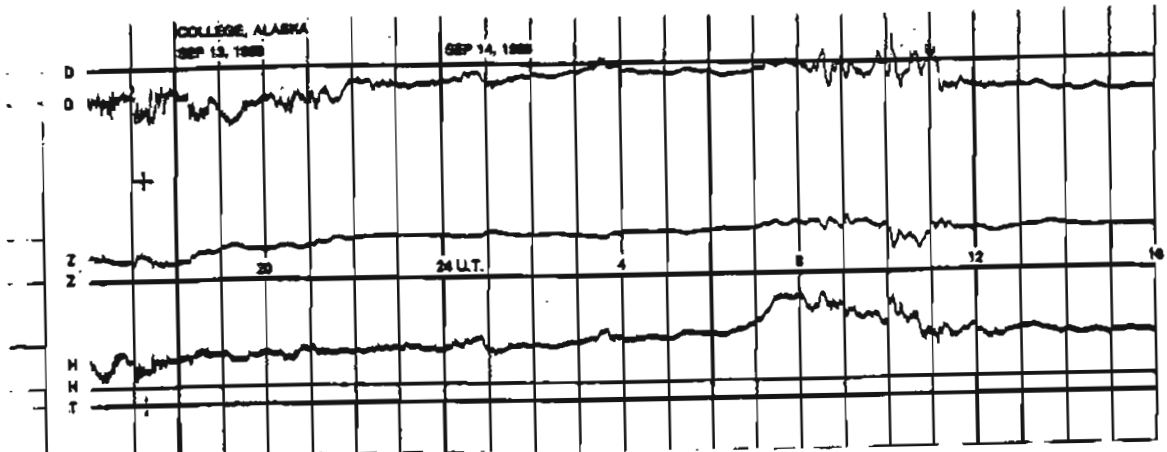
NORMAL MAGNETOGRAMS



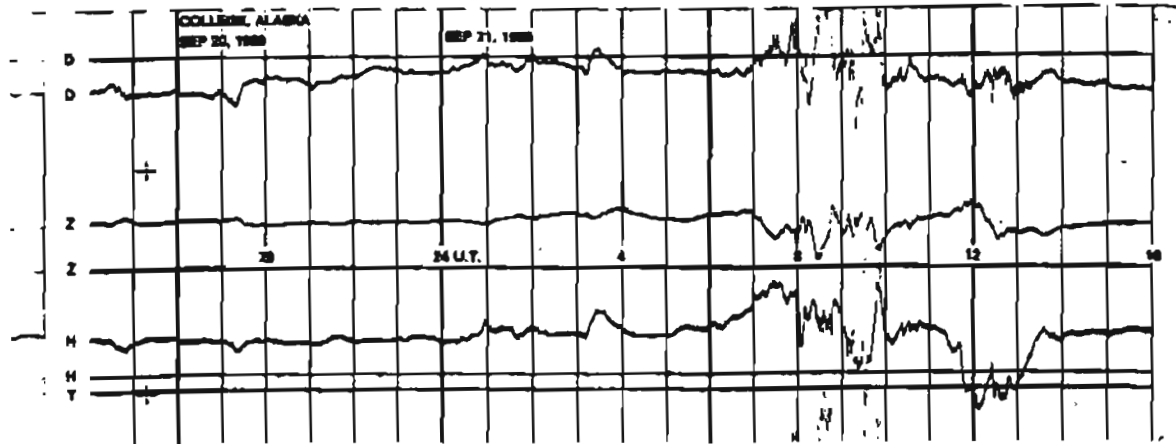
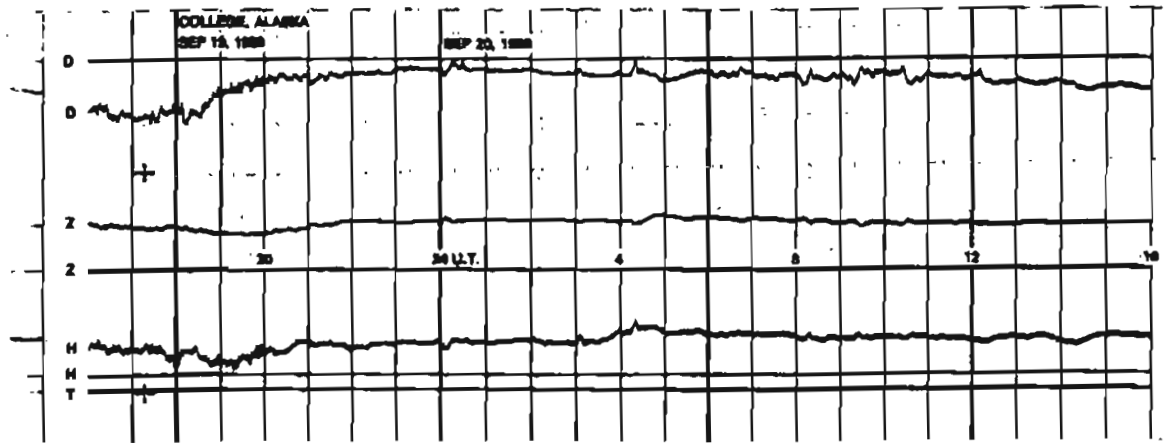
