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U.S. DEPARTMENT OF COMMERCE / Environmental Science Services Administration

AD 662053

essa Technical Report

WEATHER BUREAU

WB - 3

Weekly Synoptic Analyses, 5-, 2-, and 0.4- Mb. Surfaces for 1965

STAFF, UPPER AIR BRANCH,
National Meteorological Center

SILVER SPRING, MARYLAND
August 1967

177

WEEKLY SYNOPTIC ANALYSES, 5-, 2-, AND 0.4- MB. SURFACES FOR 1965

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WB-1. Monthly Mean 100-, 50-, 30-, and 10-Millibar Charts January 1964 through December 1965 of the IQSY Period. Staff, Upper Air Branch, National Meteorological Center. February 1967.

WB-2. Weekly Synoptic Analyses, 5-, 2-, and 0.4-Mb. Surfaces for 1964 (based on observations of the Meteorological Rocket Network during the IQSY). Staff, Upper Air Branch, National Meteorological Center. April 1967.

U.S. DEPARTMENT OF COMMERCE
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ESSA TECHNICAL REPORT WB - 3

Weekly Synoptic Analyses, 5-, 2-, and 0.4- Mb. Surfaces for 1965 (based on observations of the Meteorological Rocket Network during the IQSY)

STAFF, UPPER AIR BRANCH,
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CONTENTS

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(based on observations of the
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during the IQSY)

Staff, Upper Air Branch, National Meteorological Center

1. ABSTRACT

Data from the Meteorological Rocket Network and other sources, in addition to high-level rawinsonde observations have been employed to analyze a series of 5-, 2-, and 0.4-mb. charts. Methods employed for processing the various types of data as well as the analysis procedure are described.

The broadscale analyses, primarily covering the North American and adjacent ocean areas, are presented for each week of 1965, the second year of the International Years of the Quiet Sun period. A brief discussion of the circulation and temperature patterns in the middle and upper stratosphere as indicated by the charts is also presented.

2. INTRODUCTION

The Upper Air Branch of the Weather Bureau's National Meteorological Center, with the aid of a grant from the U.S. Army Materiel Command, undertook the task of analyzing a series of constant-pressure charts based on rocketsonde and very-high-level rawinsonde data. The area of analysis is primarily North America and adjacent ocean areas and the period is the International Years of the Quiet Sun (IQSY), January 1964 through December 1965. Previous studies [7, 14, 16] demonstrated the feasibility of utilizing data from the Meteorological Rocket Network [9, 17] for the representation of circulation patterns in the upper stratosphere and lower mesosphere (the region from approximately 30 to 60 km.). However, the available data permitted the analysis of only occasional samples, which provided at best a limited view of the region.

In recent years the frequency of rocketsonde observations has increased significantly. Although data coverage for the 30- to 60-km. layer is still extremely sparse in comparison with that obtained at lower levels with the present-day rawinsonde network, it nevertheless appears to be adequate for preparation of broad-scale quasi-synoptic analyses on at least a weekly basis.

One of the analysis methods previously developed [14] for the portrayal of synoptic conditions in the upper stratosphere required a 10-mb. chart constructed from rawinsonde data to be used as a base or foundation for application of hydrostatic build-up techniques. However, the increased number of rawinsonde observations penetrating to the higher levels during the IQSY made it possible to use the 5-mb. surface as the base level for this series of charts.

The IQSY series of analyses at weekly intervals includes 5-, 2-, and 0.4-mb. (approximately 36, 42, and 55 km. respectively) charts nominally portraying synoptic conditions on each Wednesday of the analysis period. In addition to a description of the techniques and theory employed in obtaining these analyzed charts, a brief discussion of large-scale features is also included in the following presentation.

3. PROCESSING OF RAWINSONDE DATA

The preparation of high-level data for analysis presents many problems. Some of the difficulties encountered in the use of rawinsonde information, such as achieving compatibility between daytime and nighttime observations, extrapolation and interpolation of data, and identification of erroneous reports have been previously summarized [5, 6].

Temperature and height adjustments designed to compensate for instrumental radiation errors were applied to all 5-mb. rawinsonde reports. Initially an adjustment was made, which in essence reduced daytime values to the level of those reported from nighttime observations. The magnitudes of these day-night adjustments, which are intended to account for the effects of solar heating on the rod thermistor, were determined with the aid of a computer program which calculates monthly mean differences between reported daylight and darkness values. Input to this program consisted of all available 5-mb. data for 1964 from stations in North America and adjacent areas that employ United States outrigger-type radiosonde instruments.

Theoretical and laboratory studies [1, 11] of the rod thermistor used in present-day radiosondes indicate that a significant error may be induced by infrared cooling at stratospheric levels above 10 mb. Therefore a second adjustment based on estimates developed by Barr [2], was added to all 5-mb.

"nighttime" data, including observations actually in darkness as well as daytime reports that had been adjusted for solar-radiation error. The magnitude of the temperature correction is a function of reported temperature, while the height adjustment varies linearly with the temperature correction.

Rawinsonde data utilized for the 5-mb. analyses were processed by computer methods. Input to the program consisted of North America and adjacent-area observations for the 7-, 5-, 4-, and 3-mb. levels in the form of punched cards obtained from the National Weather Records Center. Output listings included all observations for one week at each station. The data for levels other than 5 mb. were also listed in order to supply the analyst with as much supplementary information as possible. Thermal winds and corresponding horizontal temperature gradients were computed for the layers from 7 to 5, 7 to 4, and 5 to 4 mb. In addition, the 5-mb. temperature and height adjustment schemes, including calculation of the required solar elevation angles, were incorporated into the system.

4. PROCESSING OF ROCKETSONDE DATA

Rocket winds and temperatures form the basis for analysis of the 2- and 0.4-mb. charts and in addition are used together with rawinsonde observations at 5 mb. The information for each week was extracted primarily from the Data Reports, Meteorological Rocket Network (MRN) Firings [8].

The basic steps in the extraction of rocketsonde information and the computation of heights for the 5-, 2-, and 0.4-mb. surfaces were as follows:

1. Temperatures observed above 40 km. with the Arcasonde 1A instrument were reduced in accordance with a recent theoretical study [3]. The magnitude of this correction increases to about 4°C. at 50 km. and 12°C. at 60 km. Published temperature data obtained by the Deltasonde generally include a correction [15] and hence were utilized without further adjustment. The great majority of observations were made with the above-mentioned instruments.

2. An initial estimate of the height field must be made before the temperature at a given constant-pressure surface can be selected. This estimate was obtained by extrapolating the trend of the height field from the analyzed charts for the previous two weeks. The selected temperature value was then utilized together with that derived from the previously completed lower-level analysis for the computation of a layer-mean temperature.

3. Heights for the upper surface were computed hydrostatically with the aid of the mean temperature obtained as described above.

4. Since the analyses are intended to portray synoptic-scale features, portions of wind component profiles that exhibited rapid oscillations in the vertical were smoothed.

5. Wind components were extracted from the profiles at the height of the constant-pressure surface and a resultant wind was computed.

6. Thermal winds were determined for 6-km. layers surrounding each pressure surface.

5. ANALYSIS PROCEDURE

Conventional techniques, including differential analysis methods, were utilized to construct the 5-, 2-, and 0.4-mb. charts. The analysis system consisted of the following steps:

1. Isotherms were derived with the aid of processed temperatures and the computed thermal winds. Where possible, time-height sections of temperature were plotted as a further aid in deriving the isotherms.

2. A mean temperature field within the layer between the previously analyzed lower surface and the selected surface was derived graphically. This mean field represents a geopotential thickness, which when added to the lower-level height field, yields a smooth, conservative first approximation to the contour pattern at the upper surface. Daily 10-mb. charts, analyzed by a computerized system [4], were employed for the 5-mb. build up.

3. Reported winds and computed heights for individual stations were used to adjust the first approximation of the contour field. Winds were accorded the highest priority for this adjustment.

4. The analysis was checked for vertical and temporal consistency. For example, centers of systems, as well as ridges and troughs were examined with the aid of all available data to verify vertical slope and movement with time. Time-height sections and height-change charts were especially useful for these purposes.

The above procedures appear to produce excellent results at 5 mb. and were successfully applied to obtain the 2- and 0.4-mb. charts. Generally, only slight adjustments of the first approximation height fields were necessary at the 5- and 2-mb. levels. However, rather formidable analysis problems were evident at the 0.4-mb. level. Foremost among these was the sparsity of observations. The area of analysis presented in the charts at the higher levels has thus been reduced in accordance with the available data. Another difficulty was the apparent occurrence of large day-to-day temperature changes, at times exceeding 10°C., as well as rapid oscillations within many wind profiles. In some cases, deviations of reported temperatures and winds from the fields derived by differential analysis techniques could be accounted for by obvious synoptic changes. Occasionally, it was impossible to make a reasonable reconciliation of station values with the values determined by differential analysis.

A further analysis problem arises from the apparent intersection of the stratopause with the 0.4-mb. level. Since the normal stratospheric temperature inversion ceases at the stratopause level, the graphical method for obtaining mean temperature, which depends on the existence of a linear profile, is no longer valid. Thus, especially at lower latitudes, adjustments must be made in the computed heights.

In the course of analysis of charts for summer, an additional problem became apparent. During that season the circulation at the upper surfaces (2 and 0.4 mb.) would be expected to follow the pattern established for lower levels, i.e. rather uniform easterly flow about an anticyclone centered at or very near the pole. However, on a typical summertime 0.4-mb. chart, the majority of the reported rocketsonde winds exhibit significant southerly components. If these winds were to be given full weight in the analysis, the resulting pattern would consist of contours oriented from southeast to northwest, spiraling toward a high center located, apparently, over northern Europe.

The prevalence of positive meridional components in summertime rocketsonde winds has been noted previously [10]. Recent studies [12, 13] utilizing MRN data for several summers have demonstrated that the meridional wind component due to the diurnal tide reaches maximum southerly strength about noon, local time. Since most MRN firings occur near noon, the measured winds naturally contain this component. The adjustment to compensate for the effects of the diurnal variation is therefore most noticeable on the summertime charts.

Although careful consideration of high-level data allows a broad-scale depiction of circulation patterns up to 0.4 mb., the sparsity of reports requires an increasing amount of subjectivity as the analysis proceeds to this high level. As yet the analyst has little in the way of synoptic models for guidance with respect to the probable contour and isotherm patterns and the phase relationship between them in areas of sparse data. In spite of these factors, surprisingly little alteration in the principal features of the circulation and temperature distribution shown in the final analysis can be made without inordinately violating some of the data. Even so, the same degree of accuracy that is customarily found in the analysis of charts at lower levels should not be expected in these maps. In general, the values with which contours and isotherms are labelled and the spacing between them are only approximations.

It was not convenient to use the same contour interval throughout the year. During the winter months, the intense westerlies necessitated the use of 320-geopotential meter contour intervals, but a 160-gpm. interval was sufficient to depict the more moderate summer easterlies. In addition, intermediate dashed contours were used to outline areas of relatively weak gradient, especially during the spring and fall changeover periods. The changes in contour interval, as indicated by a legend in the lower right-hand corner of each chart, show the changes in intensity of circulation from season to season and from one level to another. Isotherms are drawn and labelled at 5°C. intervals at all levels throughout the year. The "Station Model and Reporting Rocket Stations" chart (p. 17) illustrates the way reported winds and temperatures on days closest to map-time have been plotted on these maps.

6. DISCUSSION of 1965 CHARTS

The stratospheric circulation during the first week of January 1965 was dominated by a typical cold polar cyclone centered over northern Greenland. An increase in the extent of this system with increasing altitude is shown in the general southward slope of the subtropical ridge line. A second major feature in the middle and upper stratosphere was the well-developed Aleutian anticyclone. The data indicated that this system, which was located over the Kamchatka region at 5 mb., sloped westward and off the map area with increasing height.

Large temperature changes appeared to take place at the higher levels during January, and the movement of several centers could be traced. For example, on January 6 at 0.4 mb., there were indications from reported temperatures that warm air was located over central Canada while a cold center was situated west of Alaska. This configuration was supported by the thermal wind field computed for that level. Observations for the following two weeks, including data from West Geirinish, Scotland, outlined a substantial eastward movement of both centers. The changes also could be seen, but to a lesser degree, at 2 mb.

The polar cyclone reached maximum winter intensity shortly after mid-January and subsequently began filling. At the same time, maximum winter westerlies were observed at the higher altitudes over middle-latitude stations. During the first week in February, the Aleutian anticyclone intensified somewhat, and was accompanied by an elongation of the polar trough. The pronounced trough line over North America was outlined by the wind profiles observed at Pt. Mugu and White Sands on February 3. The plotted winds show that the trough line was located between the two stations at the 5- and 2-mb. levels but sloped northward with increasing height.

Reported winds over North America at all levels decreased in intensity during February and early March, suggesting that the polar vortex was diminishing in strength. It is difficult to ascertain the timing of events which led to the vernal transition since the charts are restricted in areal coverage. Therefore, the transition will be briefly described with respect to the 10-mb. surface, for which hemispheric analyses were available. With the sequence of events at this level in mind, the changes shown by the higher-level charts can be readily understood.

During early March, stratospheric charts at 10 mb. and lower levels indicated a fairly common circulation feature consisting of a hemispheric ridge line that spiraled northeastward from the Caribbean area, through northern Africa to a position near Alaska. Several anticyclonic centers could be traced moving northeastward along the axis of the ridge. At the same time, a steady intensification was evident in an anticyclone located over the Kamchatka region, with this system becoming quite intense by March 17. Within the following week, the polar vortex became elongated and split into two segments. The portion over the western United States filled rapidly, while the other segment and its associated cold air moved from Greenland to a position over northern Canada. The warm air associated with the anticyclone soon spread over the polar region.

The circulation changed rapidly during the first few weeks in April. For a brief period in the middle of the month, a cyclone again dominated the polar area, but this system was small in size compared to the mid-winter vortex. The cyclone was short-lived, and by the end of April the summertime anticyclone was firmly established over the Pole. As the area of influence of the anticyclonic easterlies expanded, the remnants of the polar vortex drifted southward, finally disappearing by the last week in May.

As can be seen by the charts at all levels, the polar anticyclone intensified steadily throughout the month of June, reached a peak in mid-July, and then slowly diminished in strength. Greatest wind speeds were reported over middle-latitude stations at the highest level. In addition to the meridional components primarily associated with the diurnal effect (especially at 0.4 mb.), many of the reported winds at the various levels deviated from easterly by

10 to 30 degrees, suggesting the existence of small-scale perturbations within the dominant easterly flow. The sparsity of observations unfortunately precluded a definition of the smaller features within this relatively stable circumpolar circulation pattern.

A definite relaxation of the high latitude temperature gradient was apparent during August. Initial evidence of the breakdown of the summer circumpolar easterlies was given by occasionally observed changes of the rocket and rawinsonde wind directions from easterly to southerly at the highest-latitude stations. By September 1, cyclonic circulation had developed in the Alaskan area and within a week the thermal gradient had reversed with the coldest air located in the polar region. As the cooling polar vortex expanded, the vestiges of anticyclonic circulation formed a nearly zonal ridge line which migrated southward. Early in October this ridge line reached low latitudes at 5 mb. and appeared to slope rather sharply to the south with altitude.

Steady cooling and deepening of the polar vortex continued on the European side of the Northern Hemisphere. However, the temperatures remained fairly constant in the area of the western Pacific, resulting in relatively high heights. Anticyclonic development in the Aleutian area commenced late in October and continued during November.

From late November through December a substantial change in the thermal and contour patterns occurred in the area covered by the maps. Although not a hemispheric "sudden stratospheric warming" as found in such winters as 1957, 1958 and 1963, it is of sufficient interest to merit further study. Only brief comments will be made here. In the initial stage, the Aleutian anticyclone began moving eastward over Alaska at the beginning of December, and continued until reaching central Canada. The system moved north and eastward over northern Canada, Greenland, and then over Europe. In conjunction with this movement, the polar vortex drifted eastward across northern Scandinavia and Siberia. As the anticyclone dissipated over Europe at the end of December, the vortex resumed a near-polar position. By the end of December, the Aleutian anticyclone was again evident in the Pacific area.

The large-scale changes that occurred during 1965 may be seen in the time sections (Figs. 1-5) of analyzed height and temperature values extracted from the weekly charts. The annual range of values was greatest at the highest-latitude stations and decreased at lower latitudes. Changes in the height field had the greatest amplitude at the highest level, as may readily be seen in the very steady increases during the summer. Major wintertime disturbances at Ft. Greely and Ft. Churchill were associated with pulsations of the Aleutian anticyclone. However, at lower latitude stations, perturbations of smaller magnitude were in evidence.

Fig. I — FORT GREELY, ALASKA

(64°00'N — 145°44'W)

ANALYZED VALUES EXTRACTED FROM WEEKLY 5-, 2-, and 0.4-MB CHARTS

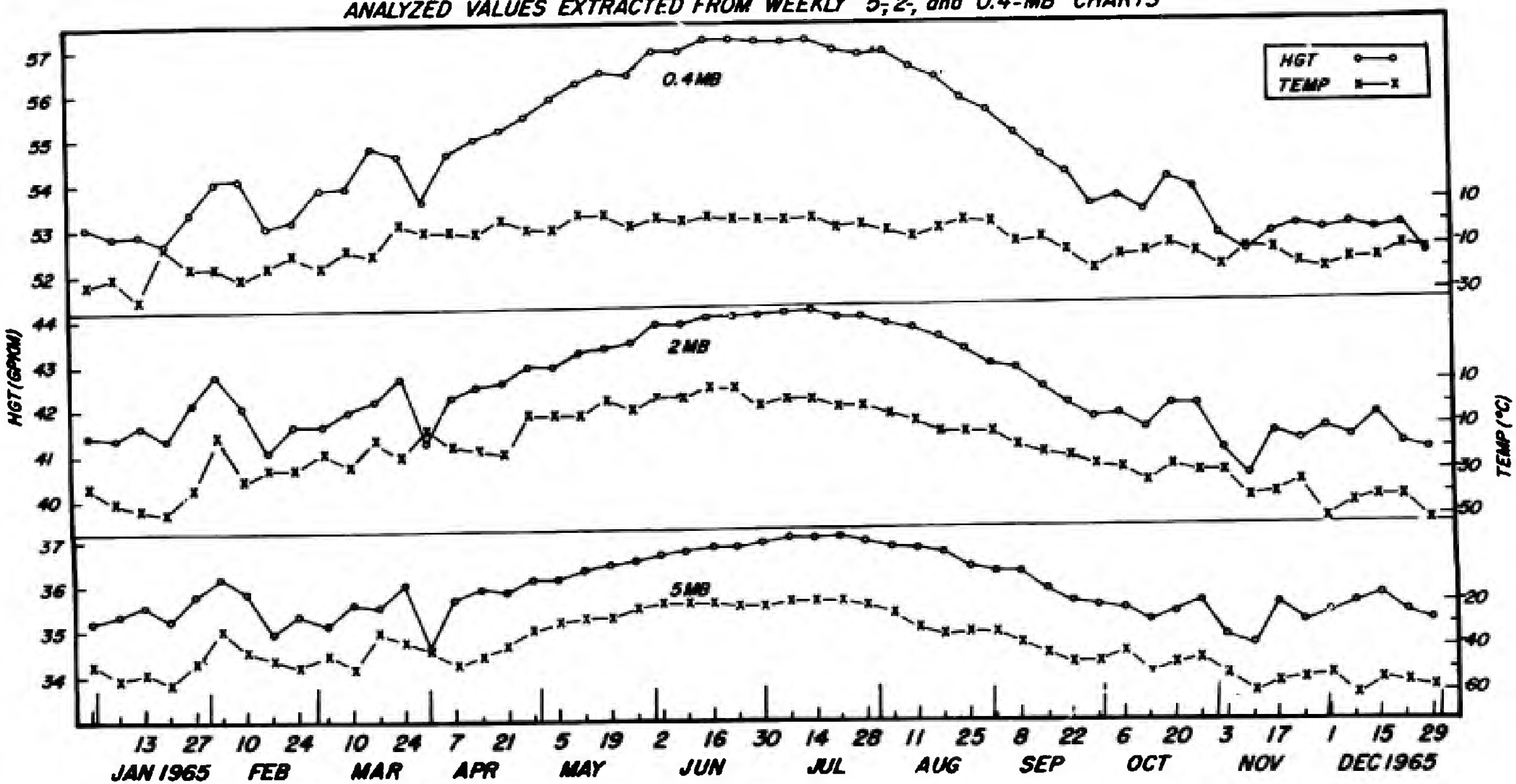


Fig. 2 — FORT CHURCHILL, CANADA
(58°44'N — 93°49'W)
ANALYZED VALUES EXTRACTED FROM WEEKLY 5-, 2-, and 0.4-MB CHARTS

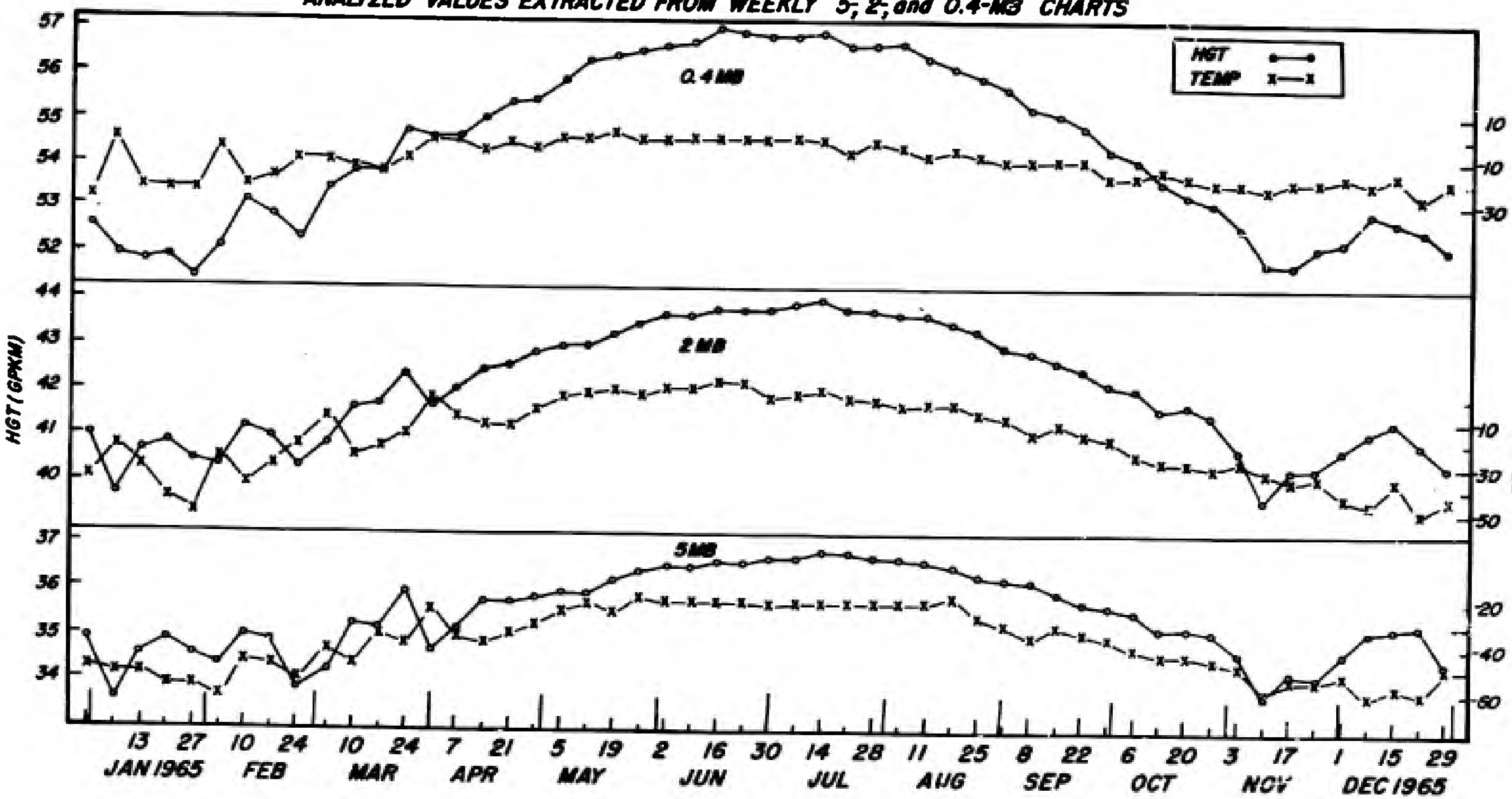


Fig. 3 — WALLOPS ISLAND, VA
(37°50'N-75°29'W)
ANALYZED VALUES EXTRACTED FROM WEEKLY 5-, 2-, and 0.4-MB CHARTS

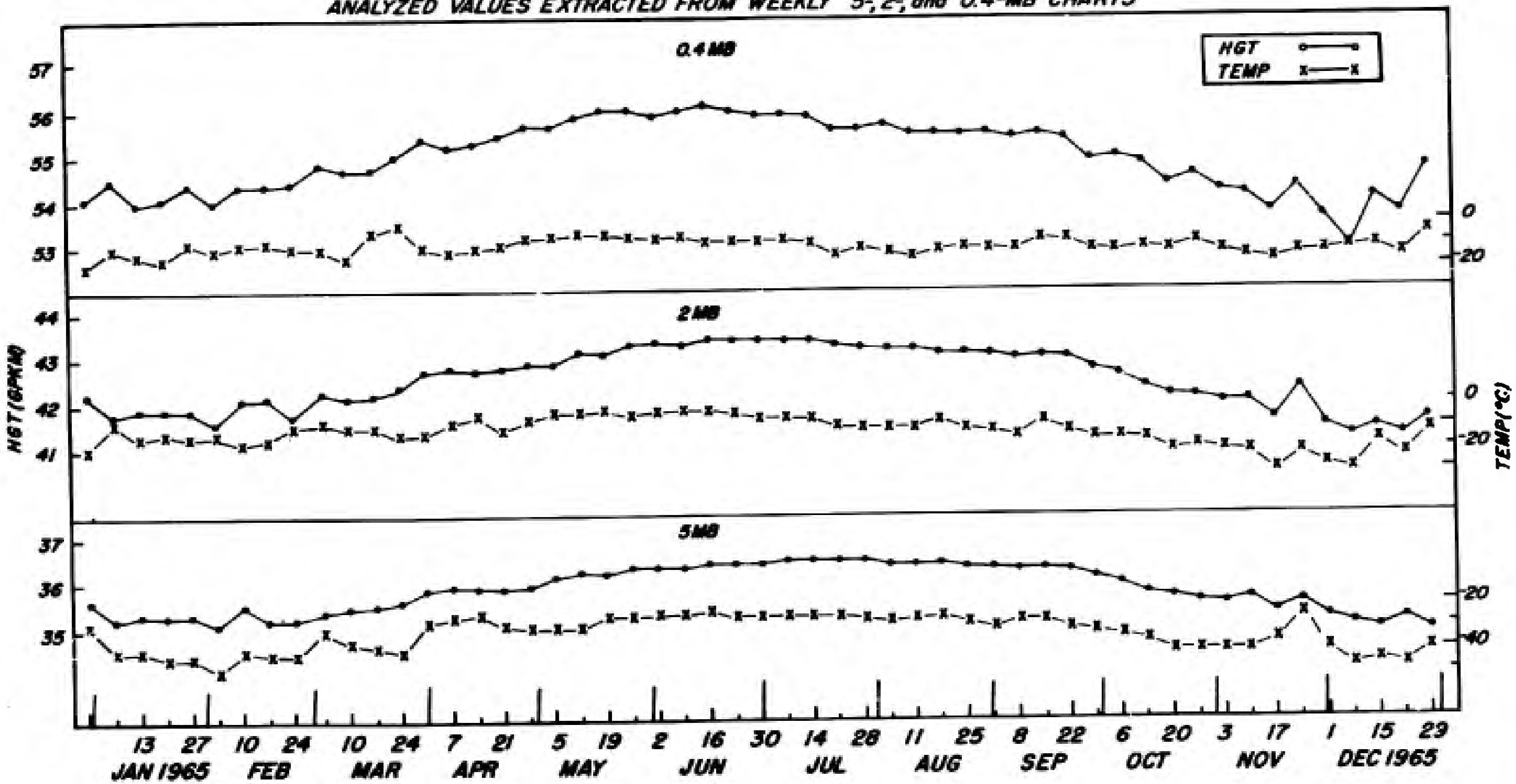


Fig. 4 — WHITE SANDS, N.MEX.

(32°23'N – 106°29'W)

ANALYZED VALUES EXTRACTED FROM WEEKLY 5-, 2-, and 0.4-MB CHARTS

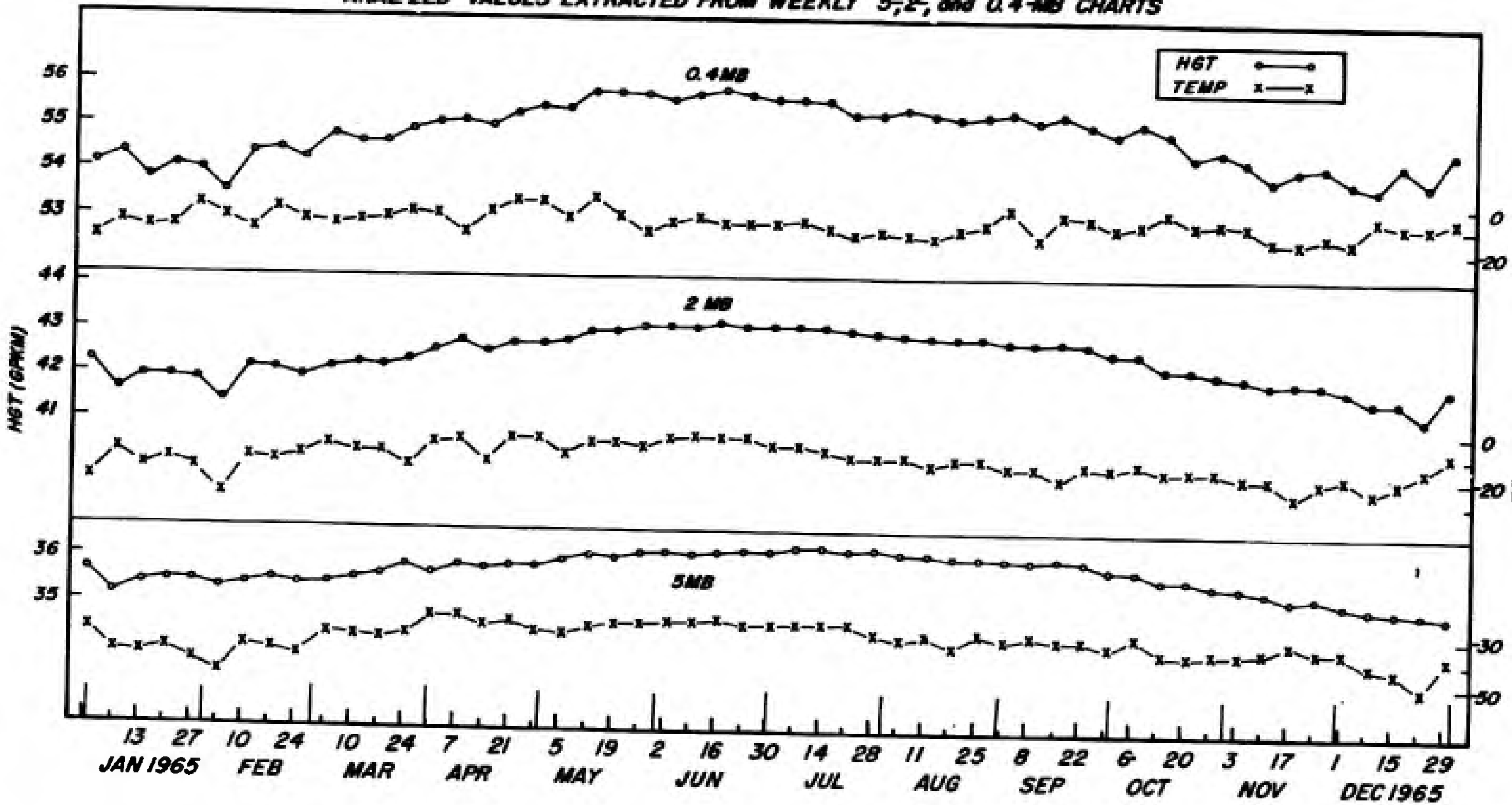
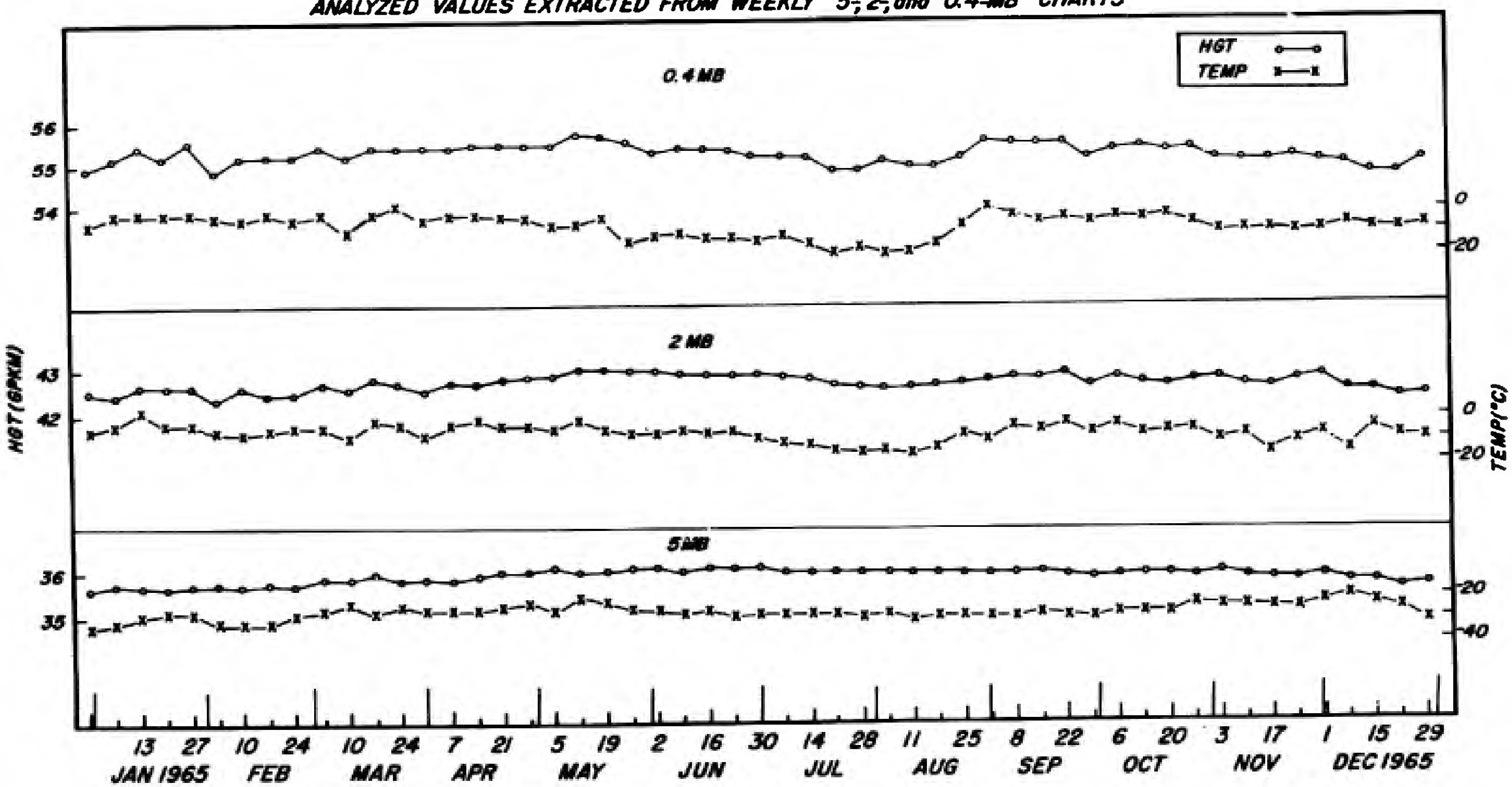


Fig. 5 — ANTIGUA, B.W.I.
(17°09'N – 61°47'W)

ANALYZED VALUES EXTRACTED FROM WEEKLY 5-, 2-, and 0.4-MB CHARTS



7. ACKNOWLEDGMENTS

Funds for the analysis of the map series were provided by the U.S. Army Materiel Command. Much of the research leading to the construction of the charts was accomplished under the auspices of the National Aeronautics and Space Administration, the Naval Air Systems Command, and the National Science Foundation.

This series of charts was initiated through the efforts of Dr. Sidney Teweles, ESSA, Weather Bureau and Mr. Willis L. Webb, White Sands Missile Range.

Weather Bureau personnel actively engaged in the analysis project were:

Project Manager - Frederick G. Finger

Research Consultants - H. M. Woolf, A. J. Miller, and C. E. Anderson

Project Analysts - M. E. Gelman and L. J. Hortch

Data Processing - L. P. Mannello, J. A. Booth and S. F. Wilkes

Computer Operations - K. W. Johnson, W. P. Townshend, and J. H. Yeakel

Report Coordinator - Melvyn E. Gelman.

Acknowledgment is made to members of the Atmospheric Sciences Laboratory, White Sands Missile Range, for supplying rocket data in a format suitable for computer processing.

8. REFERENCES

1. R. W. Armstrong: "Improvement in Accuracy of the ML-419 Radiosonae Temperature Element for Heights Above 50,000 Feet and Up to 150,000 Feet," Technical Report ECOM-2634, U.S. Army Electronics Command, Fort Monmouth, New Jersey, 1965, 55 pp.

2. W. Barr: "Corrections of Radiational Error of Radiosonde Temperature Measurements in the Stratosphere," U.S. Army Electronics Command, Fort Monmouth, New Jersey, 1966 (personal communication).

3. W. A. Drews: "Final Report on Research and Development to Improve Temperature Measurements at High Altitudes," TR-PL-8876, Atlantic Research Corporation, Alexandria, Virginia, 1966.

4. Environmental Science Services Administration: "Daily 100-, 50-, 30-, and 10-Millibar 1200 GMT Synoptic Weather Maps of the IQSY Period," National Weather Records Center, Asheville, North Carolina, 1966 (microfilm).

5. F. G. Finger, H. M. Woolf, and C. E. Anderson: "A Method for Objective Analysis of Stratospheric Constant-Pressure Charts," Monthly Weather Review, vol. 93, No. 10, Oct. 1965, pp. 619-638.

6. F. G. Finger, H. M. Woolf, and C. E. Anderson: "Synoptic Analyses of e 5-, 2-, and 0.4-Millibar Surfaces for the IQSY Period," Monthly Weather Review, vol. 94, No. 11, Nov. 1966, pp. 651-661.

7. T. J. Keegan: "Synoptic Patterns at 100,000 to 200,000 Feet," Air Force Surveys in Geophysics No. 140, Air Force Cambridge Research Laboratories, Bedford, Mass., 1962, pp. 195-210.

8. Meteorological Rocket Network Committee: "Data Report of the Meteorological Rocket Network Firings," IRIG Document 109-62, vols. 29-52, White Sands Missile Range, New Mexico, 1965-1966.

9. Meteorological Rocket Network Committee, ed.: "The Meteorological Rocket Network," IRIG Document 111-64, White Sands Missile Range, New Mexico, 1965.

10. B. T. Miers and N. J. Beyers: "Rocketsonde Wind and Temperature Measurements Between 30 and 70 Km for Selected Stations," Journal of Applied Meteorology, vol. 3, No. 1, Feb. 1964, pp. 16-26.

11. E. P. Ney, R. W. Maas, and W. F. Huch: "The Measurement of Atmospheric Temperature," Journal of Meteorology, vol. 18, No. 1, Feb. 1961, pp. 60-80.

12. R. J. Reed, D. J. McKenzie, and J. C. Vyverberg: "Further Evidence of Enhanced Diurnal Tidal Motions Near the Stratopause," Journal of the Atmospheric Sciences, vol. 23, No. 2, March 1966, pp. 247-251.

13. R. J. Reed, D. J. McKenzie, and J. C. Vyverberg: "Diurnal Tidal Motions Between 30 and 60 Km in Summer," Journal of the Atmospheric Sciences, vol. 23, No. 4, July 1966, pp. 416-423.

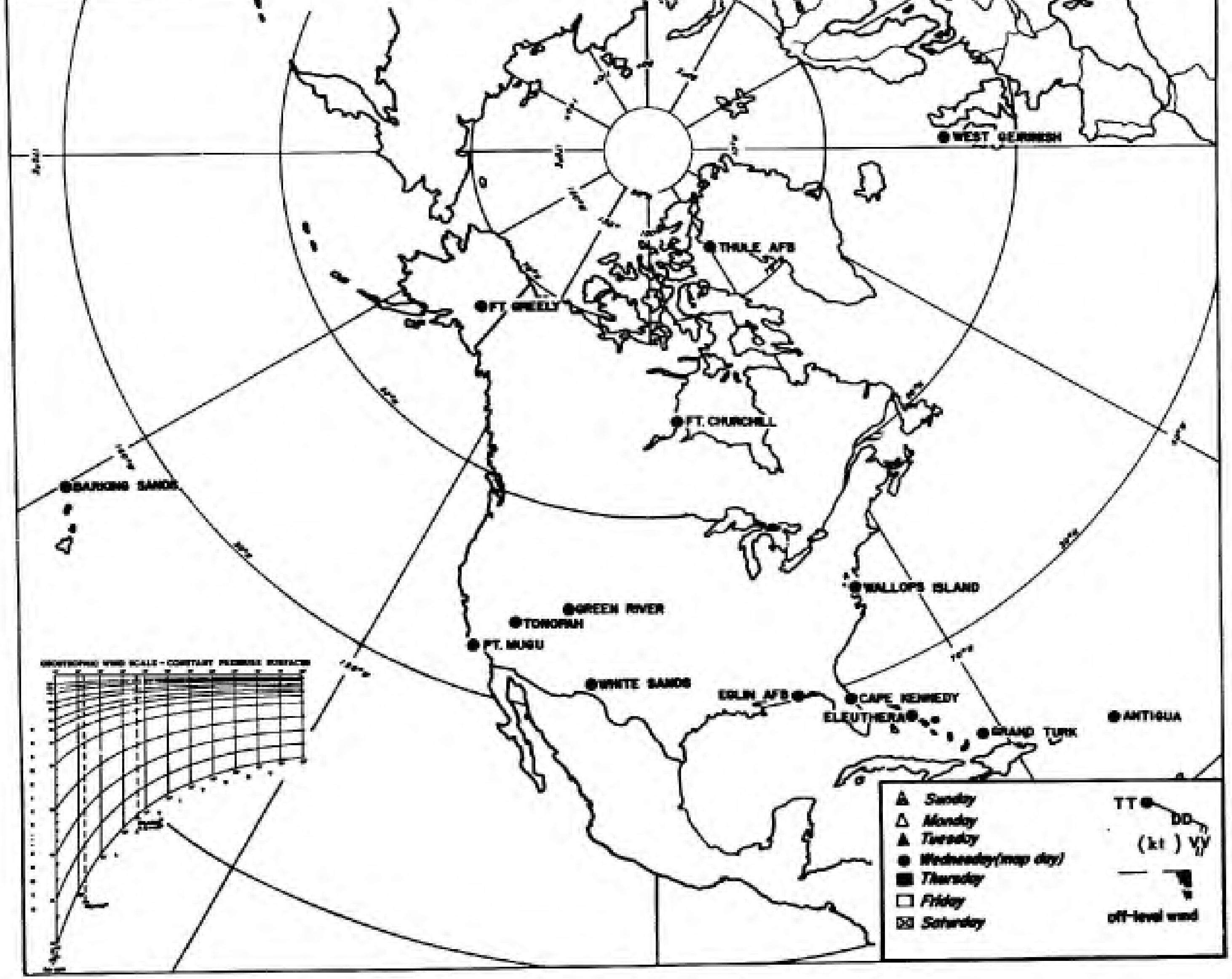
14. S. Teweles: "Application of Meteorological Rocket Network Data," NASA SP-49, National Aeronautics and Space Administration, Washington, D.C., 1964, pp. 15-35.

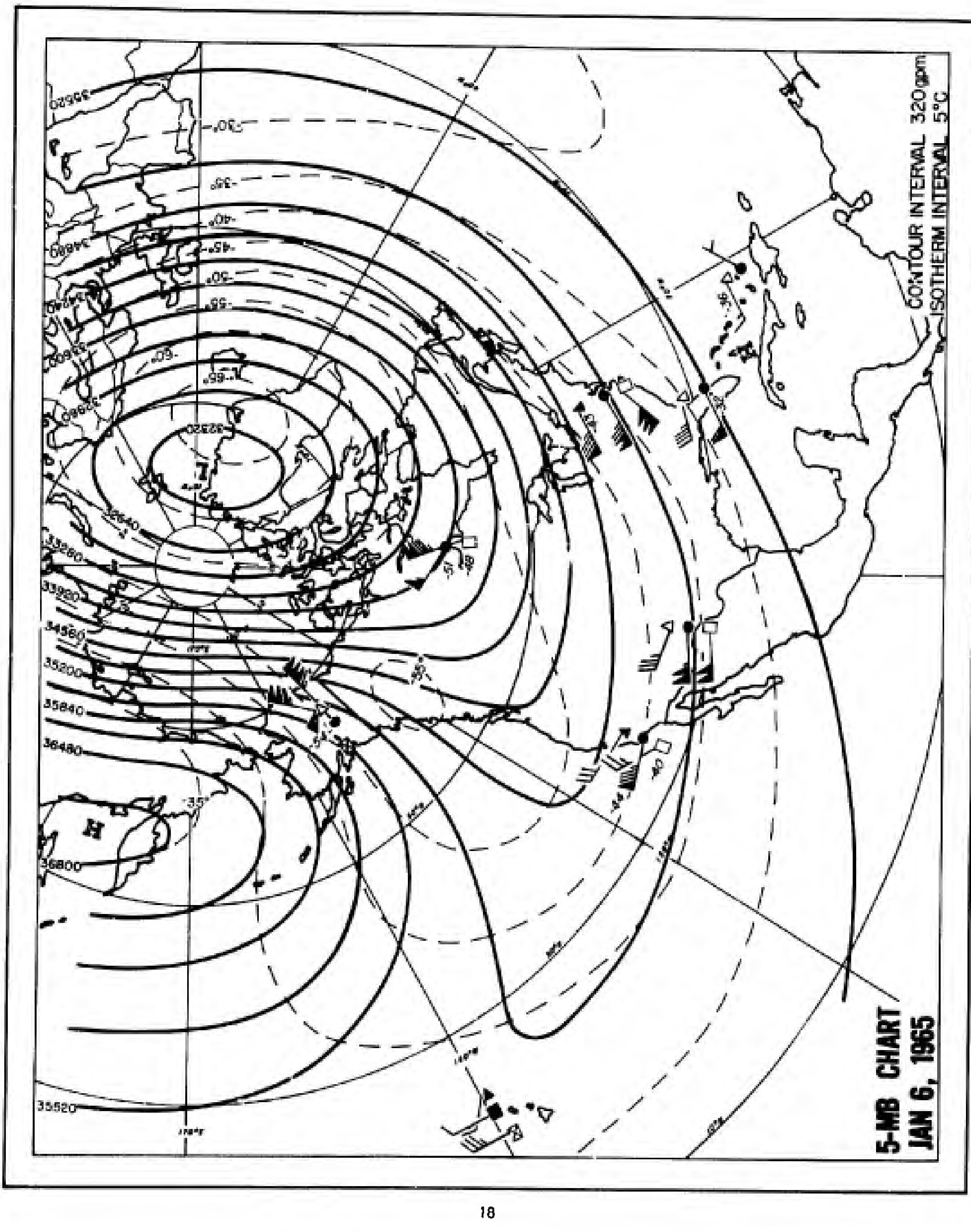
15. N. K. Wagner: "Theoretical Accuracy of a Meteorological Rocketsonde Thermistor," Journal of Applied Meteorology, vol. 3, No. 4, Aug. 1964, pp. 461-469.

16. G. Warnecke: "Eine synoptische Hohenwetterkarte für das 0.5 mbar-Niveau vom Sommer 1960," Berliner Wetterkarte, Beil. 37, 1961.

17. W. L. Webb, W. I. Christensen, E. P. Varner, and J. F. Spurling: "Inter-Range Instrumentation Group Participation in the Meteorological Rocket Network," Bulletin of the American Meteorological Society, vol. 43, No. 12, Dec. 1962, pp. 640-649.

STATION MODEL AND REPORTING ROCKET STATIONS

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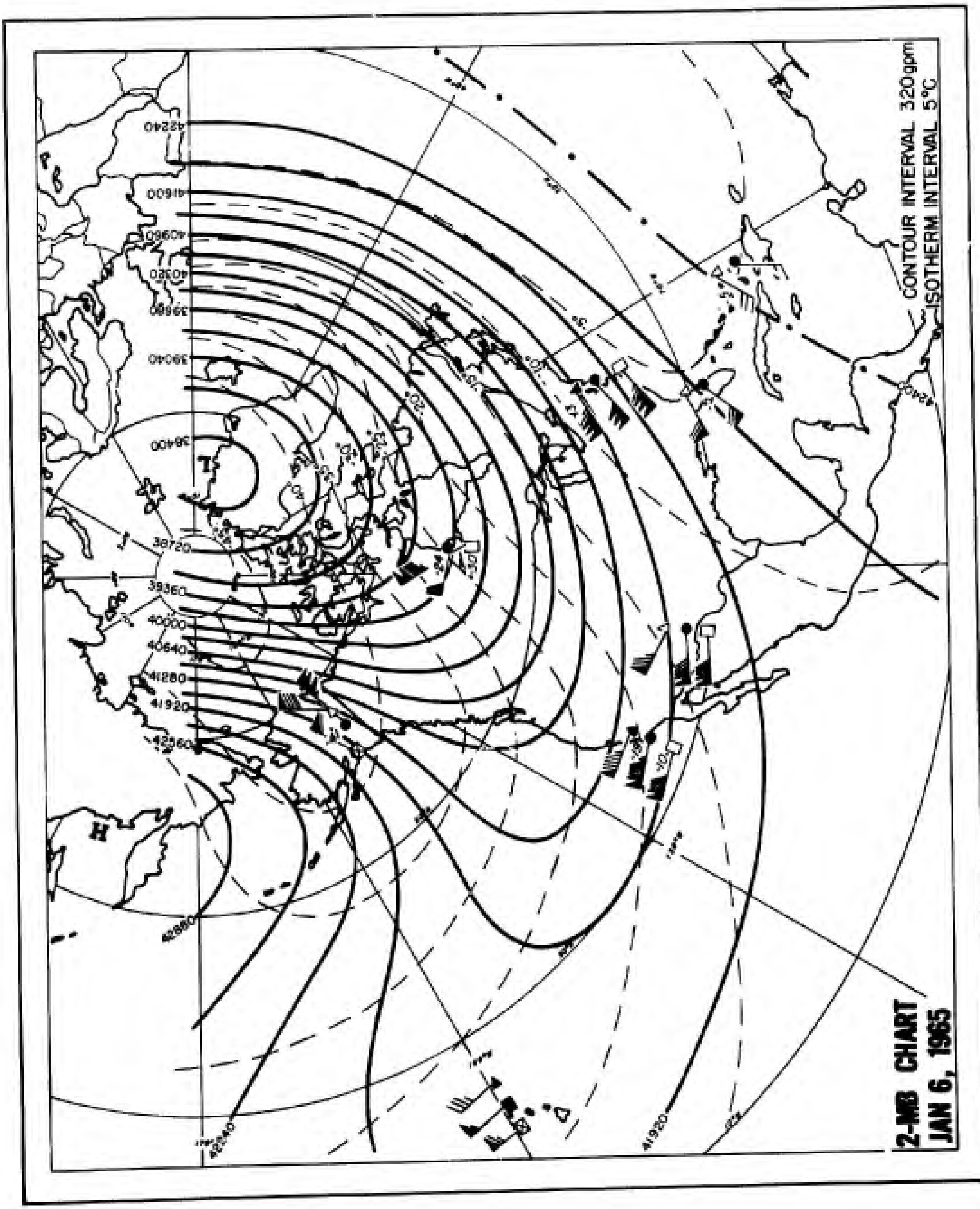
36800
35520



2-MB CHART
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ISOTHERM INTERVAL 5°C
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41600
40960
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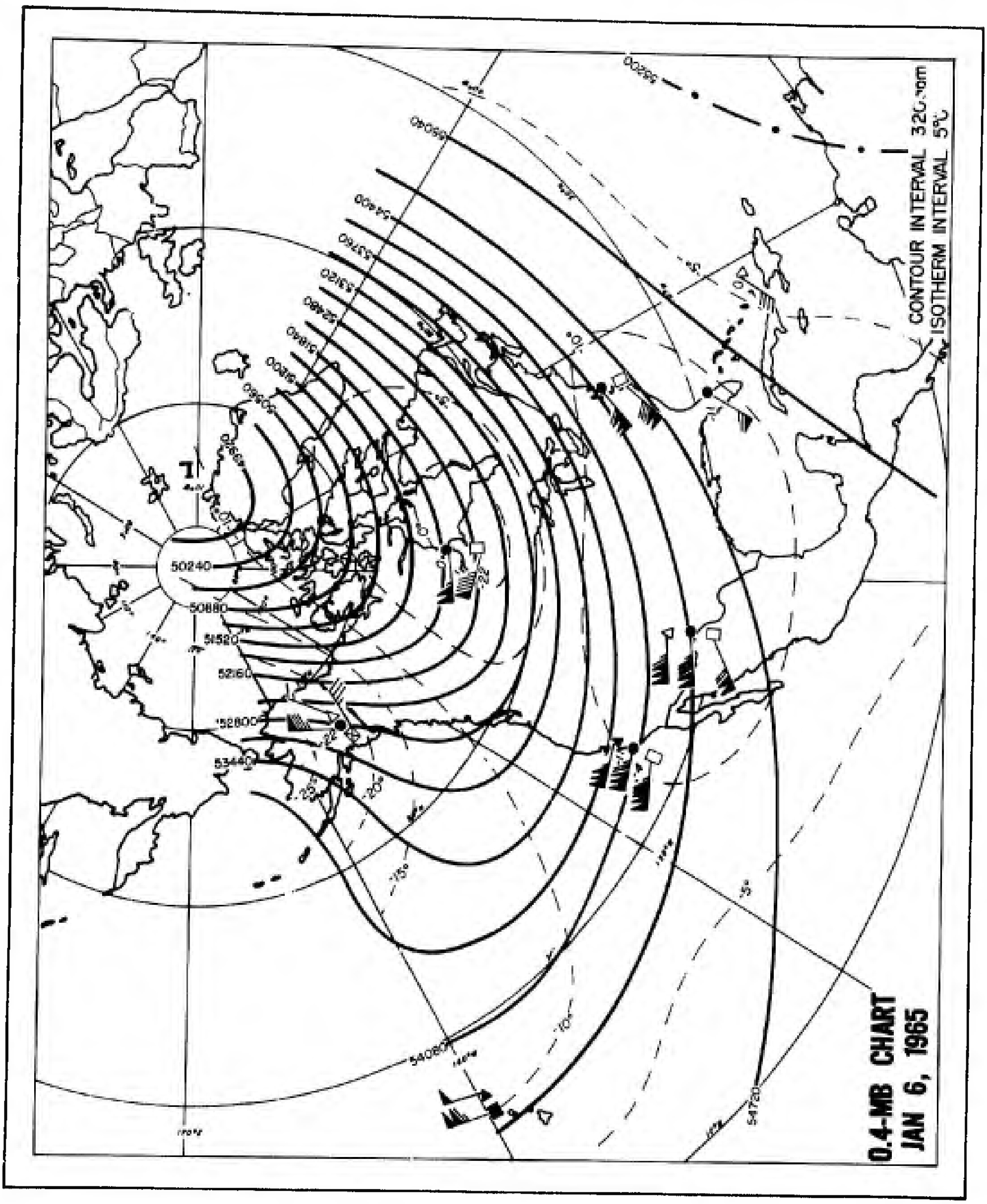
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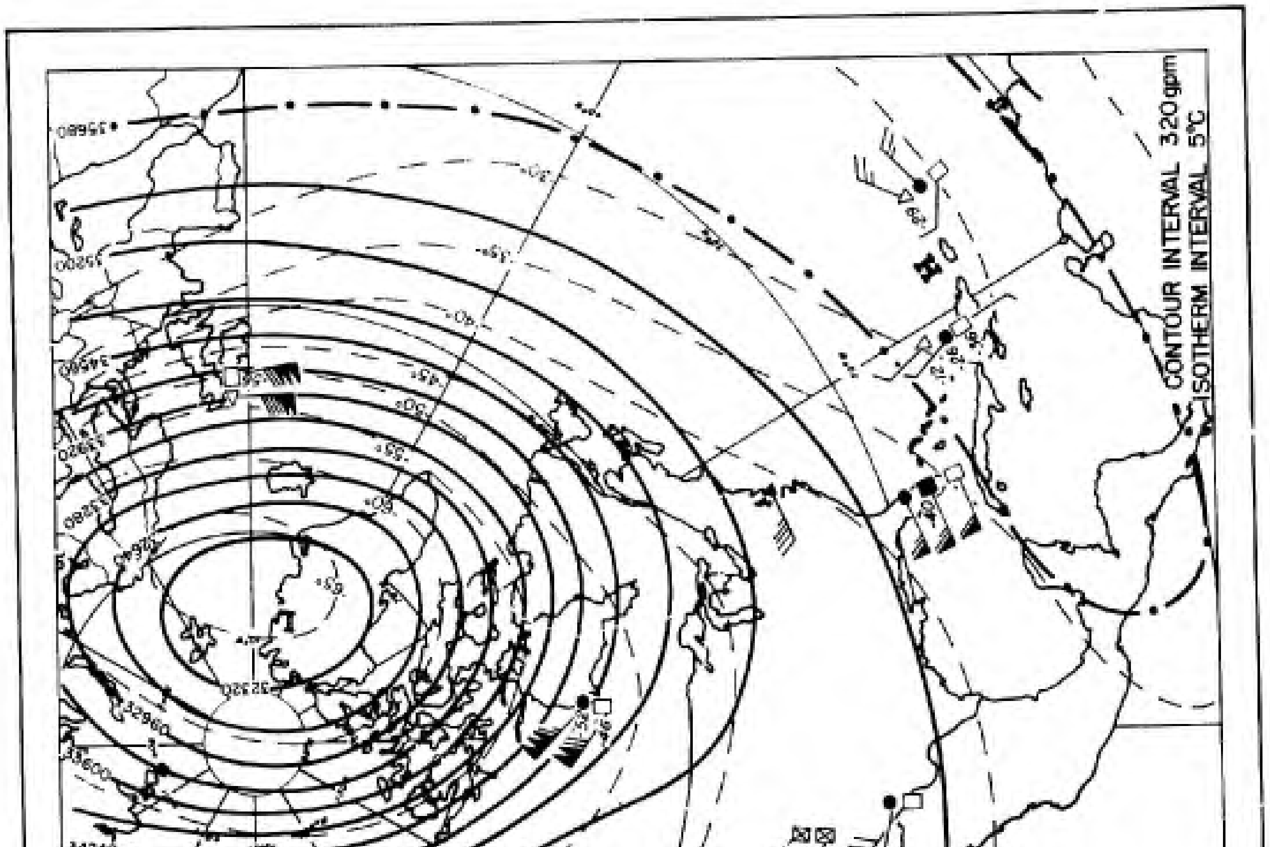
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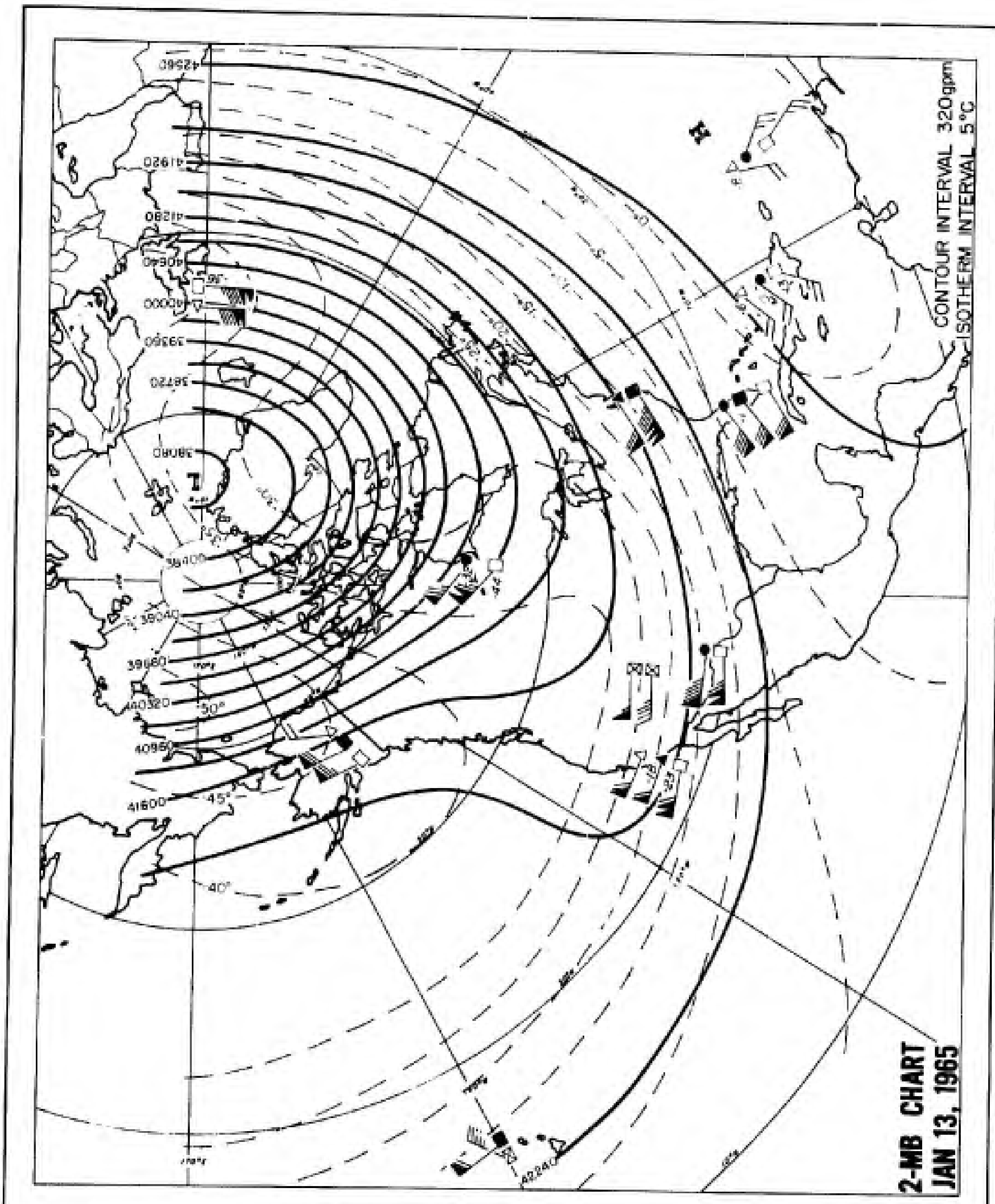
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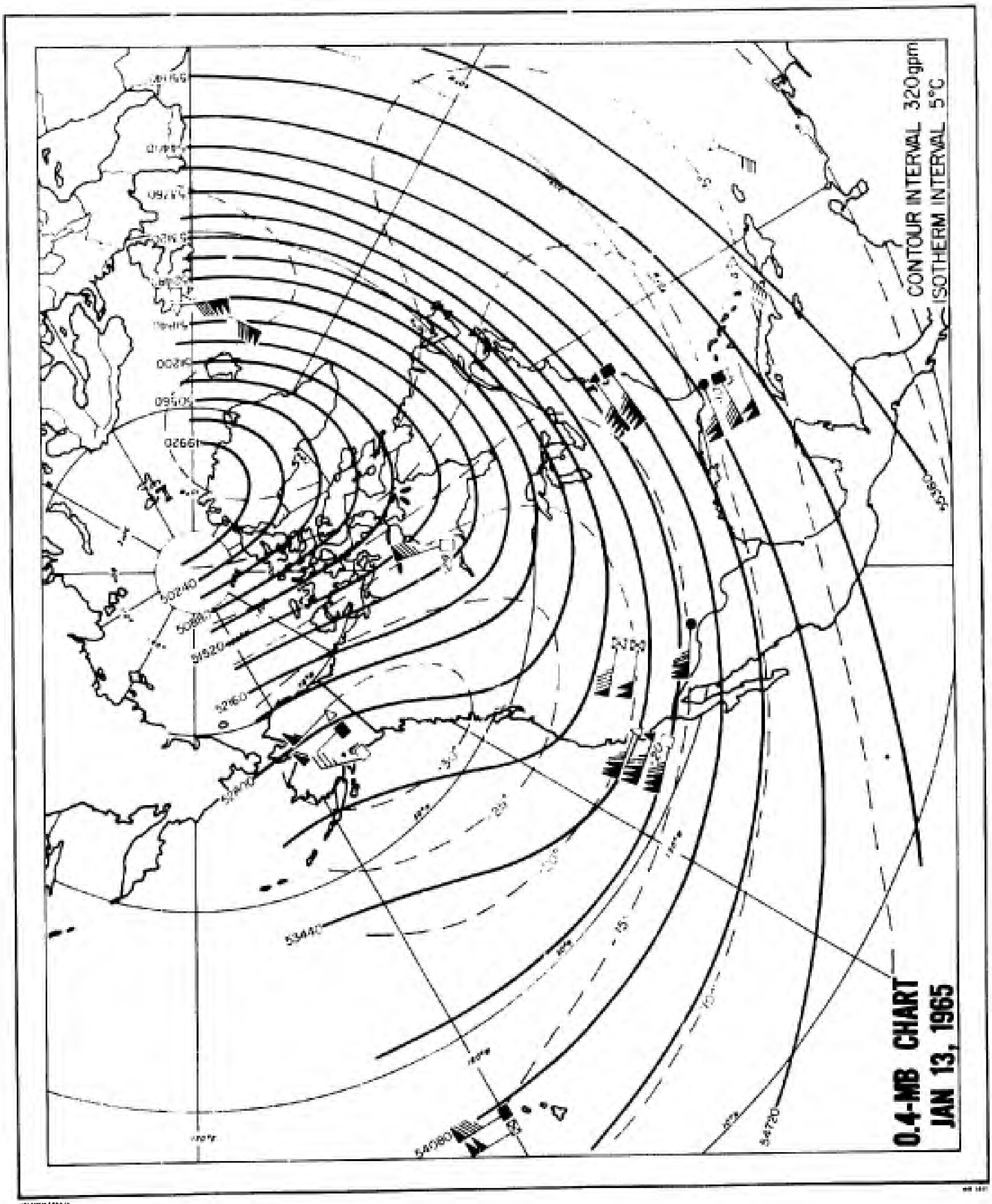
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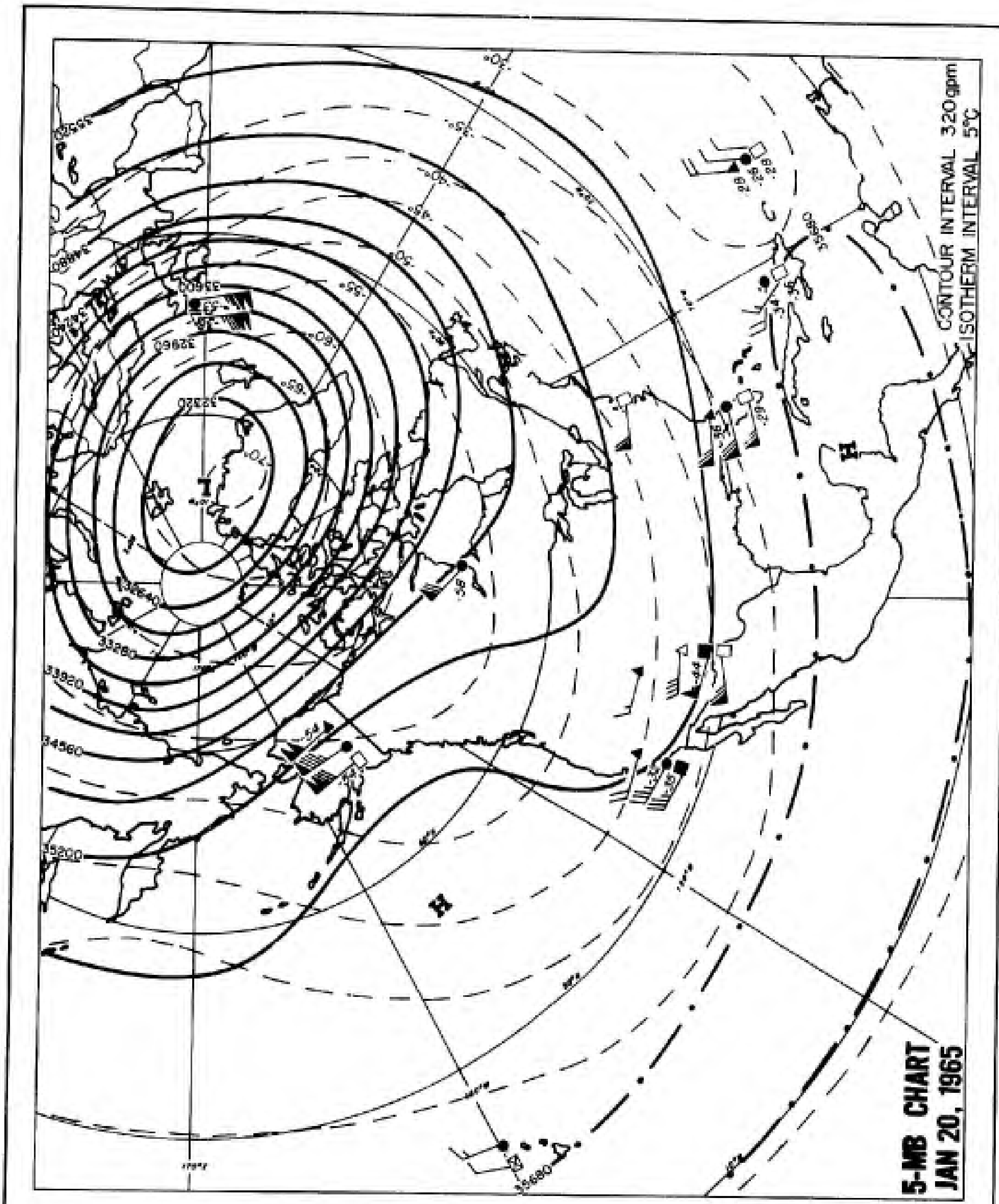
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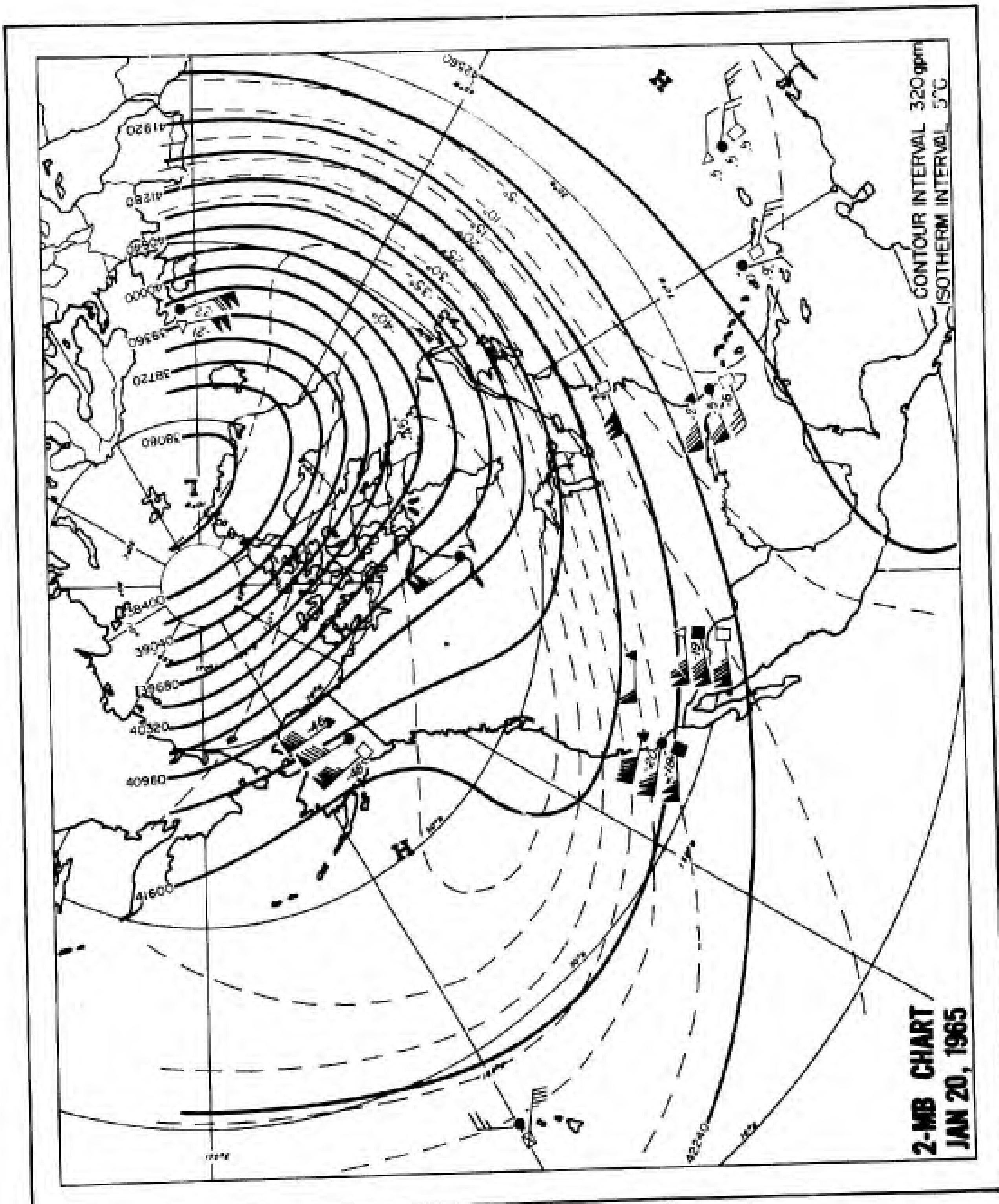
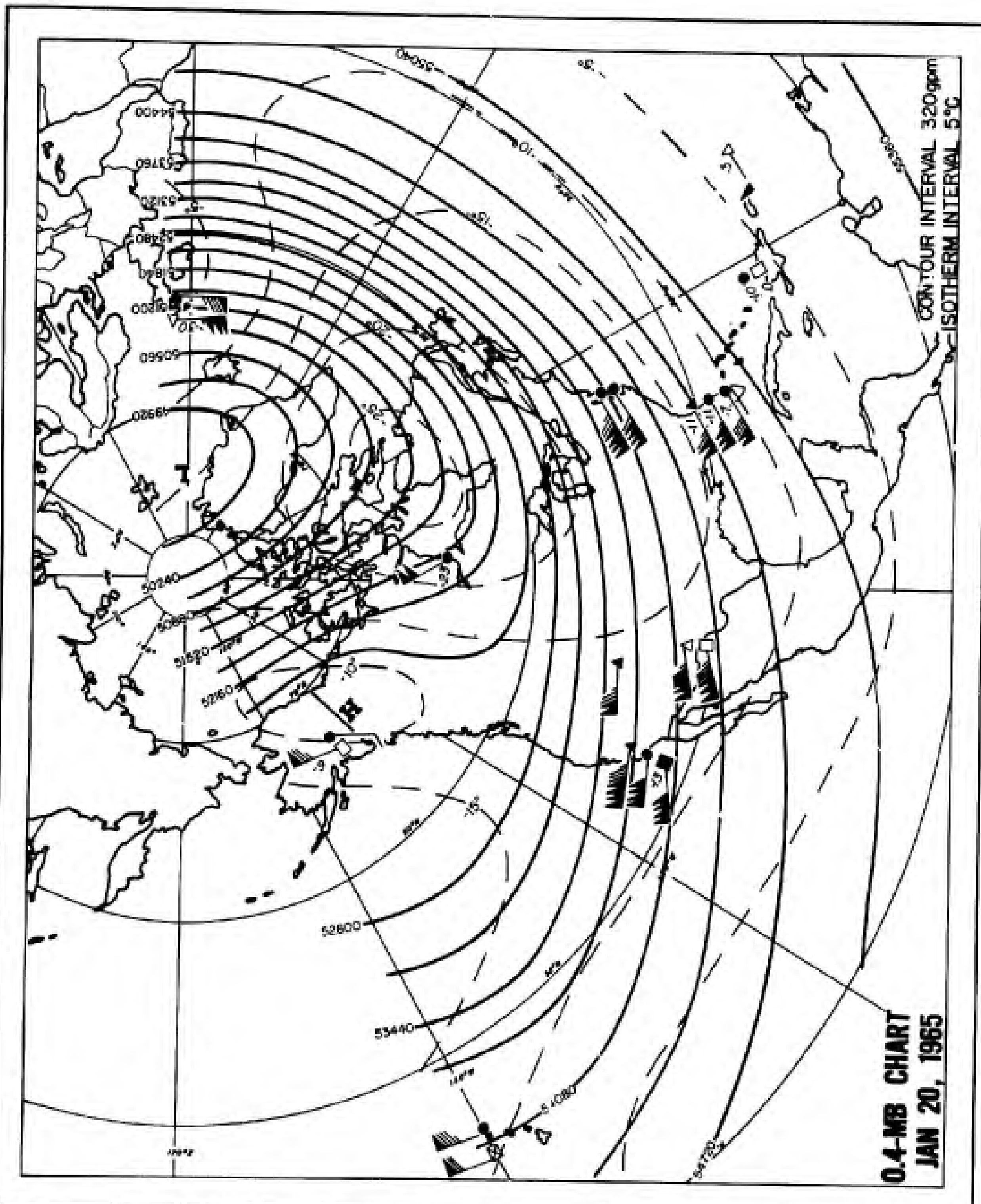
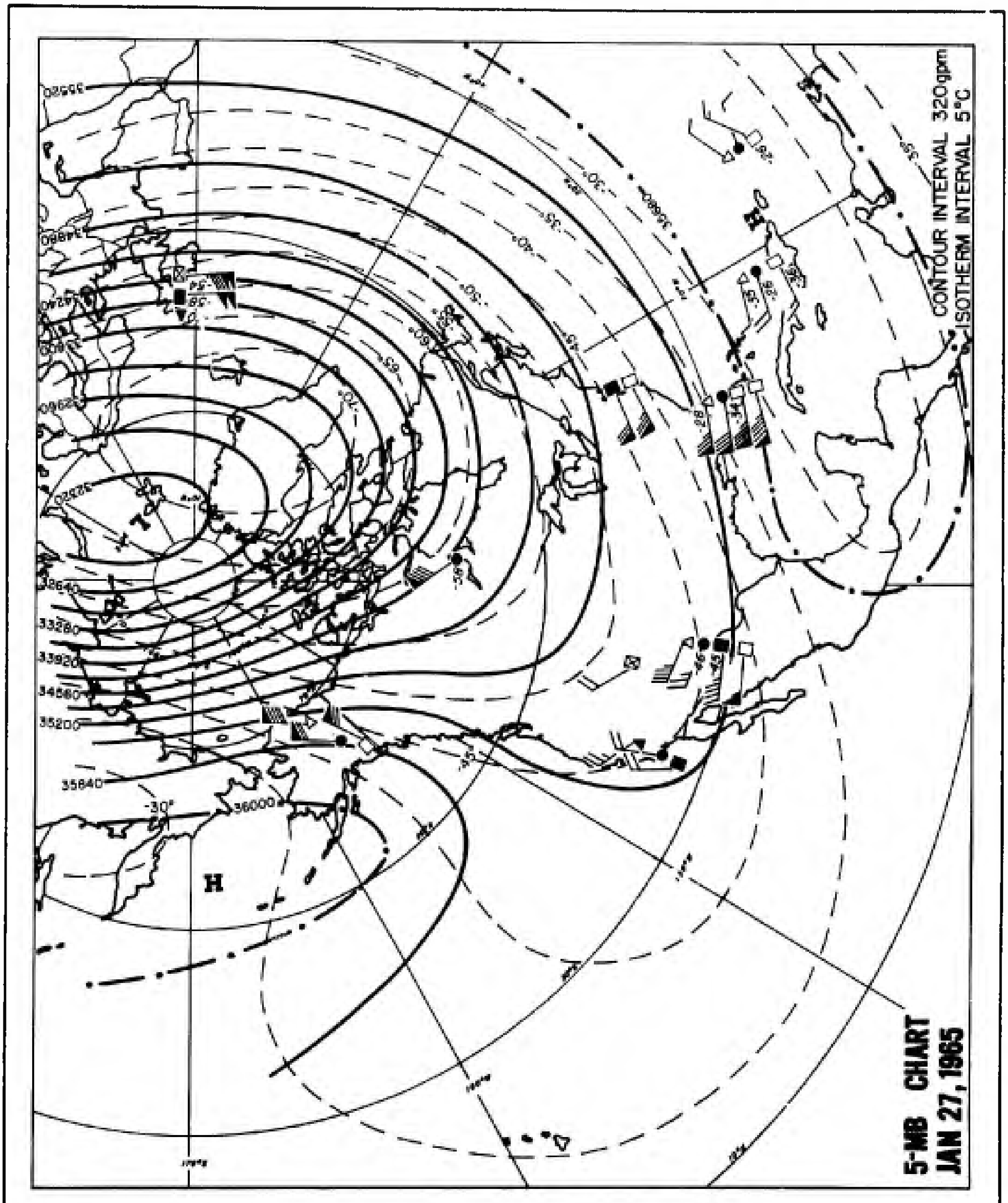
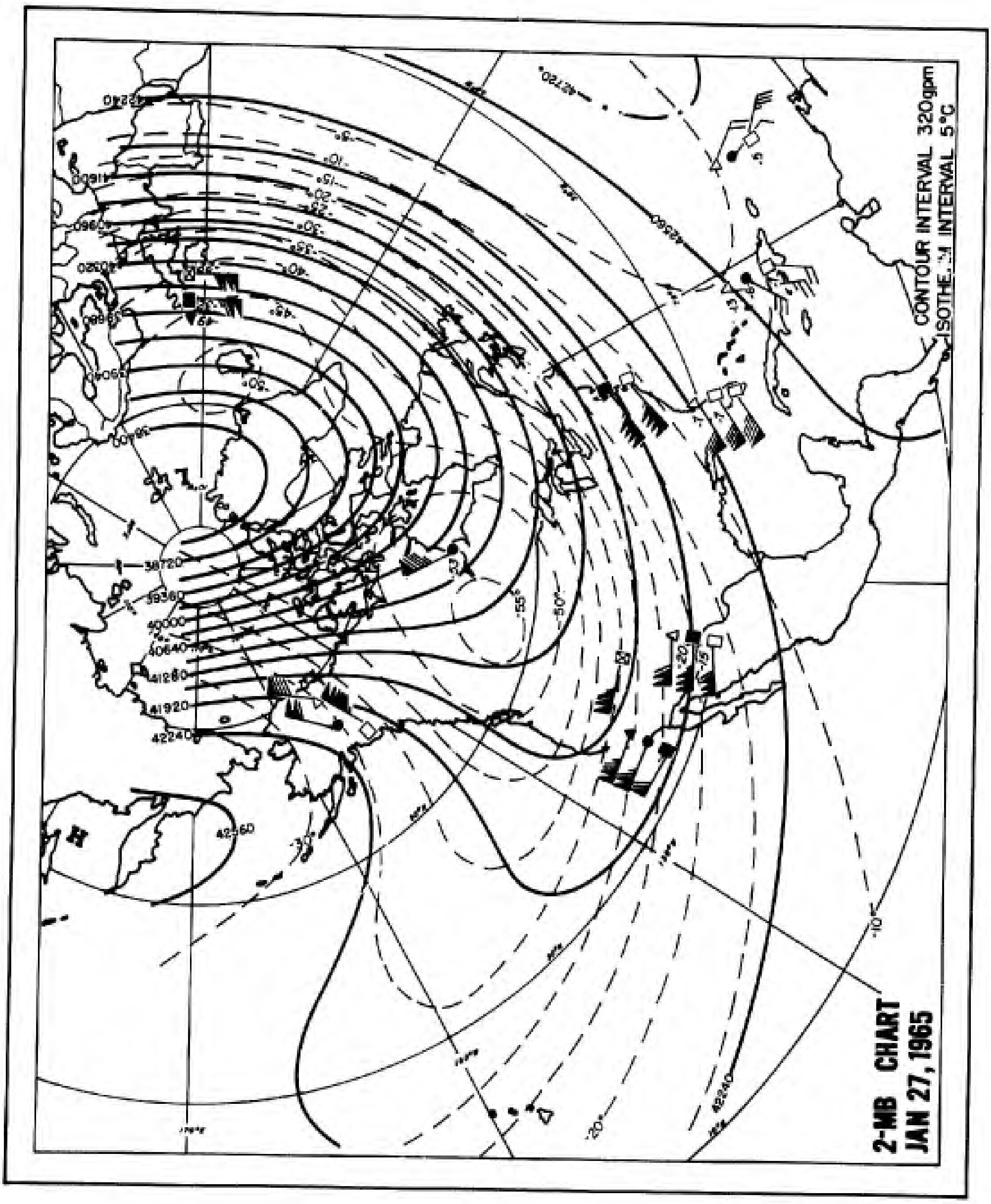
CONTOUR INTERVAL 320gpm
ISOTHERM INTERVAL 5°C

