

**UNITED STATES DEPARTMENT OF THE INTERIOR**

**GEOLOGICAL SURVEY**

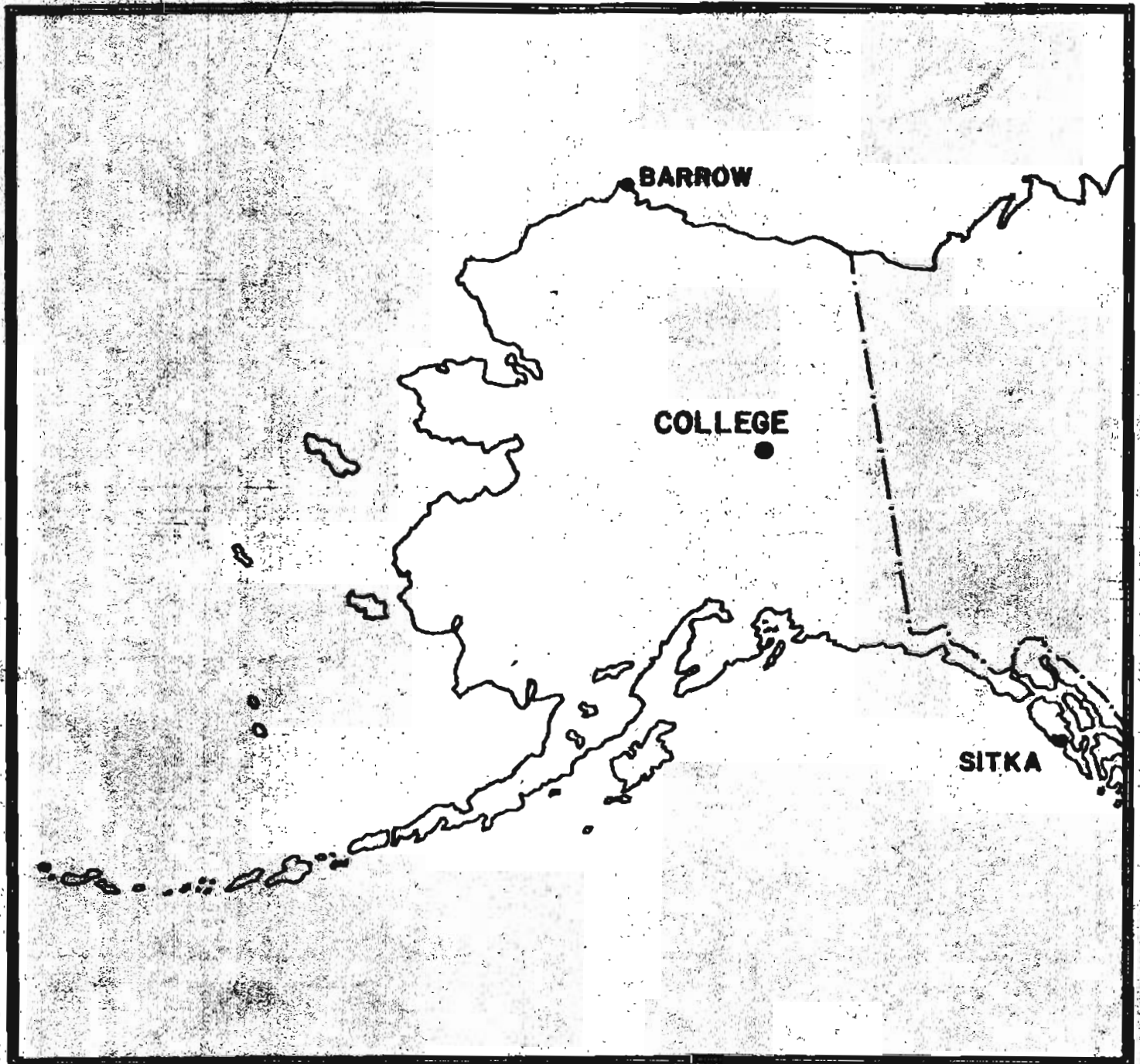
**PRELIMINARY GEOMAGNETIC DATA**

**COLLEGE OBSERVATORY**

**FAIRBANKS, ALASKA**

**JULY 1989**

**OPEN FILE REPORT 89-03006**



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° 51.8'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 10γ 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 < 1650	7	140
1650 < 2500	8	240
2500+	9	400 (10γ)

### Principal Magnetic Storms

Gradual and sudden commencement magnetic disturbances with at least one K-Index of 3 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

JULY, 1989

DATE	K-INDICES									A <sub>k</sub>	TIME SCALE ON MAGNETOGRAMS		
	00-03	03-06	06-09	09-12	12-15	15-18	18-21	21-24	SUM		20 mm/hr		
1	2	1	3	1	2	6	6	4	25	28	SUDDEN COMMENCEMENTS		
2	3	3	2	2	0	0	1	1	12	06	d	h	m
3	1	1	0	0	0	1	1	0	4	02	1	07	17
4	1	0	0	0	0	0	0	0	1	00	17	01	54
5	2	1	1	4	3	3	3	3	20	13			
6	3	3	3	4	4	4	3	2	26	19			
7	2	3	4	2	2	1	2	1	17	10			
8	0	0	0	1	0	1	1	0	3	01			
9	3	3	0	1	1	1	1	1	11	06			
10	2	4	3	4	4	3	3	1	24	17			
11	2	1	0	1	1	2	0	1	8	03			
12	0	0	0	0	0	0	0	1	1	00			
13	2	3	4	1	3	1	1	0	15	09			
14	1	3	1	3	1	1	1	1	12	06			
15	1	2	2	3	1	2	2	1	14	07			
16	0	1	0	0	0	0	0	0	1	00			
17	4	3	4	2	5	3	3	2	26	20			
18	4	6	3	4	3	5	2	1	28	28			
19	2	2	2	0	3	0	1	1	11	05	POSSIBLE SOLAR-FLARE EFFECTS BASED ON INSPECTION OF GRAMS ALONE (WITHOUT REFERENCE TO DATA FROM OTHER SOURCES)		
20	1	2	1	0	0	1	1	1	7	03			
21	2	3	3	3	1	1	1	1	15	08			
22	1	1	2	2	3	3	1	2	15	08			
23	4	4	3	3	2	2	2	1	21	14			
24	2	2	3	4	2	2	2	2	19	11	BEGIN	END	
25	3	3	2	1	1	1	1	1	13	07	d	h	m
26	3	2	4	5	6	3	2	2	27	26	d	b	m
27	2	3	3	2	2	3	1	2	18	10			
28	3	3	2	1	2	2	2	2	17	09			
29	2	2	1	2	4	2	2	2	17	09			
30	2	2	2	2	1	1	1	1	12	05			
31	2	1	2	1	1	0	1	1	9	04			

K SCALE USED: LOWER LIMIT FOR K = 9..... CURRENT SCALE VALUE..... LOWER LIMIT FOR K = 9.....	D	H	Z	
	675.7	322.2		(mm)
	3.69	7.77		(γ/mm)
	2490	2500		(to nearest 10γ)

SCALINGS AND COMPUTATIONS HAVE BEEN CHECKED.

APPROVED

John B. Townshend, Chief

OBSERVER IN CHARGE

NOAA FORM 86-500  
(11/73)

PRINCIPAL MAGNETIC STORMS  
COLLEGE OBSERVATORY, COLLEGE, ALASKA

WDC-A FOR SOLAR-TERRRESTRIAL PHYSICS  
ENVIRONMENTAL DATA SERVICE, NOAA  
BOULDER, COLORADO 80502 U.S.A.

