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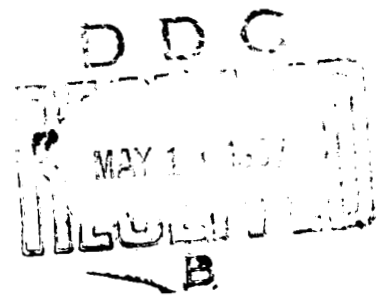
HIGH LATITUDE GEOPHYSICAL DATA

30 Mc/s COSMIC NOISE RECORDS—OCT.-DEC., 1966
N-S TELLURIC CURRENT RECORDS—OCT.-DEC., 1966
N-S TELLURIC AMPLITUDE ACTIVITY—OCT.-DEC., 1966
TELLURIC FLUCTUATION ACTIVITY—OCT.-DEC., 1966
TELLURIC SONAGRAMS, Pc and Pi—OCT.-DEC., 1966
TELLURIC MICROPULSATION ACTIVITY, Pc 1—OCT.-DEC., 1966
GEOMAGNETIC ACTIVITY, K Ak, C—OCT.-DEC., 1966

DECEMBER 1966 10

FACILITY FORM 602

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2 **GEOPHYSICAL INSTITUTE**
UNIVERSITY OF ALASKA
COLLEGE, ALASKA

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"High Latitude Geophysical Data" is published by the Institute with the objective of presenting current geophysical data related to polar ionospheric activity. Because of the research nature of the Institute's program, the type of material presented and the experimental and scaling methods may be novel and are subject to change. Thus the methods are described in sufficient detail to assure correct interpretation of data.

V. P. Hessler, Editor

30 MC/S COSMIC NOISE LEVEL

R. Parthasarathy
Assoc. Professor of Physics

and

J. L. Hook
Assistant Geophysicist

This section consists of reproductions of the cosmic radio noise level at 30 Mc/s, monitored at College, Alaska (64.65°N, 256.56°E, geomagnetic).

The zenith directed antenna is a pair of crossed, 3-element Yagis, responding to the noise in the right circular mode. The beam has approximate rotational symmetry, with about 60 degrees between half-power points. The power linear receiver system is calibrated at 1.0, 2.0, 3.0, 4.0 and 5.0 milliamp of the diode plate current.

The variation of the noise level at College is primarily due to the variation of the precipitating auroral particles. It is known that the energies of these primary particles (electrons and protons) that are of immediate relevance to the luminosity of the auroral displays are about a few kilovolts, and that the integral energy spectrum of the flux expressed as a power law of the energy is characterized by an exponent, minus γ , the γ varying from about two to five. It is also known from observations at 37 Mc/s with antenna beams comparable to the angular dimensions of the displays (i.e., a few degrees in the meridian plane) that, in general, the radiowave absorption in any direction is only poorly specified by the luminosity of the display. The radiowave absorption at a single frequency is not capable of specifying the height distribution of ionization responsible for the absorption, and hence the energies of the primary particles. Simultaneous absorption data in a number of frequencies in the HF and VHF band have, therefore, been utilized in the past for deriving the ionization profile as a function of height over College. The derived profiles suggest that the VHF absorption is dominantly controlled by the high energy tail ($20 \text{ kev} < E < 100 \text{ kev}$) of the precipitating electrons.

The recording and reproduction of these traces is financially supported by the National Aeronautics and Space Administration under Contract NAS5-3595.

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30 MC/S COSMIC NOISE

OCT 1966

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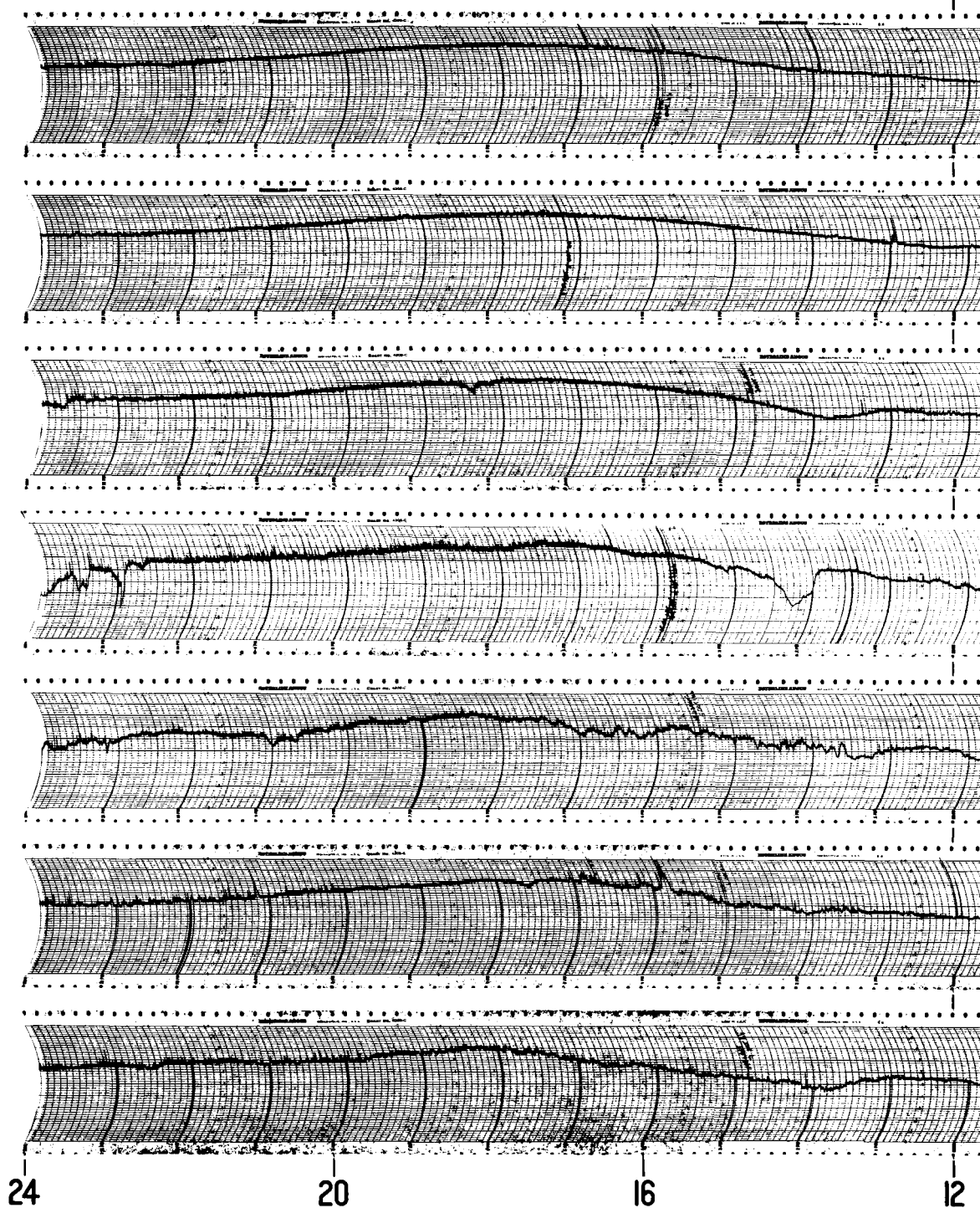
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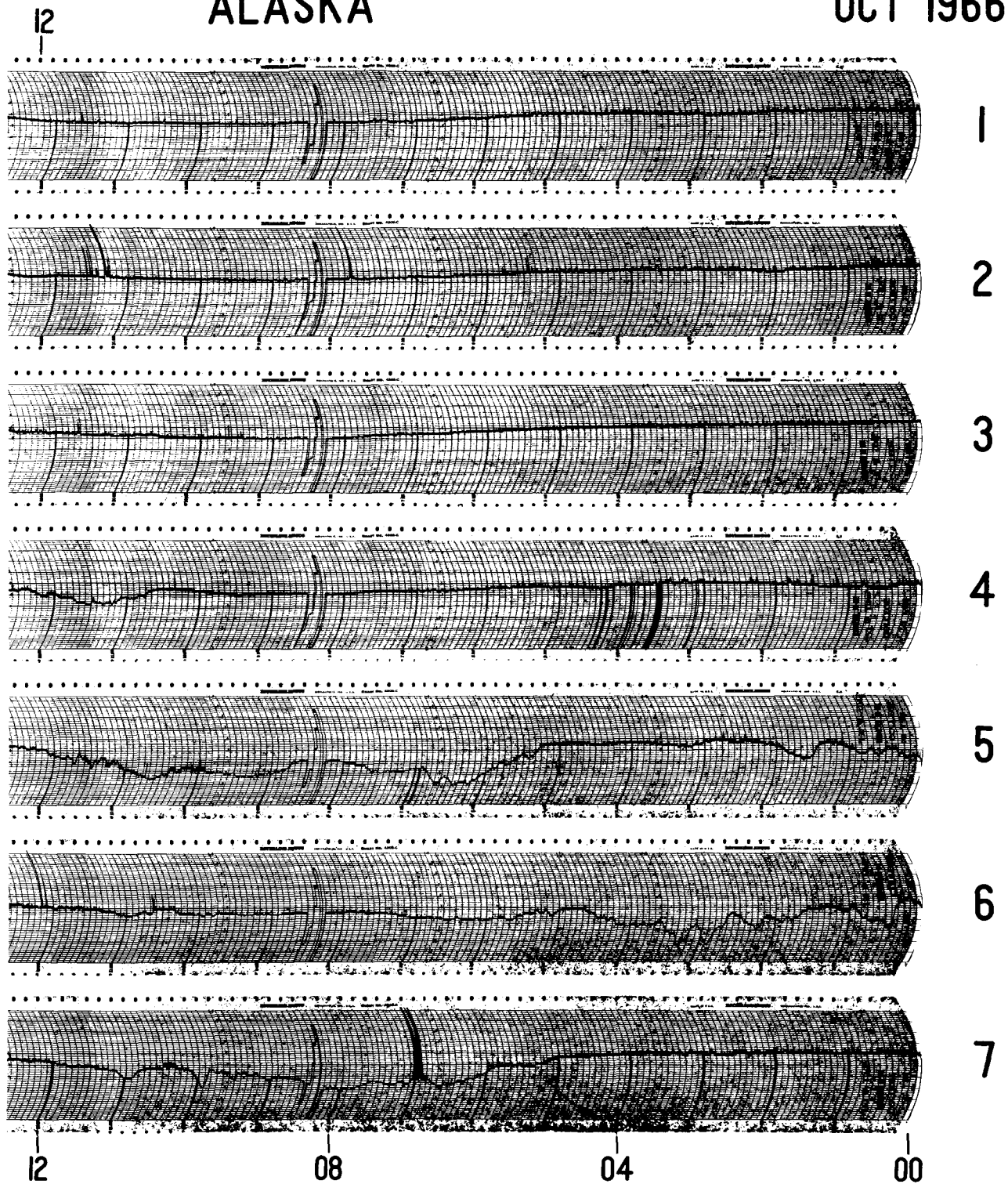
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150° WEST MERIDIAN TIME

ALASKA

OCT 1966



30 MC/S COSMIC NOISE

OCT 1966

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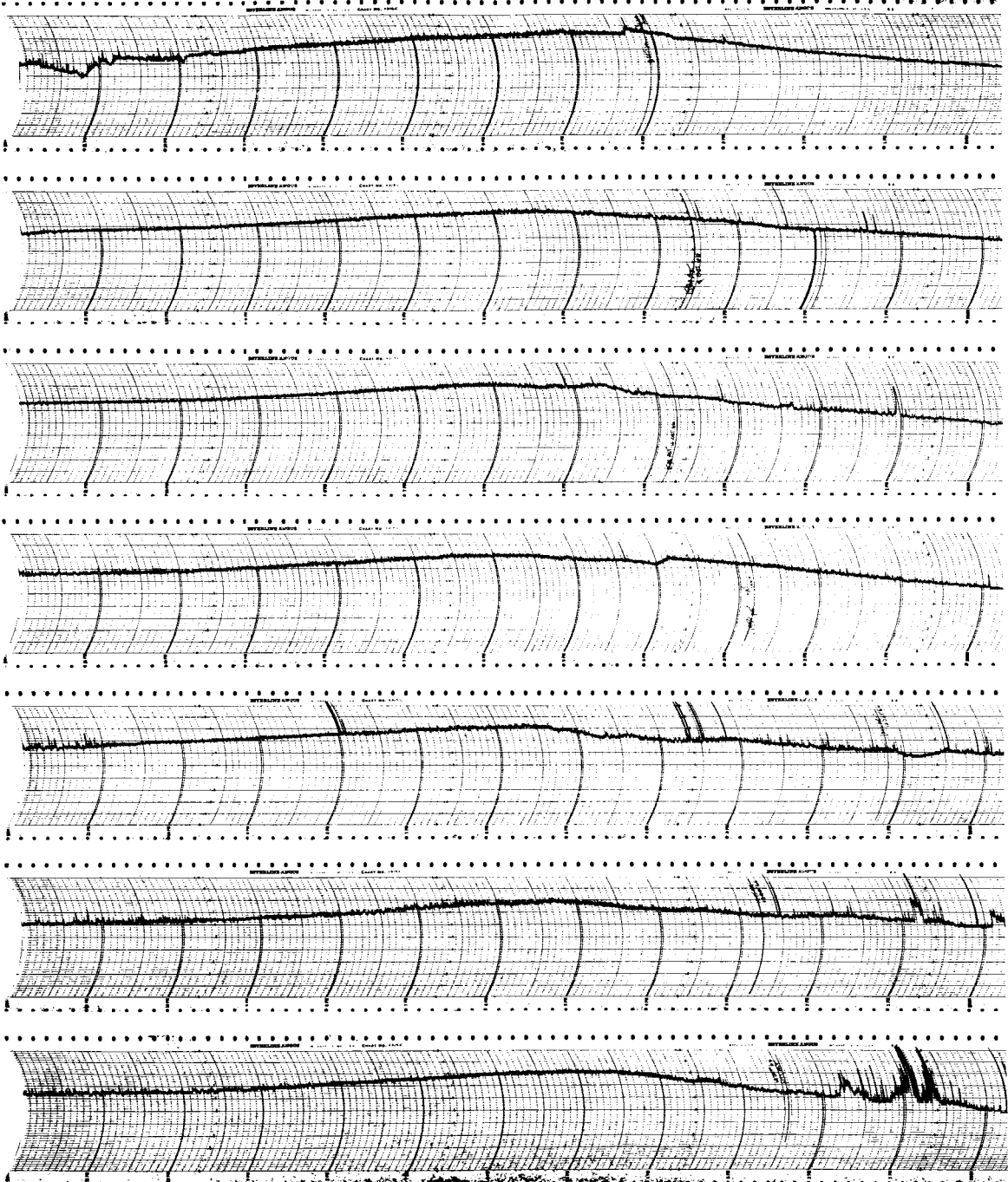
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150° WEST MERIDIAN TIME



ALASKA

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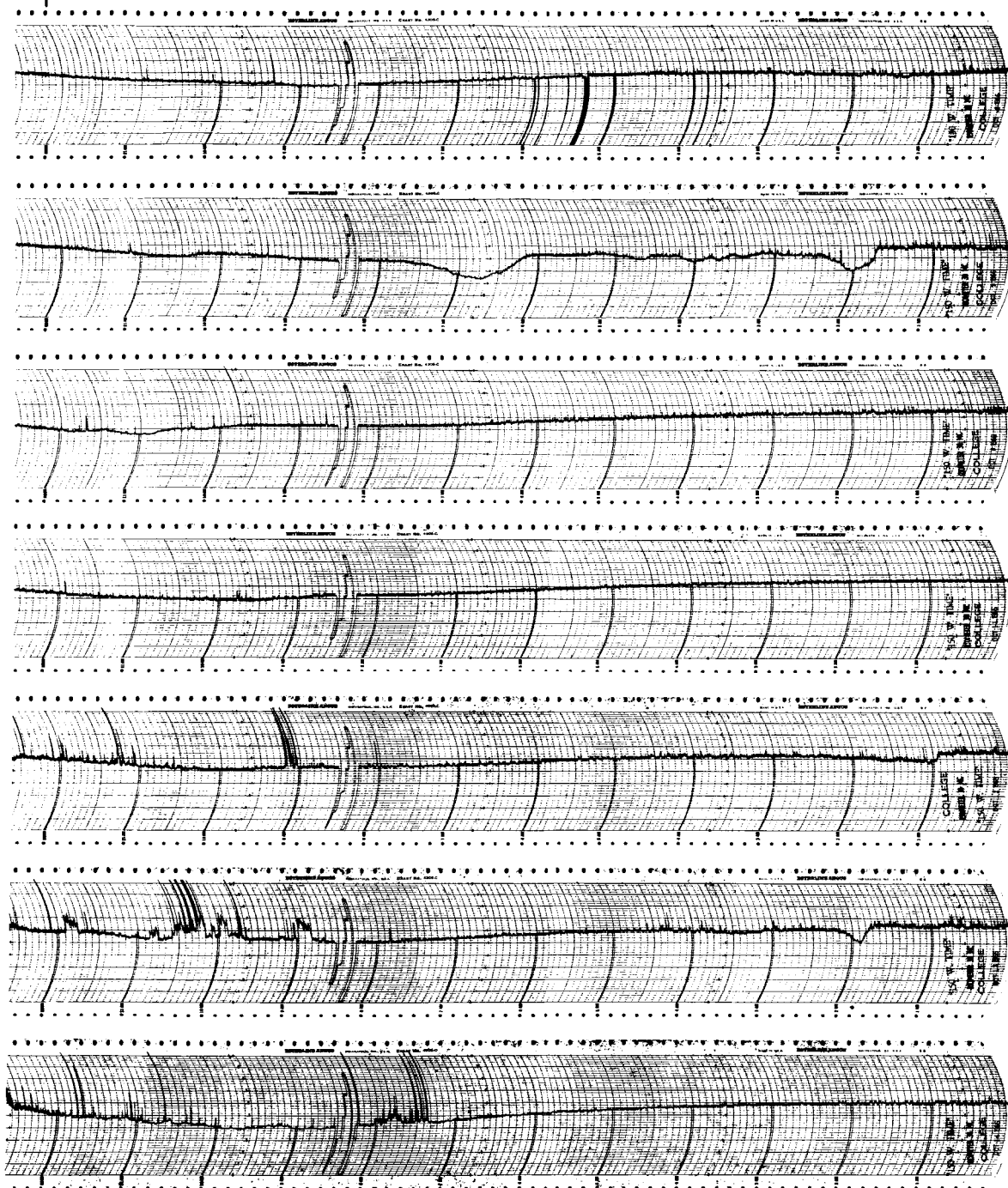
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30 MC/S COSMIC NOISE



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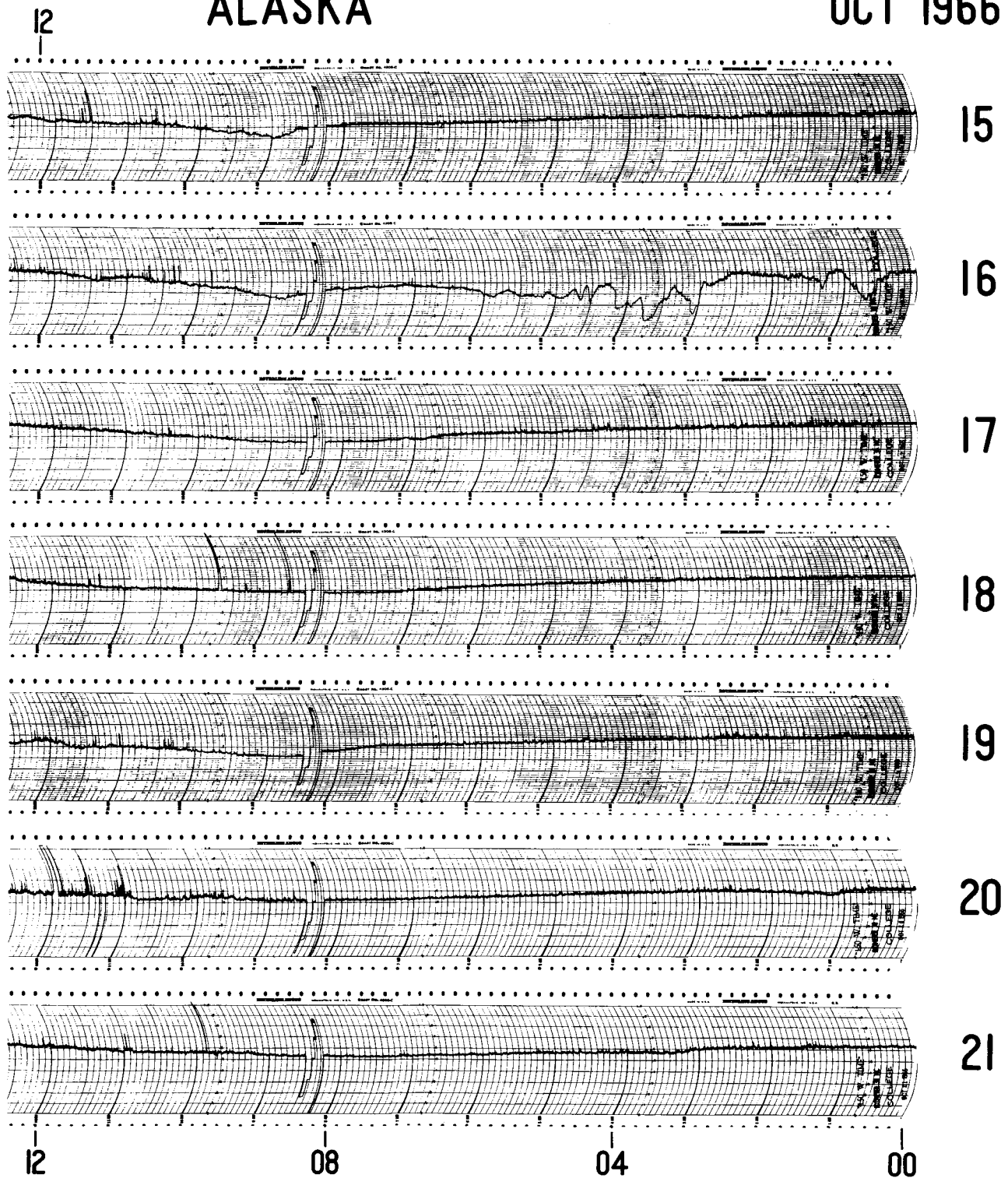
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150° WEST MERIDIAN TIME

ALASKA

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30 MC/S COSMIC NOISE

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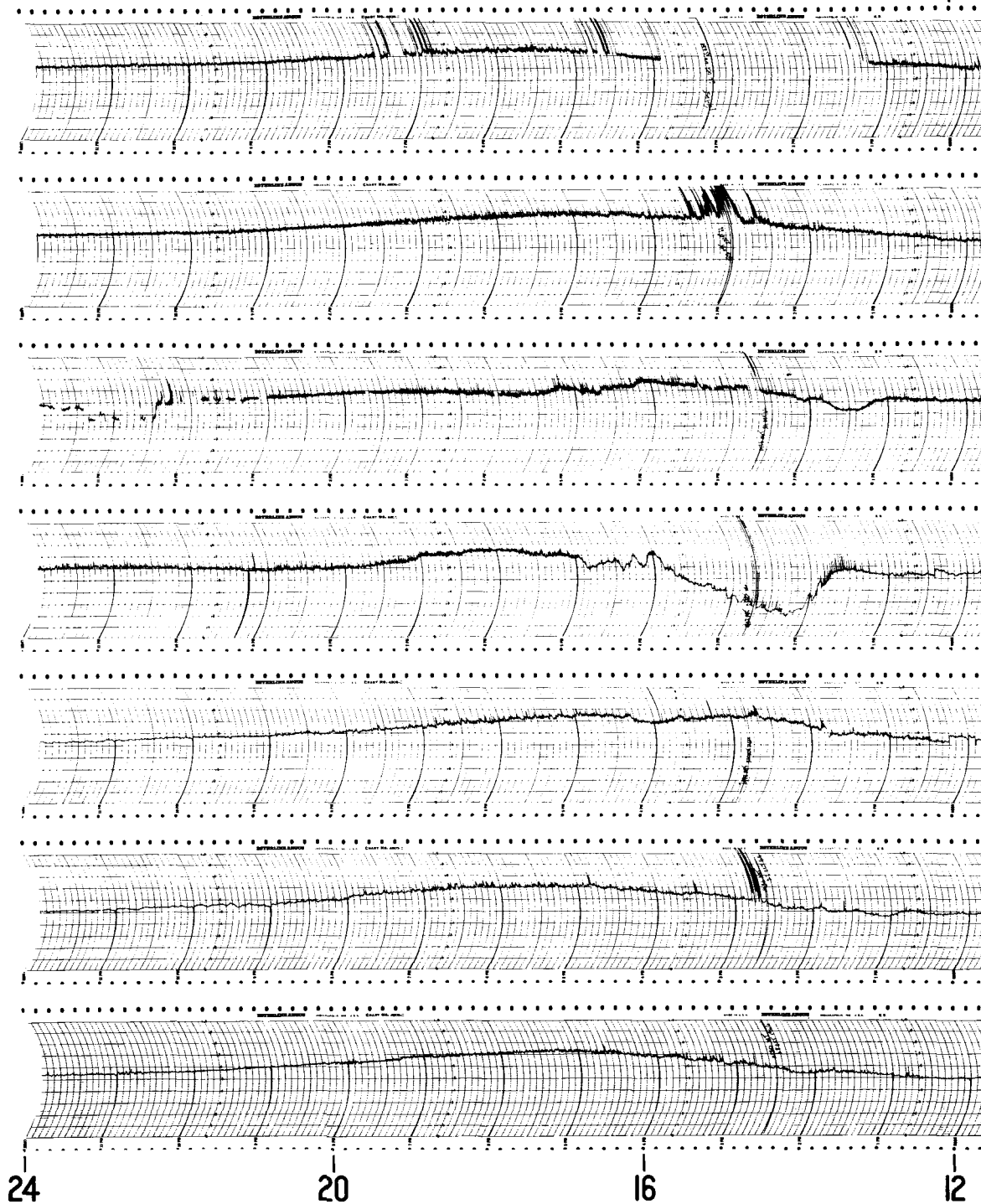
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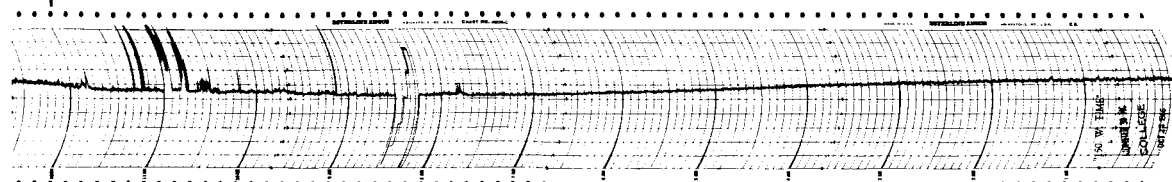


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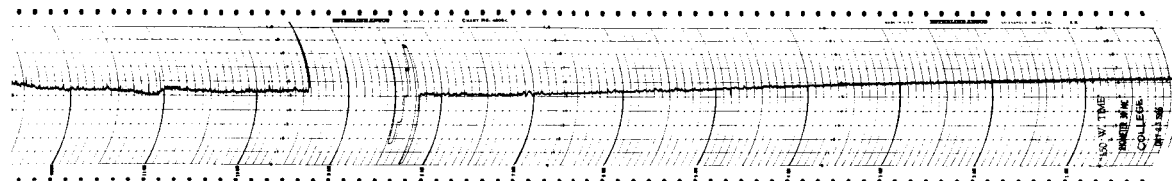
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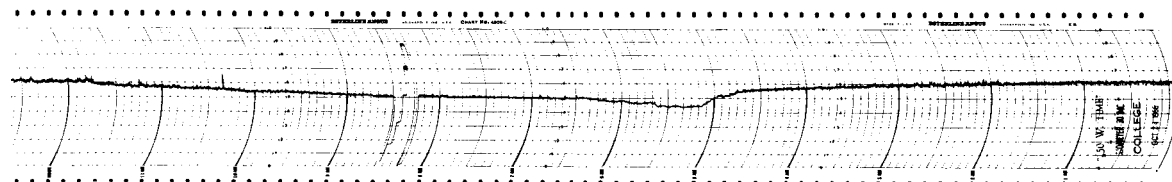
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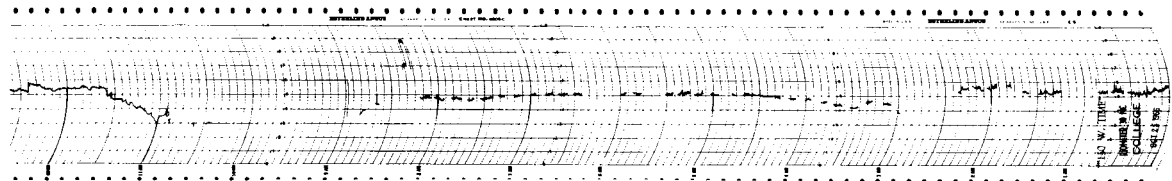
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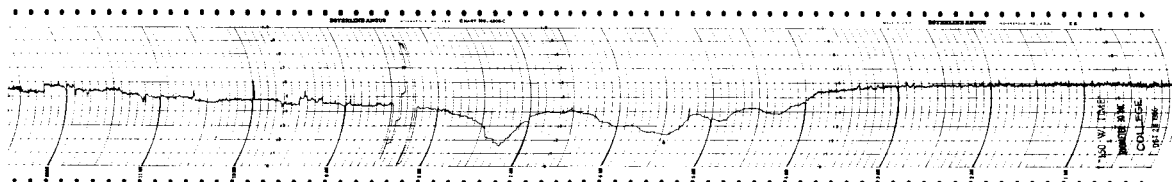
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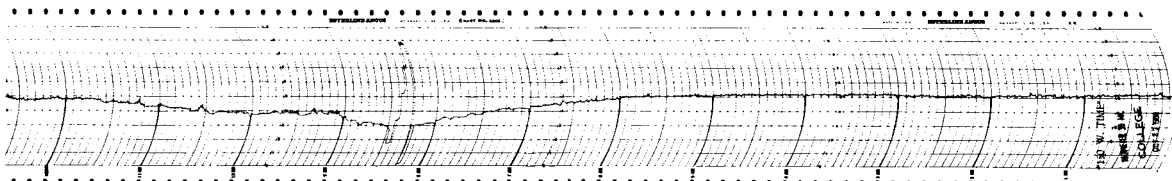
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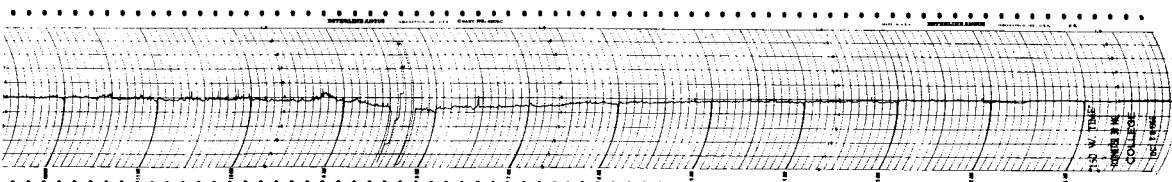
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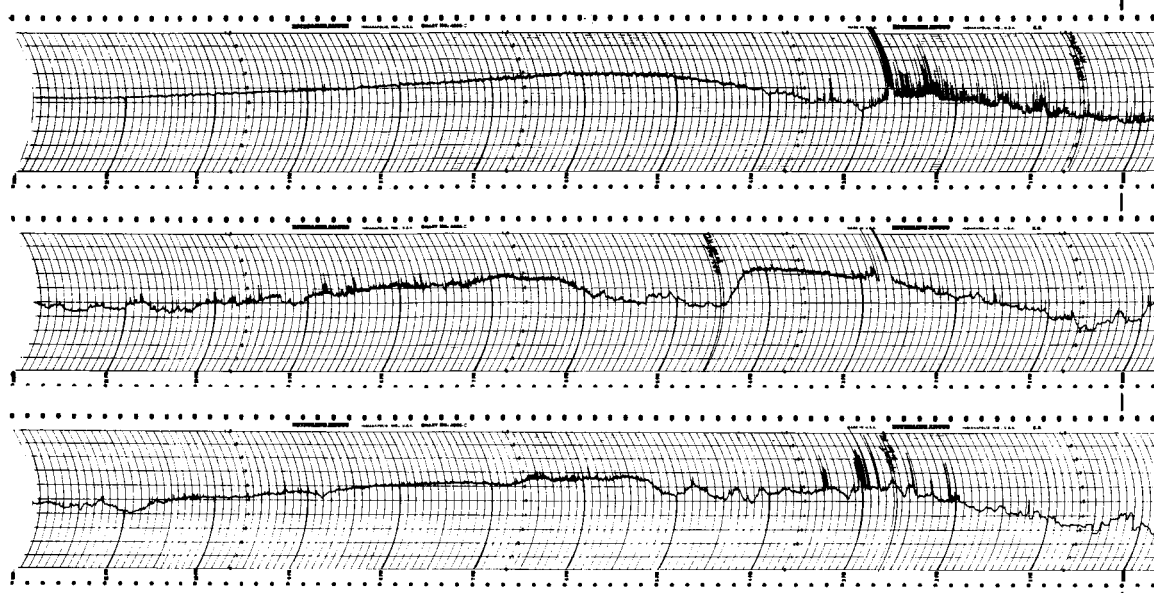
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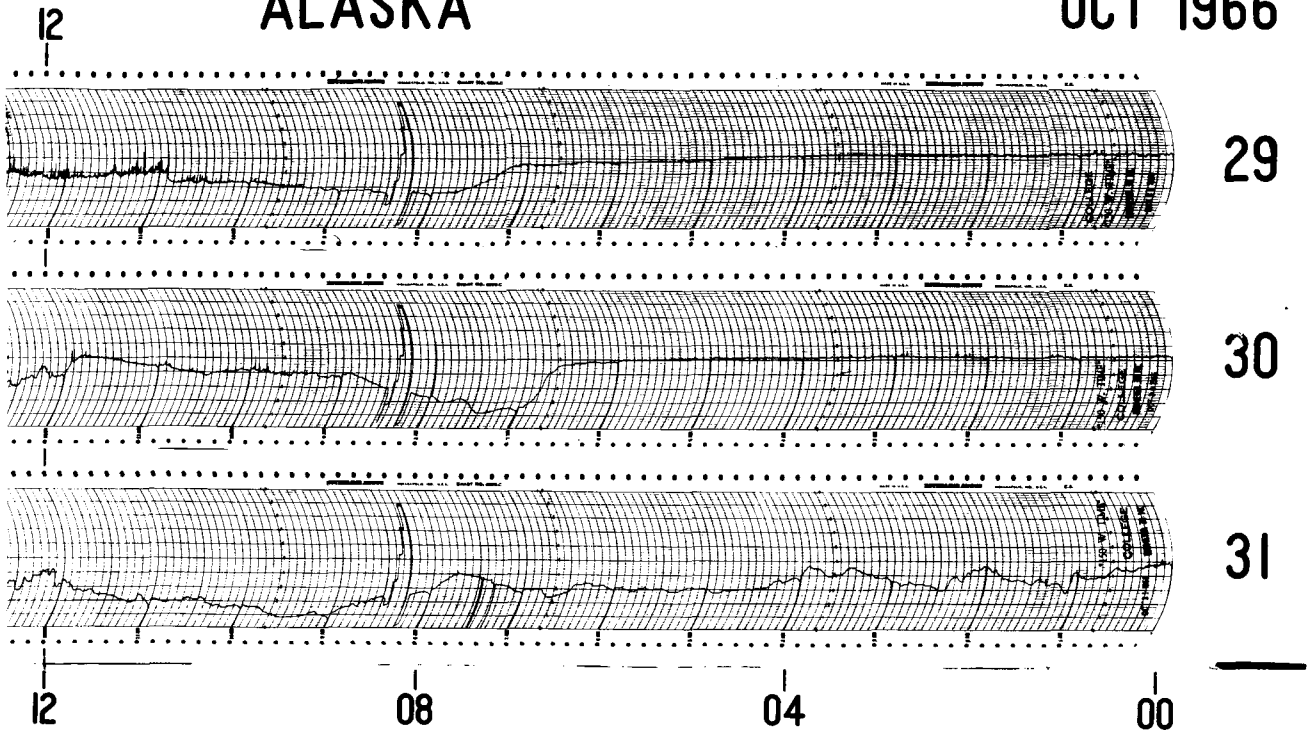
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150° WEST MERIDIAN TIME



ALASKA

OCT 1966



30 MC/S COSMIC NOISE

NOV 1966

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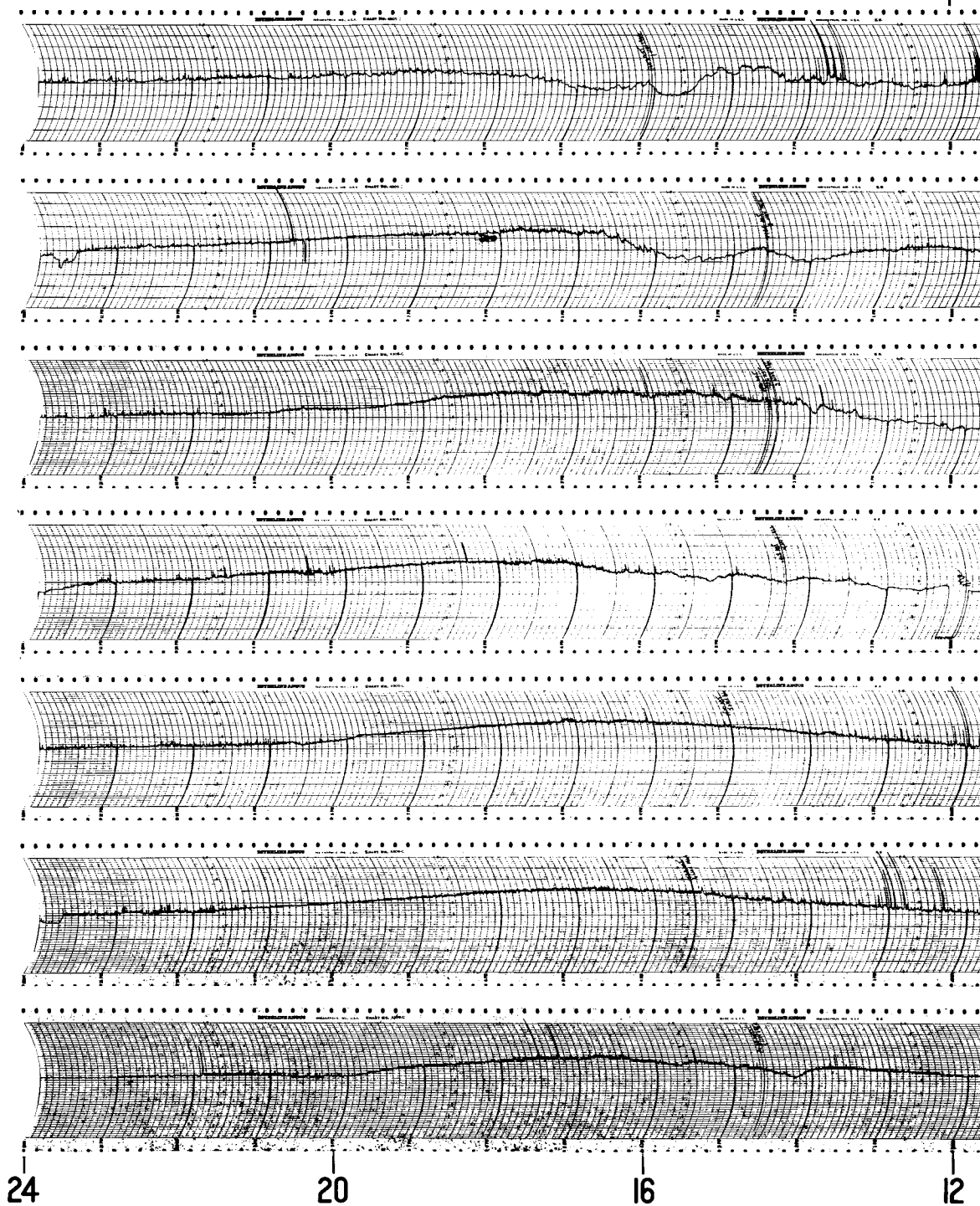
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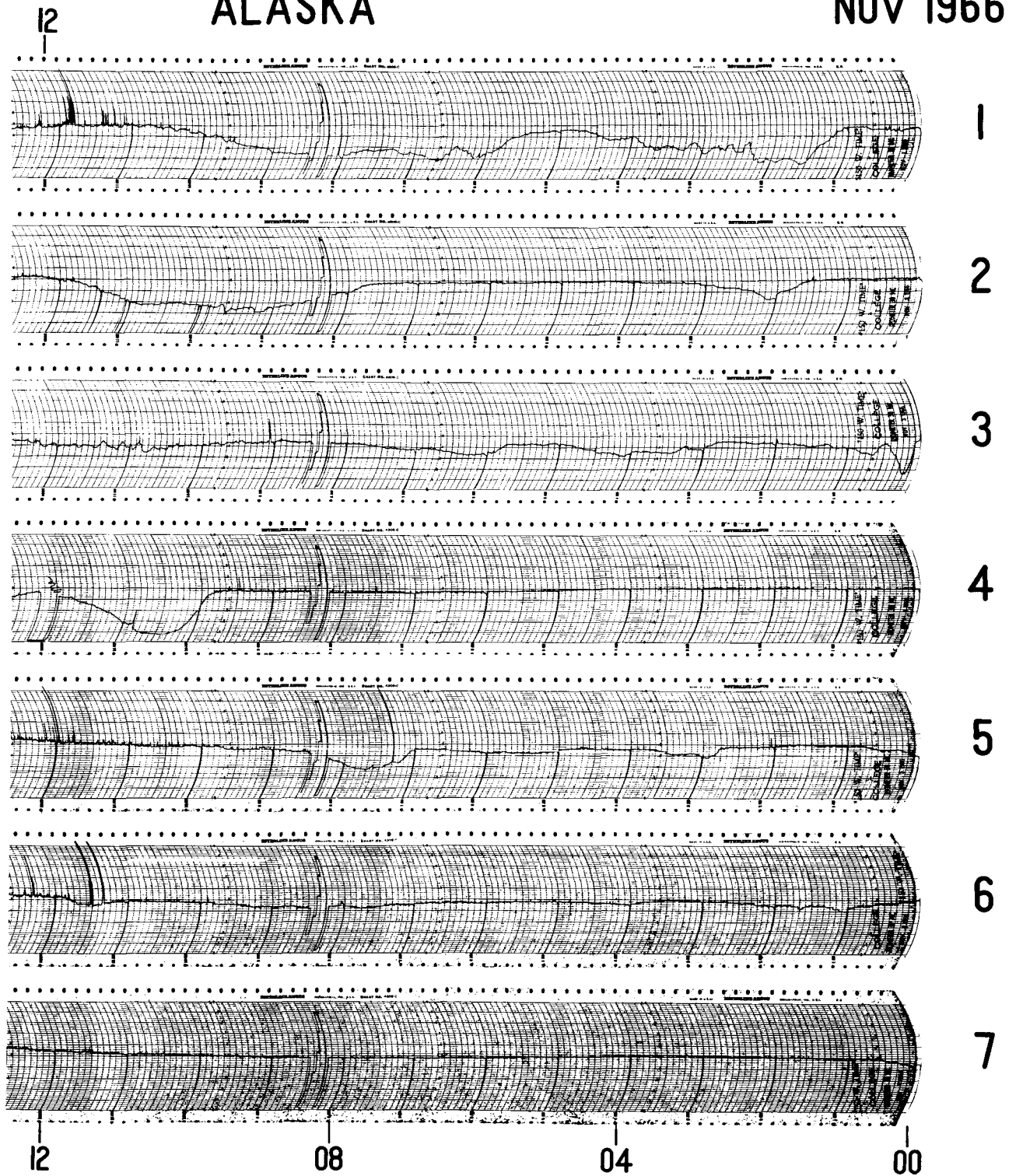
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150° WEST MERIDIAN TIME