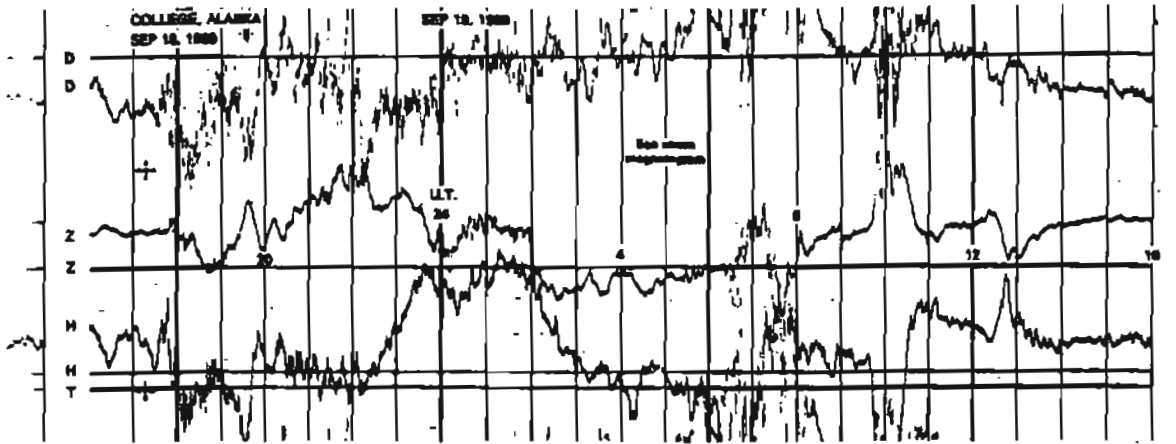
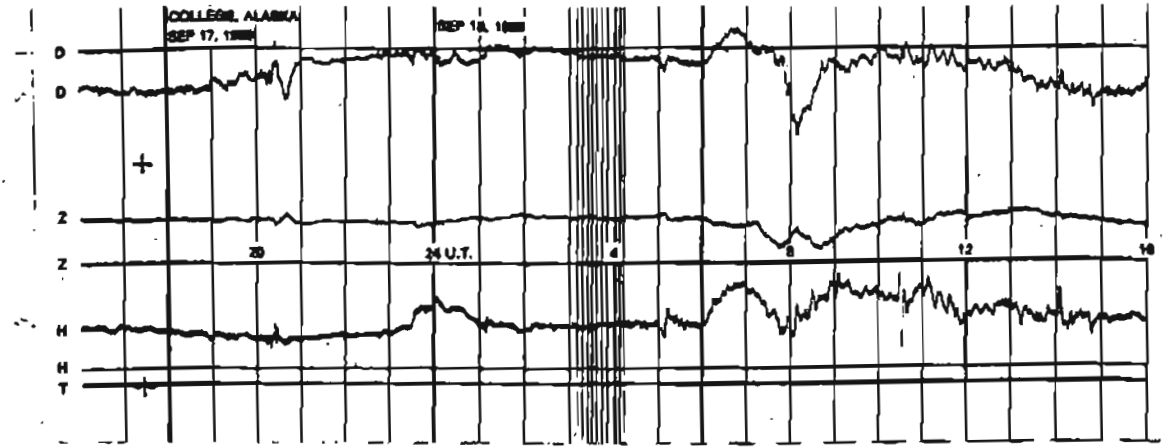
NORMAL MAGNETOGRAMS