Data from Individual Observatories:

JULY 19 89

Obs. 2 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	1	0717	SC	-7	+101	-34	1	6,7	6	104	1125	300	2	02
		17	0154	SC*	-15	+208	-52	18	2	6	162	1045	600	18	17

NORMAL MAGNETOGRAPH					
COMPONENT	PERIOD		CALIBRATION		
	FROM	TO	SCALE VALUE		BASELINE
D	0001 UT, 7-1-89	2400 UT, 7-31-89	1.0' /mm	3.7 γ/mm	26° 51.1' E
H	0001 UT, 7-1-89	2400 UT, 7-5-89	7.8 γ/mm		12639 γ
	0001 UT, 7-6-89	2400 UT, 7-19-89	(SAME)		12644 γ
	0001 UT, 7-20-89	2400 UT, 7-31-89	(SAME)		12642 γ
Z	0001 UT, 7-1-89	2400 UT, 7-14-89	7.7 γ/mm		55196 γ
	0001 UT, 7-15-89	2400 UT, 7-31-89	(SAME)		55200 γ

STORM MAGNETOGRAPH					
COMPONENT	PERIOD		CALIBRATION		
	FROM	TO	SCALE VALUE		BASELINE
D	0001 UT, 7-1-89	2400 UT, 7-31-89	7.9' /mm	29.4 γ/mm	
H	(SAME)	(SAME)	43.5 γ/mm		
Z	(SAME)	(SAME)	49.0 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° 02.1' E	12798 γ	55340 γ

\* COMPUTED FROM FIVE QUIETEST DAYS DURING MONTH.

DAYS USED: JULY 3, 4, 8, 12, 16

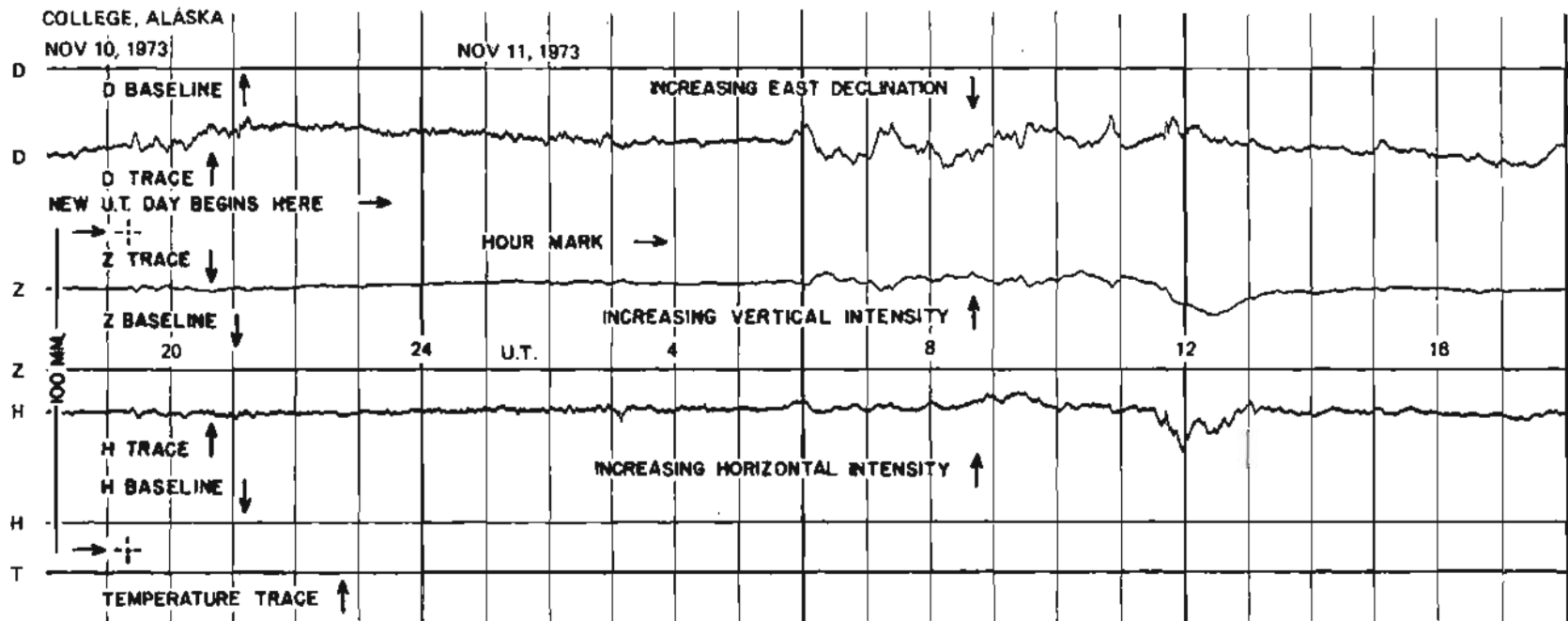
MAGNETOGRAM HOURLY SCALINGS - FIVE QUIETEST DAYS  
(UNIVERSAL TIME)

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		3	4	8	12	16	3	4	8	12	16	3	4	8	12	16	3	4	8	12	16	DAY																		
Hr		02	00	01	00	00	02	00	01	00	00	02	00	01	00	00	02	00	01	00	00	Hr																		
HOURL		01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24															
		10	-39	40	9	1	196	160	175	160	160	204	191	185	181	187	204	191	185	181	187																			
		-1	-23	41	17	26	210	182	179	176	180	205	198	190	184	187	205	198	190	184	187																			
		12	-8	51	41	51	217	211	190	192	192	202	204	191	186	197	202	204	191	186	197																			
		40	40	60	64	73	222	200	200	206	201	203	209	189	186	198	203	209	189	186	198																			
		91	72	71	78	87	211	208	206	210	222	221	200	189	189	200	221	200	189	189	200																			
		113	91	73	86	101	206	210	210	210	205	221	195	189	202	202	221	195	189	189	202																			
		112	102	96	97	99	201	210	217	209	208	210	196	195	190	185	210	196	195	190	185																			
		112	102	97	100	100	207	210	220	210	220	204	196	197	188	187	204	196	197	188	187																			
		100	98	88	91	98	219	209	230	210	217	198	190	200	182	189	198	190	200	182	189																			
		100	97	99	88	80	209	210	225	218	218	198	191	202	180	181	198	191	202	180	181																			
		92	90	94	81	76	206	212	222	228	218	196	190	191	180	180	196	190	191	180	180																			
		94	50	84	81	85	202	217	219	230	220	195	190	195	179	182	195	190	195	179	182																			
		101	91	101	91	98	200	221	218	229	230	192	190	200	184	177	192	190	200	184	177																			
		126	101	125	119	116	190	220	221	230	230	191	190	200	190	162	191	190	200	190	162																			
		140	119	128	157	132	179	210	224	224	239	169	179	197	191	173	169	179	197	191	173																			
		182	180	180	211	189	205	237	210	210	230	165	180	179	189	174	165	180	179	189	174																			
		222	215	229	260	240	210	243	220	210	259	173	183	198	180	173	173	183	198	180	173																			
		251	222	243	232	258	197	240	217	208	239	173	185	200	180	174	173	185	200	180	174																			
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		170	155	188	160	183	170	170	170	160	179	142	171	174	154	173	142	171	174	154	173																			
		119	80	120	106	140	159	157	160	158	174	149	162	174	160	163	149	162	174	160	163																			
		58	22	51	58	90	136	149	151	151	166	169	167	176	157	157	169	167	176	161	157																			
		-1	-10	11	13	49	139	143	157	160	175	177	178	173	150	150	177	178	173	163	150																			
DAILY SUM		2718	2290	2744	2743	2861	4664	4836	4822	4772	4980	4482	4502	4580	4289	4302	4482	4502	4580	4289	4302																			
DAILY MEAN		113	95	114	114	119	194	202	201	199	208	187	188	191	179	179	187	188	191	179	179																			
MEAN		111																								201					185									

