AFSWP Report #217

UNITED STATES NAVY

APPENDIX TO VOLUME II

ANALYSIS OF 500-MILLIBAR PATTERNS

March 1954

PROJECT AROWA

Bureau of Aeronautics Project Arowa (TED-UNL-MA-501)
"Applied Research; Operational Weather Analysis"
(AROWA)

U. S. Naval Air Station
Building R-48
Norfolk, Virginia

April 1954

AFSWP Report # 717

BUREAU OF AERONAUTICS PROJECT AROWA (TED-UNL-MA-501)
"Applied Research; Operational Weather Analyses"

Appendix to Volume II

ANALYSIS OF 500-MILLIBAR PATTERNS

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BUILDING R-48
U. S. NAVAL AIR STATION
NORFOLK 11, VIRGINIA

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ARITHMETICAL METHODS

In carrying out this procedure certain methods and short cuts have been developed and used in handling the numbers. These methods are listed here for the information of those using the procedure and as an explanation of the numerical values on the charts.

1. Reading:

Heights are read to the nearest 50 feet from the Andrews' Analysis. This analysis has contours for every 400 feet. This requires that intermediate contours are sketched near singular points and in areas of weak gradient.

17,864 feet read as 785
17,722 feet read as 770
18,026 feet read as 805
18,338 feet read as 835

2. Computation of Space Mean:

Heights at the four points of the diamond grid are summed and rounded to three digits, using heights from 1:

17,864 feet read as 785
17,722 feet read as 770
18,025 feet read as 805
18,338 feet read as 835
3195 sum plotted as 320

Contours are drawn on the mean charts for every 8 numbers from 336. The equivalence of these numbers in standard contours is shown:

336	18,400
328	18,200
320	18,000

On all mean charts the 18,400 contour and the 17,200 contour are emphasized in red. The 18,400 contour has a statistical relation to the maximum wind at that level and with the 17,200 show the major flow channel. The 17,200 contour disappears frequently in mid-summer and this value should be revised upward to 17,600 about 1 June.

3. Total Tendency:

The total tendency is plotted in tens of feet with the last number always 5 or zero. On a total tendency chart:

5 = 50 feet
10 = 100 feet
15 = 150 feet etc.

Isolines are drawn for every 20 units on the chart. Center tendencies are estimated. Falling tendencies 40-60 and 80-100 etc., are shaded in red. Rising tendencies of the same value are shaded in blue. Zero lines are not drawn.

4. Long Wave Tendencies:

The difference between daily mean heights are plotted at each point. These values range from 0 to about 30. Their meaning in actual height change is:

$$2 = \frac{200}{4} = 50 \text{ feet}$$

$$10 = \frac{1000}{4} = 250 \text{ feet}$$

$$20 = \frac{2000}{4} = 500 \text{ feet}$$

These charts are analyzed for isolines named 0 +5, -5 +10, -10 etc. Centers smaller than 5 are essentially no change. That is there is a basic indeterminacy of about 2.5 due to numerical processes.

The area between isolines numbered +5 and +10, and +15 and +20 etc., are shaded in blue. The similar areas with falling tendencies are shaded red.

5. Departure from Normal:

The difference in height between the daily mean height and the height from the space averaged normal is plotted. These values range from 0 to about $\pm$ 80. Their numerical meaning is:

$$4 = \frac{400}{4} = 100 \text{ feet}$$

$$+20 = \frac{2000}{4} = 500 \text{ feet} \quad \text{etc.,}$$

These charts are analyzed for 0, $\pm$10 $\pm$ 20 units etc. The area between 0 and +10 and between +20 and +30 are colored blue and the corresponding fall areas in red.

6. Continuity Charts:

The continuity chart is prepared by reading heights along a selected latitude circle and plotting these heights on a graph with

time as one coordinate and longitude as the other. The normal heights for the month are read from the space averaged normal chart and this line is plotted in green each day. When the actual line is above the normal line the area involved is shaded blue and when the actual line is below the normal line the area is shaded in red.

A vertical line marking the longitude of a location of particular interest is helpful for orientation. Norfolk is indicated in this fashion on the continuity charts presented here.

HEMISPHERIC THREE DAY AVERAGE ZONAL WIND

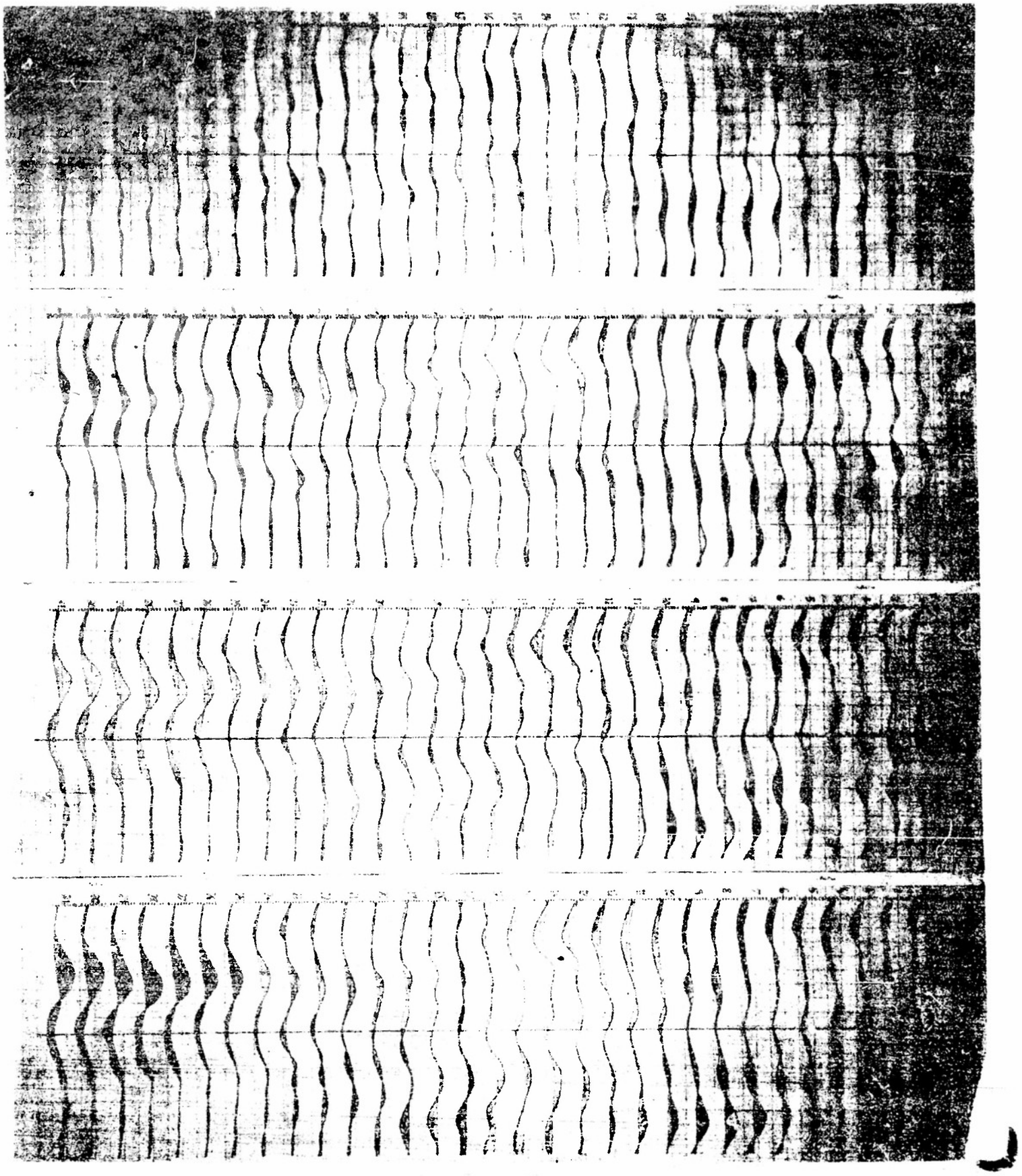
(meters per second
departure from normal)

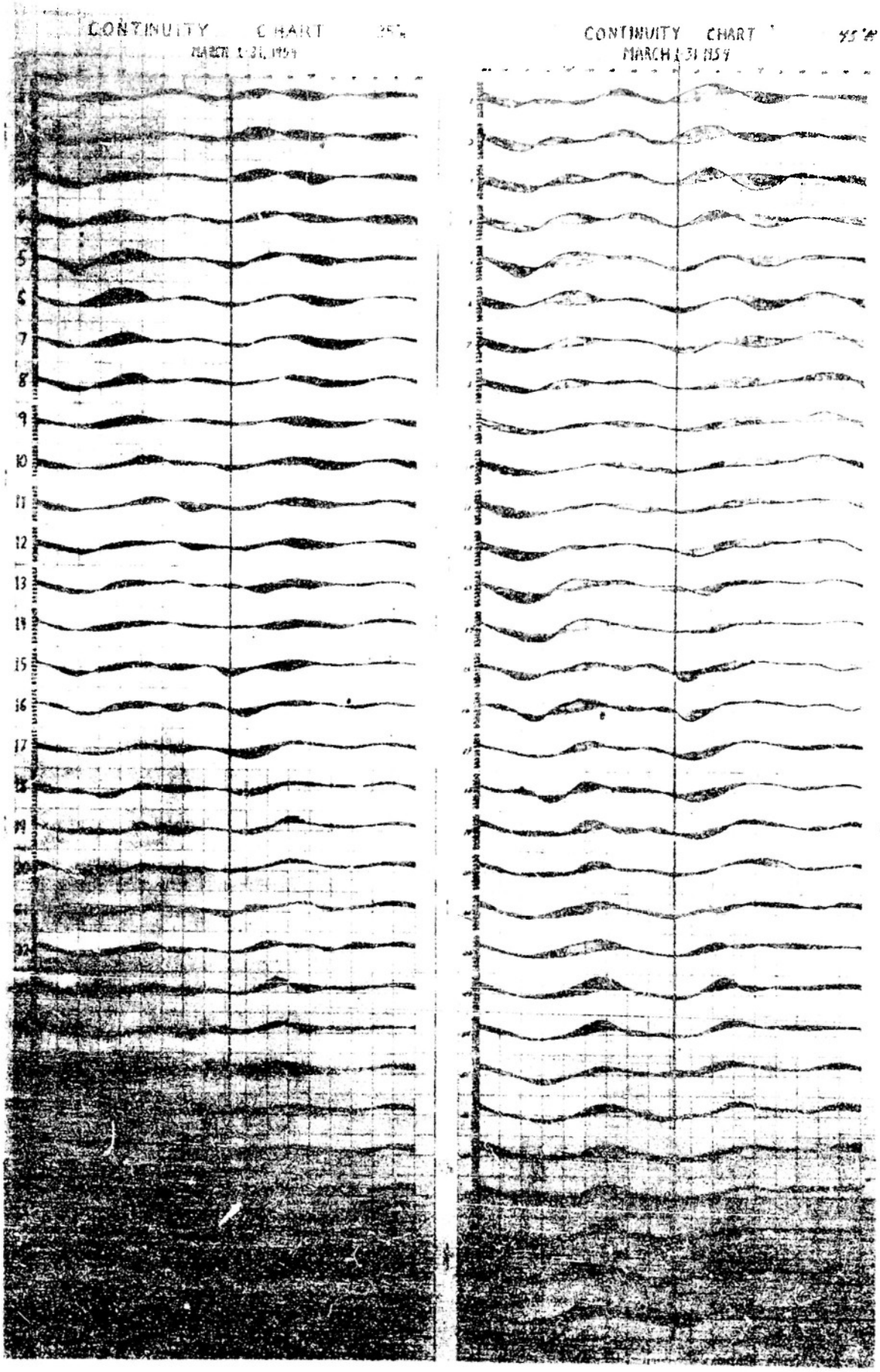
YEAR 1954
MONTH MARCH

LAT.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
67.5		8.2	8.2	8.1	7.8	7.3	6.8	6.9	7.2	8.0	8.4	9.0	9.4	9.6	9.5	9.3	9.4	9.6	10.0	10.5	10.9	10.7	10.4	9.9	9.1	8.4	7.6	7.0	6.3	5.9	
62.5		8.9	9.2	9.7	9.8	9.1	8.1	7.4	7.3	7.5	7.9	8.6	9.1	9.5	9.9	10.1	9.6	9.0	9.3	10.5	11.3	11.6	11.4	10.9	10.3	9.0	7.6	6.5	5.4	4.7	
57.5		9.2	8.9	9.3	9.9	10.7	10.4	9.7	8.4	7.6	7.8	8.4	9.0	9.2	9.9	9.9	9.6	9.1	9.3	10.2	10.8	11.0	10.9	10.7	10.1	9.1	8.6	8.4	8.0	7.3	
52.5		10.2	10.7	11.5	11.7	12.8	12.9	12.7	11.2	10.0	9.3	8.7	8.5	8.8	9.5	10.0	10.1	10.6	10.6	10.6	10.5	10.8	11.1	10.8	10.0	10.6	9.8	10.5	11.6	12.5	
47.5		13.7	13.3	13.2	13.0	13.7	14.6	14.3	14.1	12.9	12.1	11.5	11.2	11.2	10.9	11.4	12.2	12.2	12.0	10.9	11.0	11.9	12.0	11.6	12.3	13.4	14.2	14.7	15.1	16.2	
42.5		14.9	17.0	16.5	16.2	15.4	15.9	16.3	16.9	16.9	16.0	15.0	14.7	15.0	15.2	15.4	15.1	14.3	14.2	13.8	14.1	13.7	14.2	15.0	16.0	17.3	17.7	17.4	17.1	17.5	
37.5		16.2	16.8	17.5	17.3	16.4	15.6	16.1	17.6	19.3	19.8	19.6	18.7	18.5	18.4	18.4	18.2	18.1	17.7	17.2	16.6	15.9	15.2	14.9	15.3	15.9	16.8	17.9	18.4	17.8	
32.5		16.0	16.7	17.2	17.1	15.9	15.9	16.7	18.1	16.5	20.0	20.3	20.7	20.2	20.1	19.7	19.6	18.7	18.4	17.9	17.9	17.6	17.6	17.3	16.6	15.5	15.1	15.8	16.4	17.0	
27.5		14.9	14.0	15.2	16.2	16.3	15.8	15.6	15.9	16.4	17.1	18.2	18.5	18.7	18.7	19.3	19.5	19.1	17.8	16.6	16.1	15.8	16.3	15.4	15.7	14.5	14.8	14.4	14.8	14.5	
22.5																															
17.5																															
12.5																															

YEAR 1954
MONTH MARCH

LAT.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
67.5		MA	MA	MA	MA	A	A	A	A	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	A	A	N	N	N	
62.5		MA	MA	MA	MA	A	A	A	A	A	A	A	A	MA	MA	A	A	A	A	MA	MA	MA	MA	MA	MA	A	N	N	B	B	
57.5		A	N	A	A	A	A	A	N	N	N	N	N	A	A	A	A	N	A	A	A	A	A	A	A	N	N	N	N	B	
52.5		N	N	N	A	A	A	N	N	N	N	B	B	B	N	N	N	N	N	N	N	N	N	N	N	N	N	N	A	A	
47.5		N	N	N	N	N	A	A	N	N	N	B	B	B	B	B	N	N	N	B	B	N	N	N	N	A	A	A	MA	MA	
42.5		N	A	A	A	N	N	A	A	A	A	N	N	N	N	N	N	N	N	B	N	N	N	N	A	MA	MA	MA	MA	MA	
37.5		B	B	N	B	B	MB	B	N	A	A	A	A	A	A	A	A	A	N	N	N	N	B	B	B	N	A	A	MA	A	
32.5		MB	MB	N	MB	MB	MB	MB	B	MB	A	A	A	A	A	A	A	A	N	N	N	N	N	N	N	MA	A	MA	MA	MA	
27.5		MB	MB	MB	B	B	B	B	B	B	N	A	A	A	A	MA	MA	MA	N	N	N	N	N	N	N	MA	MA	MA	MA	MA	
22.5																															
17.5																															
12.5																															

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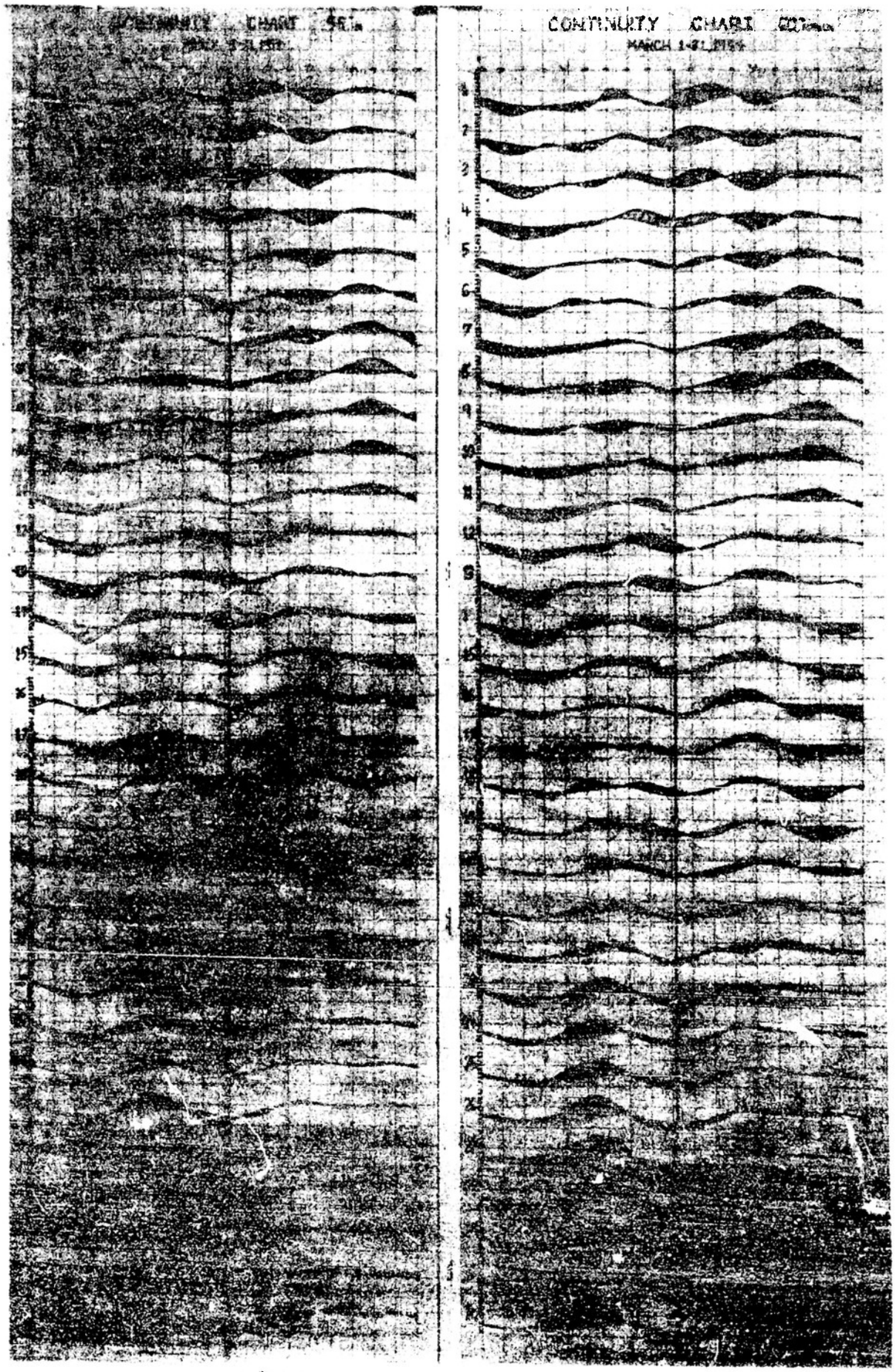
MARCH 31, 1959
CONTINUITY CHART
MARCH 31 1959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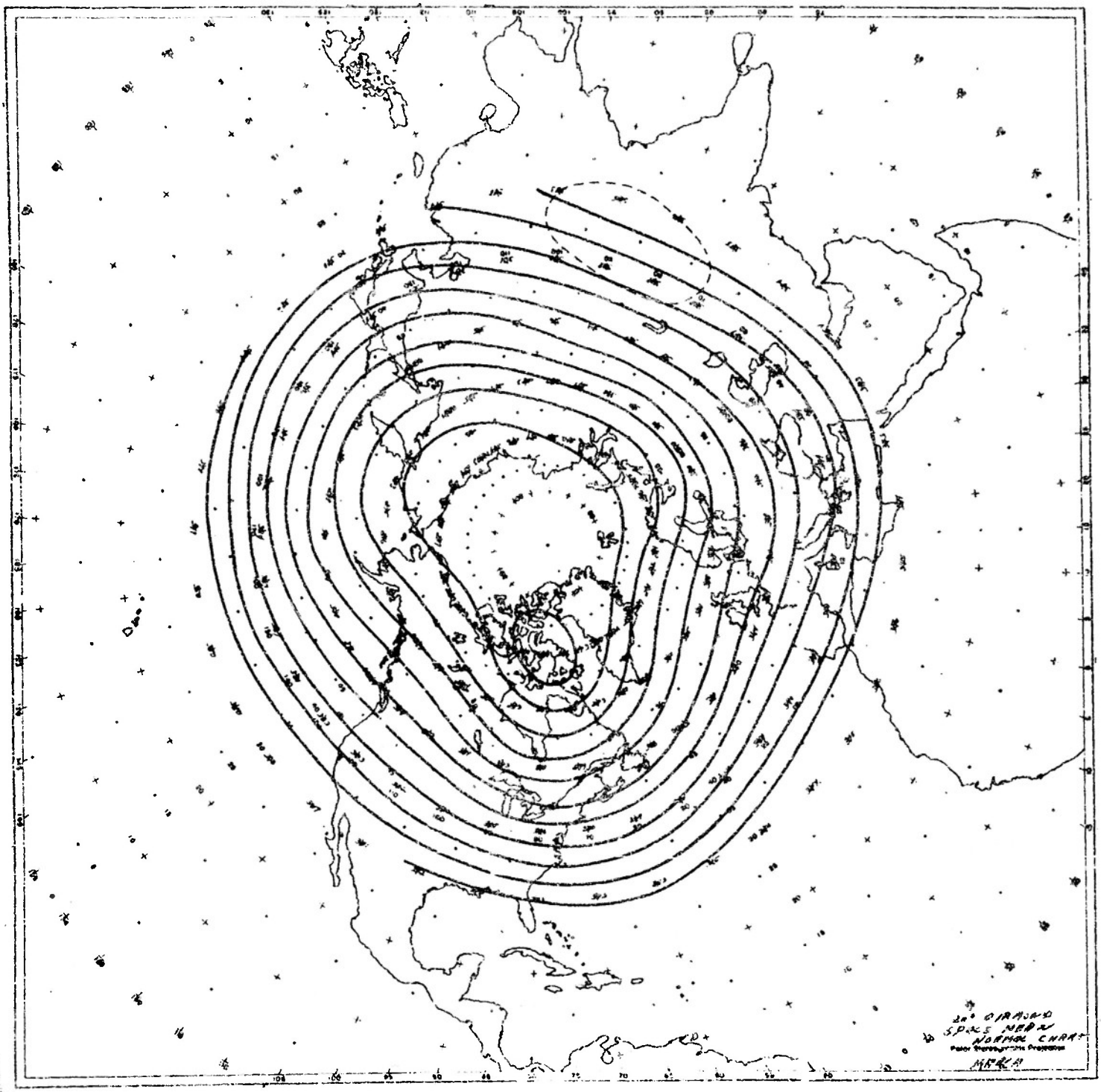
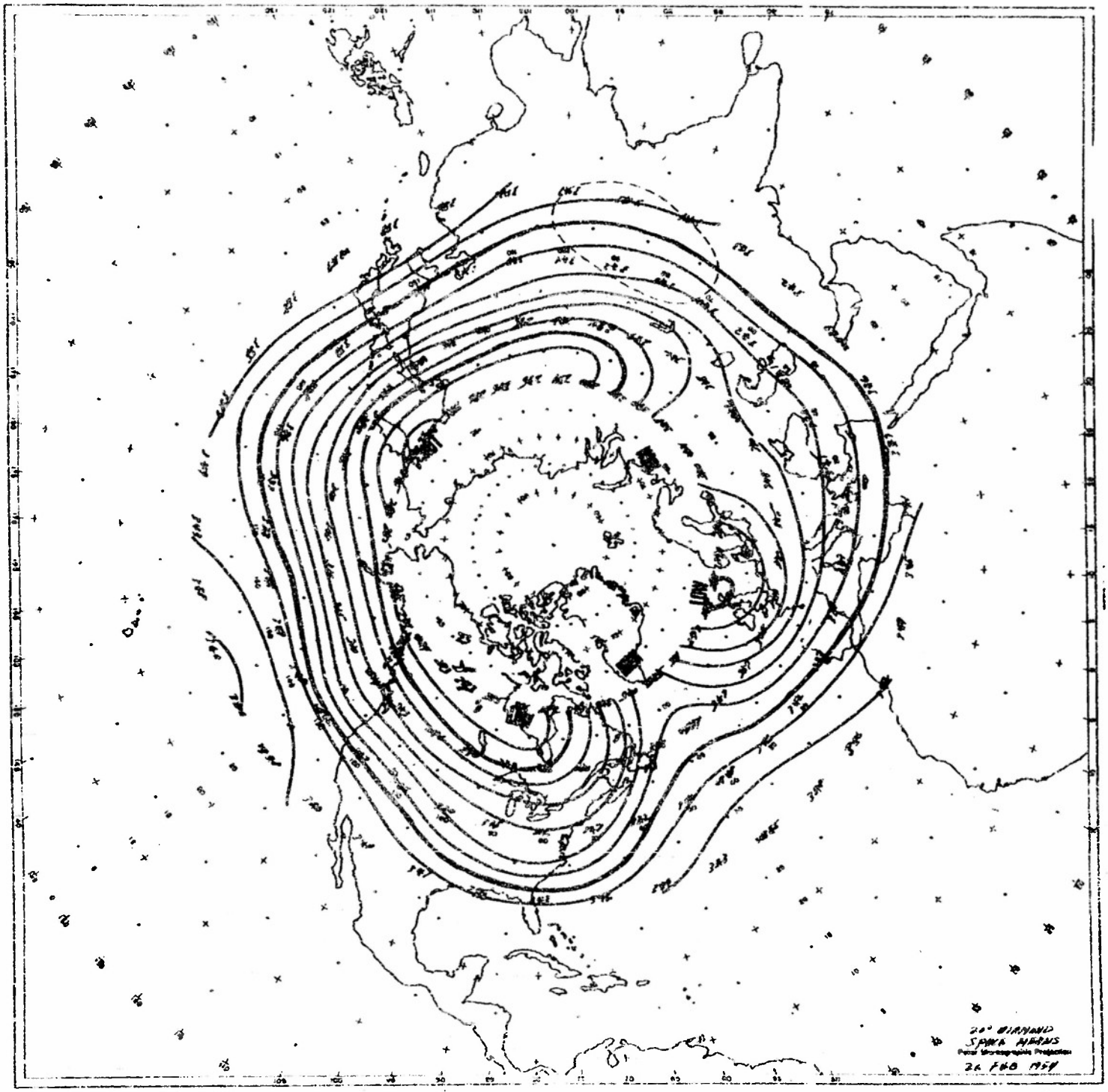

20° GRADED
SPACE MEAN
NORMAL CHART
Polar Stereographic Projection
MARCH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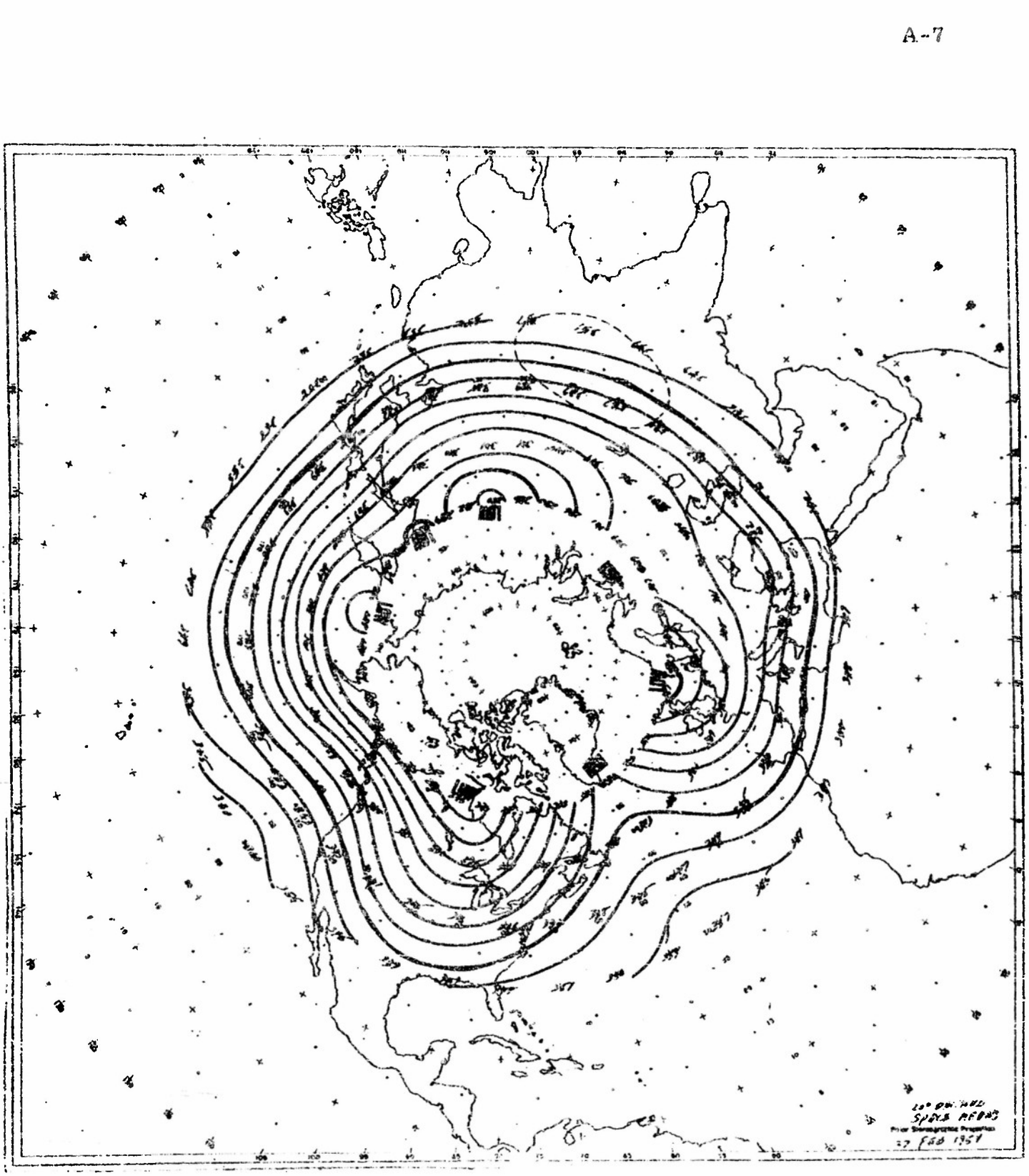
SPIRA MIRUS
Polar Stereographic Projection
24 FEB 1959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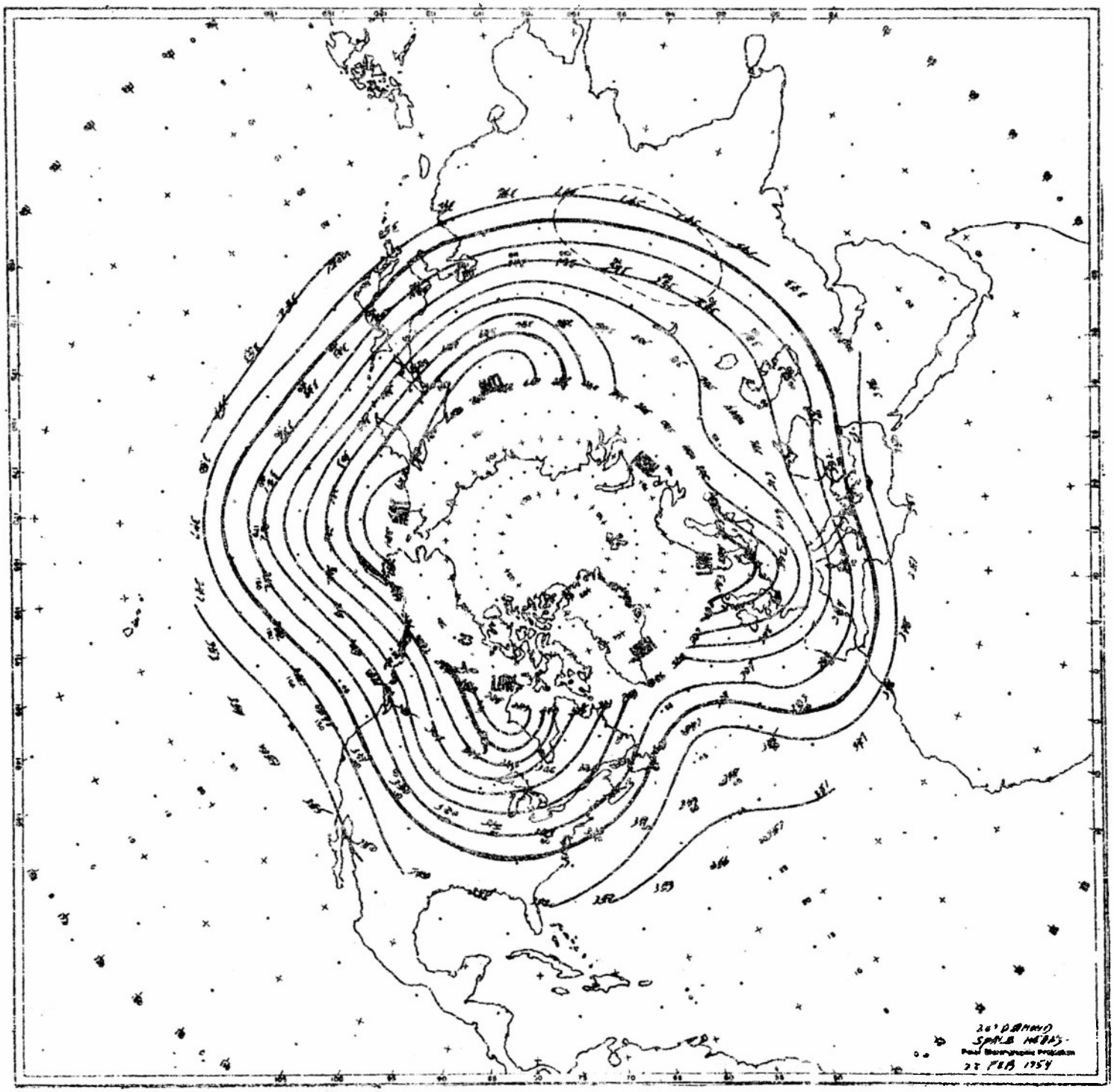
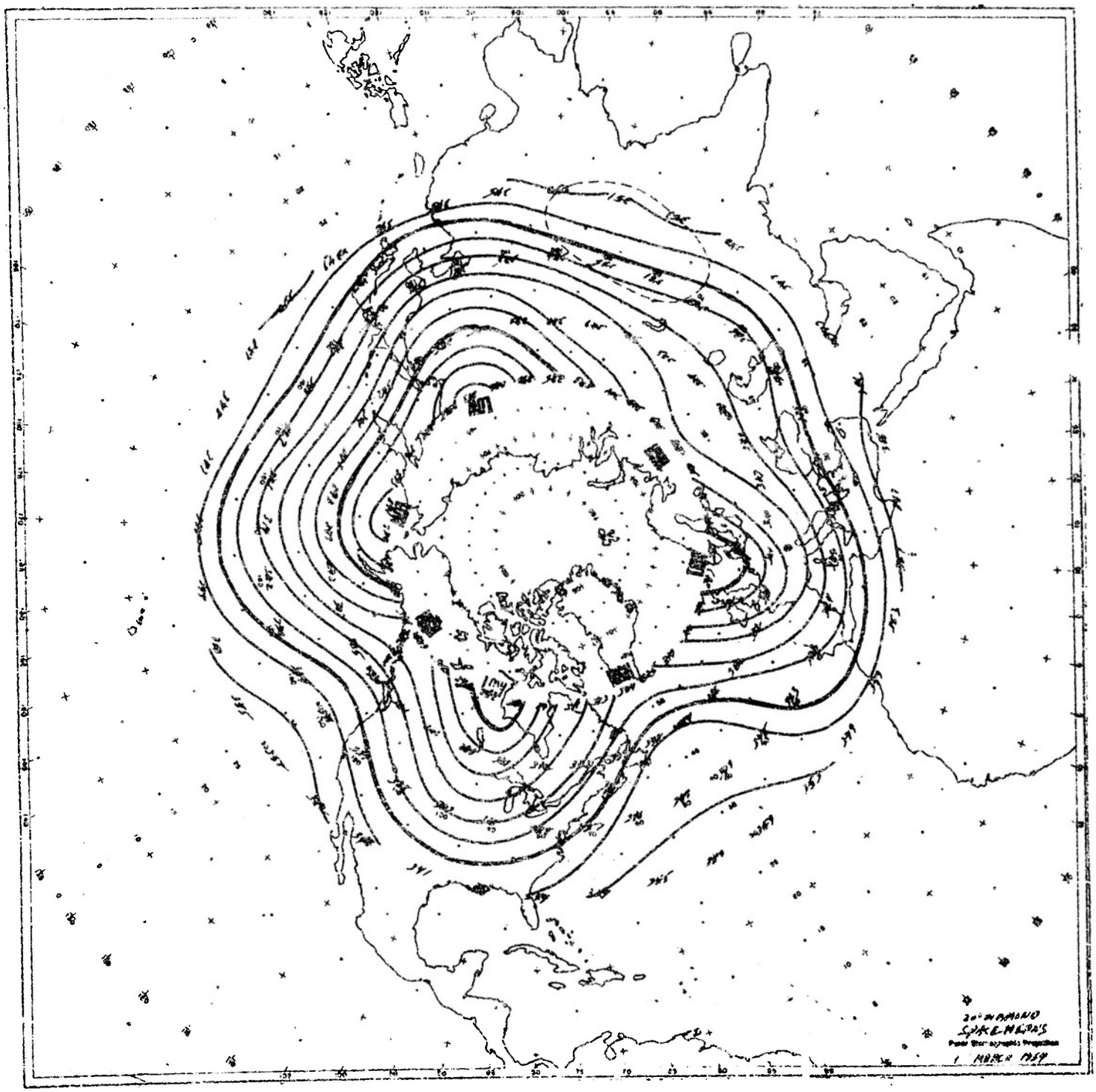
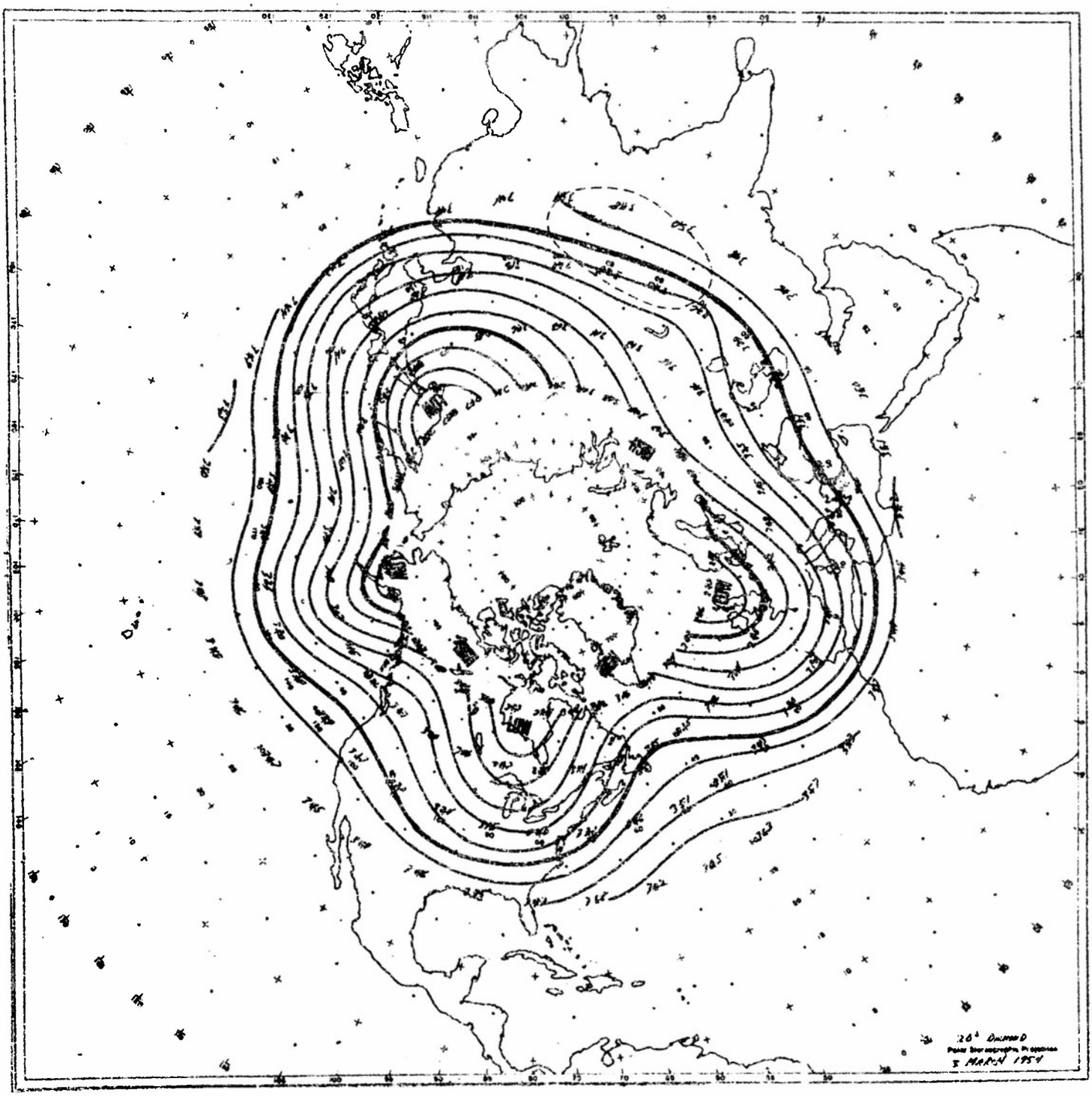
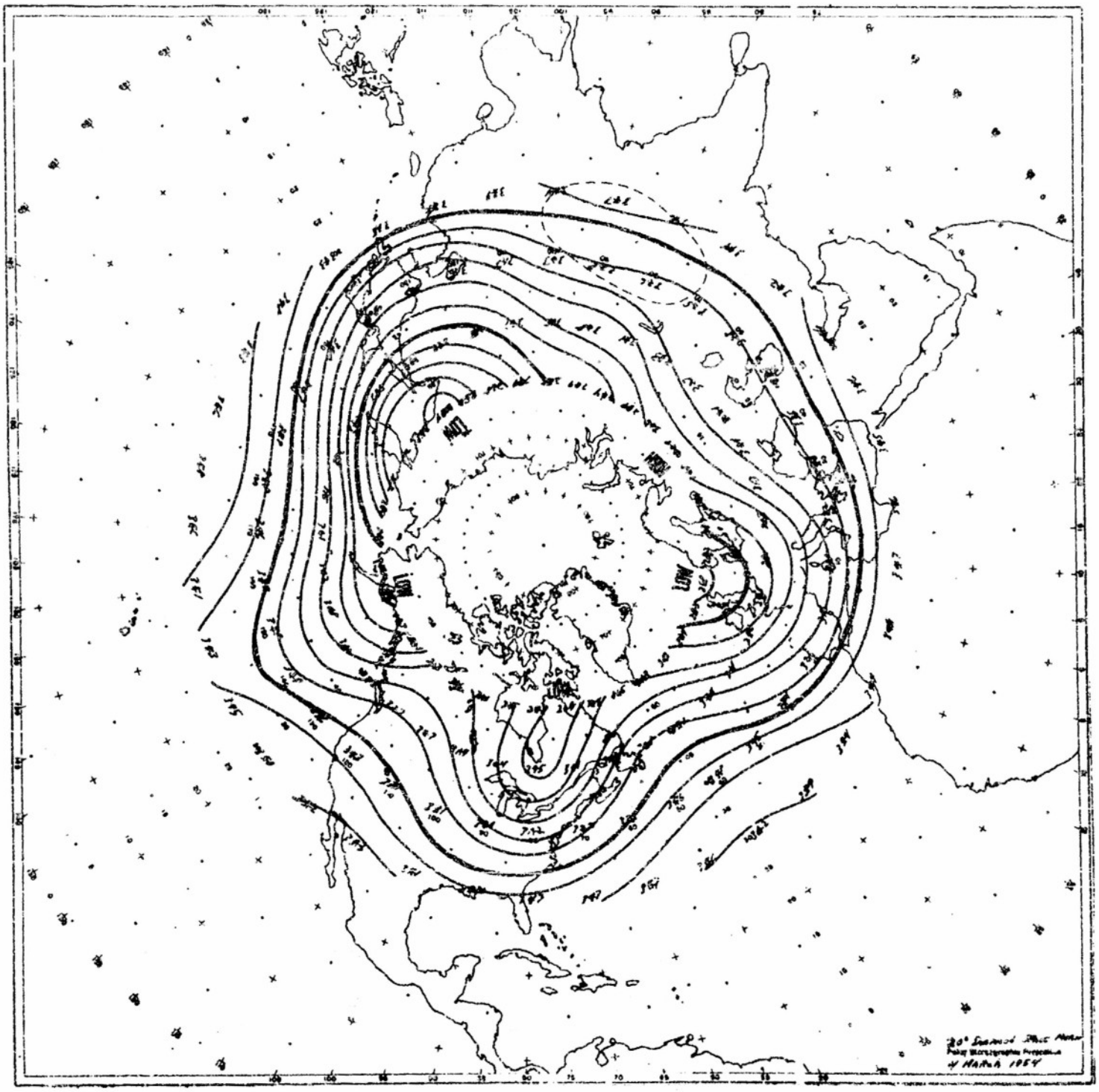
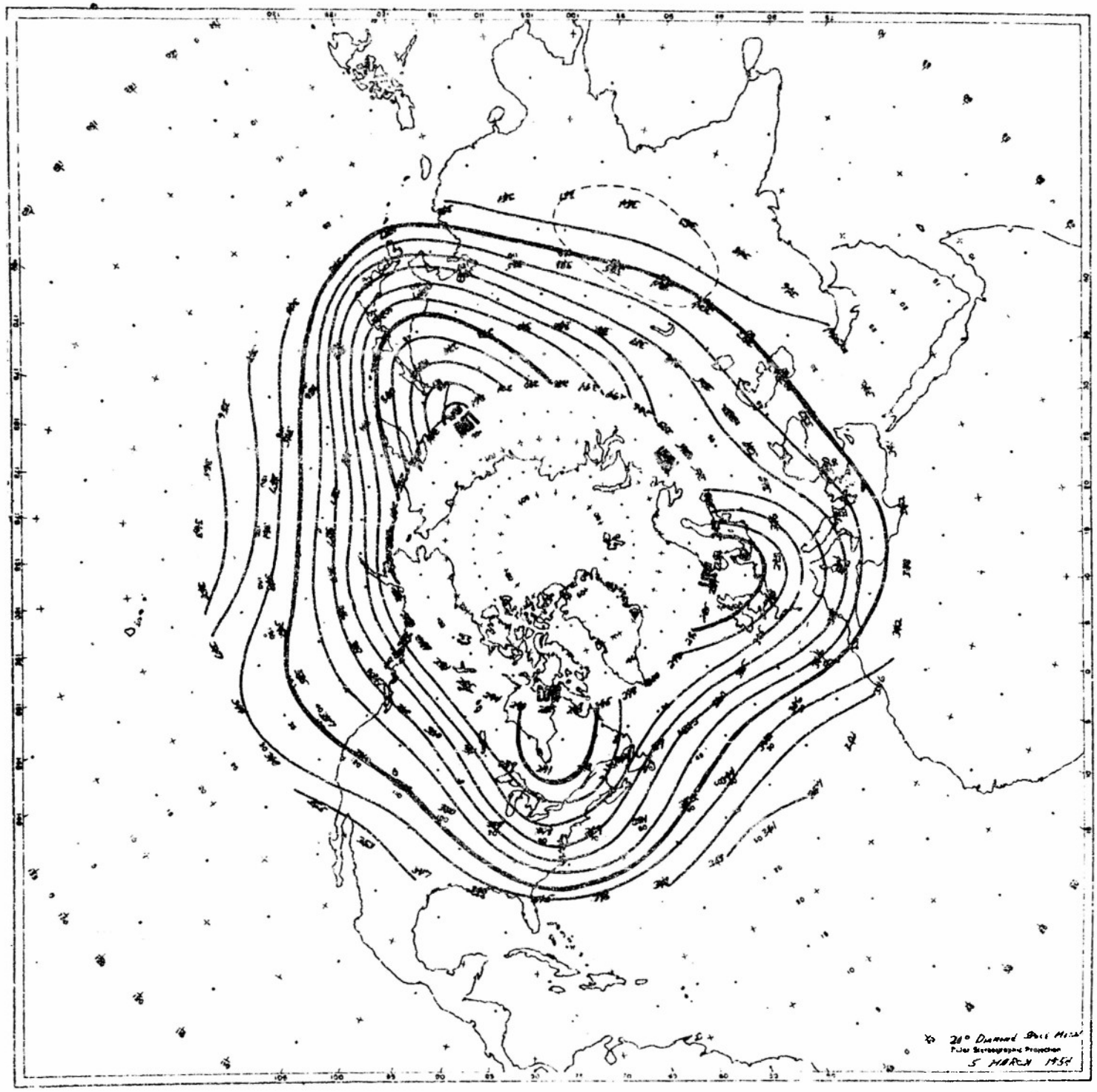
27 FEB 1954


26 DIAMOND
SPACE MEDS
Food Storage Program
28 FEB 1954


30° IN DIAMOND
SPACE-HEADS
Polar Stereographic Projection
1 MARCH 1959


20° Dalmo D
1 MARCH 1954


LOW
LOW
LOW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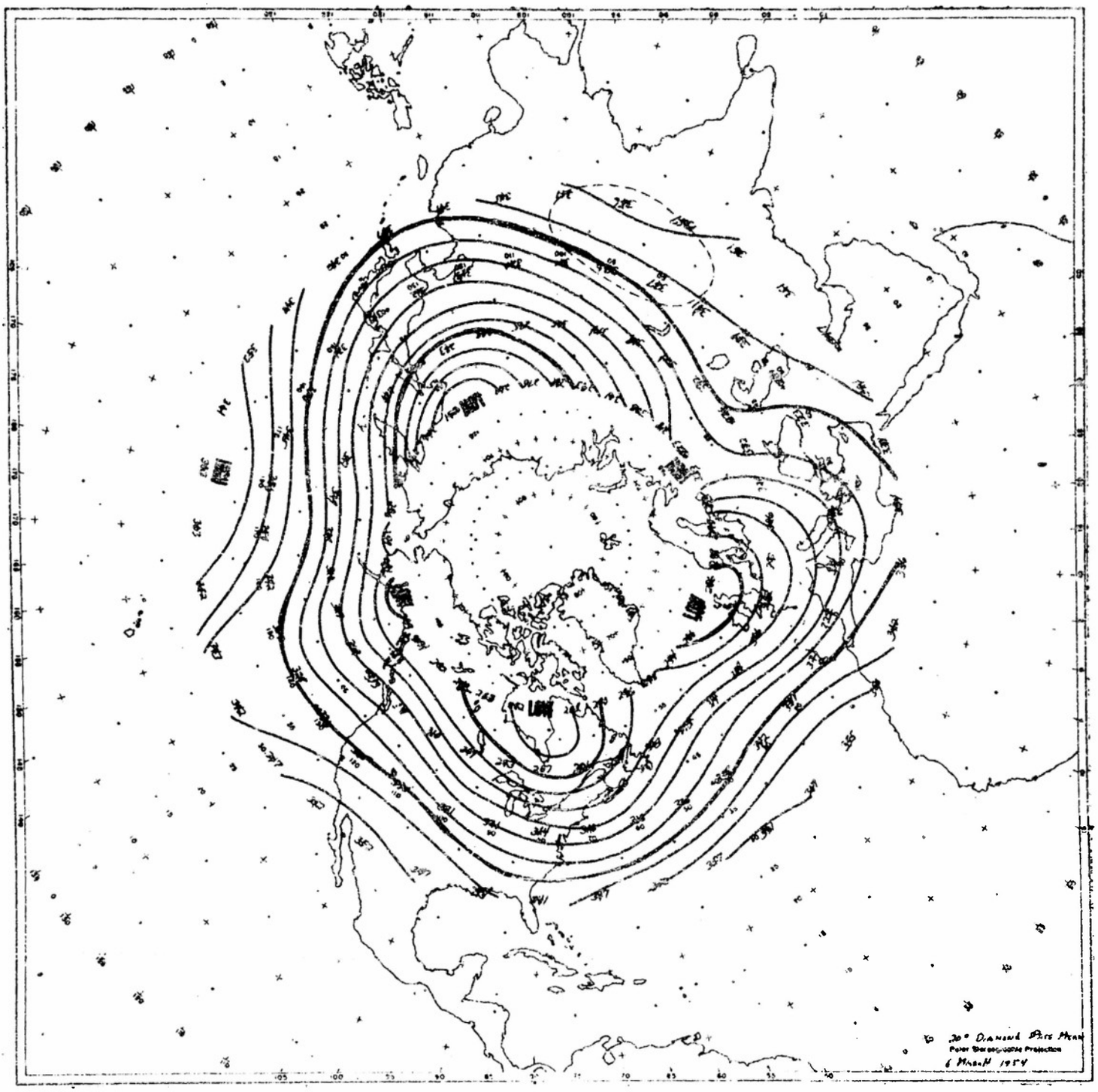
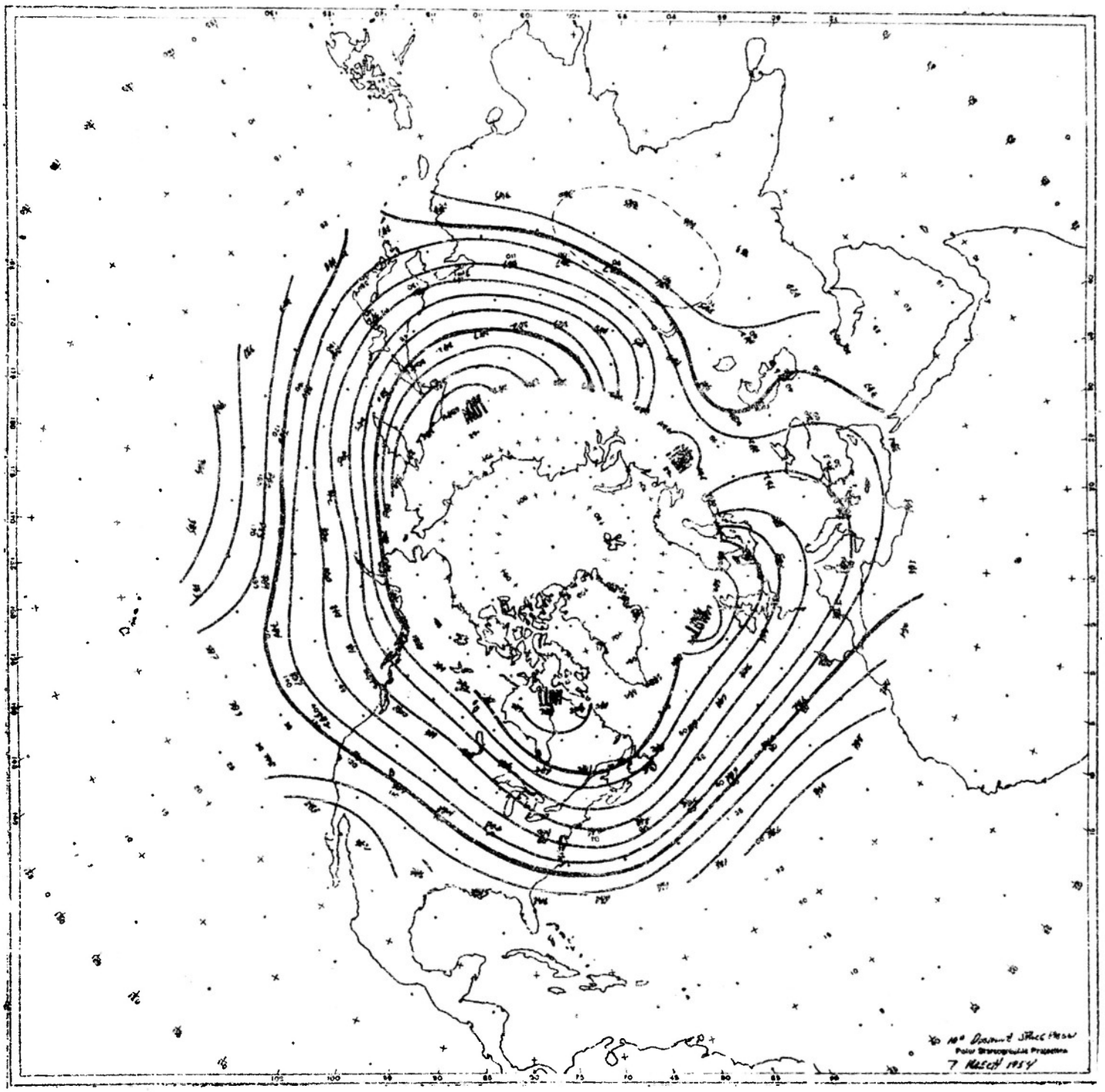
5 MARCH 1954


