INVESTIGATIONS OF THE AURORA BOREALIS AT NORDLYS OBSERVATORIET TROMSØ 1929—1930

BY

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1. Introduction.

This publication contains the results of height-measurements of the aurora borealis at Nordlys observatoriet, Tromsø. The method of determining the position of the aurora by means of two parallactic photos — originally developed by Størmer — has been used. —

The material was collected in the spring months of 1929 and during the winter 1929—30.

The authors wish to express their best thanks to Prof. C. Størmer for his kind interest shown during the work and for many excellent suggestions. One of us (Tønsberg) also wishes to express his most cordial thanks to Prof. Krogness, — formerly director of «Det Geofysiske Institut» Tromsø, — where he first had the opportunity of learning the method of height-measurements of the aurora. As a natural consequence of this he has managed the said work at the Observatory and given a presentation of the working-method in the present paper.

We are also greatly indebted to Mr. Magnus Jacobsen, instrument maker at the Observatory, for his most valuable assistance during the collection of the material, — and to Mr. Steinar Jenssen for his most able management of the second auroral station. — By his kindness in placing the telephone-line Tromsø—Tennes at our disposal, the director of the telegraph-office at Tromsø, Mr. Feyling, has rendered invaluable assistance. During the working out of the present material, we have been most ably assisted by M. Mathisen cand. mag. and Bj. Stav engineer.

CHAPTER I.

2. The Photography. The Instrumental Equipment.

To be able to determine the height of the aurora borealis by the method developed by Størmer,[1]) photos must be taken from two stations simultaneously. Our stations, — the principal and secondary, — are the Observatory (fig. 1), Tromsø, and Tennes in Balsfjord, — the latter situated at a suitable distance from Tromsø. At Tromsø the photos are taken from a cemented platform (size 8 m. × 8 m.) near the observatory building. The platform is surrounded by a wooden bulwark protecting against snow-drift and wind. On the platform is erected a small house (fig. 2) for electrical equipment, — the door of which can be turned down to a horizontal position, thus serving as a

[1]) Bericht über eine Expedition nach Bossekop etc. Videnskapsselskapets Skrifter I. Mat.-Natur. Klasse No. 17. Kristiania 1911.

Fig. 1.

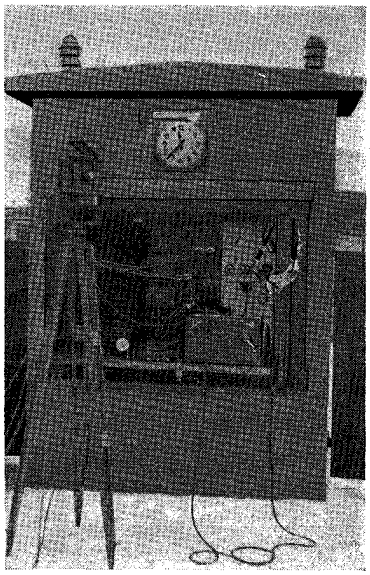

Fig. 2.

table for the field-telephone apparatus, the cassettes, et cetera. The cameras employed were procured by Størmer. They are of the Krognesstype, which allow six pictures to be taken on the same plate. The size of the plate is 9 cm. × 12 cm., and accordingly the size of the picture about 4 cm. × 4 cm. The plates used were Herzog Sonja E. W. by the recommendation of Størmer. The objective of the camera is a Kino-Plasmat from Hugo Meyer, Görlitz, f:1,5, focal distance 5 cm. This objective gives excellent sharpness of picture.

In the autumn 1930 an objective of quartz was tried. As the strongest lines in the auroral spectrum are to be found in the violet and ultra-violet region, one should expect with such an objective to be able to diminish the time of exposure.[1]) The quartz-objective constructed consisted of three lenses of quartz which were ground biconvex to diminish the spherical aberration. Although this objective is not acromatic, the stars are visible as points on the plate. By simultaneous exposures by quartz and glass objectives with the same aperture ratio, the quartzobjective was found to give considerably more strongly exposed pictures. The results of a more detailed comparison will be published later.

Besides the camera, each station has a field-telephone apparatus, a «Nife» lantern, a piece of chalk for the numbering of the plates and a supply of new plates.

When taking photos the observers are constantly in connection with each other by the telephone, and at the same time also with a third person in the Observatory who keeps the diary. While sitting snug and warm in the Observatory — with the chronometer on the table — he puts down the moments for the beginning and end of each exposure, the constellation of stars towards which the cameras are directed, and any other information given by the Observers A and B. Supposing that A is the leader of the photography he gives brief orders and receives brief answers as agreed beforehand. However, some practice is required for rapid and succesful photography.

The slides with the exposed plates are numbered and from the second station at once sent to the Observatory for development. To avoid any confusion, the number of the plate and a letter denoting the station are written on the plate with a pencil before development.

[1]) The advantage of using quartzobjective in order to diminish the time of exposure is pointed out by Størmer in «Probleme und Richtungslinien der künftigen Nordlichtforschung», *Arktis*, 1928, Heft 3/4, page 72.

3. The Orientation of the Negatives.

The plates are arranged in corresponding pairs, and — if possible — three, but at least two stars must be identified on each picture. These stars should lie in the central part of the picture and at some distance from each other. When identifying the stars, the negatives are regarded through a magnifying lens against an intensely lighted sheet of white paper. The selected stars are marked out by a small ink cross on the glass side of the plate. The centre of each picture is marked with an ink dot, and is found by placing the plate on a piece of white carboard, on which the outlines and the centres of the pictures have been drawn beforehand. The selected stars are put down, their declination and rightascension taken out of a starcatalogue. («Berliner Astronomisches Jahrbuch» has been used), and the hourangles computed in the usual way. It is serviceable to make use of a scheme which partly allows every new hourangle to be derived from the preceding one. The determination of the hourangle is especially current when several consecutive pictures show the same stars. A diagram or a table giving the connection between the angle expressed in *degrees* and in *hours* is useful. Time is saved by computing a great number of hourangles in succession.

4. Computation of the Angles h and a, u and ω for a Point in the Sky.

To determine the position in space of an auroral point according to the method introduced by Størmer [1]) the angles mentioned above are required. h and a are the height and azimuth of the point (referred to the principal station), u and ω we shall call the *base-distance* and the *base-height* of the point.

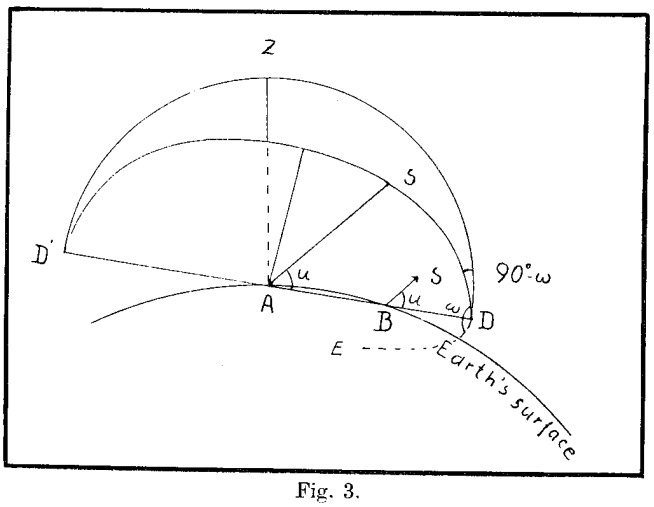

Fig. 3.

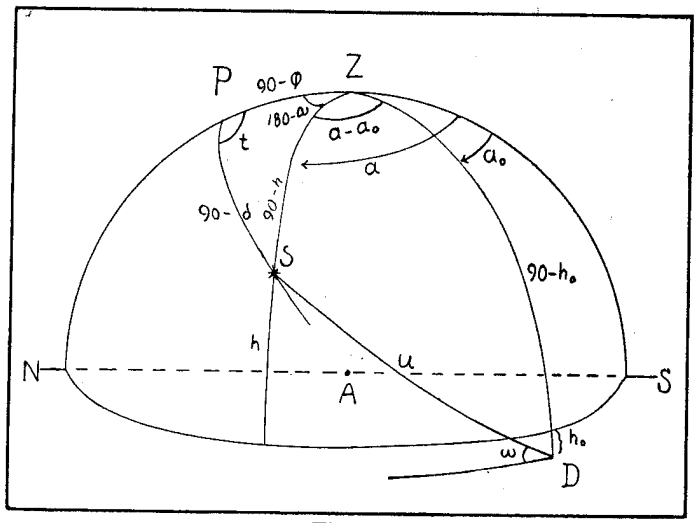

Fig. 4.

Regarding fig. 3, A denotes the principal station and B the second station. The straight line through A and B, which we shall call the *base-axis*, cuts the celestial sphere at two points D and D′, — which we call the *base-poles*. Let S be a star. Then the *base-distance*, u (cfr. fig. 3) means the angular distance from D to S measured along the great circle through these points. The *base-height*, ω (the angle EDS) means the completion of the angle between the vertical plane through ADZ and the plane through ADS, — which we shall call the *plane of displacement*. The base-distance u and the base-height ω represent a pair of spherical coordinates which are referred to the vertical plane through the base-poles and the base-pole D itself. With origin in D

[1]) Bericht etc. page 53.

the base-distance u is reckoned from 0° to 180°, and the base-height a from 0° to 180° with its origin in the plane through ADE, which we call the *base-plane.*

Regarding fig. 4 we get according to Størmer [1]) the following equations:

$$\sin h = \sin \varphi \sin \delta + \cos \varphi \cos \delta \cos t \quad (1)$$

$$\sin a = \cos \delta \sin t \sec h \quad (2)$$

$$\cos a = \div \cos \varphi \sin \delta \sec h + \sin \varphi \cos \delta \cos t \sec h \quad (3)$$

$$\cos u = \sin h_0 \sin h + \cos h_0 \cos h \cos (a—a_0) \quad (4)$$

When $h_0 = 0$, we get

$$\cos u = \cos h \cos (a—a_0) \quad (4')$$

$$\cos \omega = \cos h \sin (a—a_0) \operatorname{cosec} u \quad (5)$$

In these equations the letters signify:

φ the geographical latitude of the principal station
δ » declination of the star
t » hour-angle » » »
h » height » » »
a » azimuth » » »
u » base-distance » »
ω » base-height » »
h_0 » height of the base-pole
a_0 » azimuth » » »

5. The Displacement of an Auroral Point. The Base-line and the Base-pole. Computation of the Quantities r, H and D for an Auroral Point.

Regarding fig. 5 A, B, D and C denote respectively the principal and second auroral station, the base-pole and an auroral point. The plane through ABCD we have called the *plane of displacement*, because an auroral point C, when viewed from B, in this plane will be displaced an angle $p = u_2 \div u_1$ relative to the direction from A. This displacement of an auroral point relative to the infinitely remote stars becomes evident by a glance at two corresponding photos.

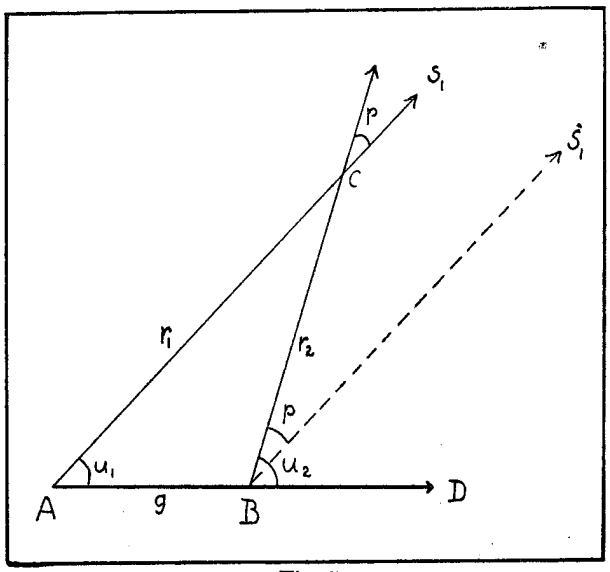

Fig. 5.

Let the distance from the principal auroral station A to the second auroral station B be g, (fig. 5). Knowing the geographical coordinates of the two auroral stations, we are able to compute the base-line g. The geographical coordinates are as follows:

A: Tromsø $\varphi = 69°\ 39',0$ $\lambda = 18°\ 56',80$ E. Gr.
B: Tennes $\varphi = 69°\ 18',0$ $\lambda = 18°\ 20',54$ »

The heights above sea level are respectively 112 m. (A) and 12 m. (B) Using these values, we get the following values for the base-line and the base-pole D:

$$g = 43{,}40 \text{ km. } h_0 = \div 0°{,}33, \ a_0 = \div 20°{,}96$$

[1]) Rapport sur une Expédition d'Aurores Boréales à Bossekop et Store Korsnes pendant le Printemps de l'Année 1913. Geofysiske Publikasjoner Vol. I., No. 5. Kristiania 1921, page 30.

where, as mentioned before, h_0 and a_0 are the height and aximuth of the base-pole D.

For the opposite base-pole D', — cfr. fig. 3, — we get:

$$h_0 = 0°{,}33,\ a_0 = 180° \div 20°{,}96.$$

Reckoned from the base-pole D', the base-distances u_1 and u_2 for points on the northern sky get values below 90°, — and as the aurora most frequently occurs in the north, we have, — to avoid the supplemental number 180° in the tables and during the numerical calculation, — chosen the base-pole D' as origin for the base-distances.

Further let r_1 denote the distance from A to C (fig. 5), we then get:

$$r_1 = \frac{g \sin u_2}{\sin (u_2 - u_1)} = g \sin u_2 \operatorname{cosec} (u_2 - u_1) \qquad (6)$$

For the determination of the position of an auroral point C relative to the principal station A, we consider, — according to Størmer, — a vertical plane through the principal auroral station A and the point C (fig. 6). Knowing the radius, R, of the earth, the height H_0 above the sealevel of the principal station, the distance r_1 from A to C, and the height h of the point C, we get according to Størmer[1]) and Vegard & Krogness:[2])

$(H + R)^2 = (R + H_0 + y)^2 + x^2$, where $x = r \cos h$

$y = r \sin h$

$$\text{o: } H = \sqrt{(R + H_0 + y) + x} \div R \qquad (7)$$

$$D = R \arcsin \frac{x}{H + R} \qquad (8)$$

or approximately

$$H = H_0 + y + \frac{x^2}{2\,(R + H_0 + y)}$$

$$D = \frac{R}{R + H}\, x$$

As to the accuracy attainable with the approximate formula, we refer to the paper of Størmer mentioned above. —

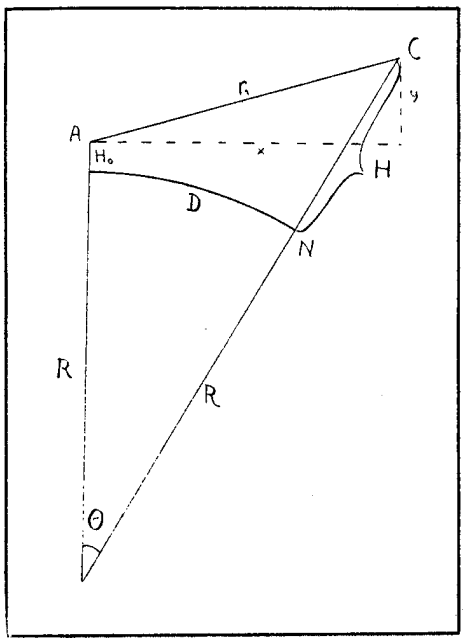

Fig. 6.

CHAPTER II.

THE PRACTICAL METHOD, — WITH SOME VARIATIONS FROM THE METHOD DESCRIBED IN THE PAPERS OF STØRMER AND VEGARD & KROGNESS

6. The Nets.

For the determination of the angles h, a, u_1 and u_2 Størmer has introduced a graphic aid, — the «nets», — which highly simplified the method of determination. The idea of the nets is the following:

Suppose circles of constant declination δ and constant right ascension α to be drawn on the celestial sphere with an interval of 2°. Imagine a part of these intersecting curves to be photographed by an auroral camera, and the photo obtained to be enlarged, we then should get a *net*.

Of course this net of curves does not exist in the sky, and cannot be photographed,

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[1]) Bericht a. s. o. pag. 50—53.

[2]) The Position in Space of the Aurora Polaris, Geofysiske Publikasjoner Vol. I. No. 1. Kristiania 1920, page 29.

but the stars appear on the photo, and by means of their declination and right ascension we are able to construct the net.

The photos of the stars used for the construction of the nets were taken in the following way:

Let the optical axis of the camera be brought approximately into the meridian plane, and directed towards a star with the pole-distance $\gamma = 90° \div \delta$, then the centre of the picture will have exactly the same pole-distance, and consequently also the centre of the net to be constructed on the base of this picture. The γ-value of the net — i. e. the pole-distance of its centre — solely characterizes the net. The next picture is taken with the optical axis directed towards a point with pole-distance $\gamma + 2°$ a. s. o. In order to recover a zero-position of the optical axis from one evening to another, and to be able to direct the latter towards a point with an arbitrary pole-distance, the camera is equipped with a level and a pointer running along a scale as sketched in fig. 7. For the construction of the nets, it is desirable to have a great number of stars on the picture, and we therefore with the camera in a fixed position made several exposures, generally four, with definite time-intervals. As suitable time-intervals were chosen 8 and 16 minutes of *sideral* time, — corresponding to a movement of the stars of respectively 2° and 4°. A time of exposure of exactly one minute has proved to be suitable. We have up to this time drawn nets for every 4° of the angle γ, but it is desirable to have nets for every 2° of γ. —

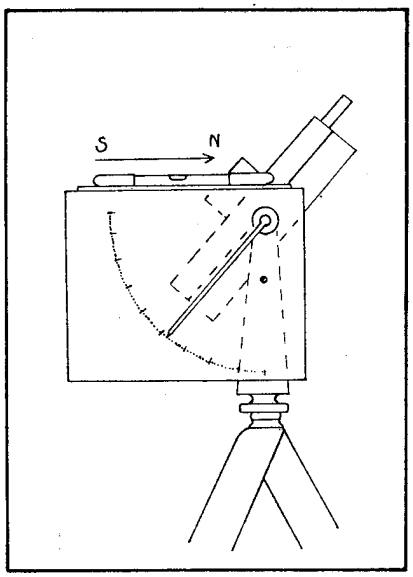

Fig. 7.

We will now account for the construction of the nets. By means of a lantern the net-photo is projected on a sheet of thin white paper fastened to a vertical screen. The same lantern is later used when projecting and enlarging the auroral photos. As to the enlargement, the scale originally chosen by Størmer is a very suitable one. According to this scale, *1 cm.* corresponds to *1 degree of arc* in the central part of the drawing, where the deformation caused by the lenses of the camera and the lantern is negligible. To be able to obtain this scale we have to compute the angular distance between stars situated in the central part of the picture. Regarding fig. 8 S_1 and S_2 denote two stars and a their angular distance, — we then get the following equations:

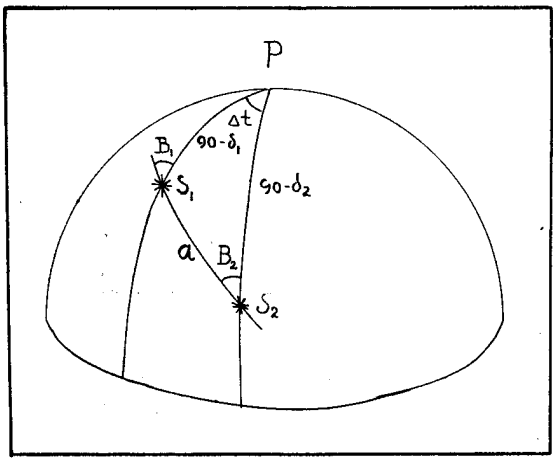

Fig. 8.

$$\operatorname{tg}\frac{B_1 \div B_2}{2} = \sin\frac{\delta_1 + \delta_2}{2}\sec\frac{\delta_1 \div \delta_2}{2}\operatorname{tg}\frac{\Delta t}{2}$$

$$\operatorname{tg}\frac{B_1 + B_2}{2} = \cos\frac{\delta_1 + \delta_2}{2}\operatorname{cosec}\frac{\delta_1 \div \delta_2}{2}\operatorname{tg}\frac{\Delta t}{2}$$

$$\operatorname{tg}\frac{a}{2} = \cos\frac{B_1 \div B_2}{2}\sec\frac{B_1 + B_2}{2}\operatorname{tg}\frac{\delta_1 \div \delta_2}{2}$$

Suppose that we know the angular distance between some centrally situated stars on the drawing, the distance between lantern and screen is to be fitted in such a way that the distances *in centimeters* between the stars are equal to their angular distances *in degrees*. Just this position of the lantern must be carefully determined and marked out. The scale put in order, the centre and the stars are plotted on the drawing.