ALASKA

NOV 1966



30 MC/S COSMIC NOISE

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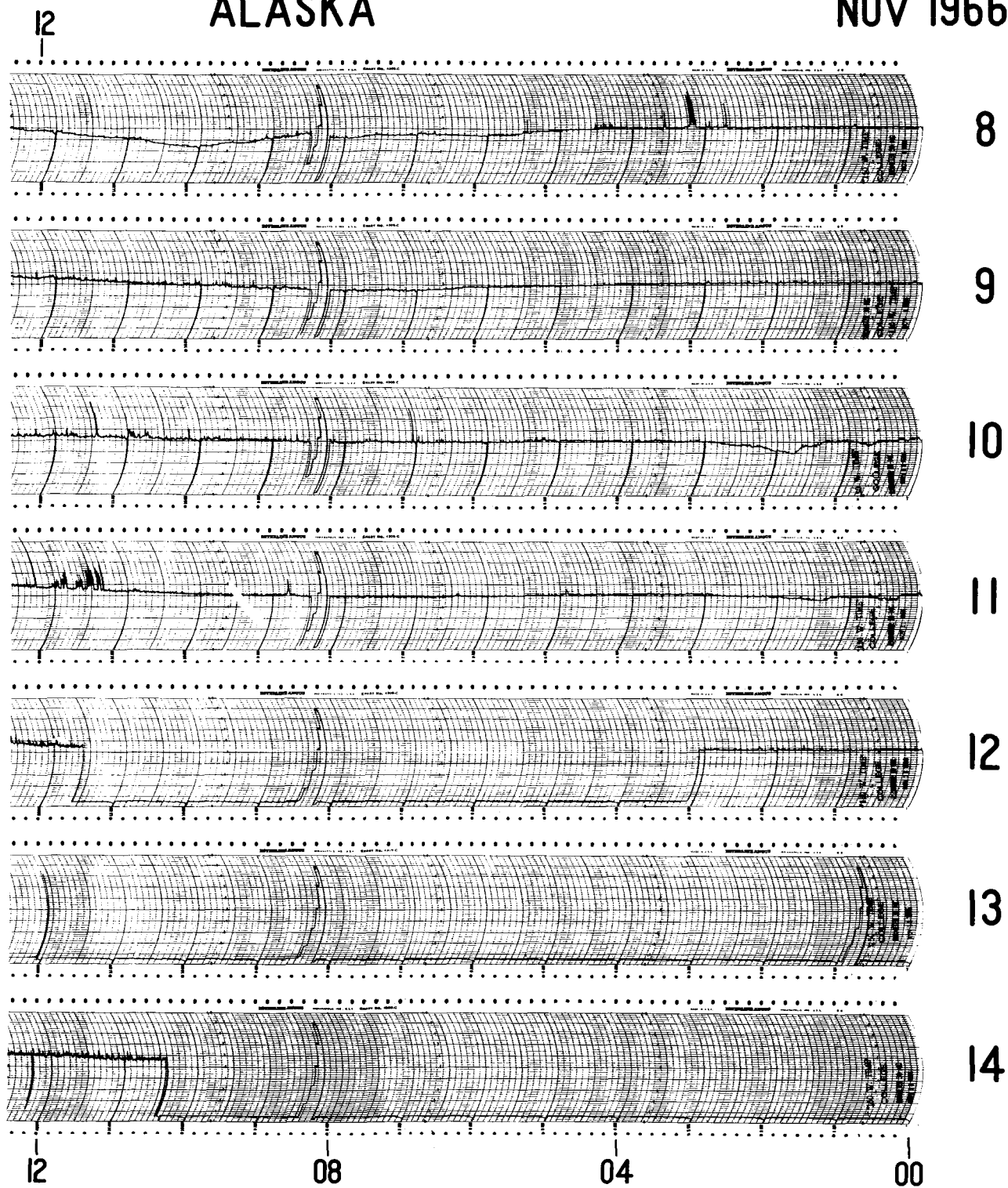
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150° WEST MERIDIAN TIME

ALASKA

NOV 1966



30 MC/S COSMIC NOISE

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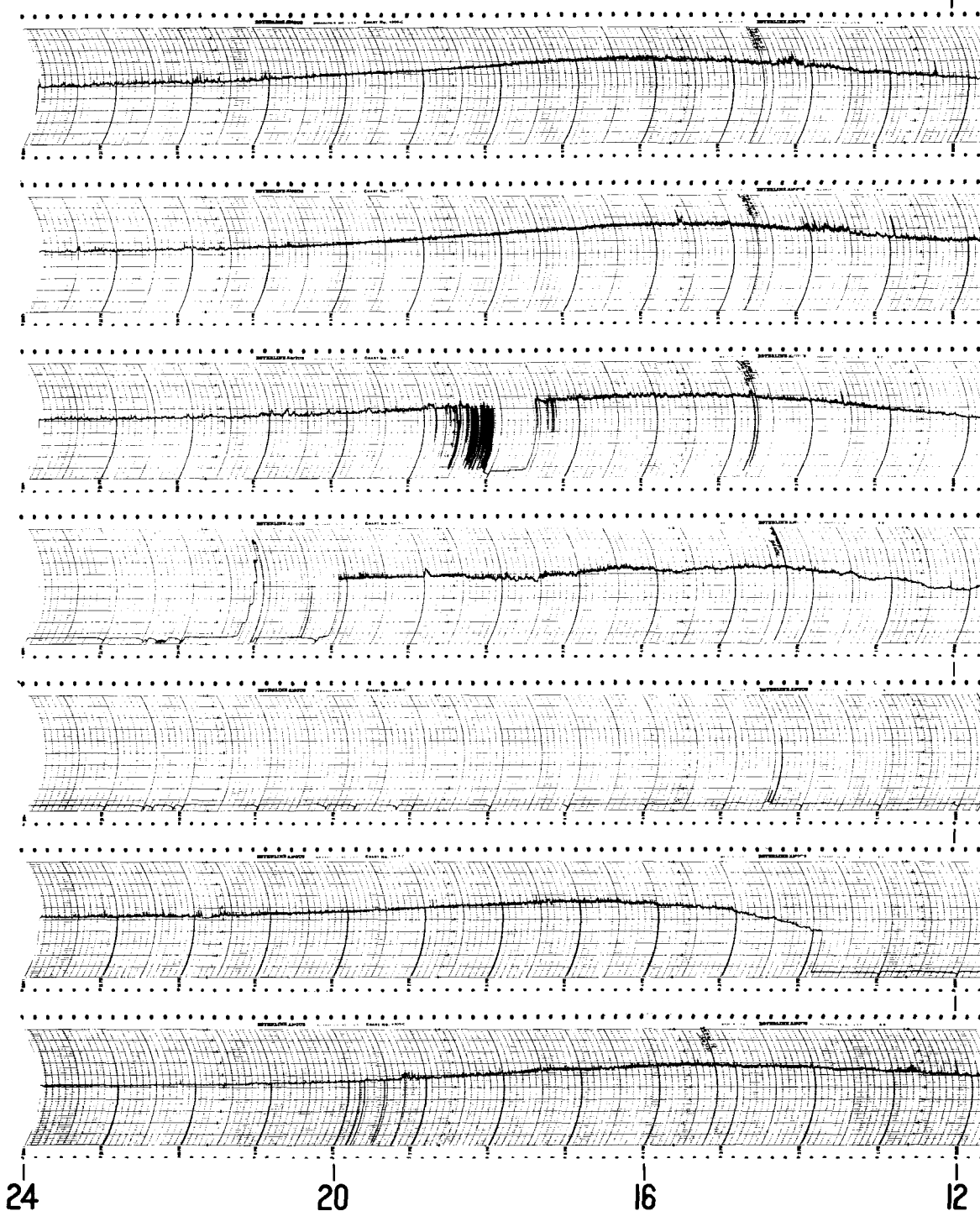
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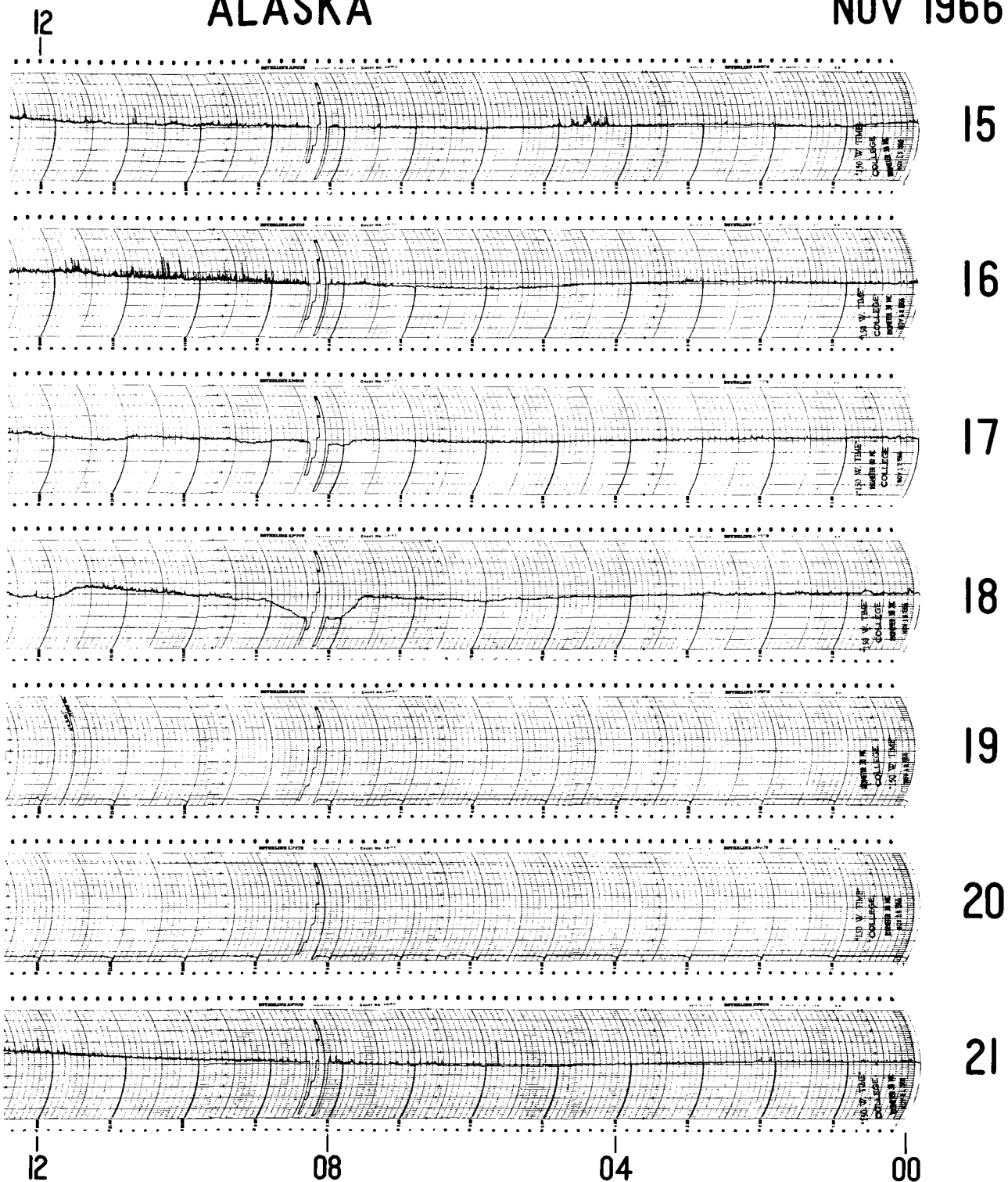
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150° WEST MERIDIAN TIME

ALASKA

NOV 1966



NOV 1966

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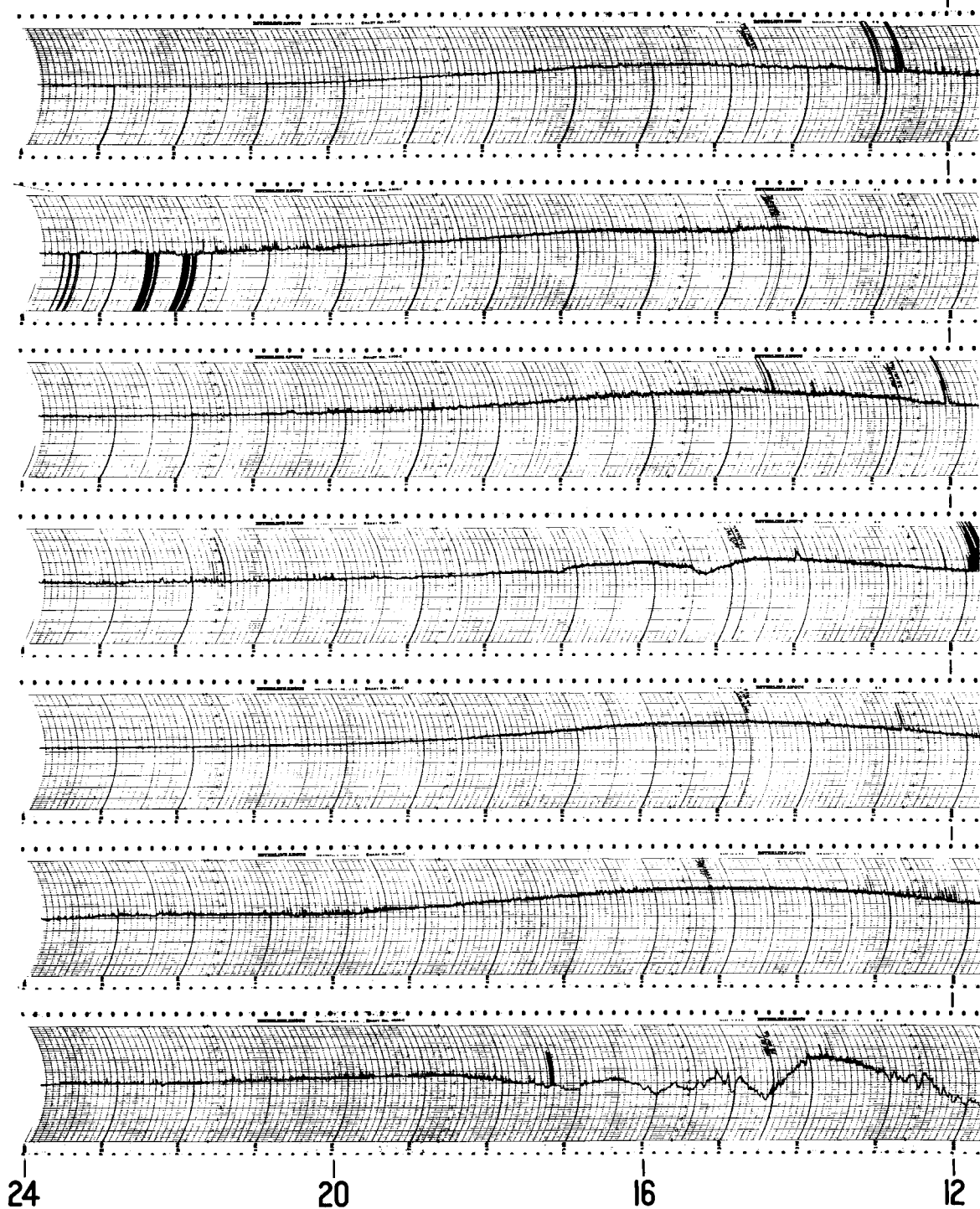
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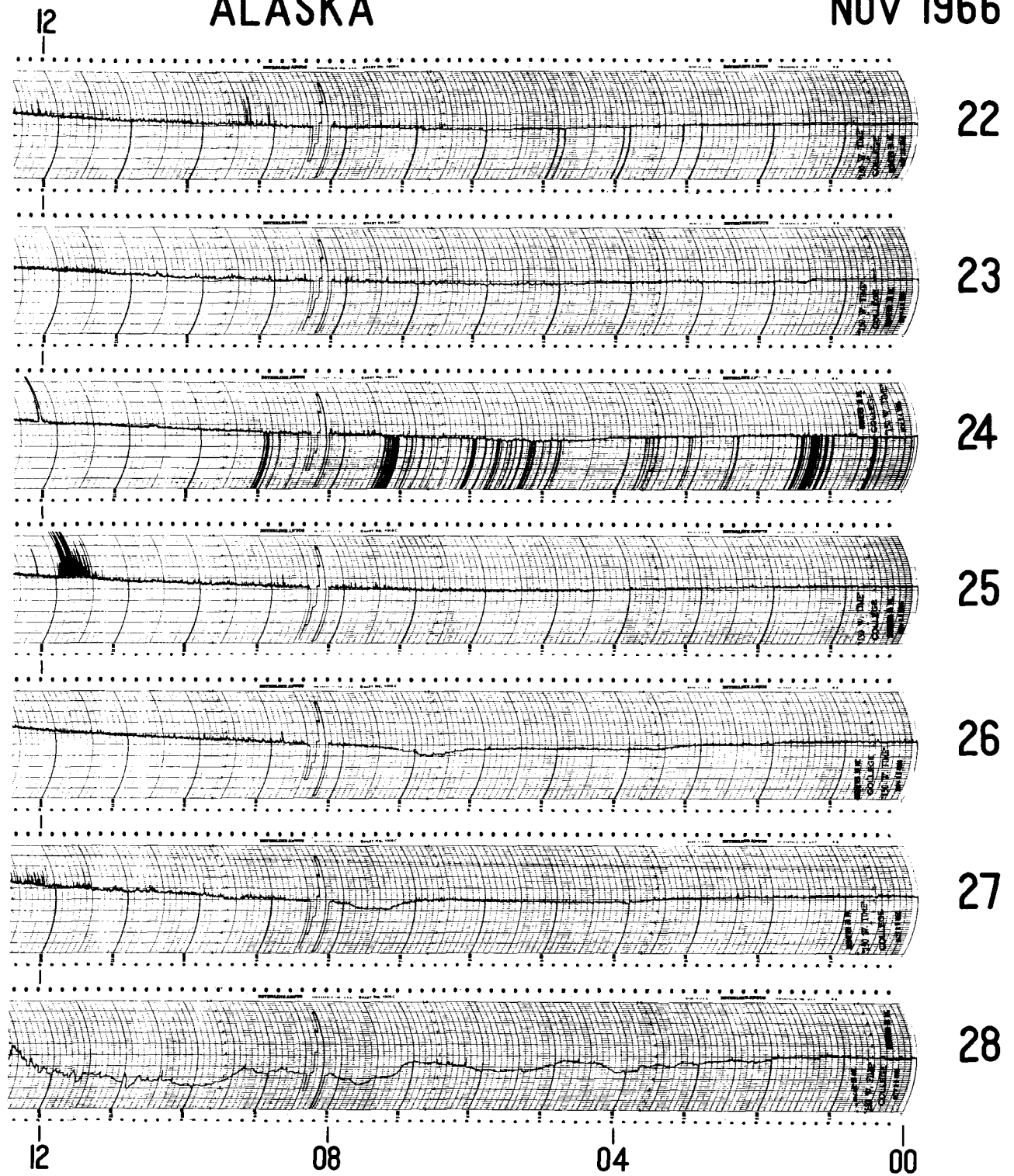
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150° WEST MERIDIAN TIME

ALASKA

NOV 1966



30 MC/S COSMIC NOISE

NOV 1966

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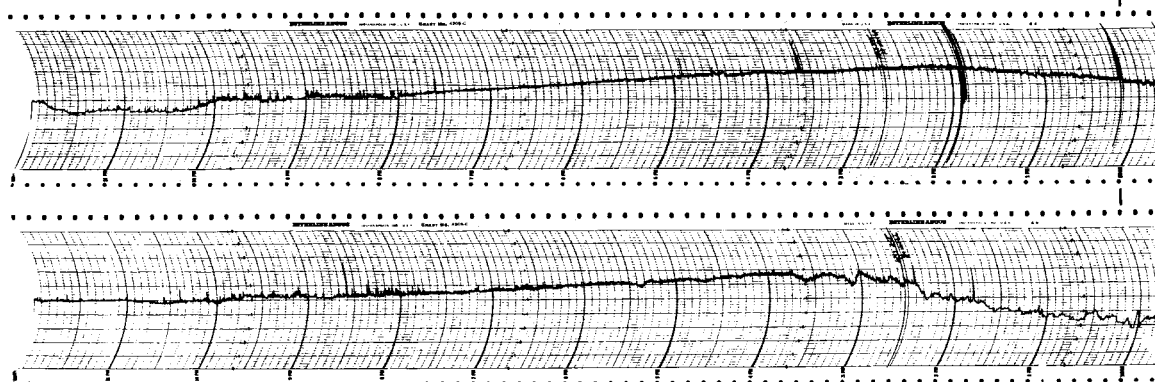
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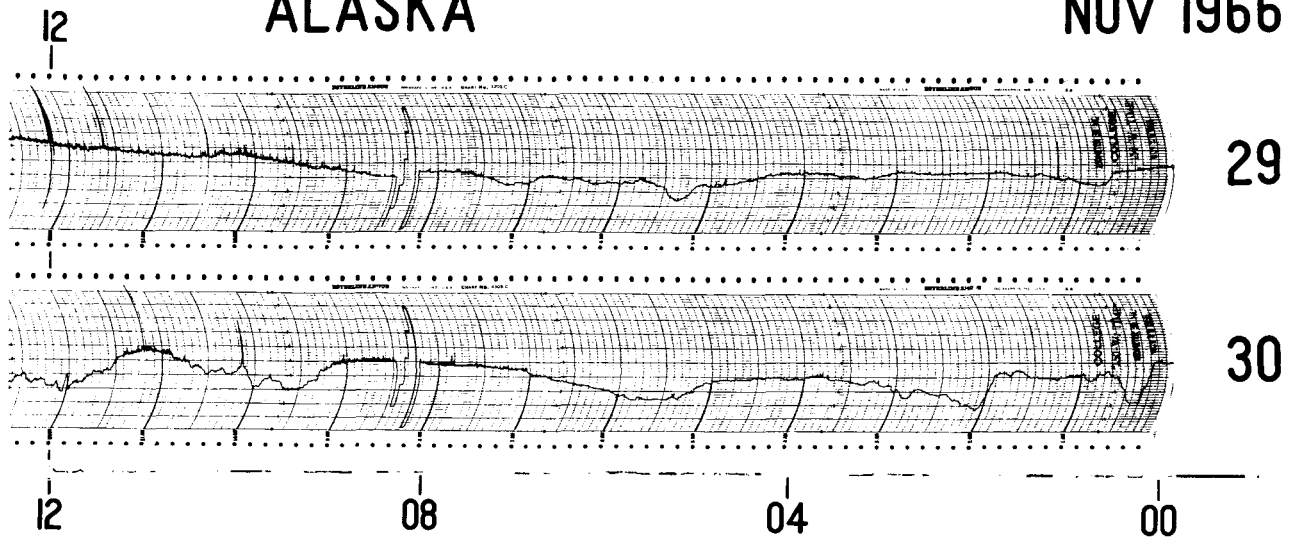
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150° WEST MERIDIAN TIME



ALASKA

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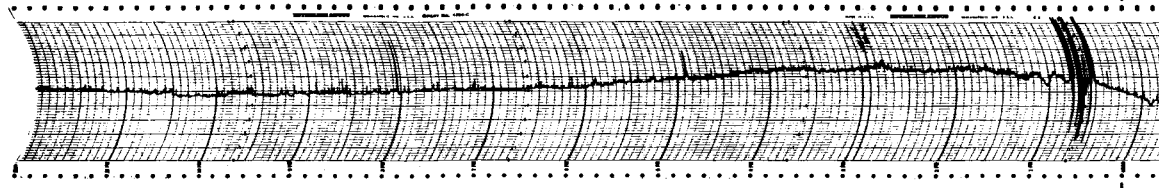
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DEC 1966

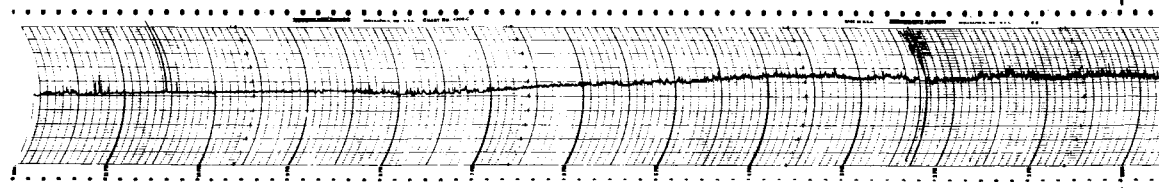
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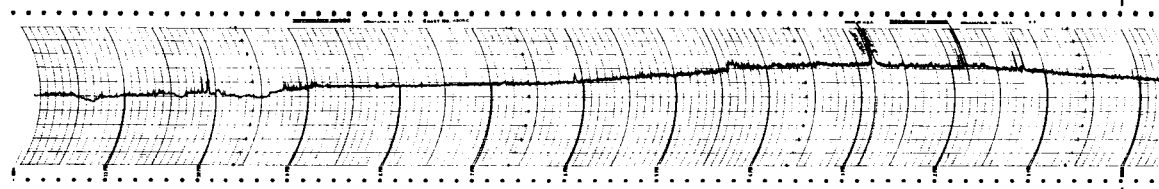
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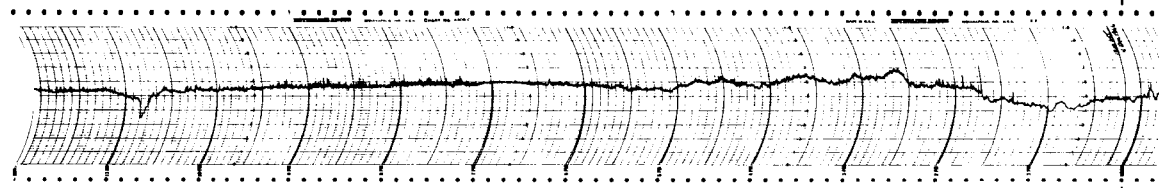
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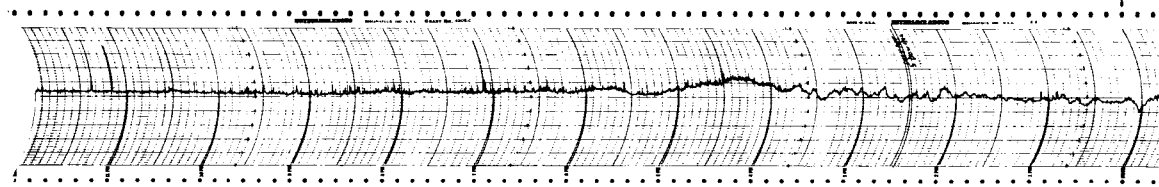
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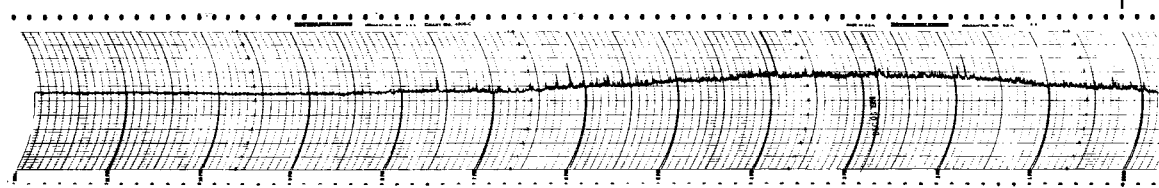
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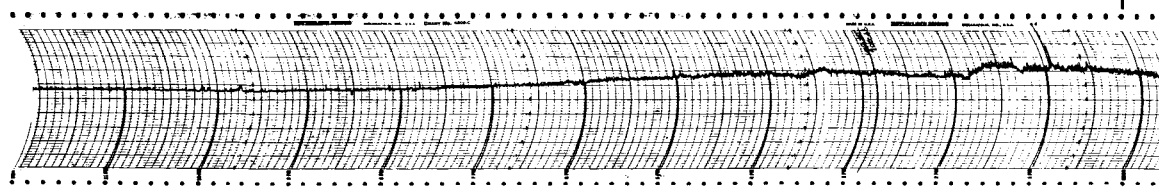
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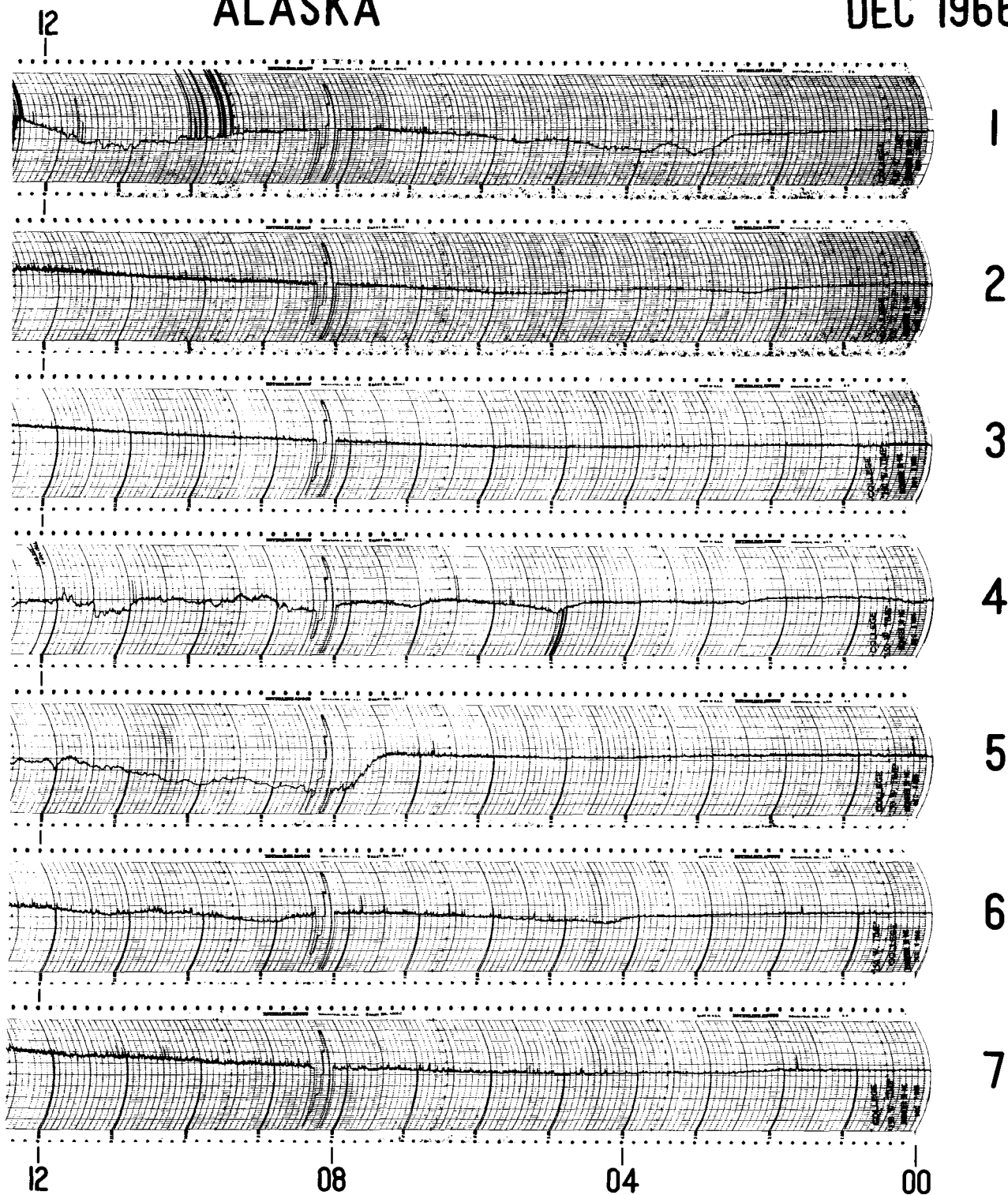
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150° WEST MERIDIAN TIME

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DEC 1966



30 MC/S COSMIC NOISE

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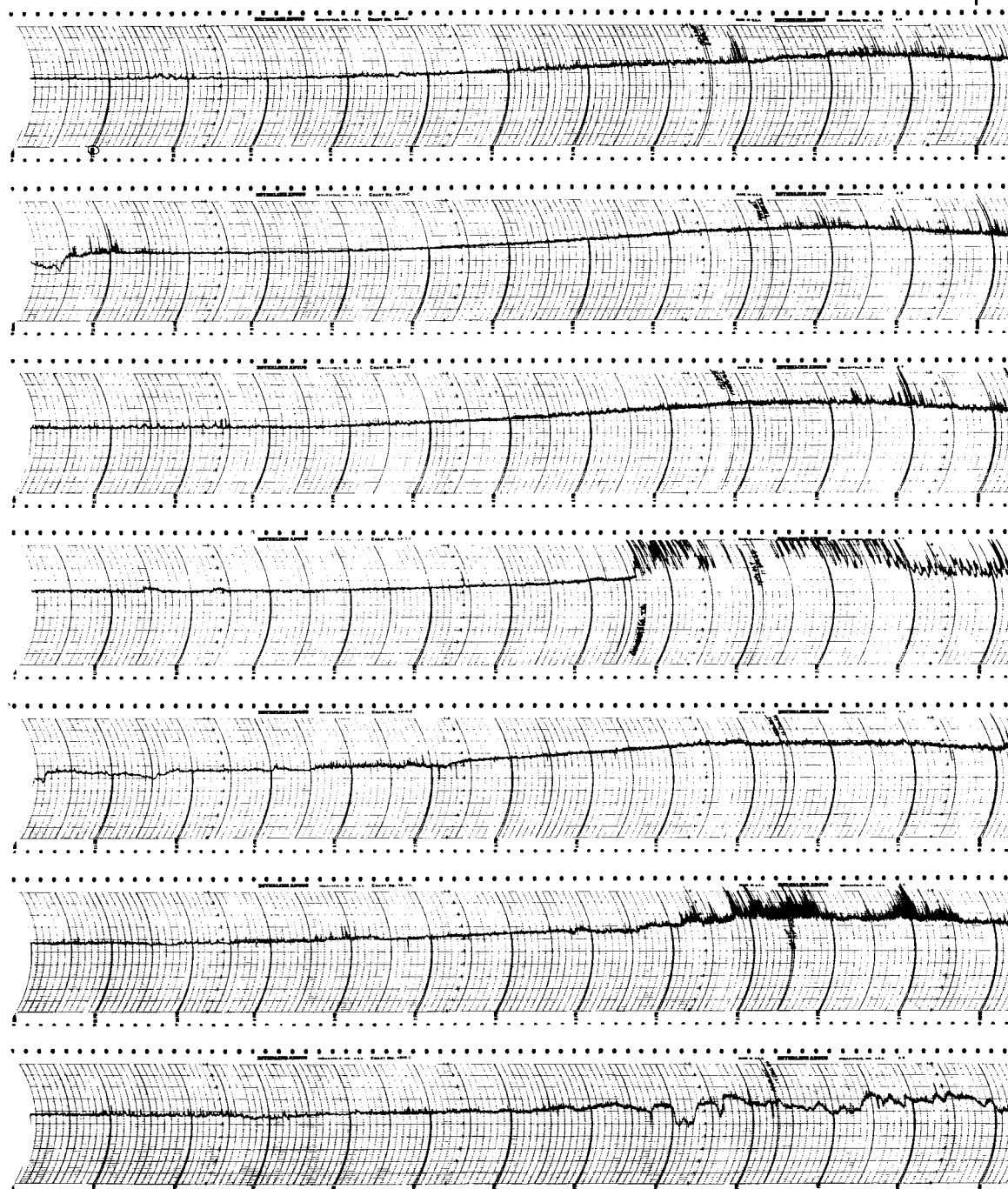
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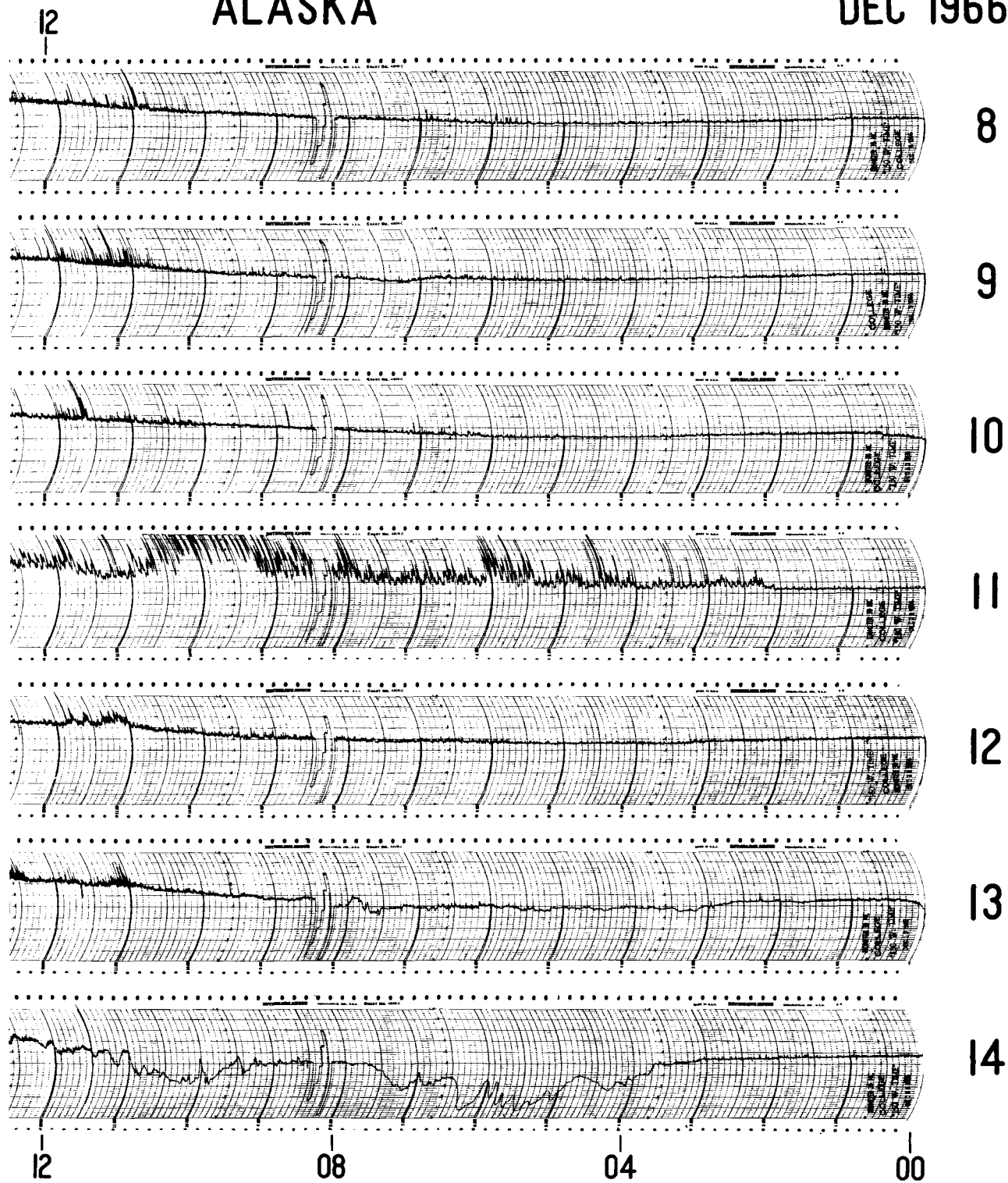
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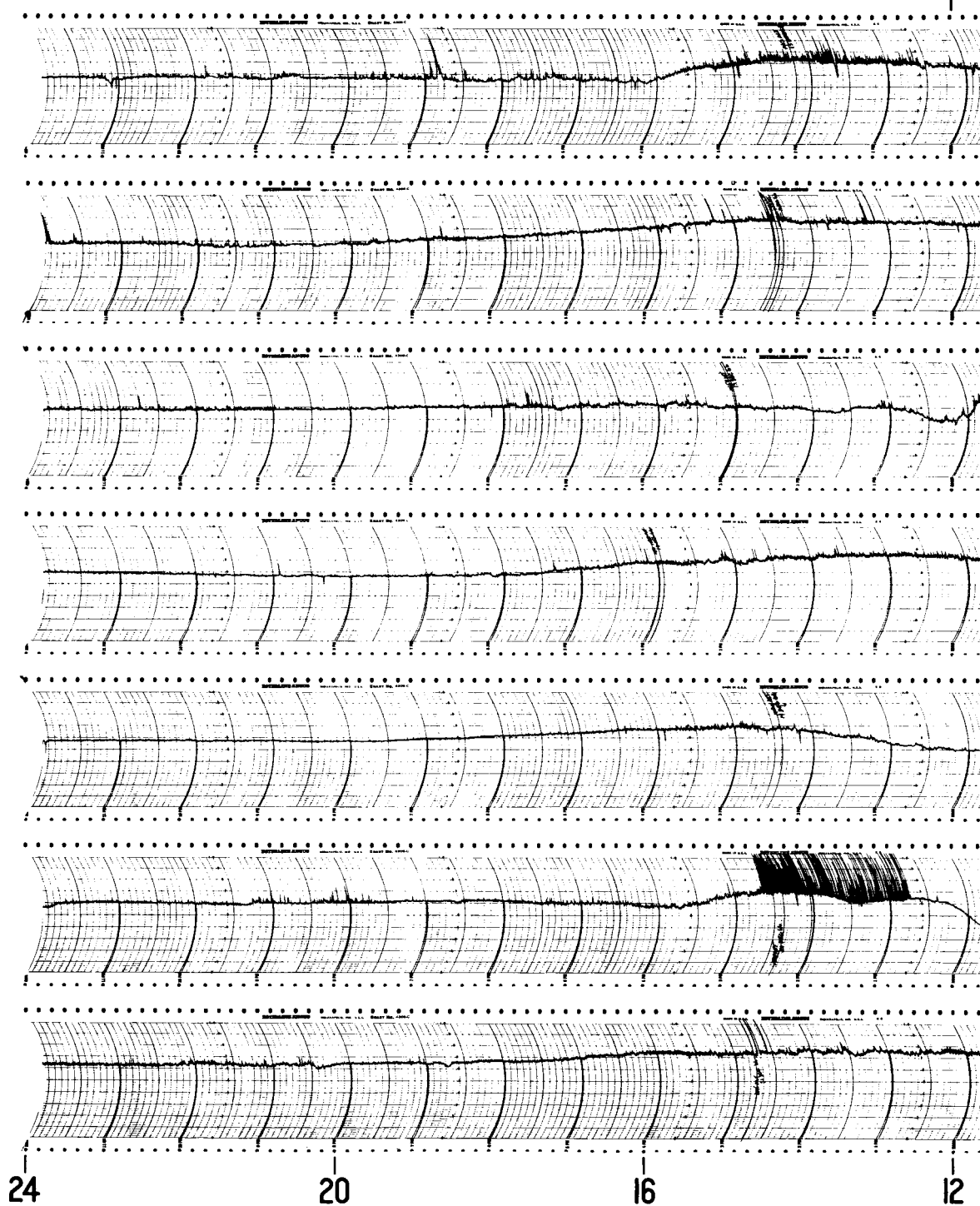
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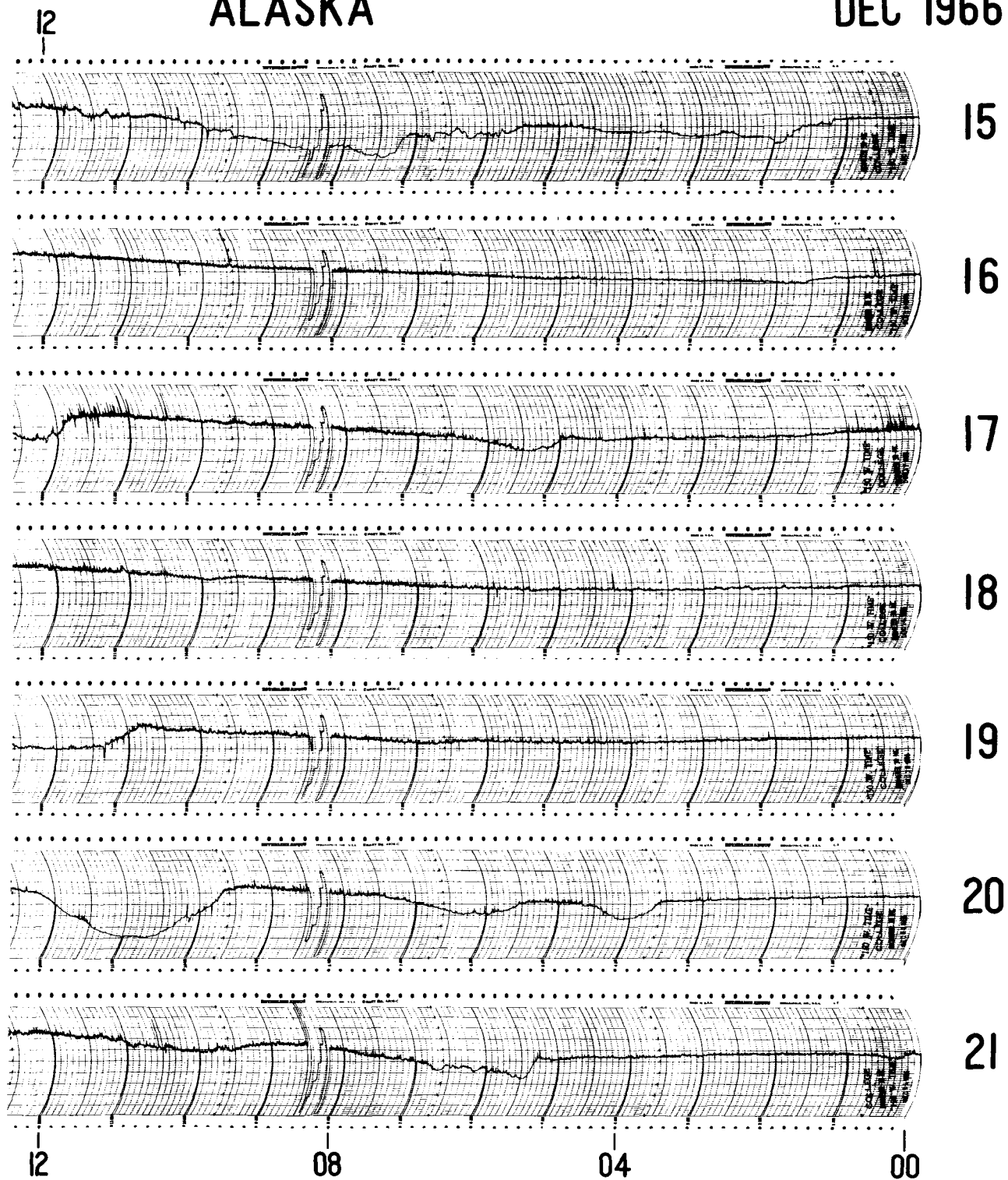
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150° WEST MERIDIAN TIME