NORMAL MAGNETOGRAMS

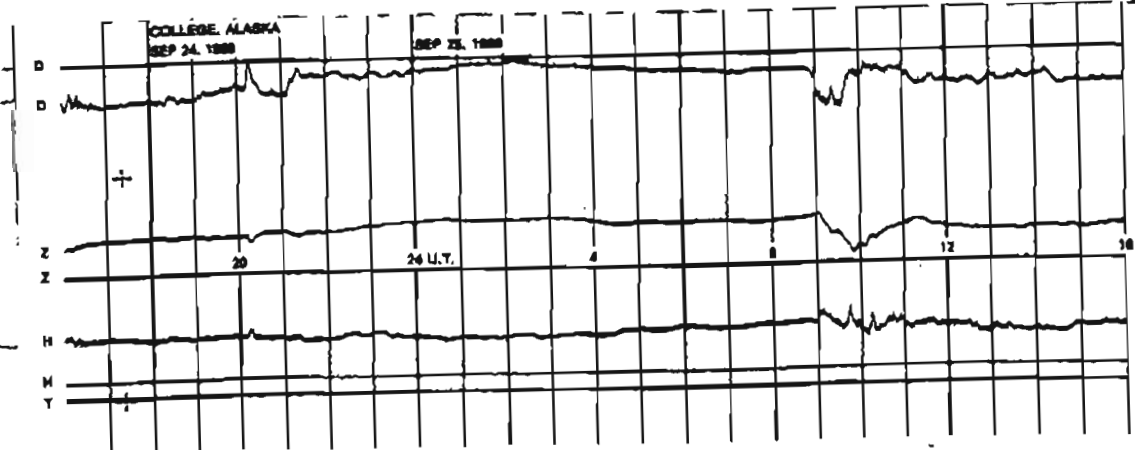
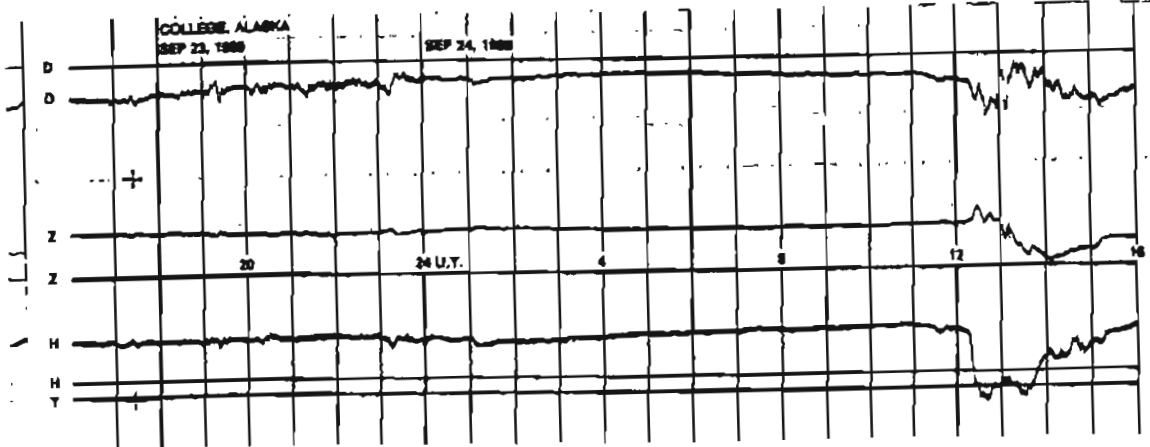
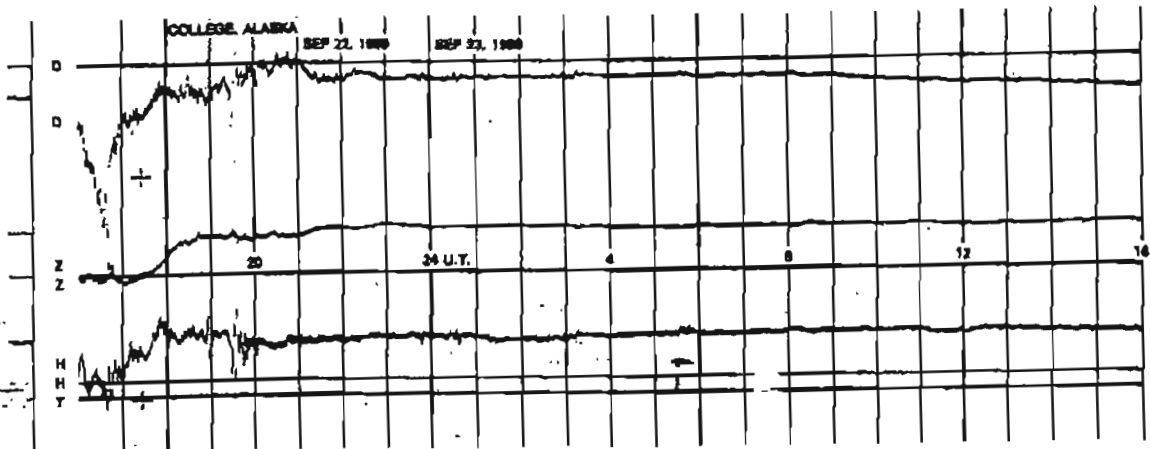
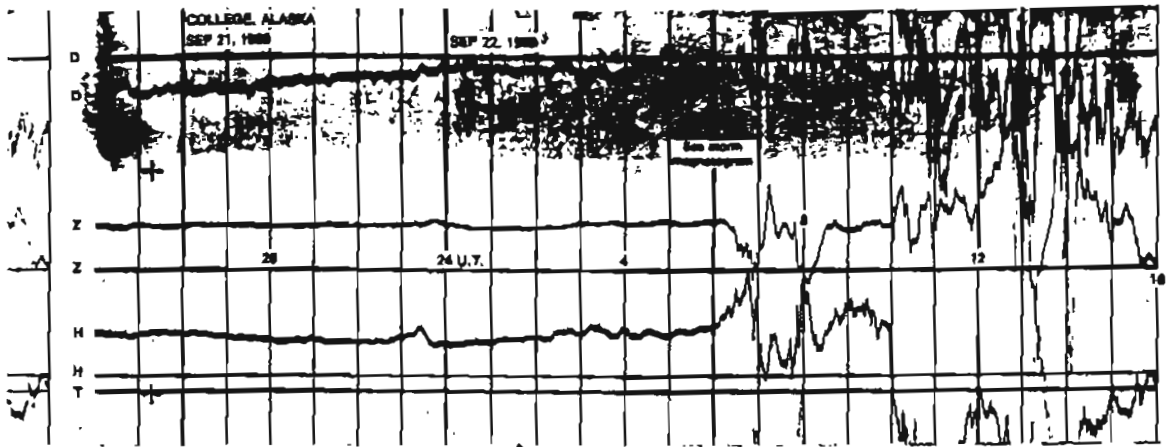


