

**UNITED STATES DEPARTMENT OF THE INTERIOR**

**GEOLOGICAL SURVEY**

**RECEIVED at**

**PRELIMINARY GEOMAGNETIC DATA**

**APR 10 1991**

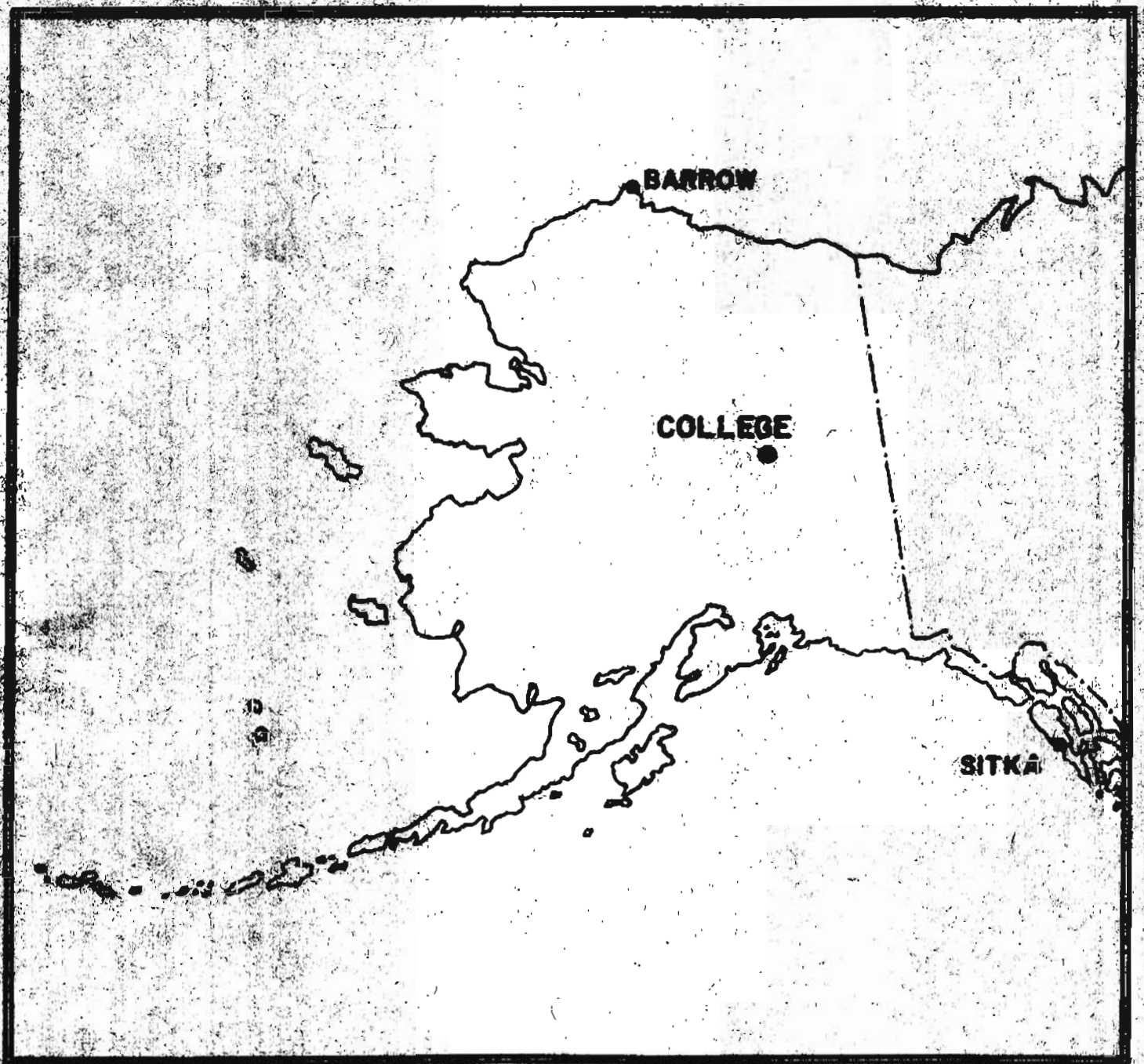
**COLLEGE OBSERVATORY**

**State Geological Survey  
Fairbanks**

**FAIRBANKS, ALASKA**

**FEBRUARY 1991**

**OPEN FILE REPORT 91-0300B**



THIS REPORT WAS PREPARED UNDER THE DIRECTION OF JOHN B TOWNSEND,  
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)

# 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 D63m 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.....+64.8°  
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 $\gamma$  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:

Gamma Range	K-Index	ak
0 < 25	0	0
25 < 50	1	3
50 < 100	2	7
100 < 200	3	15
200 < 350	4	27
350 < 600	5	48
600 < 1000	6	80
1000 < 1850	7	140
1850 < 2500	8	240
2500+	9	400 (10 $\gamma$ )

### 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;  
 $B_D$ ,  $B_H$  and  $B_Z$  are base-line values;  
 $S_D$ ,  $S_H$  and  $S_Z$  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

February, 1991

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	2	1	3	6	4	5	5	5	31	35	SUDDEN COMMENCEMENTS		
2	3	3	1	4	2	1	0	1	15	9	d	h	m
3	1	1	2	2	3	1	0	1	11	5			
4	0	0	0	1	0	0	1	2	4	2			
5	1	1	2	3	2	1	1	2	13	6			
6	1	2	0	2	3	1	2	1	12	6			
7	1	2	2	4	4	4	2	2	21	14			
8	2	2	4	5	6	4	3	2	28	27			
9	3	1	2	4	3	5	5	2	25	21			
10	3	2	2	5	3	1	1	1	18	13			
11	2	2	2	3	2	5	2	3	21	14			
12	2	2	2	3	5	3	2	1	20	14			
13	1	1	0	4	4	3	2	1	16	12			
14	0	1	0	2	2	3	1	1	10	5			
15	2	1	2	1	2	1	1	1	11	5			
16	1	0	0	4	0	1	0	0	6	4			
17	1	1	0	1	2	1	0	0	6	2			
18	0	1	1	1	0	0	0	1	4	2	POSSIBLE SOLAR-FLARE EFFECTS BASED ON INSPECTION OF GRAMS ALONE (WITHOUT REFERENCE TO DATA FROM OTHER SOURCES)		
19	1	0	0	1	4	4	2	1	13	9			
20	1	0	2	3	3	4	4	1	18	12			
21	1	1	2	3	3	1	2	0	13	7			
22	1	2	4	4	3	1	2	2	19	12			
23	2	1	4	5	6	5	4	3	30	32			
24	1	1	0	0	1	1	2	1	7	3	BEGIN	END	
25	1	0	0	4	5	4	2	1	17	14	d h m	d h m	
26	1	2	3	4	1	1	1	1	14	8			
27	0	0	1	4	2	2	3	2	14	8			
28	3	2	3	4	4	3	3	1	23	16			
29													
30													
31													

K SCALE USED: LOWER LIMIT FOR K = 9..... CURRENT SCALE VALUE..... LOWER LIMIT FOR K = 9.....	D	H	Z	
	675.7	322.2		(mm)
	3.66	7.72		(γ/mm)
	2470	2490		(to nearest 10γ)

SCALINGS AND COMPUTATIONS HAVE BEEN CHECKED.

APPROVED John B. Townshend, Chief

OBSERVER IN CHARGE

PRINCIPAL MAGNETIC STORMS  
COLLEGE OBSERVATORY, COLLEGE, ALASKA

February 19 91

WDC-A FOR SOLAR-TERRESTRIAL PHYSICS  
ENVIRONMENTAL DATA SERVICE, NOAA  
Boulder, Colorado 80502 U.S.A.