Scaled MM Checked CAJ

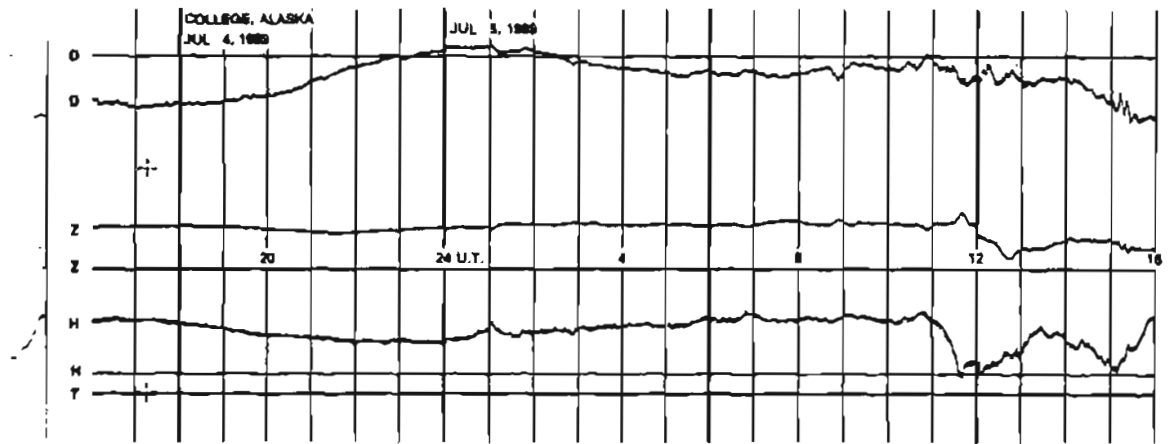
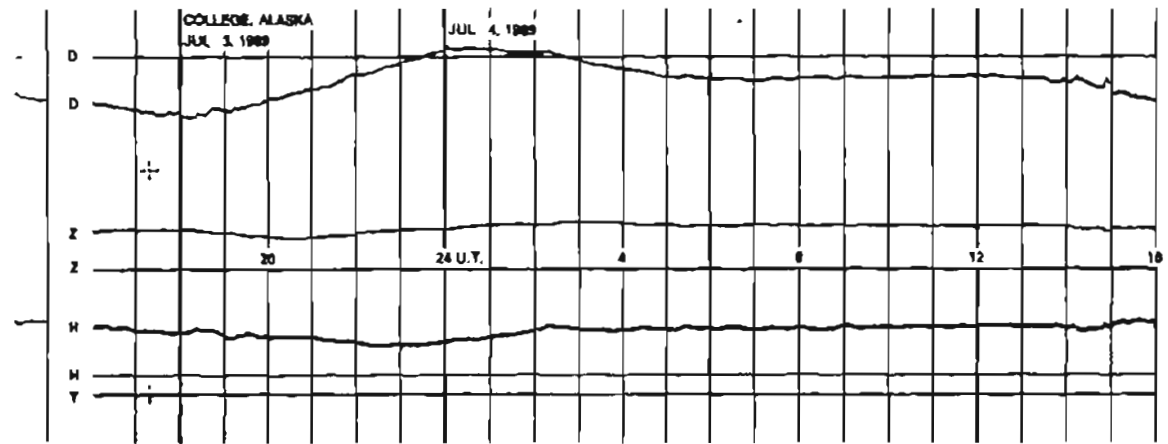
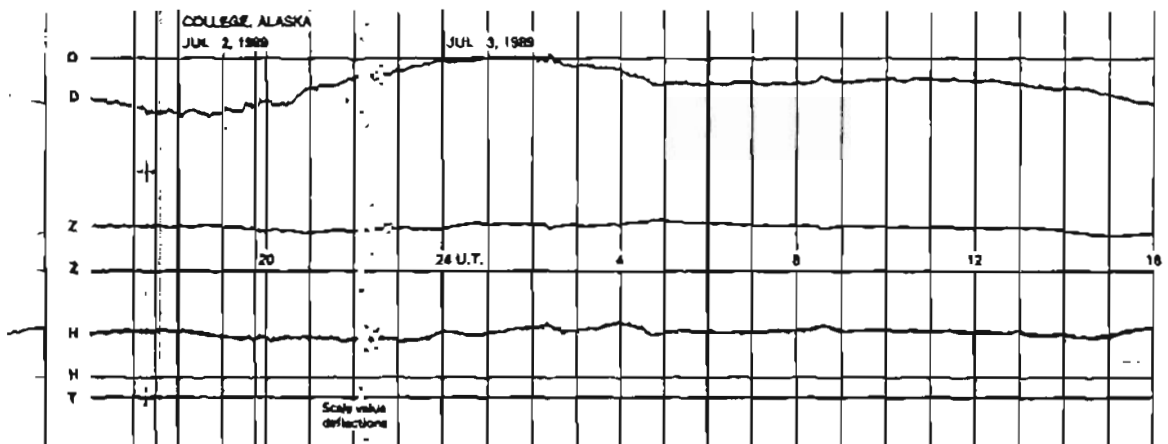
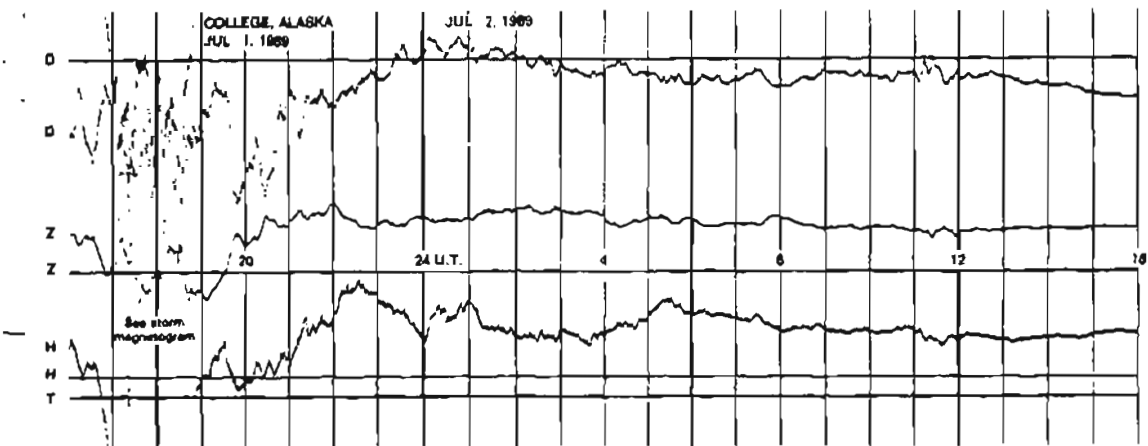
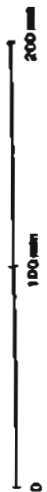
# FORMAT FOR NORMAL & STORM MAGNETOGRAMS (SAMPLE ONLY)