NORMAL MAGNETOGRAMS



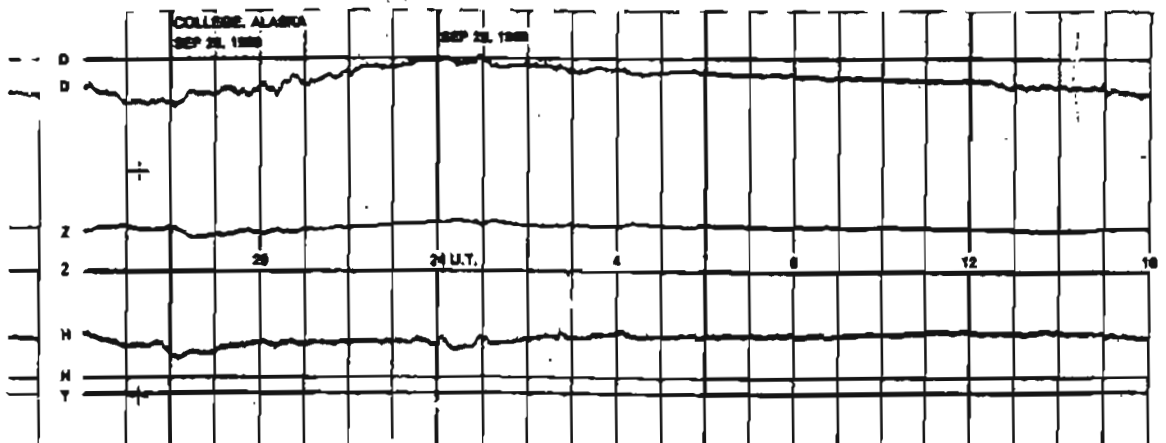
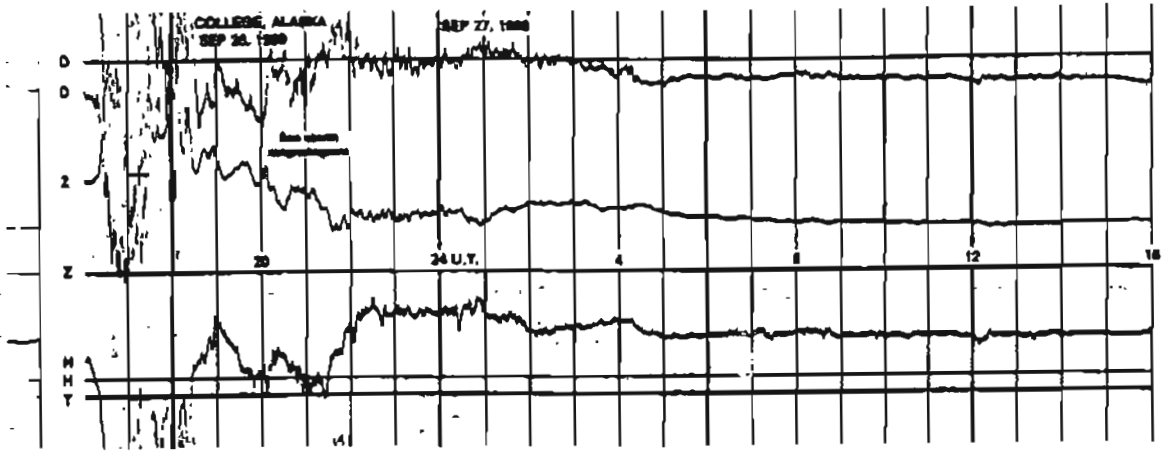
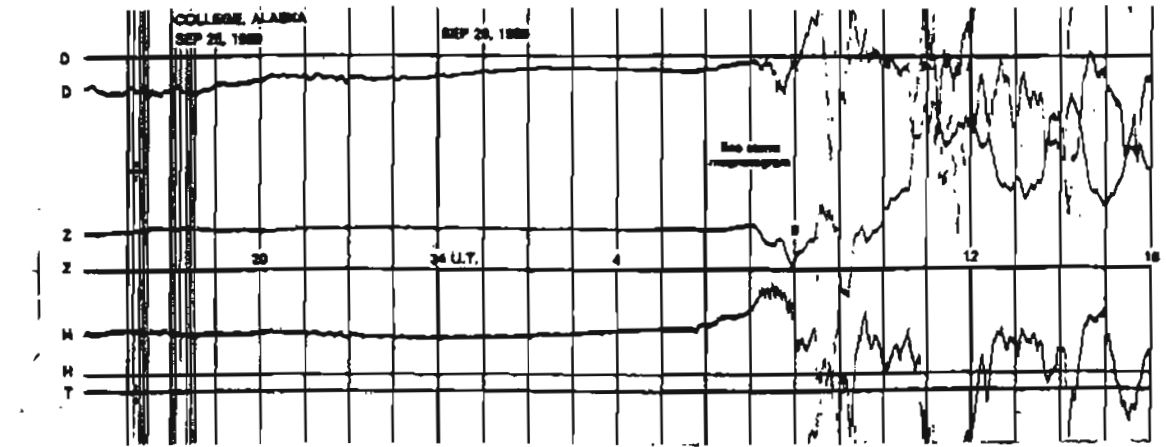
NORMAL MAGNETOGRAMS