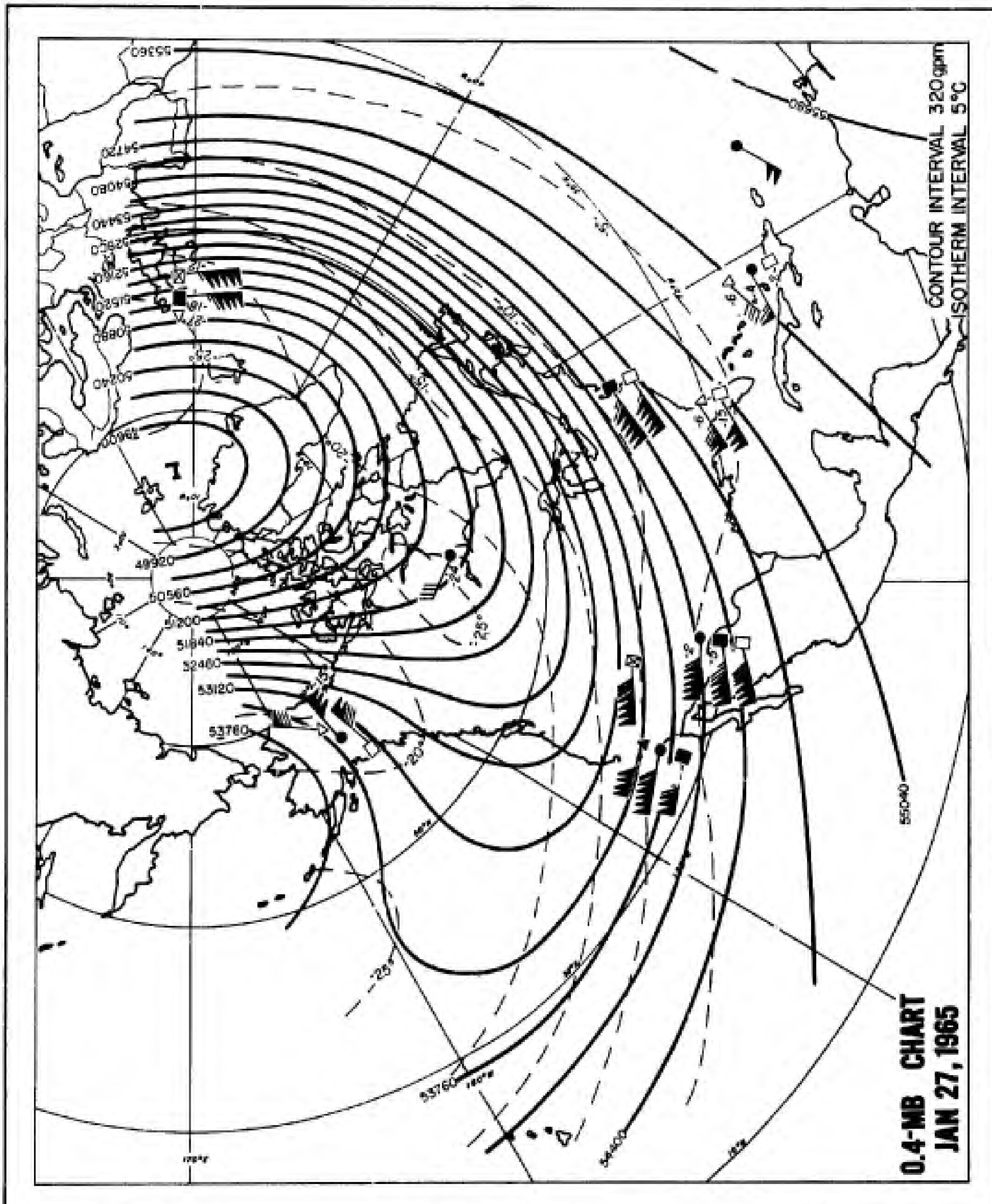

2-MB CHART
JAN 20, 1965
CONTOUR INTERVAL 320 gpm
ISOTHERM INTERVAL 5°C
38400
39040
39680
40320
40960
41600
42240


0.4-MB CHART
JAN 20, 1965
CONTOUR INTERVAL 320gpm
ISOTHERM INTERVAL 5°C
55040
54400
53760
53120
52480
51840
51200
50560
49920
50240
50880
51520
52160
52800
53440
54080
54720



5-MB CHART
JAN 27, 1965
CONTOUR INTERVAL 320gpm
ISOTHERM INTERVAL 5°C
32640
33280
33920
34560
35200
35840
36000
-30°
H


2-MB CHART
JAN 27, 1965
CONTOUR INTERVAL 320gpm
INTERVAL 5°C
38720
39360
40000
40640
41280
41920
42240
42560
42720
-55°
-50°
-10°
-20°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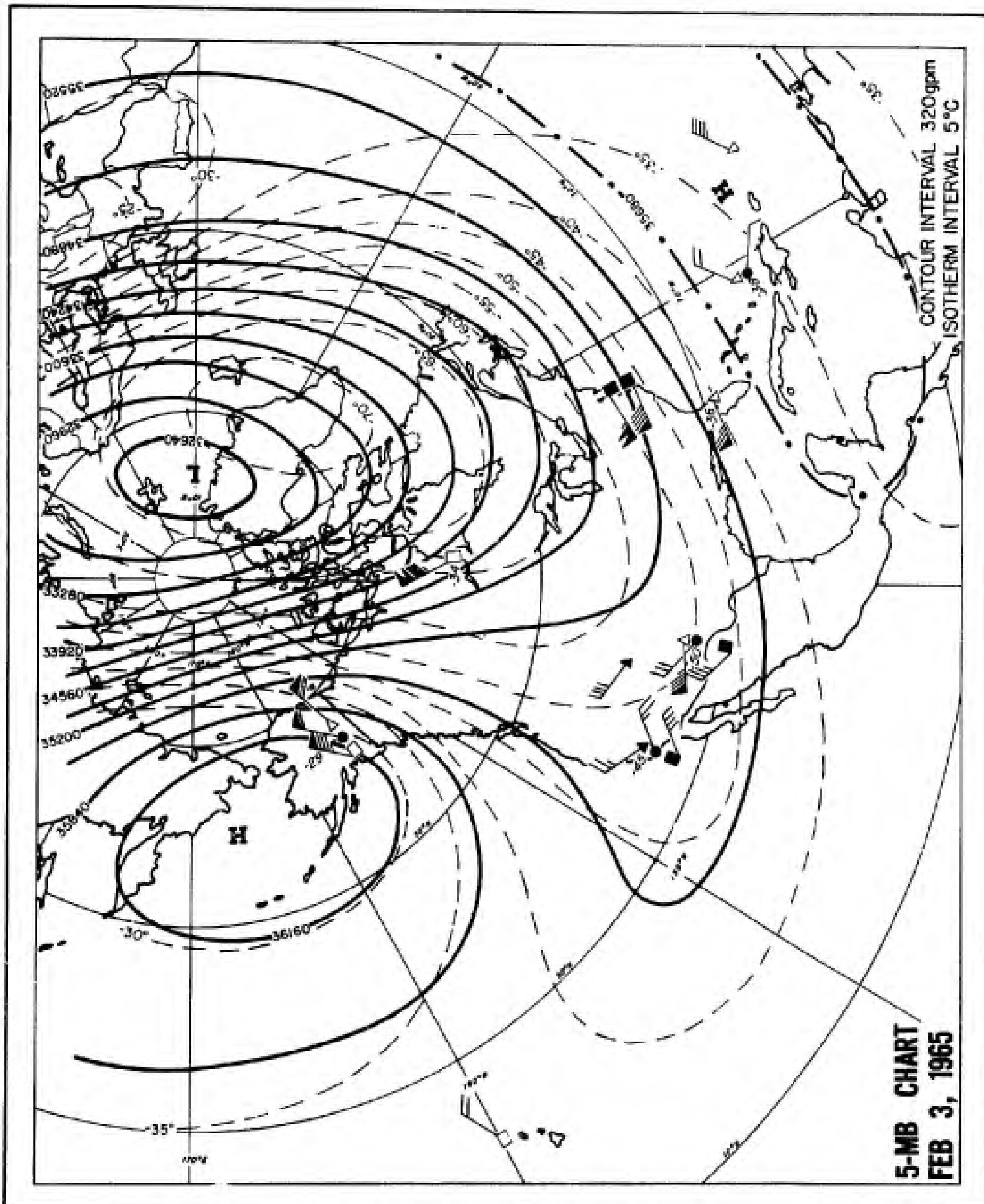
ISOTHERM INTERVAL 5°C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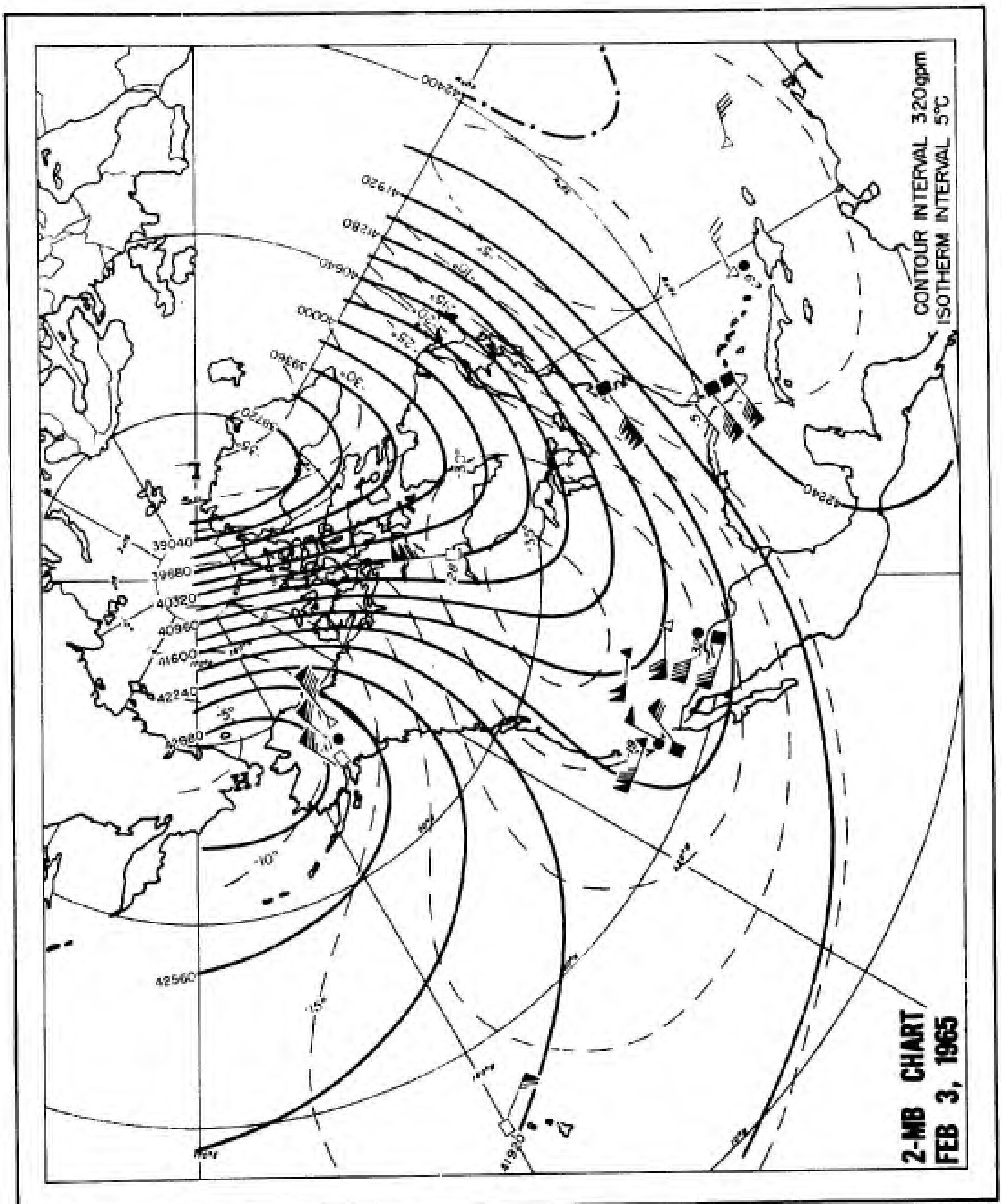
FEB 3, 1965
CONTOUR INTERVAL 320gpm
ISOTHERM INTERVAL 5°C


2-MB CHART
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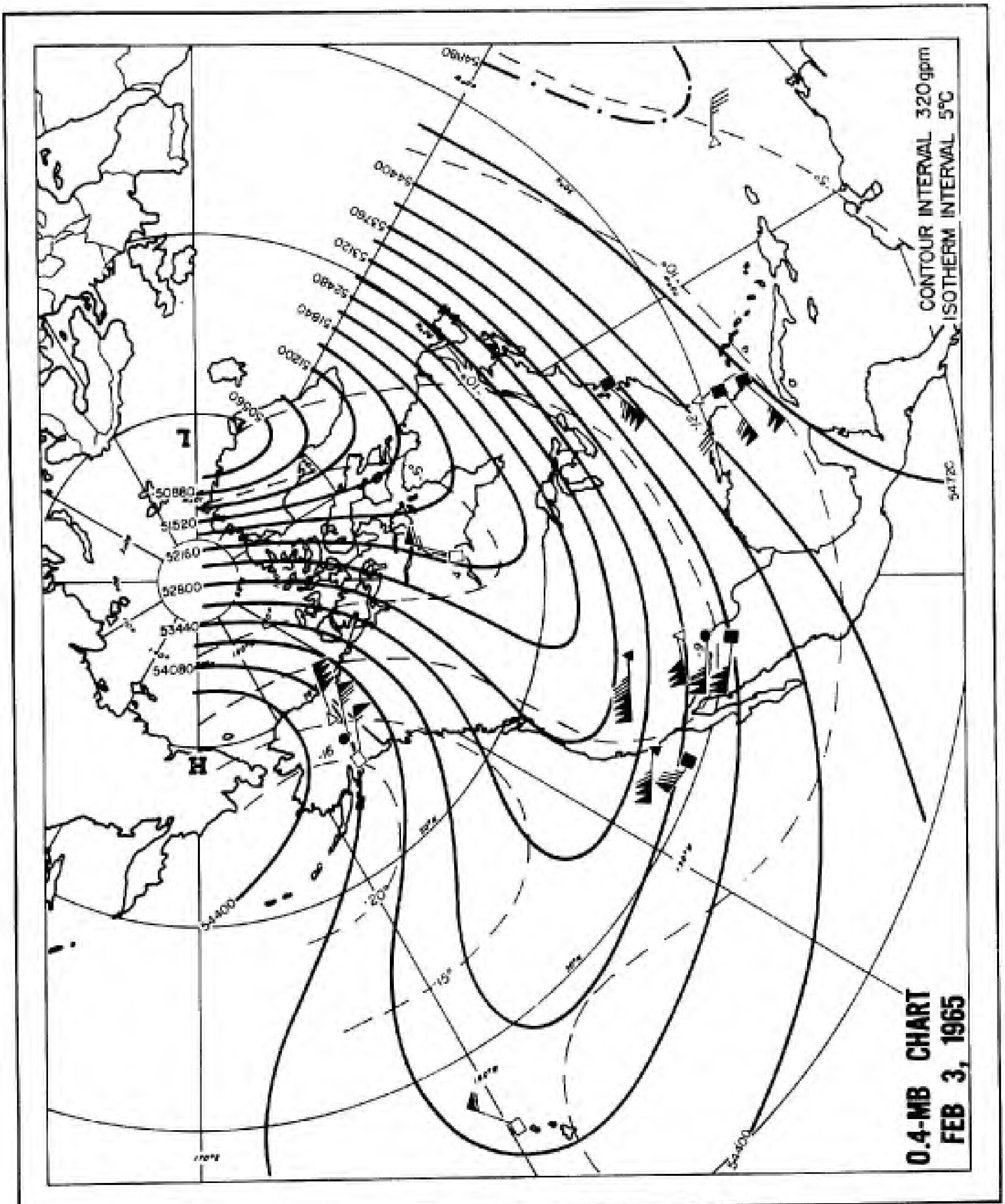
CONTOUR INTERVAL 320 gpm
ISOTHERM INTERVAL 5°C
39040
39680
40320
40960
41600
42240
42560


0.4-MB CHART
FEB 3, 1965
CONTOUR INTERVAL 320gpm
ISOTHERM INTERVAL 5°C
L
H
50880
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52160
52800
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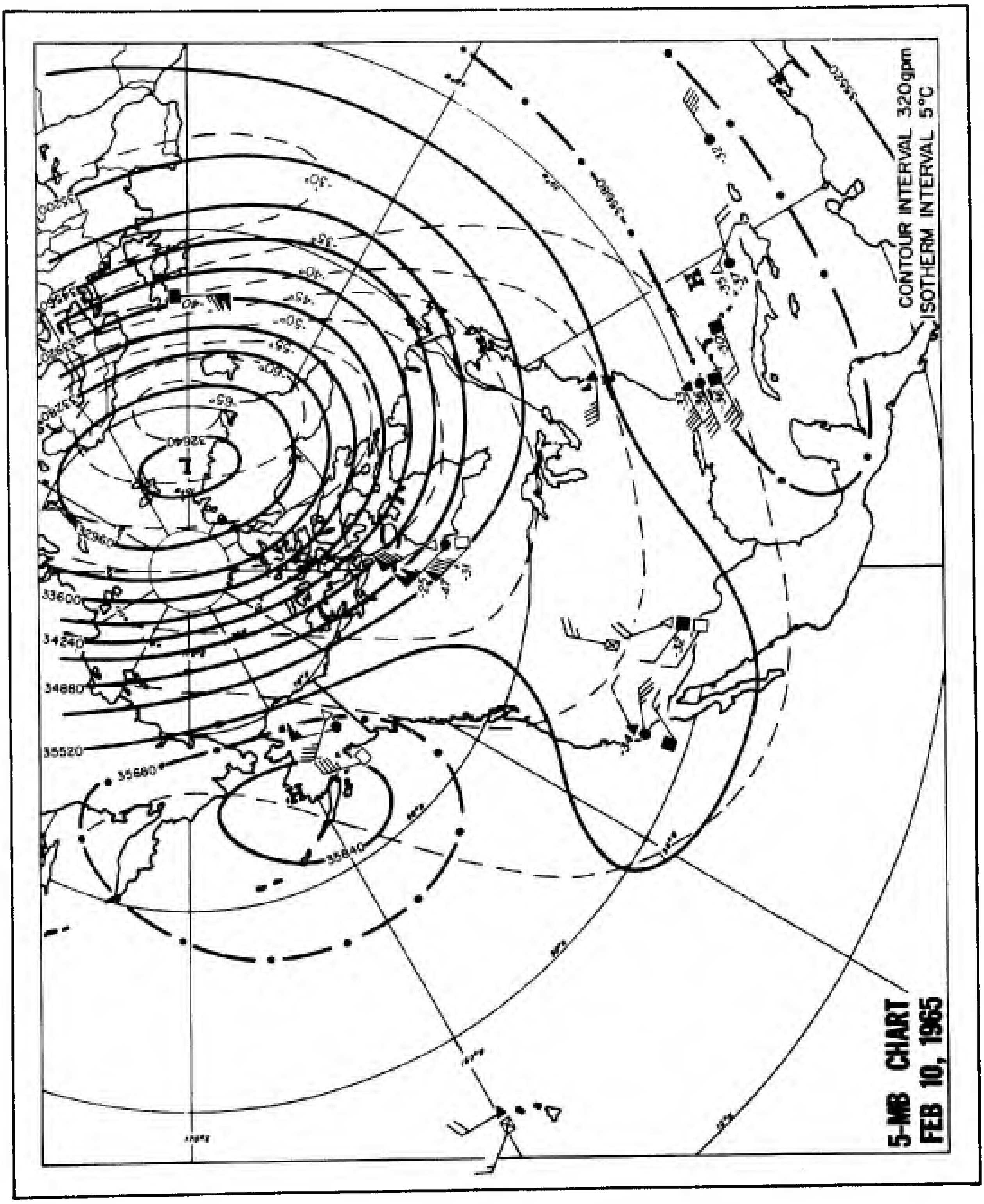
54080
54400
54720


5-MB CHART
FEB 10, 1965
CONTOUR INTERVAL 320gpm
ISOTHERM INTERVAL 5°C
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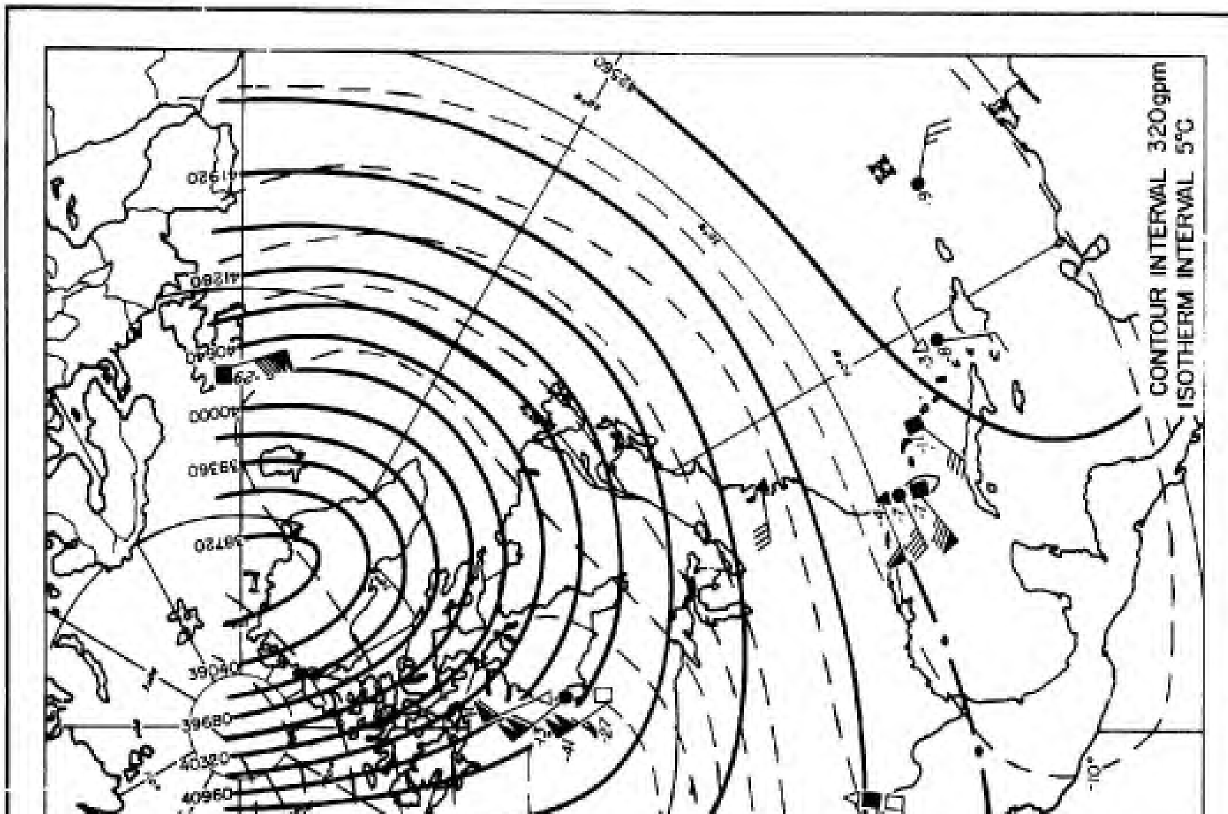
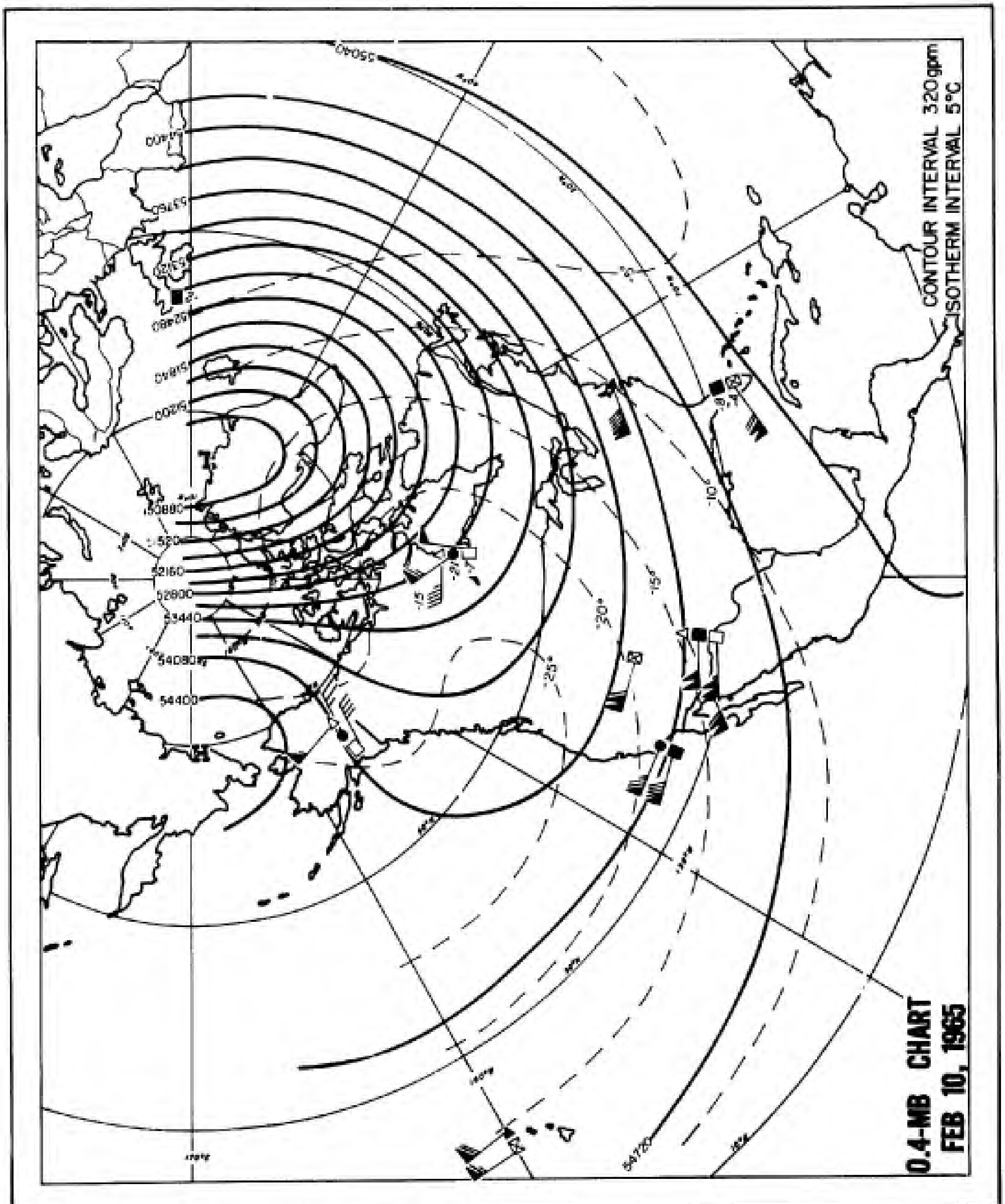
32960
33600
34240
34880
35520
35680
35840


2-MB CHART
FEB 10, 1965
CONTOUR INTERVAL 320gpm
ISOTHERM INTERVAL 5°C
41920
41280
40640
40000
39360
38720
39040
39680
40320
40960
41600
42240
42400
42400
-15°
-20°
-40°
-35°
-30°
-25°
-20°
-15°
-10°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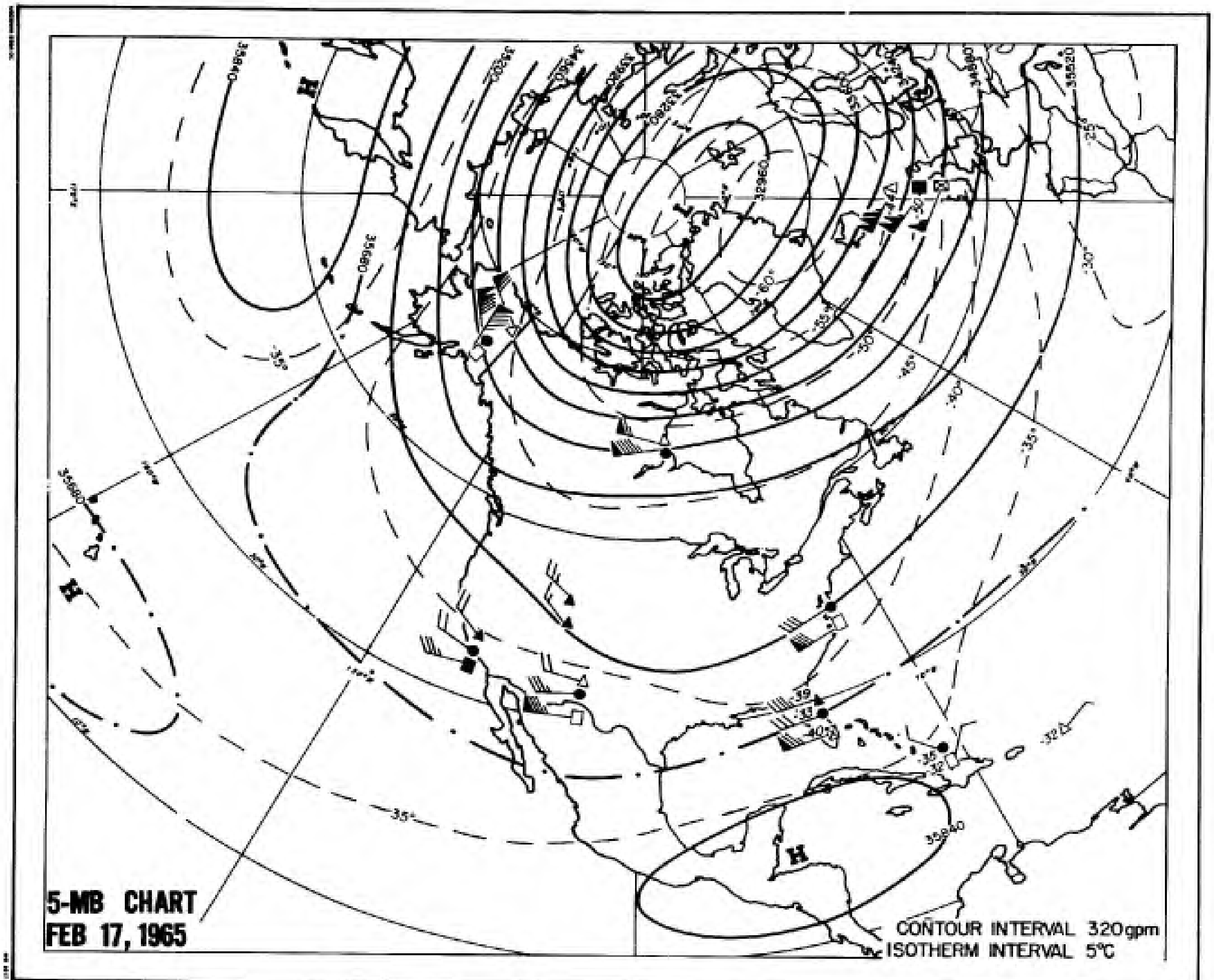
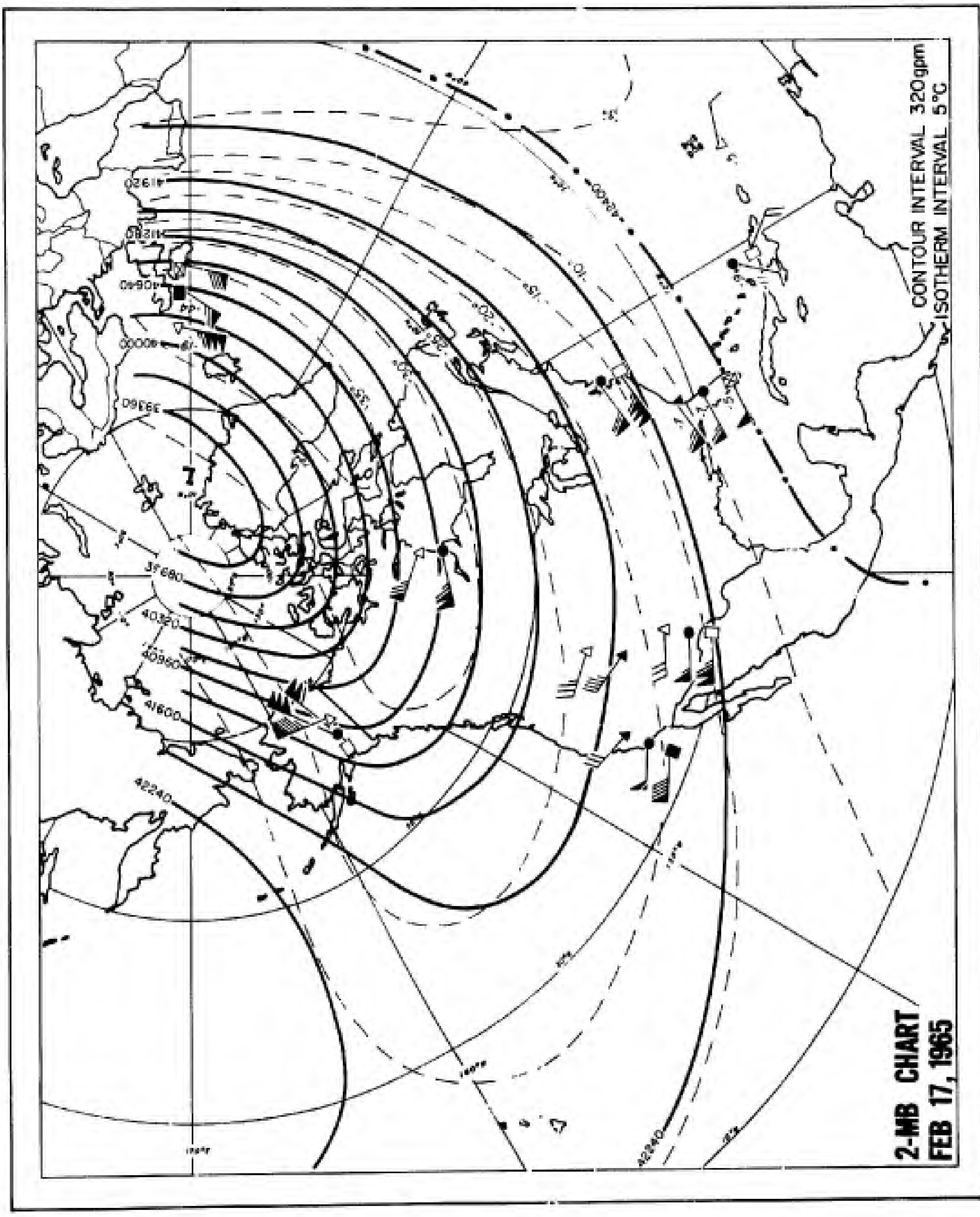
FEB 10, 1965
CONTOUR INTERVAL 320 gpm
ISOTHERM INTERVAL 5°C


5-MB CHART
FEB 17, 1965
CONTOUR INTERVAL 320gpm
ISOTHERM INTERVAL 5°C
35840
35680
32960
33280
33920
34560
35200
35520
-25°
-30°
-35°
-40°
-45°
-50°
-55°
-60°
-39
-37
-40
-35
-32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FEB 17, 1965
CONTOUR INTERVAL 320gpm
ISOTHERM INTERVAL 5°C
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41280
40640
40000
39360
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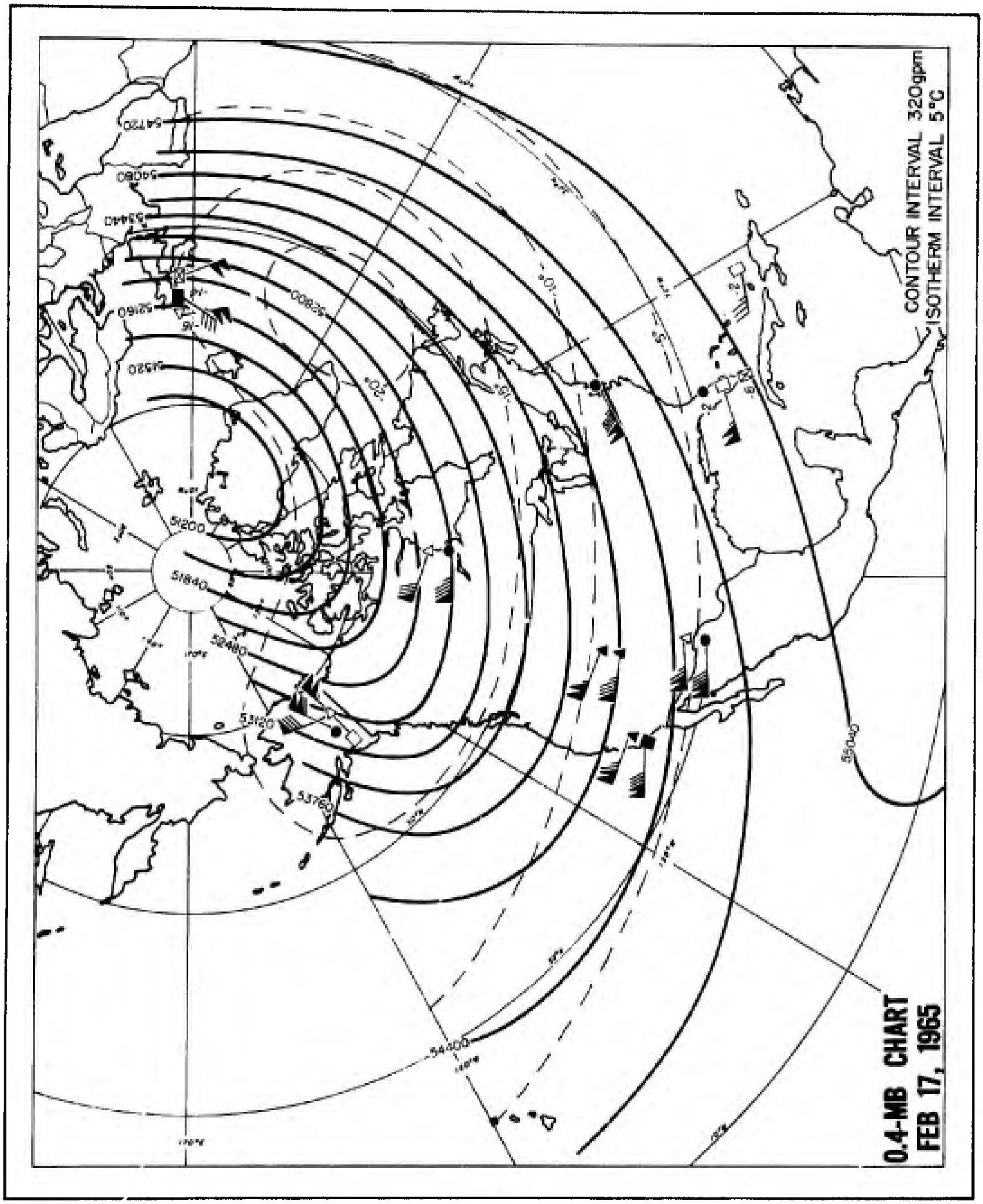
40960
41600
42240
42240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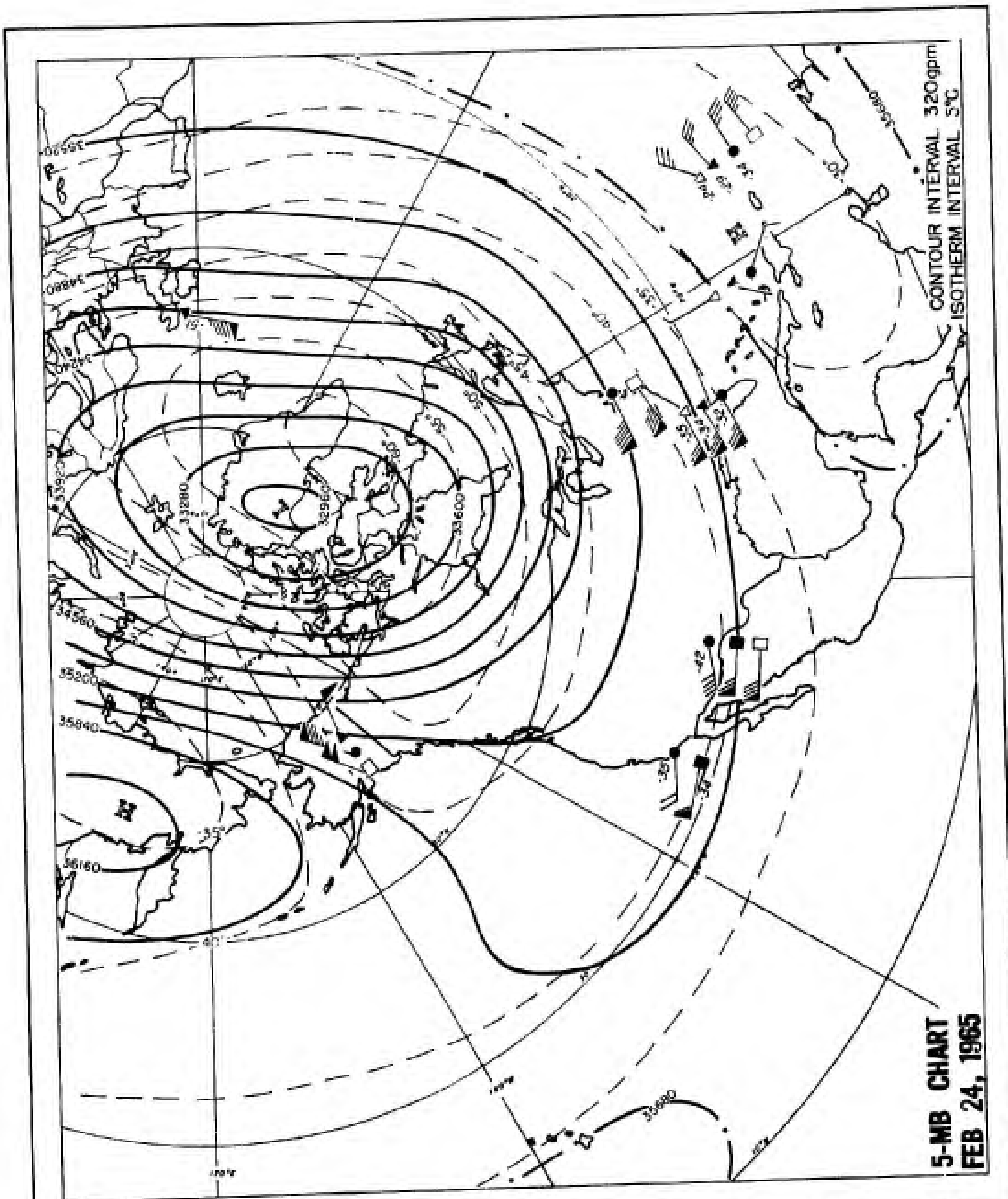
ISOTHERM INTERVAL 5°C



5-MB CHART
FEB 24, 1965
CONTOUR INTERVAL 320gpm
ISOTHERM INTERVAL 5°C
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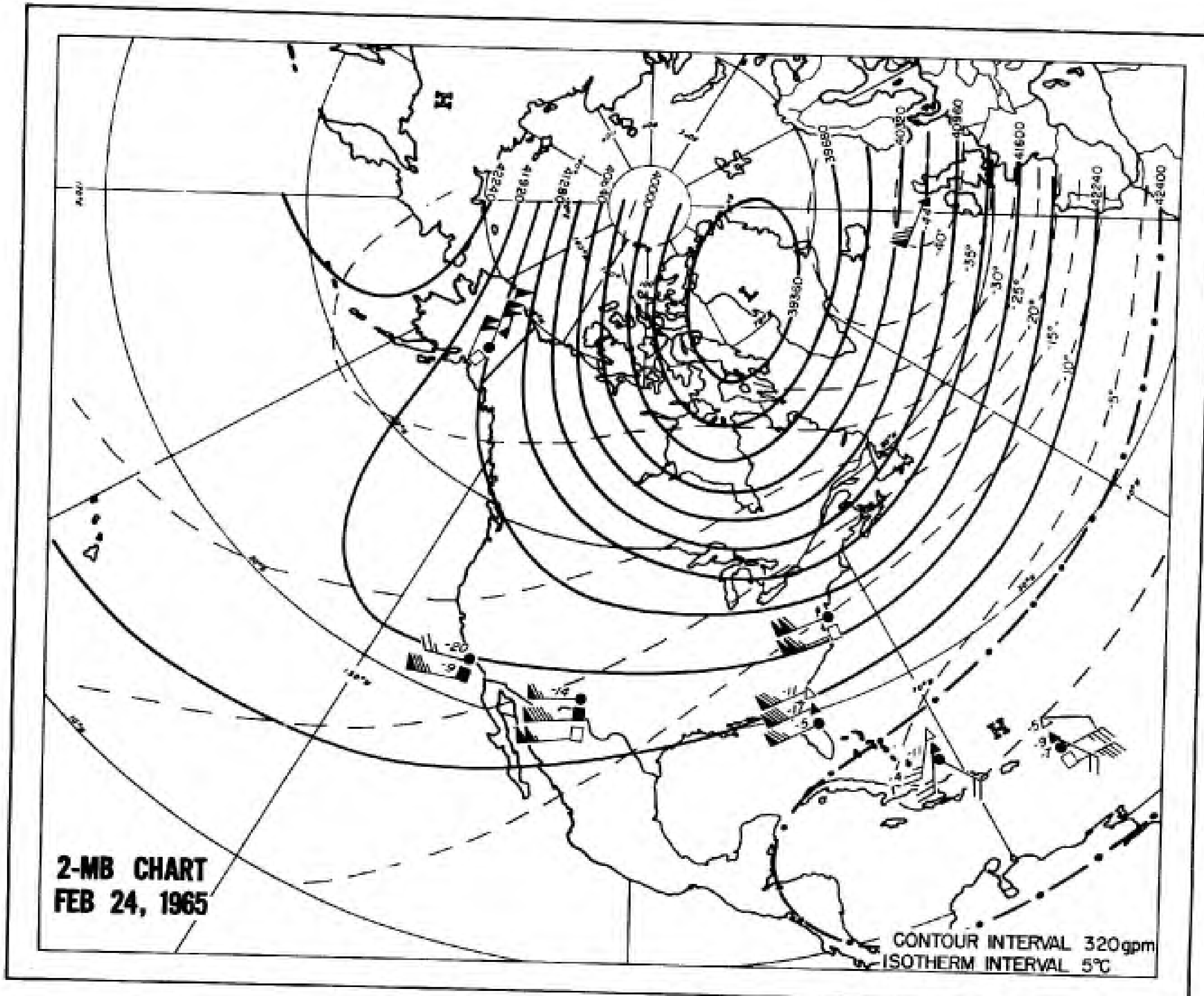
33280
33600
34560
35200
35840
36160
35680


2-MB CHART
FEB 24, 1965
CONTOUR INTERVAL 320gpm
ISOTHERM INTERVAL 5°C
42240
41920
41280
40640
40000
39680
39360
40320
40960
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-5°
-10°
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-20°
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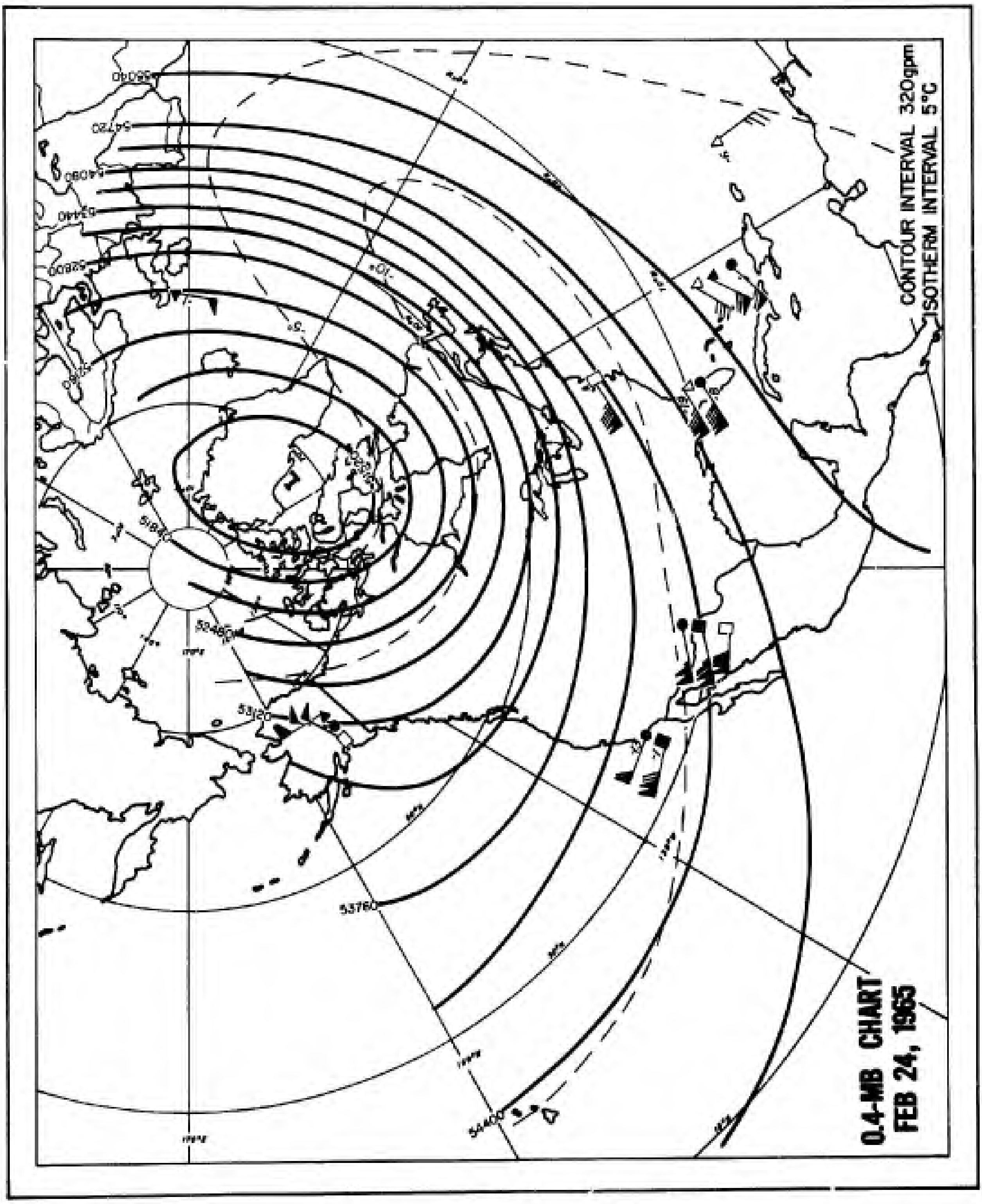
-30°
-35°
-40°
L
H
H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CONTOUR INTERVAL 320gpm
ISOTHERM INTERVAL 5°C
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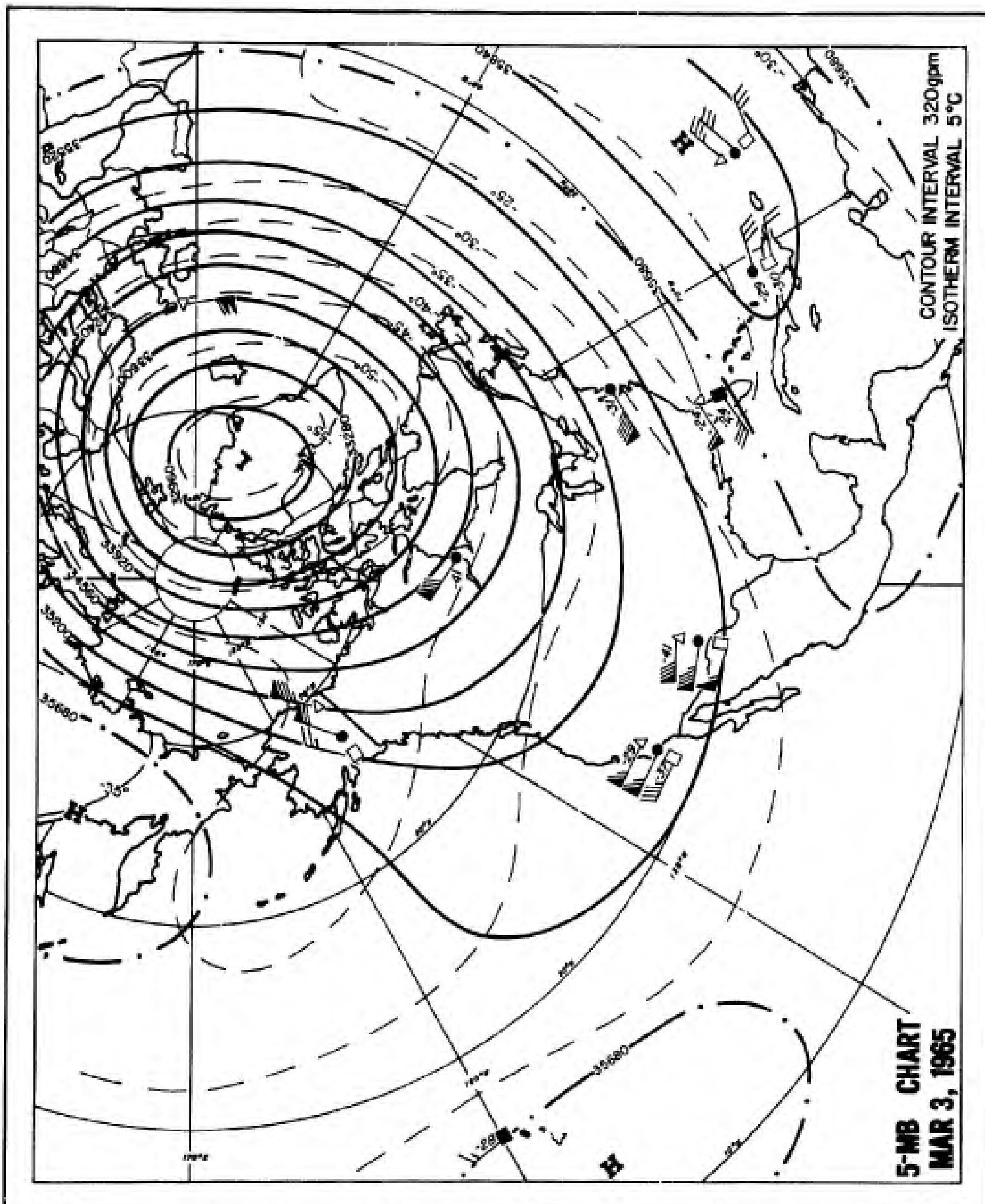
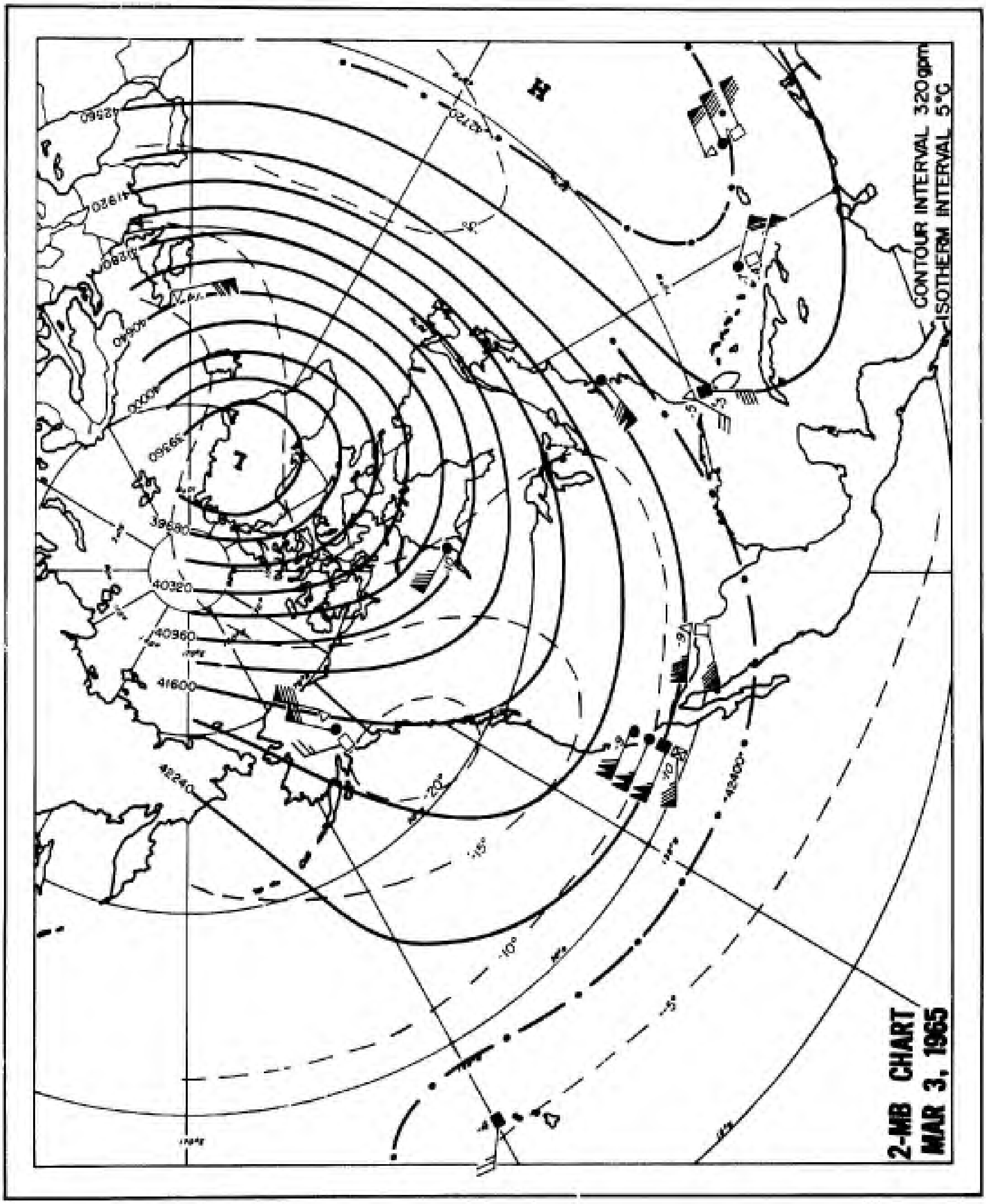
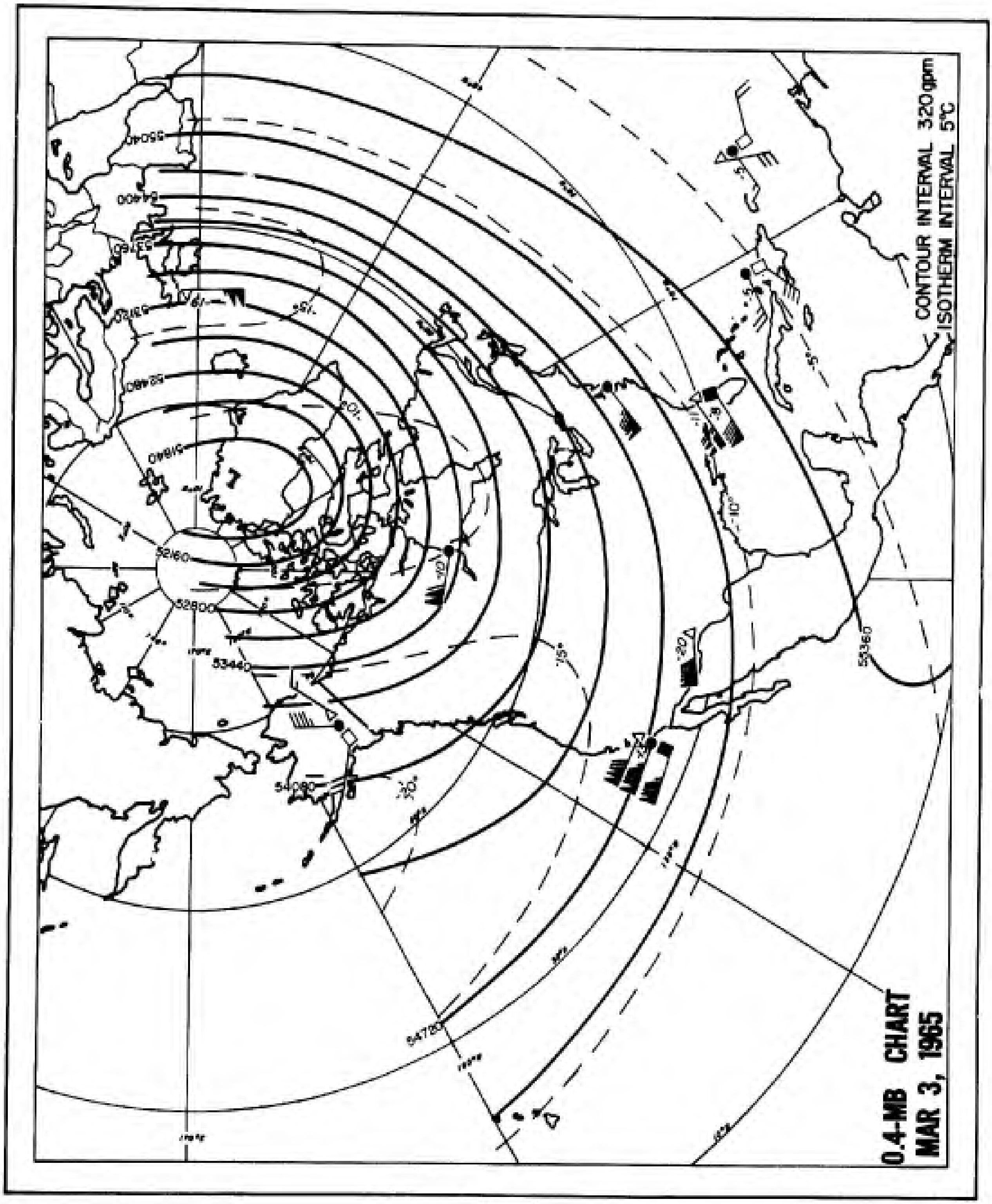
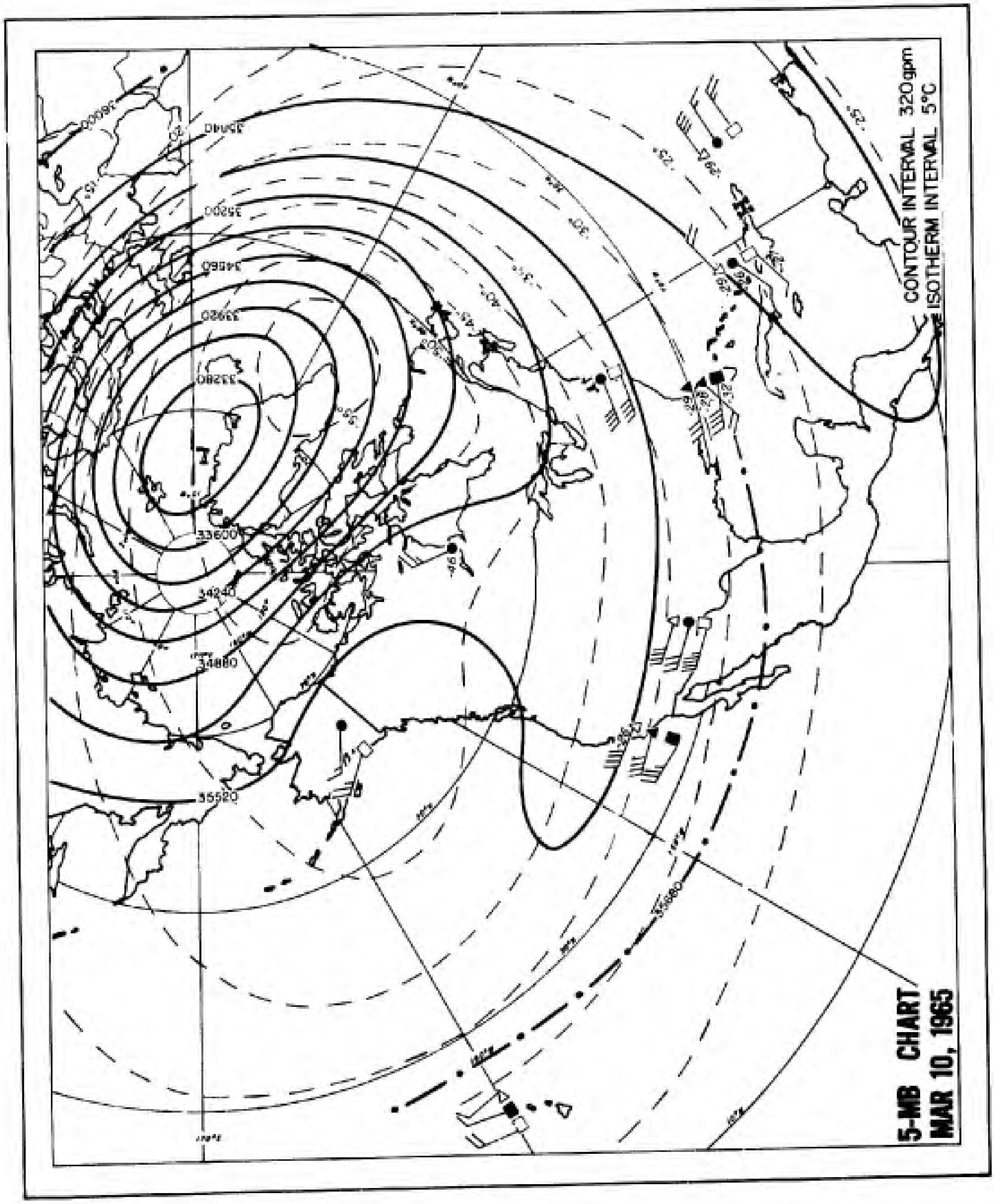
52480
53120
53760
54400


5-MB CHART
MAR 3, 1965
CONTOUR INTERVAL 320gpm
ISOTHERM INTERVAL 5°C


2-MB CHART
MAR 3, 1965
CONTOUR INTERVAL 320 gpm
ISOTHERM INTERVAL 5°C
39680
40320
40960
41600
42240
42400
-10°
-15°
-20°


0.4-MB CHART
MAR 3, 1965
CONTOUR INTERVAL 320gpm
ISOTHERM INTERVAL 5°C
55040
54400
53760
53120
52480
51840
52160
52800
53440
54080
54720
55360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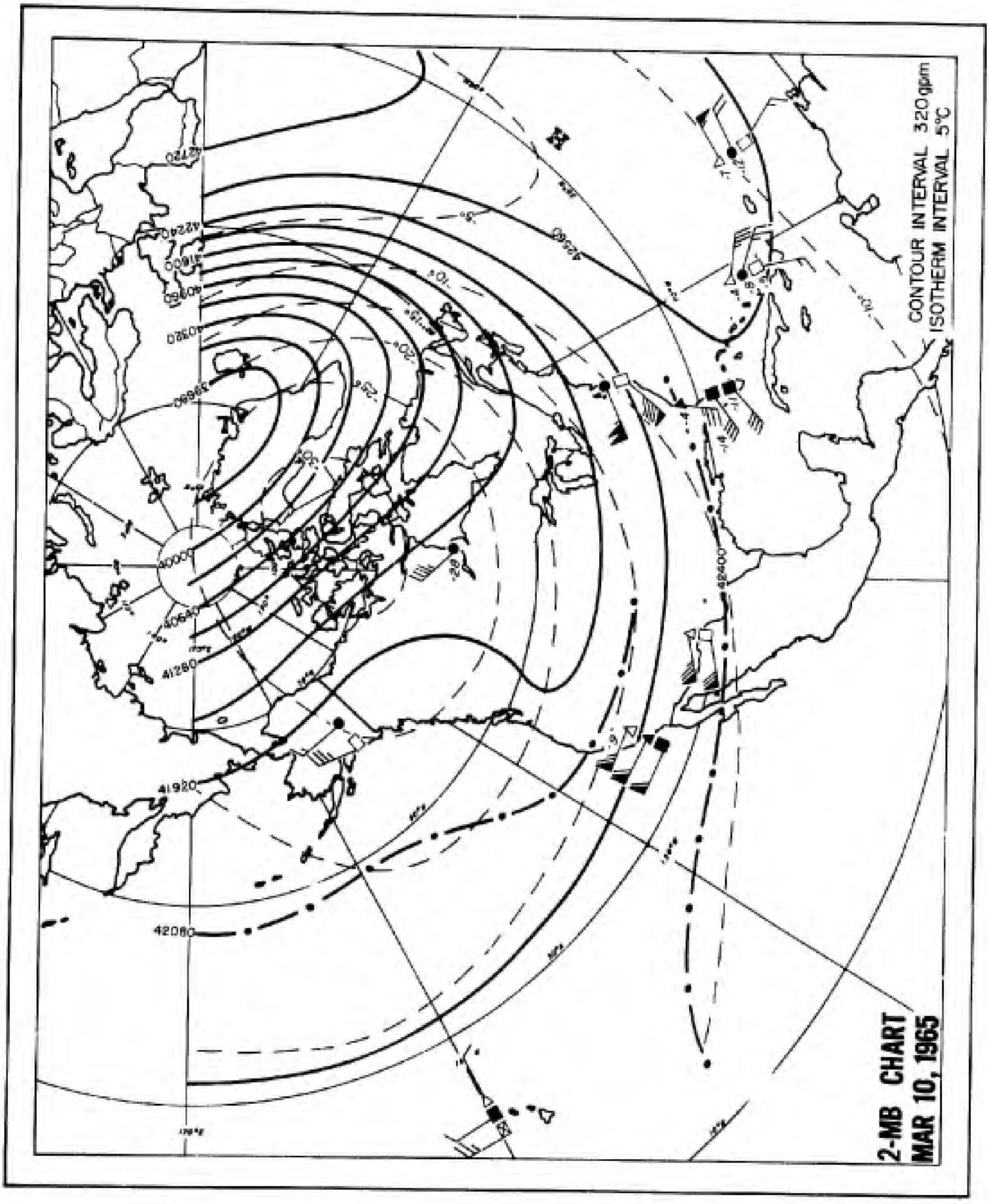
MAR 10, 1965
CONTOUR INTERVAL 320 gpm
ISOTHERM INTERVAL 5°C


2-MB CHART
MAR 10, 1965
CONTOUR INTERVAL 320 gpm
ISOTHERM INTERVAL 5°C
42720
42240
41600
40960
40320
39680
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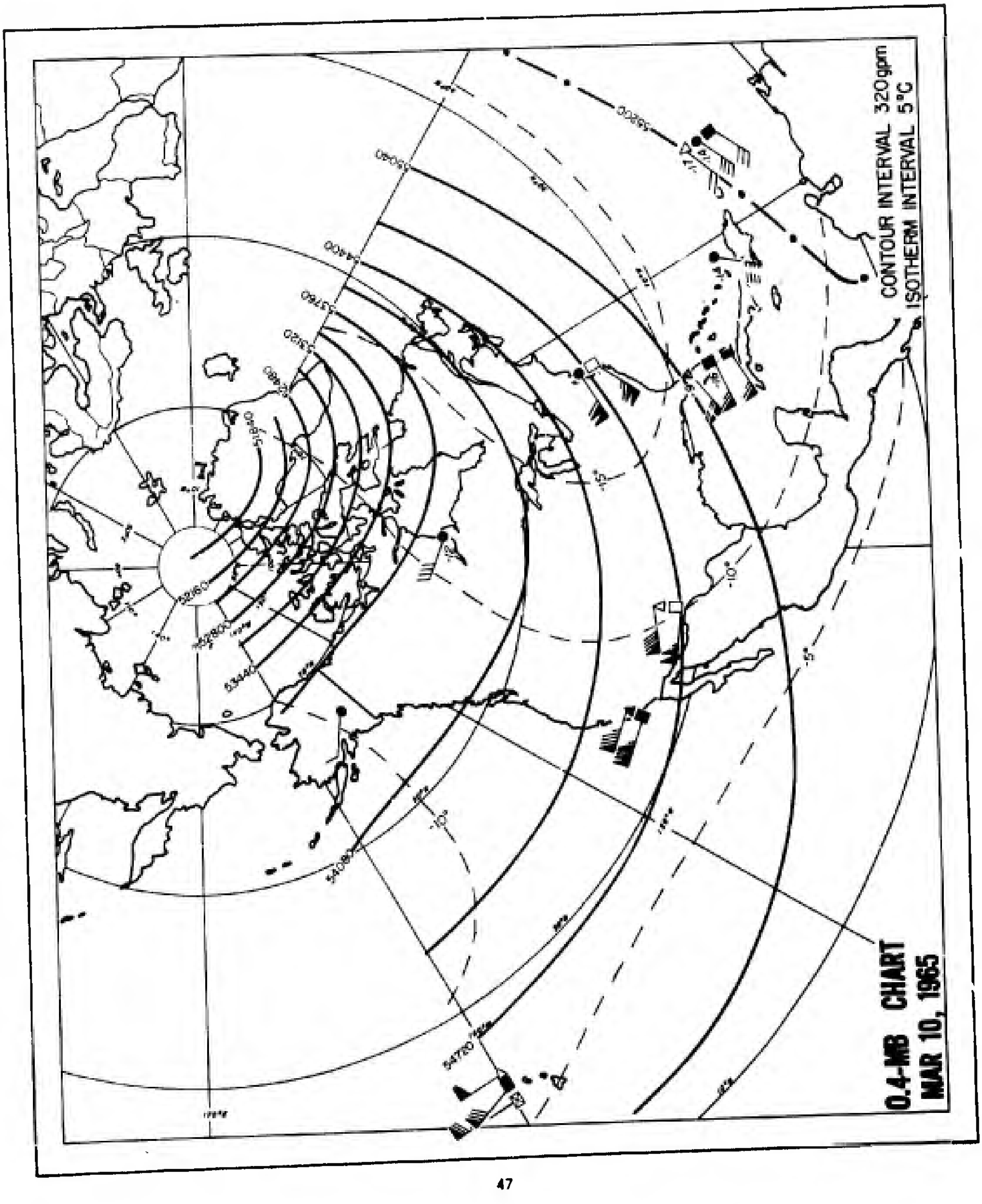
41280
41920
42080
42400