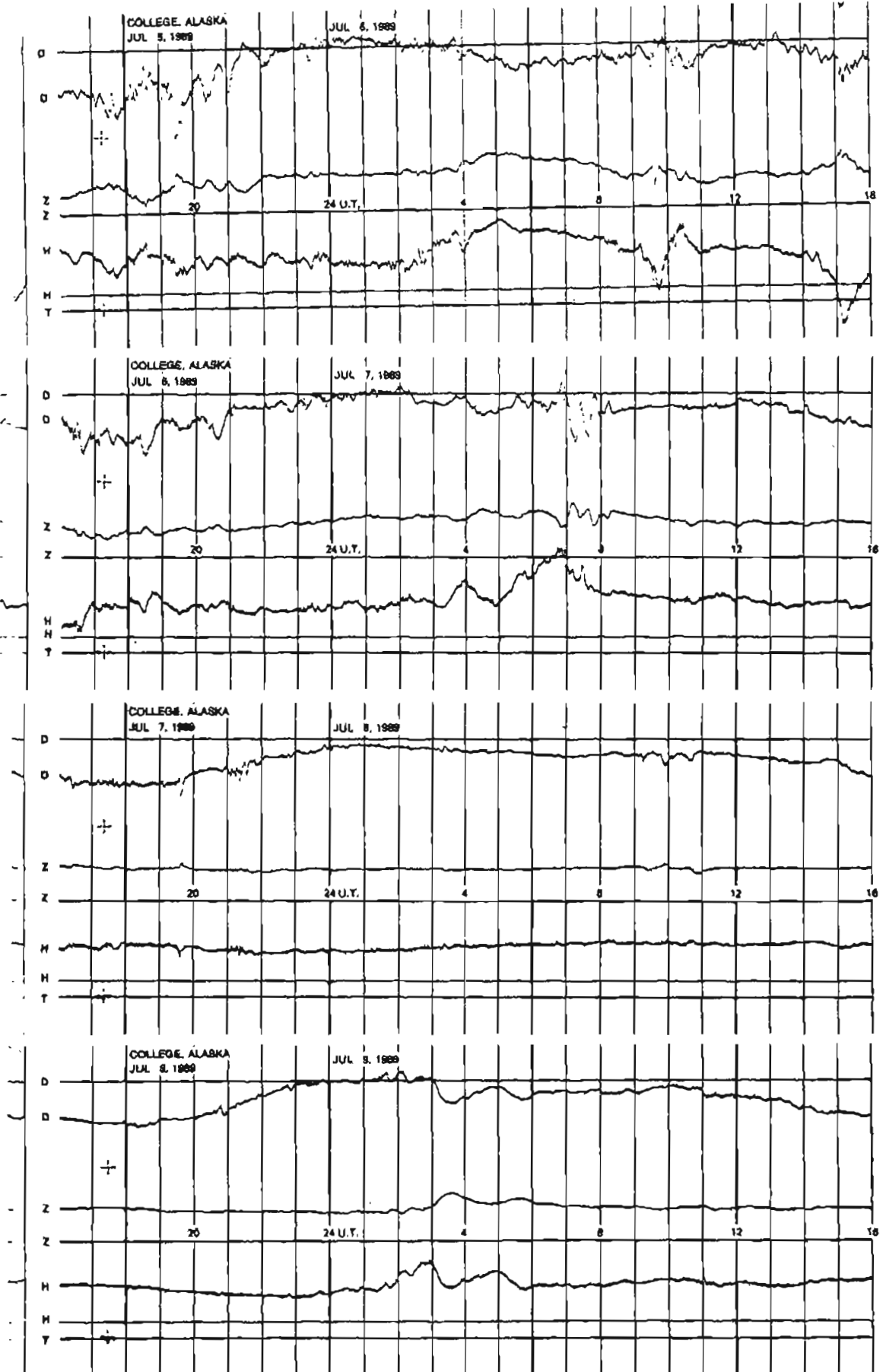
SEE PRELIMINARY CALIBRATION DATA FOR SCALE VALUES & BASELINE VALUES



NORMAL MAGNETOGRAMS

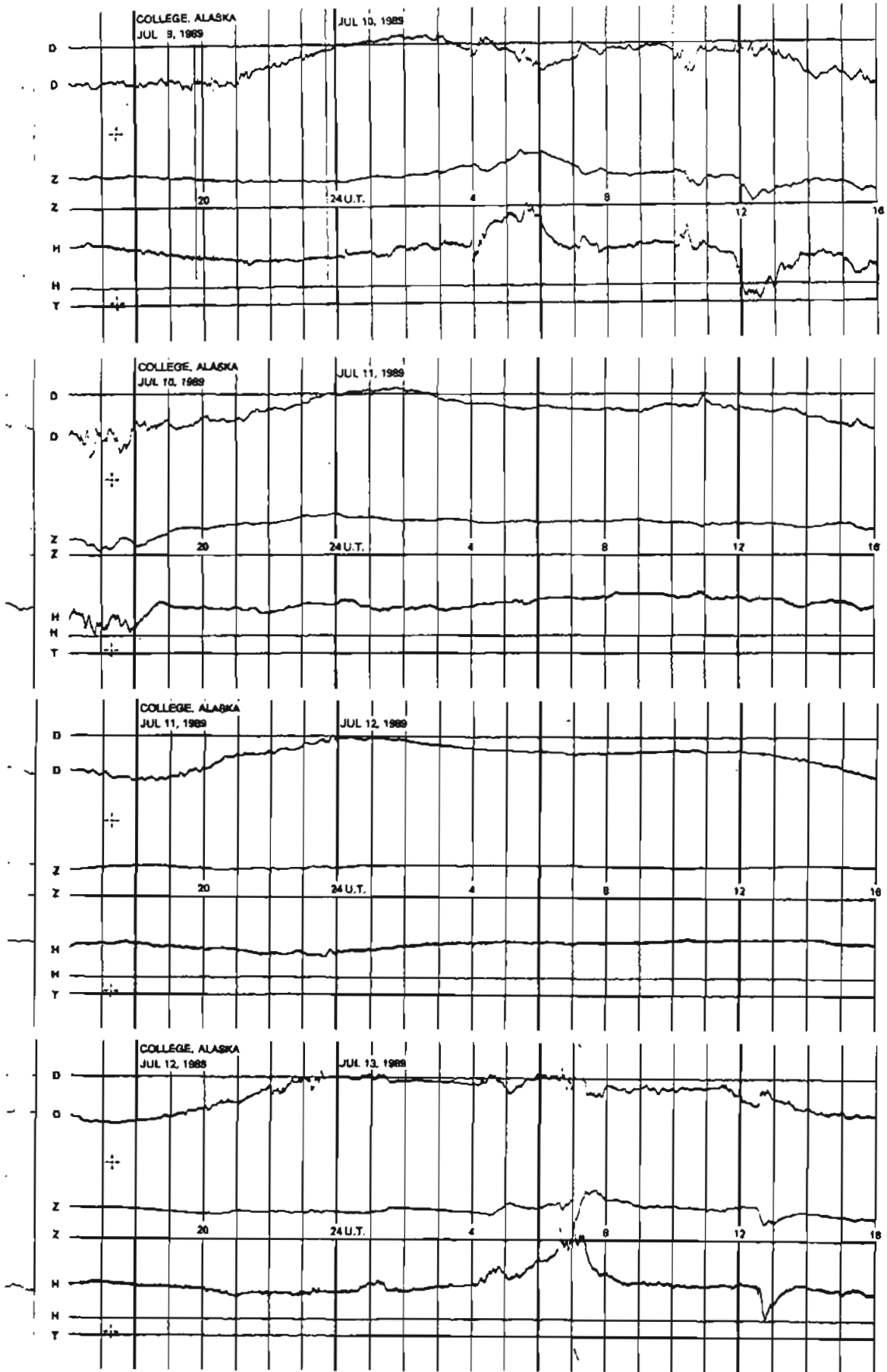