Data from Individual Observatories

Obs. station IATA code	Geomag. Lat.	Commencement		SC - amplitudes			Max. 3 hr - index K		Ranges			UT End day hr		
		day	hr min (UT)	type	D(')	H(Y)	Z(Y)	day	(3 hr - period)	K	D(')		H(Y)	Z(Y)
CO	64°6 N	1	09XX	..				1	4	6	229	760	505	2 02
		8	08XX	..				8	5	6	63	650	415	8 19
		23	06XX	..				23	5	6	93	965	385	23 22

NORMAL MAGNETOGRAPH					
COMPONENT	PERIOD		CALIBRATION		
	FROM	TO	SCALE VALUE	BASILINE	
D	0001 U.T., 2-1-91	2400 U.T., 2-28-91	10' / mm	3.7 γ / mm	26° 34.1' E
H	(SAME)	(SAME)	7.7 γ / mm	12623 γ	
Z	(SAME)	(SAME)	7.8 γ / mm	55213 γ	

STORM MAGNETOGRAPH					
COMPONENT	PERIOD		CALIBRATION		
	FROM	TO	SCALE VALUE	BASILINE	
D	0001 U.T., 2-1-91	2400 U.T., 2-28-91	7.9' / mm	29.4 γ / mm	
H	(SAME)	(SAME)	43.4 γ / mm		
Z	(SAME)	(SAME)	48.9 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
26° 45.5' E	12759 γ	55318 γ

\*COMPUTED FROM FIVE QUIETEST DAYS DURING MONTH.  
 DAYS USED: FEB 4, 16, 17, 18, 24.

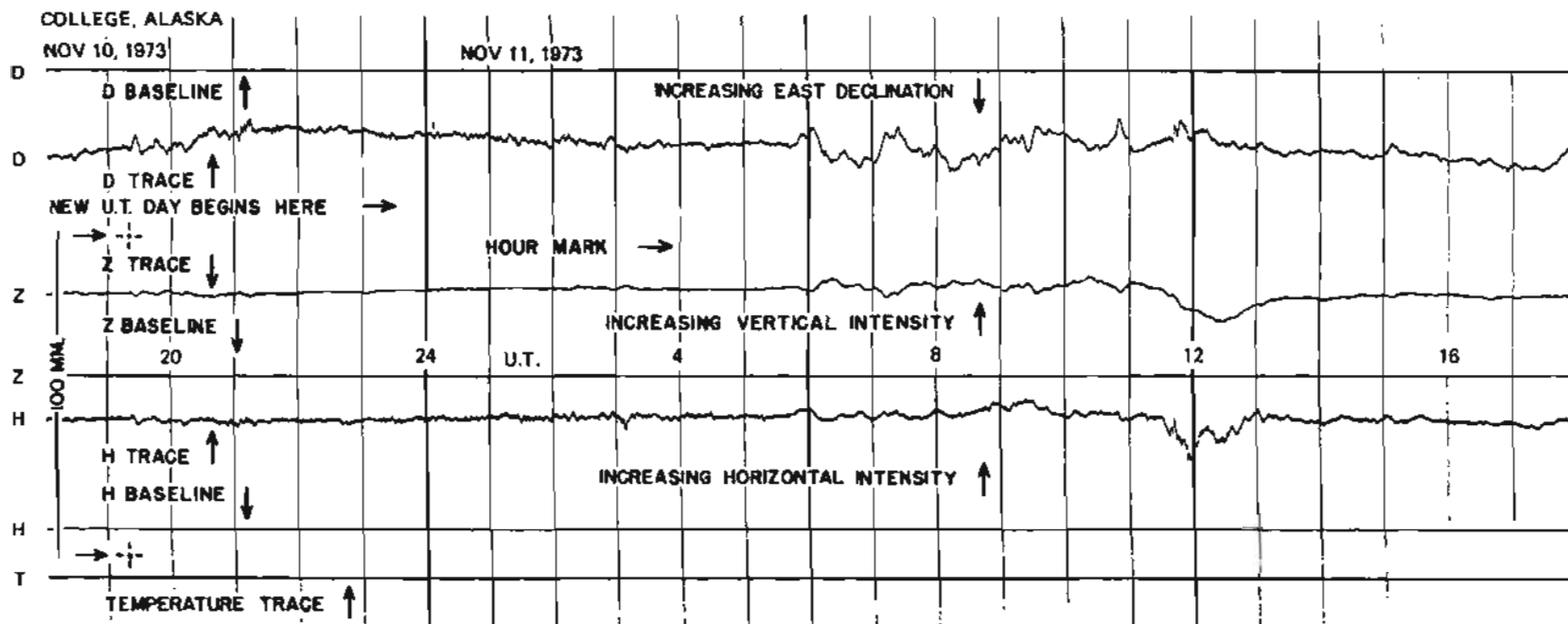
MAGNETOGRAM HOURLY SCALINGS - FIVE QUIETEST DAYS  
(UNIVERSAL TIME)

Values are in tenths of mm and are averages for successive periods of one hour beginning at Midnight. Shrinkage Corrections have been applied. Negative Values in Red with Minus.

COMPONENT	D					H					Z					COMPONENT								
	DAY		17		18		24		16		17		18		24		DAY		HOUR					
	4	2	4	2	4	2	4	2	4	2	4	2	4	2	4	2	16	17	18	24				
01	88	81	77	64	101	167	158	160	154	156	142	138	144	140	139	140	140	140	140	140	140			
02	91	71	50	68	86	159	170	174	165	170	145	135	144	140	150	140	140	140	140	140	140			
03	79	68	40	63	73	172	181	180	172	176	140	140	145	140	141	140	140	140	140	140	140			
04	79	87	42	60	79	183	180	189	181	176	140	140	160	144	150	140	140	140	140	140	140			
05	86	86	56	69	80	189	190	201	190	180	153	138	172	149	150	140	140	140	140	140	140			
06	110	87	73	67	83	189	192	209	204	189	155	144	172	150	150	140	140	140	140	140	140			
07	113	85	102	64	91	188	201	197	206	198	146	143	166	174	152	140	140	140	140	140	140			
08	113	87	113	83	99	187	201	195	218	198	144	161	144	174	150	140	140	140	140	140	140			
09	111	86	109	92	112	181	201	189	210	190	143	154	141	163	151	140	140	140	140	140	140			
10	112	13	109	81	108	180	166	182	199	180	143	86	140	155	138	140	140	140	140	140	140			
11	127	120	112	107	119	180	175	180	199	180	140	123	138	155	134	140	140	140	140	140	140			
12	140	110	109	117	117	180	200	173	190	180	135	149	124	155	132	140	140	140	140	140	140			
13	130	127	126	128	124	189	183	167	189	176	135	146	117	143	124	140	140	140	140	140	140			
14	131	140	116	119	140	182	180	170	191	180	139	126	114	137	112	140	140	140	140	140	140			
15	137	158	147	130	120	180	180	139	188	181	135	115	84	135	108	140	140	140	140	140	140			
16	125	159	170	130	105	179	180	161	190	190	126	124	74	131	116	140	140	140	140	140	140			
17	141	146	172	145	104	182	180	183	185	182	134	128	107	133	134	140	140	140	140	140	140			
18	156	153	179	157	117	180	163	180	171	181	144	126	120	127	134	140	140	140	140	140	140			
19	172	162	209	181	90	168	169	177	170	142	155	121	126	122	117	140	140	140	140	140	140			
20	180	169	191	182	179	155	161	172	170	150	155	113	115	113	110	140	140	140	140	140	140			
21	161	156	193	199	130	150	162	159	163	176	145	113	126	115	127	140	140	140	140	140	140			
22	130	139	150	169	158	158	160	153	142	160	136	122	130	120	140	140	140	140	140	140	140			
23	121	108	115	128	119	170	159	150	132	169	131	131	133	126	145	140	140	140	140	140	140			
24	103	95	81	79	91	170	154	150	130	158	134	142	136	133	150	140	140	140	140	140	140			
DAILY SUM	2936	2699	2842	2684	2625	4218	4251	4192	4309	4218	3395	3158	3172	3374	3254	3374	3374	3374	3374	3374	3374			
DAILY MEAN	122	112	118	112	109	176	177	175	180	176	141	132	132	141	136	141	141	141	141	141	141			
MEAN											177					136								