100 gamma  
500 gamma  
0

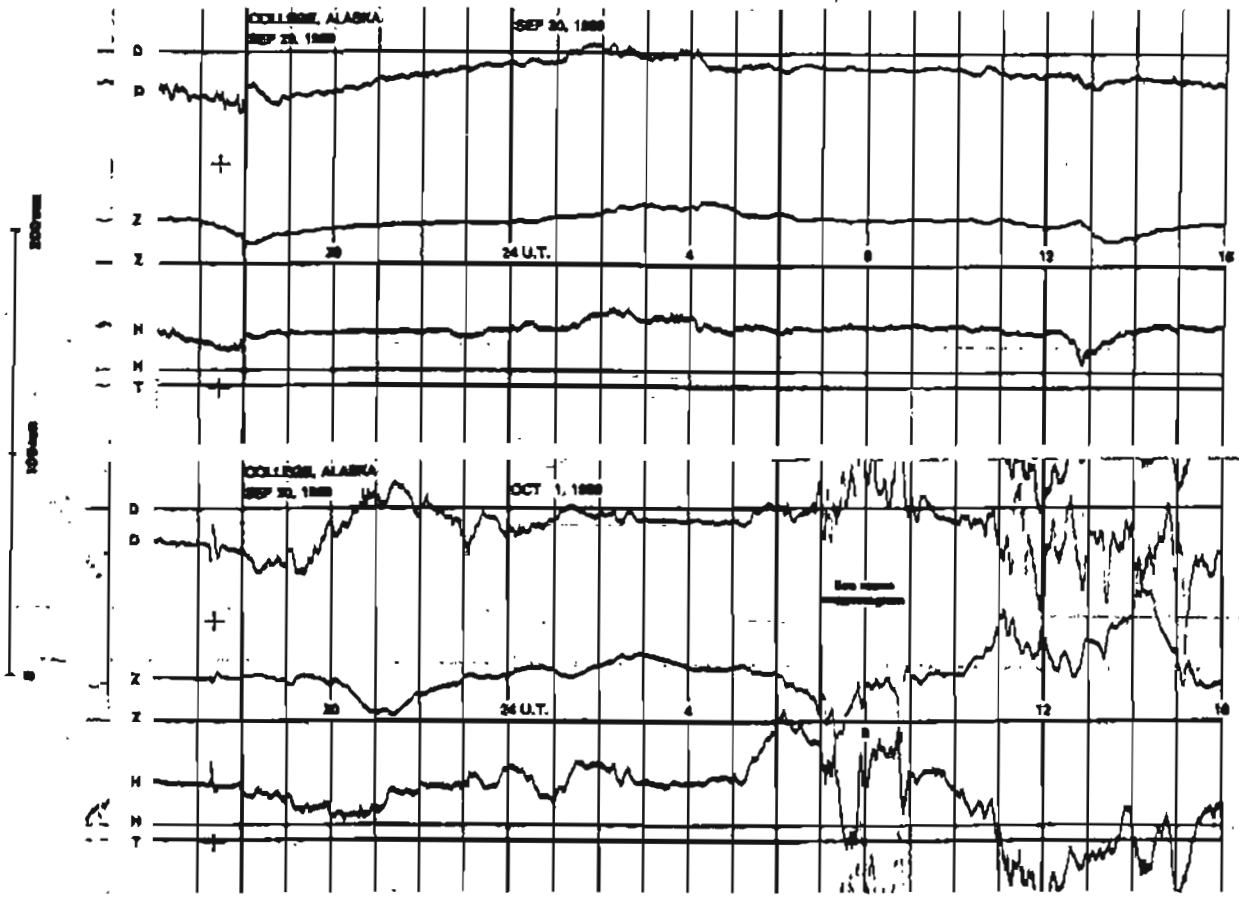


NORMAL MAGNETOGRAMS

200 mm  
100 mm  
0