0.4-MB CHART
MAR 10, 1965
CONTOUR INTERVAL 320gpm
ISOTHERM INTERVAL 5°C
51840
52160
52480
52800
53120
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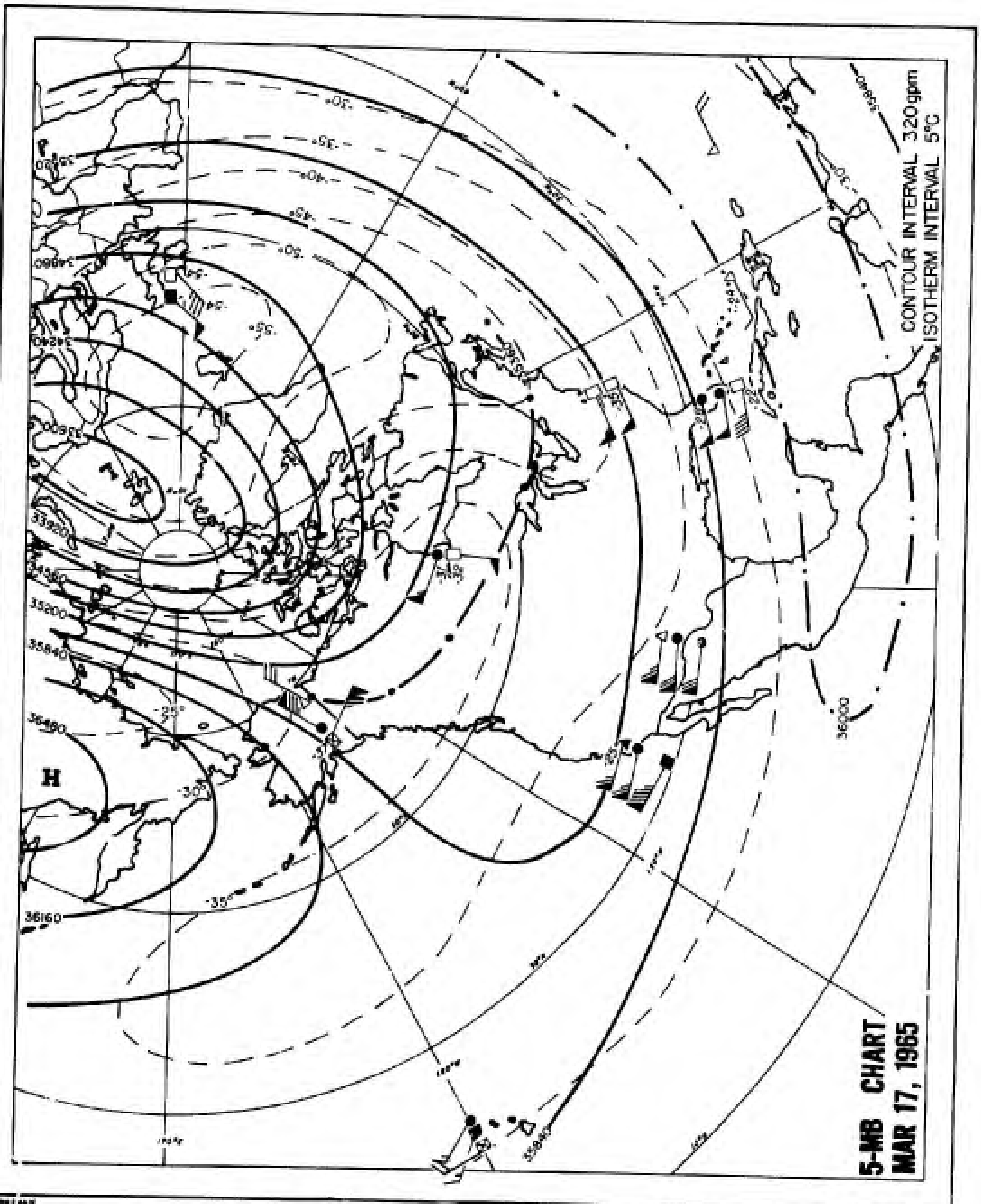
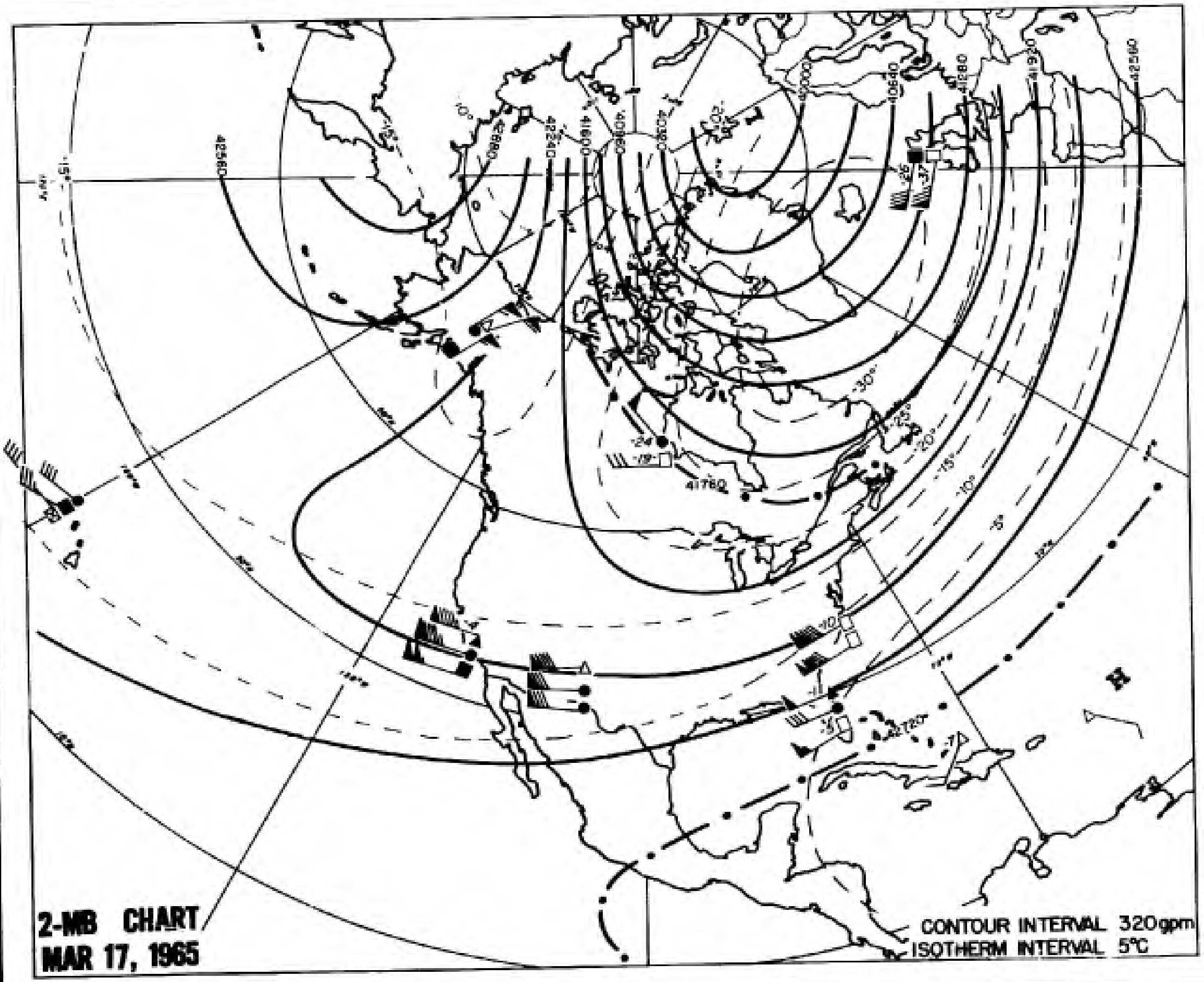
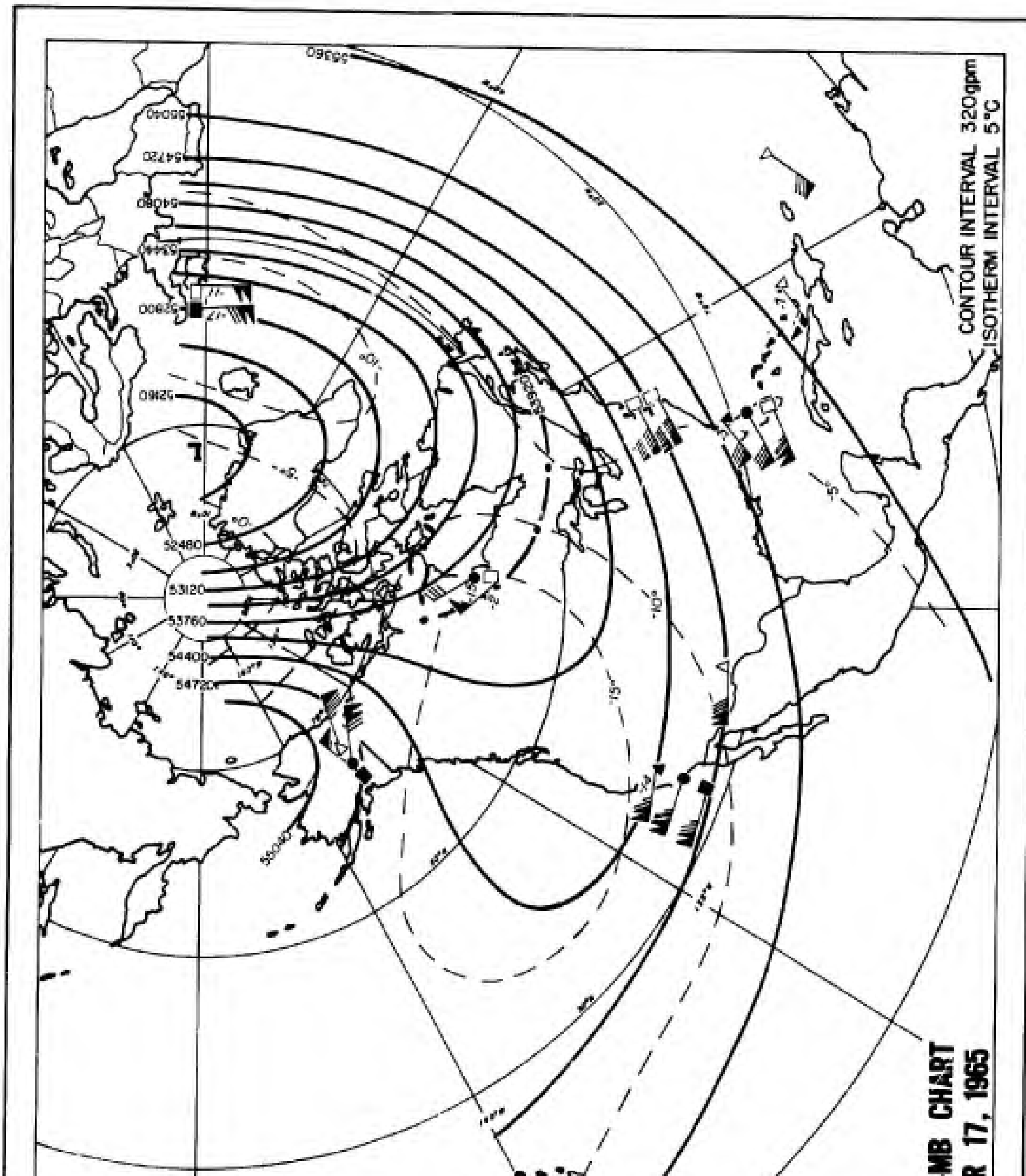
54080
54400
54720


5-MB CHART
MAR 17, 1965
CONTOUR INTERVAL 320gpm
ISOTHERM INTERVAL 5°C
H



2-MB CHART
MAR 17, 1965



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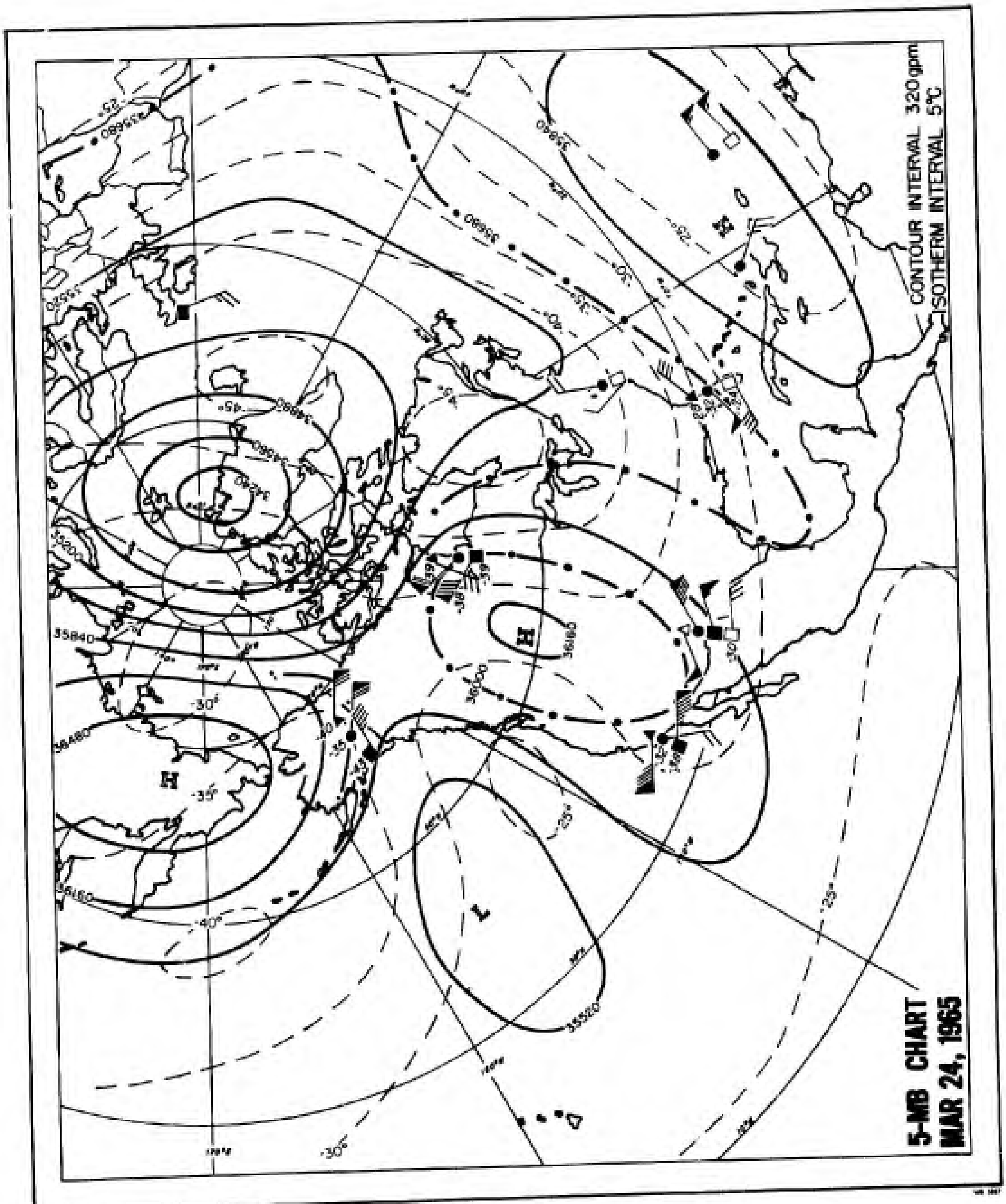
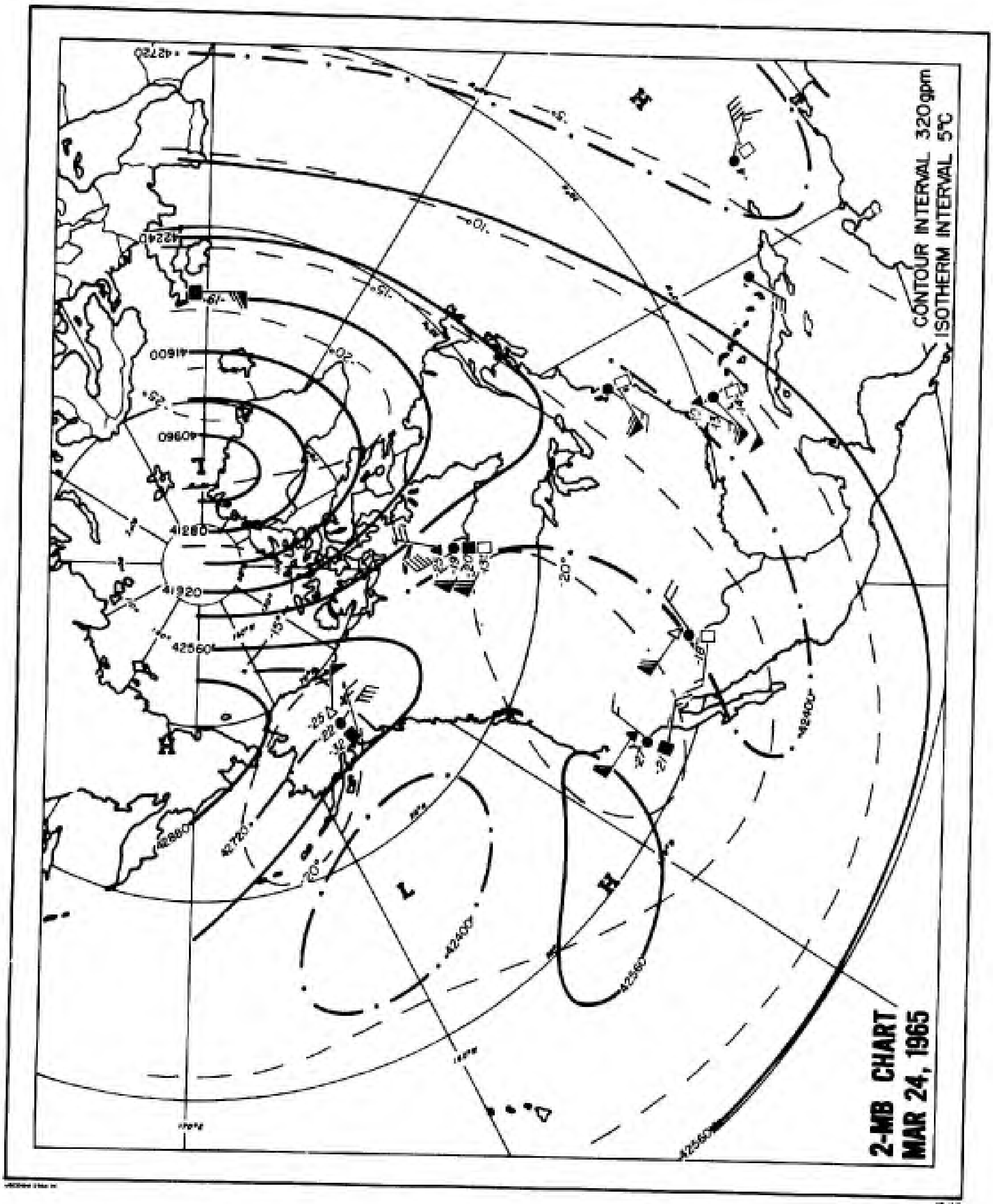
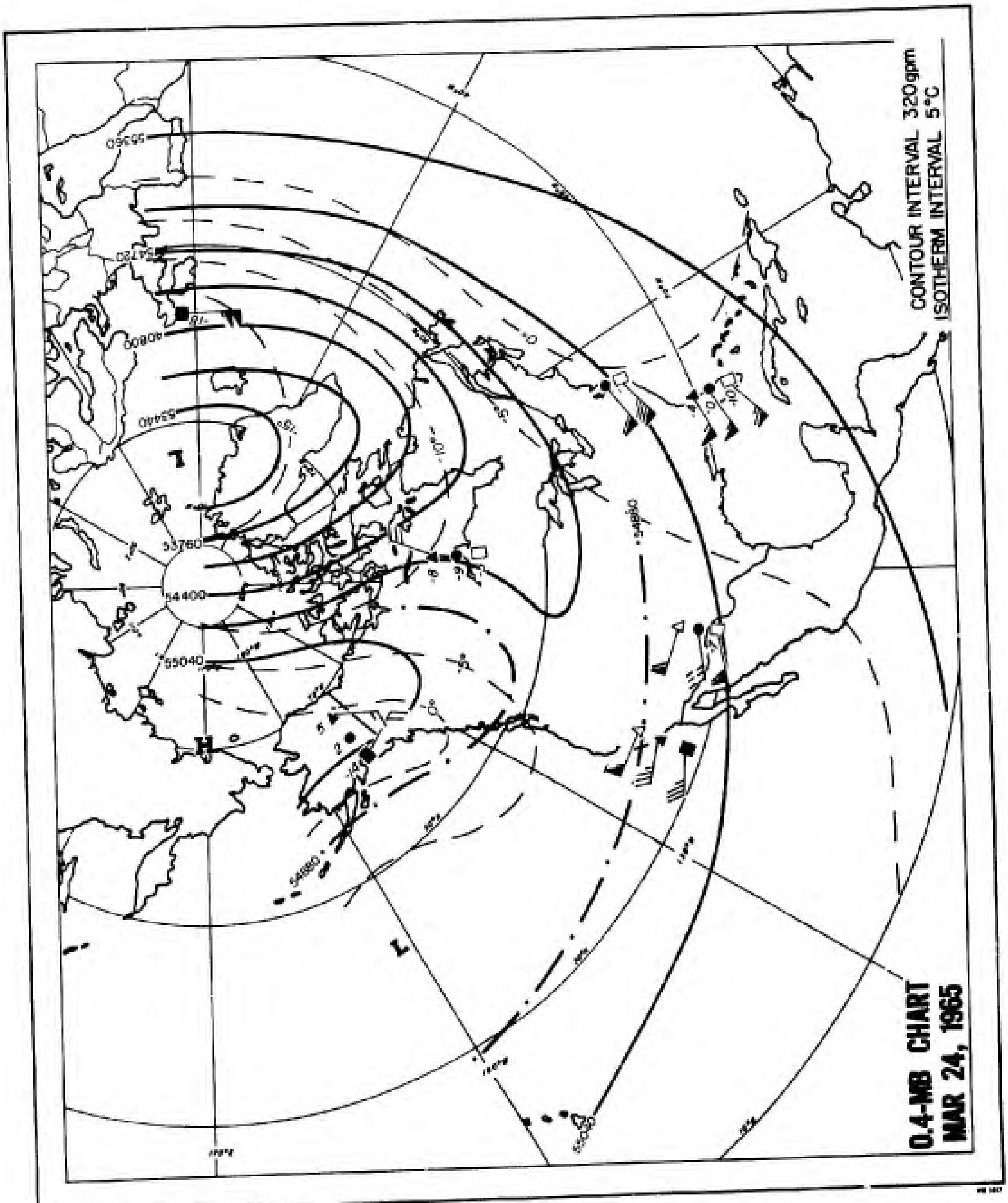
ISOTHERM INTERVAL 5°C


5-MB CHART
MAR 24, 1965
CONTOUR INTERVAL 320 gpm
ISOTHERM INTERVAL 5°C


2-MB CHART
MAR 24, 1965
CONTOUR INTERVAL 320 gpm
ISOTHERM INTERVAL 5°C


0.4-MB CHART
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CONTOUR INTERVAL 320gpm
ISOTHERM INTERVAL 5°C
55360
54720
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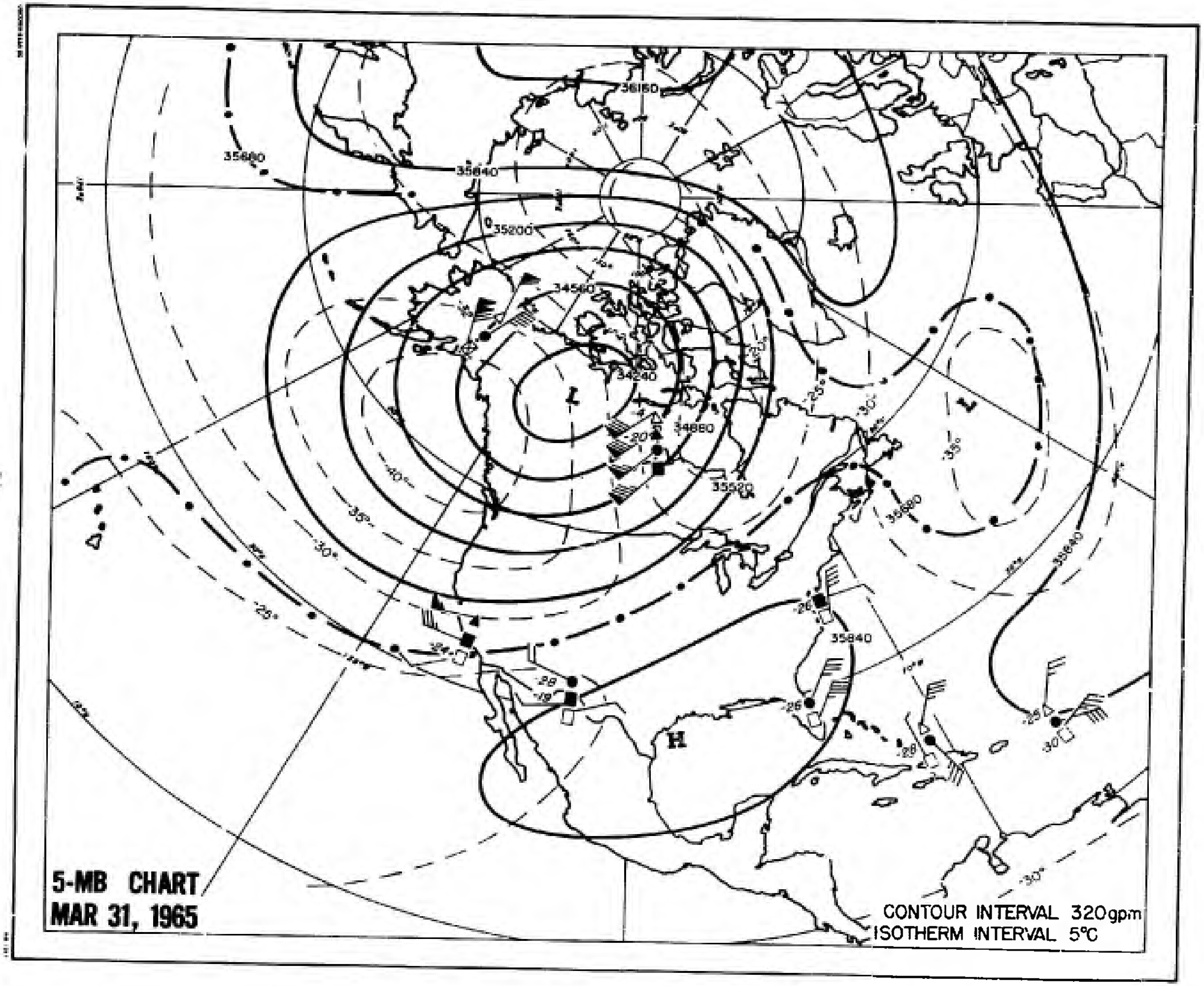
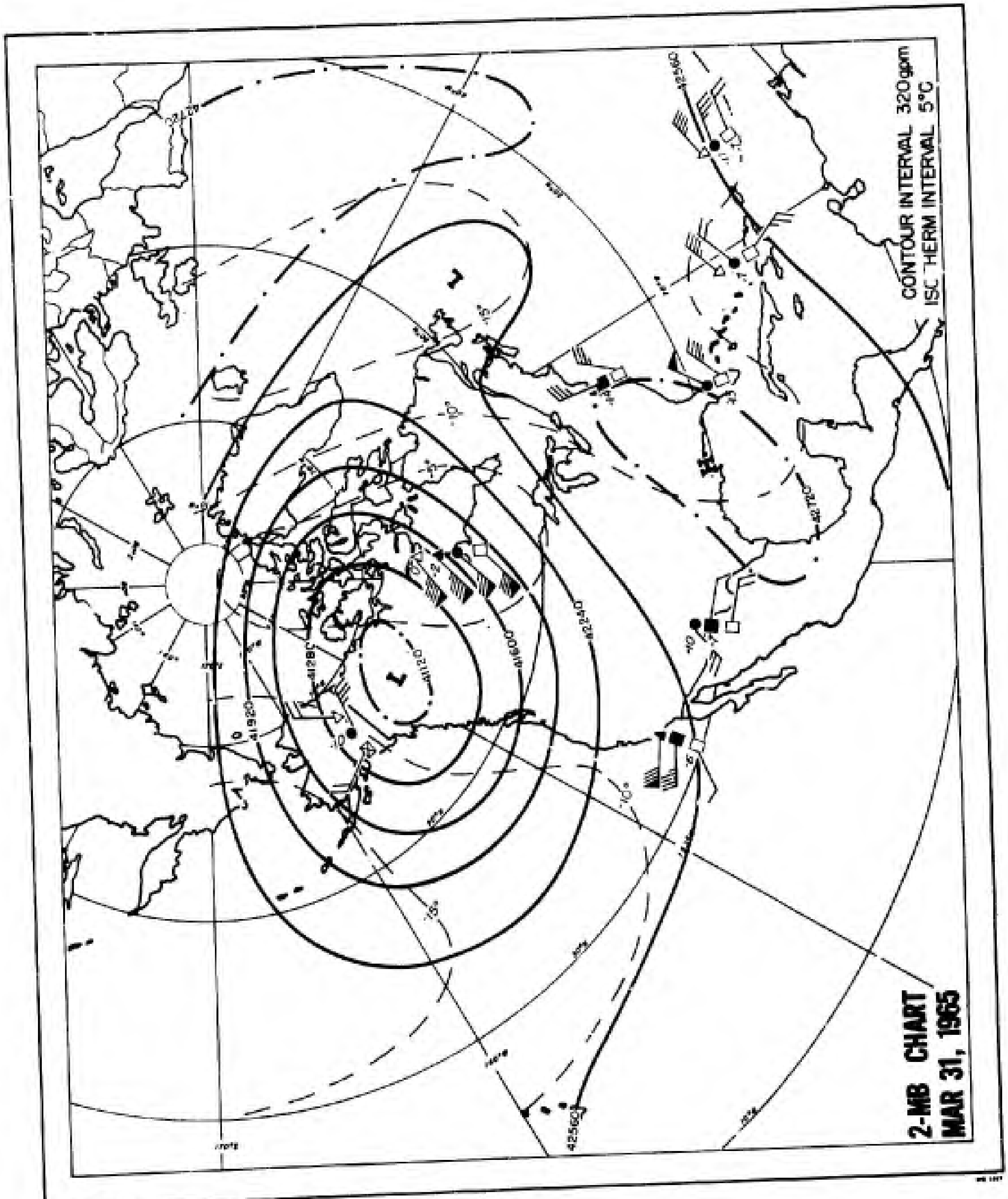
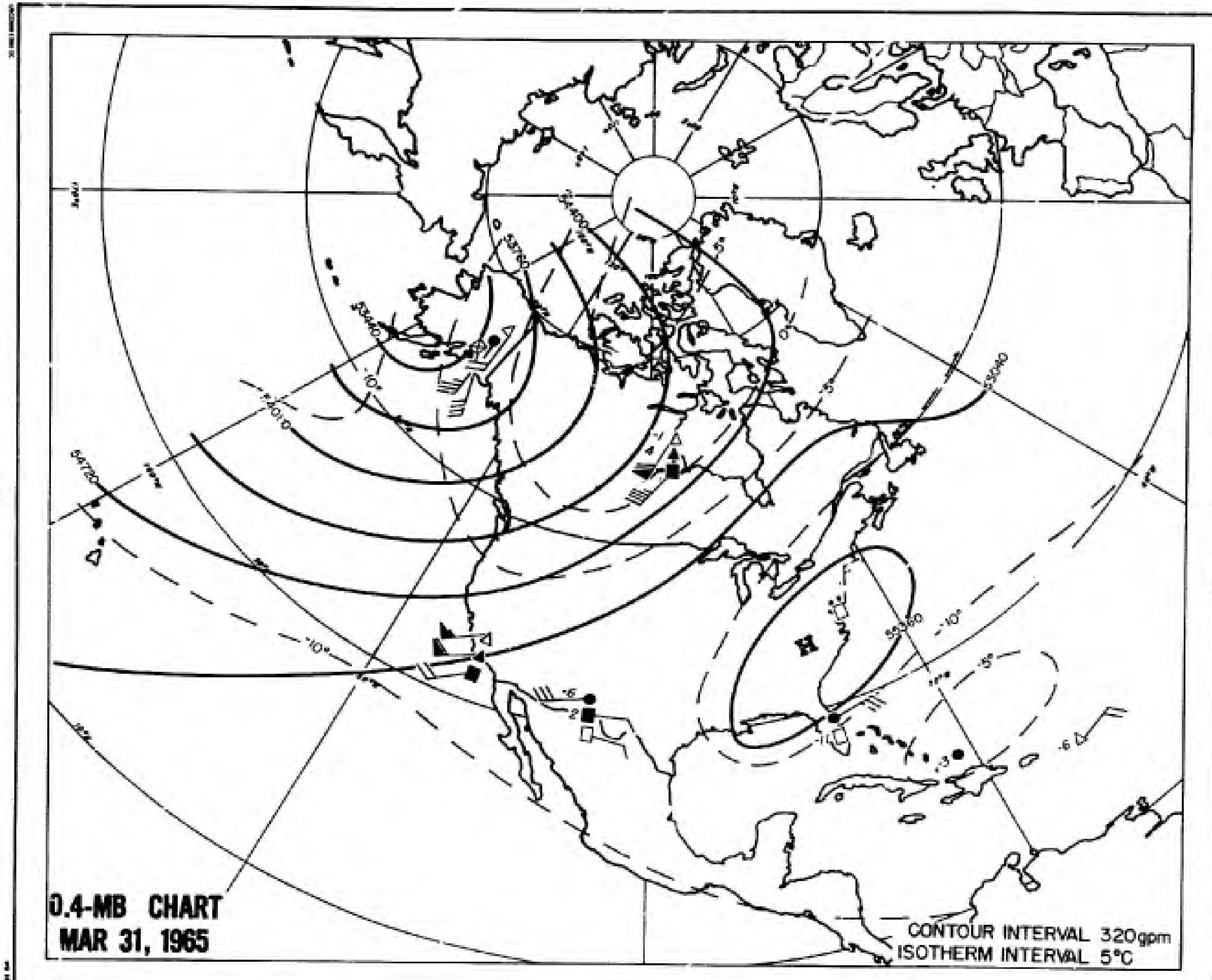
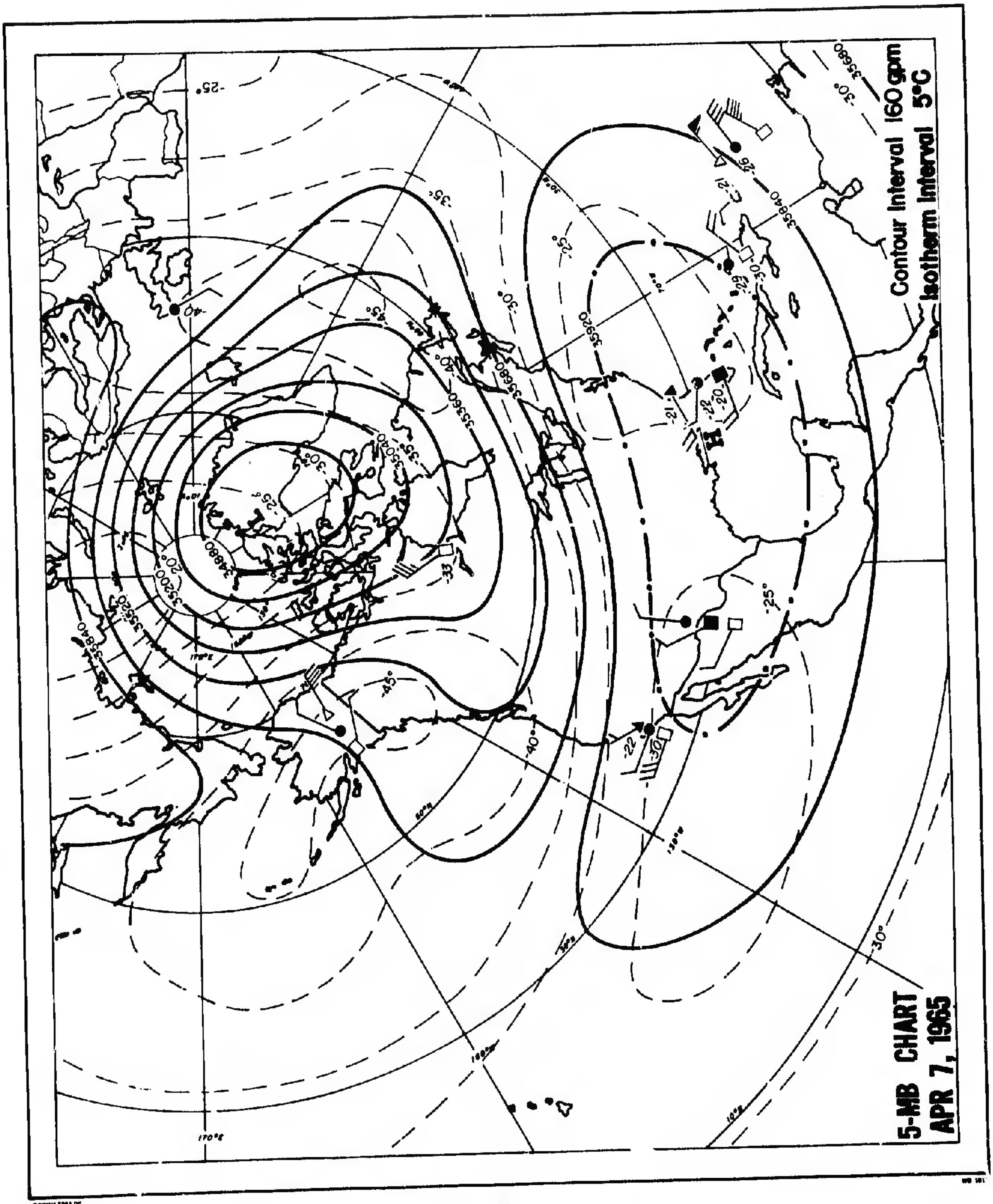
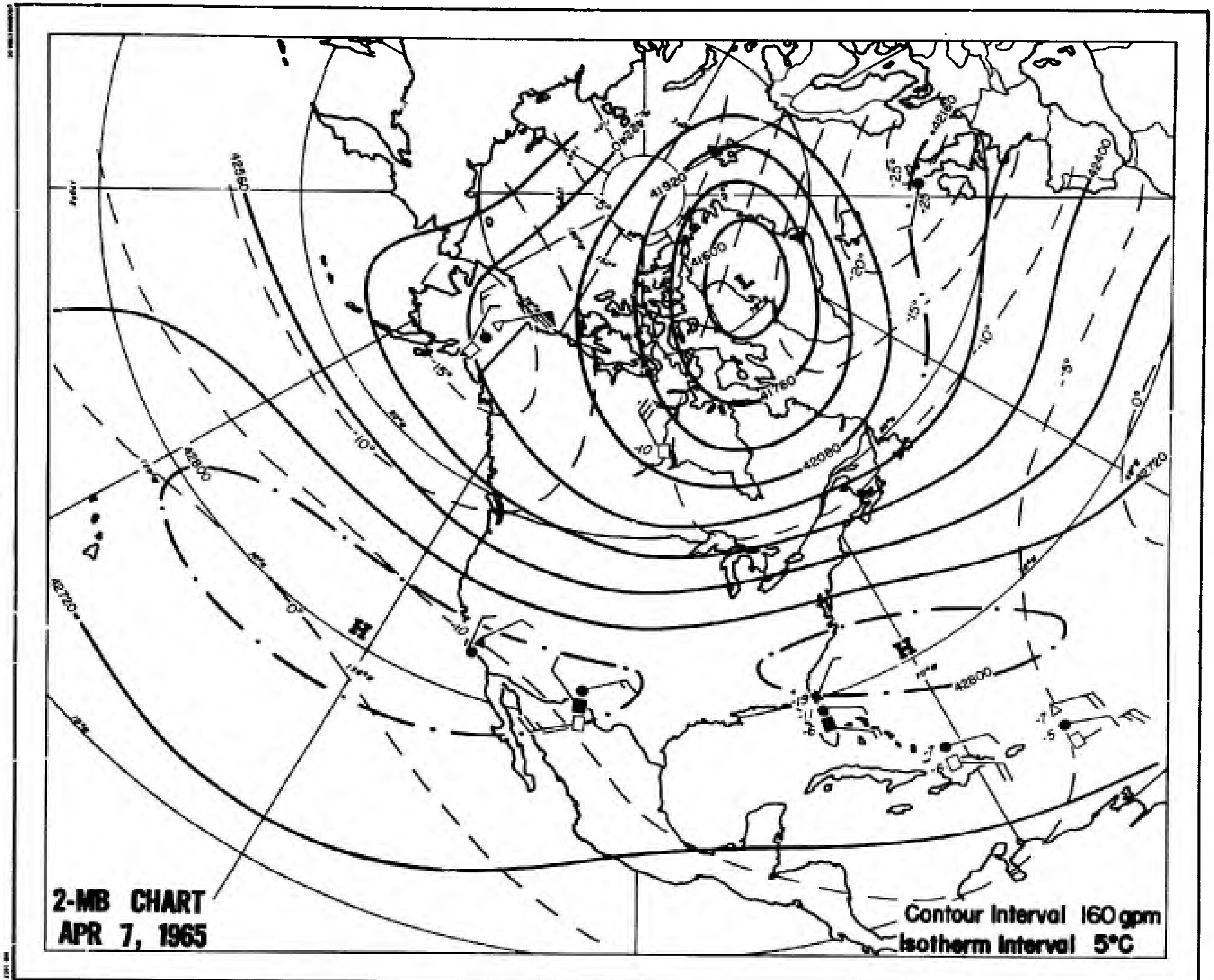
53440
53760
54400
55040
54880
55040

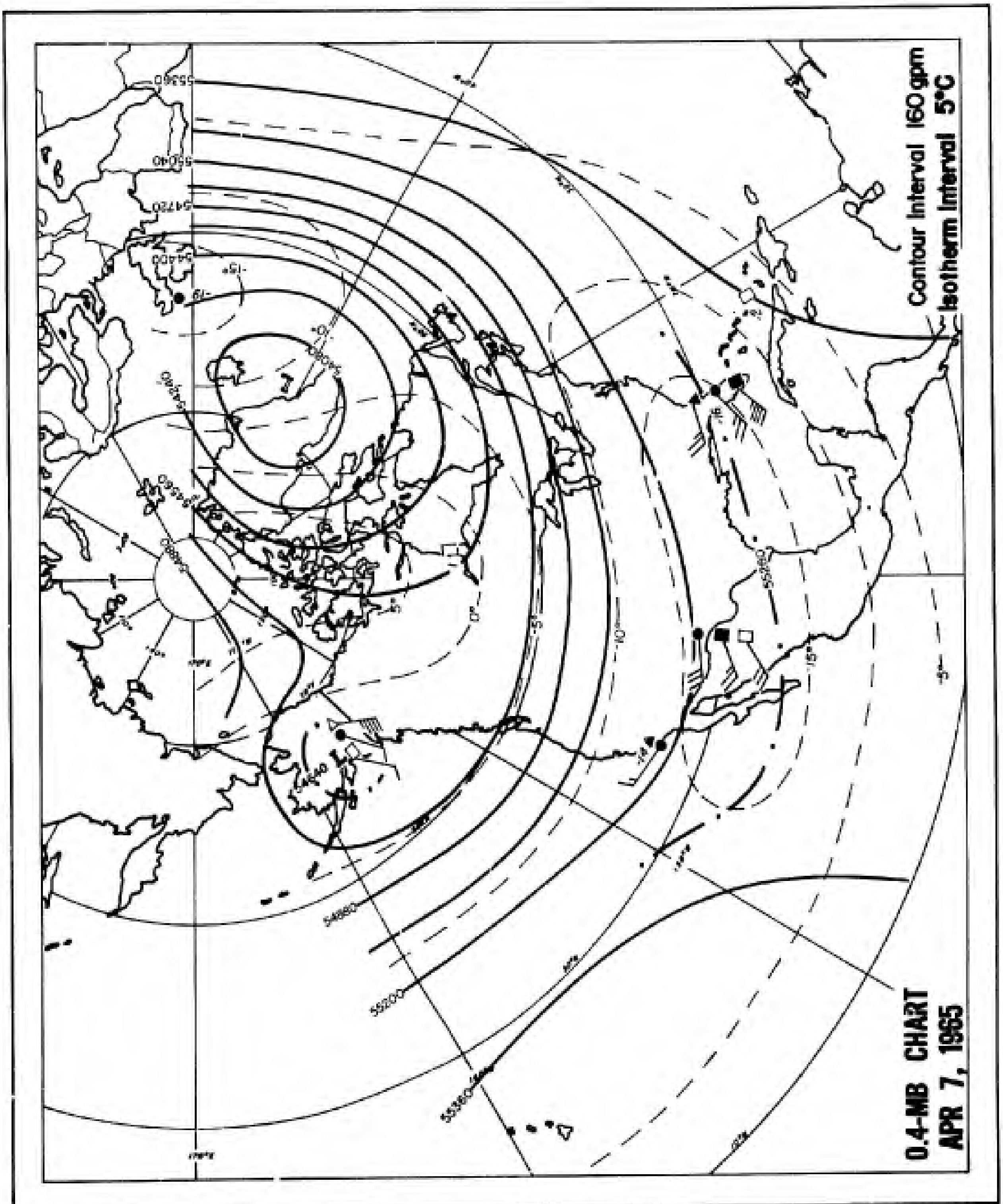

5-MB CHART
MAR 31, 1965
CONTOUR INTERVAL 320gpm
ISOTHERM INTERVAL 5°C
L
H
36160
35840
35680
35200
34560
34240
34880
35520
35840
35680
35840
-25°
-30°
-35°
-40°


2-MB CHART
MAR 31, 1965
CONTOUR INTERVAL 320gpm
ISOTHERM INTERVAL 5°C
41120
41280
41600
41920
42240
42560
L


0.4-MB CHART
MAR 31, 1965
CONTOUR INTERVAL 320gpm
ISOTHERM INTERVAL 5°C
53440
53760
54400
54720
55040
55360
-10°
-5°


5-MB CHART
APR 7, 1965
Contour Interval 160 gpm
Isotherm Interval 5°C


2-MB CHART
APR 7, 1965
Contour Interval 160 gpm
Isotherm Interval 5°C
42560
42720
42800
42400
42240
42080
41920
41760
41600
L
H
H


0.4-MB CHART
APR 7, 1965
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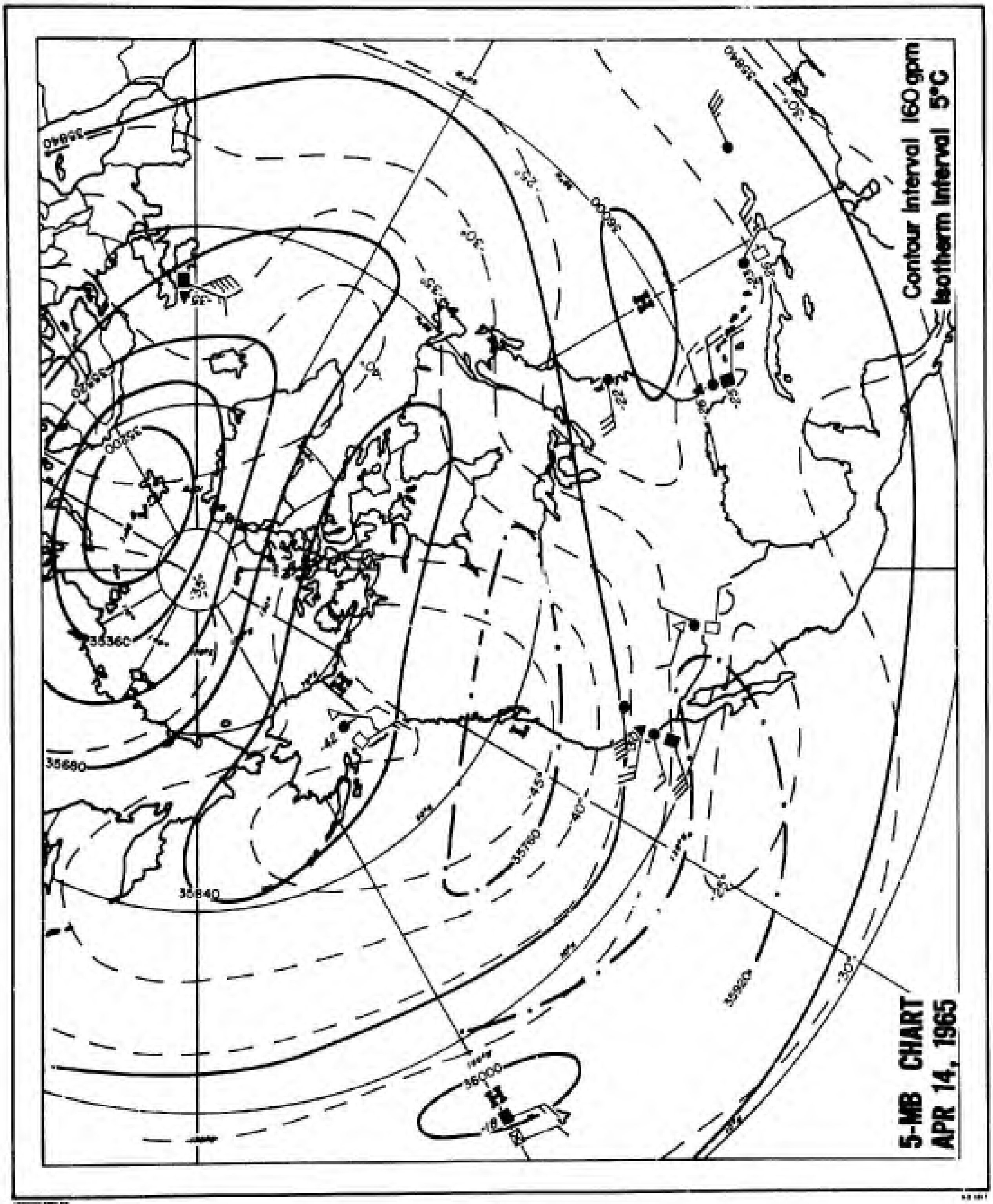
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APR 14, 1965
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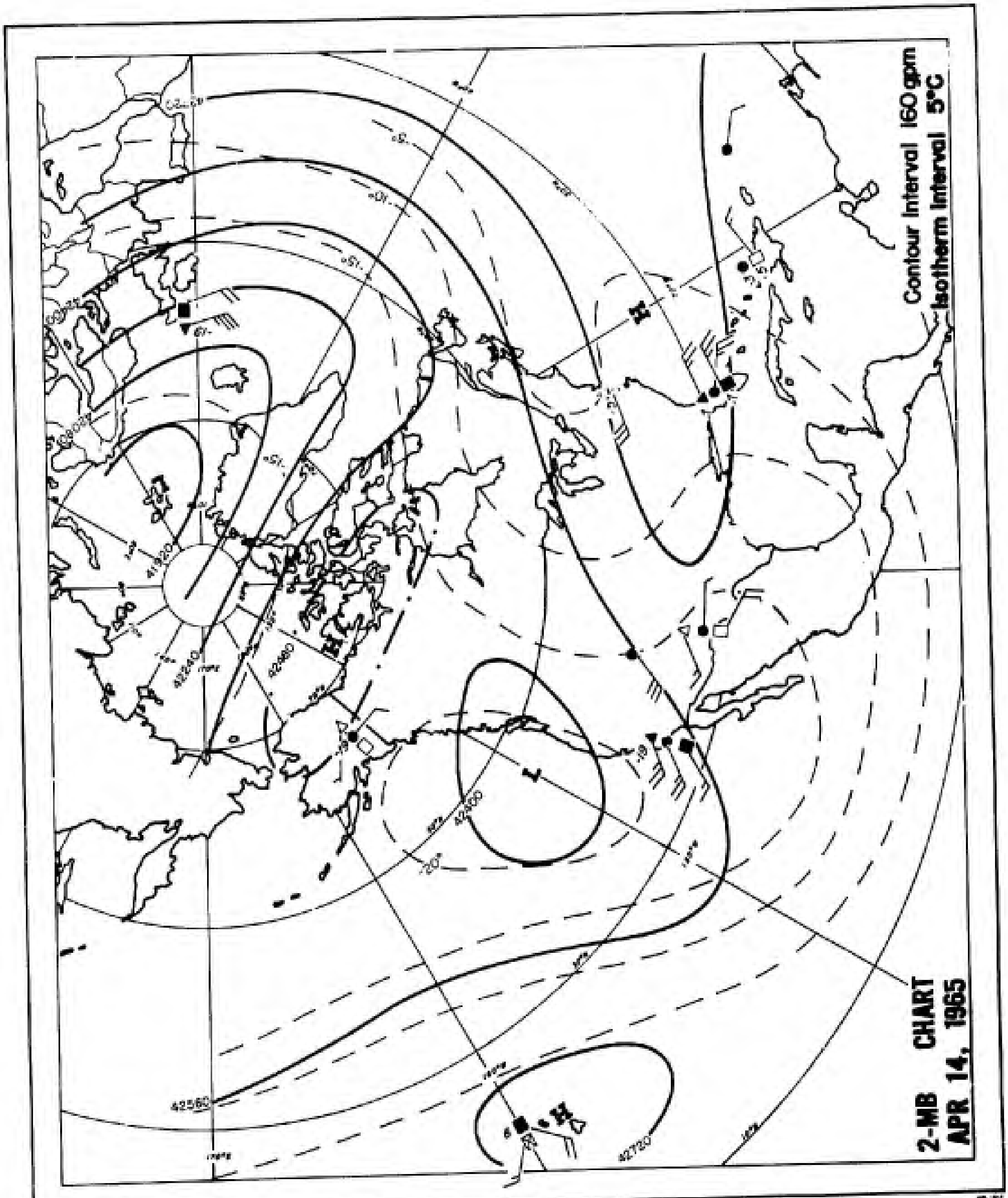
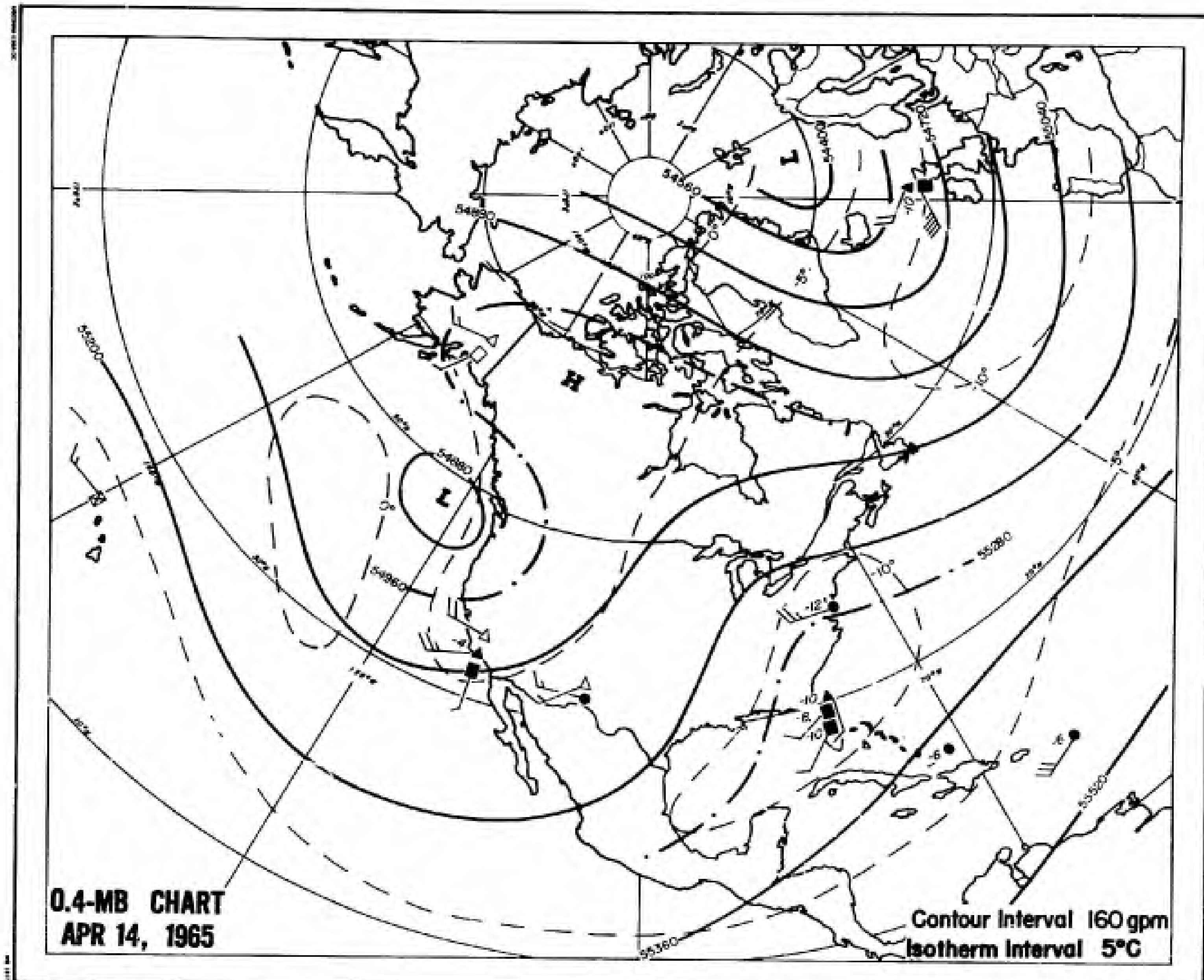
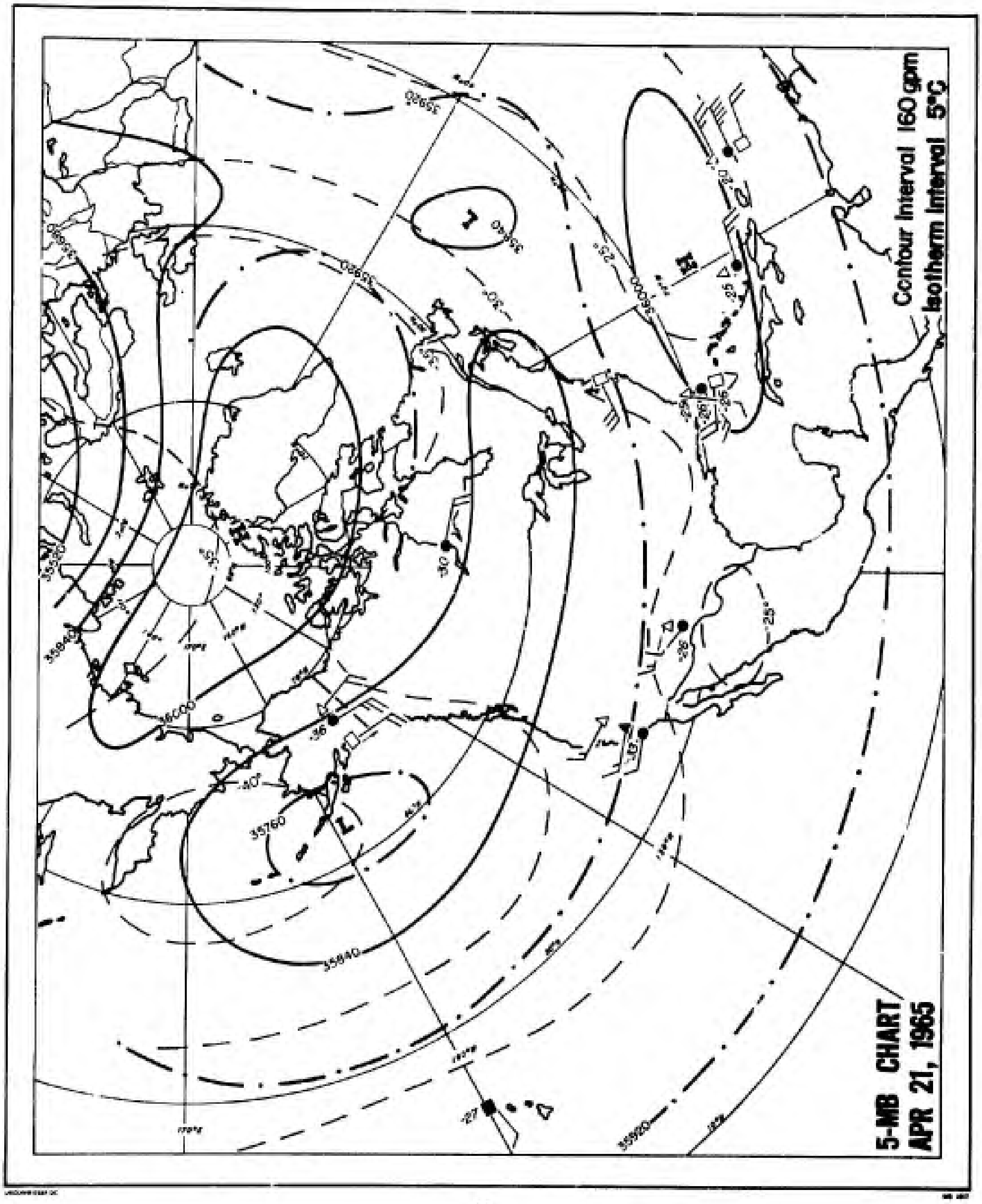
Isotherm Interval 5°C


2-MB CHART
APR 14, 1965
Contour Interval 160 gpm
Isotherm Interval 5°C
42560
42720
42400
42240
41920
-20°


0.4-MB CHART
APR 14, 1965
Contour Interval 160 gpm
Isotherm Interval 5°C
54400
54720
55040
54560
54880
54960
55200
55280
55360
55520
L
H
-10°
-5°
0°
-12°
-8
-4
-6


5-MB CHART
APR 21, 1965
Contour Interval 160 gpm
Isotherm Interval 5°C
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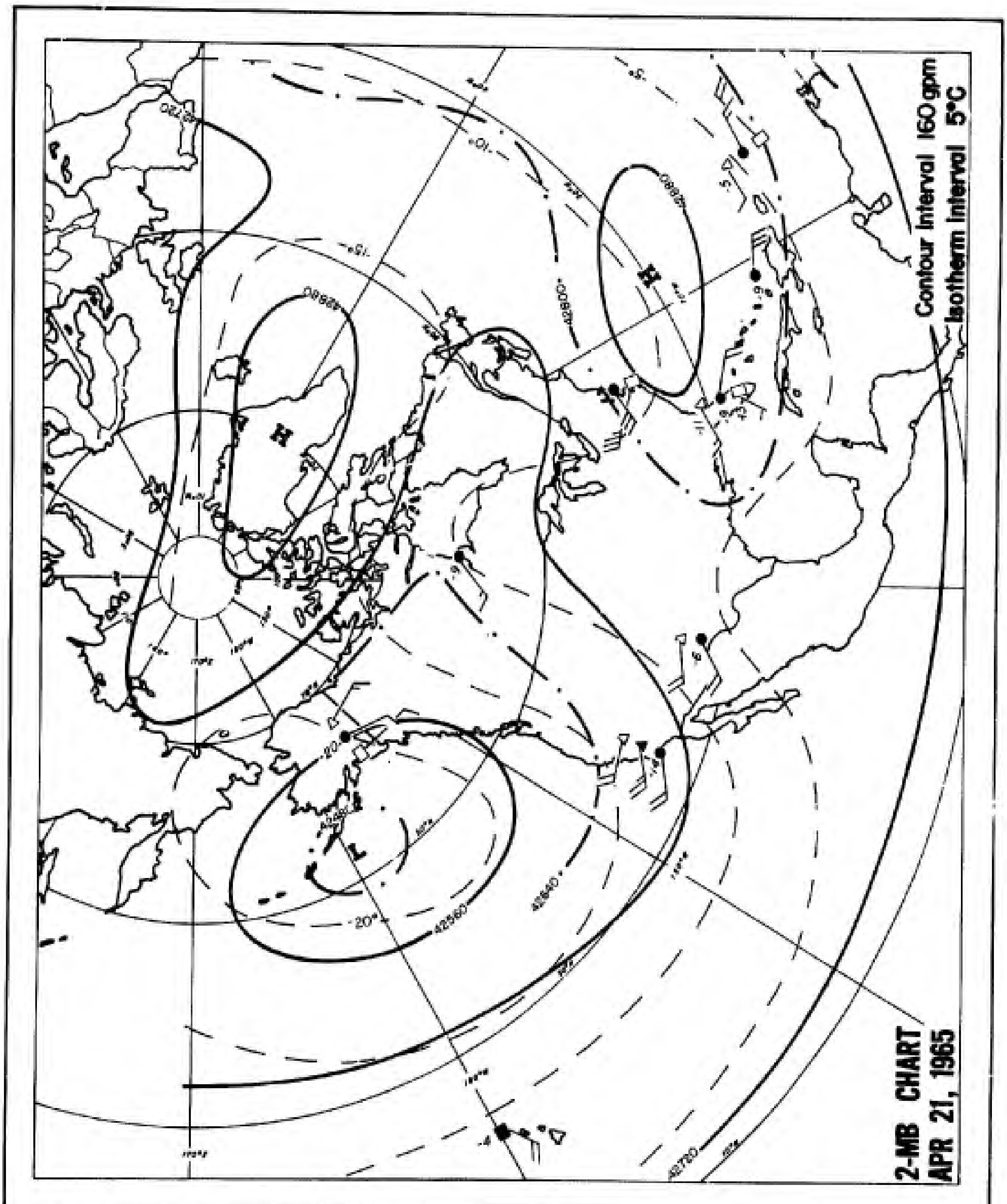
35840
36000
35760


2-MB CHART
APR 21, 1965
Contour Interval 160 gpm
Isotherm Interval 5°C
42560
42640
42720
42800
42880
-20°
-15°
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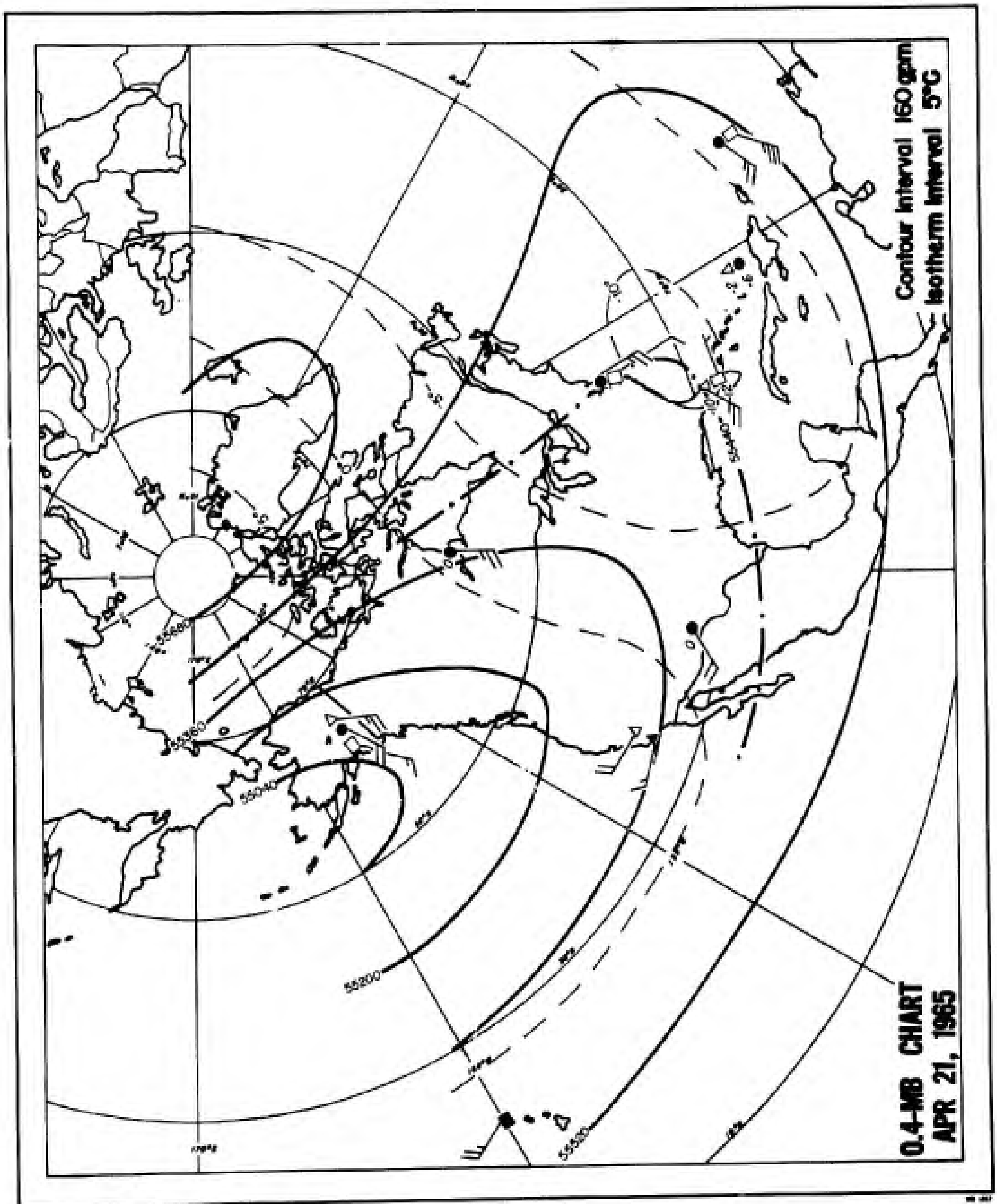
-5°
H
H
L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Isotherm Interval 5°C
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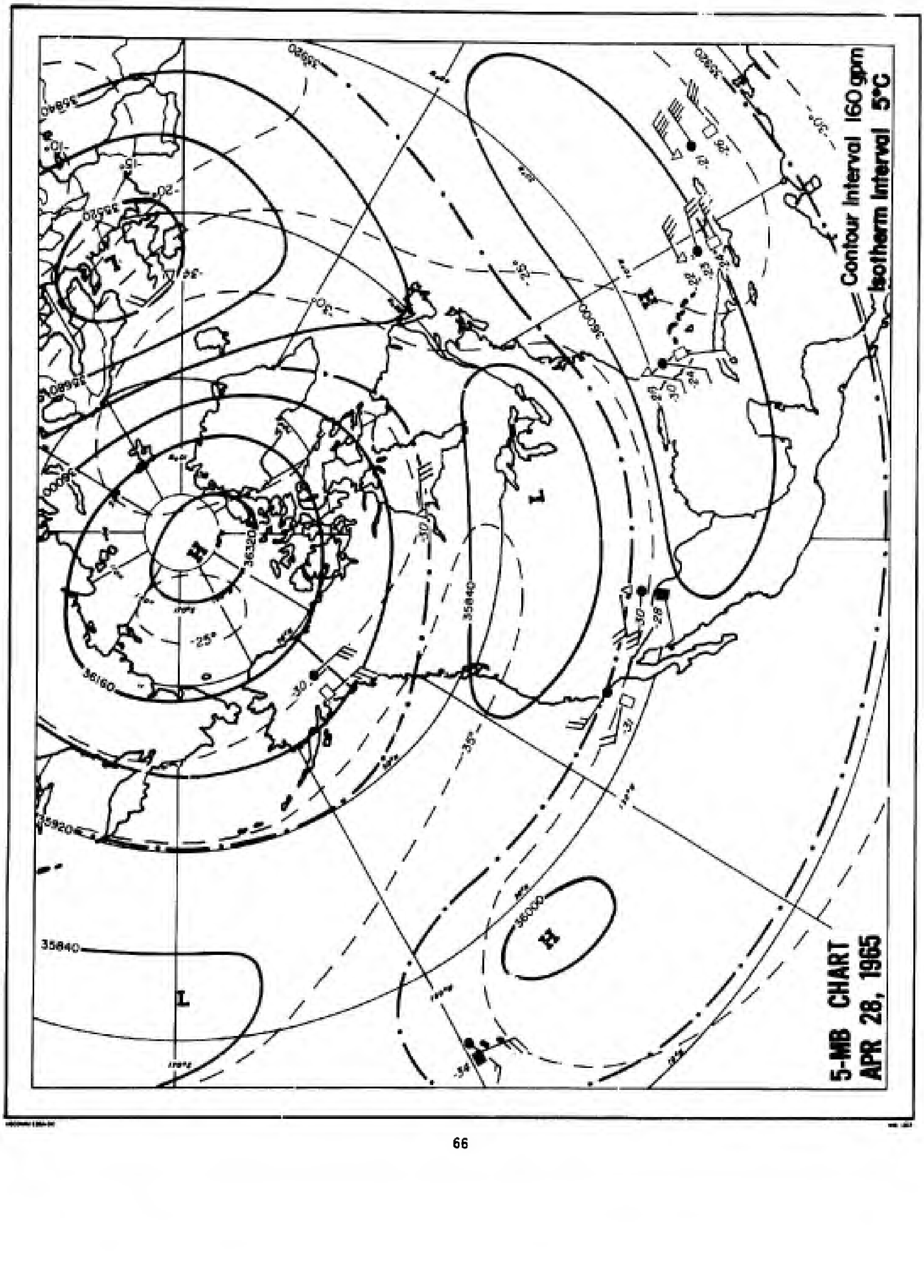
5-MB CHART
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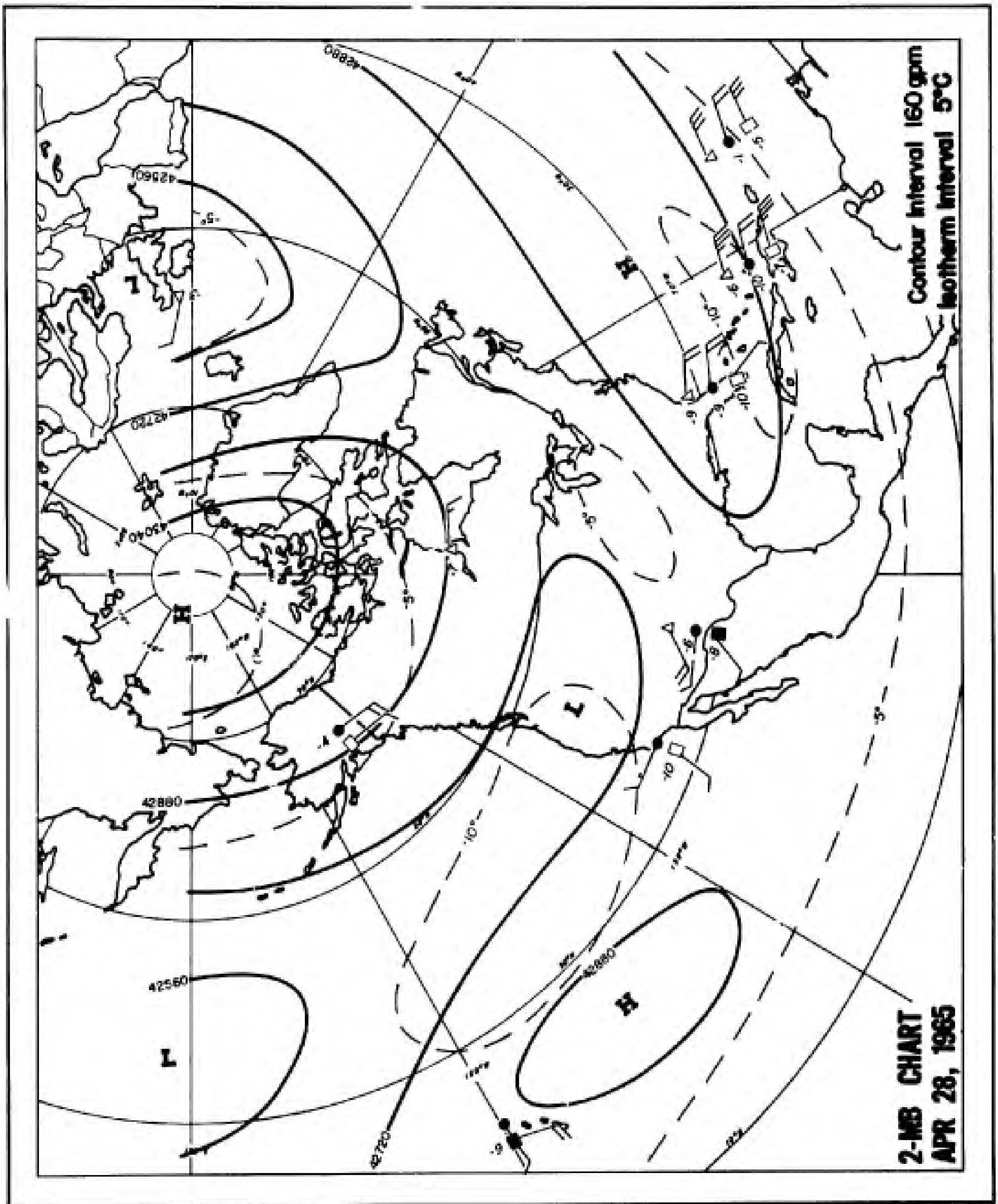
Isotherm Interval 5°C