30° Diamond Pole Mean
Polar Stereographic Projection
6 March 1954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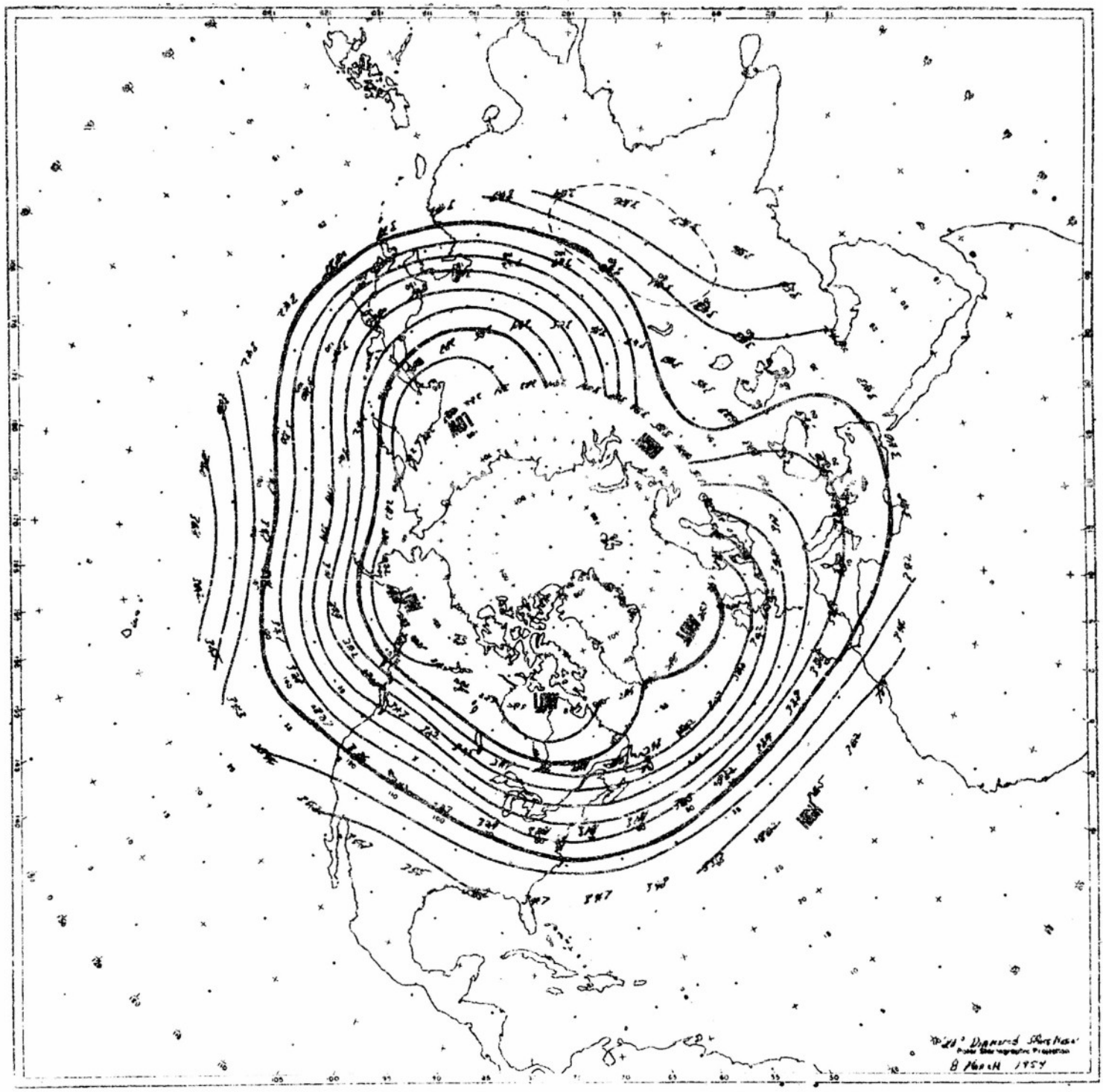
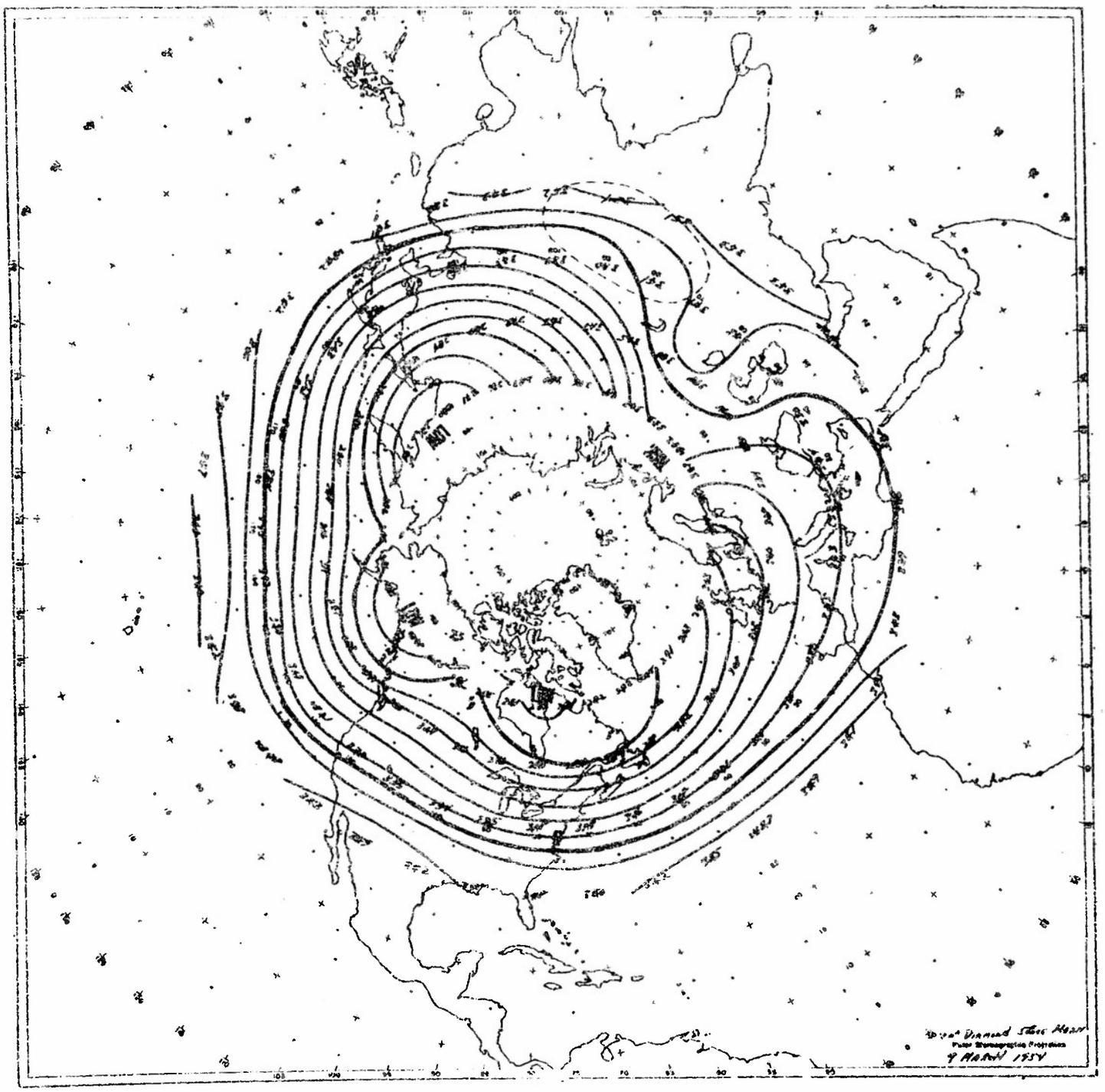
7 March 1954




Diamond Shoe Mean
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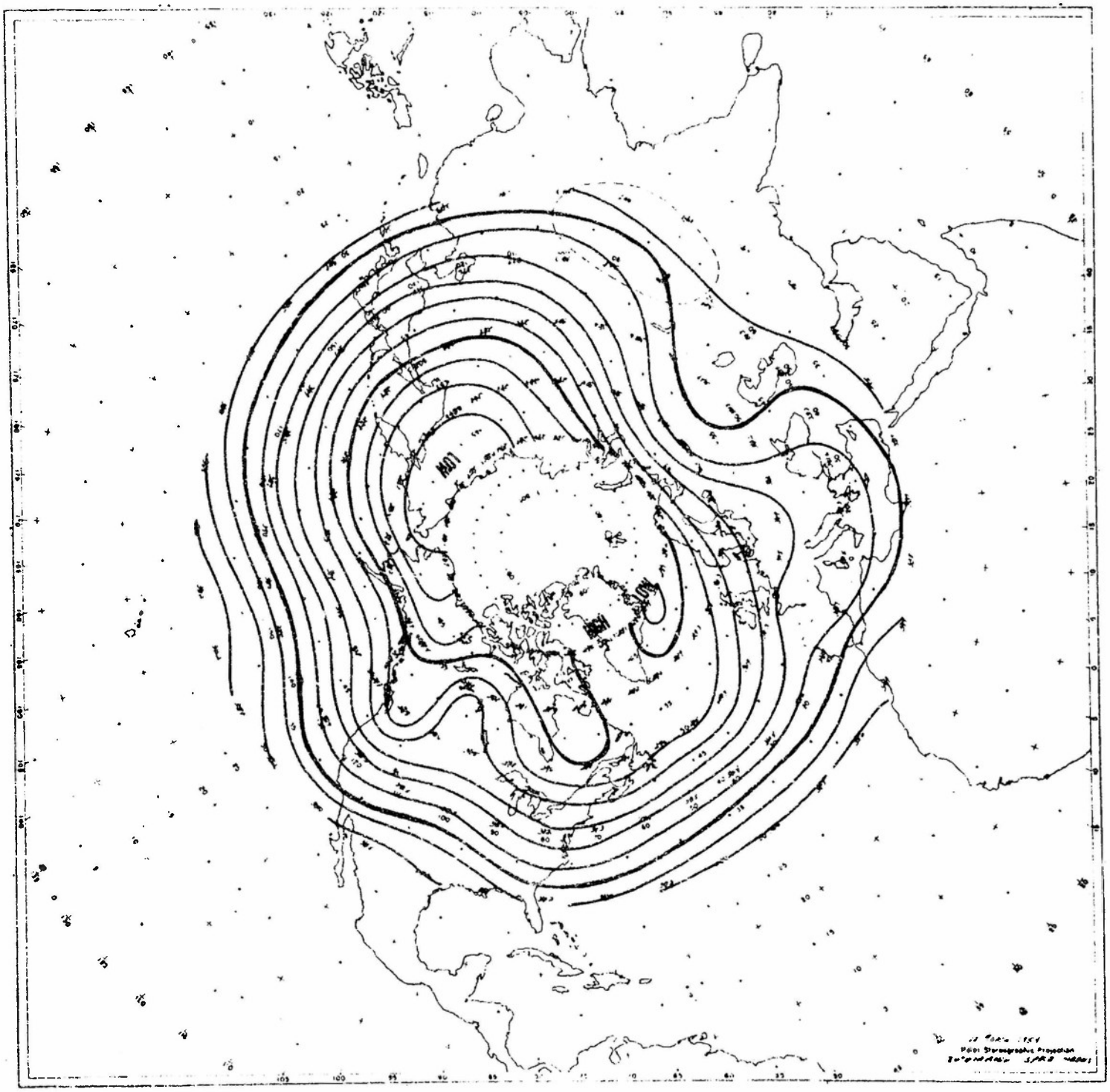
7 March 1954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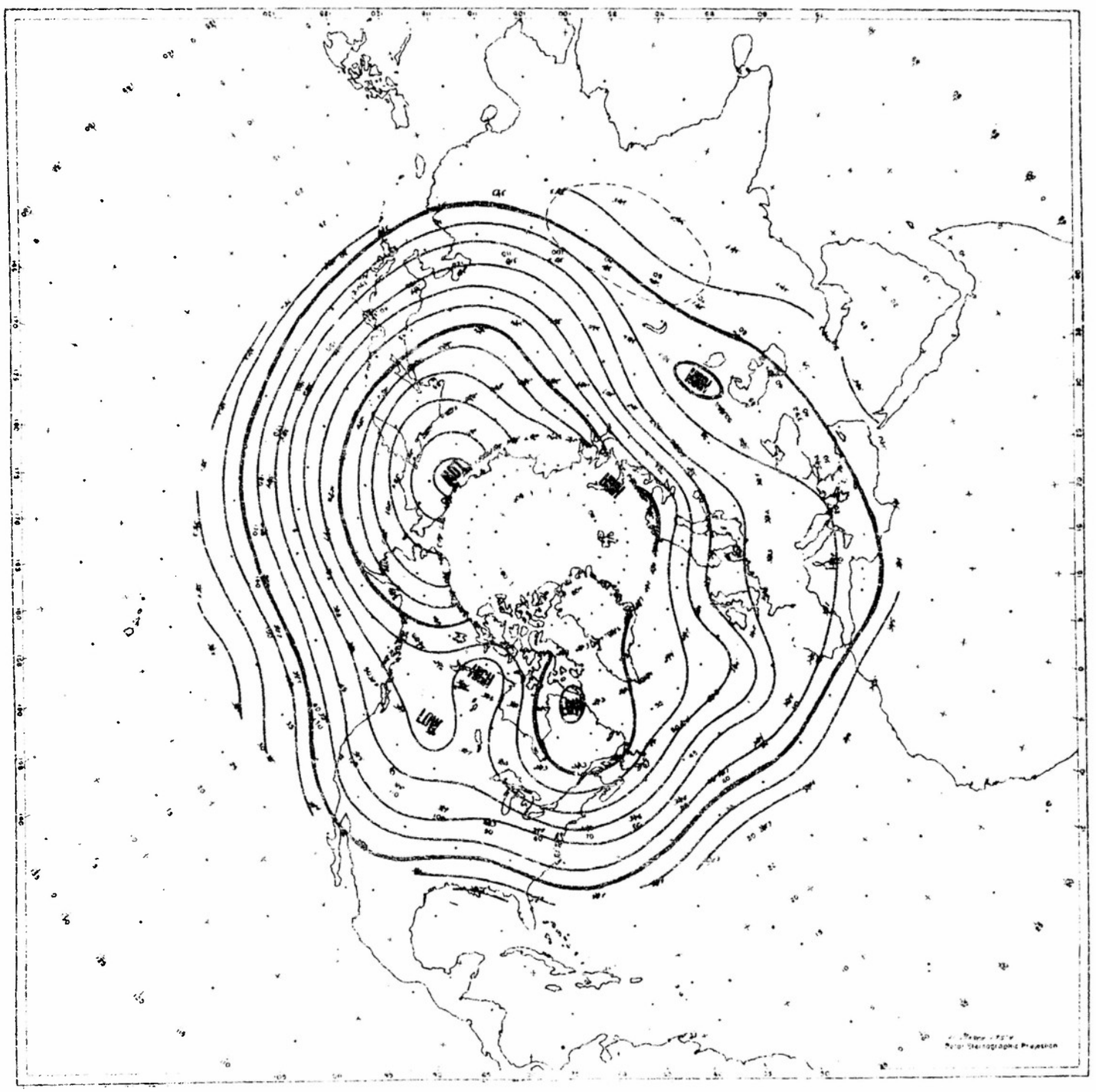
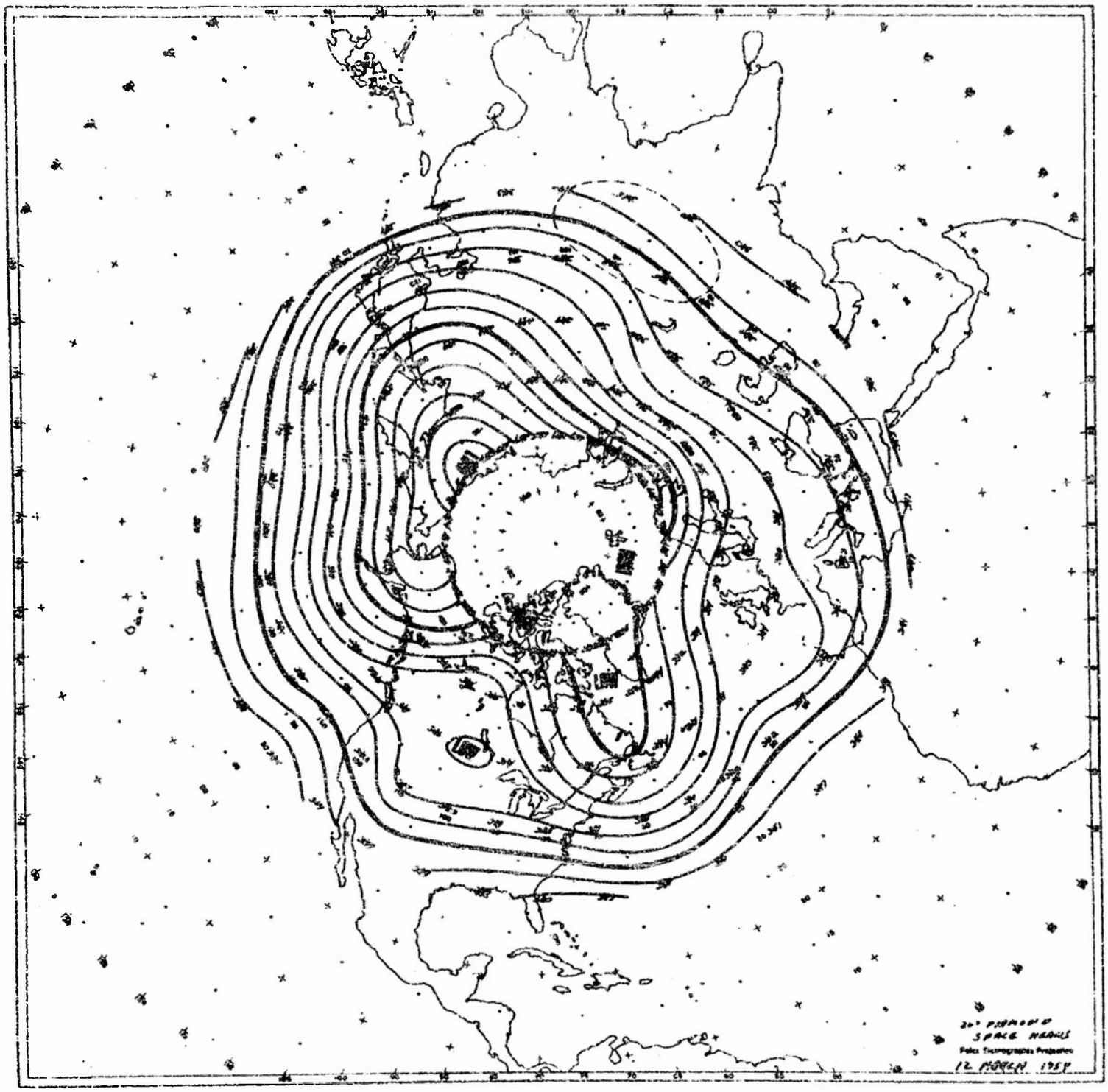
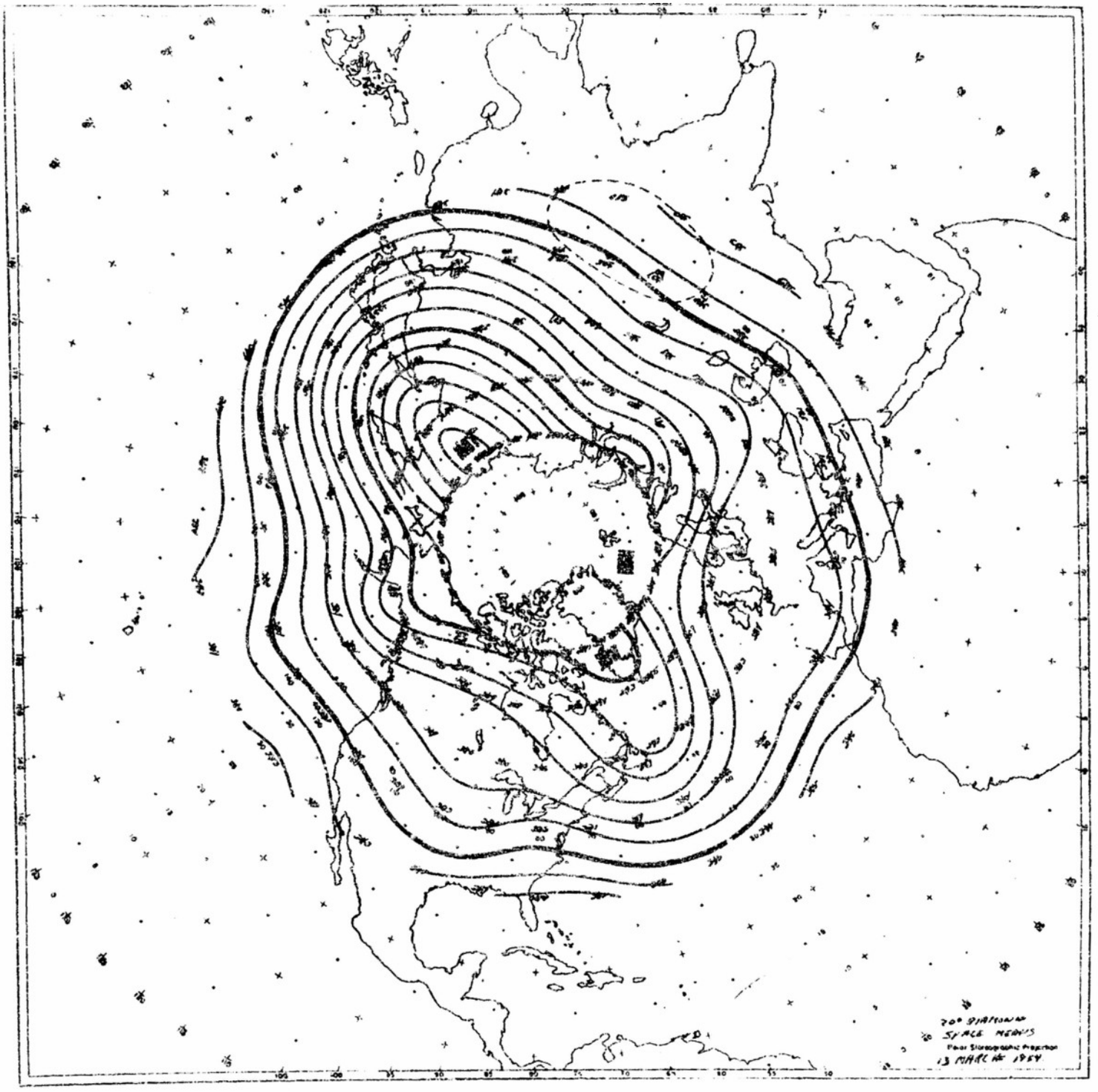
HIGH


HIGH
HIGH
HIGH
LOW
HIGH


20th FIGHTER
SPACE WINGS
Polar Stereographic Projection
12 MARCH 1959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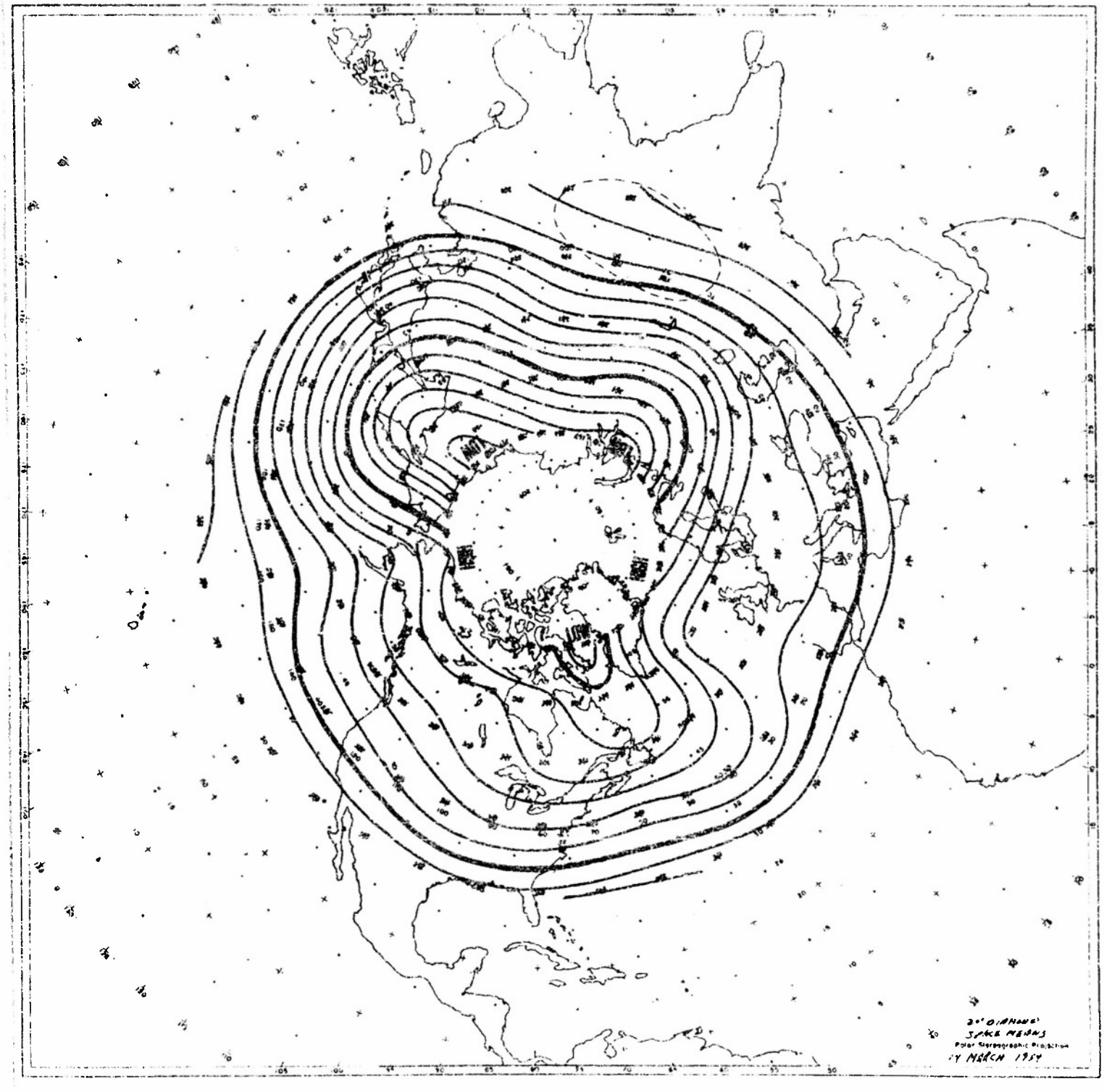
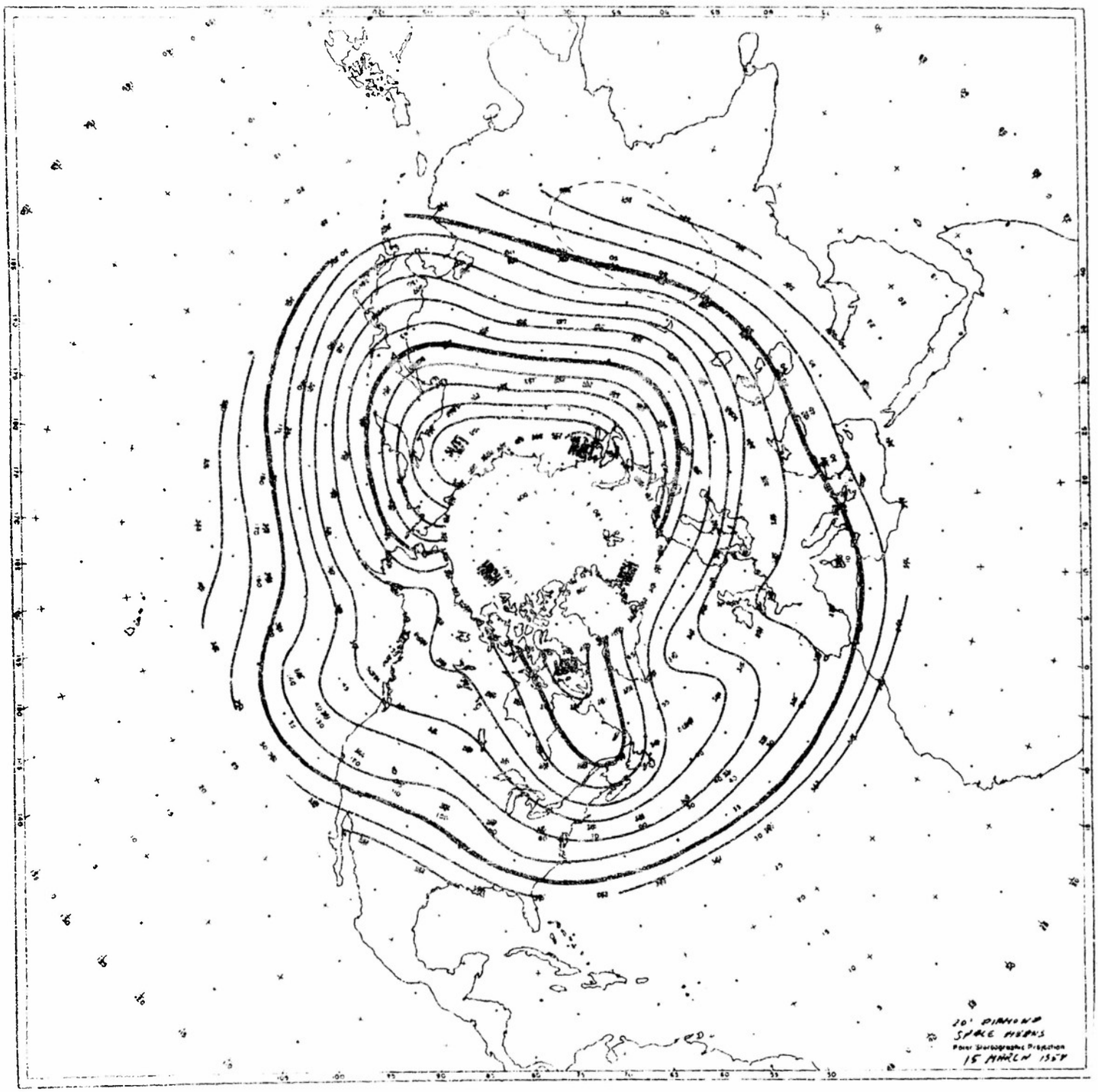
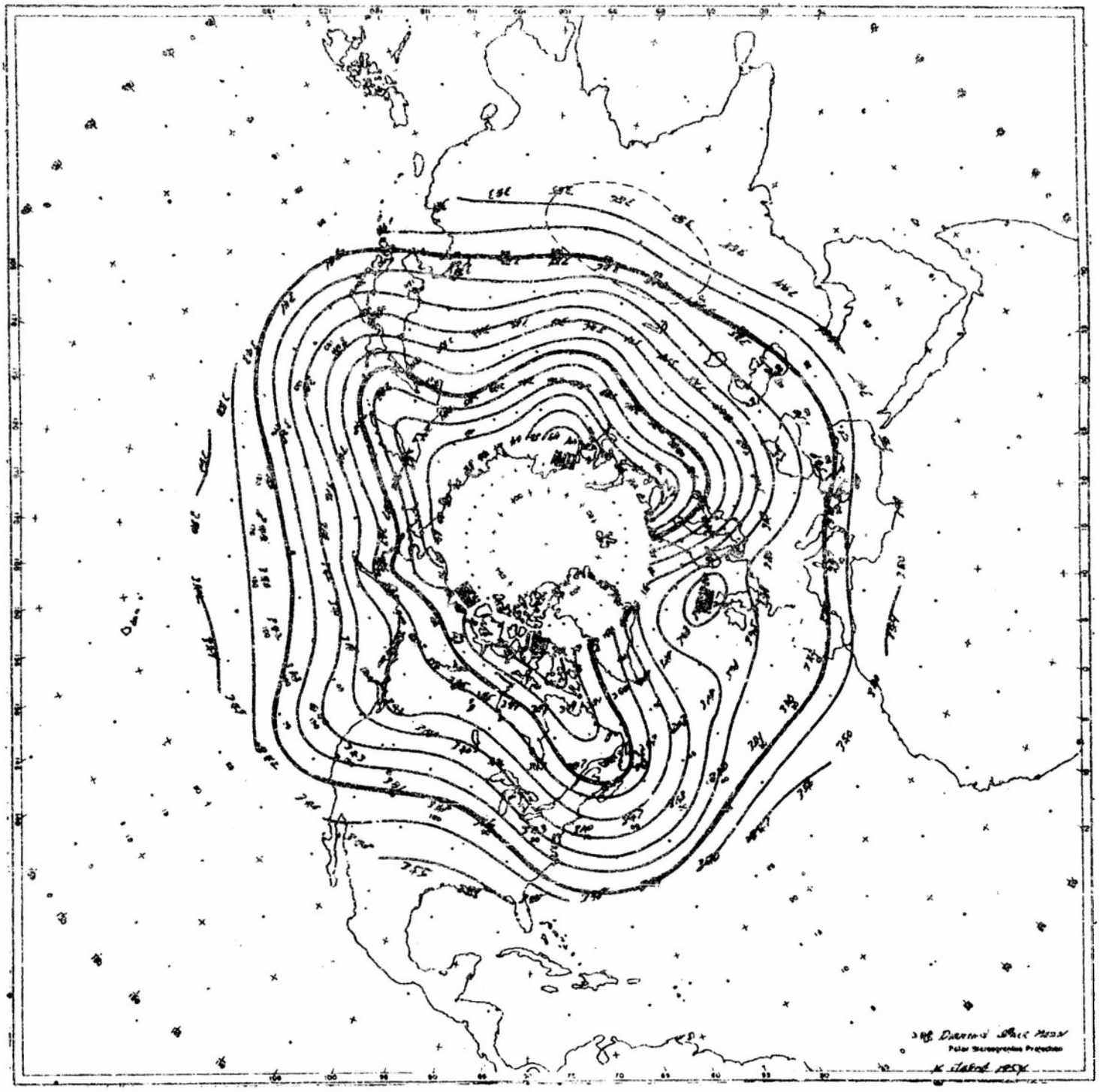
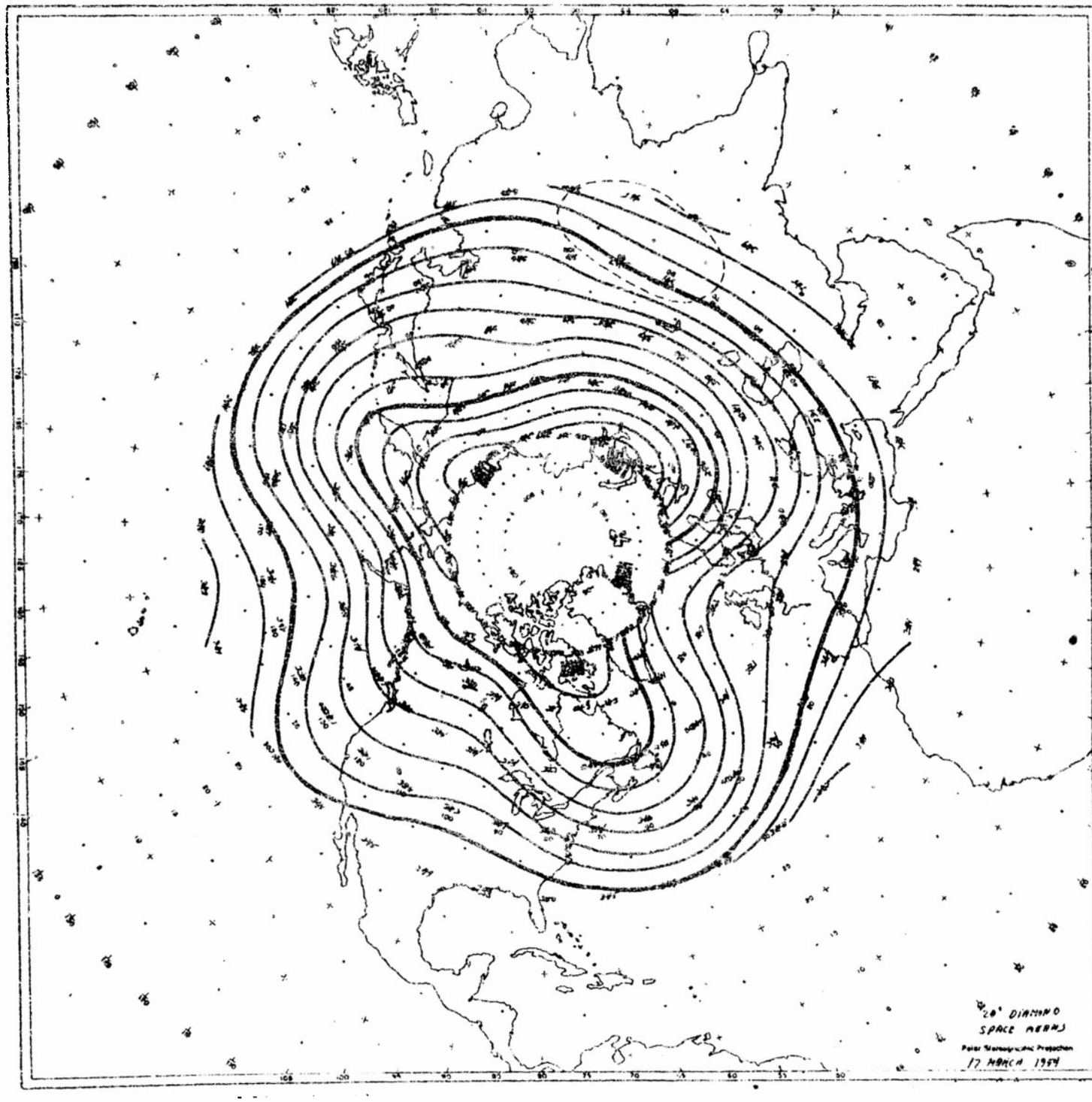
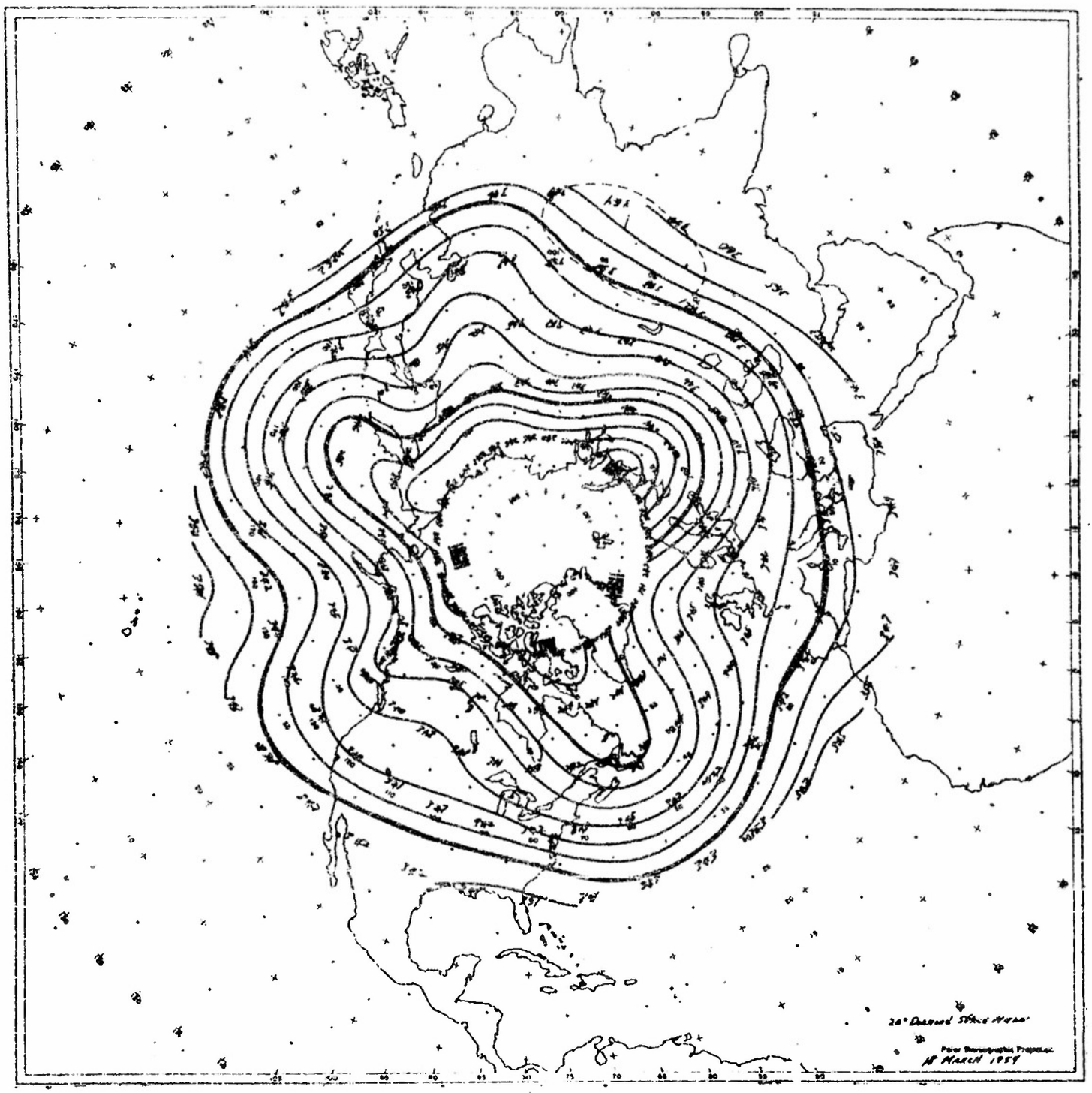
SPACE HEIGHTS
Polar Stereographic Projection
13 MARCH 1964