Scaled 740 Checked CR

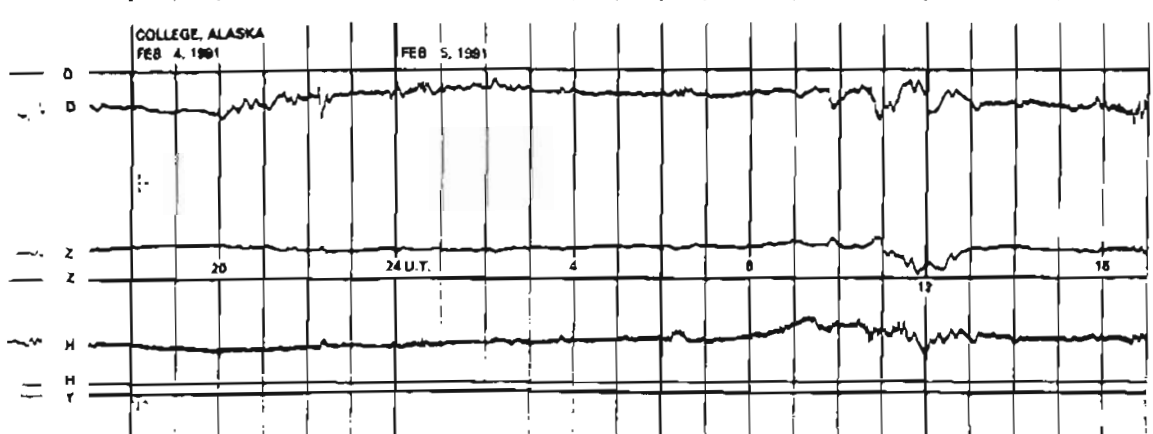
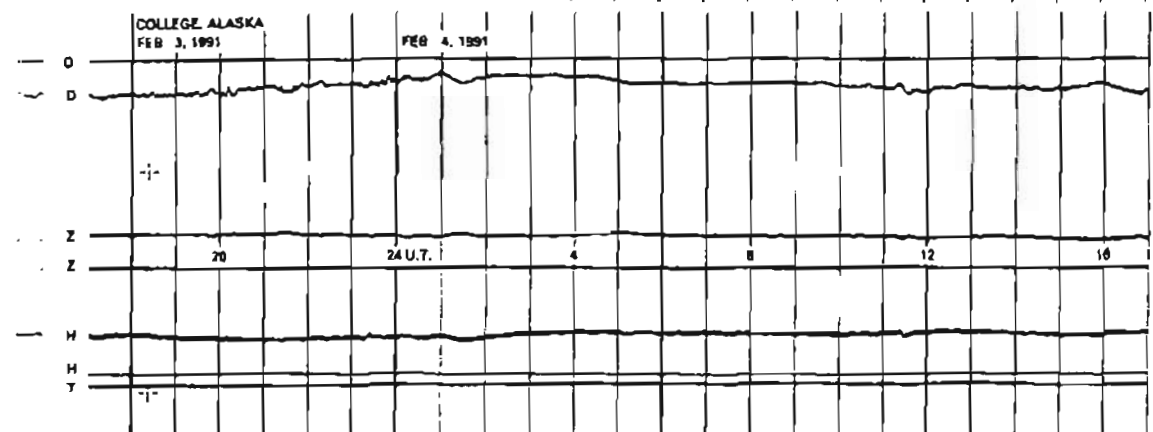
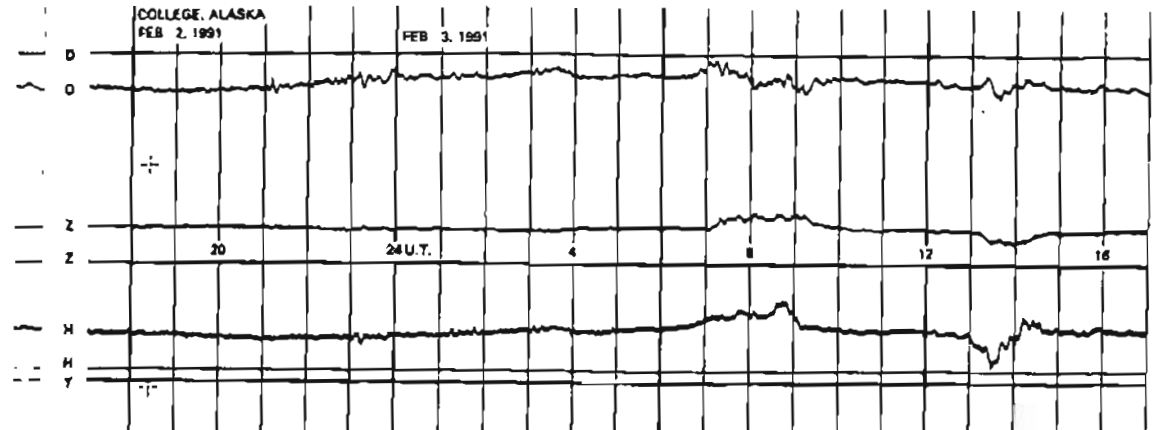
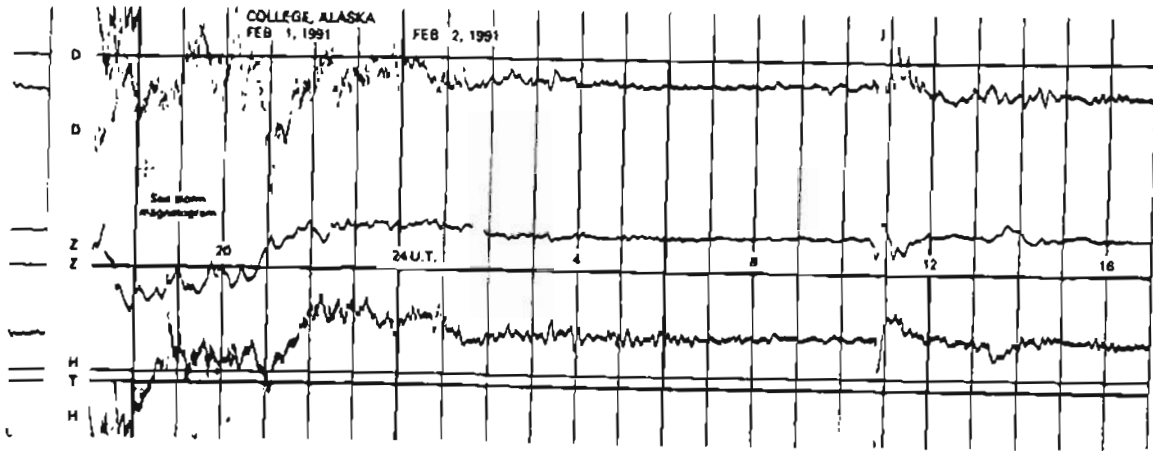
# FORMAT FOR NORMAL & STORM MAGNETOGRAMS (SAMPLE ONLY)