2-MB CHART
APR 28, 1965
Contour Interval 160 gpm
Isotherm Interval 5°C
42560
42720
42880
43040
42880
42560
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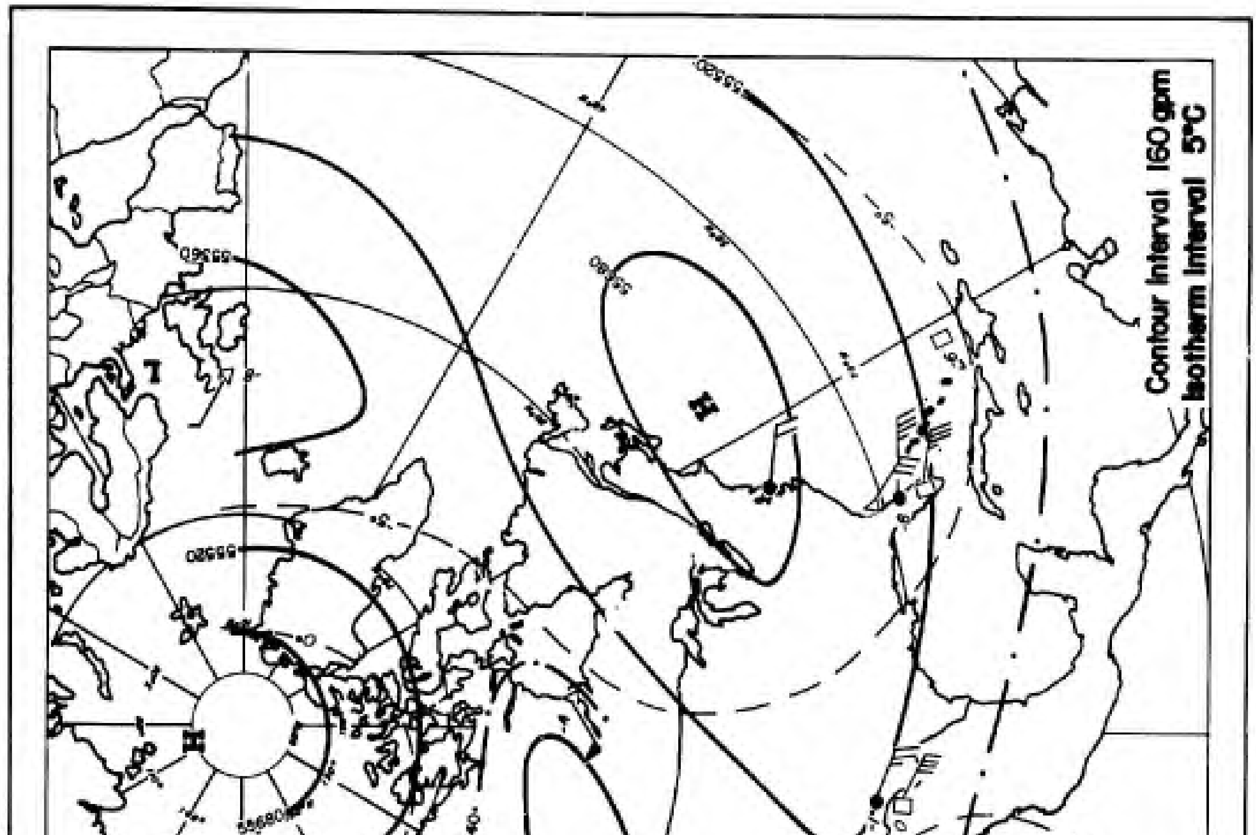
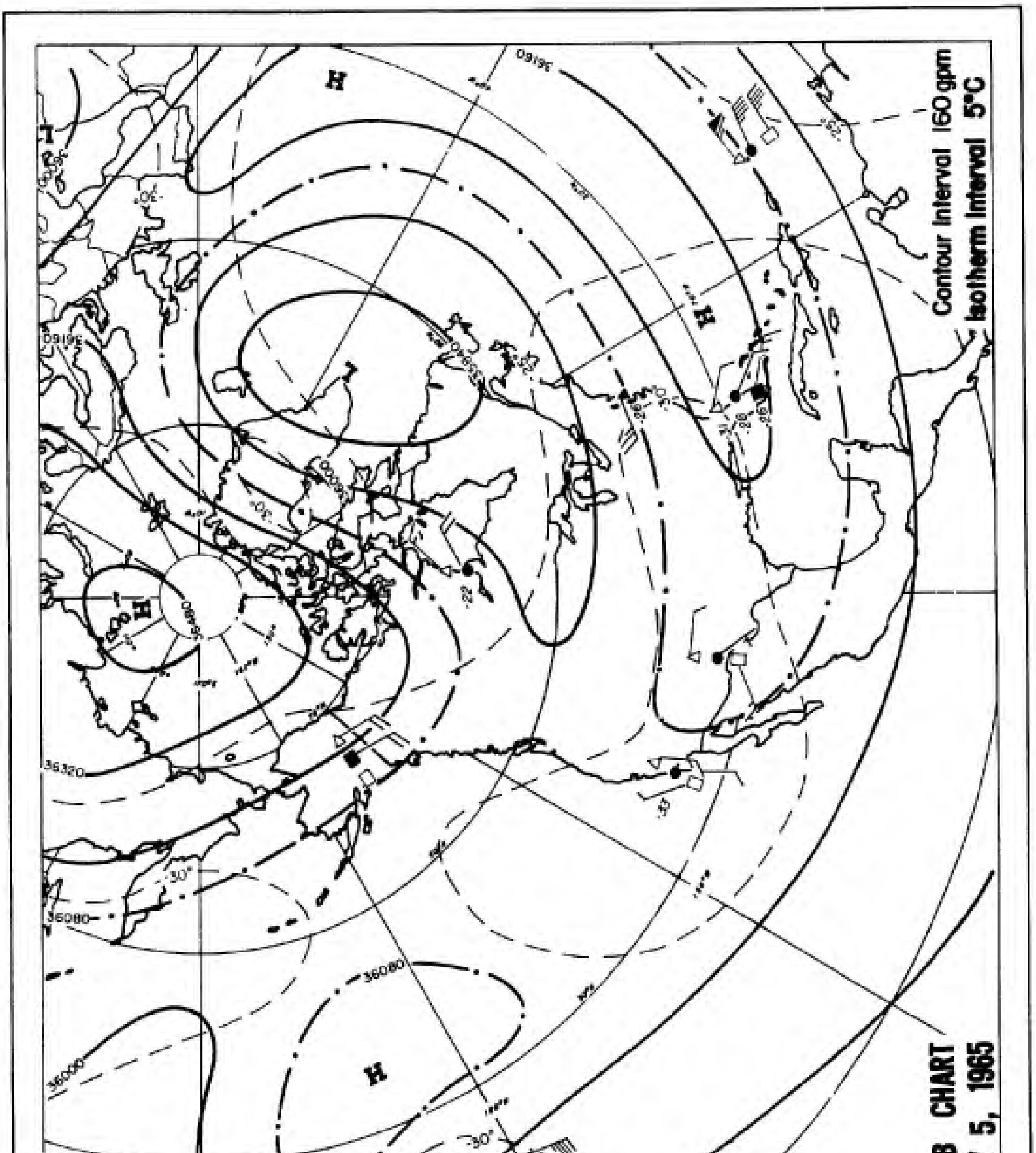
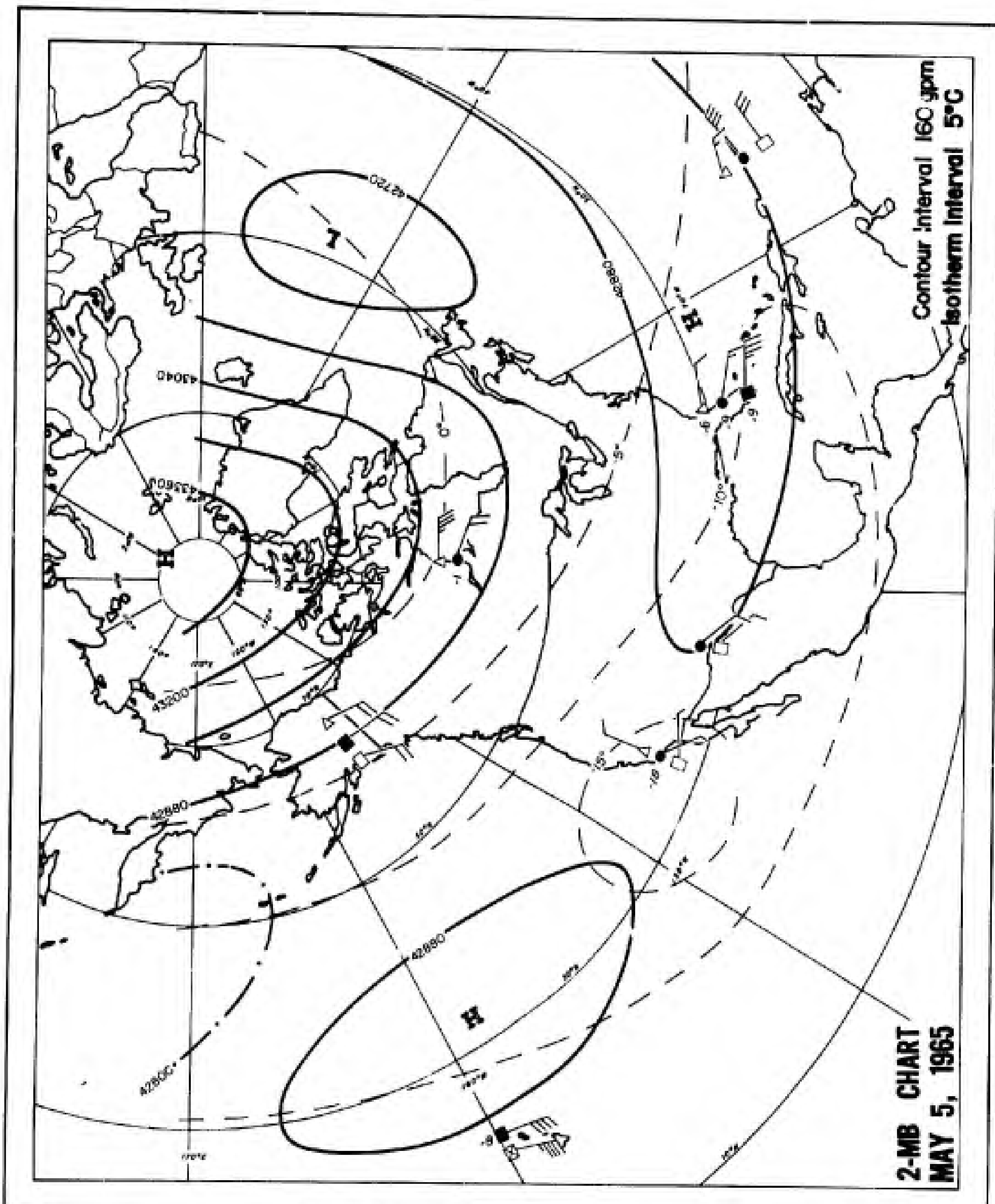
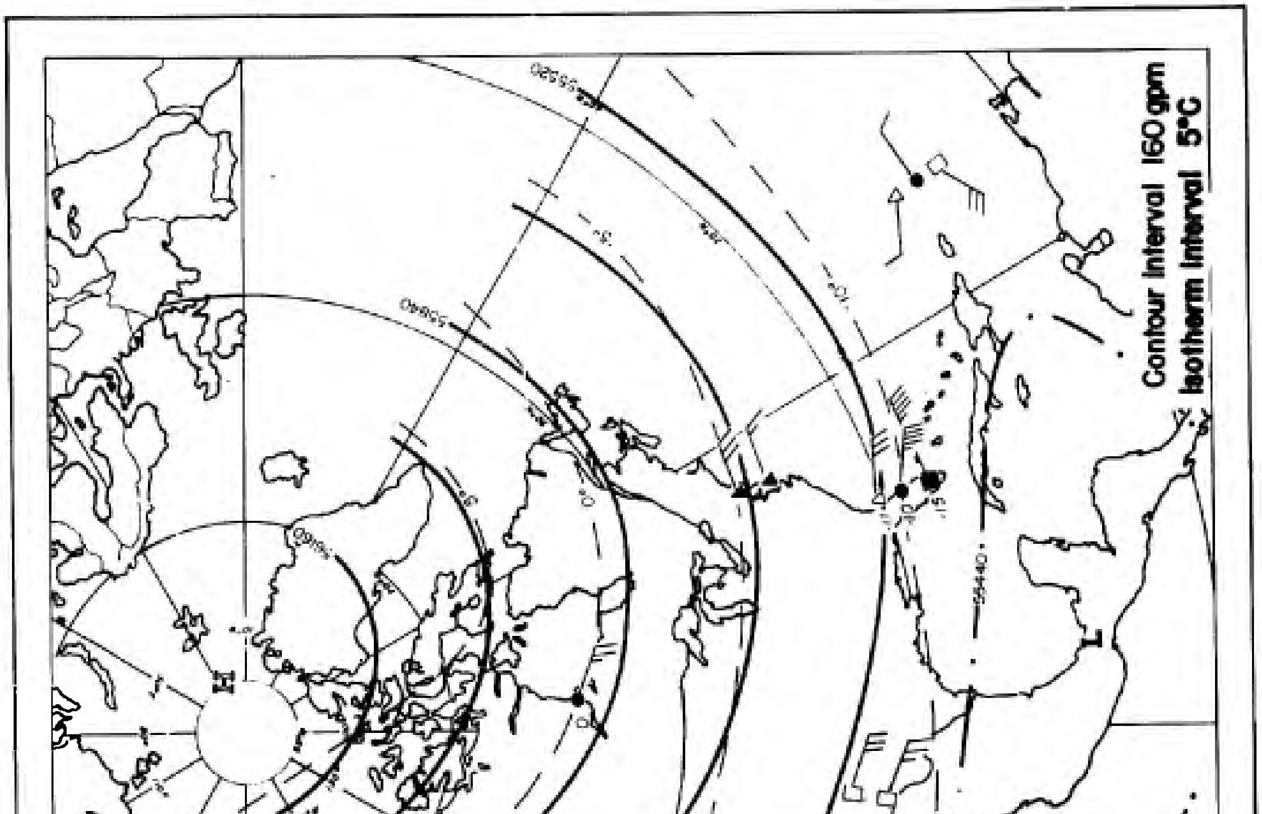
H
L
L
H
H



0.4-MB CHART
APR 28, 1965
Contour Interval 160 gpm
Isotherm Interval 5°C
55360
55520
55680
55440
H
L


5-MB CHART
MAY 5, 1965
Contour Interval 160 gpm
Isotherm Interval 5°C
36320
36080
36000
35840
36160
36480
-30°
-25°


2-MB CHART
MAY 5, 1965
Contour Interval 160 gpm
Isotherm Interval 5°C
42720
43040
43360
43200
42880
42800
-5°
-10°
-15°


0.4-MB CHART
MAY 5, 1965
Contour Interval 160 gpm
Isotherm Interval 5°C
55520
55680
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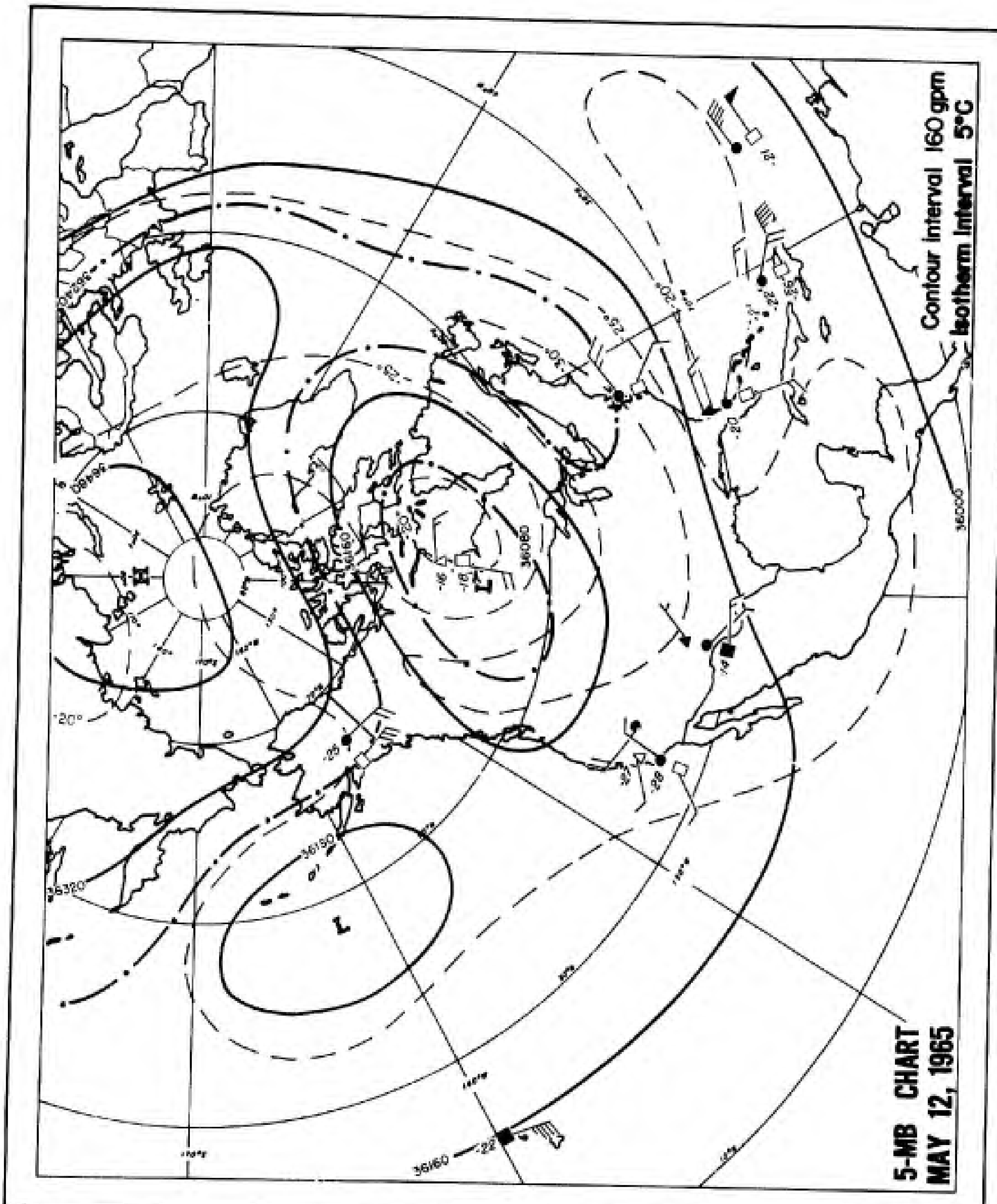
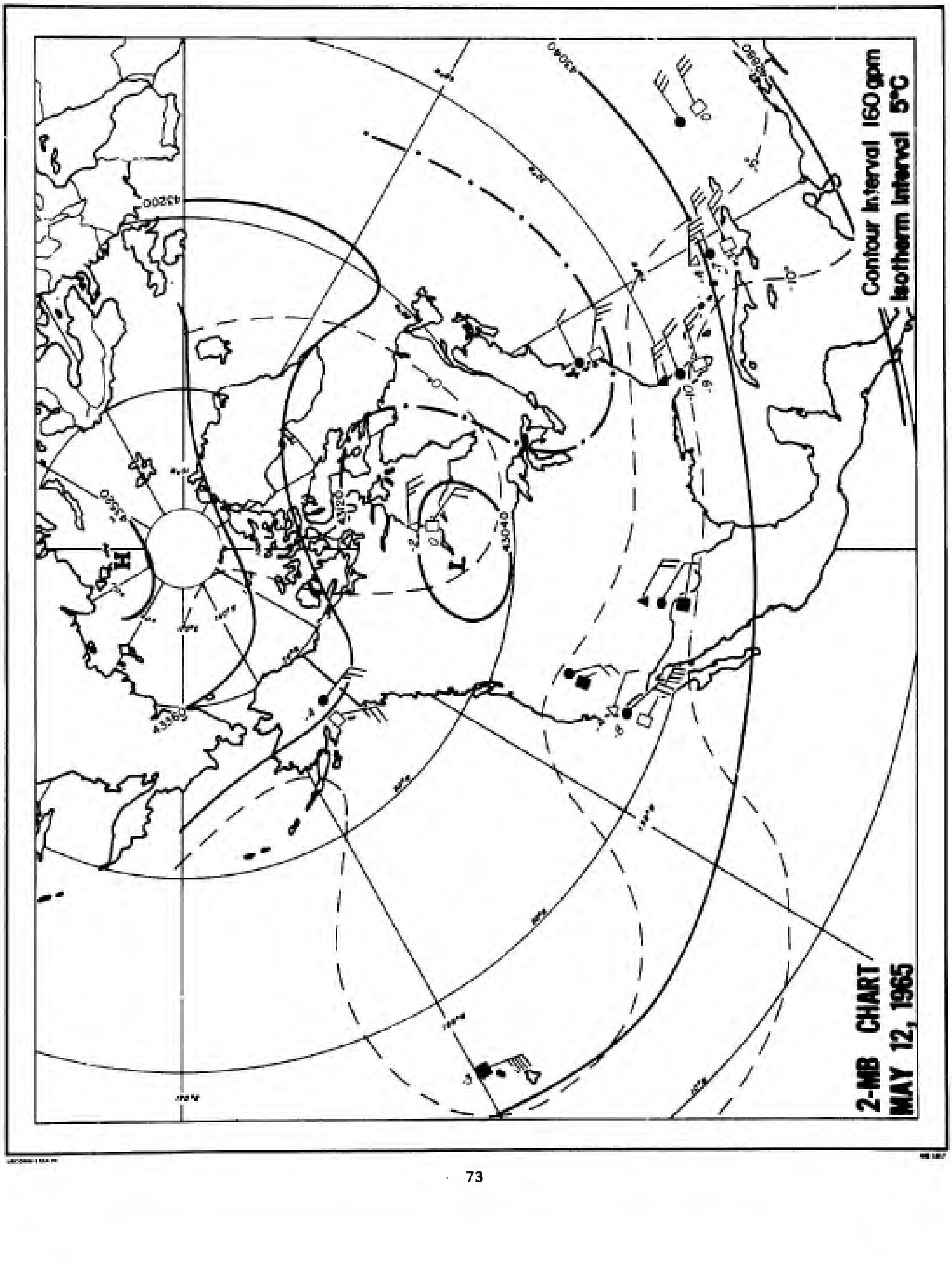
56000
56160
55440
55920


5-MB CHART
MAY 12, 1965
Contour Interval 160 gpm
Isotherm Interval 5°C
36320
36160
36150
36080
36000
L


2-MB CHART
MAY 12, 1965
Contour Interval 160 gpm
Isotherm Interval 5°C
43200
43040
43360
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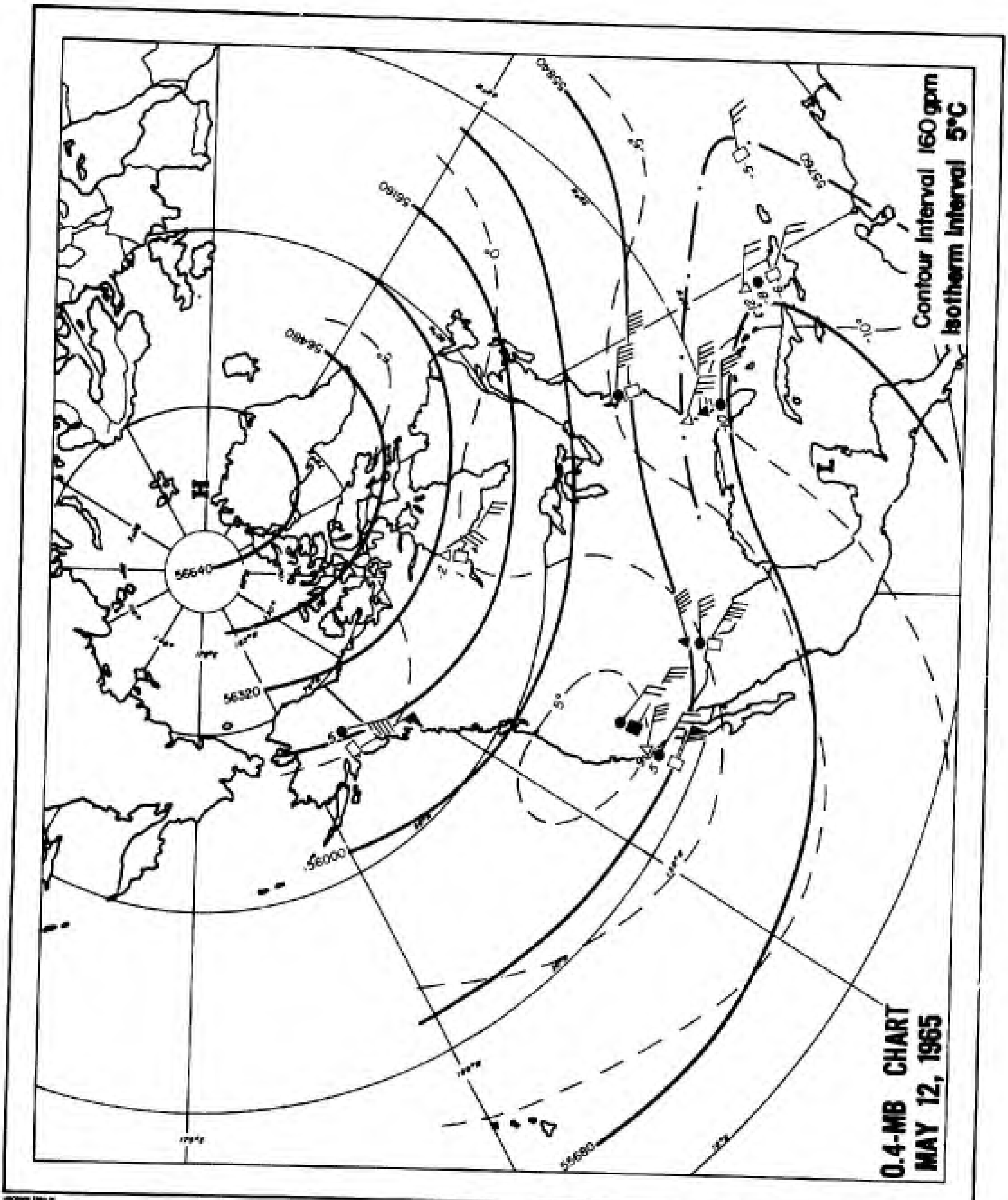
43040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Isotherm Interval 5°C
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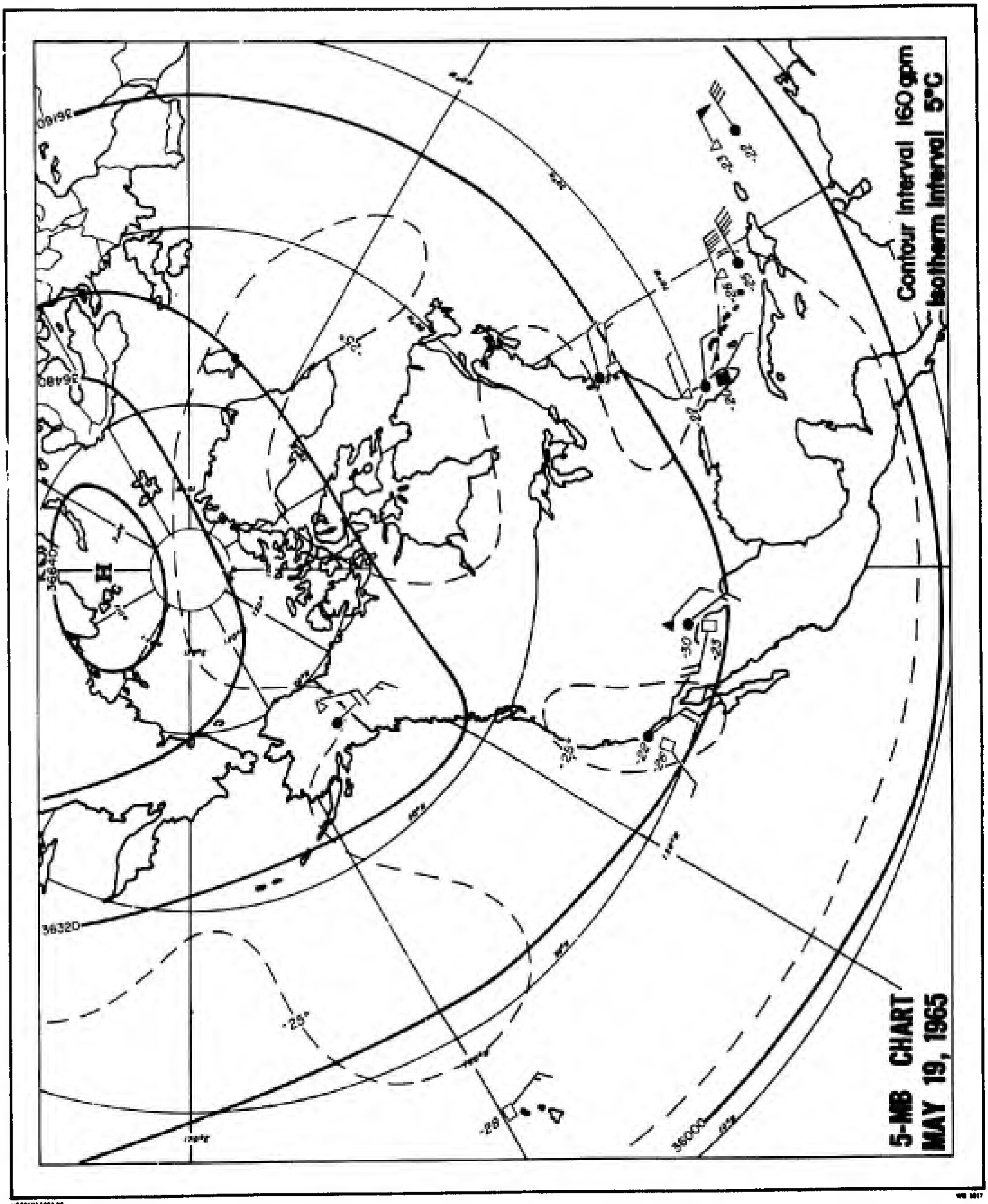
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Isotherm Interval 5°C
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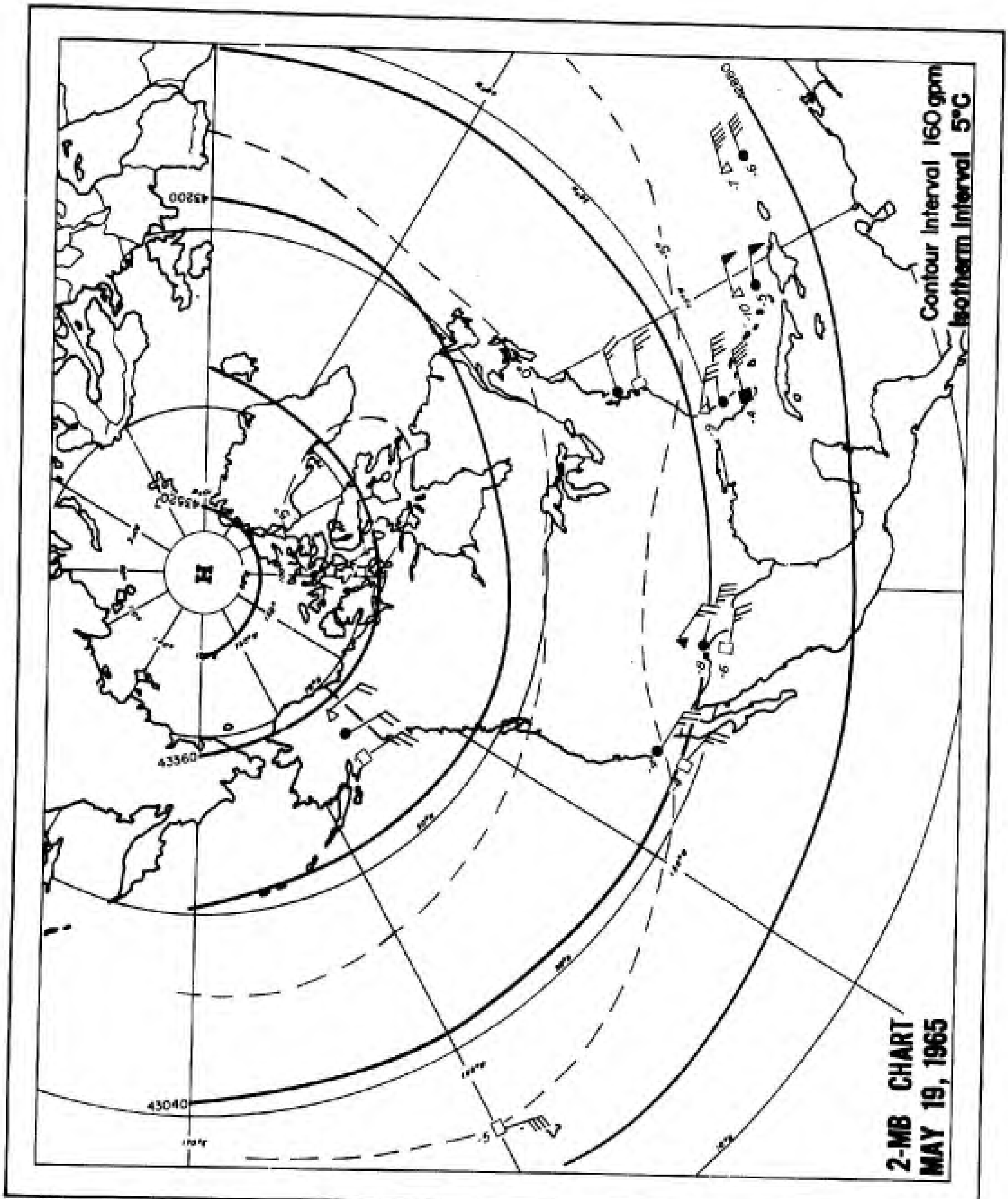
36000
H
-25°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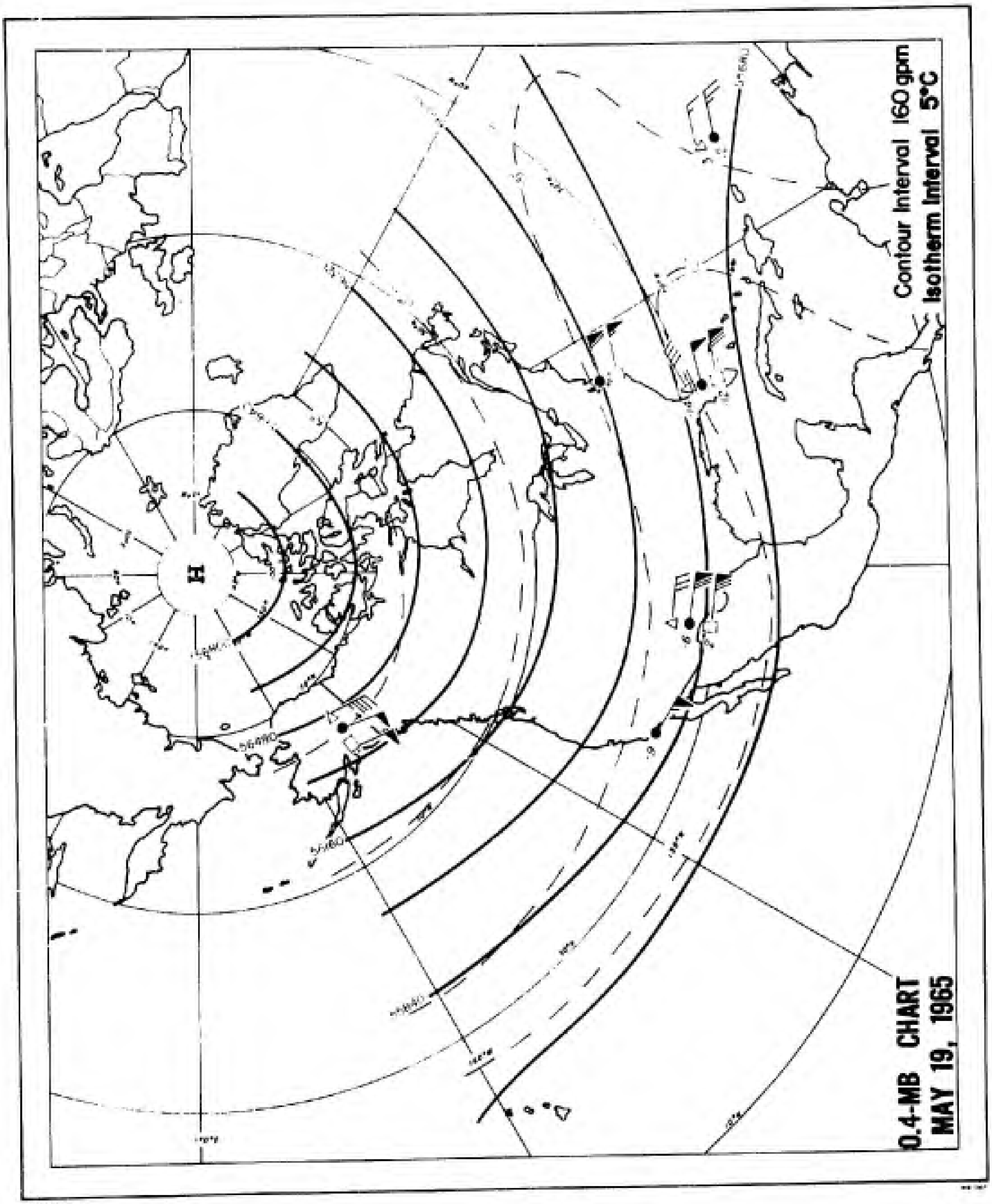
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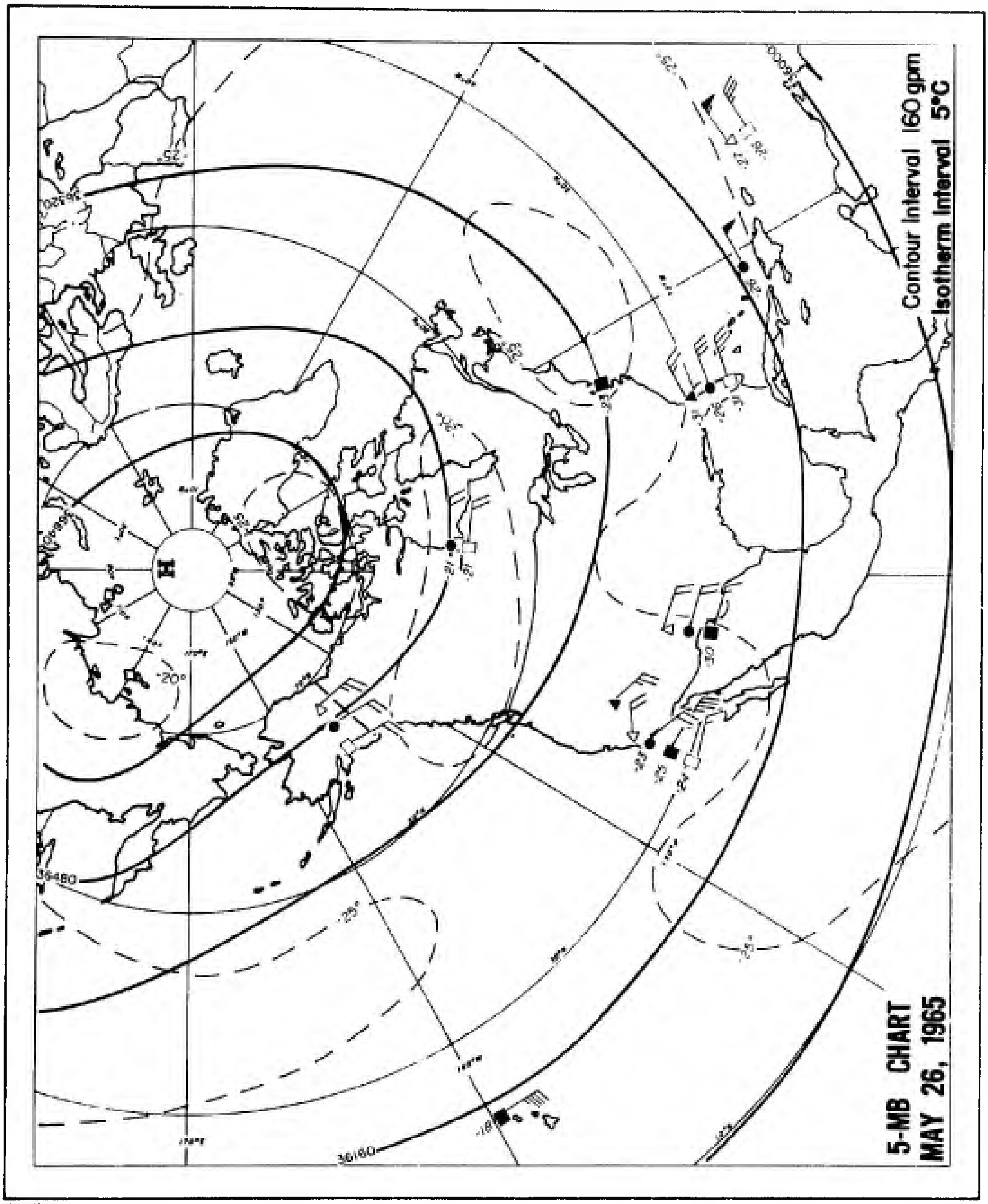

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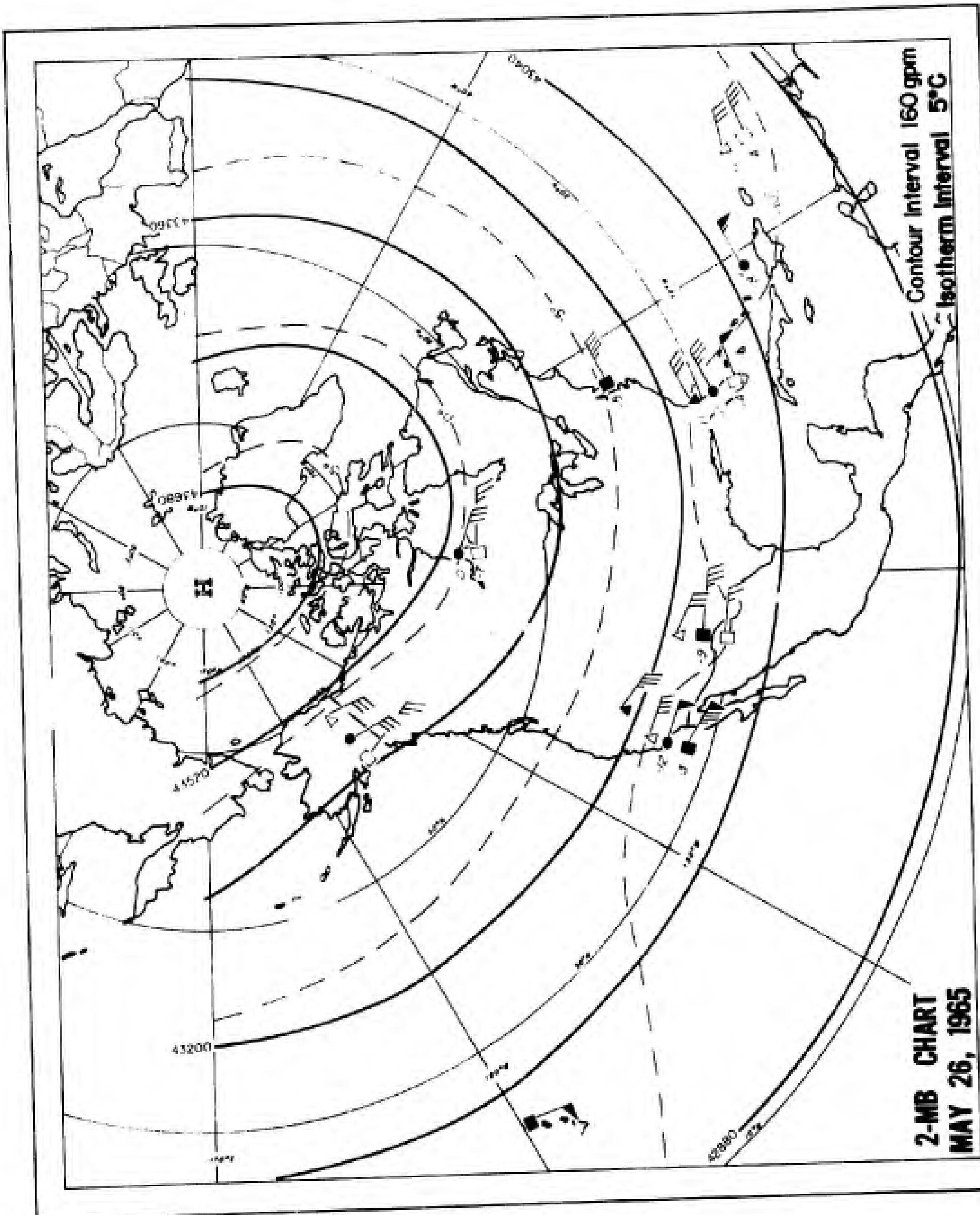
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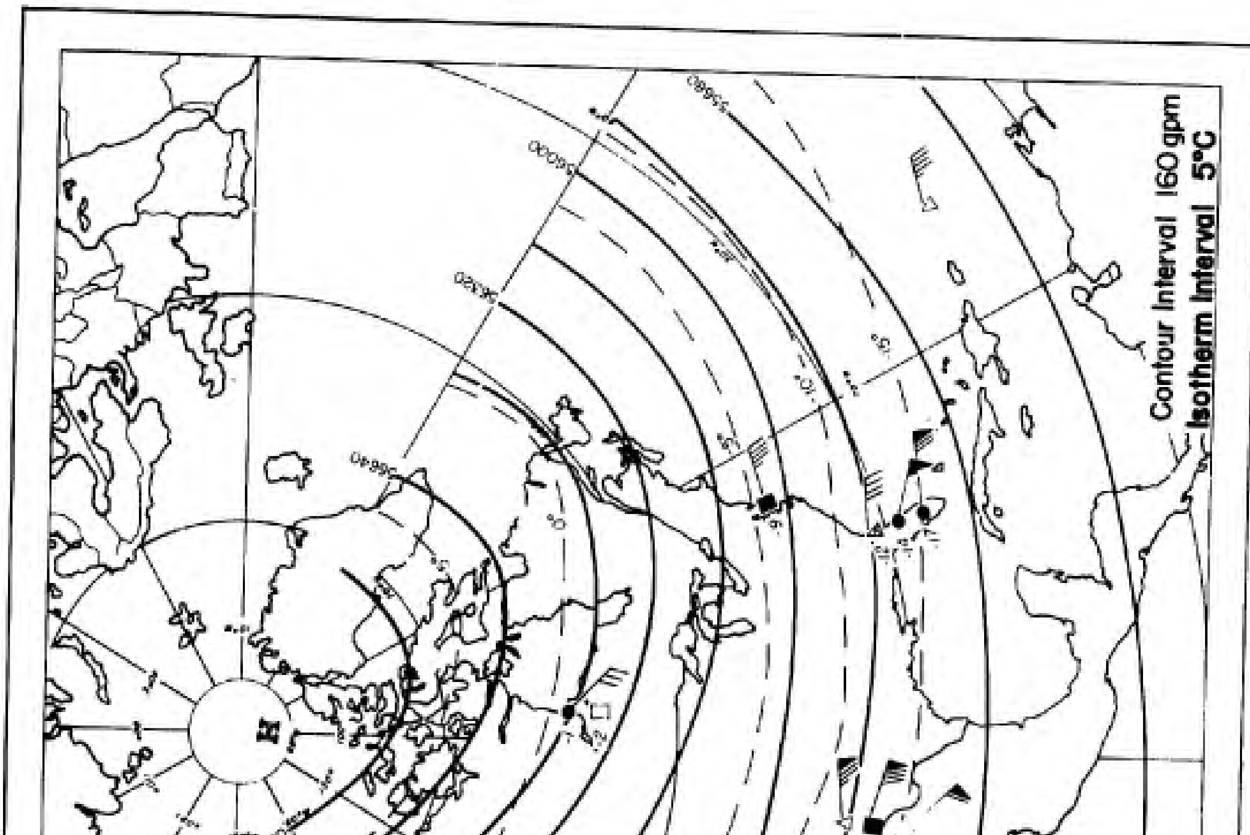
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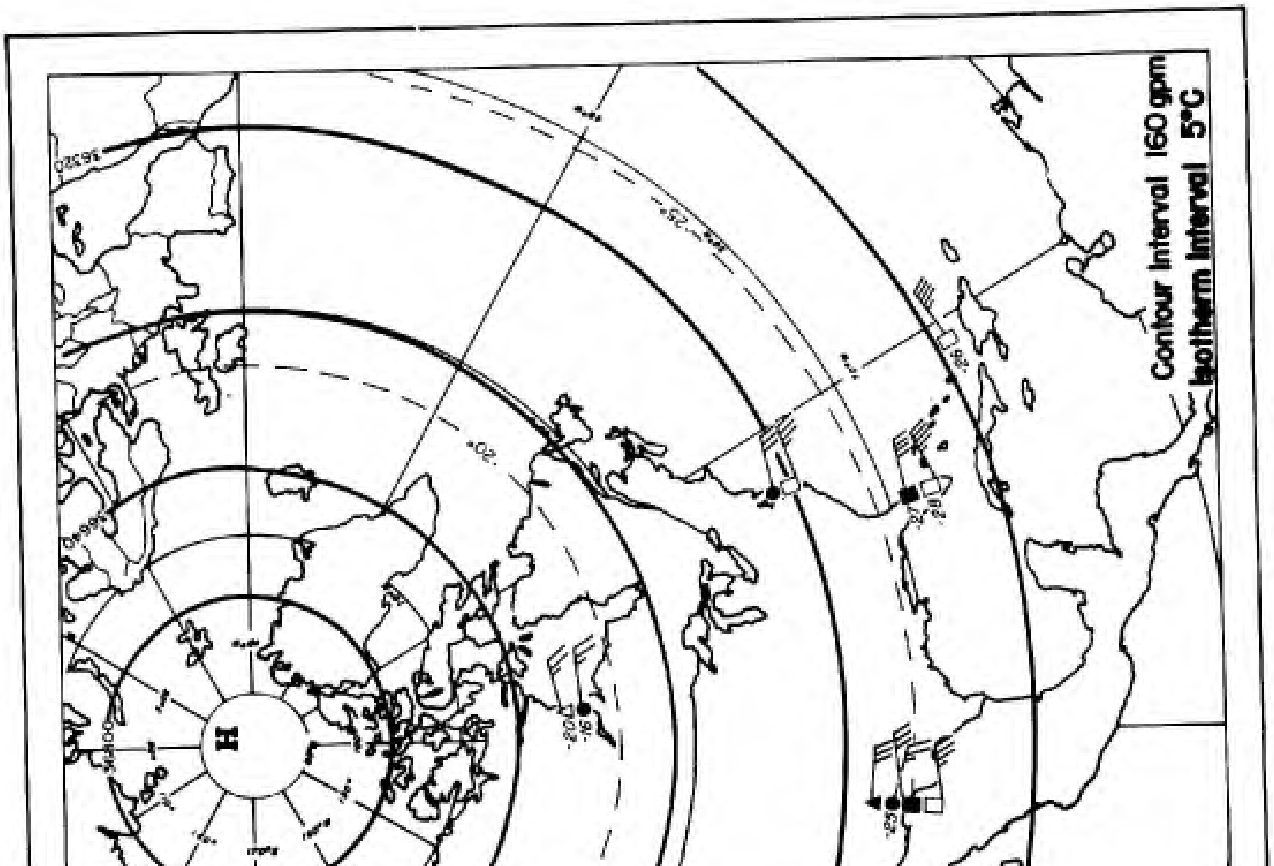
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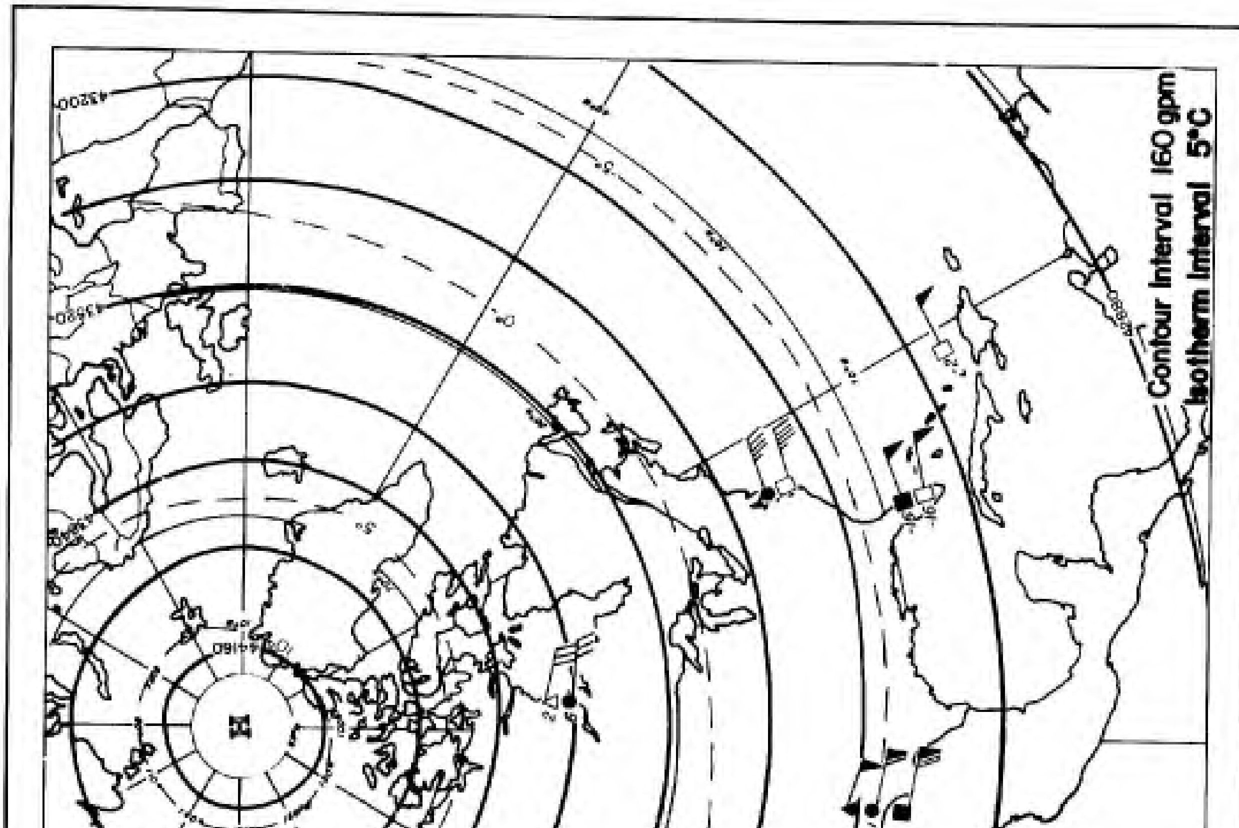
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Isotherm Interval 5°C
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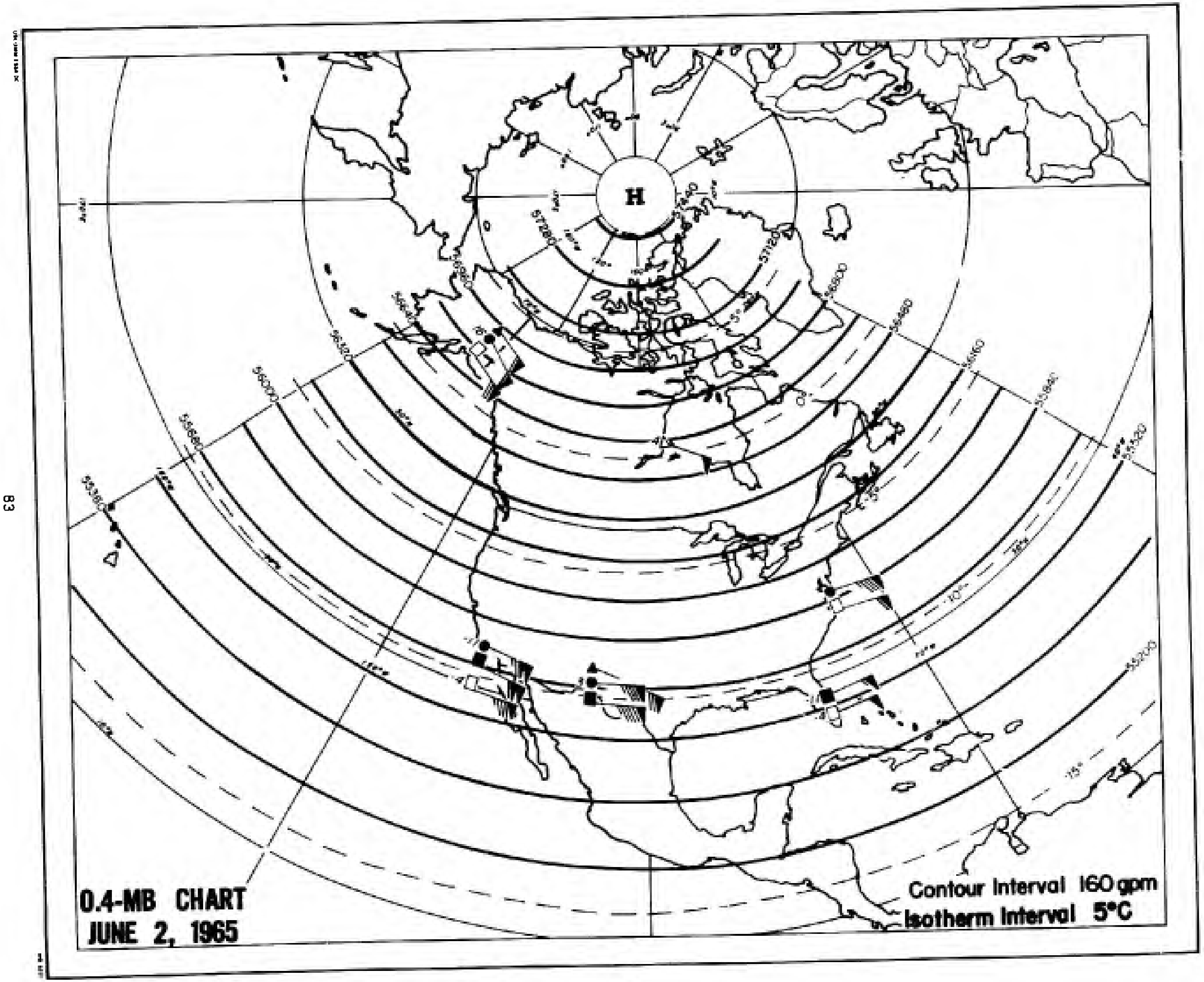
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Isotherm Interval 5°C
H
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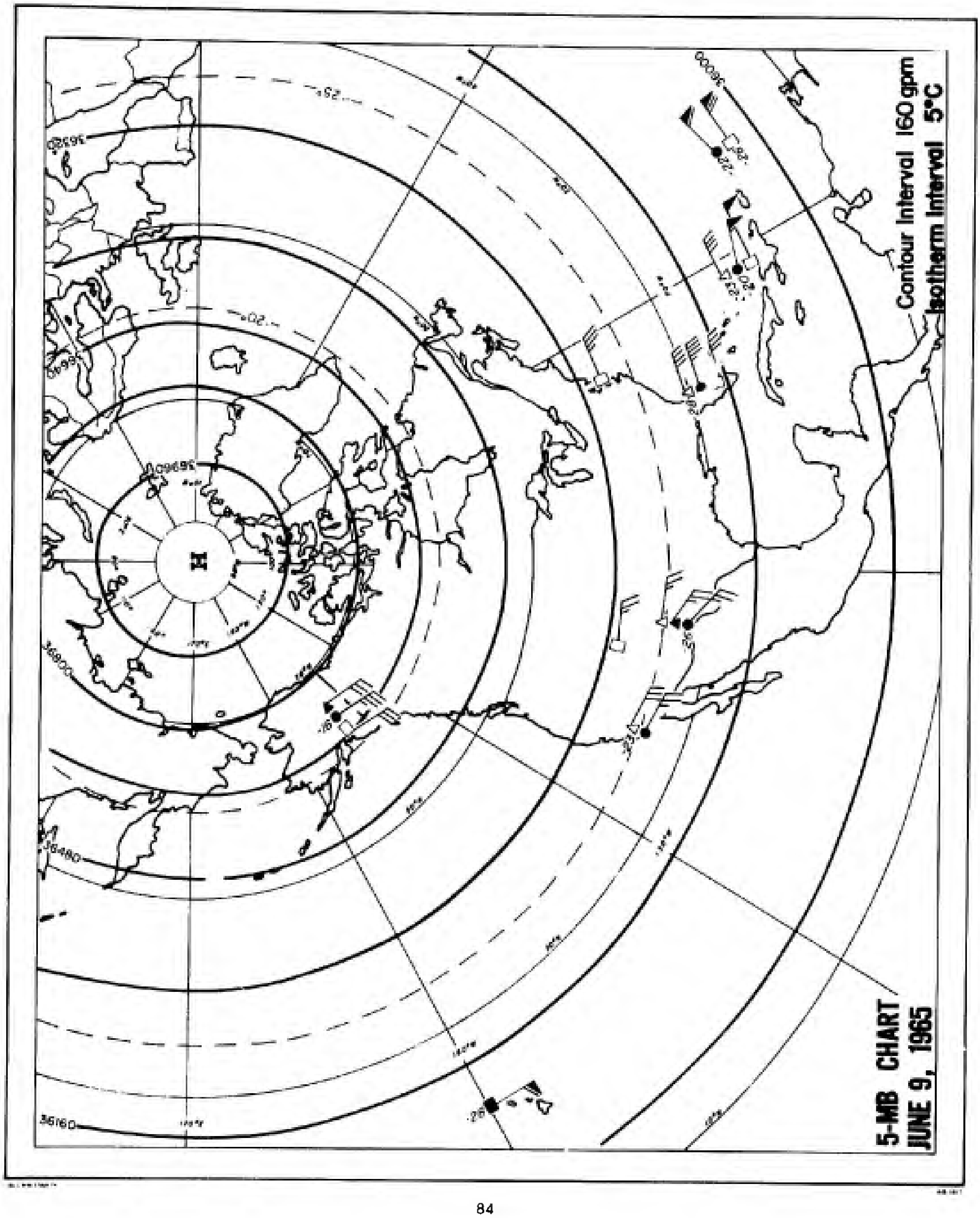
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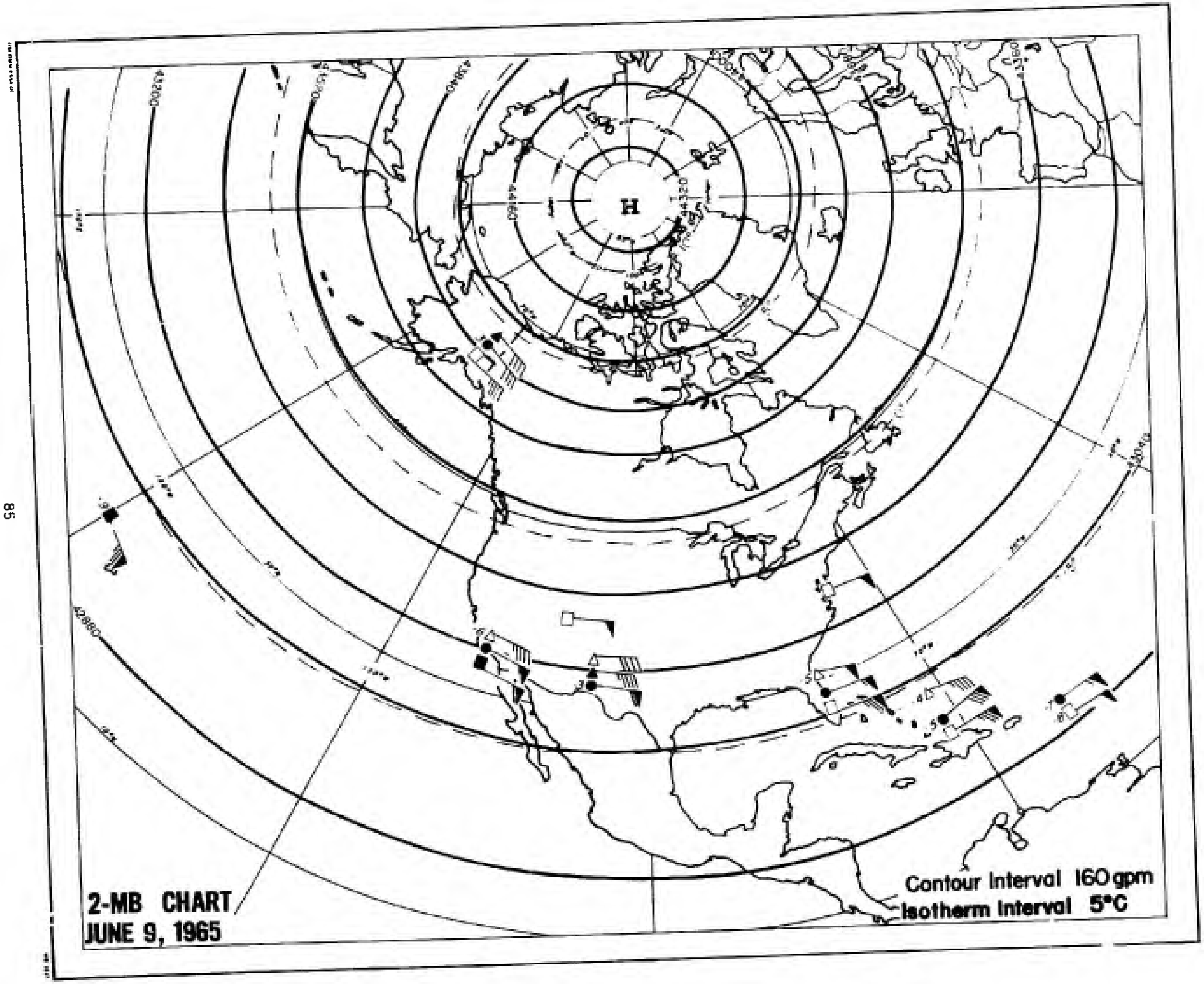
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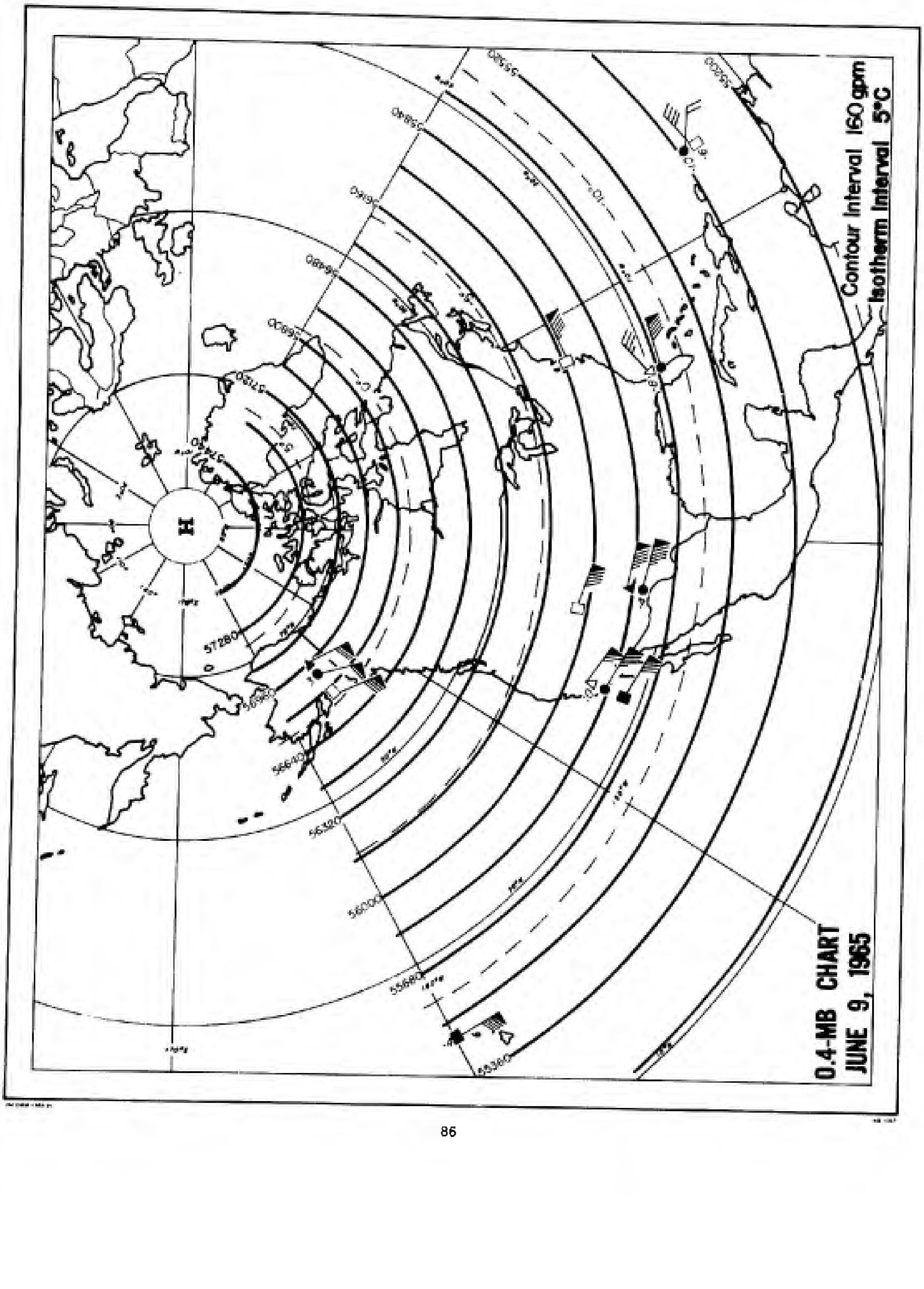

0.4-MB CHART
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Isotherm Interval 5°C
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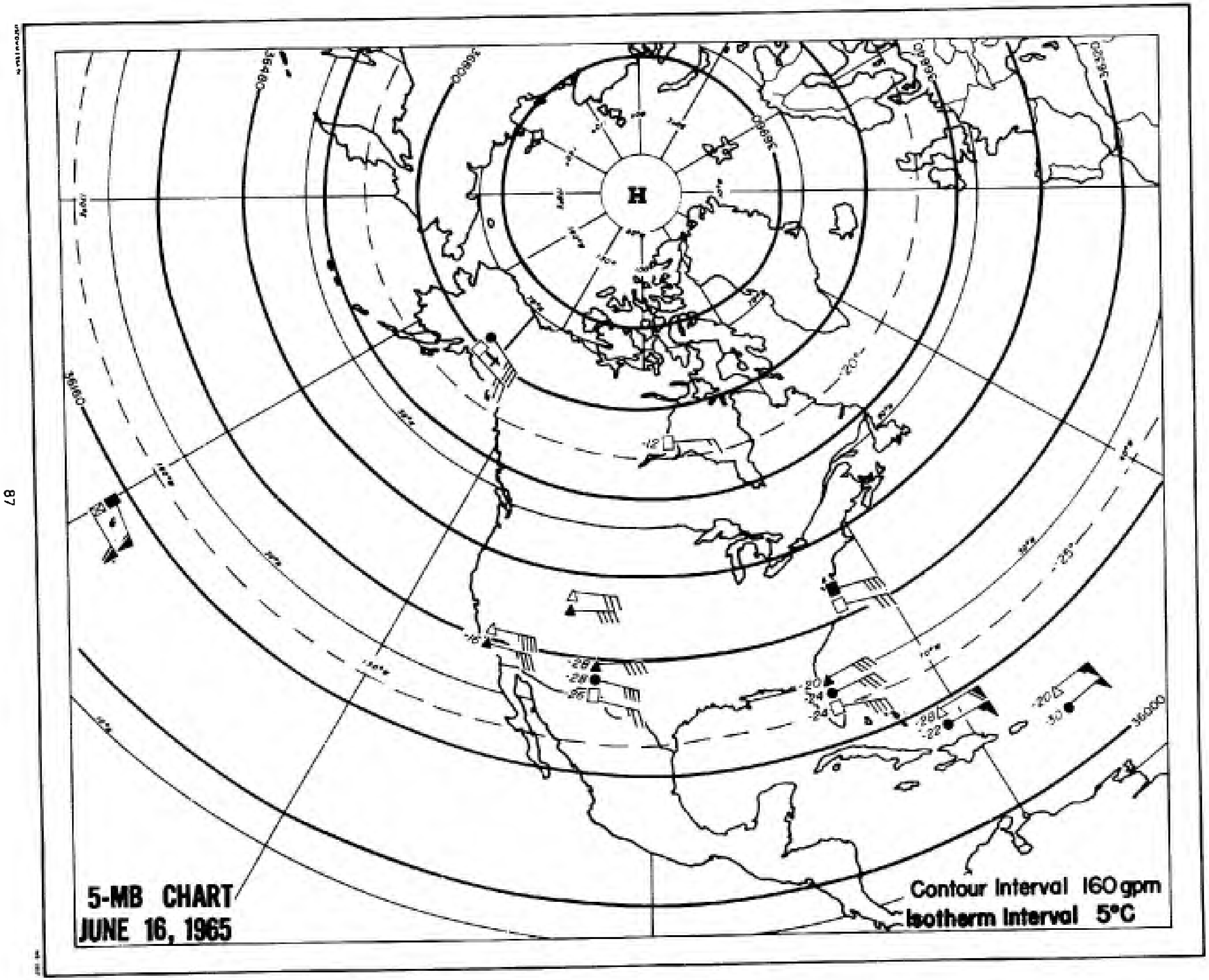