By means of the spherical coordinates (δ, α) and the movement of the stars, the curves of constant declination and right ascension can be drawn by interpolation, usually with an interval of 2°. On nets with small values of the pole-distance γ, however, the curves of constant right ascension are drawn with intervals of 4° and even 8°. Fig. 9 shows the net with $\gamma = 54°$. The nets are drawn on strong transparent tracing paper. When the nets are produced in this way, every deformation caused by the lenses is also included in the construction. Fortunately, the lenses of our two auroral cameras deform the pictures by the same amount, — thus we can directly use the nets obtained with the camera of the Observatory on the photos from the second station. —

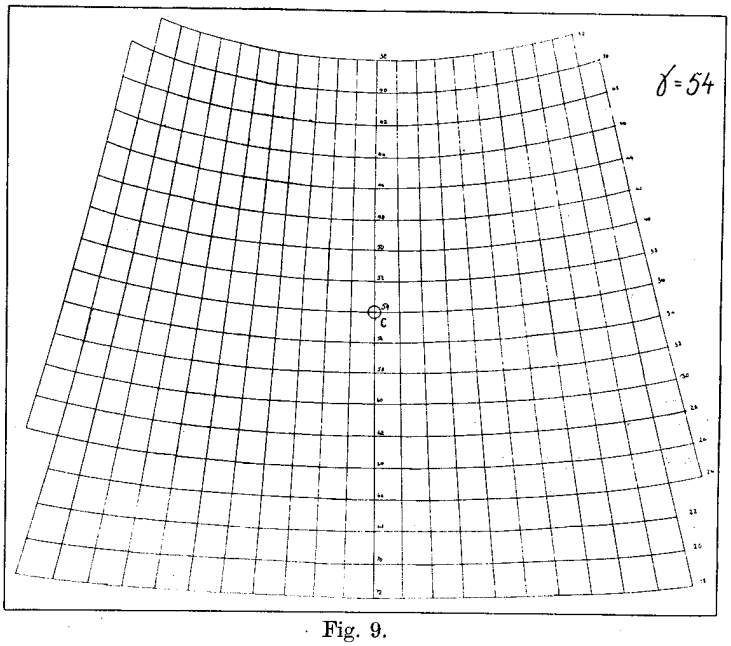

Fig. 9.

7. The Projection of Corresponding Auroral Photos.

According to the advice of Prof. Størmer the two corresponding photos are projected simultaneously, by means of *two* identical lanterns, on sheets of thin, white paper, with the enlargement chosen before. The use of *two lanterns simultaneously* (fig. 10 shows an apparatus) represents a great advantage with respect to a direct comparison of corresponding photos. On the sheets of paper the centres, the selected stars and the essential outlines of the aurora, common to the two photos, are carefully drawn with a pencil. It must be noticed that the scale may change a little from one photo to another, — special attention should be drawn to photos with diffuse stars.

8. The Application of the Nets. «Artificial Stars».

The drawing from the principal station, — which we shall call the A-drawing, — is placed on a glass-plate, which is illuminated from below. On the drawing are put the values of declination and hour angle for the selected stars. Among the nets we select *the one*, whose value of γ coincides as nearly as possible with the pole-distance $\gamma = 90° \div \delta$ for the centre of the drawing. The γ-value in question can be estimated from the pole-distances of the selected stars. On the «light-table» we adjust the drawing upon the net in such a way that the declinations δ and the differences of hour angles Δt of the selected stars can be read off *on the net.*, whilst at the same time the net-curves indicate respectively all *even* values of declination and hour angle inside the border of

the drawing (fig. 11). Further, the centres of the net and the drawing must coincide approximately. To find this position of the drawing upon the net we make use of the auxiliary scale illustrated in fig. 12. We proceed in the following way: Supposing the right position of *one* star to be adjusted, and the drawing fixed by a needle through this star, then by turning the drawing around the needle, the next star is brought into its right position., and then the coordinates of the third star — the control star — must coincide with the values on the net. The drawing may be kept quiet on the net by means of small heavy weights.

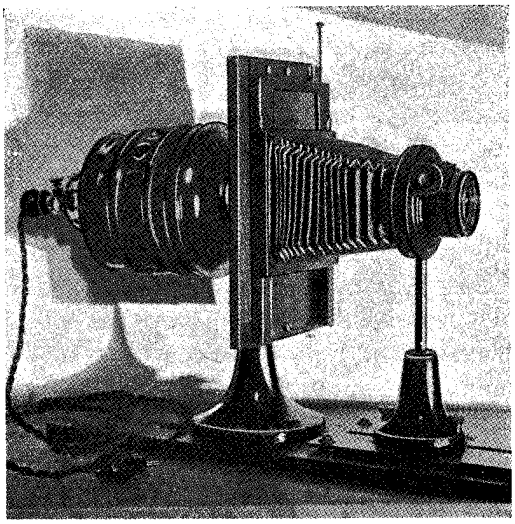

Fig. 10.

The points of intersection on the net, indicating *even* values of the coordinates δ and t can now easily be transferred to the drawing. Suppose that for these points the height h and the azimuth a with respect to the principal station, and the base-angles u and ω for a fixed base-line have been computed, we then on the drawing should have a number of points with all the coordinates required for further treatment. We then proceed as follows.

A number of points with *even* values of declination and hour angles are chosen and their h, a, u and ω are computed, using the equations (1), (2), (4), and (5) mentioned on page 6. We shall call these points «artificial stars». Table I contains 500 «artificial stars» with respect to the base-line Tromsø—Tennes. In Table I t and δ designate the hour angle and the declination* of the selected points and h, a, u and ω the computed values of respectively the height, azimuth, base-distance and base-height.

As to the choice of hour-angles of the «artificial stars», experience has proved that it is sufficient to use successive values of merely 6° intervals. In view of the smaller calculation work, the hour-angles in Table I outside this interval should be replaced by the neighbour-values given by the interval. Further it may be noticed that a sufficiently large number of «artificial stars» will be procured by using 8° as interval in successive hour-angles.

The computations are made with our self-acting calculating machine «Mercedes-Euclid», using «Lohse: Tafeln

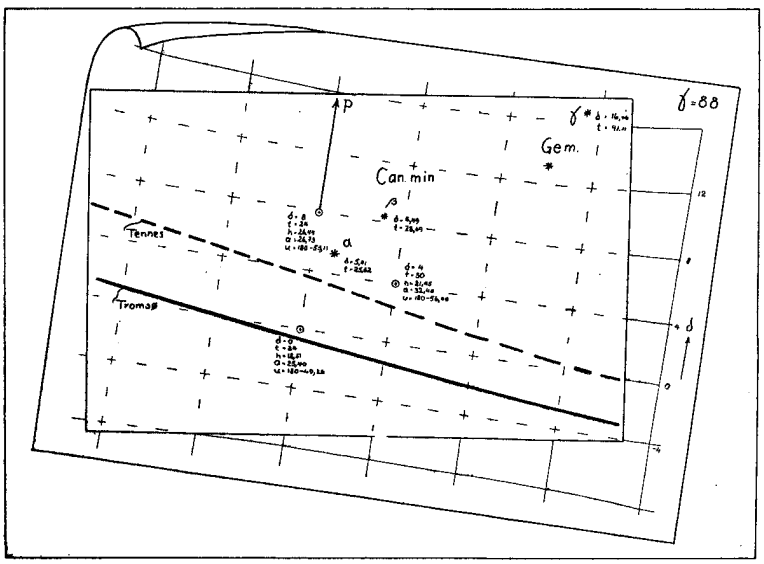

Fig. 11.

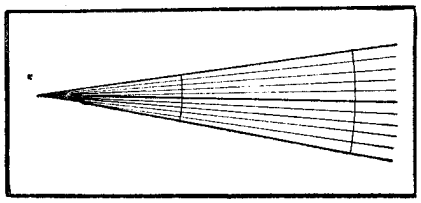

Fig. 12.

für numerisches Rechnen». The method of «artificial stars» is in principle introduced in the work of Vegard and Krogness.[1])

Returning to our drawing, — now adjusted on the net with respect to δ and t, — we plot at least three «artificial stars» selected from Table I and falling round the centre of the drawing, (fig. 11). Now the A-drawing is furnished with all the coordinates required. The direc-be tion to the north pole may drawn through one of the «artificial stars».

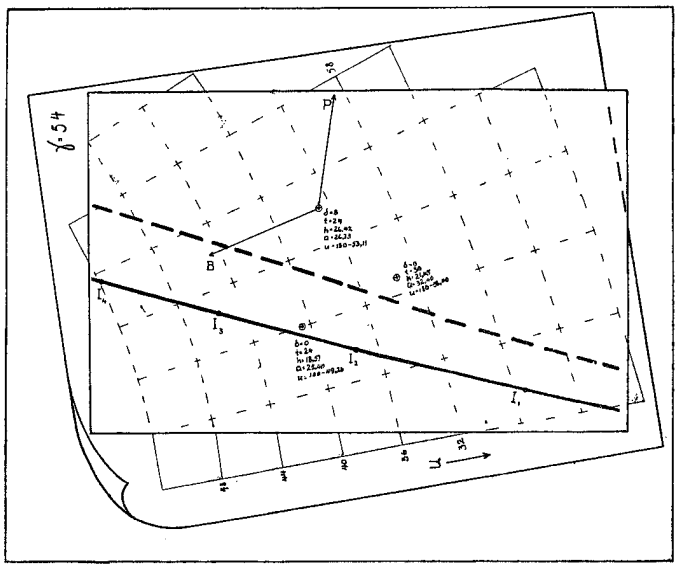

Fig. 13.

We now place the A-drawing upon the B-drawing and if the selected (real) stars on the A-drawing exactly cover the same stars on the B-drawing we transfer the drawn outlines of the aurora on the B-drawing to the A-drawing as dotted lines, — and we do not need the B-drawing any more (cfr. fig. 11). If, however, the selected stars on corresponding drawings lie at different distances from the centres it is impossible, on account of the deformation, to bring the stars to cover each other exactly. In such cases the B-drawing must be treated separately.

We suppose the most favourable case and return to our modified A-drawing for the purpose of determining corresponding points on the continuous and dotted auroral out-lines. Among the nets we select *the one*, whose γ-value coincides as nearly as possible with the base-distance u_c, or its supplement $180° \div u_c$, of the centre of the drawing. The γ-value in question can be estimated from the base-distances of the «artificial stars». On the «light-table» we adjust the drawing upon the net in such a way that the base-distances u and the differences of the base-heights $\Delta\omega$ of the «artificial stars» can be read off *on the net*, whilst at the same time the net-curves indicate respectively all *even* values of base-distances and base-heights inside the border of the drawing (fig. 13). Further the centres of the drawing and the net must coincide approximately. The direction to the base-pole — being the direction of the displacement itself — may be drawn through one «artificial star». Having at present by means of the net-curves both the magnitude and the direction of the displacement, we are able to read off *on the net* the base-distances u_1 and u_2, and if necessary the base-

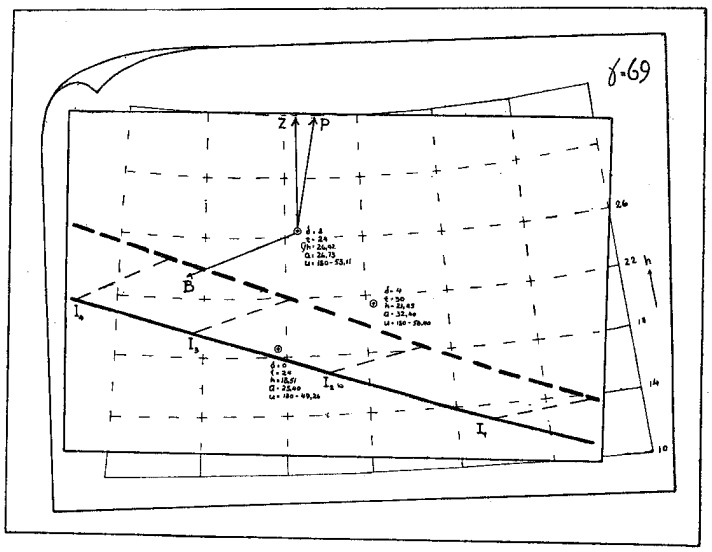

Fig. 14.

[1]) The Position in Space etc. page 25.

height ω for any selected auroral point. In the selection of the auroral points the negatives must be at hand for comparison (cfr. Plate 1). In cases where the stars do not cover each other exactly when the drawings are laid upon each other, the B-drawing must be treated separately. The corresponding auroral point on the B-drawing is determined by the intersection between the outline considered and the direction of displacement fixed by the known ω. The base-distance u_2 is read off *on the net.*

Now it is left to determine the height h and the azimuth a of the selected auroral points from the principal station. As to the selection and application of the suitable net it is sufficient to refer to the procedure already employed for the (δ, t) net and (u, ω) net (fig. 14). Finally we have all the quantities required for the determination of the position in space of an auroral point.

9. Determination of r, H and D for an Auroral Point.

We recall that these quantities are determined by the equations (6), (7), (8) previously given. Vegard & Krogness,[1]) however, have introduced a graphic-mechanical

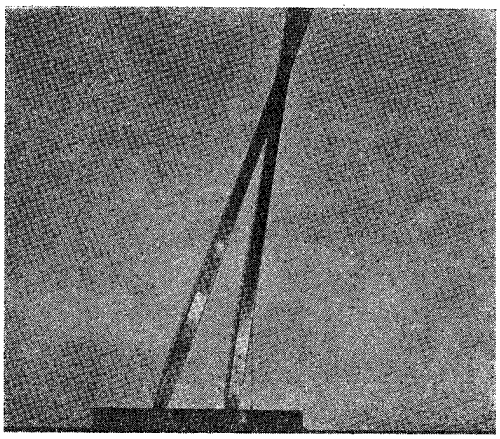

Fig. 15.

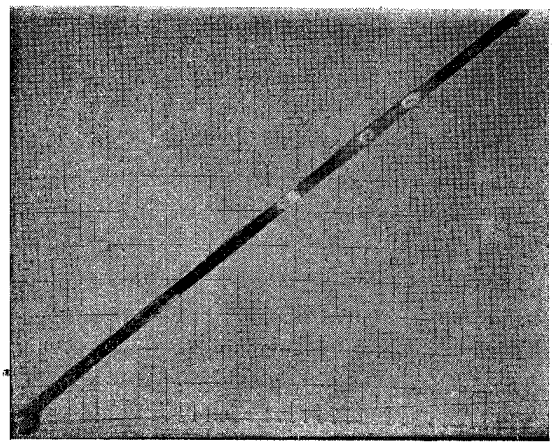

Fig. 16.

method, which has proved to be very convenient and time-saving. Fig. 15 and 16 are photos of our methods used, — scale value: 2 mm. equal to 1 km. Having at our disposal a self-acting calculating machine, we found it more convenient to compute the distance r_1, and used the graphic-mechanical method as a control.

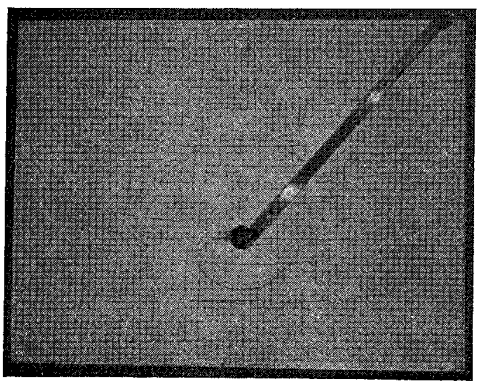

Fig. 17.

Knowing the distance D and the azimuth a of the auroral points, we may plot on a map their foot-points (horizontal projections) on the earth's surface, and thus get an idea of the geographical distribution of the aurora. Our maps are constructed using the method described on page 116 in the paper of Vegard and Krogness. As to the accuracy of the results we refer to the discussions of Størmer and Vegard and Krogness.

[1]) The Position in Space etc. page 27—29.

CHAPTER III.

10. The Heights of the different Forms of the Aurora.

A classification of the different forms of the aurora has been given by Størmer [1]) and Vegard and Krogness.[2]) In our statistical treatment of the lower limit of the different forms we have divided the material ino the following groups, using the terms of Størmer.

1) diffuse arcs and bands
2) draperies and arcs with ray-structure
3) rays
4) pulsating surfaces
5) diffuse, luminous surfaces («auroral clouds»)
6) coronae.

Table II indicates the time in G. M. T. when each picture was taken. The time is reckoned from the middle of the exposure. Table III contains the coordinates of each auroral point measured. As coordinates we have used the height, H, of the auroral point, — and its horizontal projection on the earth's surface, — the latter determined by its distance, D, from the Observatory, Tromsø, in km. and the azimuth, a, of this direction, — computed positively from S towards W.

On the drawings and in Table II we have tried to use *one* roman number for each contour. For all forms we have tried to determine the lower limit. For the diffuse arcs and bands we have only drawn the contour of the lower limit., — for aurora with ray-structure we have also drawn the contours of the streamers. On photos of pulsating aurora and diffuse, luminous surfaces, it is often difficult to determine a lower border, — we have there drawn the contours of corresponding borders on the two photos.

In some cases we have drawn the line of maximum light-intensity on both drawings and used this for determination of the height. Points which lie on the line of maximum light-intensity are marked by a star (*). The Table below contains the height-distribution of the *lower* borders of the different forms, — and fig. 18 shows the height-distribution graphically. In fig. 18 we have counted the number of points in an interval of 2 km., — the altitude 100 km. thus embraces the number of points at 99 and 100 km.

Fig. 18 also shows the height-distribution determined by Vegard and Krogness from material collected at the Haldde-Observatory in 1913—14[3]) — and the height-distribution determined by Størmer[4]) from material collected on his auroral expedition to Bossekop i 1913,

Regarding the frequency-curves of the *diffuse arcs and bands* we find a close resemblance between the three curves. The two maxima at 100 and 106 km. occur in all three curves. Further we remark that on the frequency-curve from Tromsø the lower maximum at 100 km. is the most predominant one.

Regarding the frequency-curve of the *draperies and the arcs with ray-structure* we find a close resemblance between the curve from Tromsø and the curve determined by Størmer from material collected on his expedition to Bossekop in 1913. — Between the frequency-curve from Tromsø and the curve determined by Vegard and Krogness

[1]) Photographic Atlas of Auroral Forms. Published by the International Geodetic and Geophysical Union, Oslo 1930.

[2]) The Position in Space etc. page 98. 1920.

[3]) The Position in Space etc. page 104.

[4]) Résultats des Mésures Photogrammetriques des Aurores Boréales observées dans la Norvege meridionale de 1911 à 1922. Geofysiske Publikasjoner, Vol. IV, No. 7 pag. 104.

Heights	Diffuse arcs and bands	Draperies	Rays	Pulsating surfaces	Heights	Diffuse arcs and bands	Draperies	Rays	Pulsating surfaces
80	7	0	—	—	126	13	15	3	—
81	4	2	—	—	127	11	13	5	—
82	6	2	1	—	128	7	13	3	3
83	6	4	—	—	129	2	6	2	—
84	5	6	—	—	130	2	19	3	2
85	5	—	—	—	131	4	6	3	—
86	13	2	—	—	132	3	11	2	—
87	6	1	—	—	133	3	10	—	1
88	11	8	—	—	134	5	5	1	—
89	17	4	—	1	135	4	14	1	—
90	18	6	—	—	136	2	10	—	—
91	13	9	2	2	137	2	4	1	—
92	17	8	2	2	138	7	12	1	—
93	34	10	3	1	139	2	6	1	—
94	21	16	—	1	140	1	7	1	—
95	24	12	—	3	141	3	6	2	—
96	33	14	1	2	142	—	4	2	—
97	25	21	3	3	143	3	5	1	—
98	24	26	3	—	144	1	5	—	—
99	35	17	1	—	145	2	5	1	—
100	54	26	1	3	146	2	2	—	—
101	29	21	4	5	147	1	—	1	—
102	44	23	3	2	148	—	—	—	—
103	33	35	2	4	149	1	1	—	—
104	40	25	3	2	150	1	1	1	—
105	45	30	1	4	151	1	3	1	—
106	40	33	3	3	152	—	1	—	—
107	34	31	1	—	153	1	—	—	—
108	34	38	6	3	154	—	2	—	—
109	25	29	5	1	155	1	3	—	—
110	47	48	6	1	156	—	—	1	—
111	22	36	2	3	157	—	2	—	—
112	37	38	3	2	158	—	—	—	—
113	35	21	2	2	159	—	—	—	—
114	36	31	2	2	160	—	—	—	—
115	17	23	3	—	161	—	1	—	—
116	20	14	4	—	162	—	—	—	—
117	33	30	2	—	163	—	—	1	—
118	34	25	4	—	164	—	1	—	—
119	17	17	—	1	165	—	—	—	—
120	17	27	2	2	166	—	—	—	—
121	19	18	3	—	167	—	1	—	—
122	13	17	3	2	168	—	—	—	—
123	11	13	2	1	169	—	—	—	—
124	13	11	3	2	170	—	1	—	—
125	14	16	3	—					

there is a difference, as the lower limits in Tromsø on an average have a greater value.