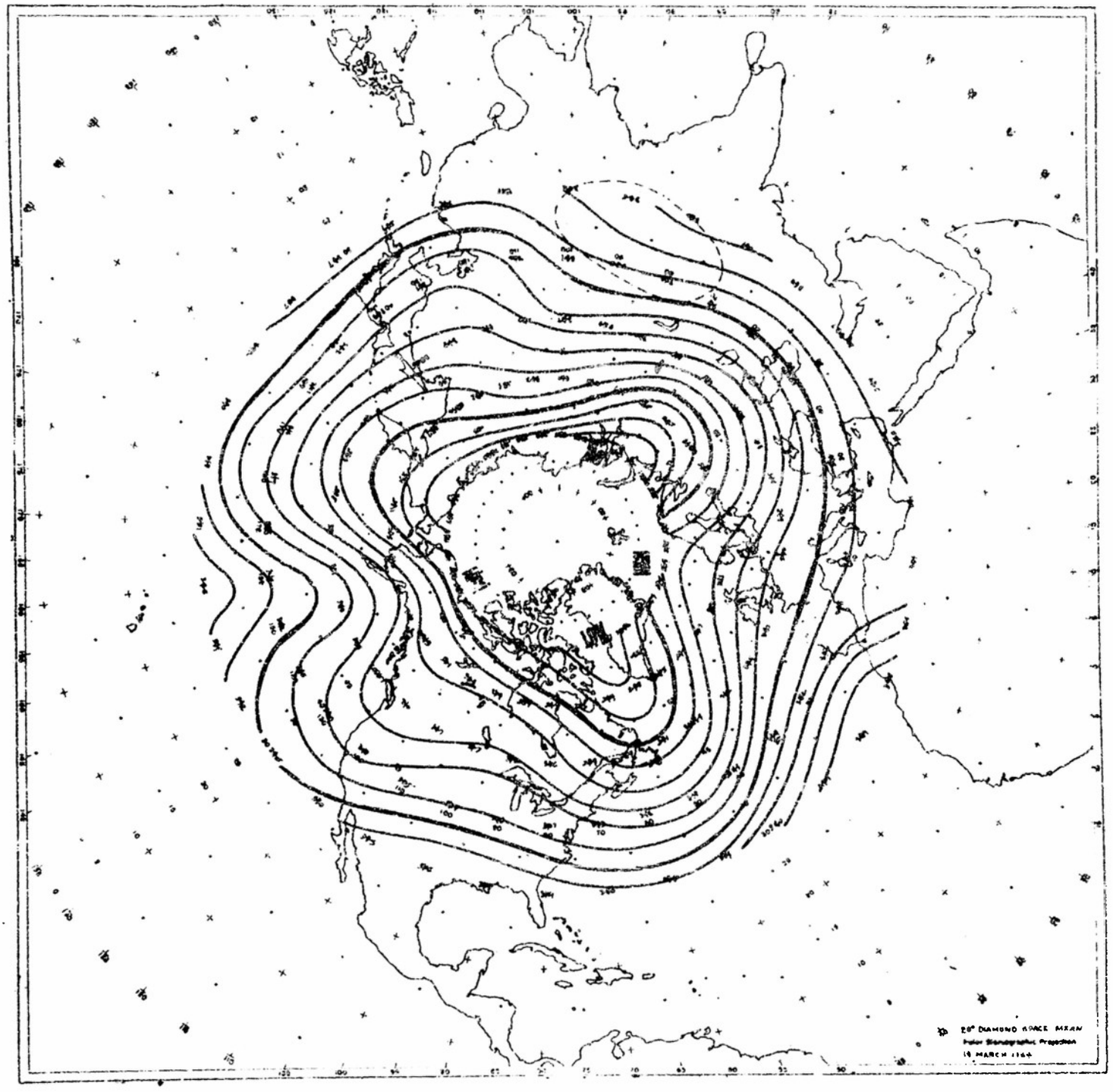

20 MILLIBARS
JUNE MEANS
Polar Stereographic Projection
IN MARCH 1959

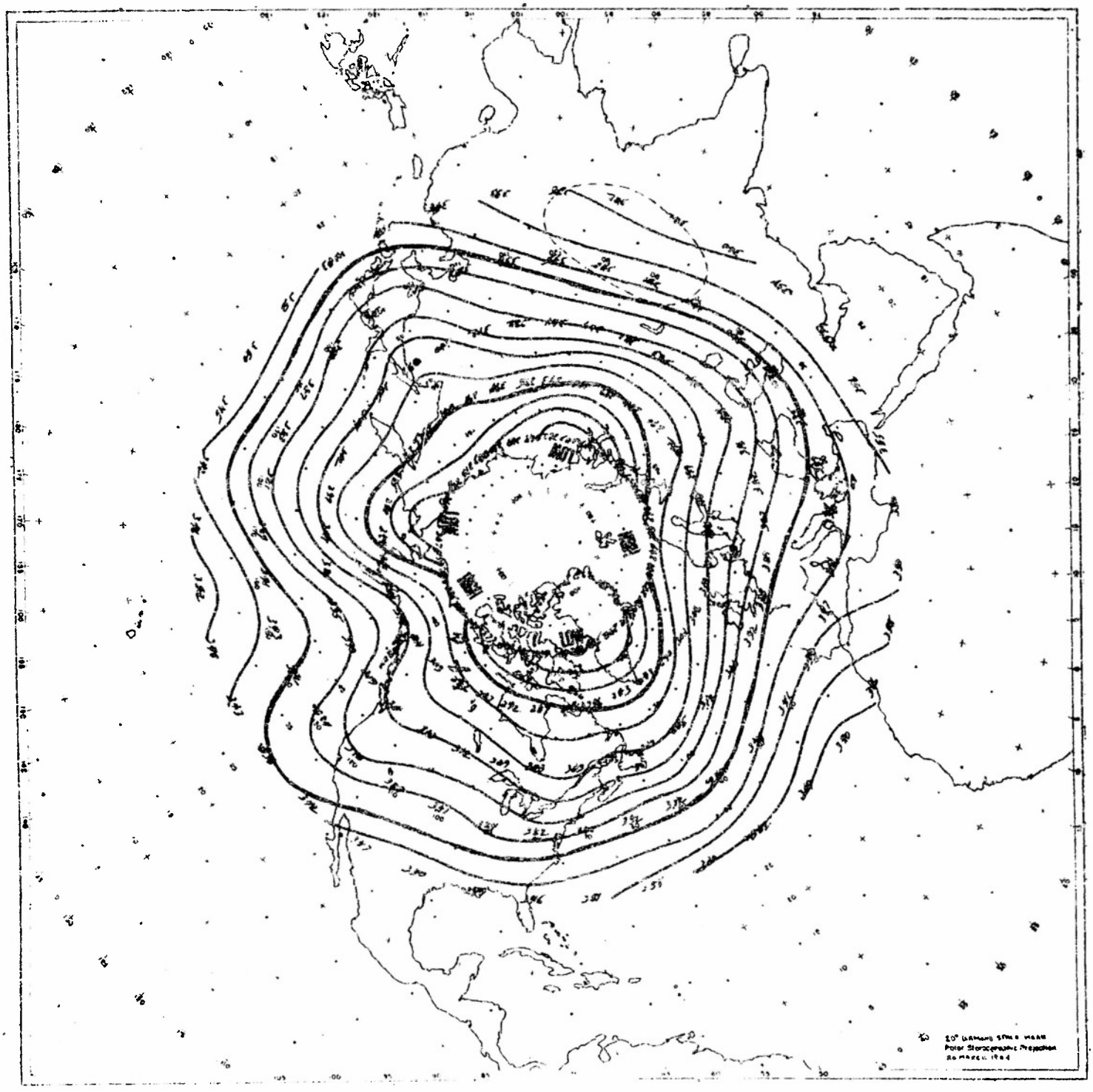

20° DIAMOND
SPACE MEANS
Polar Stereographic Projection
15 MARCH 1957

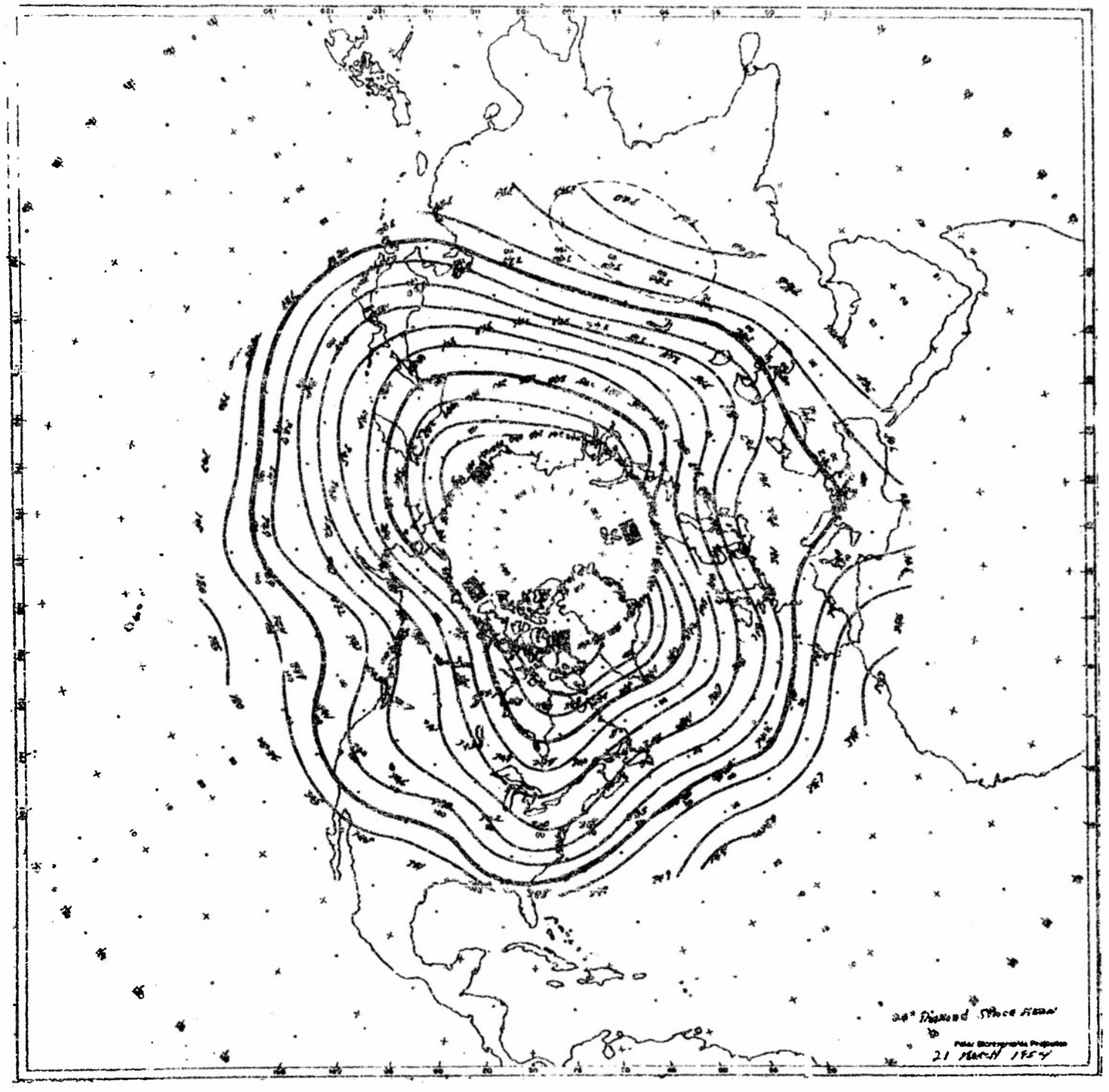


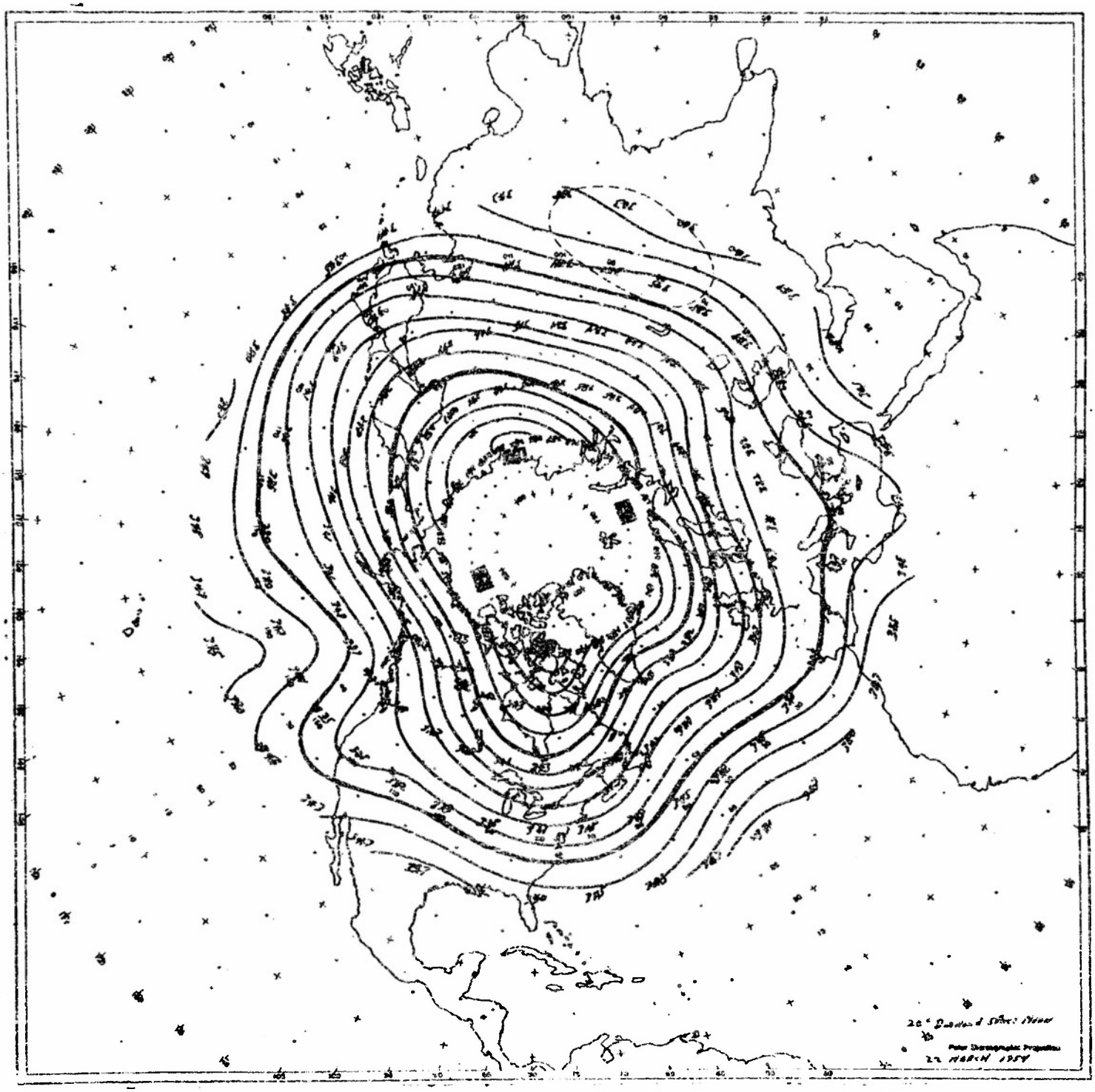

20° DIAMOND
SPACE MEANS
Polar Stereographic Projection
17 MARCH 1964

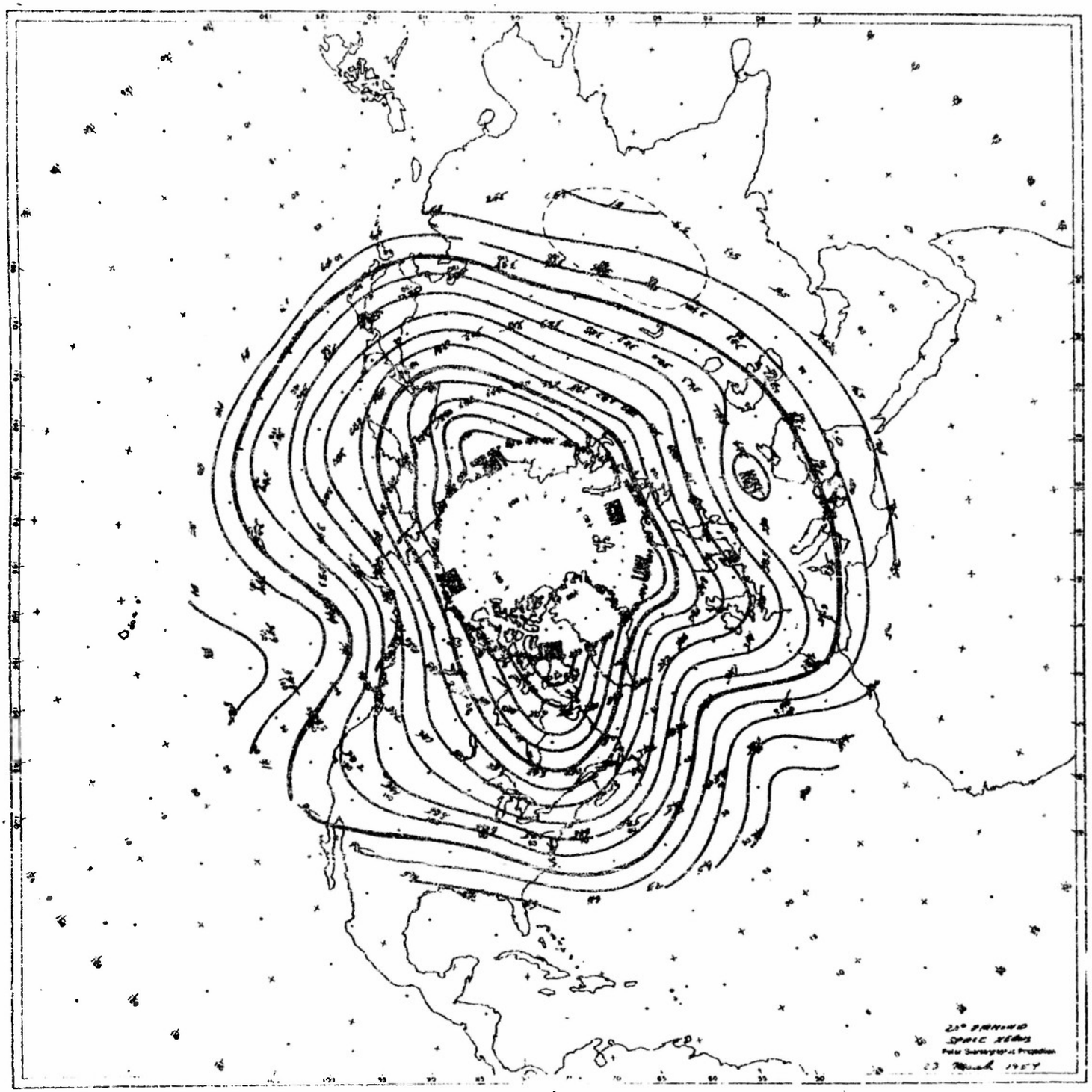

20° Dynamic Surface Height
Polar Stereographic Projection
1st MARCH 1959

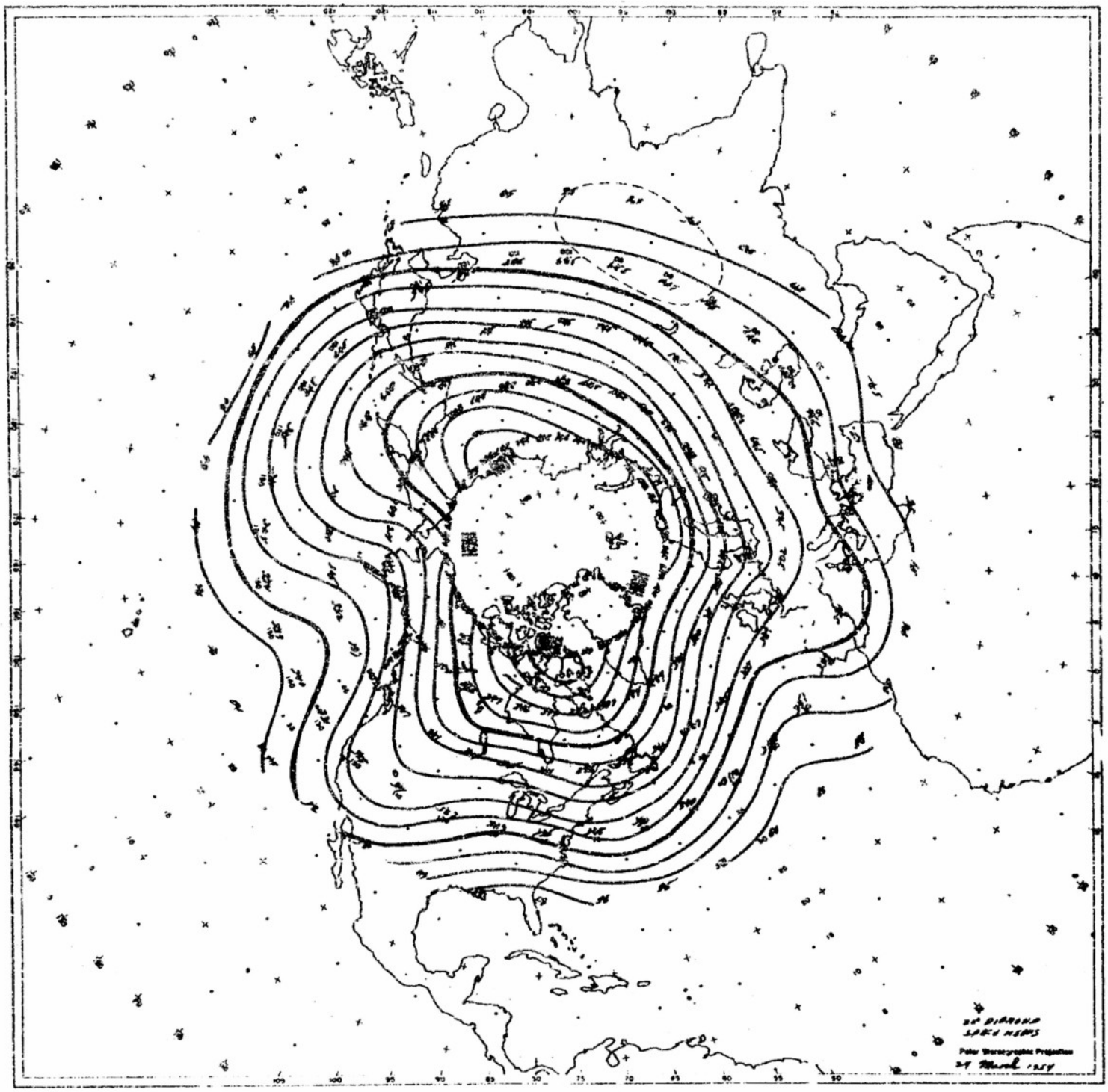

20° DIAMOND HEAD MEAN
Polar Stereographic Projection
16 MARCH 1964

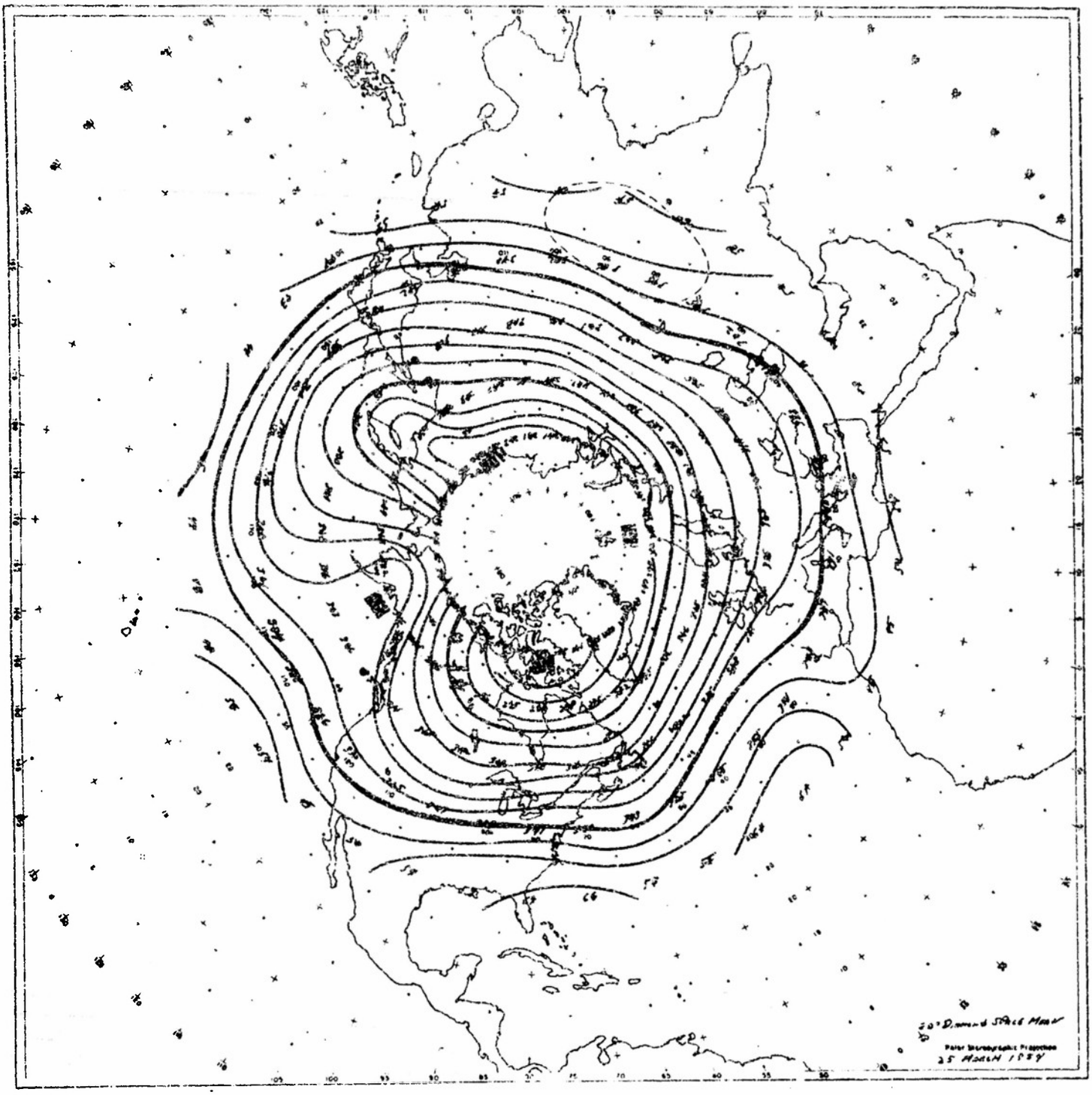


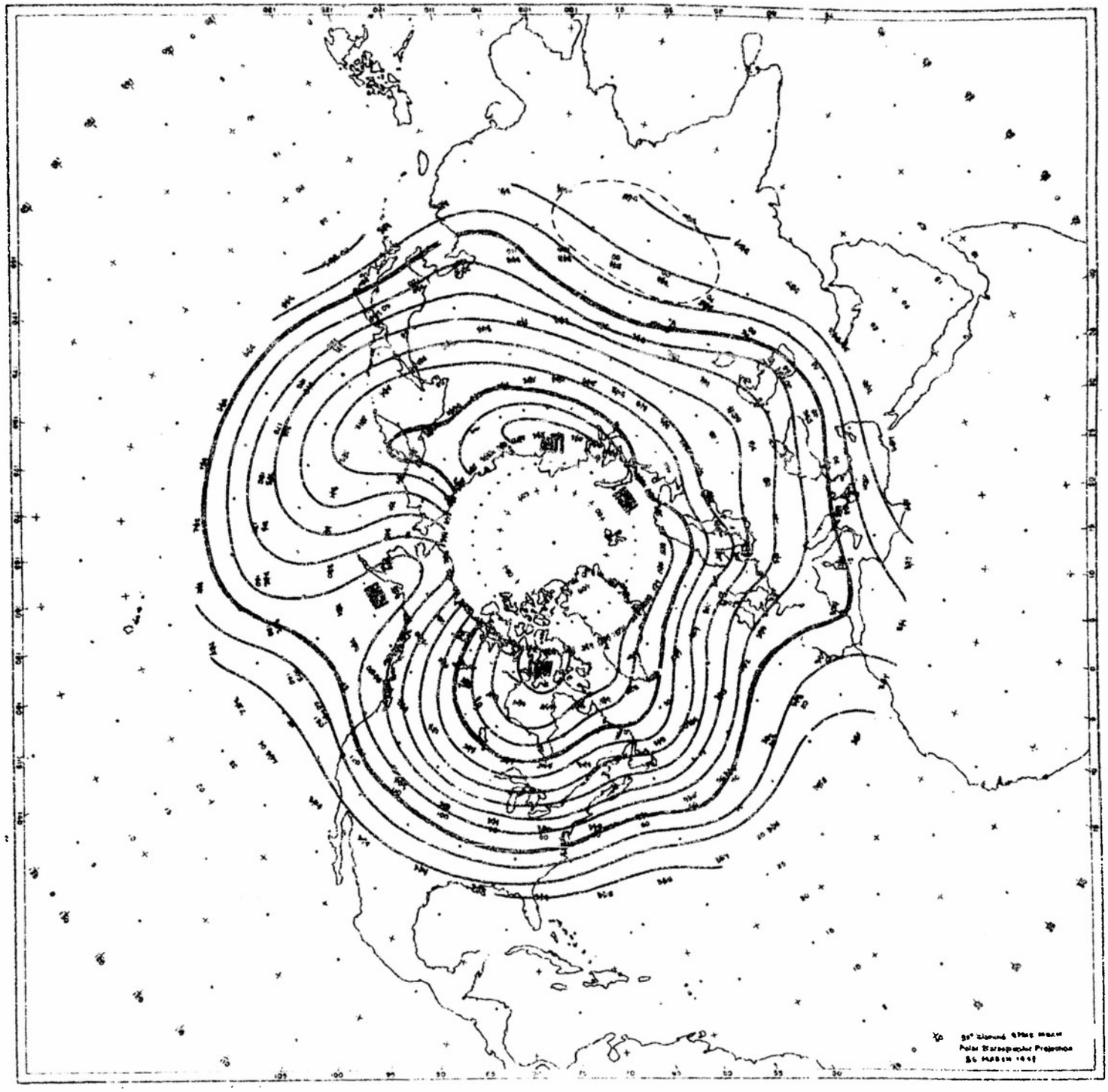

30° Diamond Shoal Area
21 MARCH 1954

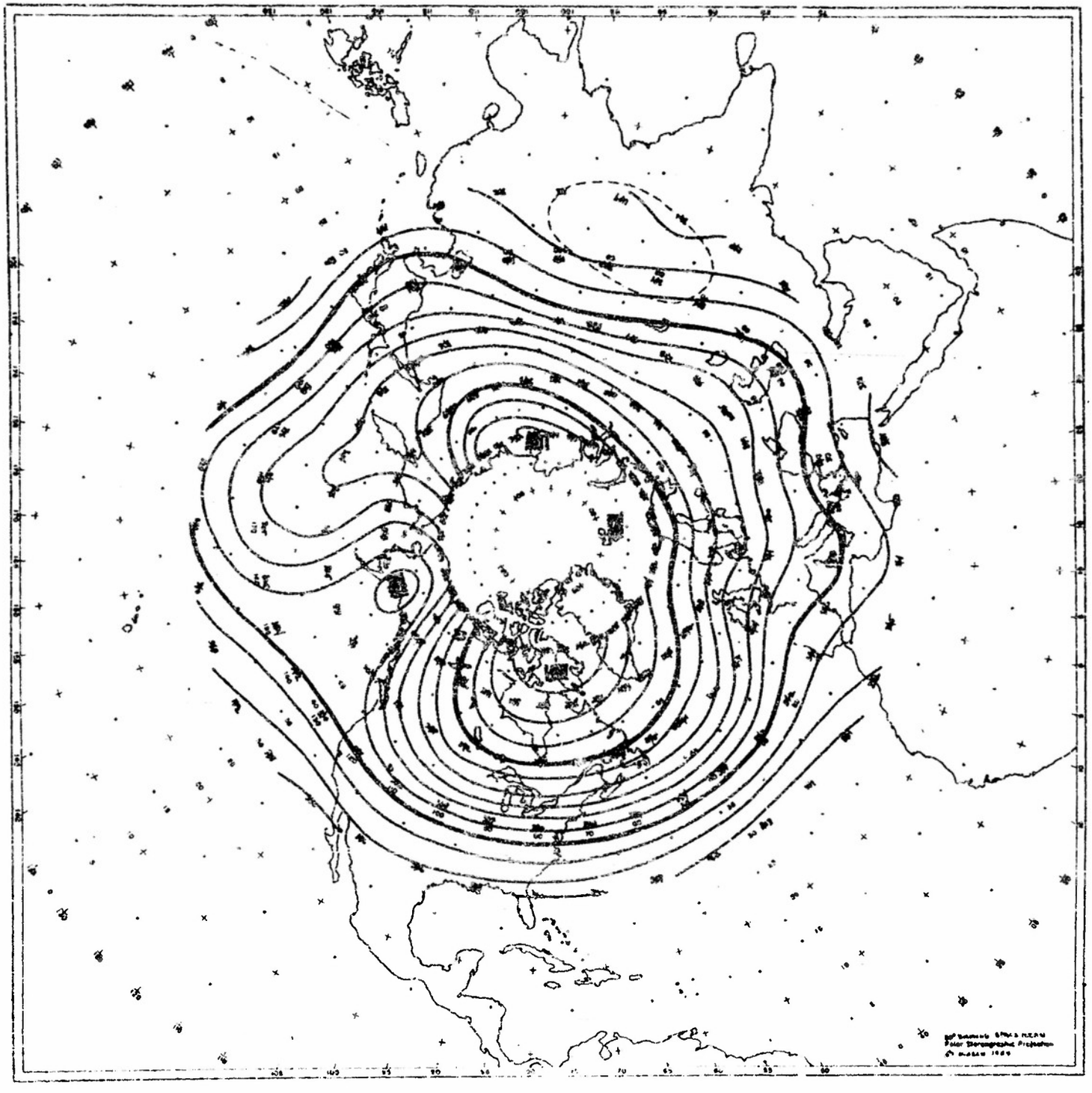

20° Standard Sphere Datum
Polar Stereographic Projection
22 MARCH 1954

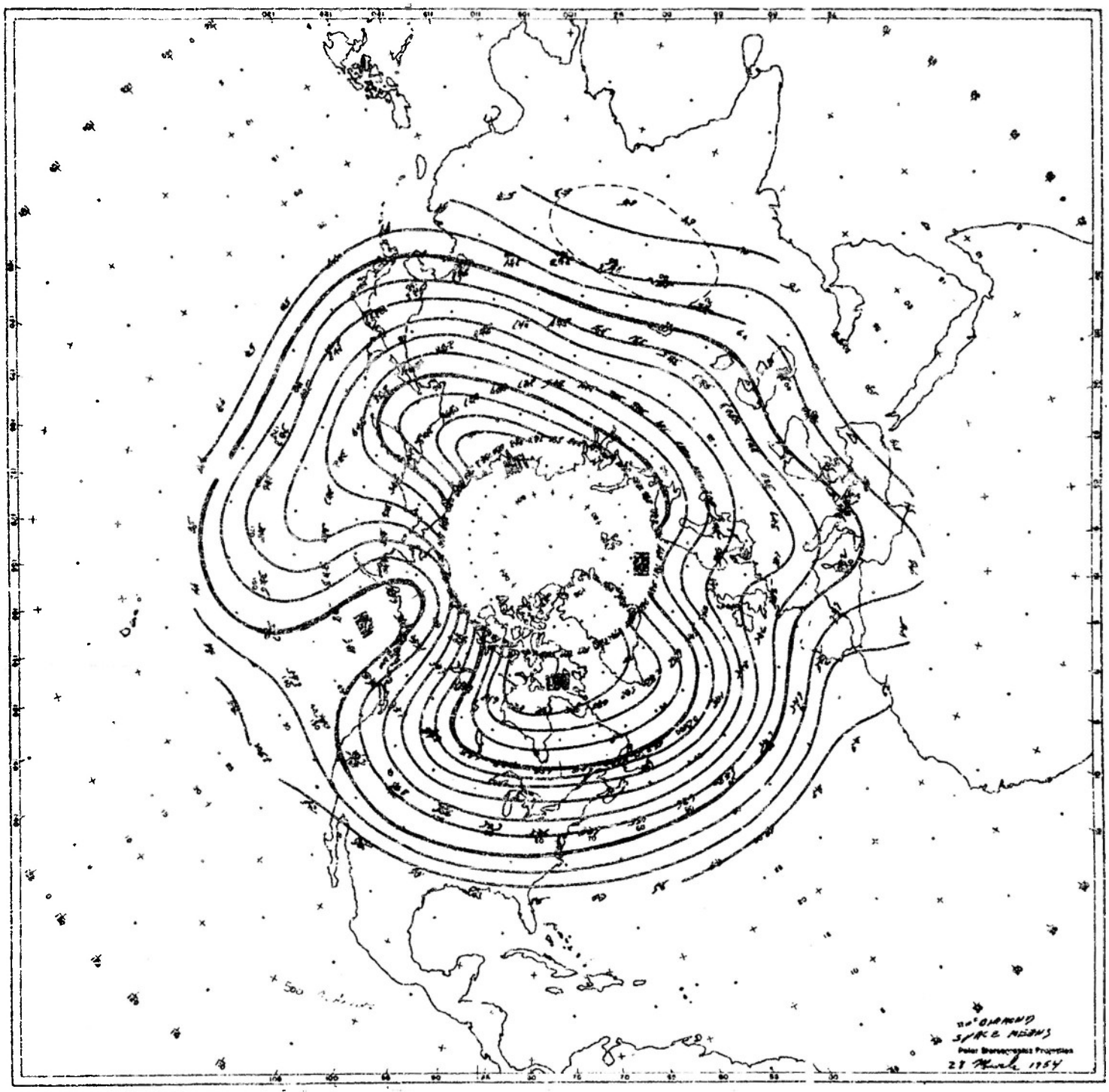

25° BANKED
SPACE NEEDLE
Polar Stereographic Projection

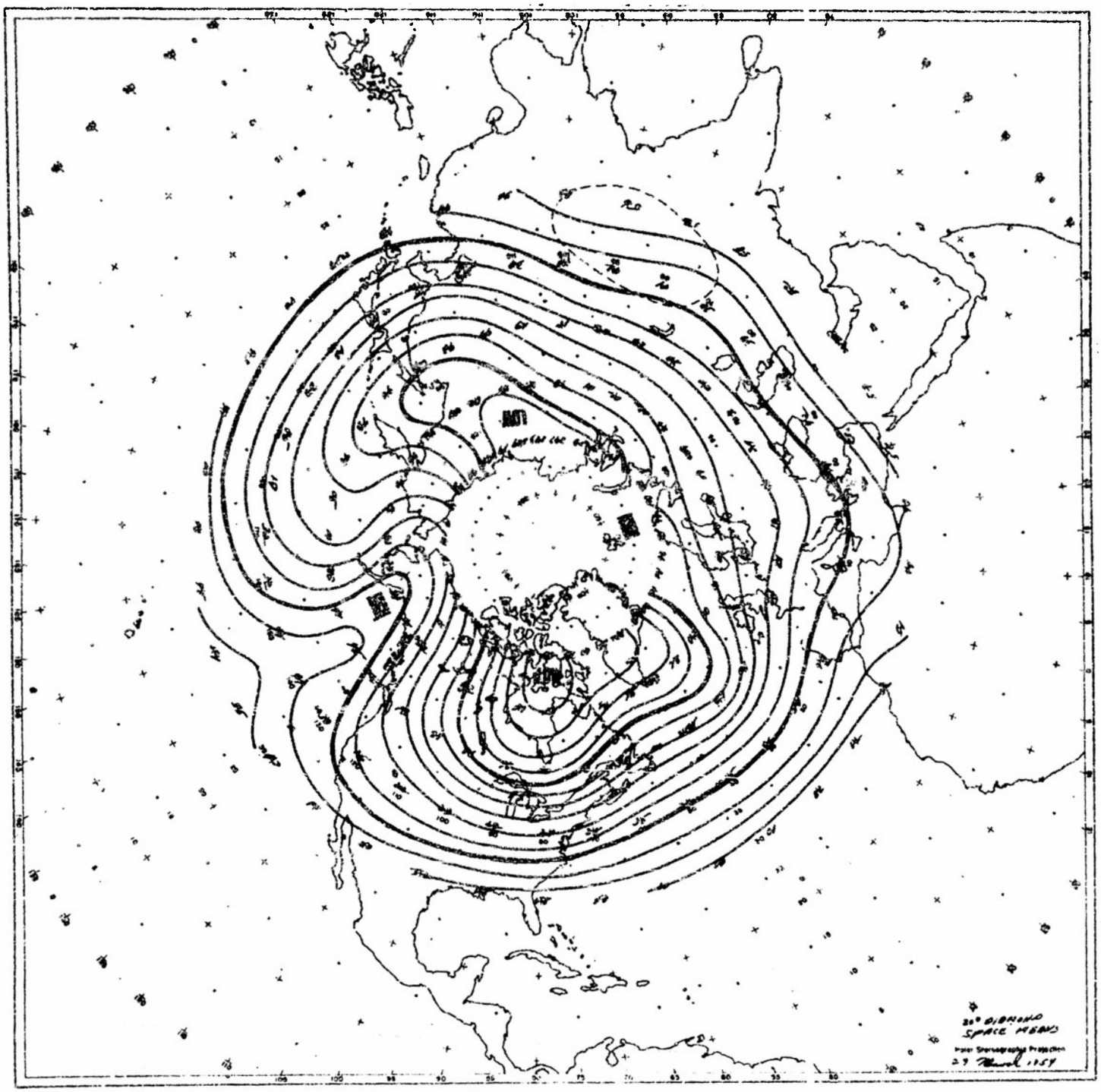

Polar Stereographic Projection

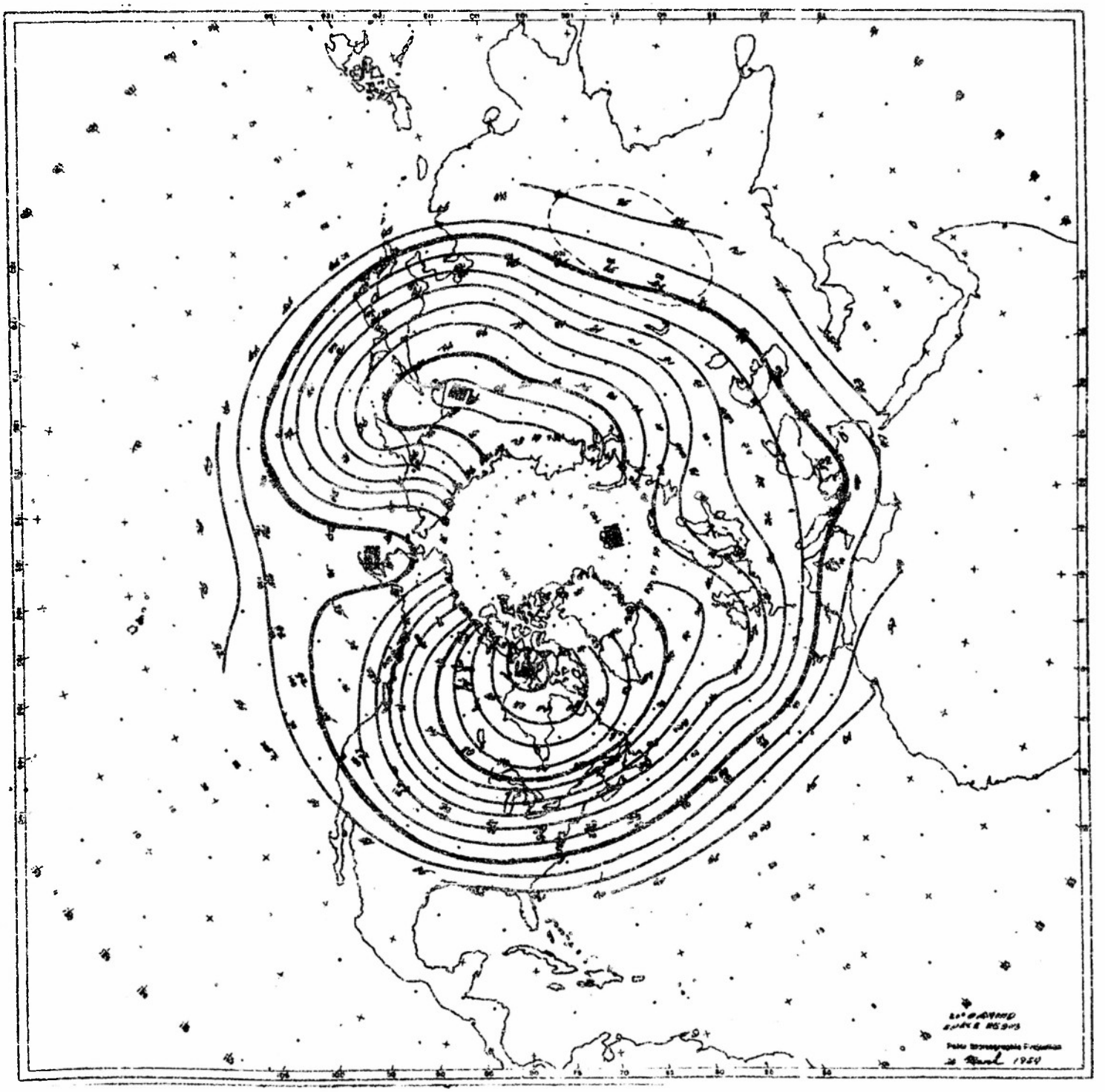

20° Diamond Space Map
Polar Stereographic Projection
25 MARCH 1959

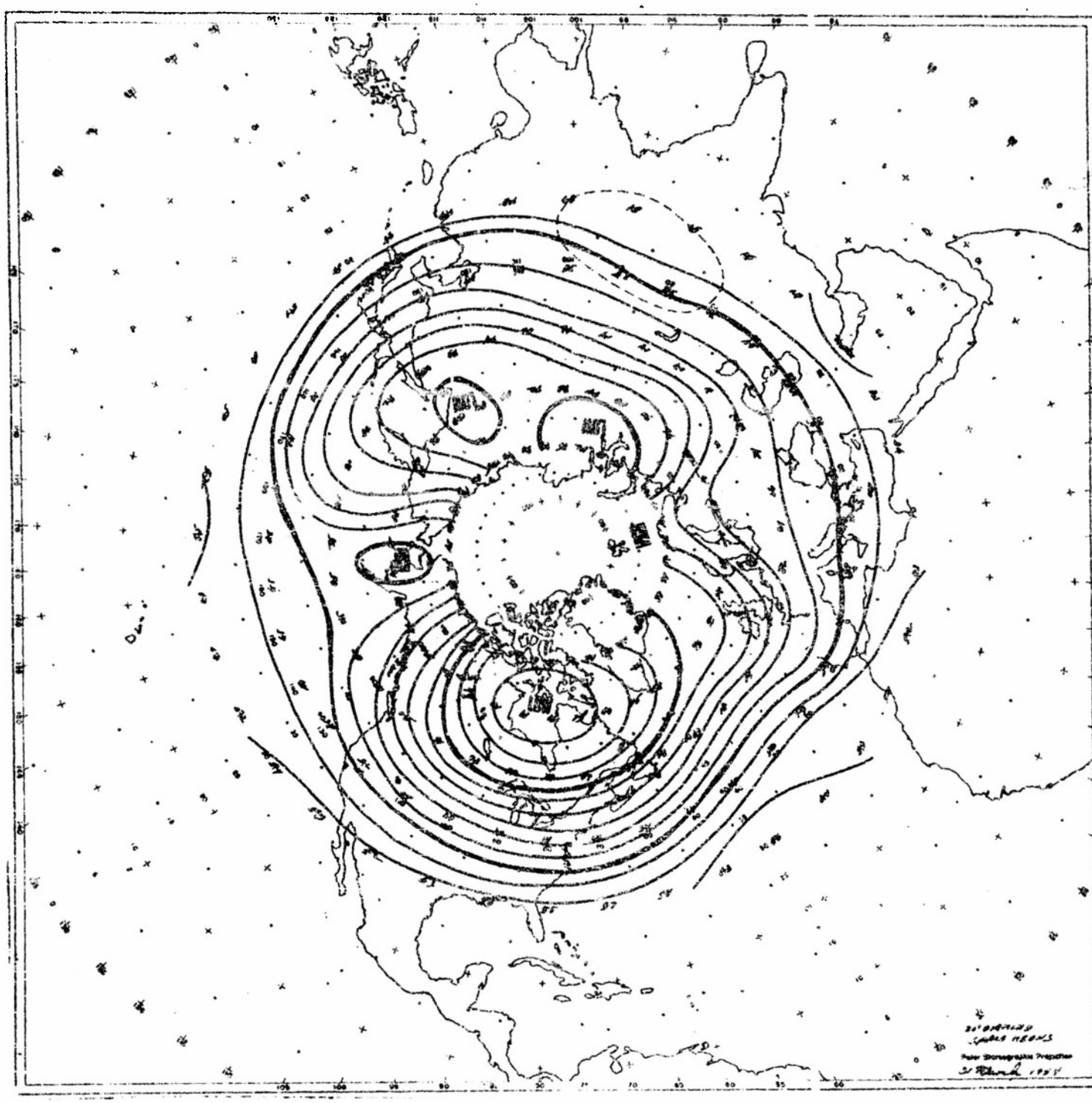


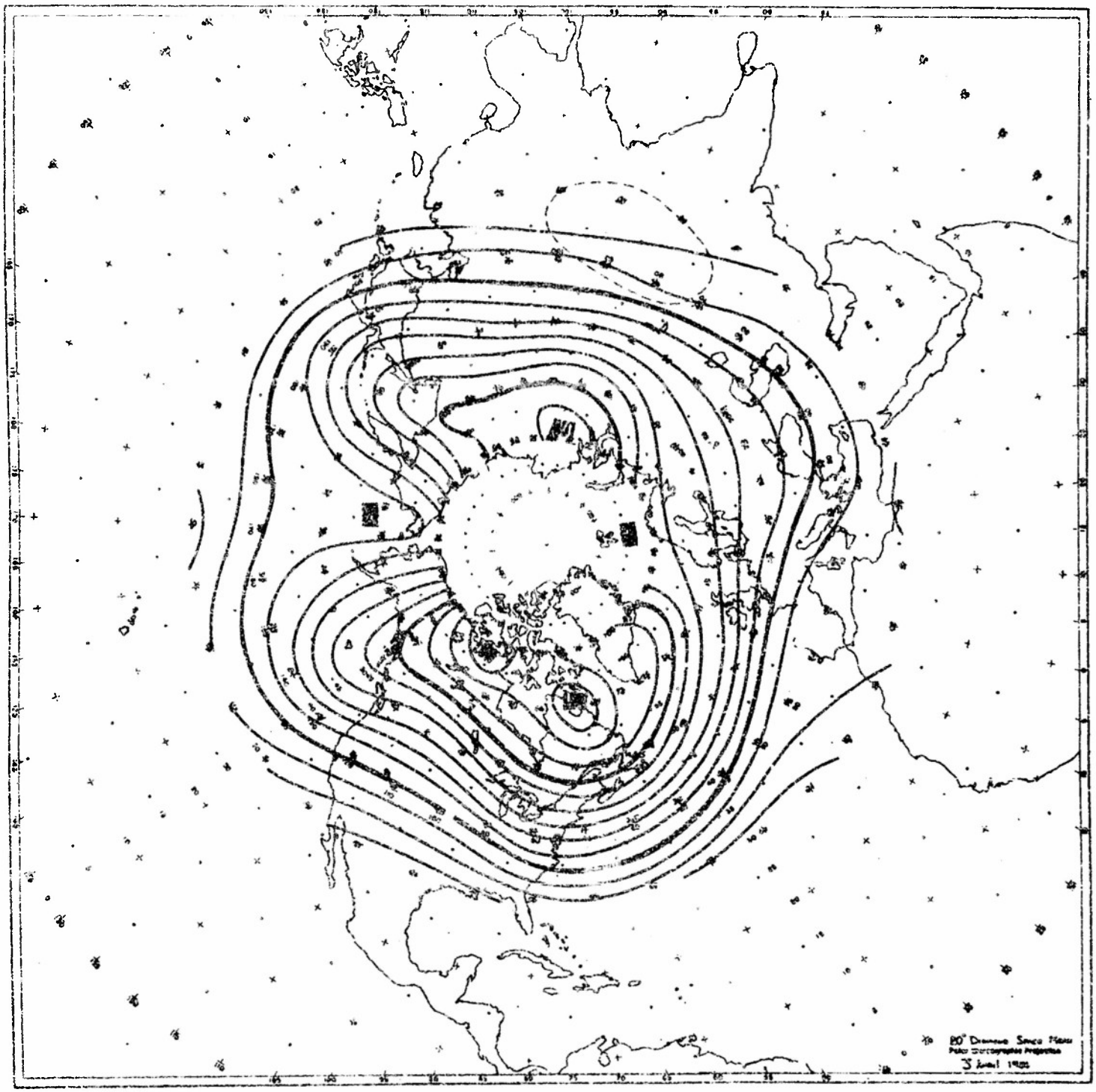


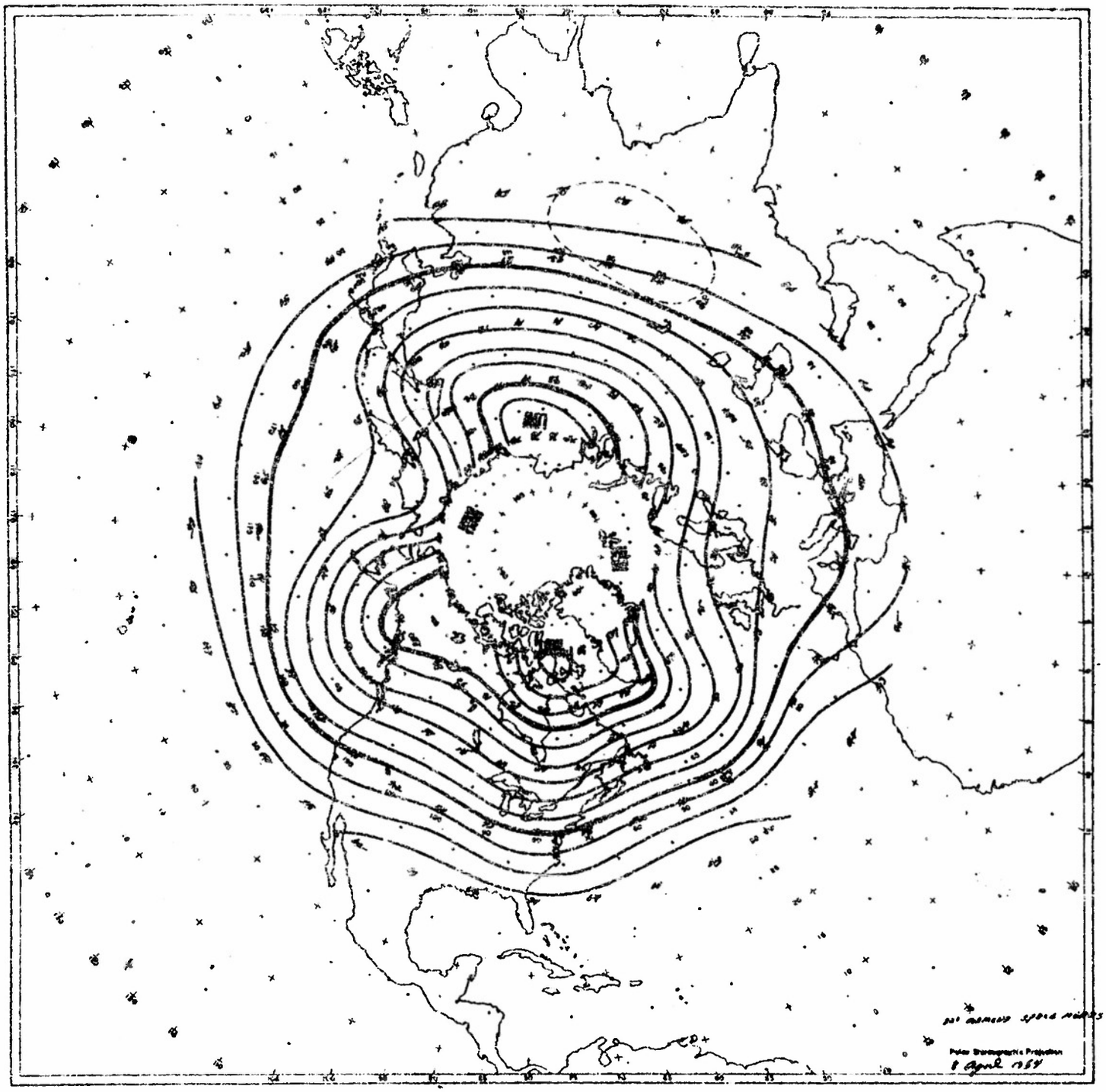

Diamond
Surface Winds
Polar Stereographic Projection
27 March 1954

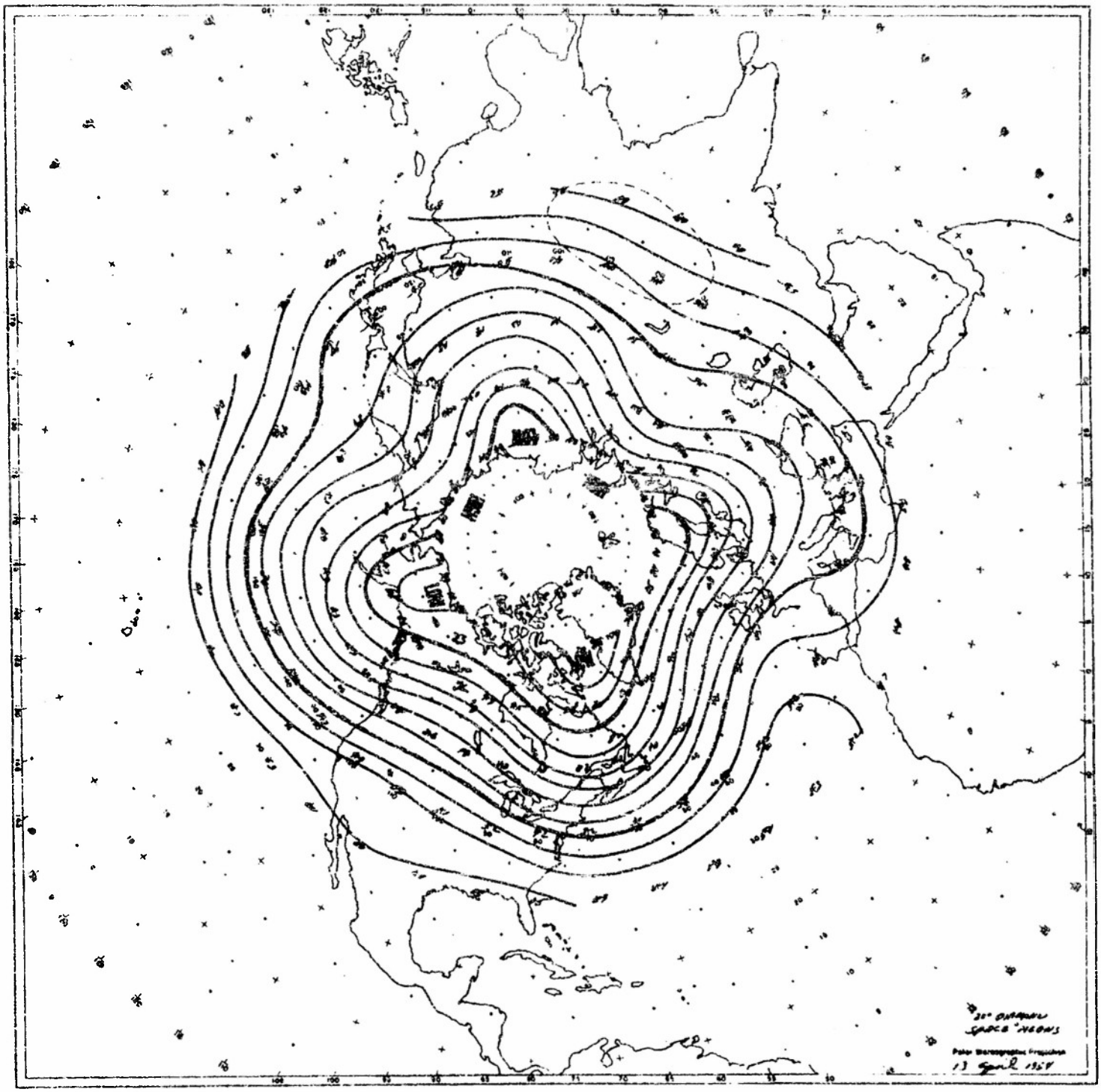

SPACE MEANS

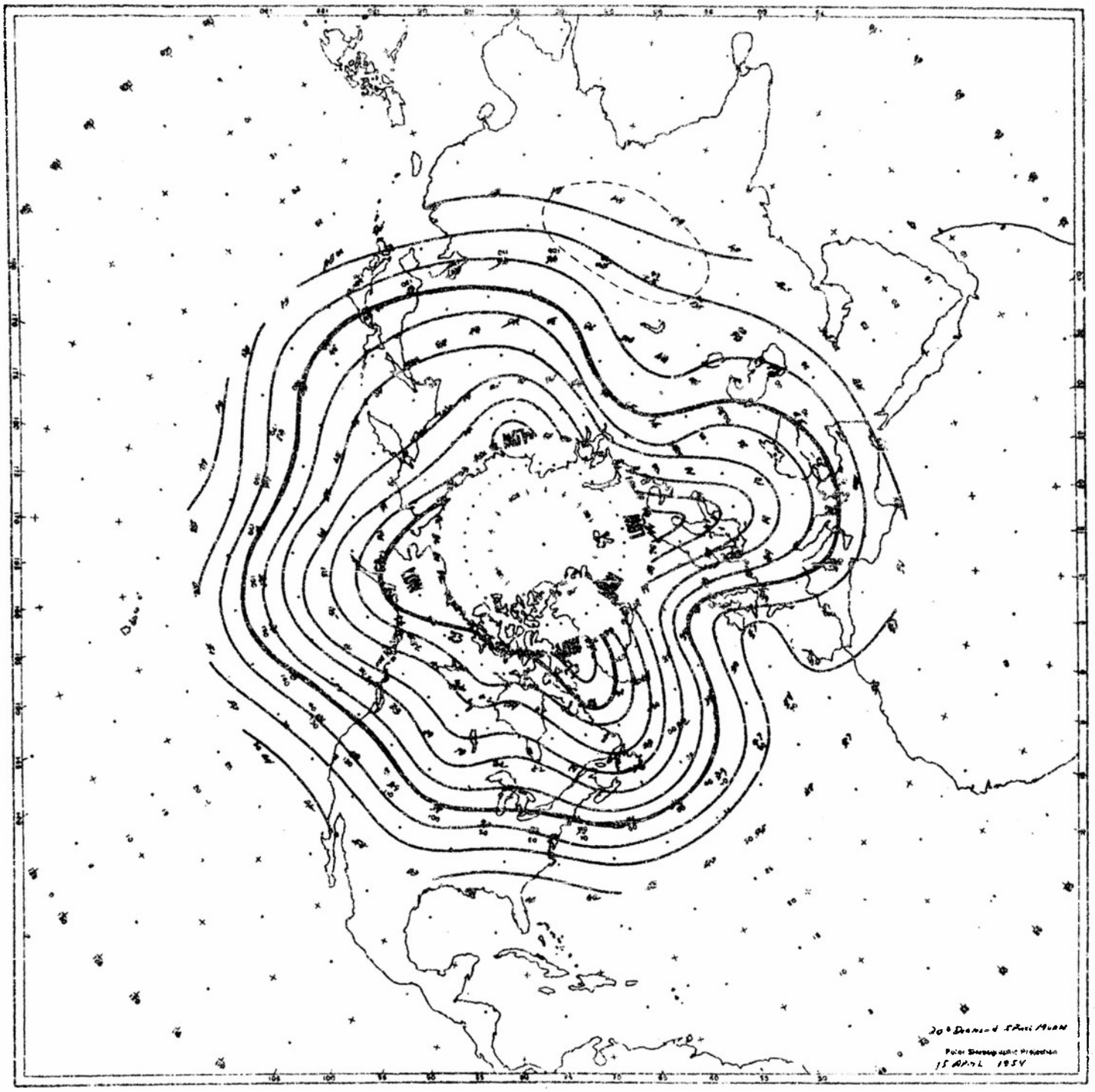


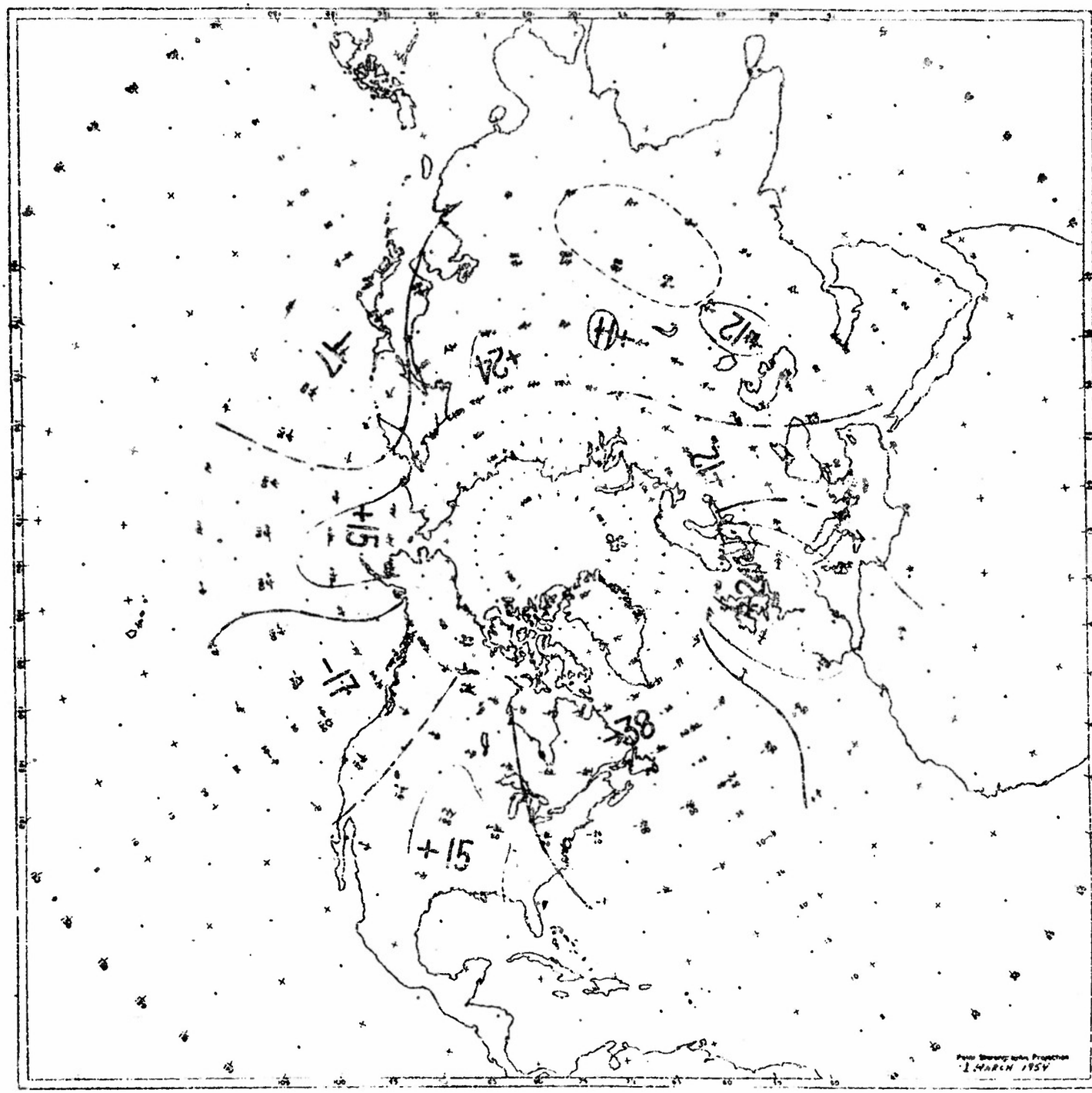



80° Dimmus Space Plate
Polar Stereographic Projection
3 Juin 1985


Polar Stereographic Projection
8 April 1954




30° Standard Parallel North
Polar Stereographic Projection
15 APRIL 1954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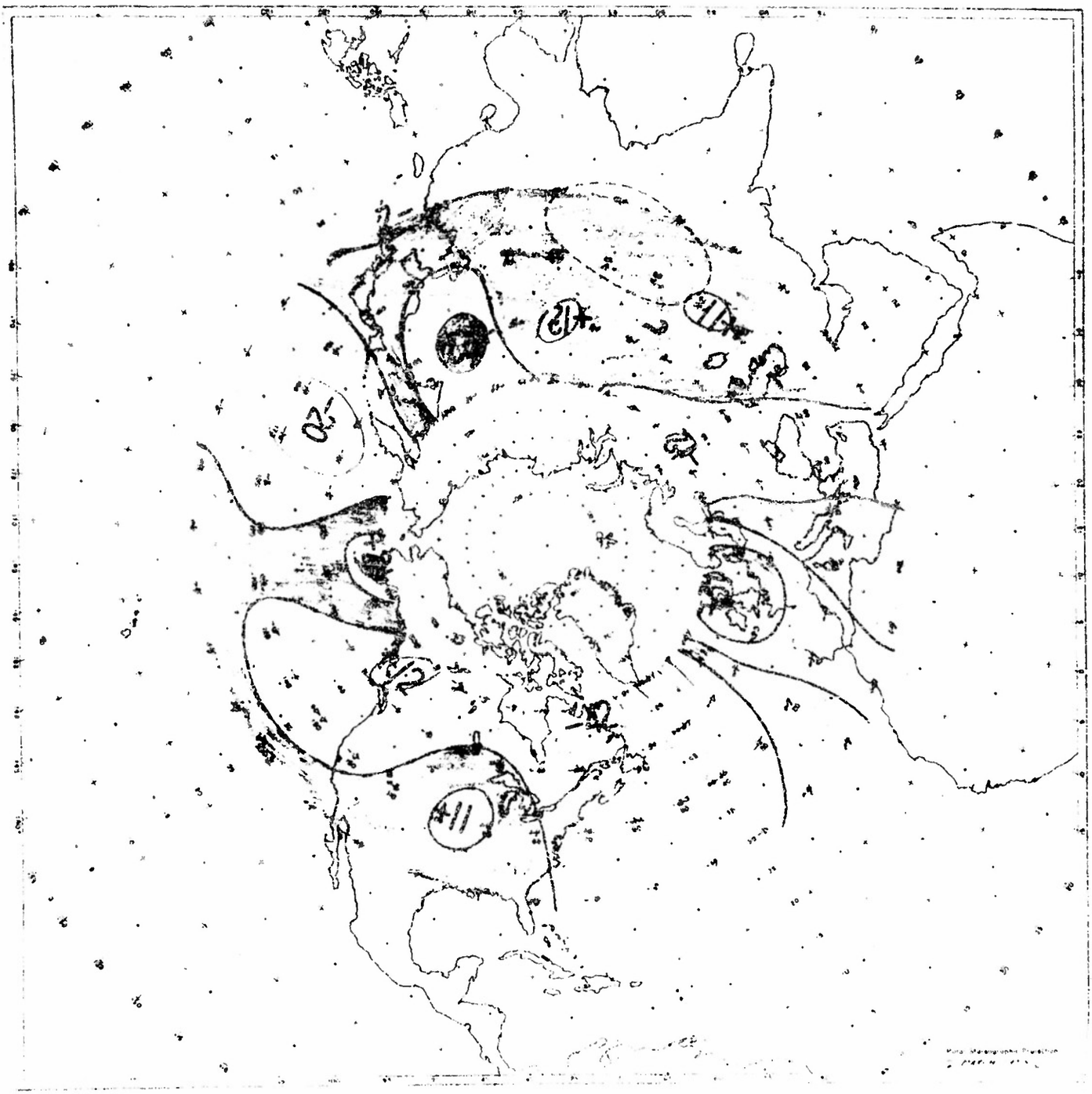
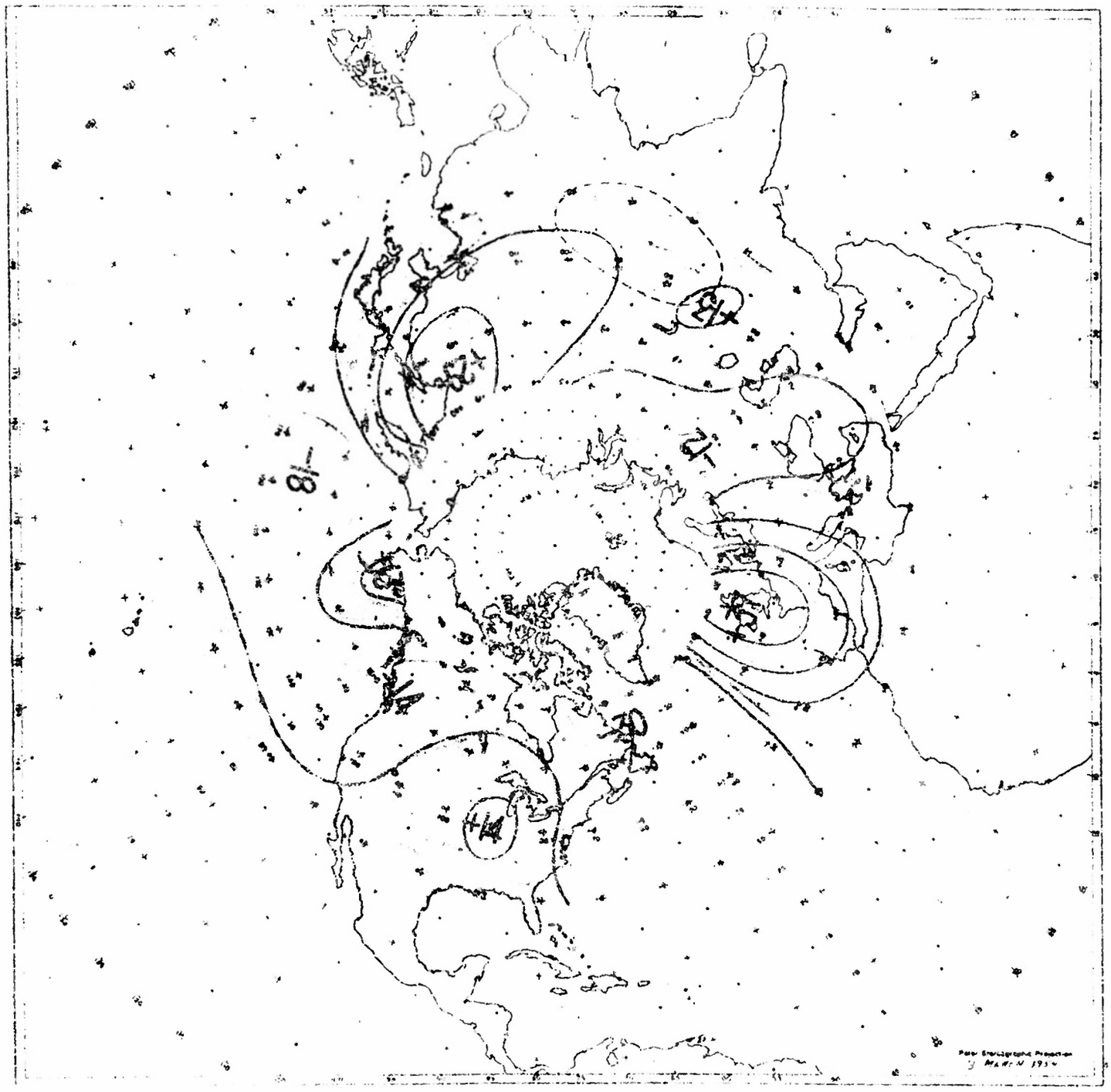
Polar Stereographic Projection
1 MARCH 1954