NORMAL MAGNETOGRAMS

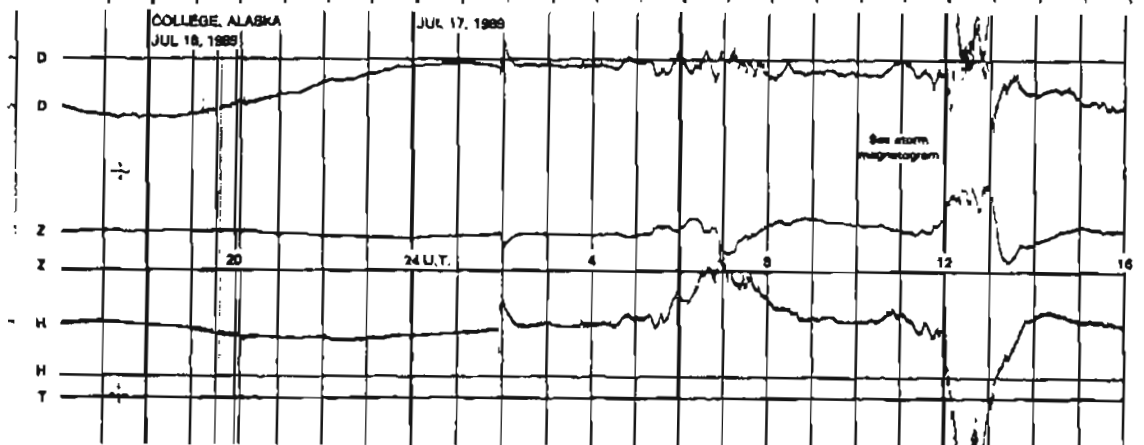
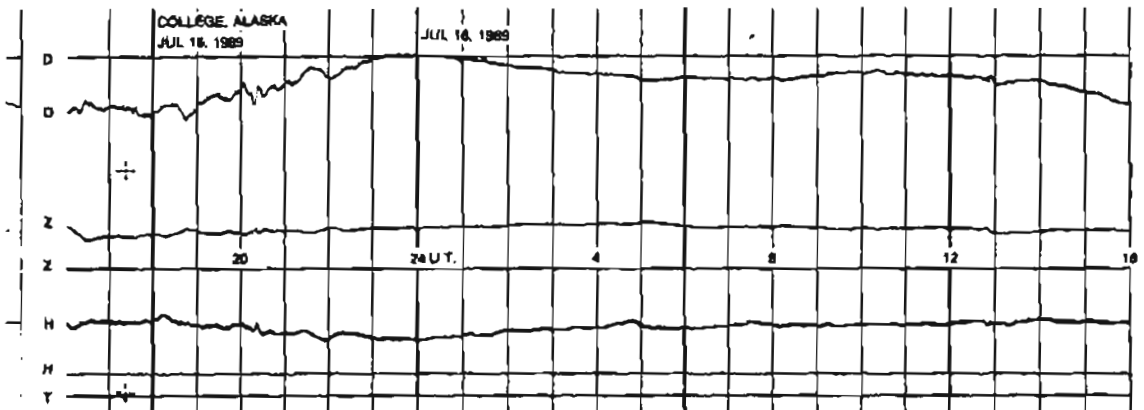
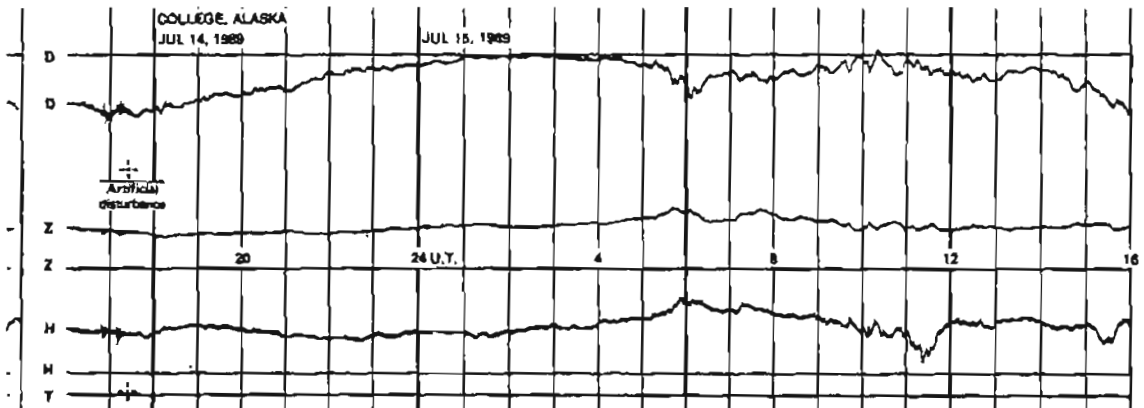
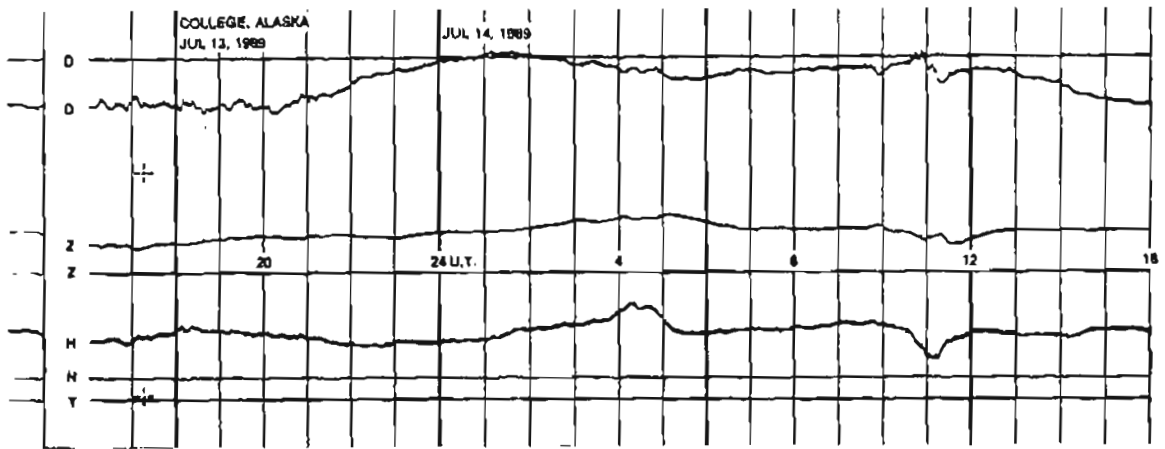