The most interesting feature in the frequency-curves from Haldde is the two pronounced maxima at 100 and 106 km. The explanation of these maxima is uncertain. In an interesting paper, Egedal [1]) has tried to explain this by the lunar tides of the upper atmosphere. We have tried to trace the same effect using the same method of calculation as Egedal, — but neither the frequency-curves of the arcs and bands nor the frequency-curve of the draperies gave any certain confirmation of this theory.

[1]) Publikationer fra det Danske Meteorologiske Institut, No. 10. Copenhagen 1930.

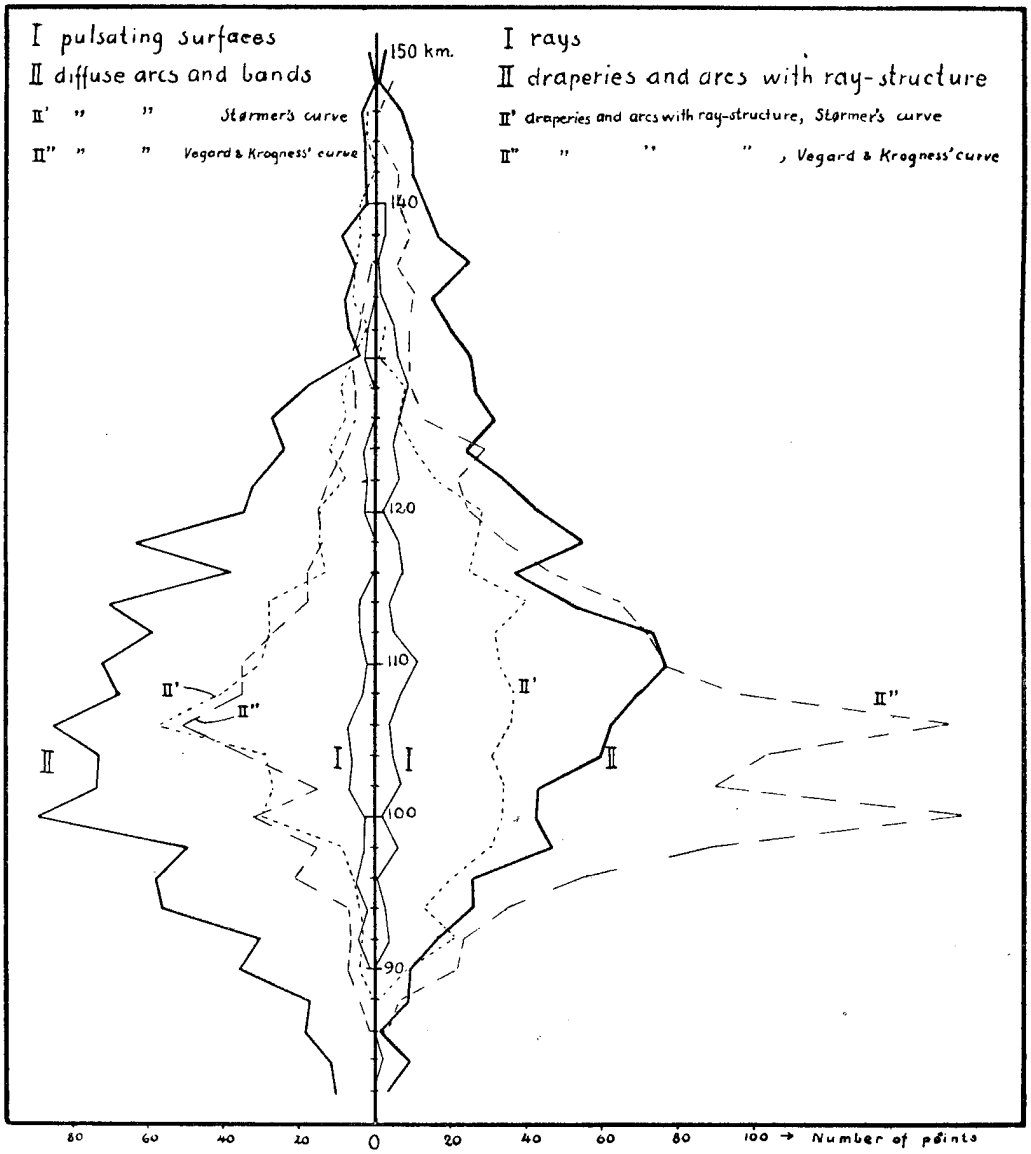

Fig. 18.

11. Observations of Coronae.

The following determinations of the radiation-point of the coronae were made:

		G. M. T.	h.	a.			G. M. T.	h.	a.
		h m s	c	°			h m s	c	°
$^{17}/_{10}$—29		19 37 30	76,0	÷ 1,0	$^{3}/_{12}$—29		20 33 30	76,8	+ 2,5
	I.	38 0	76,6	÷ 4,0		II.	34 36	75,2	÷ 3,0
		38 30	77,1	÷ 3,0			mean ...	76°,0	÷ 0°,3
		39 0	76,3	÷ 6,7	$^{28}/_{3}$—30		21 7 59	75,8	÷ 1,0
		50 30	77,1	÷ 3,8		III.	8 17	76,0	÷ 5,0
		21 19 0	77,6	÷ 3,7			8 41	76,5	÷ 1,0
		mean ...	76°,8	÷ 3°,7			mean ...	76°,1	÷ 2°,0

Mean of these three groups h = 76°,3. a = ÷ 2°,0.

During the winter 1929—30 we had at the Observatory no opportunity of determining the inclination; — we are therefore not able to give the coordinates of the magnetic

zenith at the moments when the photos of the coronae were taken. Regular determinations of the inclination were first taken in October 1930, — which give the following values of the magnetic zenith on quiet days: $h = 77°\ 0'$, $a = \div 4°\ 8'$. Regarding the values of the coordinates of the magnetic zenith and the radiation point, we see that the radiation point is situated somewhat below the magnetic zenith, which is in agreement with previous observations.[1])

12. Sunlit Aurora.

In some papers Størmer has drawn attention to a special type of the aurora situated in the sun-lit atmosphere, — and characterized by its great elevation and faint grey-violet colour.

Sunlit aurora should be expected in Tromsø too, and at any rate in the evening of April 2nd. 1929 this has proved to hold true. The most exactly determined auroral

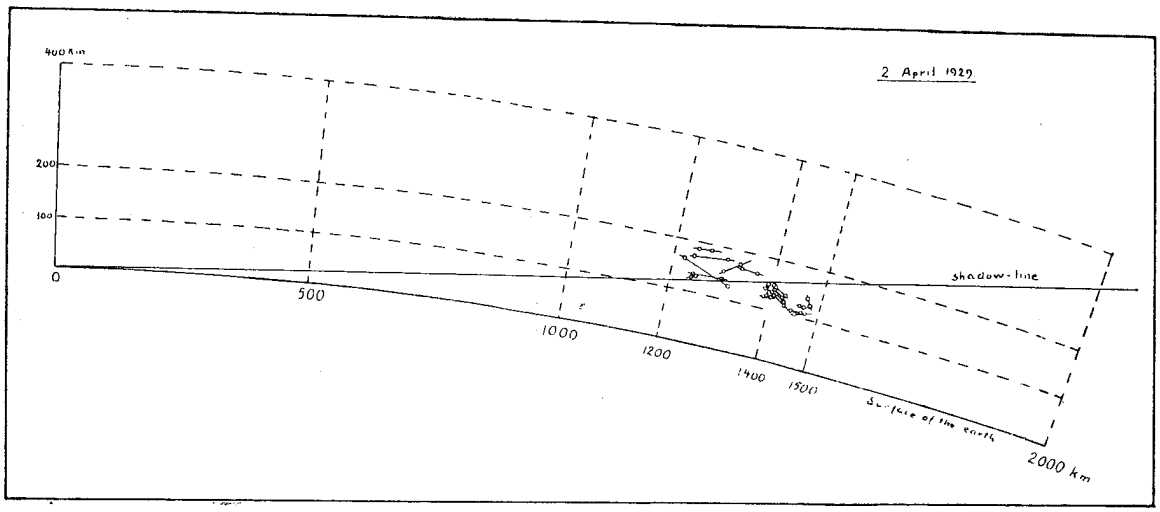

Fig. 19.

points of that evening are put down in the excellently illustrating vertical plane (fig. 19) introduced in the papers of Størmer.[2])

The sunlit group of this aurora appeared in the west, hour-angle of about 75°, the group in shadow appeared in the east, hour-angle of about $180° + 80°$. The sunlit group were draperies without any marked ray-structure. Later we will examine our extensive material with respect to *sunlit* aurora.

The method used to point out sunlit aurora is based on the geographical position of the *foot-points*. The height h of the centre of the sun above a fixed spot (φ, λ) at a certain moment is given by the equation (1):

$$\sin h = \sin \varphi \sin \delta + \cos \varphi \cos \delta \cos t.$$

To this height h, — being negative for points in shadow, — we have to add about double the amount of the atmospheric refraction, to be valued at 66′ or 1°,10, and thus get:

$$h_1 = h + 1°{,}10$$

[1]) Position in Space etc. Chapter VII pag. 142, 1920. Geophys. Publ. IV. No. 7, page 64, 1926.
[2]) Nature, Sept. 3, 1927. — Zt. f. Geophys. 5, Heft 5/6, 1930.

The elevation X (fig. 20) of the shadow-line above the spot S (φ, λ) considered, is determined by the equation:

$$X = R \ (\sec h_1 \div 1)$$

where R is the mean radius of curvature of the earth's surface, to be put equal to 6394 km. for our territory of observation. An error caused by mountains at T (fig. 20) is negligible. A direct comparison of the elevations H and X for an auroral point gives answer to the question: sunlit aurora or not. But to be able to give the illustration (fig. 19) of the position of the aurora relative to shadow-line, we have to compute the distance L (fig. 20) from the footpoint S to the point T where the *straight* sunrays touch the surface of the earth. When h is expressed in degrees we get:

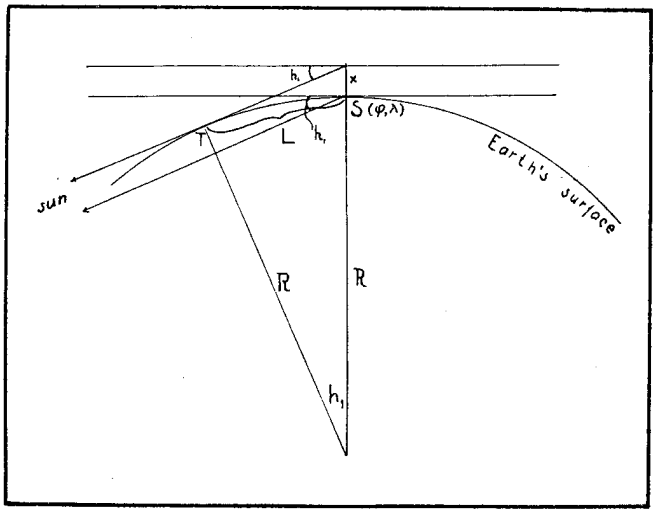

Fig. 20.

$$L = \frac{\pi}{180} \cdot R \cdot h_1 \text{ km.} = 111{,}6 \ h_1 \text{ km.}$$

Strictly speaking it is incorrect to use *straight* sunray and *straight* shadow-line, but it is practical.

Let us briefly repeat the procedure: On the map we read off the geographical coordinates φ and λ for the footpoint S by means of its quantities a and D.

The hour angle t of the sun is computed by means of λ and the moment of exposure of the aurora considered. The declination of the sun is taken from an almanac. Now the height h of the sun may be computed and corrected. As will be seen the investigation of sunlit aurora costs but little time and work.

13. Explanation of the Plates.

O indicates that the picture is taken at the Observatory, Tromsø, — *T* indicates that the picture is taken at the second auroral station Tennes in Balsfjord.

Plate	No.	Date	G. M. T.	Current No. in Table III.	Type
			h m s		
A	1	17. 10. 1929	21 11 47	266	drapery
»	2 a	—»—	19 37 32	—	corona
»	2 b	—»—	19 38 1	—	»
»	3	21. 11. 1929	20 2 24	331	drapery
B	4	12. 3. 1930	19 50 22	476	»
»	5	—»—	21 1 35	487	rays
»	6	27. 3. 1930	21 11 12	567	arc
C	7	27. 3. 1930	21 11 58	568	»
»	8	28. 3. 1930	20 13 57	592	drapery
»	9	2. 4. 1930	20 31 0	640	»

TABLE I. «ARTIFICIAL STARS».

t	δ	h	a	u	ω	t	δ	h	a	u	ω
0	—8	12,34	0	180—24,35	180—32,05						
	0	20,34	0	—29,12	—46,43						
	8	28,34	0	—35,00	—56,71						
	16	36,34	0	—41,51	—64,23						
	24	44,34	0	—48,41	—70,00						
	32	52,34	0	—55,53	—74,63						
	40	60,34	0	—62,80	—78,52						
	48	68,34	0	—70,16	—81,93						
	56	76,34	0	—77,59	—85,04						
	64	84,34	0	—85,05	—87,97						
	72	87,67	180	87,49	89,17						
	80	79,67	180	80,03	86,27						
	88	71,67	180	72,59	83,23						
6	—4	16,22	6,23	180—31,52	180—32,94	—6	—4	16,22	— 6,23	180—22,03	180—49,39
	4	24,22	6,57	—36,26	—44,54		4	24,22	— 6,57	—28,23	—61,37
	12	32,21	6,94	—41,87	—53,62		12	32,22	— 6,94	—35,13	—69,13
	20	40,20	7,39	—48,05	—60,81		20	40,20	— 7,39	—42,38	—74,58
	28	48,19	7,96	—54,60	—66,70		28	48,19	— 7,96	—49,81	—78,68
	36	56,18	8,74	—61,40	—71,69		36	56,18	— 8,74	—57,37	—81,96
	44	64,16	9,93	—68,35	—76,07		44	64,16	— 9,93	—65,00	—84,72
	52	72,12	12,10	—75,41	—80,03		52	72,12	—12,10	—72,67	—87,16
							64	83,88	—25,43	—84,22	89,52
8	60	79,78	23,09	180—83,00	180—82,86						
	68	86,67	63,82	89,97	—86,68						
12	—8	11,90	12,15	180—35,07	180—21,52	—12	—8	11,90	—12,15	180—15,03	180—54,65
	0	19,87	12,77	—38,72	—33,40		0	19,87	—12,77	—21,74	—68,79
	8	27,85	13,46	—43,39	—43,32		8	27,85	—13,46	—29,08	—76,26
	16	35,82	14,27	—48,78	—51,55		16	35,82	—14,27	—36,68	—80,90
	24	43,78	15,25	—54,65	—58,47		24	43,78	—15,25	—44,41	—84,11
	32	51,74	16,54	—60,87	—64,43		32	51,74	—16,54	—52,20	—86,54
	40	59,67	18,38	—67,32	—69,70		40	59,67	—18,38	—60,03	—88,50
	48	67,56	21,38	—73,93	—74,48		48	67,56	—21,38	—67,89	89,83
	56	75,34	27,35	—80,64	—78,96		56	75,34	—27,35	—75,76	88,33
	76	82,78	180—23,57	82,46	—89,67		76	82,78	180+23,57	84,53	84,92
16						—16	60	78,26	—42,65	180—79,43	85,61
	64	81,58	55,61	180—88,38	180—81,81		68	84,01	—81,71	—87,41	84,27
	84	75,34	180— 6,54	75,49	86,27		84	75,34	180+ 6,54	76,70	83,11
18	—4	15,33	18,64	180—42,13	180—23,59	—18	—4	15,33	—18,64	180—15,82	180—81,77
	4	23,27	19,61	—45,93	—33,74		4	23,27	—19,61	—23,64	—86,91
	12	31,21	20,70	—50,51	—42,55		12	31,21	—20,70	—31,55	—89,57
	20	39,15	21,99	—55,67	—50,22		20	39,15	—21,99	—39,49	88,74
	28	47,06	23,61	—61,24	—56,95		28	47,06	—23,61	—47,44	87,55
	36	54,94	25,80	—67,12	—62,99		36	54,94	—25,80	—55,41	86,63
	44	62,76	29,06	—73,20	—68,51		44	62,76	—29,06	—63,39	85,86
	52	70,46	34,66	—79,43	—73,69		52	70,46	—34,66	—71,36	85,20
24	—8	10,60	24,19	180—46,20	180—15,09	—24	—8	10,60	—24,19	180—11,39	73,71
	0	18,51	25,40	—49,26	—25,08		0	18,51	—25,40	—19,34	77,19
	8	26,42	26,73	—53,11	—34,10		8	26,42	—26,73	—27,32	78,69
	16	34,31	28,25	—57,56	—42,18		16	34,31	—28,25	—35,30	79,55
	24	42,18	30,09	—62,48	—49,47		24	42,18	—30,09	—43,30	80,13
	32	50,01	32,46	—67,75	—56,11		32	50,01	—32,46	—51,29	80,55
	40	57,77	35,75	—73,27	—62,26		40	57,77	—35,75	—59,29	80,89
	48	65,40	40,83	—78,96	—68,06		48	65,40	—40,83	—67,28	81.18
	56	72,73	50,00	—84,76	—73,63		56	72,73	—50,00	—75,28	81,43
	60	76,12	57,97	—87,68	—76,37		64	79,10	—70,48	—83,27	81,67
	68	81,24	180—89,50	86,48	—81,83						
	72	81,85	180—62,45	83,58	—84,87		72	81,85	180+62.45	88,74	81,90
30	—4	13,58	30,87	180—53,17	180—17,30	—30	—4	13,58	—30,87	180—50,14	55,14
	4	21,45	32,40	—56,40	—26,28		4	21,45	—32,40	—53,54	63,53
	12	29,30	34,11	—60,23	—34,54		12	29,30	—34,11	—57,59	68,13
	20	37,12	36,10	—64,53	—42,17		20	37,12	—36,10	—62,14	71,09
	28	44,91	38,56	—69,20	—49,24		28	44,91	—38,56	—67,08	73,21
	36	52,62	41,78	—74,13	—55,87		36	52,62	—41,78	—72,30	74,87

Table I.

t	δ	h	a	u	ω	t	δ	h	a	u	ω
	44	60,21	46,39	180—79,26	180—62,18		44	60,21	—46,39	180—77,72	76,23
	52	67,55	53,71	—84,51	—68,28		52	67,55	—53,71	—71,58	77,42
	80	77,34	180—23,34	77,02	—89,46		80	77,34	180+23,34	80,65	81,08
32	64	76,40	81,16	86,85	180—76,69	—32	60	73,62	—69,99	180—79,67	77,50
							68	78,46	—83,01	—84,95	79,78
36	—8	8,51	36,05	180—57,48	180—10,33	—36	—8	8,51	—36,05	180—17,44	30,79
	0	16,33	37,77	—60,23	—19,10		0	16,33	—37,77	—23,51	45,91
	8	24,14	39,63	—63,51	—27,37		8	24,14	—39,63	—30,44	54,79
	16	31,92	41,73	—67,27	—35,15		16	31,92	—41,73	—37,76	60,56
	24	39,66	44,23	—71,38	—42,49		24	39,66	—44,23	—45,29	64,66
	32	47,34	47,35	—75,75	—49,48		32	47,34	—47,35	—52,93	67,82
	40	54,90	51,53	—80,31	—56,20		40	54,90	—51,53	—60,63	70,39
	48	62,25	57,63	—85,01	—62,73		48	62,25	—57,63	—68,38	72,59
	56	69,16	67,51	—89,76	—69,17		56	69,16	—67,51	—76,16	74,58
	76	77,92	180—42,78	78,46	—85,44		76	77,92	180+42,78	84,36	79,12
40	60	70,94	79,75	86,21	180—71,24						
	68	75,73	180—77,56	81,88	—78,00						
42	—4	11,08	42,86	180—64,41	180—12,46	—42	—4	11,08	—42,86	180—24,57	28,32
	4	18,85	44,85	—67,30	—20,65		4	18,85	—44,85	—30,30	40,57
	12	26,59	47,05	—70,59	—28,46		12	26,59	—47,05	—36,82	48,99
	20	34,29	49,56	—74,20	—35,95		20	34,29	—49,56	—43,77	55,13
	28	41,93	52,28	—78,06	—43,18		28	41,93	—52,28	—50,98	59,87
	36	49,47	56,41	—82,08	—50,19		36	49,47	—56,41	—58,33	63,71
	44	56,84	61,64	—86,24	—57,07		44	56,84	—61,64	—65,80	66,99
	52	63,88	69,37	89,56	—63,88		52	63,88	—69,37	—73,32	69,90
							64	72,94	—88,66	—83,93	74,16
56	84	73,29	180—15,16	73,05	88,26		84	73,65	180+14,40	76,40	80,35
48	0	13,45	49,83	180—71,42	180—14,32	—48	0	13,45	—49,83	180—31,75	26,83
	8	21,15	52,10	—74,36	—22,10		8	21,15	—52,10	—37,23	37,14
	16	28,82	54,62	—77,56	—29,66		16	28,82	—54,62	—43,41	45,04
	24	36,43	57,54	—80,97	—37,03		24	37,43	—57,54	—50,01	51,26
	32	43,96	61,10	—84,54	—44,26		32	43,96	—61,10	—56,88	56,35
	40	51,34	65,68	—88,16	—51,39		40	51,34	—65,68	—63,94	60,70
	48	58,48	72,00	88,17	—58,51		48	58,48	—72,00	—71,10	64,55
	56	65,15	81,41	84,53	—65,64		56	65,15	—81,41	—78,34	68,08
							60	68,18	180+88,03	—83,36	69,27
	64	70,86	180—83,48	80,98	180—72,87		68	73,04	+72,62	—89,27	73,07
	72	74,50	—59,27	77,57	—80,24		72	74,50	+59,27	87,08	74,71
54	—4	7,95	54,58	180—75,73	180— 8,30	—54	—4	7,95	—54,58	180—34,52	14,62
	4	15,62	56,93	—78,43	—16,01		4	15,62	—56,93	—38,93	25,81
	12	23,25	59,46	—81,34	—23,59		12	23,25	—59,46	—44,21	34,89
	20	30,84	62,31	—84,40	—31,04		20	30,84	—62,31	—50,09	42,31
	28	38,36	65,64	—87,54	—38,42		28	38,36	—65,64	—56,36	48,53
	36	45,76	69,74	89,28	—45,76		36	45,76	—69,74	—62,90	53,88
	44	52,97	75,08	86,10	—53,11		44	52,97	—75,08	—69,61	58,63
	52	59,84	82,51	82,99	—60,51		52	59,84	—82,51	—76,45	62,98
							64	68,80	180+78,75	—86,81	69,09
56	60	65,40	180—84,65	79,06	—67,66						
	68	70,43	—67,97	76,47	—75,40						
60	0	10,01	61,57	180—82,70	180—10,13	—60	0	10,01	—61,57	180—41,70	15,51
	8	17,61	64,13	—85,42	—17,70		8	17,61	—64,13	—46,10	25,18
	16	25,18	66,91	—88,21	—25,20		16	25,18	—66,91	—51,19	33,41
	24	32,69	70,08	88,95	—32,70		24	32,69	—70,08	—56,79	40,49
	32	40,11	73,80	86,15	—40,19		32	40,11	—73,80	—62,72	46,70
	40	47,38	78,44	83,41	—47,74		40	47,38	—78,44	—68,91	52,27
	48	54,40	84,54	80,78	—55,36		48	54,40	—84,54	—75,27	57,38
	56	60,99	180—86,94	78,32	—63,11		56	60,99	180+86,94	—81,72	62,20
	76	72,15	—43,12	73,18	—83,06		76	72,15	+43,12	81,98	73,84
	80	72,48	—29,97	72,37	—87,16		80	72,48	+29,97	78,74	76,21
	88	70,59	— 5,22	71,02	84,53		88	70,59	+ 5,22	72,32	81,15
64	64	65,44	180—71,46	74,36	180—70,55	—64	60	62,65	180+78,02	180—86,18	62,95
							68	67,89	+63,46	87,60	67,98