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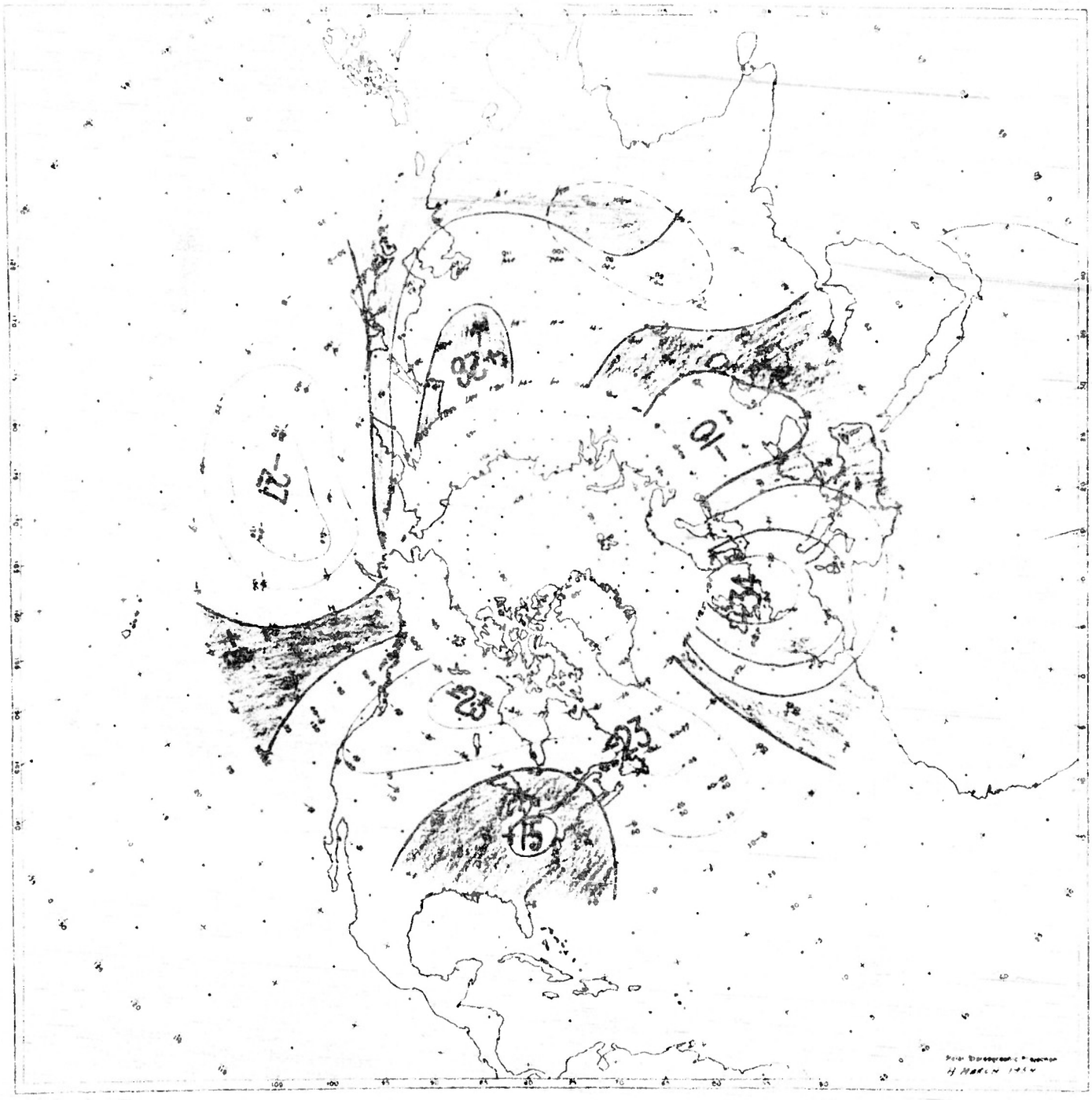
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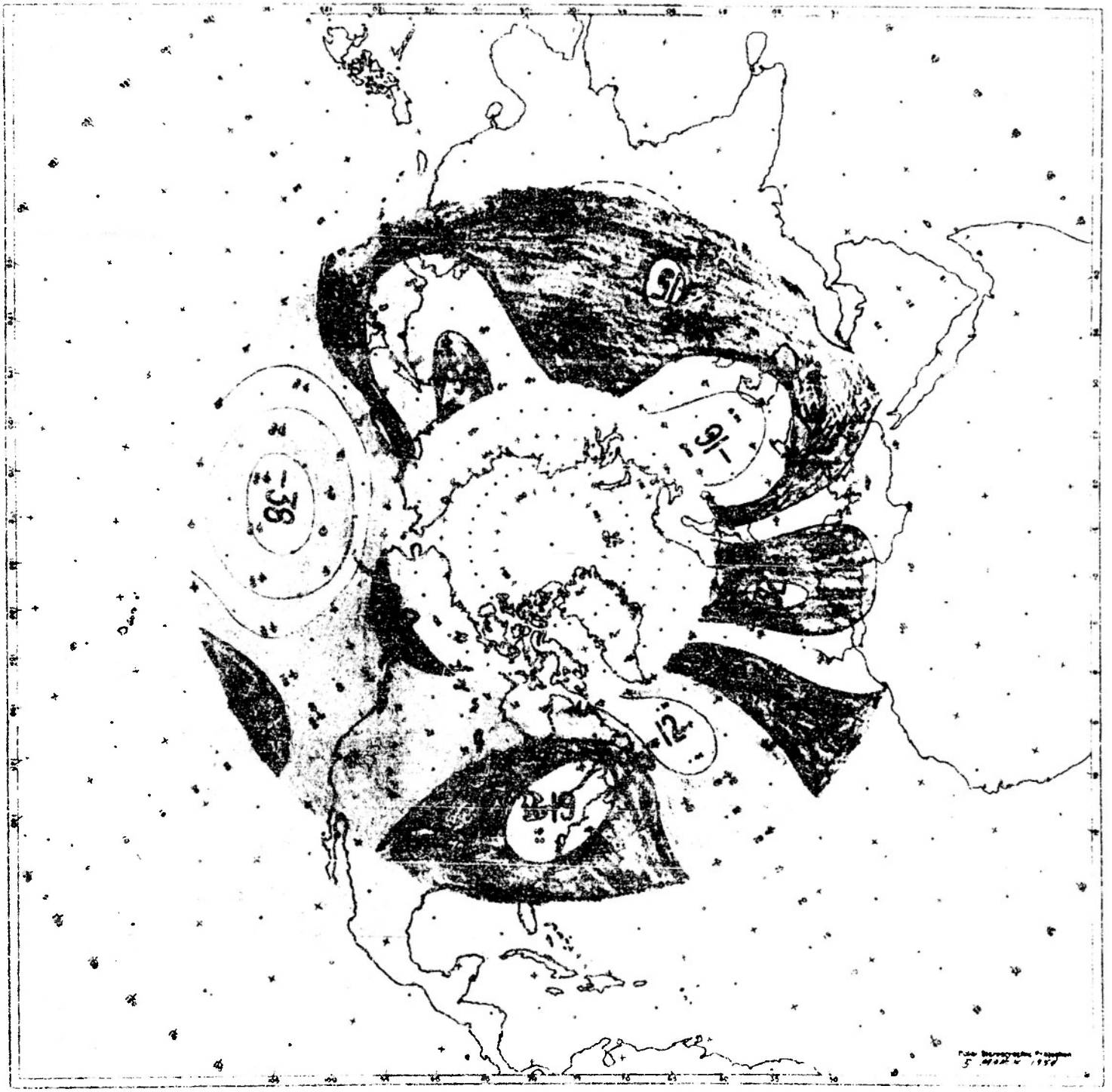
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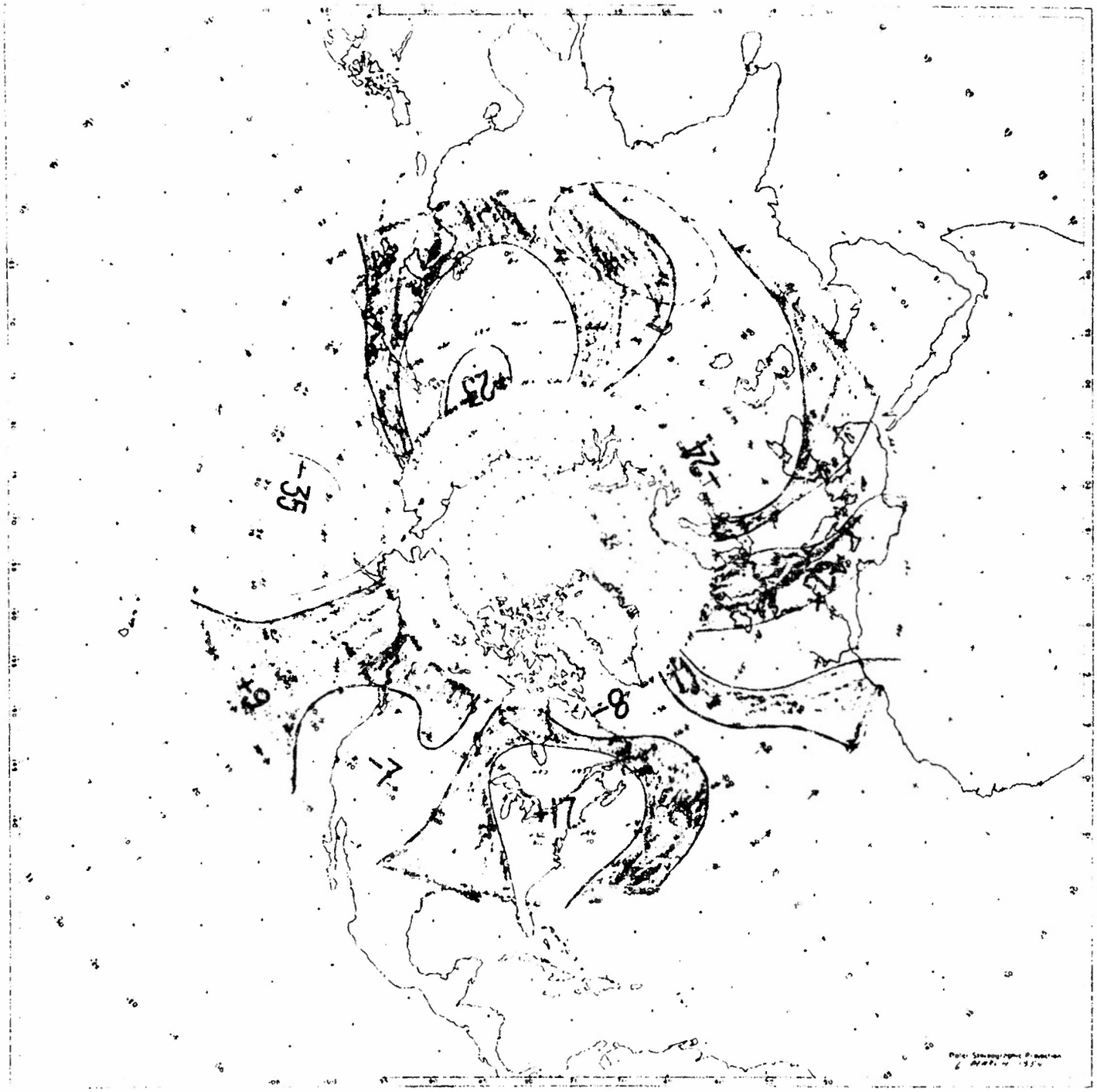
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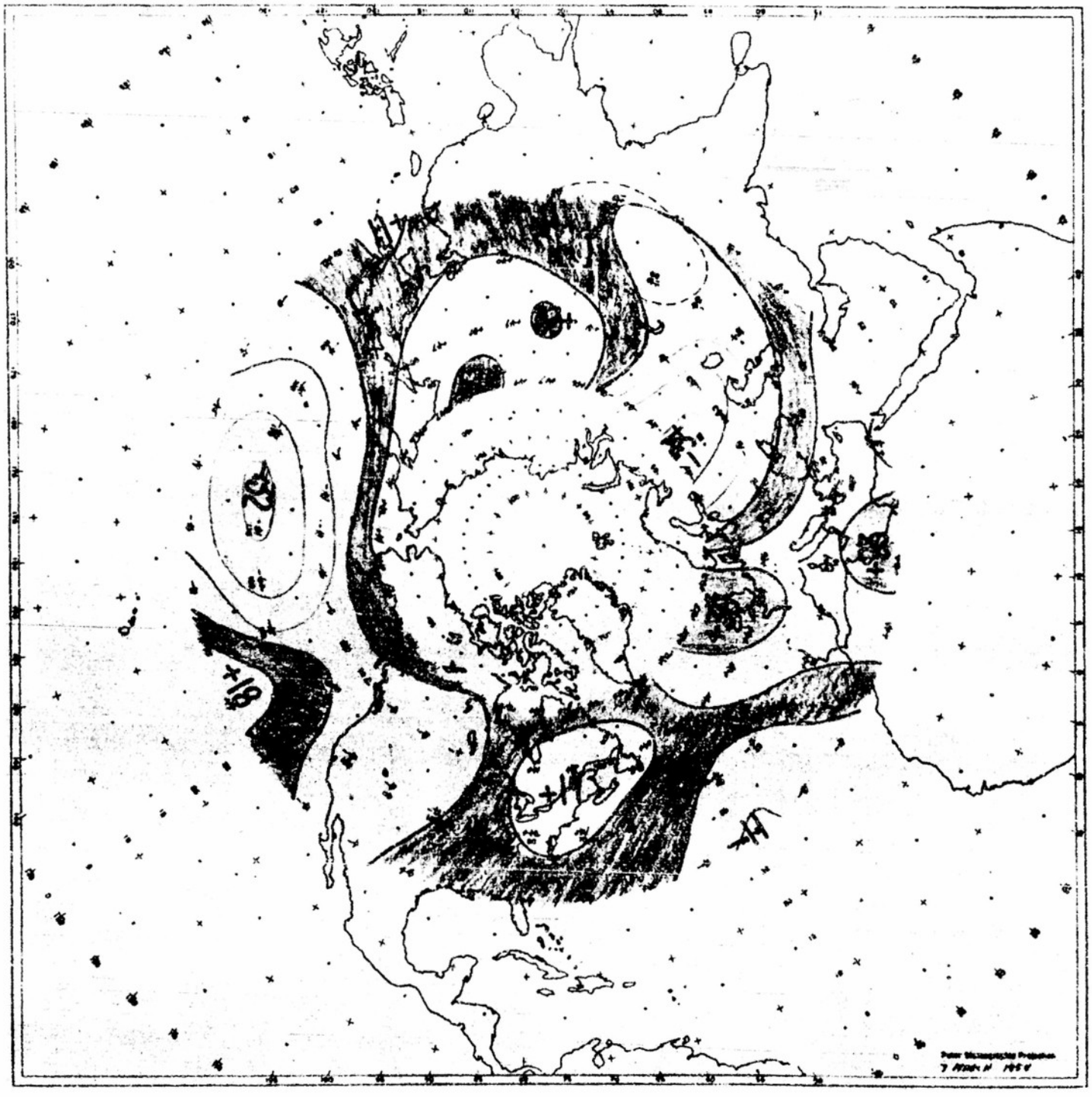
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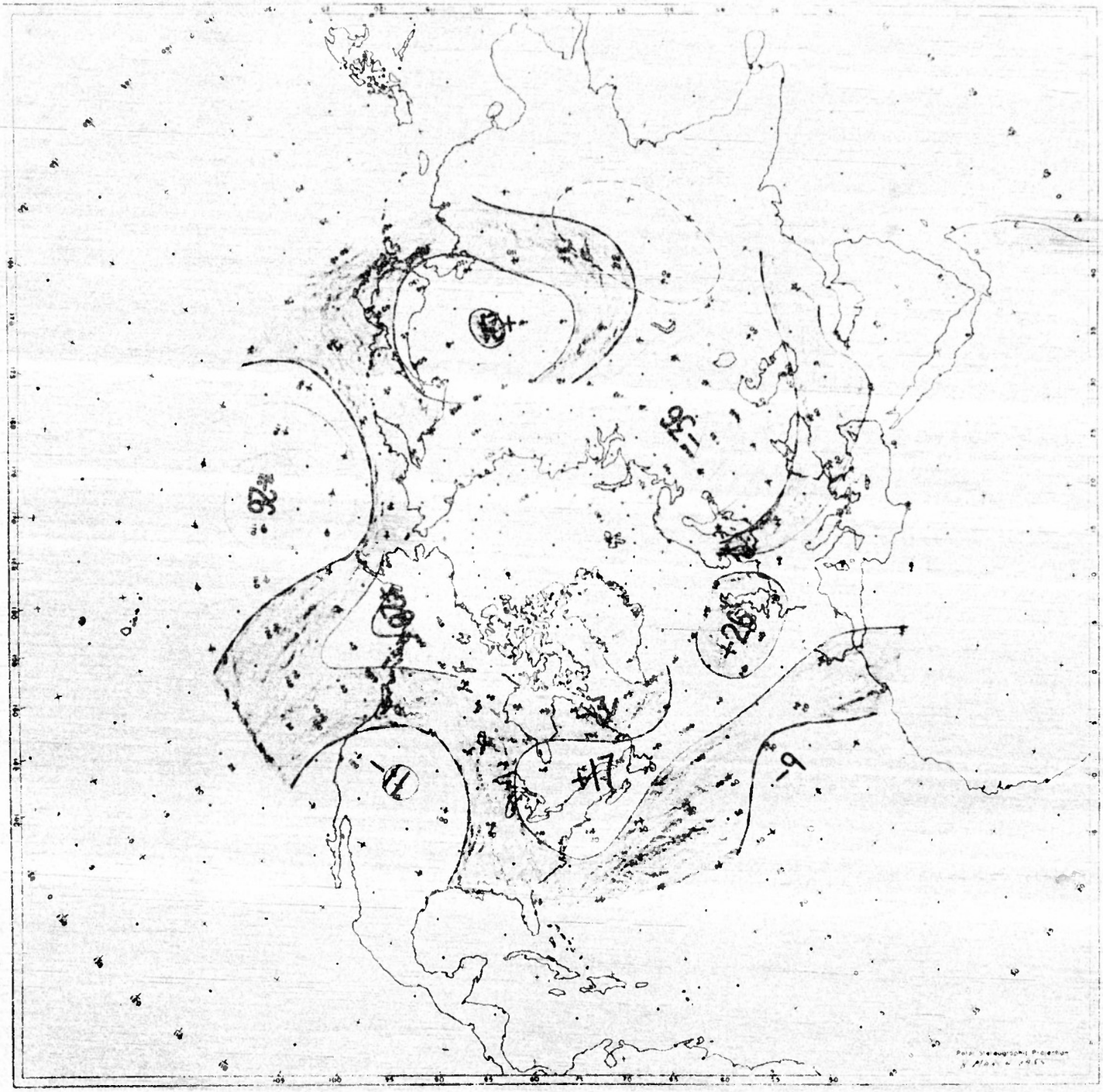
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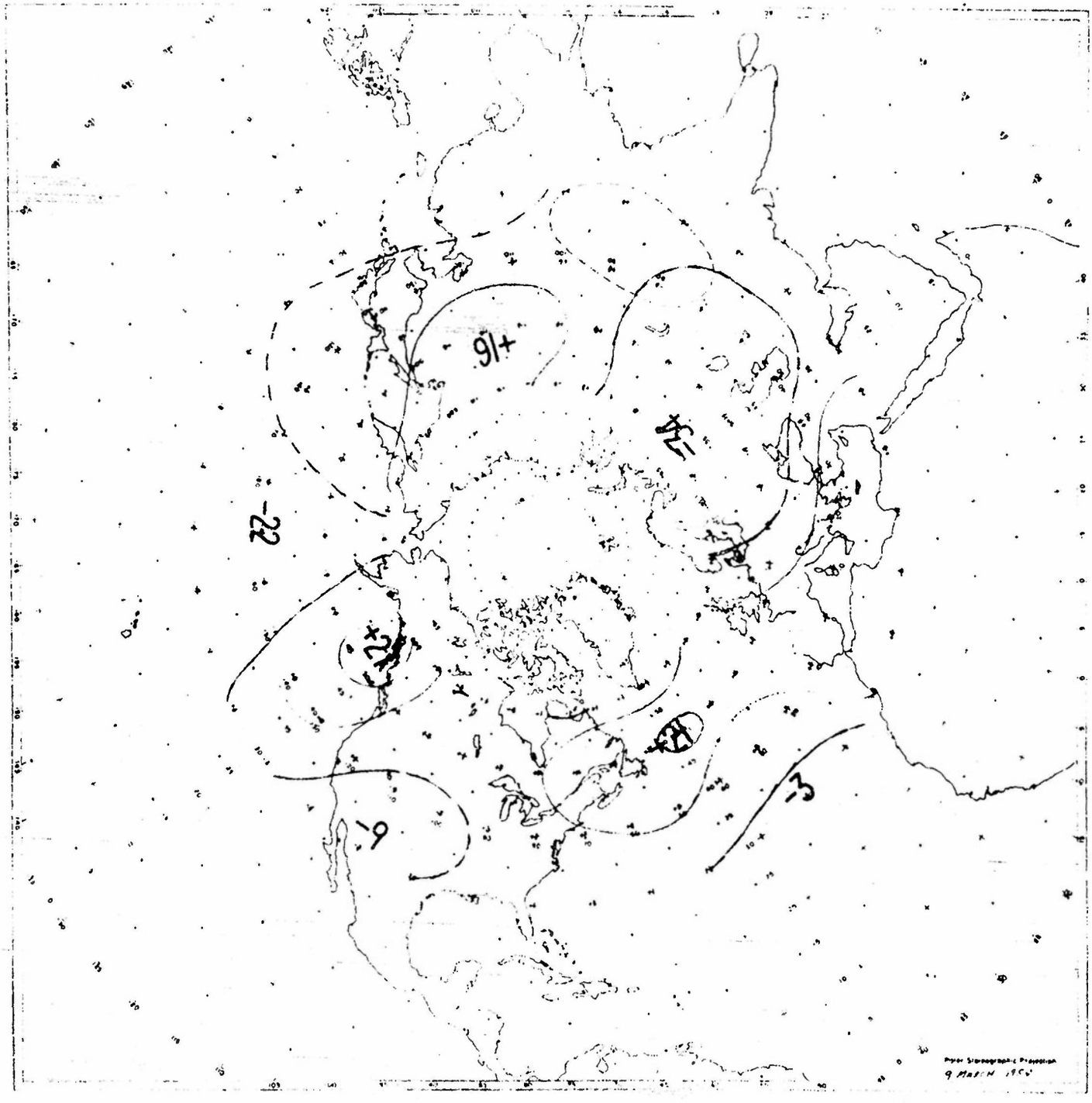
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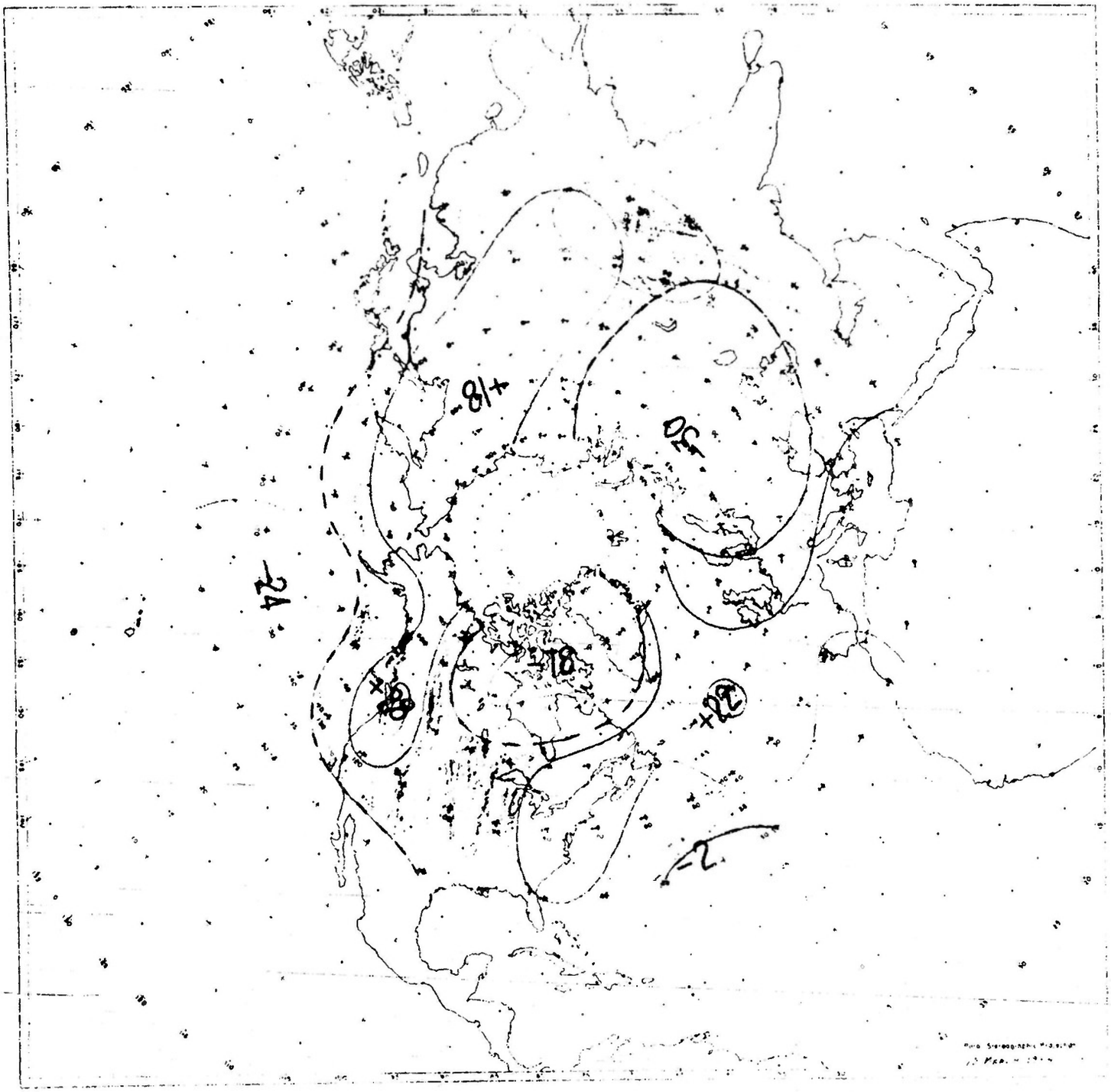
9 MARCH 1964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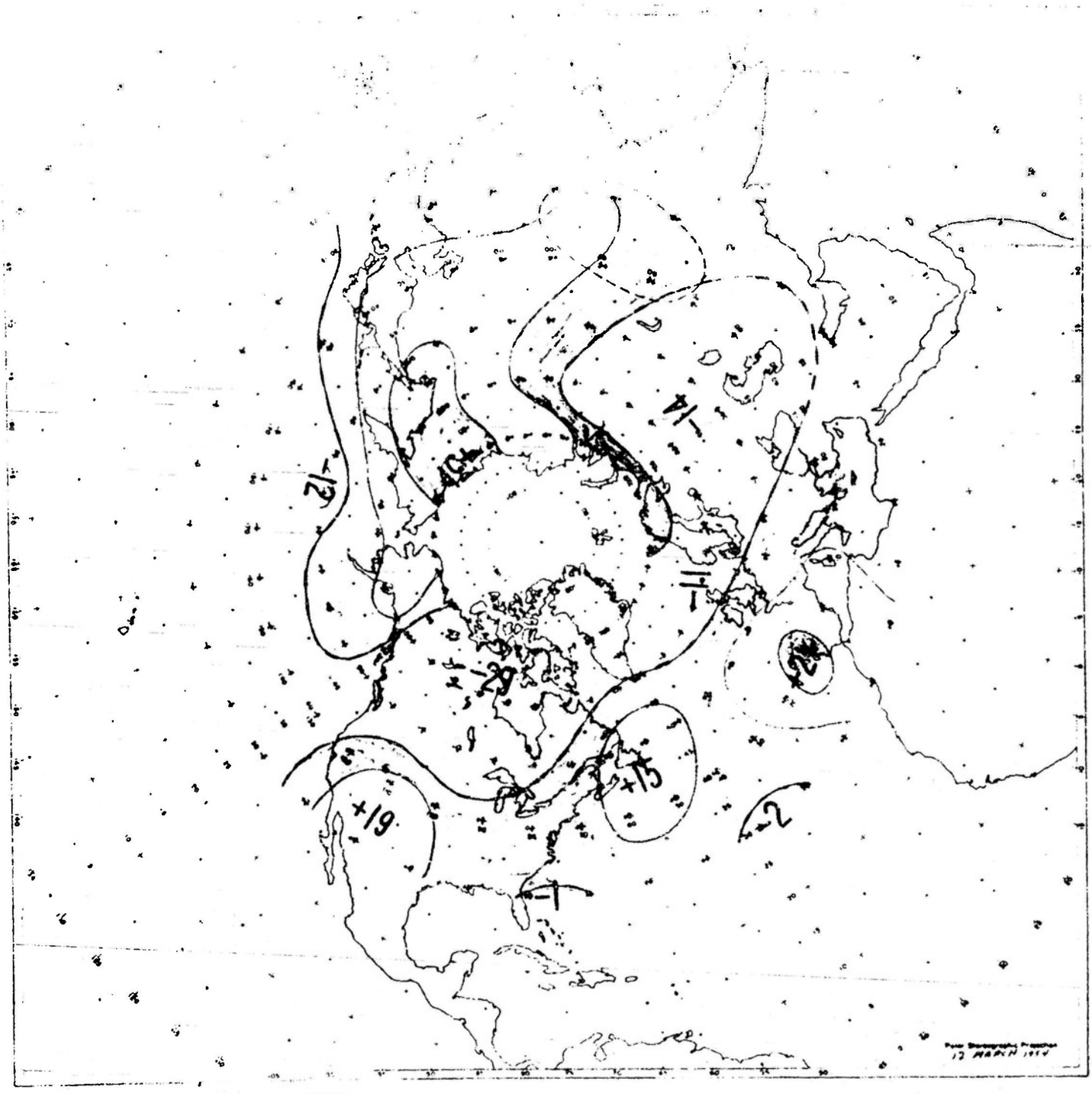
-6
11 MARCH 1954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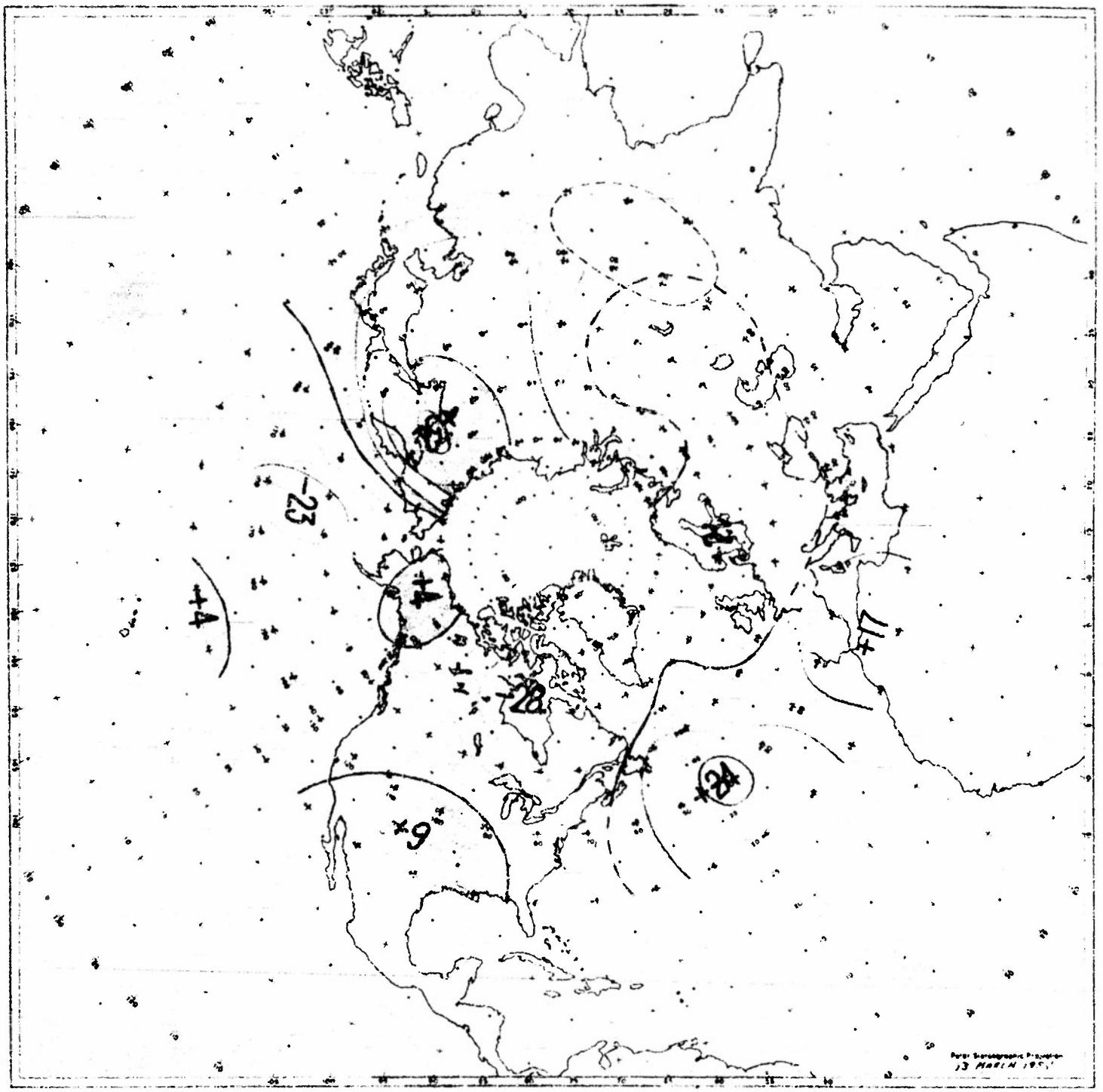
Polar Stereographic Projection
12 MARCH 1954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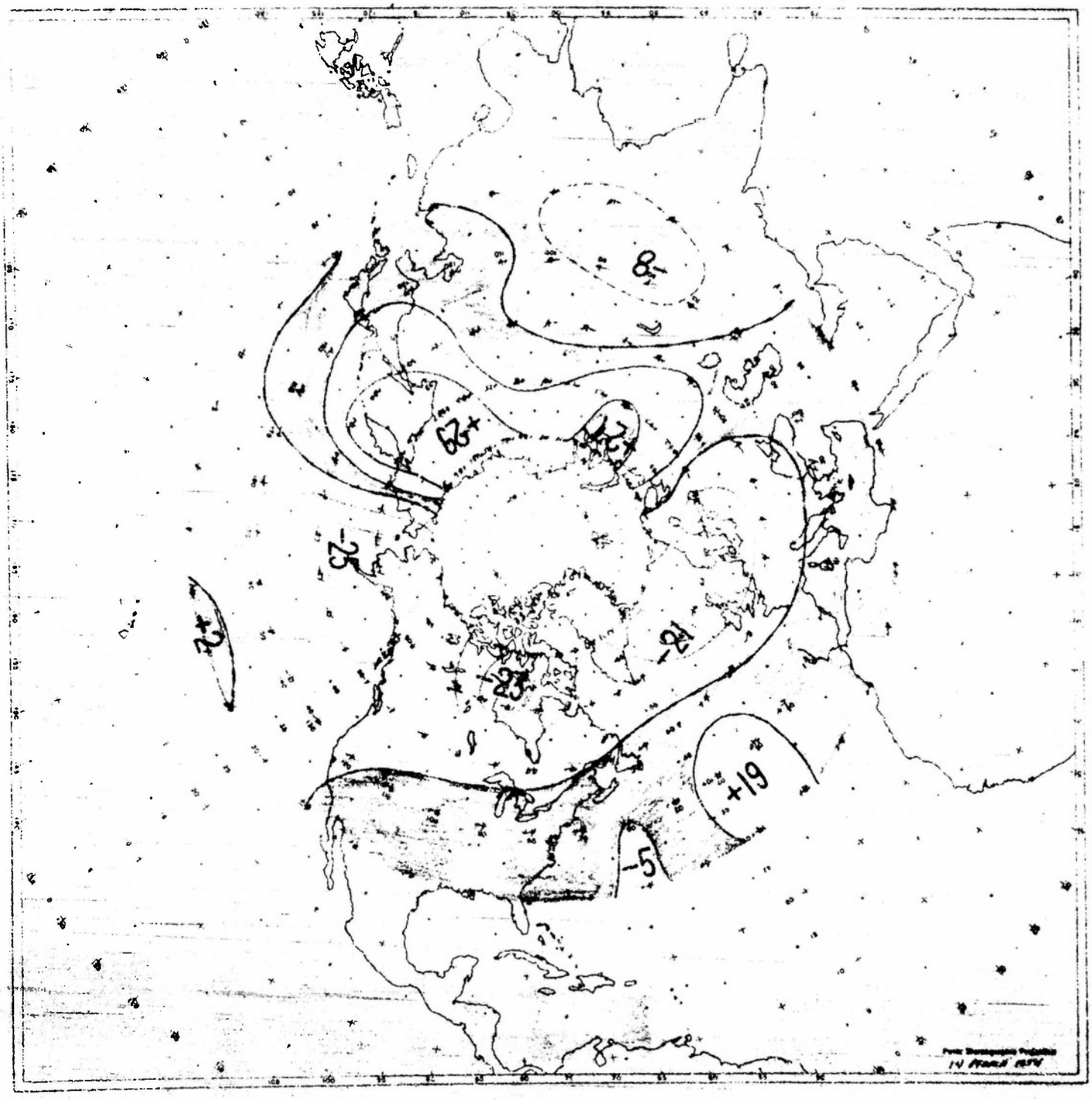
Polar Stereographic Projection
13 MARCH 197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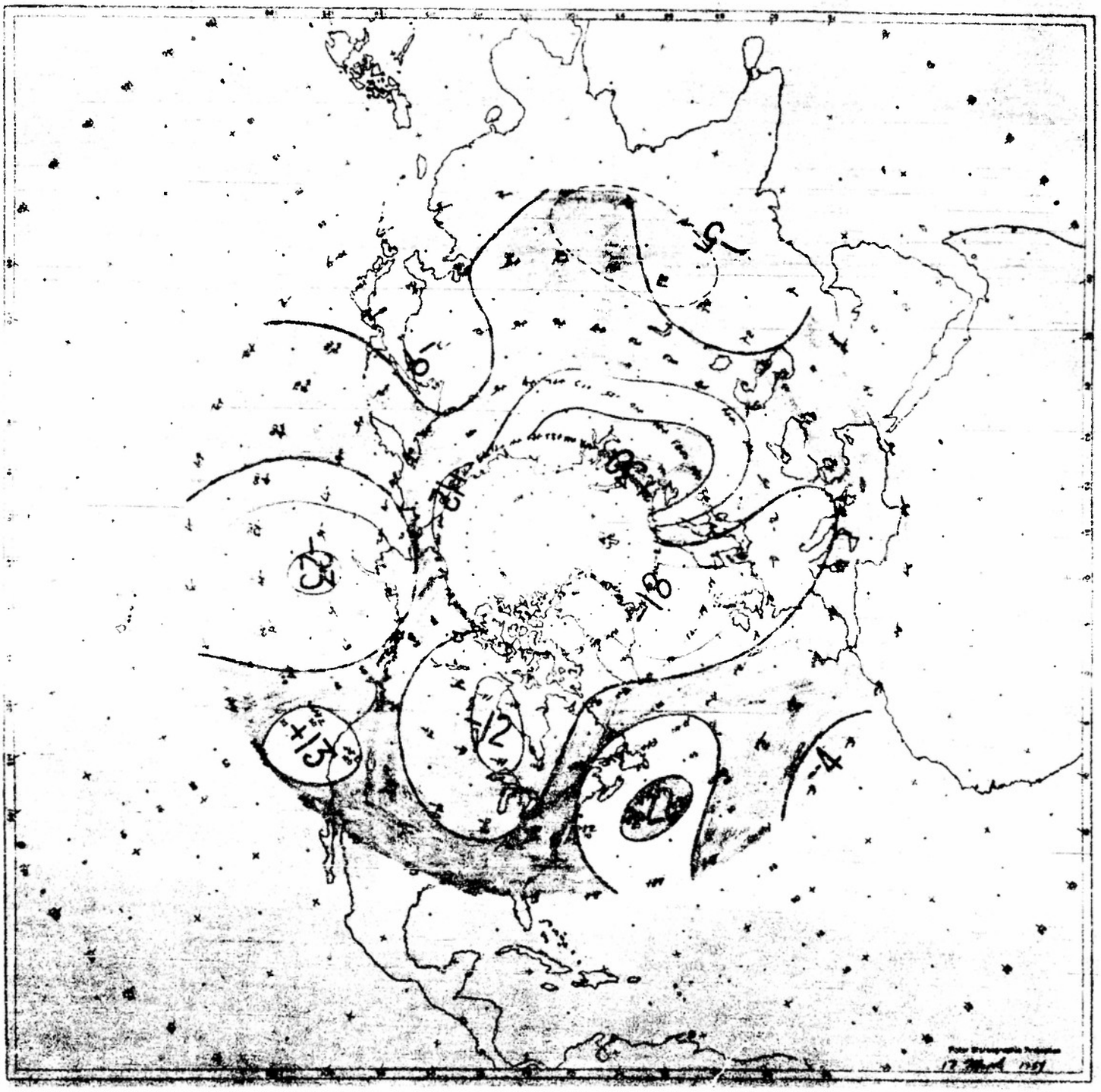
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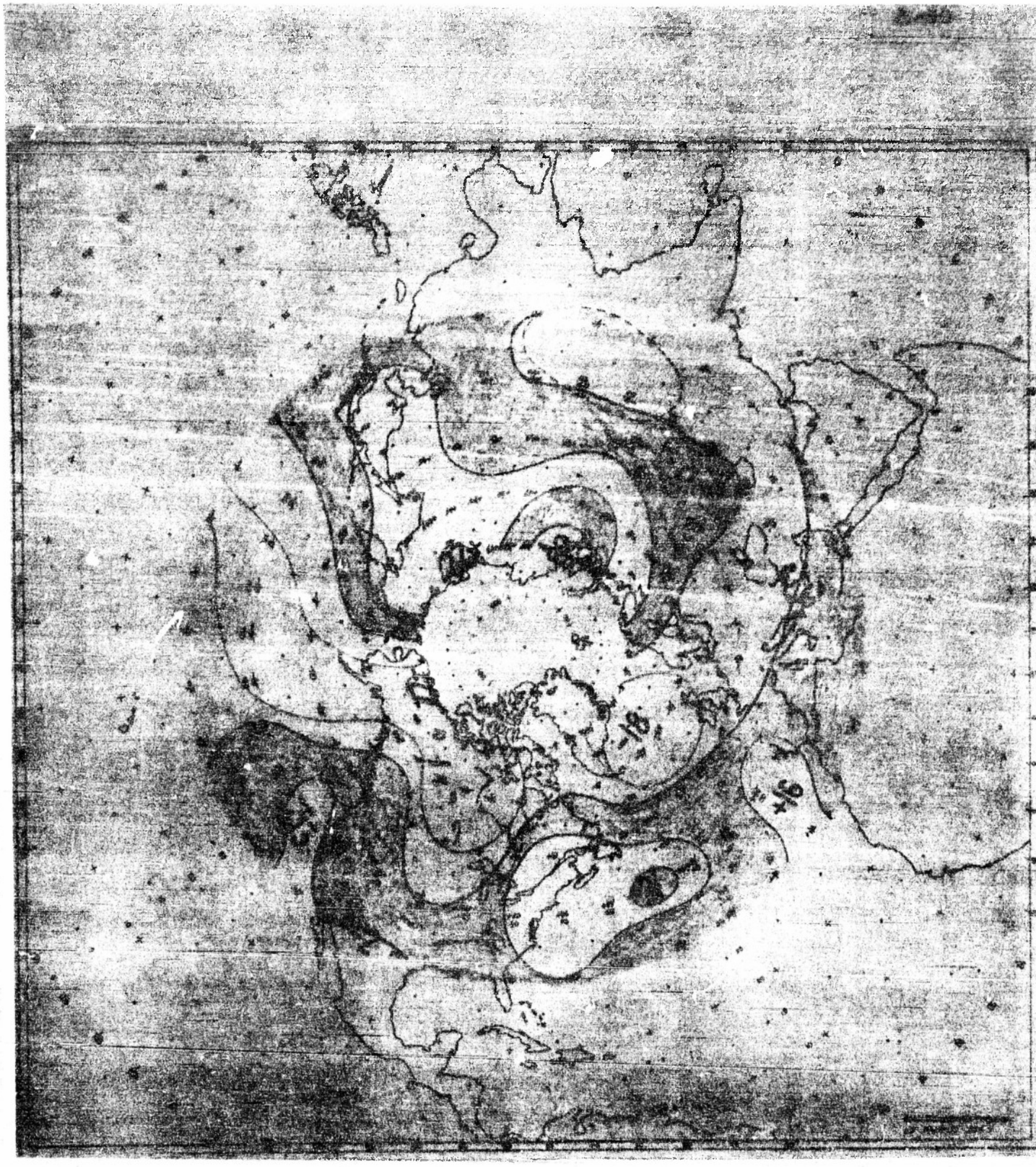