ALASKA

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DEC 1966

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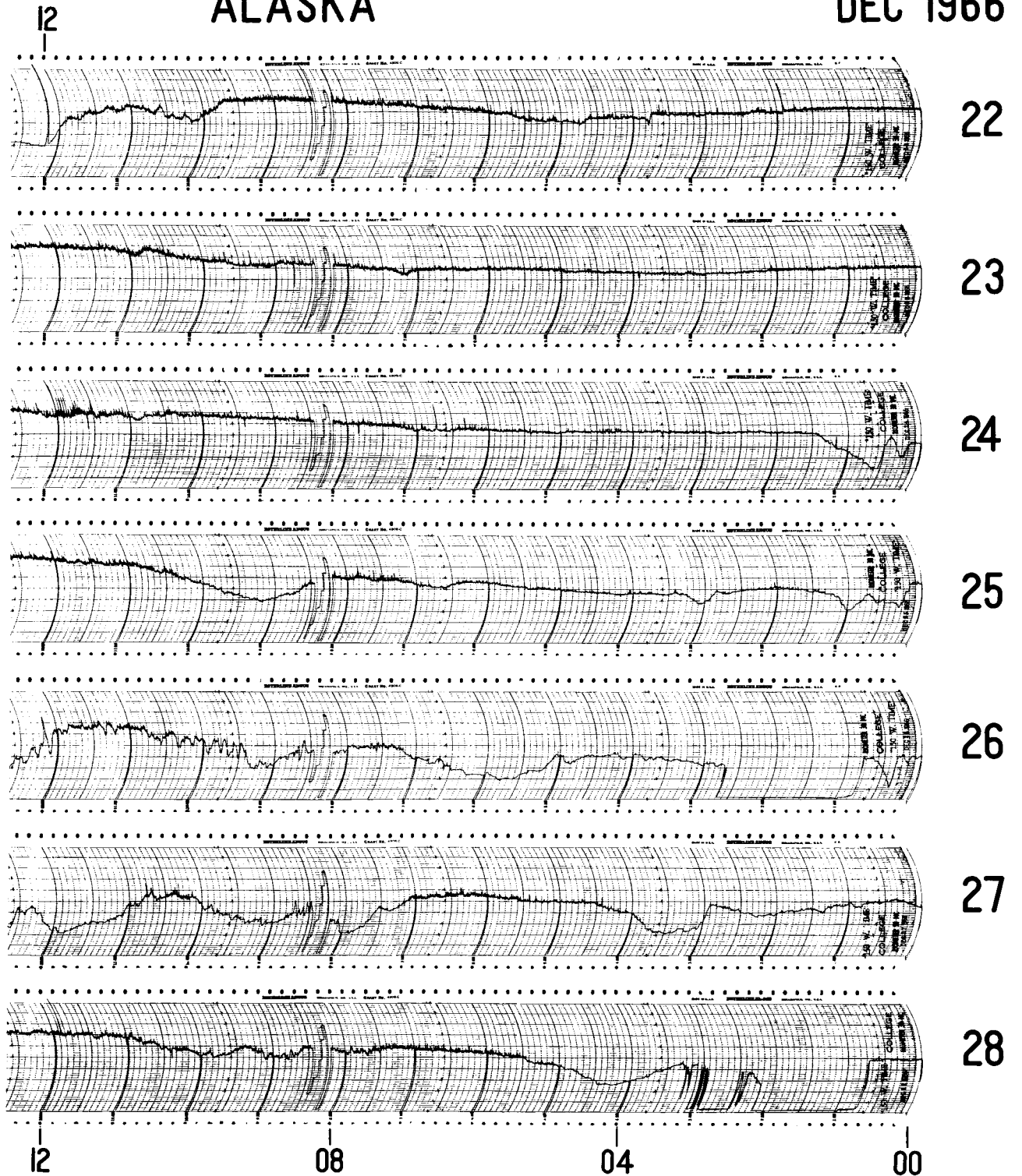
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150° WEST MERIDIAN TIME

ALASKA

DEC 1966



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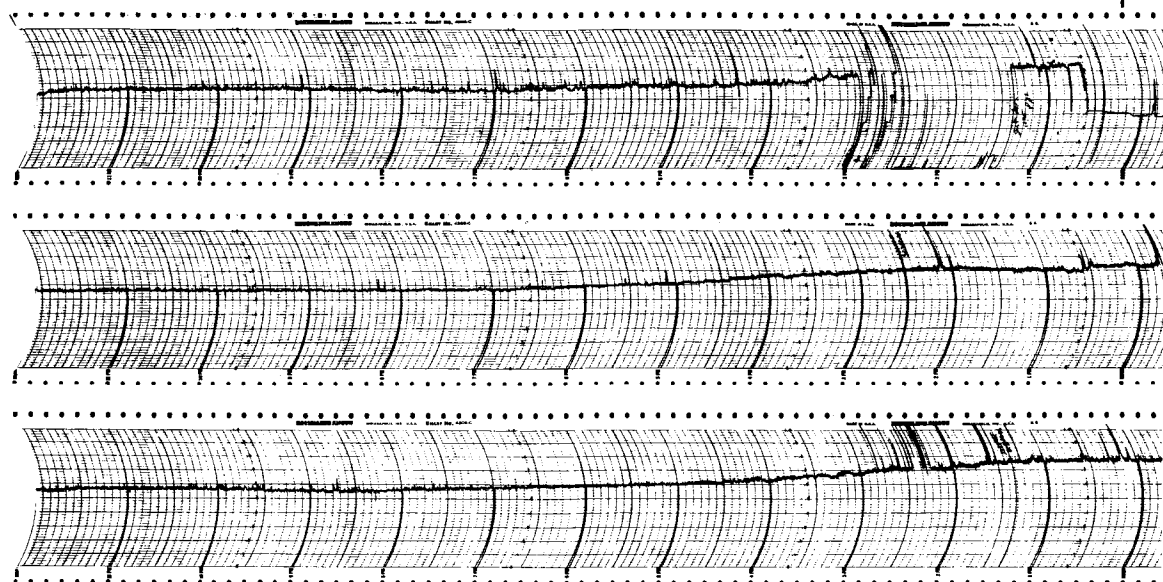
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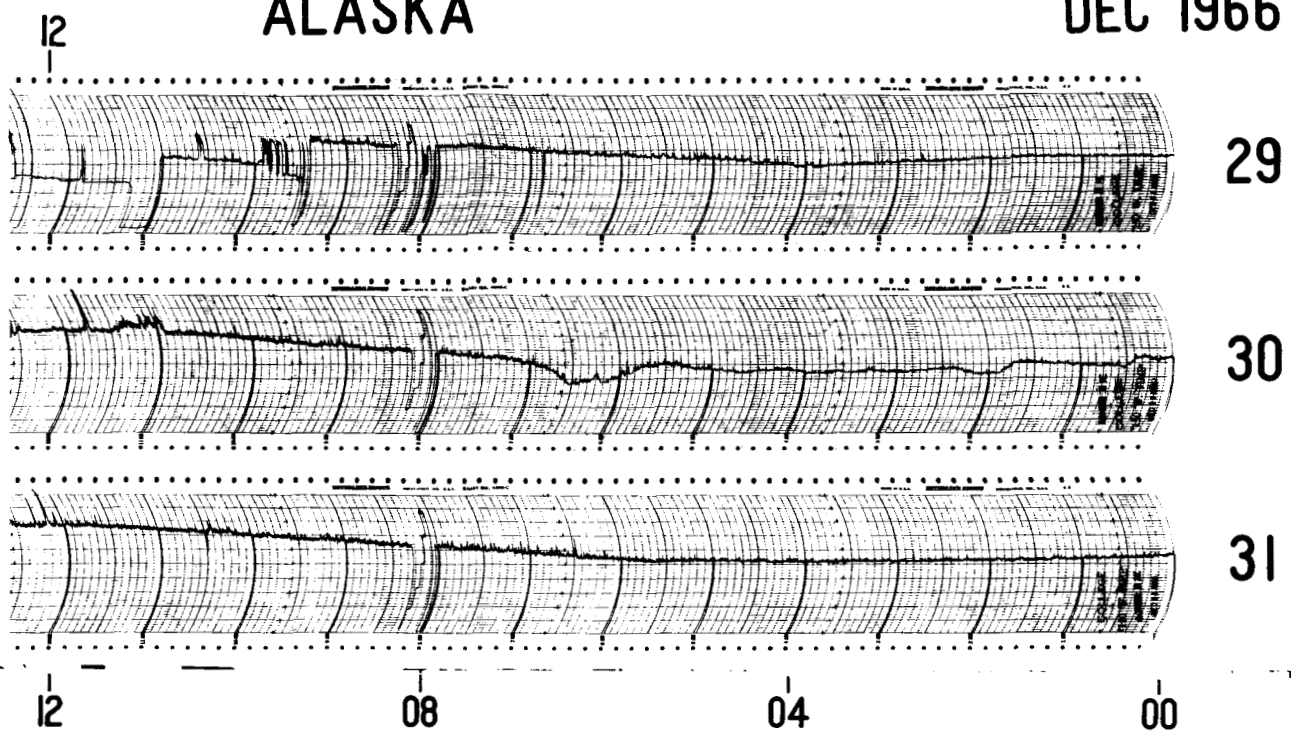
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150° WEST MERIDIAN TIME



ALASKA

DEC 1966



30 MC/S COSMIC NOISE

TELLURIC CURRENT ACTIVITY

V. P. Hessler
Professor of Geophysics

The electrode field is located south of the Geophysical Institute Ballaine Lake Field site ($64^{\circ}51'N$ and $147^{\circ}50'W$ geographic and $64^{\circ}37'N$ and $256^{\circ}30'E$ geomagnetic). The 200 meter spaced electrodes are aligned in the N-S geographic meridian.

N-S telluric current records. These records are made on an L&N Speedomax recorder, with a 5 second full scale response rate, at 3 in/hr and at 1000 mv/km full scale range. Since the telluric perturbation vector tends to be linearly polarized ($N\ 35^{\circ}W$ geographic at this site) the N-S trace alone gives a good indication of the total activity. These telluric records always carry much more fine structure than the corresponding magnetograms and thus are a more sensitive indicator of ionospheric activity.

N-S telluric amplitude activity. The N-S telluric trace is scaled for hourly values of arithmetic range in a manner similar to that used in scaling magnetic K-indices. By range is meant the difference between the greatest positive and negative departure from an arbitrarily assigned zero trace (the diurnal variation at College is negligible in comparison with the disturbance phenomena). Monthly correlation coefficients between magnetic A figures and telluric amplitude scalings are always close to 0.95. Thus the telluric amplitude activity scalings presented herein are an index of ionospheric activity similar to the K-indices, but in more detail since the scalings are arithmetic and hourly in contrast to the 3-hourly quasi-logarithmic K-indices.

Telluric fluctuation activity. The fluctuation count is made on the same recorder as the N-S trace. The equipment consists of a 10-point stepping relay, a clutch driven microswitch, and an operations pen attached to the recorder. The switch is closed as the pen starts upscale and opens as it starts downscale. Thus within the sensitivity of the equipment the stepping relay advances one step for each cycle of fluctuations regardless of amplitude or pen position. At a recorder full scale range of 1000 mv/km the equipment will record fluctuations down to 5 mv/km. The data serve as an index of micropulsations activity showing diurnal, seasonal and sunspot cycle variations. The nighttime fluctuations are closely correlated with aurorally associated cosmic noise absorption. An indication of the micropulsation period in seconds can be obtained by dividing 3600 by the cycle per hour value.

The collection, analysis, and publication of these telluric current records and scalings is supported in part by the Air Force Cambridge Research Laboratories, Office of Aerospace Research under Contract No. AF 19(628)-1695, monitored by Mr. Elwood Maple.

N-STELLURIC CURRENT

OCT 1966

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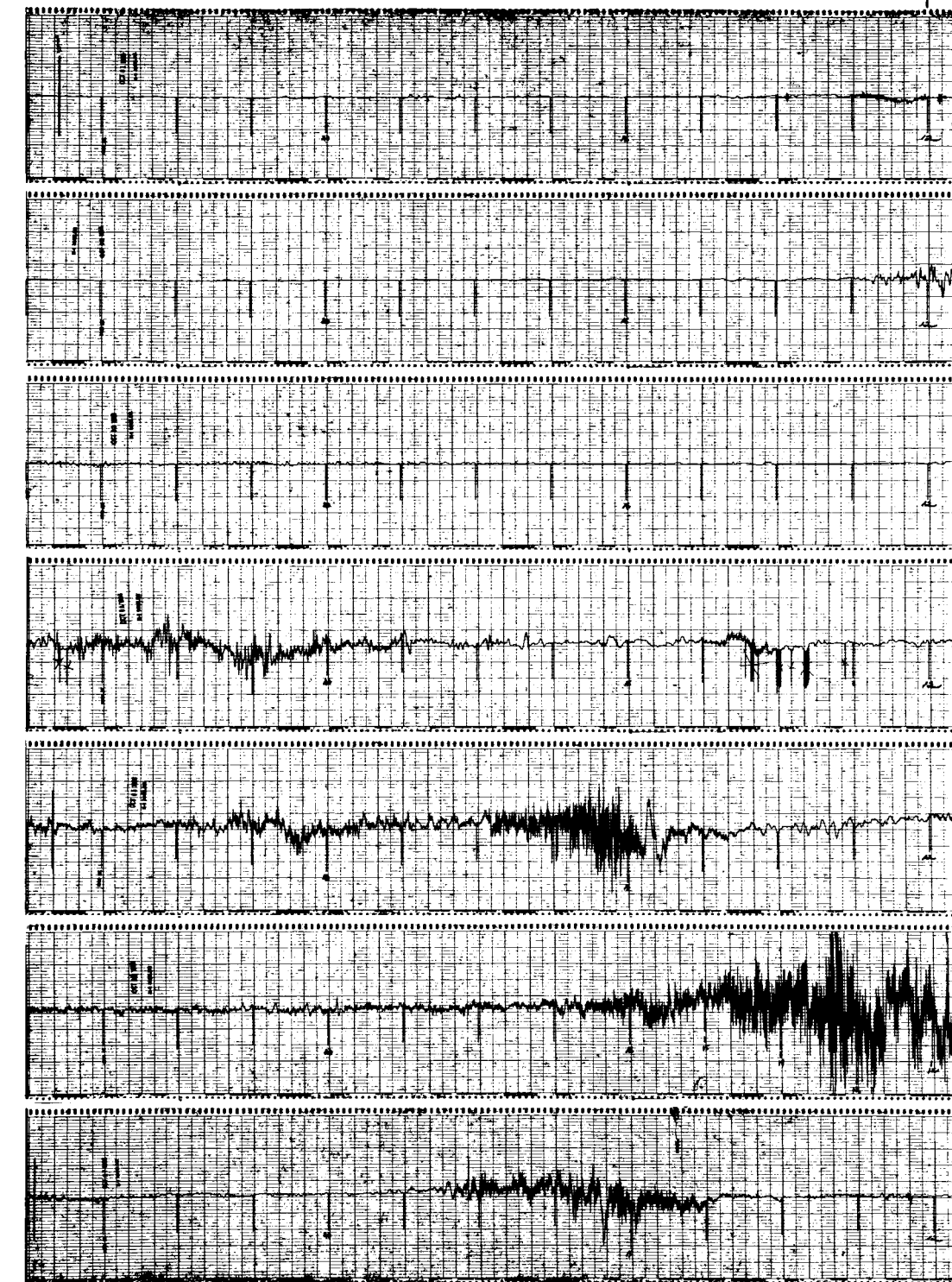
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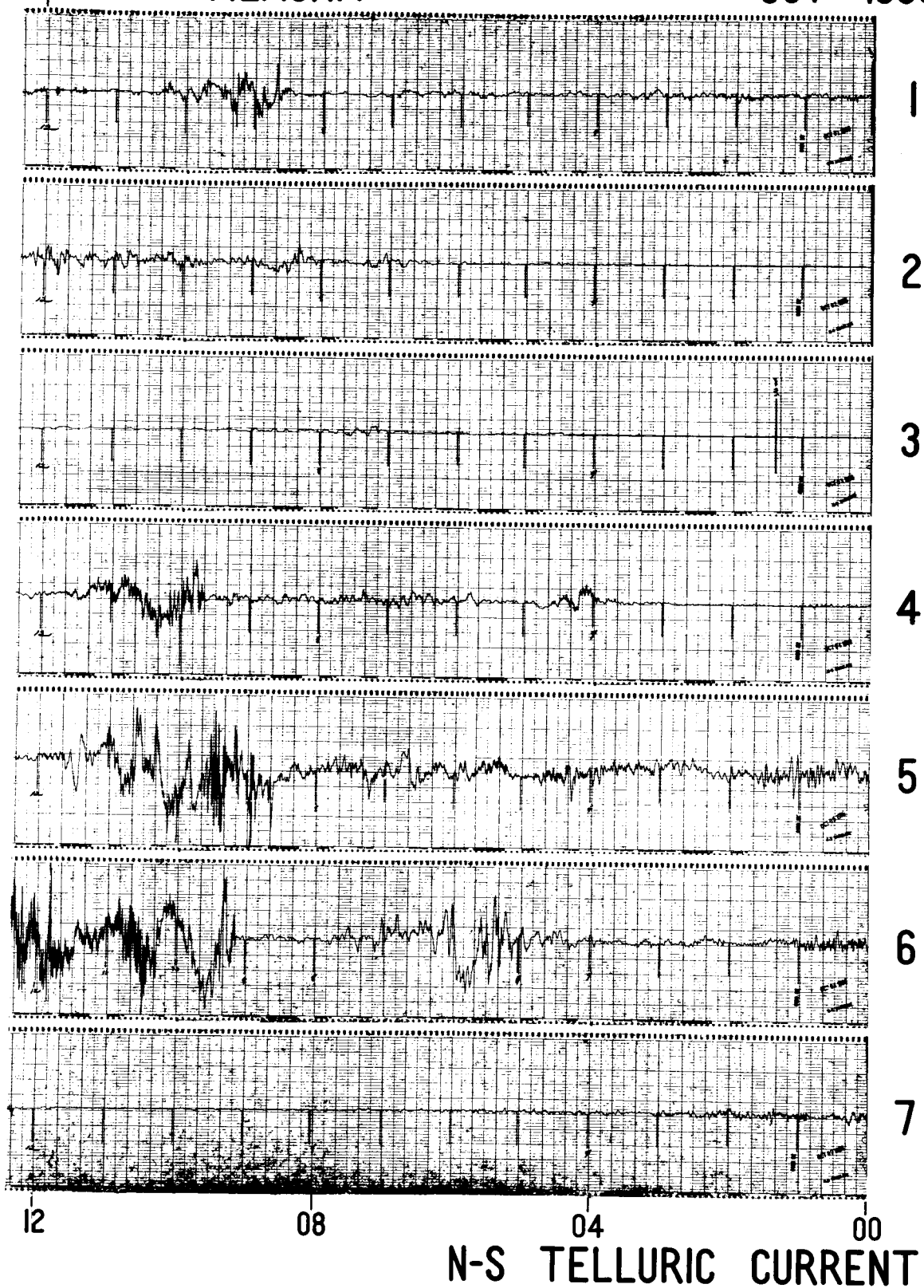
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UNIVERSAL TIME

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ALASKA

OCT 1966



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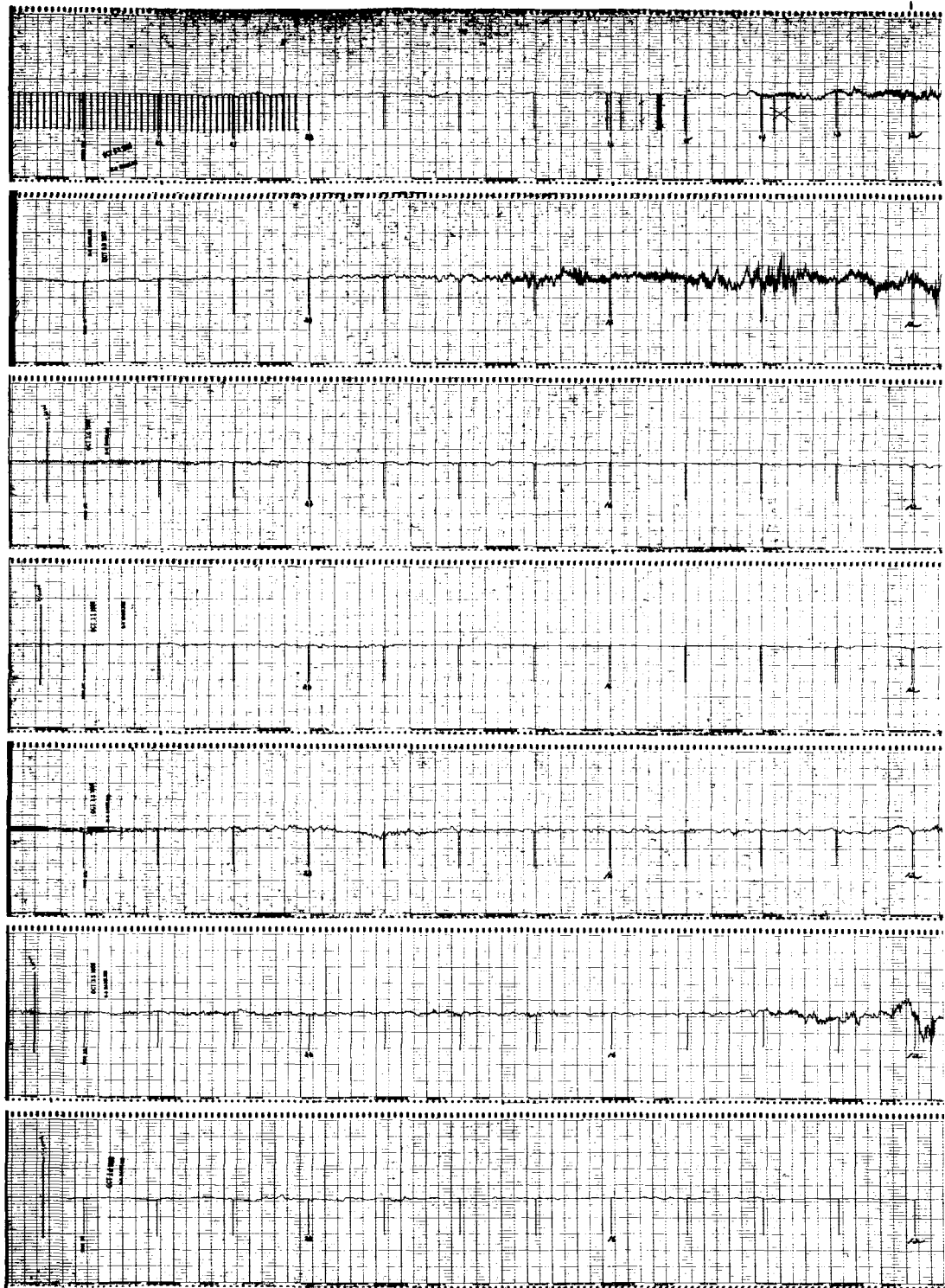
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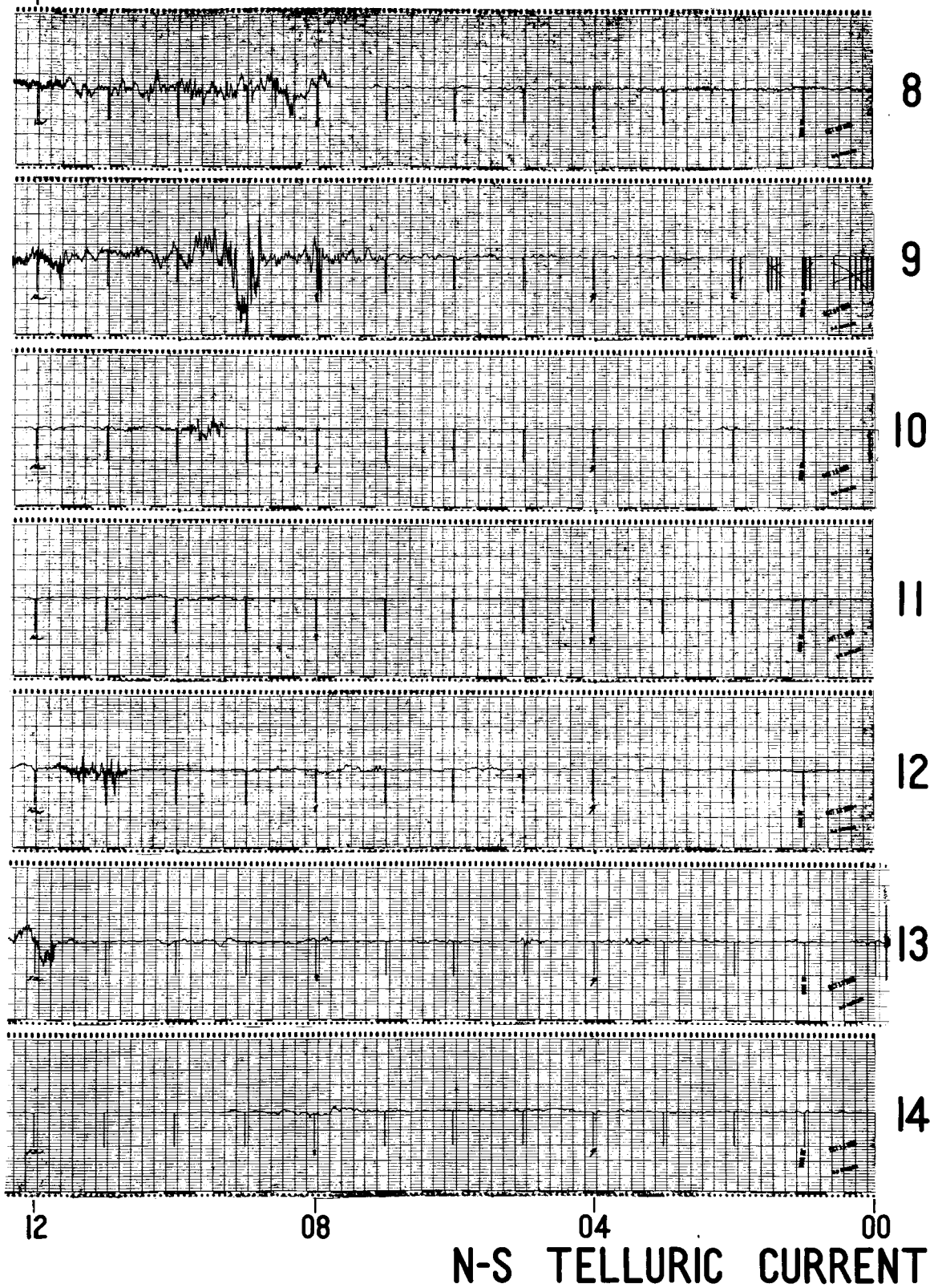
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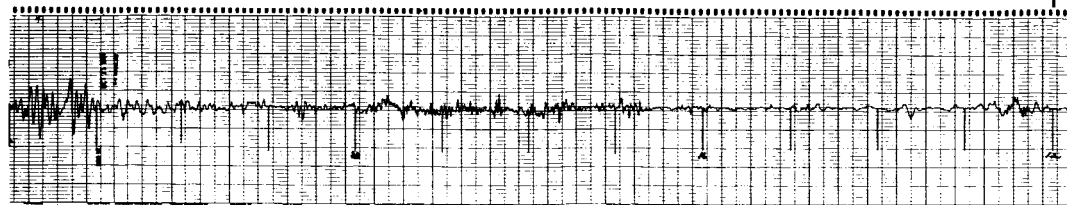


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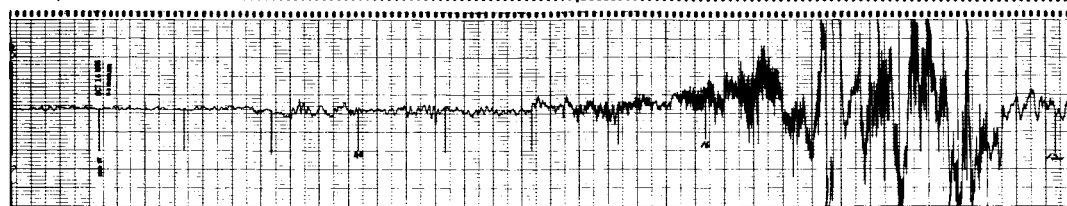
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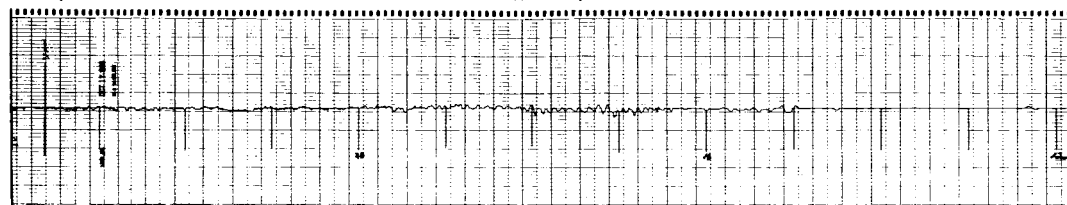
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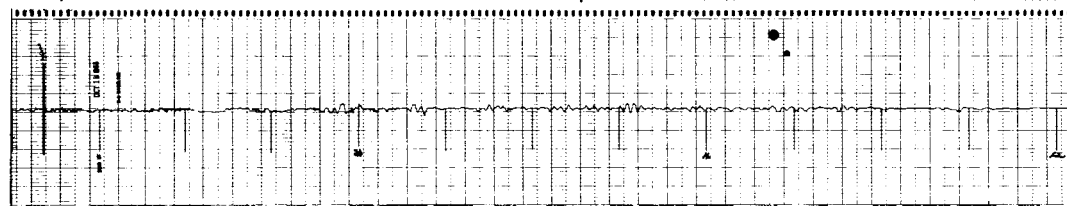
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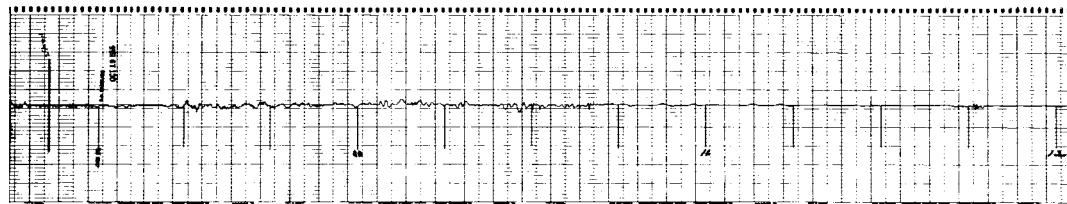
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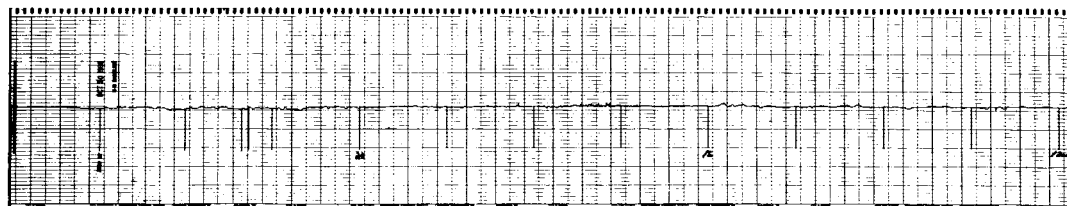
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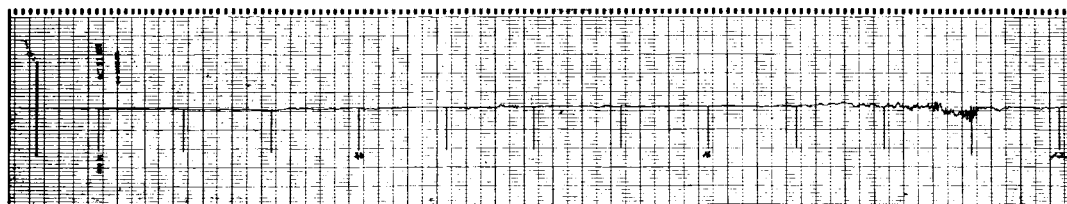
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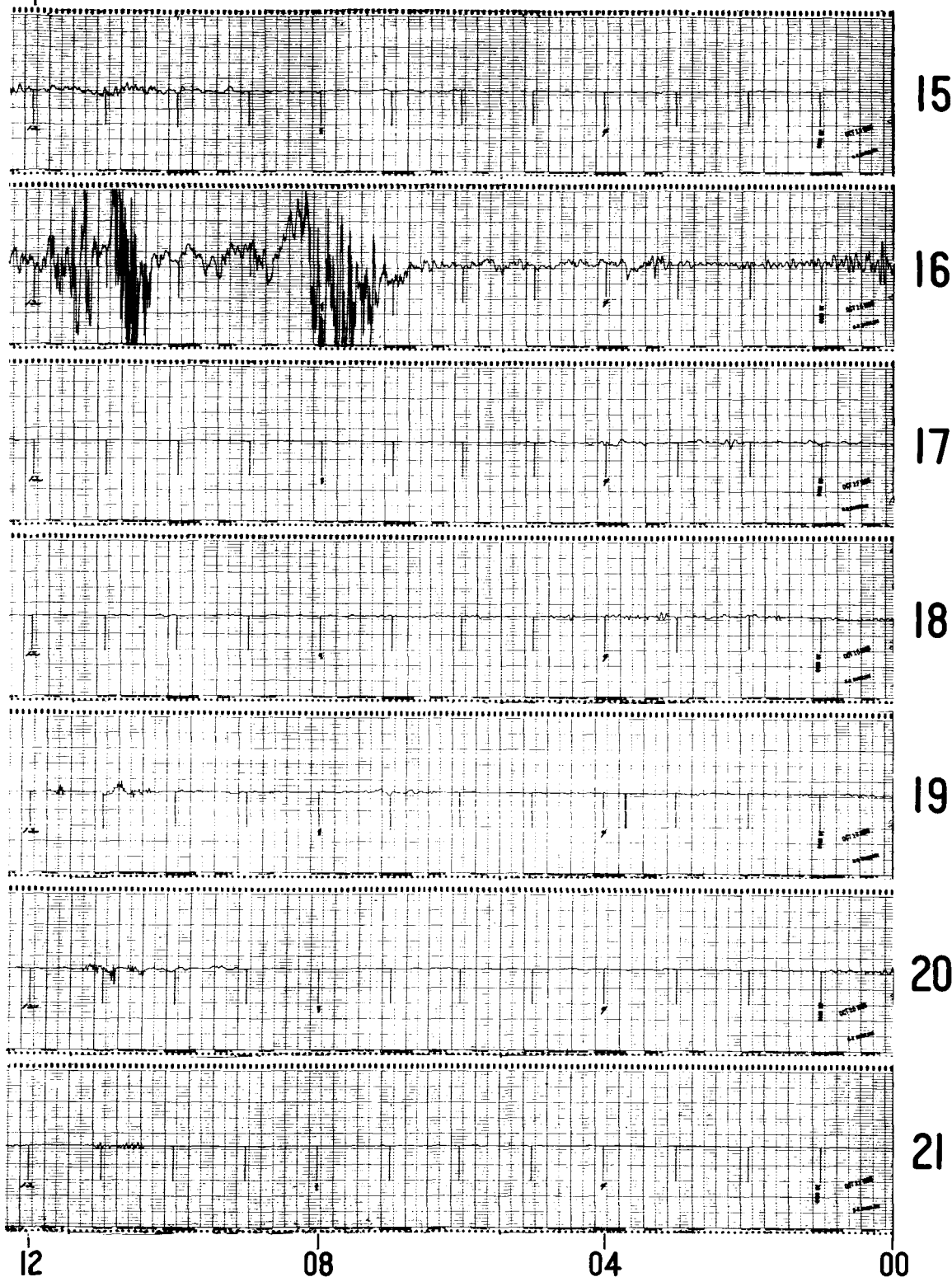
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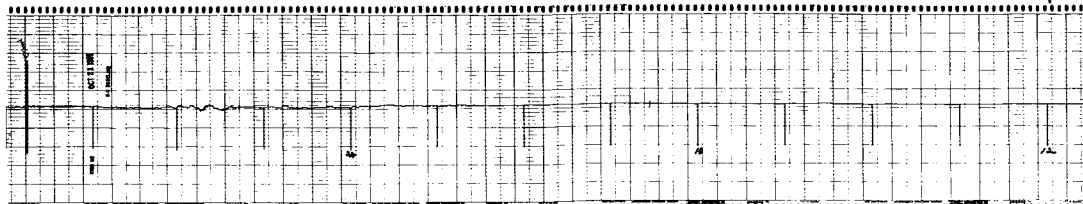
N-S TELLURIC CURRENT