Table I.

t	δ	h	a	u	ω	t	δ	h	a	u	ω
66	4	11,91	68,65	180—89,69	180—11,92	—66	4	11,91	—68,65	180—48,89	16,19
	12	19,46	71,40	87,66	—19,47		12	19,46	—71,40	—53,23	24,84
	20	26,97	74,41	85,07	—27,05		20	26,97	—74,41	—58,12	32,53
	28	34,40	77,86	82,55	—34,69		28	34,40	—77,86	—63,43	39,39
	36	41,72	81,98	80,16	—42,41		36	41,72	—81,98	—69,04	45,64
	44	48,86	87,13	77,96	—50,25		44	48,86	—87,13	—74,84	51,42
	52	55,68	180—86,03	75,97	—58,20		52	55,68	180—86,03	—80,79	56,89
72	8	13,70	75,79	83,36	180—13,75	—72	8	13,70	—75,79	180—56,07	16,83
	16	21,20	78,70	80,88	—21,43		16	21,20	—78,70	—60,29	24,81
	24	28,65	81,93	78,55	—29,21		24	28,65	—81,93	—64,94	32,13
	32	36,01	85,62	76,46	—37,12		32	36,01	—85,62	—69,95	38,90
	40	43,24	180—89,99	74,65	—45,13		40	43,24	180+89,99	—75,14	45,26
	48	50,24	—84,23	73,01	—53,32		48	50,24	+84,23	—80,61	51,27
	56	56,87	—76,66	71,77	—61,62		56	56,87	+76,66	—86,12	57,11
	60	59,97	—71,84	71,29	—65,80		64	62,86	+66,04	88,34	62,88
	68	65,45	—59,05	70,60	—74,23						
	72	67,67	—50,66	70,40	—78,53		72	67,67	+50,66	82,81	68,69
76	84	70,28	180—17,49	69,98	88,75	—76	84	70,28	180+17,49	74,35	77,41
78	4	7,90	80,10	79,00	180— 7,98	—78	4	7,90	—80,10	180—59,52	9,39
	12	15,40	82,93	76,53	—15,77		12	15,40	—82,93	—63,16	17,49
	20	22,87	86,00	74,28	—23,71		20	22,87	—86,00	—67,26	25,08
	28	30,27	89,40	72,34	—31,81		28	30,27	—89,40	—71,67	32,20
	36	37,56	180—86,64	70,73	—40,07		36	37,56	180—86,64	—76,34	38,96
	44	44,70	—81,86	69,53	—48,47		44	44,70	+81,86	—81,16	45,45
	52	51,57	—75,67	68,68	—57,00		52	51,57	+75,67	—86,14	51,77
80	64	60,25	180—60,47	67,18	180—69,97	—80	60	57,38	180+65,98	88,07	57,41
							68	63,13	+54,70	83,28	63,83
84	8	9,58	87,20	72,05	180— 9,99	—84	8	9,58	—87,20	180—66,65	10,60
	16	17,06	90,00	69,90	—18,08		16	17,06	—90,00	—70,11	18,31
	24	24,49	180—86,75	67,94	—26,42		24	24,49	180+86,85	—74,07	25,64
	32	31,85	—83,17	66,48	—34,96		32	31,85	+83,17	—78,23	28,80
	40	39,09	—78,99	65,51	—43,66		40	39,09	+78,99	—82,50	39,55
	48	46,15	—73,85	65,03	—52,45		48	46,15	+73,85	—86,91	46,26
	56	52,91	—67,24	65,08	—61,27		56	52,91	+67,24	88,65	52,92
	76	66,73	—37,51	67,41	—83,00		76	66,73	+37,51	77,77	69,84
88	60	54,90	180—60,34	63,31	180—65,90						
	68	60,92	—50,38	64,64	—74,68						
90	12	11,24	180—85,77	65,26	180—12,25	—90	12	11,24	180+85,77	180—73,67	11,82
	20	18,71	—82,79	63,32	—20,86		20	18,71	+82,79	—77,10	19,29
	28	26,12	—79,53	61,92	—29,73		28	26,12	+79,53	—80,74	26,55
	36	33,45	—75,83	61,10	—38,79		36	33,45	+75,83	—84,52	33,66
	44	40,65	—71,45	60,89	—47,93		44	40,65	+71,45	—88,39	40,68
	52	47,64	—66,02	61,30	—57,06		52	47,64	+66,02	87,72	47,67
							64	57,44	+54,53	81,97	58,25
	80	67,43	—26,91	67,23	—87,53		80	67,43	+26,91	74,77	72,84
180—84	16	12,92	180—78,76	58,62	180—14,97	180+84	16	12,92	180+78,76	180—80,60	13,15
	24	20,38	—75,74	57,14	—24,26		24	20,38	+75,74	—83,84	20,54
	32	27,78	—72,42	56,36	—33,78		32	27,78	+72,42	—87,16	27,84
	40	35,09	—68,61	56,32	—43,39		40	35,09	+68,61	89,46	35,09
	48	42,26	—64,05	57,02	—52,94		48	42,26	+64,05	86,09	42,35
	56	49,21	—58,34	58,43	—62,25		56	49,21	+58,34	82,78	49,68
	64	55,78	—50,82	60,50	—71,23		60	52,55	+54,87	81,17	53,37
							68	58,85	+46,07	78,06	60,87
	72	61,71	—40,43	63,13	—79,80		72	61,71	+40,43	76,58	64,68
180—78	20	14,64	180—71,81	52,24	180—18,37	180+78	20	14,64	180+71,81	180—87,40	14,68
	28	22,11	—68,78	51,37	—28,50		28	22,11	+68,78	89,63	22,11
	36	29,52	—65,42	51,40	—38,75		36	29,52	+65,42	86,69	29,55
	44	36,83	—61,53	52,30	—48,85		44	36,83	+61,53	83,80	37,04
	52	43,98	—56,81	54,04	—58,62		52	43,98	+56,81	81,00	44,60

Table I.

t	δ	h	a	u	ω	t	δ	h	a	u	ω
180—76	60	50,36	180—49,50	55,60	180—68,32	180+76	64	53,70	180+45,93	76,29	55,91
	68	56,92	—41,76	59,00	—76,93						
	84	67,48	—15,36	67,26	87,68		84	67,48	+15,36	71,70	76,18
180—72	16	8,93	180—67,73	47,35	180—11,87	180+72	16	8,93	180+67,73	88,66	8,93
	24	16,46	—64,94	46,23	—22,75		24	16,46	+64,94	85,97	16,47
	32	23,94	—61,94	46,19	—33,84		32	23,94	+61,94	83,38	24,07
	40	31,36	—58,56	47,19	—44,75		40	31,36	+58,56	80,89	31,75
	48	38,68	—54,61	49,20	—55,15		48	38,68	+54,61	78,57	39,53
	56	45,83	—49,76	52,07	—64,81		56	45,83	+49,76	76,46	47,43
	76	62,11	—29,46	62,11	—85,51		76	62,11	+29,46	72,35	67,77
180—68	64	51,79	180—41,07	54,17	180—74,79	180+68	60	48,33	180+44,21	73,53	51,01
							68	55,15	+37,43	72,29	59,28
180—66	20	10,83	180—60,93	41,08	180—16,23	180+66	20	10,83	180+60,93	81,97	10,89
	28	18,39	—58,21	40,78	—28,43		28	18,39	+58,21	79,64	18,65
	36	25,90	—55,25	41,78	—40,48		36	25,90	+55,25	77,47	26,50
	44	33,35	—51,87	43,95	—51,81		44	33,35	+51,87	75,54	34,49
	52	40,68	—47,88	47,16	—62,08		52	40,68	+47,88	73,89	42,60
180—60	24	12,86	180—54,25	35,29	180—22,14	180+60	24	12,86	180+54,25	75,51	13,20
	32	20,46	—51,62	36,10	—35,82		32	20,46	+51,62	73,59	21,26
	40	28,01	—48,71	38,37	—48,53		40	28,01	+48,71	71,97	29,47
	48	35,49	—45,37	41,86	—59,72		48	35,49	+45,37	70,73	37,82
	56	42,86	—41,35	46,29	—69,31		56	42,86	+41,35	69,85	46,26
	60	46,48	—38,97	48,78	—73,56		64	50,05	+36,24	69,37	54,78
	68	53,54	—33,09	54,16	—81,14						
	72	56,94	—29,38	57,01	—84,53		72	56,94	+29,38	69,33	63,33
	80	63,29	—19,55	62,97	89,29		80	63,29	+19,55	69,70	71,86
	88	68,60	— 4,75	69,16	83,74		88	68,60	+ 4,75	70,48	80,33
180—54	28	15,06	180—47,71	30,25	180—30,37	180+54	28	15,06	180+47,71	69,39	16,05
	36	22,70	—45,19	32,49	—45,18		36	22,70	+45,19	67,96	24,45
	44	30,29	—42,38	36,22	—57,75		44	30,29	+42,38	67,02	33,05
	52	37,82	—39,09	41,04	—68,01		52	37,82	+39,09	66,55	41,75
180—52	64	48,50	180—31,42	49,01	180—80,83	180+52	60	44,84	180+33,75	65,56	50,52
							68	52,12	+28,73	66,31	59,25
180—48	24	9,73	180—43,54	24,35	180—23,38	180+48	24	9,73	180+43,54	64,83	10,60
	32	17,44	—41,34	26,36	—41,56		32	17,44	+41,34	63,56	19,38
	40	25,13	—38,96	30,29	—56,31		40	25,13	+38,96	62,86	28,31
	48	32,77	—36,25	35,49	—67,55		48	32,77	+36,25	62,71	37,30
	56	40,34	—33,04	41,49	—76,07		56	40,34	+33,04	63,14	46,27
	76	58,60	—20,19	58,28	89,53		76	58,60	+20,19	66,60	68,06
180—44	60	43,40	180—28,56	43,60	180—81,99	180+44	64	47,15	180+26,60	62,41	55,51
	68	50,87	—24,35	50,62	—87,23		84	65,01	+ 9,90	68,42	76,53
	84	65,01	— 9,90	65,18	84,88						
180—42	28	12,25	180—37,20	20,04	180—37,11	180+42	28	12,25	180+37,20	58,89	14,16
	36	20,01	—35,18	24,11	—55,60		36	20,01	+35,18	58,30	23,50
	44	27,75	—32,95	29,73	—68,24		44	27,75	+32,95	58,40	32,90
	52	35,44	—30,38	36,19	—76,95		52	35,44	+30,38	59,18	42,20
180—36	32	14,98	180—31,07	17,73	180—56,16	180+36	32	14,98	180+31,07	53,43	18,52
	40	22,79	—29,24	23,86	—70,84		40	22,79	+29,24	53,68	28,47
	48	30,58	—27,18	30,82	—79,51		48	30,58	+27,18	54,73	38,24
	56	38,33	—24,77	38,16	—85,16		56	38,33	+24,77	56,55	47,68
	64	46,02	—21,78	45,69	—89,20		60	42,18	+23,37	57,73	52,24
	72	53,60	—17,82	53,34	87,68		68	49,83	+19,96	60,54	60,97
							72	53,60	+17,82	62,15	65,14
180—30	28	10,05	180—26,64	11,24	180—60,00	180+30	28	10,05	180+26,64	48,32	13,20
	36	17,92	—25,16	18,07	—77,02		36	17,92	+25,16	48,60	23,89
	44	25,78	—23,54	25,57	—84,61		44	25,78	+23,54	49,85	34,34
	52	33,62	—21,69	33,29	—88,89		52	33,62	+21,69	52,00	44,27
	80	60,60	—10,19	60,84	83,97		80	60,60	+10,19	64,84	73,71
180—28	60	41,20	180—18,18	40,94	86,81	180+28	64	45,09	180+16,95	55,87	58,40
	68	48,98	—15,54	48,87	85,28						

Table I.

t	δ	h	a	u	ω	t	δ	h	a	u	ω
180—24	32	13,16	180—20,75	12,83	89,91	180+24	32	13,16	180+20,75	43,26	19,02
	40	21,07	—19,51	20,79	86,19		40	21,07	+19,51	44,61	30,41
	48	28,97	—18,13	28,77	84,85		48	28,97	+18,13	47,01	41,05
	56	36,86	—16,51	36,76	84,05		56	36,86	+16,51	50,32	50,77
	76	56,41	—10,25	56,76	82,94		76	56,41	+10,25	61,45	70,95
180—20	64	44,40	180—12,11	44,76	81,02	180+20	60	40,45	180+12,99	50,58	56,62
							68	48,34	+11,11	55,42	64,62
180—18	28	8,53	180—16,02	9,56	59,15	180+18	28	8,53	180+16,02	37,73	13,56
	36	16,49	—15,11	17,15	70,64		36	16,49	+15,11	39,04	26,32
	44	24,43	—14,13	24,99	75,15		44	24,43	+14,13	41,64	38,03
	52	32,37	—13,02	32,91	77,60		52	32,37	+13,02	45,30	48,39
							84	63,90	+ 4,21	66,21	78,20
180—12	32	12,04	180—10,39	15,72	48,54	180+12	32	12,04	180+10,39	33,24	21,84
	40	20,02	— 9,76	22,54	61,57		40	20,02	+ 9,76	35,93	35,12
	48	27,99	— 9,06	29,92	68,59		48	27,99	+ 9,06	39,89	46,46
	56	35,97	— 8,26	37,54	73,02		56	35,97	+ 8,26	44,79	55,89
	60	39,95	— 7,79	41,17	74,68		64	43,93	+ 7,27	50,32	63,73
	68	47,91	— 6,67	49,17	77,37		72	51,88	+ 5,97	56,30	70,36
	72	51,88	— 5,97	53,08	78,78						
	84	63,77	— 2,82	64,84	81,25						
180—6	36	15,76	180— 5,04	22,02	45,18	180+6	36	15,76	180+ 5,04	29,94	32,29
	44	23,75	— 4,71	28,23	57,21		44	23,75	+ 4,71	34,18	45,11
	52	31,74	— 4,34	35,12	65,00		52	31,74	+ 4,34	39,48	55,14
180—4	64	43,69	180— 2,42	46,41	71,49	180+4	60	39,70	180+ 2,60	44,85	64,15
							68	47,69	+ 2,22	51,46	70,20
180	32	11,67	180	23,70	29,36						
	40	19,67	180	28,20	44,53						
	48	27,66	180	33,93	55,42						
	56	35,66	180	40,36	63,34						
	76	55,67	180	57,90	76,22						
	80	59,67	180	61,54	78,14						
	88	67,67	180	68,89	81,62						

TABLE II.

Date	N	G. M. T.	Date	N	G. M. T.	Date	N	G. M. T.	Date	N	G. M. T.
		h m s			h m s			h m s			h m s
12/2 1929	1	21 15 42		69	15 10		137	43 54	1929	205	13 25
	2	37 30		70	19 29		138	44 31	23/9 1929	206	21 13 47
	3	22 11 34		71	26 53		139	46 57		207	14 9
	4	20 0		72	27 23		140	47 11		208	14 32
18/2 1929	5	21 25 56		73	27 52		141	55 9		209	18 58
	6	31 9		74	29 49		142	57 47	6/10 1929	210	19 13 11
	7	32 11		75	30 19		143	59 37		211	13 34
	8	36 44		76	31 39		144	22 0 10		212	14 36
	9	43 34		77	32 3		145	0 43		213	15 58
	10	58 7		78	32 19		146	5 42		214	17 33
	11	22 0 34		79	32 31		147	6 27		215	20 35
	12	1 39		80	33 9		148	6 57		216	20 58
	13	3 7		81	33 41	2/4	149	21 47 18		217	21 33
	14	23 29 39		82	33 54	1929	150	47 56		218	22 56
	15	31 21		83	34 12		151	48 50		219	37 1
	16	32 27		84	34 33		152	50 38		220	38 4
	17	33 14		85	37 41		153	52 10		221	38 49
	18	34 0		86	54 0		154	52 55		222	43 48
	19	36 57		87	54 29		155	53 36		223	44 25
	20	37 51		88	54 53		156	54 18		224	46 16
	21	39 37		89	58 54		157	55 2		225	49 59
	22	41 19		90	59 43		158	55 39		226	52 40
	23	43 41		91	22 9 48		159	57 5		227	53 6
	24	55 17		92	10 0		160	58 0		228	20 0 3
	25	56 11		93	19 15		161	58 36		229	5 47
	26	56 32		94	19 57		162	59 14		230	8 44
	27	57 27		95	47 15		163	59 50		231	9 47
	28	24 0 47		96	49 5		164	22 0 26		232	10 54
	29	1 47		97	49 45		165	2 9		233	12 7
	30	2 47	14/3	98	22 6 39		166	2 48		234	15 45
	31	5 49	1929	99	7 6		167	6 0		235	35 20
	32	10 24		100	8 19		168	12 6		236	36 24
	33	39 0		101	9 8		169	12 18		237	37 24
	34	41 29		102	37 42		170	12 31		238	43 7
	35	42 31		103	42 50		171	14 40		239	21 26
	36	43 37		104	43 11		172	15 21		240	21 41 29
	37	44 41		105	43 32		173	15 38		241	42 4
	38	48 7		106	44 28		174	16 12		242	42 30
	39	50 7		107	46 9	3/4	175	22 11 6		243	43 1
	40	51 11		108	46 25	1929	176	11 33		244	43 34
	41	51 51		109	50 58		177	11 48		245	22 10 34
	42	53 7		110	51 14		178	12 8		246	10 56
21/2 1929	43	22 40 58		111	54 21		179	12 27		247	11 27
	44	41 32		112	54 42		180	13 8		248	19 7
	45	43 38		113	55 4		181	13 38		249	19 54
	46	46 38		114	55 28		182	14 51	17/10	250	19 33 47
	47	23 18 42		115	23 22 56		183	15 31	1929	251	34 25
	48	29 15		116	6 4		184	16 7		252	35 6
	49	30 52		117	6 40		185	16 46		253	35 28
	50	31 2	24/3	118	20 56 52		186	17 54		254	36 24
	51	31 17	1929	119	21 35 51		187	18 33		255	47 16
	52	31 36		120	22 50 13		188	91 43		256	47 51
	53	40 31		121	23 1 23		189	25 7		257	20 7 3
	54	42 58		122	2 56		190	26 59		258	8 0
	55	43 45		123	4 0		191	30 53		259	9 3
	56	45 38		124	5 26		192	34 16		260	9 39
	57	46 15		125	7 4		193	36 14		261	10 44
	58	54 2	25/3	126	21 17 8		194	57 20		262	20 39
	59	55 10	1929	127	17 59		195	23 0 57		263	21 21
	60	24 1 18		128	18 31		196	6 51		264	39 7
	61	3 4		129	19 3		197	8 4		265	39 37
22/2 1929	62	21 26 50		130	31 25		198	9 48		266	22 11 47
	63	27 8		131	32 31		199	10 44		267	12 14
	64	27 30		132	34 37		200	15 58		268	15 40
	65	27 44		133	36 2		201	26 53	18/10	269	20 23 49
27/2 1929	66	21 2 7		134	36 40		202	27 49	1929	270	38 37
	67	4 47		135	37 12		203	29 5		271	44 3
	68	5 42		136	38 40	15/9 1929	204	22 12 40		272	44 18

Table II.