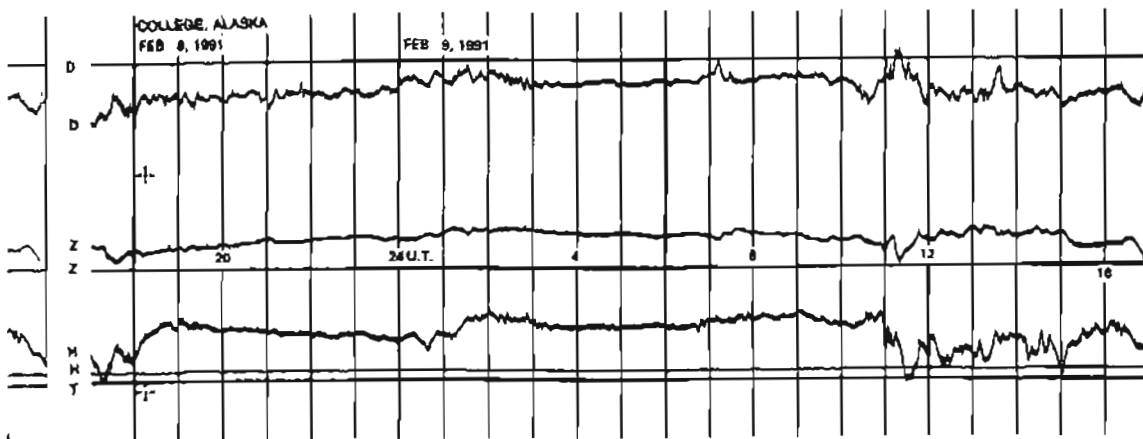
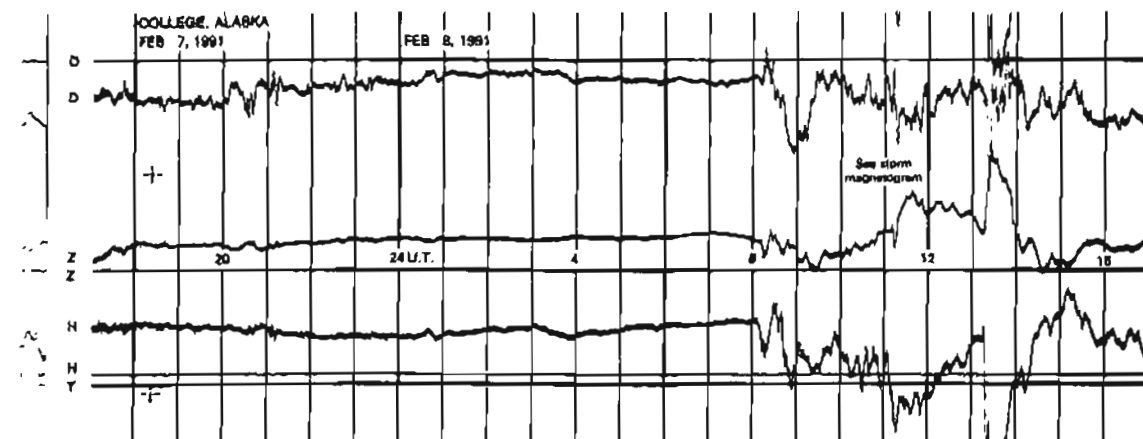
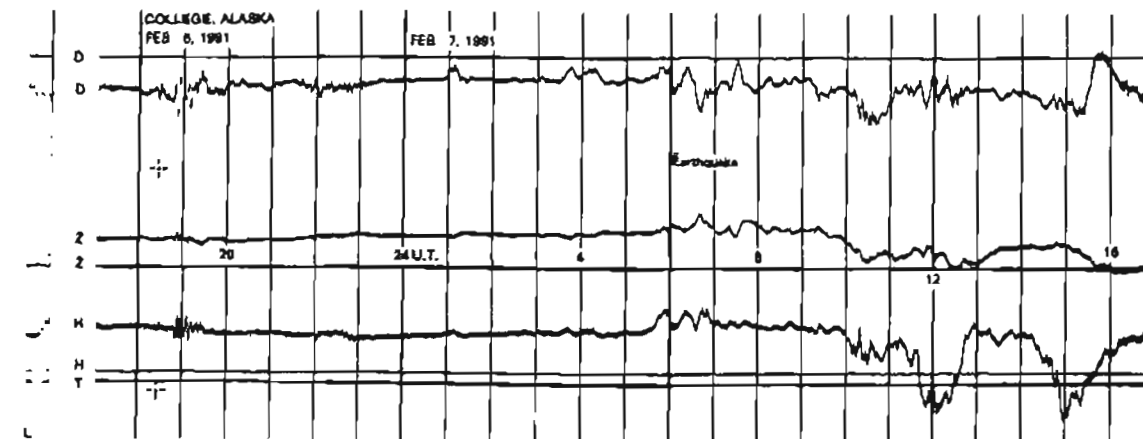
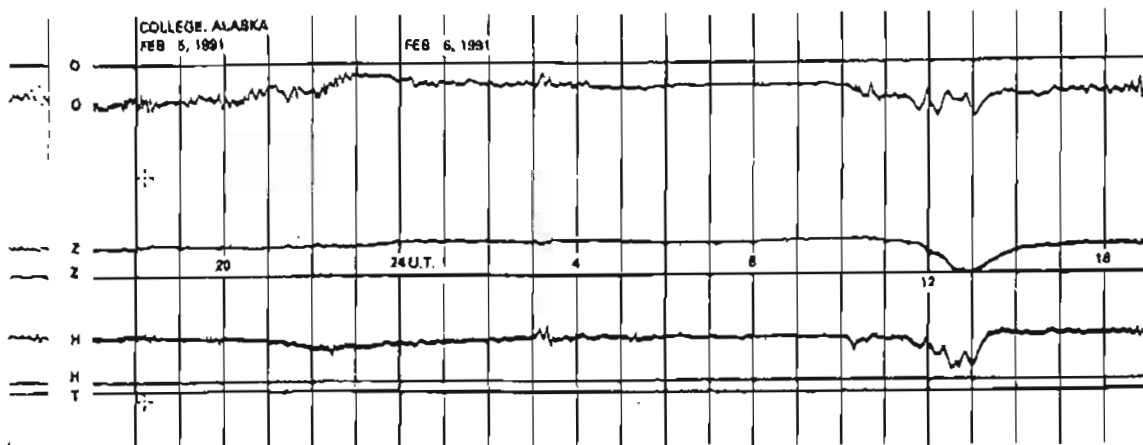
SEE PRELIMINARY CALIBRATION DATA FOR SCALE VALUES & BASELINE VALUES



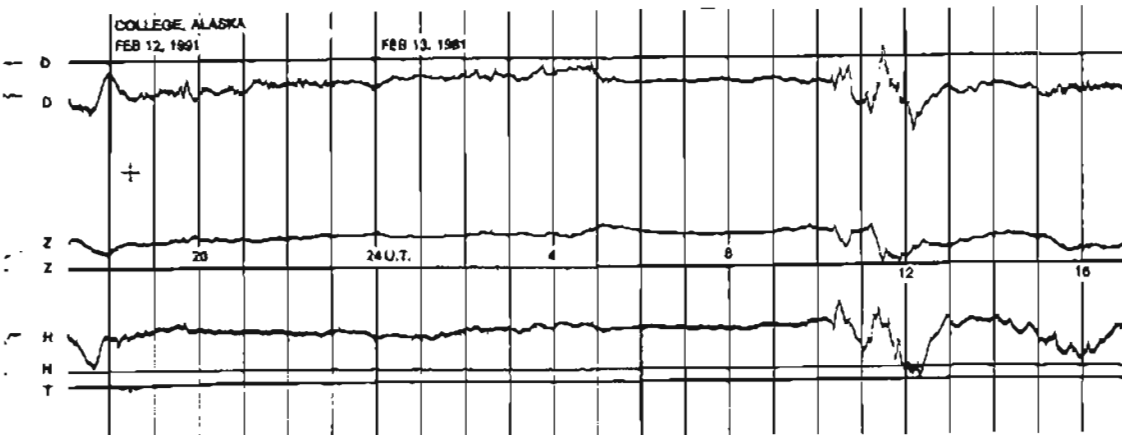
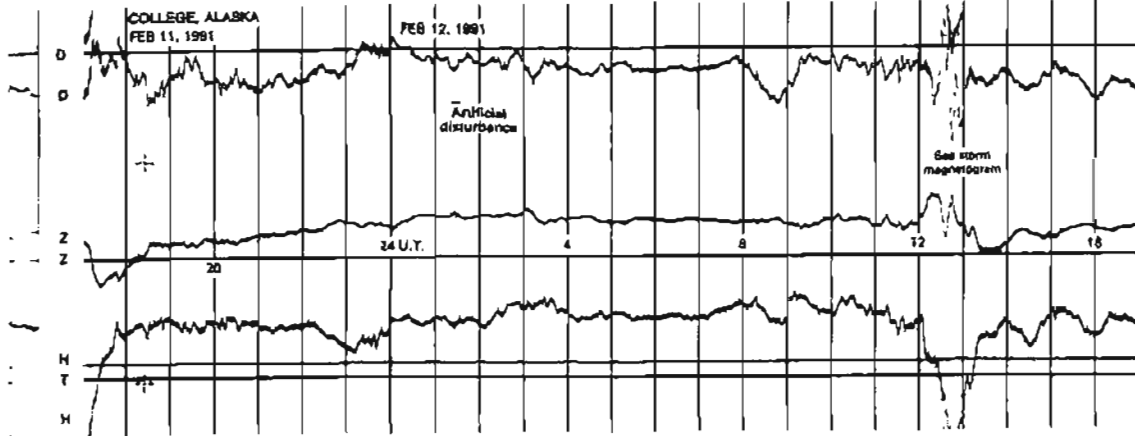
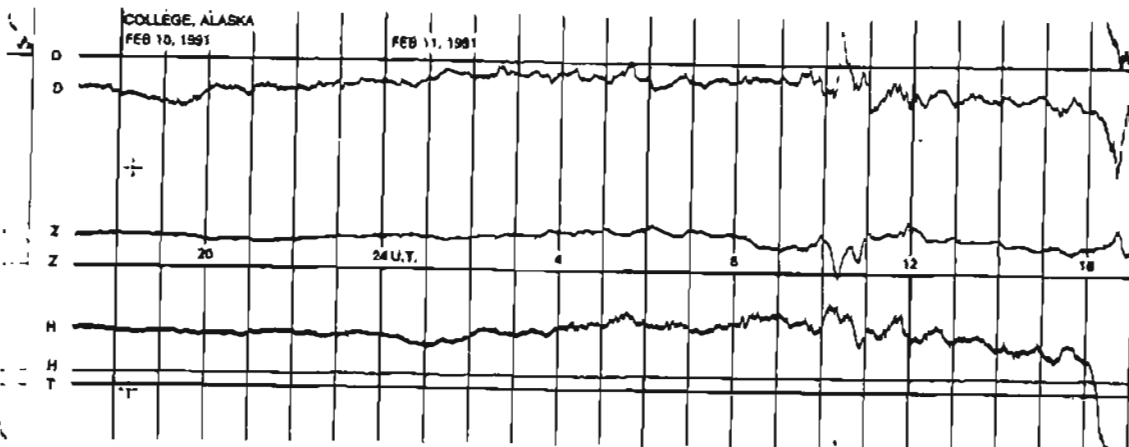
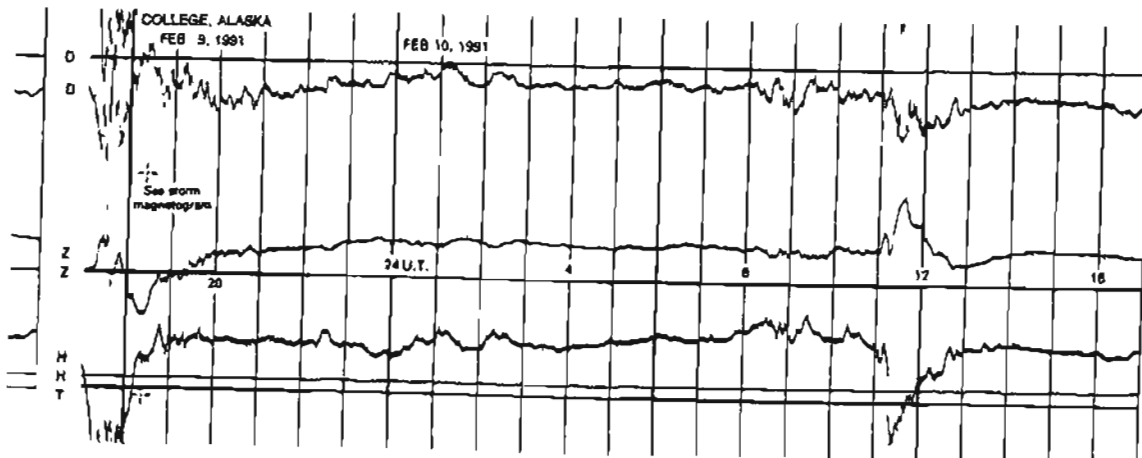
NORMAL MAGNETOGRAMS