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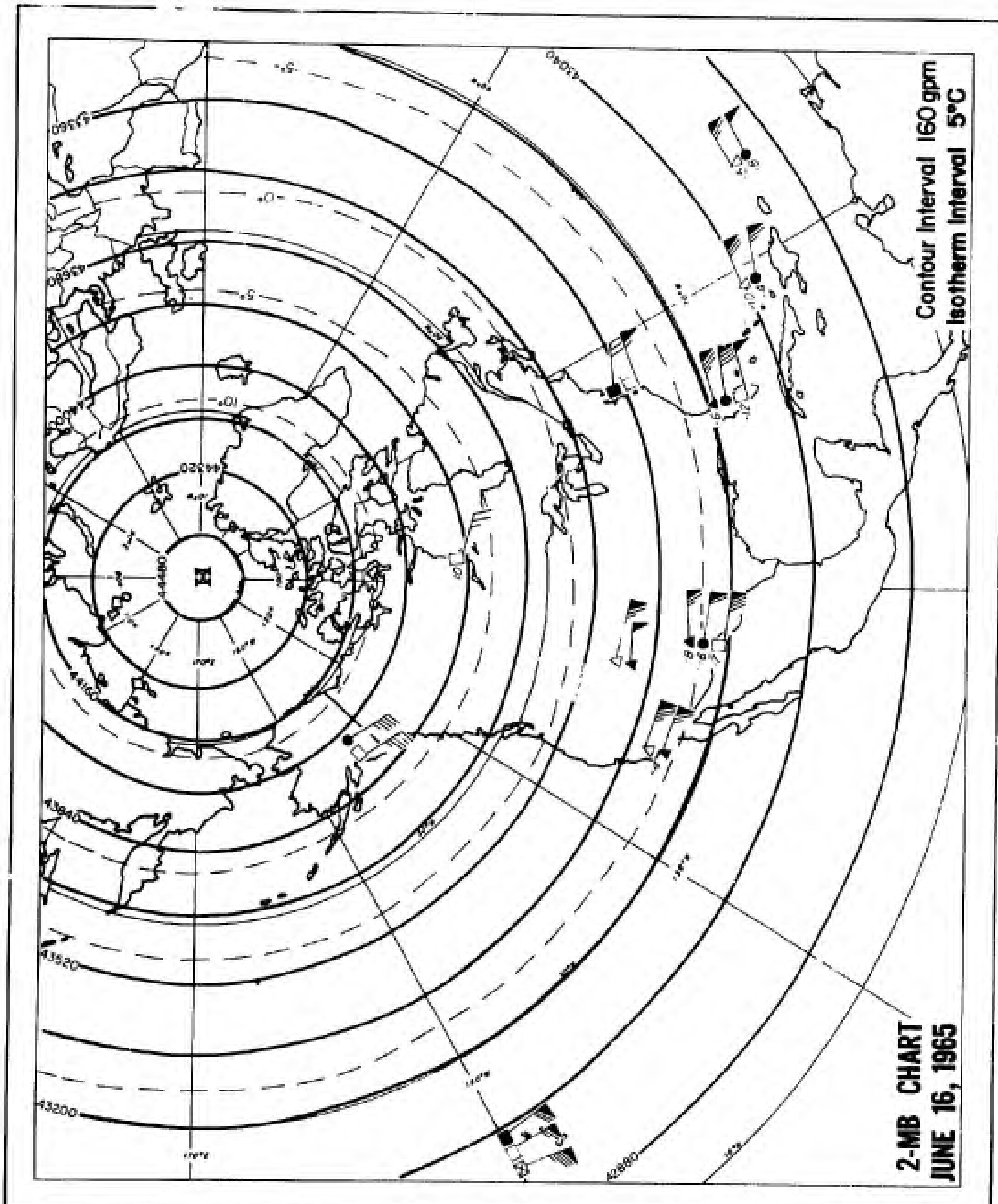
2-MB CHART
JUNE 16, 1965
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Isotherm Interval 5°C
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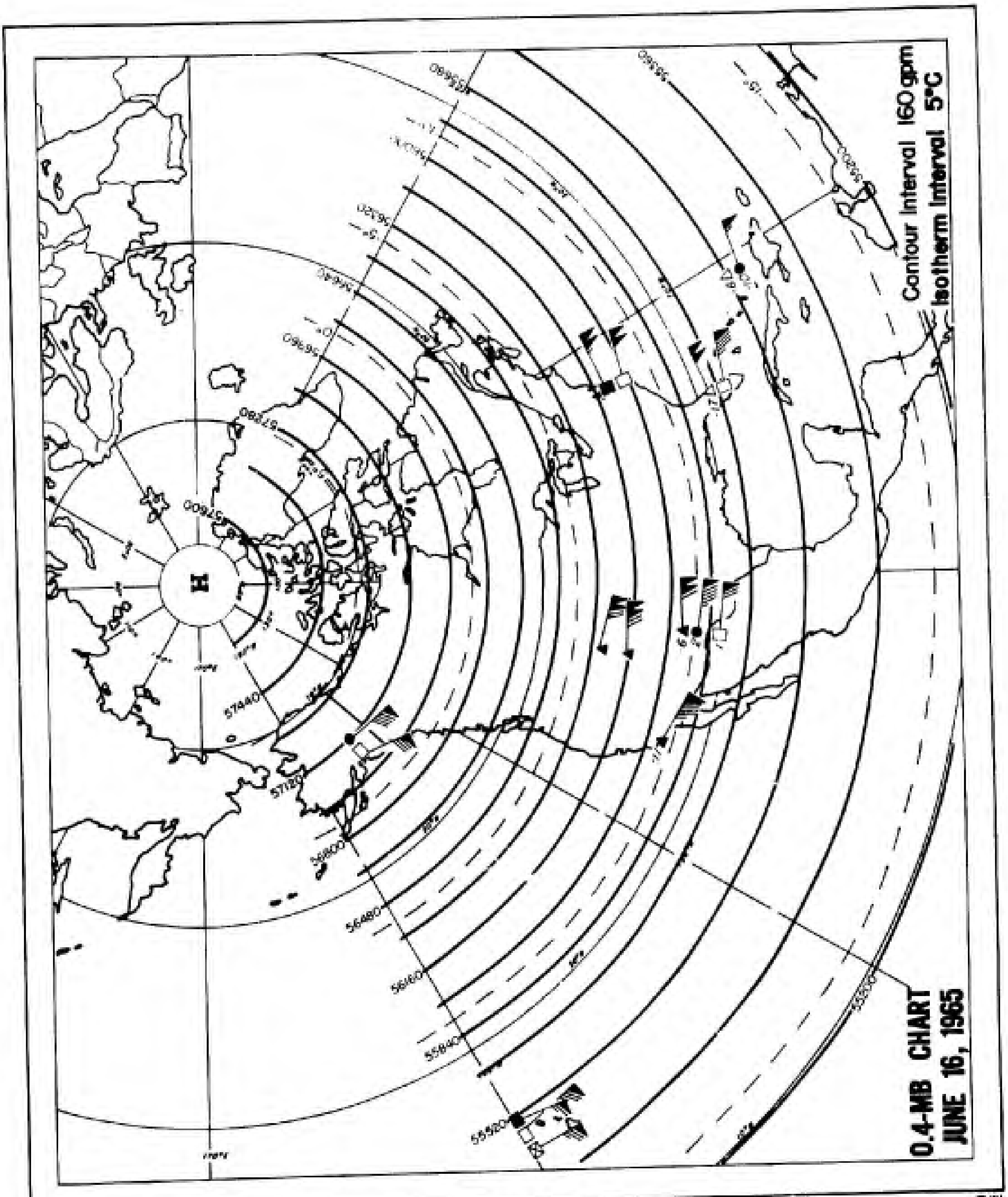
42880
43040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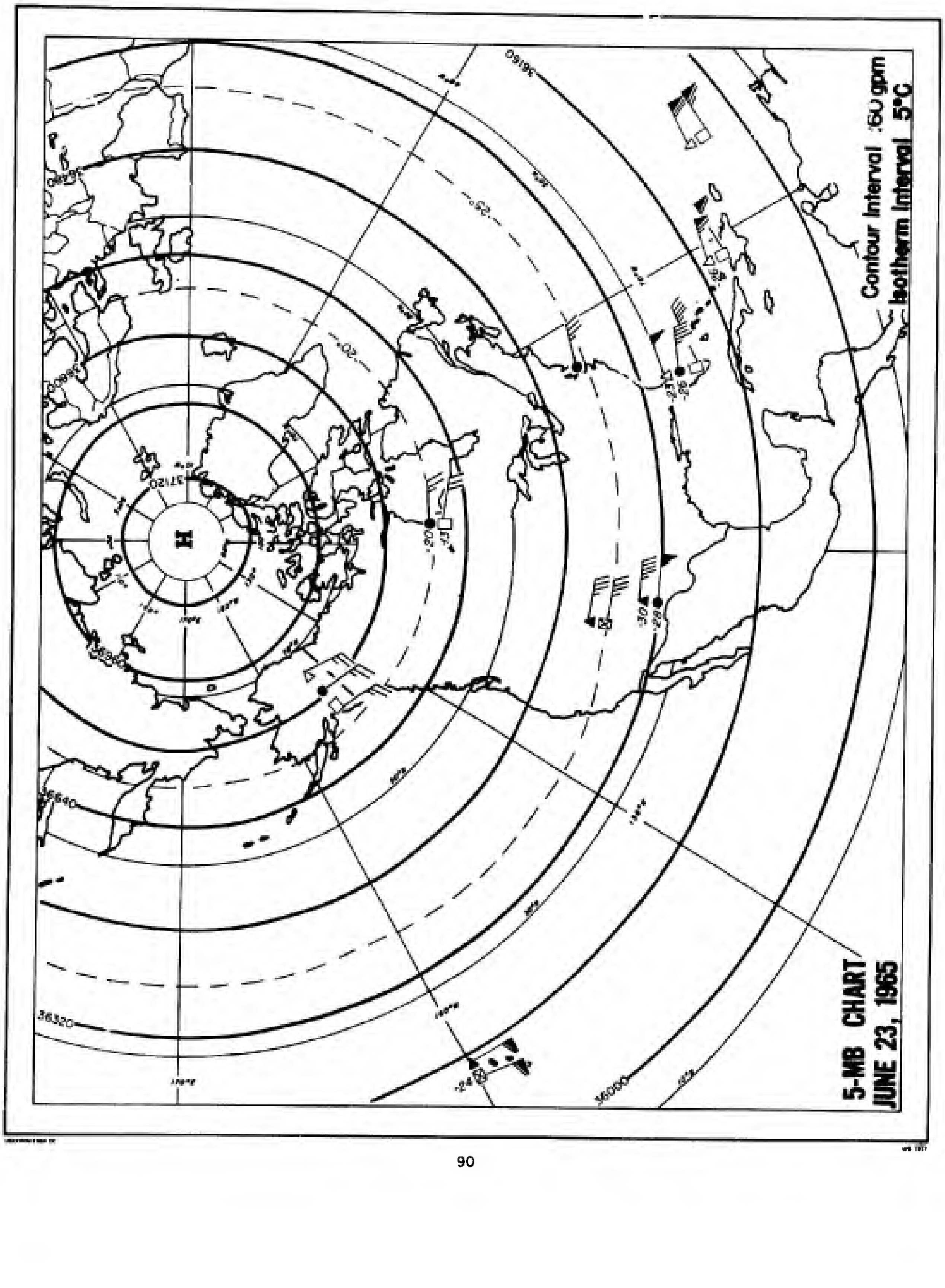
H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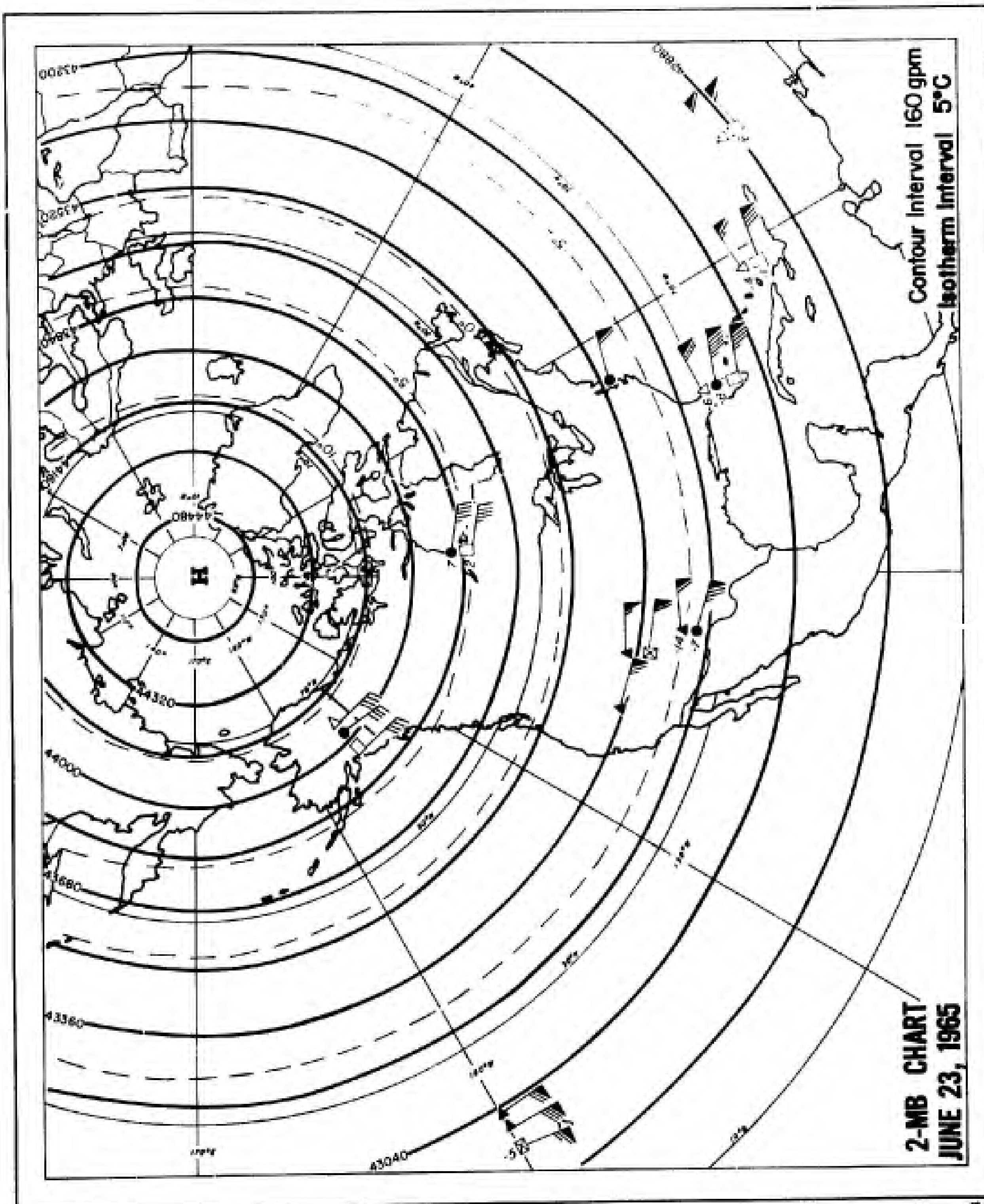
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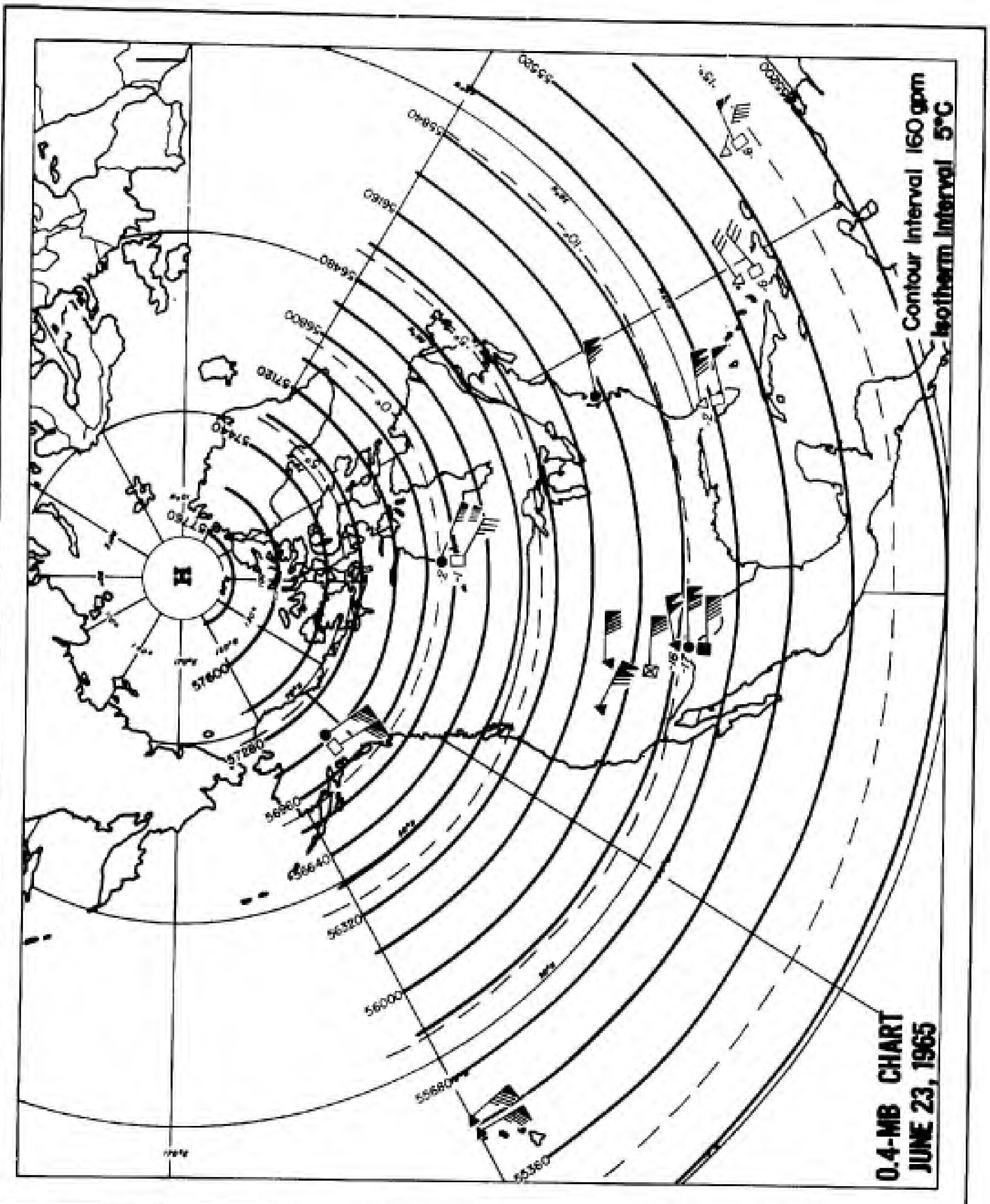
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Isotherm Interval 5°C
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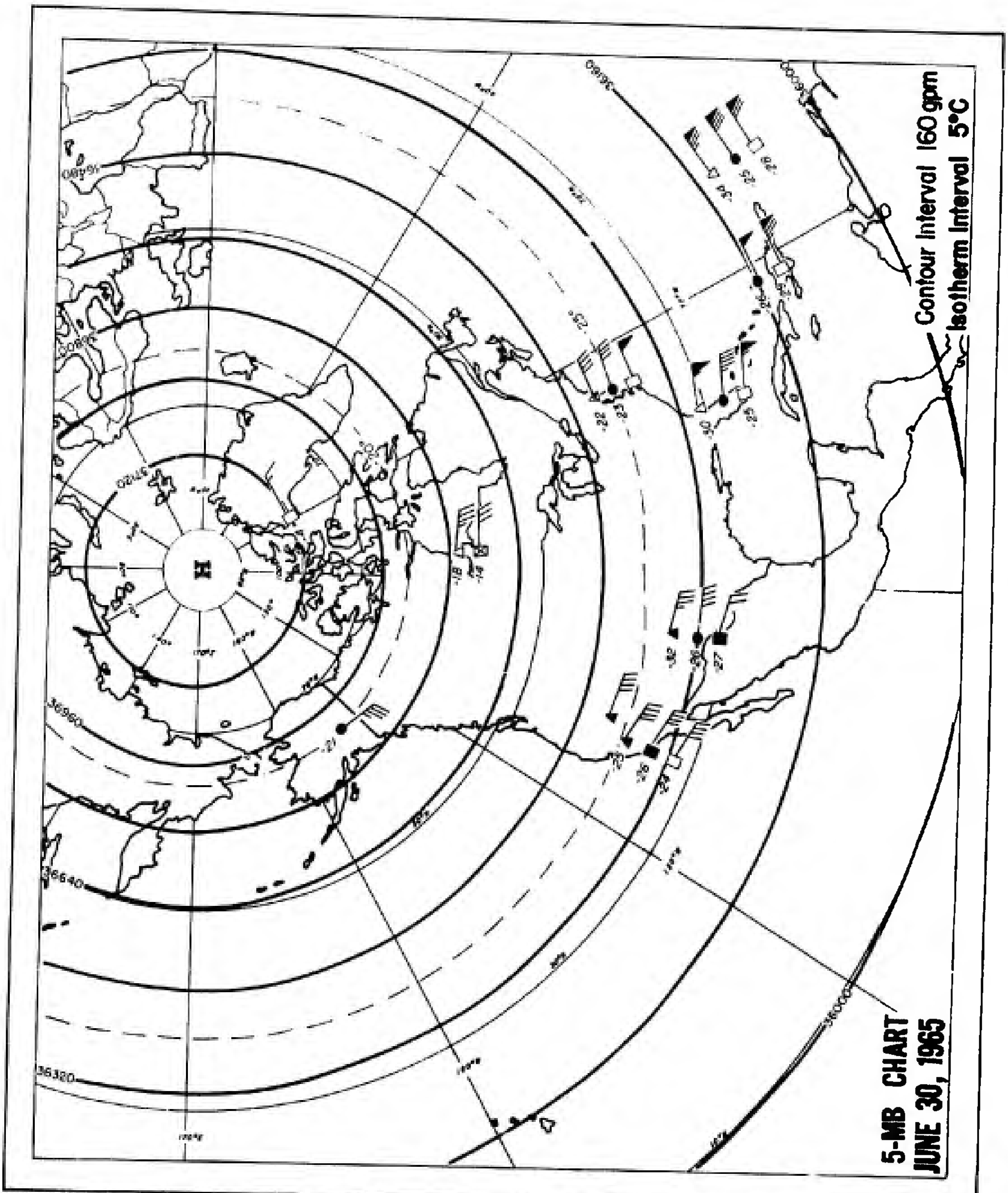
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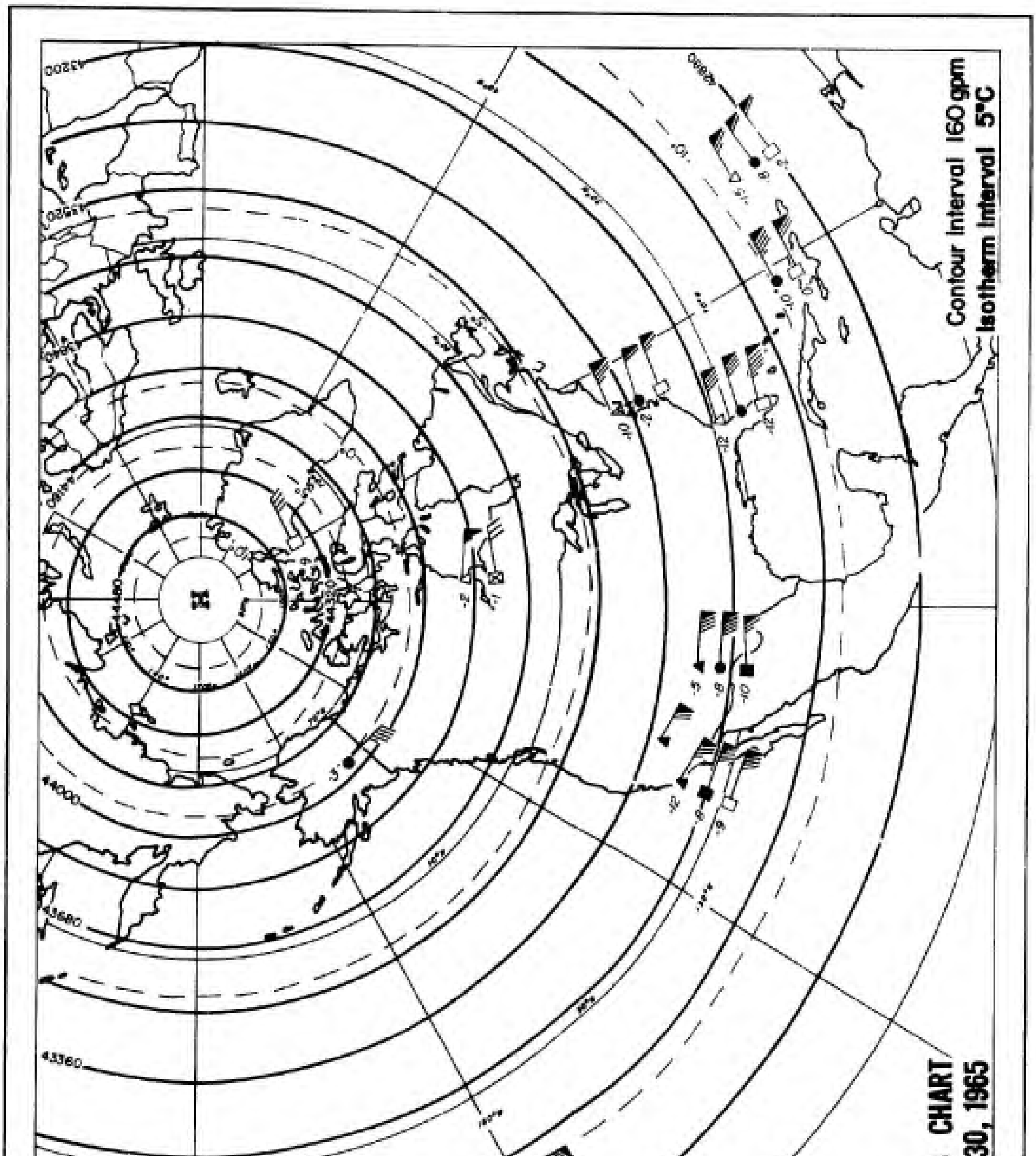
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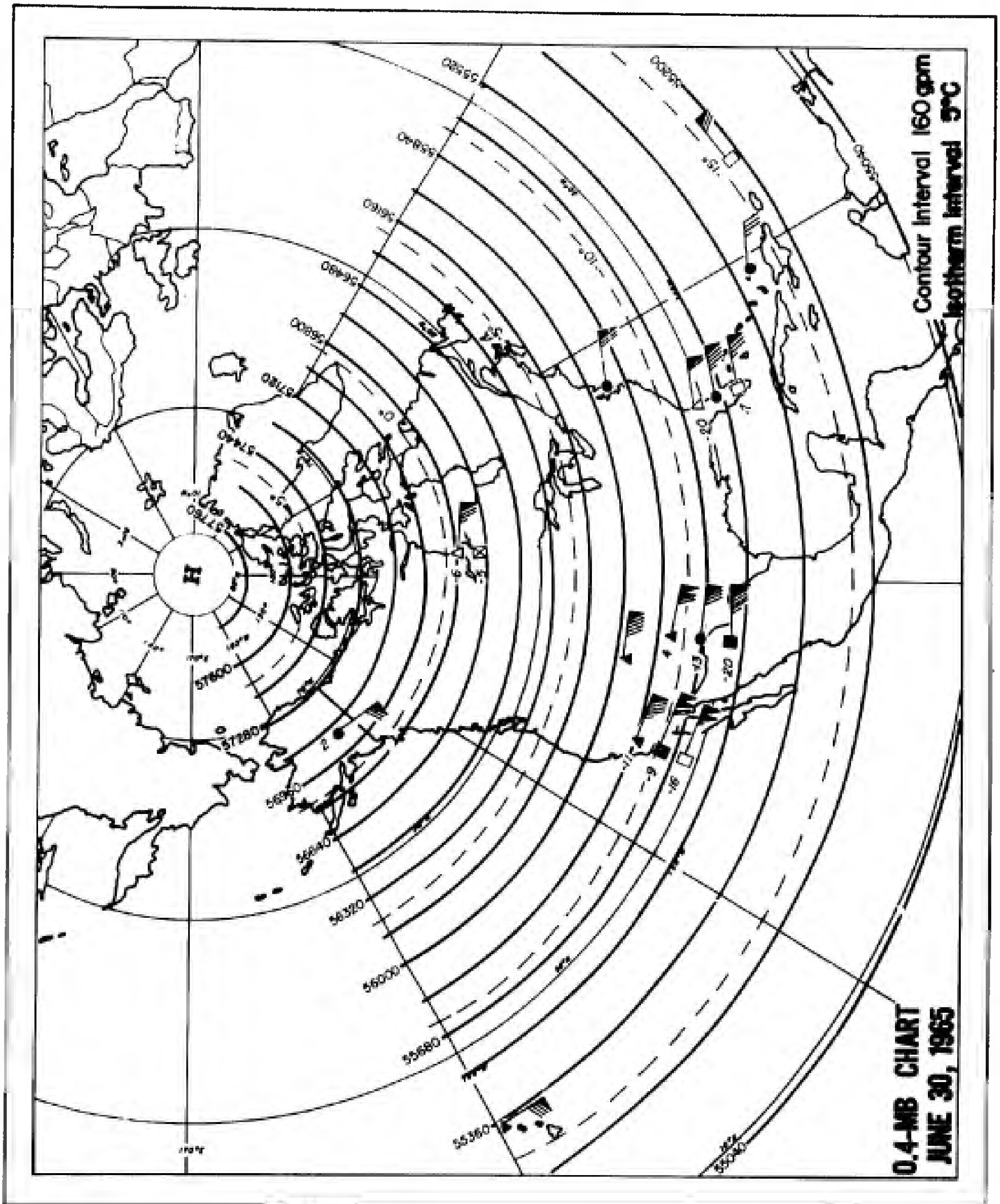
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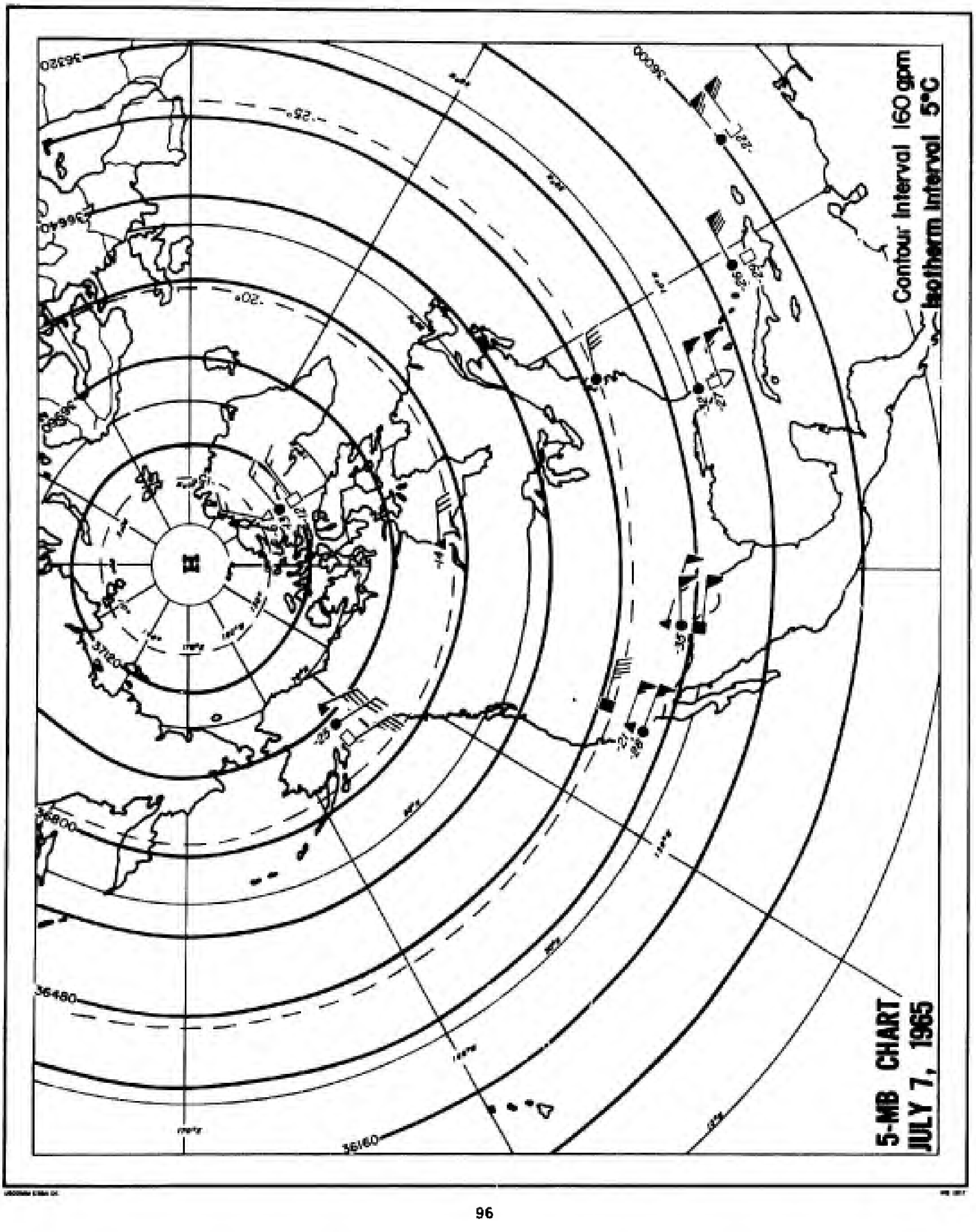
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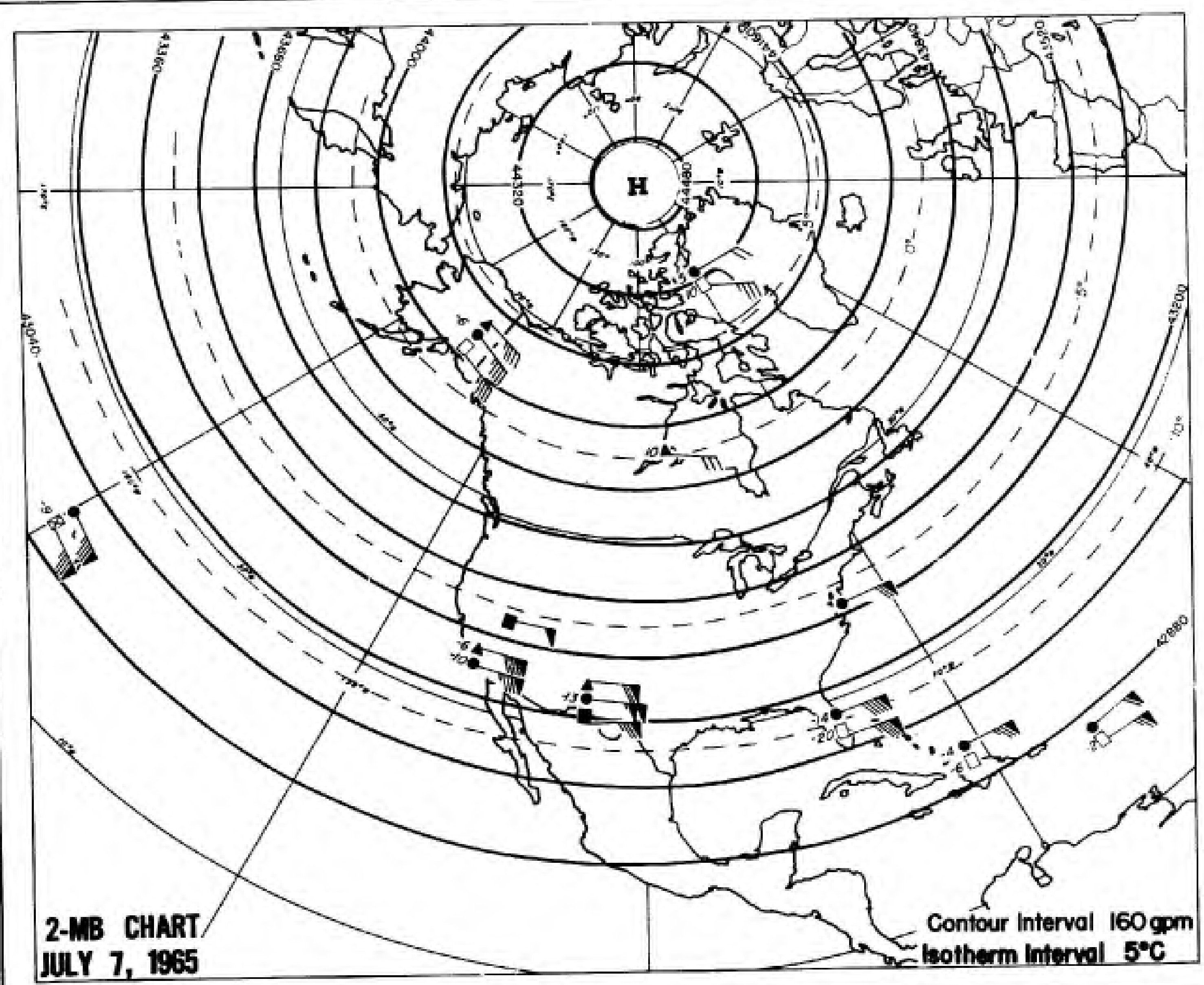
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Isotherm Interval 5°C
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43360
43200
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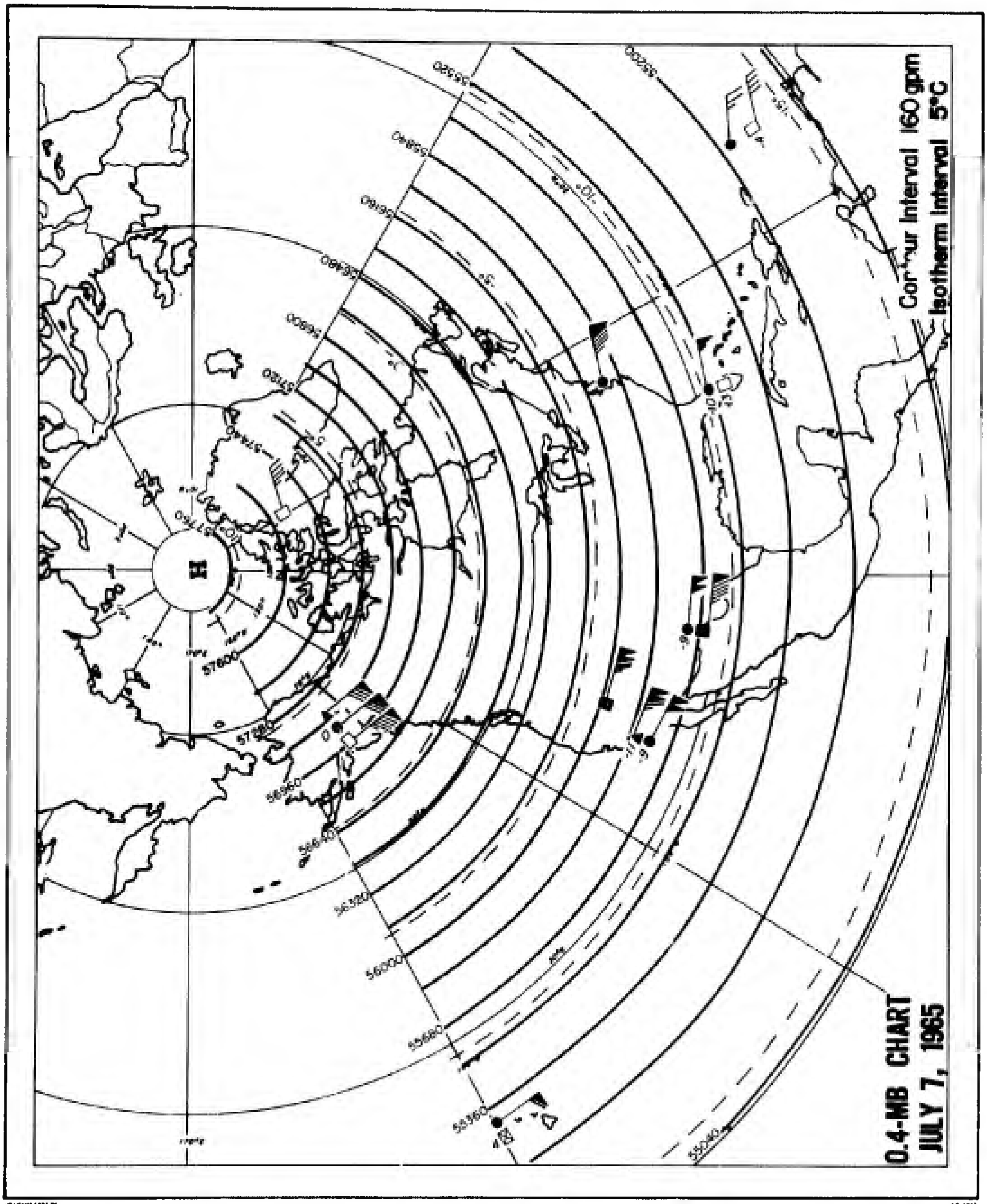
-5°
-10°
0°
5°
10°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Isotherm Interval 5°C
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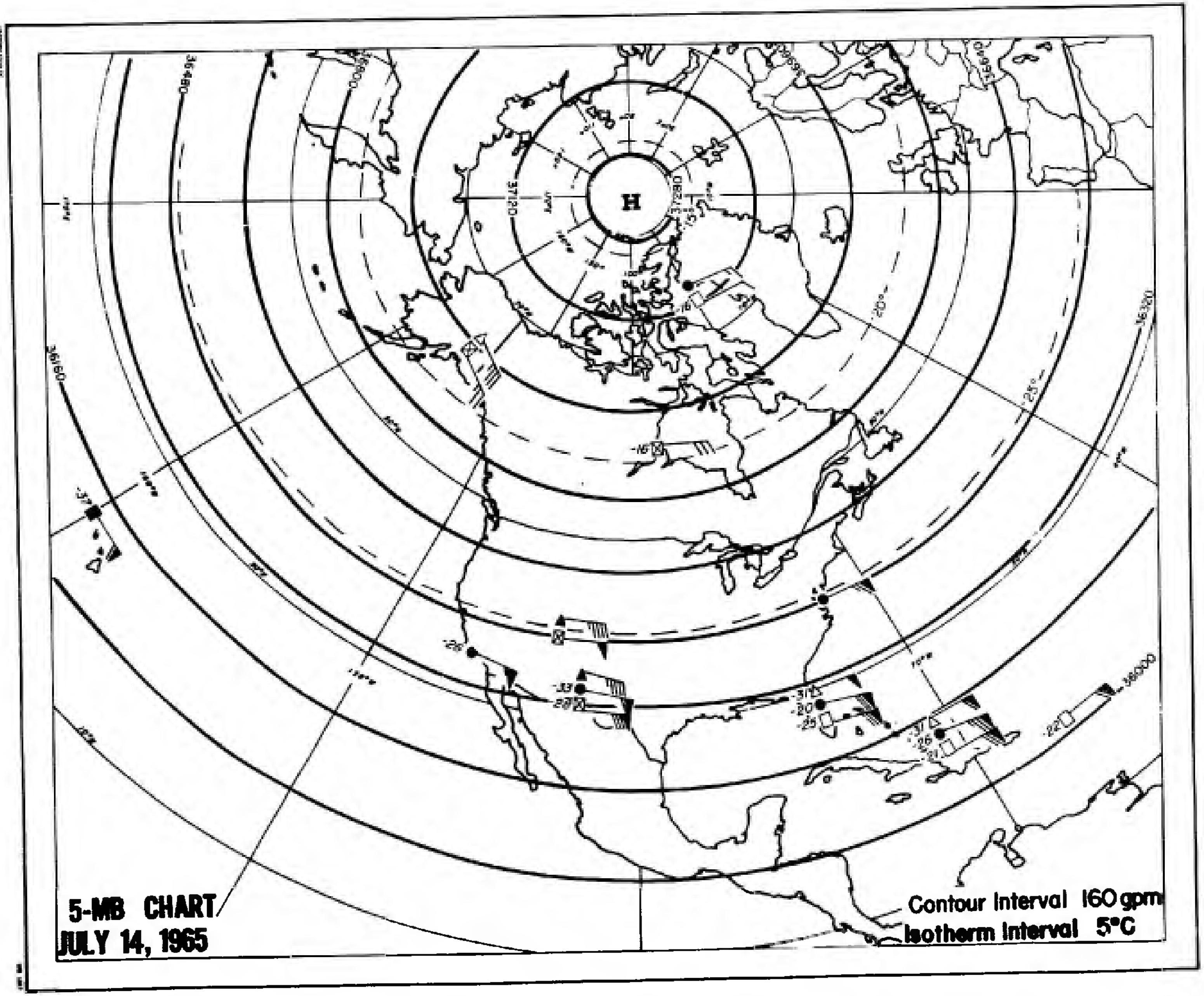
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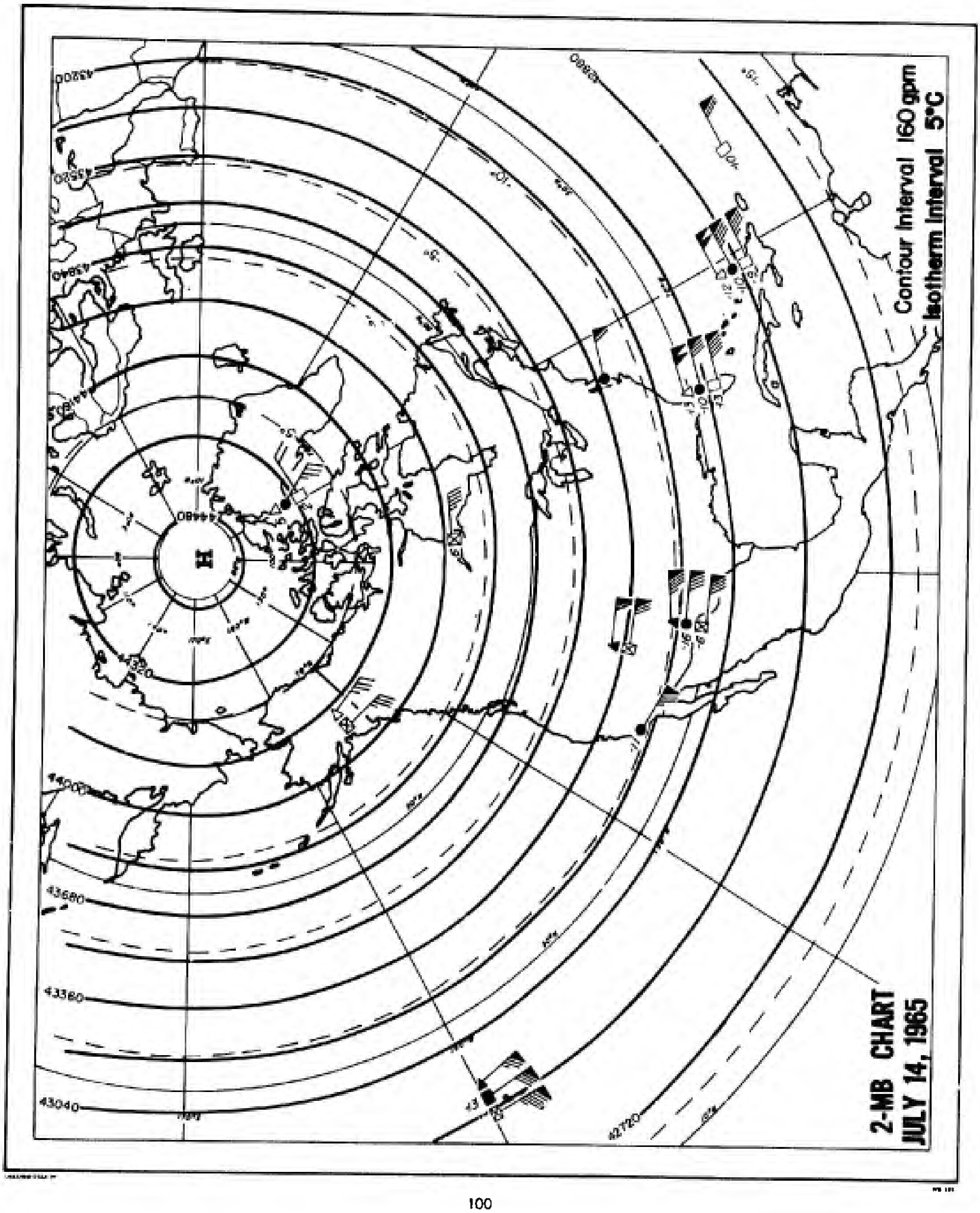
Isotherm Interval 5°C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Isotherm Interval 5°C
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42880
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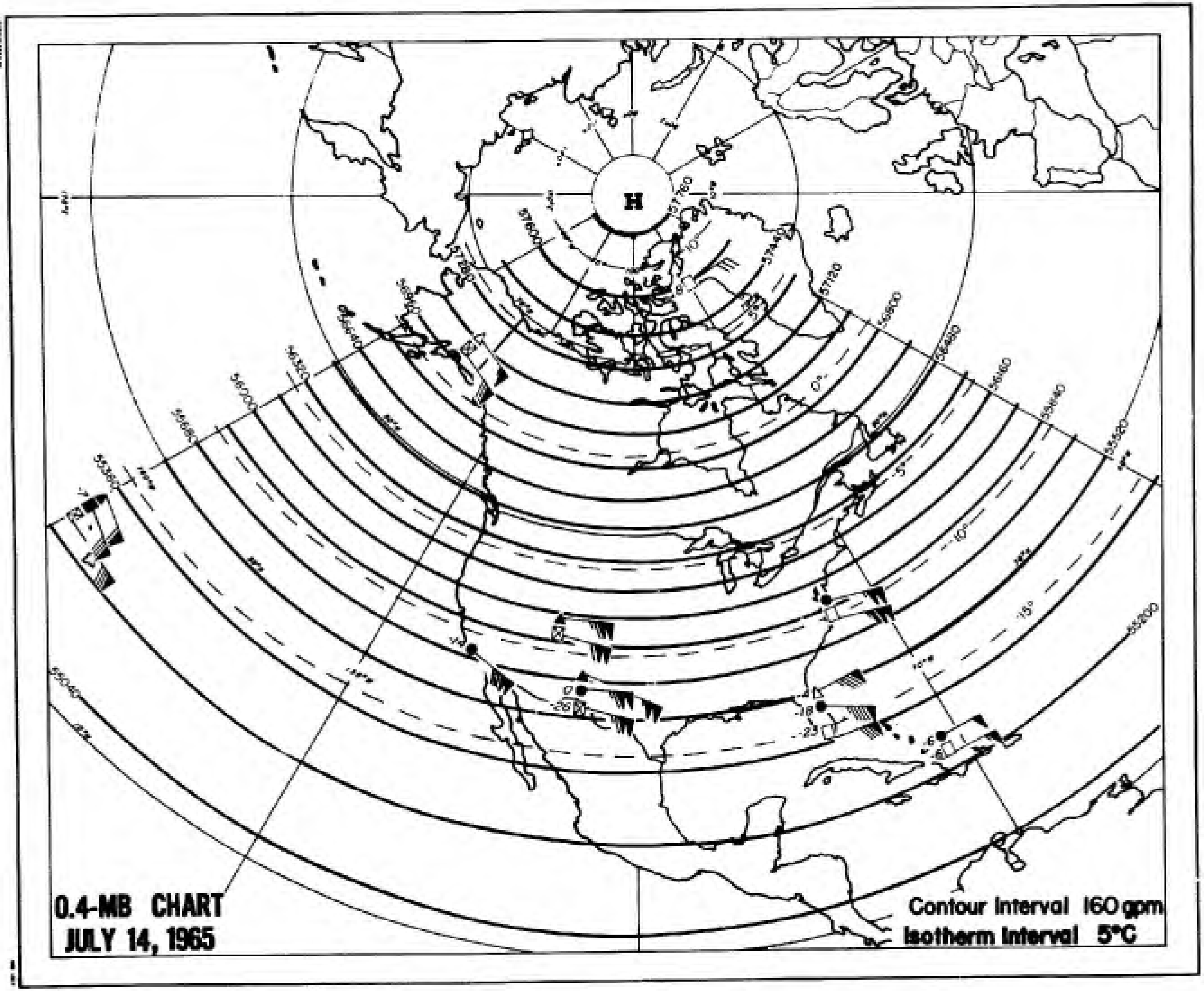
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Contour Interval 160 gpm
Isotherm Interval 5°C
H
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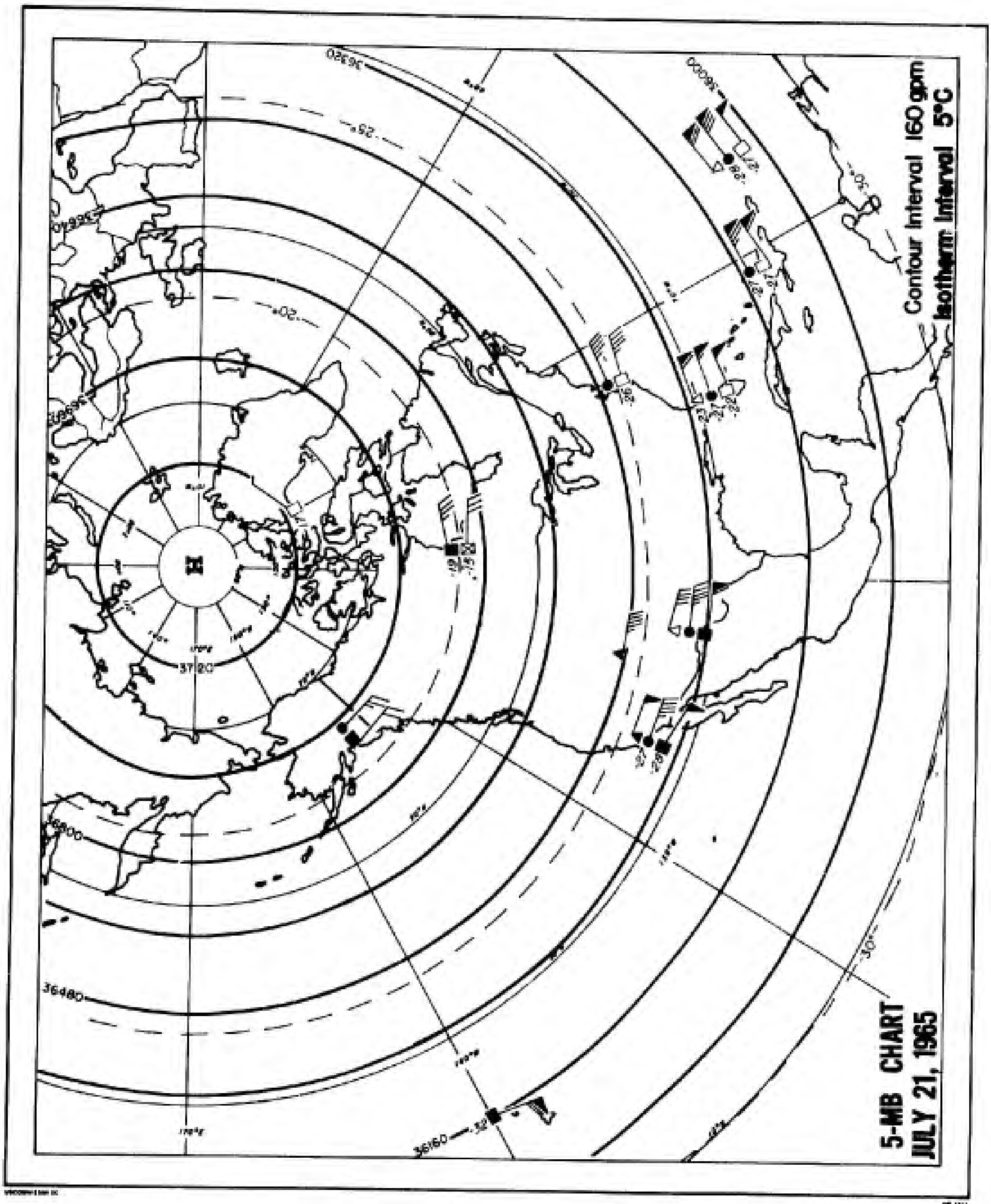
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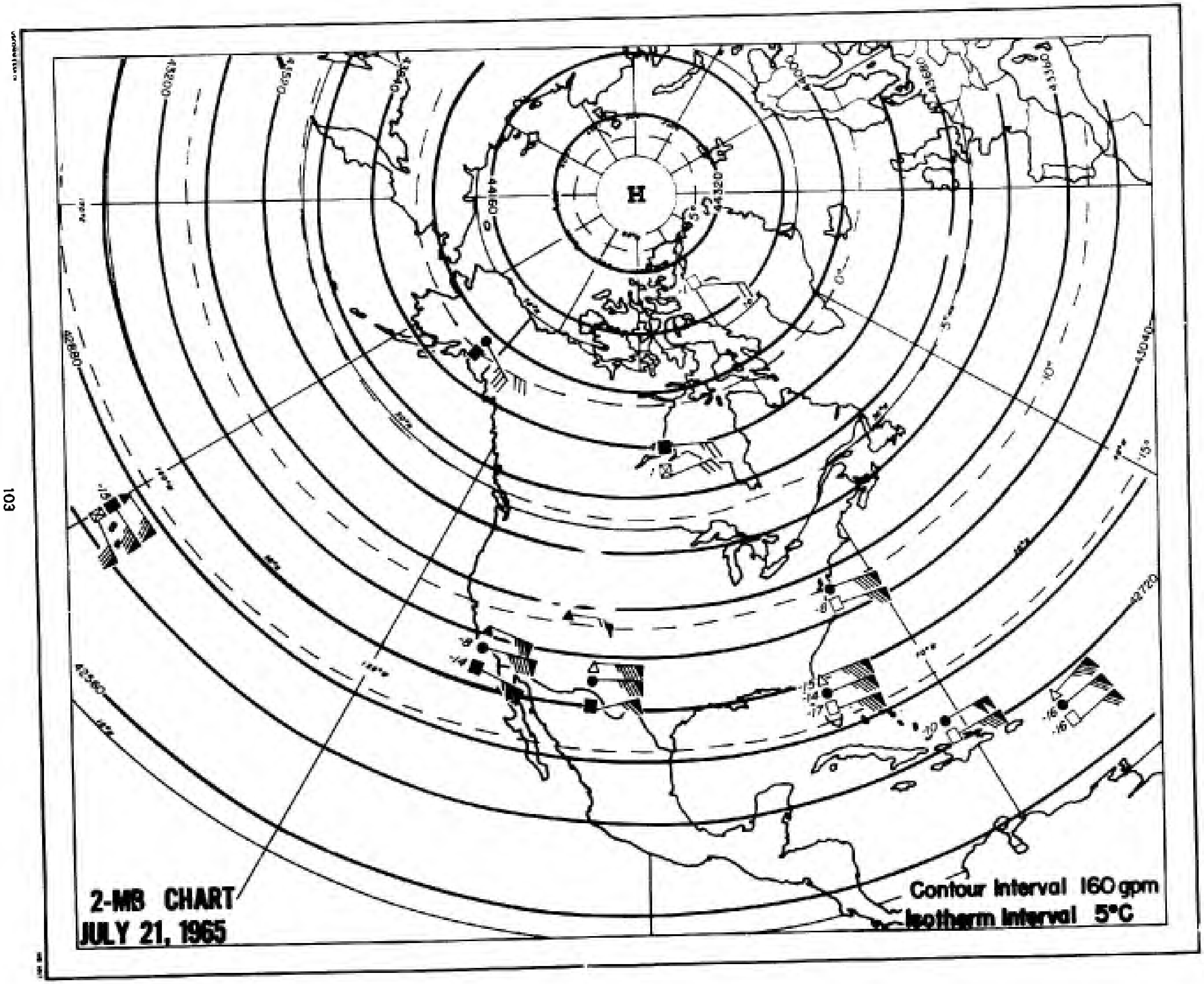