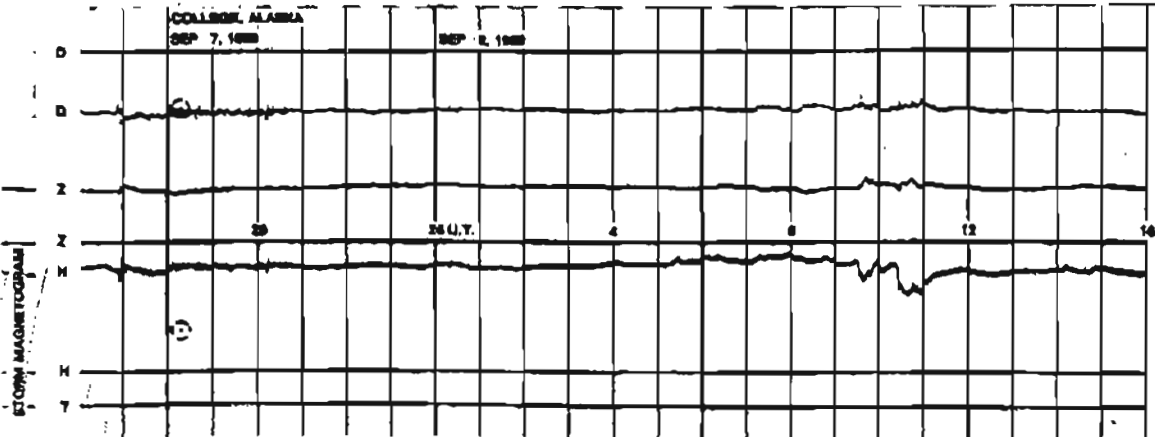
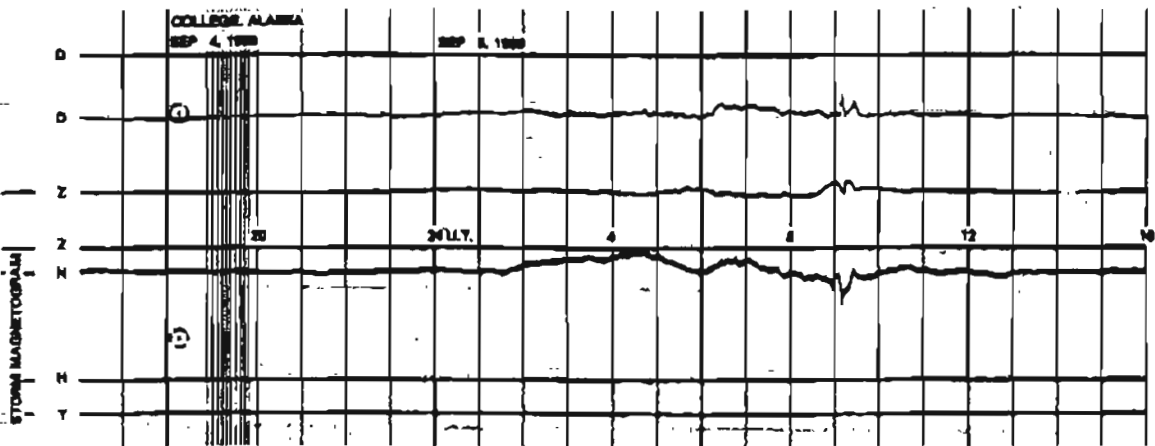
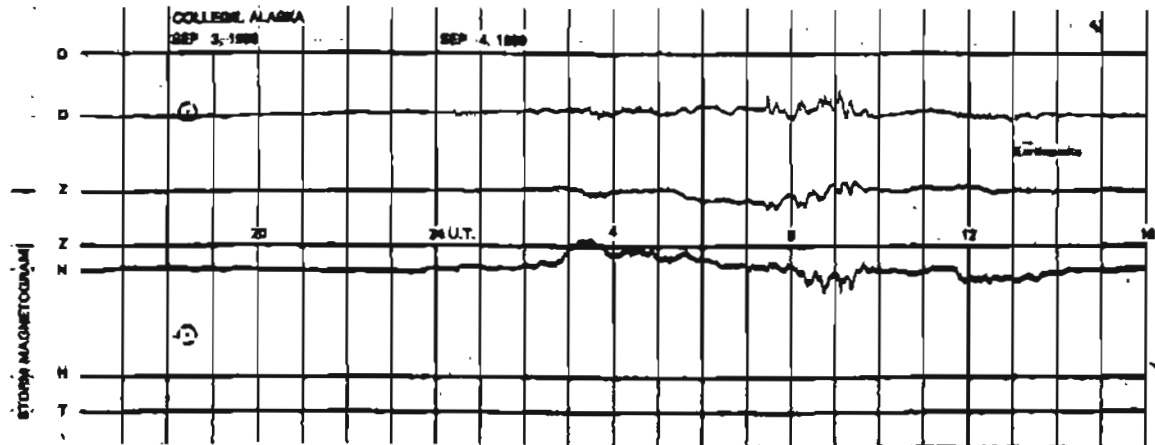