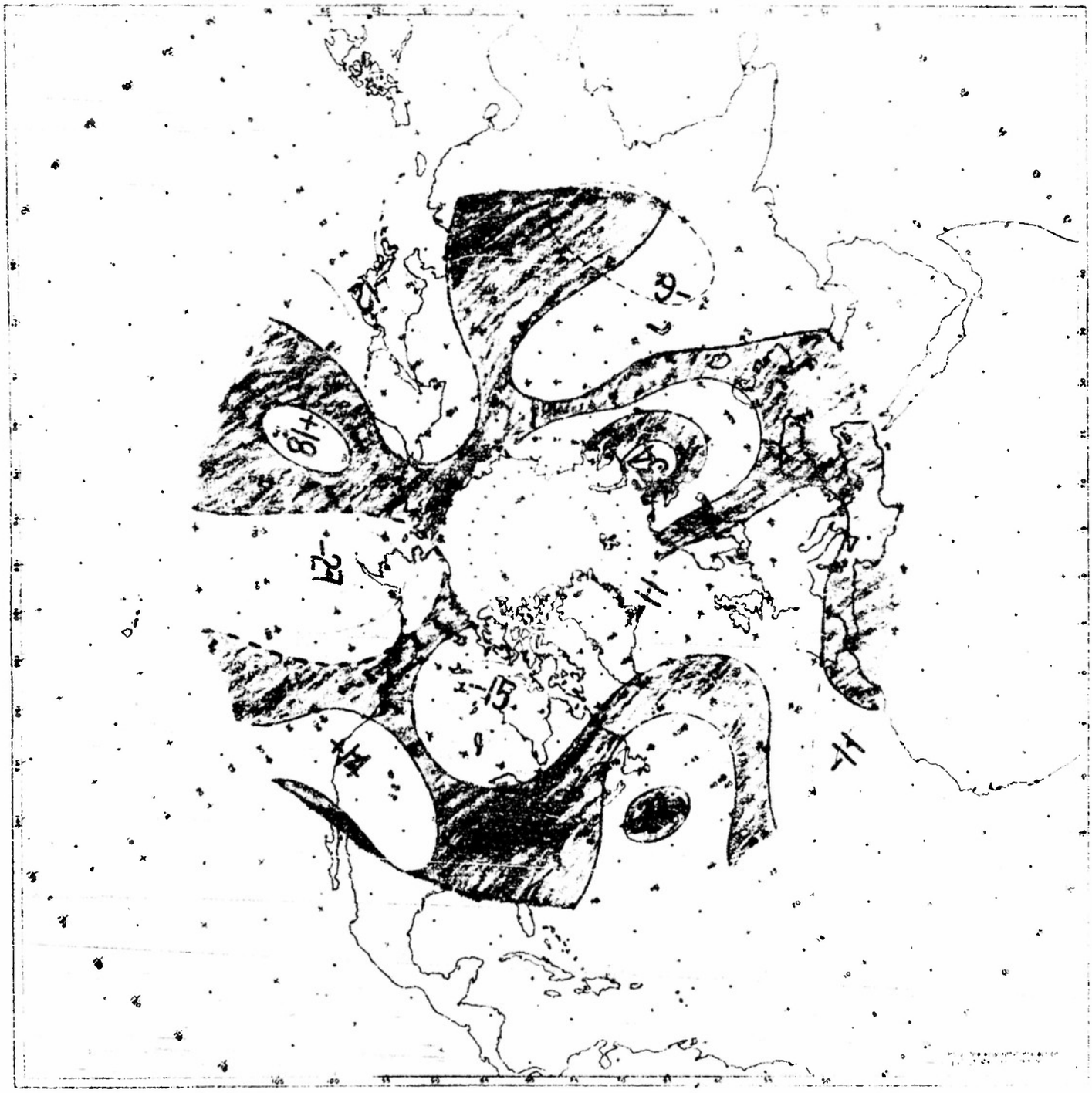
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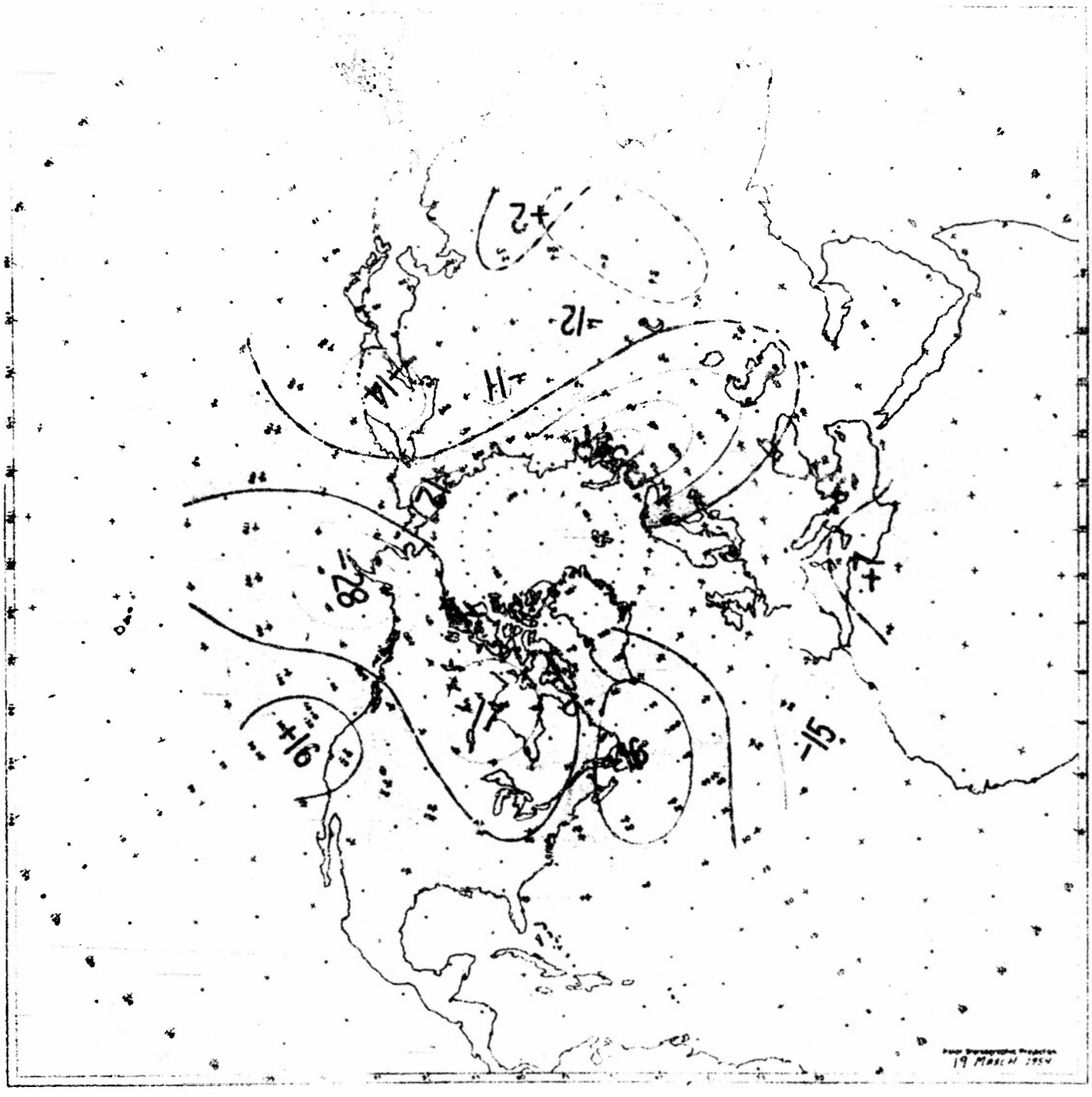
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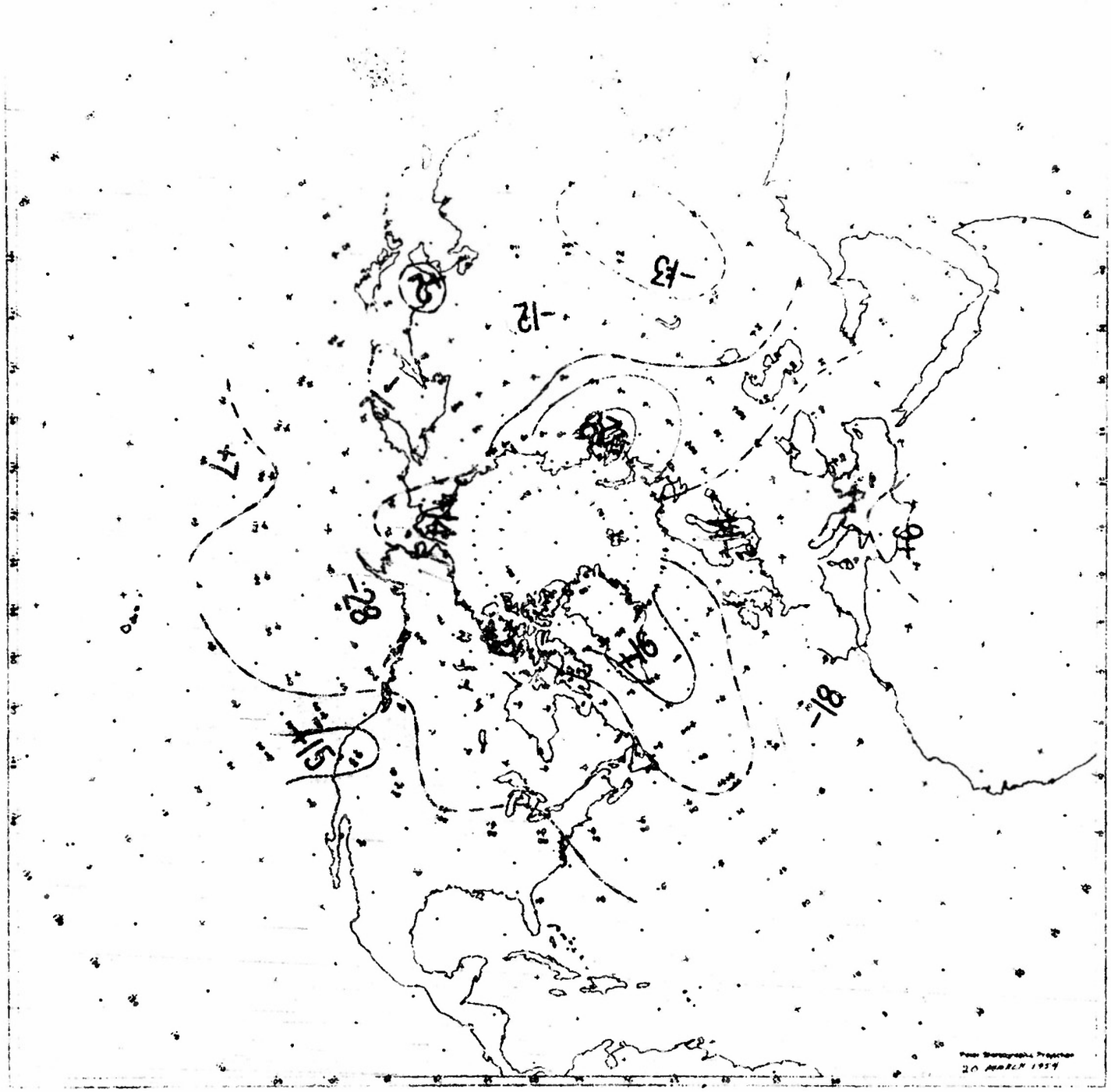
19 MARCH 1954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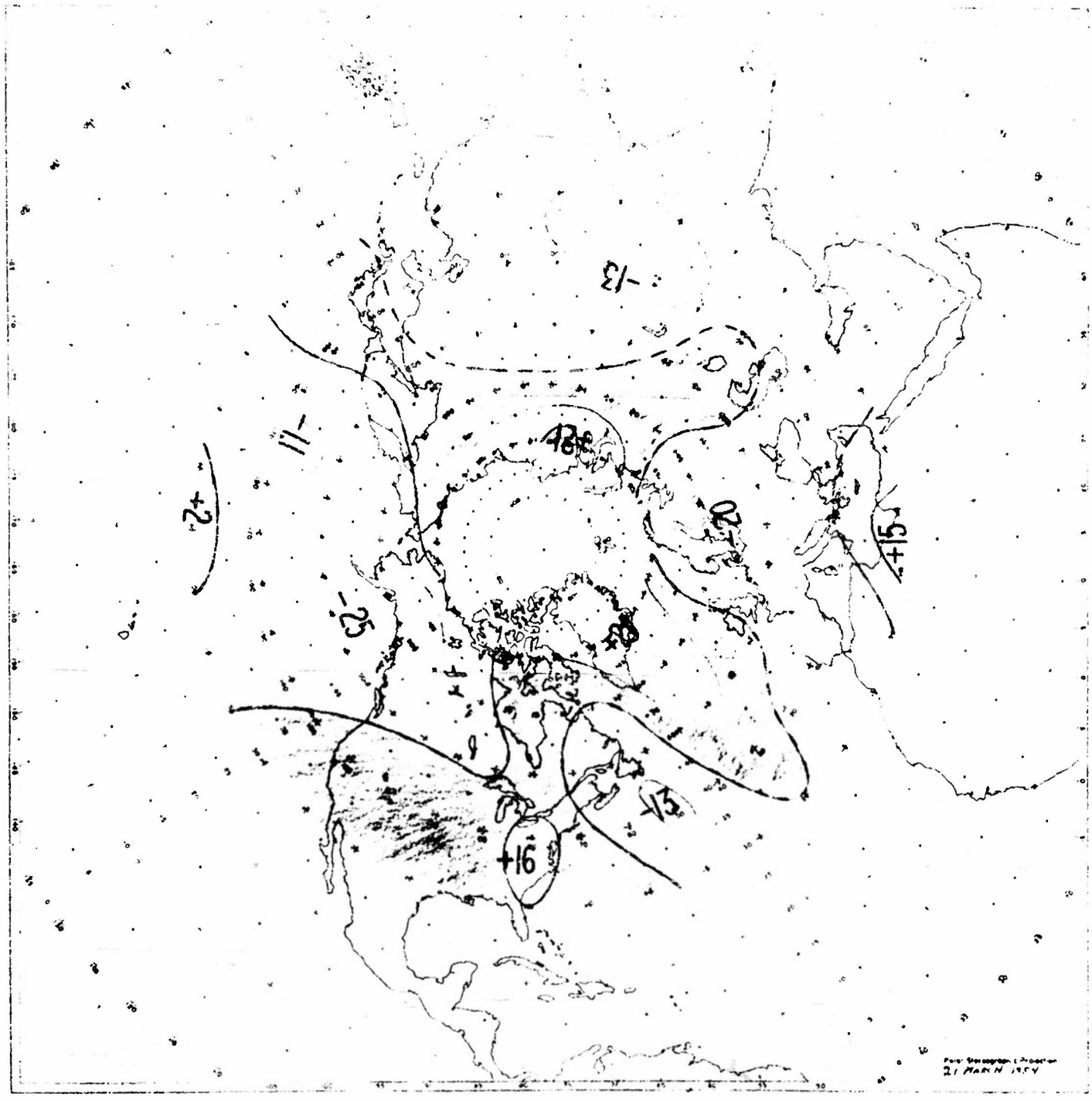
20 MARCH 1959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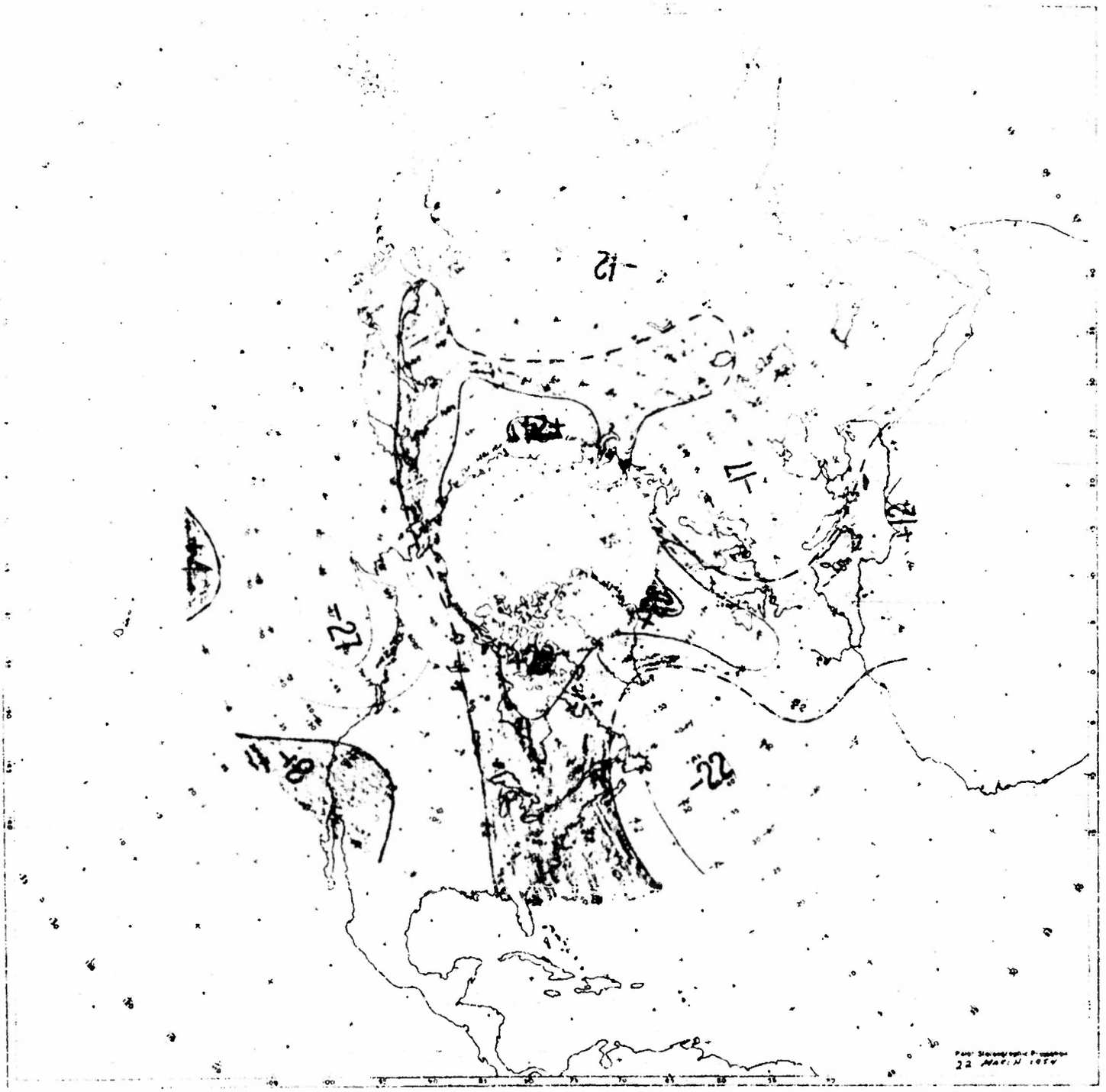
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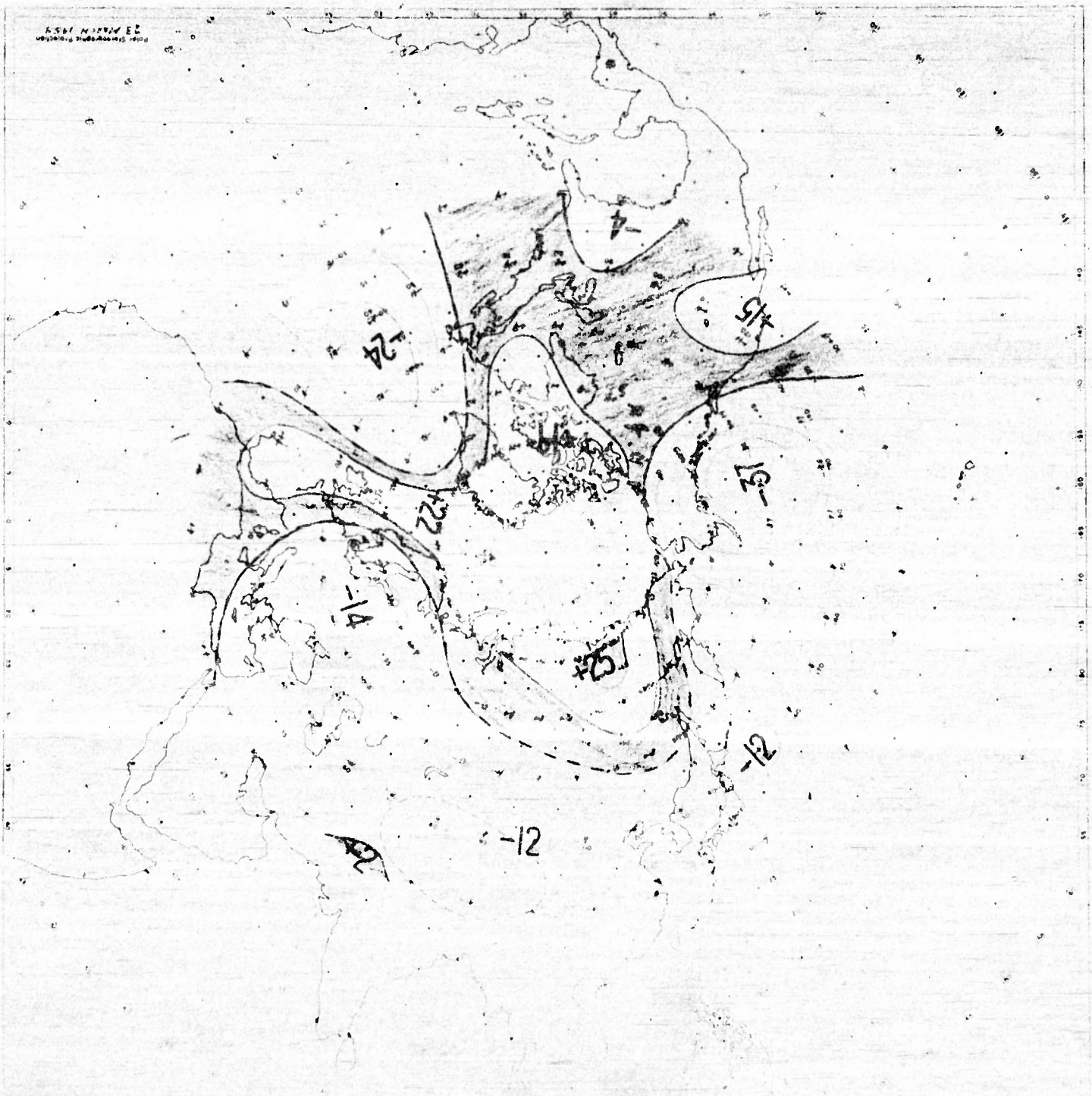
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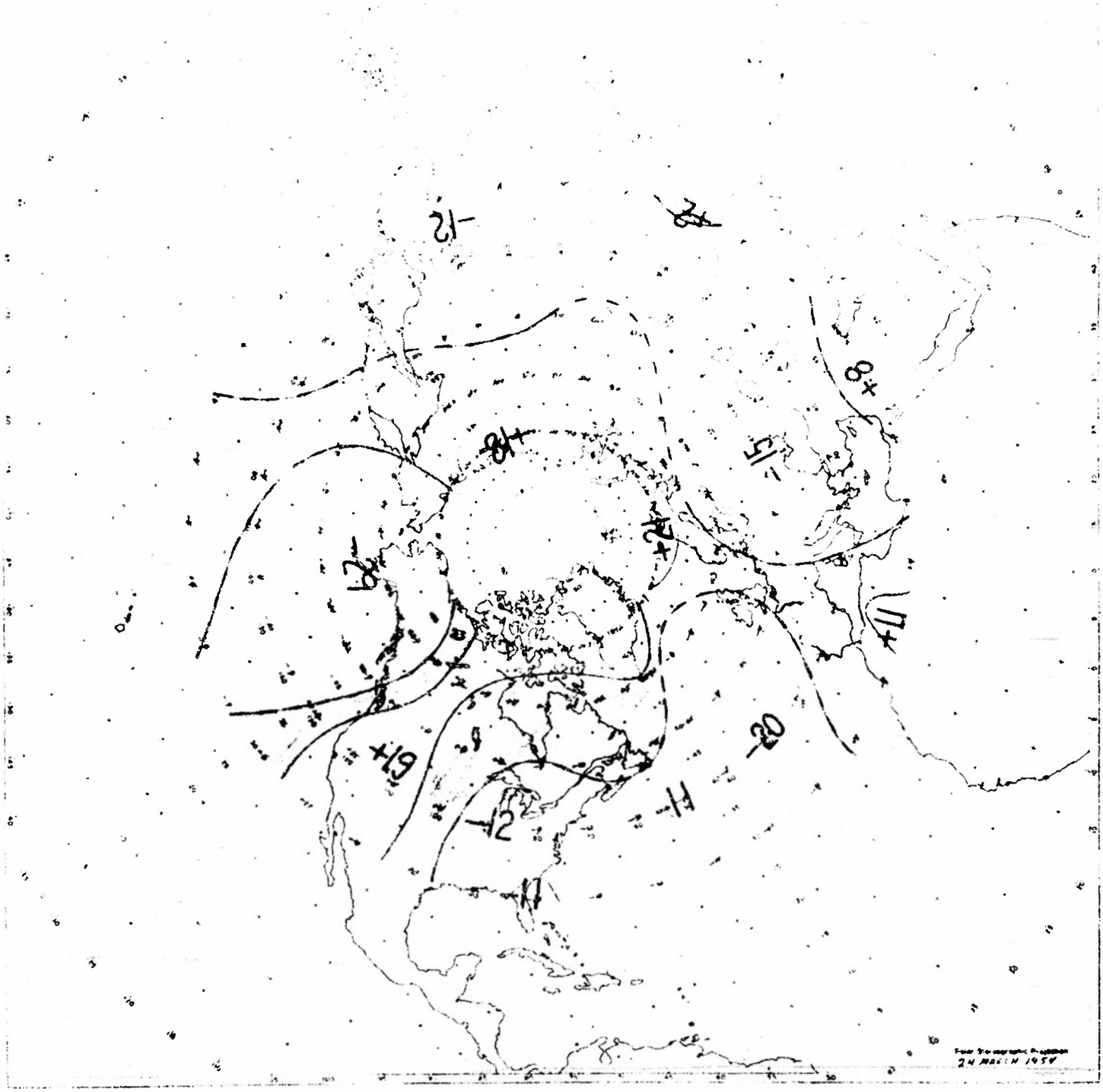

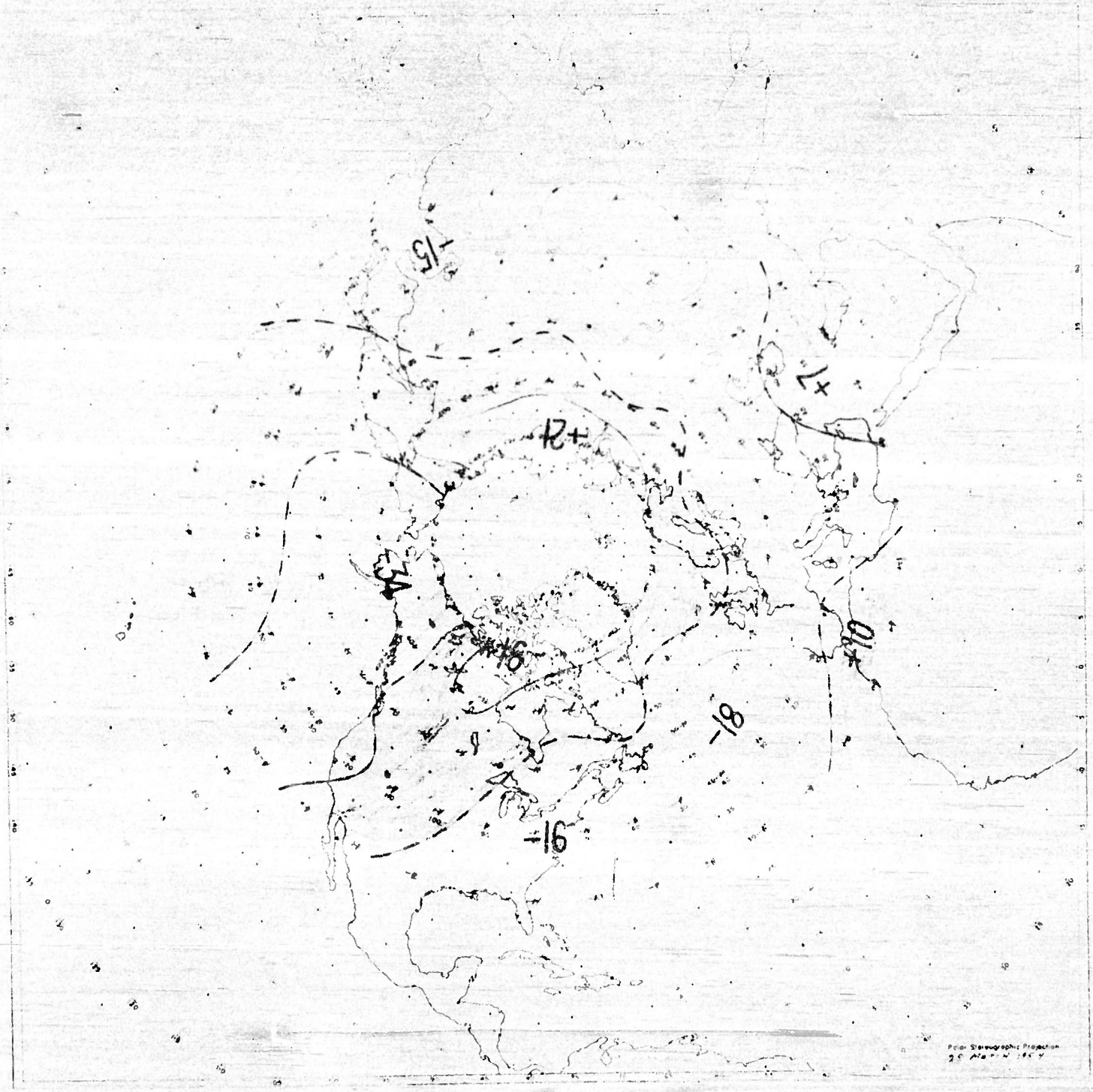
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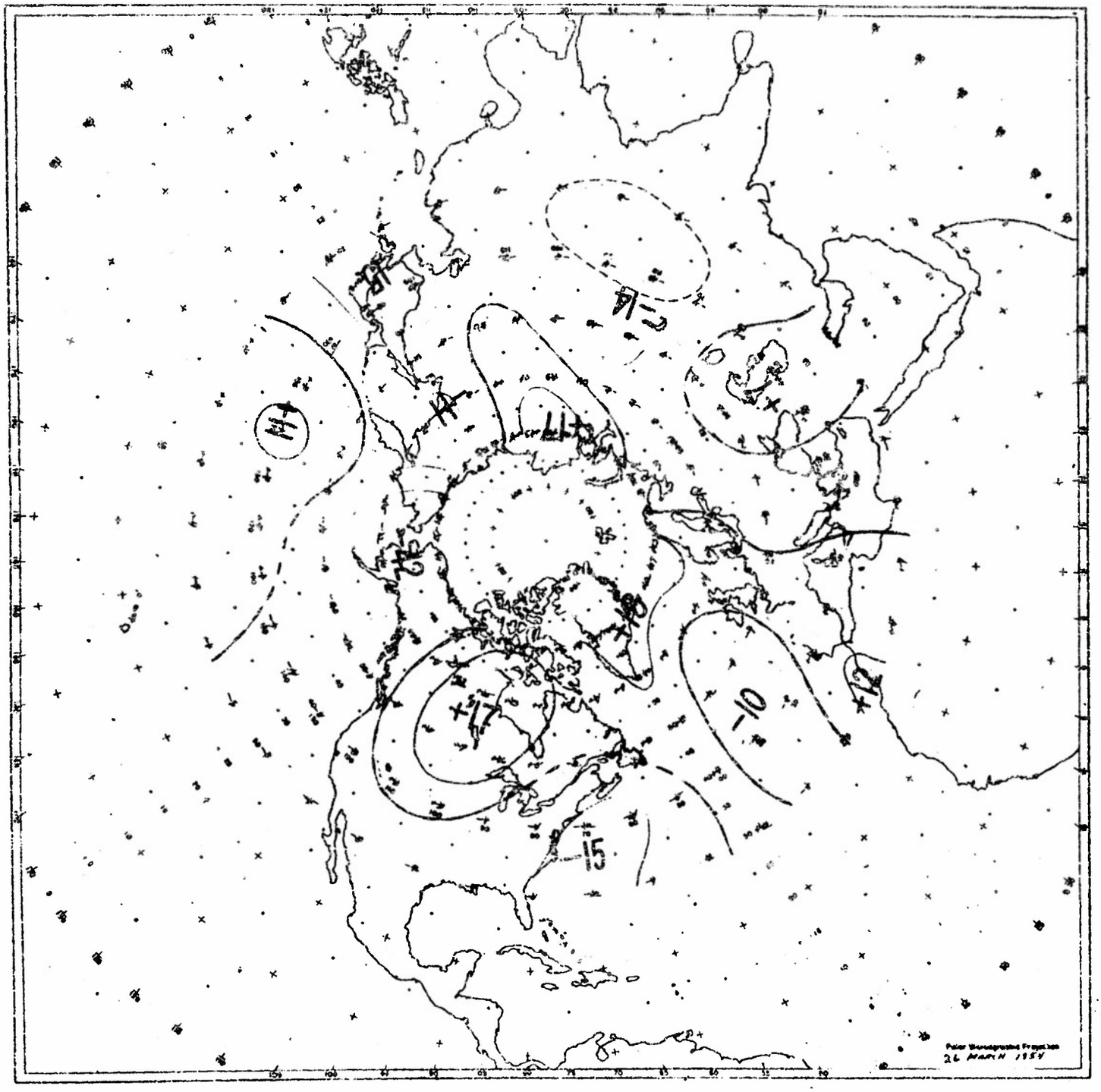
Polar Stereographic Projection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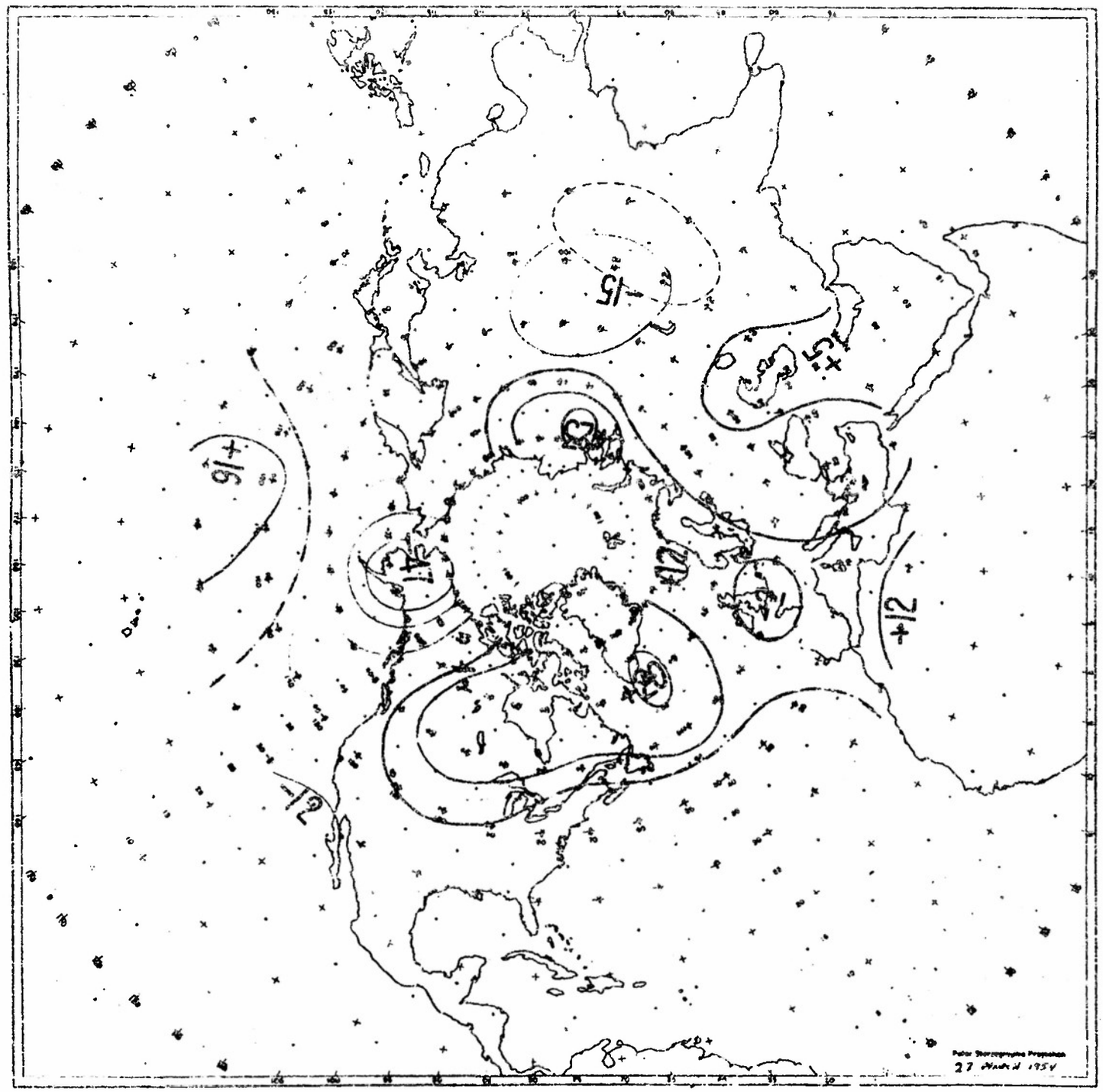
Polar Stereographic Projection
26 MARCH 1954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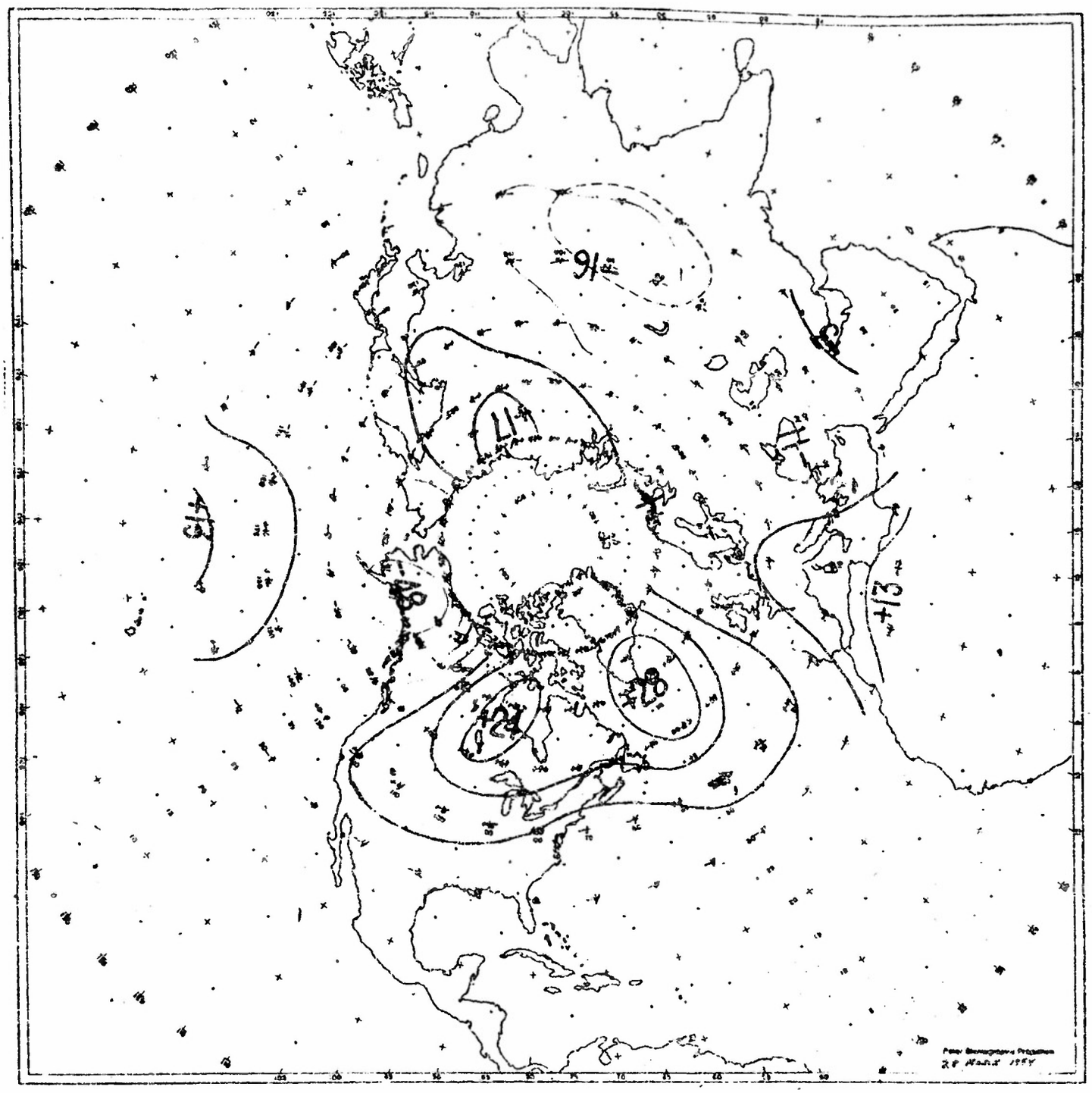
+12
Polar Stereographic Projection
27 March 1954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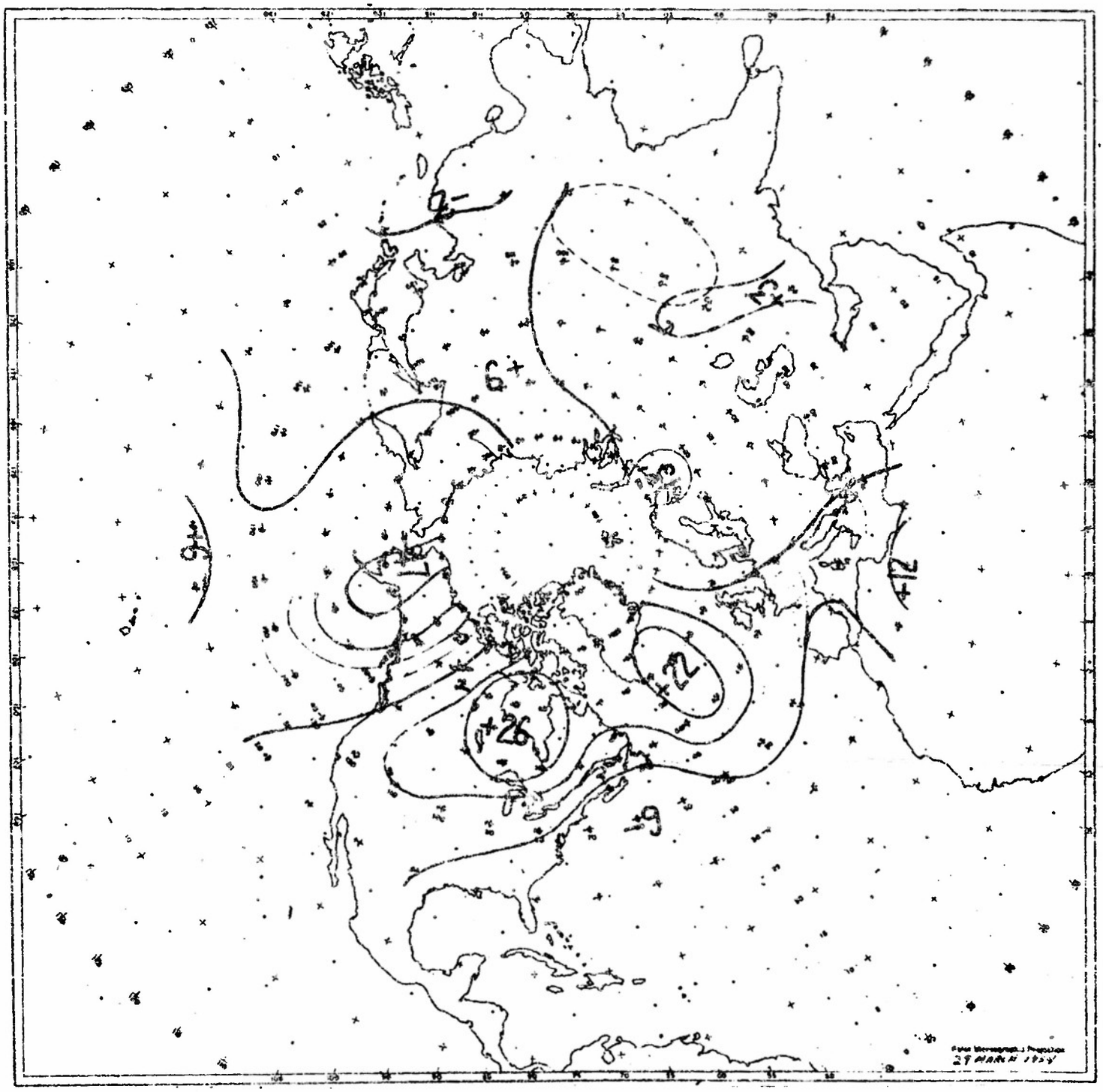
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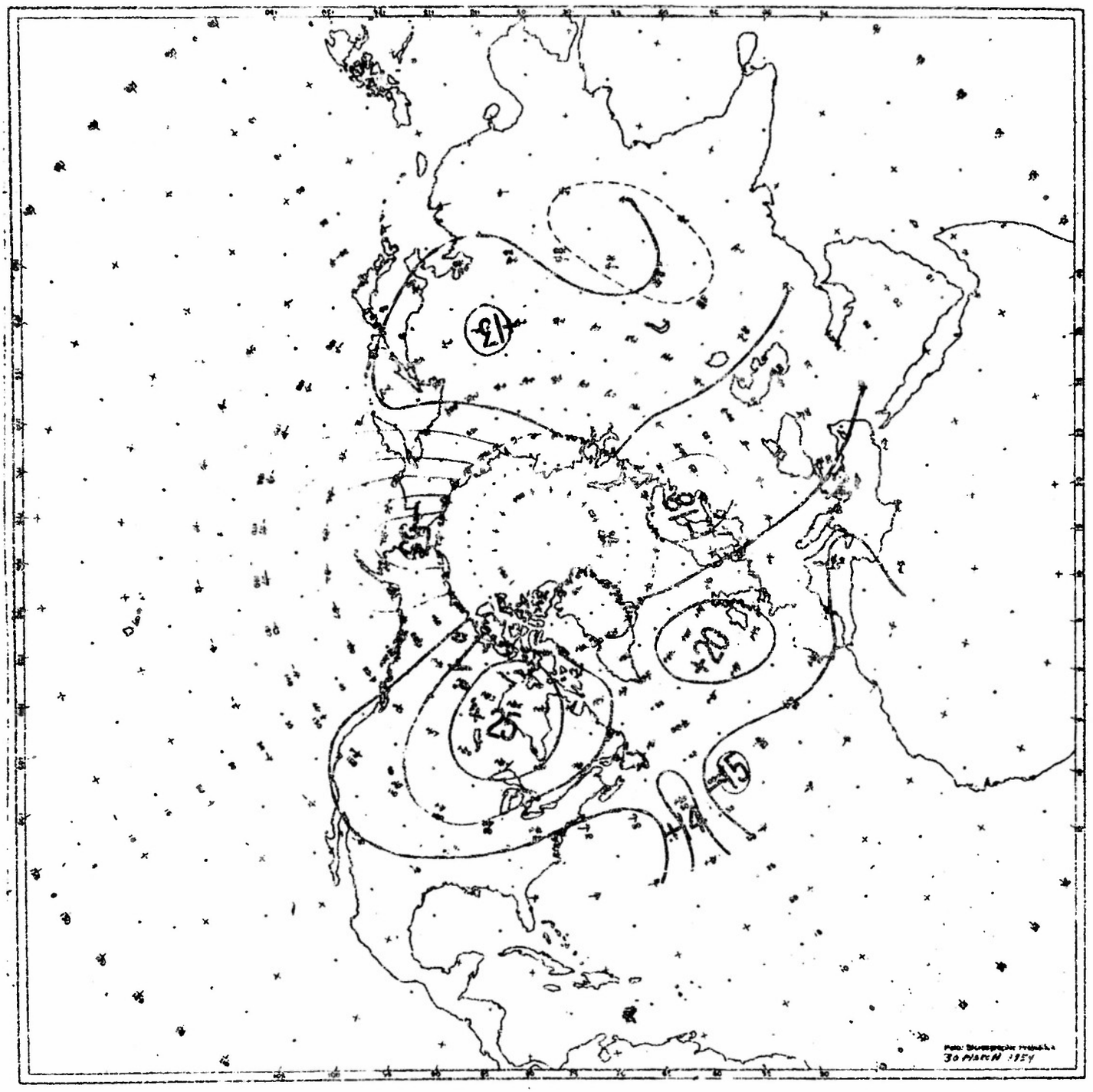
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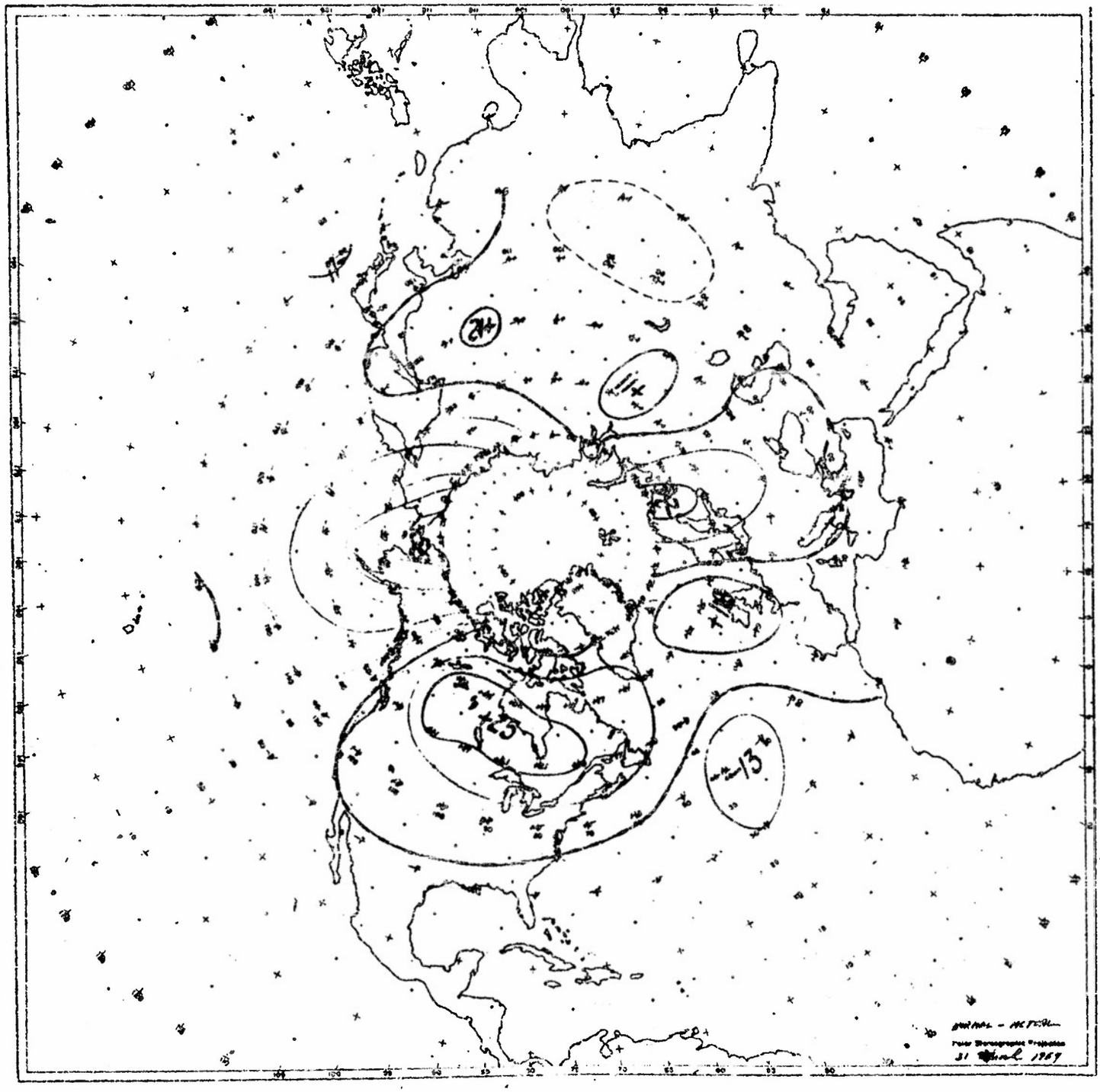
15
30 MARCH 1954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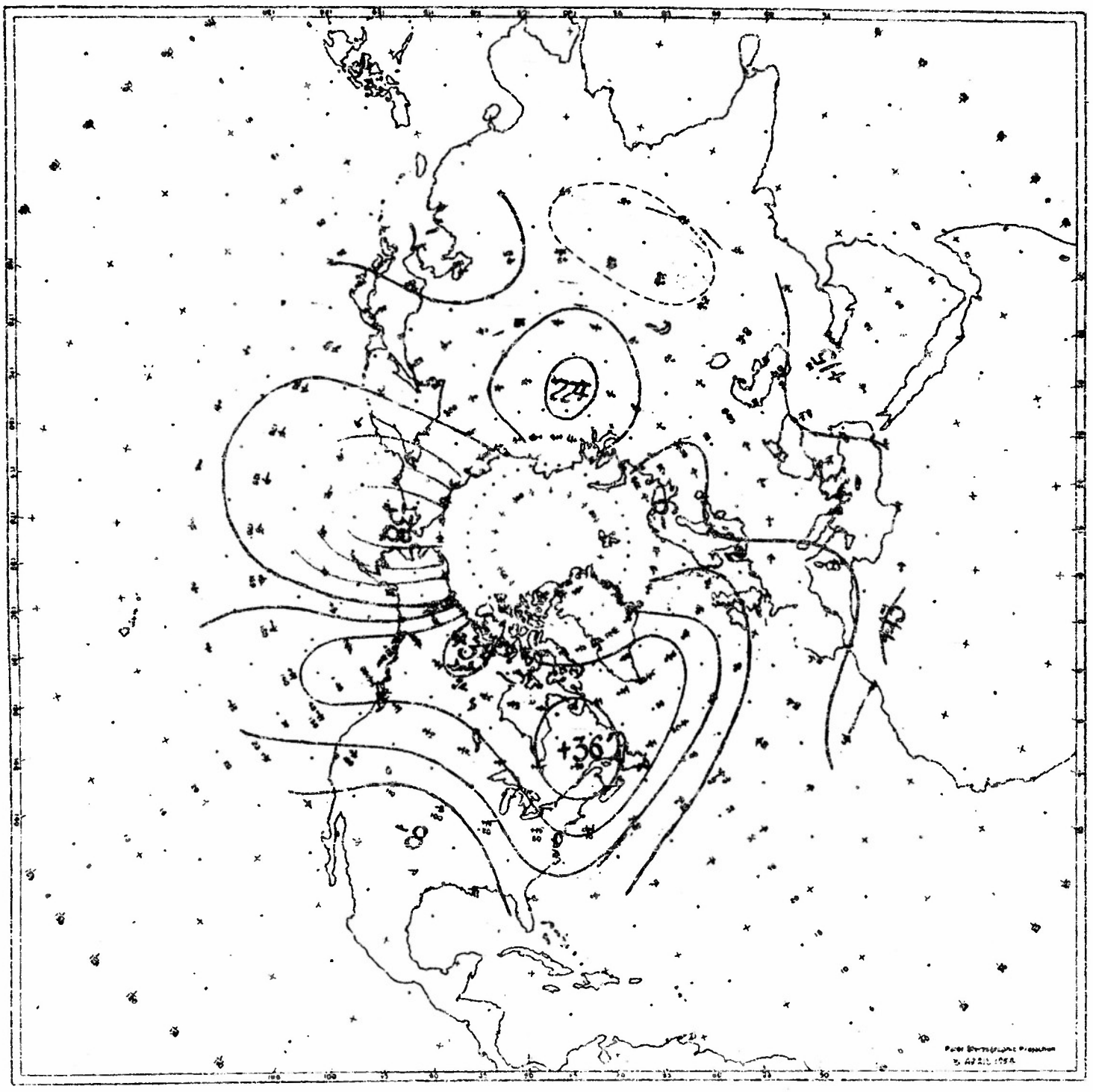
31 March 1959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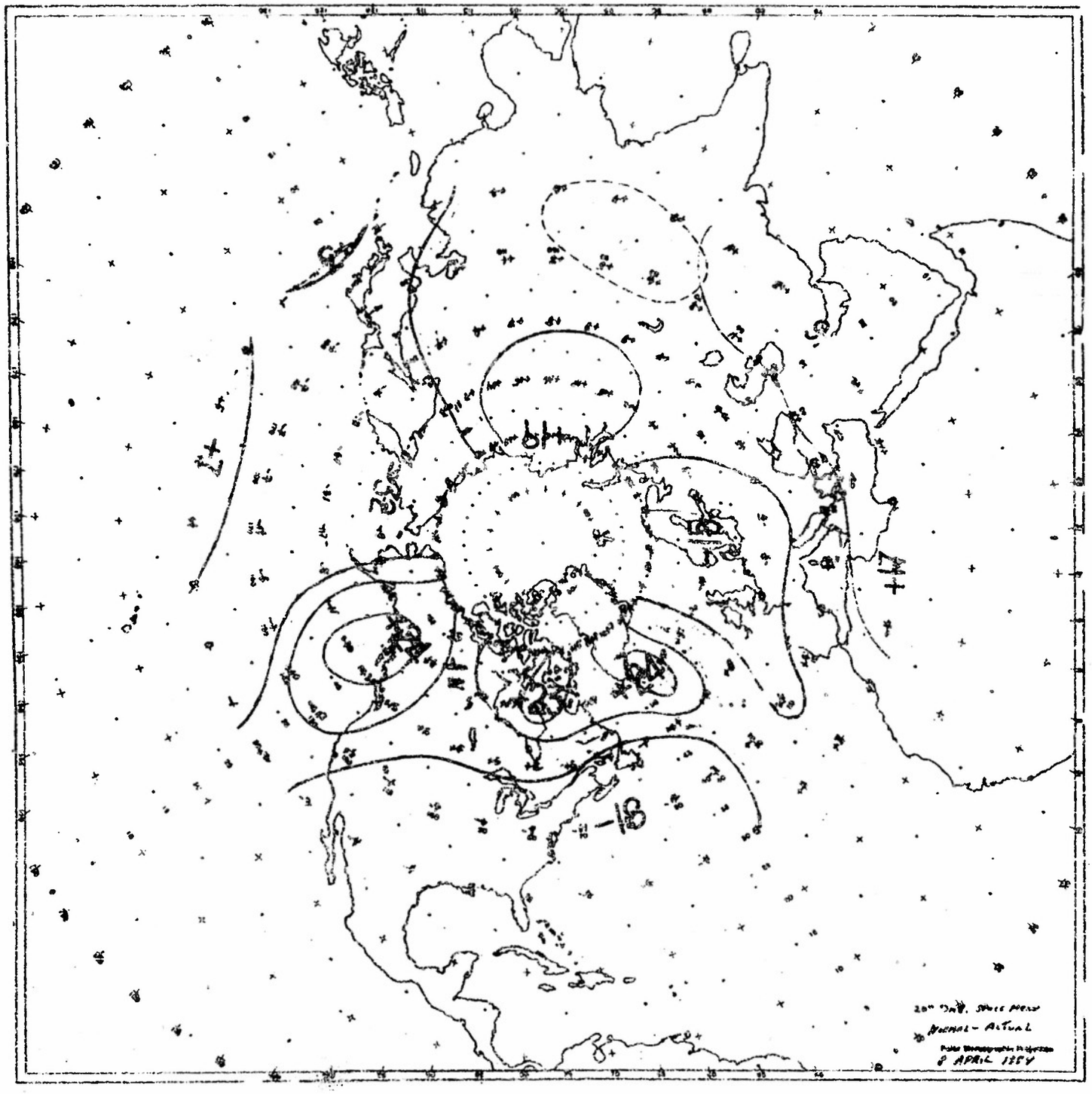
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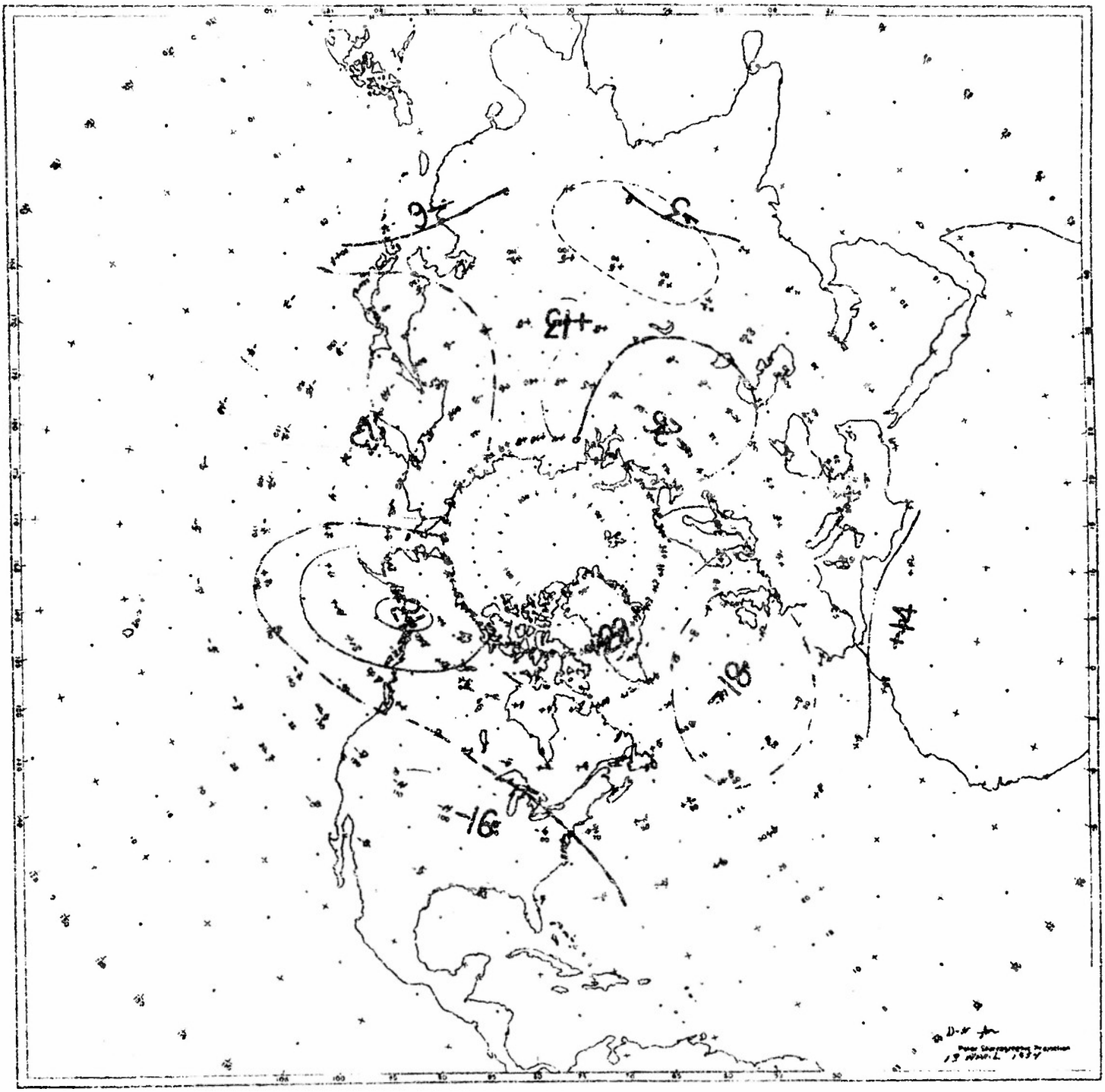
20mb 24hr. Surface Height
Normal - Actual
8 APRIL 1954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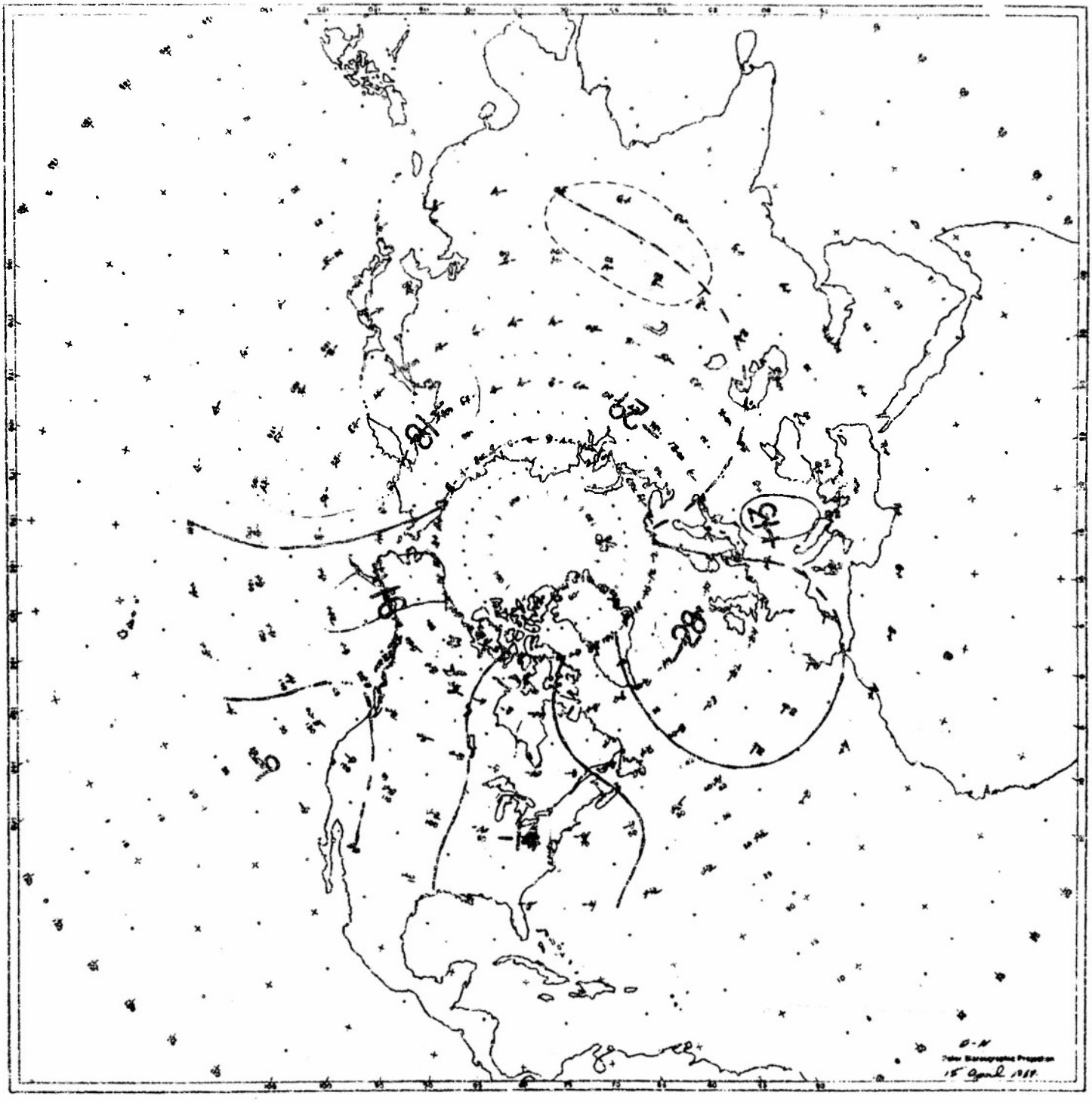
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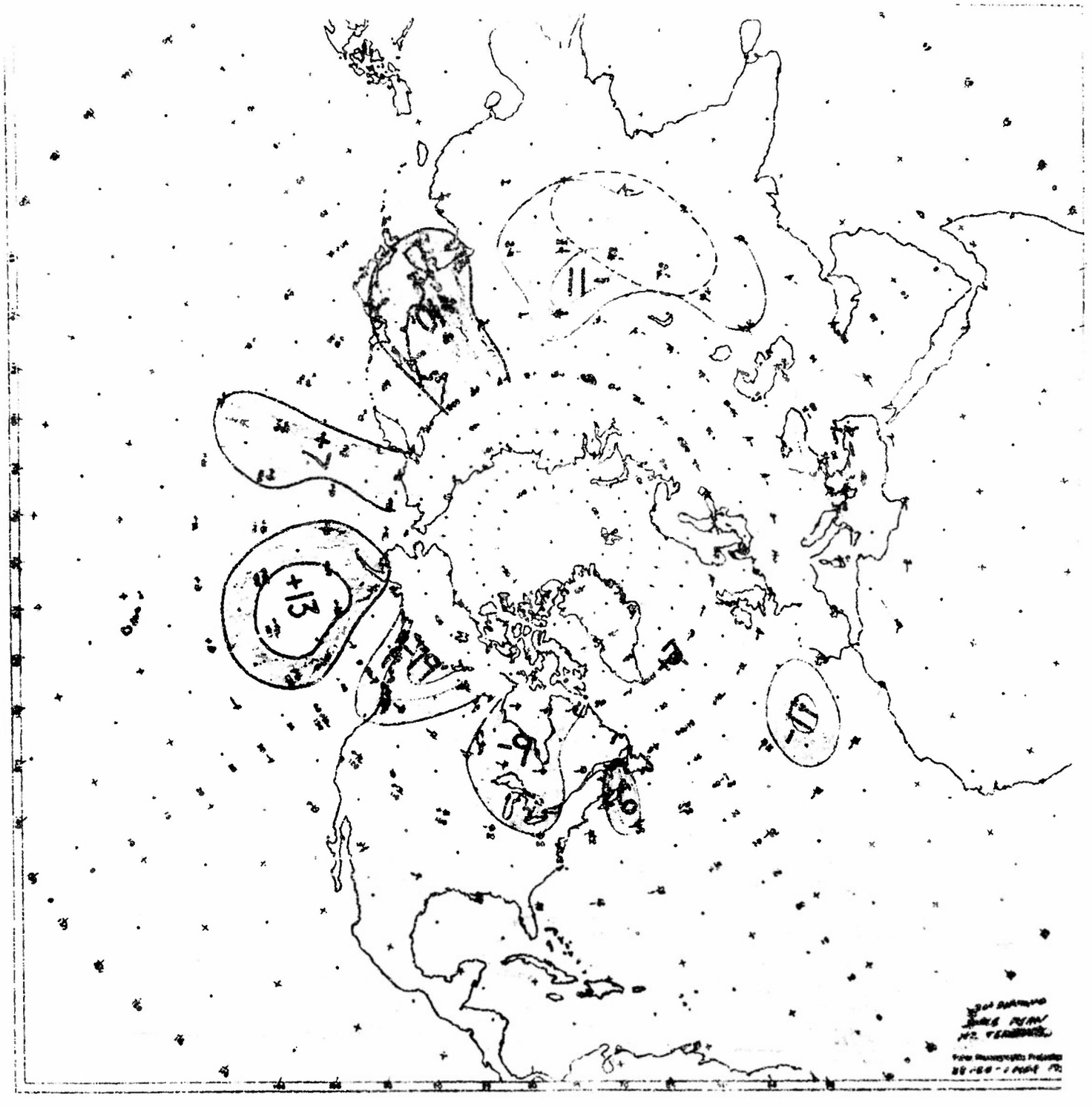
Polar Stereographic Projection
15 April 1969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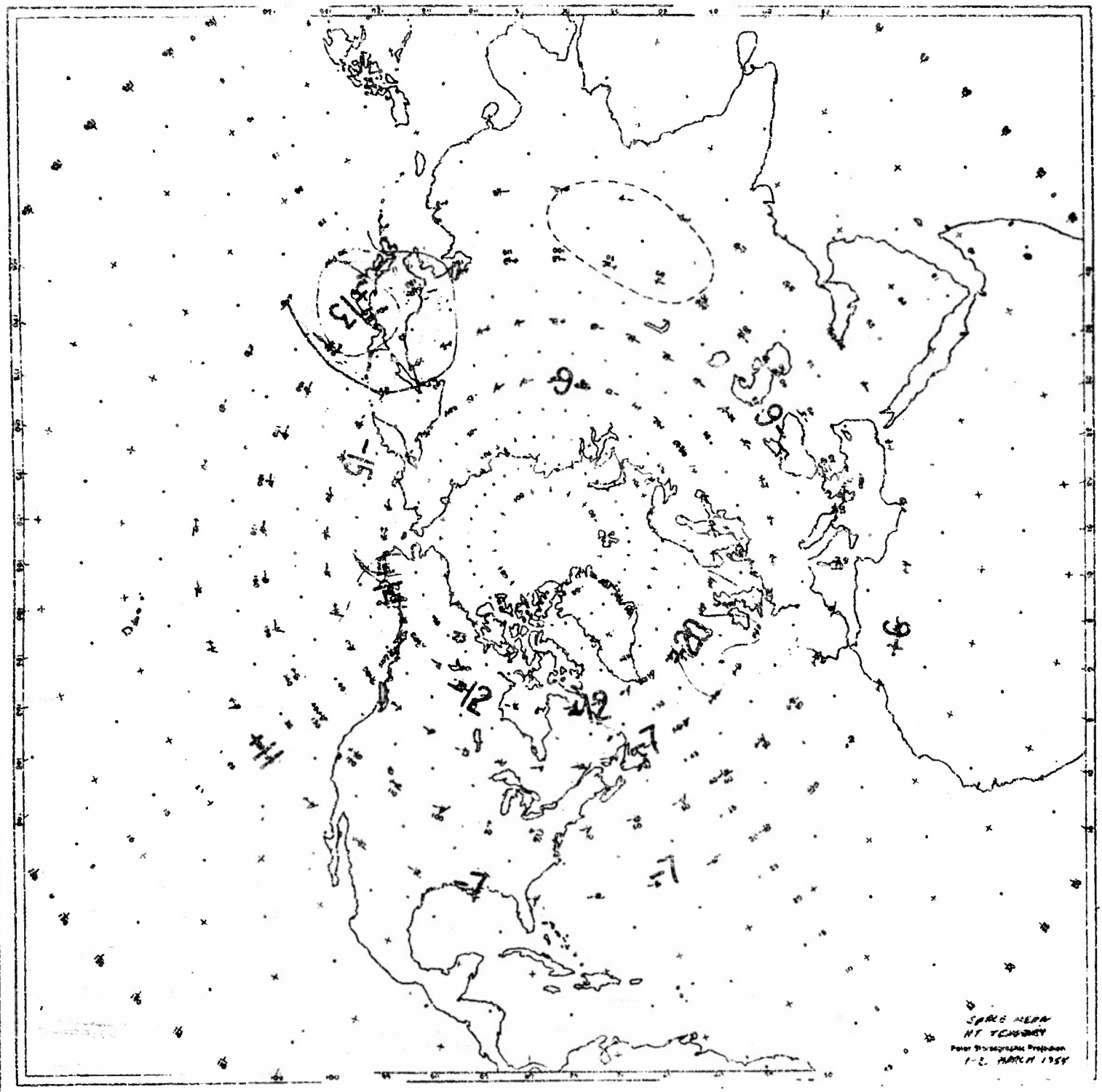
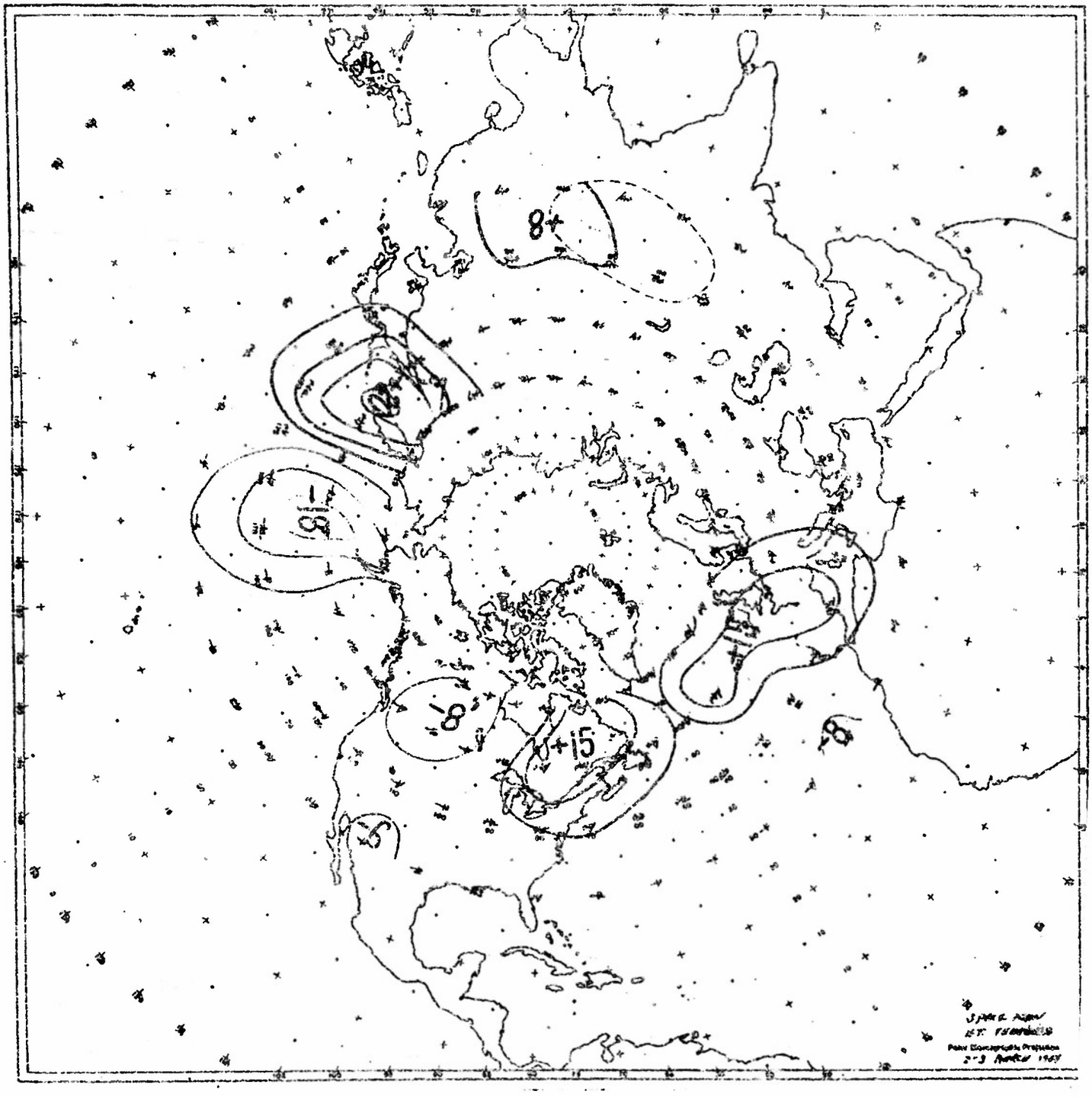