NORMAL MAGNETOGRAMS

200 mm  
100 mm  
0

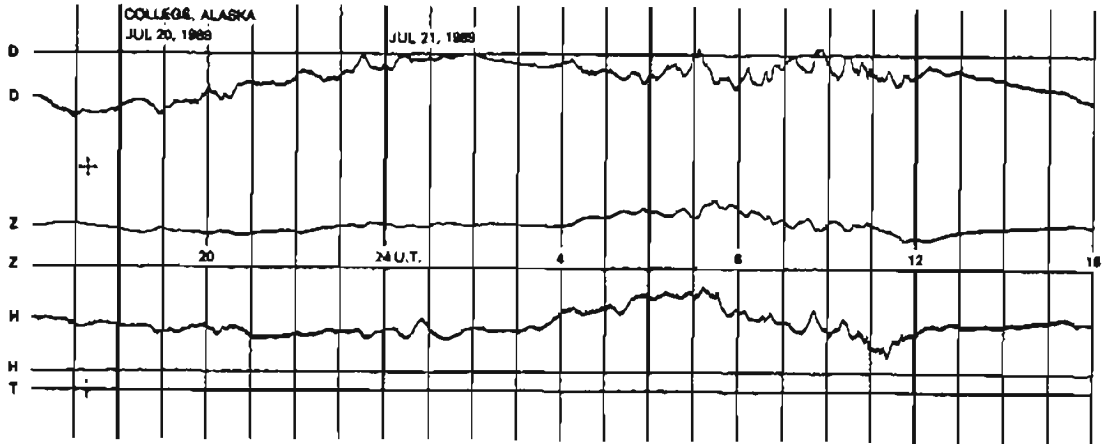
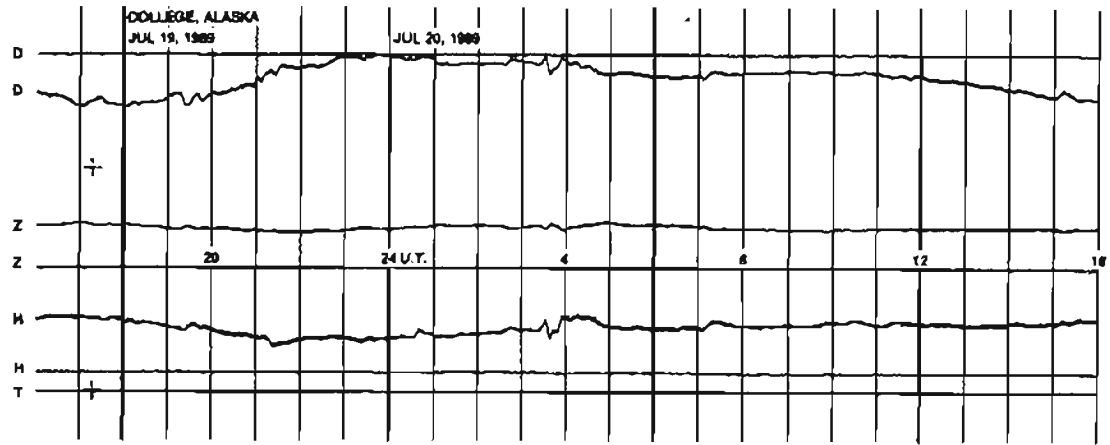
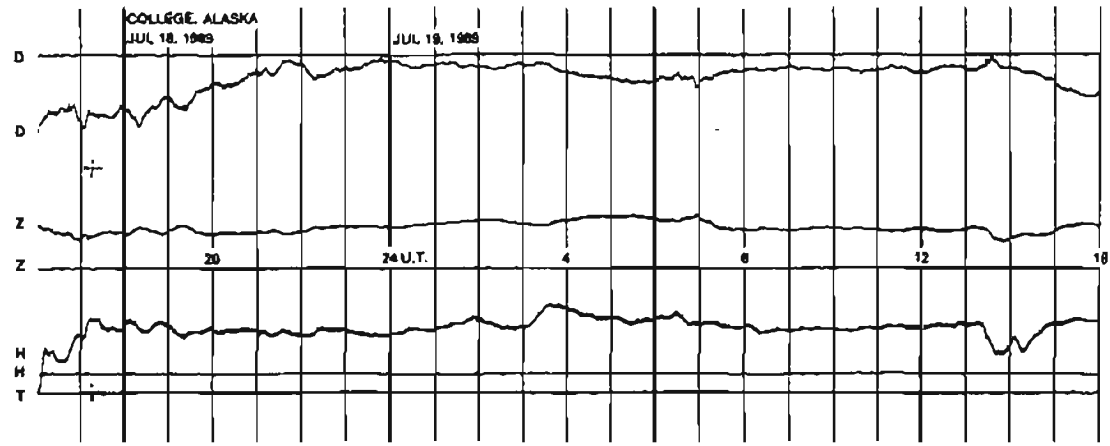
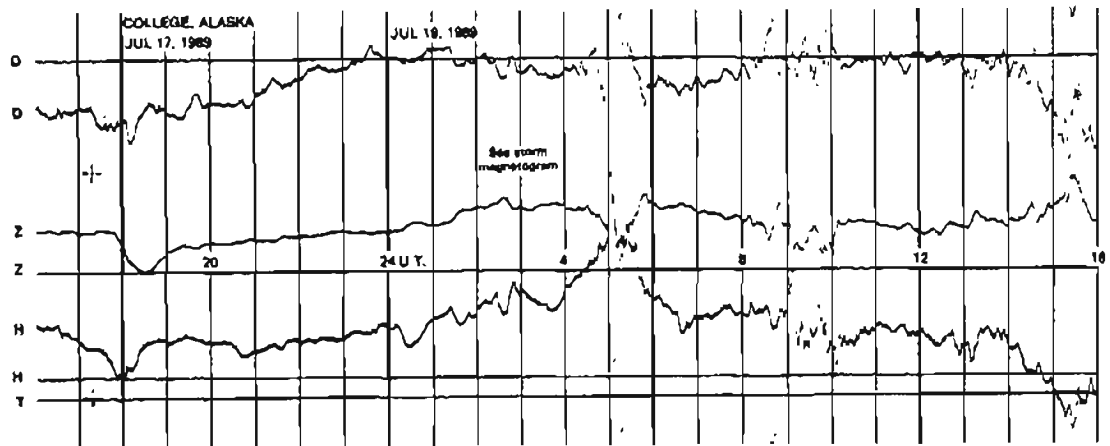
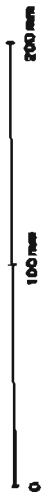