H
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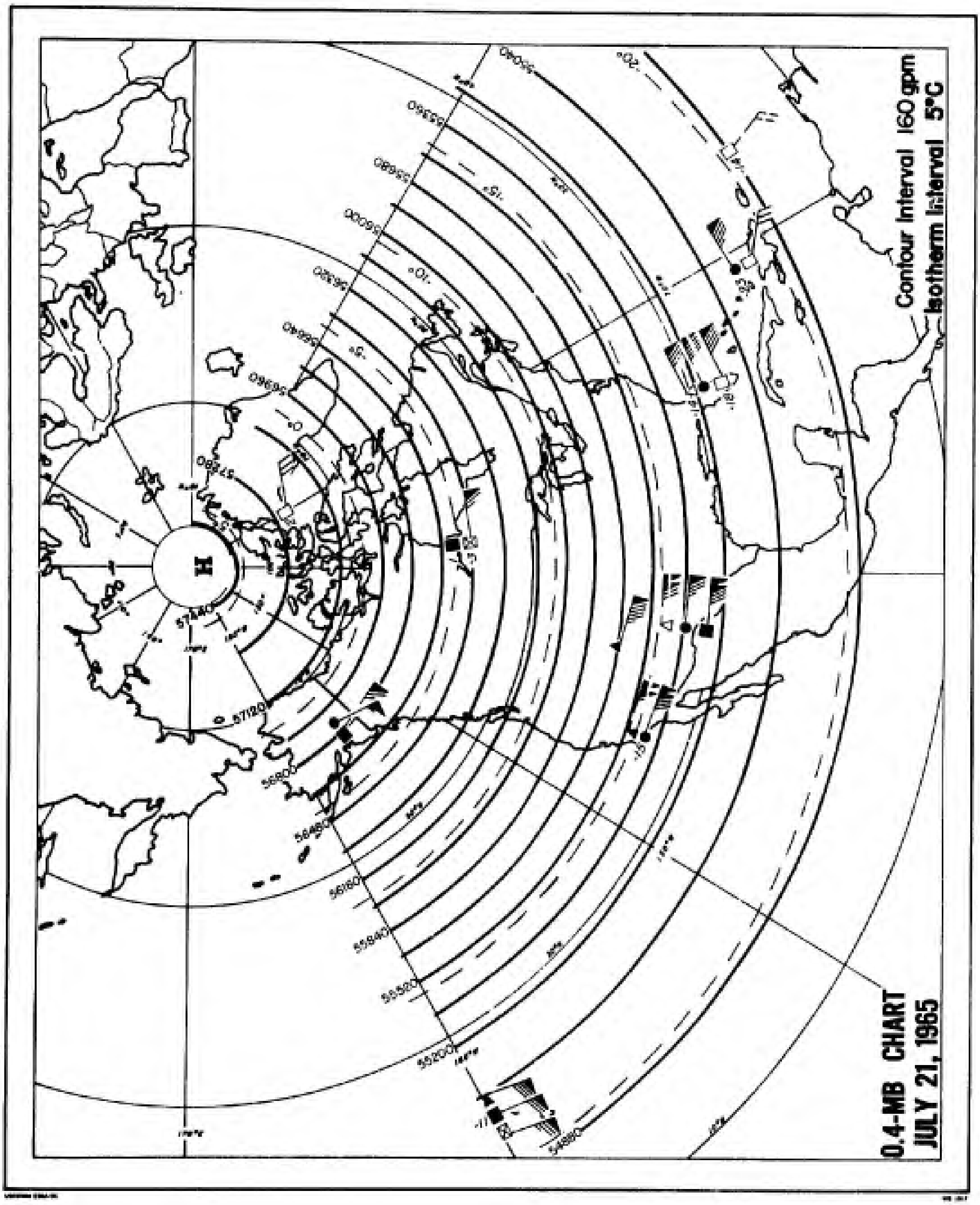
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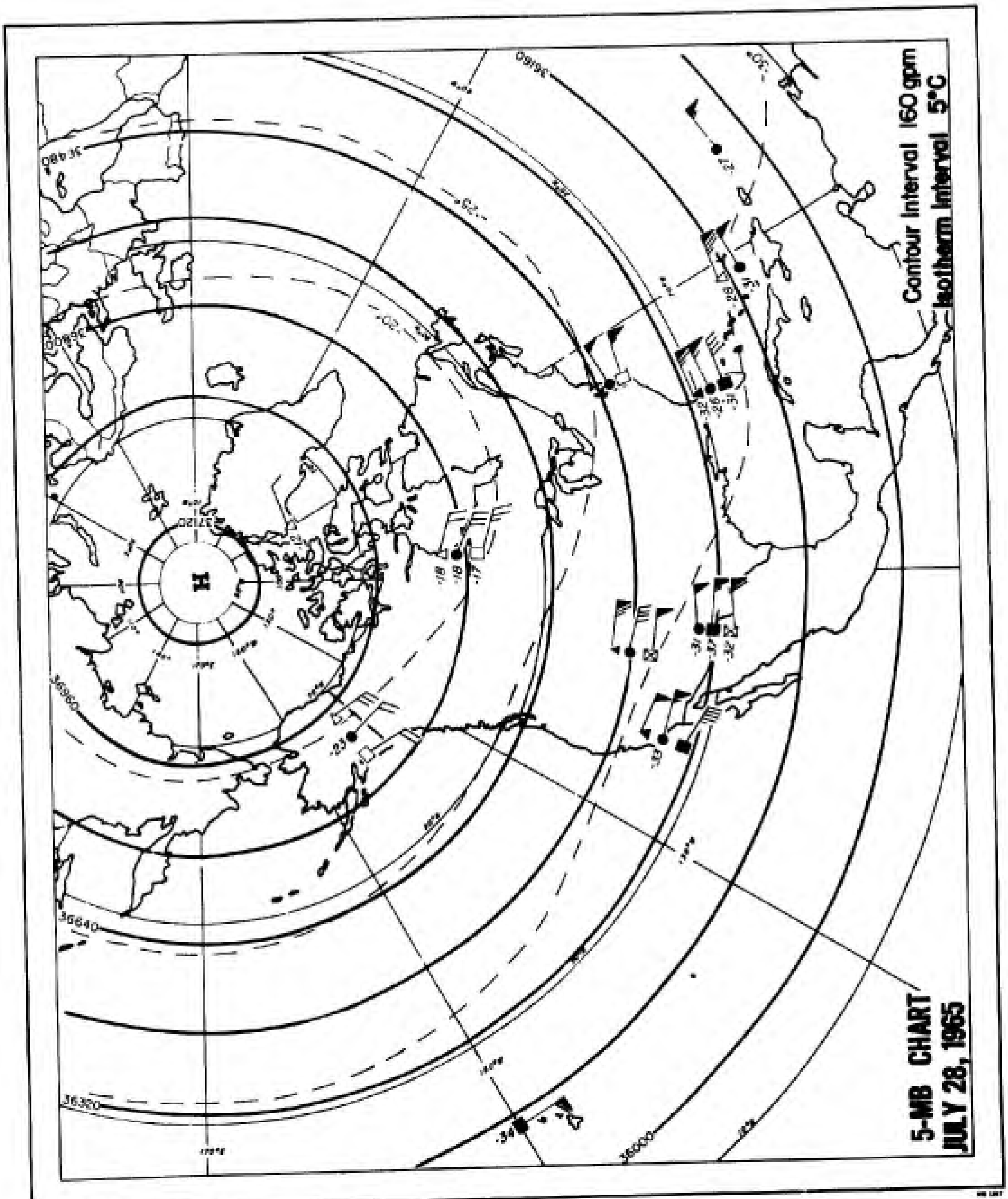
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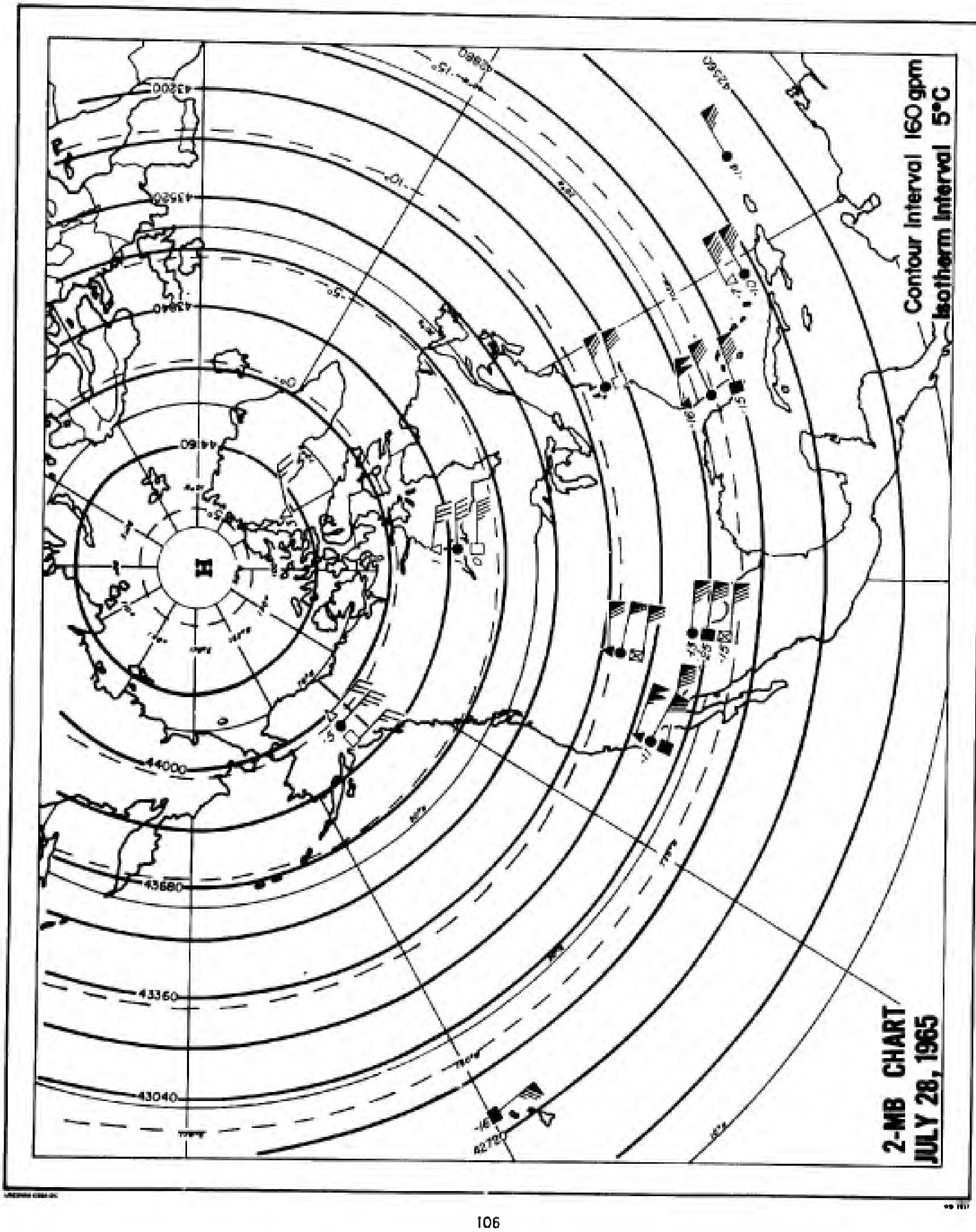
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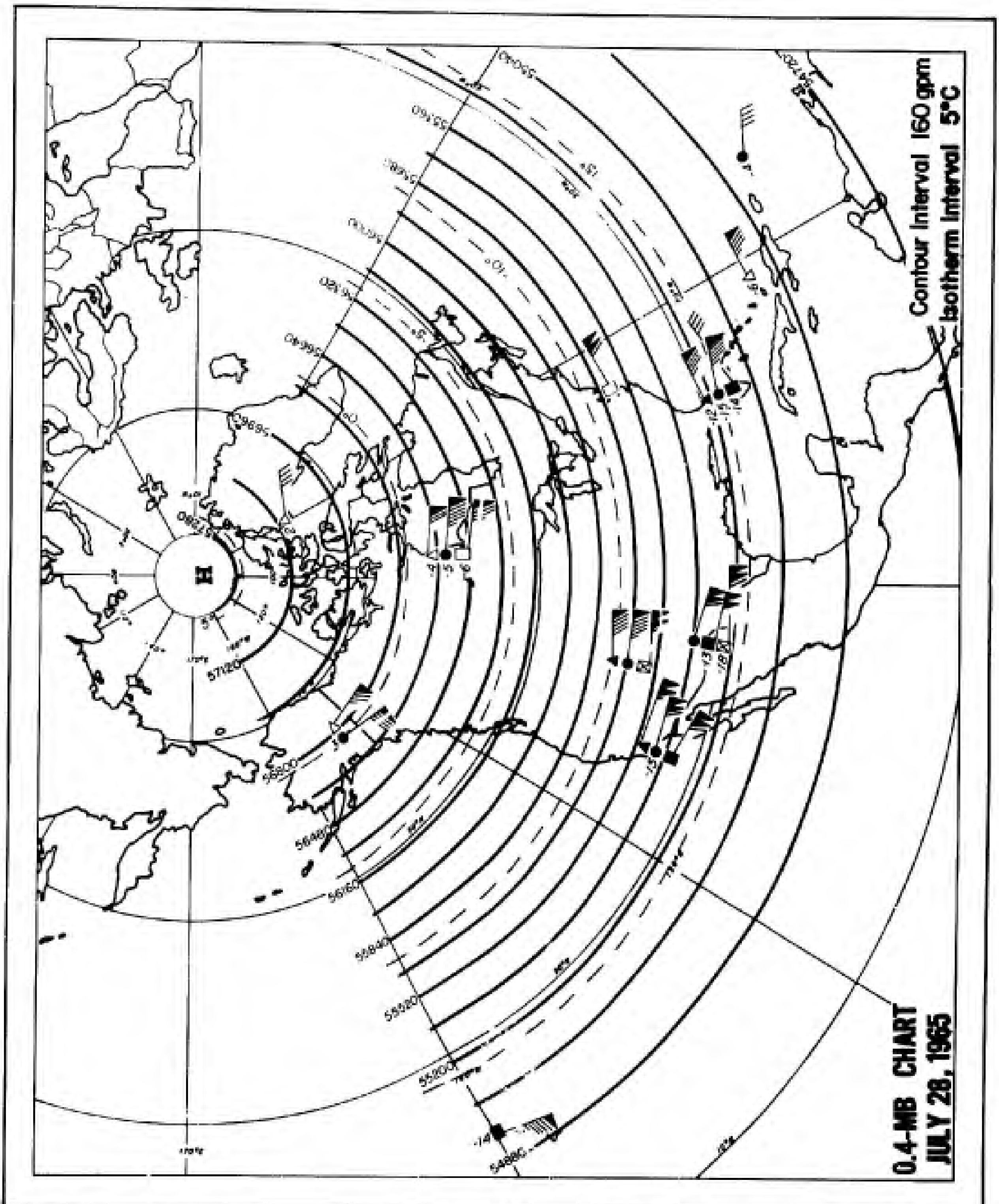
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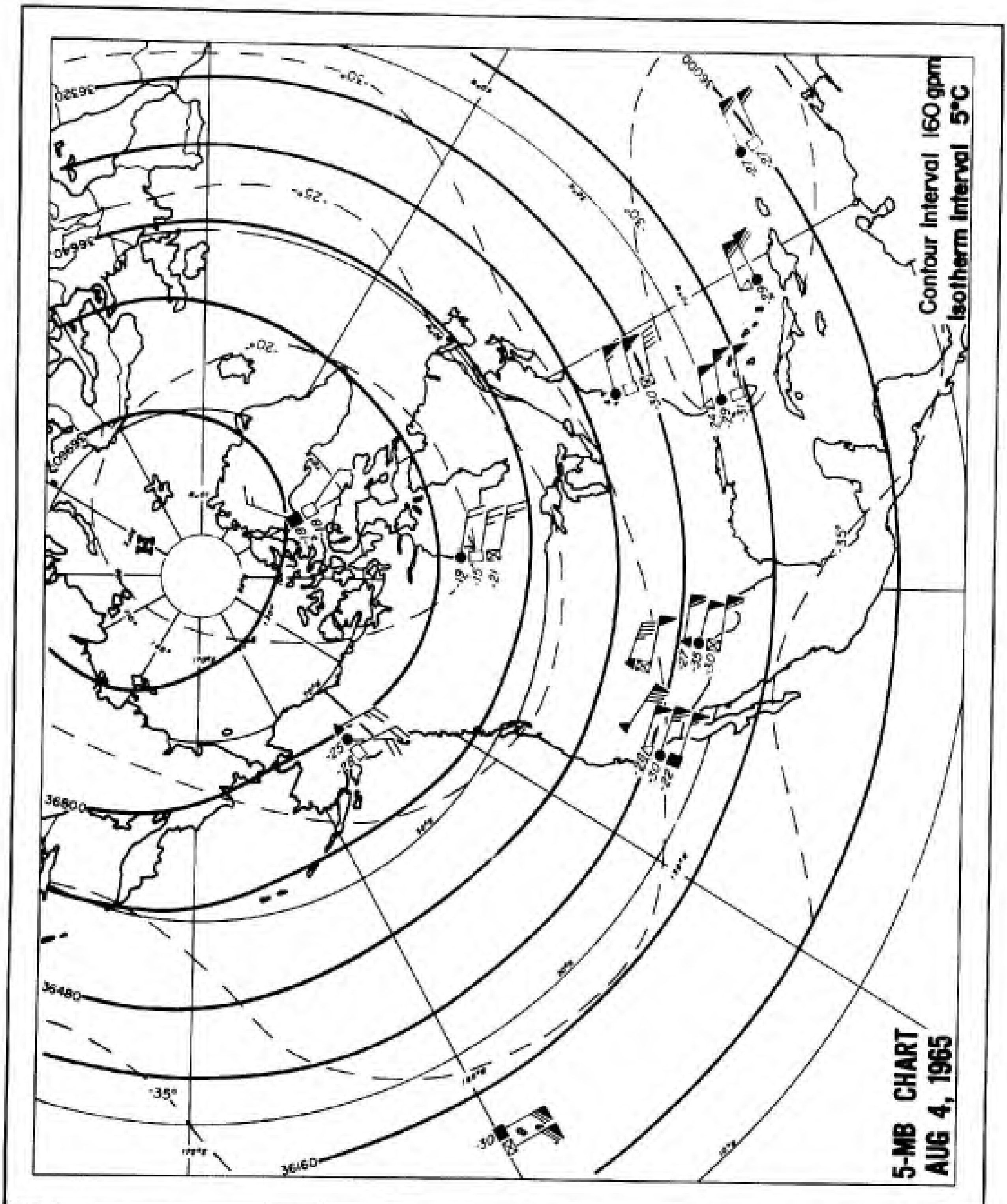
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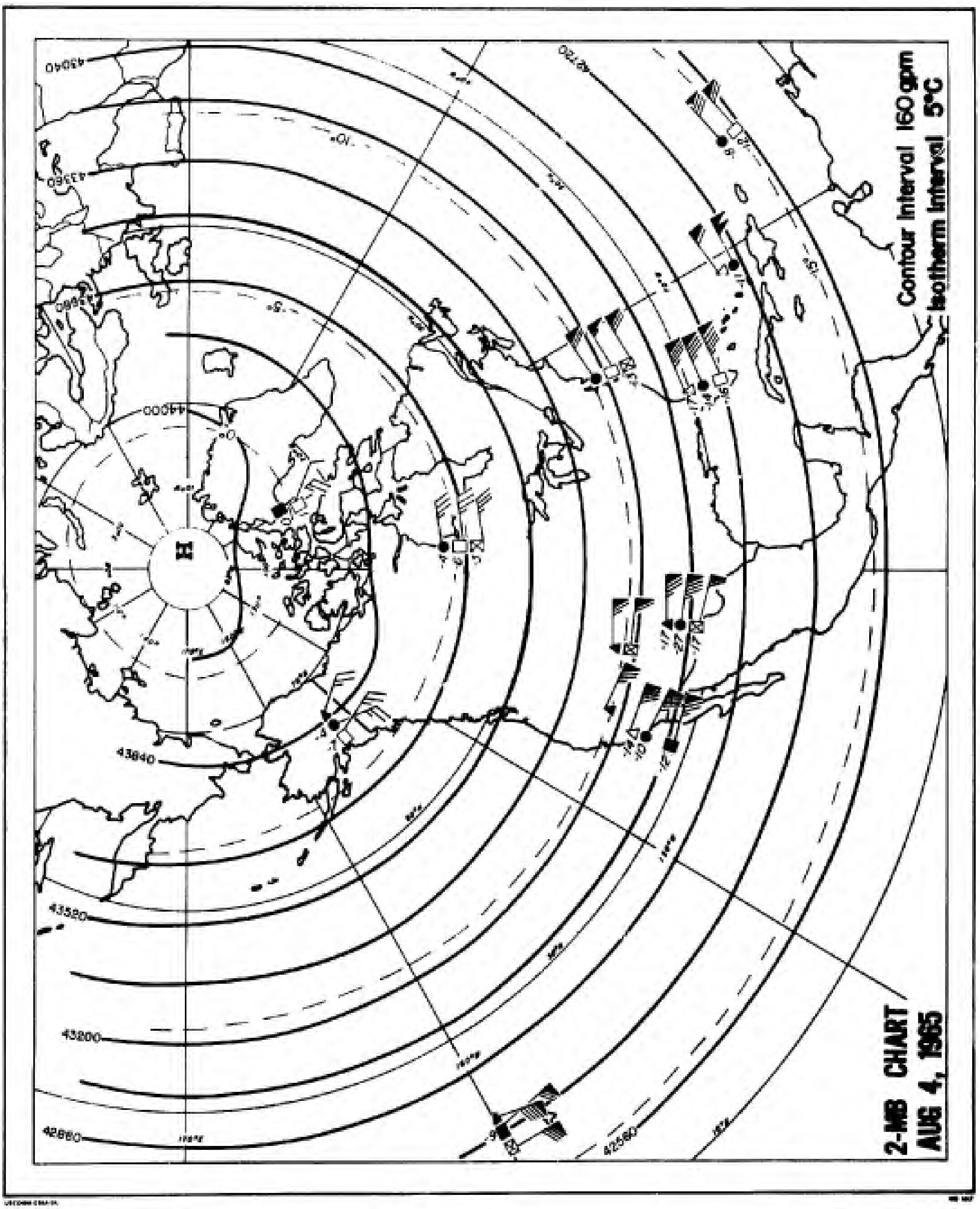
-20°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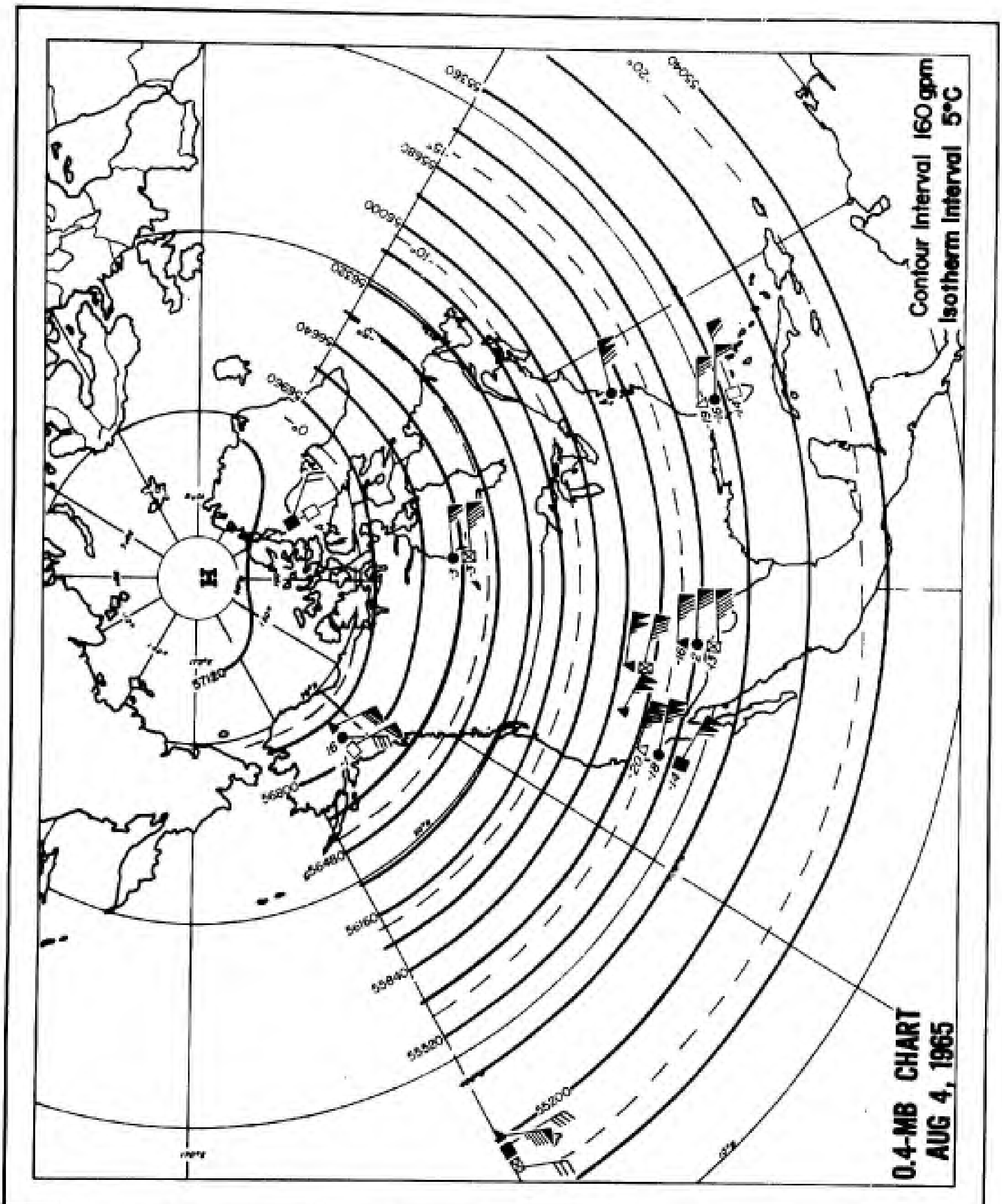
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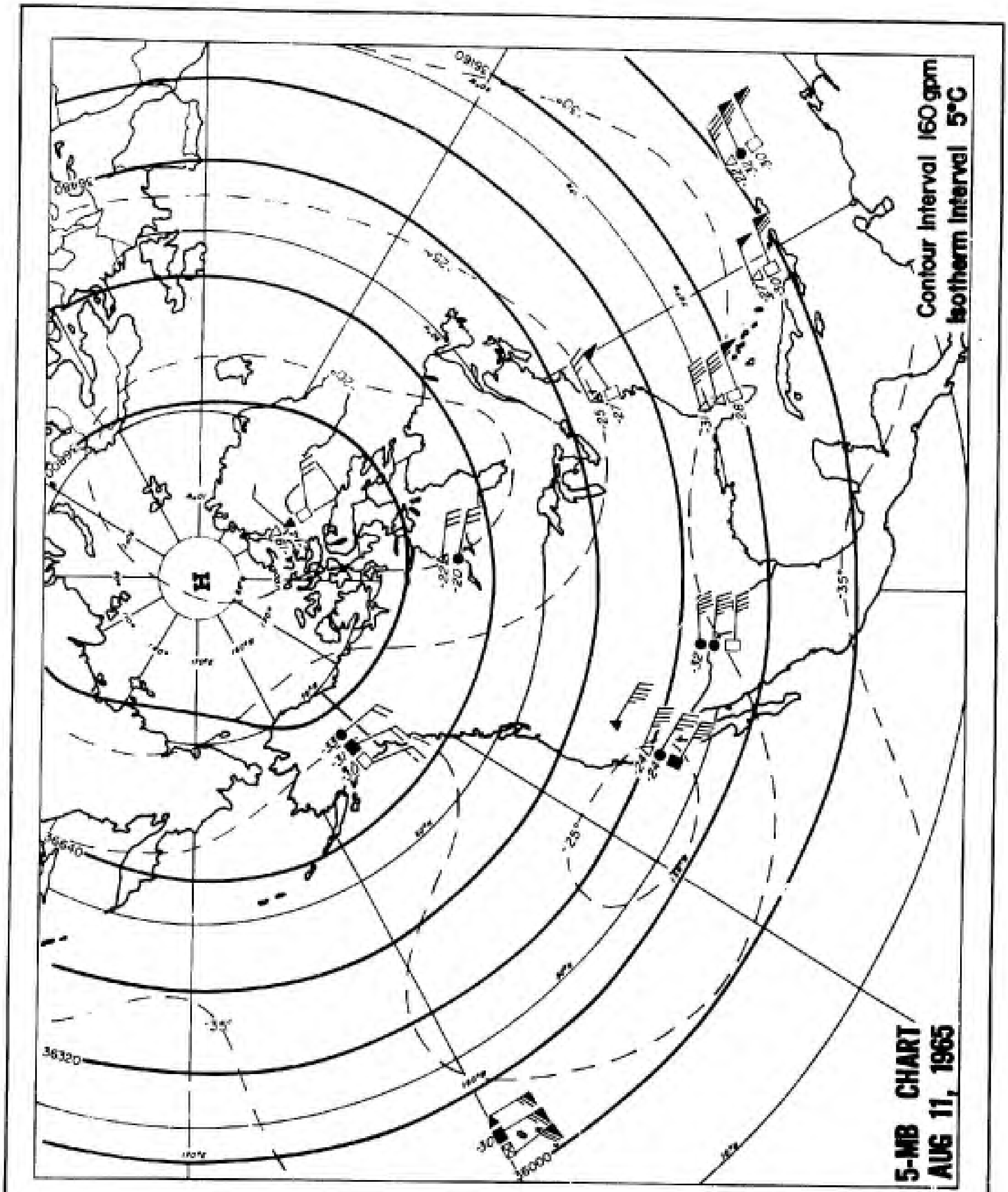
H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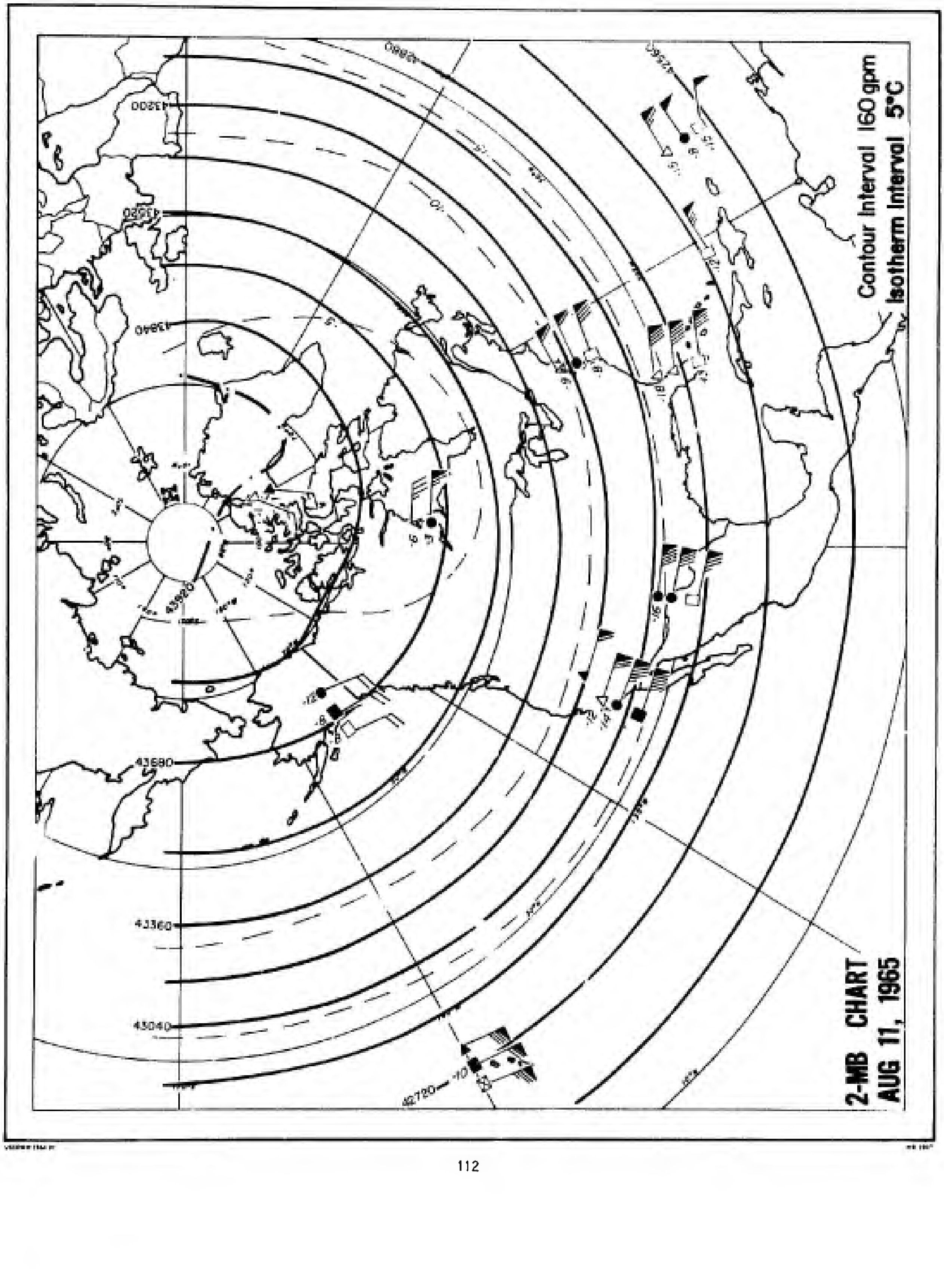
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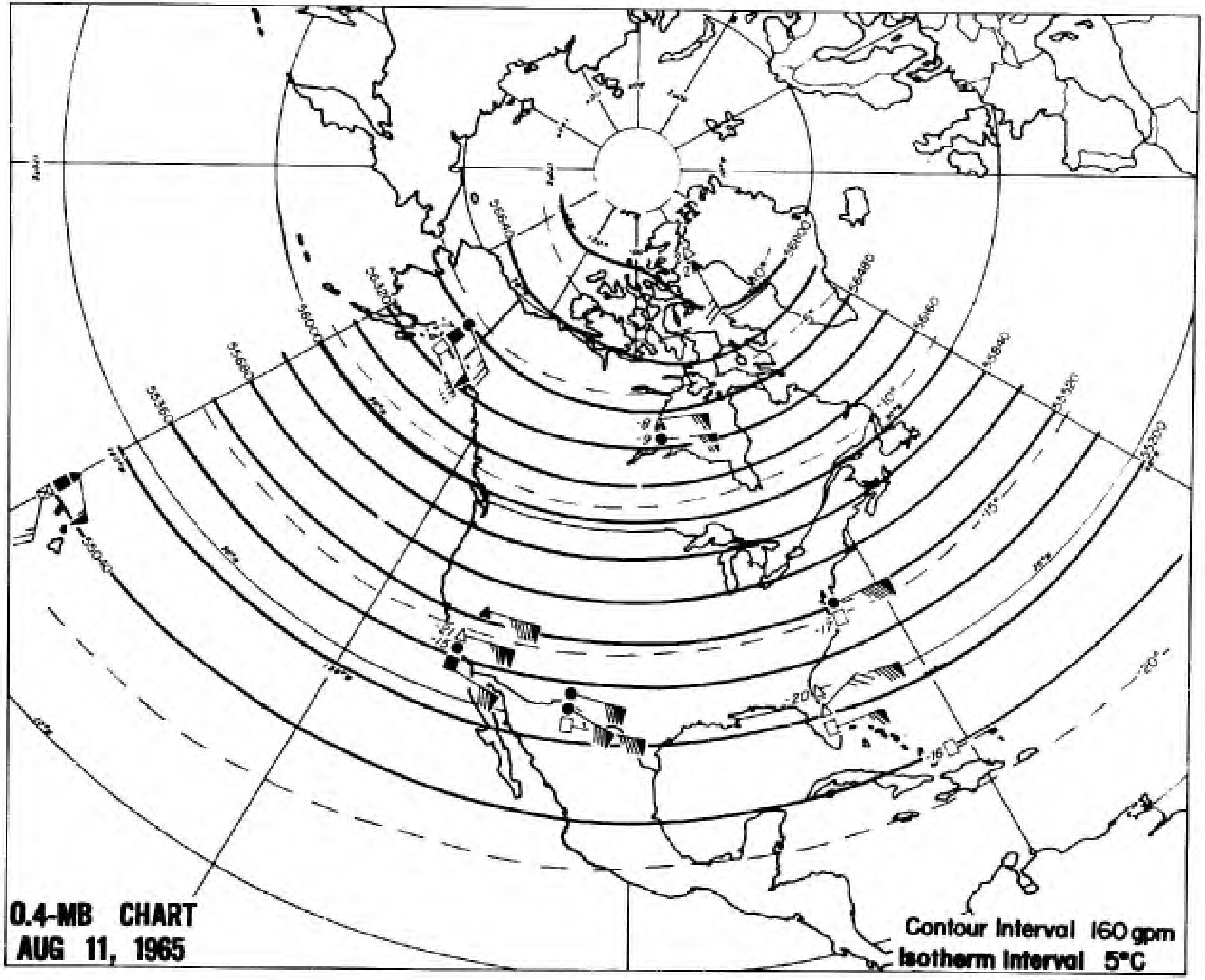
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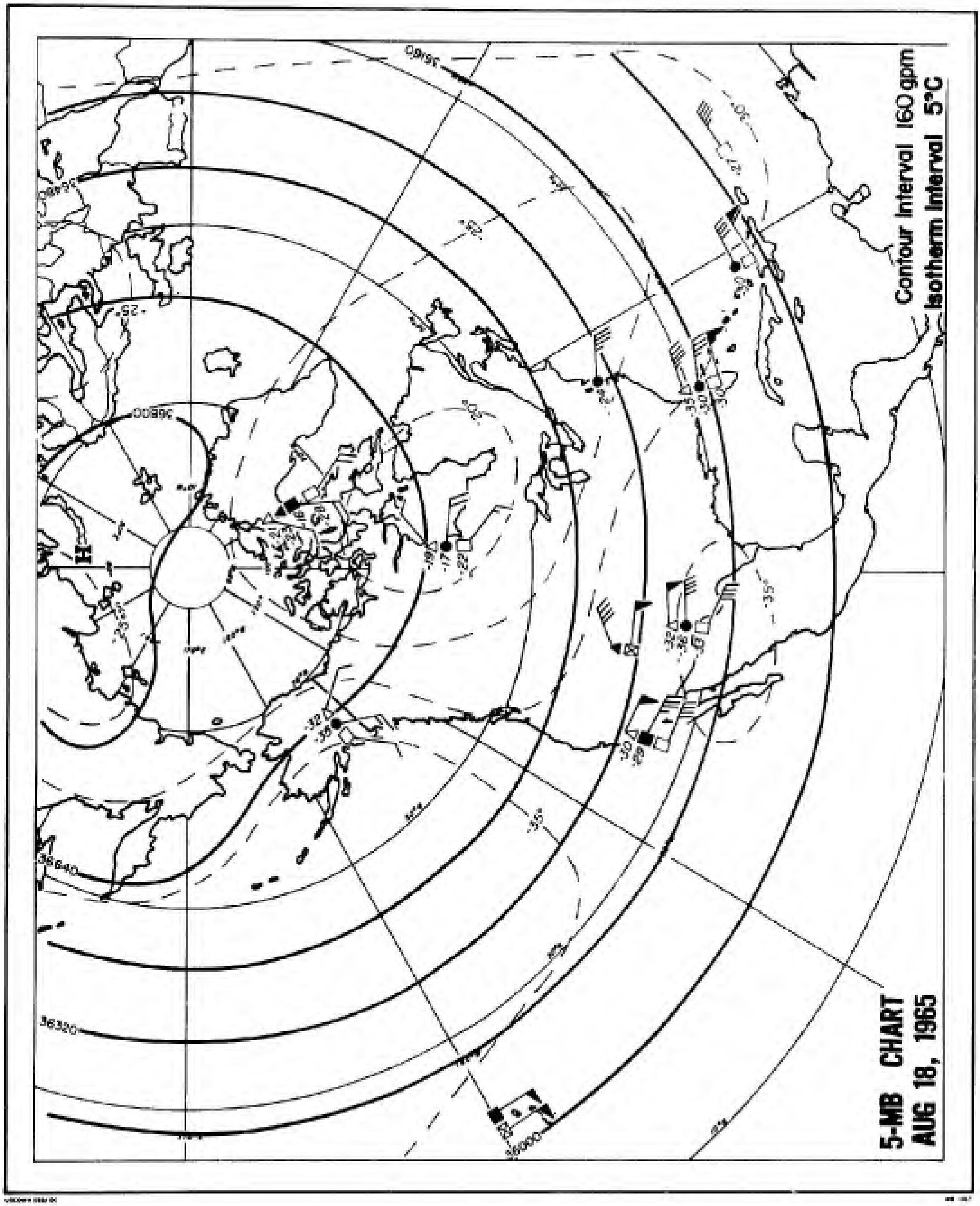
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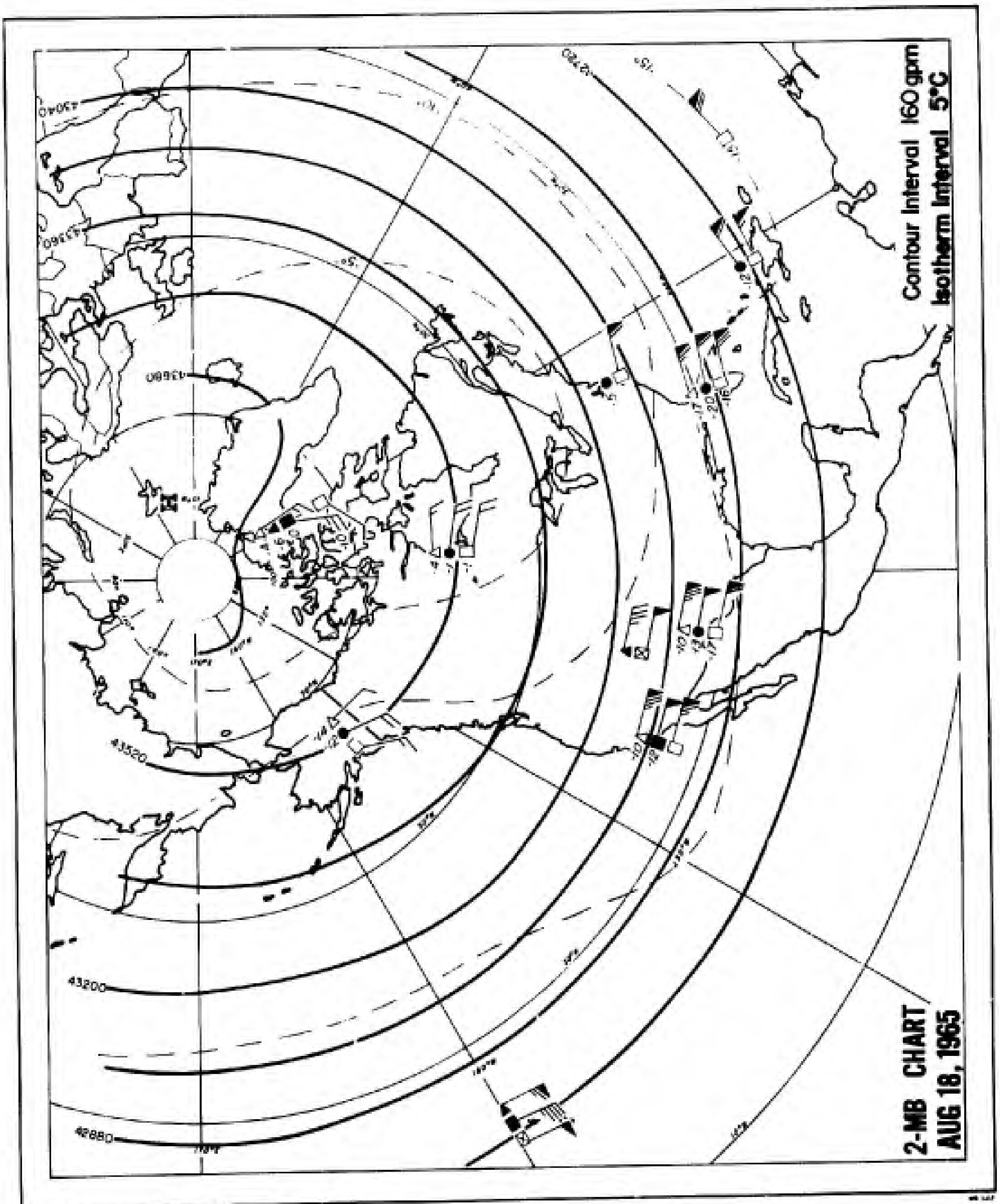
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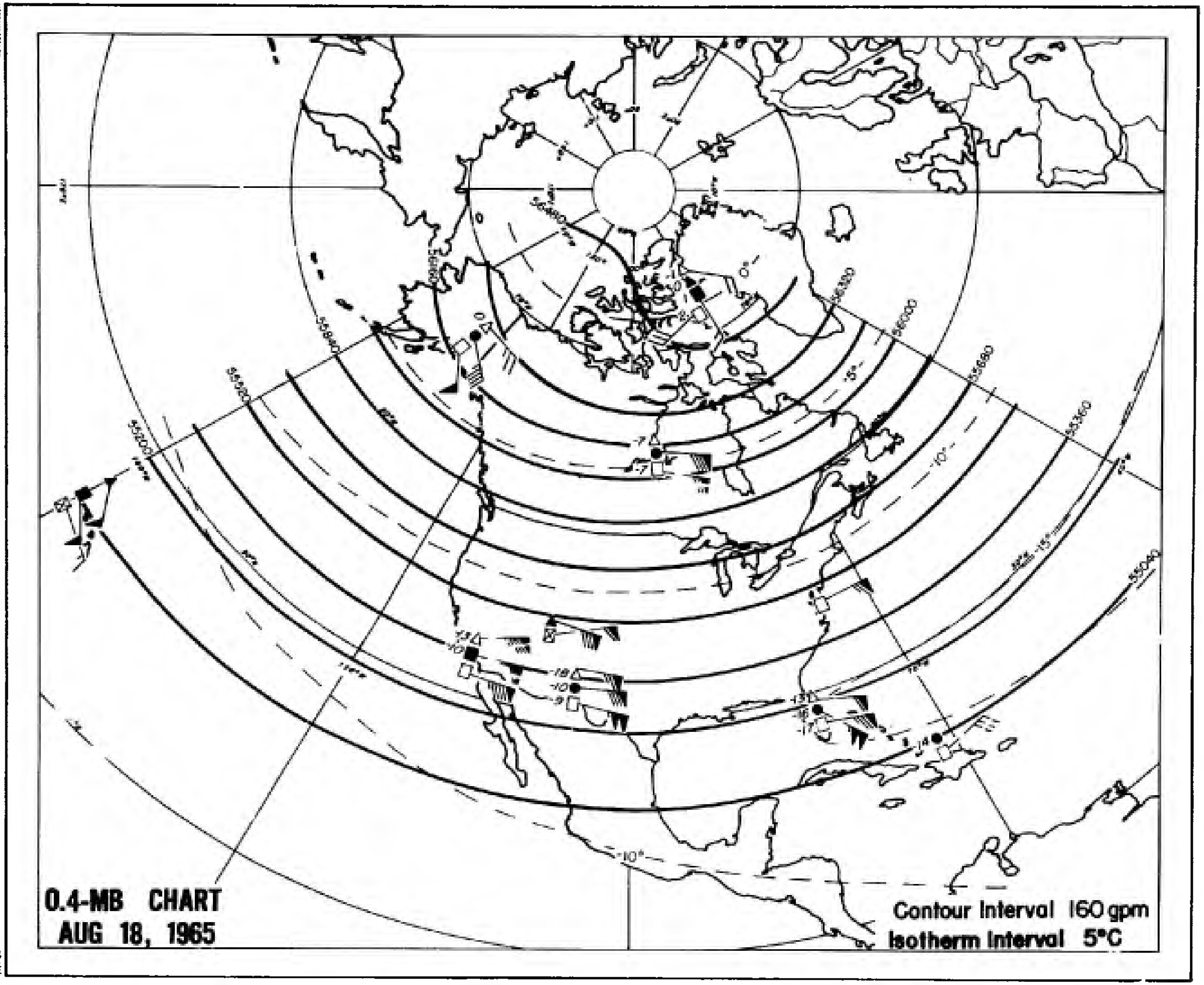
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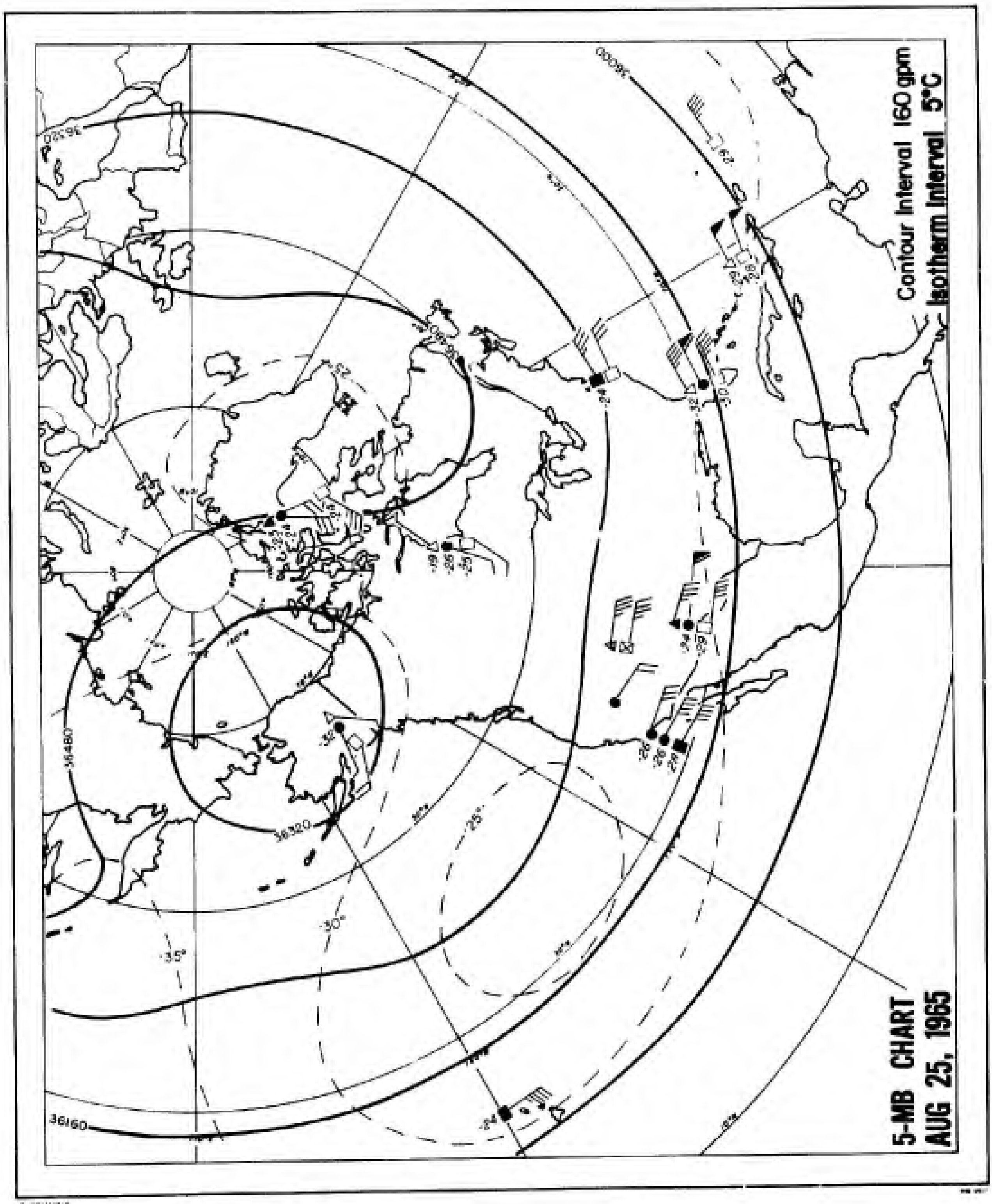
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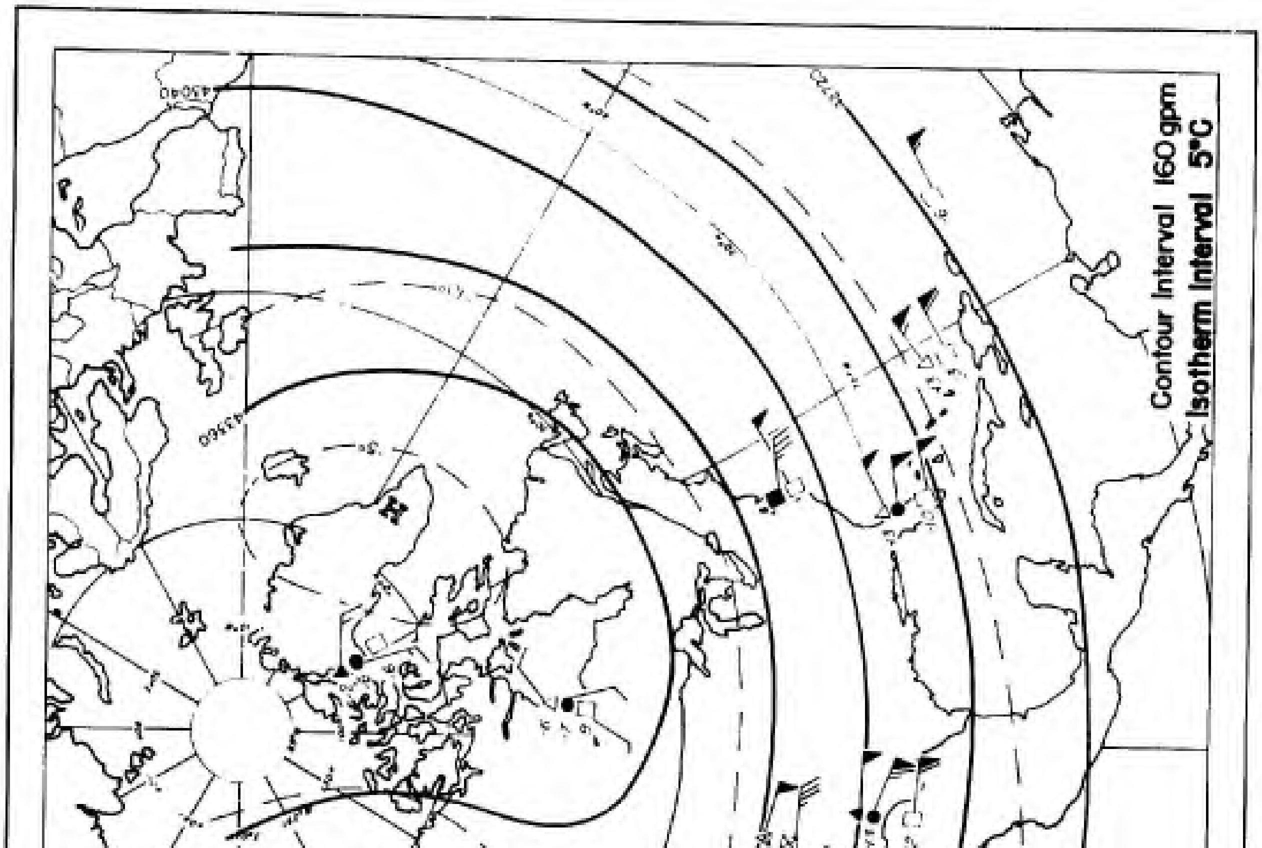
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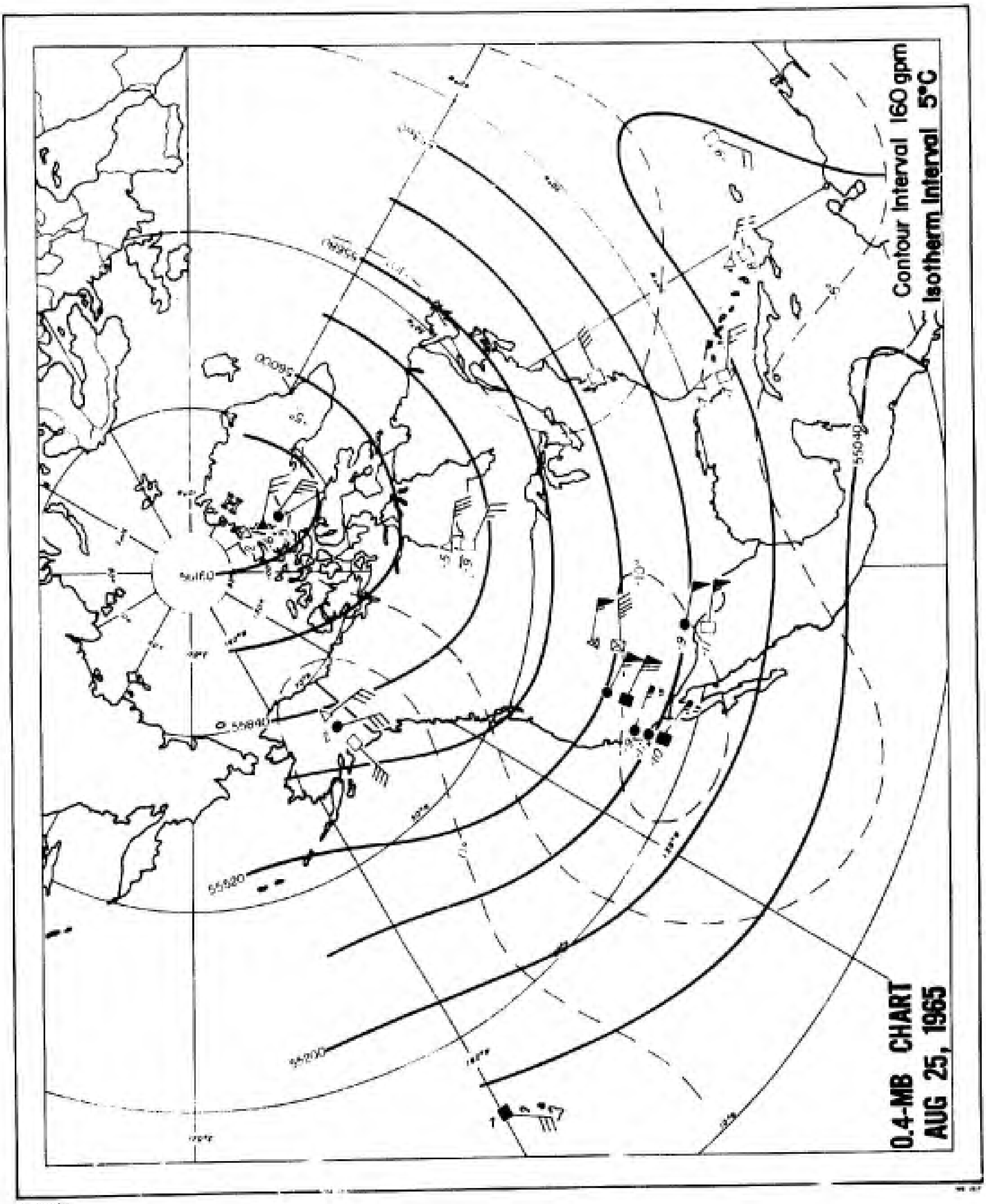
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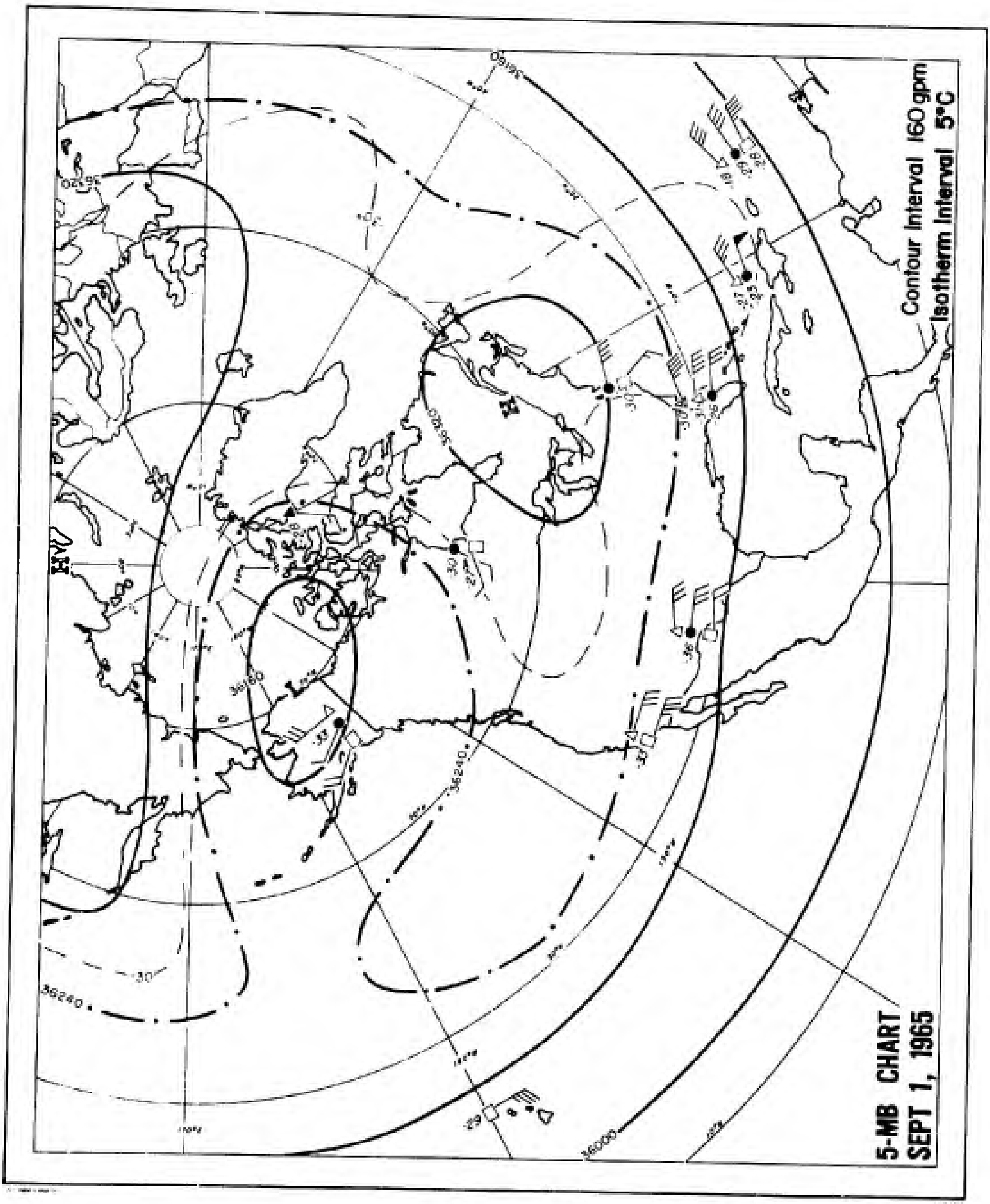
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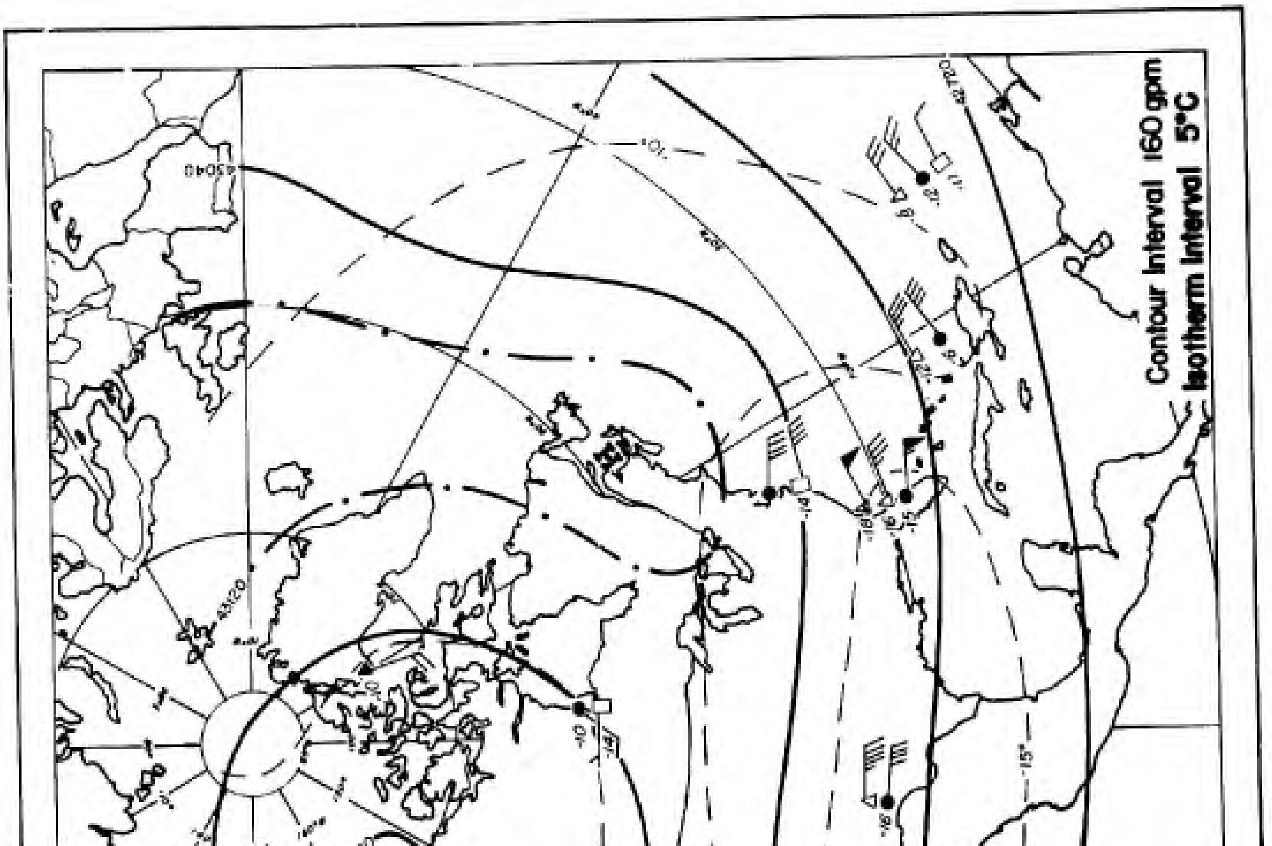
2-MB CHART
SEPT 1, 1965
Contour Interval 160 gpm
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43040
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42720
L
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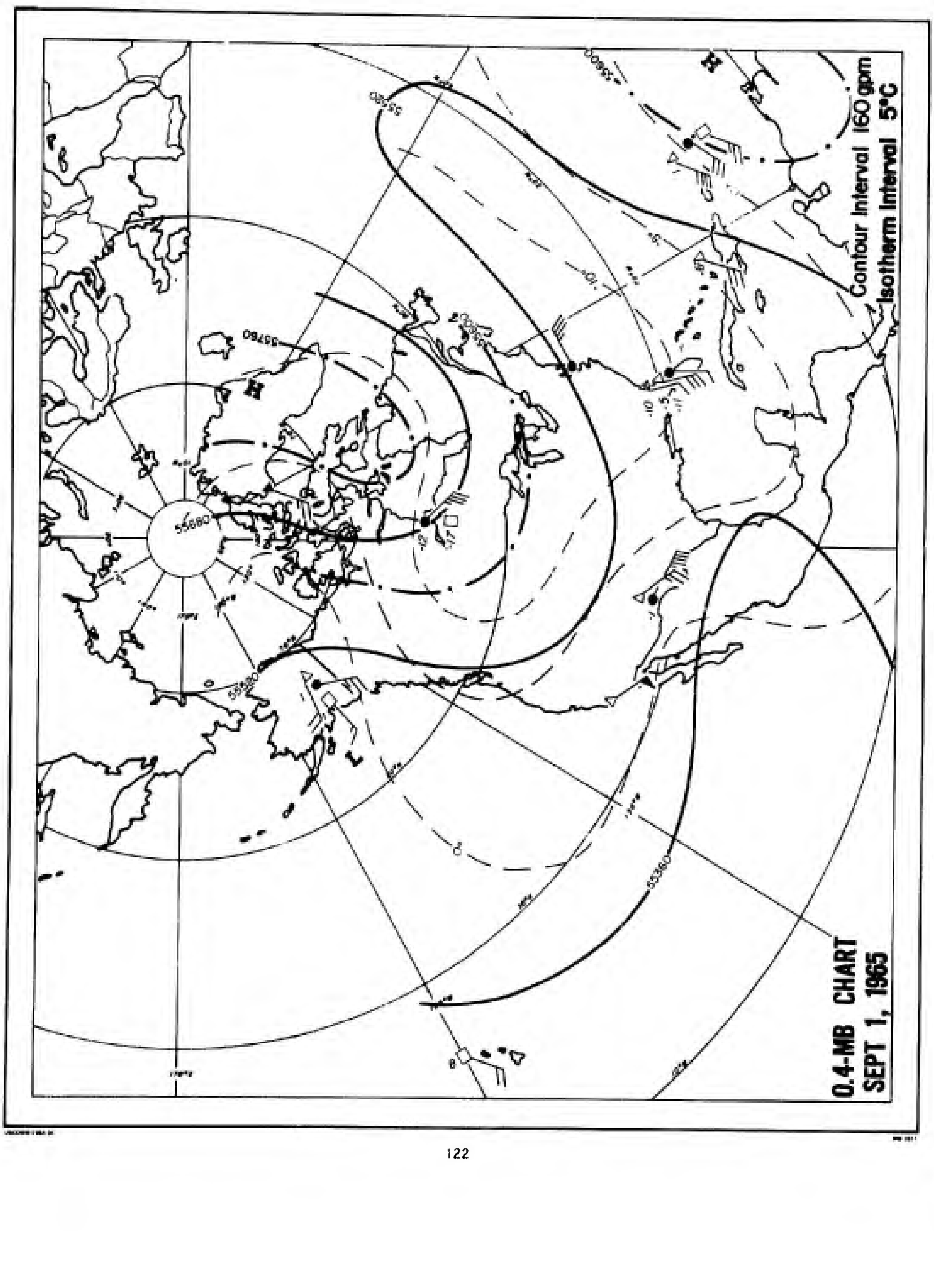
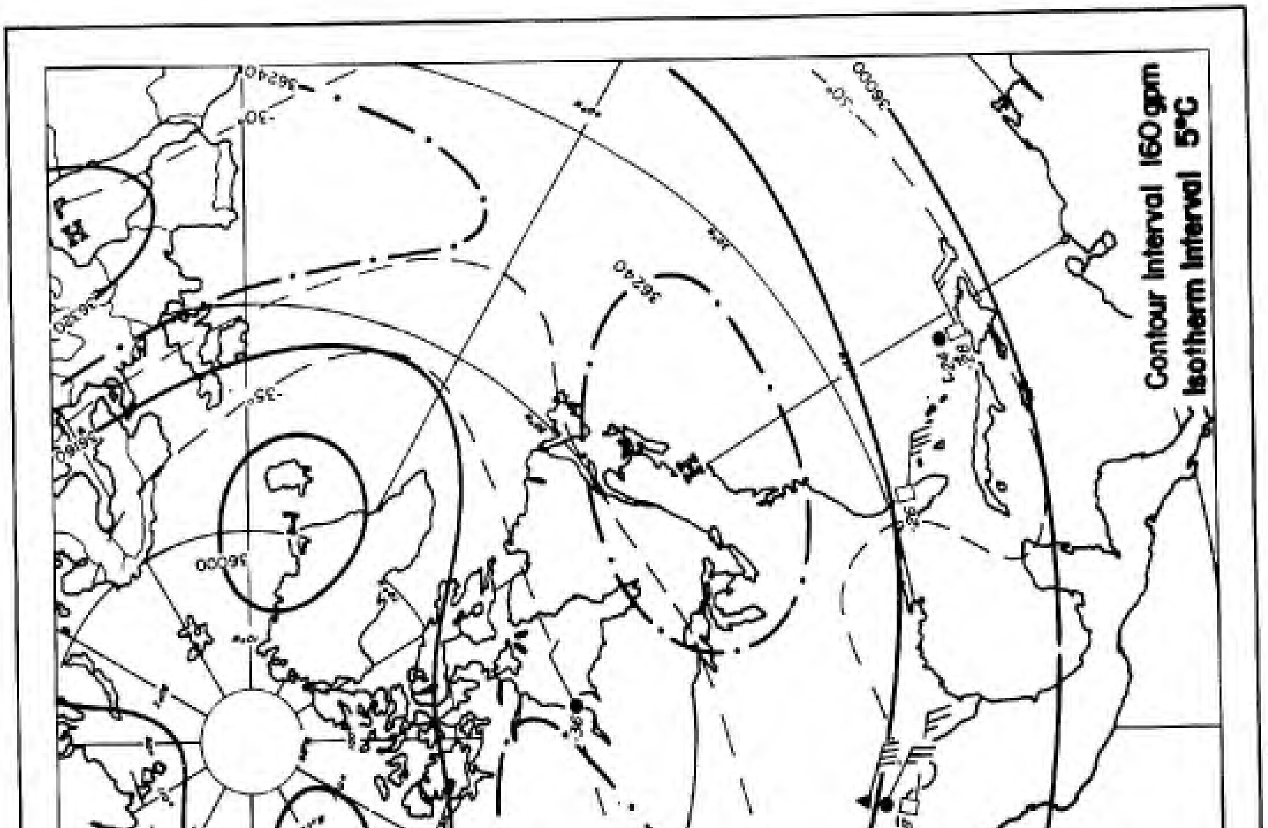
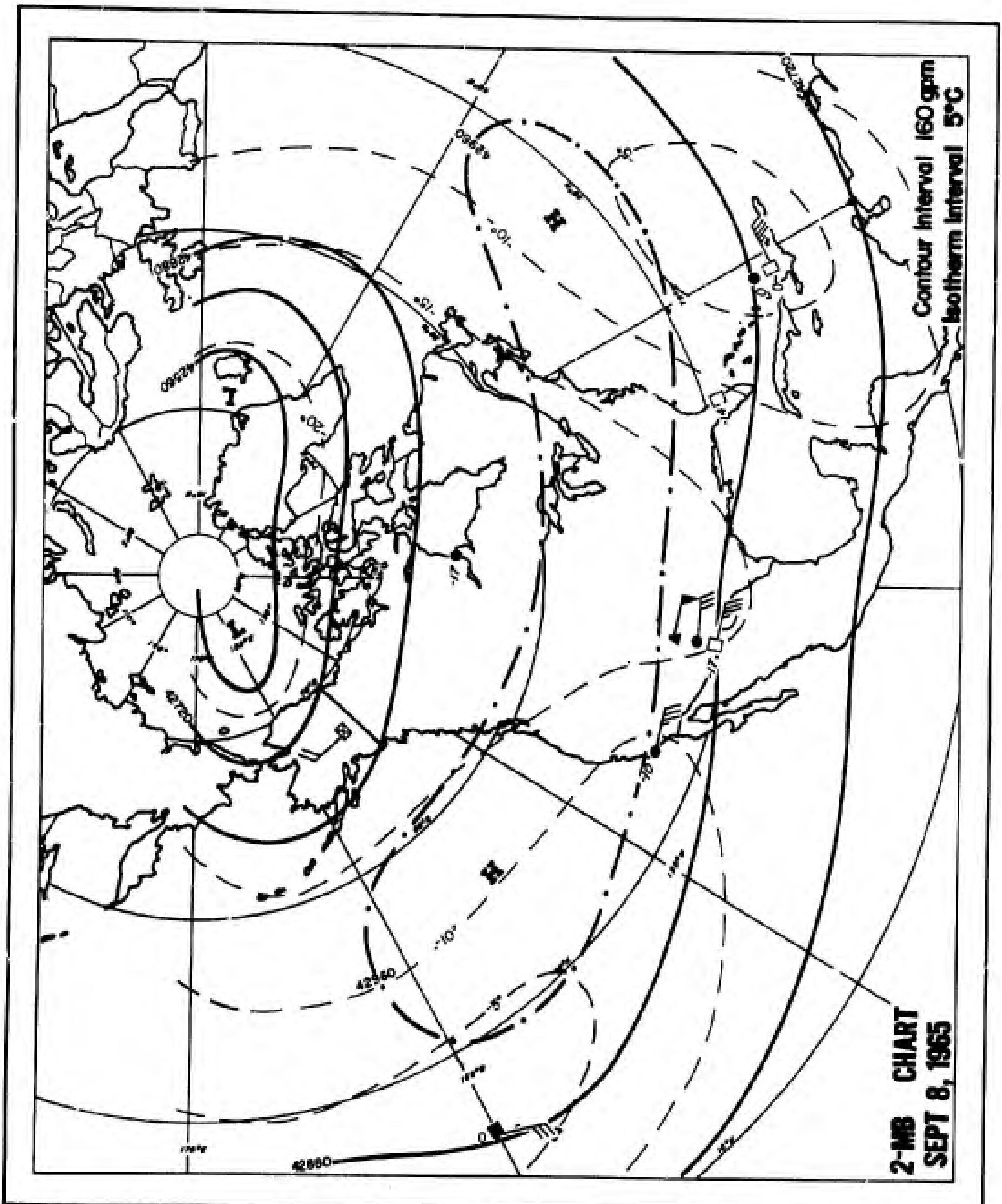
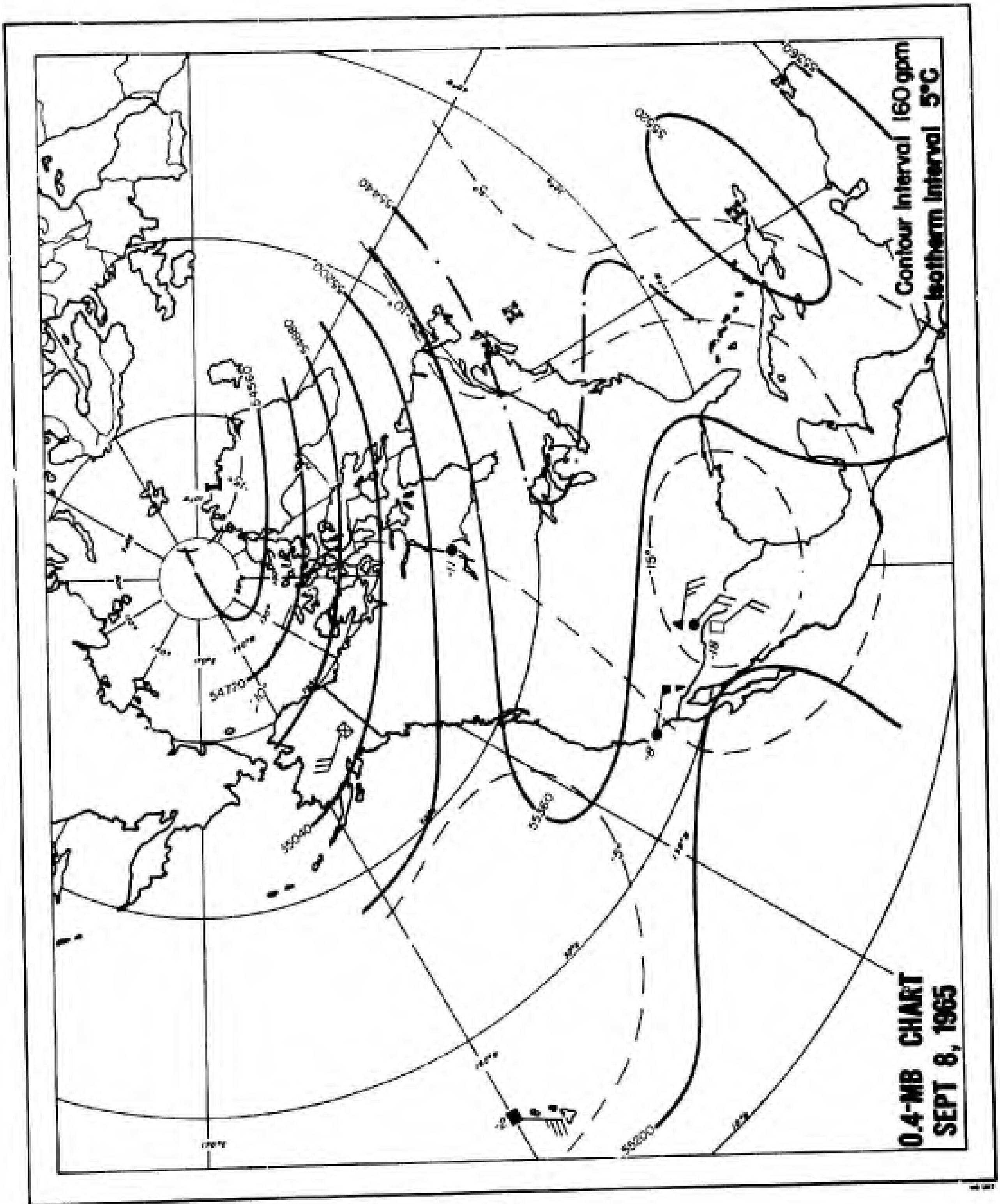
-15°
-5°


0.4-MB CHART
SEPT 1, 1965
Contour Interval 160 gpm
Isotherm Interval 5°C
55680
55760
55680
55360
55520
H
H
L


5-MB CHART
SEPT 8, 1965
Contour Interval 160 gpm
Isotherm Interval 5°C
36240
36000
36160
36320
-30°
-35°
H
L



2-MB CHART
SEPT 8, 1965
Contour Interval 160 gpm
Isotherm Interval 5°C
42880
42560
42720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Contour Interval 160 gpm
Isotherm Interval 5°C
55520
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55360
55200
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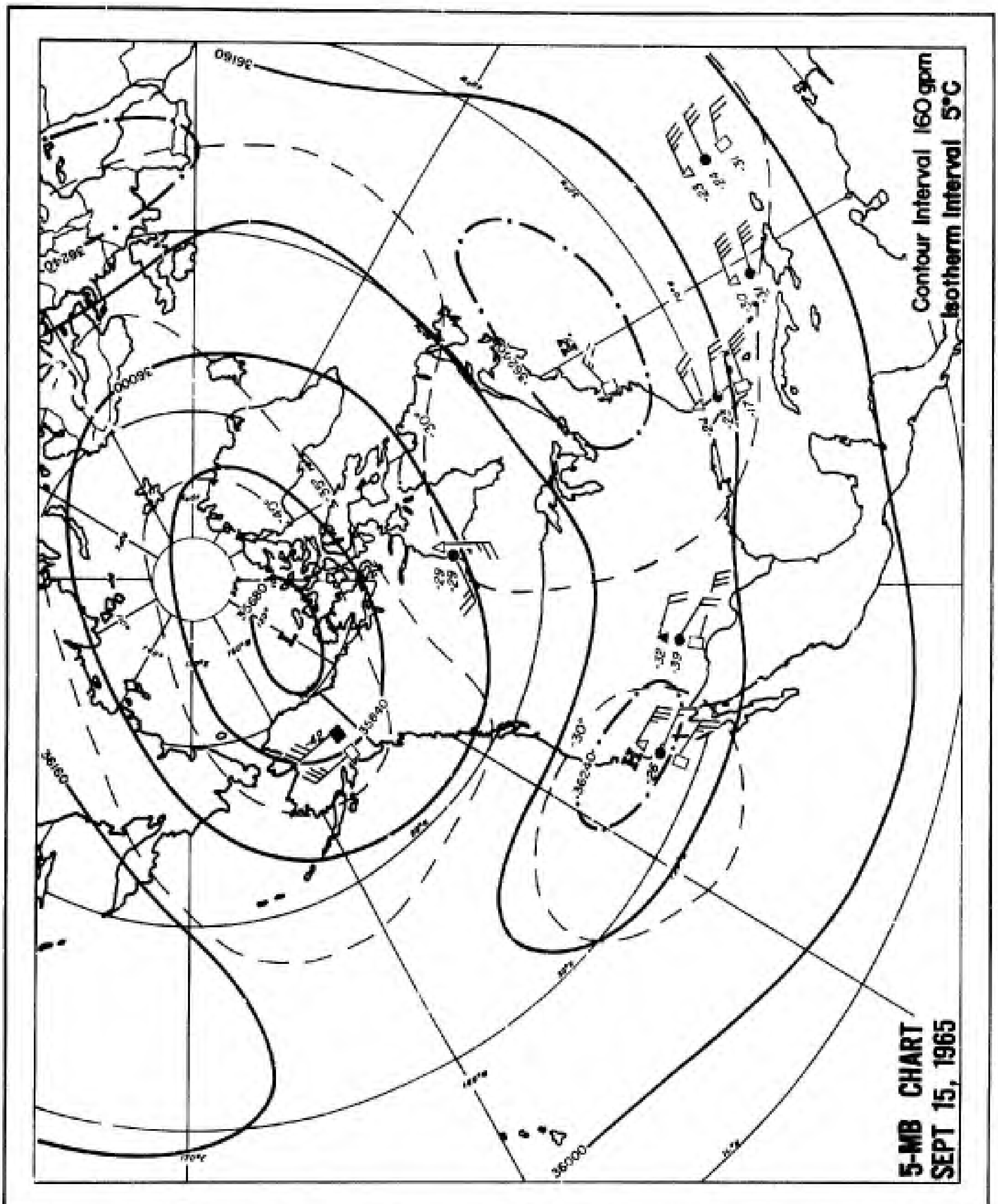
54560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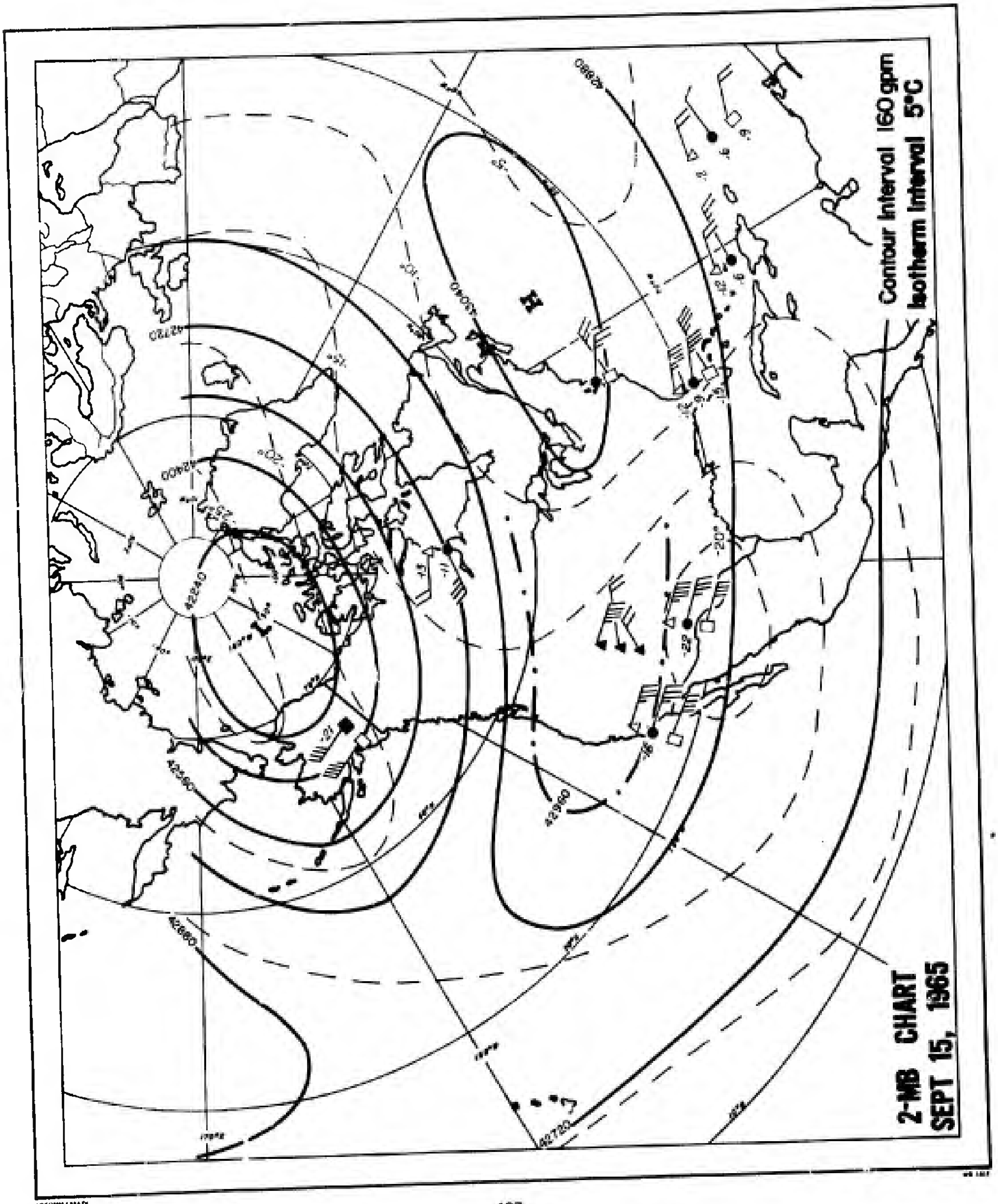
SEPT 15, 1965
Contour Interval 160 gpm
Isotherm Interval 5°C



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Contour Interval 160 gpm
Isotherm Interval 5°C
42240
42400
42560
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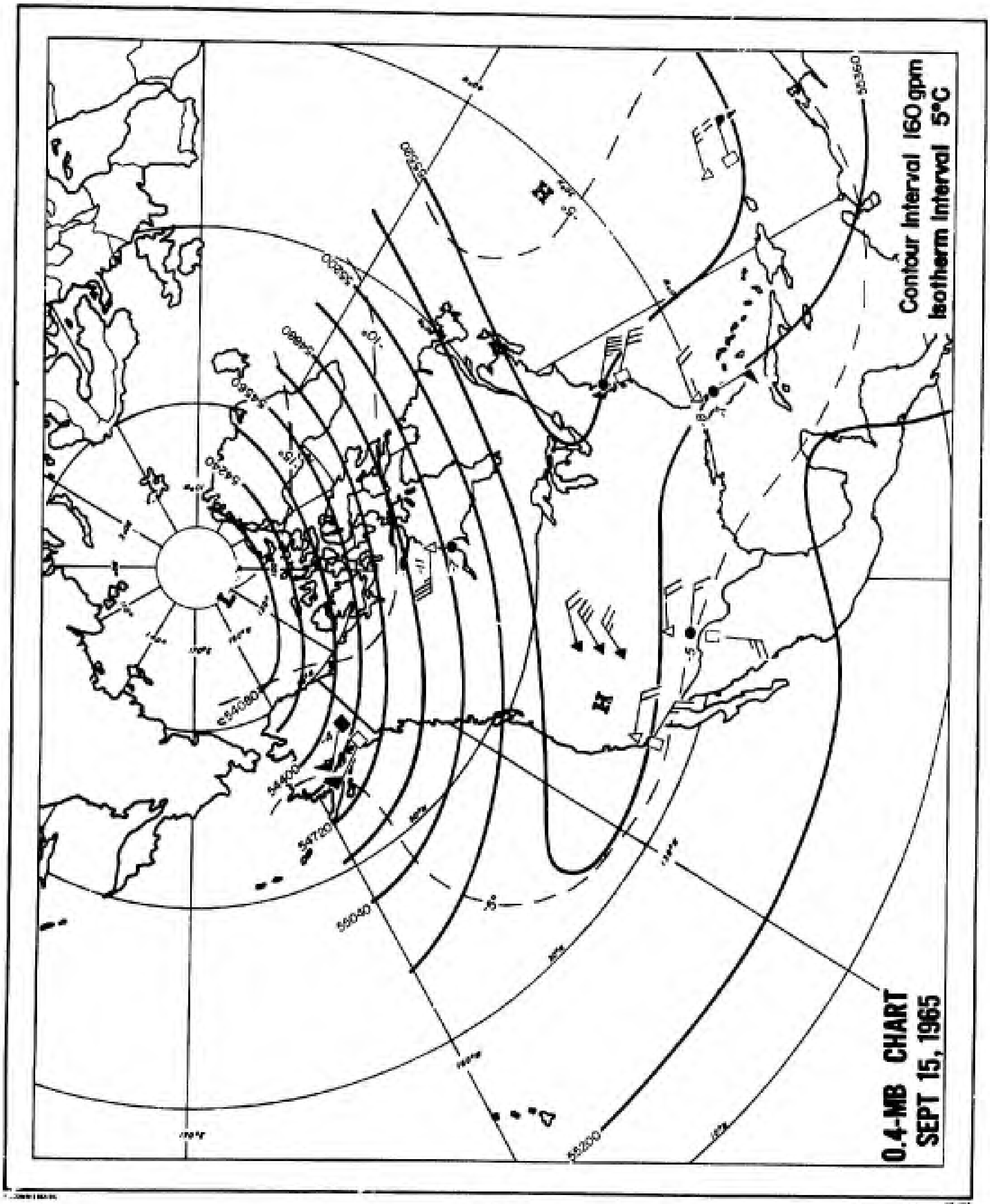
42880
43040
42960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Contour Interval 160 gpm
Isotherm Interval 5°C
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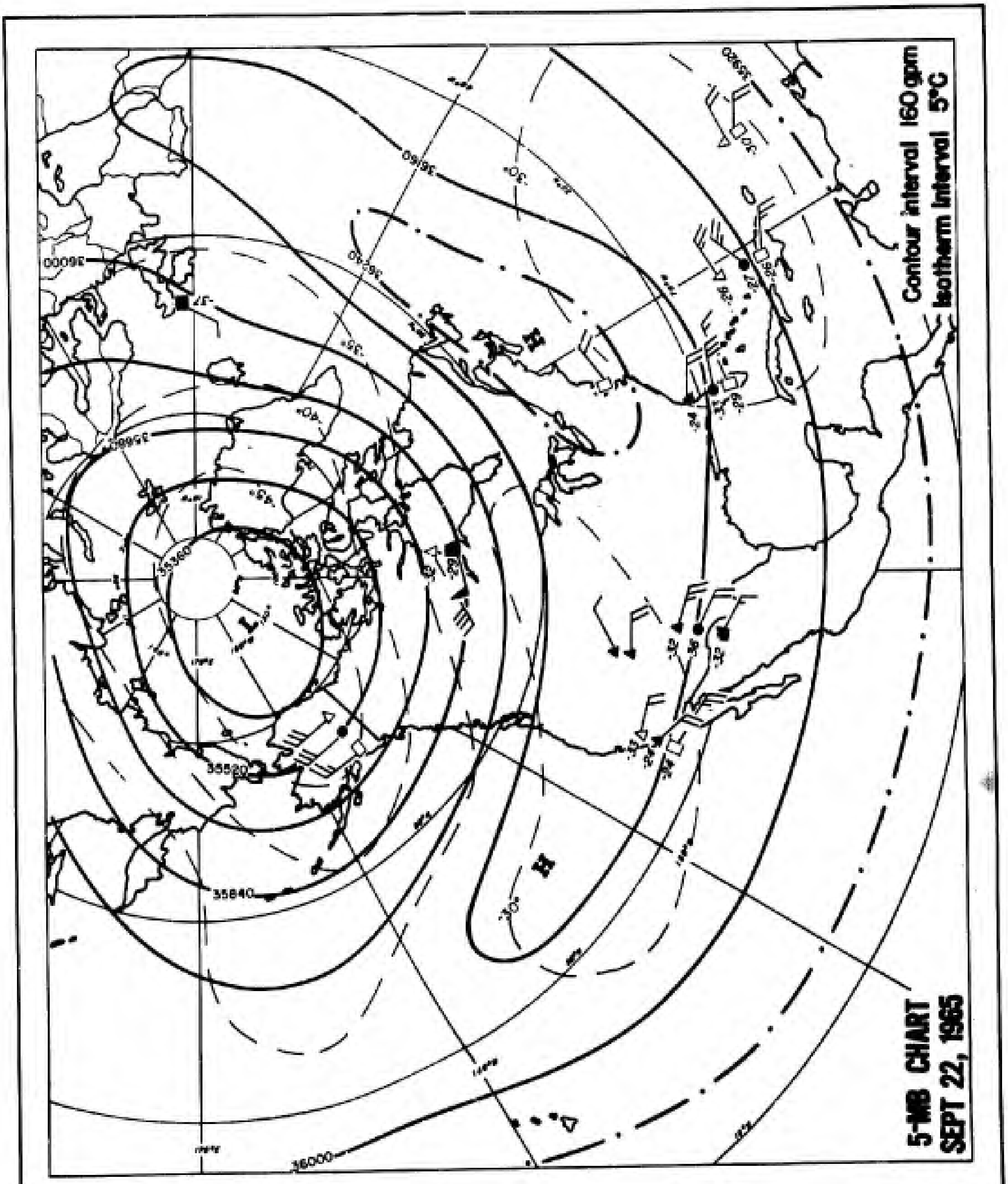
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SEPT 22, 1965
Contour interval 160 gpm
Isotherm interval 5°C
36000
35840
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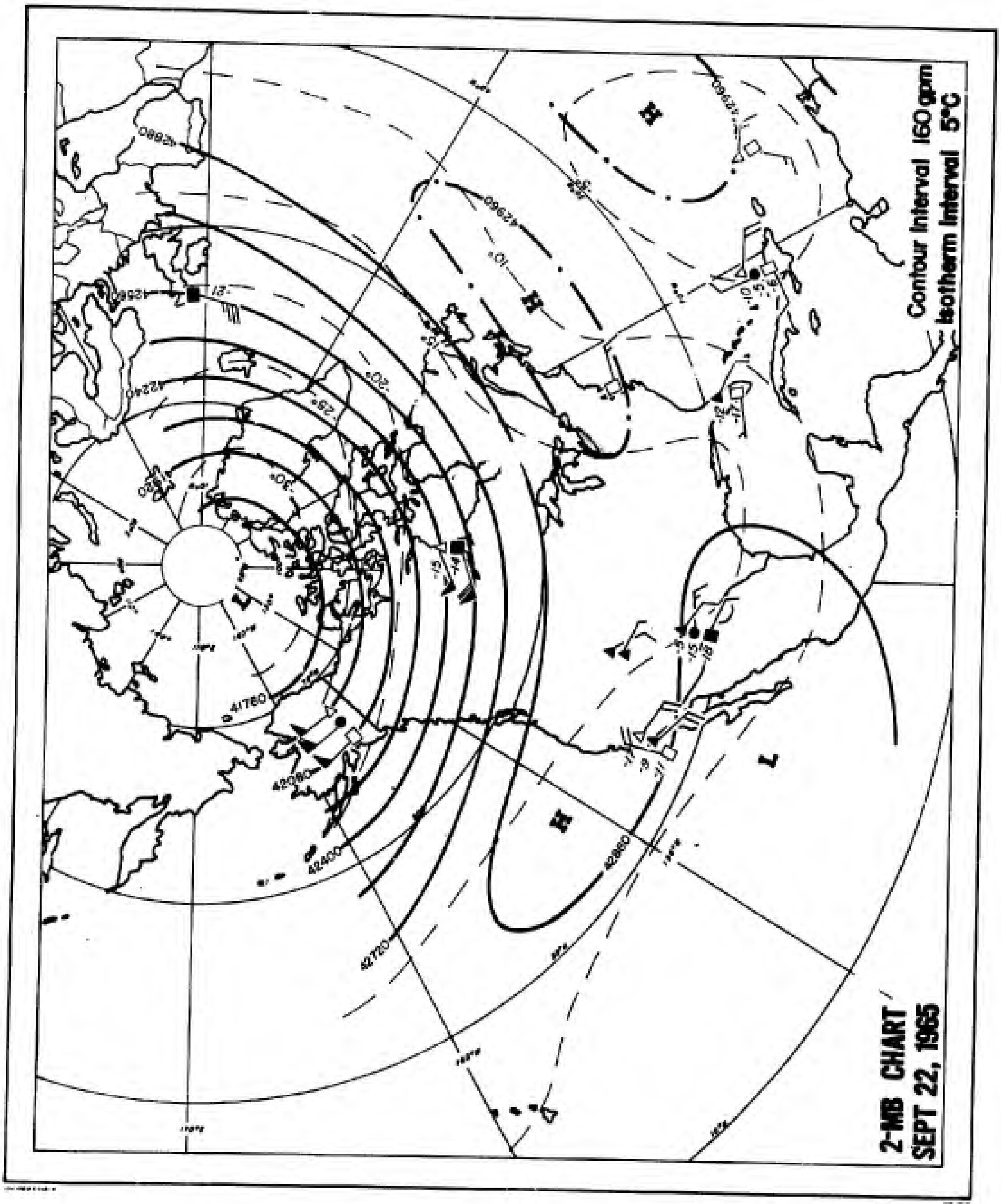
36000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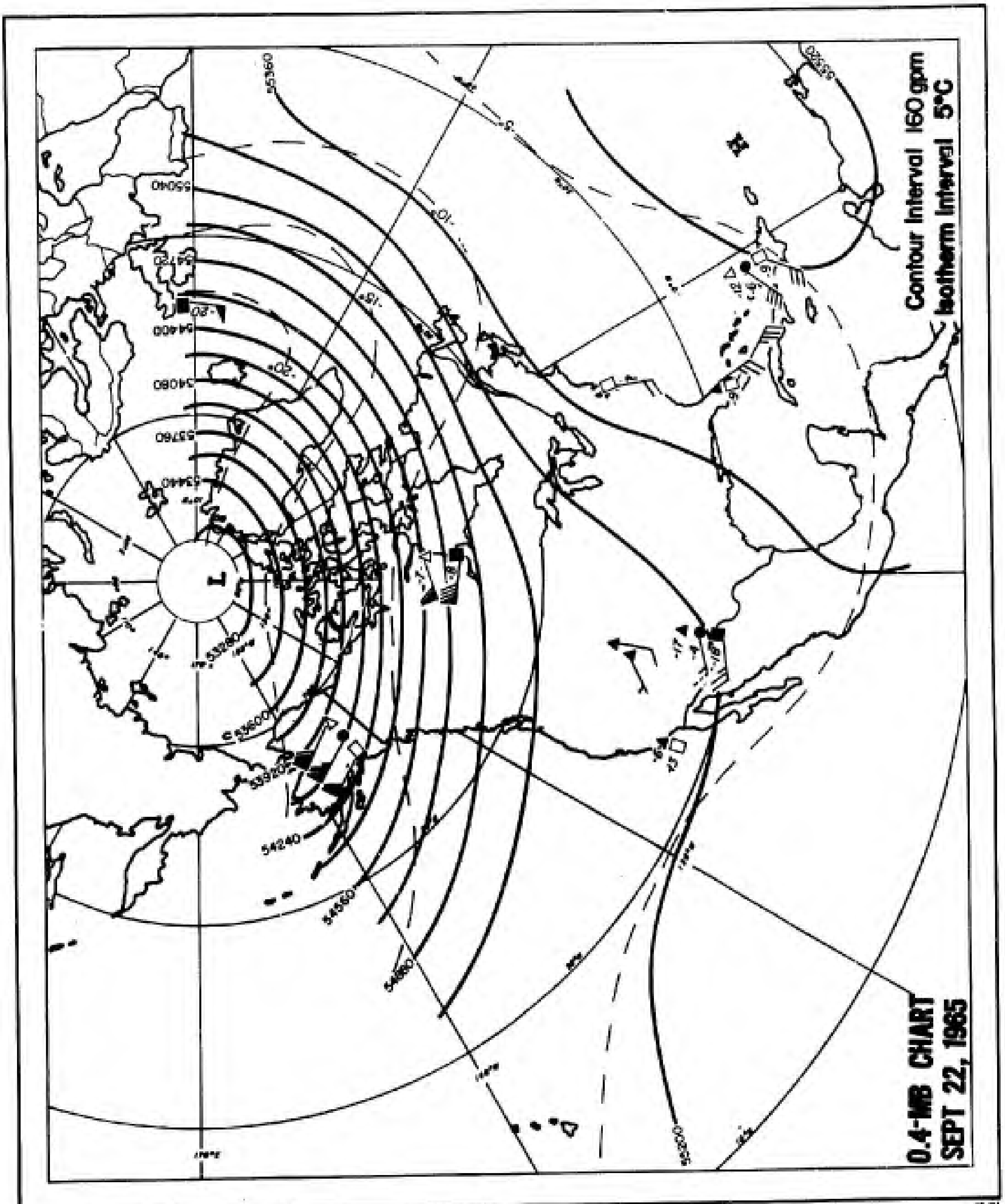
Isotherm Interval 5°C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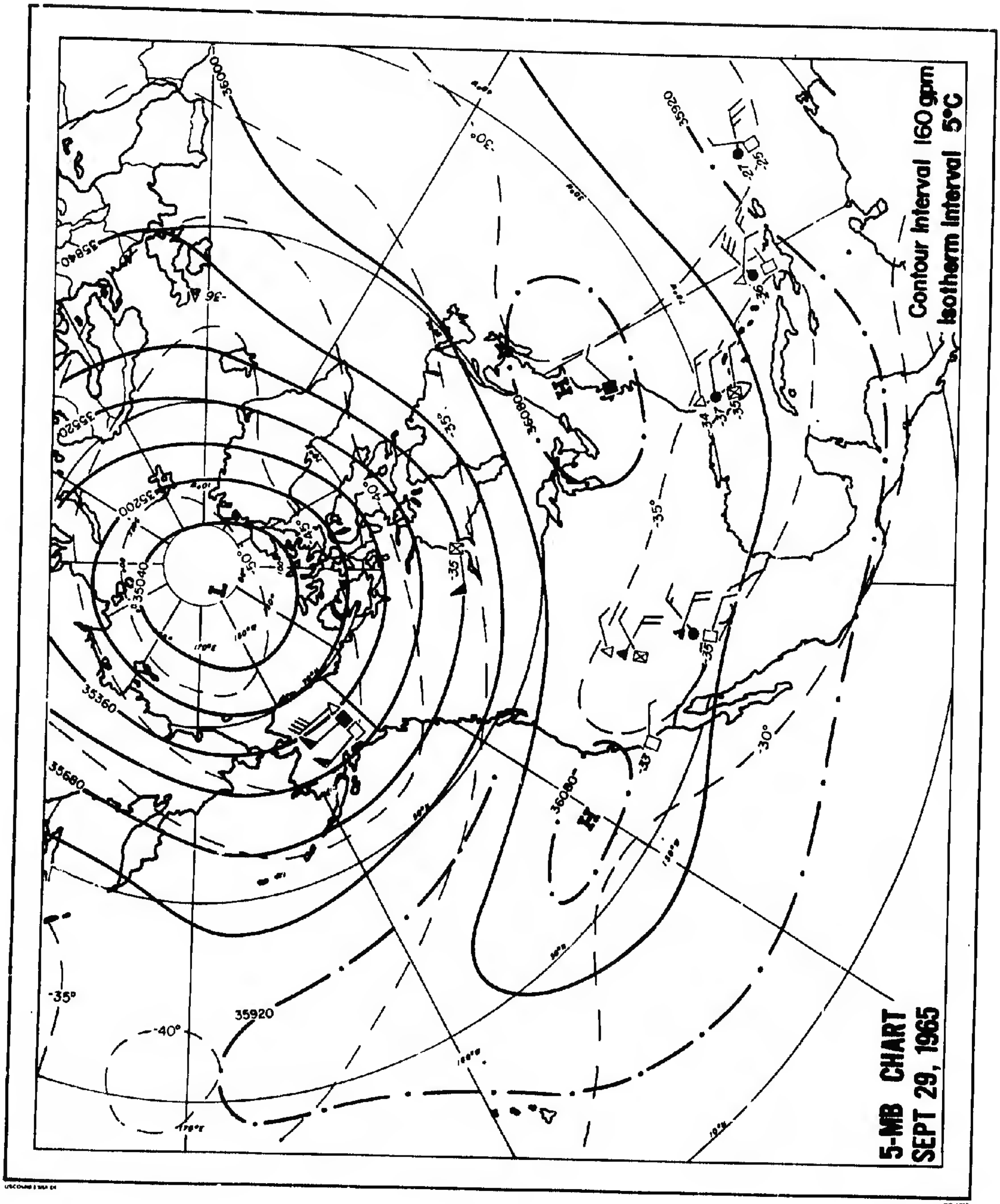
Isotherm Interval 5°C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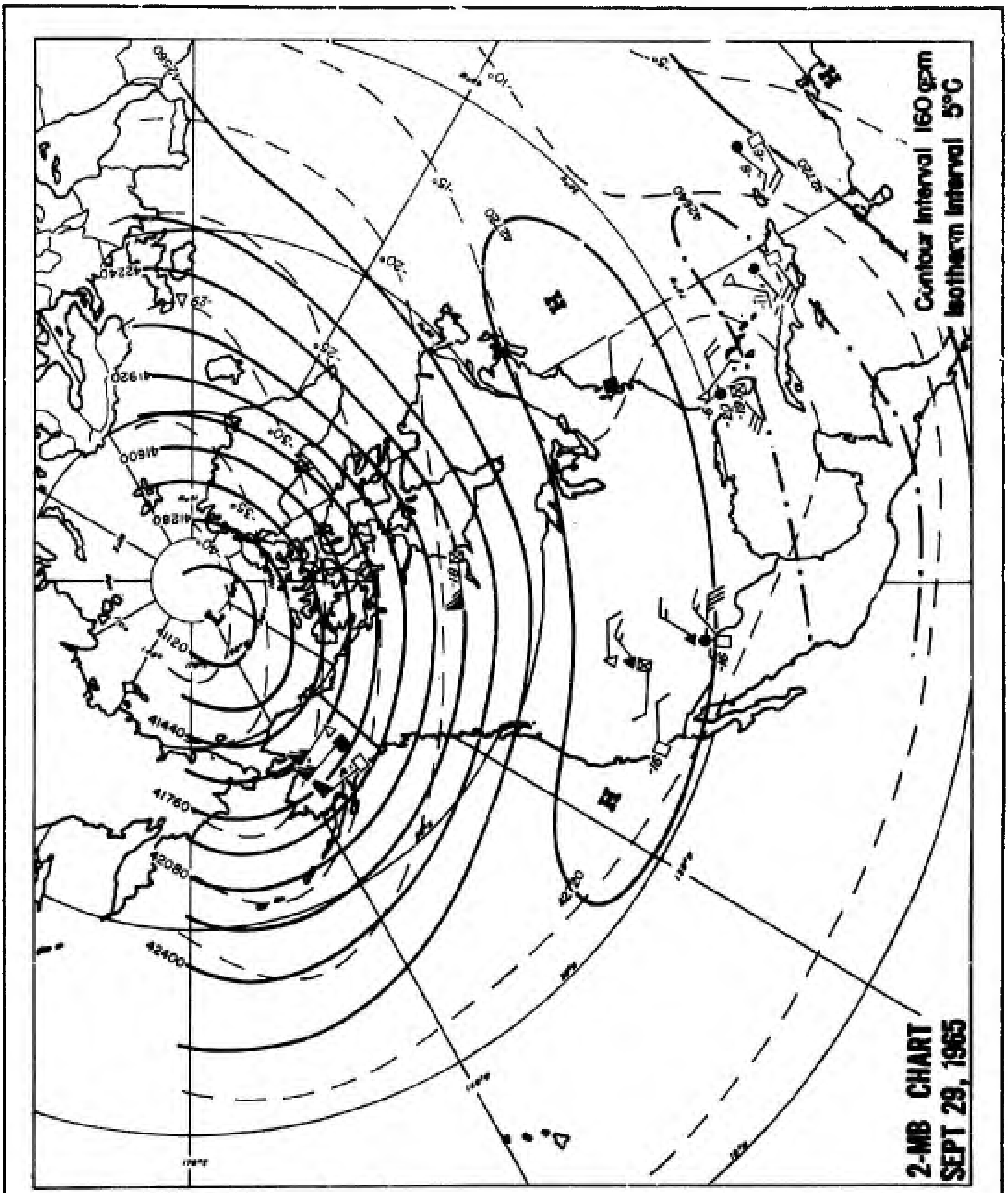
SEPT 29, 1965
Contour Interval 160 gpm
Isotherm Interval 5°C
35040
35200
35360
35520
35680
35840
36000
35920
36080
-30°
-35°
-40°