SPACE MEDICINE
MIT
Polar Stereographic Projection
1-2 MARCH 1954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8-
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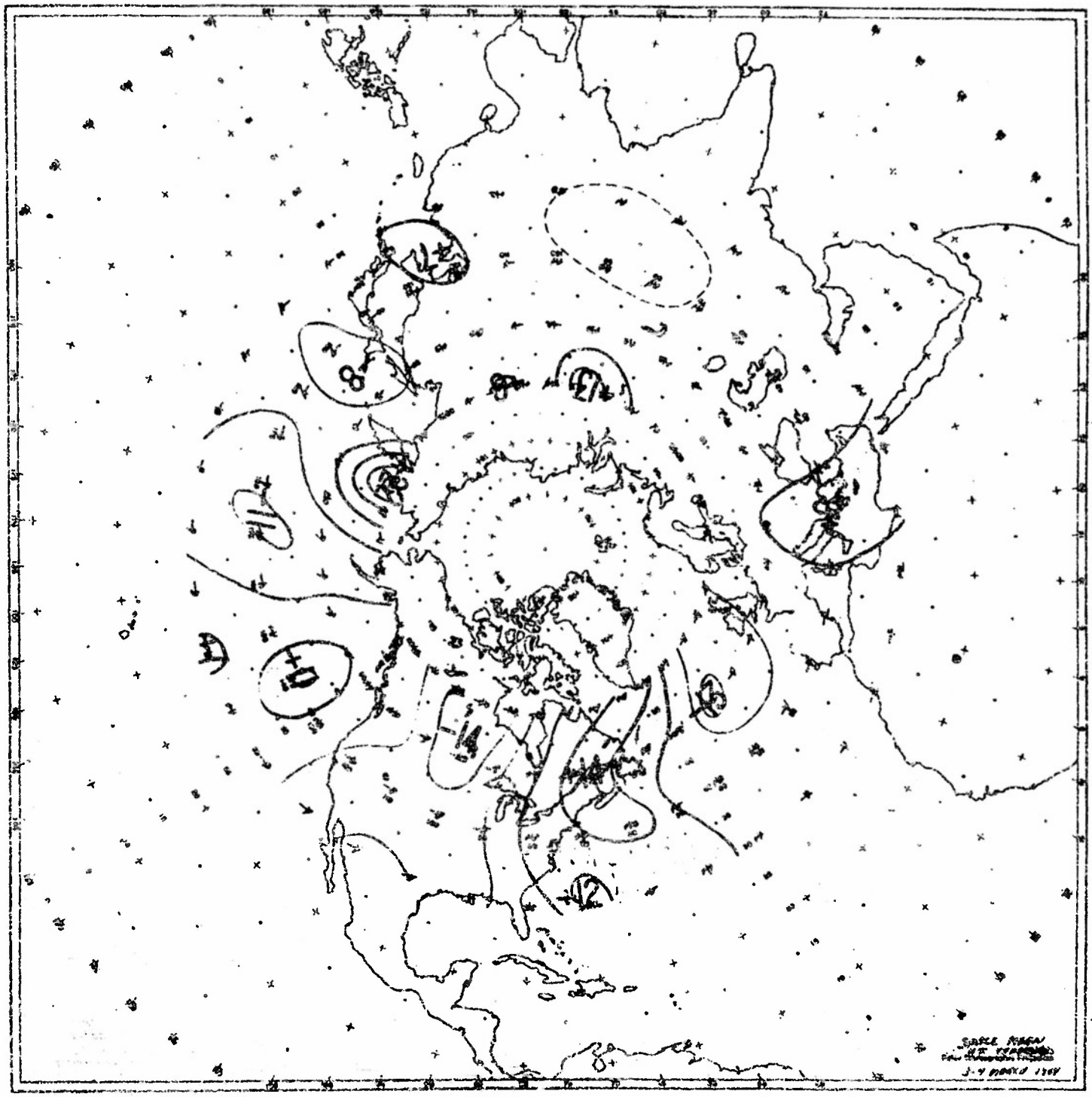
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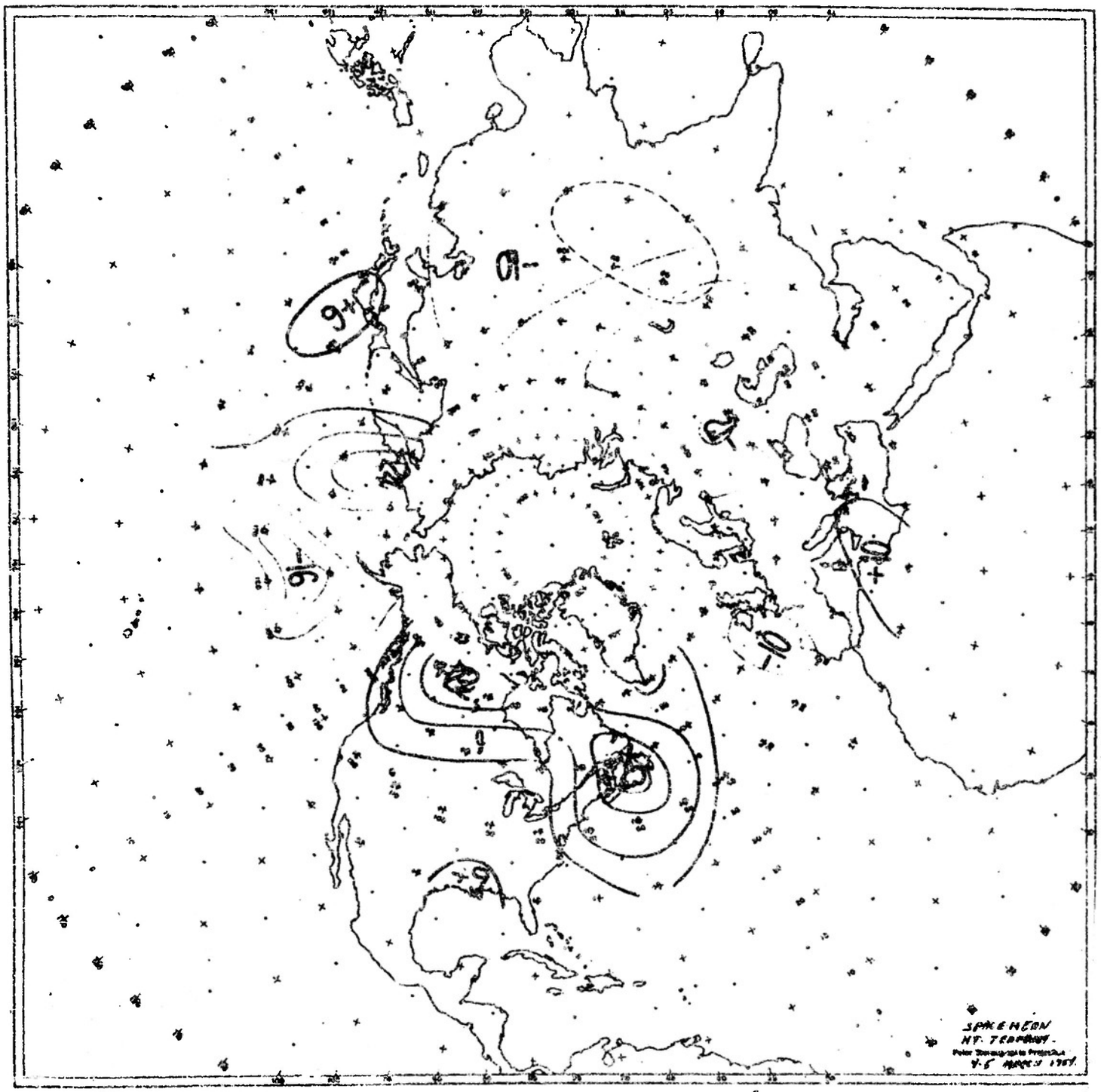
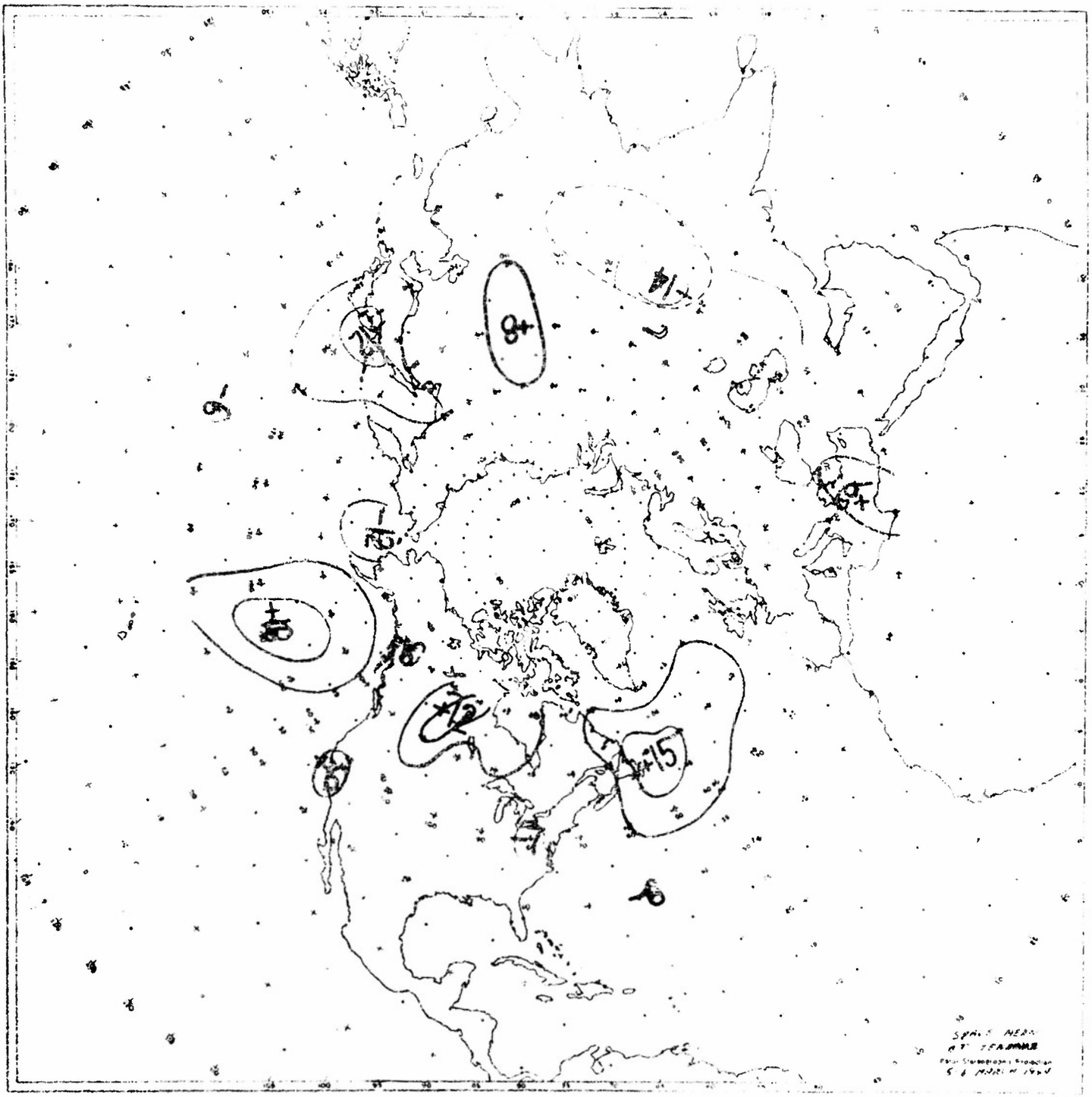

SPHEROID
HT. TEMPERATURE -
Polar Stereographic Projection
U.S. MARCH 1961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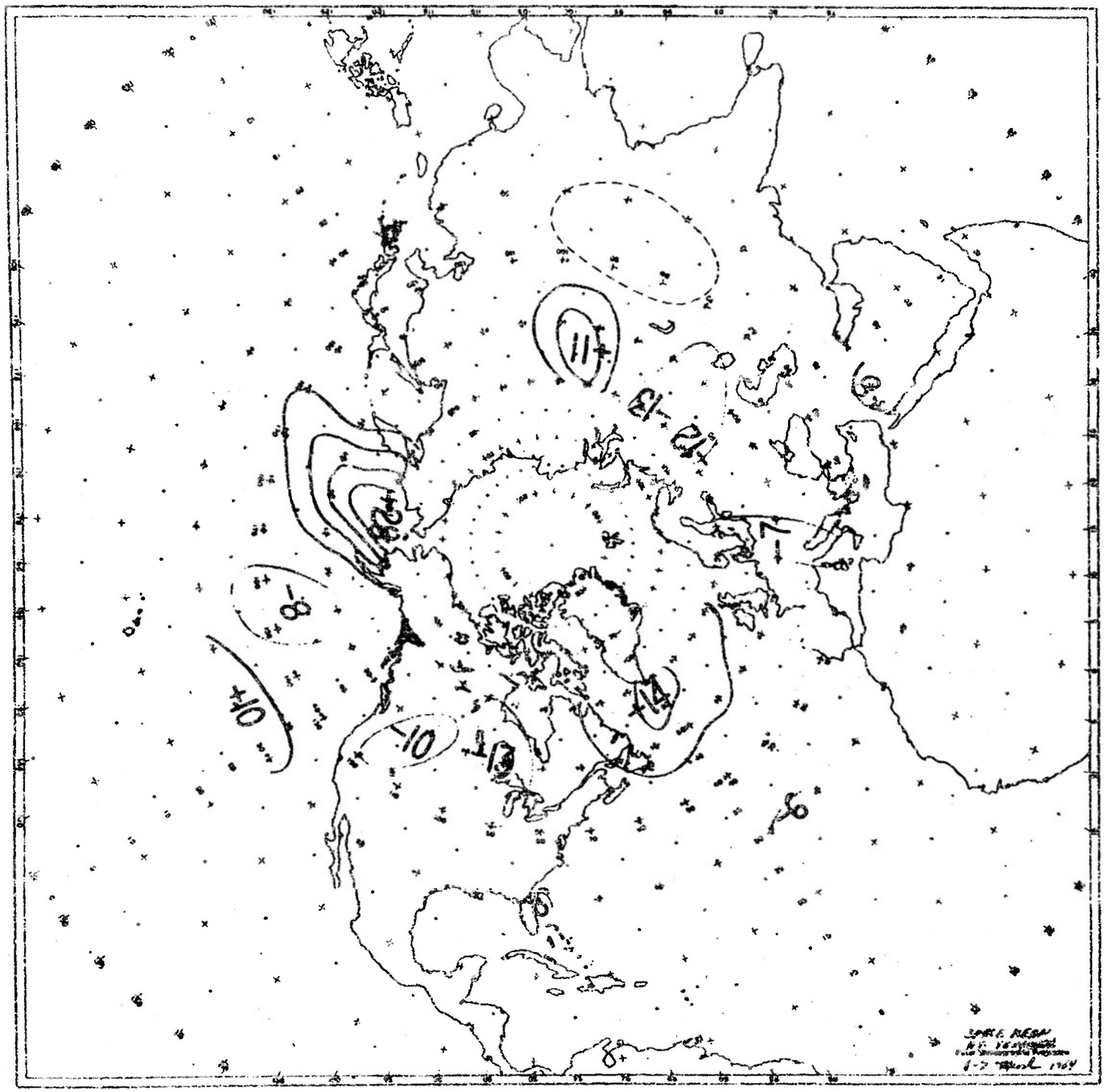
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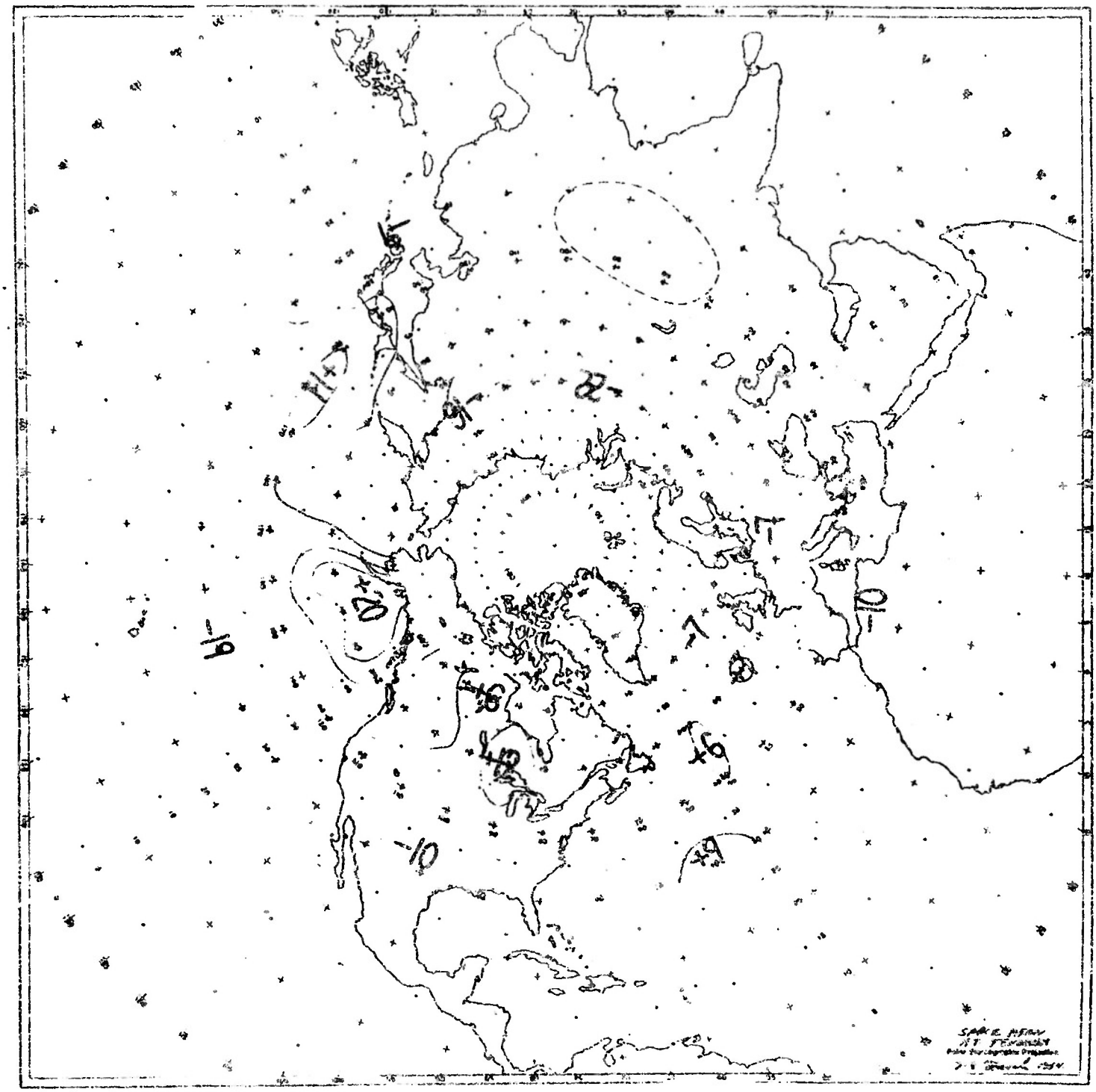

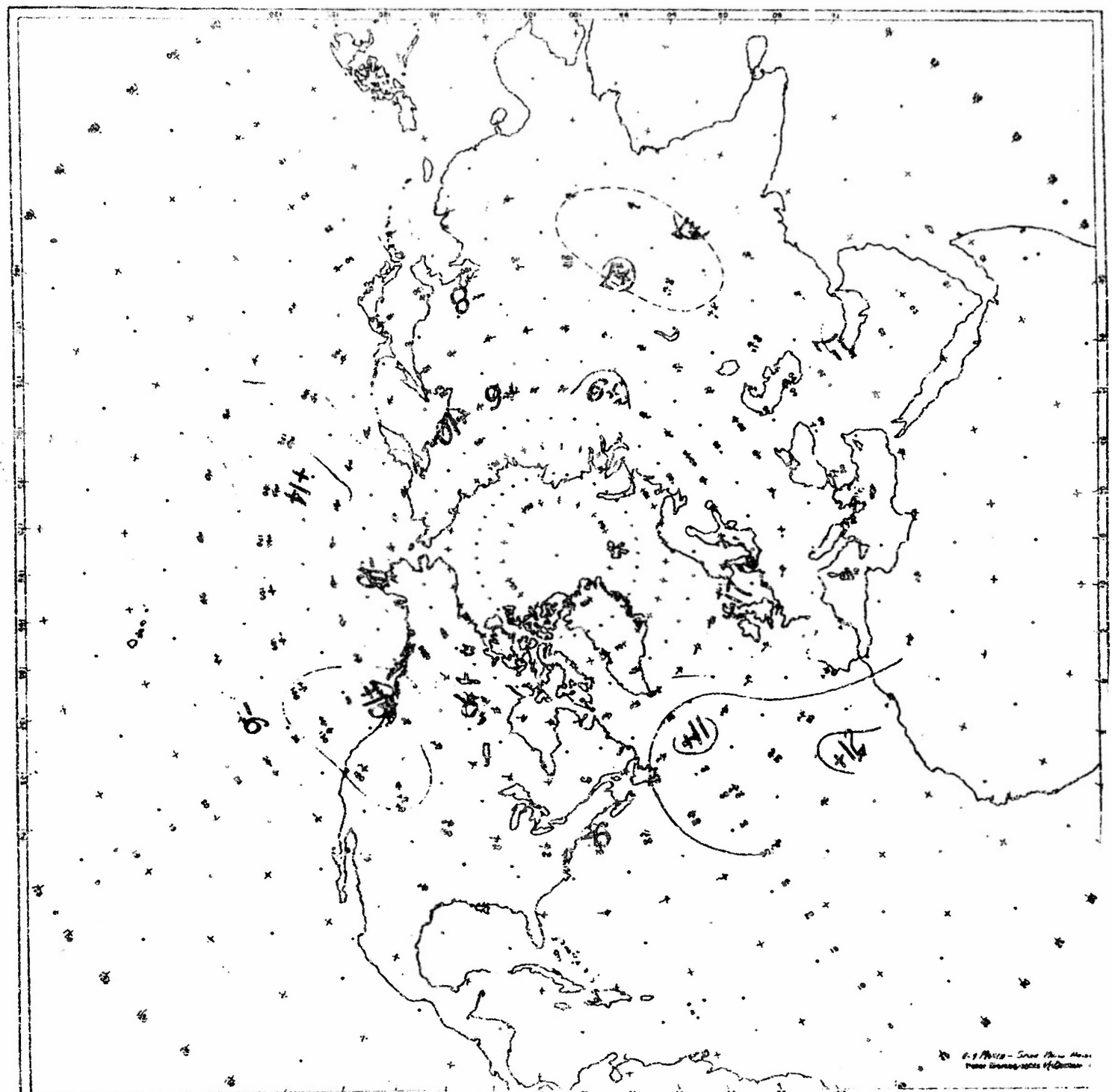
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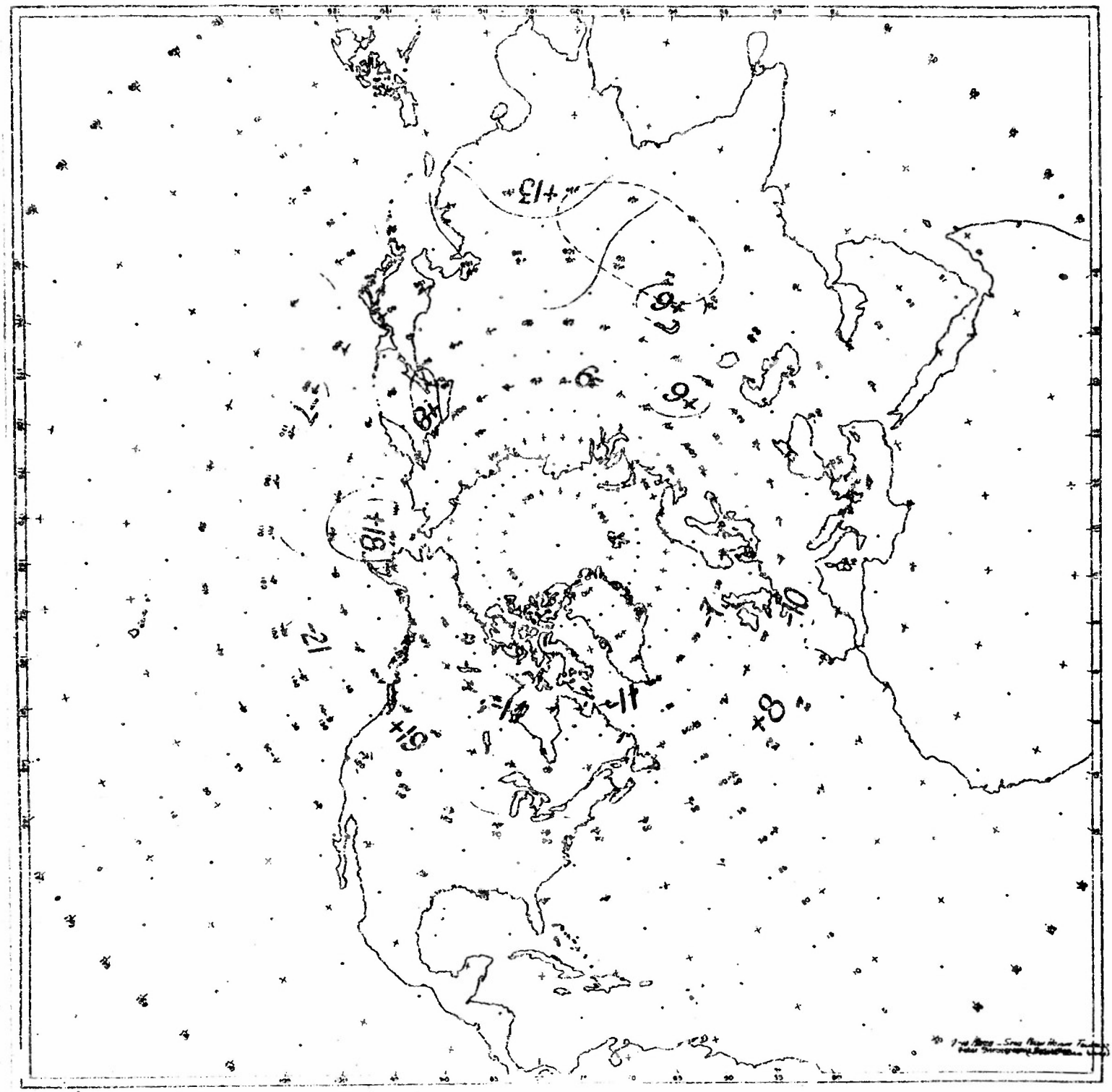
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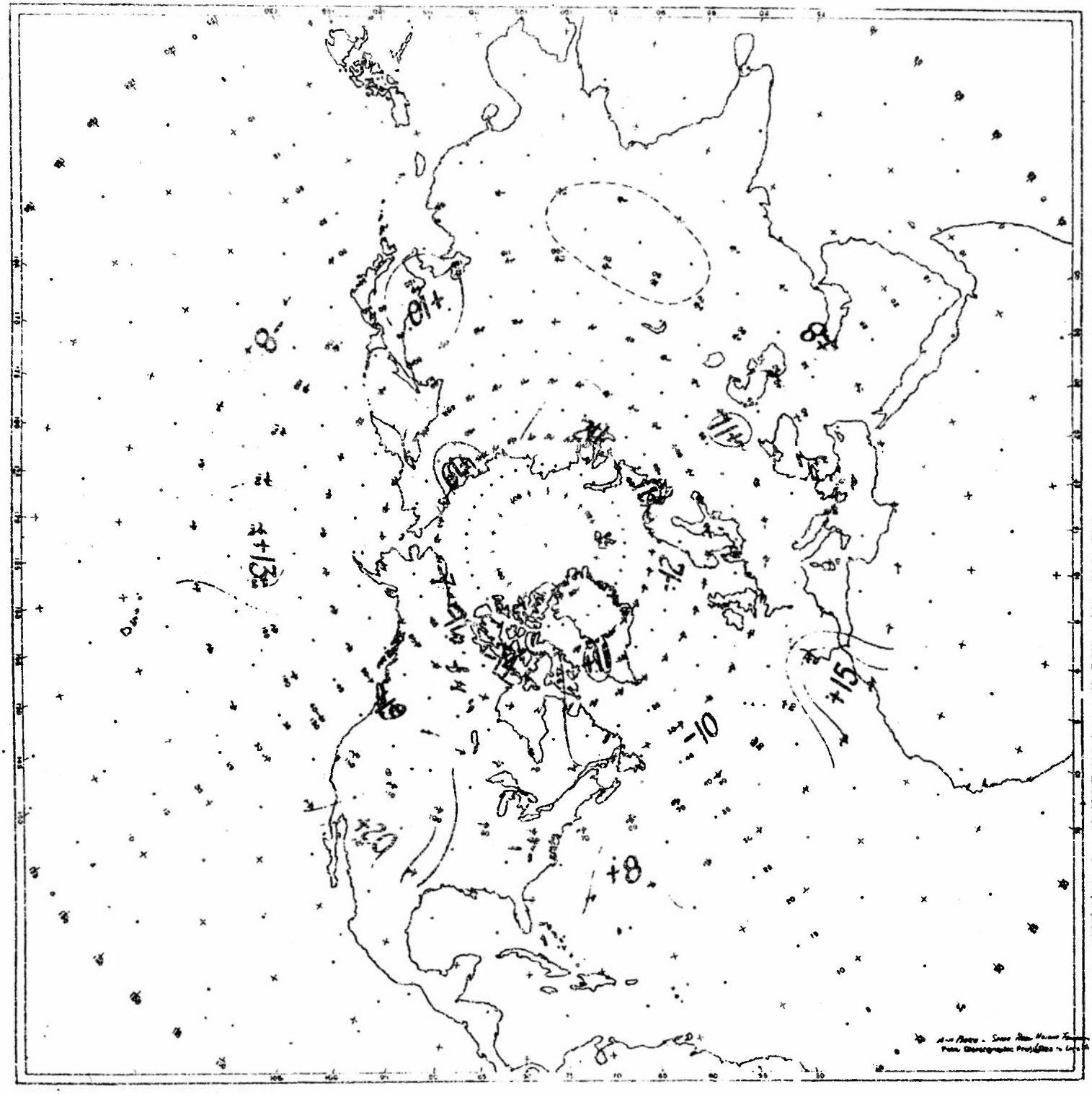
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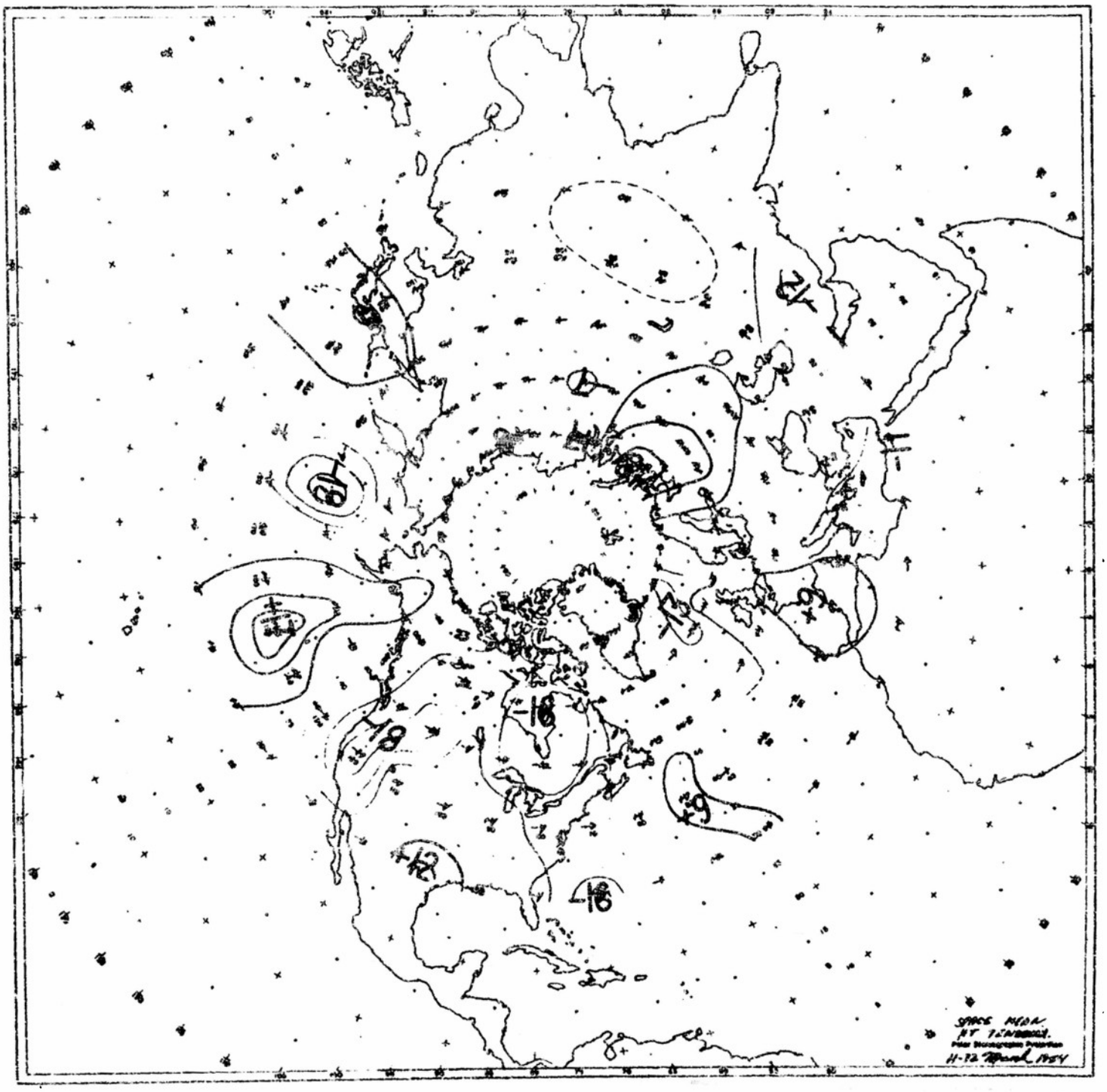
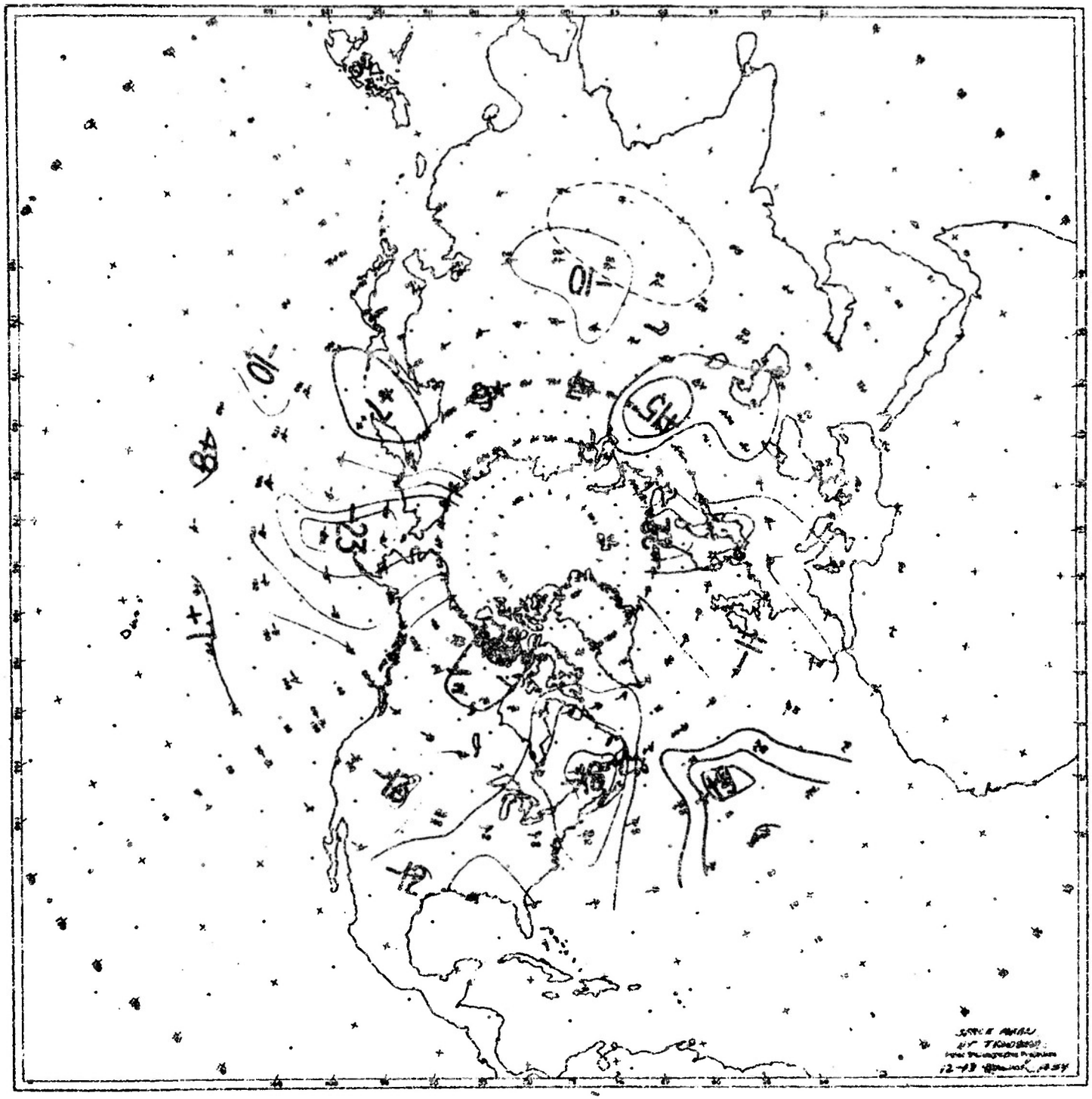
+8


SPACE MEAN
AT 7.5 MB.
H-72 April 1954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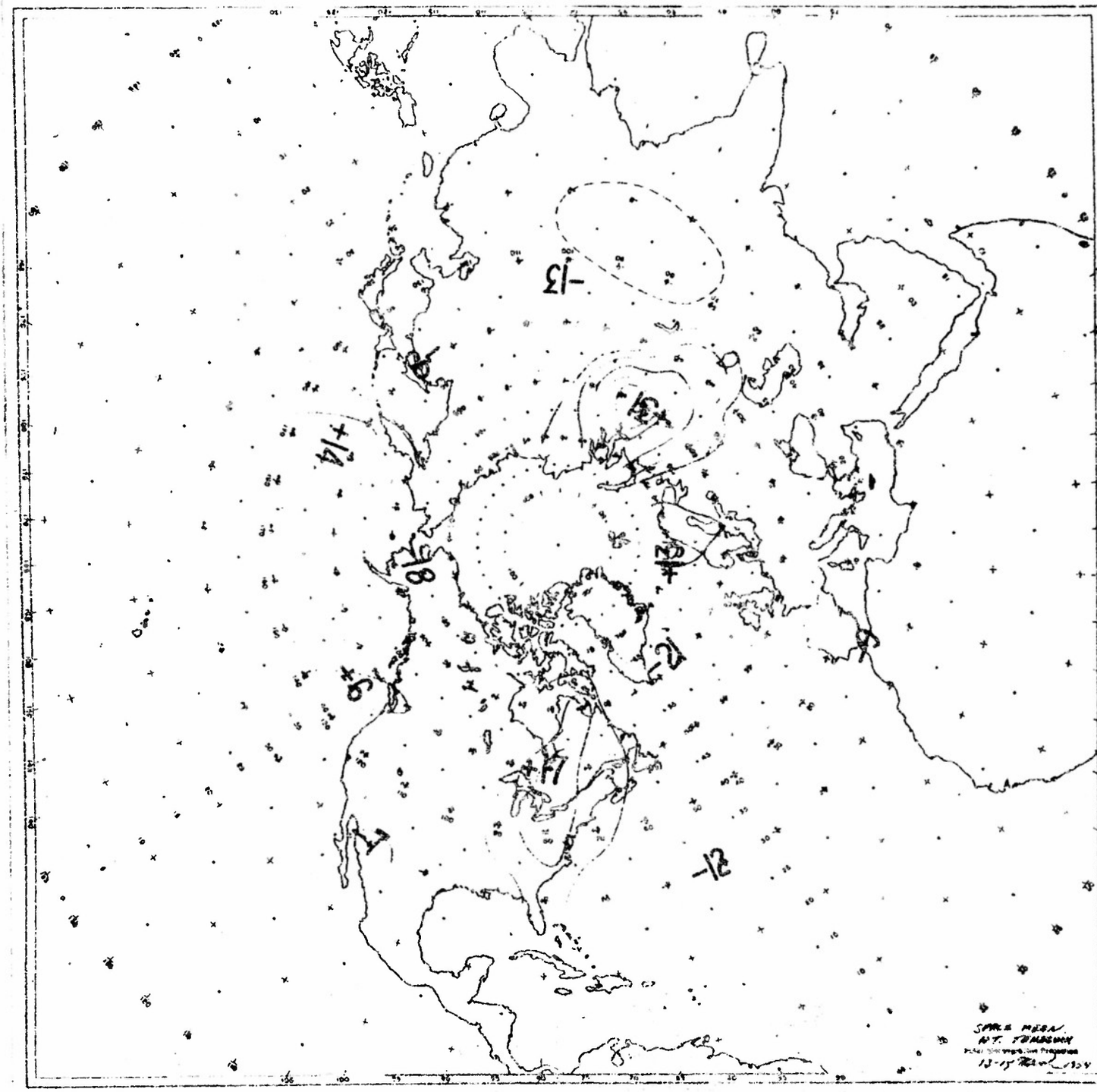
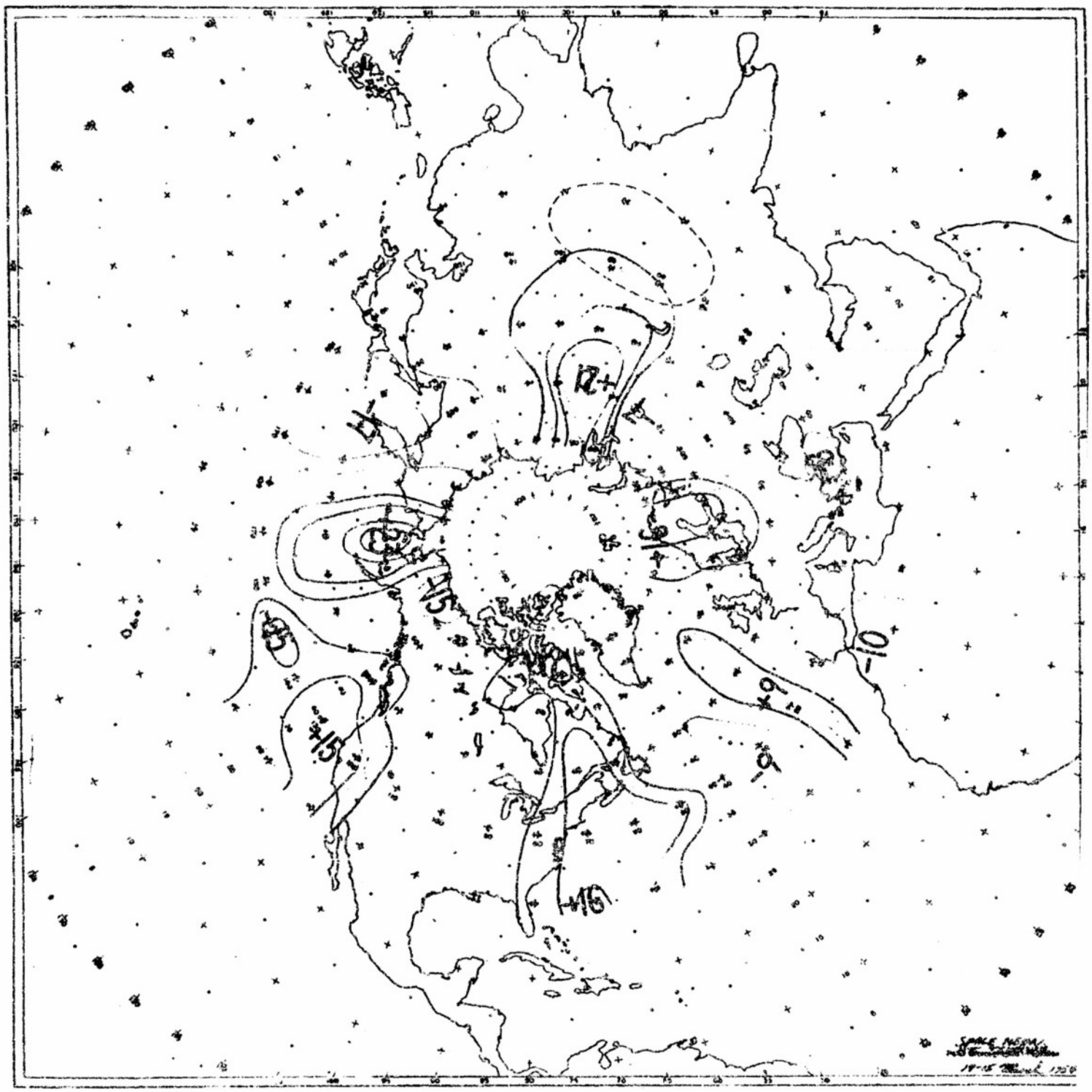