NORMAL MAGNETOGRAMS



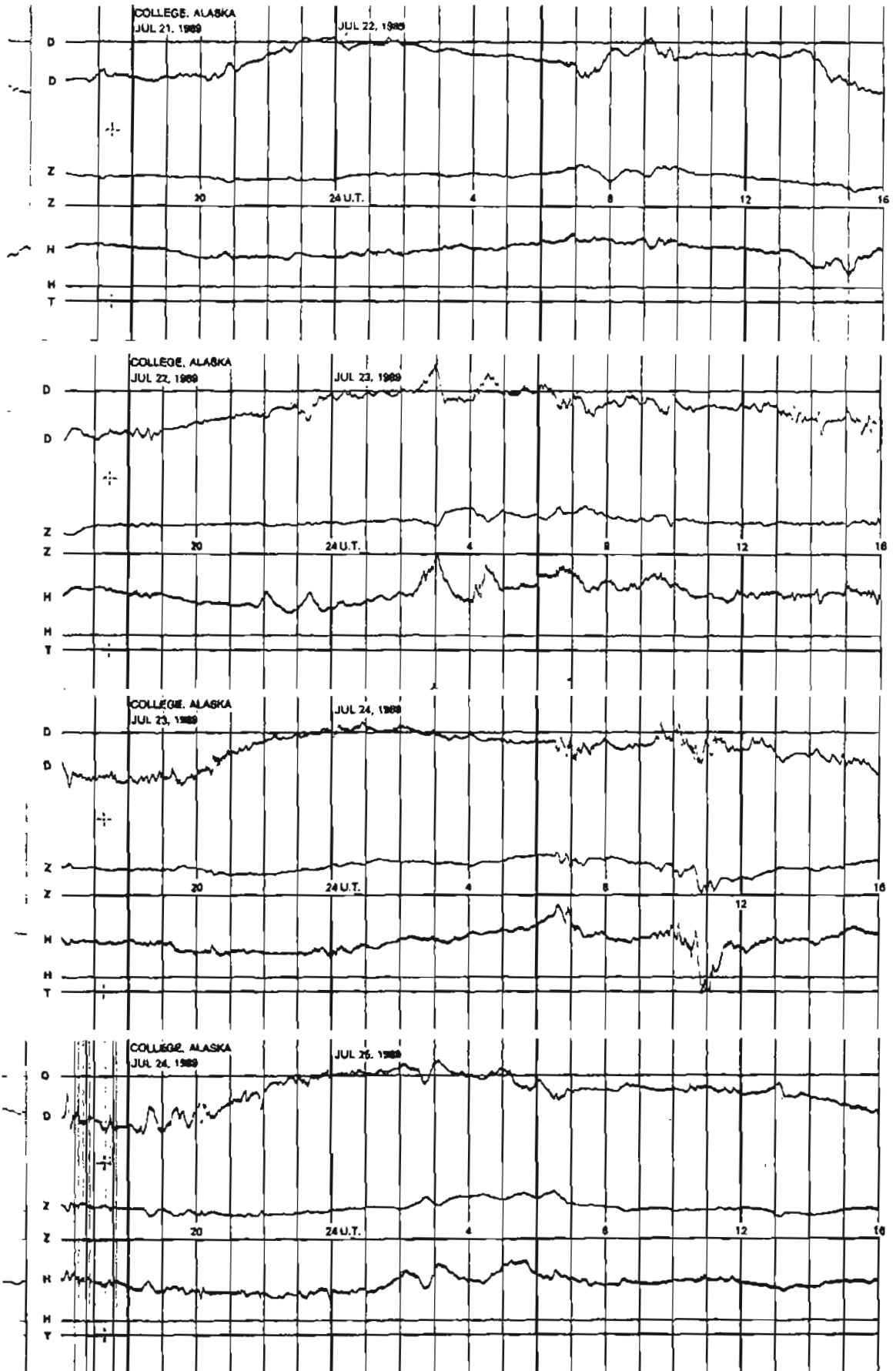
200mm  
100mm  
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NORMAL MAGNETOGRAMS



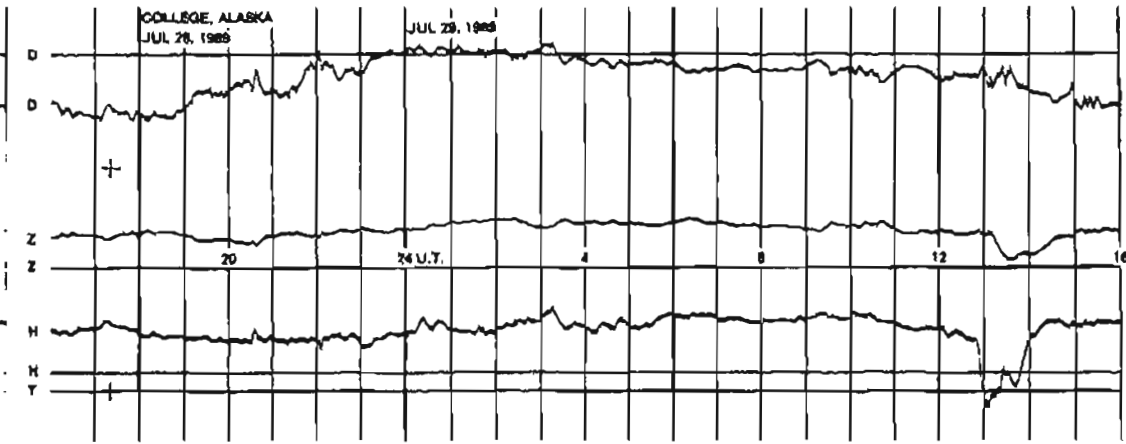
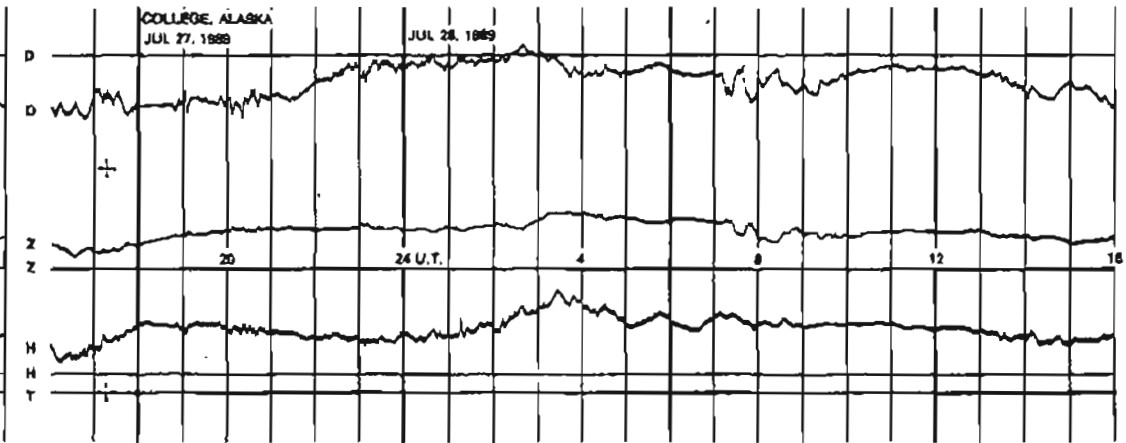
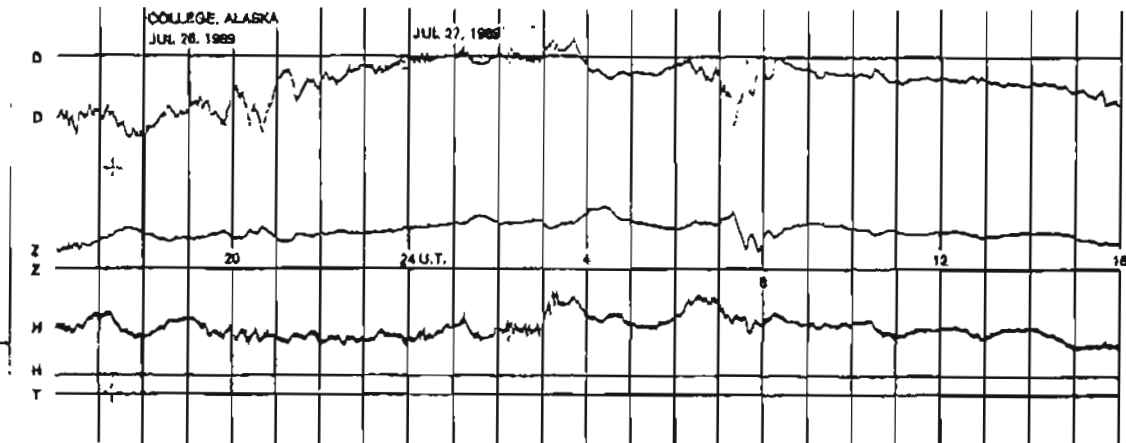
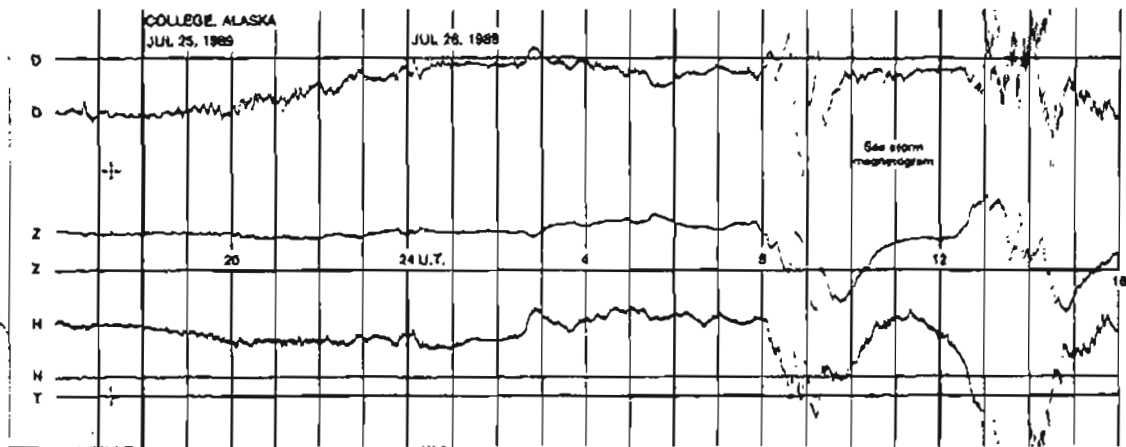
NORMAL MAGNETOGRAMS