2-MB CHART
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Contour Interval 160 gpm
Isotherm Interval 5°C
42400
42080
41760
41440
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41920
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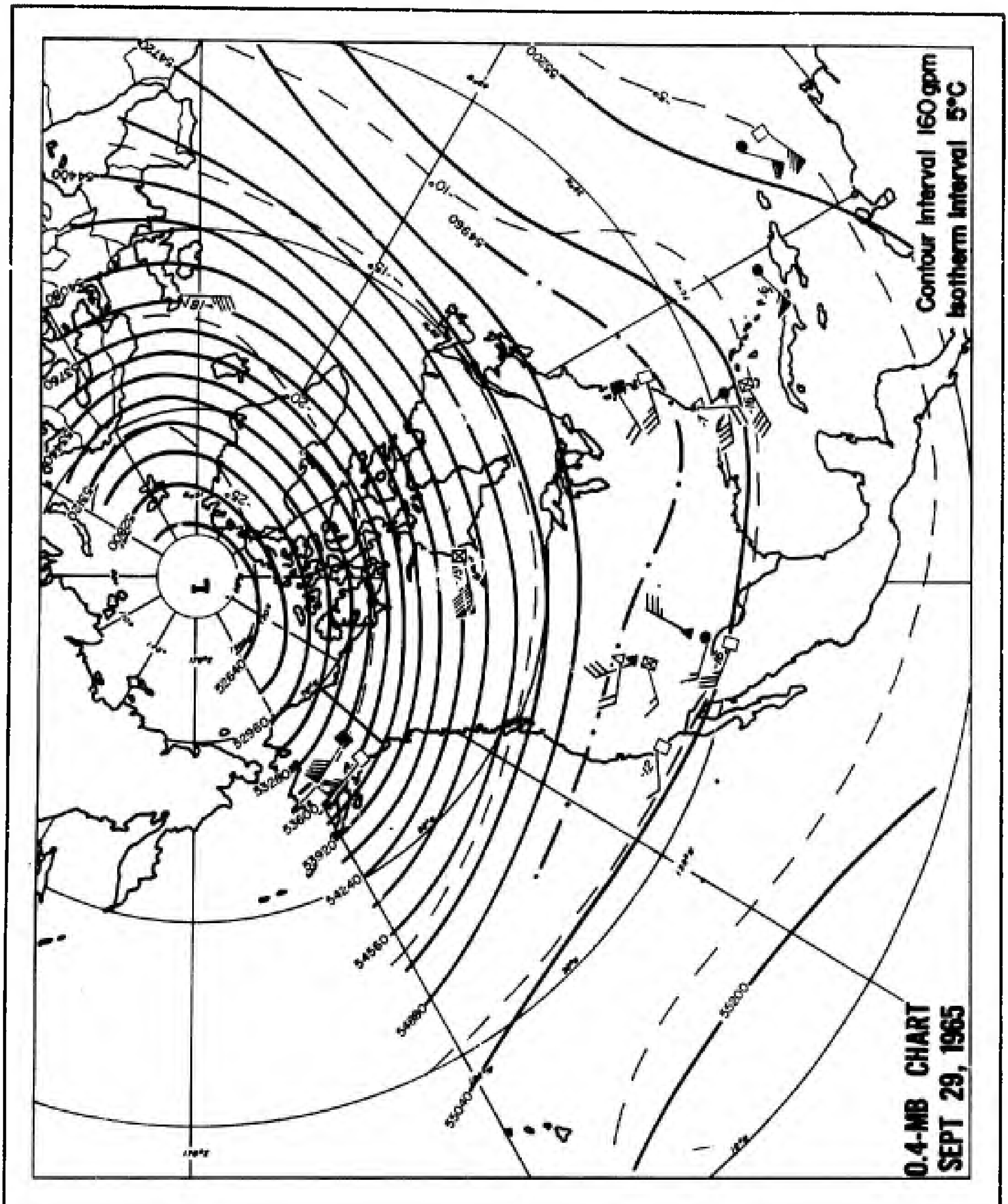
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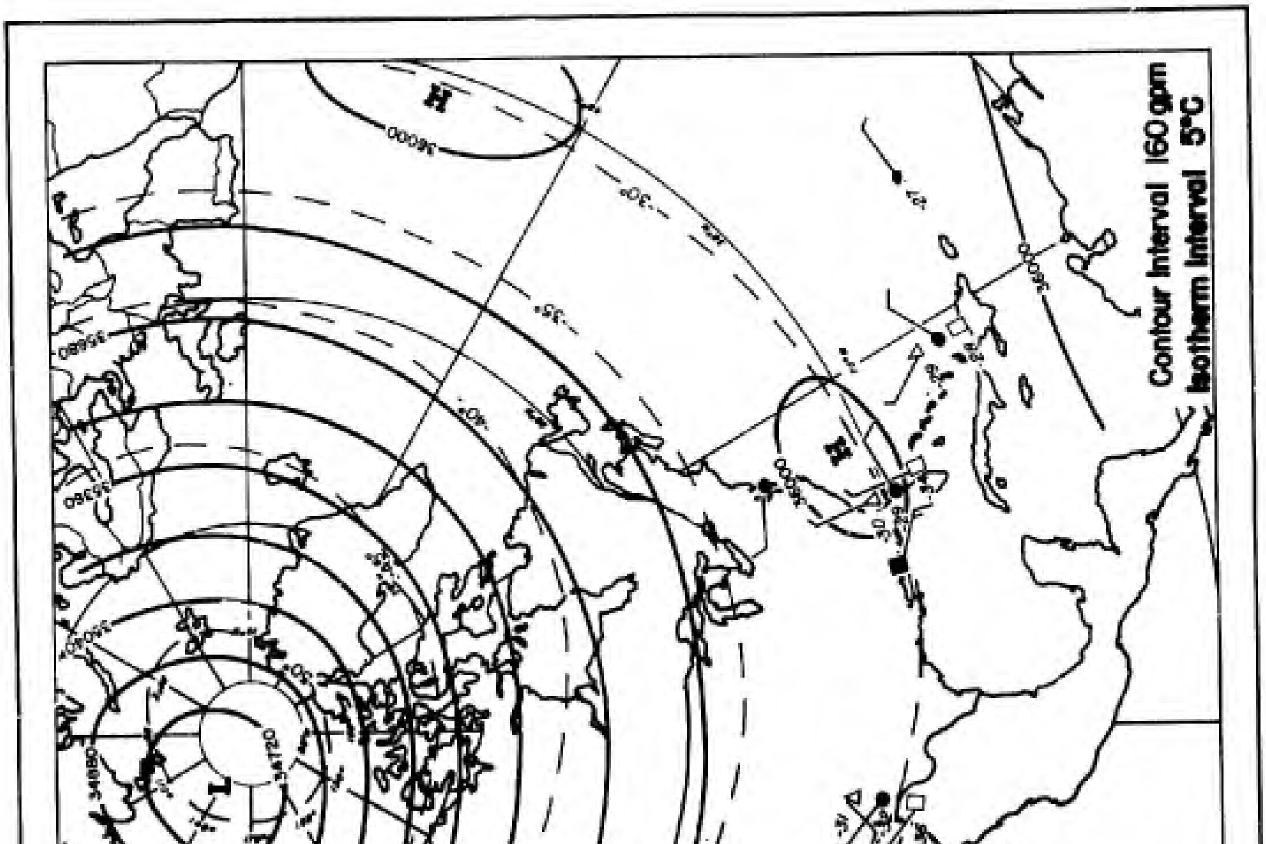
Isotherm Interval 5°C


5-MB CHART
OCT 6, 1965
Contour Interval 160 gpm
Isotherm Interval 5°C
36000
35680
35360
35040
34880
34720
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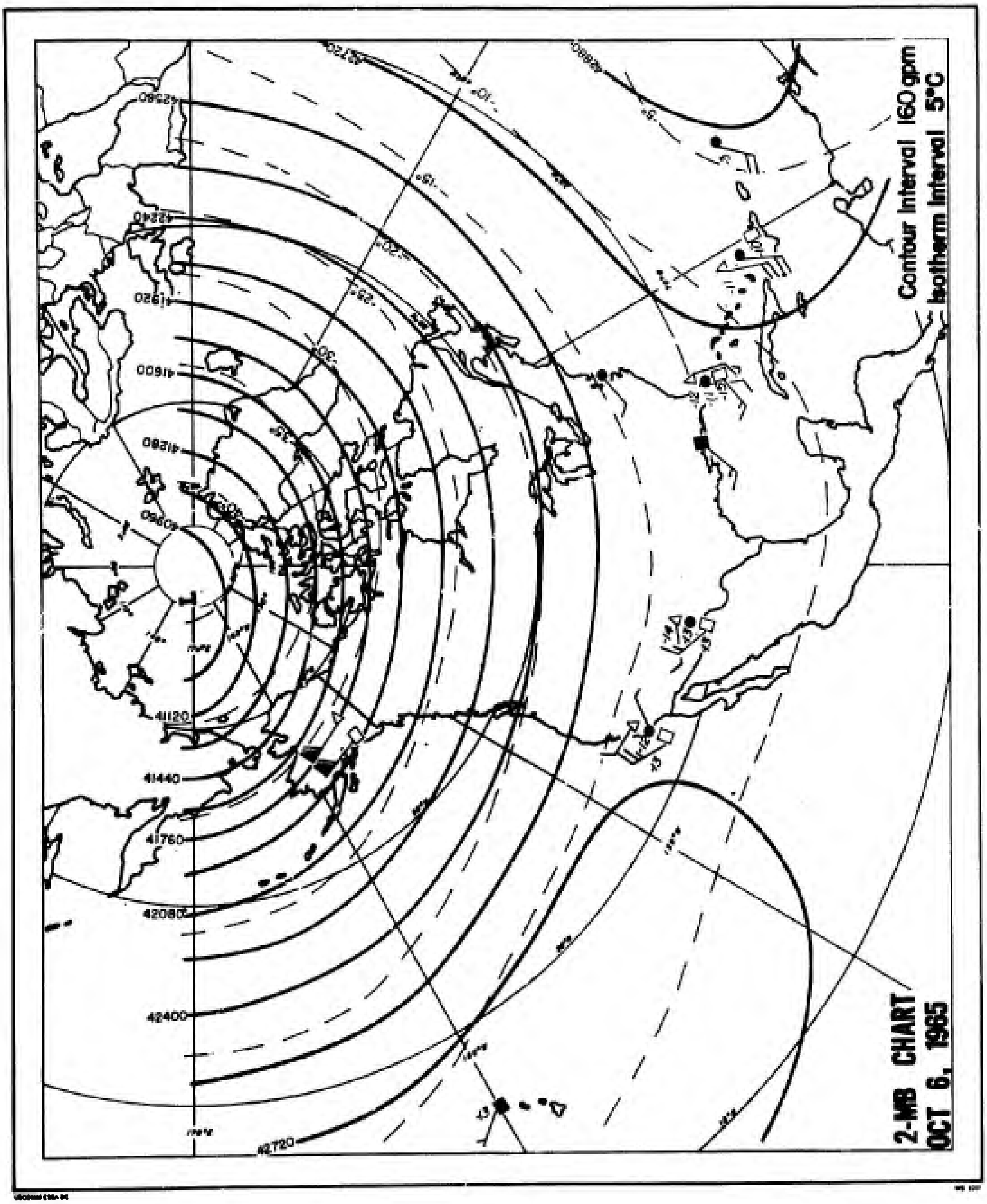
35520
35840
H
L


2-MB CHART
OCT 6, 1965
Contour Interval 160 gpm
Isotherm Interval 5°C
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41440
41760
42080
42400
42720
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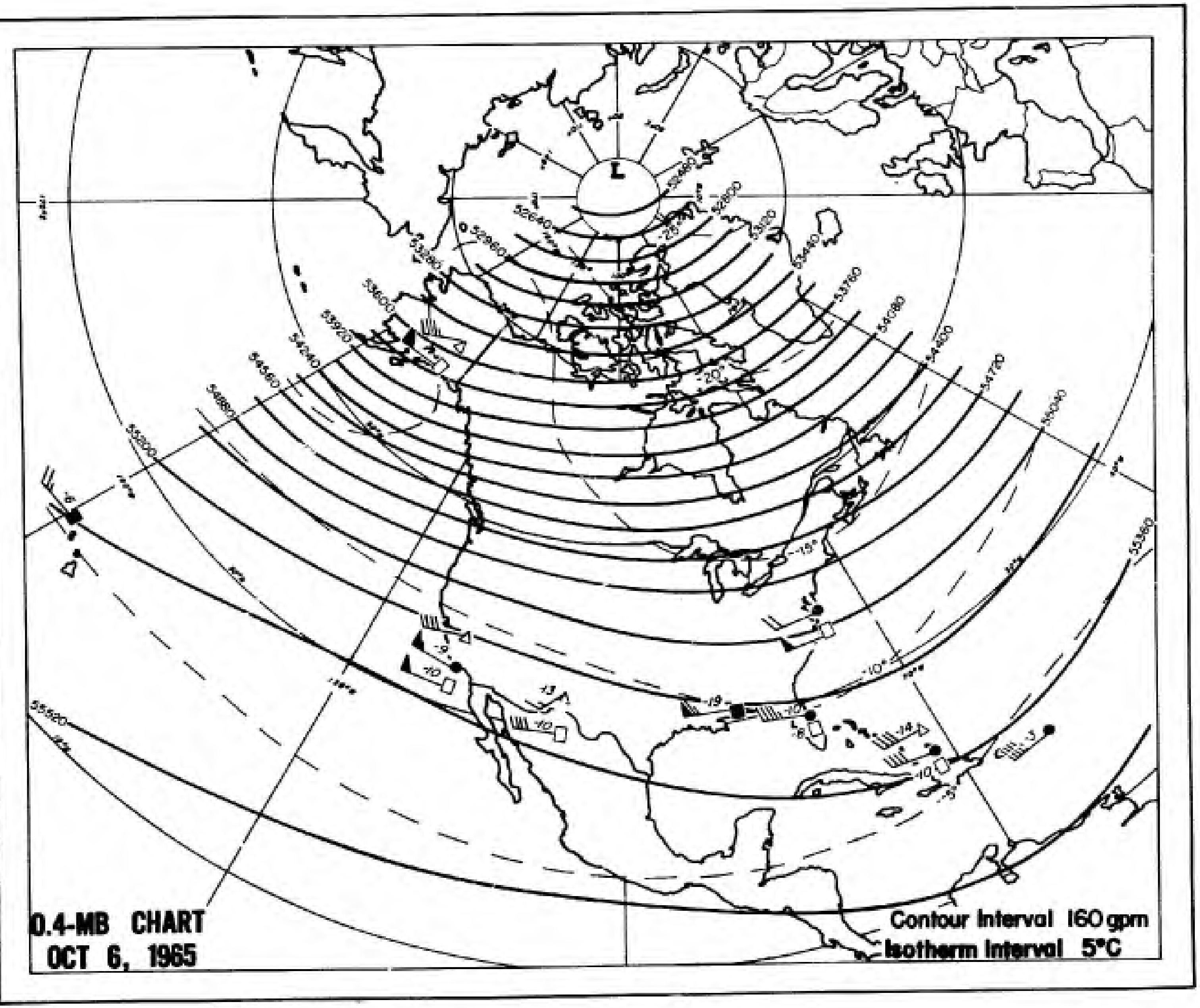
41920
42240
42560
42880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OCT 6, 1965
Contour Interval 160 gpm
Isotherm Interval 5°C
L
52480
52640
52800
52960
53120
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53440
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53760
53920
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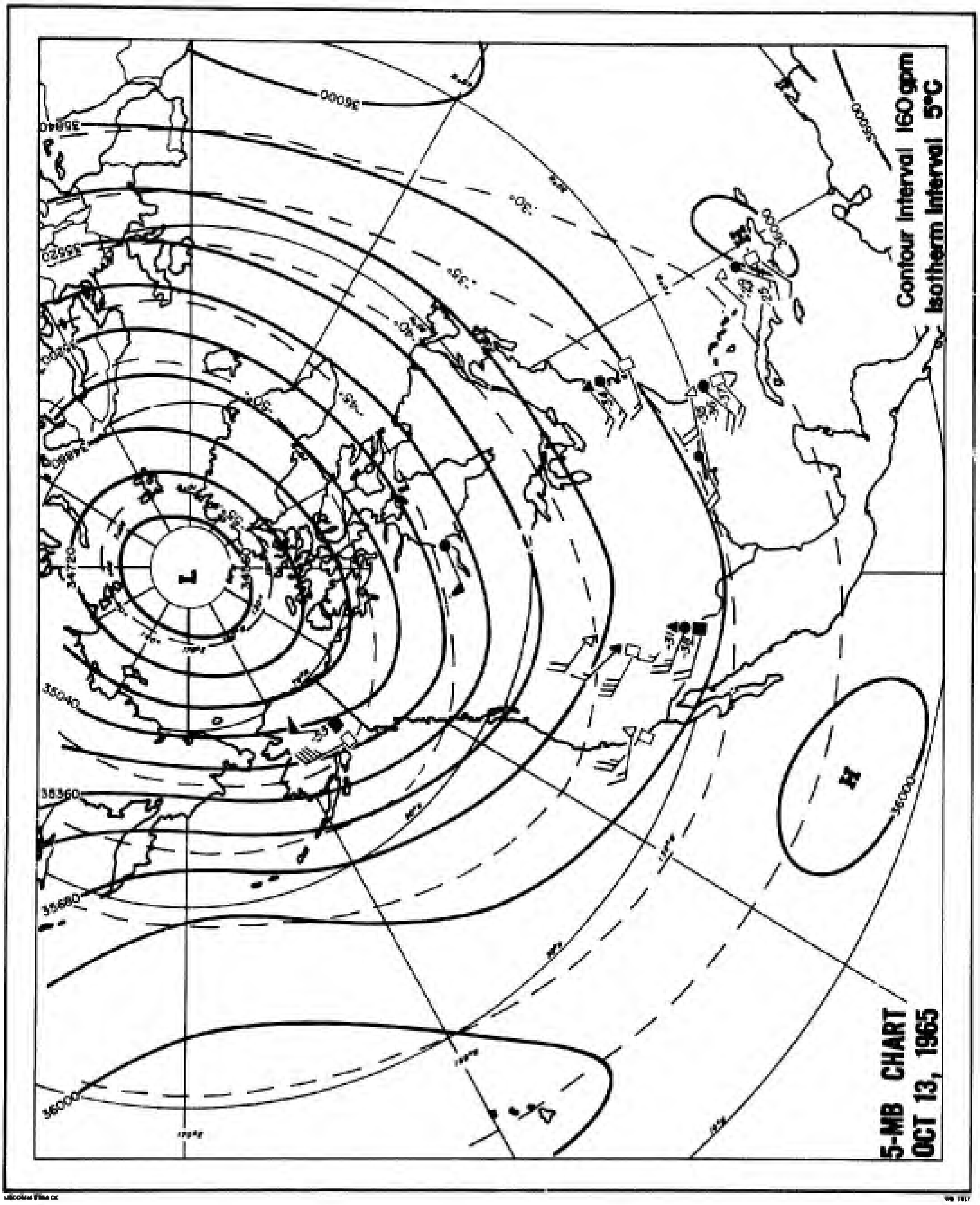
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OCT 13, 1965
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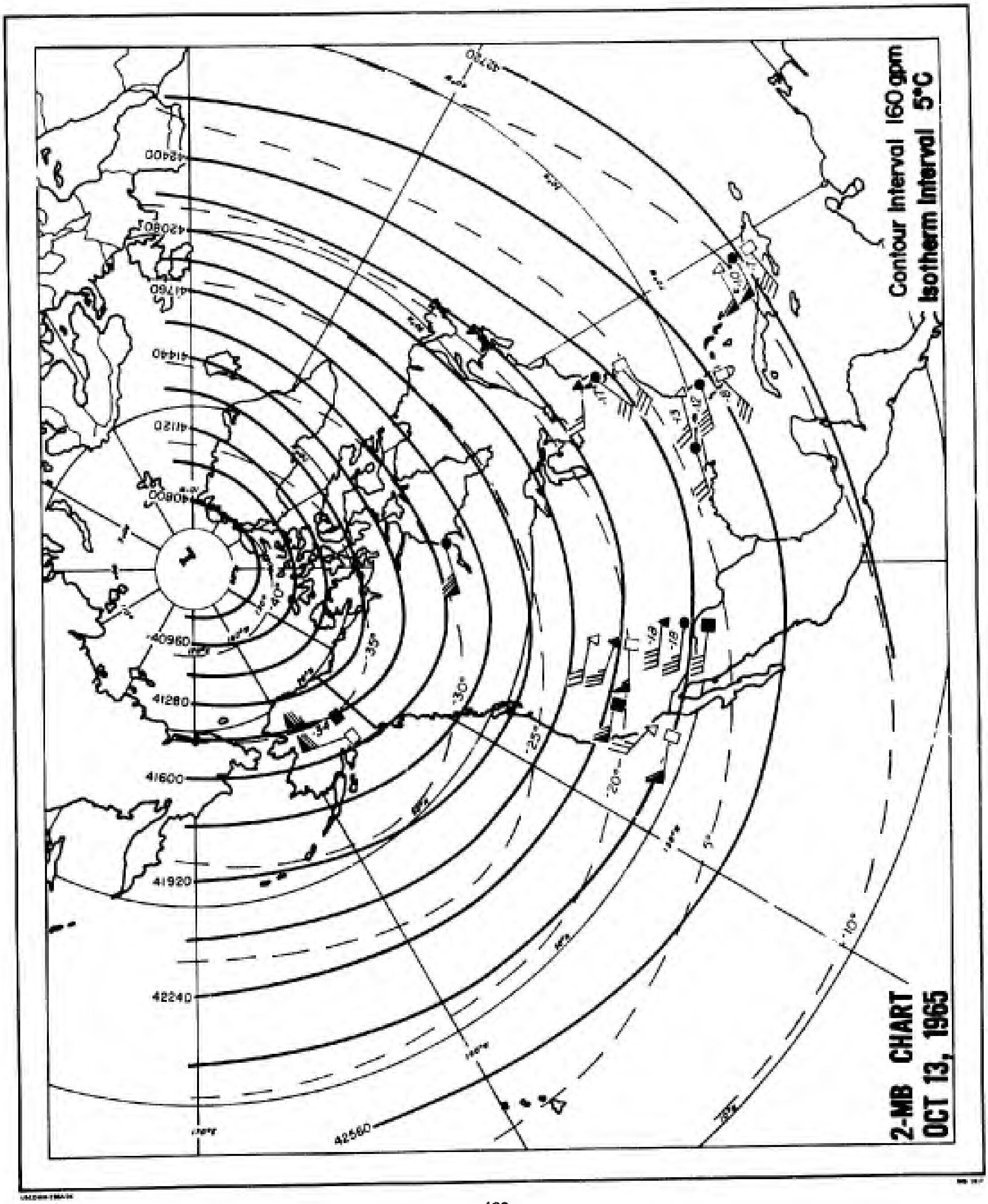
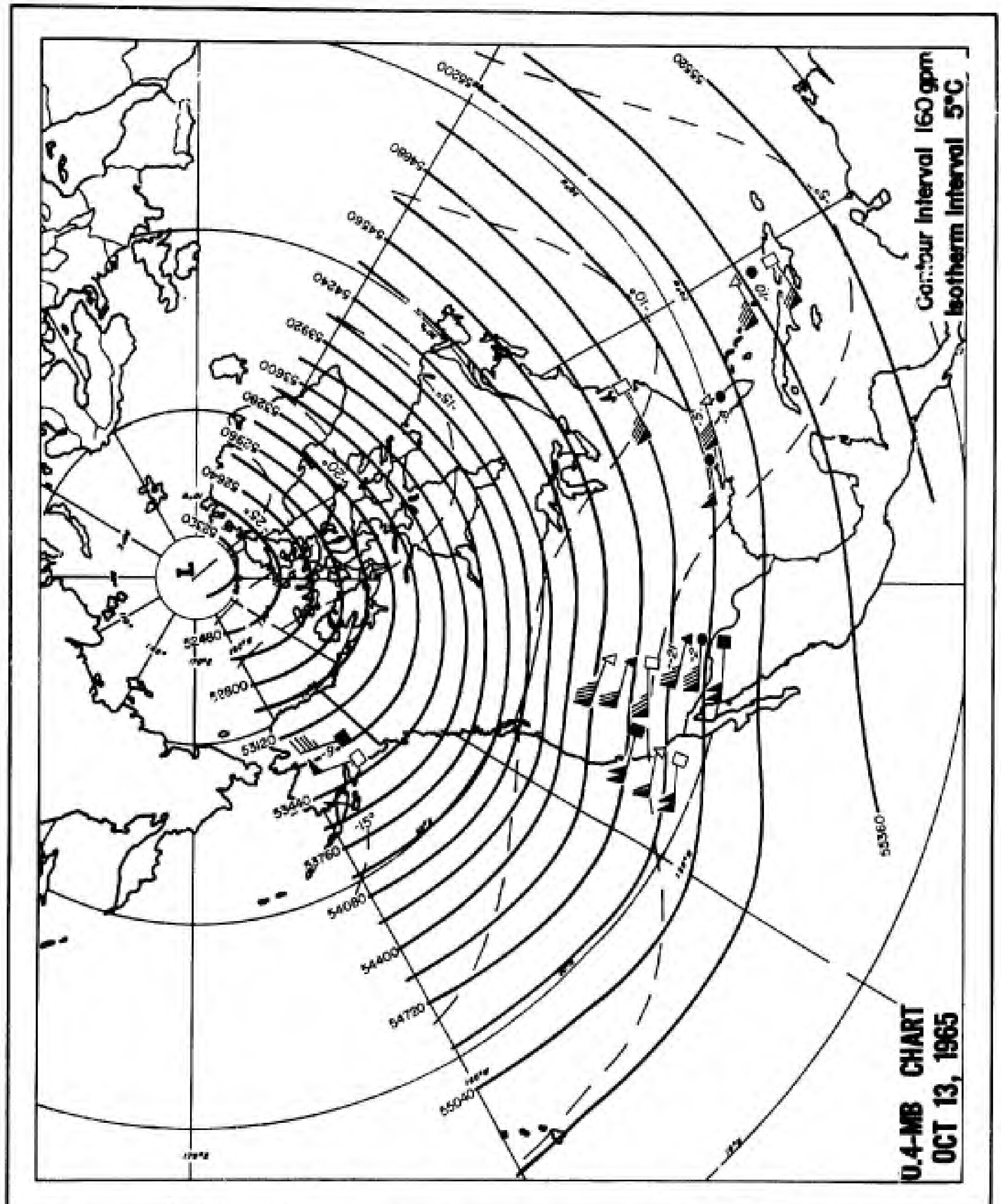
Isotherm Interval 5°C



2-MB CHART
OCT 13, 1965
Contour Interval 160 gpm
Isotherm Interval 5°C
42400
42080
41760
41440
41120
40800
40960
41280
41600
41920
42240
42560
42720
-40°
-35°
-30°
-25°
-20°
-10°
-5°
L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OCT 13, 1965
Contour Interval 160 gpm
Isotherm Interval 5°C
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53760
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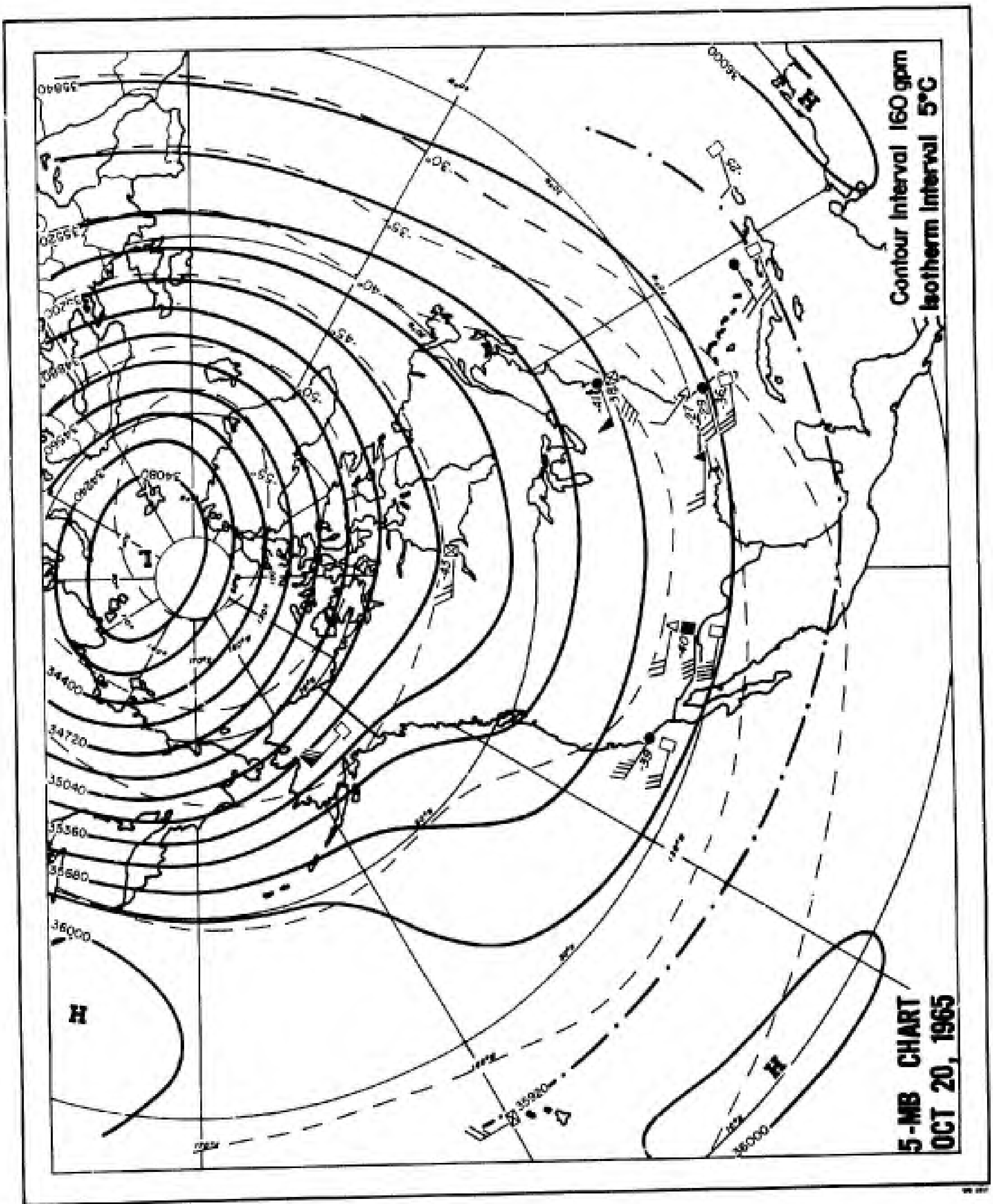
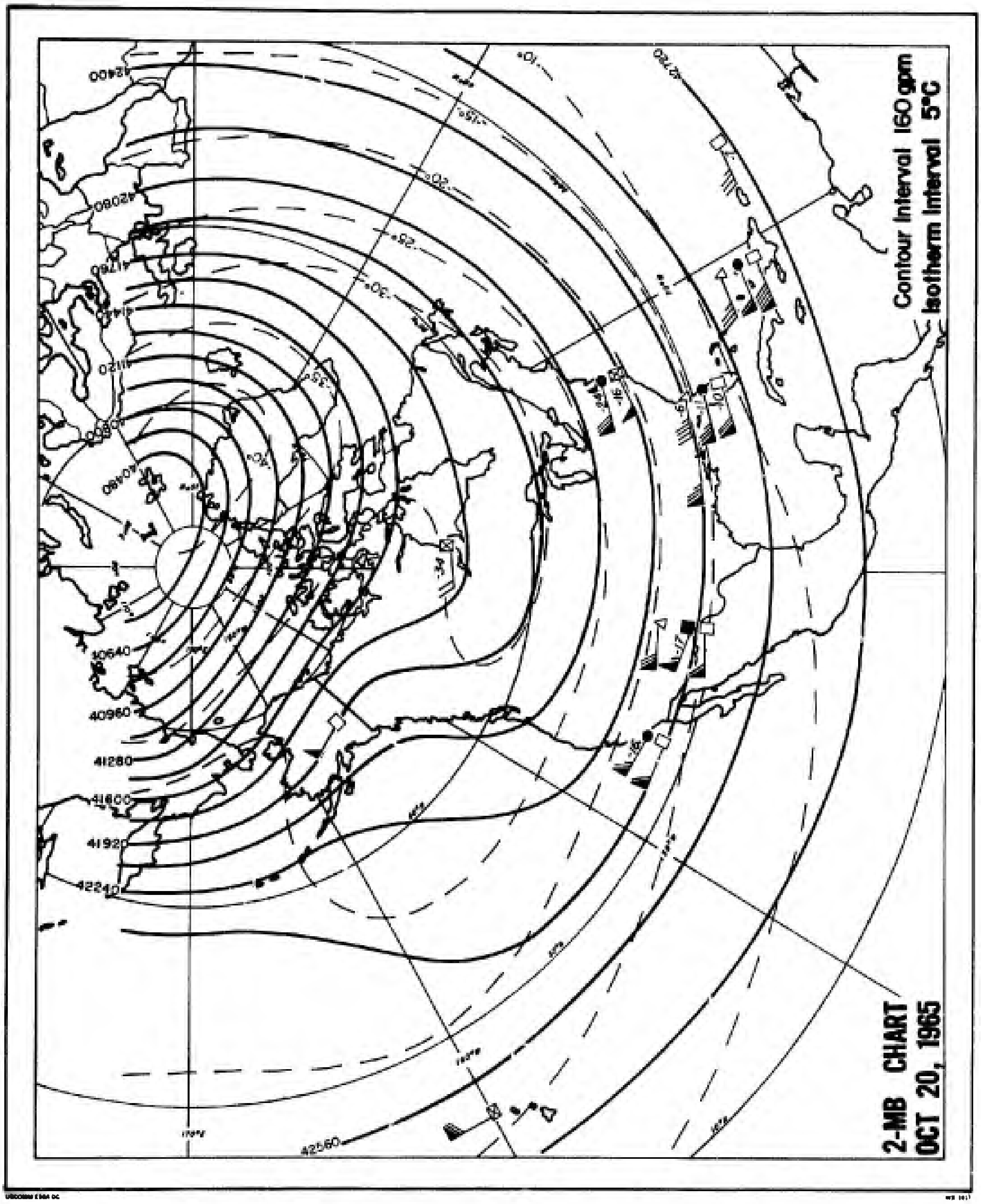
52640
52320


5-MB CHART
OCT 20, 1965
Contour Interval 160 gpm
Isotherm Interval 5°C
34400
34720
35040
35360
35680
36000
35920
36000
H
H
H
L


2-MB CHART
OCT 20, 1965
Contour Interval 160 gpm
Isotherm Interval 5°C
40480
40640
40800
40960
41120
41280
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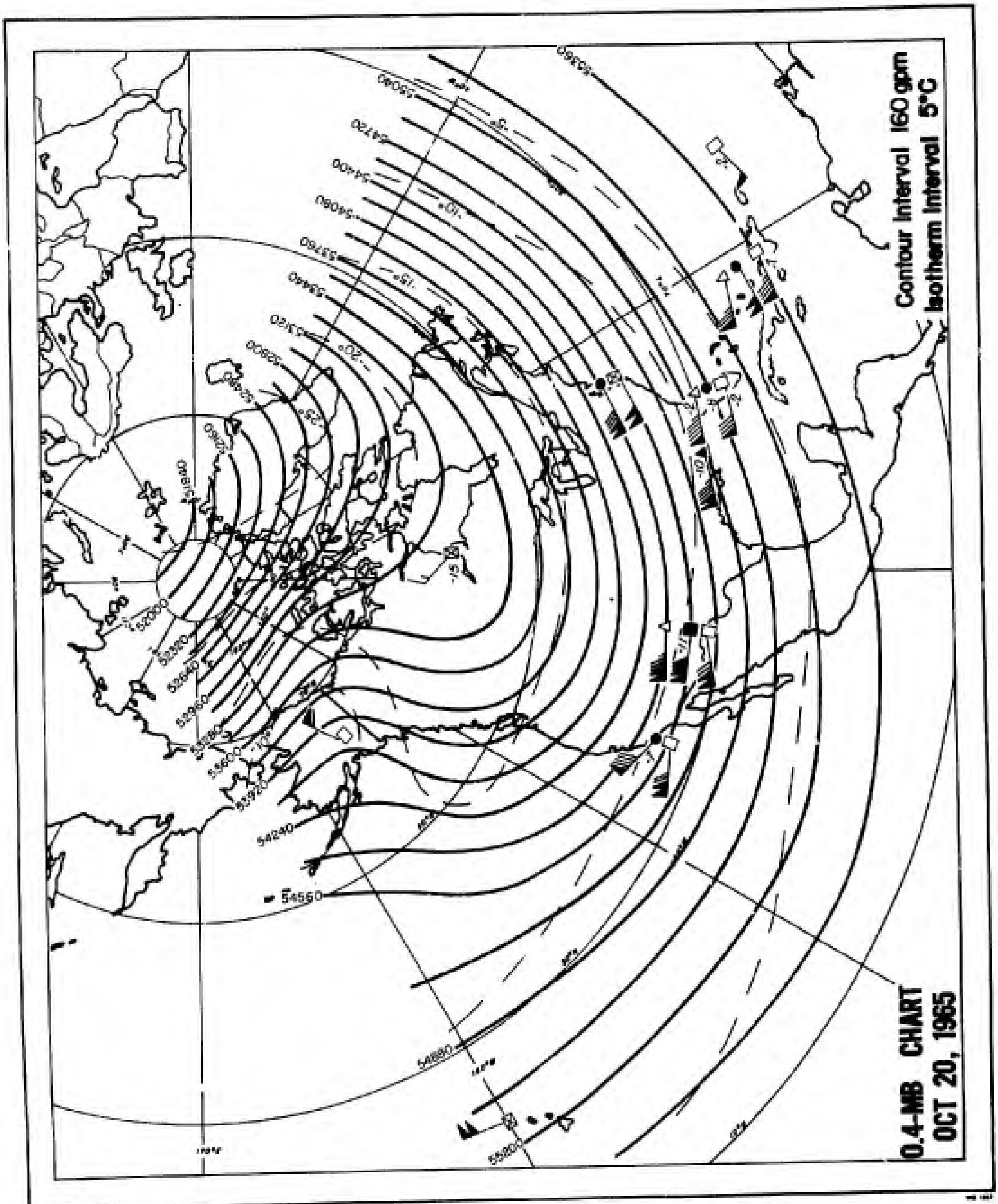
-25°
-30°
-35°



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OCT 20, 1965
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Isotherm Interval 5°C
52000
52320
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52960
53600
53920
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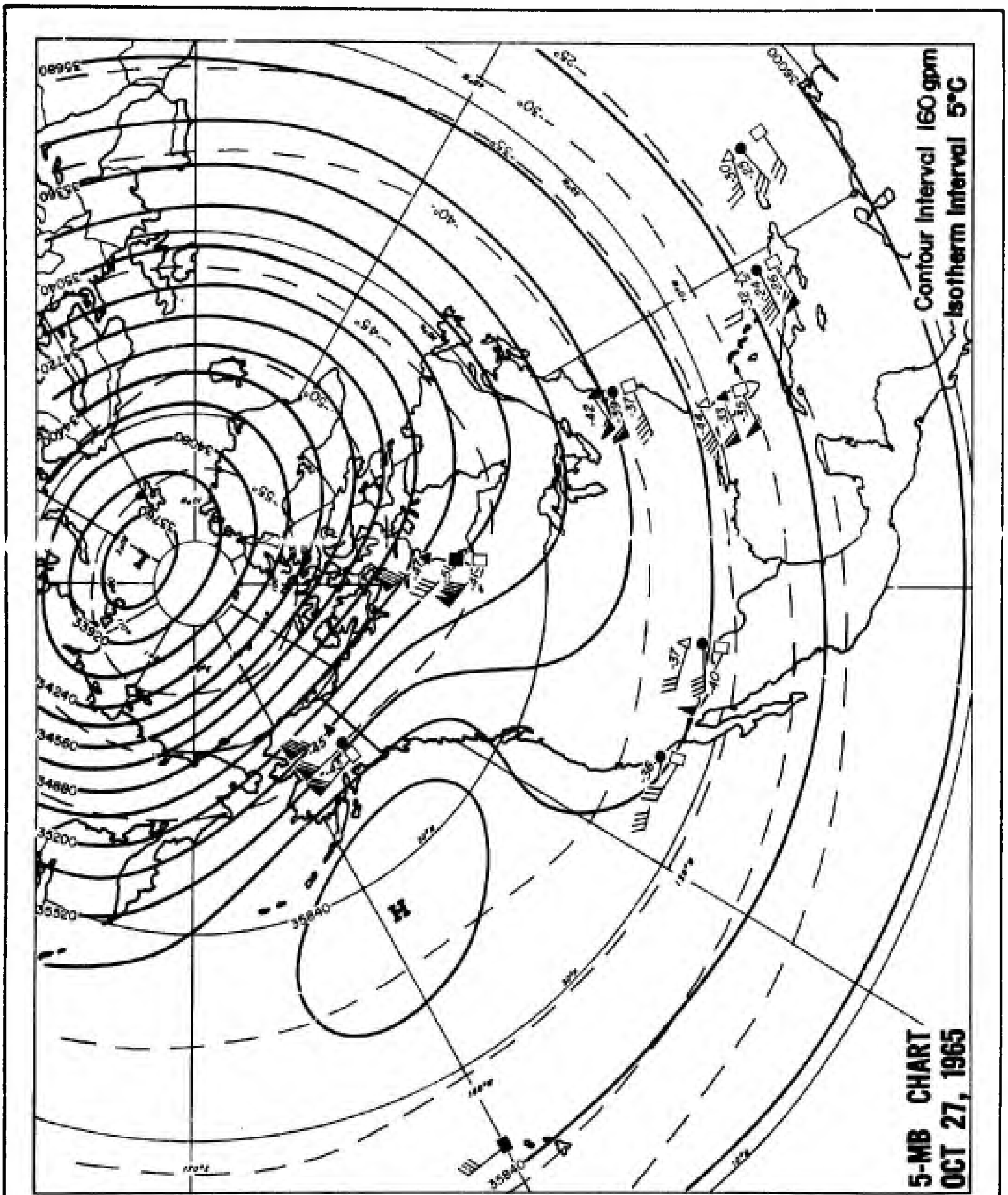
54560
54880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OCT 27, 1965
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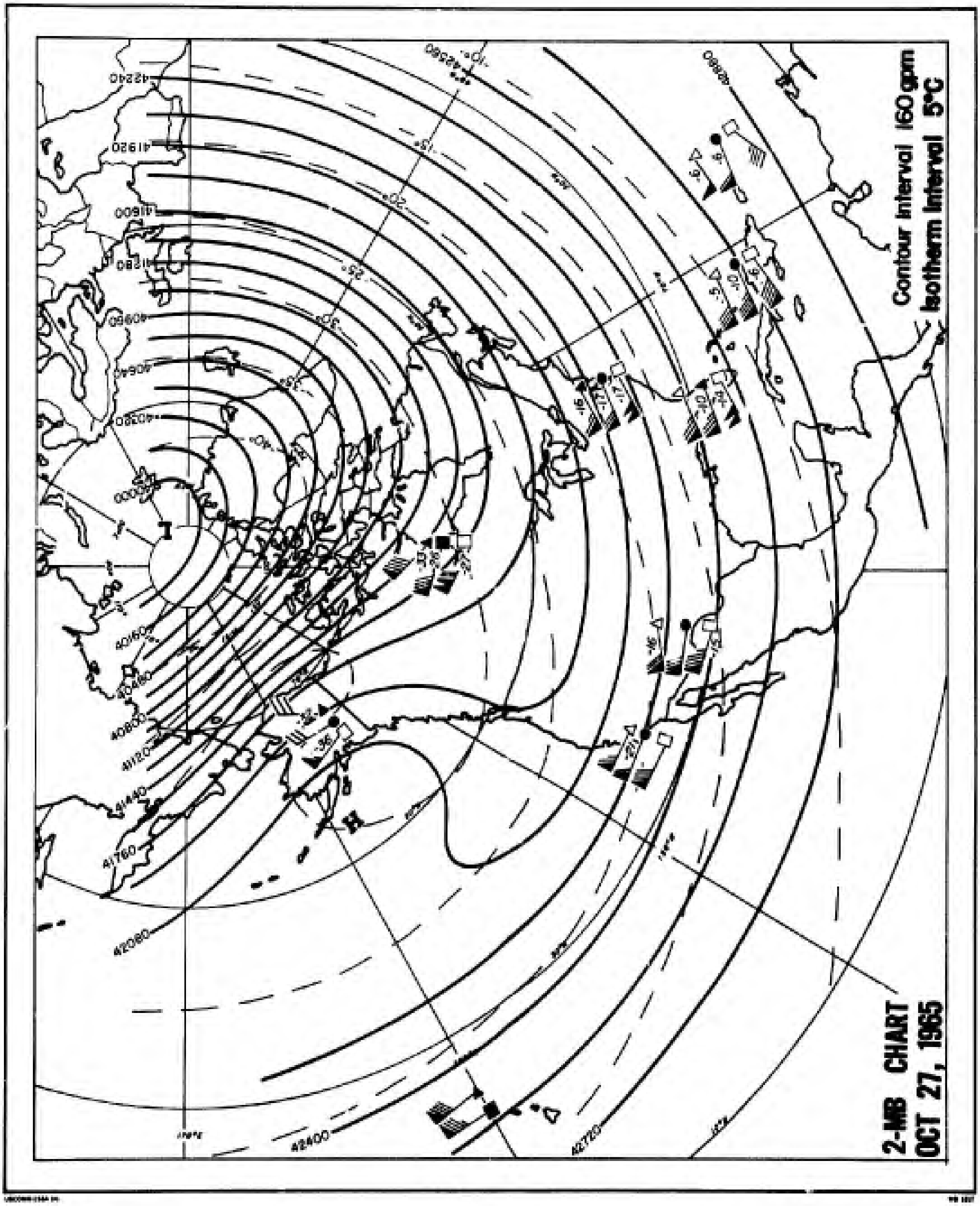
Isotherm Interval 5°C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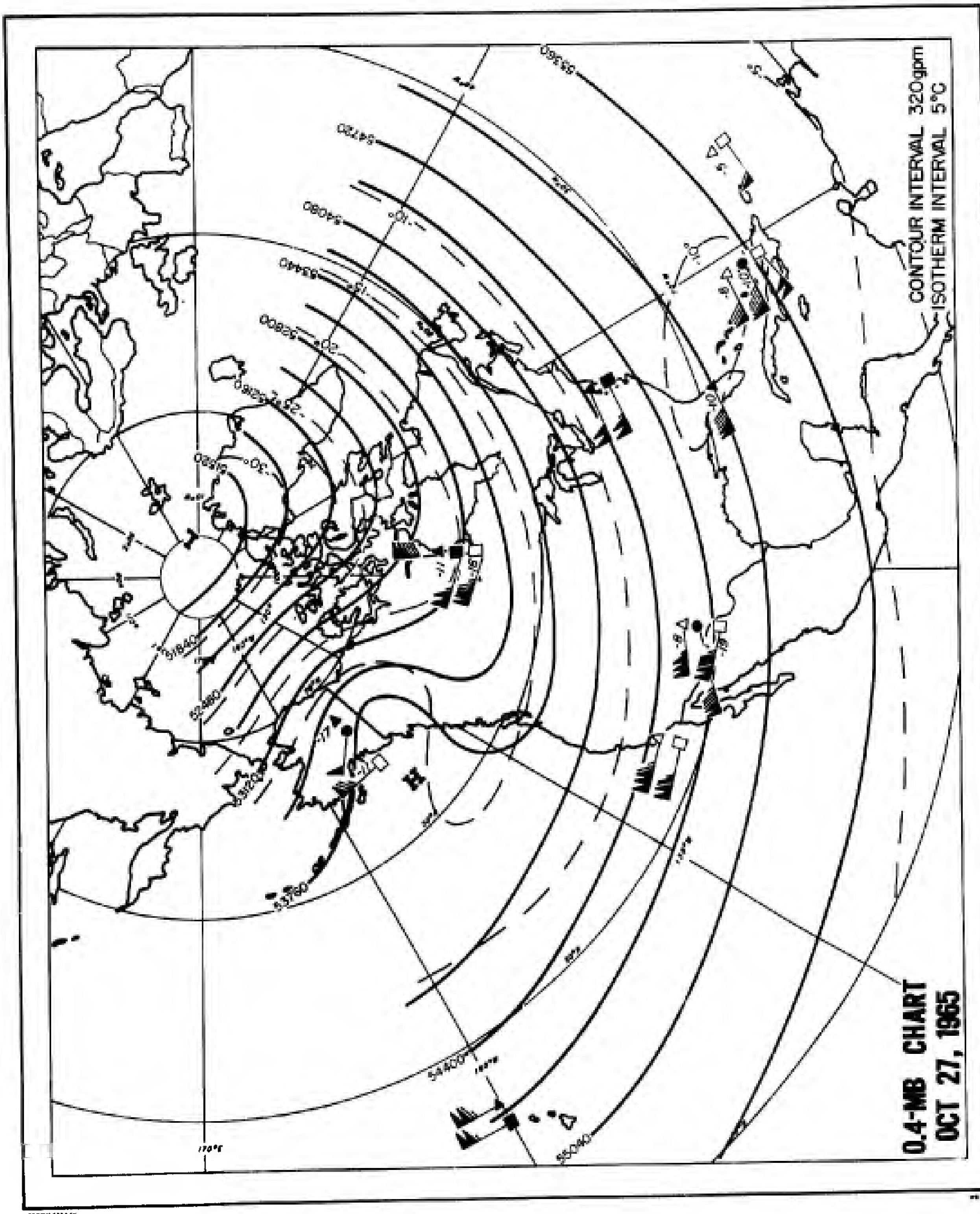
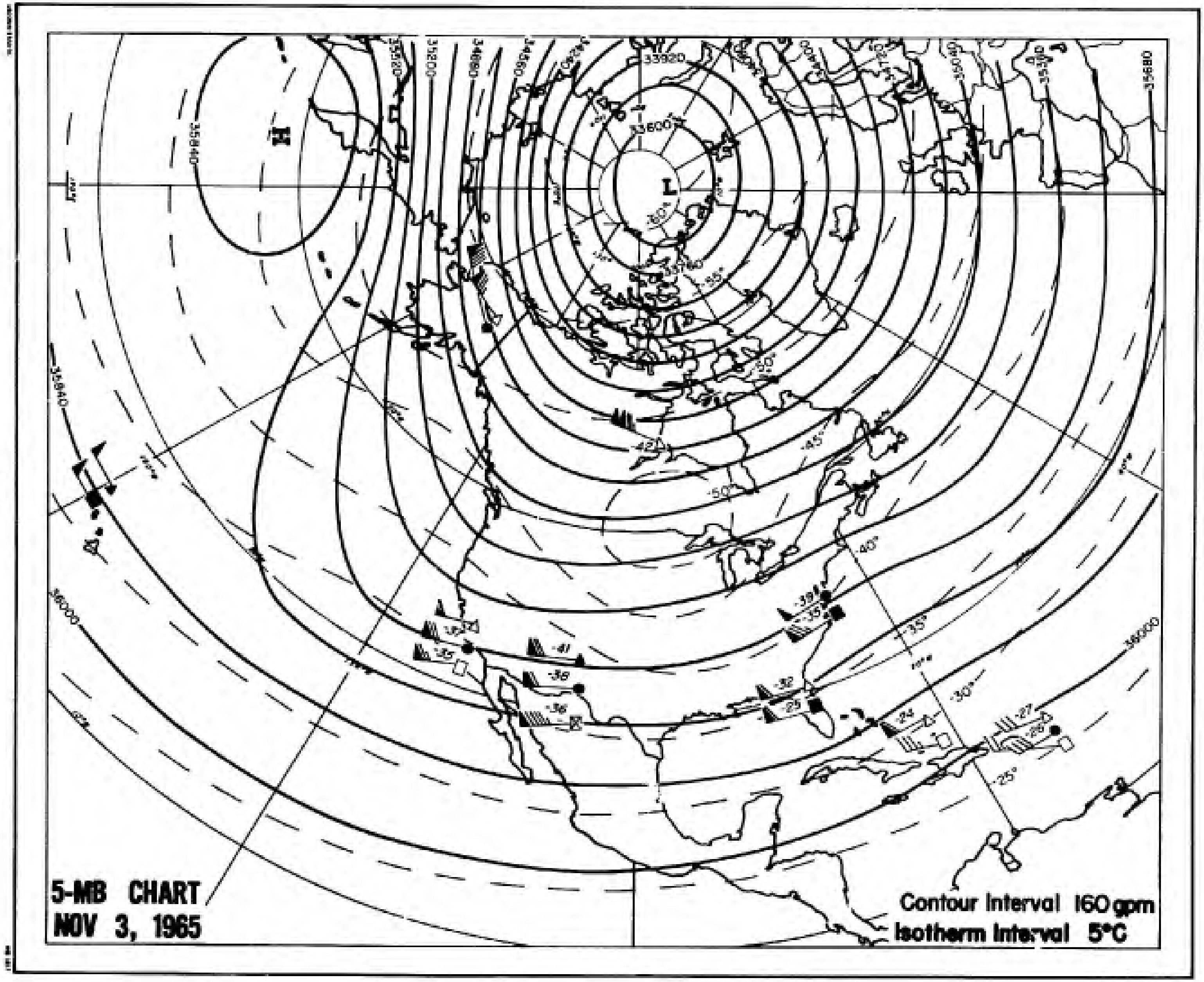
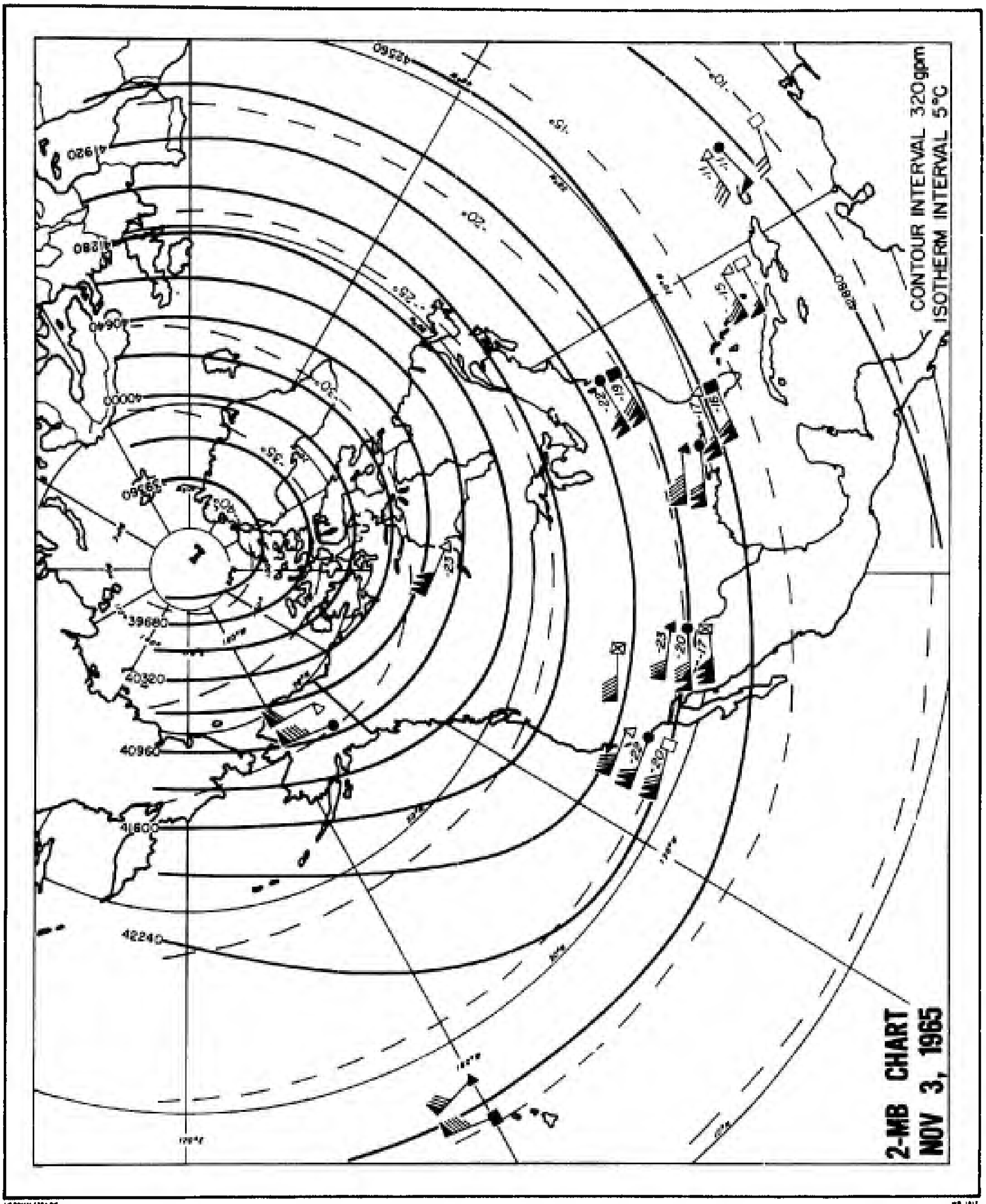
Isotherm Interval 5°C



0.4-MB CHART
OCT 27, 1965
CONTOUR INTERVAL 320gpm
ISOTHERM INTERVAL 5°C
55360
54720
54080
53440
52800
52160
51520
51840
52480
53120
53760
54400
55040
-30
-25
-20
-15
-10
-5
170°E


5-MB CHART
NOV 3, 1965
Contour Interval 160 gpm
Isotherm Interval 5°C
35840
36000
35680
33920
33600
L
H
-50°
-45°
-40°
-35°
-30°
-25°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CONTOUR INTERVAL 320gpm
ISOTHERM INTERVAL 5°C
39680
40320
40960
41600
42240
42560
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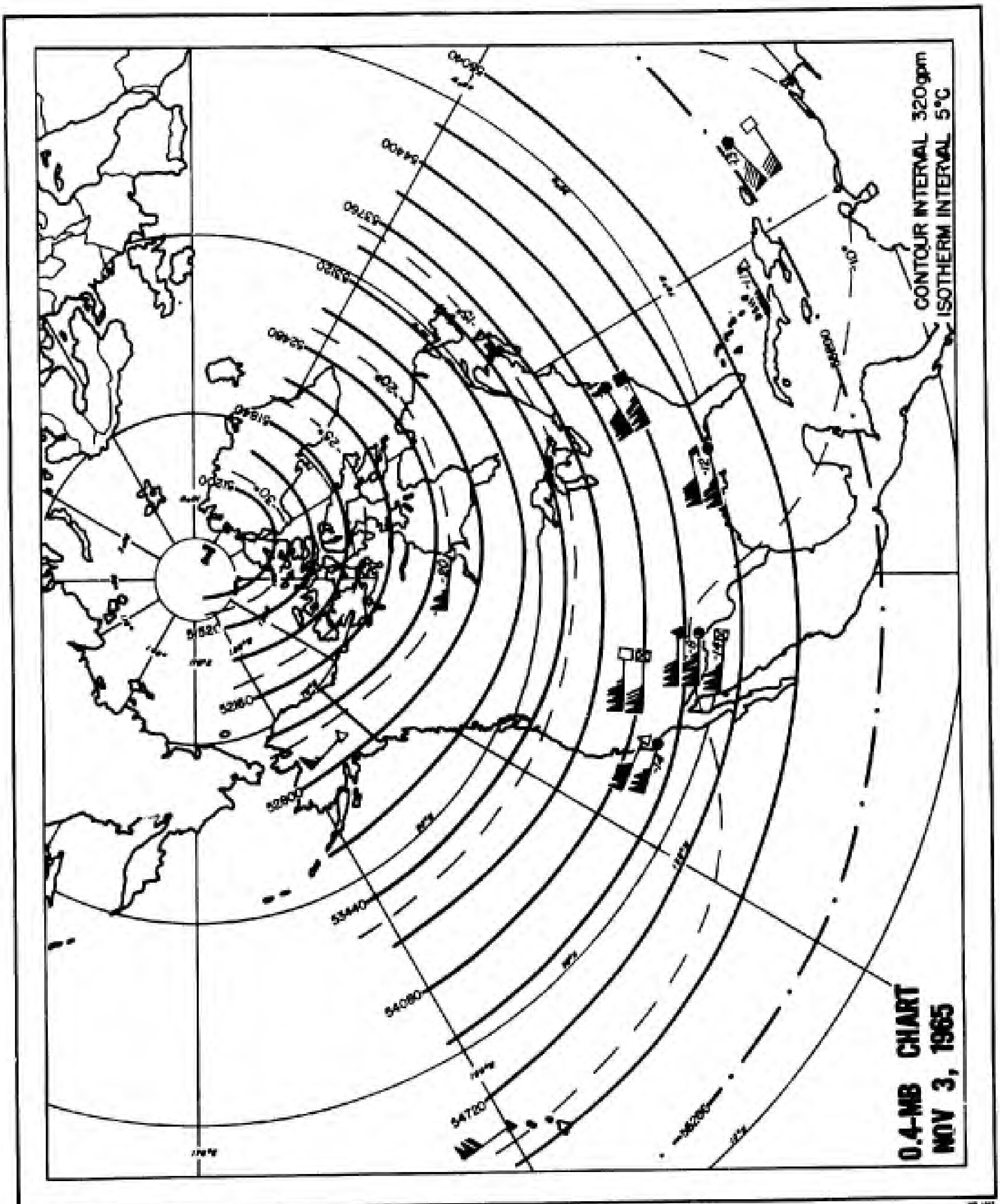
41280
40640
40000
39360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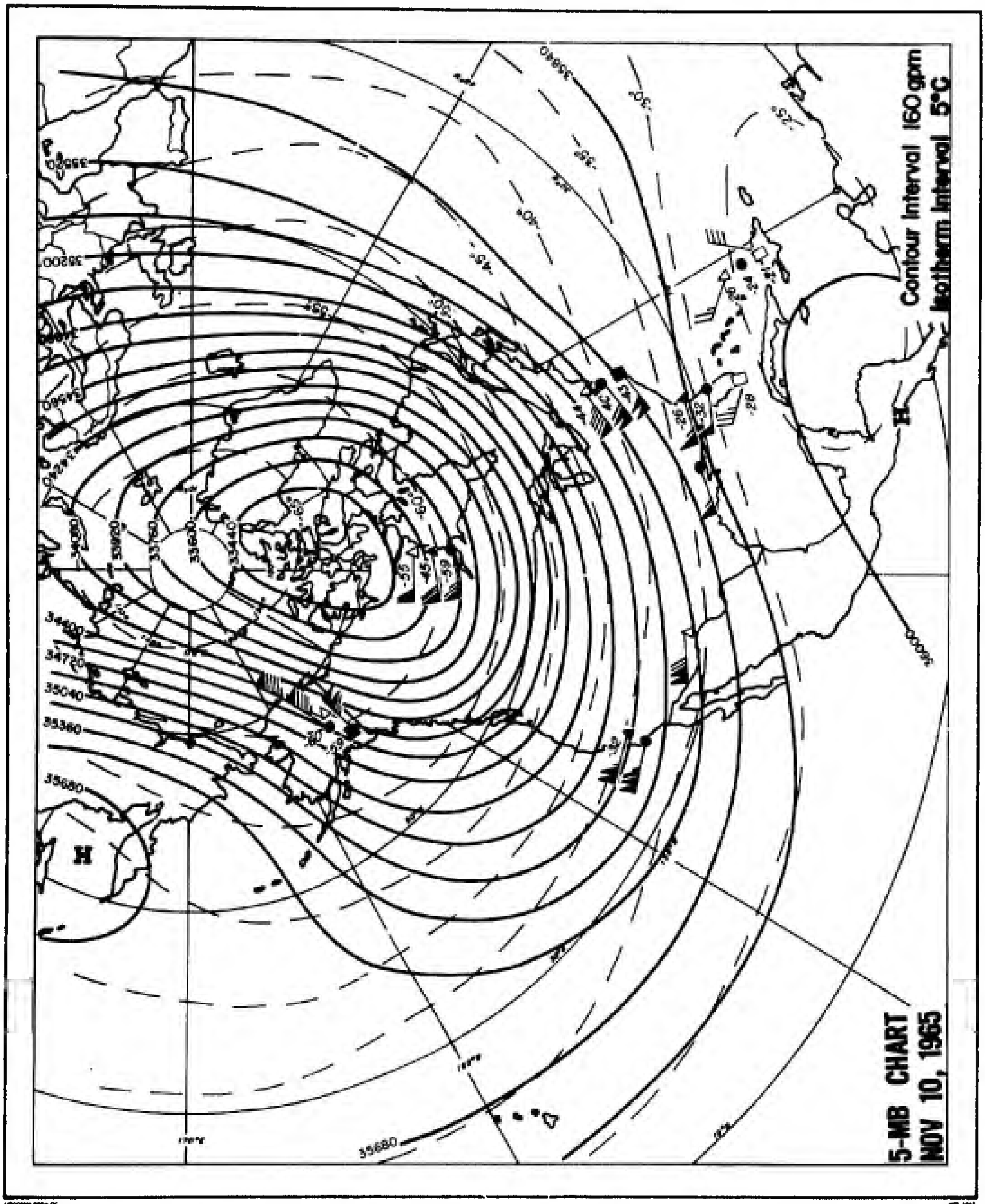
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Isotherm Interval 5°C
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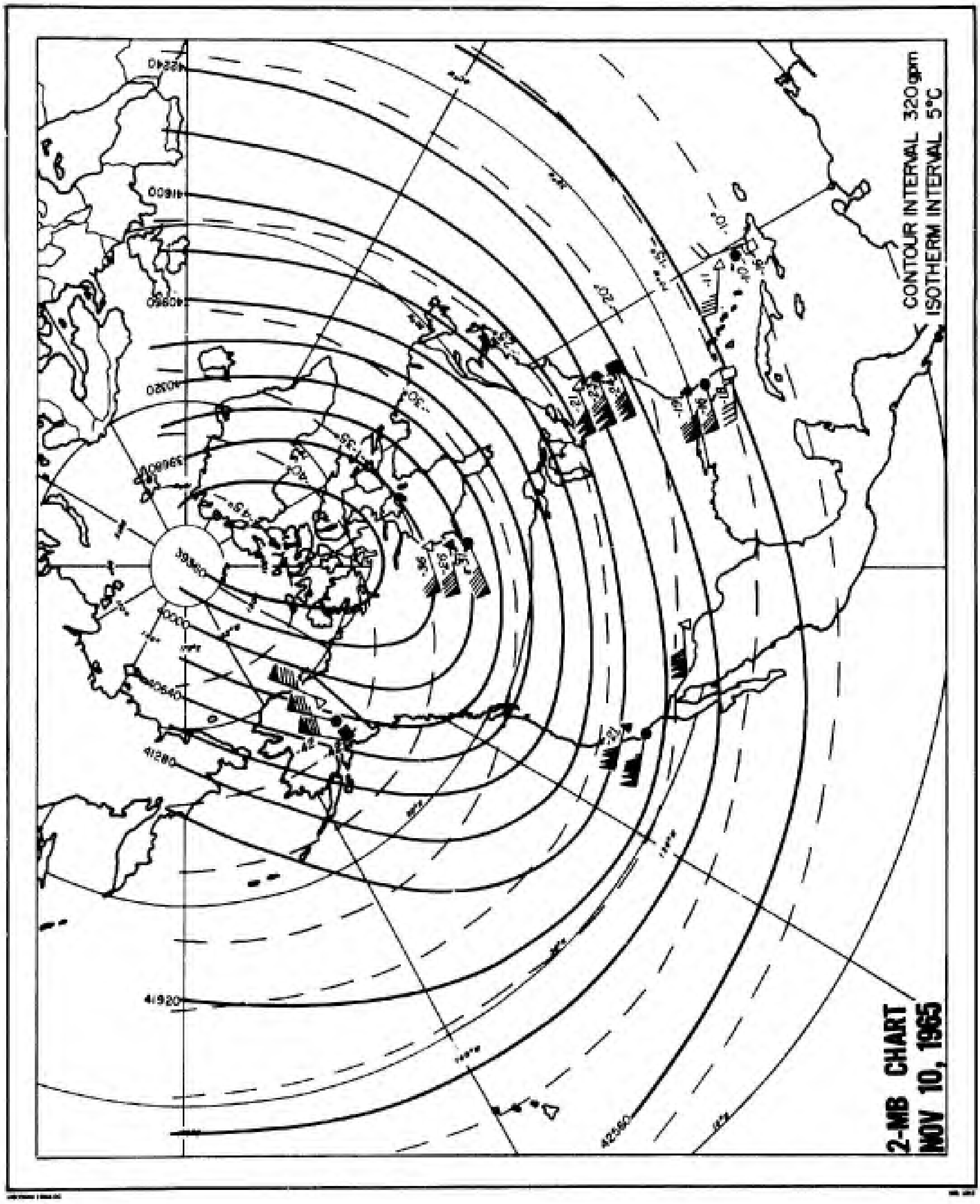
34720
35040
35360
35680
35680


CONTOUR INTERVAL 320gpm
ISOTHERM INTERVAL 5°C
2-MB CHART
NOV 10, 1965
41920
42560
41280
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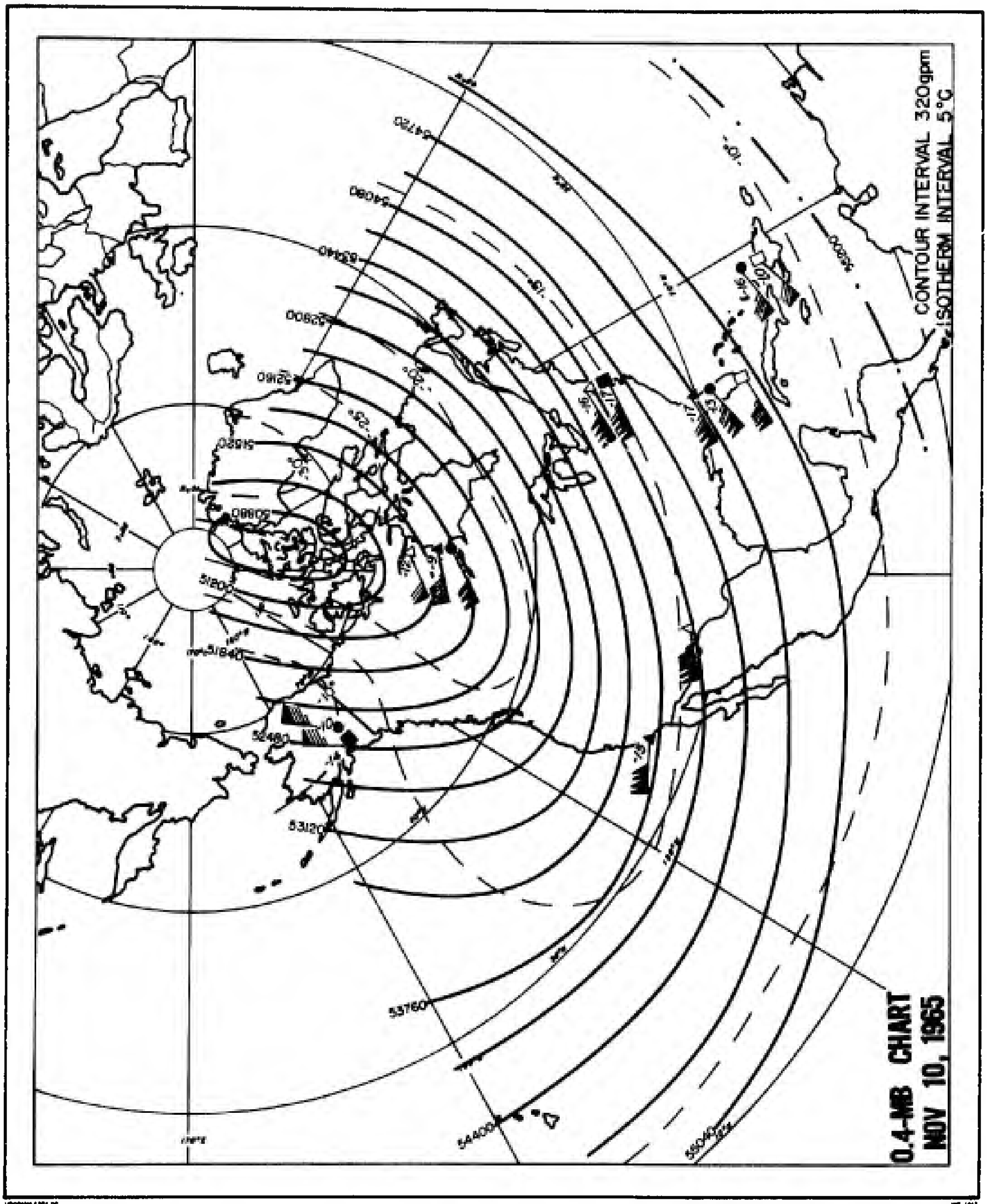
40000
39680