-13
+14
+22
-12
SPACE MEDICINE
M.T. TOMASSONI


+12
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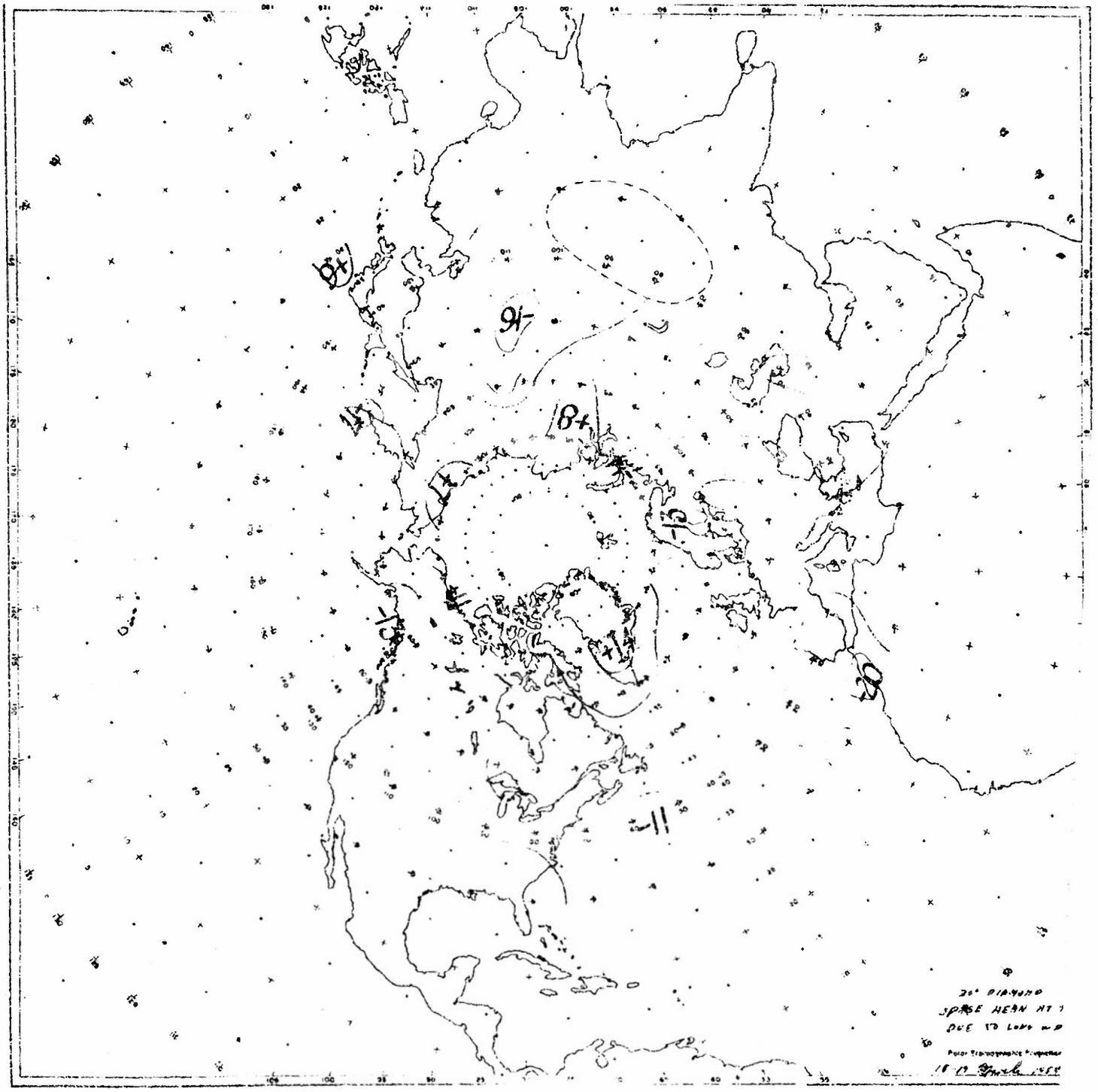
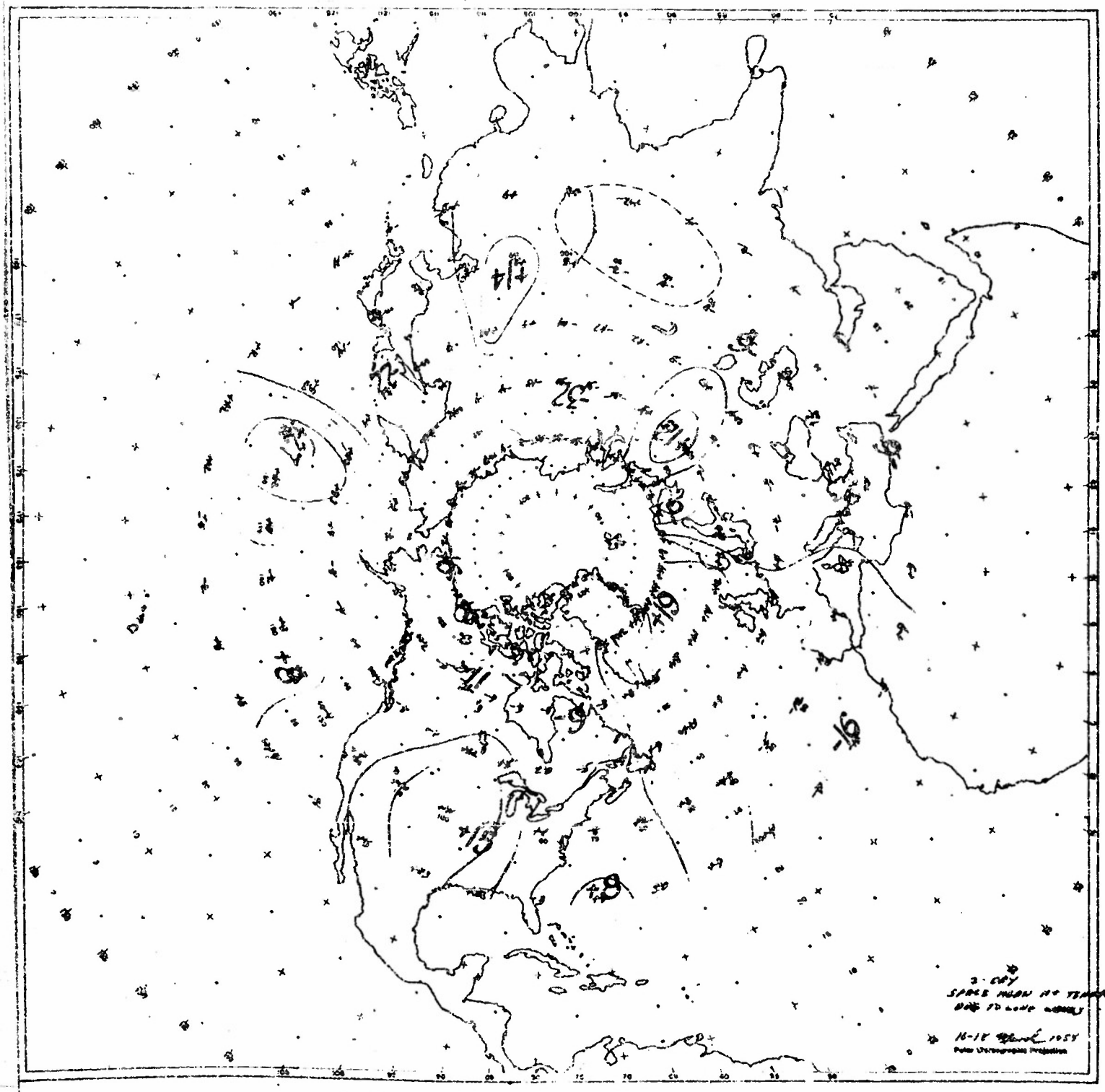
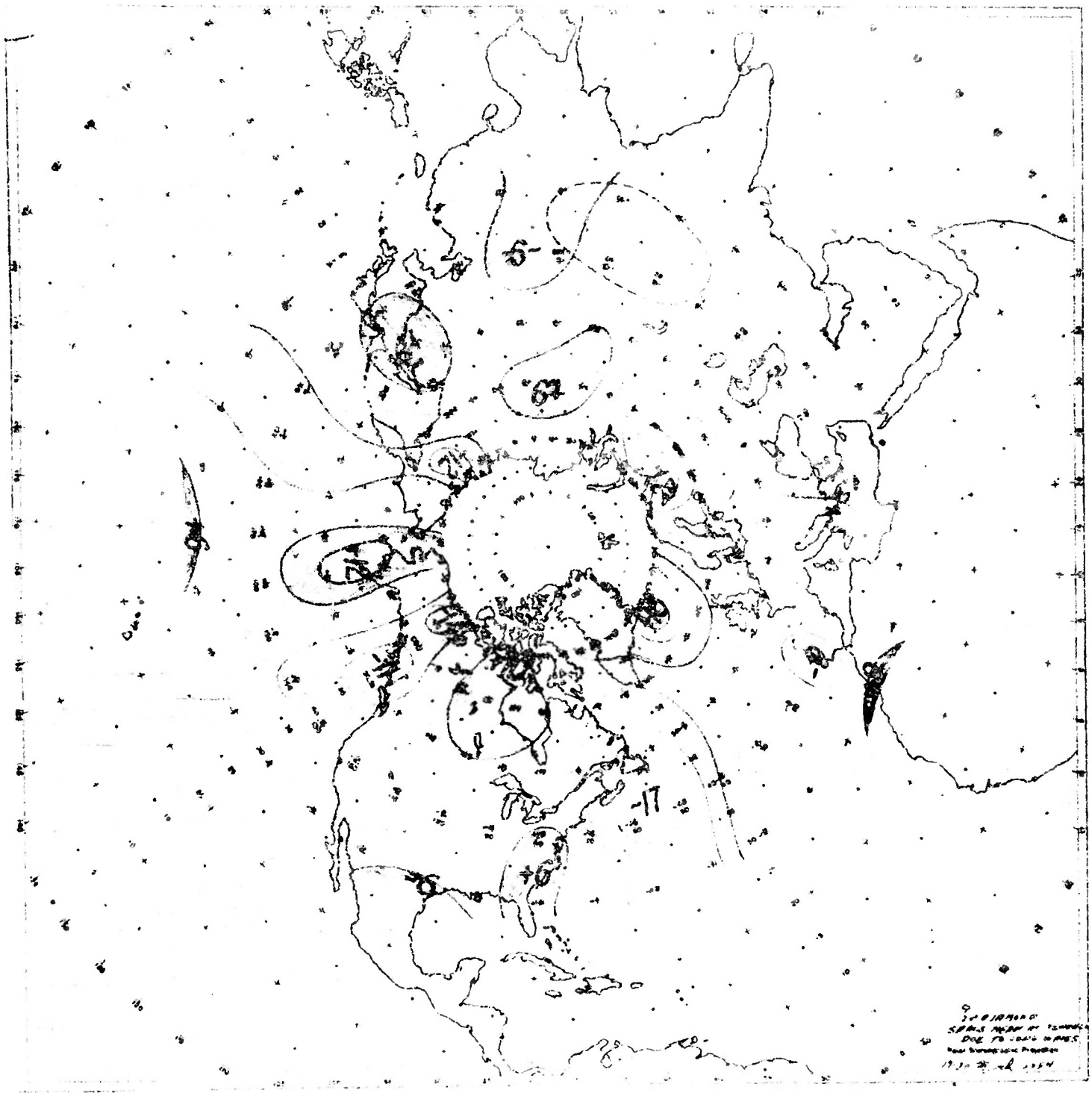
+15
+10
+9
+9
+16


20° DIAMOND
SPACE HEAN HT
DUE TO LOW W-D


+14
-32
-16
+8
3-DAY
SPACE MEAN 40 TEMPERATURES
DUE TO LONG WAVES
16-18 March 1958
Polar Stereographic Projection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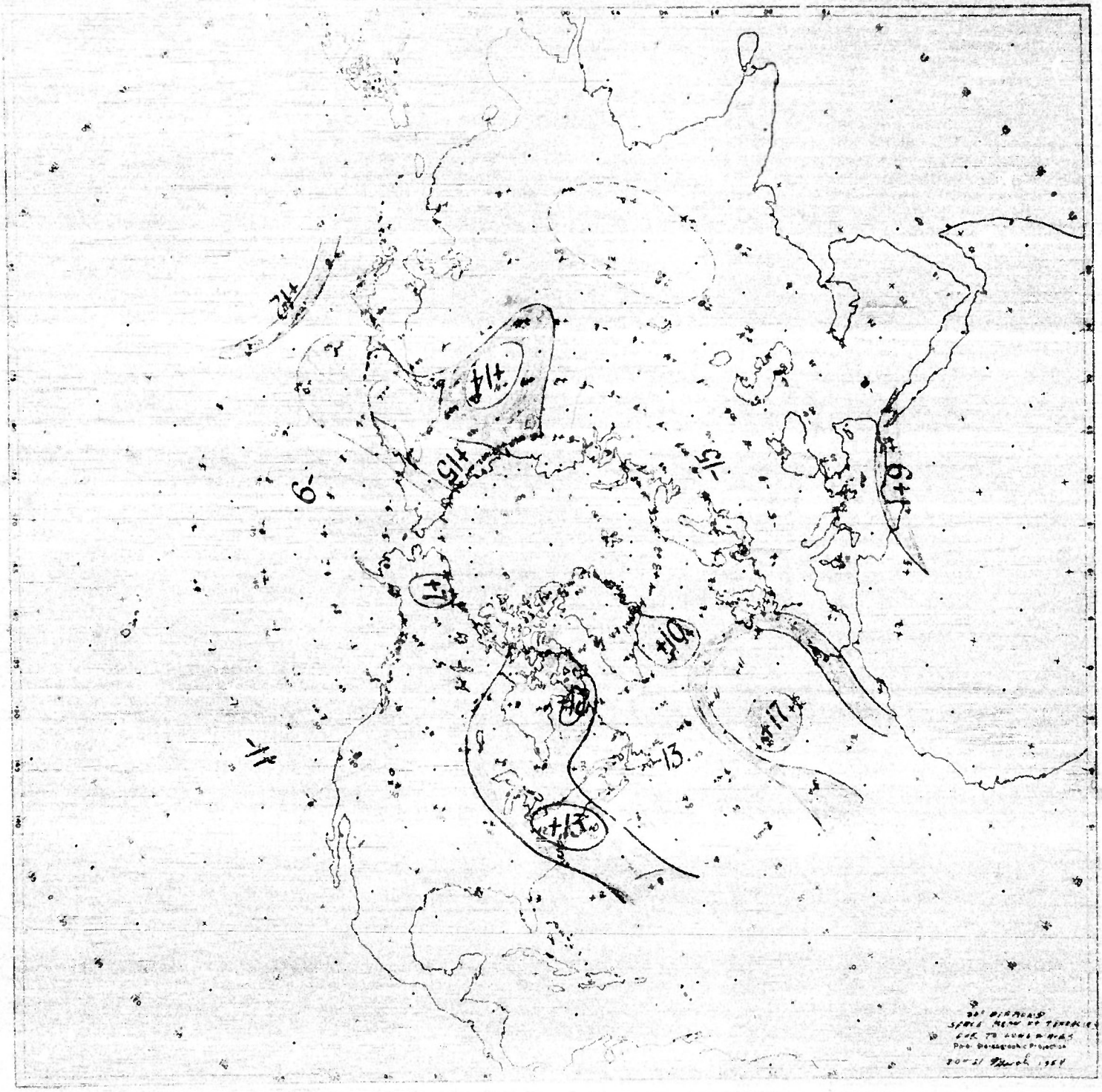
+12
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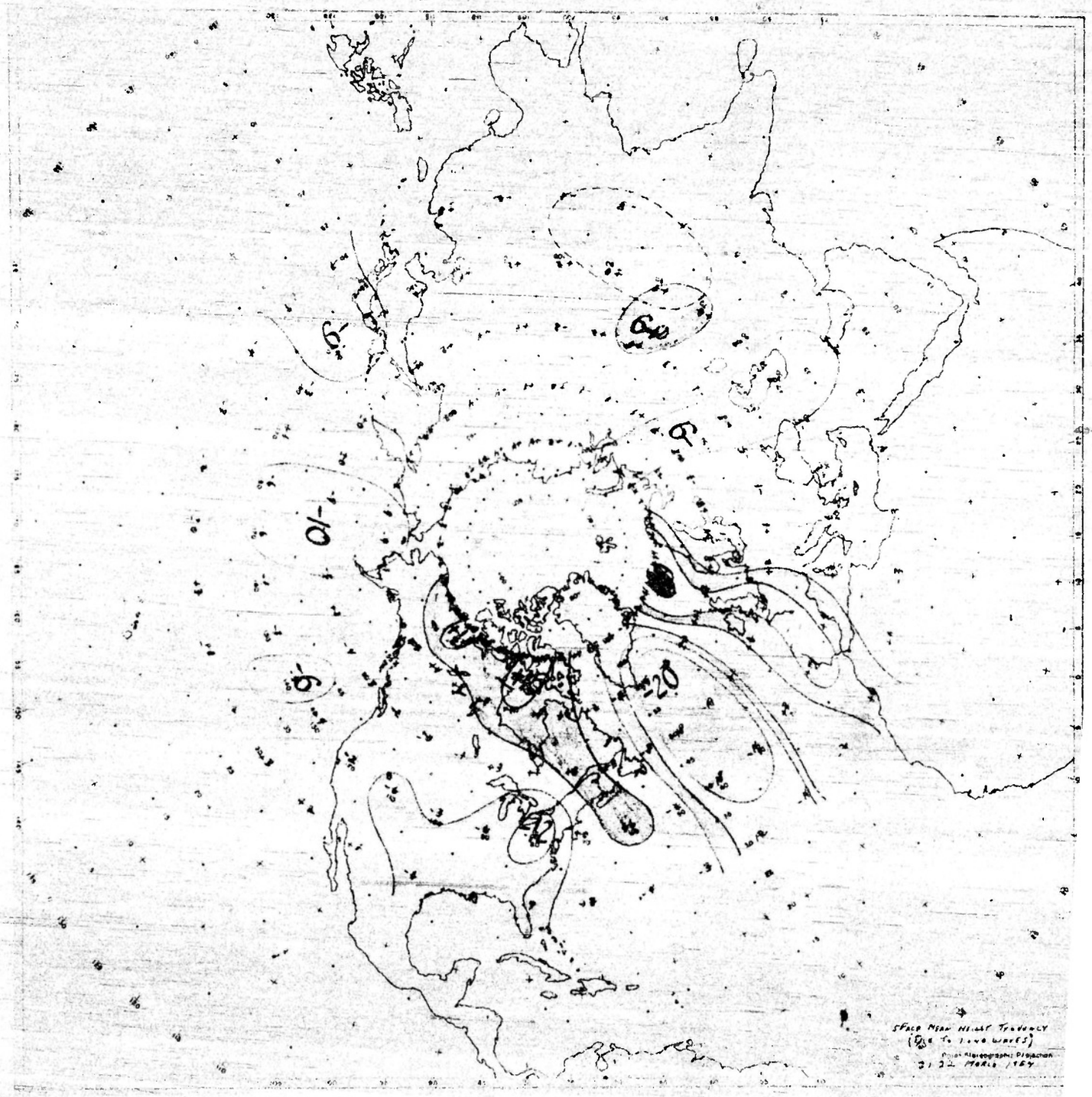
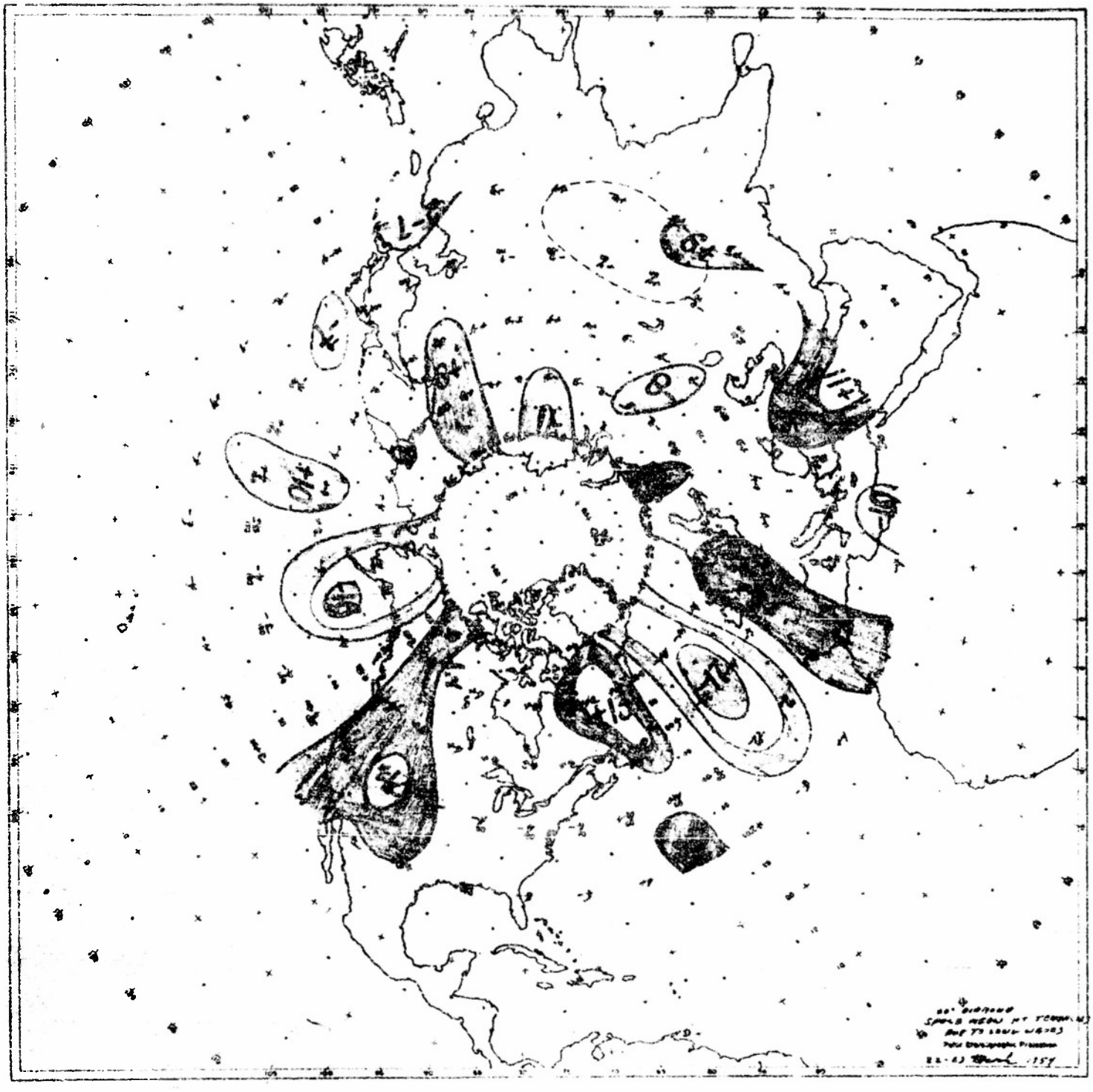
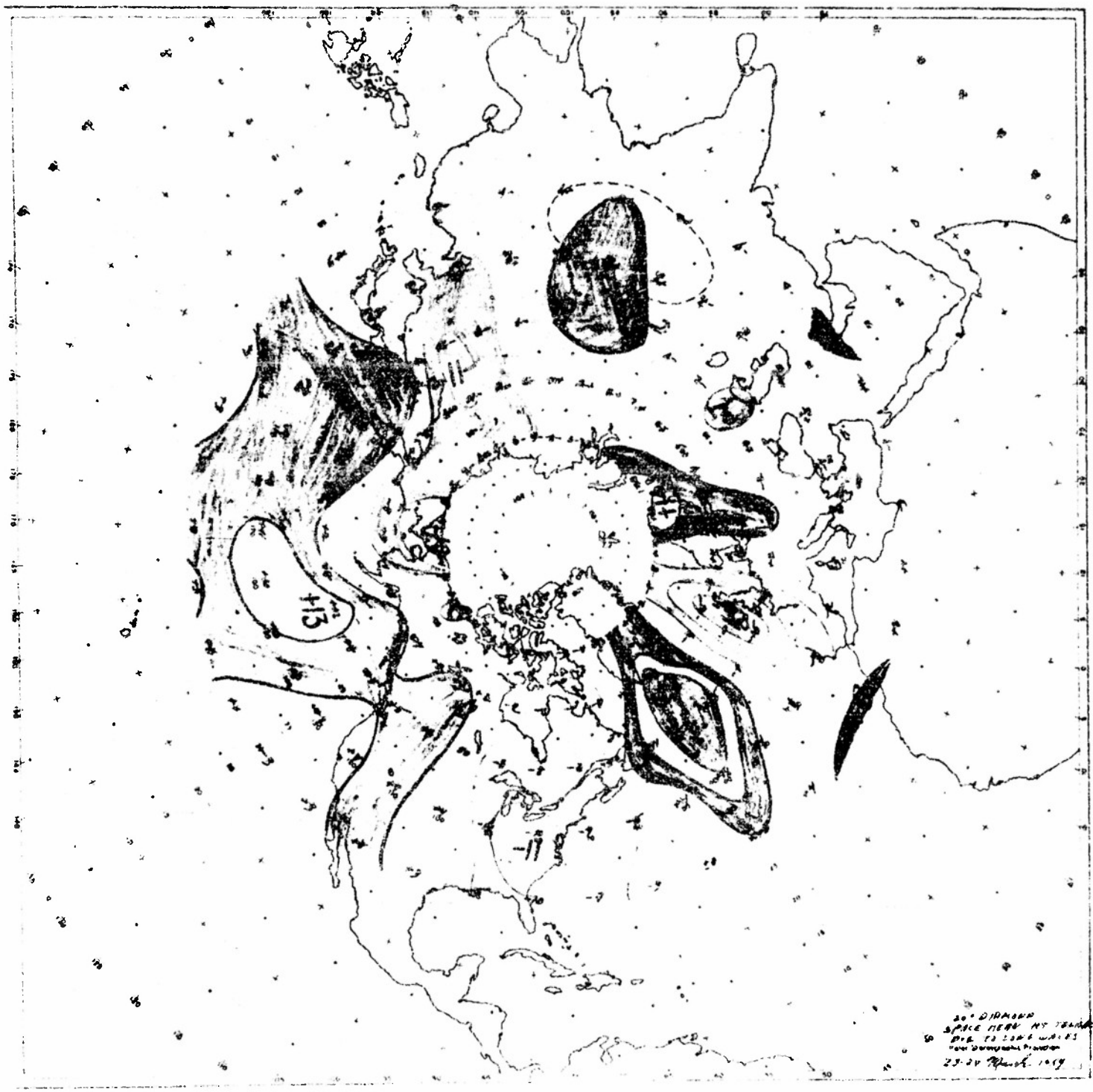
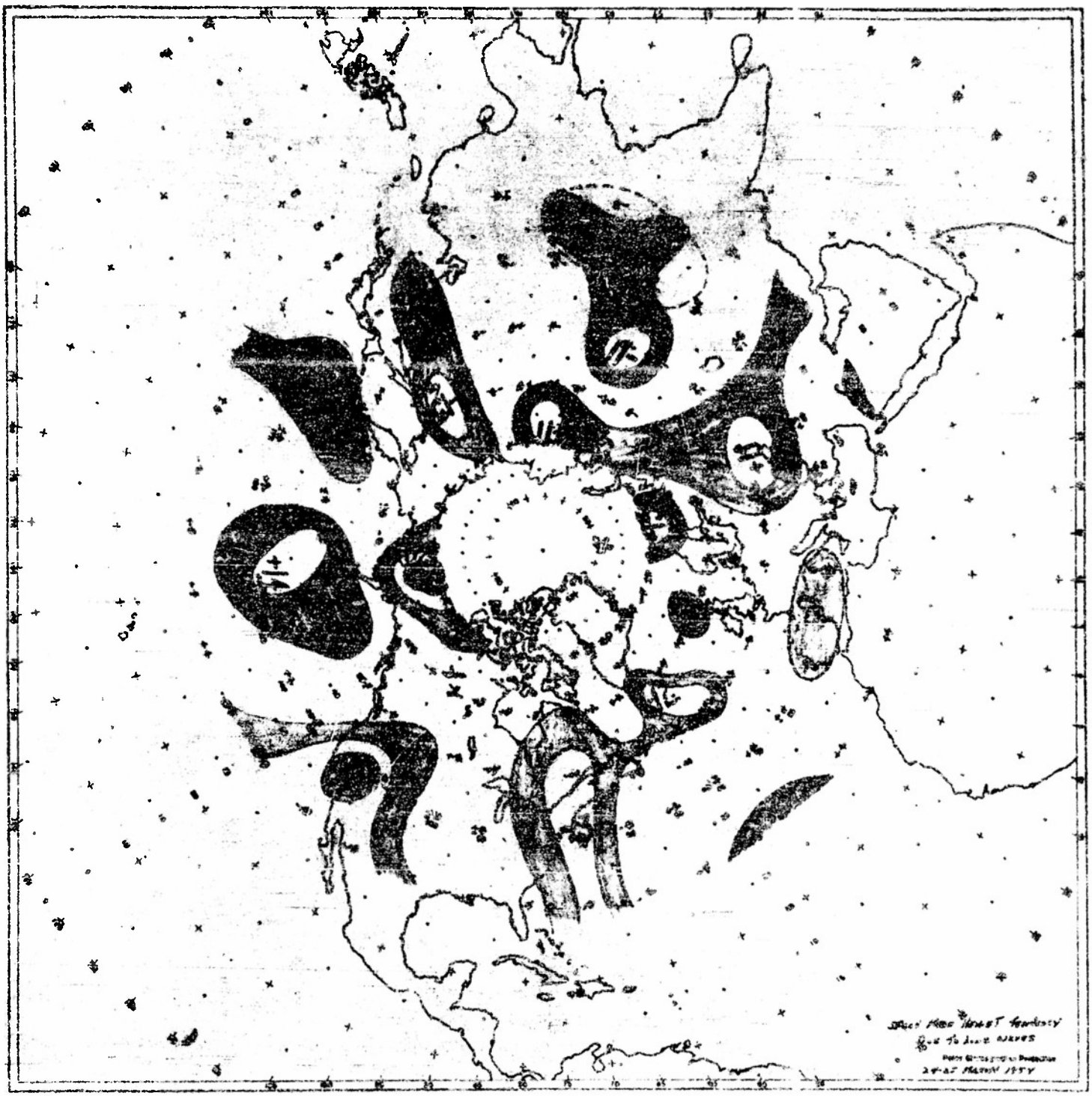
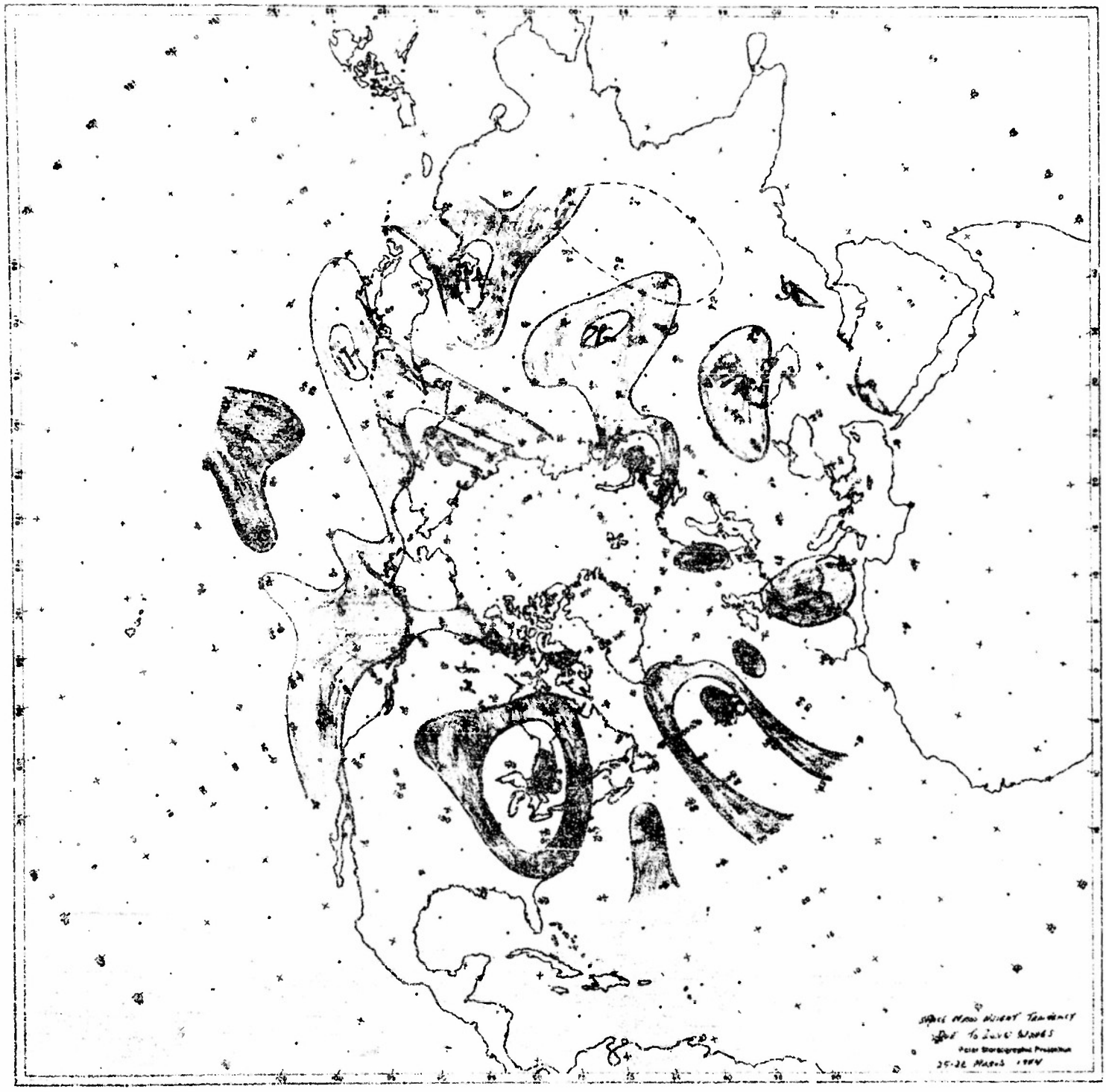
+6
+7
+10
+17
-12
13
+13

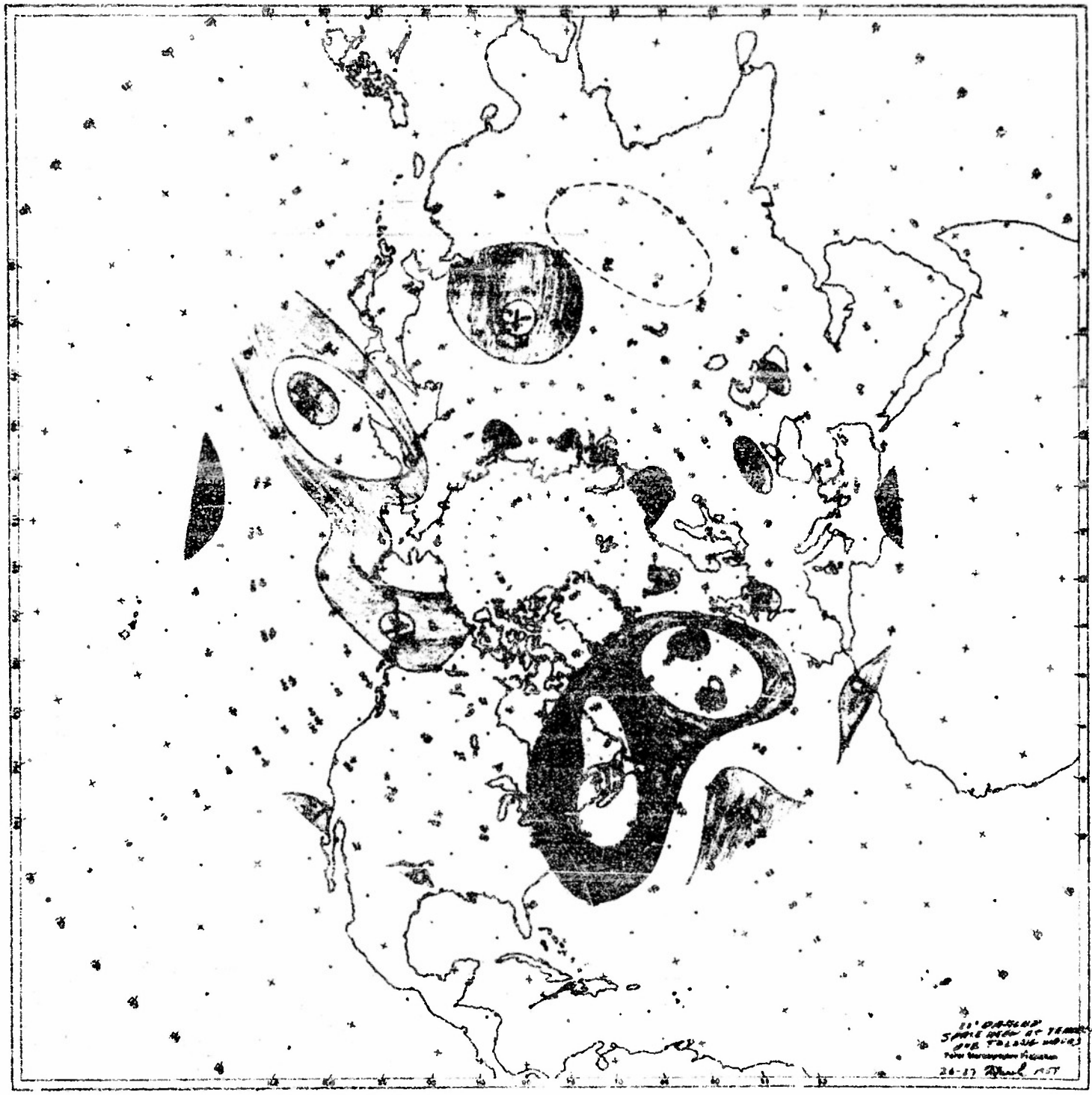

-60
-60
-10
-20
SPACE MEAN HEIGHT TOPOGRAPHY
(DUE TO LONG WAVES)
Polar Stereographic Projection
21 JAN. MEANS 1964