Date	N	G. M. T.	Date	N	G. M. T.	Date	N	G. M. T.	Date	N	G. M. T.
		h m s			h m s			h m s			h m s
	273	49 17		341	27 53		409	13 35		477	50 41
$^{21}/_{10}$	274	19 38 8		342	35 5		410	18 18		478	51 46
1929	275	39 10		343	38 38		411	20 2		479	20 30 0
	276	40 57	$^{30}/_{11}$	344	19 18 46		412	22 50		480	33 22
	277	41 48	1929	345	28 56		413	25 36		481	33 47
	278	58 48		346	31 6		414	32 46		482	34 10
	279	20 2 24		347	32 8	$^{7}/_{12}$	415	14 43 37		483	42 50
	280	11 22		348	34 54	1929	416	44 53		484	50 30
	281	14 1		349	35 39		417	46 49		485	51 54
	282	21 9 1		350	37 24		418	50 56		486	21 0 56
	283	9 25		351	51 43		419	51 34		487	1 35
$^{5}/_{11}$	284	20 5 21		352	59 41		420	14 52 20		488	8 15
1929	285	7 20		353	20 2 41		421	54 31	$^{17}/_{3}$	489	19 32 5
	286	10 18		354	4 41		422	55 8	1930	490	37 19
	287	10 40		355	6 6		423	55 46		491	37 49
	288	14 7		356	9 36		424	56 32		492	38 55
	289	24 12		357	11 26		425	57 37		493	39 58
	290	30 45		358	12 1		426	58 24		494	46 8
	291	32 6		359	19 16		427	58 51		495	49 19
	292	32 51		360	20 26		428	15 1 12		496	50 10
$^{13}/_{11}$	293	19 59 44		361	20 51	$^{23}/_{1}$	429	21 7 16		497	20 0 58
1929	294	20 0 14		362	21 26	1930	430	8 13		498	4 49
	295	4 42	$^{3}/_{12}$	363	22 6 54		431	9 6		499	10 5
	296	5 18	1929	364	8 28		432	9 48		500	11 49
	297	5 50		365	9 43		433	31 20		501	53 40
	298	6 27		366	15 10		434	32 50		502	54 37
	299	7 12		367	19 46		435	34 30		503	21 4 9
	300	7 56		368	21 30		436	35 0	$^{18}/_{3}$	504	20 35 50
	301	14 52		369	22 25		437	35 35	1930	505	36 19
	302	16 26		370	23 6		438	37 7		506	36 57
	303	17 17		371	25 43		439	39 30		507	38 27
	304	17 58		372	44 2		440	42 9		508	45 22
	305	20 7		373	54 13		441	43 34		509	46 3
	306	21 57		374	54 27		442	44 38		510	47 2
	307	28 55		375	56 37		443	46 16		511	47 45
	308	30 46		376	23 0 8		444	47 20		512	21 50 33
	309	33 1		377	1 43		445	49 21		513	22 8 26
	310	33 56		378	3 46		446	50 23	$^{20}/_{3}$	514	20 52 41
	311	34 32		379	10 23		447	51 34	1930	515	53 13
	312	36 47		380	11 17		448	52 36		516	21 18 48
	313	37 35		381	13 6		449	54 26	$^{26}/_{3}$	517	19 49 45
	314	38 26		382	14 7	$^{27}/_{1}$	450	19 32 36	1930	518	53 12
	315	40 15		383	14 51	1930	451	20 57 32		519	54 16
	316	41 52		384	23 0		452	21 3 0		520	57 55
	317	42 43		385	25 18		453	9 8		521	59 39
	318	43 53		386	26 22		454	11 38		522	20 0 40
	319	44 41		387	27 20	$^{29}/_{1}$	455	19 28 48		523	2 32
	320	45 40		388	28 4	1930	456	30 26		524	3 37
$^{21}/_{11}$	321	19 56 38	$^{5}/_{12}$	389	15 14 17		457	31 44		525	10 11
1929	322	57 2	1929	390	15 21		458	32 45		526	20 30
	323	57 40		391	17 15		459	34 21		527	22 50
	324	58 20		392	18 11		460	36 51	$^{27}/_{3}$	528	19 36 49
	325	58 58		393	20 5		461	37 38	1930	529	39 12
	326	59 25		394	21 12		462	38 57		530	40 0
	327	20 0 26		395	28 11		463	41 32		531	40 42
	328	1 3		396	29 20	$^{15}/_{2}$	464	18 46 52		532	41 13
	329	1 34		397	38 7	1930	465	51 43		533	42 35
	330	2 0		398	38 50		466	52 17		534	43 0
	331	2 24		399	39 22	$^{10}/_{3}$	467	20 15 41		535	43 42
	332	2 58		400	42 41	1930	468	19 52		536	44 11
	333	17 6		401	43 7		469	20 14		537	44 37
	334	17 28		402	43 36		470	20 45		538	45 45
	335	21 21		403	44 2		471	36 9		539	46 13
	336	21 48		404	19 47 46		472	44 10		540	46 35
	337	22 26		405			473	47 38		541	46 51
	338	25 20		406			474	58 6		542	47 8
	339	26 13		407		$^{12}/_{3}$	475	19 49 40		543	48 19
	340	26 36		408	20 12 53	1930	476	50 22		544	50 43

Table II.

Date	N	G. M. T.	Date	N	G. M. T.	Date	N	G. M. T.	Date	N	G. M. T.
		h m s			h m s			h m s			h m s
	545	51 32		574	37 51		603	23 58		632	35 28
	546	51 57		575	38 16		604	49 35		633	37 39
	547	52 20		576	39 0		605	50 17	$^{2}/_{4}$	634	20 14 35
	548	20 2 56	$^{26}/_{3}$	577	19 48 0		606	51 0	1930	635	15 8
	549	3 30	1930	578	49 56		607	51 55		636	17 40
	550	7 5		579	50 23		608	52 44		637	18 21
	551	7 35		580	52 40		609	54 5		638	19 2
	552	7 55		581	20 2 3		610	54 39		639	22 16
	553	10 53		582	3 52		611	55 15		640	31 0
	554	11 28		583	4 53		612	57 30		641	34 27
	555	13 0		584	5 35		613	58 23		642	35 15
	556	13 45		585	6 35		614	21 2 47		643	37 55
	557	15 0		586	7 35		615	4 1		644	38 27
	558	18 56		587	8 25		616	4 50		645	21 32 10
	559	19 56		588	10 15		617	6 13		646	32 40
	560	24 0		589	10 42		618	7 35		647	40 17
	561	25 46		590	11 14		619	11 50		648	42 31
	562	26 28		591	11 55		620	21 38		649	49 10
	563	29 11		592	13 57		621	23 32		650	22 23 5
	564	29 36		593	14 42		622	23 48		651	23 30
	565	29 58		594	15 24		623	24 5		652	24 1
	566	39 9		595	15 52		624	52 34		653	24 28
	567	21 11 12		596	16 20		625	22 6 25		654	24 50
	568	11 58		597	17 21		626	29 10		655	25 18
	569	12 27		598	18 0		627	30 22		656	31 29
	570	15 7		599	18 32		628	30 47		657	32 11
	571	15 56		600	21 16		629	31 50		658	33 0
	572	19 45		601	22 6		630	32 39		659	43 34
	573	36 45		602	22 34		631	34 25			

TABLE III.

N	A.P.	a	D	H		N	A.P.	a	D	H	
1	I_1	180—16,1	385	97	*diffuse arc*		I_2	—35,9	278	98	
							II_3	—33,7	298	93	
2	I_1	180+12,2	469	93	» »		II_4	—29,0	315	99	
	I_2	+ 3,2	467	100			II_5	—24,1	368	119	
							II_6	—19,5	377	128	
3	I_1	180+ 8,6	383	128	*band*						
	I_2	+14,5	362	110		17	I_1	180—39,7	373	125	*bands*
	I_3	+20,9	440	118			II_1	—31,2	368	103	
							II_2	—27,0	329	88	
4	I_1	180+22,0	447	93	»						
	I_2	+14,2	426	95		18	I_1	180—43,8	386	131	*band*
							I_2	—34,8	318	96	
5	I_1	180— 7,7	533	118	*diffuse arc*		I_3	—27,7	324	89	
	I_2	— 3,2	518	115							
						19	I_1	180—74,9	424	98	*diffuse arc*
6	I_1	180+ 0,1	500	123	» »		I_2	—66,9	329	93	
	I_2	+ 9,6	496	122			I_3	—59,1	309	95	
	I_3	+19,0	430	98			I_4	—49,9	304	92	
7	I_1	180+34,5	622	120	*band*	20	I_1	180—47,7	422	126	*bands*
							I_2	—40,9	350	100	
8	I_1	180—22,9	410	114	*diffuse arc*		II_1	—34,3	355	100	
	I_2	—14,6	387	106			II_2	—28,5	372	102	
	I_3	— 8,7	438	118							
	I_4	180+ 2,5	405	102		21	I_1	180—34,1	368	94	*band*
							I_1	—35,3	412	124	
9	I_1	180+ 4,4	310	91	» »						
	I_2	+10,6	396	112		22	I_1	180—54,8	348	98	*diffuse arc*
	I_3	+19,7	344	90							
						23	I_1	180—64,2	438	108	» »
10	I_1	180—60,1	406	115	*draperies*		I_2	—58,9	460	121	
	I_2	—60,1	344	123	lower limit		I_1	—61,7	407	108	
	I_3	—60,6	330	149	upper limit						
	II_1	—57,1	348	109	lower »	24	I_1	180—42,0	259	110	*draperies*
	II_2	—57,4	302	118	upper »		I_2	—37,1	220	197	
	III_3	—55,7	297	104	lower »		II_1	—29,9	347	135	
	III_4	—56,8	274	122	upper »		II_2	—24,3	410	163	
11	I_1	180—70,0	306	98	*draperies*	25	I_1	180—44,9	272	103	*draperies*
	I_2	—76,3	223	104	lower limit		I_2	—41,0	260	103	
	II_1	—62,0	251	105	» »		II_1	—40,4	329	115	
	II_2	—63,0	269	153			II_2	—35,7	287	107	
	II_3	—64,2	300	232	upper limit		II_3	—30,8	297	119	
12	I_1	180—19,4	438	118	*band*	26	I_1	180—48,6	250	88	*draperies*
	I_2	—14,7	473	127			I_2	—42,6	298	111	
	I_3	— 8,5	438	108			I_3	—37,1	317	126	
	II_1	—17,3	532	126							
						27	I_1	180+ 5,7	238	107	*rays*
13	I_1	180—18,9	296	91	*diffuse arc*		I_2	+ 6,3	249	151	
	I_2	—15,5	320	100			I_3	+ 6,9	253	194	upper limit
	I_3	—11,5	338	106			II_1	+13,5	154	131	
	I_4	— 6,3	299	92			III_1	+14,3	199	127	
	II_1	—18,7	377	90			III_2	+16,0	188	158	upper limit
	II_2	—15,7	467	118							
	II_3	—11,7	560	146		28	I_1	180—74,5	377	83	*bands*
	II_4	— 5,3	491	127			II_1	—62,2	408	108	
	II_5	180+10,7	520	145			II_2	—58,2	346	101	
14	I_1	180—61,3	500	128	*diffuse arc*	29	I_1	180—58,3	336	88	band
	I_2	—56,6	344	106			I_2	—46,4	358	96	
	I_3	—51,2	321	108			I_3	—41,8	436	124	
	I_4	—45,7	297	110							
						30	I_1	180—67,9	377	97	*bands*
15	I_1	180—36,4	259	90	*band*		II_1	59,5	479	117	
	I_2	—30,2	281	95							
	I_3	—24,5	294	96		31	I_1	180—62,8	482	100	*band*
	I_4	—18,8	286	91			I_2	—60,5	545	119	
16	I_1	180—43,4	287	98	*bands*	32	I_1	180—44,6	405	104	*diffuse arc*

Table III.

N	A. P.	a	D	H		N	A. P.	a	D	H	
	I_2	180—39,2	418	121			II_4	180—30,6	405	136	
	I_3	—33,8	349	111			II_5	—23,3	422	146	
	I_4	—28,8	314	105			I_1	—53,3	400	104	
	I_5	—23,4	353	124			I_2	—44,1	314	95	
							I_3	—33,8	383	131	
33	I_1	—55,5	211	121	*draperies*		I_4	—25,5	397	145	
	I_2	—54,2	227	167	upper limit						
						44	I_1	180—59,2	460	104	*diffuse arc*
34	I_1	83,8	322	94	*bands*		I_2	—49,5	352	96	
	I_2	180—84,6	229	93			I_3	—39,9	297	93	
	II_1	—82,0	369	137			I_4	—31,2	266	91	
							I_5	—23,1	252	91	
35	I_1	180—79,4	236	102	*band*		I_1*	—55,9	460	120	
	I_2	—71,1	196	97			I_2*	—45,9	333	100	
	I_3	—62,1	213	113			I_3*	—34,9	287	99	
	I_4	—53,6	205	110			I_4*	—24,6	255	96	
							II_1	—59,2	462	115	
36	I_1	180—79,6	285	117	*bands*		II_2	—45,2	368	118	
	I_2	—68,7	219	102			II_3	—26,1	277	107	
	I_3	—55,6	207	99							
	II_1	—67,2	321	128		45	I_1	180+13,4	605	155	*diffuse arc*
	II_2	—59,7	276	110			I_2	+24,7	617	141	
	II_3	—54,7	228	91			I_3	+35,9	680	134	
37	I_1	180—14,2	176	90	*band*	46	I_1	180—63,1	362	109	*rays*
	I_2	— 9,1	220	86			I_2	—64,3	313	135	upper limit
	I_3	— 2,1	232	98							
	I_4	+ 3,1	215	99		47	I_1	180—68,9	369	151	*draperies*
	I_5	+ 8,6	207	90			I_2	—69,7	296	151	
							I_3	—70,0	228	143	
38	I_1	180— 0,2	207	93	*band*						
	I_2	+ 6,5	225	98		48	I_1	180—56,6	148	141	*rays*
	I_3	+12,4	219	86			I_2	—62,3	139	216	upper limit
							II_1	—54,7	134	132	lower »
39	I_1	180—49,4	115	97	*diffuse arc*		II_2	—60,3	134	219	upper »
	I_2	—40,3	105	97							
	I_3	—30,8	106	104		49	I_1	35,8	271	112	*draperies*
	I_4	—21,2	107	107			I_2	34,8	266	121	
	I_5	— 7,7	113	110			II_1	33,0	207	109	
							II_2	25,6	229	122	
40	I_1	180—43,2	208	93	*band*		II_3	23,7	217	105	
	I_2	—35,4	184	86			II_4	22,2	219	112	
	I_3	—28,3	188	92			II_5	20,3	220	116	
	I_4	—20,6	169	87							
	I_5	—12,6	177	92		50	I_1	28,1	218	115	*draperies*
	I_6	— 4,5	208	99			I_2	33,7	273	138	
							II_1	37,0	265	113	
41	I_1	180—34,4	261	97	*pulsating*		II_2	41,6	292	115	
	I_2	—28,0	238	94	*aurorae*		II_3	47,3	335	117	
	I_3	—21,2	214	91			III_1	46,6	344	136	
	II_1	—53,8	195	101			III_2	50,0	410	154	
	II_2	—43,0	245	124							
	II_3	—34,6	264	133		51	I_1	57,0	281	112	*band*
	II_4	—28,1	251	128			I_2	54,2	225	110	
							I_1*	56,3	276	113	
42	I_1	180—58,9	285	105	*draperies*		I_2*	54,1	249	117	
	I_2	—53,1	232	93			II_1	54,8	299	114	
	I_3	—47,4	240	100			II_2	48,8	291	104	
	II_1	—77,6	204	97			II_3	45,2	263	108	
	II_2	—68,7	163	99			II_4	43,3	275	116	
							II_5	40,2	245	105	
43	I_1	180—59,3	340	82	*diffuse arc*	52	I_1	49,3	153	102	*draperies*
	I_2	—51,6	349	100			I_2	46,5	161	119	
	I_3	—44,3	298	96			II_1	47,7	511	133	
	I_4	—35,6	288	102			II_2	46,7	523	166	upper limit
	I_5	—26,5	339	129			III_1	49,7	493	135	
	II_1	—58,4	421	94			III_2	48,2	431	141	
	II_2	—47,3	379	105			IV_1	56,3	310	115	
	II_3	—38,5	347	108			IV_2	55,7	301	123	

Table III.

N	A.P.	a	D	H		N	A.P.	a	D	H	
	V_1	58,2	246	110		64	I_1	82,7	294	93	*band*
	V_2	57,0	235	114			I_2	75,3	232	93	
	VI_1	65,7	287	125			I_1*	87,6	344	107	
	VI_2	64,3	238	123			I_2*	85,4	314	110	
53	I_1	180—84,7	192	98	*draperies*	65	I_1	79,3	295	100	*band*
	I_2	—86,2	184	107			I_2	71,6	233	93	
	II_1	—84,8	207	95							
	II_2	86,5	195	110		66	I_1	180+74,4	184	106	*drapery*
	III_1	89,2	229	100			I_2	+72,3	153	104	
	III_2	87,8	193	105			I_3	+70,5	132	112	
							I_4	+71,0	117	123	
54	I_1	82,9	340	117	*draperies*		II_1	+78,1	134	117	
	I_2	80,1	346	208	upper limit						
	II_1	86,3	295	126		67	I_1	—82,6	266	122	*drapery*
	II_2	89,0	290	134			I_2	—85,6	308	112	
	II_3	180—88,5	249	107			I_3	—90,5	409	108	
	II_4	—86,6	260	109			I_1*	—85,6	288	114	
	II_5	—83,4	264	120							
						68	I_1	49,3	129	112	*band*
55	I_1	87,8	161	104	*draperies*		I_2	42,1	120	121	
	I_2	85,8	166	137	upper limit		I_3	33,9	105	120	
	II_1	180—87,7	131	101	lower »						
	II_2	—88,9	125	106	upper »	69	I_1	48,9	77	96	*band*
							I_2	38,6	70	101	
56	I_1	180+46,7	298	118	*draperies*						
	I_2	+47,6	318	160	upper limit	70	II_1	—27,3	222	110	*band*
							II_2	—34,0	227	104	
57	I_1	180+52,1	318	120	*draperies*		II_3	—41,5	283	118	
	I_2	+52,9	305	134			II_4	—46,7	308	122	
	I_3	+50,9	313	112			III_1	—35,1	193	110	
	I_4	+51,1	300	118			III_2	—43,4	217	125	
	II_1	+54,3	375	120			III_3	—45,5	238	122	
	II_2	+55,2	368	147	upper limit						
	II_1*	+53,5	374	117			I_1	—25,6	335	84	*draperies*
							I_2	—25,5	367	106	
58	I_1	180+39,4	303	119	*draperies*	71	II_1	—10,4	277	138	
	I_2	+40,4	272	144	upper limit						
	I_3	+41,8	409	145			I_1	—78,5	510	102	*draperies*
	I_4	+47,8	416	133			I_2	—77,5	511	135	
	II_1	+44,7	275	102		72	II_1	75,0	494	111	
	II_2	+45,4	274	127	upper limit		III_1	64,6	618	144	
59	I_1	180+61,2	470	112	*draperies*		I_1	÷61,2	484	130	*draperies*
	I_2	+62,7	529	111			I_2	—62,3	570	130	
	II_1	+63,3	624	150		73	II_1	—47,7	397	102	
							III_1	—41,5	239	102	
60	I_1	180+48,9	375	122	*rays*		III_2	—39,8	215	112	upper limit
	I_2	+50,3	335	147	upper limit		IV_1	—51,9	339	115	» »
	II_1	+50,2	366	118	lower »		V_1	—52,9	266	128	
	II_2	+52,5	335	176	upper »		V_2	÷50,7	249	148	» »
							VI_1	—61,4	237	98	
61	I_1	180+57,2	418	126	*rays*		VI_2	—59,4	231	123	» »
	I_2	+58,5	418	181	upper limit						
	II_1	+58,0	432	125	lower »		I_1	—72,2	206	84	*drapery*
	II_2	+59,0	408	149	upper »		II_1	180+86,0	300	93	
						74	III_1	—85,2	318	83	
62	I_1	89,5	322	78	*bands*						
	I_2	85,3	304	105							
	I_3	81,4	249	97			I_1	—85,7	455	107	*drapery*
	II_1	180—85,6	378	95		75	I_2	—87,5	532	123	
	II_2	—87,7	319	101			II_1	180+85,2	330	103	
							II_2	85,3	209	95	
63	I_1	86,4	360	103	*band*		III_1	85,5	289	98	
	I_2	82,3	292	106							
	I_3	73,5	227	101							
	II_1	180—88,0	328	98		76	I_1	180+66,8	210	106	*drapery*
	II_2	88,1	255	94			II_1	+68,5	237	101	
	II_3	81,8	207	90			III_1	+76,9	280	96	

Table III.