200 mm  
100 mm  
0



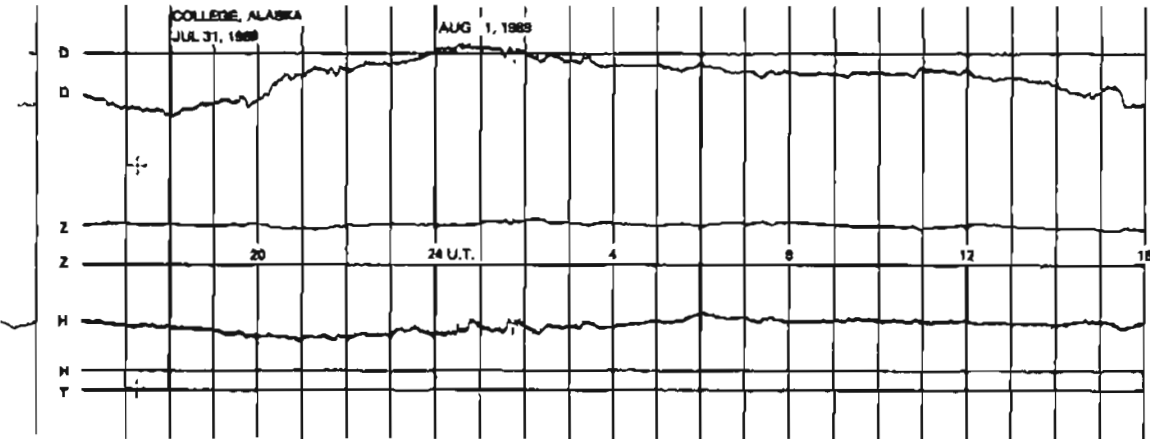
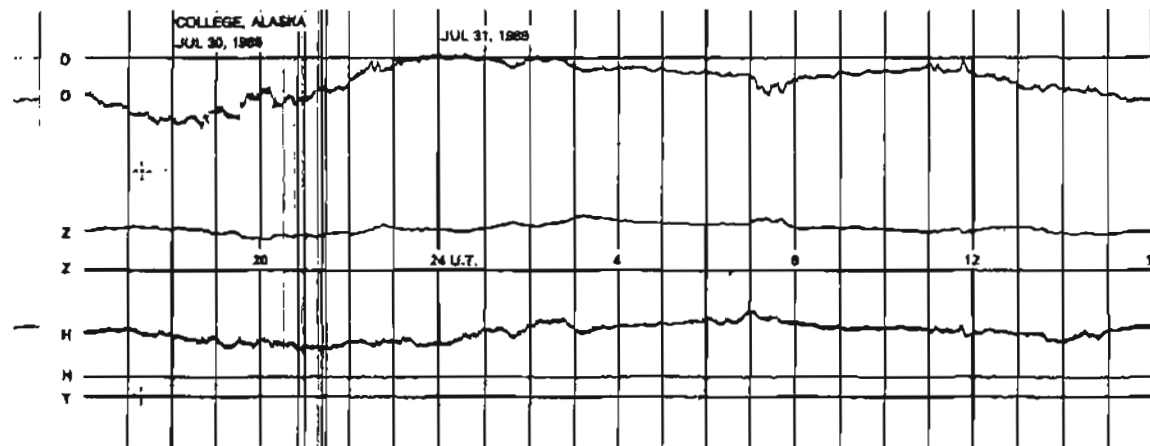
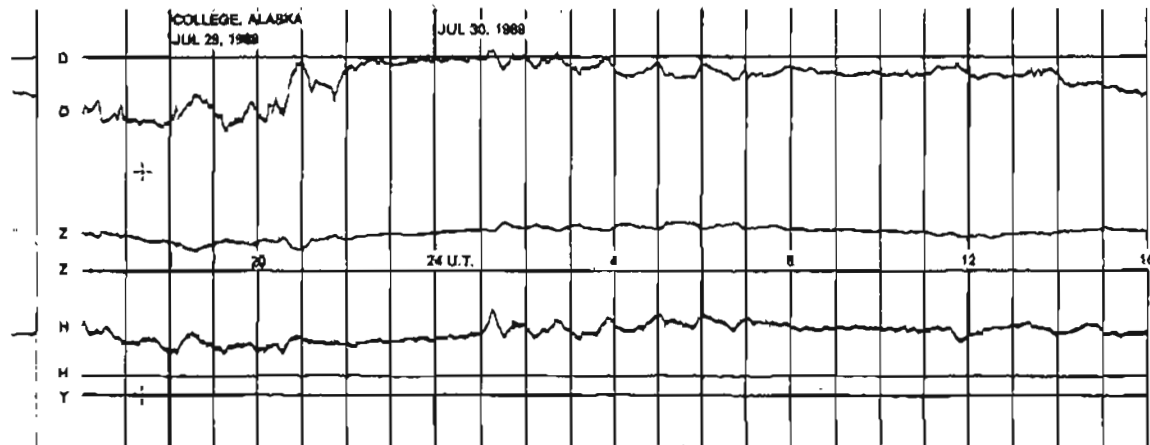
NORMAL MAGNETOGRAMS

200 mm  
100 mm  
0



NORMAL MAGNETOGRAMS

200 nT  
100 nT  
0





# STORM MAGNETOGRAMS