OCT 1966

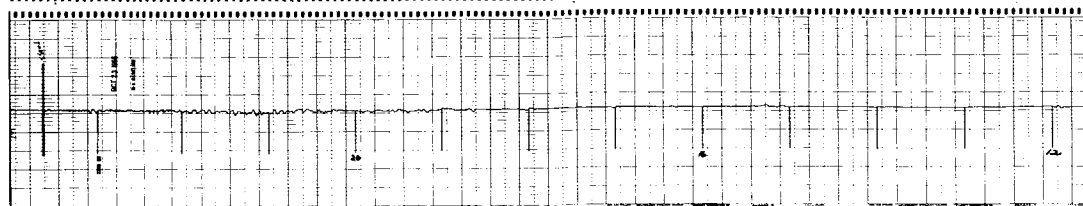
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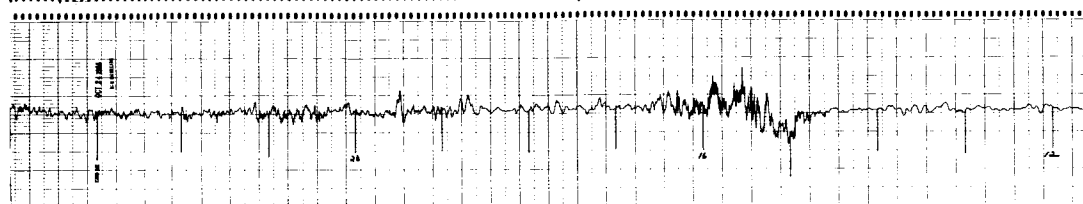
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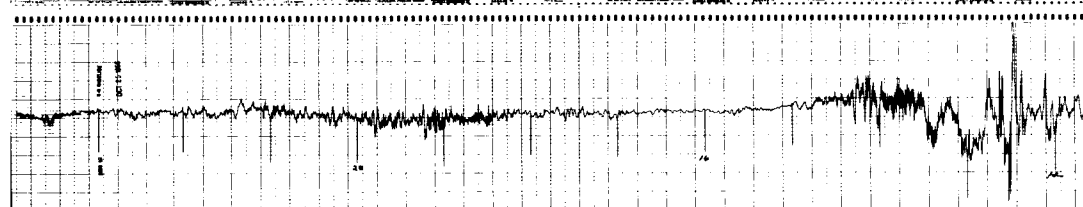
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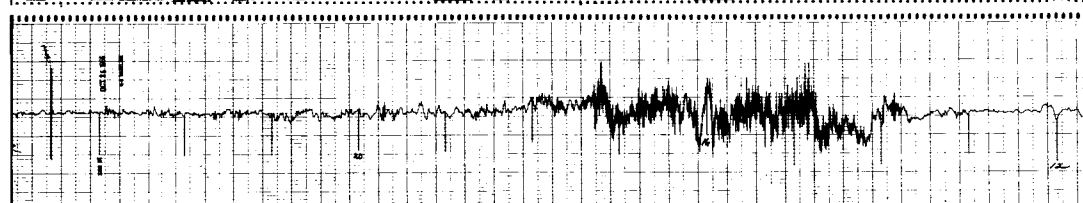
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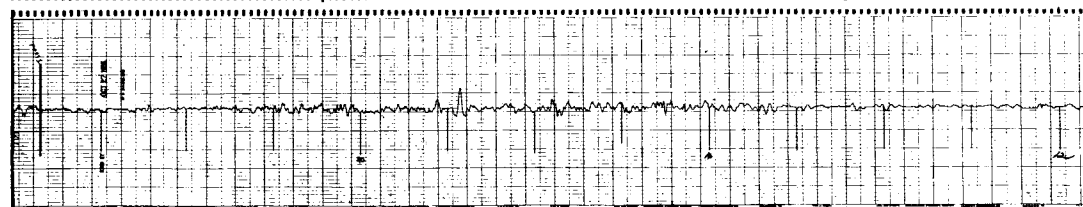
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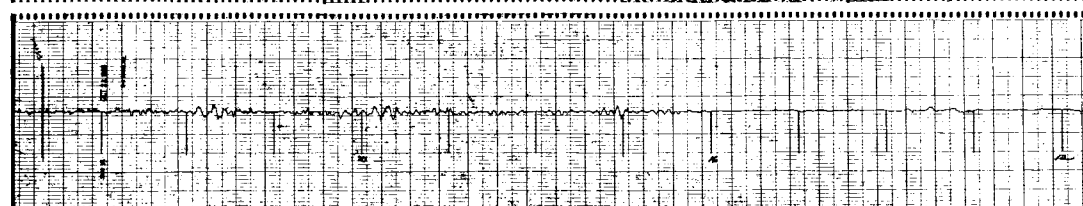
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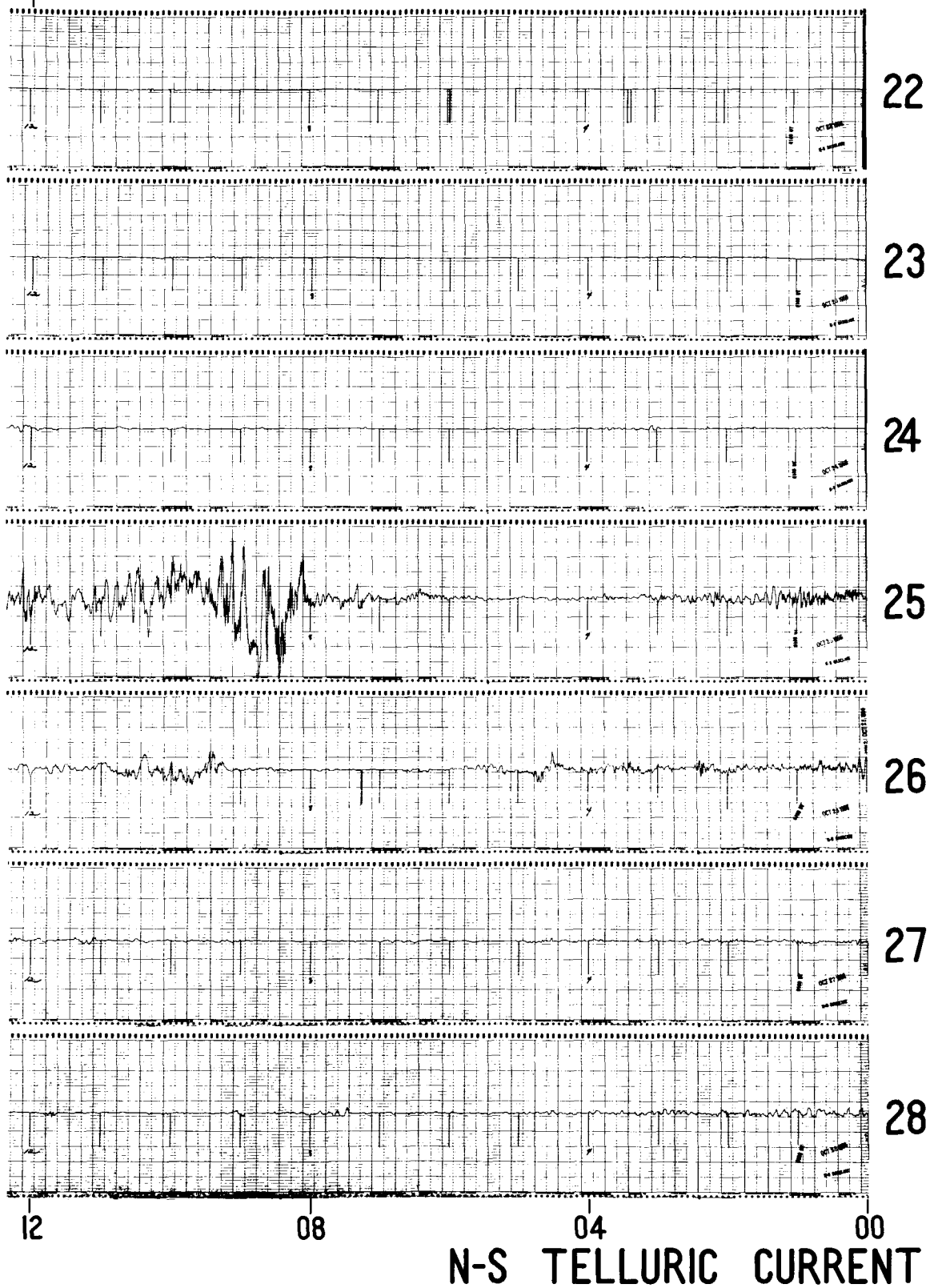
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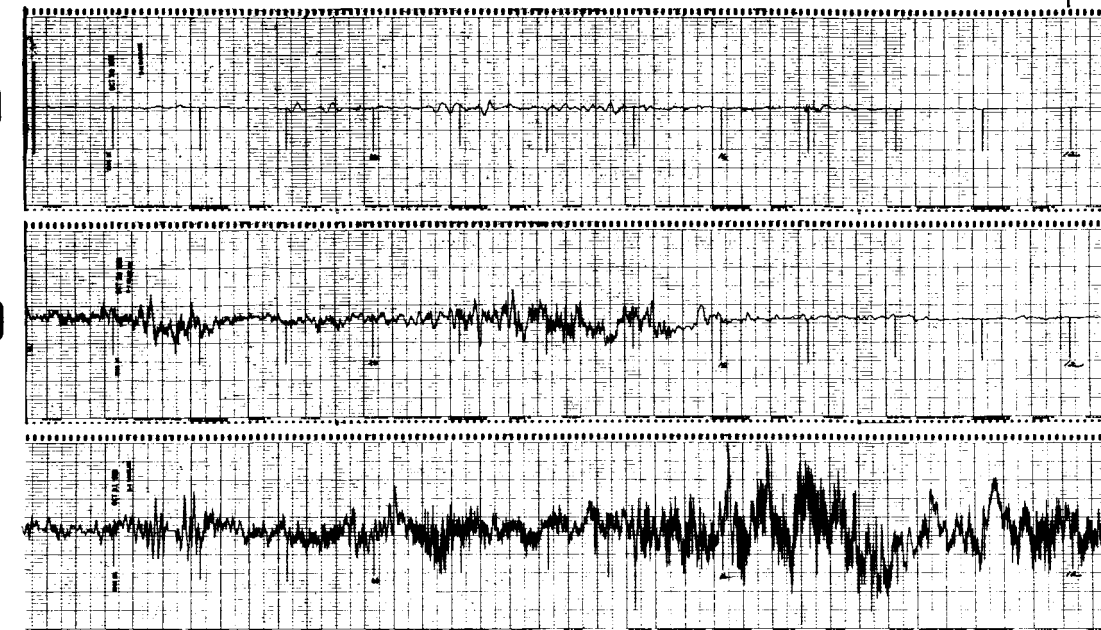
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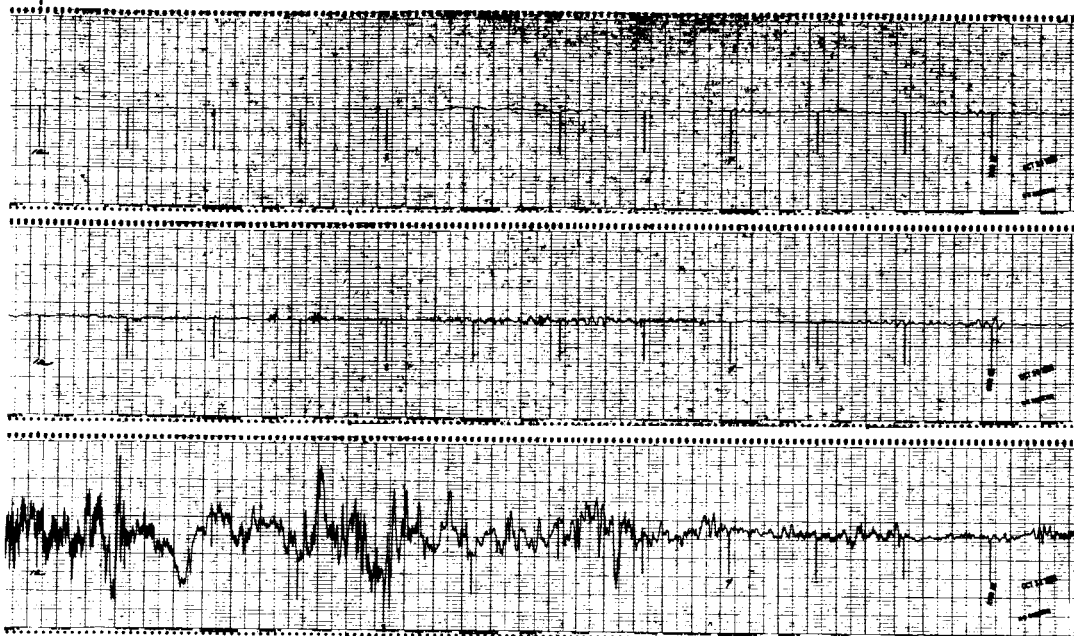
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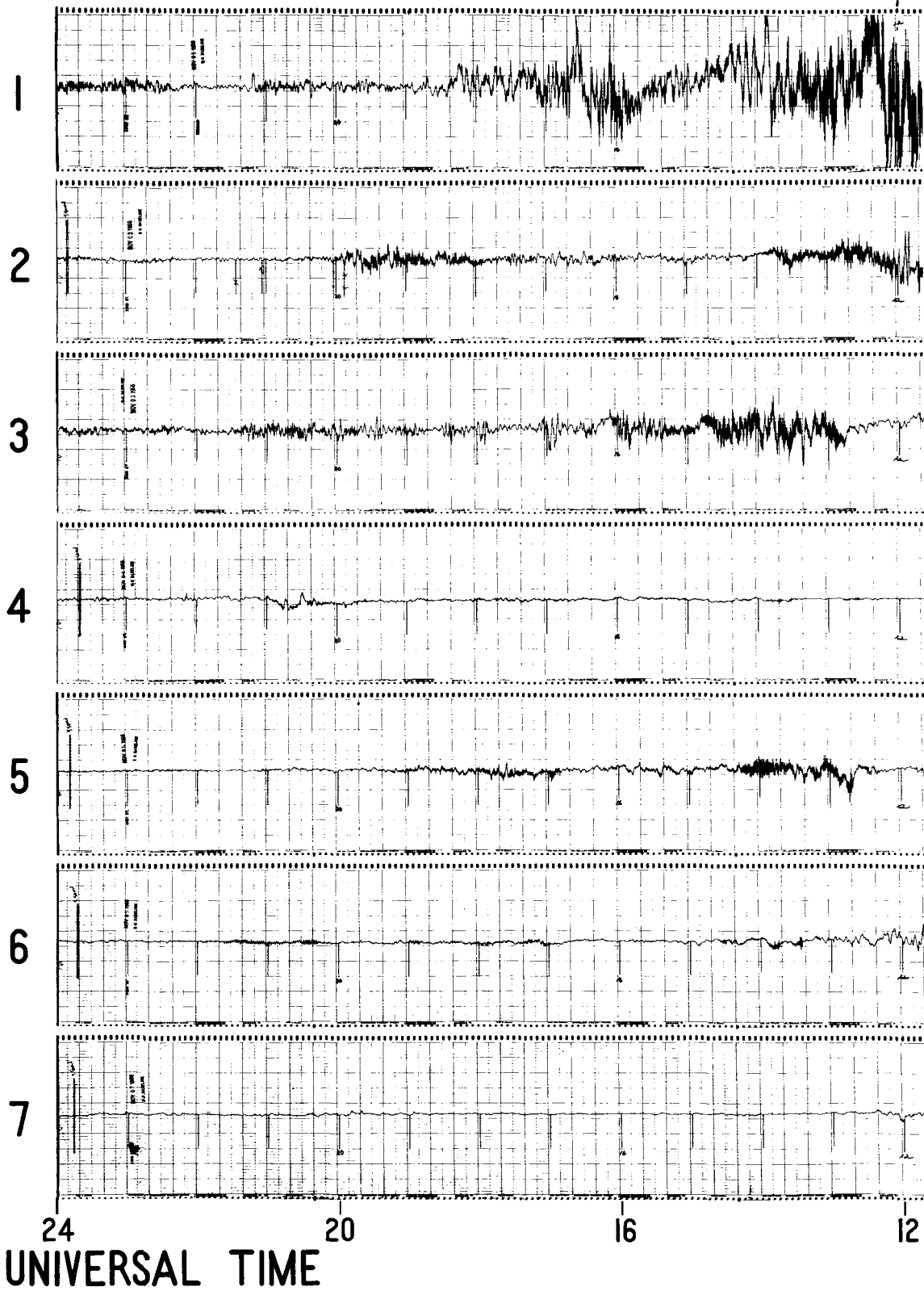
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N-S TELLURIC CURRENT

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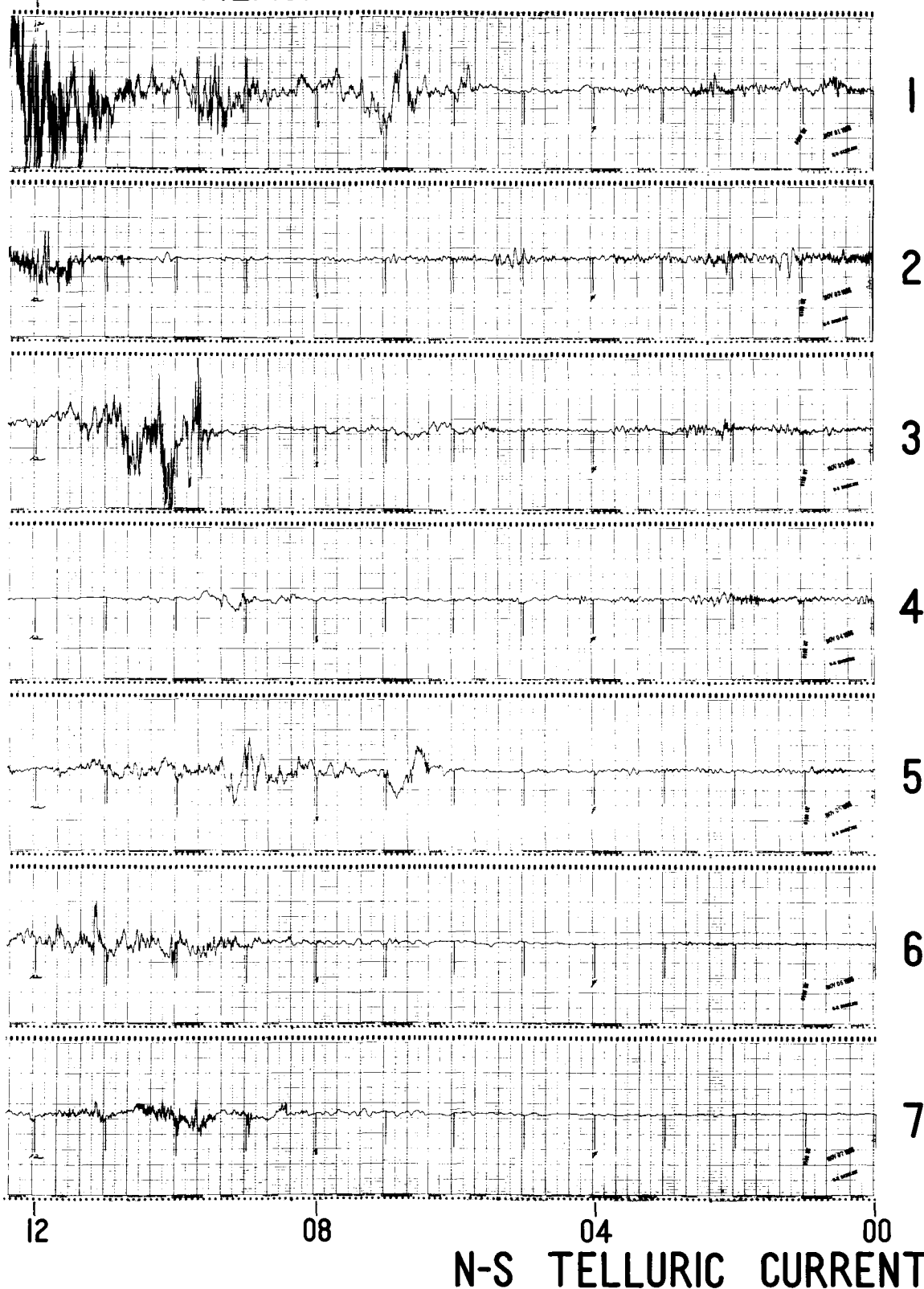
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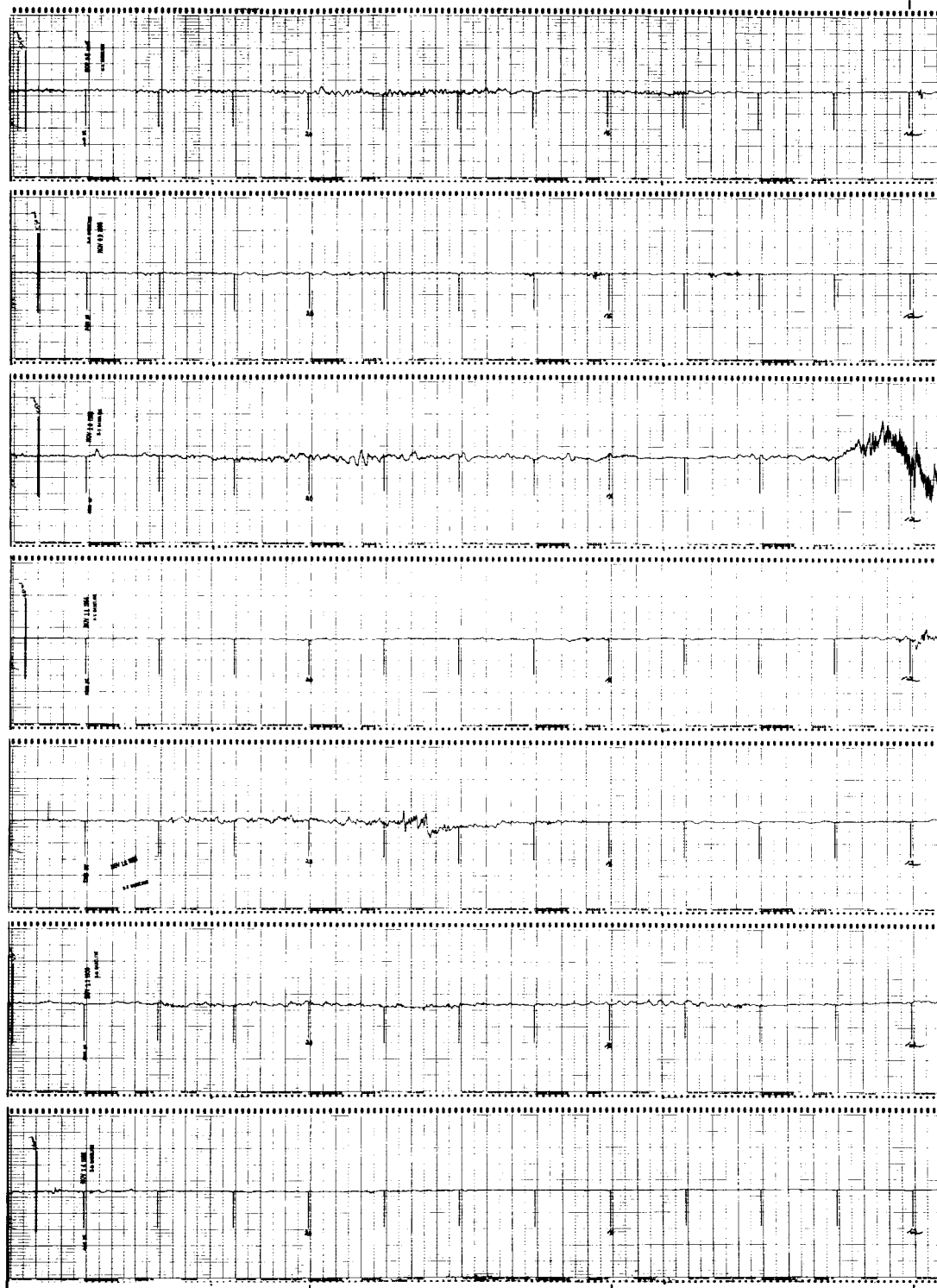
24

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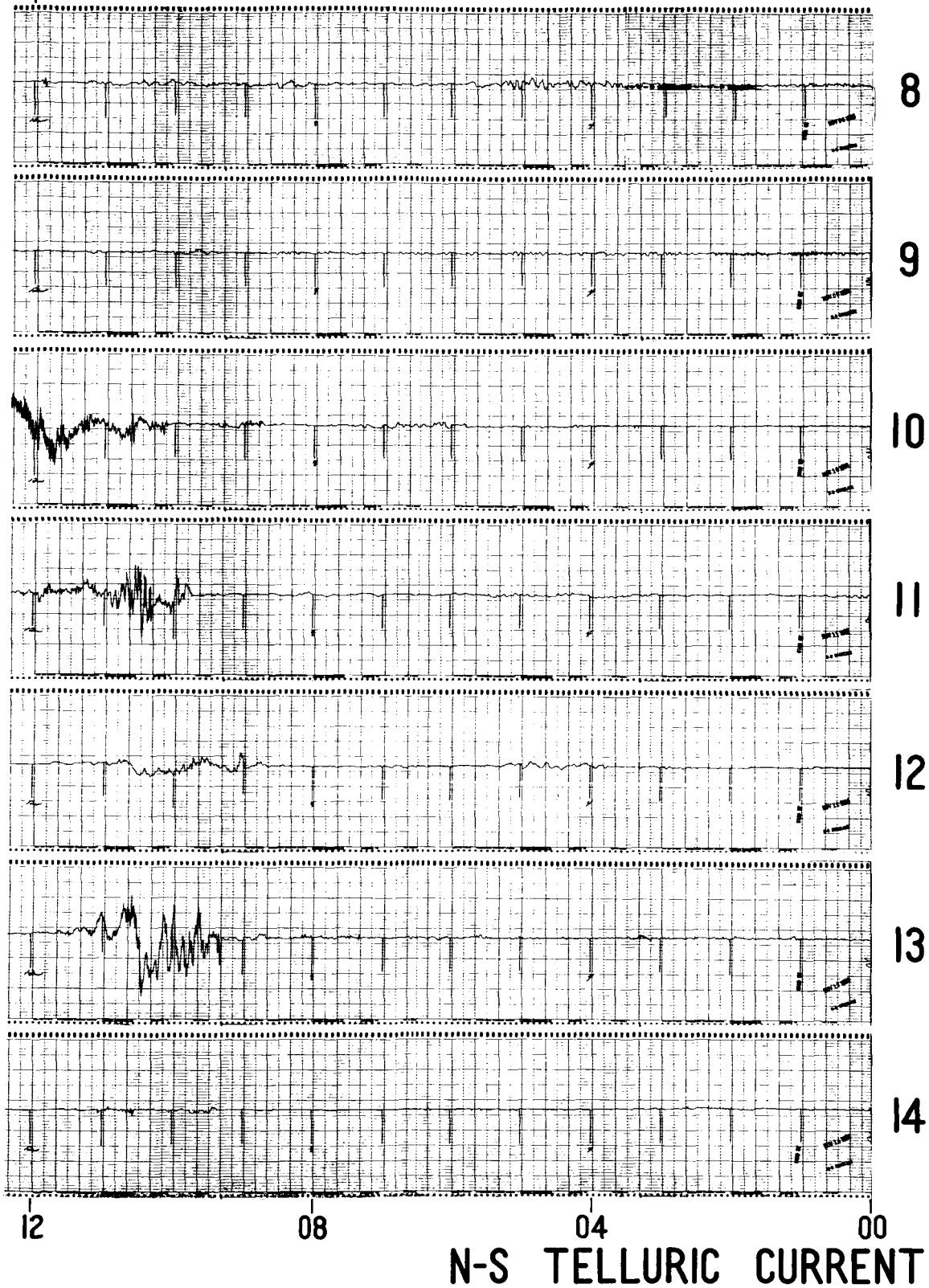
UNIVERSAL TIME



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ALASKA

NOV 1966

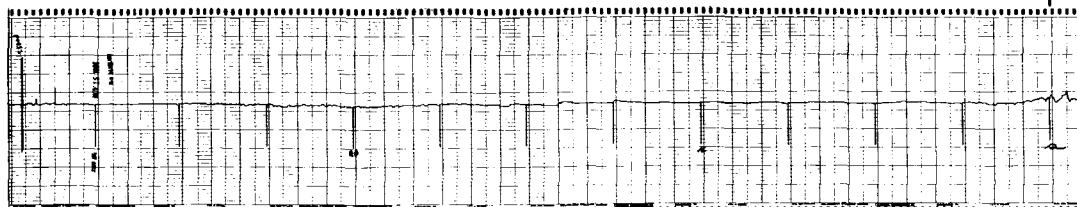


NOV 1966

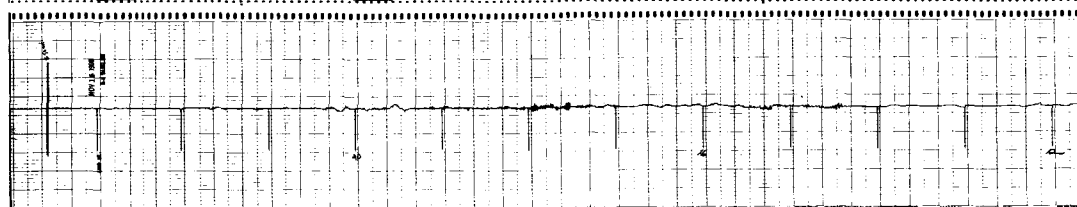
COLLEGE

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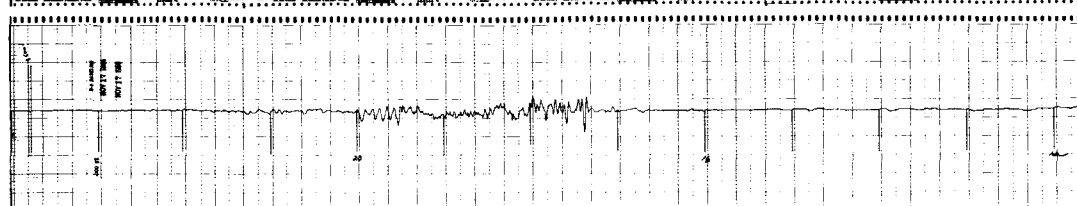
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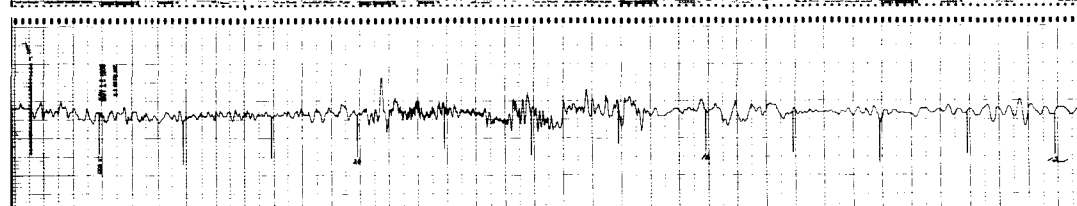
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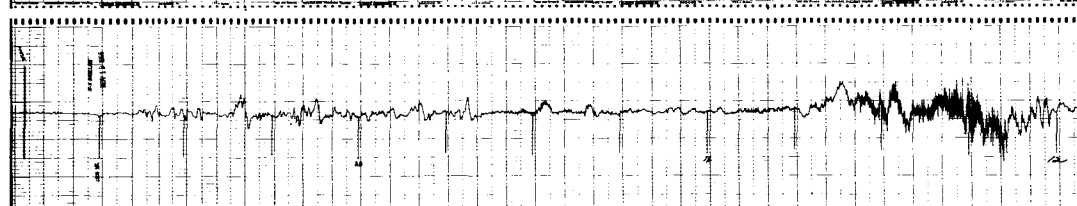
17



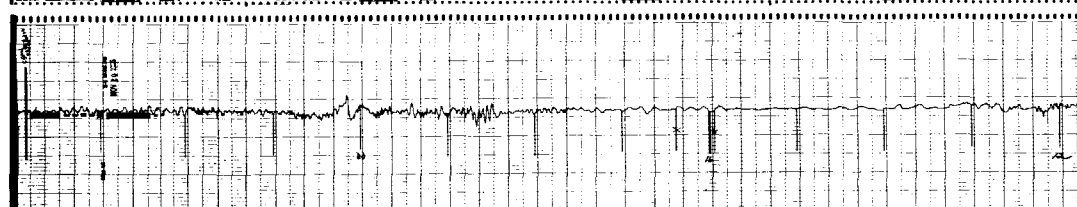
18



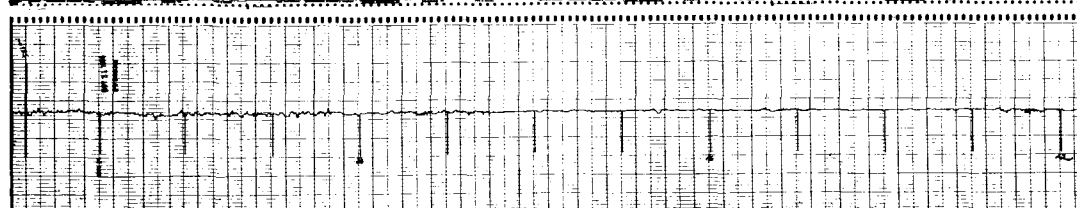
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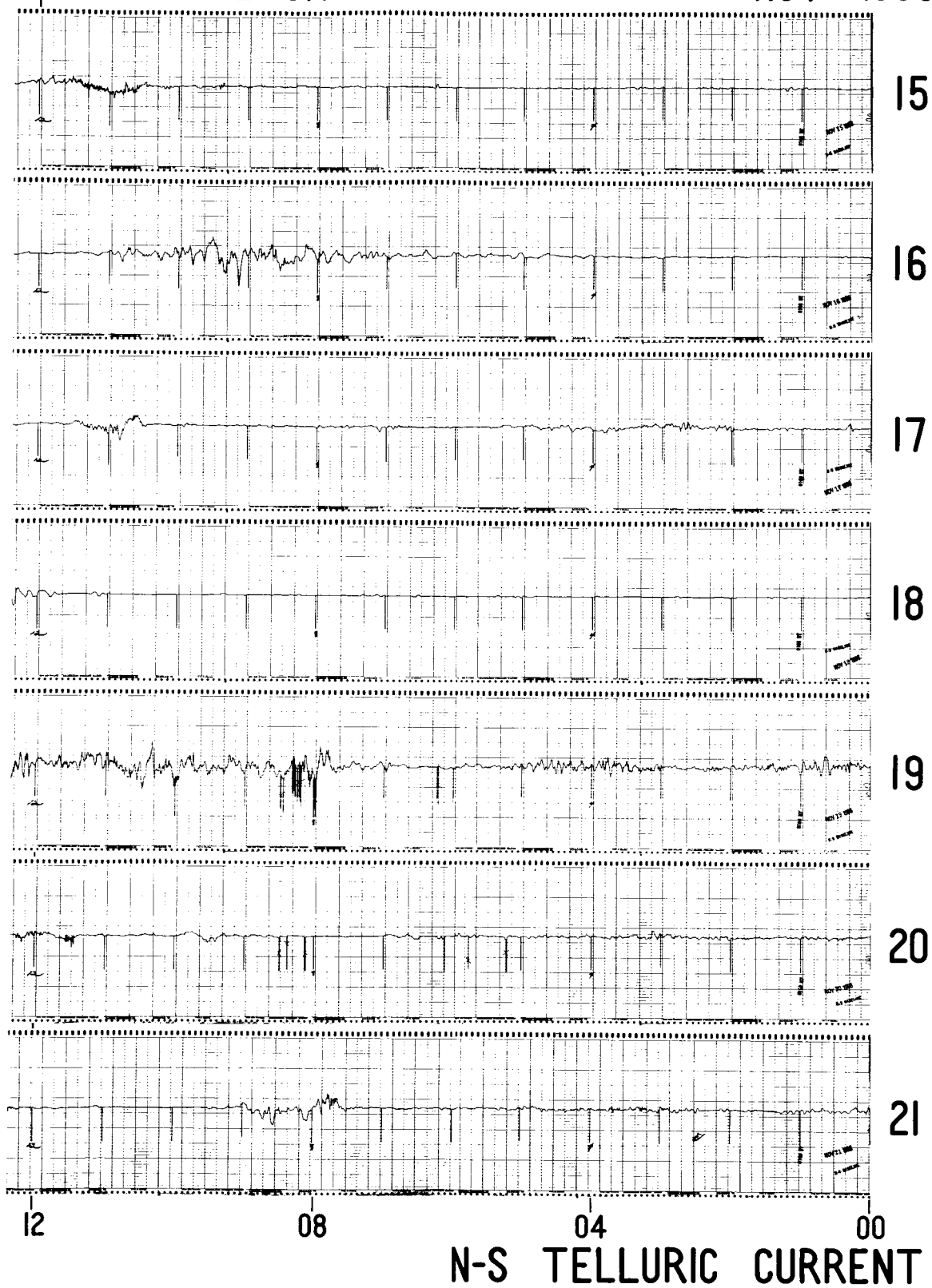
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UNIVERSAL TIME

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ALASKA

NOV 1966



NOV 1966

COLLEGE

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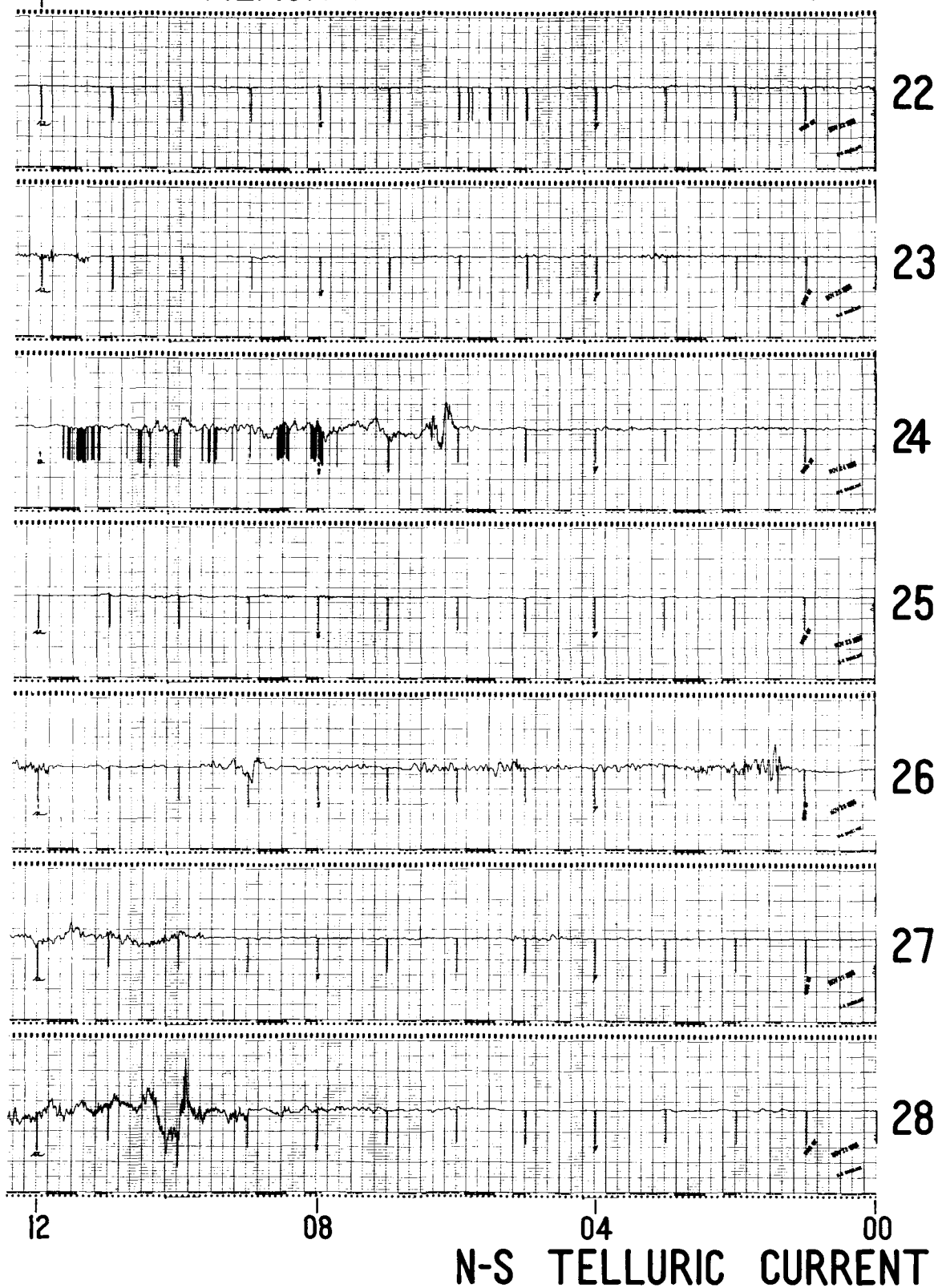
24 20 16 12
UNIVERSAL TIME



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ALASKA

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NOV 1966

COLLEGE

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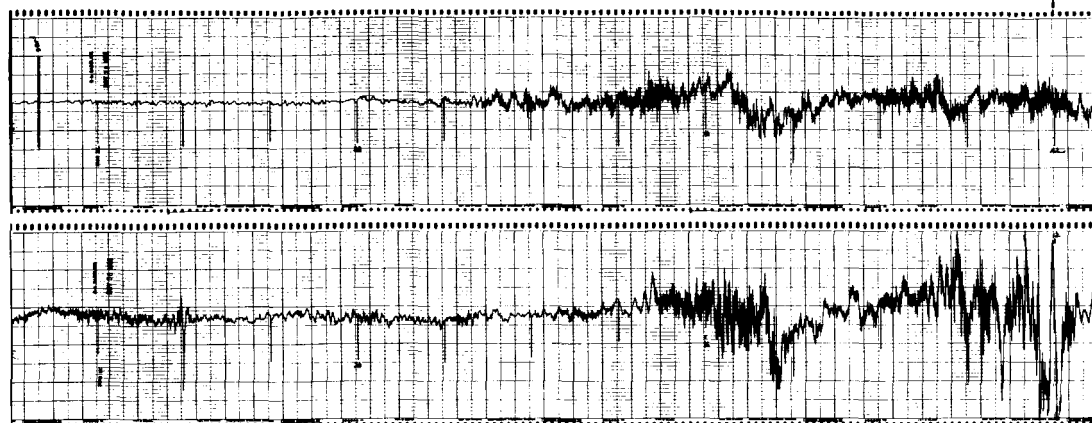
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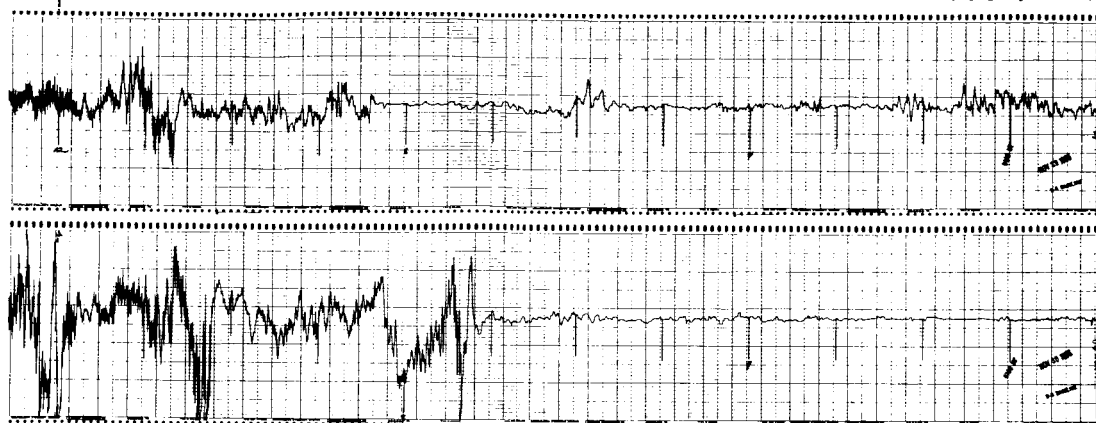
UNIVERSAL TIME