NORMAL MAGNETOGRAMS

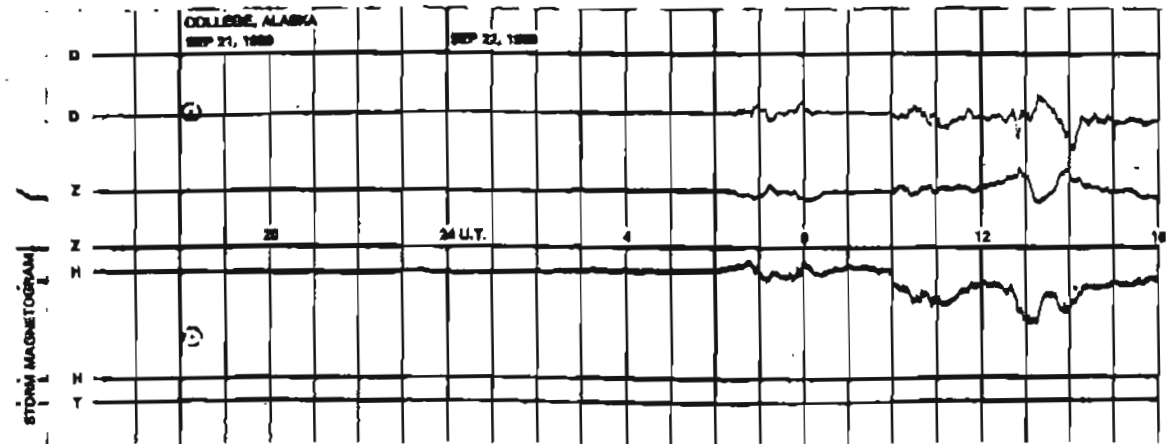
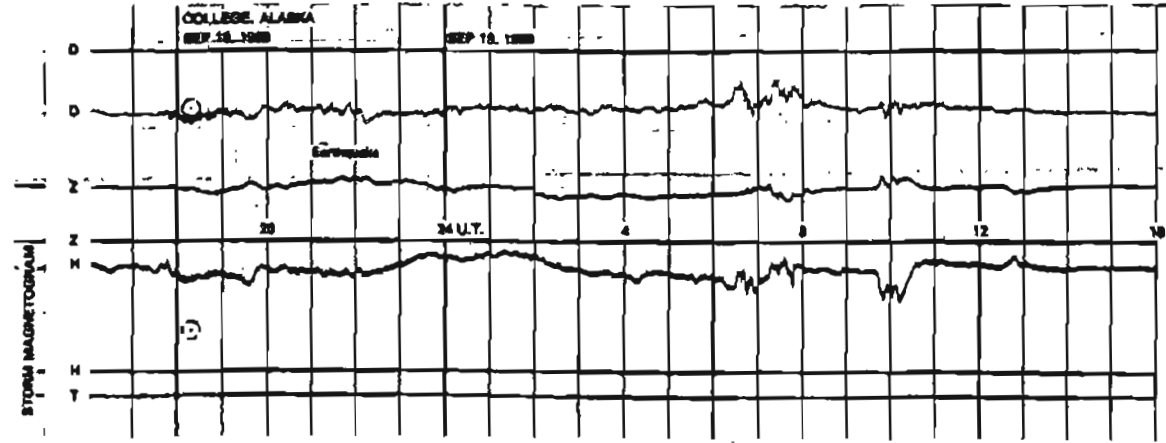
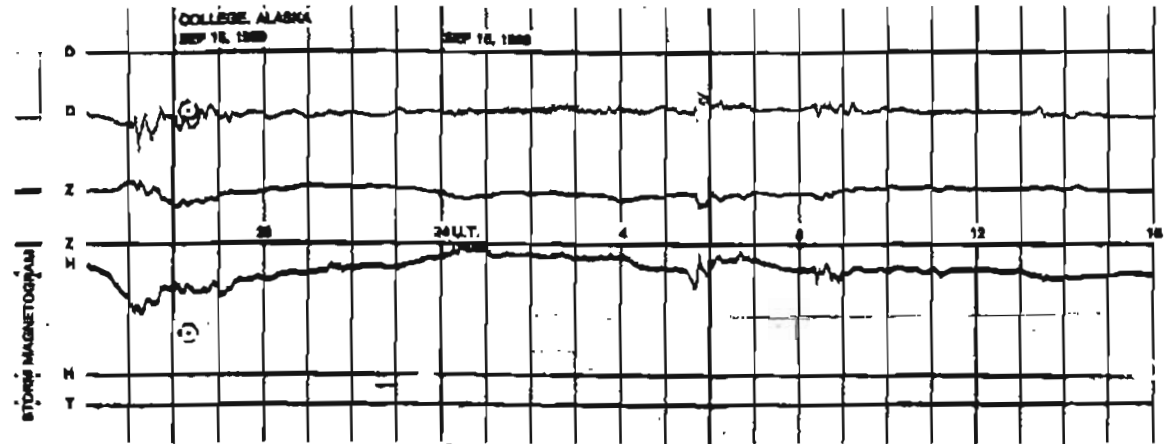
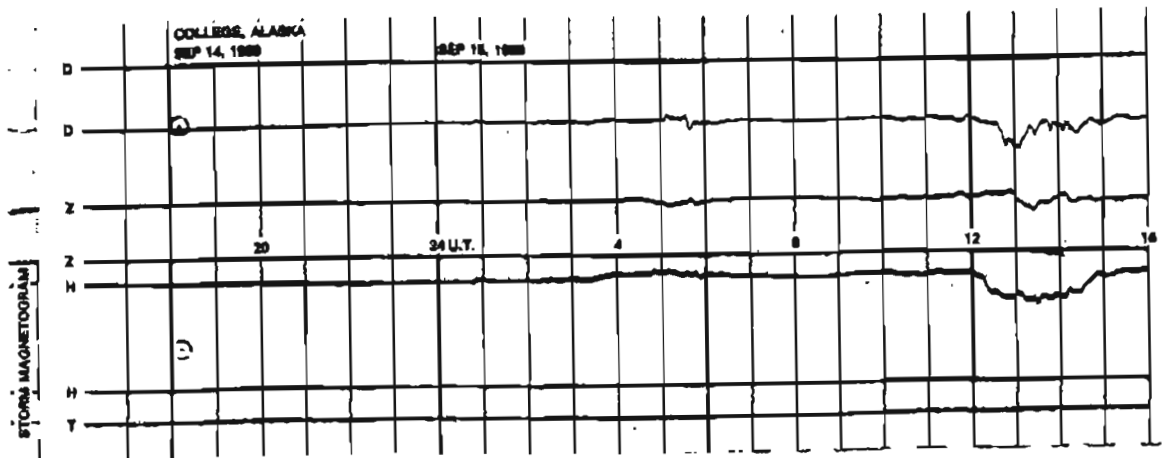