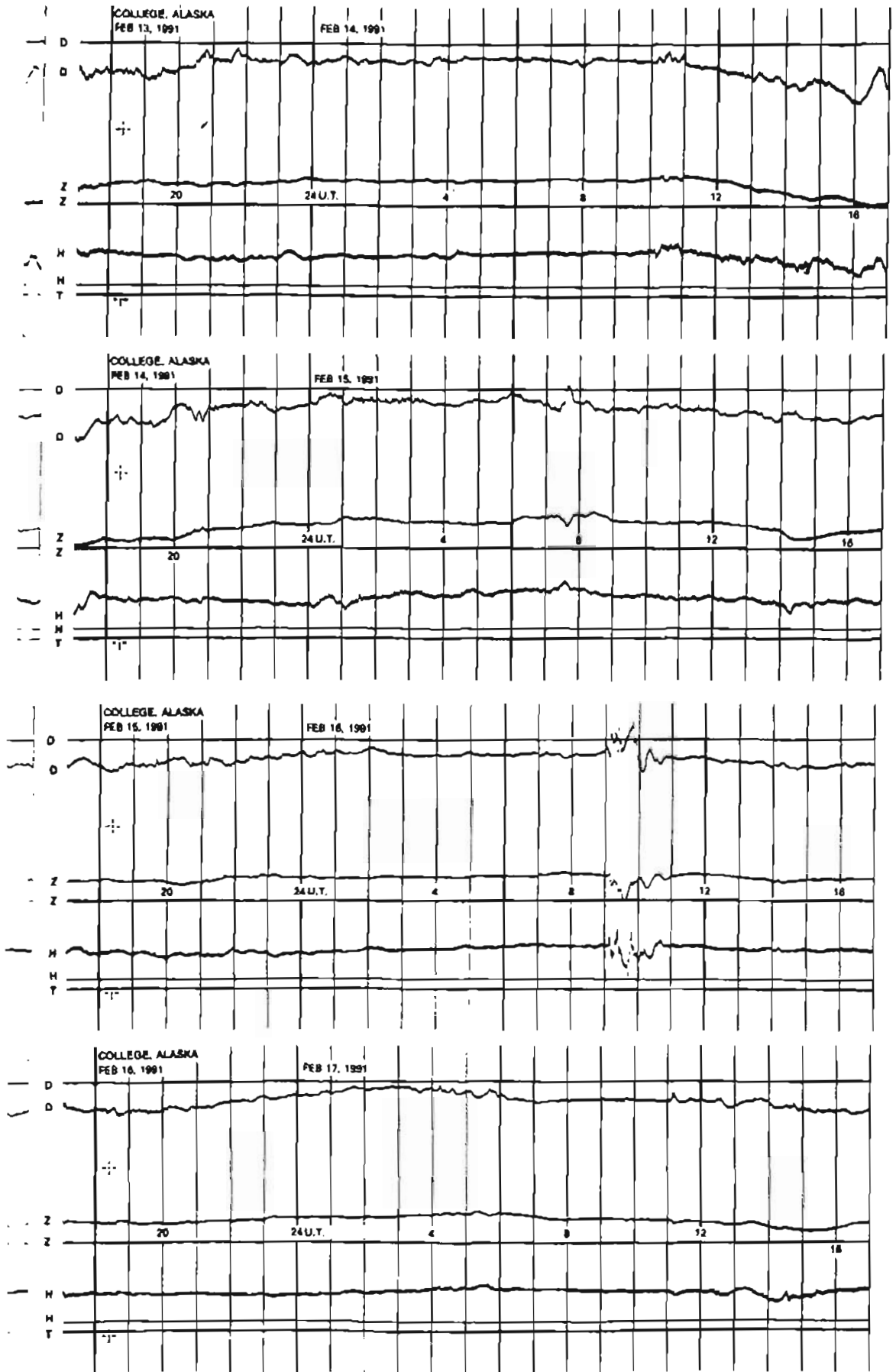
NORMAL MAGNETOGRAMS



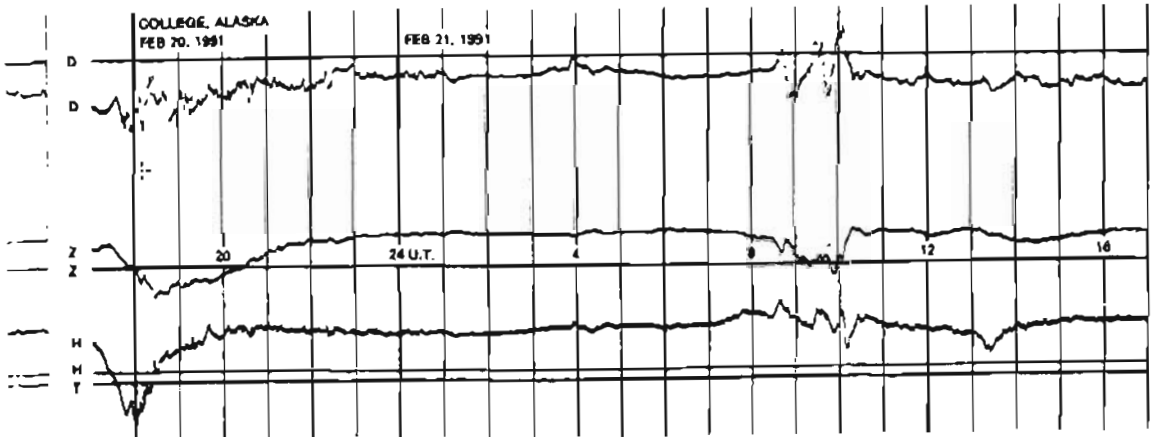
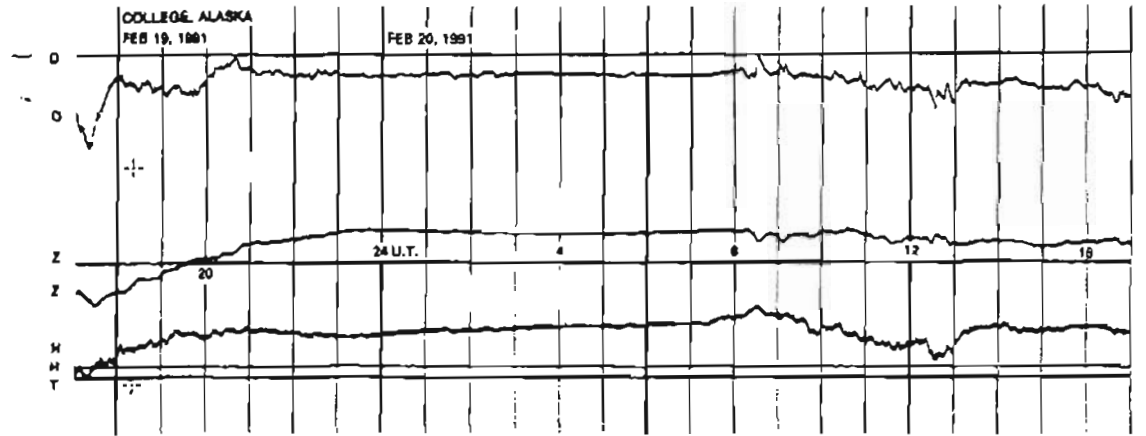
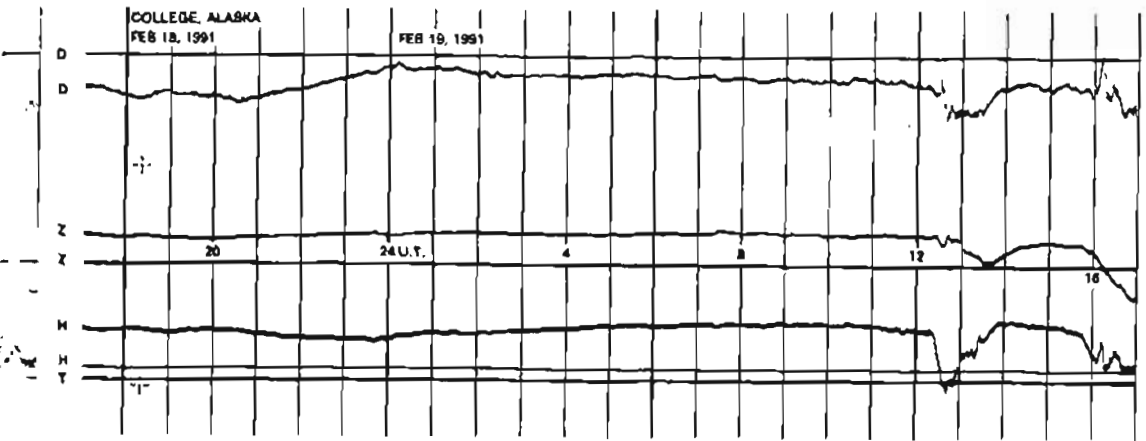
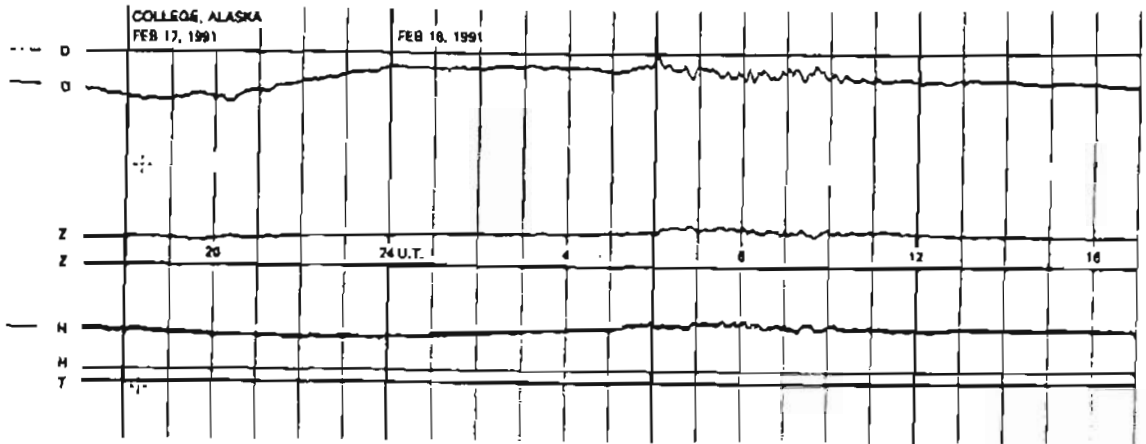