0.4-MB CHART
NOV 10, 1965
CONTOUR INTERVAL 320 gpm
ISOTHERM INTERVAL 5°C
54720
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51840
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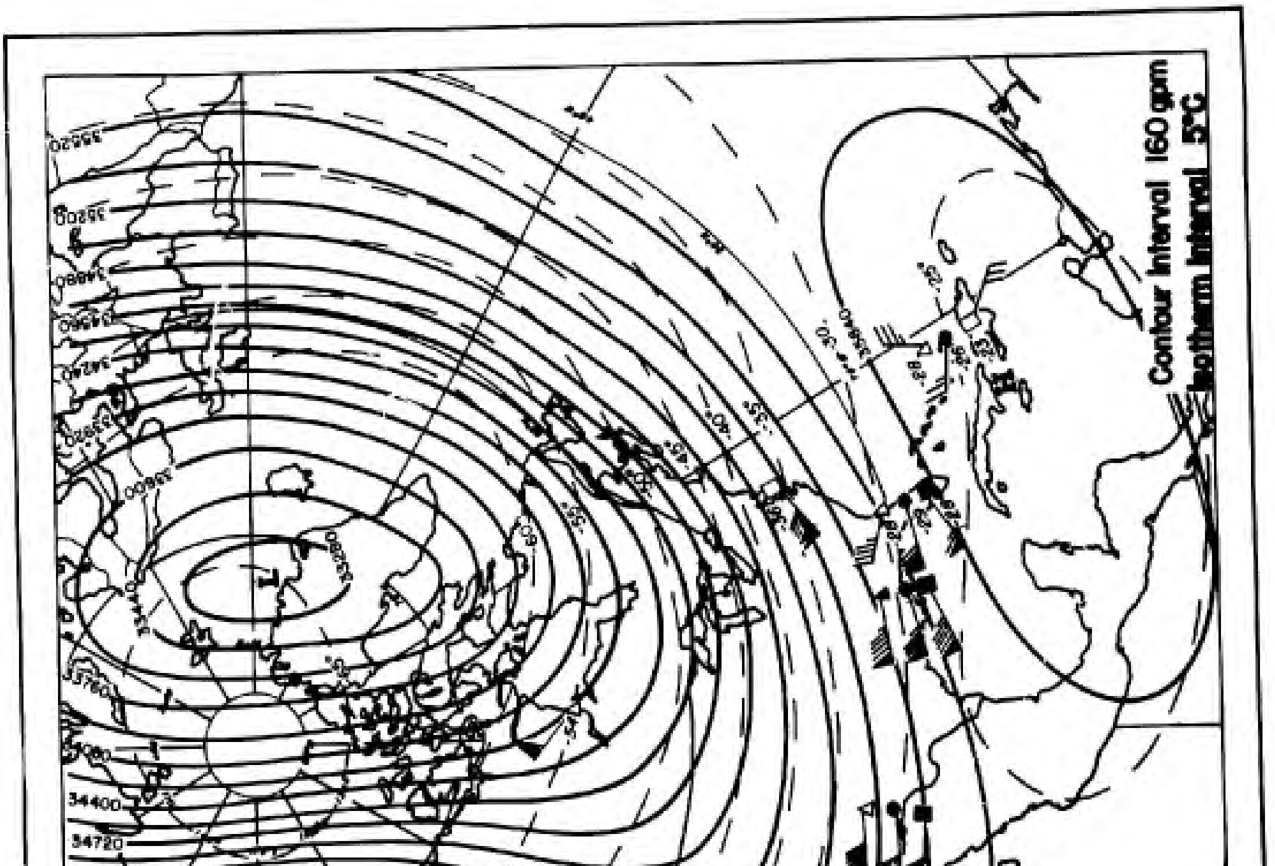
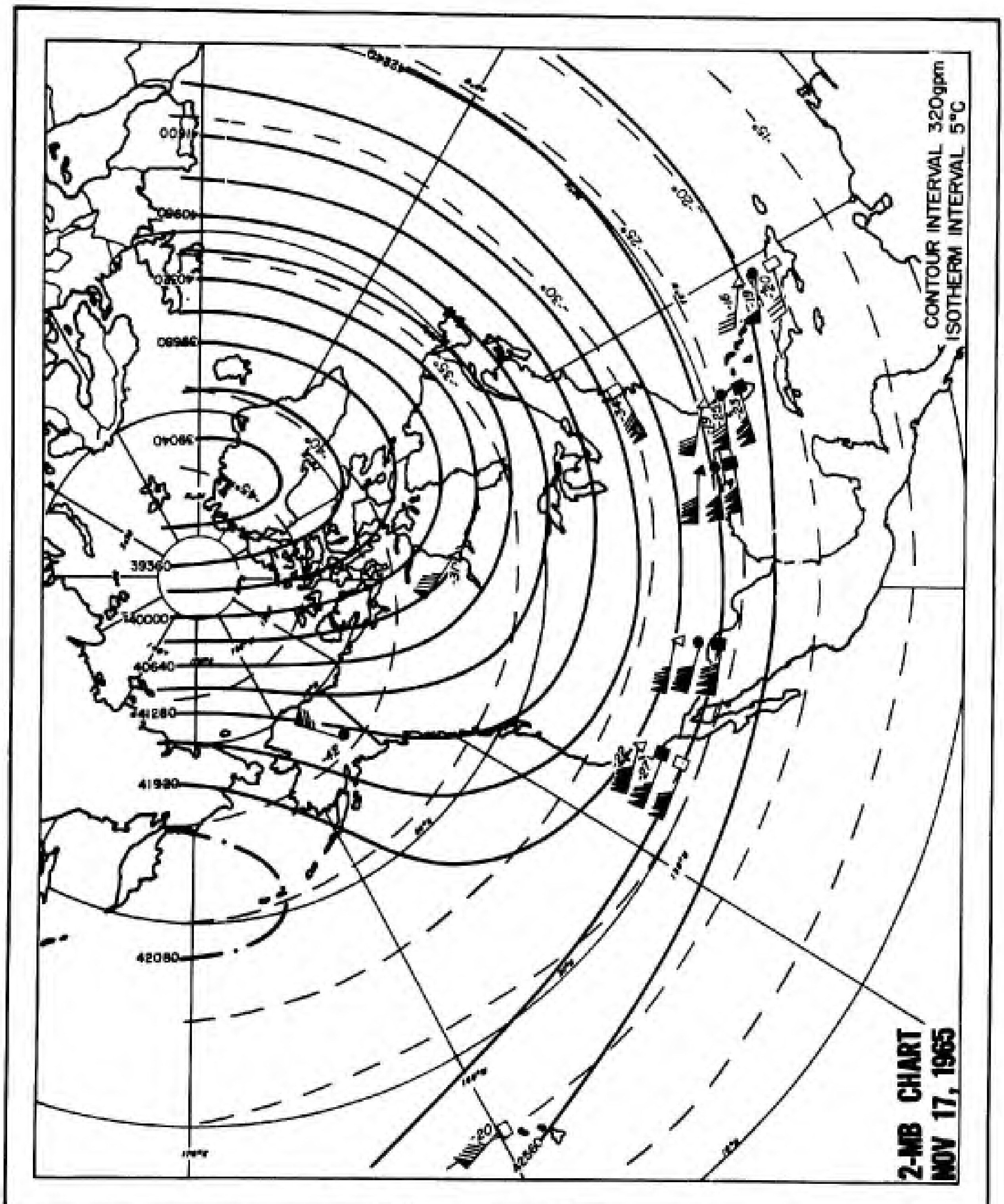
53120
53760
54400
55040


5-MB CHART
NOV 17, 1965
Contour Interval 160 gpm
Isotherm Interval 5°C
34400
34720
35040
35360
35680
35840
H
L
H


2-MB CHART
NOV 17, 1965
CONTOUR INTERVAL 320gpm
ISOTHERM INTERVAL 5°C
41600
40960
40320
39680
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39360
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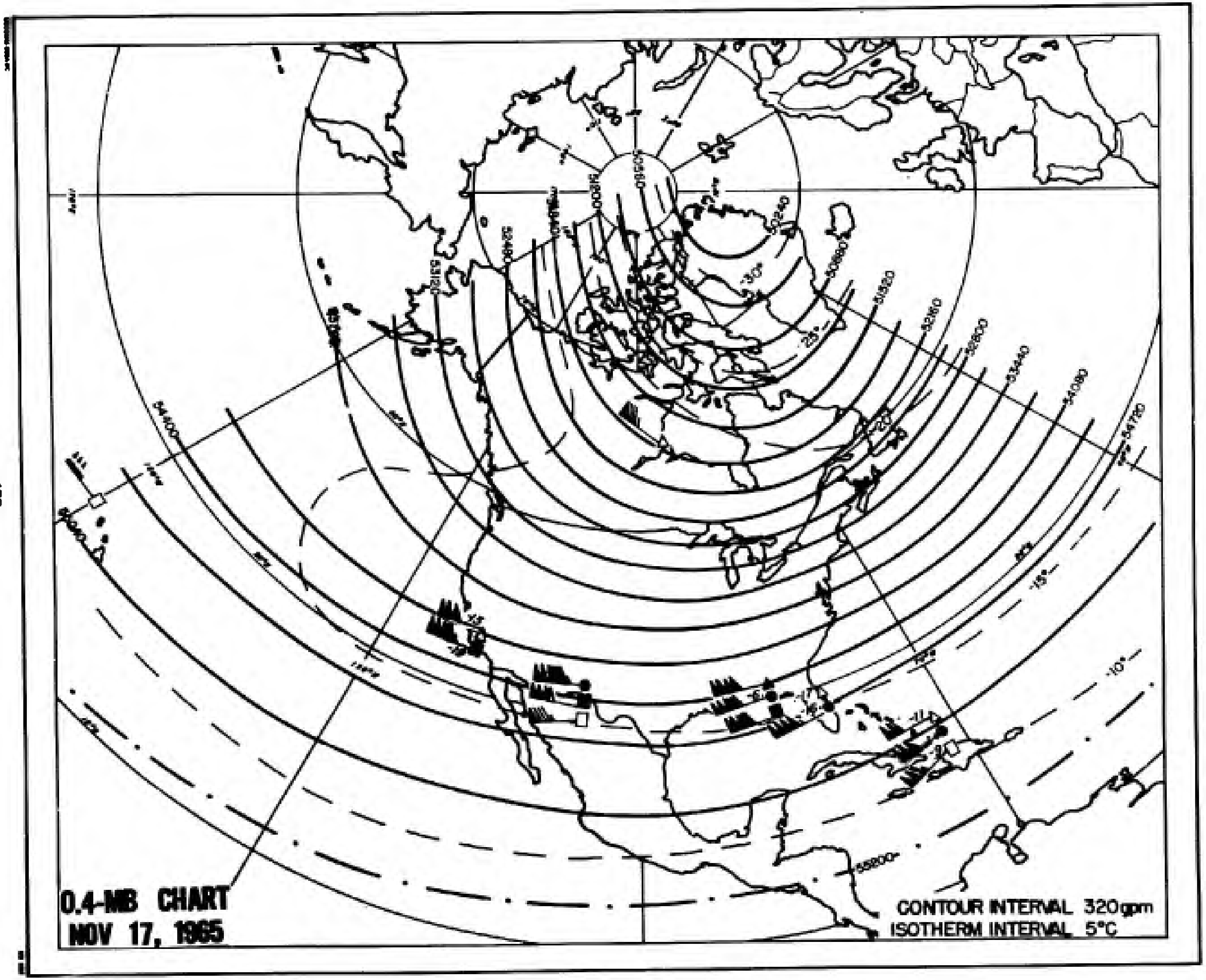
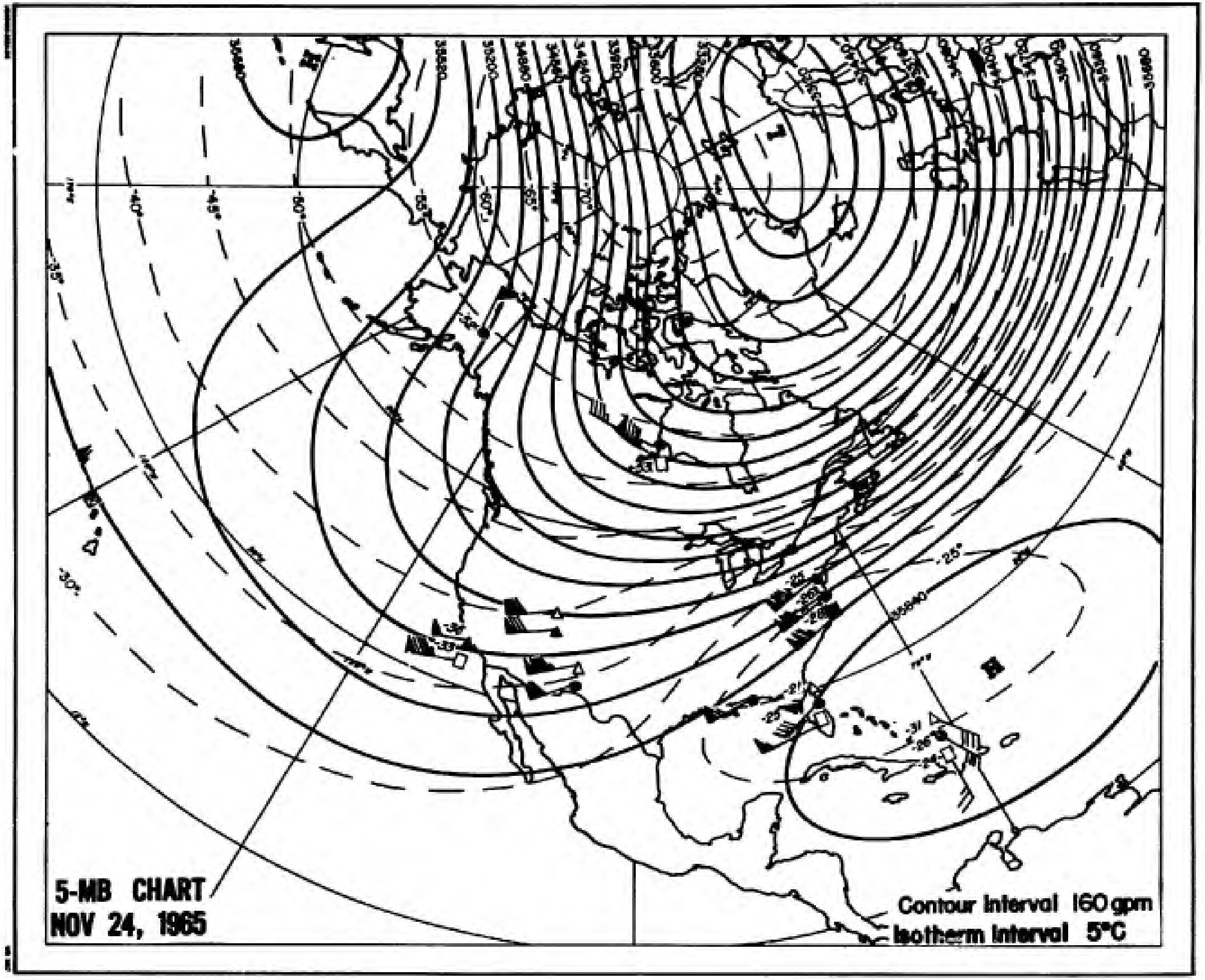
40640
41280
41920
42080


0.4-MB CHART
NOV 17, 1965
CONTOUR INTERVAL 320gpm
ISOTHERM INTERVAL 5°C
50560
51200
51840
52480
53120
54400
50240
50880
51520
52160
52800
53440
54080
54720
-30°
-25°
-20°
-15°
-10°


5-MB CHART
NOV 24, 1965
Contour Interval 160 gpm
Isotherm Interval 5°C
33280
33600
33920
34240
34880
35200
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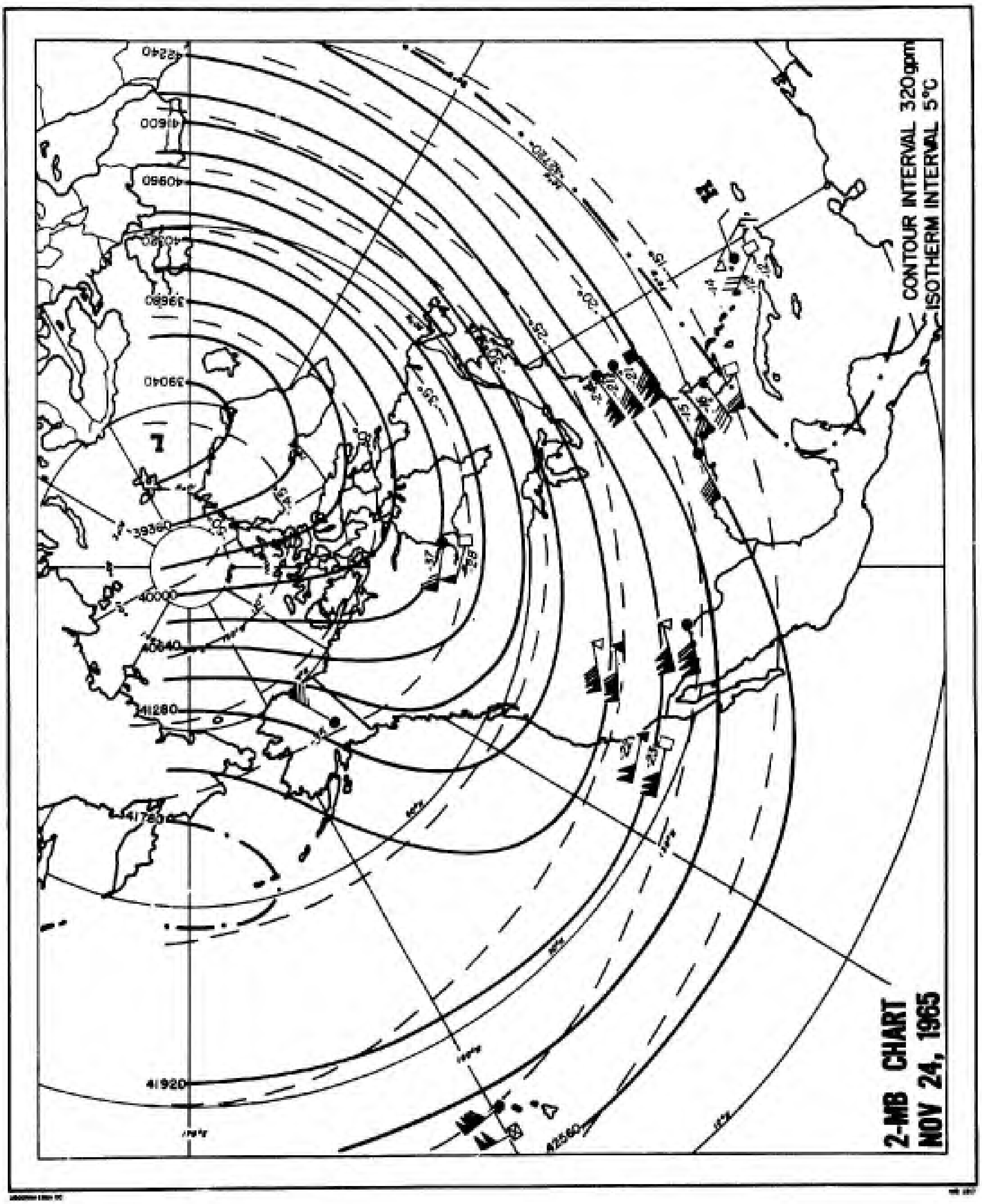
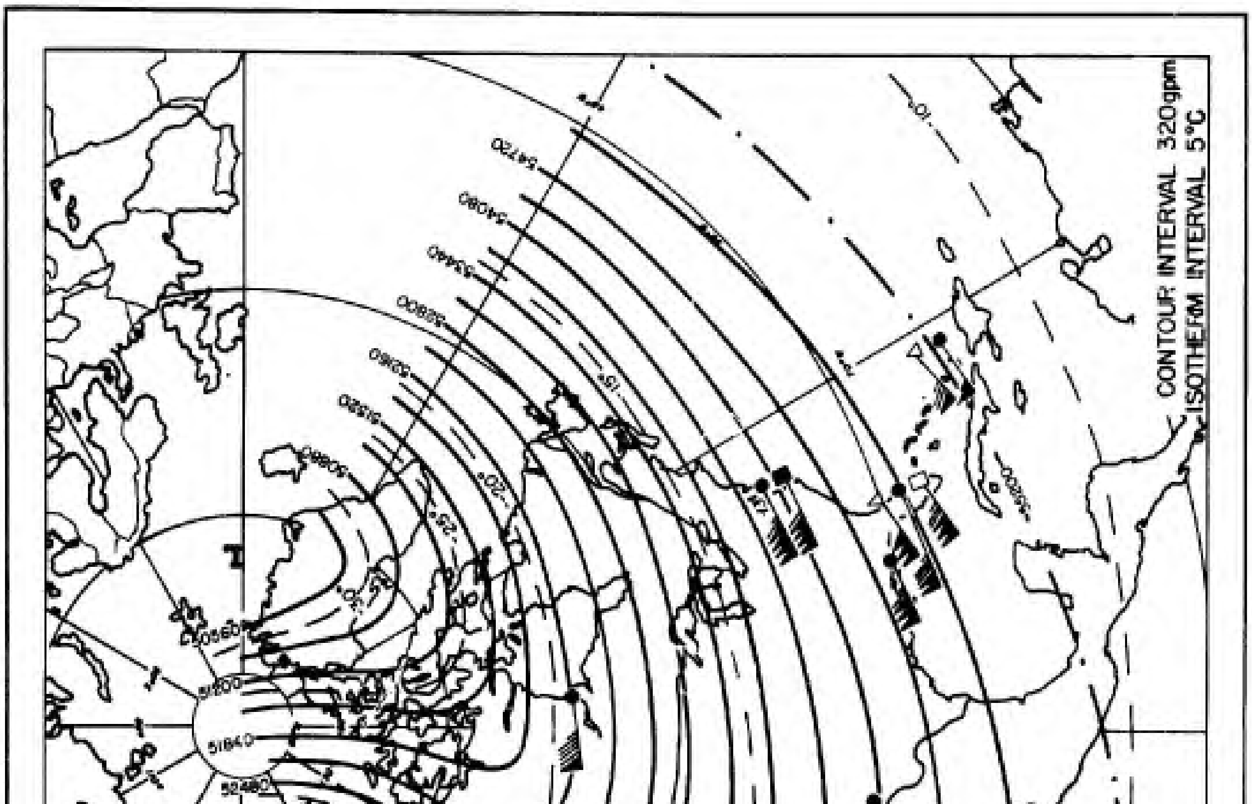
-65°
-60°
-55°
-50°
-45°
-40°
-35°
-30°
-25°



2-MB CHART
NOV 24, 1965
CONTOUR INTERVAL 320 gpm
ISOTHERM INTERVAL 5°C
42240
41600
40960
40320
39680
39040
39360
40000
40640
41280
41920
42560
L
H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NOV 24, 1965
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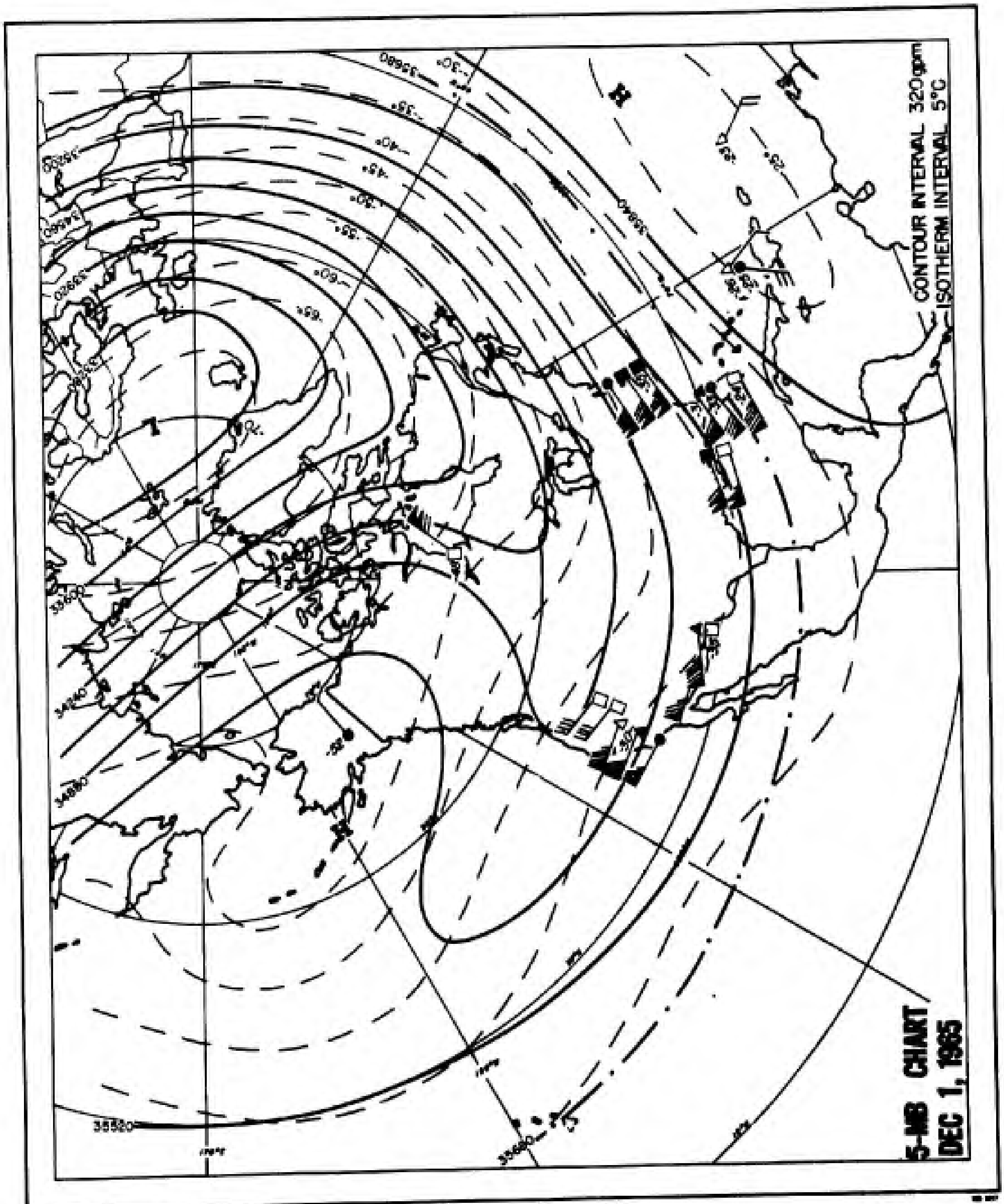
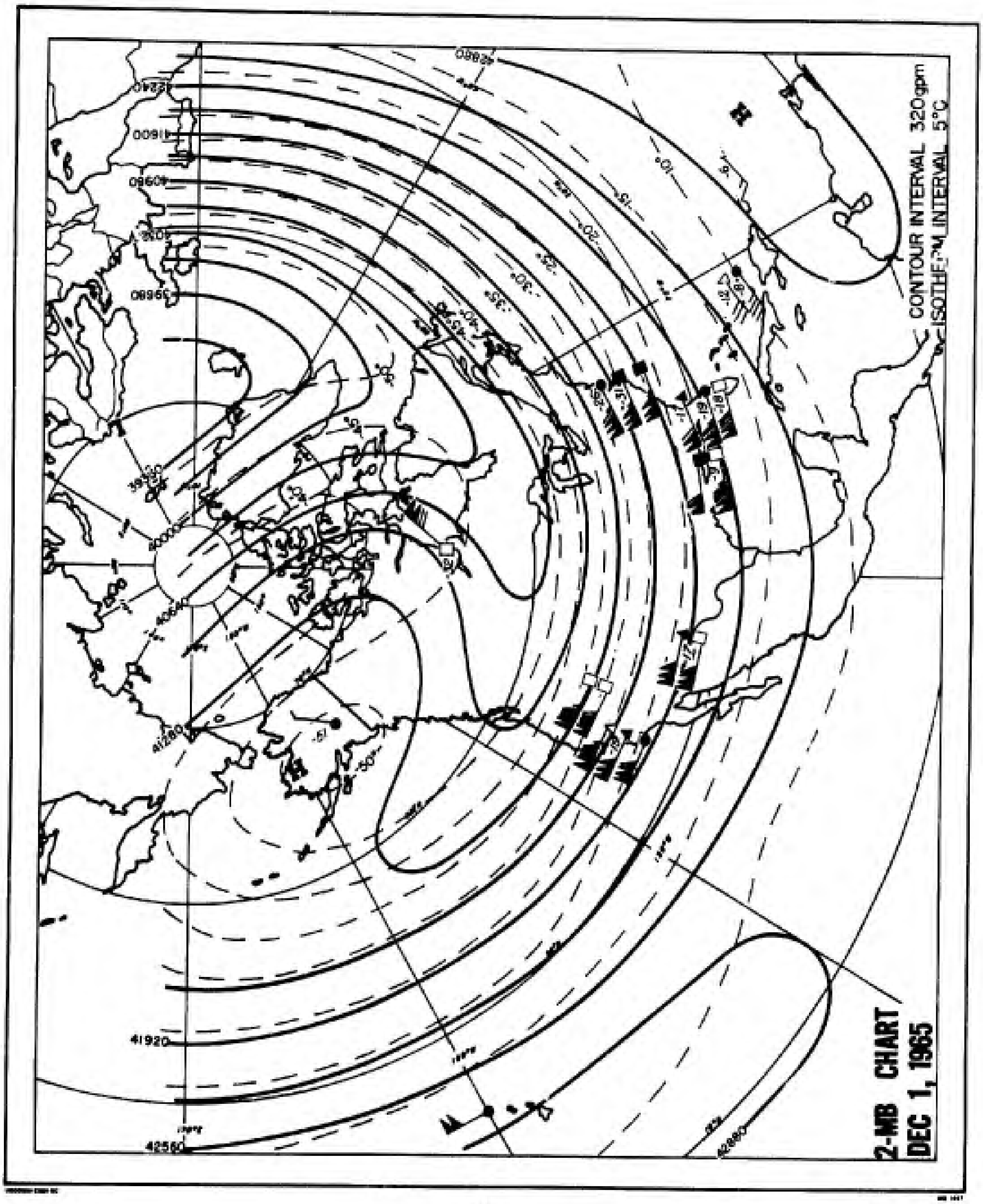
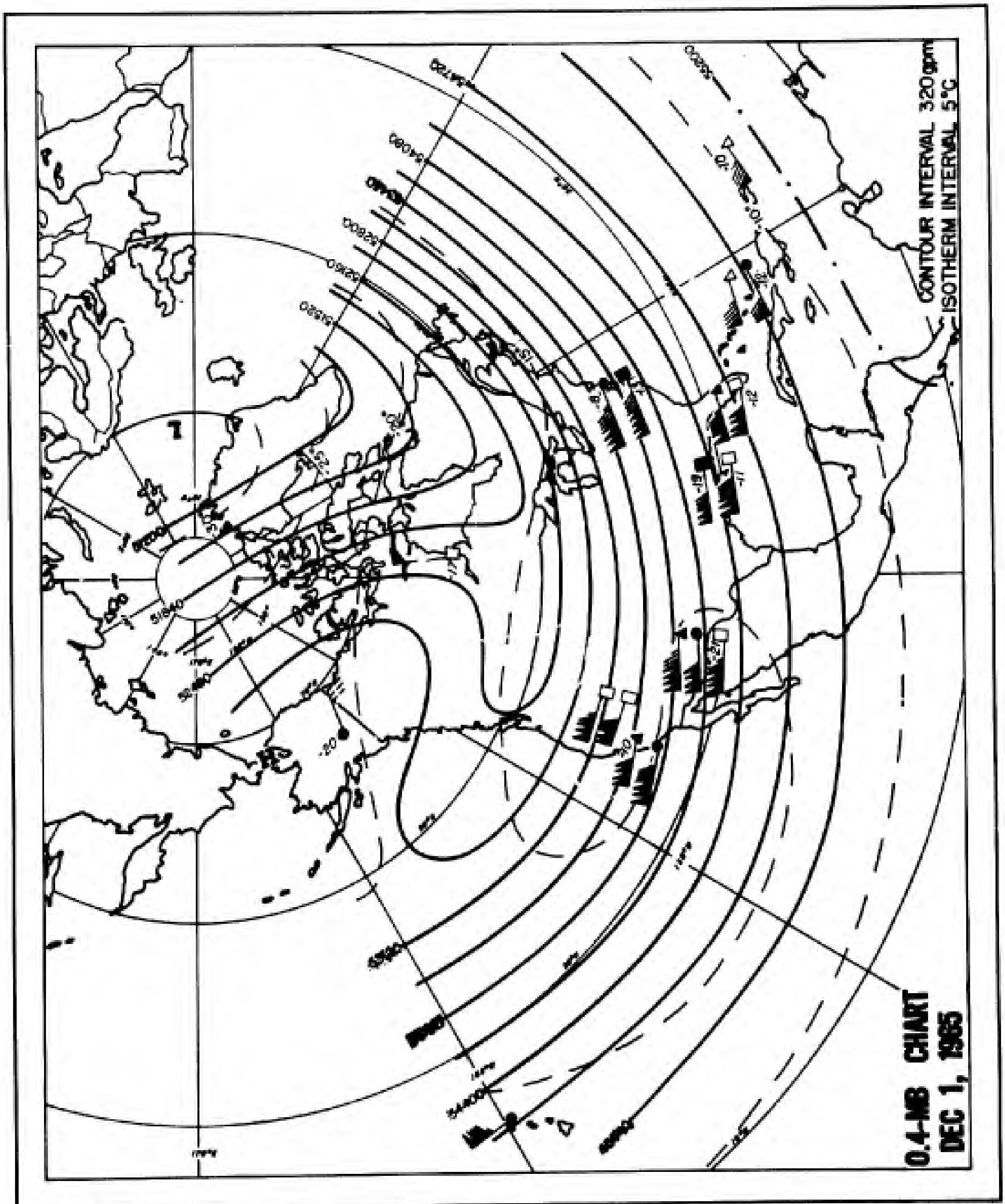
ISOTHERM INTERVAL 5°C



5-MB CHART
DEC 1, 1965
CONTOUR INTERVAL 320gpm
ISOTHERM INTERVAL 5°C


2-MB CHART
DEC 1, 1965
CONTOUR INTERVAL 320gpm
ISOTHERM INTERVAL 5°C
42560
41920
41280
40640
40000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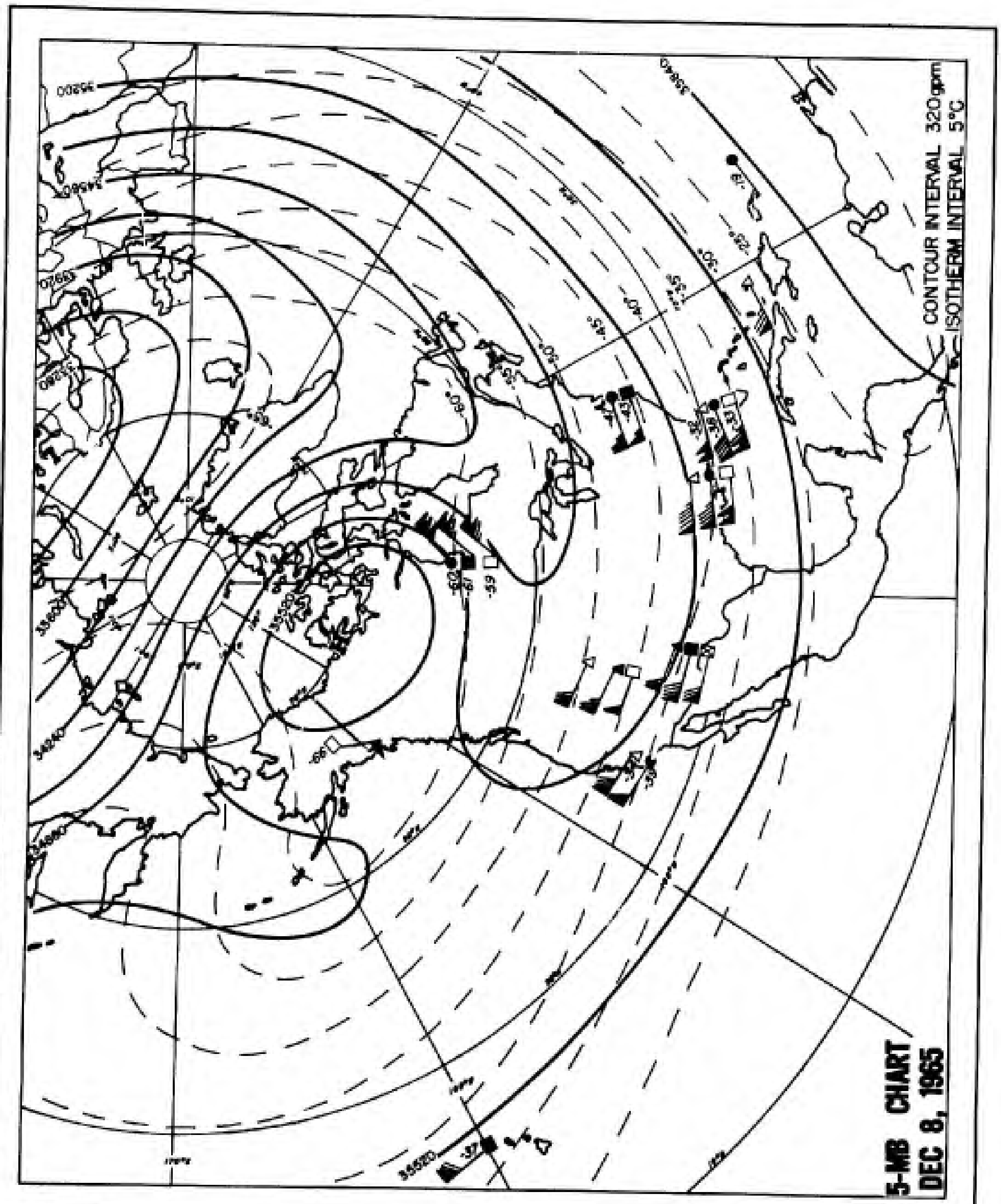
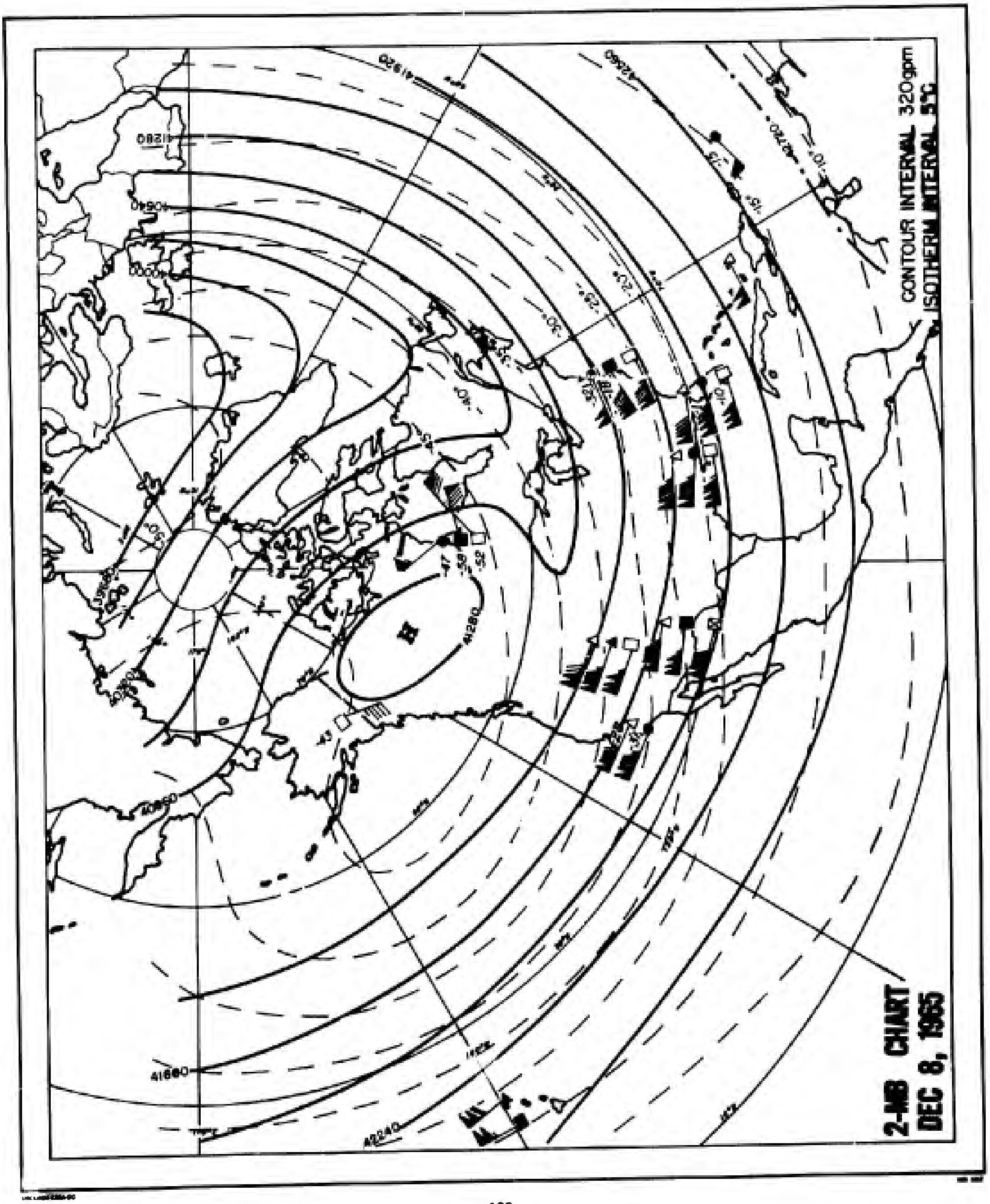
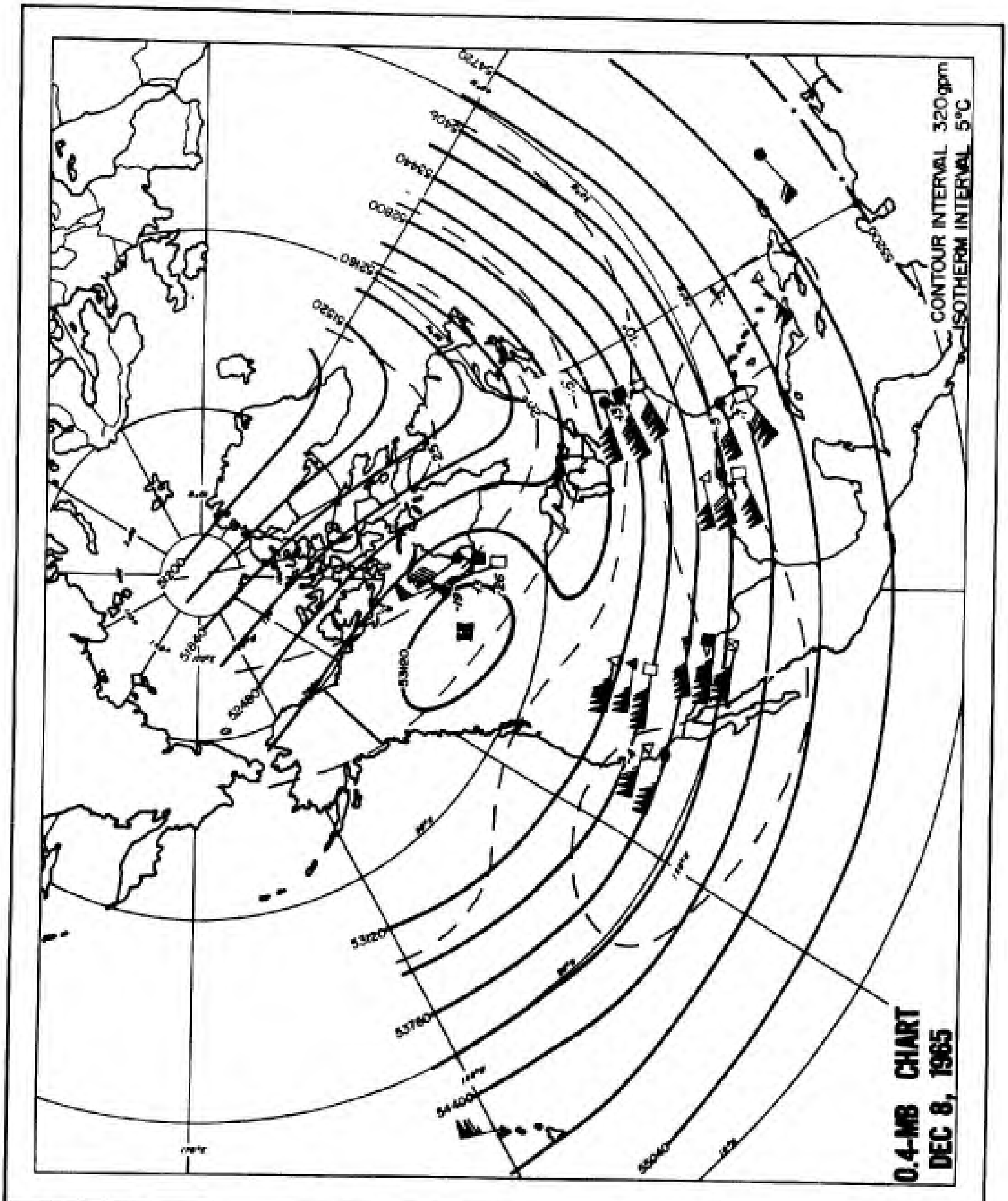
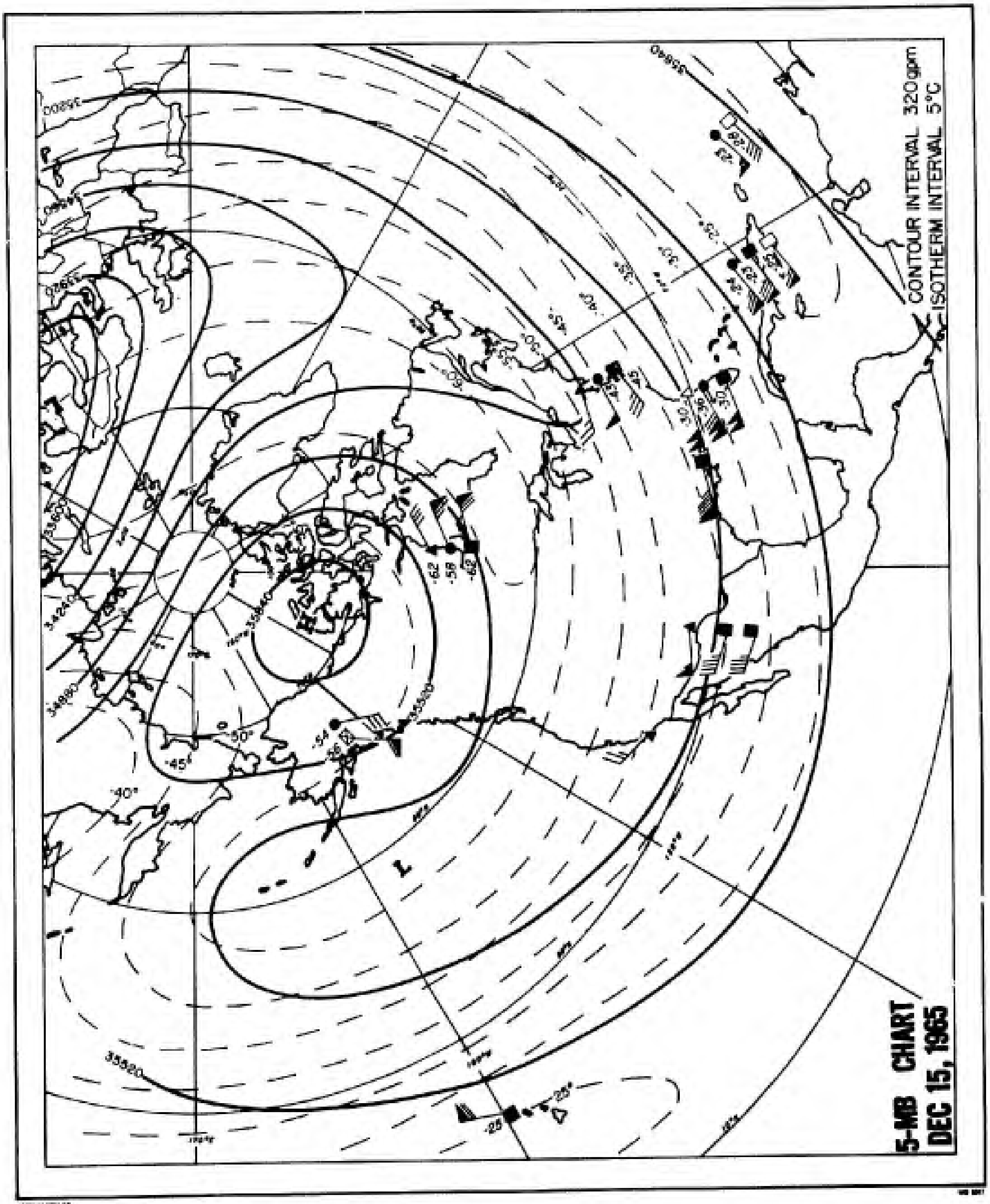
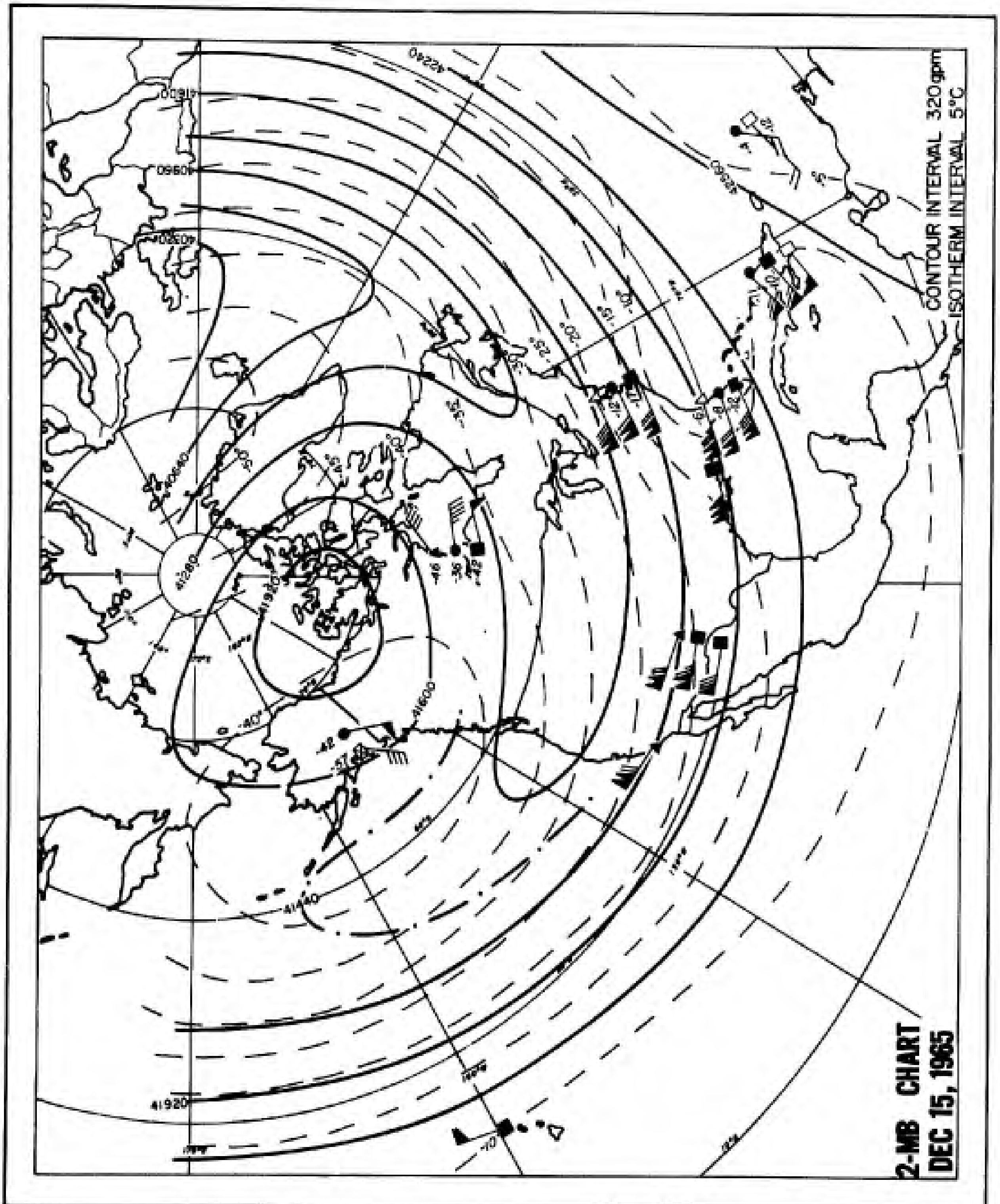
DEC 1, 1965
CONTOUR INTERVAL 320 gpm
ISOTHERM INTERVAL 5°C

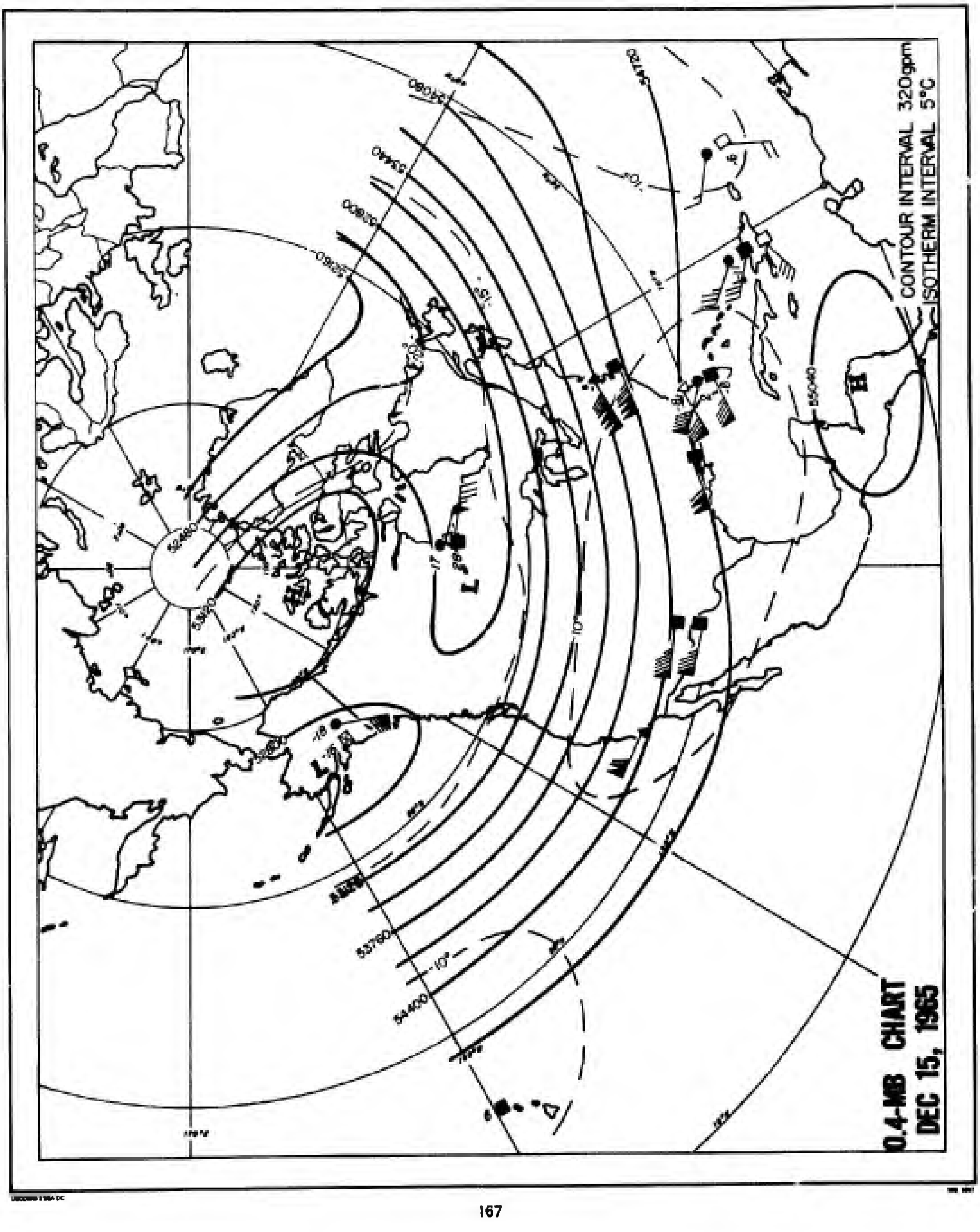

5-MB CHART
DEC 8, 1965
CONTOUR INTERVAL 320gpm
ISOTHERM INTERVAL 5°C


2-MB CHART
DEC 8, 1965
CONTOUR INTERVAL 320gpm
ISOTHERM INTERVAL 5°C
41680
42240
41280


0.4-MB CHART
DEC 8, 1965
CONTOUR INTERVAL 320 gpm
ISOTHERM INTERVAL 5°C
53120
53760
54400
55040
51840
52480


5-MB CHART
DEC 15, 1965
CONTOUR INTERVAL 320 gpm
ISOTHERM INTERVAL 5°C


2-MB CHART
DEC 15, 1965
CONTOUR INTERVAL 320gpm
ISOTHERM INTERVAL 5°C


0.4-MB CHART
DEC 15, 1965
CONTOUR INTERVAL 320 gpm
ISOTHERM INTERVAL 5°C
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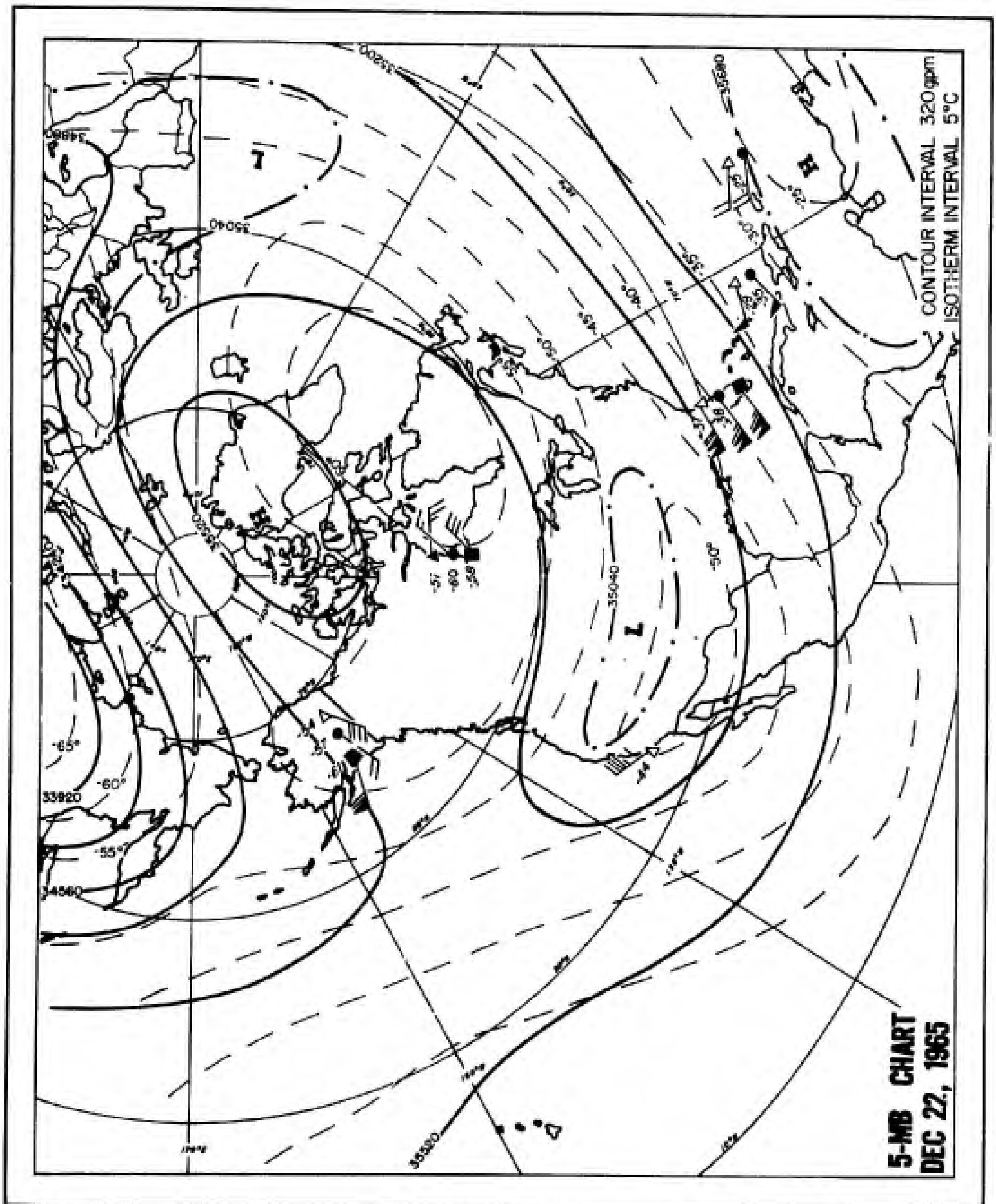
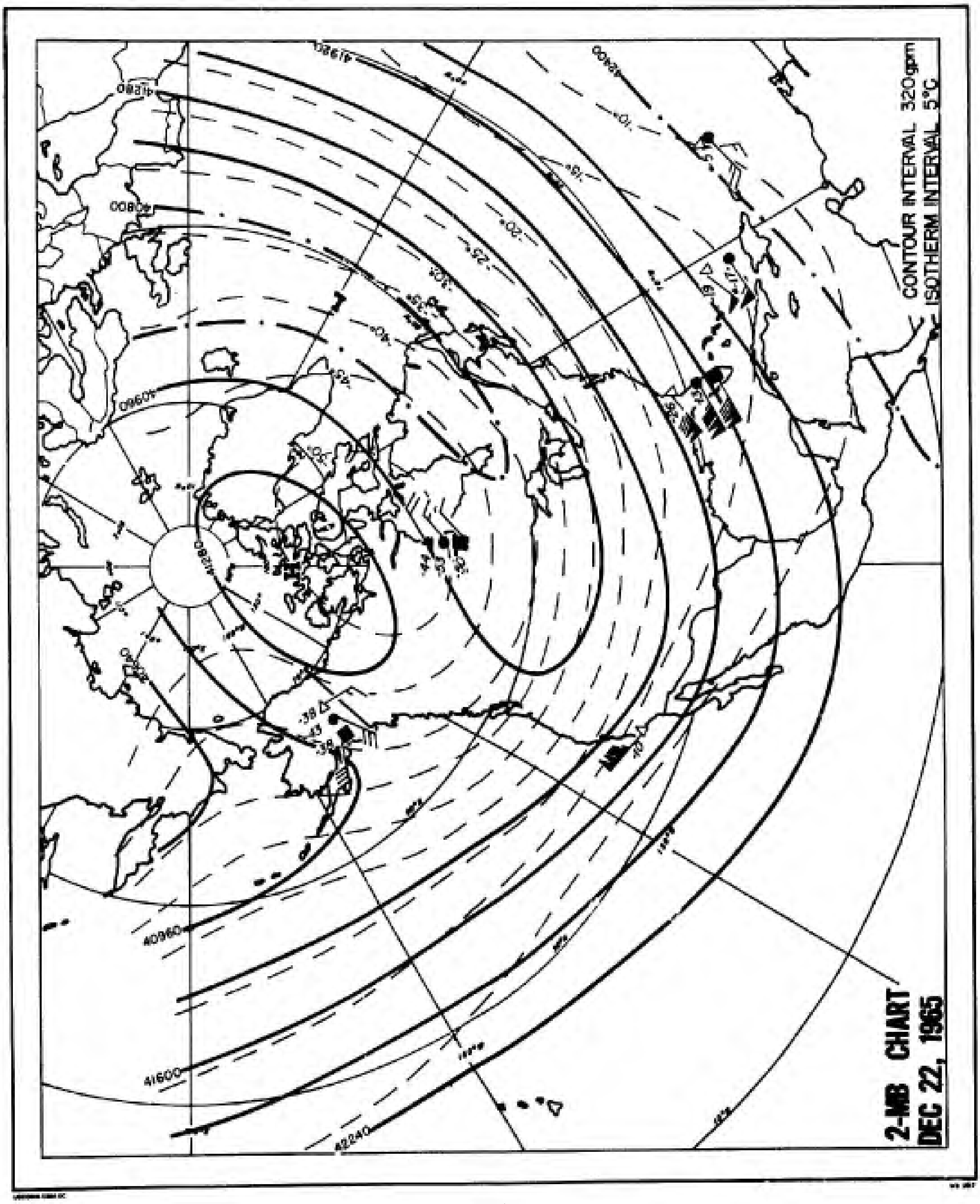
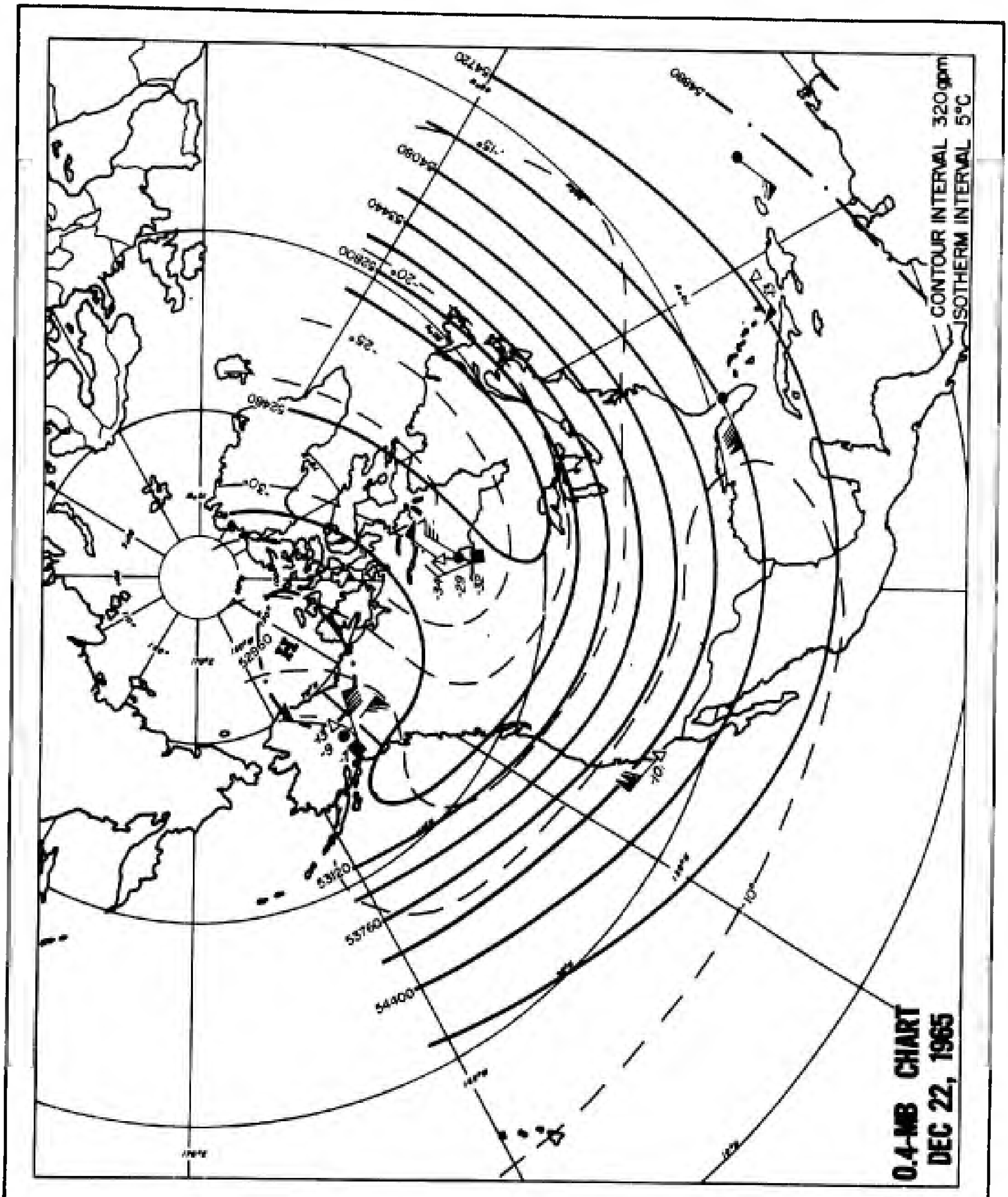
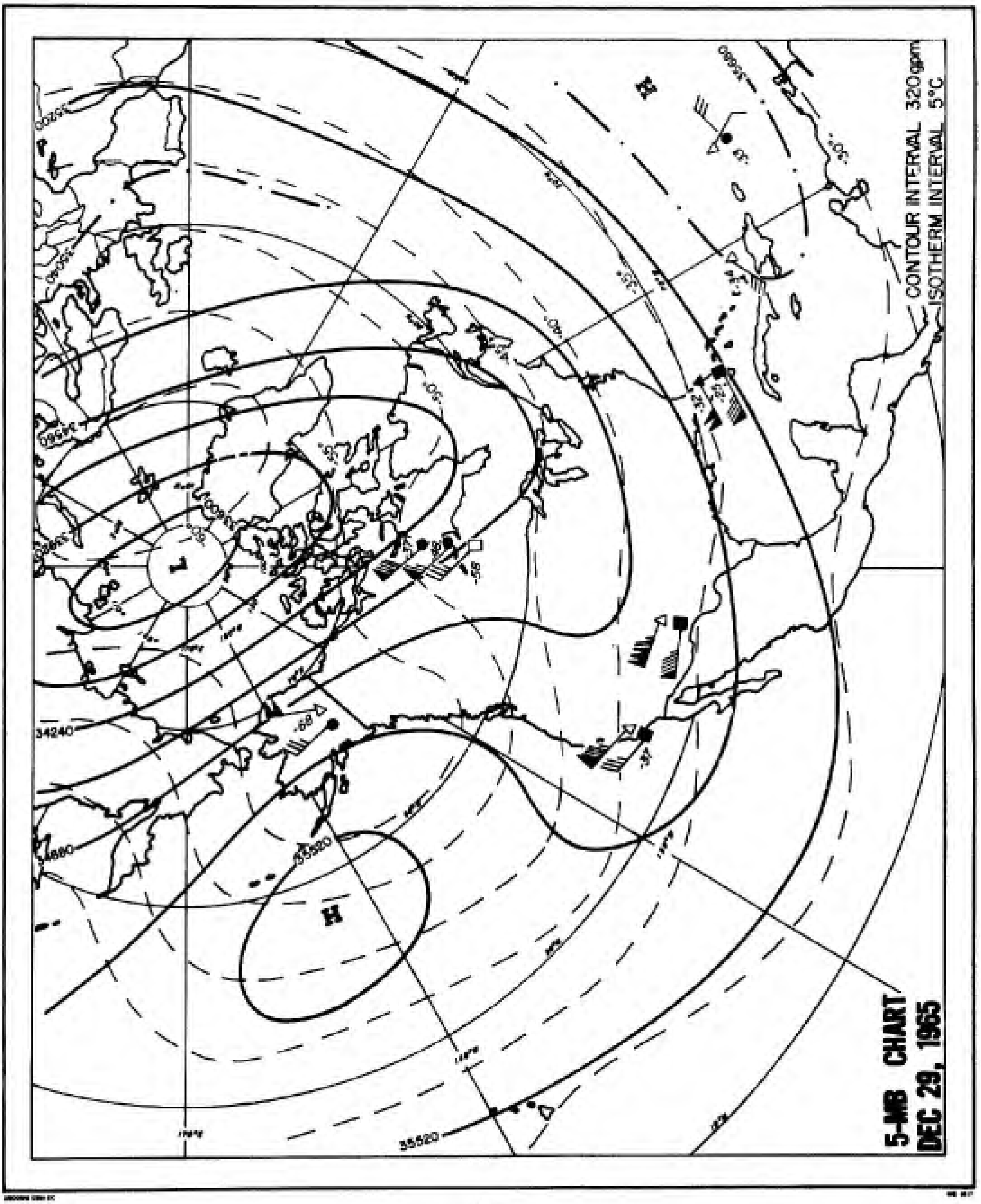

5-MB CHART
DEC 22, 1965
CONTOUR INTERVAL 320gpm
ISOTHERM INTERVAL 5°C
33920
34560
35040
35520
-65°
-60°
-55°
-50°


2-MB CHART
DEC 22, 1965
CONTOUR INTERVAL 320gpm
ISOTHERM INTERVAL 5°C
40960
41600
42240


0.4-MB CHART
DEC 22, 1965
CONTOUR INTERVAL 320gpm
ISOTHERM INTERVAL 5°C
54720
54080
53440
52800
52160
53120
53760
54400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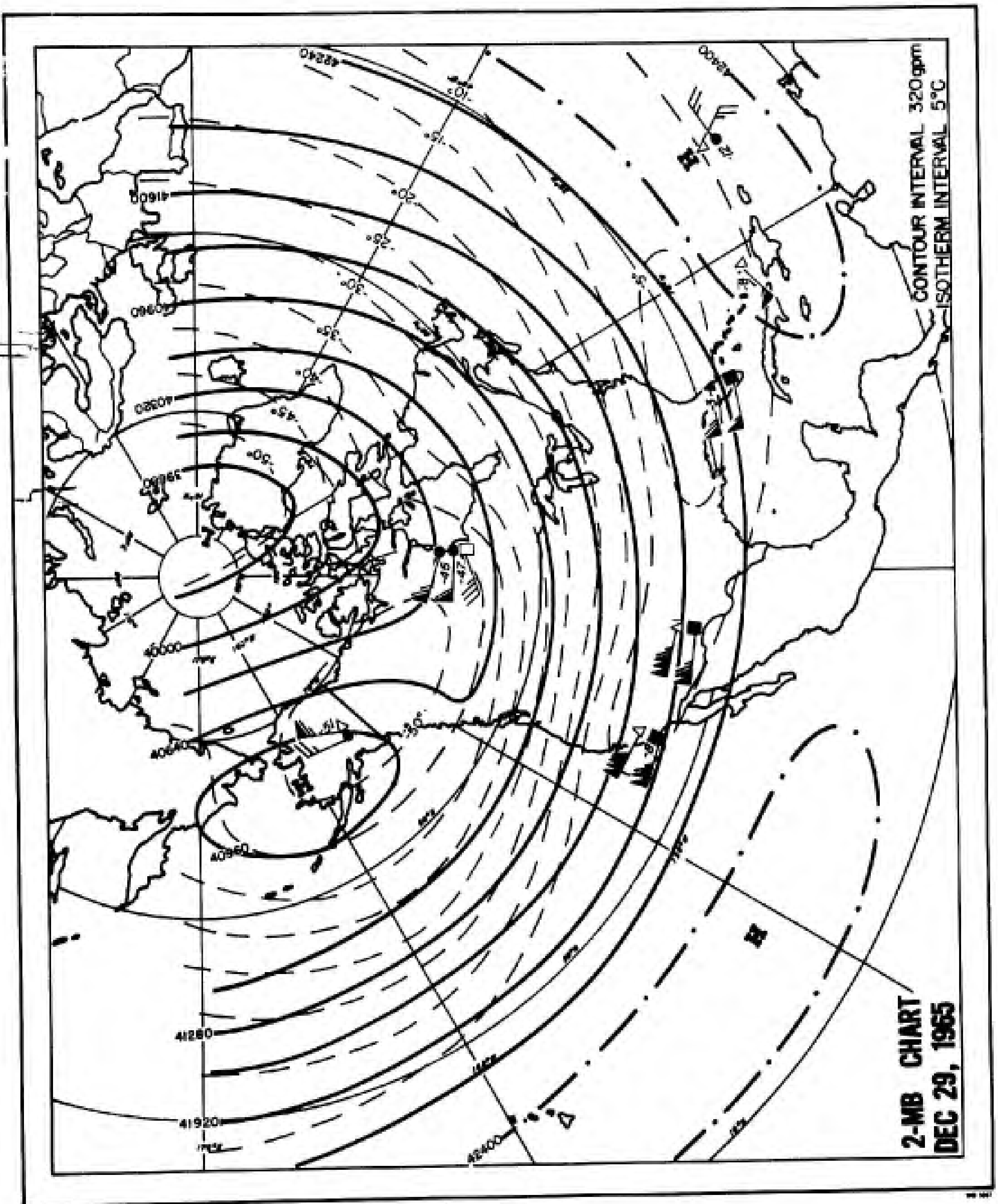
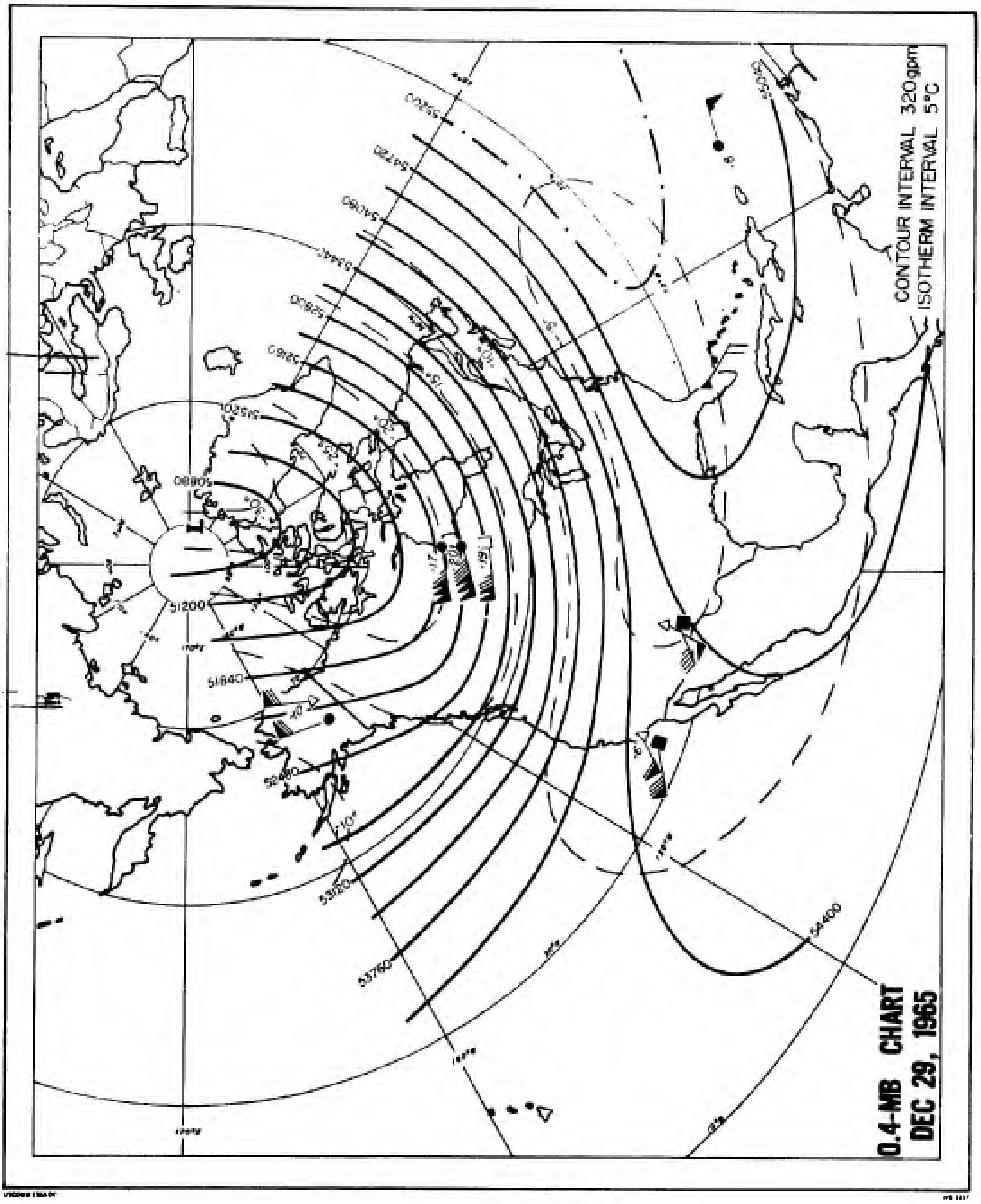
DEC 29, 1965
CONTOUR INTERVAL 320gpm
ISOTHERM INTERVAL 5°C
34240
35520
35520


CONTOUR INTERVAL 320 gpm
ISOTHERM INTERVAL 5°C
2-MB CHART
DEC 29, 1965
41600
40960
40320
39680
40000
40640
40960
41280
41920
42400
42240


0.4-MB CHART
DEC 29, 1965
CONTOUR INTERVAL 320 gpm
ISOTHERM INTERVAL 5°C
51200
51840
52480
53120
53760
54400