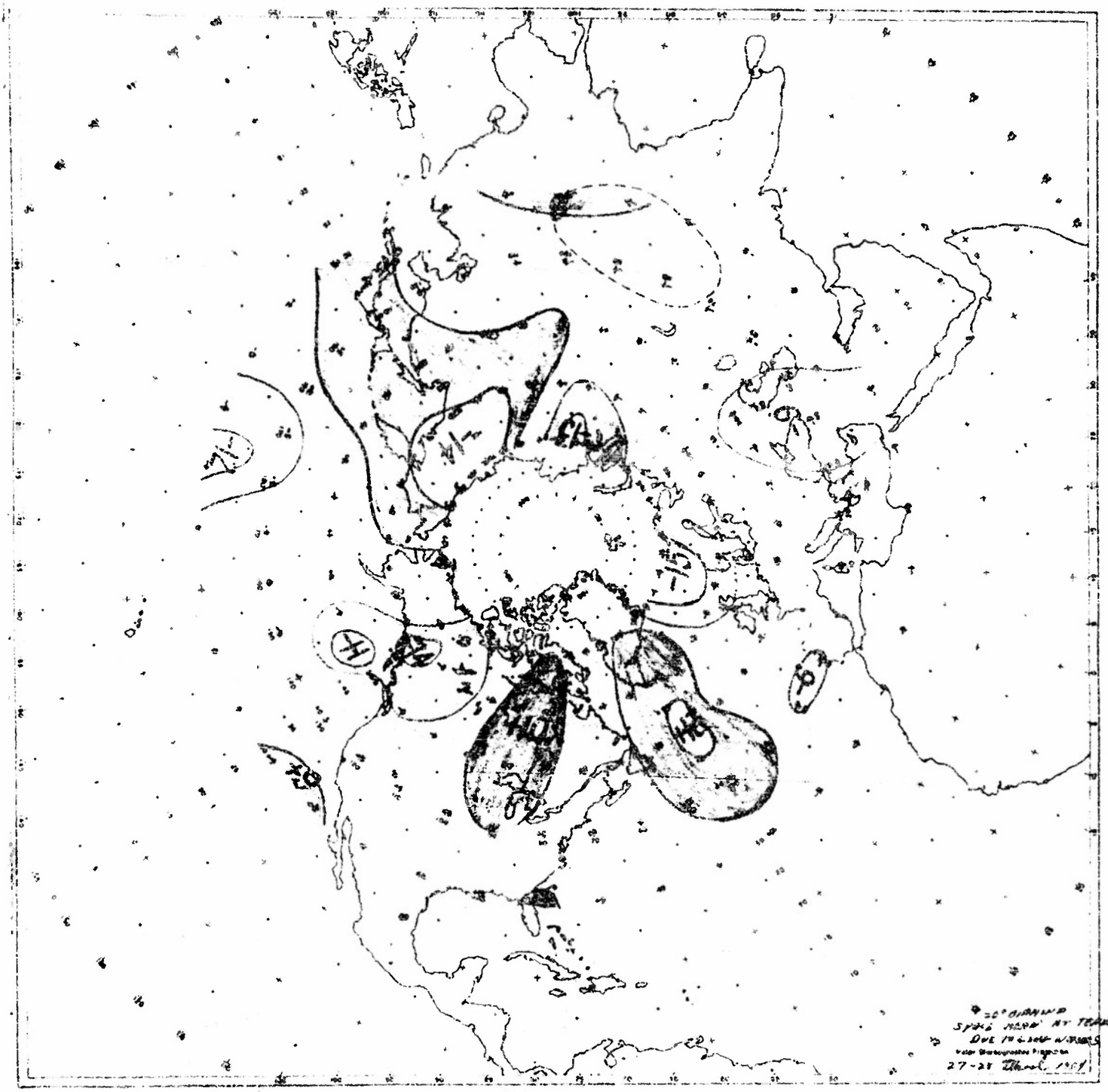


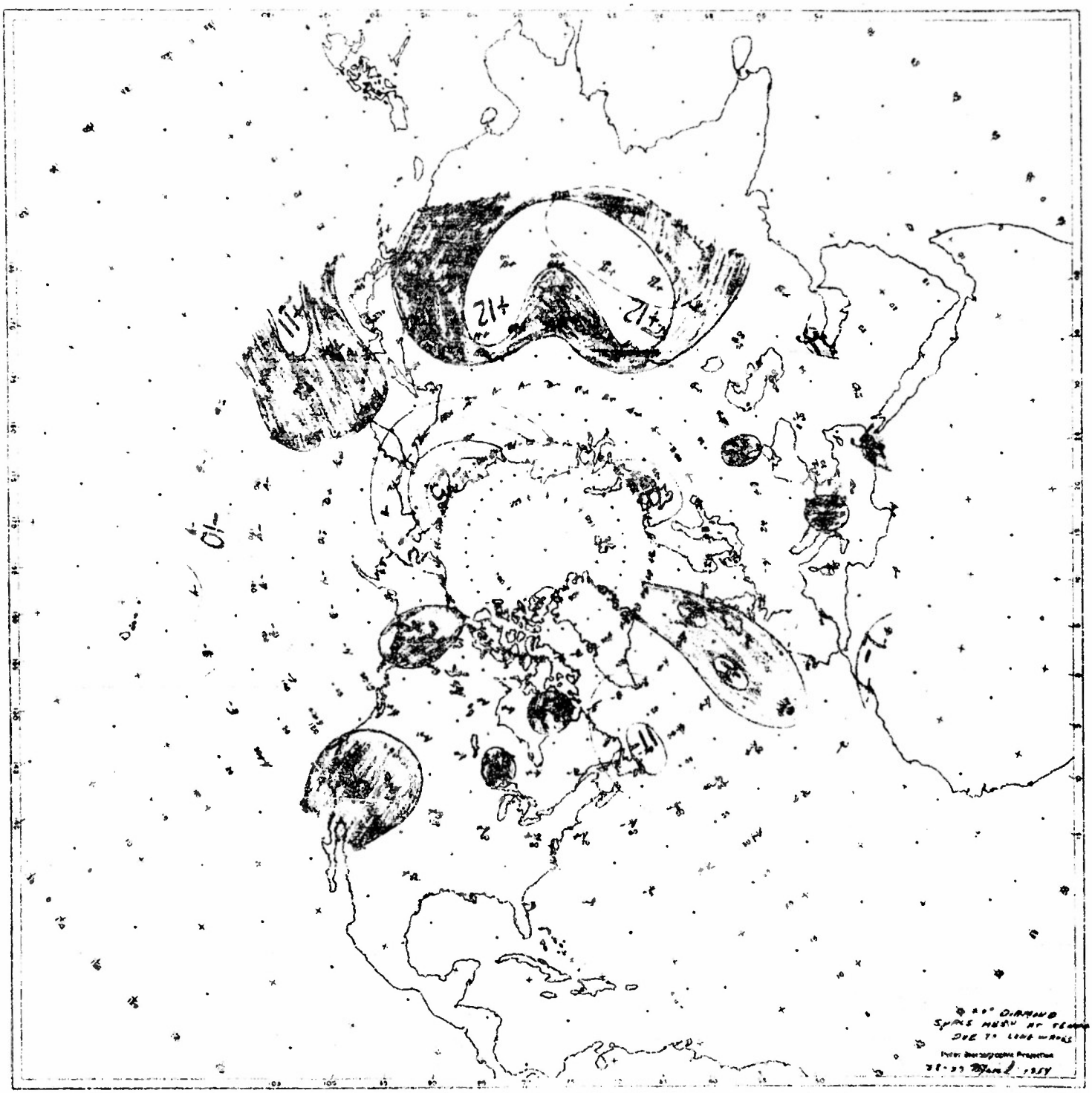

+13
-11

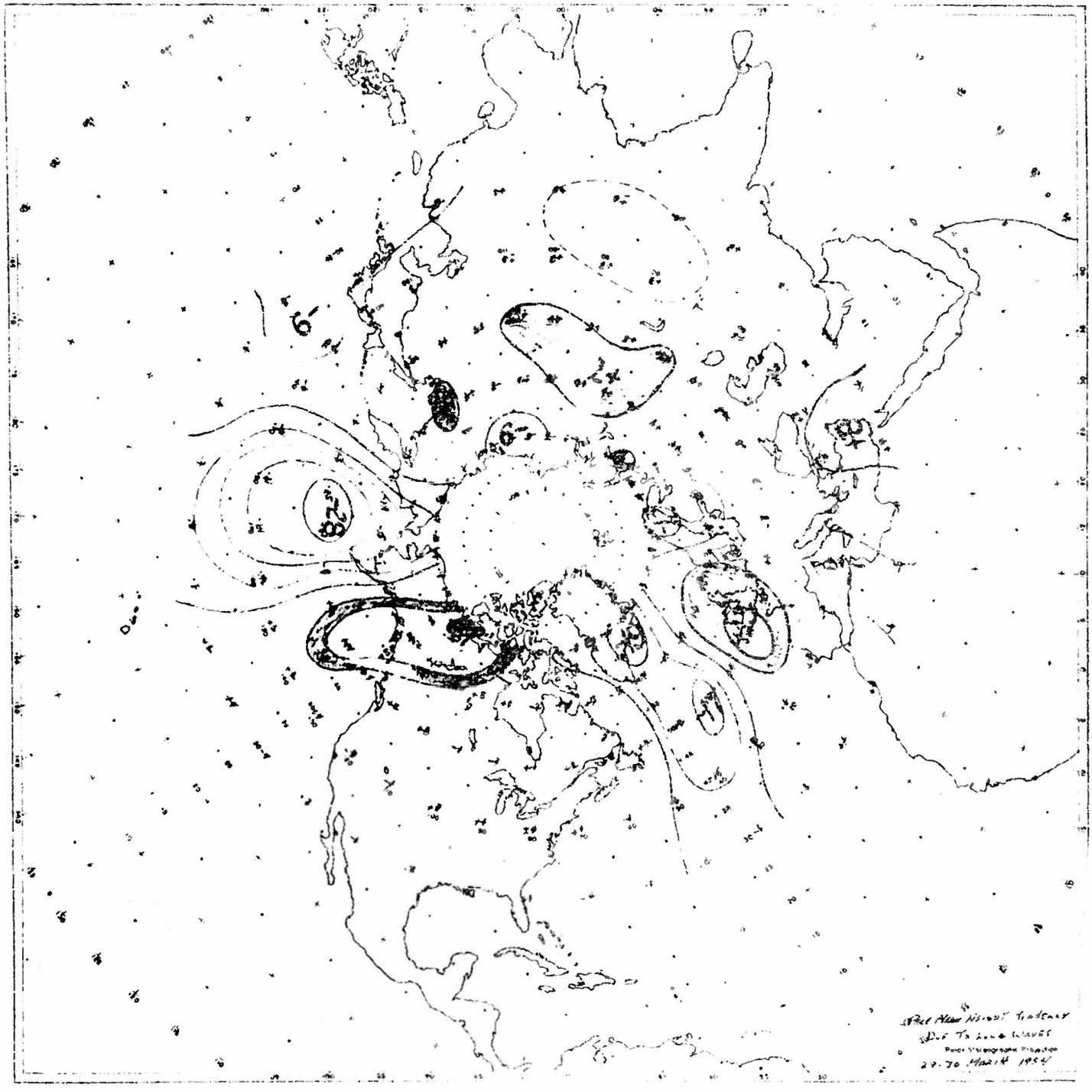


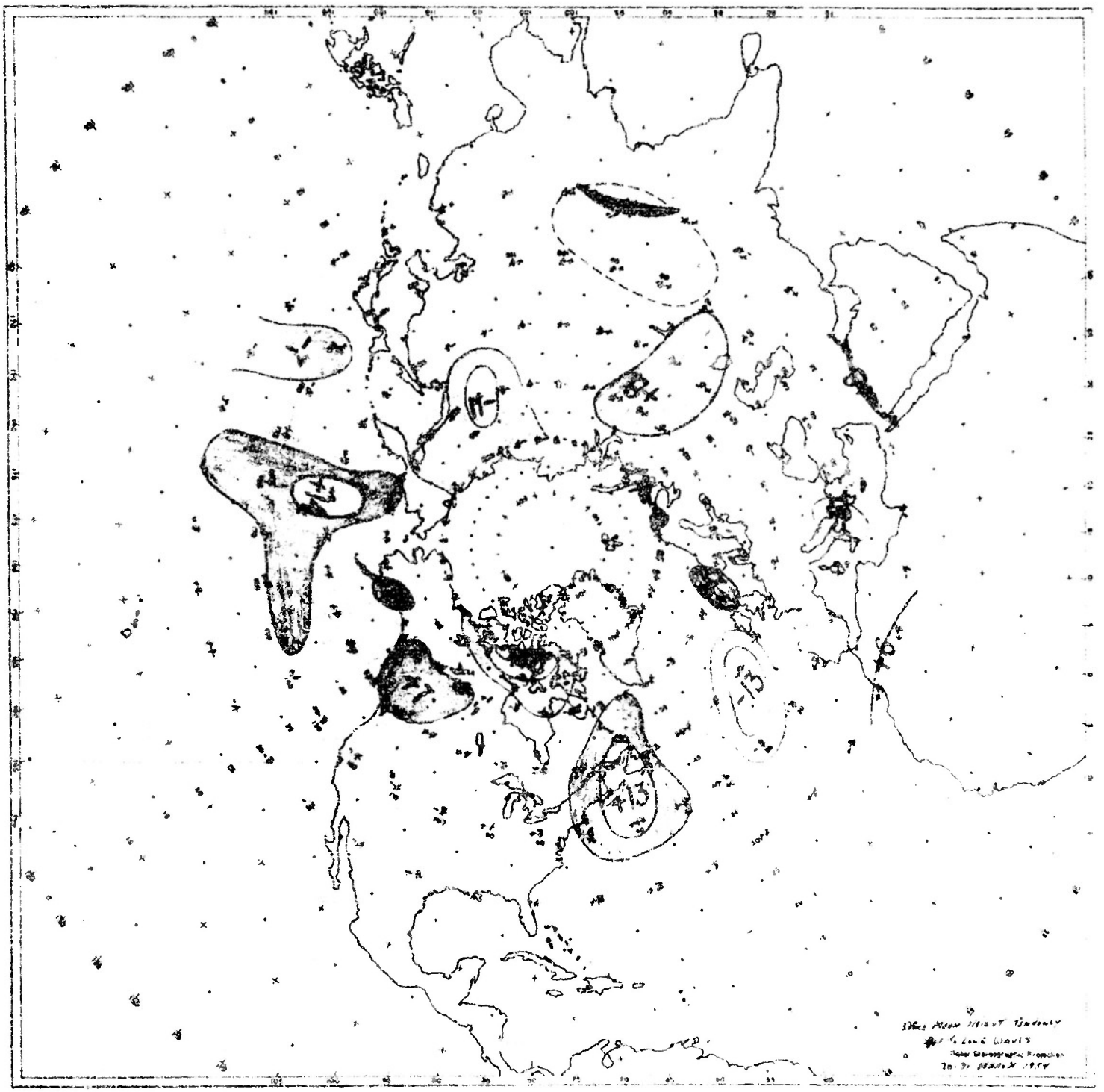

Polar Stereographic Projection

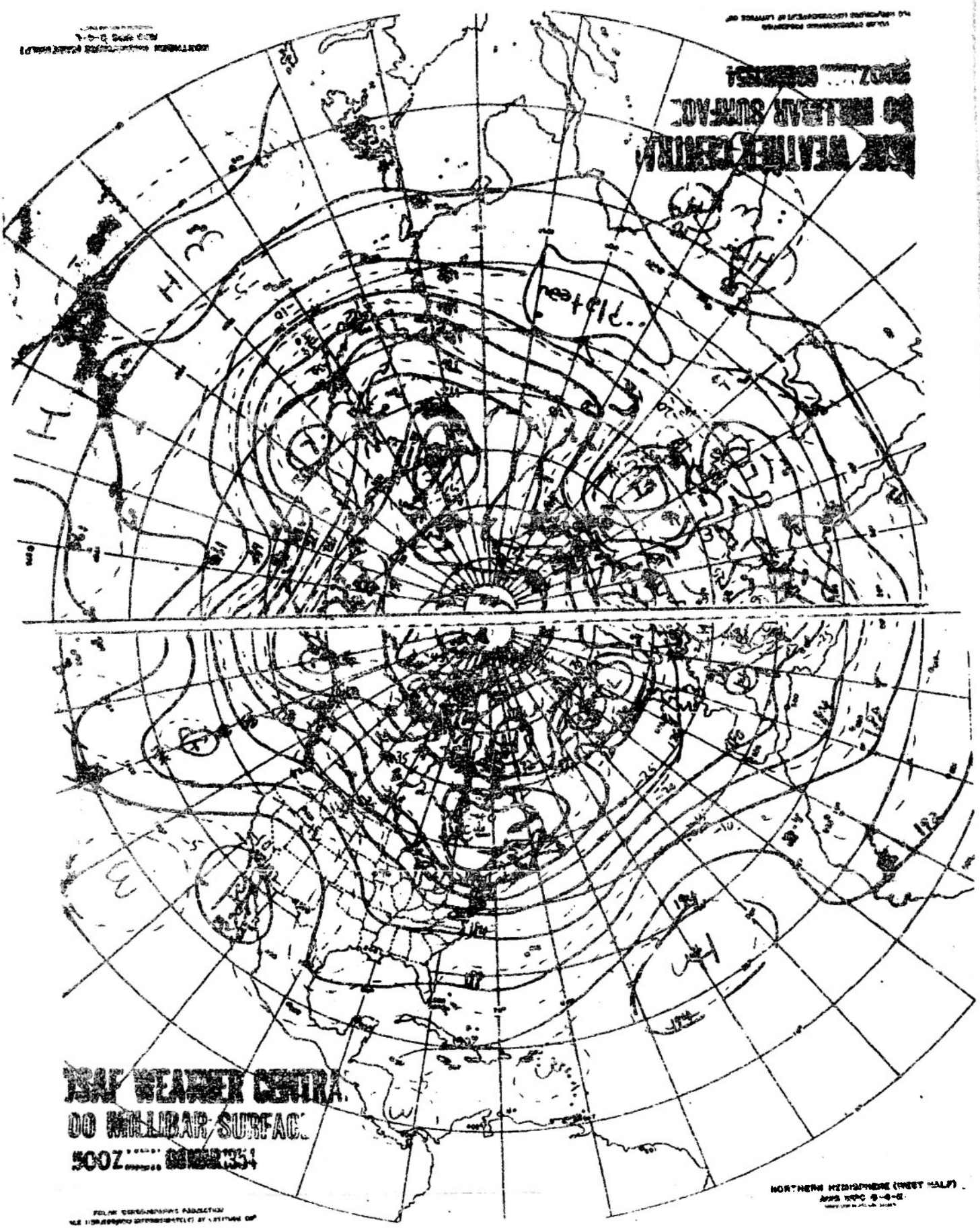


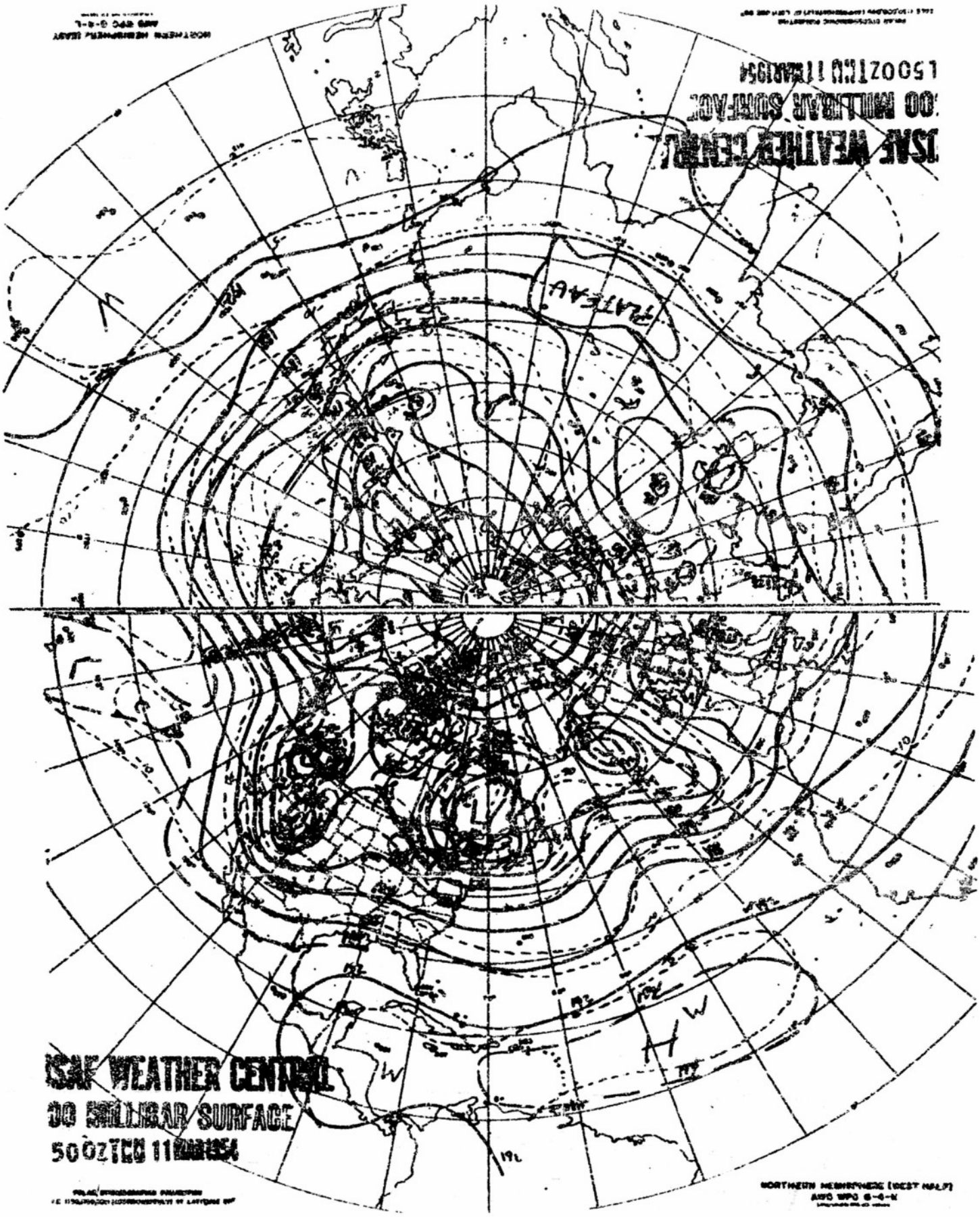


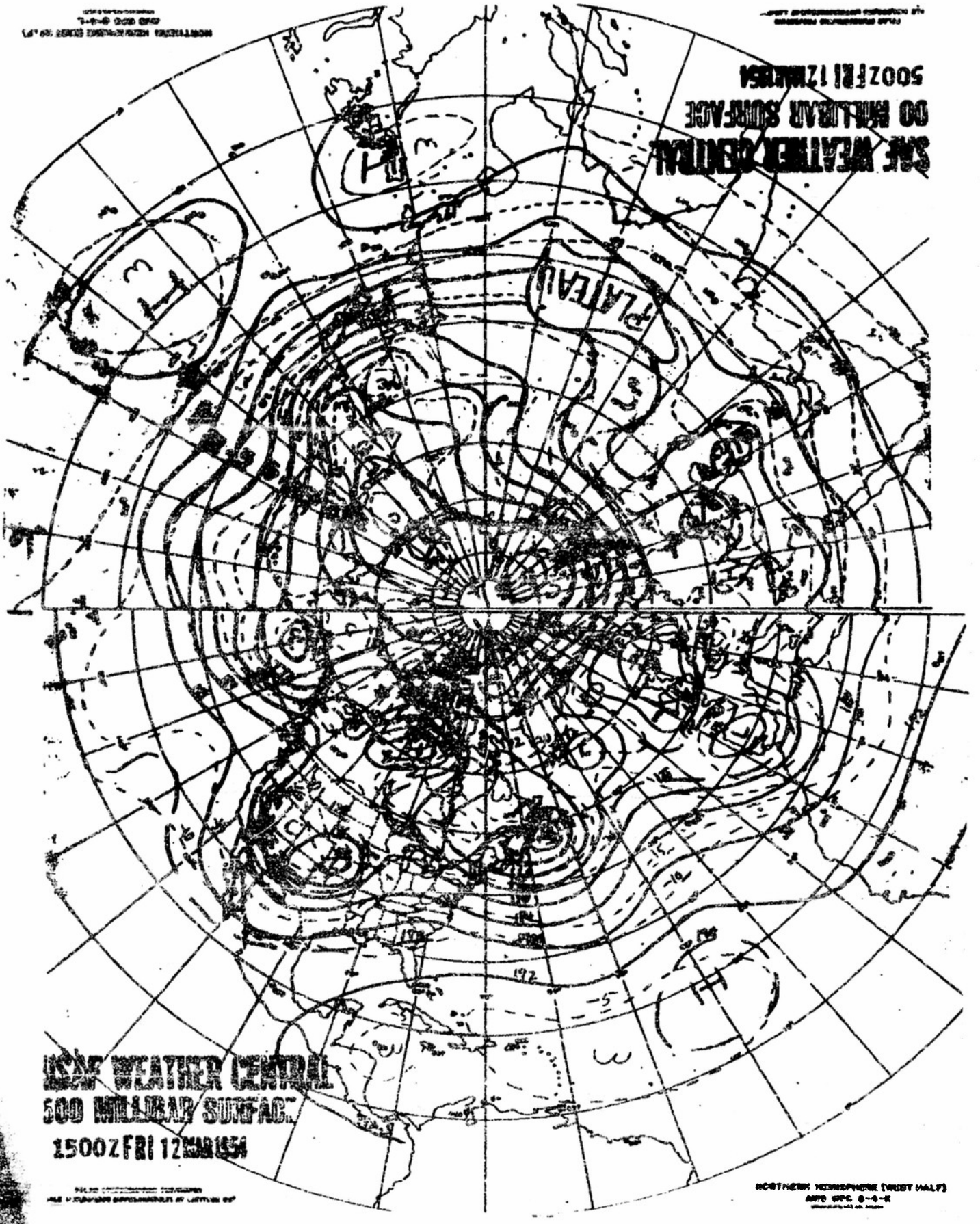

+12
+12
+10
0
-10
-12
-12
80° DIAMOND
SPIKE MEAN AT TEMPO
DUE TO LONG WAVES

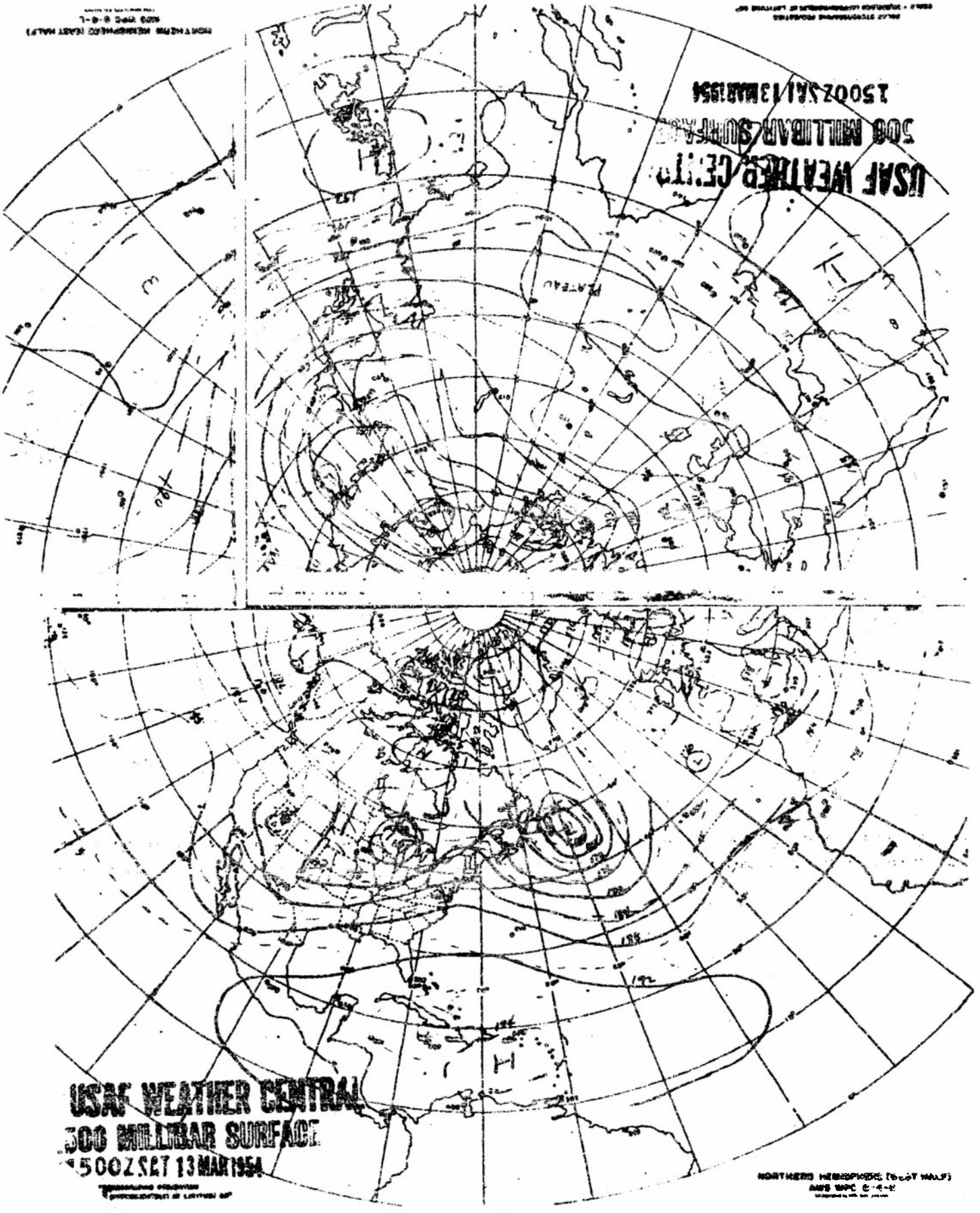

6
6
8
Sea Level Pressure Tendency
Due To Long Waves
Four Hemisphere Prediction
27-30 March 1954

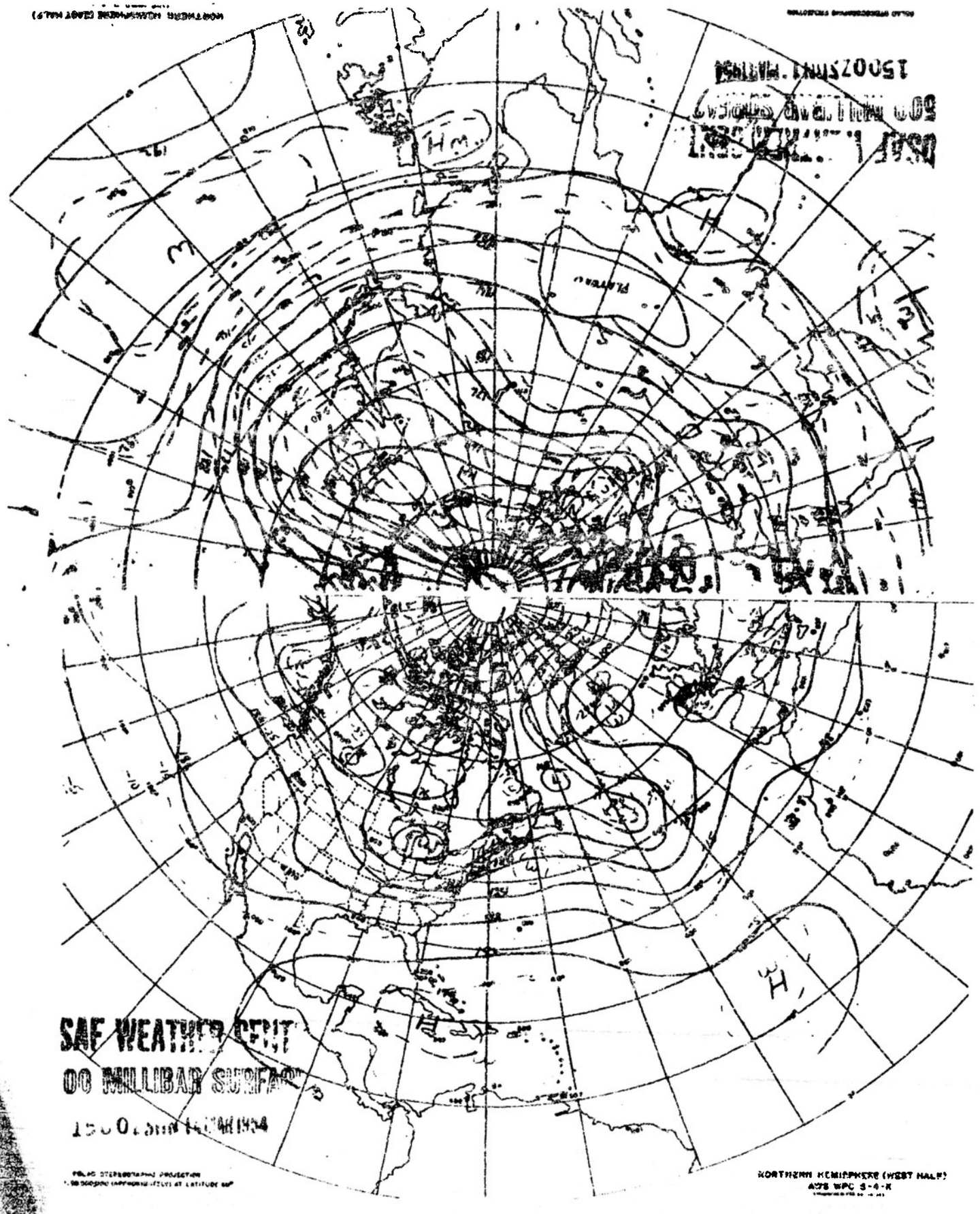

-11
-13
-13

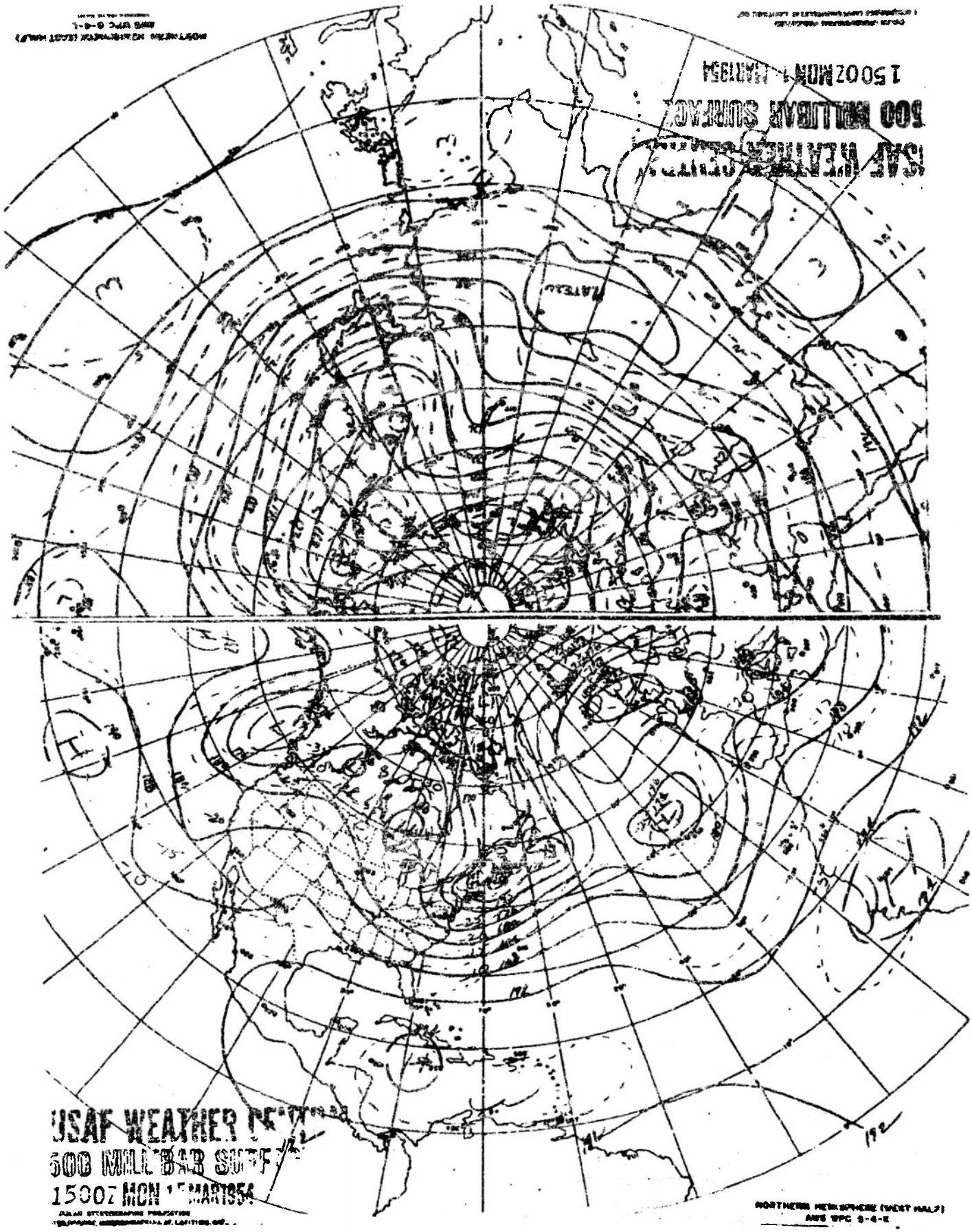

NORTHERN HEMISPHERE (WEST HALF)

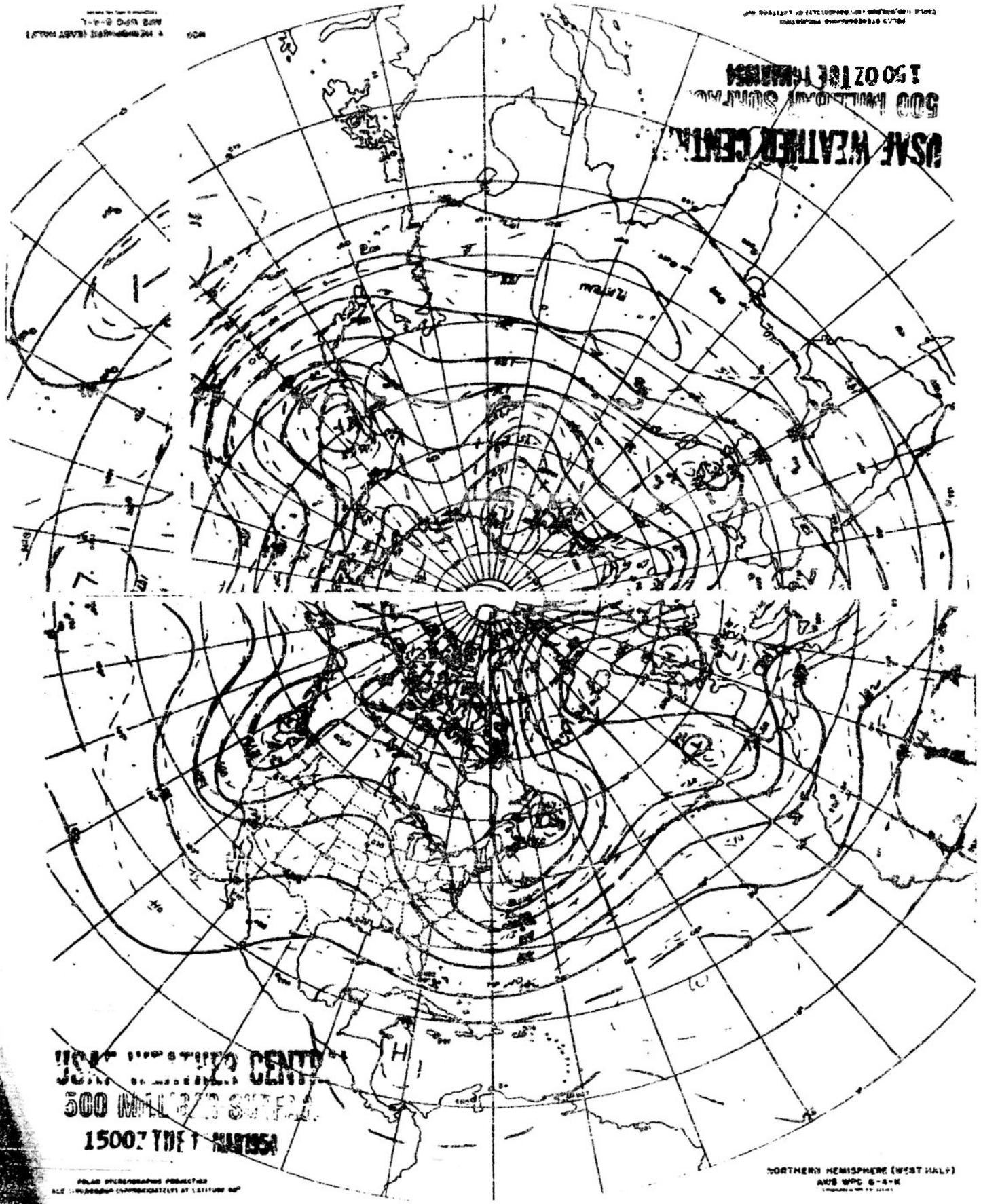

ISAF WEATHER CENTRAL
500 MILLIBAR SURFACE
500ZTCD 11 MAR1954
NORTHERN HEMISPHERE (WEST HALF)
AWS WPC 6-6-N

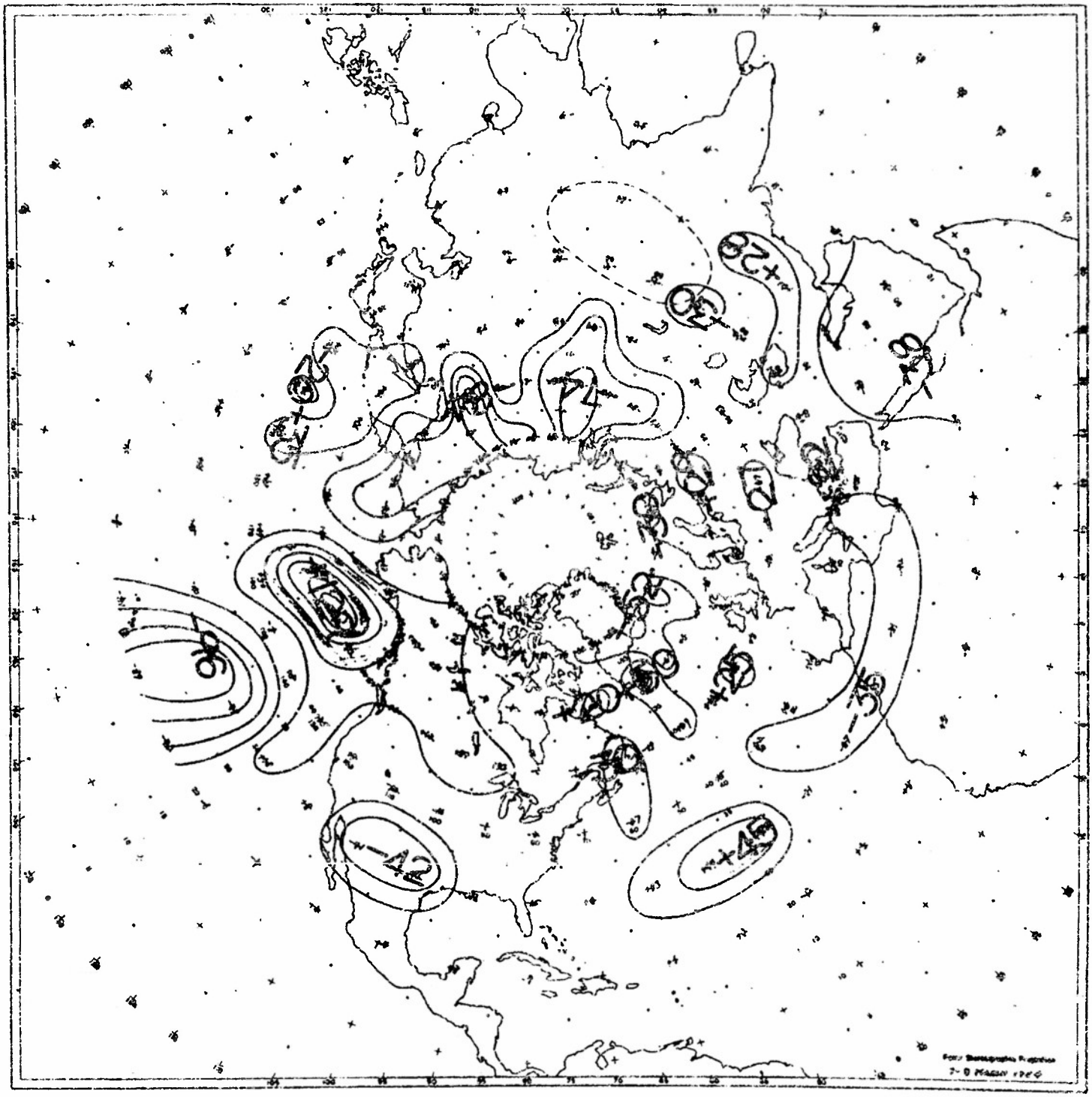

USAF WEATHER CENTRAL
500 MILLIBAR SURFACE
1500Z FRI 12

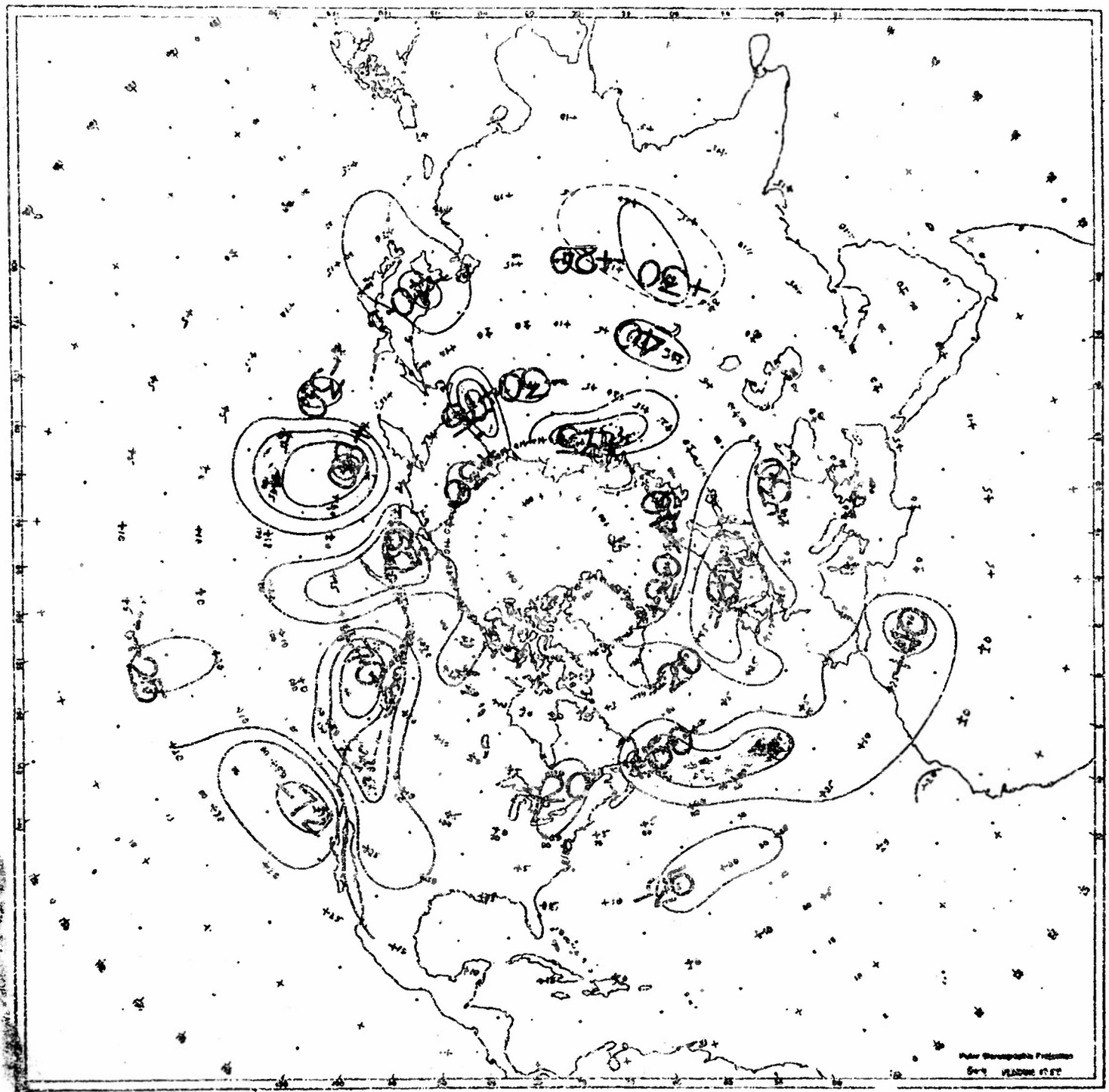

USAF WEATHER CENTRAL
300 MILLIBAR SURFACE
1500Z SAT 13 MAR 1954

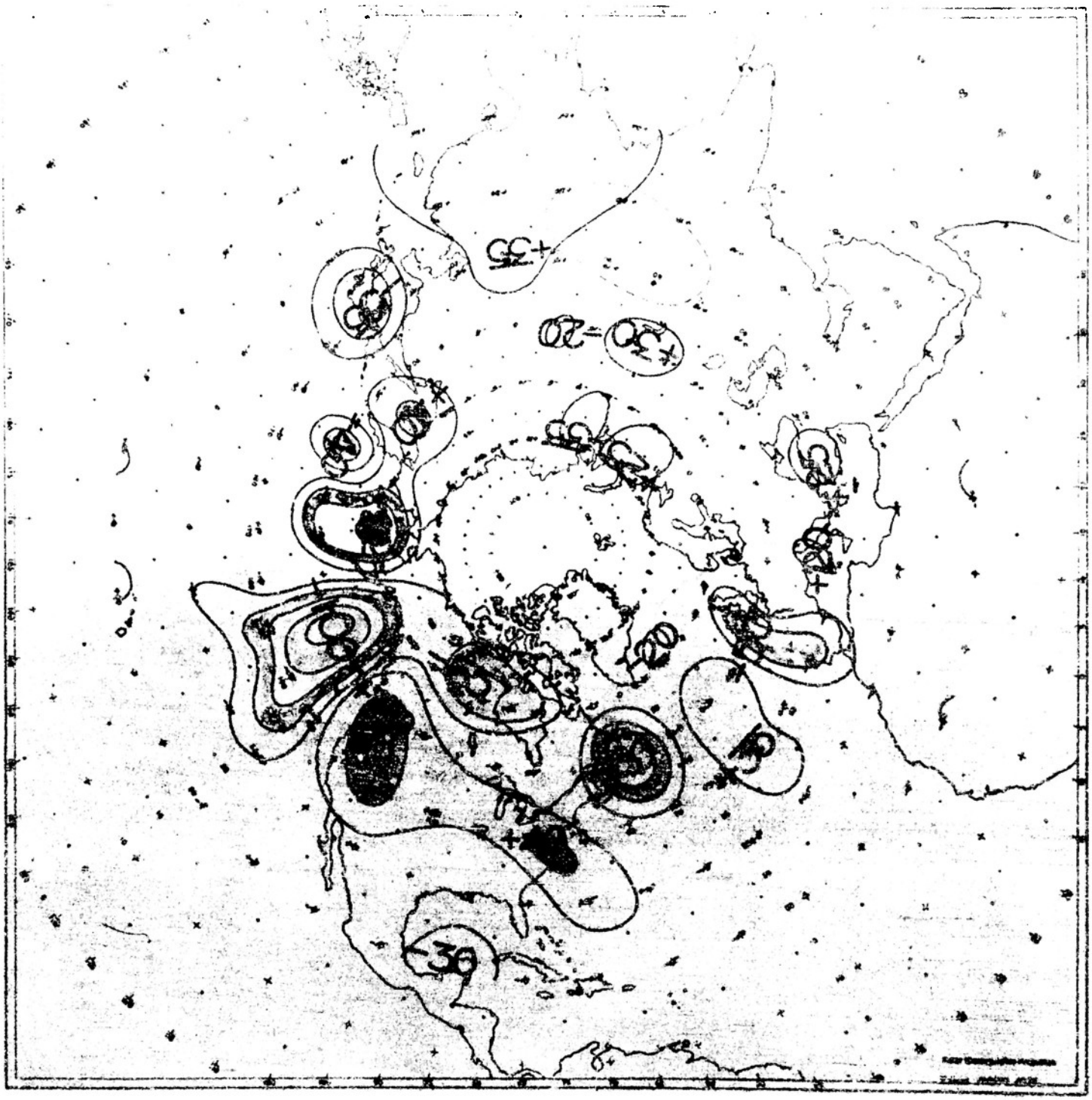

SAF WEATHER CENT
00 MILLIBAR SURFAC
1500Z 14 MAR 1954
POLAR STEREOGRAPHIC PROJECTION
1:30,000,000 (APPROXIMATELY) AT LATITUDE 60°
NORTHERN HEMISPHERE (WEST HALF)
AWS WPC 3-4-K
H
H
L


USAF WEATHER
500 MILLIBAR SURF
15002 MON
NORTHERN HEMISPHERE (WEST HALF)
AWS TPC 9-4-E


500 MILLIBARS SURFACE
15007 FEET
NORTHERN HEMISPHERE (WEST HALF)
AWS WPC 6-4-K


+28
+24
+45
-42




+35
+30
-20
-30
-120
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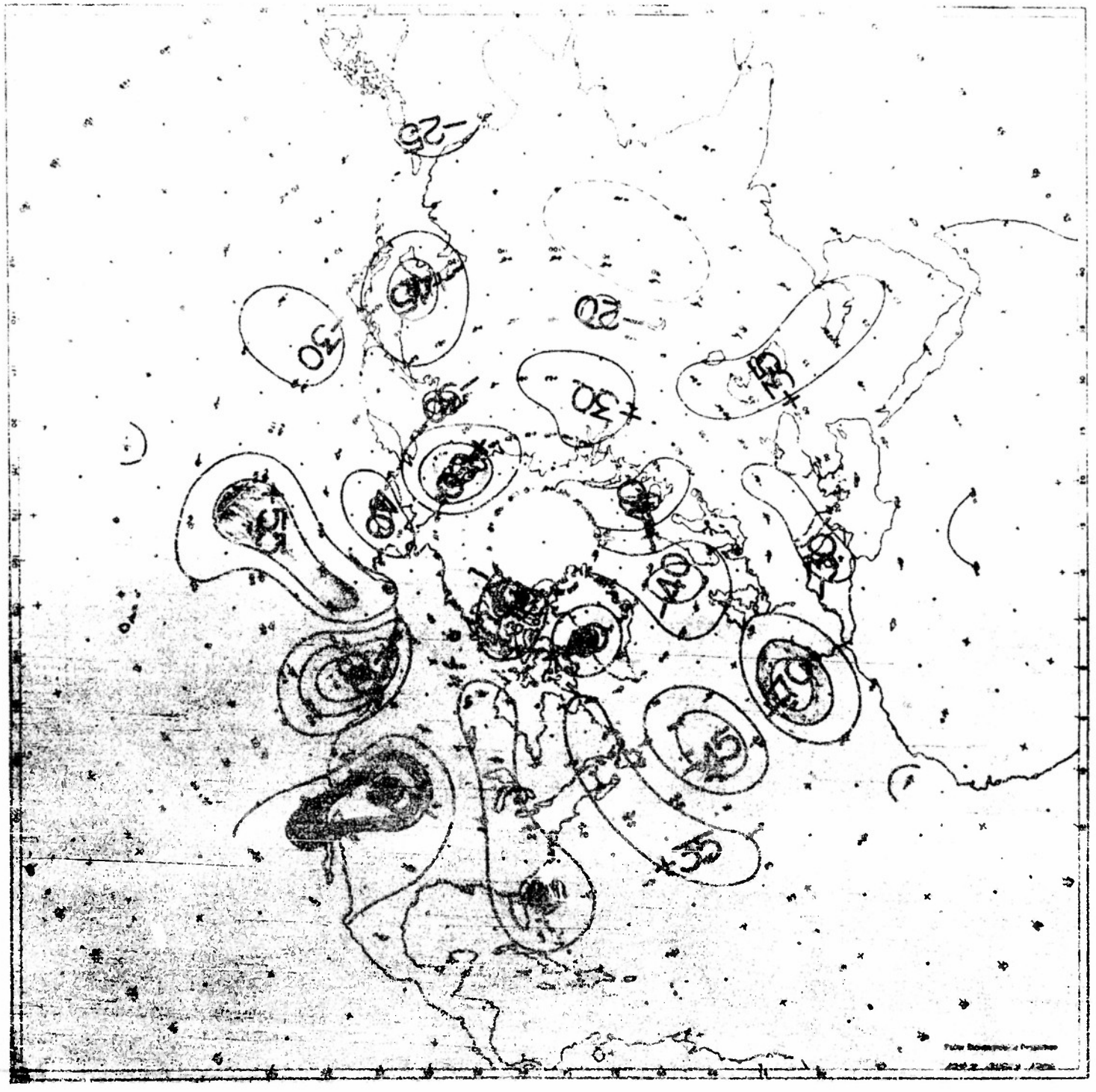
-30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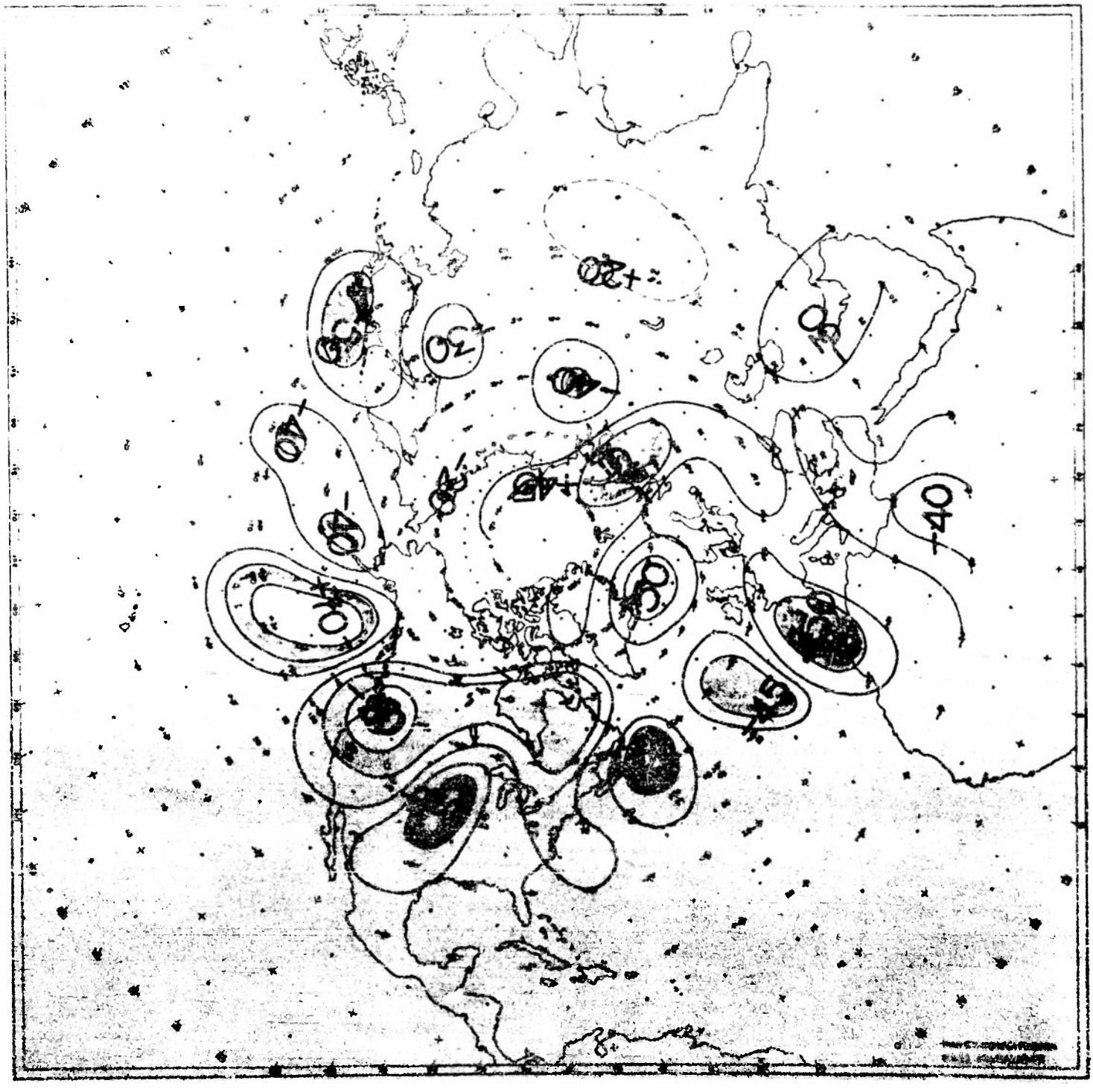
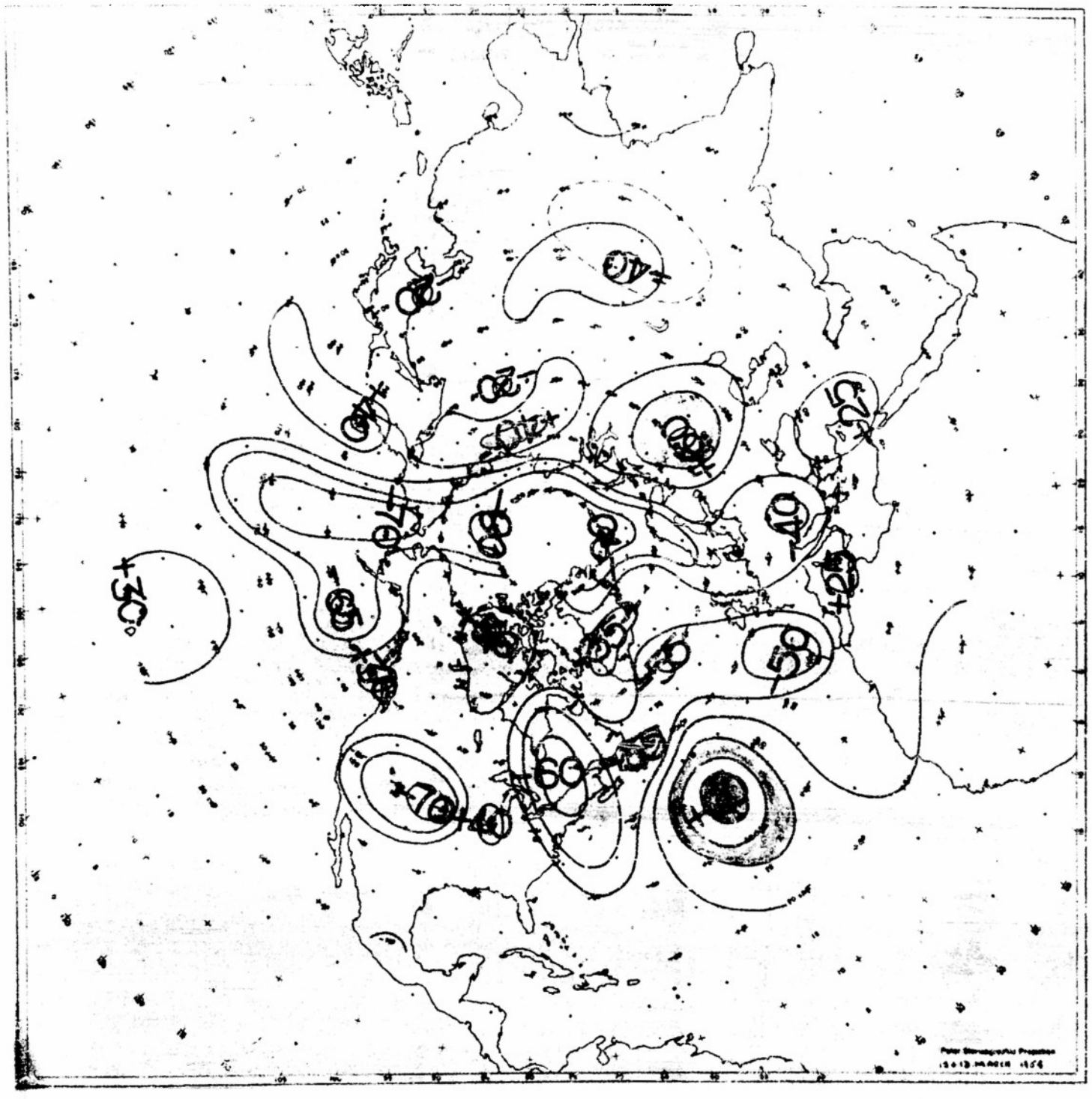
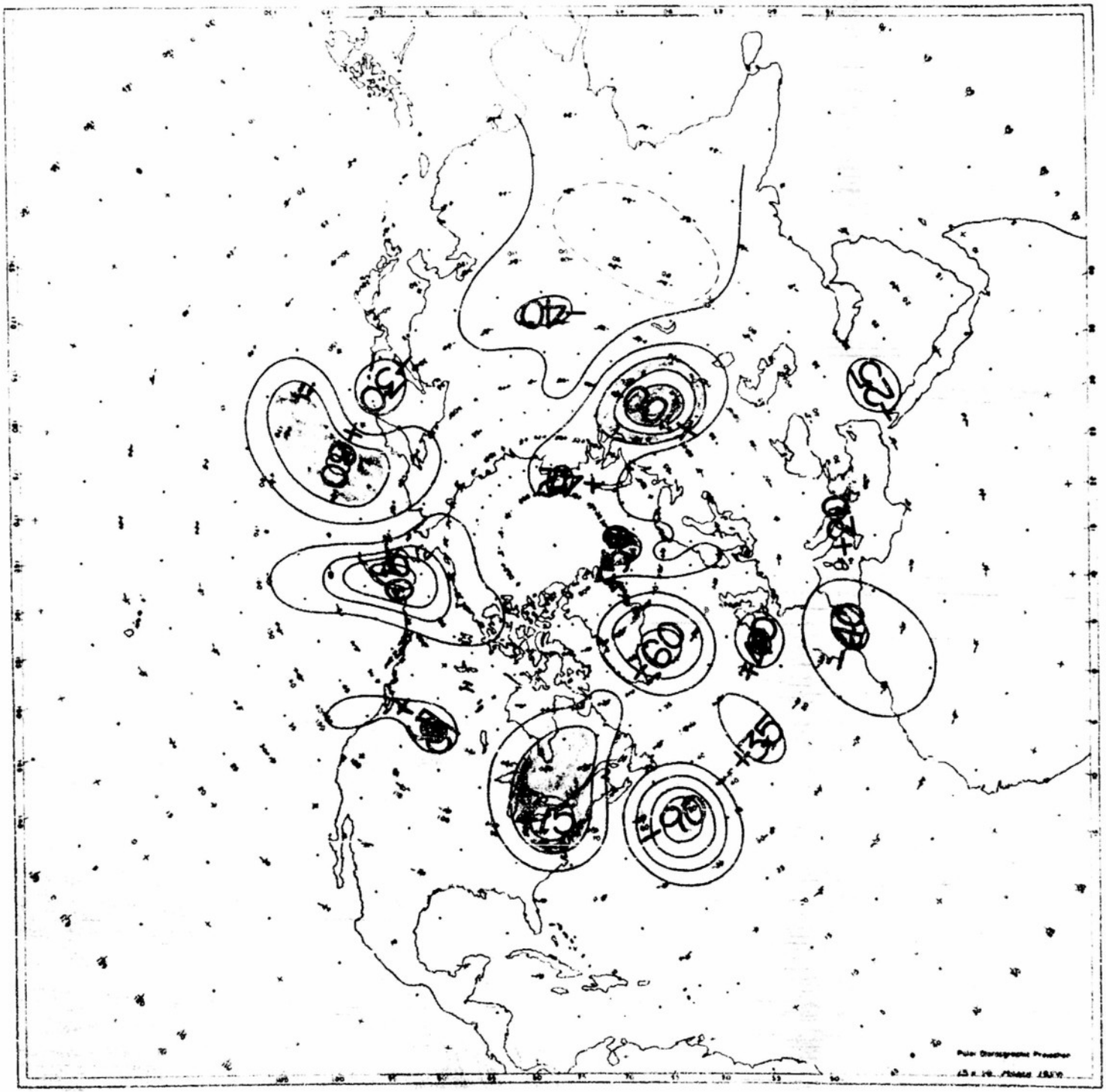
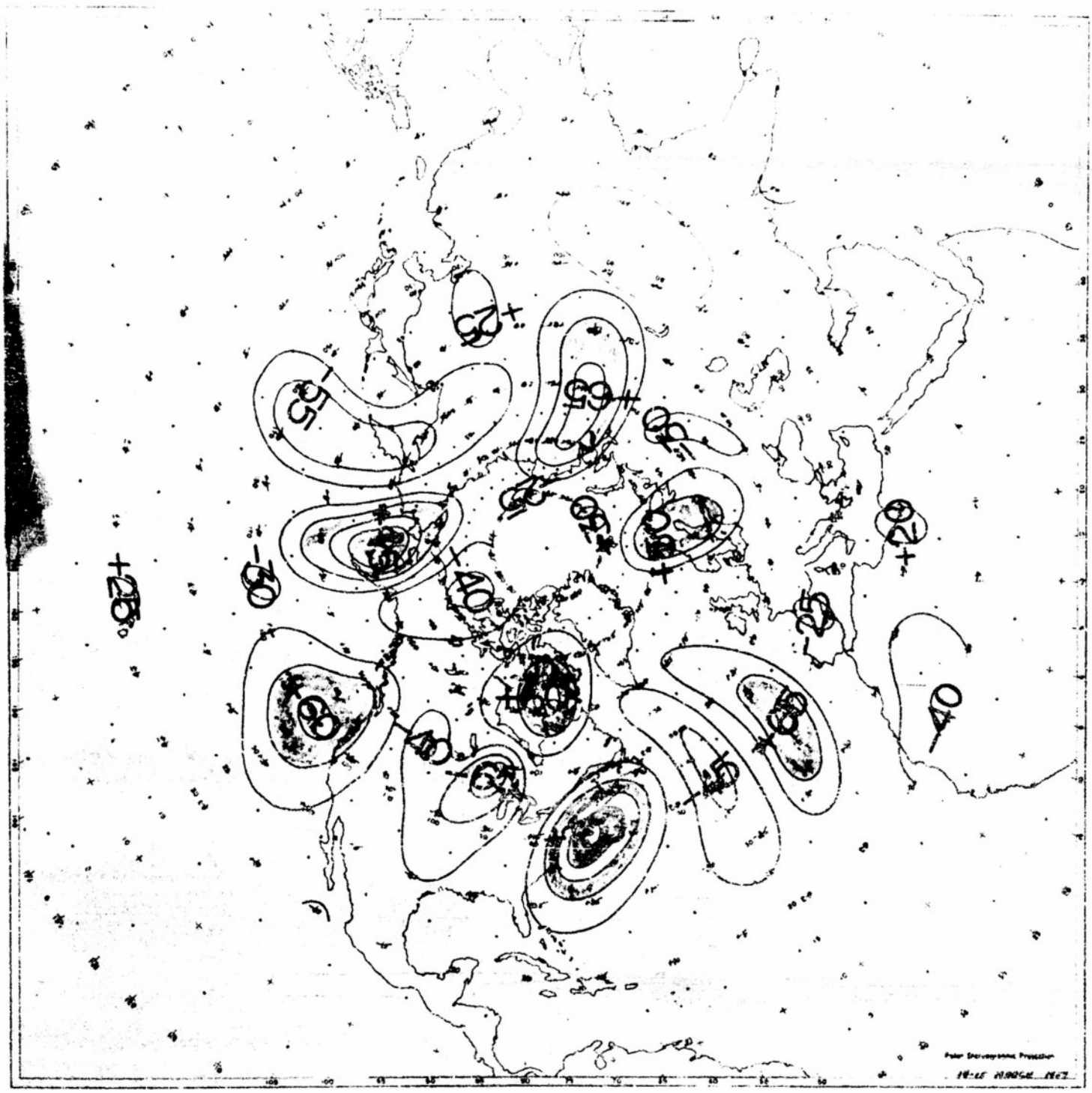
-30
-40
-40
-35
-30
-25
-15
-10
-5
0


+20
30
-40
+45


+30°
+40
+50
+60
+70
+80
+90
+65
+55
+45
+35
+25
Polar Stereographic Projection


+12
+30
+80
+27
+23
+60
+35
+75
+96


+25
-55
+65
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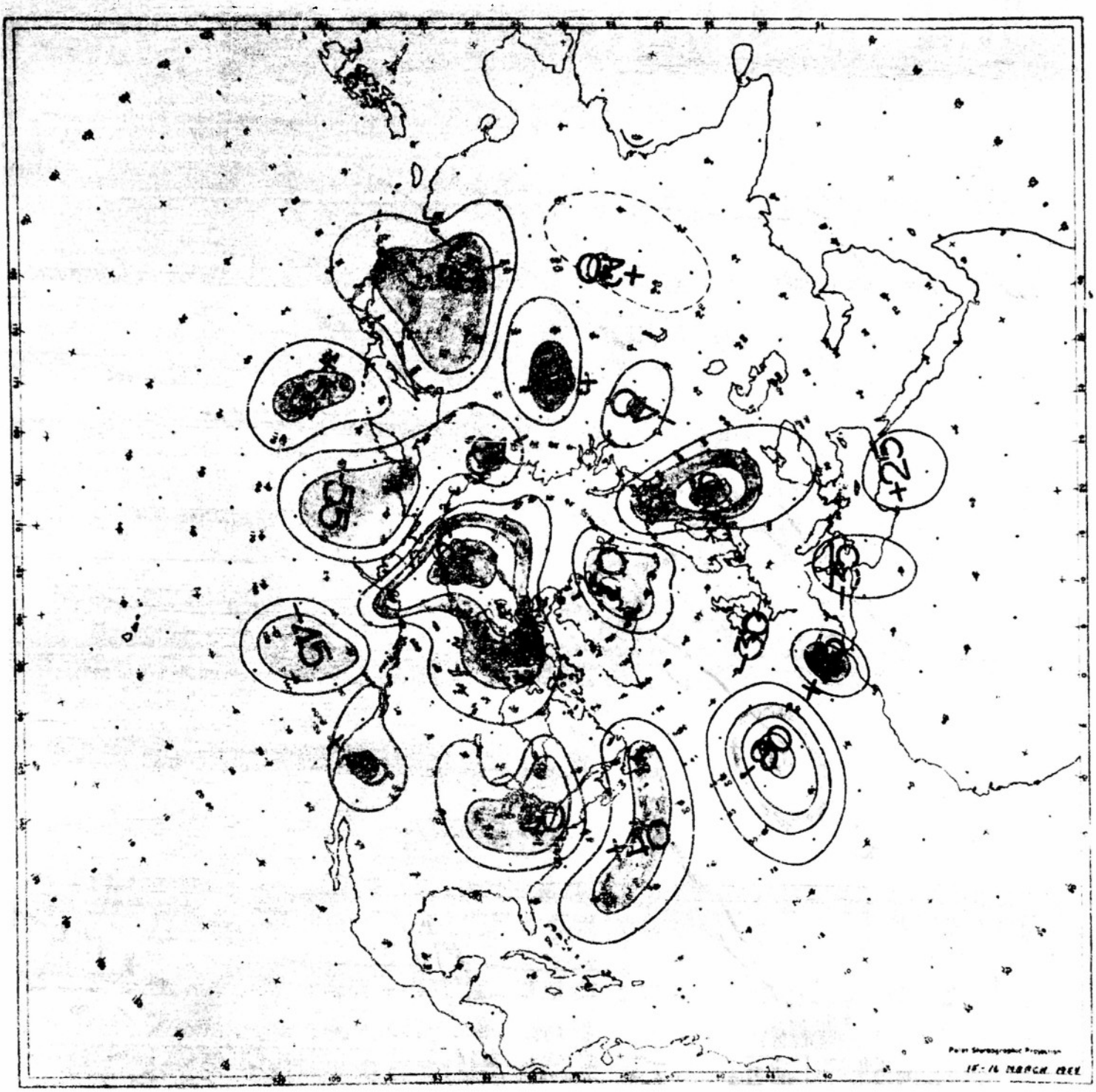
-40
+20
-25
-40
+60
-40
-45
+65
+25
-30
Polar Stereographic Projection


+20
+25
45
Polar Stereographic Projection
15-16 MARCH [illegible]