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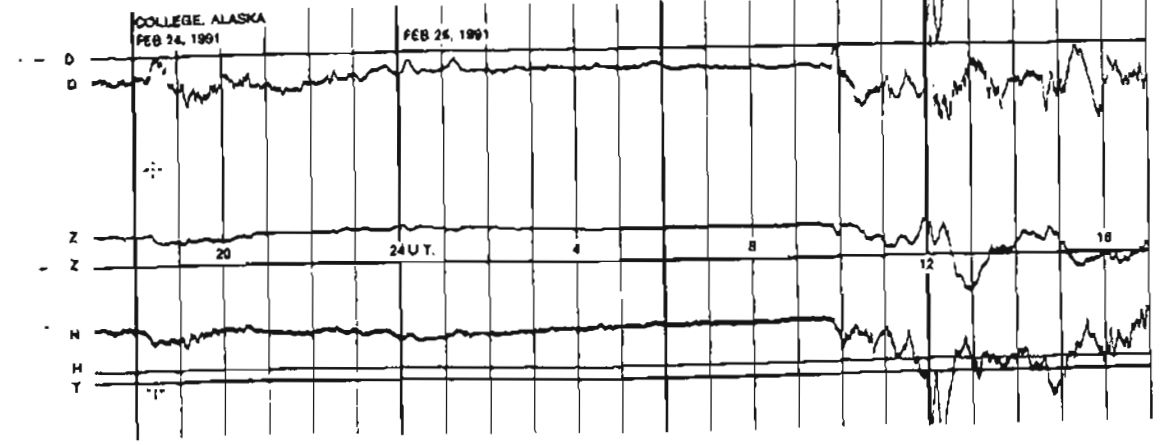
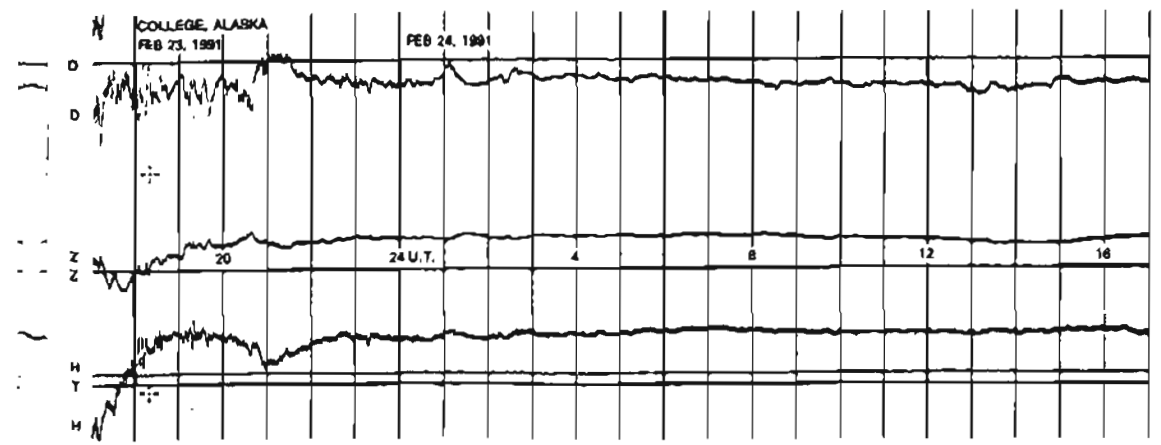
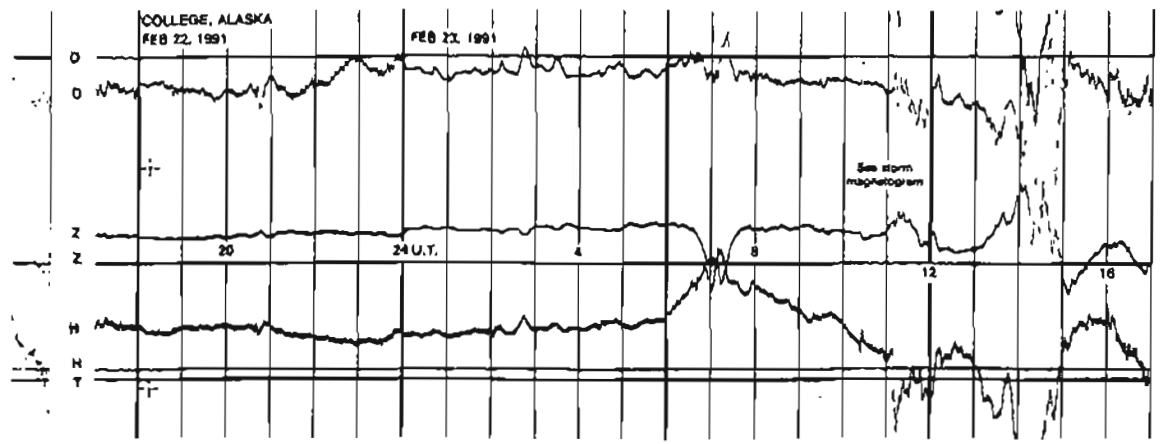
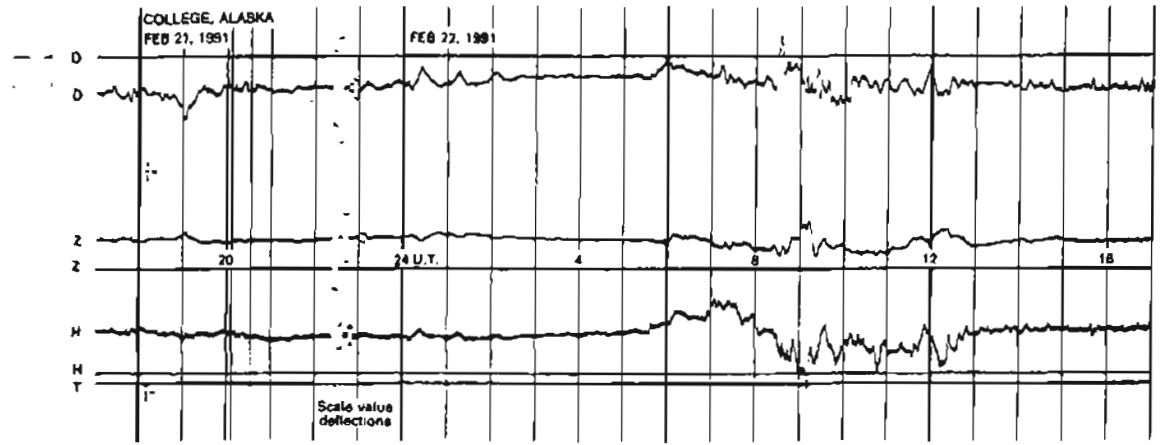
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