# STORM MAGNETOGRAMS

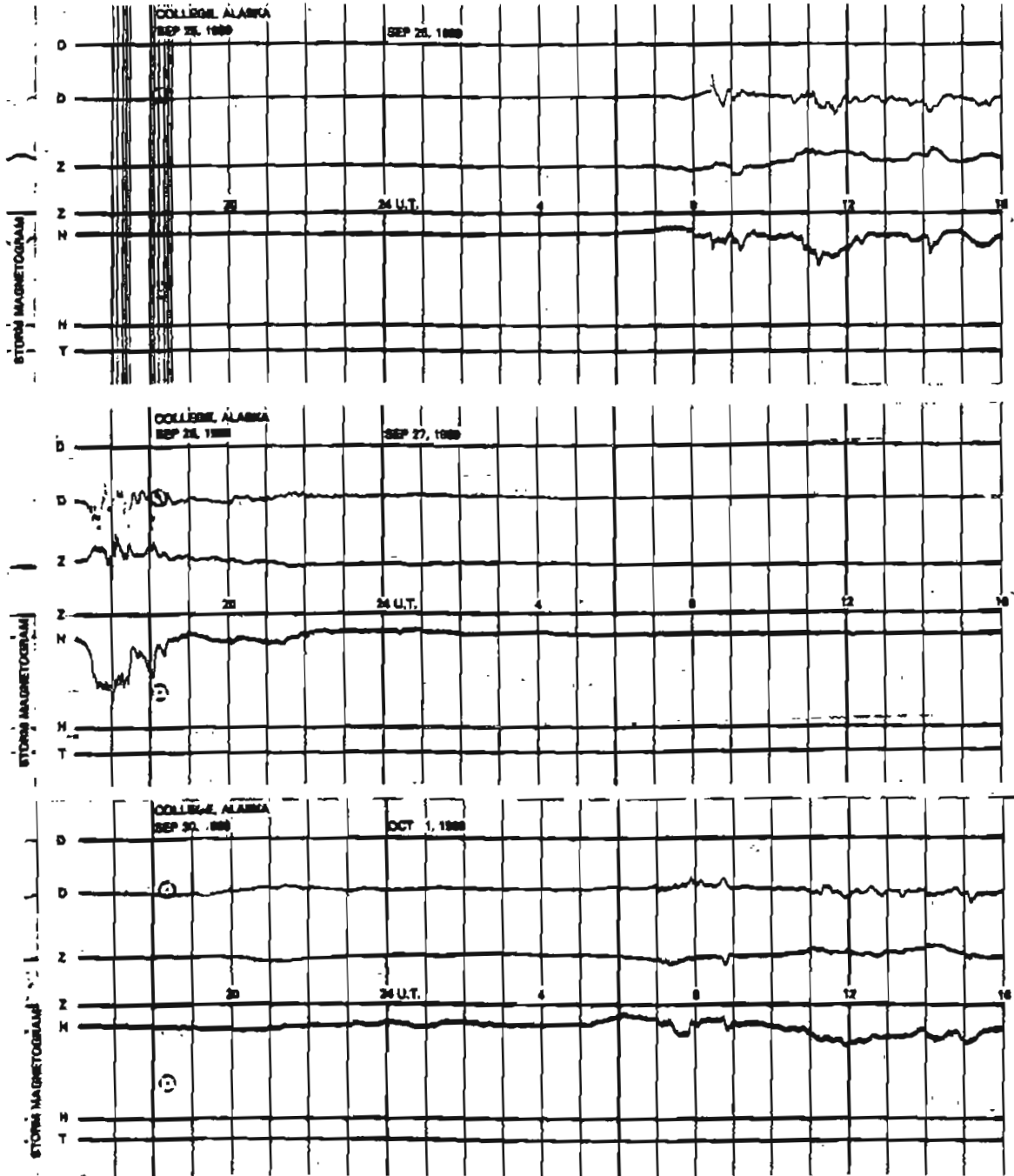


# STORM MAGNETOGRAMS



# STORM MAGNETOGRAMS

300mm  
100mm  
0



10/1/69