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N-S TELLURIC CURRENT

DEC 1966

COLLEGE

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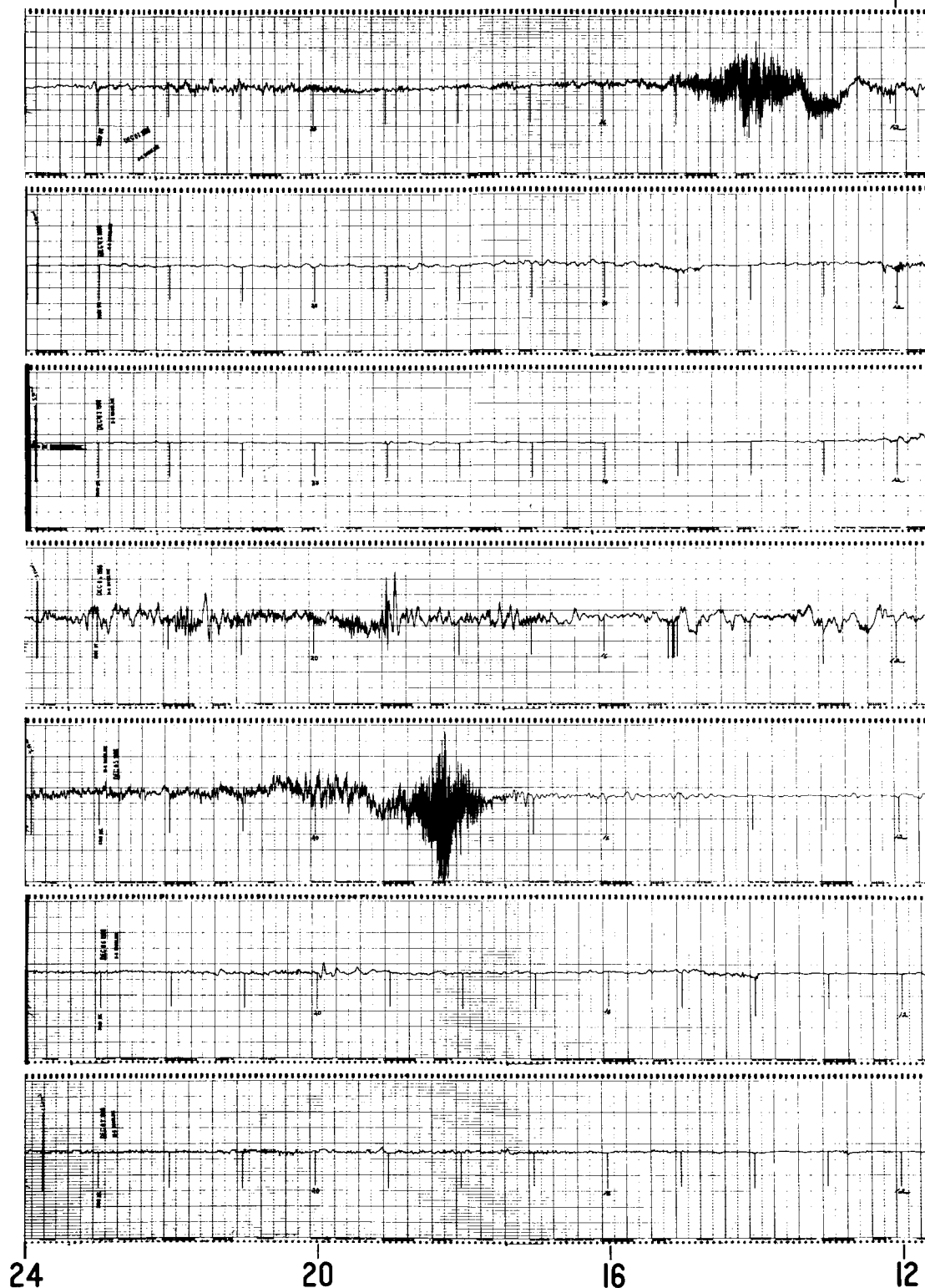
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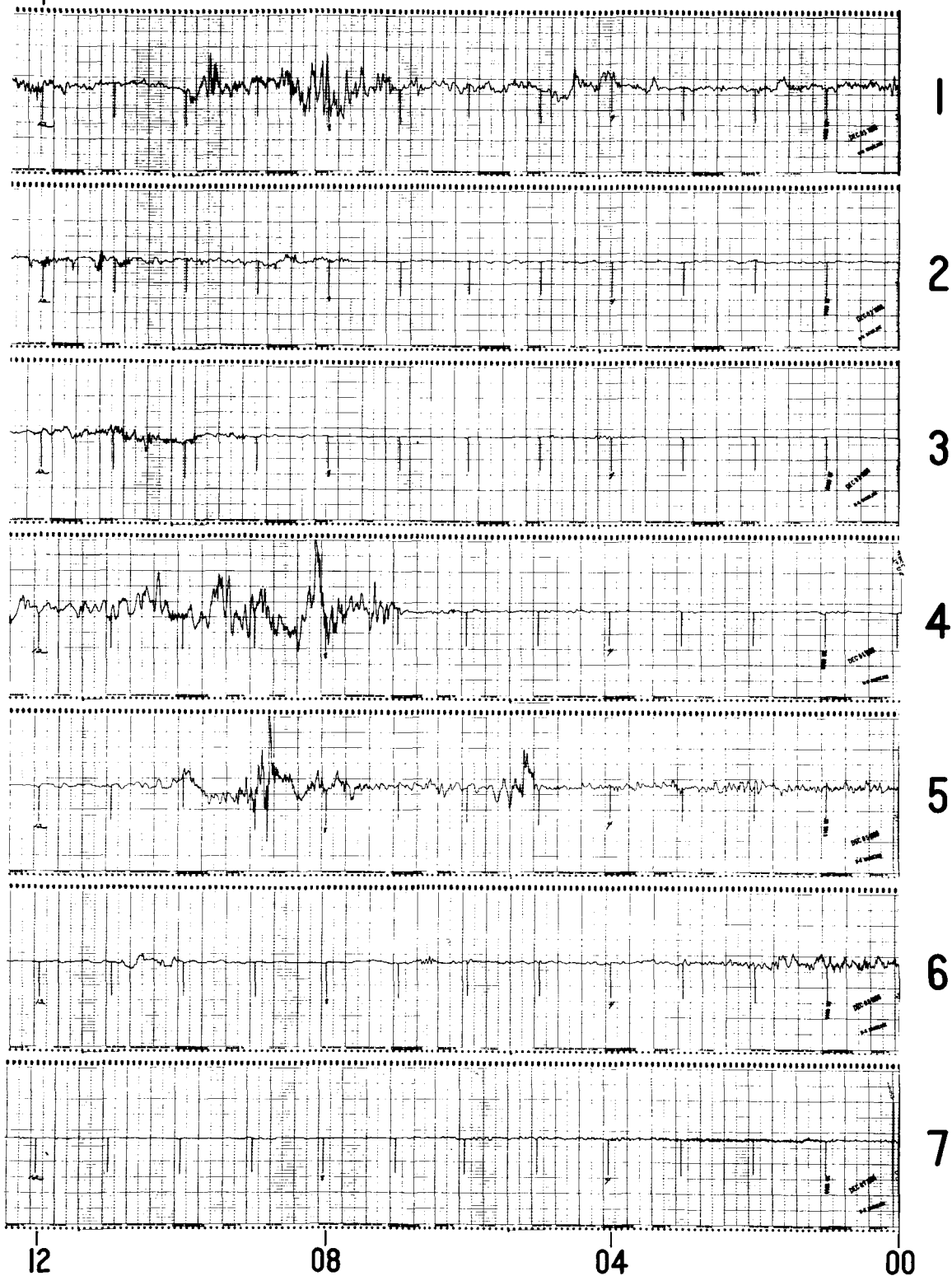


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UNIVERSAL TIME

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ALASKA

DEC 1966



N-S TELLURIC CURRENT

DEC 1966

COLLEGE

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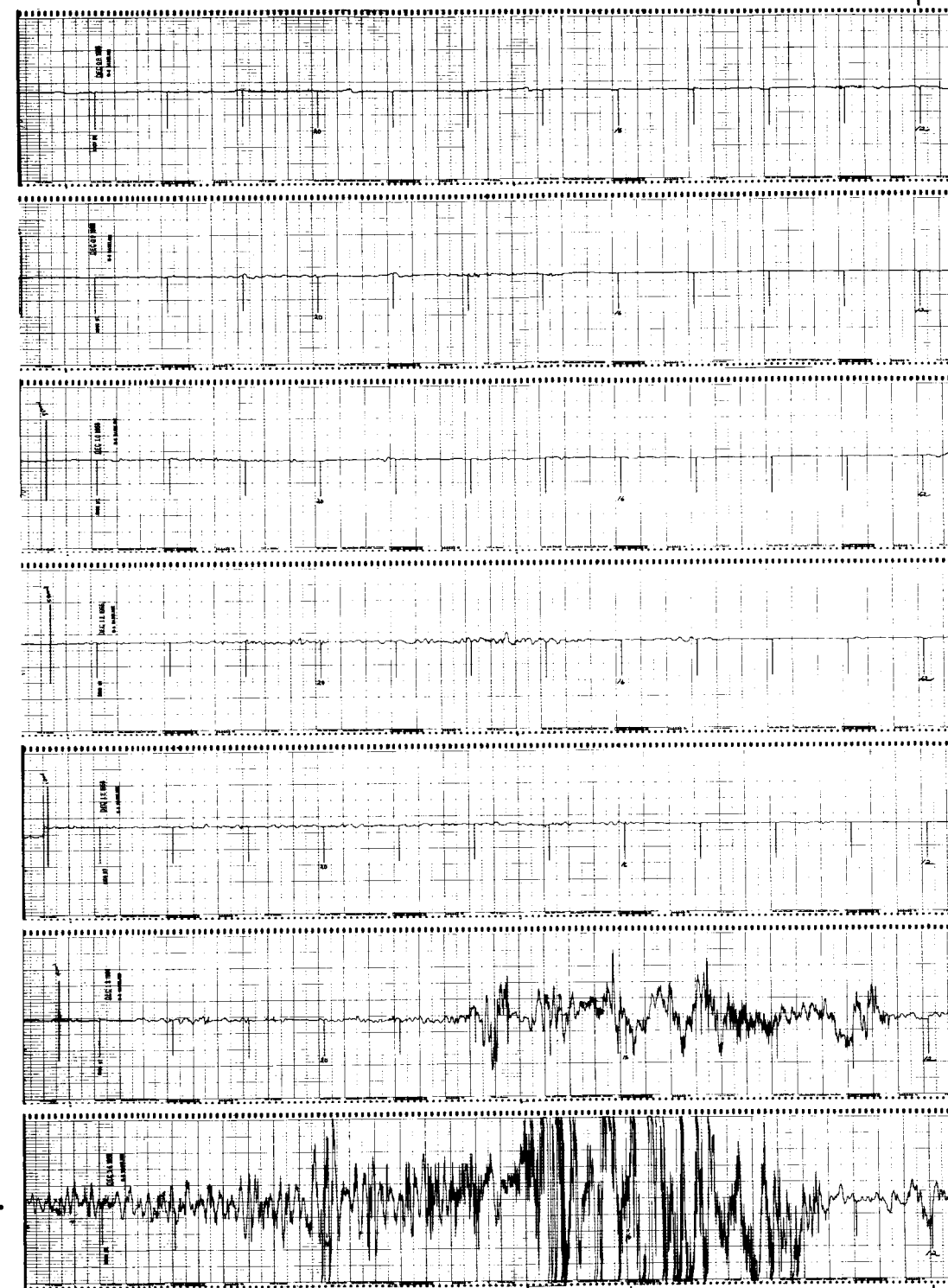
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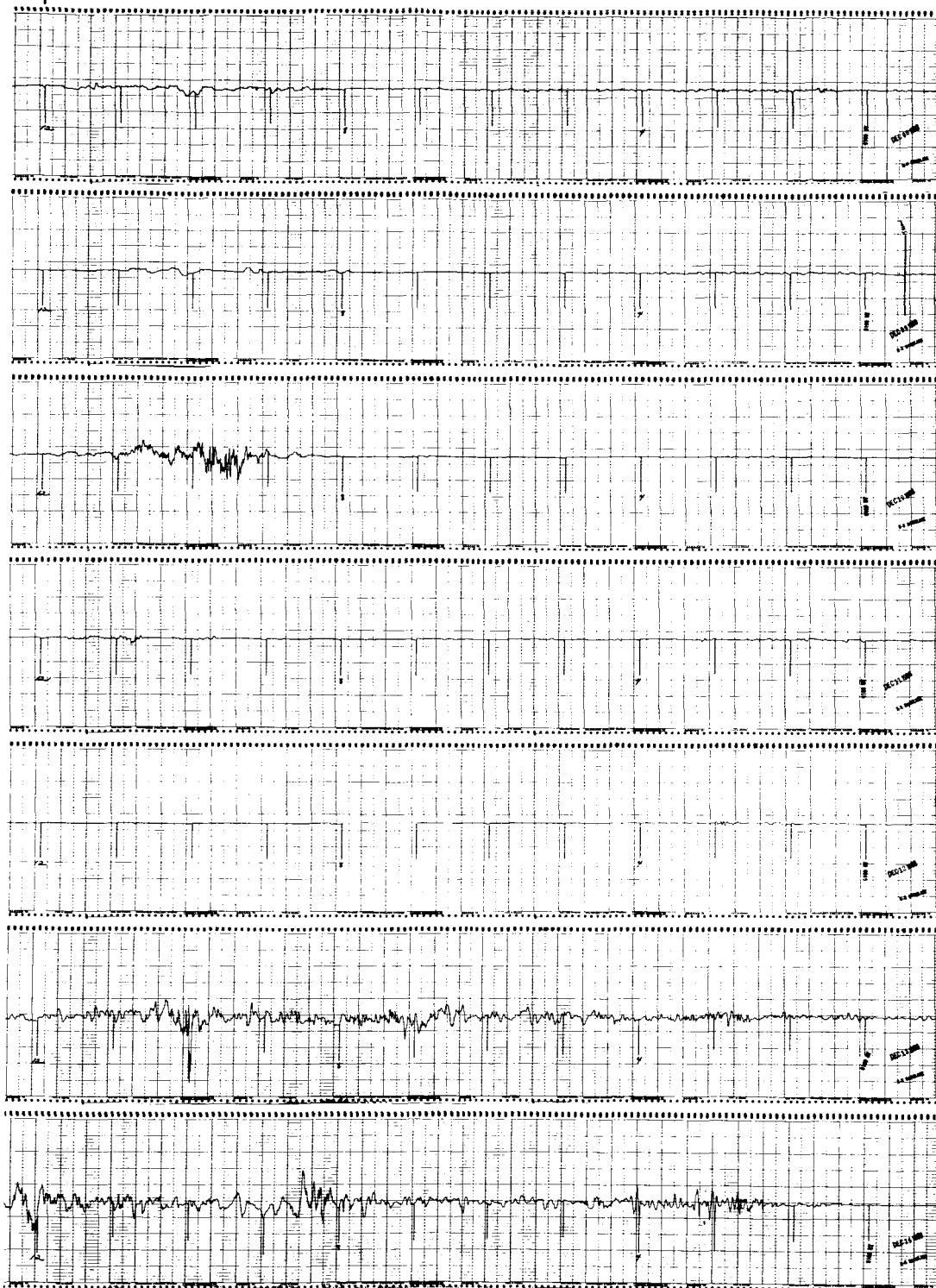
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UNIVERSAL TIME

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ALASKA

DEC 1966



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N-S TELLURIC CURRENT

DEC 1966

COLLEGE

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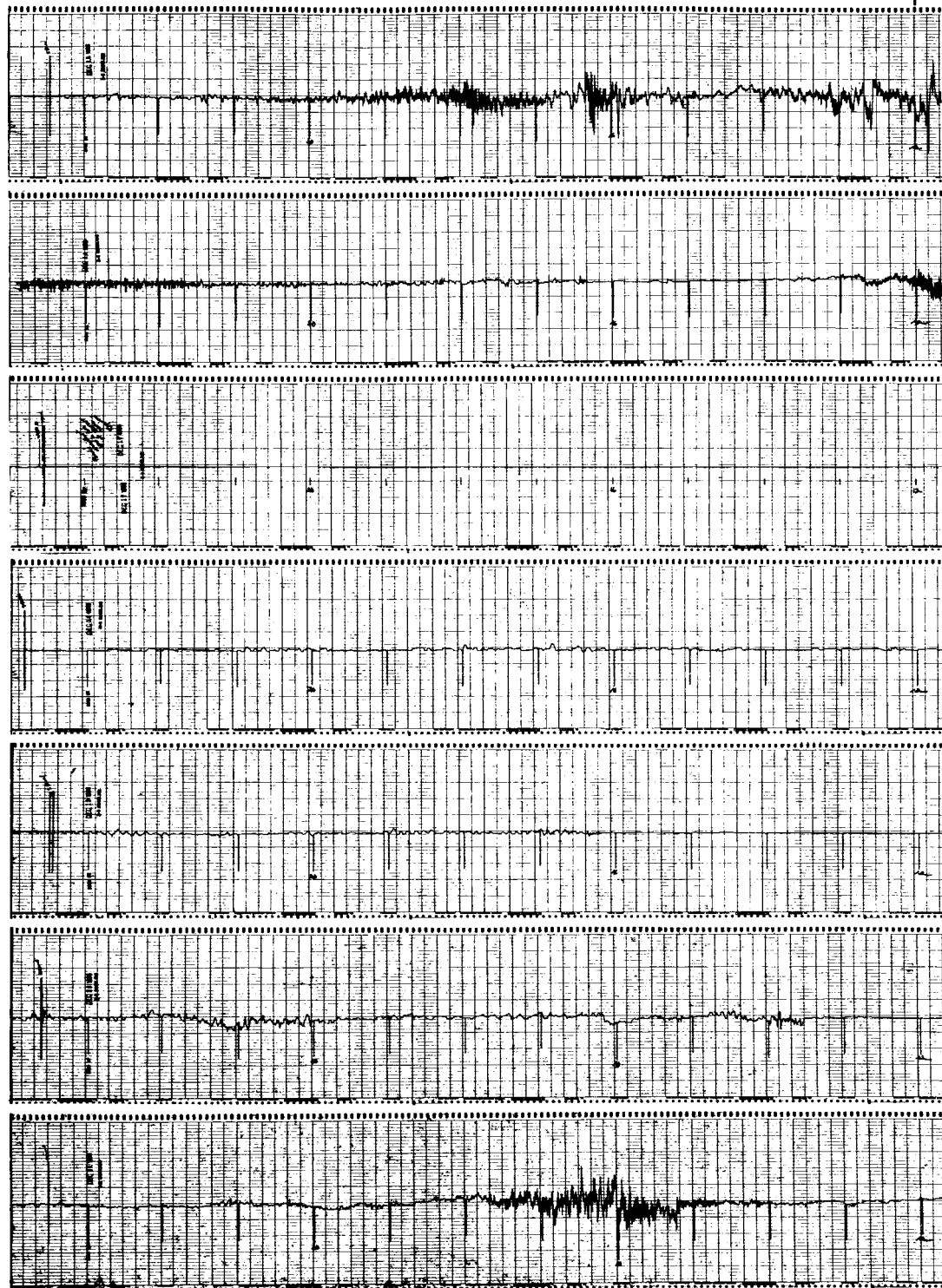
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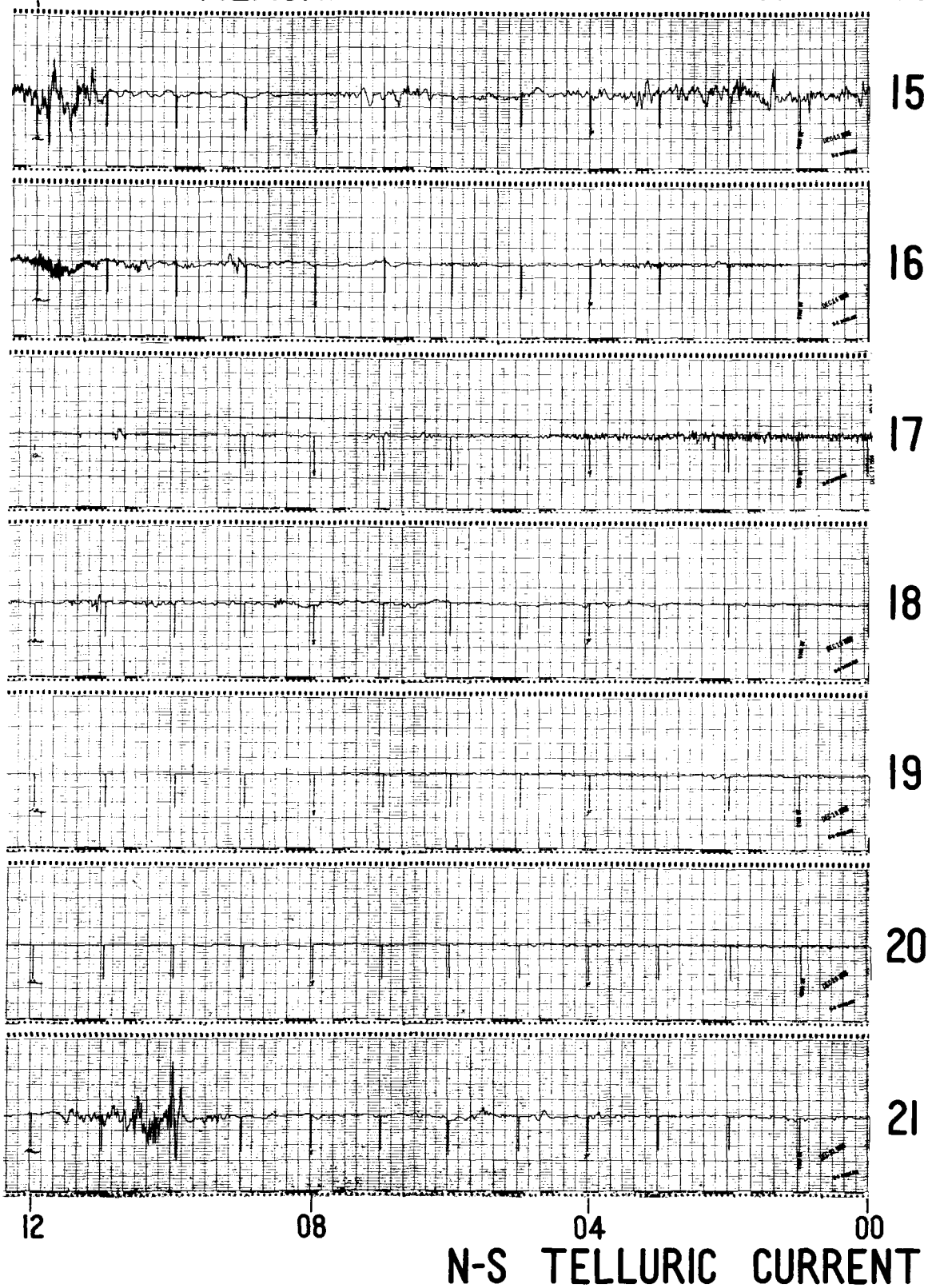
UNIVERSAL TIME



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ALASKA

DEC 1966



DEC 1966

COLLEGE

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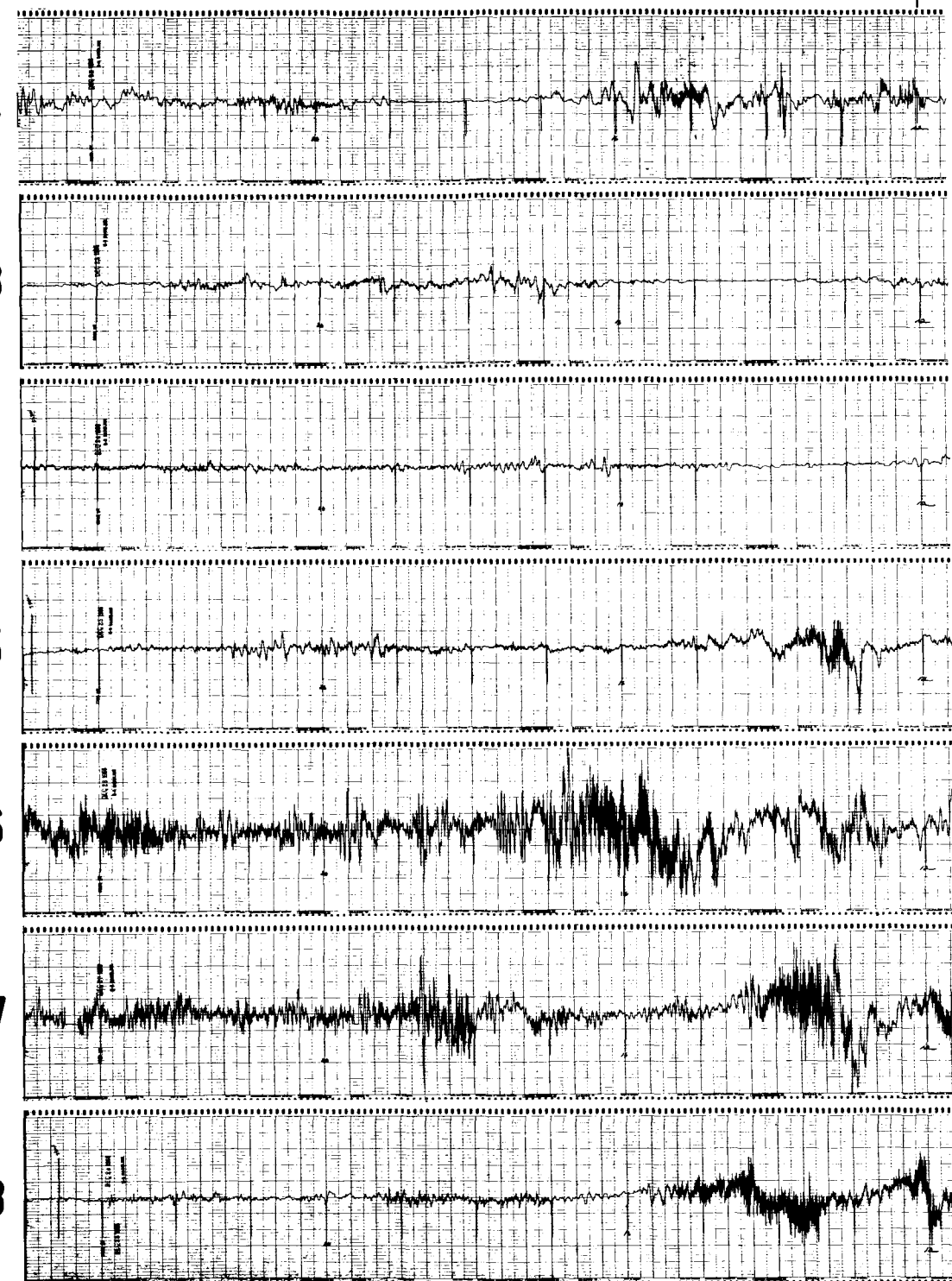
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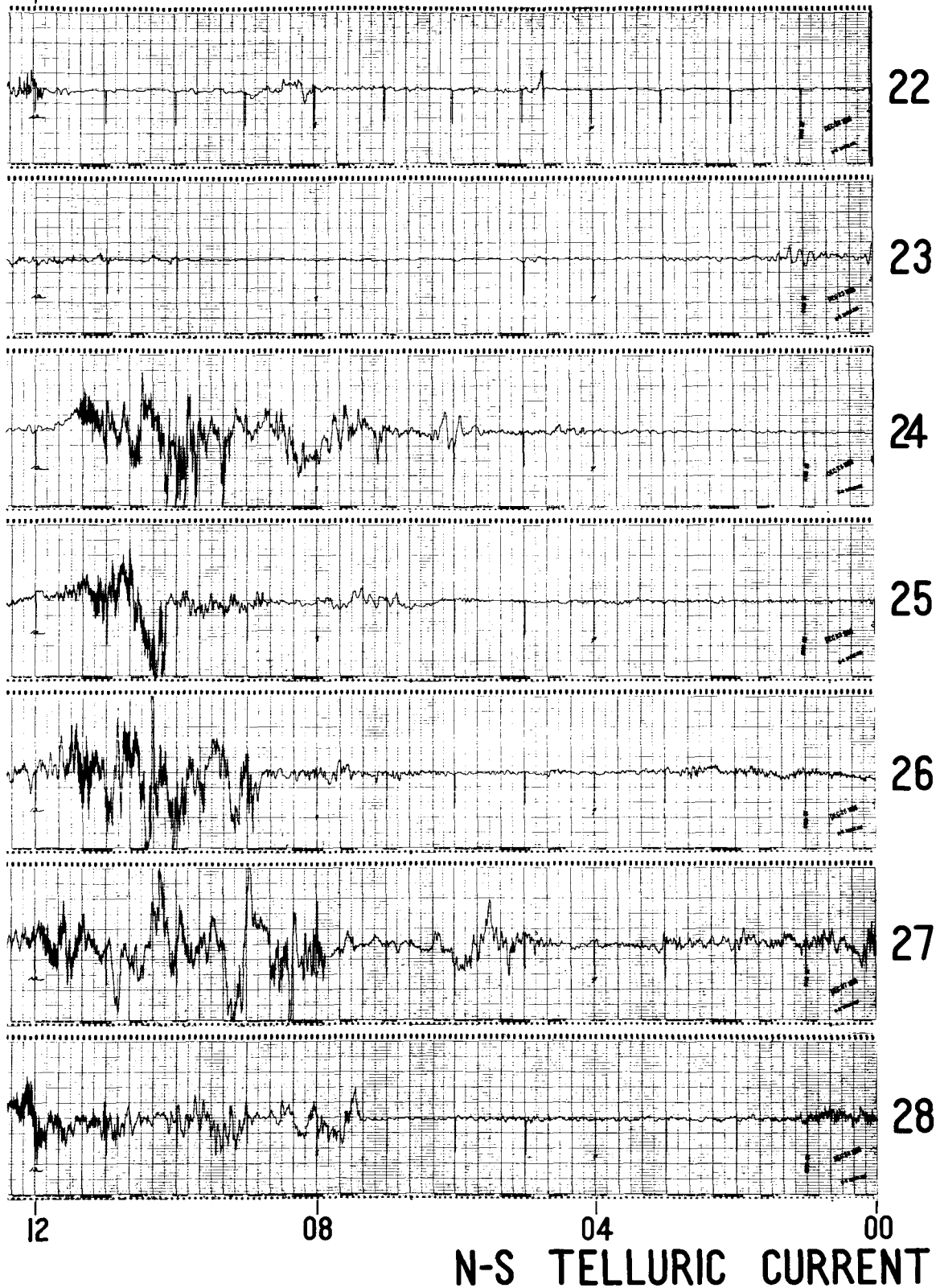


UNIVERSAL TIME

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ALASKA

DEC 1966



DEC 1966

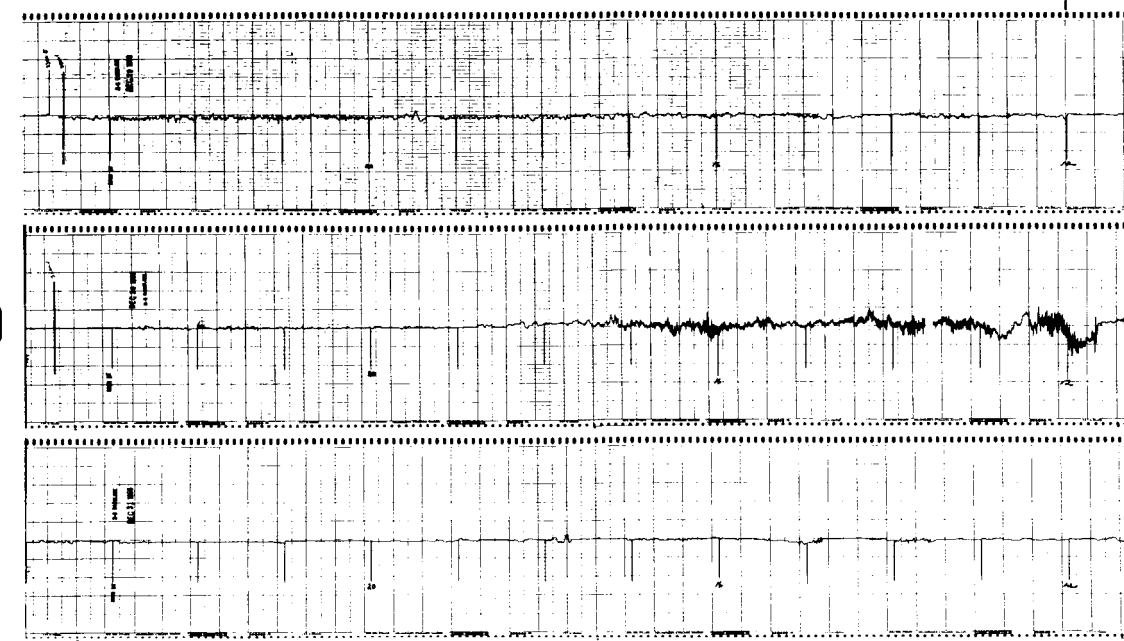
COLLEGE

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UNIVERSAL TIME

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ALASKA

DEC 1966



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N-S TELLURIC CURRENT

N-S TELLURIC CURRENT AMPLITUDE ACTIVITY - MV/KM

Month: October 1966

Month: October 1966																									
Day	Hour (Universal Time)												Observatory: College												
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Avg
1	70	80	70	80	40	70	60	40	370	370	130	70	100	60	20	10	20	20	30	20	40	20	20	20	76
2	20	10	20	20	30	20	70	110	200	90	150	210	140	20	30	10	10	10	10	10	20	20	20	20	53
3	10	10	10	10	30	30	30	80	30	20	10	30	10	10	20	20	10	20	20	20	30	40	40	40	24
4	30	30	20	60	190	110	130	110	80	490	420	160	60	80	160	80	90	120	160	140	300	360	390	190	165
5	210	310	170	200	250	180	280	300	>630	820	840	390	90	140	130	460	690	270	130	180	340	240	90	140	311
6	160	90	90	90	170	660	320	230	60	880	>800	900	890	>>1070	580	330	230	100	120	120	90	90	70	70	342
7	100	120	70	50	40	40	30	30	20	20	10	20	90	40	80	320	490	220	260	50	30	40	50	70	95
8	50	40	50	40	30	40	30	130	300	220	220	150	110	70	50	20	30	30	40	20	30	30	20	20	74
9	20	10	20	20	30	40	50	380	610	630	200	290	200	340	170	120	140	110	70	40	30	30	30	30	151
10	20	30	30	20	20	10	10	30	40	180	50	40	20	20	20	20	20	30	20	20	30	40	40	30	33
11	20	20	30	20	20	10	10	10	20	40	40	20	20	10	10	10	10	10	20	31	20	20	20	20	19
12	10	10	10	20	20	31	20	71	41	10	255	224	61	40	51	30	20	20	71	91	40	40	51	51	54
13	40	30	30	40	51	30	30	51	40	71	40	202	182	111	51	20	40	51	51	30	40	40	20	40	56
14	20	20	20	40	30	10	20	71	61	20	0	0	10	10	20	20	20	20	40	30	40	20	30	10	24
15	20	20	20	20	20	20	30	20	20	50	100	80	110	80	50	50	110	140	140	140	110	90	120	330	79
16	290	80	50	170	80	110	180	>970	>>1070	230	>>1070	>980	>680	>>1070	>>1070	530	170	170	70	120	130	50	30	30	392
17	30	40	60	50	40	20	10	10	10	10	10	10	20	10	30	40	60	80	50	50	30	40	30	30	32
18	30	40	40	60	50	30	20	20	20	20	20	10	20	20	40	40	60	40	40	70	70	40	40	40	37
19	30	20	30	20	20	10	40	50	20	30	110	80	40	20	20	20	20	40	60	50	30	70	30	30	37
20	70	10	10	20	20	10	10	10	20	20	120	60	20	20	20	20	10	20	31	10	20	10	20	10	25
21	10	0	10	10	10	10	10	10	0	0	51	41	60	110	40	10	0	10	20	10	10	10	10	10	19
22	0	0	10	0	0	0	0	0	0	0	20	0	0	0	10	10	0	0	10	20	10	30	20	10	6
23	10	20	20	10	10	10	10	10	20	20	20	20	0	0	0	20	10	10	20	20	30	40	30	20	16
24	20	10	20	40	10	20	10	20	20	20	30	20	50	70	180	420	160	90	130	180	120	120	70	110	81
25	140	160	110	50	30	30	100	180	>910	710	480	250	>1020	440	30	70	40	80	140	200	150	130	70	140	236
26	160	80	110	90	210	80	20	20	30	230	180	80	90	180	490	440	390	440	120	110	90	70	70	40	159
27	30	30	30	20	30	20	20	20	10	20	20	40	30	30	30	60	80	100	160	80	70	40	40	70	45
28	70	60	40	30	30	20	20	50	30	30	20	40	10	30	10	10	30	70	40	90	50	80	50	40	40
29	20	30	20	20	10	20	40	20	0	0	0	0	10	20	50	40	30	60	80	60	60	20	30	10	27
30	80	50	40	10	50	60	70	30	50	50	30	20	20	40	30	70	210	240	310	120	110	140	330	140	96
31	110	60	150	90	190	500	250	650	680	290	440	790	510	460	770	>840	440	410	290	490	280	240	390	180	396
Avg	61	49	46	46	55	73	62	120	175	181	190	169	151	149	138	135	117	98	89	85	79	73	73	64	103

Selected Days:

Five Quiet 3 - 11 - 14 - 21 - 22

Five Disturbed 5 - 6 - 16 - 25 - 31

N-S TELLURIC CURRENT AMPLITUDE ACTIVITY - MV/KM

Month: November 1966												Hour (Universal Time)												Observatory: College											
Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Avg										
1	150	120	170	80	60	260	660	450	230	560	440	>970	>1070	>870	600	530	>910	330	270	110	130	140	110	130	390										
2	130	210	160	70	100	140	60	40	30	30	110	410	330	200	90	90	110	90	170	220	50	30	50	60	124										
3	70	80	150	60	30	80	120	60	30	>940	>940	280	230	490	290	280	290	190	150	180	150	130	70	80	224										
4	60	90	110	40	50	40	30	30	60	140	40	10	20	30	30	30	30	40	30	60	120	30	60	40	51										
5	60	40	40	50	30	30	360	120	370	380	160	130	260	200	160	110	130	130	80	50	40	30	30	20	126										
6	20	20	30	10	20	30	40	50	80	190	270	380	130	100	60	40	40	50	40	30	40	50	20	20	74										
7	20	20	10	10	20	30	40	50	230	250	180	150	80	20	20	20	20	20	20	40	30	20	20	40	57										
8	40	20	30	50	90	60	30	30	50	40	40	60	10	10	20	30	30	50	50	60	30	30	20	30	38										
9	30	30	30	30	30	30	20	20	20	40	20	20	10	10	40	20	50	30	20	20	20	10	20	20	25										
10	20	10	10	10	20	30	50	20	40	50	200	390	350	40	40	30	50	50	70	110	50	40	50	30	74										
11	20	20	20	30	30	30	20	20	30	200	490	160	40	10	20	20	30	20	10	10	20	10	10	20	54										
12	20	10	20	20	60	40	20	20	50	150	120	30	10	20	20	10	30	50	170	60	60	50	20	20	45										
13	20	20	30	50	20	30	20	40	50	470	670	160	20	20	50	40	30	30	40	40	40	40	20	20	82										
14	20	20	30	20	20	20	20	20	20	40	59	30	20	10	10	10	10	20	20	20	10	20	30	20	22										
15	20	30	10	20	20	10	30	20	20	40	110	110	40	20	10	10	20	20	40	10	20	20	20	20	29										
16	20	10	10	20	40	40	69	89	188	327	109	30	20	20	40	40	30	40	30	40	40	20	20	10	54										
17	50	40	70	60	50	30	30	50	30	30	170	90	20	20	20	20	20	198	99	109	40	30	10	10	54										
18	10	10	20	10	10	10	20	20	10	10	10	40	149	99	69	129	188	238	208	297	109	69	99	129	82										
19	139	79	40	129	99	50	59	238	218	218	317	129	390	310	240	40	40	100	130	110	160	190	100	20	148										
20	40	30	50	60	30	30	30	10	20	70	30	110	78	39	20	29	39	39	127	98	147	59	69	55	55										
21	49	29	39	49	39	20	20	137	147	29	10	20	39	20	20	20	29	20	29	29	59	39	59	39	41										
22	39	20	20	20	20	10	10	20	20	20	10	0	10	10	10	20	29	29	29	39	29	29	29	21	21										
23	20	30	30	50	30	20	10	10	30	0	10	99	50	20	20	20	20	20	20	20	20	20	20	20	25										
24	20	30	20	30	20	40	317	168	149	99	109	40	30	50	59	20	20	20	20	20	20	20	10	56	56										
25	10	10	10	10	10	20	20	30	20	20	20	20	10	30	20	20	30	30	30	30	20	30	20	21	21										
26	30	337	79	59	50	119	69	40	178	119	20	79	89	109	99	40	99	59	40	59	30	20	20	20	78										
27	10	10	20	20	40	30	20	20	20	59	109	139	90	50	30	20	30	80	100	80	70	50	30	30	48										
28	10	30	30	20	10	30	30	40	80	560	440	160	200	320	330	320	290	400	330	200	430	190	200	110	199										
29	157	176	157	78	59	176	118	49	226	226	490	462	255	284	264	383	274	186	167	59	39	39	29	29	183										
30	29	29	29	39	69	59	88	824	599	383	>873	>726	>1039	735	323	716	314	127	98	118	98	235	274	118	331										
Avg	45	54	49	40	39	52	81	91	108	190	229	181	170	139	101	104	108	90	85	78	71	56	52	42	94										

Selected Days: Five Quiet 9-14-22-23-25 Five Disturbed 1-3-19-28-29

N-S TELLURIC CURRENT AMPLITUDE ACTIVITY - MV/KM

Month: December 1966													Hour (Universal Time)											Observatory: College														
Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Avg													
1	137	108	39	137	226	88	127	343	408	323	88	98	274	549	520	118	59	59	49	78	88	127	49	69	187													
2	20	29	29	20	20	20	10	39	98	49	69	147	88	29	59	69	49	39	49	20	39	20	29	10	44													
3	10	10	10	20	20	10	10	10	20	88	176	98	39	20	10	10	10	10	29	10	10	20	10	10	28													
4	20	20	10	20	20	20	49	412	>775	412	323	137	186	176	186	98	108	186	510	196	118	323	216	167	196													
5	88	98	78	88	49	383	118	196	>873	235	98	29	30	10	40	60	50	430	>950	340	250	160	130	90	203													
6	110	110	60	40	20	20	50	30	20	20	90	20	10	40	70	30	20	20	20	110	40	50	20	20	43													
7	20	49	29	29	29	29	20	10	10	10	10	10	29	10	20	20	29	29	29	39	49	29	20	20	24													
8	20	29	20	29	20	20	10	10	39	49	59	39	20	20	20	10	10	20	10	20	20	20	10	20	23													
9	20	20	20	20	20	10	10	20	20	40	50	10	10	10	10	10	29	20	29	20	29	20	10	10	19													
10	10	0	20	10	10	10	10	10	39	235	157	49	10	0	10	20	20	10	10	20	20	20	20	20	31													
11	10	20	10	20	10	10	10	20	10	20	49	20	10	0	10	29	29	78	39	20	49	20	10	10	21													
12	10	10	30	20	10	10	0	10	0	0	0	0	0	20	10	10	29	29	20	29	20	29	20	20	14													
13	29	59	98	49	88	118	176	186	108	176	226	98	353	314	618	510	648	579	108	39	20	49	29	20	196													
14	10	29	176	196	206	78	98	157	333	167	147	206	314	736	>1049	>1049	>1049	>1049	539	>1000	873	412	235	226	431													
15	206	284	157	206	69	59	137	118	39	39	49	579	323	226	118	353	392	294	186	108	59	59	49	20	172													
16	29	29	49	59	20	29	39	78	49	147	118	206	108	49	20	29	59	49	59	29	49	78	98	98	66													
17	78	78	137	59	39	29	39	39	20	69	88	137	108	78	137	118	78	49	39	49	20	59	69	20	68													
18	20	29	10	49	39	29	59	29	59	29	39	108	29	20	29	20	49	29	20	29	29	20	20	20	34													
19	20	29	29	20	20	10	20	20	0	10	10	10	0	0	10	10	49	29	39	20	29	29	49	29	20													
20	29	20	20	20	20	29	20	10	10	10	0	10	10	118	69	49	69	39	49	39	98	118	69	59	41													
21	39	39	20	39	59	88	59	29	29	657	323	98	39	39	69	314	373	167	78	49	49	59	29	29	116													
22	29	20	20	29	196	49	39	49	157	39	29	147	235	471	294	392	137	49	20	98	147	69	137	176	126													
23	157	108	39	20	39	39	10	29	20	20	59	88	78	78	10	39	118	235	78	118	118	88	39	29	69													
24	20	39	29	39	78	206	245	392	461	>785	>922	392	59	29	49	39	127	108	88	49	78	78	59	49	184													
25	39	29	29	39	29	39	98	147	118	176	>893	343	490	363	147	98	59	69	88	167	186	108	59	49	161													
26	98	88	98	39	39	39	69	157	422	628	>1049	618	520	500	529	834	>863	461	559	480	333	274	343	480	397													
27	353	176	108	147	147	490	216	530	>1049	>775	952	559	589	735	343	176	206	284	795	323	274	274	226	333	420													
28	147	88	49	39	49	49	29	373	245	392	255	412	461	441	422	206	78	118	118	108	69	78	78	39	181													
29	49	29	39	20	29	20	39	49	373	510	69	20	29	39	29	29	39	39	39	59	39	59	39	29	72													
30	20	20	20	20	20	10	29	29	29	196	353	216	176	127	127	108	167	98	39	20	20	20	29	20	80													
31	20	20	20	39	10	10	20	29	10	10	29	29	20	29	29	39	20	39	20	20	20	10	10	20	22													
Avg	60	55	49	51	53	66	60	115	188	204	218	159	150	170	163	158	162	152	152	120	105	90	71	71	119													
Selected Days:													Five Quiet 9-11-12-19-31													Five Disturbed 5-13-14-26-27												