N	A. P.	a	D	H		N	A. P.	a	D	H	
77	I_1	180+76,3	332	107	*band*		I	180+36,0	171	109	
	I_2	+75,2	249	97			II	+45,0	162	110	
	I_3	+76,3	199	102			II	+44,0	159	91	
	I_4	+78,8	157	101							
	I_5	+83,2	125	99		94	I_1	180+46,3	185	114	*drapery*
							I_2	+49,0	156	113	
78	I_1	180+77,8	364	112	*drapery*		I_3	+49,5	158	134	
	I_2	+78,2	274	102							
	I_3	+79,3	204	100		95	I_1	—69,0	158	91	*rays*
	I_4	+81,7	168	103			I_2	—68,5	157	110	
	I_5	+85,3	139	105			I_3	—67,7	145	121	upper limit
79	I_1	180+80,3	332	108	*drapery*	96	I_1	—73,7	329	124	*rays*
	I_2	+80,2	256	111			I_2	—73,2	338	152	
	I_3	+79,8	201	112			I_3	—72,6	345	181	
	I_4	+80,6	164	110			I_4	—71,9	365	221	upper limit
	I_5	+82,0	148	119			II_1	—72,0	330	112	
	I_1*	+81,6	212	109			II_2	—70,6	335	151	
	I_1*	+82,0	181	109			II_3	—69,4	325	174	upper limit
80	I_1	180+80,3	450	119	*drapery*	97	I_1	—70,7	219	130	*rays*
	I_2	+83,0	341	110			I_2	—69,6	218	151	
	I_3	+81,1	255	110			I_3	—68,2	223	182	upper limit
81	I_1	180+87,1	315	118	*drapery*	98	I_1*	— 8,0	134	130	*pulsating*
	I_2	+88,7	289	99			I_2*	— 2,5	140	128	*aurora*
	II_1	+85,5	256	129							
						99	I_1	27,2	208	114	*band*
82	I_1	180+87,4	267	108	*drapery*		I_2	31,7	218	111	
	I_2	+88,2	244	117			I_3	36,7	233	108	
	II_1	—86,3	267	130			I_1*	31,1	219	119	
							I_2*	36,0	241	120	
83	I_1	180+85,1	407	110	*drapery*						
	I_2	+88,8	402	110		100	Ii	40,9	226	96	*band*
	I_3	+90,0	384	116			I_2	34,3	204	104	
	II_1	+80,0	498	114			I_3	28,2	181	105	
							I_4	22,4	175	112	
84	I_1	180+88,3	350	95	*drapery*		I_5	16,4	165	114	
85	I_1	—86,4	377	83	*drapery*	101	I_1	18,6	151	120	*bands*
							I_2	24,0	162	116	
86	I_1	180—46,6	66	97	*pulsating*		I_3	29,8	188	118	
	I_2	—35,0	62	97	*aurorae*		II_1	23,0	131	127	
	I_3	—22,8	63	101			II_2	28,9	144	125	
							II_3	36,6	168	121	
87	I_1	1,6	121	96	*drapery*		III_1	26,7	102	127	
	I_2	6,5	121	97			III_2	33,5	115	130	
	I_3	14,0	120	95							
	I_4	32,0	149	100		102	I_1	180+22,4	450	111	*band*
							I_2	+17,1	477	132	
88	I_1	24,0	117	103	*drapery*						
	II_1	18,2	116	99		103	I_1	180+85,2	263	123	*band*
	III_1	11,4	120	100			I_2	+88,9	205	119	
	IV_1	1,5	131	101			I_3	—86,5	163	114	
							II_1	180+88,2	289	121	
89	I_1	180+89,8	196	103	*drapery*		II_2	—89,4	240	119	
	I_2	+87,7	233	106							
	I_3	+84,7	277	107		103	I_1	180—59,8	242	125	*drapery*
	I_4	+80,0	368	119			I_2	—61,1	217	126	
90	I_1	180+76,9	432	98	*drapery*	104	I_1	180—59,4	204	101	*drapery*
	I_2	+78,2	400	103			I_2	—61,3	201	119	upper limit
							II_1	—62,5	235	117	
91	I_1	180—70,3	114	113	*drapery*		II_2	—63,6	242	137	upper limit
	I_2	—65,3	110	109							
	II_1	—76,4	122	122		105	I_1	180—58,0	189	94	*drapery*
92	I_1	180—67,2	102	120	*drapery*		I_2	—58,3	231	128	upper limit
	II_1	—73,2	161	115							
						106	I_1	180—00,0	174	103	*pulsating*
93	I	180+36,1	177	122	*drapery*		I_2	—58,0	190	108	*aurora*

Table III.

N	A. P.	a	D	H		N	A. P.	a	D	H	
107	I_1	—75,2	183	115	*drapery*	120	I_1	180—67,0	421	120	*diffuse arc*
	I_2	—74,2	147	109			I_2	—59,6	398	129	
	I_3	—74,4	126	108			I_3	—53,1	329	133	
108	I_1	—63,9	187	105	*drapery*	121	I_1	180—59,4	329	95	*band*
	I_2	—59,8	172	110			I_2	—56,6	242	83	
	I_3	—59,0	157	113	upper limit		I_3	—53,7	199	80	
	II_1	—57,3	282	122							
	II_2	—56,0	254	132	upper limit	122	I_1	180+36,3	344	112	*band*
							I_2	+32,0	315	117	
109	I_1	180+19,5	92	104	*drapery*		I_3	+27,8	269	113	
	I_2	+22,8	106	106			I_4	+23,0	253	121	
	I_3	+26,5	116	104							
	I_4	+34,4	142	104		123	I_1	180+39,3	352	102	*band*
	I_5	+37,6	162	104			I_2	+34,0	295	109	
							I_3	+27,9	248	107	
110	I_1	180+47,9	206	123	*ray*		I_4	+22,0	216	107	
	I_2	+47,6	167	114							
						124	I_1	180+42,3	356	106	*band*
111	I_1	180+43,6	292	110	*draperies*		I_2	+37,8	285	109	
	I_2	+44,2	282	118	upper limit		I_3	+33,2	240	106	
	II_1	+42,4	255	114			I_4	+27,7	241	113	
	II_2	+43,5	252	134	upper limit						
	III_1	180+40,8	193	108		125	I_1	180+47,7	345	89	*band*
	III_2	+41,3	197	137	upper limit		I_2	+44,9	335	95	
	IV_1	+31,6	230	110			I_3	+36,3	283	92	
	IV_2	+32,9	207	112	» »						
						126	I_1	180+32,3	460	130	*diffuse arc*
112	I_1	180+51,8	294	99	*draperies*		I_2	+25,2	400	123	
	I_2	+53,6	354	117			I_3	+18,2	362	117	
	I_3	+48,0	304	111			I_4	+ 8,8	359	118	
	II_1	+51,2	273	109			I_5	+ 4,0	350	115	
	II_2	+47,3	217	100							
	II_3	+44,8	215	107		127	I_1	180—24,6	420	114	*band*
	III_1	+38,5	184	109			I_2	—28,1	448	118	
	III_2	+36,6	153	111			I_3	—31,4	536	138	
113	I_1	180+54,2	404	120		128	I_1	180—44,0	481	117	*band*
	I_2	+54,1	347	104			I_2	—39,8	415	104	
	I_3	+47,2	266	108			I_3	—33,5	400	99	
	I_4	+42,6	222	114			I_4	—21,0	424	115	
	I_5	+37,7	194	118							
	I_6	+33,6	155	120		129	I_1	180—45,4	390	90	*band*
							I_2	—35,5	475	124	
114	I_1	180+48,4	241	99	*draperies*		I_3	—21,7	392	119	
	I_2	+49,4	258	99			I_4	—16,0	413	134	
	I_3	+49,8	268	108		130	I_1	180—19,1	303	104	*band*
	I_4	+47,0	226	106		131	I_1	180— 4,2	228	93	*band*
	I_5	+44,0	198	107			I_2	+ 3,7	231	94	
115	I_1	180+28,7	269	89	*draperies*		I_3	+13,0	317	120	
	I_2	+22,7	367	117			I_4	+24,0	347	121	
	I_3	+19,0	367	133							
						132	I_1	180—37,4	349	90	*band*
116	I_1	180+20,7	553	118	*ray*		I_2	—31,7	345	101	
	I_2	+21,1	554	150			I_3	—18,7	303	104	
	I_3	+21,5	548	181	upper limit		I_4	—11,2	328	120	
117	I_1	180+21,8	431	141	*ray*	133	I_1	180— 5,2	243	92	*diffuse arc*
	I_2	+21,9	470	172	upper limit		I_2	+ 2,0	236	90	
							I_3	+12,1	255	94	
118	I	180—33,5	120	98	*ray*		I_4	+22,8	302	101	
	I	—33,2	151	150	upper limit						
						134	I_1	180—39,3	381	92	*diffuse arc*
119	I_1	180—50,6	361	97	*diffuse arc*		I_2	—20,5	258	87	
	I_2	—43,6	367	103			I_3	— 1,1	241	93	
	I_3	—36,7	364	104							
	I_4	—31,0	395	113		135	I_1	180—30,2	380	107	*band*
	I_5	—25,3	400	110			I_2	—23,8	355	111	
	I_6	—21,3	436	120			I_3	—15,4	286	101	

Table III.

N	A. P.	a	D	H		N	A. P.	a	D	H	
136	I_1	180—32,9	328	82	*band*		I_1*	+30,3	211	104	
	I_2	—27,4	313	90			I_2*	+24,8	183	104	
							I_3*	+20,0	165	104	
137	I_1	180+23,7	353	122	*band*						
	I_2	+31,4	349	112		148	I_1*	180— 2,2	87	100	*drapery*
	I_3	+38,0	390	110			I_2*	—15,6	72	101	
	I_1*	+26,7	345	121			II_1	— 1,9	90	94	
	I_2*	+36,2	365	112			II_2	—11,4	74	92	
	I_3*	+43,0	442	108			II_3	—26,4	70	94	
							III_1	— 6,9	93	93	
138	I_1	180—84,6	278	106	*drapery*		III_2	—14,4	78	86	
	I_2	—85,0	256	128			III_3	—21,0	67	82	
	I_3	—86,5	249	158	upper limit						
						149	I_1	180+82,2	302	135	*drapery*
139	I_1	72,7	333	119	*drapery*		I_2	+84,6	252	143	upper limit
	I_2	70,3	283	145	upper limit		I_3	+88,1	202	140	
	II_1	71,5	462	102			II_1	+78,5	285	155	
	II_2	69,3	500	185	» »		II_2	+81,4	237	159	» »
140	I_1	67,4	386	104	*drapery*	150	I_1	180+81,8	280	125	*drapery*
	I_2	66,0	388	138	upper limit		I_2	+86,6	228	138	
	I_1*	68,6	390	110			I_3	+89,5	187	148	upper limit
	II_1	69,9	340	106			II_1	180+85,2	222	140	
	II_2	68,7	320	121	» »		II_2	+86,6	202	152	» »
	III_1	71,5	351	106							
	III_2	68,5	325	155	» »	151	I_1	67,1	315	184	*drapery*
	IV_1	71,8	220	187			I_2	64,1	259	186	
	IV_2	72,0	217	128	» »						
						152	I_1	85,2	141	127	*drapery*
141	I_1	180+60,3	262	105	*drapery*		I_2	86,0	119	132	
	I_2	+55,2	206	107			I_3	86,2	86	127	
	I_3	+47,1	152	103							
	I_1*	+59,7	218	105		153	I_1	83,2	244	149	*drapery*
	I_2*	+52,3	157	102			I_2	82,5	212	171	
							I_3	81,0	206	220	upper limit
142	I_1	59,2	131	103	*band*		II_1	70,6	338	183	
	I_2	55,5	113	107			II_2	67,8	230	179	
	I_3	53,3	94	105							
						154	I_1	72,8	376	122	*drapery*
143	I_1	180+72,8	170	95	*drapery*		I_2	69,7	331	145	
	I_2	+75,0	143	100			II_1	82,8	319	193	upper limit
	I_3	+77,9	118	101							
	II_1	+70,3	152	99		155	I_1	78,9	385	124	*drapery*
	II_2	+72,5	131	117	upper limit		I_2	76,6	294	170	upper limit
	III_1	+62,9	175	106							
	III_2	+64,2	164	125	» »	156	I_1	78,6	377	132	*drapery*
							I_2	76,3	248	125	
144	I_1	88,4	143	108	*drapery*						
	I_2	85,5	98	114	upper limit	157	I_1	76,8	279	136	*drapery*
	II_1	82,6	139	101			I_2	74,8	216	136	
	II_2	80,4	120	115	» »		I_3	72,1	161	135	
	III_1	77,0	151	103			I_4	69,5	131	135	
	III_2	73,0	125	126	» »						
						158	I_1	78,2	373	161	*drapery*
145	I_1	180+66,1	344	123	*drapery*		I_2	74,5	249	151	
	I_2	+70,8	234	110			I_3	71,6	150	128	
	II_1	+62,2	308	93			I_4	66,2	119	126	
	II_2	+64,4	228	98			II_1	67,2	268	151	upper limit
							II_2	62,4	206	155	» »
146	I_1	180+47,9	459	123	*drapery*		II_3	57,3	160	156	» »
	I_2	+47,6	376	126	upper limit						
	I_1*	+48,8	450	127		159	I_1	76,6	358	167	*drapery*
	I_2*	+48,7	419	133	» »		I_2	74,2	273	170	
	II_1	+50,4	456	128			I_3	68,6	211	175	upper limit
	II_2	+50,3	442	145	» »		II_1	67,4	282	149	» »
							II_2	62,3	236	169	» »
147	I_1	180+33,5	230	94	*drapery*						
	I_2	+26,1	204	103		160	I_1	180+76,7	331	127	*drapery*
	I_3	+18,8	170	103			I_2	+78,5	248	142	upper limit
	I_4	+12,1	147	102			I_3	+82,0	174	137	

Table III.

N	A. P.	a	D	H		N	A. P.	a	D	H	
161	I_1	180+77,6	344	135	*drapery*		I_4	180—78,0	78	102	
	I_2	+79,6	244	135			I_5	—73,6	71	104	
	I_3	+81,4	200	148	upper limit						
						177	I_1	180—74,5	115	105	
162	I_1	180+76,4	355	122	*drapery*		I_2	—75,4	109	103	
	I_2	+77,7	309	139			I_3	—73,9	94	108	
	I_3	+79,7	232	136			I_4	—69,6	80	108	
	I_4	+81,6	195	142	upper limit						
						178	I_1	180—20,0	69	104	*pulsating*
163	I_1	180+76,9	345	120	*drapery*		I_2	—14,0	69	105	*aurora*
	I_2	+79,0	269	136			I_3	— 8,4	75	111	
	I_3	+81,2	191	130			I_4	— 2,5	92	112	
	I_4	+83,8	142	126			I_5	+ 5,0	92	109	
							I_6	+10,6	94	108	
164	I_1	180+78,2	306	126	*drapery*						
	I_2	+79,7	252	134	upper limit	179	I_1	180+55,5	276	132	*drapery*
	II_1	+84,0	181	128			I_2	+51,9	227	130	
							I_3	+46,2	208	141	
165	I_1	51,7	164	128	*drapery*		II_1	+52,2	316	129	
	I_2	43,8	136	141							
	II_1	67,6	217	166	upper limit	180	I_1	180+68,3	285	117	*drapery*
	II_2	63,2	150	160	» »		I_2	+71,1	240	129	
	II_3	55,5	109	162	» »		II_1	+63,1	296	114	
166	I_1	50,8	158	123	*drapery*	181	I_1	180+61,5	334	100	*drapery*
	I_2	40,2	119	127			I_2	+68,3	324	124	
	II_1	65,8	237	203	upper limit						
	II_2	54,8	109	161	» »	182	I_1	180—77,9	404	170	*pulsating*
							I_2	—71,1	221	103	*aurora*
167	I_1	—88,1	243	125	*drapery*						
	I_2	—85,1	201	137		183	I_1	180—87,7	277	103	*pulsating*
	I_3	—83,9	186	165	upper limit		I_2	—80,4	381	124	*aurora*
	II_1	—83,0	225	119			I_3	—71,4	234	114	
	II_2	—76,2	197	150	» »						
						184	I_1	89,7	293	124	*drapery*
168	I_1	—60,8	87	120	*drapery*		II_1	180—82,0	370	164	
	I_2	—46,8	65	119			II_2	—76,2	258	125	
	II_1*	—53,3	79	120							
						185	I_1	180+56,5	333	211	*ray*
169	I_1	—64,1	88	110	*drapery*		I_2	+58,4	336	289	upper limit
	I_2	—57,0	55	108							
	II_1*	—58,3	76	122		186	I_1	180+61,3	287	128	*pulsating*
							I_2	+60,8	263	139	*aurora*
170	I_1	—51,4	74	98	*drapery*		I_3	+58,6	198	122	
	II_1	—58,7	91	111			II_1	+71,4	262	130	
	II_2	—54,6	64	105							
						187	I_1	180—26,2	159	114	*drapery*
171	I_1	180+52,3	353	101	*drapery*		I_2	—19,5	143	103	
	I_2	+61,6	276	116	upper limit		I_3	—12,0	135	104	
							I_4	— 1,5	117	103	
172	I_1	180+58,3	282	118	*drapery*						
	I_2	+61,7	224	134	upper limit	188	I_1	180+ 3,5	486	141	*drapery*
	II_1	+57,0	285	140			I_2	+10,7	603	177	
173	I_1	180+61,3	252	114	*drapery*	189	I_1	180—76,7	386	91	*drapery*
	I_2	+61,9	248	134	upper limit		I_2	—67,0	337	98	
							I_3	—60,3	322	109	
174	I_1	180+63,4	251	125	*drapery*		I_4	—54,4	263	96	
	I_2	+64,9	246	152	upper limit		I_1*	—71,6	451	132	
	II_1	+62,2	232	105							
						190	I_1	180—72,9	608	144	*drapery*
175	I_1	180—79,1	292	111	*drapery*		I_1	—74,4	546	137	
	II_1	—79,8	209	101							
	II_2	—83,2	168	105		191	I_1	180—62,7	513	118	*drapery*
	II_3	—80,4	134	109			I_2	—57,1	527	135	
	II_4	—78,1	122	109			I_3	—51,5	521	140	
	II_5	—74,7	108	106			I_4	—47,6	545	155	
176	I_1	180—83,5	121	101	*drapery*						
	I_2	—83,2	106	101		192	I_1	180—51,3	572	140	*drapery*
	I_3	—81,0	88	102			I_2	—45,8	443	110	

Table III.