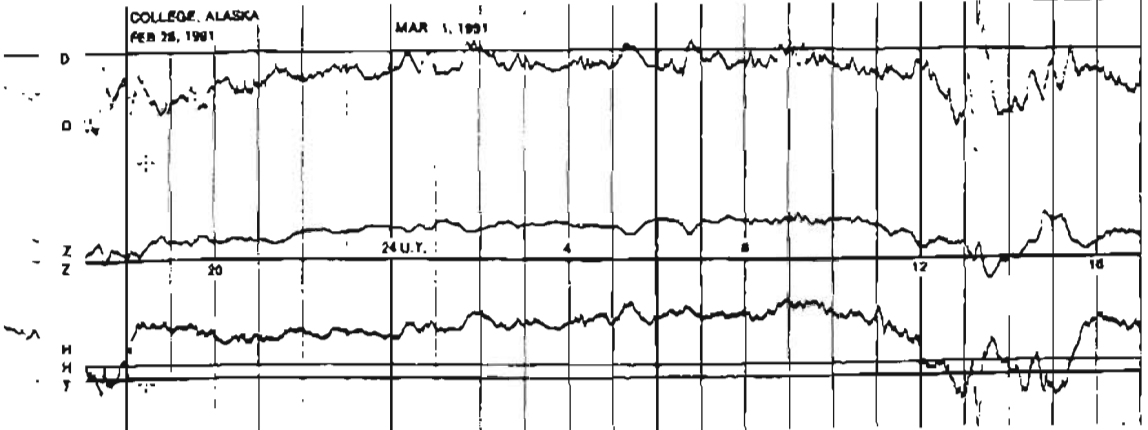
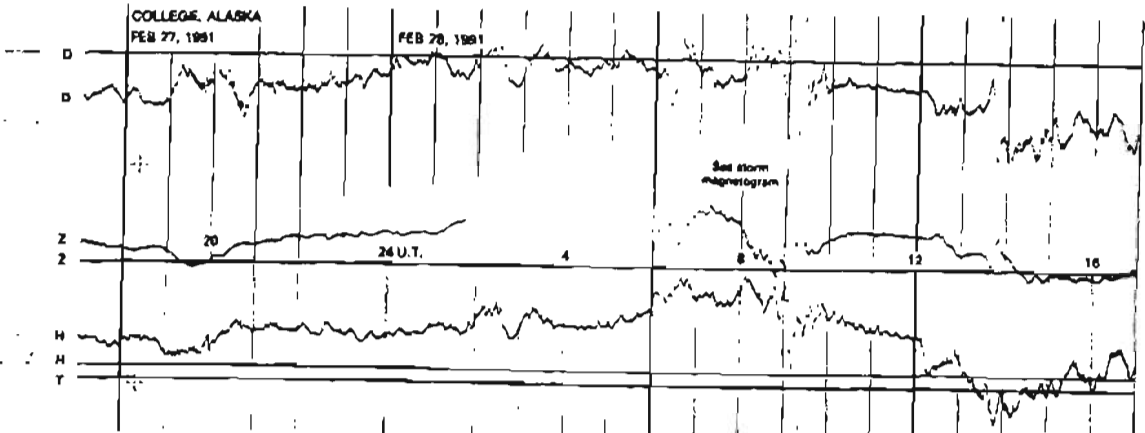
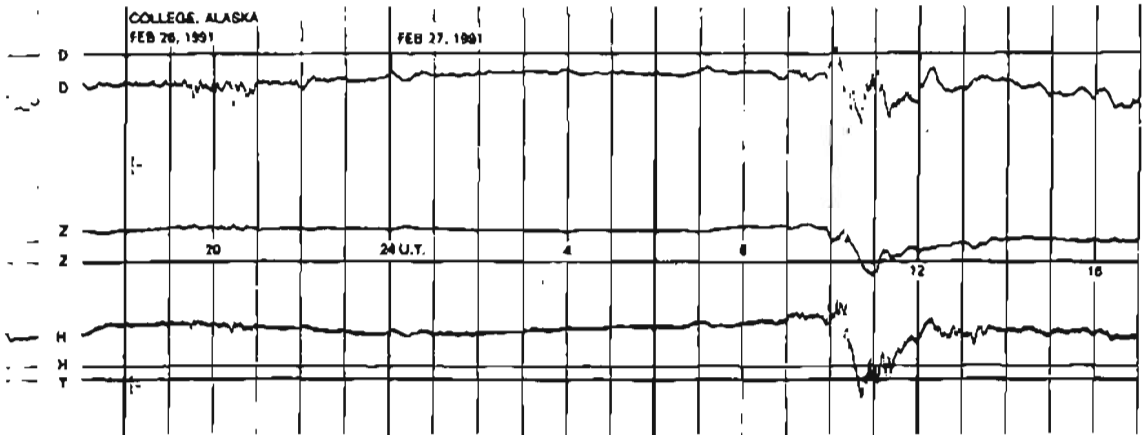
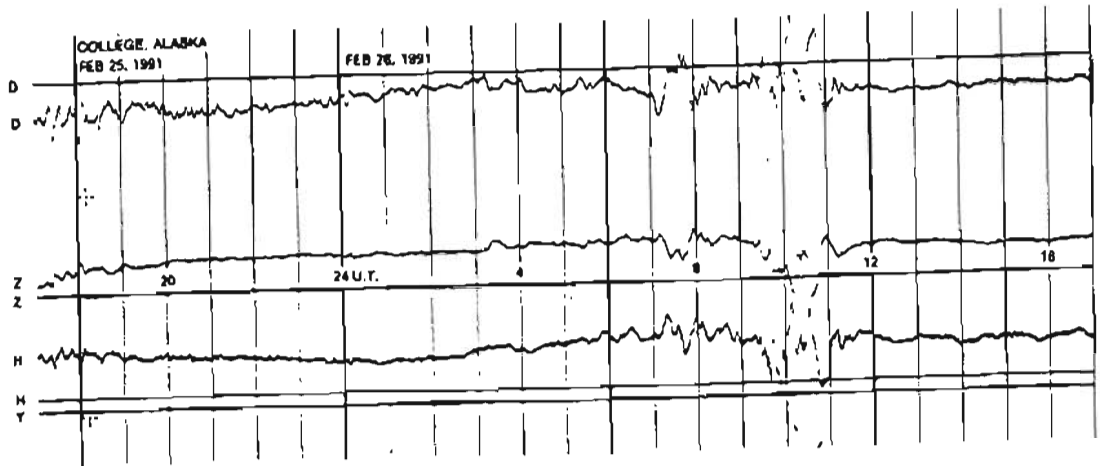
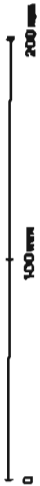
NORMAL MAGNETOGRAMS