Selected Days: Five Quiet 9-11-12-19-31

Five Disturbed 5-13-14-26-27

TELLURIC CURRENT FLUCTUATIONS - CYCLES PER HOUR

Month: October 1966												Hour (Universal Time)												Observatory: College											
Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23											
1	50*	50	40	30	10	20	20	10	40	60	20	20	120	30	0	0	10	0	10	10	10	0	10	0											
2	10	0	10	0	10	10	10	20	20	30	40	50	20	10	10	20*	50*	0	0	30	20	30	20	40											
3	60	0	10	0	0	0	10	10	0	0	0	10	0	0	10	0	0	0	0	10	0	10	140*	290*											
4	110*	90*	10	30*	230*	10	20	20	30	70	140	120	20	50	200	30	40	10	40	110	140	130	70	120*											
5	150*	110*	50*	60*	110	130	80	50	80	>140	200	90	30	30	120	260	340	200	100	230	210	110	90	100											
6	90	50	40	20	20	60	90	20	30	130	280	300	340	>360	320	360	300	220	120	60	70	50	80	90											
7	80	80	70	20	50	30	10	0	10	0	0	10	30	10	90	290	320	260	190	200	10	10	20	80											
8	40	60	50	40	20	20	10	10	60*	50	60	170	220	140	40	30	0	10	10	0	40	20	20	20											
9	20	10	10	10	10	10	10	40	70	170	100	120	260	200	230	260	260	180	50	30	20	10	10	10											
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-											
11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	210	100	30	20	30											
12	80*	10	10	10	10	10	20	10	10	10	20	70	20	30	10	10	10	20	30	40	30	40	40	70											
13	30	20	30	10	20	10	10	10	10	10	0	40	50	110	30	30	30	50	40	40	40	50	20	30											
14	30	10	20	10	10	10	10	20	10	0	0	0	10	0	10	10	0	10	20	0	10	10	10	20											
15	40	10	20	20	10	10	10	10	0	10	30	20	50	10	20	20*	20*	40	70*	50*	30	0	0	0											
16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-											
17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-											
18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-											
19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-											
20	10	20	10	10	10	0	10	10	0	10	10	20	10	0	10	10	20	20	10	10	10	10	10	0											
21	10	0	10	0	10	0	10	0	0	10	10	20	10	60	10	0	10	0	20	10	10	10	0	10											
22	10	0	0	10	0	0	0	0	0	0	20	0	0	0	0	0	10	0	10	20	0	20	10	10											
23	10	0	10	10	10	10	0	10	0	10	10	0	0	0	10	0	10	10	10	50*	20*	140*	750*	430*											
24	280*	170*	20*	10	10	10	20	10	0	10	0	10	10	10	20	170	80	10	20	60	100	70	230	50*											
25	70*	30*	50*	110*	10	20	30	20	110	160	40	30	>110	250	160	20	30	50	140	250	150	60	50	50											
26	160*	60*	20	30	40*	20*	20	10	10	30	30	10	20	50	230	280	280	220	50	30	40	40	40	40											
27	30	10	20	10	10	10	10	10	10	10	10	0	20	10	0	20	10	20	20	30	30	30	10	30*											
28	30	10	20	20	10	20	20	10	10	20	10	10	10	10	20	10	10	20	30*	30*	10	30*	40*	40*											
29	30	30	20	10	10	10	0	10	0	0	0	0	10	10	10	20	20	20	20	10	20	10	20	10											
30	20	90*	-	-	40	30	30	40	30	20	10	20	0	10	20	10	30	130	100	70	60	80	190	130											
31	70	30*	220*	50*	60	60	40	50	110	180	130	230	320	250	310	280	220	240	290	270	160	150	110	100											

0 (zero) = No Activity

- (dash) = No record

* = Pearls

TELLURIC CURRENT FLUCTUATIONS - CYCLES PER HOUR

Month: November 1966

Hour (Universal Time)

Observatory: College

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	70	30	60	40	30*	30	70	50	70	80	140	350	380	330	190	180	240	190	100	70	80	40	100	130
2	110*	50	50	40	30	30	30	20	0	20	20	80	240	220	30	40	40	70	140	140	40	20	30	40
3	60	60	40	20	10	20	10	10	10	40	220	70	100	280	280	270	70	50	50	40	80	50	60	70
4	20	60	20	20	20	20	10	10	20	20	10	10	20*	20*	30*	90*	70*	50	30	30	70*	20	10	40
5	60*	20*	30	20	10	10	30	30	30	40	50	30	100	240	170	140	60	190	160	80	30	10	30	40
6	30	50	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20
7	10	20	-	-	-	-	-	-	-	-	120	40	-	-	10	10	-	-	-	20	20	-	-	20
8	100*	20*	20	10	30	20	20	10	10	20	10	10	0	20	0	20	20	50	50	30	40*	70*	20	260*
9	60	40	-	-	-	-	-	-	-	-	-	-	10	10	30	20	20	20	10	0	-	-	-	30*
10	130*	90*	20	40	-	-	-	-	-	-	-	-	190	20	10	20	10	10	30	40	60	20	20	30
11	20	30	10	20	10	10	20	0	10	10	70	50	20	10	10	20	30	50	30	20	30	30	60	50
12	30	10	20	10	20	10	10	20	10	20	20	20	0	10	10	10	20	20	30	40	50	30	40	60
13	30	30	40	40	20	20	20	20	20	40	130	70	10	10	20	10	20	30	40	50	30	30	20	10
14	20	20	30	30	30	40	30	10	30	10	30	10	10	10	20	10	10	10	40	40	20	50	20	20
15	30	20*	30*	20	20	10	0	10	20	10	30	110	20	20	10	0	10	10	10	10	10	10	10	10
16	10	20	0	10	10	10	0	20	40	20	20	10	0	0	20	30	30	70*	60*	50	50	50	10	20
17	-	-	50	10	10	0	10	10	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	30	20	30
19	20	30	20	40*	40*	20*	20	20	50	40	60	70	180	260	160	80	40	120	80	60	50	40	40	50
20	30	70	20	10	20	10	10	0	10	10	10	30	30	10	0	30	20	40	40	80	50	80	60	130*
21	30	30	20	30	20	10	10	30	20	10	10	0	30	0	10	20	20	10	30	50	30	60	30	50
22	50	10	30	20	20	10	10	20	0	10	0	10	0	0	20	40	50	60	70	50	50*	70*	100*	50
23	200*	500*	370*	150*	20	10	20	10	0	0	10	10	20	0	10	10	10	10	20	10	10	10	10	20
24	20	40	10	20	10	10	30	20	40	30	30	30	10	30	40	30	20	20	20	30	10	20	20	10
25	10	10	10	0	10	0	10	10	10	0	10	0	10	0	10	10	20	20	10	20	10	20	10	10
26	20	20	30	20	10	20	10	10	10	10	10	0	40	60	30	90	130	70	40	60	50	30	40	50
27	30	40	50	40	20	10	20	20	10	10	30	20	20	20	40	0	20	90	80	50	60	30	70	40
28	20	20	10	10	10	10	10	10	20	150	140	130	110	100	150	170	130	310	240	140	190	170	150	70
29	90	80*	30	20	20	30	10	20	50	80	170	220	270	280	250	210	270	210	140	50	20	30	80	20
30	40	20	30	30	10	10	20	70	170	210	190	230	250	270	230	290	140	120	60	160	140	90	160	140

0 (zero) = No activity

- (dash) = No record

* = Pearls

TELLURIC CURRENT FLUCTUATIONS - CYCLES PER HOUR

Month: December 1966

Hour (Universal Time)

Observatory: College

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	70	20	10	20	0	20	20	20	130	-	-	-	-	230	280	130	80	90	50	130	100	90	40	20
2	10	10	20	-	-	20	10	10	30	20	-	-	40	20	20	50	20	20	-	-	-	10	20	10
3	10	20	0	10	10	10	-	10	10	40	90	100	60	-	0	10	-	10	-	-	-	-	10	20
4	30*	70*	10	10	10	20	10	40	90	100	100	10	60	120	50	70	50	120	70	120	80	90	70	60
5	30	30	20	20	20	20	20	60	>50	40	10	10	0	10	10	10	20	150	330	220	160	130	80	80
6	60	40	20	10	10	10	20	0	0	10	20	0	10	0	50	0	10	10	10	20	40	40	20	40
7	30*	270*	150*	90*	160*	20	20	20	10	10	0	0	20	30	10	30	30	30	30	20	30	40	30	50
8	20	30	20	20	20	30	20	10	10	10	20	10	10	10	0	20	10	0	30	20	40	30	20	10
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10	0	10	0	10	0	0	10	10	0	60	60	20	0	10	0	10	10	10	0	20	10	20	30	40
11	0	20	0	20	10	0	10	0	10	0	10	10	10	0	0	10	10	20	20	10	10	20	20	10
12	0	0	10	10	10	0	10	0	0	0	0	0	10	10	10	0	20	10	10	30	30	40	60	60
13	30	20	30	30	10	20	30	30	20	20	50	10	40	150	250	140	140	60	30	10	20	10	10	20
14	0	10	20	20	10	10	20	20	50	10	20	20	20	100	>270	>230	>210	>170	100	>100	100	60	50	50
15	30	40	30	30	20	20	20	10	10	0	10	80	240	180	90	50	150	210	110	-	-	-	10	0
16	0	10	10	10	0	10	0	0	10	10	0	140	90	10	0	-	-	-	-	-	-	50	50	30
17	40	30	40	40	30	30	20	10	10	20	30	40	50	20	50	120	40	20	20	10	20	30	10	20
18	20	20*	10	10	10	10	10	10	20	10	0	20	10	0	10	10	10	10	0	10	10	20	10	10
19	20	10	10	20	10	20	10	10	0	0	10	0	0	0	10	20	20	40	20	20	20	30	20	50
20	40	40	30	10	10	10	10	10	0	0	10	0	10	20	20	30	20	10	10	10	30	20	10	20
21	20	20*	0	10	0	10	10	10	10	20	50	30	10	40	10	250	240	170	50	70	70	30	40	40
22	10	0	10	10	20	10	10	20	10	10	10	30	60	30	80	160	30	20	20	50	60	30	30	20
23	20	10	20	10	10	10	10	30	60*	10	20	20	20	10	10	20	60	70	60	60	30	40	40	30
24	20	80	50	20	30	20	30	60	70	100	180	140	20	0	10	50	30	30	50	60	50	80	80	70
25	40	40	40	20	10	20	10	20	20	50	150	190	110	250	130	120	80	100	80	160	90	70	110	30
26	70	70	60	30	20	20	10	30	30	140	>230	230	160	180	220	340	270	180	210	190	120	150	290	290
27	220	80	20	50	30	30	60	90	>110	180	130	280	180	330	180	90	100	120	190	120	90	120	150	110
28	100	70	30	40	40	20	20	30	40	50	40	190	230	300	290	140	30	120	120	60	30	60	50	20
29	10	10	10	10	20	20	10	10	50	150	10	10	10	50	20	30	30	30	30	30	40	40	40	30
30	10	30	10	20	20	10	10	0	10	30	80	110	190	260	230	160	170	70	20	40	50	40	70	70
31	70	100	90	30	20	10	20	90	10	20	20	10	20	20	20	20	20	10	10	10	20	20	10	40

0 (zero) = No activity

- (dash) = No record

* = Pearls

FREQUENCY-TIME DISPLAYS OF TELLURIC CURRENT ACTIVITY

R. R. Heacock and V. P. Hessler

These frequency-time displays of electromagnetic micropulsation activity in the period range ~ 5.7 to 500 sec were recorded with the telluric current technique using the N-S College electrodes described in the preceding section. The telluric system has the advantage of larger low frequency response than an induction loop system and a better signal to noise ratio because of the millivolts available from the telluric electrodes in comparison with the microvolt signals of the induction loop. A magnetometer of the required dynamic and frequency range for this application would be far more expensive.

The amplifier is a Medistor microvoltmeter set at 10 mv range and logarithmic scale. The logarithmic response makes it possible to accommodate the wide dynamic range of activity which occurs at College in the frequency range under investigation. Thus with constant gain settings the low amplitude Pc 3 day-time activity can be brought out clearly on the sonagrams, and with no overloading of the instrumentation due to the powerful nighttime Pi activity.

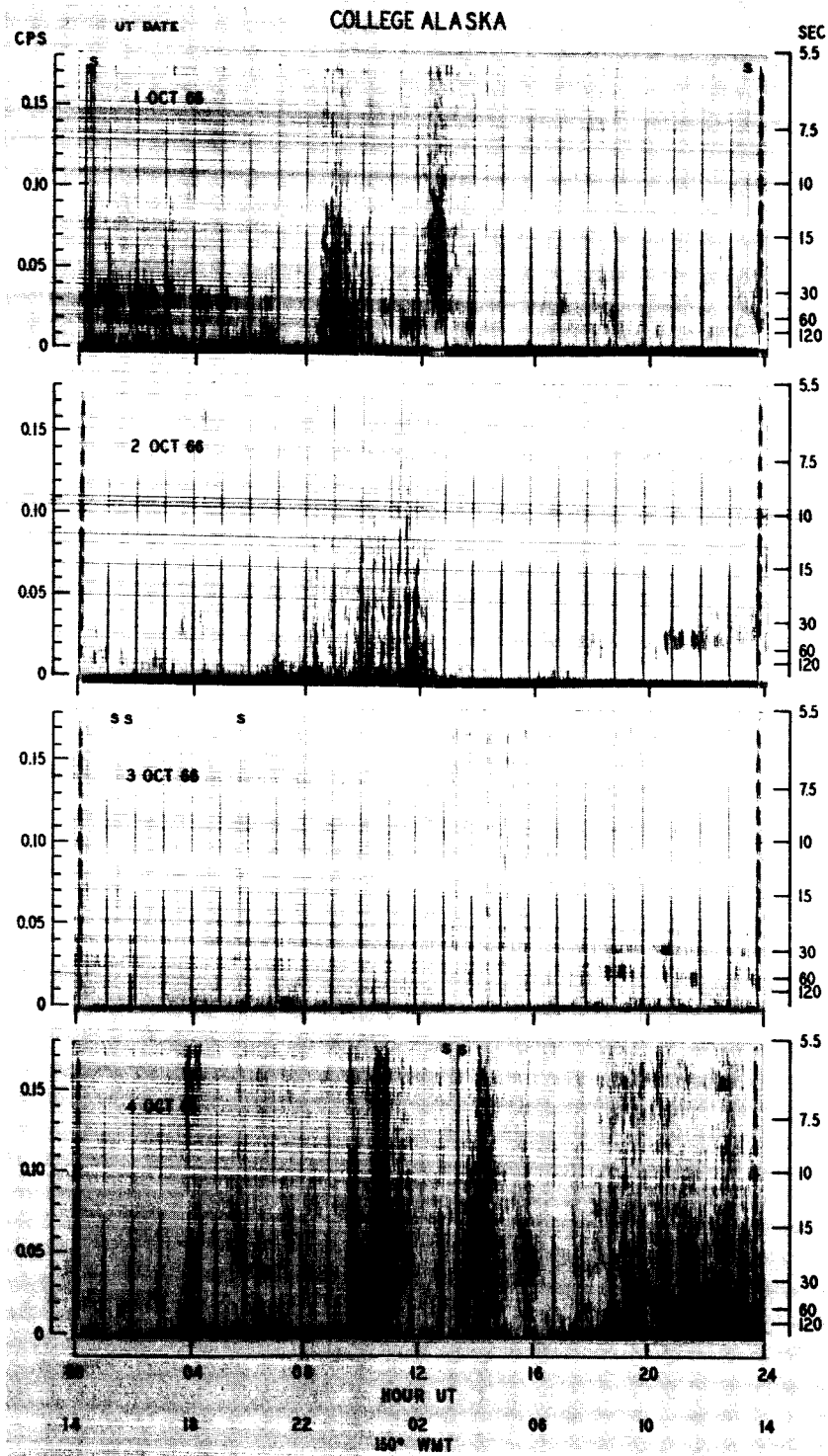
The tape recorder is a Knight 4000A AM recorder which has been modified to record at 1 1/6 inch per hour. The playback recorder is another Knight 4000A which has 15 ips tape speed. Thus a speedup factor of 46,000 is achieved. This speedup permits the display of 24 hours of data on one sonagram, and the resulting data period range is 5.7 to 500 secs.

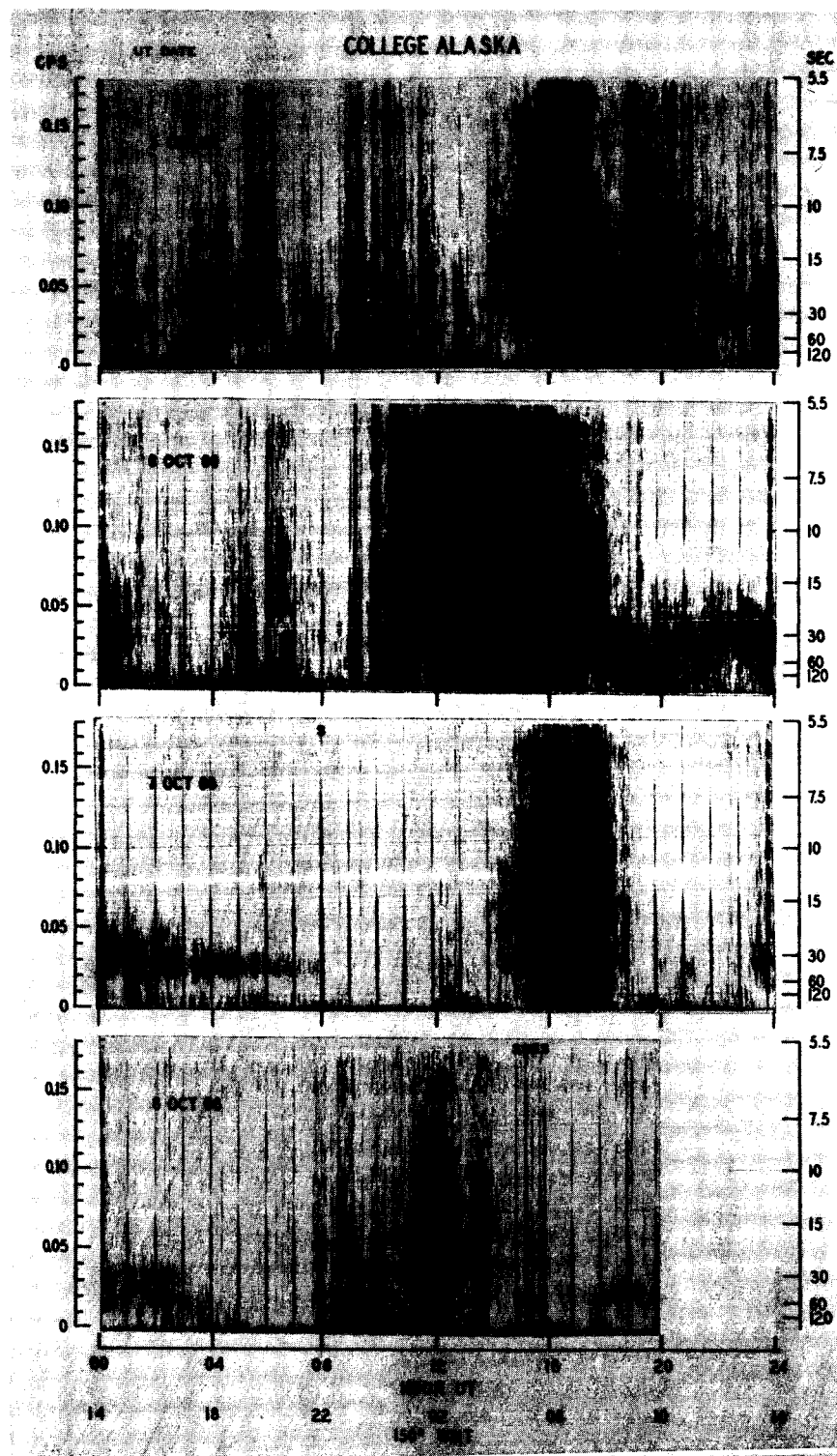
The playback amplifier is a Tektronix Type 122. The frequency response of the amplifier and Sonagraph are shaped such that average activity at the bottom of sonagrams is not too black and average activity at the top is not too faint. To accomplish this, the response was made to increase monotonically toward higher frequencies. If a flat response had been used, the upper part of the sonagrams would usually be blank when a reasonable level was present at the bottom. The departure from flatness is not sufficient to significantly distort the Pc 3 - 5 activity. One should thus not use these sonagrams to infer the power spectra of the activity. The intent is to display the general frequency-time characteristics in all parts of the 5.7 - 500 sec period range.

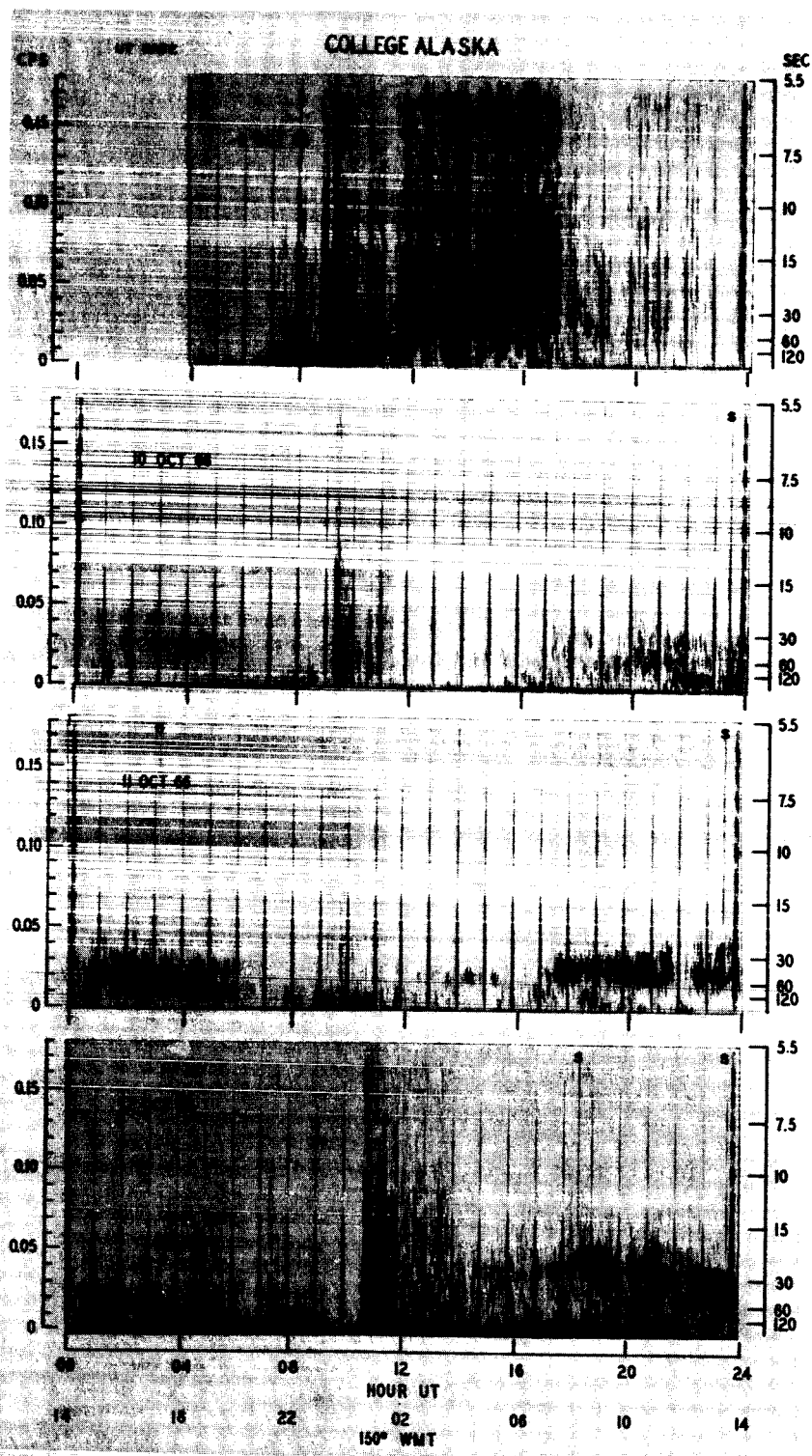
Spurious effects on the sonagrams are indicated by an "S" at the top.

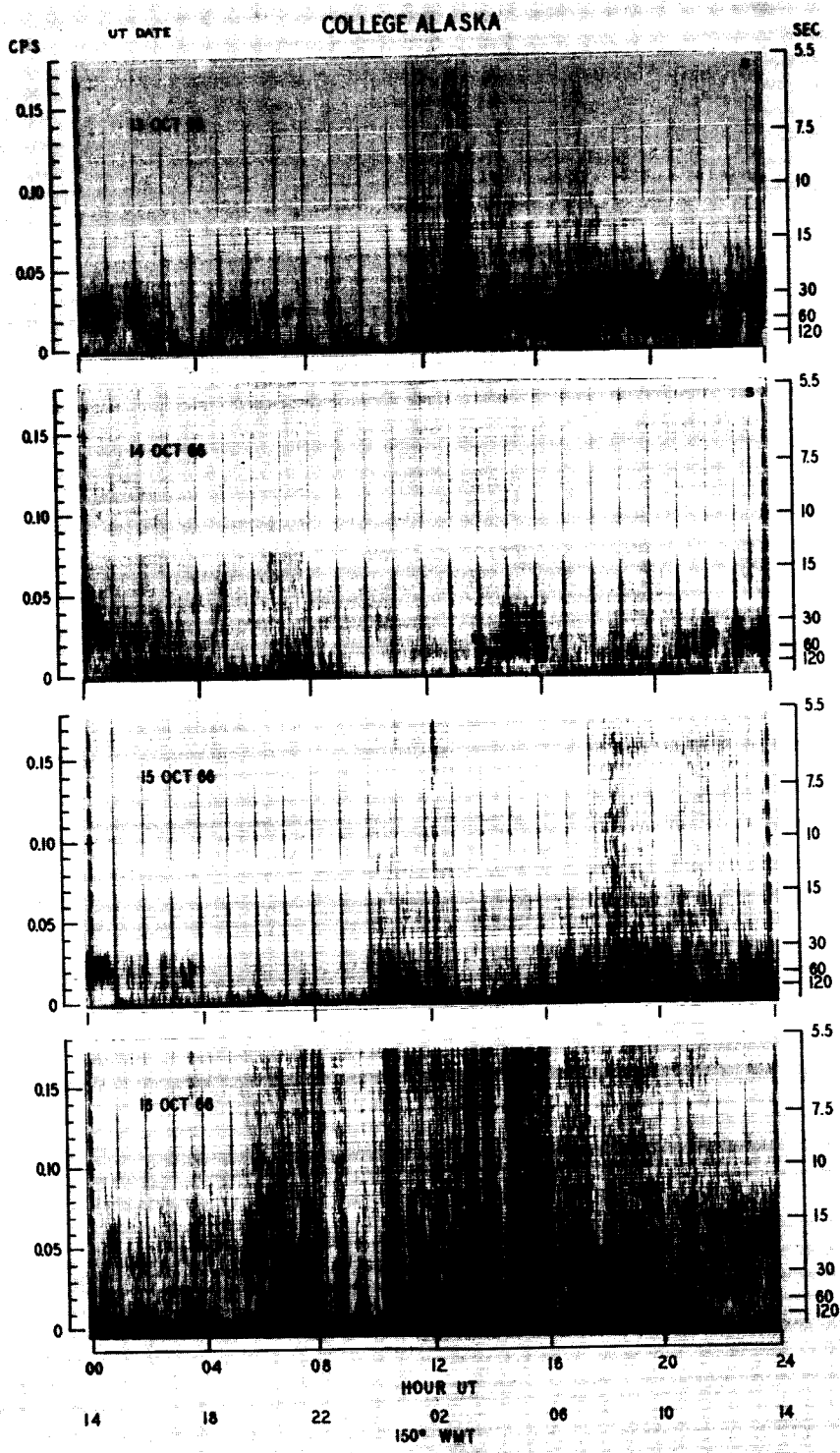
In general, these sonagrams should be studied together with the telluric current time-amplitude traces given in the preceding section.

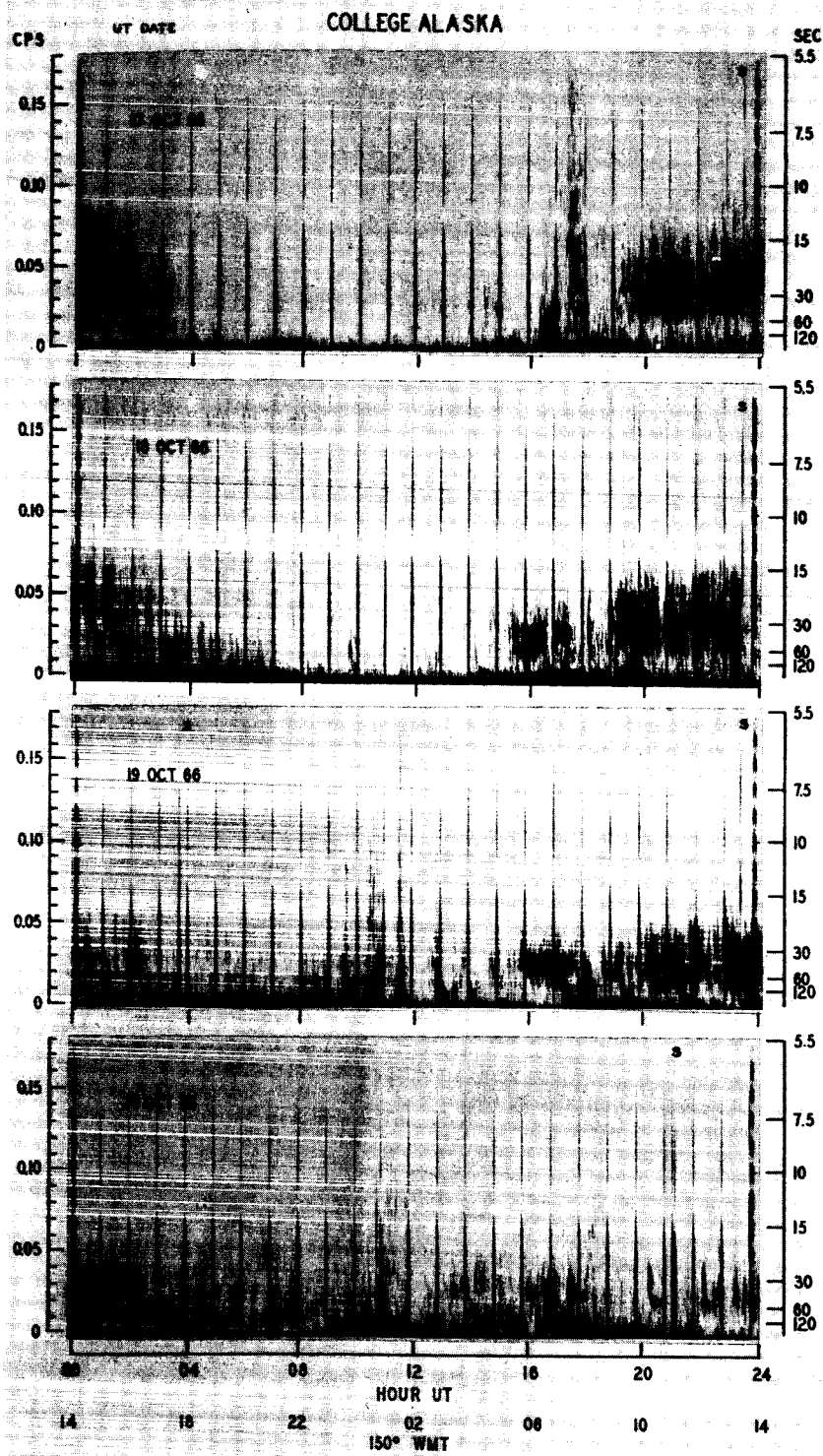
The collection and publication of these sonagrams is supported jointly by the Office of Naval Research under Contract NONR 3010 (01) and by the Air Force Cambridge Research Laboratories, Office of Aerospace Research under Contract No. AF 19(628)-1695.