N	A. P.	a	D	H		N	A. P.	a	D	H	
	I_3	180—42,1	391	91			III_1	180+50,9	416	133	upper limit
							III_2	+49,1	443	117	
193	I_1	180—70,4	462	177	*ray*						
	I_2	—70,8	405	181	upper limit	208	I_1	180+30,2	292	121	*draperies*
	II_1	—72,3	471	201	» »		I_2	+38,7	262	95	
							I_3	+45,1	293	92	
194	I_1	180—60,8	512	128	*band*		II_1	+49,1	448	142	upper limit
	I_2	—52,4	583	152			II_2	+48,3	443	109	
	I_3	—47,1	367	106			III_1	+50,2	451	140	» »
	I_4	—41,9	419	126			III_2	+49,5	440	103	
	I_5	—36,5	412	126			IV_1	+51,8	474	159	» »
	I_1*	—52,2	563	171			IV_2	+50,3	441	106	
	I_2*	—44,2	368	115							*ray*
						209	I_1	180+43,8	255	172	upper limit
195	I_1	180—43,2	452	126	*band*		I_2	+42,2	259	118	
	I_2	—38,4	478	135							
	I_3	—34,8	550	157		210	I_1	180+31,0	345	112	*diffuse arc*
							I_2	+27,0	325	114	
196	I_1	58,2	336	114	*band*		I_3	+22,7	302	113	
	I_2	54,4	263	107			I_4	+17,0	286	106	
	I_3	50,9	222	105							
						211	I_1	180+30,9	357	107	*diffuse arc*
197	I_1	63,9	480	120	*drapery*		I_2	+26,2	330	109	
	I_2	59,8	355	110			I_3	+21,3	285	100	
	I_3	55,8	261	97			I_4	+17,1	316	117	
198	I_1	56,4	345	112	*drapery*	212	I_1	180+37,5	442	113	*bands*
	I_2	52,5	282	116			II_1	+20,9	340	96	
	I_3	47,4	236	121			II_2	+14,3	268	82	
199	I_1	54,8	270	93	*drapery*	213	I_1	180+30,5	457	106	*diffuse arc*
	I_2	51,2	244	97			I_2	+26,7	441	108	
	I_3	45,3	196	98			I_3	+23,5	458	122	
							I_4	+20,3	408	113	
200	I_1	28,5	223	98	*drapery*		I_5	+16,7	450	133	
	I_2	36,1	214	112							
	I_3	42,5	207	132		214	I_1	180+24,1	363	99	*diffuse arc*
						215	I_1	180+14,8	387	94	» »
201	I_1	46,0	293	144	*drapery*		I_2	+14,9	388	99	
	I_2	43,5	360	208			I_3	+14,1	414	106	
							I_4	+ 6,3	382	112	
202	I_1	46,2	296	136	*drapery*		I_5	+ 1,4	390	121	
	I_2	42,9	291	154			I_6	— 2,5	348	110	
203	I_1	49,3	230	94	*drapery*	216	I_1	180+10,7	438	106	*diffuse arc*
	I_2	45,1	252	118			I_2	+ 8,4	460	123	
							I_3	+ 8,1	375	116	
204	I_1	180+48,0	396	143	*rays*		I_4	+ 4,3	390	126	
	I_2	+48,8	419	93	upper limit		I_5	+ 1,4	350	114	
	I_3	+50,5	406	109							
						217	I_1	180+11,2	436	118	*diffuse arc*
205	I_1	180+49,7	466	122	*rays*		I_2	+12,1	431	122	
	I_2	+50,2	472	102			I_3	+10,8	382	110	
	I_3	+51,2	464	104			I_4	+ 5,9	338	103	
	II_1	+43,4	405	105			I_5	+ 2,2	329	102	
	III_1	+41,6	452	131			I_6	— 0,8	305	96	
						218	I_1	180+18,1	469	117	*band*
206	I_1	180+85,3	346	153	*draperies*		I_2	+12,1	442	103	
	I_2	+84,1	356	114	upper limit		I_3	+ 4,7	427	108	
	I_3	+70,2	372	111							
	II_1	+82,6	357	130		219	I_1	180—54,6	328	102	*diffuse arc*
					upper limit		I_2	—49,7	367	118	
							I_3	—43,8	332	106	
207	I_1	180+27,3	284	119	*draperies*		I_4	—38,3	313	102	
	I_2	+37,3	314	117			I_5	—34,1	330	109	
	I_3	+45,6	421	108							
	II_1	+47,3	396	133	upper limit	220	I_1	180—58,7	342	97	*diffuse arc*
	II_2	+46,9	408	110			I_2	—61,5	335	89	

Table III.

N	A. P.	a	D	H		N	A. P.	a	D	H	
	I_3	180—64,3	355	89			I_4	180— 0,8	343	98	
	I_4	—68,1	442	106			I_5	+ 2,6	371	108	
221	I_1	180+14,1	371	96	*diffuse arc*	232	I_1	180—18,3	323	120	*diffuse arc*
	I_2	+ 8,7	384	109			I_2	—14,3	310	110	
	I_3	+ 3,8	443	135			I_3	—10,0	353	120	
	I_4	— 0,7	434	138			I_4	— 4,8	343	111	
222	I_1	180—63,1	473	122	*diffuse arc*		I_5	+ 2,5	304	94	
	I_2	—62,8	377	106		233	I_1	180—20,0	250	92	*diffuse arc*
	I_3	—59,5	294	86			I_2	—15,8	259	93	
	I_4	—56,8	328	100			I_3	—11,3	257	88	
223	I_1	180—69,7	371	84	*diffuse arc*		I_4	— 6,2	247	82	
	I_2	—66,0	372	94			I_5	+ 0,3	302	95	
	I_3	—61,9	350	91		234	I_1	180—13,1	396	126	*diffuse arc*
	I_4	—57,9	337	101			I_2	—11,3	394	124	
	I_5	—54,5	312	97			I_3	— 7,6	373	117	
224	I_1	180—70,2	437	95	*diffuse arc*		I_4	— 0,8	379	116	
	I_2	—65,5	400	104			I_5	+ 3,4	336	100	
	I_3	—60,9	368	105		235	I_1	—53,4	373	81	*diffuse arc*
	I_4	—56,4	359	112			I_2	—48,0	402	92	
	I_5	—52,2	363	119							
	I_6	—48,5	343	118		236	I_1	180—59,2	460	100	*diffuse arc*
							I_2	—52,0	455	104	
225	I_1	180—71,2	457	108	*diffuse arc*		I_3	—46,7	410	94	
	I_2	—66,2	377	105			I_4	—42,0	405	94	
	I_3	—61,9	368	104							
	I_4	—57,5	343	111		237	I_1	180—58,7	447	96	*diffuse arc*
	I_5	—50,4	286	100			I_2	—56,0	424	95	
	I_6	—47,6	283	102			I_3	—41,7	421	103	
							I_4	—39,0	376	98	
226	I_1	180—63,2	404	104	*diffuse arc*						
	I_2	—60,3	384	109		238	I_1	180—46,1	510	124	*diffuse arc*
	I_3	—57,9	366	111			I_2	—43,5	524	135	
	I_4	—55,2	340	110			I_3	—39,6	460	122	
	I_5	—52,9	324	110			I_4	—36,4	357	94	
	I_6	—50,5	284	100							
						239	I_1	180+25,7	523	126	*drapery*
227	I_1	180—65,6	400	95	*diffuse arc*		I_2	+21,5	412	113	
	I_2	—62,0	364	97			I_3	+17,7	411	127	
	I_3	—58,5	363	104							
	I_4	—56,5	341	104		240	I_1	180—76,8	442	113	*diffuse arc*
	I_5	—53,9	317	102			I_2	—72,9	401	123	
					drapery		I_3	—69,1	377	127	
228	I_1	180+ 7,7	520	199	upper limit						
	I_2	+ 7,7	530	178		241	I_1	180—75,0	371	100	*diffuse arc*
	I_3	+ 7,7	524	140			I_2	—71,1	383	123	
	II_1	+ 4,8	424	142	» »		I_3	—68,2	375	132	
	II_2	+ 4,9	443	130							
	III_1	+ 2,5	402	114		242	I_1	180—76,0	146	113	*diffuse rac*
	III_2	+ 2,1	382	113			I_2	—74,0	380	114	
							I_3	—71,8	340	111	
229	I_1	180+27,0	577	110	*drapery*		I_4	—69,8	318	110	
	I_2	+24,9	537	118							
	II_1	+16,2	664	155		243	I_1	180—76,0	404	109	*diffuse arc*
	II_2	+15,7	692	172	upper limit		I_2	—73,9	391	116	
	II_3	+13,1	605	152	» »		I_3	—71,6	372	120	
							I_4	—69,0	348	121	
230	I_1	180—69,9	426	104	*diffuse arc*						
	I_2	—64,8	414	116		244	I_1	180—73,7	386	117	*diffuse arc*
	I_3	—59,7	332	99			I_2	—71,4	353	119	
	I_4	—54,9	324	103			I_3	—68,7	314	114	
	I_5	—51,3	319	107							
	I_6	—47,7	339	117							
						245	I_1	180—51,3	404	121	*diffuse arc*
231	I_1	180—12,0	368	120	*diffuse arc*		I_2	—50,5	375	99	
	I_2	— 8,7	350	114			I_3	—50,1	363	101	
	I_3	— 5,1	336	106			I_4	—49,5	369	109	

Table III.

N	A. P.	a	D	H		N	A. P.	a	D	H	
246	I_1	180—52,3	367	116	*rays*		I_3	180—26,7	192	103	
	I_2	—52,0	362	102			I_4	—29,9	198	108	
	II_1	—50,9	375	106			I_5	—33,4	191	104	
	II_2	—51,4	397	129			I_6	—37,1	196	108	
							I_7	—41,3	204	112	
247	I_1	180—51,8	355	128	*drapery*		I_8	—45,7	199	109	
	I_2	—51,1	352	111							
	II_1	—50,4	335	108		259	I_1	180—40,6	208	88	*diffuse arc*
							I_2	—37,5	196	86	
248	I_1	180—71,0	455	122	*diffuse arc*		I_3	—34,6	193	88	
	I_2	—67,0	437	131			I_4	—31,8	192	91	
	I_3	—64,0	425	138			I_5	—28,1	188	92	
	I_4	—60,8	398	136			I_6	—24,6	192	98	
	I_5	—58,0	388	137			I_7	—21,3	199	103	
							I_8	—17,8	181	95	
249	I_1	180—72,7	522	141	*diffuse arc*						
	I_2	—69,5	487	145		260	I_1	180—35,2	277	105	*diffuse arc*
	I_3	—65,9	434	138			I_2	—32,0	271	106	
	I_4	—62,8	402	134			I_3	—29,5	262	104	
	I_5	—59,7	394	139			I_4	—27,2	261	102	
	I_6	—56,4	389	143			I_5	—24,3	242	100	
					drapery						
250	I_1	180+61,9	383	127	upper limit	261	I_1	180+35,2	327	105	*band*
	I_2	+61,3	386	116			I_2	+37,3	358	107	
	I_3	+60,9	396	105			I_3	+39,1	425	119	
	II_1	+62,5	392	102			I_4	+38,2	476	118	
					draperies						
251	I_1	180— 5,8	331	141	upper limit	262	I_1	180—46,4	322	138	*drapery*
	I_2	— 5,8	347	121			I_2	—43,6	290	127	
	I_3	— 5,8	341	98			I_3	—39,3	303	135	
	II_1	— 5,5	333	136	» »		I_4	—34,6	297	135	
	II_2	— 5,5	362	121			I_5	—30,9	263	127	
	III_1	— 4,2	361	166	» »		I_6	—27,4	240	122	
	III_2	— 4,2	373	149							
	III_3	— 4,2	352	119		263	I_1	180—35,3	269	108	*drapery*
							I_2	—32,0	250	108	
252	I_1	180—76,5	161	134	*rays*		I_3	—28,5	242	111	
	I_2	—75,5	158	114			I_4	—25,0	229	111	
	II_1	—89,2	118	142			I_5	—21,3	220	111	
	II_2	—87,3	119	172			I_6	—16,3	208	110	
	III_1	+83,5	118	147			I_7	—12,3	204	112	
	III_2	+84,8	118	135							
						264	I_1	180+64,2	197	117	*drapery*
253	I_1	180—70,0	189	190	*ray*		I_2	+65,6	218	110	
	I_2	—68,4	207	177			I_3	+64,5	267	113	
254	I_1	180—29,7	186	128	*rays*						*drapery*
	I_2	—31,2	154	147		265	I_1	180+68,0	289	138	upper limit
	II_1	—26,6	173	127			I_2	+67,2	288	121	
	II_2	—28,4	146	159			I_3	+66,1	302	108	
255	I_1	180+34,8	239	105	*drapery*	266	I_1	73,8	337	121	*draperies*
	I_2	+39,2	280	103			II_1	69,7	408	133	upper limit
	I_3	+33,5	312	115			II_2	70,1	417	123	
	I_4	+49,0	350	111			II_3	67,8	421	103	
							II_4	67,5	416	108	
256	I_1	180+26,8	264	106	*drapery*		III_1	74,8	561	138	
	I_2	+31,4	284	106			III_2	75,6	564	148	
	I_3	+36,4	271	97			IV_1	73,8	576	192	
							IV_2	74,7	593	158	
257	I_1	180—46,4	168	93	*drapery*						
	I_2	—41,3	165	92							
	I_3	—35,2	177	98		267	I_1	66,4	381	140	*rays*
	I_4	—31,1	193	105			I_2	67,0	386	126	
	I_5	—33,2	226	94			I_3	67,7	392	110	
	I_6	—29,0	261	108							
	I_7	—26,3	271	111							
						268	I_1	67,1	255	143	*rays*
258	I_1	180—19,5	195	99	*diffuse arc*		II_1	65,9	261	140	
	I_2	—23,6	190	99			II_2	66,5	266	128	

Table III.

N	A. P.	a	D	H		N	A. P.	a	D	H	
269	I_1	180+67,3	212	108	*drapery*	282	I_1	180+14,2	208	96	*pulsating*
	I_2	+65,9	184	107			I_2	+13,0	186	96	*aurora*
	I_3	+62,2	171	110			I_3	+13,2	161	95	
							I_4	+13,8	149	101	
270	I_1	180+79,7	127	83	*ray*						
	I_2	+80,2	138	108		283	I_1	180+ 4,2	250	123	*pulsating*
	I_3	+81,0	130	116			I_2	+ 0,5	199	111	*aurora*
	I_4	+82,0	136	140	upper limit		I_3	— 3,1	158	102	
							I_4	— 5,8	130	95	
271	I_1	—82,2	203	126	*rays*		I_5	— 8,6	108	92	
	II_1	180+87,5	187	110							
	II_2	+86,4	206	108		284	I_1	180+59,9	357	123	*drapery*
	II_3	+85,3	212	97			I_2	+68,3	306	119	
							I_3	+74,6	297	127	
272	I_1	—78,6	179	101	*drapery*						
	II_1	180+84,6	153	97		285	I_1	180+70,0	214	104	*drapery*
							I_2	+67,8	261	108	
273	I_1	180+79,8	359	94	*drapery*		I_3	+56,5	343	133	upper limit
	I_2	+78,6	385	88			II_1	+58,9	377	155	
							II_2	+57,1	402	108	
274	I_1	180—77,0	308	95	*diffuse arc*		III_1	+60,0	395	128	
	I_2	—72,3	273	101							
	I_3	—67,4	233	101		286	I_1	180— 6,9	227	125	*drapery*
	I_4	—63,0	196	96			I_2	—14,6	220	127	
	I_5	—58,4	177	97			I_3	—23,2	175	101	
							I_4	—30,9	156	88	
275	I_1	180— 7,0	219	93	*diffuse arc*						
	I_2	— 2,3	220	93		287	I_1	180+17,6	226	104	*drapery*
	I_3	+ 3,4	228	93			I_2	+12,8	208	105	
	I_4	+ 8,4	243	95			I_3	+ 5,8	193	103	
	I_5	+13,9	274	102							
	II_1	— 7,4	296	95		288	I_1	—86,5	120	151	*ray*
	II_2	— 2,9	303	98			I_2	180+89,6	123	121	
	II_3	+ 3,0	288	91							
	II_4	+ 8,4	311	96		289	I_1	180+15,9	360	188	*rays*
	II_5	+14,7	387	112			I_2	+16,2	400	170	
							I_3	+16,4	470	159	
276	I_1	180—60,2	440	97	*diffuse arc*		I_4	+20,0	477	157	
	I_2	—56,5	430	102			I_5	+20,0	440	183	
	I_3	—50,5	360	93							*drapery*
	I_4	—45,5	335	92		290	I_1	180+31,5	434	157	upper limit
	I_5	—41,5	297	85			I_2	+30,8	448	128	
							I_3	+27,6	466	110	
277	I_1	180—54,5	399	101	*diffuse arc*		I_4	+24,8	447	96	
	I_2	—48,5	354	96			I_5	+25,0	480	159	
	I_3	—41,1	334	99							*drapery*
	I_4	—36,9	285	88		291	I_1	180+23,9	517	197	upper limit
							I_2	+23,7	560	134	» »
278	I_1	180—47,4	219	96	*diffuse arc*		I_3	+27,6	652	118	
	I_2	—52,7	220	92			I_4	+27,8	617	195	» »
	I_3	—58,5	270	104			I_5	+28,3	604	269	» »
	I_4	—65,2	300	103							*drapery*
	I_5	—72,7	372	107		292	I_1	180+23,9	487	151	upper limit
							I_2	+24,2	470	199	» »
279	I_1	180—67,5	250	114	*diffuse arc*		II_1	+28,0	398	120	» »
	I_2	—72,1	281	112			II_2	+28,7	396	172	» »
	I_3	—76,6	321	120							
	II_1	—82,6	333	121		293	I_1	180—27,5	229	109	*band*
	II_2	—85,3	322	105			I_2	—23,7	213	103	
							I_3	—20,1	198	98	
280	I_1	180+52,9	447	93	*band*		I_4	—16,1	193	96	
	I_2	+51,8	392	107			I_5	—11,8	188	96	
	I_3	+48,2	280	92			I_6	— 8,2	180	94	
	I_4	+44,6	249	88			I_7	— 3,8	170	91	
	I_5	+39,9	230	87			II_1	+ 6,8	214	110	
							II_2	+ 9,8	214	107	
281	I_1	180+60,0	405	89	*band*	294	I_1	180+10,0	191	109	*band*
	I_2	+53,8	343	97			I_2	+ 4,1	210	118	
	I_3	+44,5	268	90			I_3	— 3,0	194	108	

Table III.

N	A. P.	a	D	H		N	A. P.	a	D	H	
	I_4	180—10,5	118	121			I_2	180+37,2	233	103	
	I_5	—17,2	202	112			I_3	+30,6	217	106	
	I_6	—23,5	202	112			I_4	+22,0	190	100	
	II_1	—15,5	197	121							
	II_2	—21,5	212	125		306	I_1	180+26,7	247	103	*band*
	II_3	—31,1	225	124			I_2	+33,0	252	113	
							I_3	+41,5	207	100	
295	I_1	180—73,2	236	98	*band*						
	I_2	—77,1	281	102		307	I_1	180— 2,5	230	114	*band*
	I_3	—79,6	336	101			I_2	— 8,8	218	108	
	I_4	—79,0	386	96			I_3	—15,1	217	107	
	II_1	—82,3	330	102			I_4	—21,7	234	112	
	II_2	—81,0	355	86			I_5	—28,8	254	111	
296	I_1	180—58,6	166	98	*band*	308	I_1	180—50,2	257	96	*drapery*
	I_2	—64,4	184	99			II_1	—65,1	386	128	
	I_3	—69,8	211	100			III_1	—69,7	274	106	
	I_4	—74,8	243	96			III_2	—73,2	338	115	
	I_5	—76,8	308	105							
	I_6	—75,6	359	131		309	I_1	180—43,1	392	132	*band*
							I_2	—46,5	400	135	
297	I_1	180—57,1	152	102	*band*		I_3	—51,5	357	119	
	I_2	—62,3	167	102			II_1	—54,8	302	113	
	I_3	—66,9	190	103			II_2	—62,5	306	103	
	I_4	—71,0	230	105			II_3	—70,6	300	92	
	I_5	—73,0	265	105							
	I_6	—73,3	353	119		310	I_1	180+35,9	310	99	*band*
							I_2	+29,1	268	96	
298	I_1	180+11,9	166	105	*band*		I_3	+20,5	290	110	
	I_2	+ 4,6	155	106							
	I_3	— 1,8	145	104		311	I_1	180+ 6,4	306	110	*band*
	I_4	—12,5	138	103			I_2	— 1,1	276	108	
	I_5	—21,1	141	107			I_3	— 8,9	252	101	
	I_1	—29,0	133	102			I_4	—17,6	247	100	
							I_5	—26,4	248	100	
299	I_1	180—26,0	130	102	*band*						
	I_2	—34,6	143	107		312	I_1	180—76,5	288	98	*band*
	I_3	—42,3	146	102			I_2	—80,9	320	93	
	I_4	—48,9	150	100			I_3	—82,7	355	85	
	I_5	—55,9	159	97							
						313	I_1	180—54,1	238	100	*band*
300	I_1	180+19,1	165	113	*band*		I_2	—63,4	277	117	
	I_2	+11,3	142	107			I_3	—72,2	270	105	
	I_3	+ 2,4	127	103			I_4	—77,9	344	110	
	I_4	— 6,2	126	108							
	I_5	—16,3	121	110		314	I_1	180—55,1	202	109	*band*
							I_2	—60,9	218	109	
301	I_1	180+62,7	527	115	*drapery*		I_3	—67,1	141	108	
	I_1	+66,3	538	92			I_4	—73,1	265	103	
	II_2	+58,1	487	129			I_5	—78,1	358	106	
302	I_1	180+60,9	660	89	*band*	315	I_1	180+61,7	536	96	*band*
	I_2	+60,7	635	112			I_2	+57,1	472	110	
	I_3	+58,9	544	114			II_1	+61,7	463	98	
	II_1	+59,8	430	109			II_2	+56,7	338	88	
	II_2	+52,4	394	118			II_3	+50,0	296	87	
							II_4	+40,6	249	81	
303	I_1	180+25,8	249	121	*band*						
	I_2	+20,0	212	115		316	I_1	180—46,6	140	99	*band*
	I_3	+11,9	191	111			I_2	—53,7	147	97	
	I_4	+ 4,4	181	105			I_3	—58,3	161	97	
							I_4	—63,3	197	100	
304	I_1	180+39,6	384	136	*drapery*		I_5	—66,2	260	104	
	I_2	+38,0	311	118							
	I_3	+38,1	337	142		317	I_1	180+25,5	157	104	*band*
	I_4	+33,4	243	112			I_2	+17,7	133	102	
	I_5	+26,5	200	98			I_3	+ 7,9	116	99	
	I_6	+19,6	192	96			I_4	— 1,6	110	100	
							I_5	—11,4	110	103	
305	I_1	180+43,2	266	103	*band*		I_6	—19,9	116	105	

Table III.