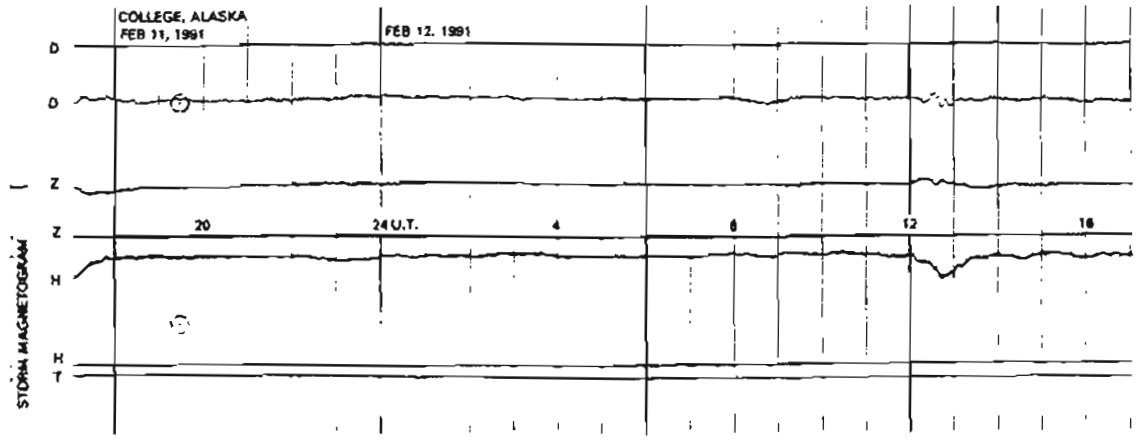
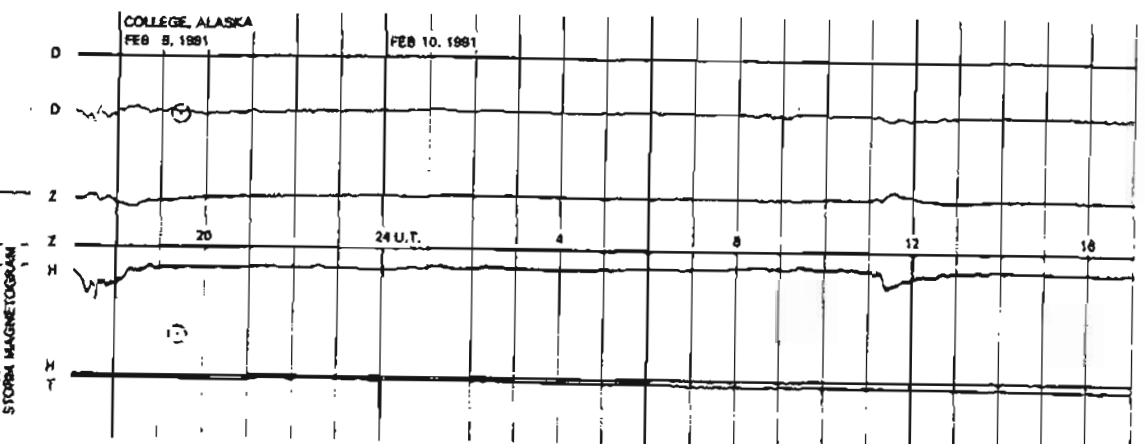
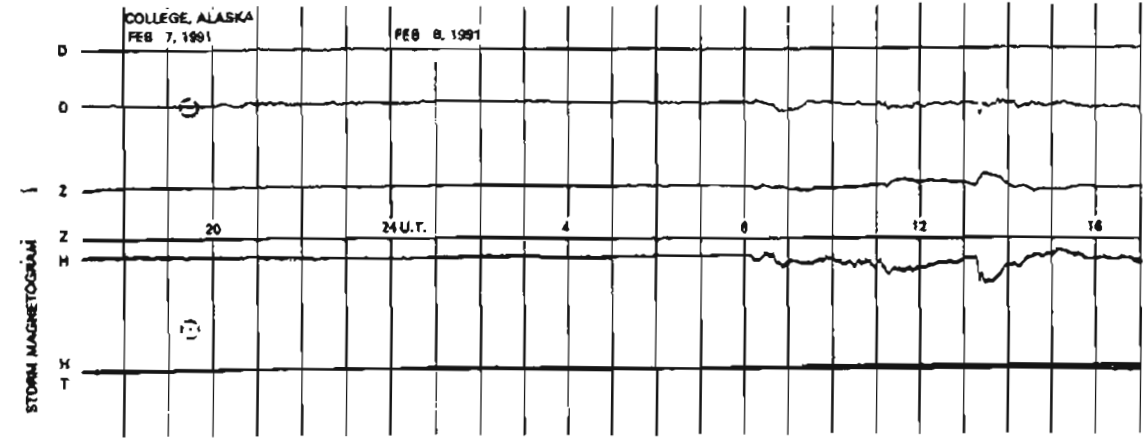
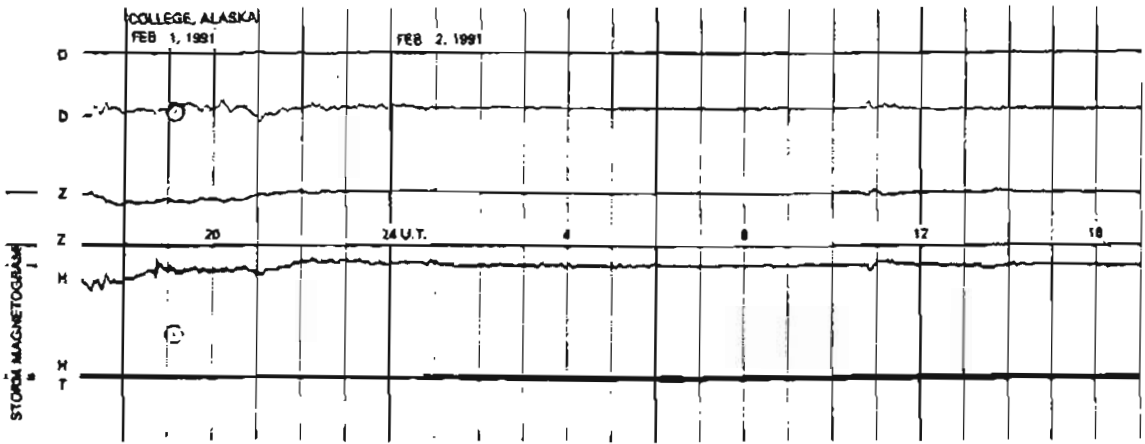
NORMAL MAGNETOGRAMS



NORMAL MAGNETOGRAMS



STORM MAGNETOGRAMS





# STORM MAGNETOGRAMS