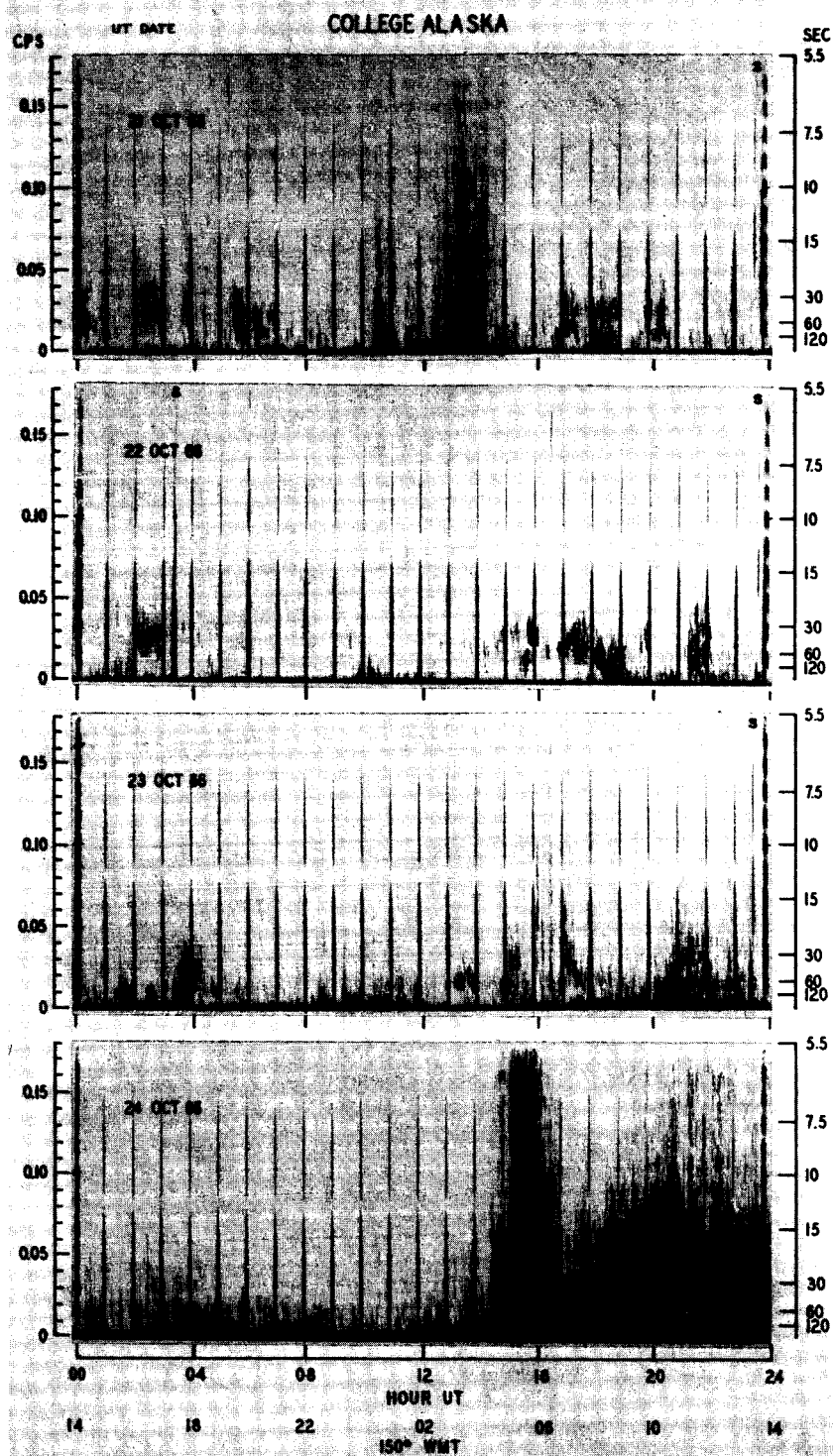


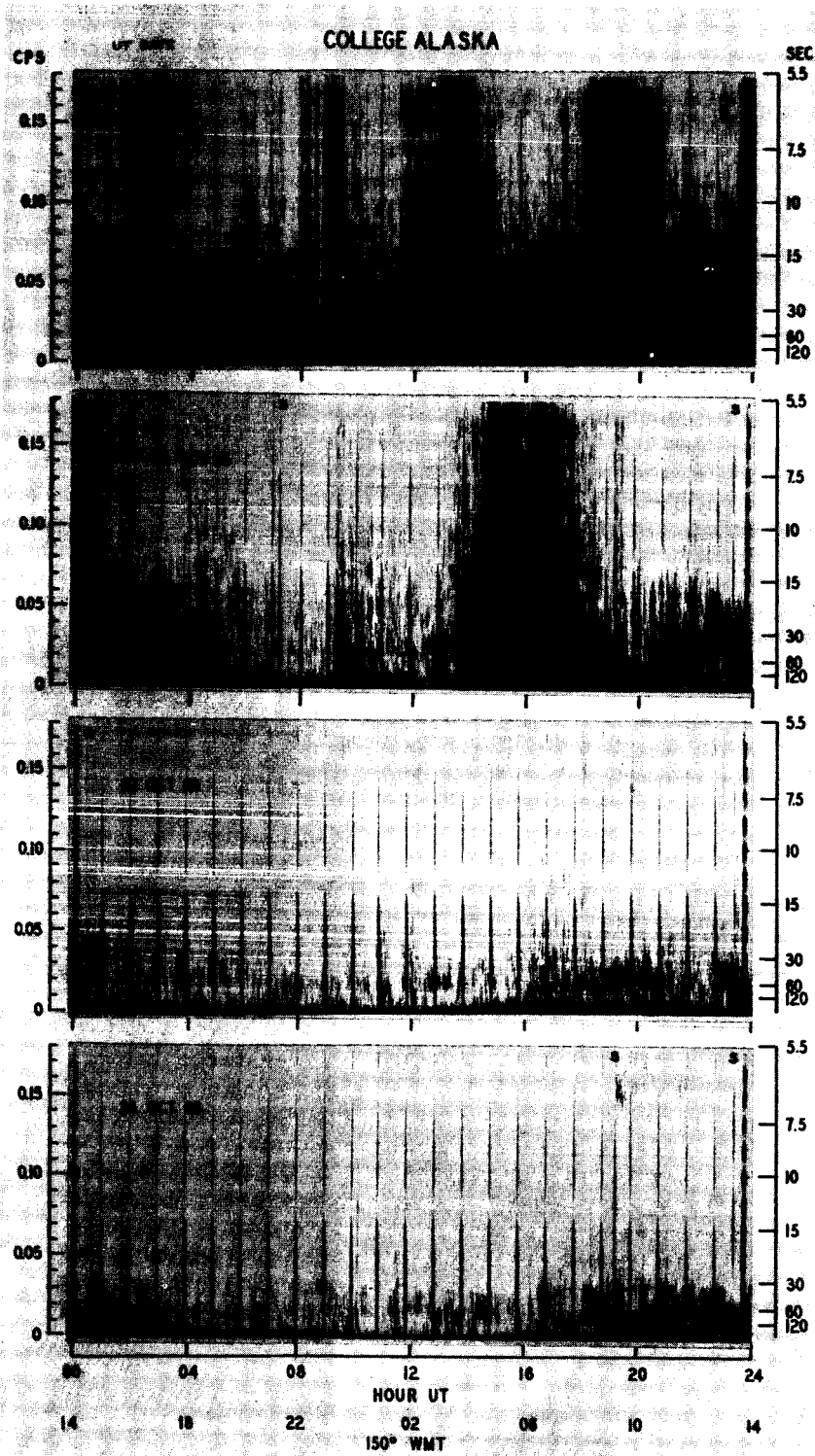


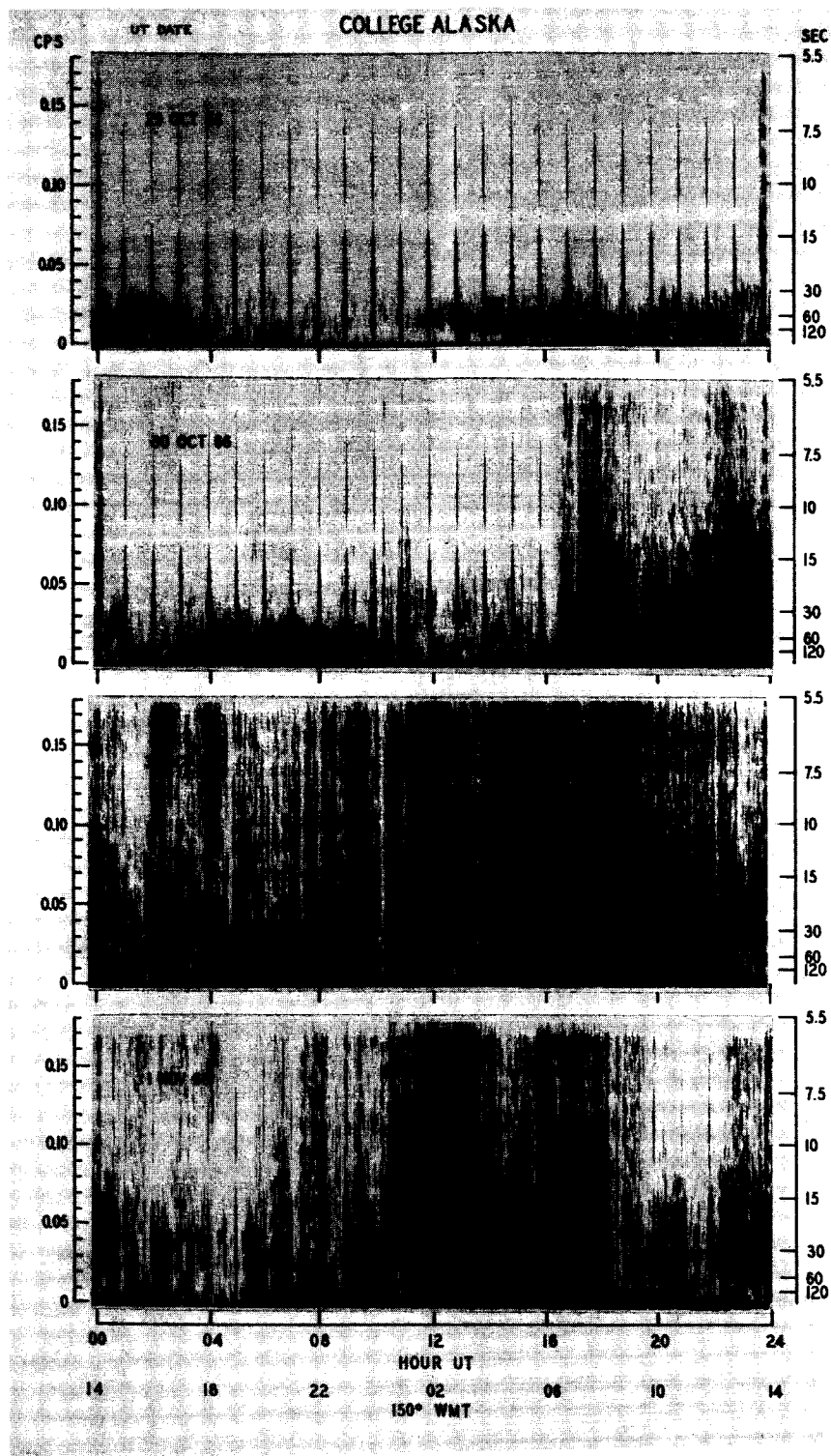


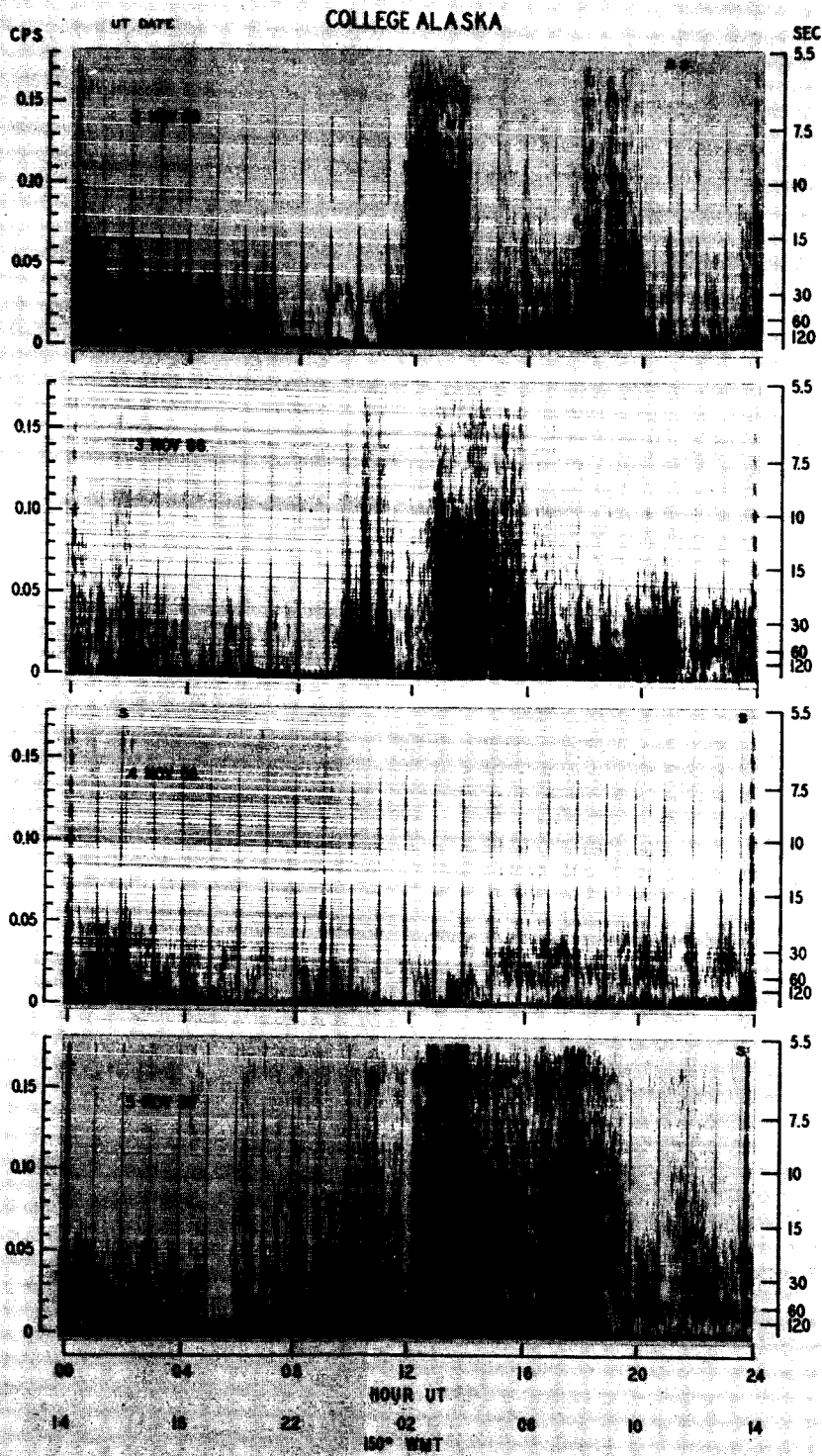


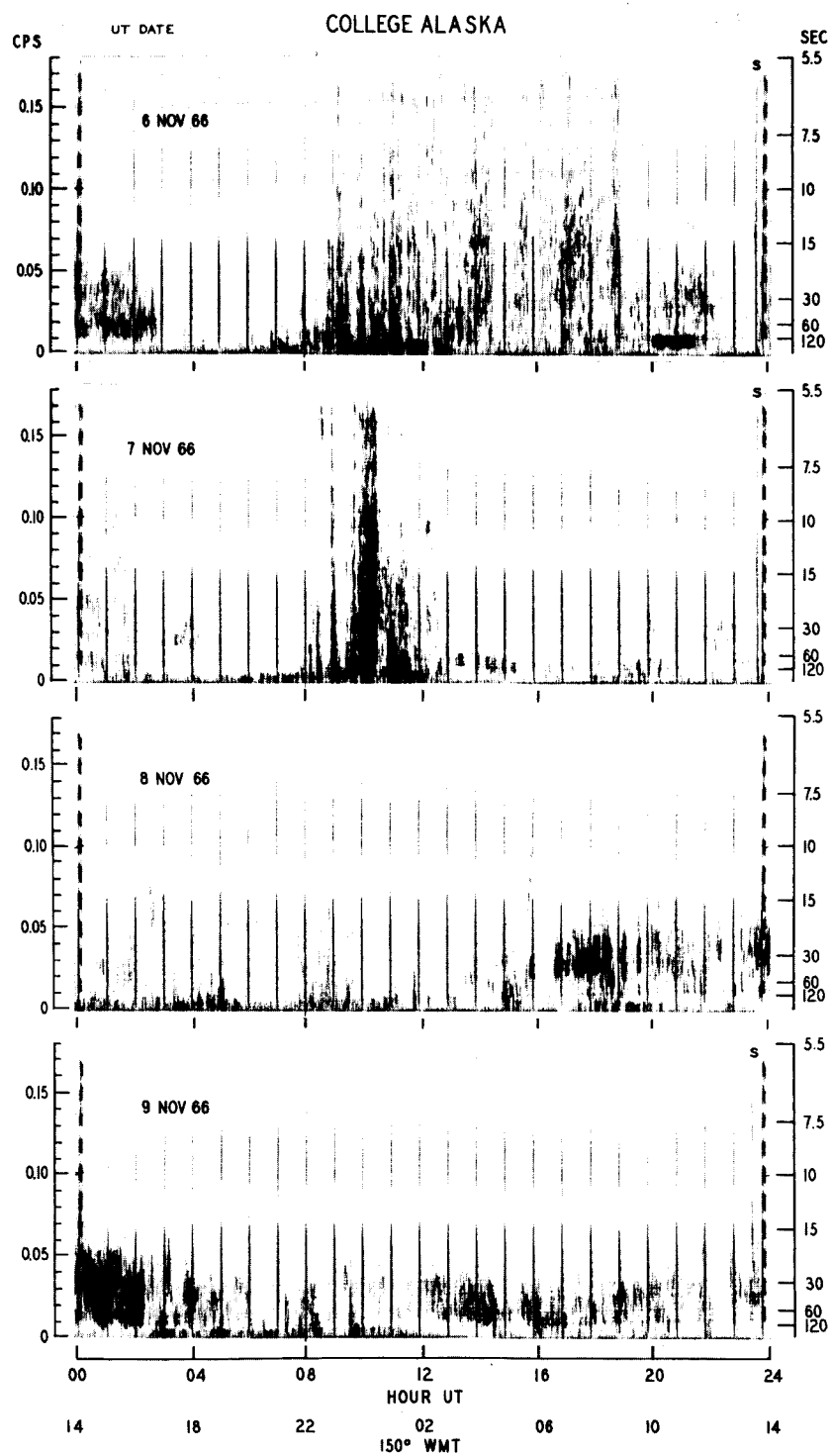


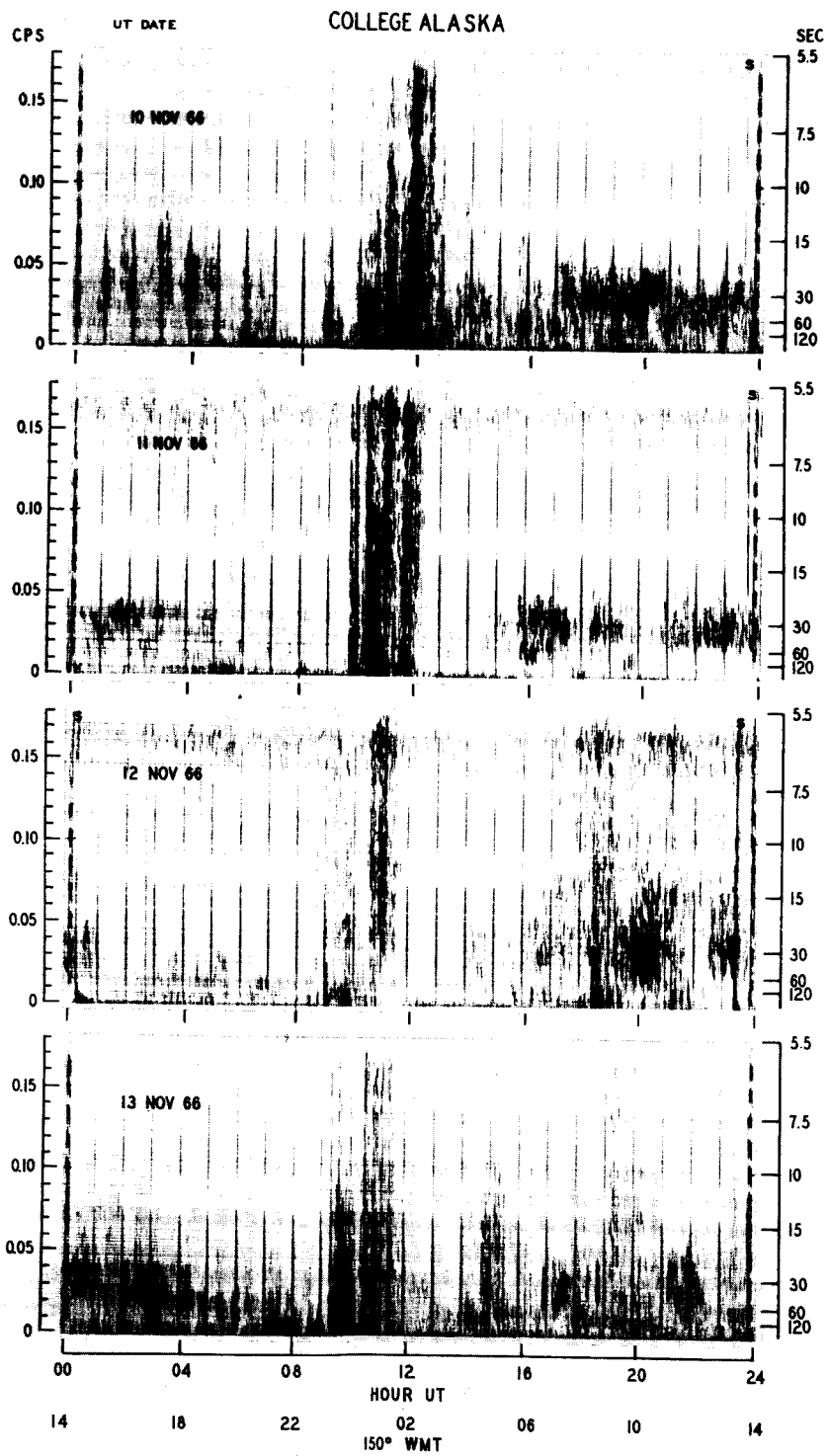


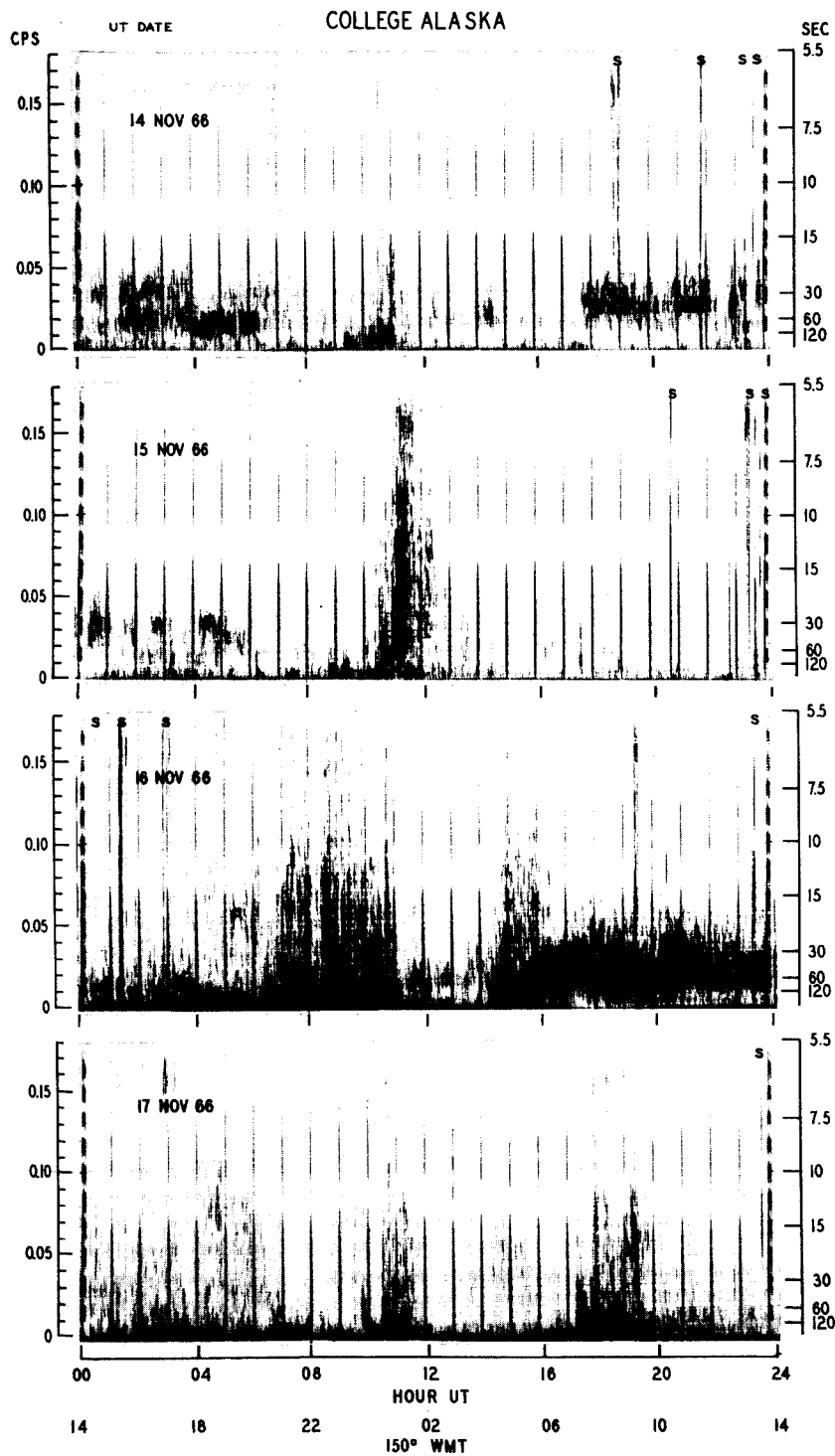


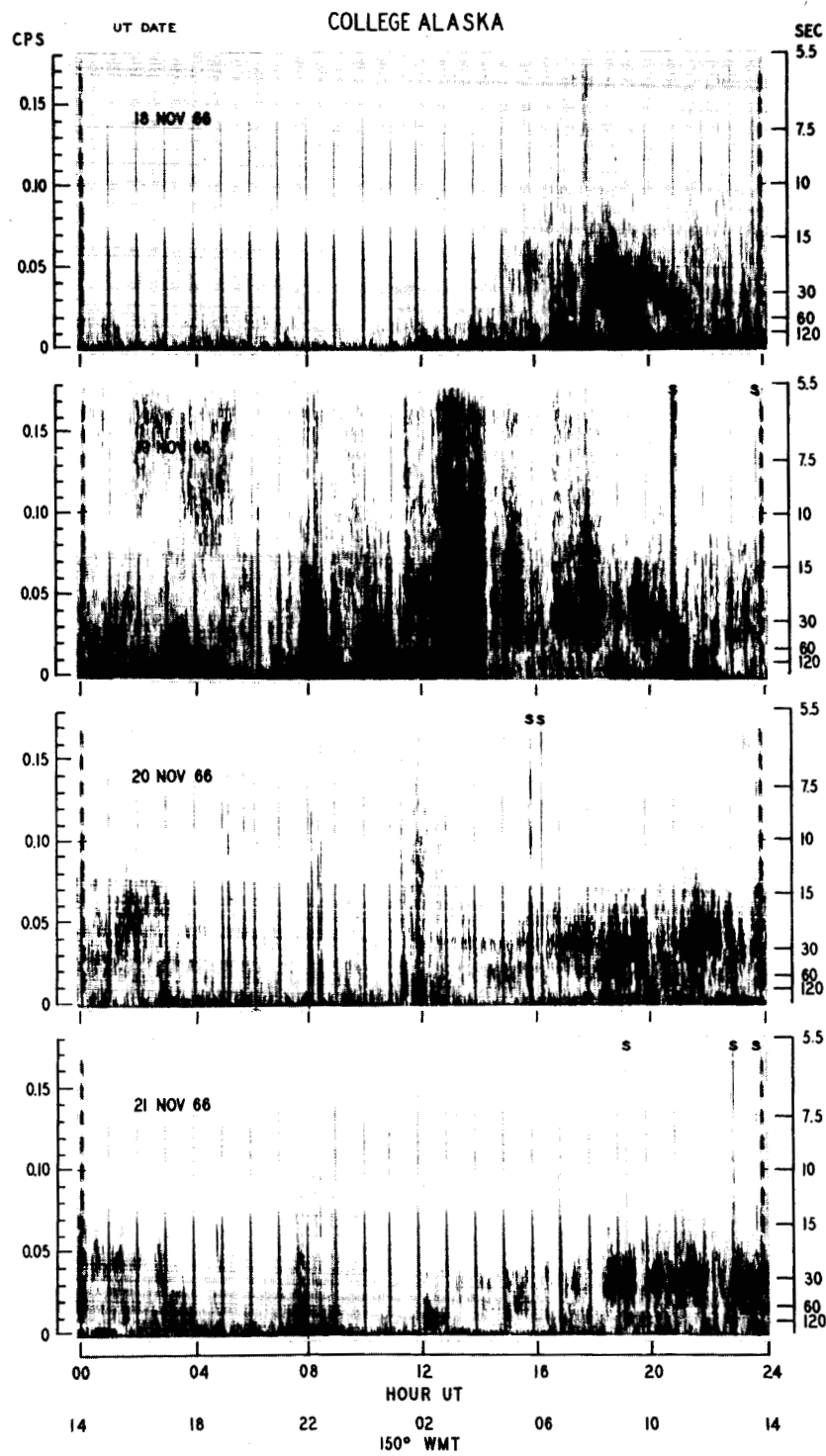


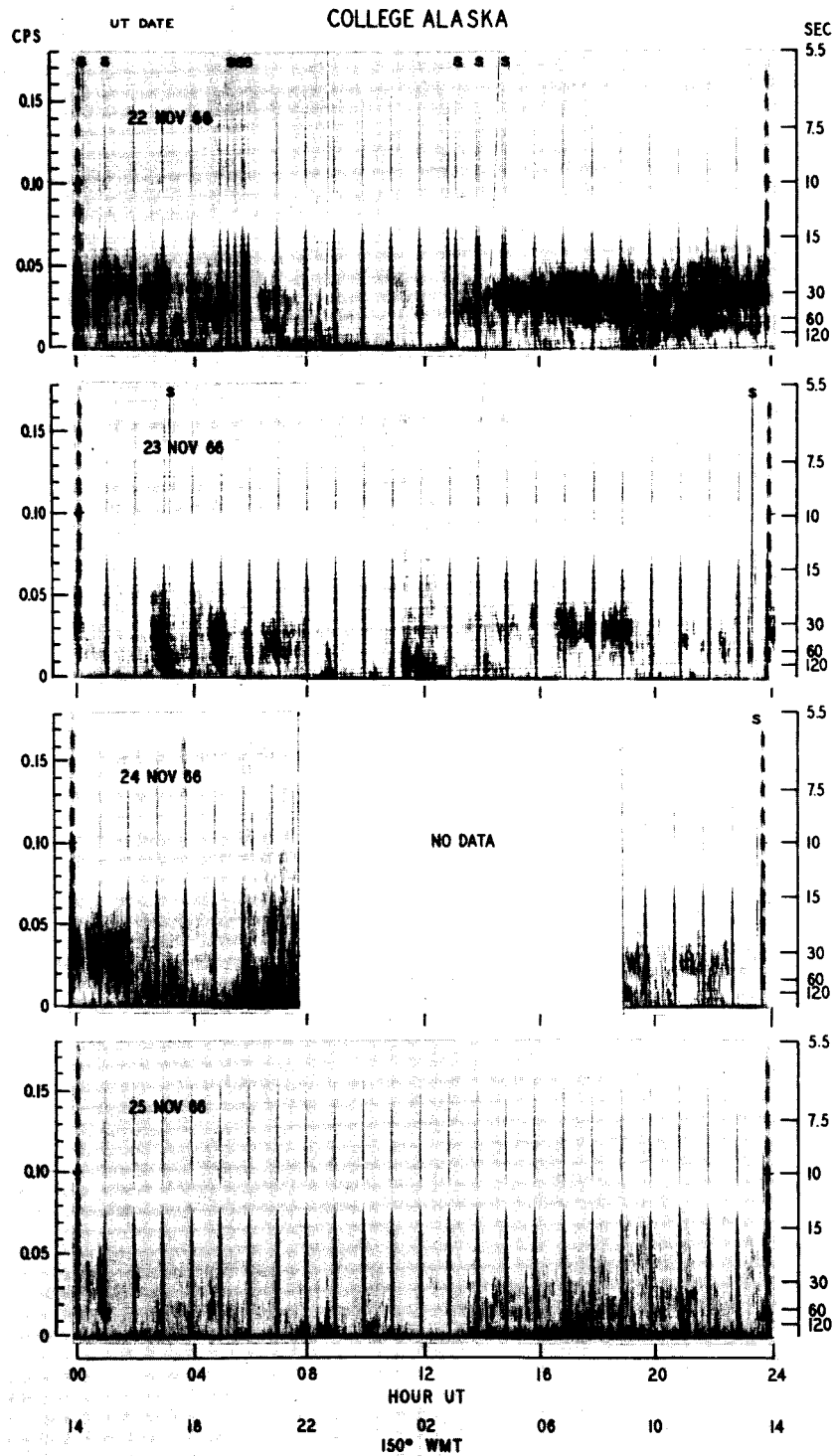


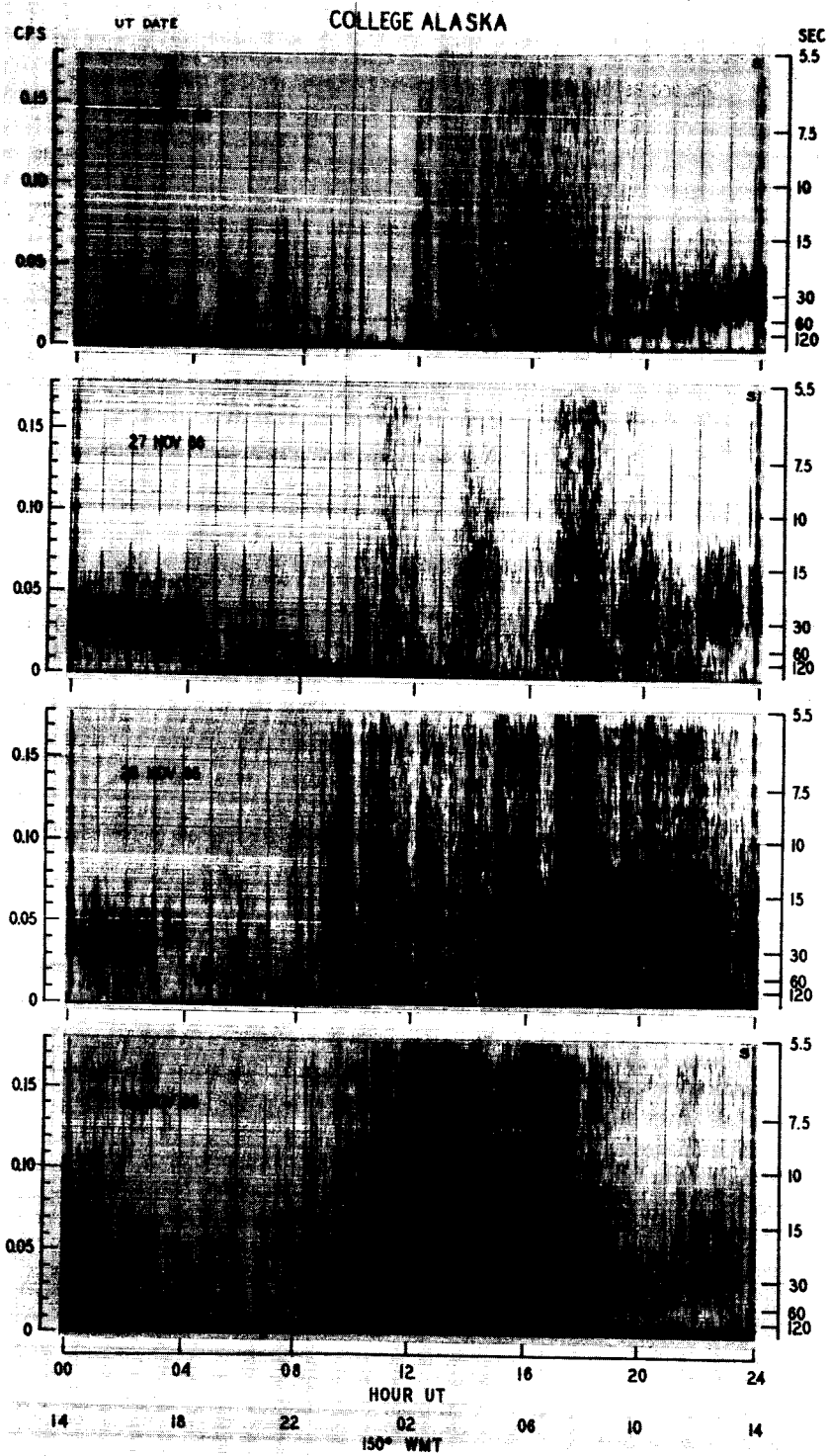


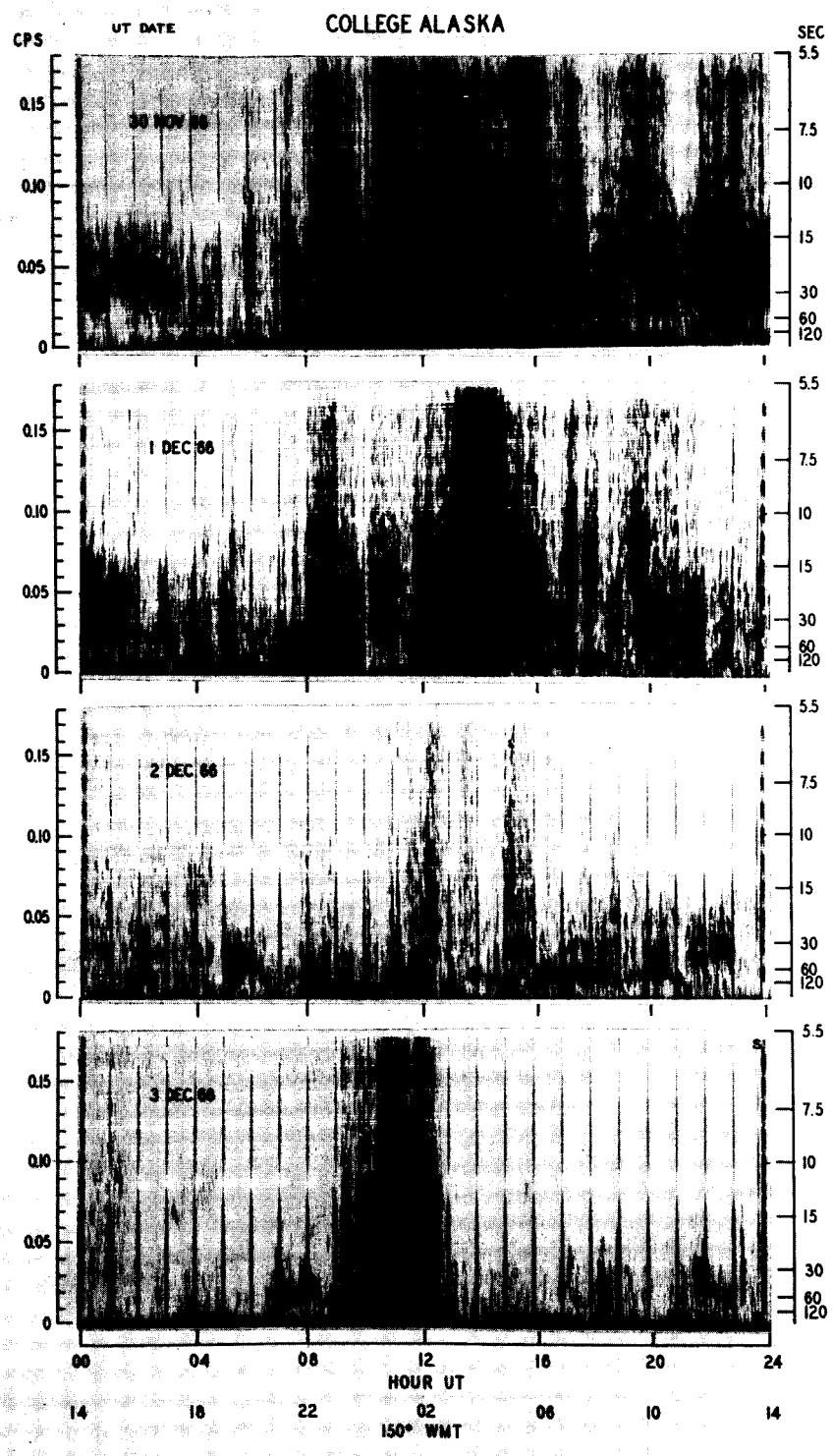


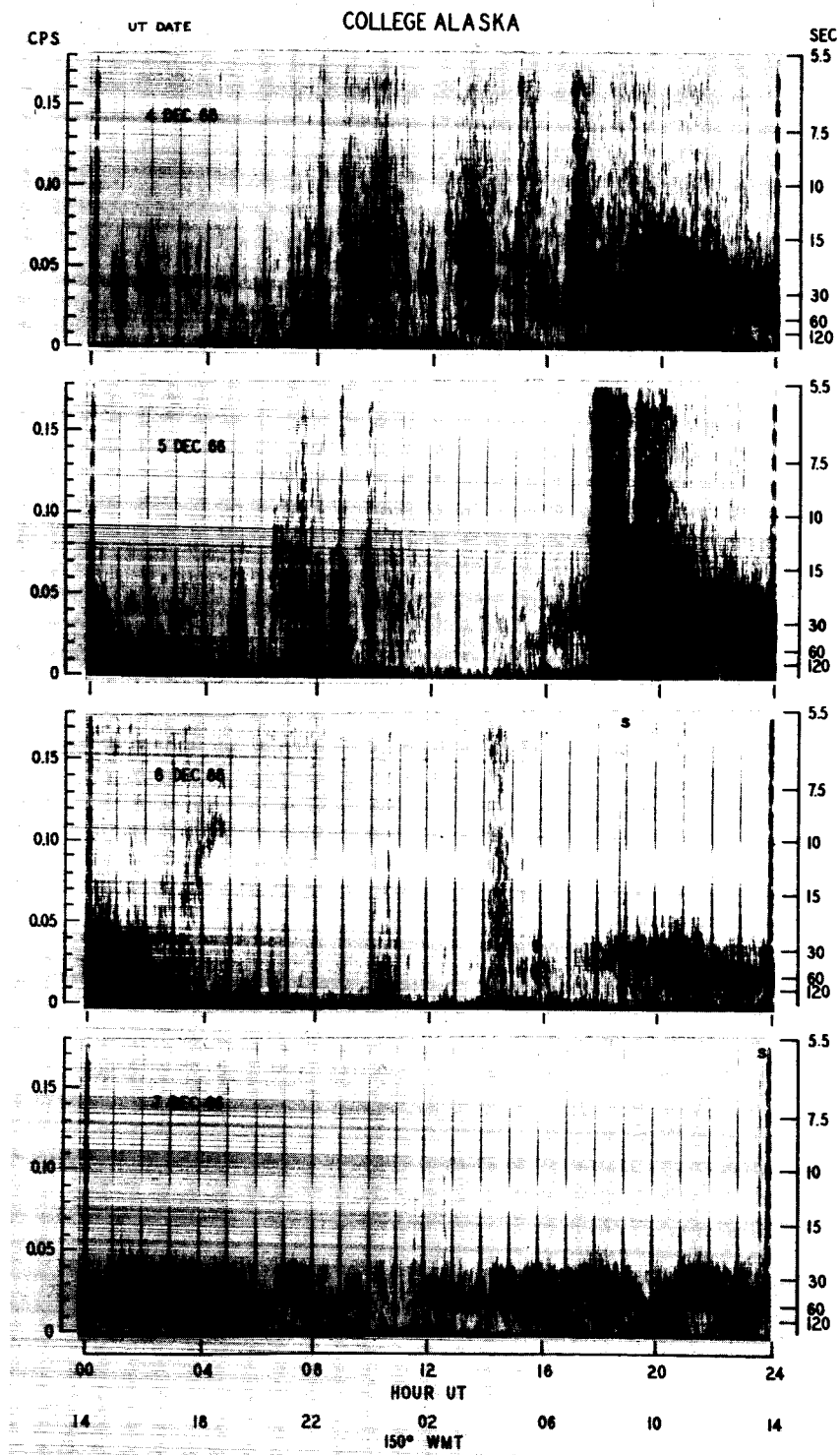


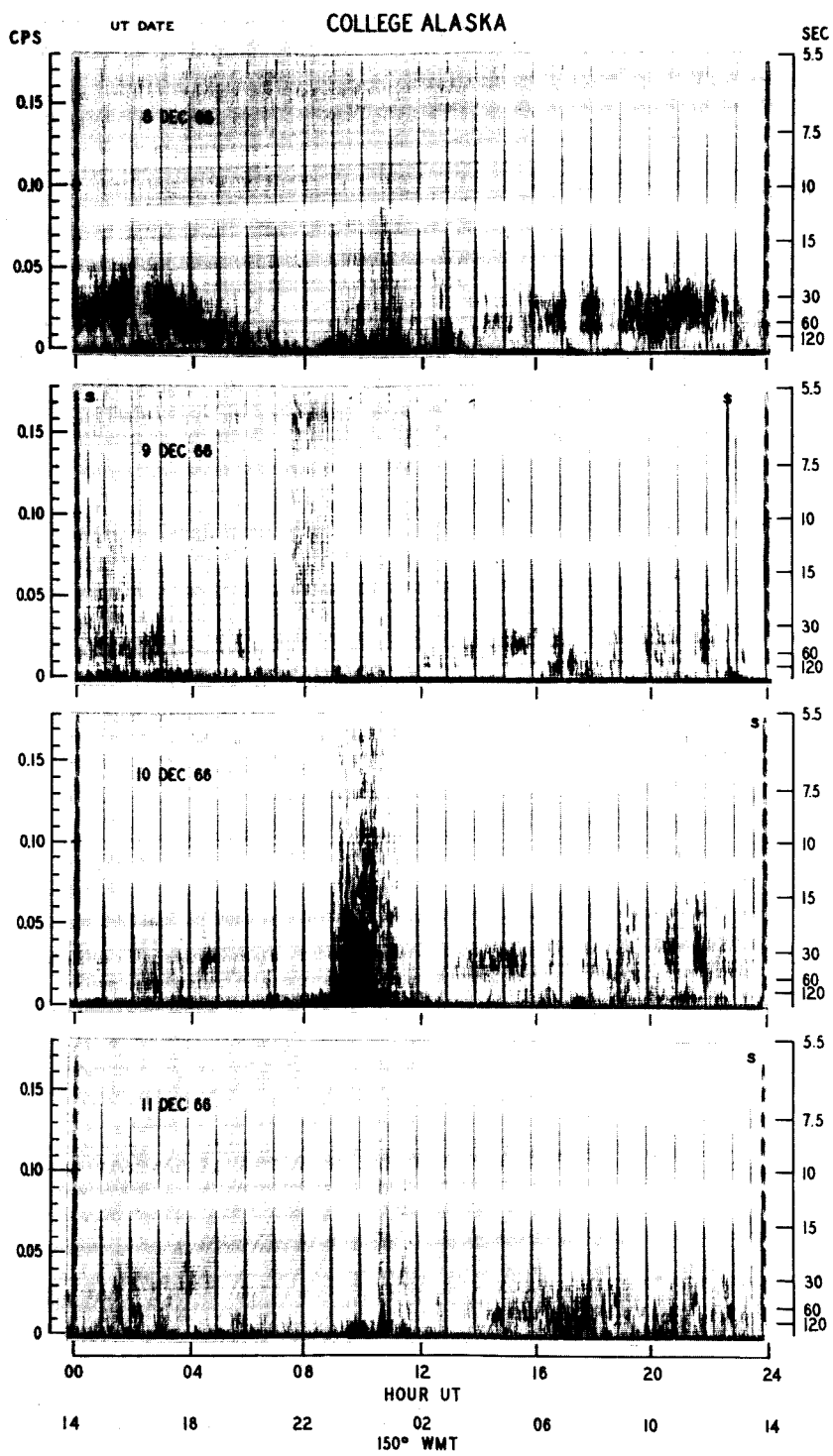












UT. DATE COLLEGE ALASKA

CPS

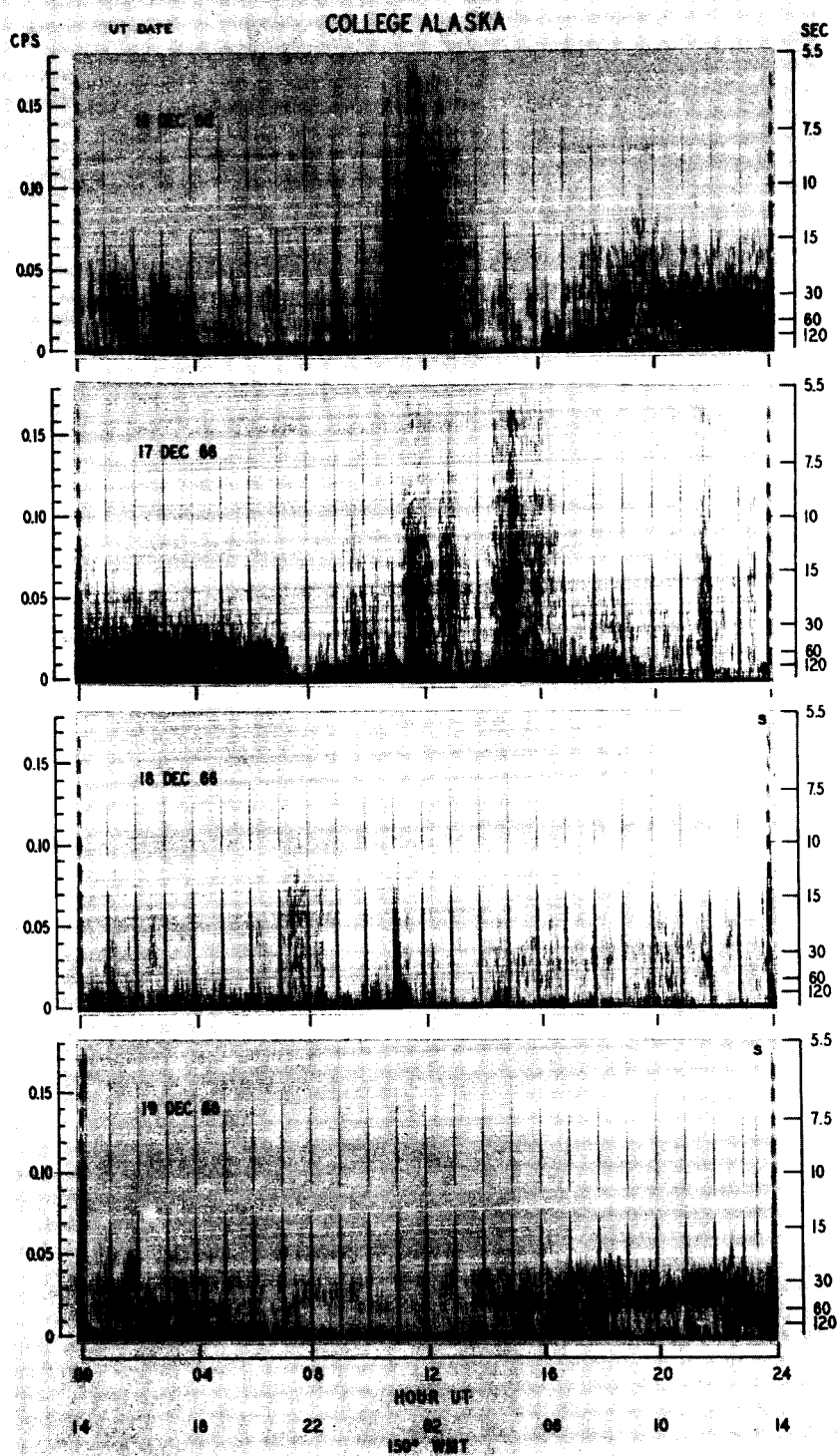
SEC

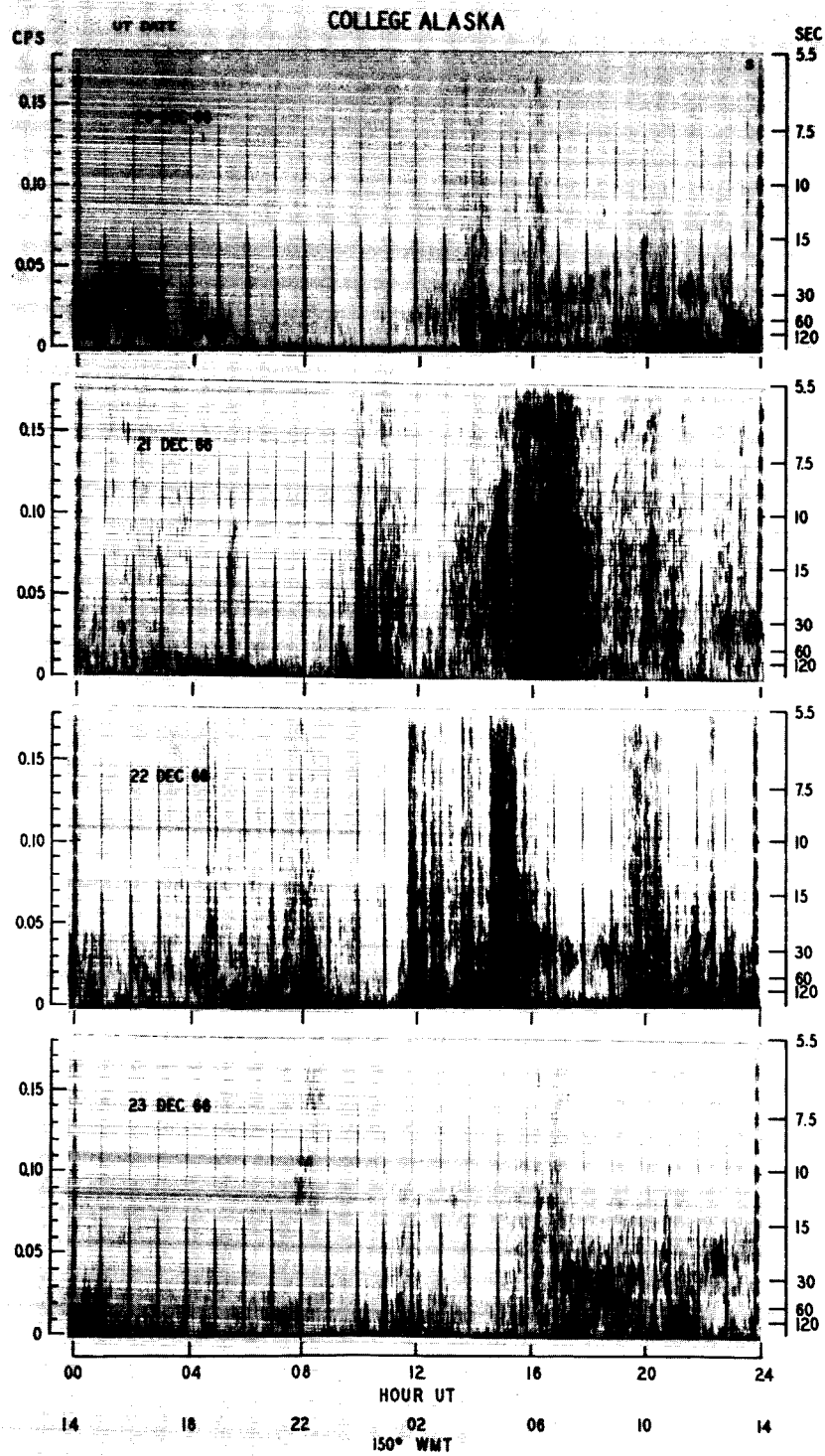
13 DEC 66

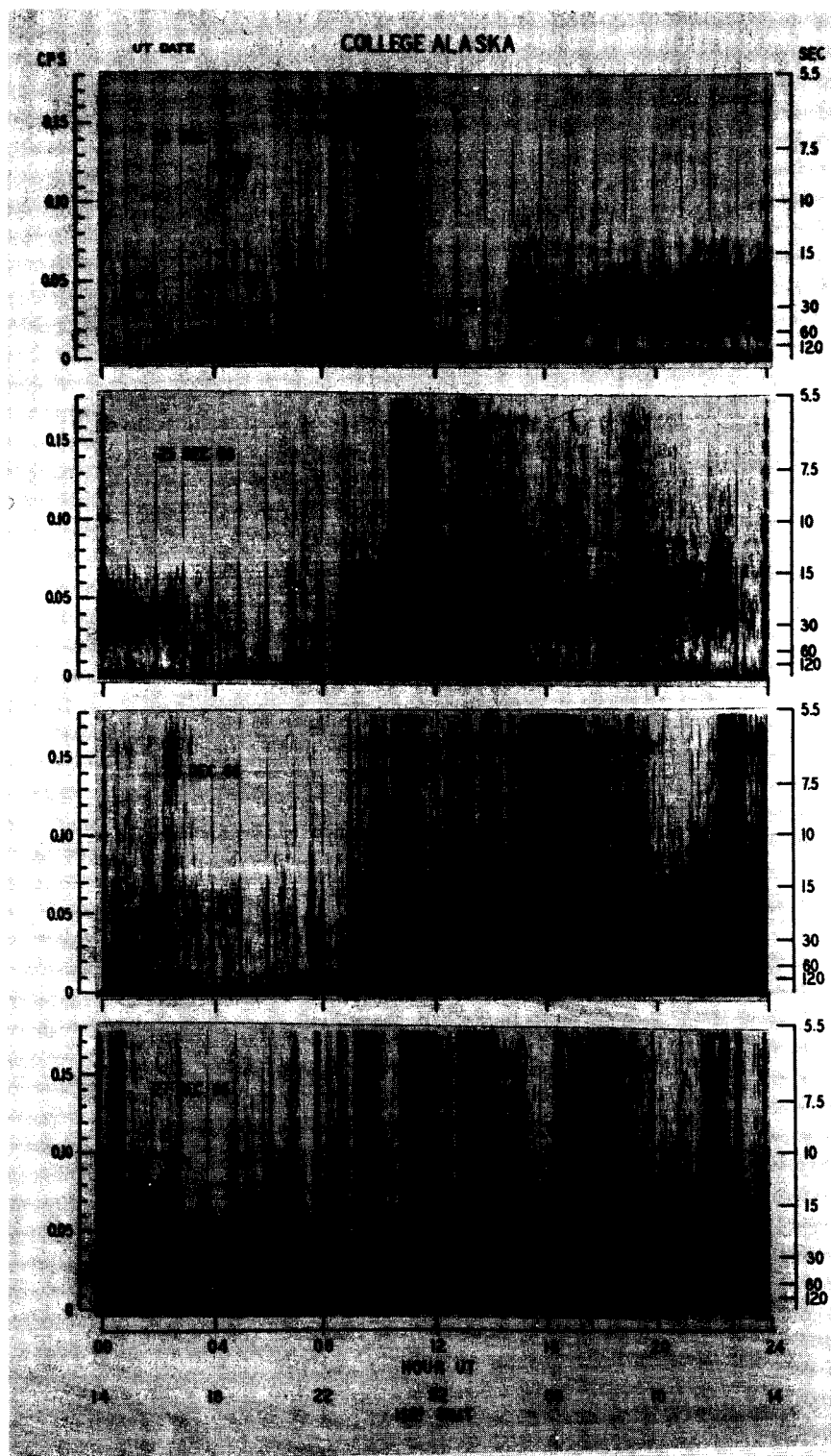
14 DEC 66

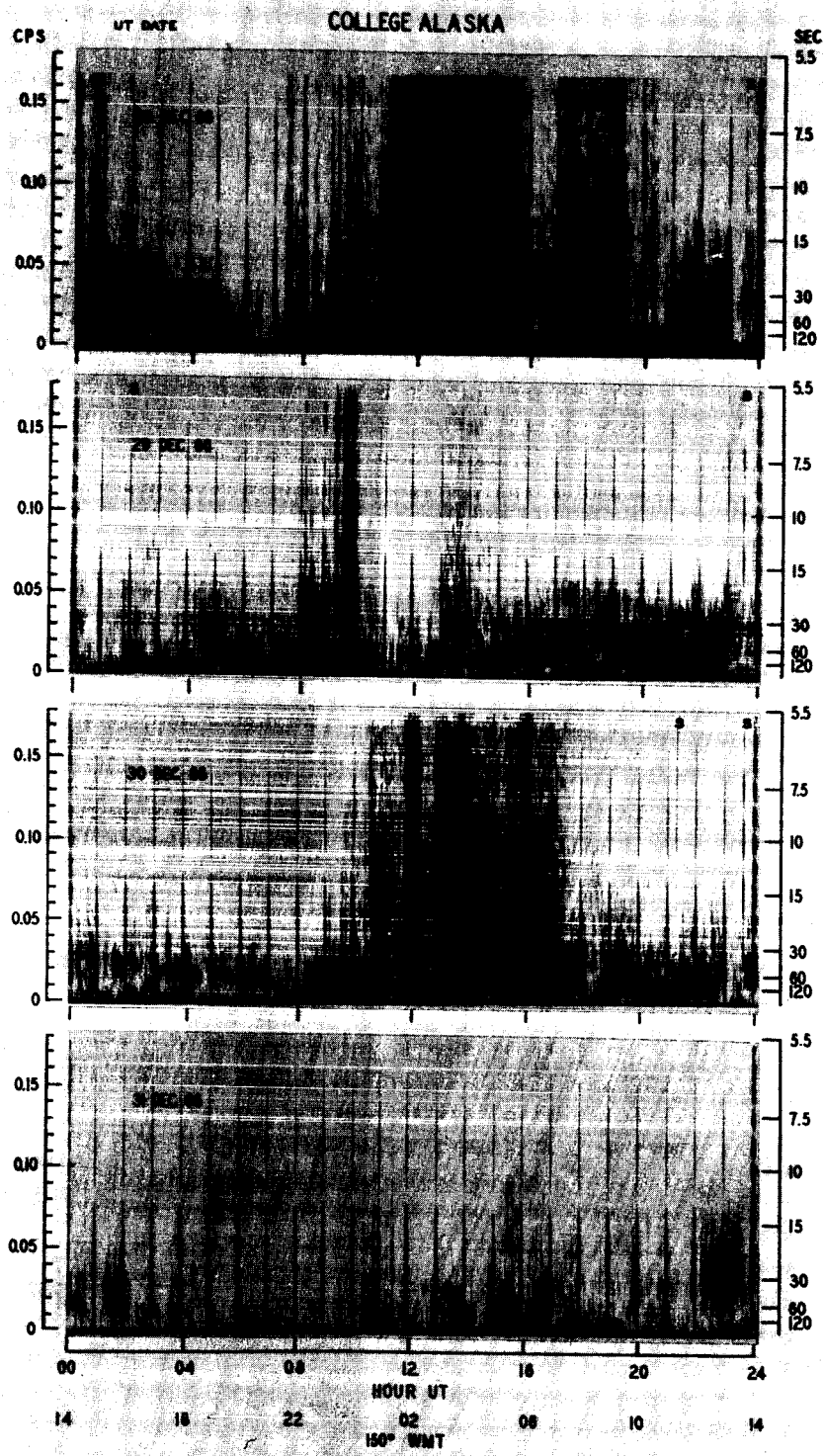
HOUR UT

LOCAL TIME









TELLURIC MICROPULSATION ACTIVITY - Pc 1

R. R. Heacock
Assistant Geophysicist

Instrumentation. The sensing elements are 200 meter spaced telluric current electrodes aligned north-south geographically. The recording system consists of a low pass LC 60 cps rejection filter, a 50k voltage divider gain control, a Tektronix type 122 preamplifier (X1000, h.f. cutoff setting 50 cps, l.f. cutoff setting 0.8 cps), a second 60 cps rejection filter, a Kronhite electronic band-pass filter with h.f. cutoff at 3 cps and l.f. cutoff at 0.06 cps, and an Esterline-Angus 1 ma recorder operating at a chart speed of 3/4" per min. Time mark signals furnished by the Institute operated NASA minitrack station are accurate to a millisecond.

The instrumentation has a rather flat response peak from 1 through 5 sec period essentially the period range of pearl-type micropulsations at College. Micropulsations are also being recorded continuously on tape, and the taped record has been inspected for evidence of pearl-type events at frequencies higher than 3 cps, with none being found to date.

Scaling procedures. The charts are inspected for half-hourly occurrences of pearl-type micropulsations. The criteria used for identification of pearls are a) a rather smooth "pearl"-like envelope, b) a rather constant pulse period in the range 0.5-10 secs, and c) a non-impulsive character (i.e. a small dynamic range). The maximum peak-to-peak amplitude of the pearl envelope is measured in each half-hour which contains more than ~1 minute of pearl-type activity, and this measurement is listed under amplitude, mv/km.

Sonagrams (frequency-time displays) are made of the pearl events. The approximate upper and lower frequency bounds of the activity are scaled by half-hour intervals and are entered under Frequency.

The form of the pearl activity is determined from the sonagram. If the event contains periodic structures with period 1-8 minutes, an S is entered in the Form column. If the activity seems intermediate between Pc 1 and Pi 1, an I is entered under Form. Thus the activity indicated by "I" may have a broader and more diffuse frequency range than for typical Pc 1 activity, or the event may be more impulsive than for typical Pc 1. The occurrence rate of "I" events has some positive correlation with Kp values.

This micropulsation recording and analysis program is supported by the Air Force Cambridge Research Laboratories, Office of Aerospace Research, under Contract No. AF 19(628)-1695, monitored by Mr. Elwood Maple.

TYPE Pc 1 (pearl) MICROPULSATION ACTIVITY
College N-S Telluric Currents

October 1966

Day	Hour U.T.	Frequency High Low	Form	AMP mv/km	Day	Hour U.T.	Frequency High Low	Form	AMP mv/km
1	0030	.3 .2	I	9	4	1100	1.0 .8	S	2
1	0230	.3 .2		1	4	1130	.9 .8	S	2
1	2200	.5 .3		2	4	1500	0.4 0.4		1
1	2300	.6 .35		2			0.2 0.2		4
1	0330	.7 .4		3	4	1630	1.40 .70	S	5
2	0000	.70 .40		4	4	1700	1.4 .8	S	5
2	0030	.70 .40		5	4	1730	1.0 .80	S	3
2	0100	.75 .35		5	4	1800	1.2 1.0	S	
2	0230	.60 .30		1	4	1830	1.2 .8	S	2
2	0300	.60 .27		1	4	2330	.5 .2		8
2	0400	.4 .2		1	5	0000	.8 .2		16
2	1500	.77 .40	S	3	5	0030	.6 .2		18
2	1530	.85 .45	S	7	5	0100	.6 .2		17
2	1600	.85 .45	S	16	5	0130	.6 .2	I	6
2	1630	.90 .60	S	10	5	0200	.5 .2		10
2	1700	.83 .60	S	3	5	0230	0.4 0.1	I	10
2	2200	.42 .38		1	5	0300	0.4 0.1	I	6
2	2230	.42 .38		1	5	2330	.45 .35	I	3
2	2300	.45 .37		2	6	0000	.4 .1	I	4
2	2330	.47 .34		2	6	0130	.60 .15		2
3	0000	.70 .38	S	4	6	0200	.4 .2		3
3	0030	.70 .40	S	4	6	0230	.4 .2		4
3	0530	.2 .1		1	6	2230	.5 .2		3
3	0600	.25 .15		1	6	2300	.5 .2		3
3	1730	.60 .45	S	1	7	0100	0.4 0.2		5
3	1800	.60 .40	S	3	7	0130	0.5 0.2		3
3	1830	.65 .20	S	4	7	0200	0.5 0.3		3
3	1900	.70 .20	S	4	7	0700	0.8 0.5	S	1
3	1930	.70 .20	S	7	7	0730	0.6 0.4	S	1
3	2000	.75 .20	S	9	7	0830	1.0 0.7	S	1
3	2030	.70 .20	S	8	7	0830	1.0 0.7	S	1
3	2100	.6 .3		4	7	0900	1.0 0.6	S	1
3	2130	.60 .30		5	7	0930	0.8 0.6	S	1
3	2200	.80 .30	S	8	7	1000	0.8 0.7	S	1
3	2230	.80 .30	S	36	7	1030	1.1 0.9	S	1
3	2300	.6 .3	S	22	7	1100	1.1 0.9	S	1
3	2330	.60 .25	S	48	7	1130	0.5 0.4	S	1
4	0000	.60 .25		5	7	1200	0.5 0.4	S	1
4	0030	.6 .3	S	33	8	0230	.22 .18	I	1
4	0100	.60 .30	S	27	8	0300	.22 .18	I	1
4	0130	.3 .2		2	8	0800	.7 .2	S	8
4	0200	.3 .2		2	8	0830	.80 .45	S	8
4	0230	.3 .2		3	8	0900	.80 .40	S	2
4	0300	.3 .2		1	8	1200	1.1 1.0		1
4	0330	.4 .1		26	8	1230	1.1 1.0		1
4	0400	.5 .1		55	8	1330	1.0 .85	S	1
4	0630	.70 .23		2	8	1400	1.1 1.0	S	1
4	0700	.70 .25		2	8	1630	.90 .55	S	1

Type Pc 1 (pearl) MICROPULSATION ACTIVITY (Cont'd.)

Day	Hour U.T.	Frequency		Form	AMP mv/km	Day	Hour U.T.	Frequency		Form	AMP mv/km
		High	Low					High	Low		
October 1966											
8	1700	.90	.55	S	2	15	1700	.75	.60	S	1
8	1730	.70	.60	S	1	15	1730	.70	.50	S	1
8	1800	.9	.5	S	1	15	1830	.70	.47	S	18
8	2300	.40	.30		3	15	1900	.72	.48	S	14
9	0000	.4	.3		1	16	0130	.9	.8		2
9	0030	.45	.3		4	16	0230	.85	.80	S	1
9	0100	1.0	.8	S		16	0300	.4	.2		3
		.4	.3		3	17	0200	.3	.2		2
9	0130	1.0	.8	S	3	17	0330	.35	.25	I	1
		.5	.3			17	0400	.4	.3		2
9	0200	.50	.23		3	17	0430	.45	.35	I	2
9	0230	.40	.22		5	18	0100	.5	.3		2
9	0300	.4	.2		1	18	0230	.6	.4	I	1
9	0400	.2	.1	I	1	19	0100	.3	.2	I	1
9	0430	.4	.3		1	20	0100	.3	.2		1
9	0500	.40	.15		1	20	0130	.6	.4		1
9	2130	.35	.1		1	20	0300	.40	.25	I	1
9	2200	.11	.1		1	22	2100	.70	.60	S	1
9	2230	.35	.1		2	22	2130	.70	.60	S	1
9	2300	.5	.4		1	22	2200	.32	.26		1
10	0100	.4	.1		1	22	2230	.30	.25		1
10	2100	.75	.6	S	2	22	2330	.7	.6	S	1
11	1930	.52	.48		1	23	0000	.65	.55	S	1
11	2000	.55	.50		2	23	0030	.65	.55	S	1
11	2030	.55	.50		2	23	0100	.3	.1		1
		.35	.30		2	23	1530	.78	.64	S	1
11	2100	.4	.25		3	23	1600	.8	.6	S	1
11	2130	.6	.4		3			.4	.2		
11	2230	.5	.4		4	23	1630	.85	.3	S	2
11	2300	.4	.3		4	23	1700	.85	.30	S	3
11	2330	.4	.3		4	23	1730	.85	.38	S	6
12	0000	.40	.30		13	23	1800	.90	.35	S	2
12	0030	.40	.30		16	23	1830	.95	.37	S	3
12	0100	.4	.2	I	2	23	1900	.95	.35	S	26
13	0030	.75	.65	S	1	23	1930	.80	.40	S	17
13	0100	.8	.6	S	1	23	2000	.70	.40	S	6
13	0130	.75	.60	S	1	23	2030	.70	.40	S	18
13	1700	1.1	.7	S	1	23	2100	1.00	.80	S	14
13	1730	1.1	.7	S	1			.60	.35		
13	1800	1.1	.75	S	1	23	2130	.70	.35	S	26
13	2200	.4	.1	I	2	23	2200	.80	.40	S	50
14	1600	.63	.56	S	1	23	2230	.75	.40	S	50
15	1300	.3	.2		2	23	2300	.80	.40	S	37
15	1400	.5	.3		1	23	2330	.85	.50	S	26
15	1430	.6	.4		3	24	0000	.85	.58	S	34
15	1500	.78	.50	S	3	24	0030	.85	.55	S	16
15	1530	.78	.50	S	15	24	0100	.75	.45	S	19
15	1600	.80	.50	S	19	24	0130	.70	.45	S	22
15	1630	.65	.52	S	4	24	0200	.60	.40	S	12

Type Pc 1 (pearl) MICROPULSATION ACTIVITY (Cont'd.)

Day	Hour U.T.	Frequency		Form	AMP mv/km	Day	Hour U.T.	Frequency		Form	AMP mv/km
		High	Low					High	Low		
October 1966											
24	0230	.50	.43	S	2	28	1700	.42	.20		2
24	0300	.52	.40	S	2	28	1730	.50	.20	S	3
24	0330	.52	.40	S	1	28	1800	.50	.18	S	7
24	1130	.26	.20		1	28	1830	.40	.38	S	2
24	1200	.35	.20		2	28	1900	.3	.15	S	7
24	1230	.35	.20		1	28	1930	.32	.15	S	6
24	1300	.32	.20		2	28	2000	.27	.15	S	3
24	1330	.30	.20		2	28	2030	.25	.15	S	2
24	1400	.30	.26		1	28	2130	.58	.51	S	5
24	1630	.90	.70	S	3	28	2200	.60	.45	S	9
24	1700	.88	.72	S	8	28	2230	.55	.40	S	14
24	1730	1.20	.85	S	1	28	2300	.48	.38	S	12
		.75	.60	S	2	28	2330	.40	.37	S	2
24	1930	1.12	.60	S	10	29	0030	.52	.48		2
24	2000	.75	.60	S	1	29	0100	.55	.45	S	4
24	2030	.90	.60	S	26	29	0130	.50	.40	S	2
24	2100	1.00	.62	S	24			.20	.15	S	2
24	2130	1.00	.65	S	13	29	0200	.50	.40	S	
24	2200	.80	.60	S	11			.30	.20	S	4
24	2230	.60	.35	S	47	29	0230	.50	.43	S	1
24	2300	.50	.40	S	5	30	0000	.2	.1		1
25	0000	.3	.1		6	30	0030	.4	.25		3
25	0030	.3	.1		3	30	0100	.45	.20		11
25	0100	.3	.1		5	30	0130	.50	.20	S	22
25	0130	.3	.1		7	30	0200	.47	.20	S	18
25	0200	.30	.1		9	30	0230	.50	.20	S	54
25	0230	.46	.1		27	30	0300	.50	.20	S	22
25	0300	.5	.1	S	32	30	0330	.50	.18	S	4
25	0330	.6	.1	S	31	30	1330	.80	.55	S	3
25	0400	.6	.4	S	2	30	1400	.80	.50	S	5
26	0030	.3	.2	I	13	30	1430	.80	.50	S	2
26	0100	.3	.2	I	6	30	1500	.80	.30		2
26	0130	.4	.2	I	7	30	1530	.9	.2	I	9
26	0230	.4	.1	I	2	30	1600	.85	.2	I	2
26	0330	.2	.1	I	2	31	0100	.35	.20		8
26	0430	.40	.20		9	31	0130	.37	.18		9
26	0500	.45	.1		8	31	0200	.3	.1	I	44
26	0530	.43	.20	S	9	31	0230	.6	.1	I	43
26	0600	.45	.25		4	31	0300	.35	.1		21
28	1600	.4	.2	S		31	0400	.35	.1		20
		.7	.6		2	31	0430	.3	.1		8
28	1630	.4	.20	S	2						

TYPE Pc 1 (pearl) MICROPULSATION ACTIVITY
College N-S Telluric Currents
November 1966

Day	Hour U.T.	Frequency		Form	AMP mv/km	Day	Hour U.T.	Frequency		Form	AMP mv/km
		High	Low					High	Low		
1	0400	.5	.1	I	18	9	0000	.55	.40		6
2	0030	.5	.2	I	8	9	0030	.3	.2		1
3	0830	.85	.62	S	1	9	0100	.5	.2		3
4	0030	.4	.2		2	9	0130	.5	.2		2
4	0130	.4	.2		3	9	0200	.5	.2		4
4	0230	.6	.3		1	9	0230	.40	.25	S	4
4	1130	.6	.3	S	6	9	0300	.48	.38		1
4	1200	.65	.30	S	10	9	0330	.48	.38		1
4	1230	.80	.38	S	10	9	1630	1.00	.80	S	5
4	1300	.76	.36	S	2	9	1700	1.00	.75	S	6
4	1330	.80	.35	S	4	9	1730	1.00	.77	S	3
4	1400	.80	.30	S	4	9	1800	.90	.75	S	1
4	1430	1.00	.40	S	10	9	1830	.85	.70	S	1
4	1500	.90	.40	S	22	9	1900	.4	.3		1
4	1530	.90	.47	S	7	9	2000	.85	.42	S	1
4	1600	.90	.47	S	12	9	2030	.80	.27	S	5
4	1630	.90	.45	S	20	9	2100	.78	.18	S	5
4	1700	.90	.40	S	11	9	2130	.92	.27	S	2
4	1730	.80	.50	S	4	9	2200	.95	.25	S	8
4	2030	.55	.20		14	9	2230	.90	.3	S	10
4	2100	.60	.30	S	5	9	2300	.8	.30	S	10
5	0000	.30	.20		3	9	2330	.80	.30	S	11
5	0030	.35	.20		17	10	0000	.8	.3		30
5	0100	.35	.20		10	10	0030	.70	.30		7
5	0130	.37	.18		8	10	0100	.82	.30	S	19
5	0200	.35	.18		2	10	0130	.80	.30	S	16
5	0230	.4	.2		1	10	0200	.62	.52	S	2
6	2030	.70	.56		3	10	0230	.63	.55	S	1
6	2100	.70	.60		3	10	0630	.3	.2		1
7	0830	.5	.2	I	6	10	0700	.4	.2		1
8	0000	.50	.30		51	10	0730	.48	.30		2
8	0030	.50	.30		11	10	1530	.90	.67	S	1
8	0100	.5	.25		4	10	1600	.90	.75	S	1
8	0130	.50	.25		9	10	1630	.85	.78	S	1
8	0200	.40	.20		4	10	1700	.70	.50	S	1
8	1630	.60	.46	S	1	10	1730	.70	.40	S	4
8	1700	.55	.40	S	1	10	1800	.60	.40	S	3
8	1730	.6	.44	S	1	12	0030	.60	.30		3
8	1900	.6	.5	S	1	12	0100	.50	.30		2
8	2030	.65	.45	S	15	12	0130	.50	.30		1
8	2100	.62	.40	S	19	12	0200	.50	.30		1
8	2130	.58	.38	S	5	14	2300	.47	.40		6
8	2200	.4	.3		1	14	2330	.42	.36		3
8	2230	.6	.3		1	15	0030	.45	.40		4
8	2300	.60	.45	S	47	15	0100	.46	.36	S	10
8	2330	.70	.40	S	44	15	0130	.45	.32	S	8

Type Pc 1 (pearl) MICROPULSATION ACTIVITY (Cont'd.)

Day	Hour U.T.	Frequency		Form	AMP mv/km	Day	Hour U.T.	Frequency		Form	AMP mv/km
		High	Low					High	Low		
November 1966											
15	0200	.50	.34	S	20	22	2300	.35	.20		5
15	0230	.47	.38	S	2	22	2330	.40	.20	S	4
16	1430	.6	.4	S	1	23	0000	.50	.25	S	18
16	1500	.70	.35	S	2	23	0030	.52	.28	S	34
16	1730	.53	.48		9	23	0100	.50	.28	S	29
16	1800	.55	.47		11	23	0130	.55	.30	S	56
16	1830	.6	.4	I	2	23	0200	.55	.25	S	43
17	0300	.40	.18		14	23	0230	.55	.25	S	32
17	0330	.4	.15		4	23	0300	.55	.25	S	34
17	1730	.60	.40	S	9	23	0330	.55	.20	S	18
17	1800	.60	.40	S	4	23	0400	.50	.20	S	5
19	0330	.25	.1	I	10	23	0430	.50	.24	S	5
19	0430	.25	.1	I	9	23	2000	.4	.2		1
19	0500	.25	.1	I	16	23	2030	.4	.2		1
19	1800	.5	.3		2	23	2300	.35	.25		6
19	2230	1.0	.8	I	2	23	2330	.35	.23		2
19	2300	.9	.7	I	1	24	0030	.30	.20	S	3
19	2330	1.0	.6		7	24	0100	.30	.20	S	3
20	0000	1.2	.8		4	24	0330	.25	.1		4
20	0030	1.2	.9		2	24	0400	.35	.20		3
20	0100	.8	.4	I	2	24	0430	.38	.20		7
20	2200	.33	.28	S	8	24	0500	.4	.3	I	1
20	2230	.33	.28	S	8	24	0600	.7	.4		3
20	2300	.25	.15	I	3	24	1630	.80	.50		4
20	2330	.50	.30		54	24	1700	.7	.5		1
21	0000	.5	.35		3	26	0200	.4	.2		3
21	0300	.15	.10		2	26	0230	.4	.1		4
21	0330	.2	.1		1	26	0300	.48	.1		5
21	1600	1.20	.90	S	5	26	0330	.48	.15		8
21	2030	.6	.4	I	2	26	0600	.25	.1	I	2
21	2100	.6	.4	I	2	26	0630	.2	.1	I	1
21	2200	.7	.5		2	29	0100	.4	.2	I	18
21	2230	.6	.5		2	29	0130	.4	.2		16
22	0000	.4	.2		2	29	0200	.3	.1	I	3
22	1630	.40	.25		1	29	0230	.2	.1		3
22	1700	.4	.3		1	29	0300	.2	.1		2
22	1830	.4	.2	S	2	29	0330	.2	.1		2
22	1900	.4	.2	S	2	29	2100	.6	.2	I	2
22	1930	.37	.22	S	6	29	2130	.6	.2	I	2
22	2000	.38	.22	S	8	30	0000	.6	.4		1
22	2030	.40	.22	S	8	30	0030	.7	.5		3
22	2100	.35	.22	S	11	30	0200	.6	.5		2
22	2130	.38	.22	S	15	30	0230	.7	.5		1
22	2200	.40	.20	S	24	30	0300	.8	.5		3
22	2230	.40	.20		17						

TYPE Pc 1 (pearl) MICROPULSATION ACTIVITY
College N-S Telluric Currents

December 1966

Day	Hour U.T.	Frequency		Form	AMP mv/km	Day	Hour U.T.	Frequency		Form	AMP mv/km
1	0100	.6	.5		1	7	1730	.30	.20		1
1	0130	.6	.3	I	2	7	1800	.30	.22		1
1	0200	.6	.4		2	7	1930	.42	.30	S	2
1	0300	.45	.3		1	7	2100	.50	.20	S	2
2	1930	1.2	1.0	S	1	7	2130	.50	.20	S	2
2	2000	1.2	1.0	S	1	7	2200	.50	.30	S	2
2	2200	.60	.43	S	3	7	2230	.50	.30	S	2
2	2230	.65	.4	S	2	7	2330	.43	.20	S	2
2	2300	.65	.3	S	7	8	0000	.43	.20	S	2
2	2330	.5	.3	S	1	8	0030	.50	.38	S	5
3	0000	.7	.5	S	1	8	0100	.50	.36	S	6
3	0030	.7	.5	S	3	8	0130	.55	.50		2
3	0100	.65	.40	S	4			.45	.33	S	2
3	0130	.62	.40	S	5	8	0200	.40	.30	S	1
3	0200	.60	.40	S	9	8	1300	.50	.40		1
3	0230	.60	.40	S	3	8	1330	.50	.40		1
3	0300	.60	.42	S	2	8	1600	.50	.40		1
3	0330	.52	.40	S	3	8	1630	.50	.40		1
3	0400	.52	.40	S	1	8	1700	.5	.4		1
3	1600	.65	.55	S	2	8	1730	.5	.4		1
3	1630	.70	.50	S	2	8	1800	.5	.4	S	1
3	1700	.80	.50	S	2	8	1830	.5	.4	S	1
3	1730	.70	.37	S	1	8	1900	.50	.38	S	1
3	1800	.63	.50	S	2	8	1930	.47	.33	S	2
3	2130	.80	.50	S	1	8	2000	.42	.32	S	1
3	2200	.80	.45	S	8	8	2030	.42	.32	S	3
3	2230	.8	.4	S	8	8	2100	.40	.33	S	2
3	2300	.8	.4	S	11	9	0430	.45	.3	S	1
4	0030	.9	.6	S	18	9	0500	.5	.3	S	1
4	0100	.9	.4	S	32	9	2130	.37	.30		1
4	0130	.8	.38	S	4	9	2200	.45	.30		1
4	0200	.45	.3	S	1	9	2230	.40	.30		1
4	0230	.80	.55	S		10	0000	.5	.15	S	4
		.4	.3		15	10	0030	.50	.20	S	2
4	0300	.8	.55	S	4	10	0100	.40	.18		2
5	0130	.35	.25		2	10	0130	.20	.18		2
7	0030	.45	.3		20			.50	.40		2
7	0100	.50	.30		44	10	0200	.60	.40	S	4
7	0130	.50	.25	S	19	10	0230	.55	.40	S	3
7	0200	.45	.25	S	24	10	2030	.63	.60	S	2
7	0230	.45	.25	S	15	10	2100	.65	.60	S	2
7	0300	.42	.20	S	14	11	0000	.60	.40	S	5
7	0330	.45	.20	S	22	11	0030	.70	.38	S	12
7	0400	.45	.25	S	21	11	0100	.70	.38	S	4
7	0430	.50	.20		14	11	0130	.50	.26	S	12
7	0500	.37	.20		10	11	0200	.50	.27	S	10
7	0530	.32	.22		2	11	0230	.45	.27	S	2

Type Pc 1 (pearl) MICROPULSATION ACTIVITY (Cont'd.)

Day	Hour U.T.	Frequency		Form	AMP mv/km	Day	Hour U.T.	Frequency		Form	AMP mv/km
		High	Low					High	Low		
December 1966											
12	2100	.62	.55	S	1	18	1430	.80	.40	S	1
12	2130	.60	.50	S	1	18	1500	.7	.5	S	1
12	2200	.60	.50	S	1	19	0830	.8	.5	S	1
12	2230	.60	.50	S	1	19	0900	.8	.5	S	1
12	2330	.6	.15		1	20	1130	1.00	.75		1
		.30	.20		1	20	1200	1.0	.8		1
13	0030	.70	.45			20	1700	.60	.50	S	1
		.4	.2		5	20	1730	.62	.48	S	2
13	0100	.70	.45		8	20	1800	.62	.52	S	2
13	0130	.75	.45	S	10	20	1830	.60	.44	S	3
13	0200	.80	.25		8	21	0030	.20	.10		2
13	0230	.5	.38		4	21	0100	.80	.60		4
13	0300	.5	.38		3			.40	.10		16
13	0530	.6	.2	I	3	21	0130	.30	.10	I	8
13	0600	.6	.4	I	2	21	1330	.80	.68	S	3
13	0700	.8	.2	I	4	21	1400	.80	.70	S	2
13	0730	.4	.2	I	3	21	1430	.89	.82	S	1
13	0800	.4	.3	I	1	22	0830	.45	.25	S	4
14	0300	0.25	0.2		2	22	0900	.48	.30		2
14	1230	0.5	0.4	I	7	22	2200	.35	.15		12
14	1300	0.5	0.4	I	2	22	2230	.40	.15		14
16	0030	.35	.20		2	22	2300	.40	.20		18
16	0100	.40	.25		2	22	2330	.35	.18		3
16	0800	1.3	1.2	S	1	23	0000	.25	.15		2
17	0500	1.6	1.4	S	1	23	0030	.4	.25		6
17	1900	1.4	1.2	S	1	23	0100	.4	.25		17
17	1930	1.1	.7	S	1	23	0130	.4	.35		4
17	2000	1.0	.6	S	1	23	0730	.2	.1	I	2
17	2100	.48	.42	S	2	23	0800	0.3	.1		10
17	2130	.48	.42	S	1	23	0830	.35	.1	S	7
17	2300	.60	.40	S	1	23	0900	.34	.10		2
17	2330	.7	.4	S	1	24	0400	.2	.1		5
18	0000	.50	.44	S	1	24	0430	.2	.1		4
18	0030	.7	.5	S	1	24	0500	.2	.1		6
18	0100	.7	.40	S	32	24	0600	.5	.1	I	4
18	0130	.75	.40	S	5	24	0630	.8	.3	S	2
18	0200	.48	.38	S	2	24	0730	.7	.3	I	7
18	0230	.43	.37	S	2	24	0800	.5	.35	I	2
18	0400	.5	.3		1	25	2300	.4	.3		3
18	0900	.60	.50		1	26	0000	.90	.75		2
18	0930	.60	.48		1			.4	.2		6
18	1200	.7	.45	S	2	26	0230	.4	.2	I	7
18	1230	.80	.50		2	26	0300	.35	.2	I	2
18	1300	.80	.50	S	4	26	0330	.35	.3	I	2
18	1330	.80	.45	S	4	26	0400	.40	.23	S	2
18	1400	.70	.45	S	1	26	0430	.35	.3		1

Type Pc 1 (pearl) MICROPULSATION ACTIVITY (Cont'd.)

Day	Hour U.T.	Frequency		Form	AMP mv/km	Day	Hour U.T.	Frequency		Form	AMP mv/km
		High	Low					High	Low		
December 1966											
26	0500	.26	.21		1	30	0200	.61	.30	S	10
27	0200	.4	.1	I	10	30	0230	.65	.32	S	10
28	0300	.22	.20		2	30	0300	.62	.30	S	6
28	0330	.22	.18	S	2	30	0330	.50	.30	S	4
29	2230	.72	.60	S	2	30	0400	.50	.30	S	2
29	2300	.77	.47	S	6	30	0430	.42	.38	S	
29	2330	.72	.43	S	6	30	0500	.38	.33	S	1
30	0000	.60	.42	S	2	30	0730	.5	.3	S	1
30	0030	.58	.38	S	3	31	2130	.70	.60	S	1
30	0100	.60	.34	S	17	31	2200	.70	.60	S	1
30	0130	.60	.30	S	18	31	2230	.50	.23		2
						31	2330	.60	.48		2

GEOMAGNETIC ACTIVITY, K, A_k , C

J. B. Townshend, Director

College Magnetic and Seismological Observatory
Environmental Science Services Administration

The K, A_k and C-indices for College are assigned at the Coast & Geodetic Survey's College Magnetic & Seismological Observatory located at the University of Alaska.

The K-index. The K-index is an indication of the intensity of the solar particle-radiation effects for each eight intervals beginning 00-03, 03-06...21 to 24 U.T. It is defined as, 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, according to the season, the sunspot cycle, and the phase of the moon. The K-indices are scaled from the Normal and Storm magnetograms, D and H traces and are based on the most disturbed component. The Z component is no longer used for determining K. The schedule for K-indices vs gamma range for College is as follows:

<u>Gamma Range</u>	<u>K-index</u>
0 < 25	0
25 < 50	1
50 < 100	2
100 < 200	3
200 < 350	4
350 < 600	5
600 < 1000	6
1000 < 1650	7
1650 < 2500	8
2500 +	9

The Equivalent Daily Amplitude, A_k . The K-index is converted into an equivalent range, a_k which is near the center of the limiting gamma ranges for a given grade of K. The average of the eight values a_k is called the equivalent daily amplitude A_k . For College the equivalent a_k for K is:

K = 0	1	2	3	4	5	6	7	8	9	
a_k = 0	3	7	15	27	48	80	140	240	400	(10 γ)

The unit 10 γ has been chosen so as not to give the illusion of an accuracy not justified. The table for the re-conversion of K into an equivalent amplitude a_k is conventional and differs somewhat from the values adopted for the center of the limiting gamma range. The difference is of importance only in special studies, therefore, the conventional re-conversion of K into a_k is used.

The Magnetic Daily Character-Figure C. To each Universal day a character is assigned on the basis C=0, if it is quiet; C=1; if it is normal or moderately disturbed; C=2, if it is greatly disturbed. The method used to assign characters at the College Observatory is based on A_k as follows:

<u>A_k range</u>	<u>C</u>
0 < 11	0
11 < 50	1
50 +	2

Reference: Annals of the IGY, IV, pp. 227-236, 1957.

MAGNETIC ACTIVITY

October 1966

K-indices, Whole-day Character, and Equivalent Daily Amplitude, A_k
 Observatory, College Magnetic Observatory USC & GS.

K-indices											
Hours UT											
Date	00-03	03-06	06-09	09-12	12-15	15-18	18-21	21-24	Sum	C	A _k
1	2	2	3	4	2	0	0	0	13	0	08
2	0	0	3	3	2	0	0	0	08	0	05
3	0	0	1	0	0	0	0	0	01	0	00
4	0	3	3	5	4	2	4	4	25	1	21
5	4	4	6	7	4	6	4	2	37	2	52
6	2	5	4	7	6	4	2	1	31	1	42
7	2	1	0	0	3	5	2	2	15	1	11
8	1	0	3	4	3	1	0	0	12	0	08
9	1	1	4	5	4	3	1	1	20	1	16
10	1	0	0	2	0	0	0	0	03	0	01
11	0	0	0	1	0	0	0	0	01	0	00
12	0	1	1	3	2	0	2	1	10	0	05
13	1	0	1	4	4	1	0	2	13	0	09
14	1	1	2	0	0	0	0	0	04	0	02
15	0	0	1	3	2	1	2	3	12	0	06
16	2	3	7	6	7	6	2	1	34	2	59
17	1	1	0	0	0	2	1	1	06	0	02
18	2	1	0	0	0	1	1	1	06	0	02
19	1	0	1	1	0	0	1	1	05	0	02
20	1	0	0	2	0	0	0	0	03	0	01
21	0	0	0	0	3	0	0	0	03	0	02
22	0	0	0	0	0	0	0	0	00	0	00
23	0	0	0	0	0	0	0	1	01	0	00
24	0	0	0	0	4	5	2	2	13	1	11
25	2	2	6	6	5	2	3	3	29	1	32
26	2	4	1	3	5	5	2	1	23	1	20
27	1	0	0	0	1	2	2	1	07	0	03
28	1	0	1	0	0	0	1	1	04	0	02
29	0	0	1	0	0	1	1	0	03	0	01
30	2	1	0	1	1	5	3	3	16	1	12
31	3	4	5	6	6	6	4	4	38	1	48
Lower limit for K = 9									D 2530	H 2490	

MAGNETIC ACTIVITY

November 1966

K-indices, Whole-day Character, and Equivalent Daily Amplitude, A_k
 Observatory, College Magnetic Observatory USC & GS.

K-indices											
Hours UT											
Date	00-03	03-06	06-09	09-12	12-15	15-18	18-21	21-24	Sum	C	A _k
1	3	3	5	6	6	6	3	2	34	1	43
2	2	2	1	5	5	2	3	1	21	1	17
3	2	2	3	7	4	4	2	2	26	1	30
4	2	2	1	2	1	1	3	1	13	0	06
5	1	1	4	4	4	3	1	0	18	1	13
6	0	1	2	4	3	1	1	1	13	0	08
7	0	0	3	4	2	0	1	1	11	0	07
8	1	2	1	1	1	1	1	0	08	0	03
9	0	0	0	1	0	0	0	0	01	0	00
10	0	1	2	5	5	1	2	2	17	1	15
11	0	1	0	4	0	0	0	0	05	0	04
12	1	1	0	3	0	2	3	1	11	0	06
13	1	0	1	5	2	1	1	1	12	0	09
14	0	0	0	0	0	0	0	0	00	0	00
15	0	0	0	3	1	0	0	0	04	0	02
16	0	1	3	3	1	1	1	0	10	0	05
17	2	2	1	2	0	2	3	0	12	0	06
18	0	0	0	1	2	3	3	2	11	0	06
19	2	3	3	4	5	2	2	3	24	1	18
20	1	2	1	2	2	1	2	1	12	0	05
21	1	1	3	2	0	0	0	1	08	0	04
22	0	0	0	0	0	0	0	0	00	0	00
23	0	0	0	1	1	0	0	0	02	0	01
24	0	1	4	3	2	0	0	0	10	0	07
25	0	0	0	0	0	0	0	0	00	0	00
26	2	1	2	3	3	2	0	0	13	0	07
27	0	0	0	2	2	2	2	0	08	0	04
28	0	1	2	5	5	5	5	3	26	1	27
29	3	3	3	6	4	5	2	0	26	1	26
30	0	1	6	7	6	6	2	3	31	2	51
Lower limit for K = 9									D 2530	H 2490	

MAGNETIC ACTIVITY

December 1966

K-indices, Whole-day Character, and Equivalent Daily Amplitude, A_k

Observatory, College Magnetic Observatory USC & GS.

K-indices											
Hours UT											
Date	00-03	03-06	06-09	09-12	12-15	15-18	18-21	21-24	Sum	C	A_k
1	2	3	4	4	5	2	2	2	24	1	18
2	1	0	1	2	3	3	1	1	12	0	06
3	0	0	0	3	1	0	0	0	04	0	02
4	0	0	5	5	5	3	3	3	24	1	24
5	2	4	5	4	1	4	5	2	27	1	24
6	3	1	1	1	2	1	1	0	10	0	05
7	0	0	0	0	0	0	1	0	01	0	00
8	0	0	0	2	0	0	0	0	02	0	01
9	0	0	0	1	0	0	0	0	01	0	00
10	0	0	1	4	0	0	0	0	05	0	04
11	0	0	0	1	0	2	0	0	03	0	01
12	0	0	0	0	0	0	0	0	00	0	00
13	1	3	3	4	5	6	3	1	26	1	26
14	2	2	3	3	7	8	5	4	34	2	62
15	3	3	3	5	5	4	3	1	27	1	23
16	1	1	1	4	3	1	0	1	12	0	07
17	1	0	1	3	3	3	1	2	14	0	08
18	1	1	2	2	0	1	0	0	07	0	03
19	0	0	0	0	0	1	0	1	02	0	01
20	0	0	0	0	3	2	2	3	10	0	06
21	1	2	1	4	3	4	2	2	19	1	12
22	1	2	3	3	5	4	2	3	23	1	17
23	2	1	0	1	2	3	2	1	12	0	06
24	1	3	5	6	2	2	1	1	21	1	21
25	1	1	3	6	5	3	3	2	24	1	23
26	3	1	4	6	6	7	4	4	35	2	50
27	4	4	6	6	6	4	4	3	37	2	45
28	3	1	3	6	5	3	2	1	24	1	23
29	1	0	3	4	1	1	1	0	11	0	07
30	0	0	1	4	4	3	0	0	12	1	09
31	0	0	0	1	1	1	0	0	03	0	01

Lower limit for K = 9

D
2530H
2490