N	A. P.	a	D	H		N	A. P.	a	D	H	
318	I_1	180+26,9	127	104	*band*		I_3	180+10,5	206	111	
	I_2	+16,6	119	104			I_4	+13,3	230	138	upper limit
	I_3	+ 5,6	118	103			I_5	+13,5	217	97	
	I_4	— 3,0	122	102			I_6	+ 3,8	405	138	
							I_7	— 1,1	437	146	
319	I_1	180—53,9	200	120	*drapery*		I_8	— 4,7	430	143	
	I_2	—59,9	220	117			II_1	+17,1	218	140	upper limit
	I_3	—65,6	212	102			II_2	+16,6	232	117	
	I_4	—68,5	239	112							
	I_5	—71,2	262	106		329	I_1	180— 6,3	142	110	*drapery*
	I_6	—74,2	304	114			I_2	+ 5,5	164	111	
	I_7	—75,3	314	106			I_3	+13,8	244	123	
							I_4	+18,3	208	113	
320	I_1	180+56,9	294	107	*band*		I_5	+17,4	217	90	
	I_2	+50,6	238	102			I_6	+ 6,9	403	133	
							I_7	+ 1,9	411	132	
321	I_1	180—49,0	208	107	*drapery*						
	I_2	—38,4	189	90		330	I_1	180— 2,0	137	109	*drapery*
	I_3	—32,5	201	89			I_2	+ 9,5	169	112	
	II_1	—26,8	187	84			I_3	+17,7	250	119	
	II_2	—26,9	272	96			I_4	+22,9	242	137	upper limit
	III_1	—36,0	261	89			I_5	+18,3	257	100	
							I_6	+ 6,3	368	108	
322	I_1	180—47,8	176	100	*drapery*		I_7	+ 2,1	378	112	
	I_2	—37,1	180	100			II_1	+ 7,0	589	139	
	I_3	—26,8	190	84			II_2	+ 7,2	603	183	upper limit
	II_1	—22,9	443	166			III_1	+ 5,5	635	159	
	II_2	—24,7	490	175			III_2	+ 5,6	617	208	» »
	II_3	—27,0	575	197							
						331	I_1	180— 3,3	134	110	*drapery*
323	I_1	180—40,7	161	99	*drapery*		I_2	+ 6,2	146	104	
	I_2	—30,2	191	113			I_3	+14,7	181	111	
	I_3	—20,0	193	96			I_4	+19,8	241	110	
	II_1	—17,1	217	98			I_5	+24,3	235	125	upper limit
	III_1	—25,1	328	111			I_6	+21,9	259	114	
	III_2	—30,5	365	121			I_7	+15,5	393	135	
	III_3	—35,2	384	121			I_8	+ 7,8	408	118	
							I_9	+ 2,2	312	91	
324	I_1	180—31,5	158	100	*drapery*						
	I_2	—22,4	167	100		332	I_1	180+ 7,1	156	115	*drapery*
	I_3	—13,2	192	101			I_2	+16,7	179	114	
	II_1	— 6,5	295	155	upper limit		I_3	+23,7	212	95	
	II_2	— 6,3	291	123	» »		I_4	+26,5	215	108	
	III_1	— 9,3	236	120	» »		I_5	+24,9	204	84	
	III_2	— 8,8	230	101							
					drapery	333	I_1	17,0	151	110	*drapery*
325	I_1	180—17,2	397	250	upper limit		I_2	27,1	180	113	
	I_2	—16,4	310	125			I_3	36,7	198	105	
	II_1	—18,3	157	94							
	II_2	—17,7	206	84		334	I_1	17,5	173	117	*drapery*
	III_1	—15,0	321	125			I_2	26,3	191	115	
	III_2	—20,0	260	105			I_3	37,0	209	113	
	IV_1	—10,3	352	118							
	IV_2	—13,4	294	105		335	I_1	—65,3	224	105	*diffuse arc*
							I_2	—58,3	211	115	
326	I_1	180— 6,6	139	105	*drapery*		I_3	—48,5	183	115	
	I_2	+ 3,3	186	108			I_4	—36,9	169	120	
	I_3	+ 7,0	214	109							
	II_1	+ 5,2	213	140	upper limit	336	I_1	—64,3	229	106	*diffuse arc*
	II_2	+ 5,6	231	115			I_2	—54,5	206	115	
							I_3	—43,7	172	110	
327	I_1	180— 6,9	164	118	*drapery*		I_4	—33,6	160	112	
	I_2	+ 2,7	182	115							
	I_3	+10,3	221	104		337	I_1	—73,1	278	119	*drapery*
	I_1	+13,0	197	100			I_2	—55,4	215	111	
	II_1	+11,3	217	169	upper limit		I_3	—45,0	185	111	
	II_2	+10,8	217	110				—33,8	165	111	
328	I_1	180— 7,9	140	106	*drapery*	338	I_1	180—61,7	263	115	*rays*
	I_2	+ 2,2	170	114			I_2	—62,4	296	165	

Table III.

N	A. P.	a	D	H		N	A. P.	a	D	H	
	I_3	180—63,7	317	223	upper limit	354	I_1	180— 0,8	206	80	*diffuse arc*
							I_2	+14,4	227	88	
339	I_1	180—58,1	151	110	*rays*		I_3	+29,0	377	125	
	I_2	—60,8	136	130			II_1	— 1,9	404	125	
	I_3	—63,2	125	154	upper limit		II_2	+11,7	382	113	
	II_1	180—57,7	150	116			II_3	+26,9	309	84	
	II_2	—59,1	147	138							
	II_3	—62,0	132	161		355	I_1	180+ 4,0	313	95	*diffuse arc*
							I_2	+13,5	280	86	
340	I_1	180—55,8	145	101	*rays*		I_3	+22,3	273	83	
	I_2	—61,9	122	161	upper limit						
	II_1	—52,3	200	139		356	I_1	180—13,8	192	80	*diffuse arc*
	II_2	—54,9	176	179	» »		I_2	+ 1,0	225	93	
							I_3	+18,9	232	92	
341	I_1	—49.0	138	106	*diffuse arc*						
	I_2	—33,4	135	107		357	I_1	180+11,3	192	83	*diffuse arc*
	I_3	—19,7	119	107			I_2	+25,0	227	85	
342	I_1	—47,3	138	107	*diffuse arc*	358	I_3	180—10,3	240	87	
	I_2	—30,4	114	104			II_1	— 7,5	430	149	
							II_2	+17,9	286	90	
343	I_1	—74,5	186	124	*rays*						*drapery*
	I_2	—73,0	192	149	upper limit	359	I_1	180— 9,1	325	151	upper limit
	II_1	—75,5	182	123			I_2	— 7,5	248	94	
	II_2	—72,5	181	163	» »		II_3	—10,1	190	81	
344	I_1	180—67,1	155	110	*drapery*	360	I_1	180+ 9,3	122	103	*diffuse arc*
	I_2	+70,8	197	107			I_2	+19,5	135	104	
	I_3	+69,3	280	106			I_3	+30,1	165	104	
	I_4	+73,1	290	120							
	I_5	+74,0	253	125							*drapery*
	II_1	+64,7	214	107		361	I_1	180+43,4	223	117	upper limit
	II_2	+64,7	349	107			I_2	+43,7	227	92	
	III_1	+62,3	308	108			II_1	+46,5	236	92	
	III_2	+61,1	380	112			II_2	+48,4	291	100	
											drapery
345	I_1	180—20,5	135	99	*diffuse arc*	362	I_1	180+52,8	317	120	upper limit
	I_2	— 4,3	157	105			I_2	+52,3	328	101	
	I_3	+ 8,6	159	98			I_3	+50,1	311	101	
											ray
346	I_1	180—20,4	164	117	*diffuse arc*	363	I_1	180+46,3	198	160	upper limit
	I_2	— 8,4	154	108			I_2	+45,0	201	120	
	I_3	+ 4,9	156	106							*rays*
	I_4	+14,3	167	105		364	I_1	180+56,7	215	180	upper limit
							I_2	+54,1	230	106	
347	I_1	180+ 7,3	177	107	*diffuse arc*		II_1	+66,9	213	164	» »
	I_2	+19,2	198	107			II_2	+65,0	221	109	
	I_3	+27,9	228	105							*rays*
						365	I_1	180+56,7	321	197	upper limit
348	I_1	180+13,2	147	93	*pulsating*		I_2	+54,1	324	108	
	I_2	+25,0	174	100	*aurora*		II_1	+66,7	253	143	» »
							II_2	+65,0	272	120	
349	I_1	180—72,7	283	105	*drapery*						
	I_2	—61,7	250	115		366	I_1	180—68,6	360	143	*rays*
	I_3	—60,7	281	152			I_2	—00,0	000	000	
							I_3	—82,2	206	148	
350	I_1	180—25,0	158	90	*diffuse arc*		II_1	—67,6	352	162	
	I_2	—10,6	177	99			II_2	—72,0	220	151	
	I_3	+ 4,7	177	88							
						367	I_1	86,3	342	122	*drapery*
351	I_1	180—20,8	291	93	*diffuse arc*		I_2	81,1	272	120	
	I_2	—11,9	297	95			I_3	75,5	235	139	
	I_3	— 0,0	309	97			II_1	91,0	284	110	
							II_2	84,4	246	128	
352	I_1	180—67,6	338	82	*diffuse arc*						
	I_2	—59,6	252	80		368	I_1	3,2	162	141	*drapery*
	I_3	—52,2	226	89			I_2	6,8	187	130	
353	I_1	180—62,4	463	95	*drapery*		I_3	10,5	218	120	
	I_2	—57,9	318	79			I_4	17,1	338	169	
	I_3	—49,3	405	110			II_1	15,0	190	204	upper limit

Table III.

N	A. P.	a	D	H		N	A. P.	a	D	H	
369	I_1	— 2,6	221	140	*diffuse arc*		III_3	8,8	348	153	
	I_2	4,9	231	128			III_4	8,0	330	207	upper limit
	I_3	14,3	249	121							
	I_4	25,9	280	121		380	I_1	÷19,9	216	112	*drapery*
							I_2	—12,2	242	116	
370	I_1	0,0	248	118	*diffuse arc*		I_3	— 1,9	305	123	
	I_2	7,5	275	126			I_4	1,2	289	122	
	I_3	18,0	291	125			I_5	8,4	305	116	
	I_4	28,9	286	114			I_6	8,5	307	104	
371	I_1	27,3	283	105	*diffuse arc*	381	I_1	—12,0	351	126	*diffuse arc*
	I_2	35,0	269	92			I_2	— 5,8	313	103	
	I_3	46,6	316	96			I_3	+ 5,1	348	106	
							I_4	+14,4	400	117	
372	I_1	49,0	230	110	*drapery*						
	I_2	54,9	249	111		382	I_1	—40,0	331	97	*drapery*
	I_3	58,7	232	109			I_2	—36,3	344	108	
	I_4	61,9	231	142	upper limit *rays*		I_3	—31,3	306	96	
							I_4	÷27,1	322	103	
373	I_1	— 9,1	516	270	upper limit		I_5	—25,2	324	103	
	I_2	— 9,3	447	168			I_6	—22,8	336	105	
	I_3	— 9,5	520	150			II_1	—27,8	306	125	upper limit
	II_1	—11,7	341	137			III_1	—34,1	380	148	» »
	II_2	—11,6	460	142			IV_1	—40,7	377	125	» »
374	I_1	39,7	131	118	*draperies*	383	I_1	—56,8	438	120	*drapery*
	I_2	50,8	169	120			I_2	—45,3	407	117	
	I_3	61,0	247	130			I_3	—38,1	411	120	
	II_1	42,5	184	115			I_4	—37,1	365	129	upper limit
	II_2	49,7	215	117							
	II_3	55,7	230	108		384	I_1	+47,0	380	104	*drapery*
	III_1	44,5	198	150	upper limit		I_2	+47,5	345	104	
	III_2	48,2	202	115			I_3	+51,0	348	112	
	III_3	46,9	201	136	» » *rays*		I_4	+54,9	372	120	
							II_1	+39,5	470	160	upper limit
375	I_1	42,9	171	142	upper limit		II_2	+40,7	390	110	
	I_2	50,8	187	121			III_1	+53,2	301	132	» »
	I_3	59,1	234	118							
						385	I_1	—20,0	256	112	*diffuse arc*
376	I_1	70,0	342	120	*draperies*		I_2	—10,8	227	101	
	I_2	67,4	361	200	upper limit		I_3	— 1,8	212	97	
	II_1	65,9	368	115			I_4	7,1	209	98	
	II_2	62,3	253	116							
	II_3	53,5	198	117		386	I_1	—21,9	212	102	*diffuse arc*
	III_1	58,4	310	117			I_2	—15,6	188	95	
	III_2	56,1	324	177	upper limit		I_3	— 8,3	166	80	
	IV_1	64,9	608	217	» »						
	IV_2	67,4	579	100		387	I_1	—88,1	351	96	*drapery*
	IV_3	65,9	583	144			I_2	—75,1	292	99	
	V_1	61,3	519	202	» »		I_3	—65,5	234	99	
	V_2	63,5	475	98							
	V_3	61,1	465	130		388	I_1	—92,5	442	103	*drapery*
							I_2	—84,1	336	99	
					drapery		I_3	—74,9	280	100	
377	I_1	47,8	236	143	upper limit						
	I_2	50,0	235	117		389	I_1	180—68,5	364	92	*diffuse arc*
	I_3	57,6	265	107			I_2	—80,3	271	99	
378	I_1	—68,7	163	114	*drapery*	390	I_1	180+19,3	303	96	*diffuse arc*
	I_2	—60,6	133	104			I_2	+14,7	309	83	
	II_1	—74,1	175	117							
	II_2	—72,3	171	132	upper limit	391	I_1	180—80,8	411	113	*diffuse arc*
							I_2	—74,5	295	117	
					drapery		I_3	—67,2	224	110	
379	I_1	— 3,0	207	181	*drapery*						
	I_2	— 1,3	223	132		392	I_1	86,5	354	104	*ray*
	II_1	3,8	341	143			I_2	84,5	349	155	upper limit
	II_2	4,3	363	121			II_1	180—78,4	387	92	arc
	III_1	7,0	320	161	upper limit						
	III_2	7,9	356	114		393	I_1	180+14,3	382	110	*diffuse arc*

Table III.

N	A. P.	a	D	H		N	A. P.	a	D	H	
	I_2	180+21,5	480	123		408	I_1	44,5	537	125	*diffuse arc*
	I_3	+28,0	494	112			I_2	55,0	599	103	
							II_1	50,0	420	121	
394	I_1	180—74,9	402	102	*diffuse arc*		II_2	52,7	465	101	
	I_2	—62,9	302	103			II_3	57,0	475	86	
	I_5	—53,0	285	120			III_1	53,5	454	113	
395	I_1	180—70,3	301	106	*drapery*	409	I_1	40,8	455	104	*diffuse arc*
	I_2	—65,0	225	105			I_2	48,8	568	112	
							I_3	54,8	492	78	
396	I_1	180—77,1	420	102	*drapery*		II_1	48,1	419	142	*band*
	I_2	—71,2	281	108			II_2	50,5	469	108	
	I_5	—66,0	162	97			II_3	56,8	492	91	
							III_1	51,7	420	106	
397	I_1	66,4	199	125	*drapery*		III_2	56,8	490	100	
	I_2	60,1	277	132							
	I_3	59,8	412	142		410	I_1	—59,5	342	86	*diffuse arc*
	I_4	62,5	452	115			I_2	—49,5	386	97	
							I_3	—39,1	286	95	
398	I_1	63,0	172	145	*drapery*		I_4	—31,4	274	99	
	I_2	62,5	194	114							
	I_3	60,3	235	105		411	I_1	—82,7	567	100	*drapery*
	I_4	52,7	295	112			I_2	—73,3	461	108	
	I_5	58,8	304	98			I_3	—64,7	389	115	
	II_1	51,9	272	91							
	II_2	56,8	285	83		412	I_1	—82,2	229	104	*band*
							I_2	—85,4	188	105	
399	I_1	54,4	139	114	*drapery*		I_3	180+86,0	173	116	
	I_2	57,4	166	114							
	I_3	57,5	183	102		413	I_1	180—60,3	405	126	*band*
	I_4	53,6	246	105			I_2	—48,3	414	122	
	I_5	57,7	275	100			I_3	—41,2	398	138	
	II_1	49,7	296	117			I_4	—32,9	397	147	
	II_2	56,1	302	104							
						414	I_1	180— 4,2	166	101	*diffuse arc*
400	I_1	180+71,1	282	98	*drapery*		I_2	+ 3,7	156	98	
	I_2	+82,0	254	107			I_3	+12,4	159	100	
	I_3	—86,4	202	103							
						415	I_1	180+86,4	231	136	*drapery*
401	I_1	180+71,3	276	94	*drapery*		I_2	+86,4	191	135	
	I_2	+82,0	257	110			I_3	+86,7	156	138	
	I_3	—86,0	212	112							
						416	I_1	180+83,1	370	130	*drapery*
402	I_1	180+69,4	348	107	*drapery*		I_2	+84,5	333	157	
	I_2	+77,8	252	101			I_3	+83,0	196	130	
	I_3	+86,9	213	108			I_4	+83,5	180	155	
	I_4	—85,3	169	102							
						417	I_1	180+84,6	185	126	*drapery*
403	I_1	180+73,8	268	97	*drapery*		I_2	+84,8	146	126	
	I_2	+80,6	209	100			I_3	+85,6	121	138	
	I_3	+88,1	165	100							
						418	I_1	180+53,6	171	121	*drapery*
404	I_1	+33,5	126	110	*diffuse arc*		I_2	+58,2	271	135	
	I_2	+41,2	148	111							
						419	I_1	180+45,2	218	155	*drapery*
405	I_1	180+83,5	291	94	*diffuse arc*		I_2	+51,8	230	130	
	I_2	—89,5	270	106			I_3	+56,5	255	112	
	I_3	—79,6	220	110							
	I_4	—70,7	188	112		420	I_1	180+45,1	241	98	*drapery*
							I_2	+50,4	248	138	
406	I_1	180+82,8	340	97	*diffuse arc*						
	I_2	—87,5	300	114							
	I_3	—77,6	241	113		421	I_1	180+37,6	242	116	*diffuse arc*
	I_4	—66,9	200	112			I_2	+44,7	295	114	
							I_3	+52,1	439	126	
407	I_1	180+87,9	347	93	*diffuse arc*						
	I_2	—81,1	271	100		422	I_1	180+37,3	257	119	*diffuse arc*
	I_3	—68,4	211	99			I_2	+44,9	287	109	
	I_4	—59,0	185	100			I_3	+50,5	382	116	

Table III.

N	A. P.	a	D	H		N	A. P.	a	D	H	
423	I_1	180+38,0	246	108	*diffuse arc*	439	I_1	180—31,3	314	127	*diffuse arc*
	I_2	+47,0	312	103			I_2	—22,4	285	116	
	I_3	+53,2	488	127			I_3	—14,5	274	112	
424	I_1	180+33,1	283	128	*diffuse arc*	440	I_1	180—32,9	206	108	*diffuse arc*
	I_2	+41,6	328	126			I_2	—22,7	211	114	
425	I_1	180+23,5	209	109	*diffuse arc*		I_3	—11,1	218	116	
	I_2	+32,0	234	107			I_4	+ 2,3	225	114	
	I_3	+39,9	296	115			II_1	—27,1	231	100	
	I_4	+46,3	349	113			II_2	—17,4	217	96	
426	I_1	180+26,6	258	127	*diffuse arc*		II_3	— 6,3	220	93	
	I_2	+36,9	262	107			II_4	+ 2,3	261	105	
	I_3	+44,1	328	114		441	I_1	180—33,1	209	108	*diffuse arc*
427	I_1	180—34,3	251	138	*diffuse arc*		I_2	—23,0	208	109	
	I_2	—25,3	199	113			I_3	—12,0	207	110	
	I_3	—12,0	177	104			I_4	— 1,6	222	113	
	I_4	— 0,3	198	114		442	I_1	180—26,7	340	123	*diffuse arc*
428	I_1	180+29,7	341	157	*diffuse arc*		I_2	—16,2	307	112	
	I_2	+39,3	328	114			I_3	— 8,0	347	127	
	I_3	+50,8	372	100			I_4	— 0,5	353	125	
429	I_1	180—85,7	110	113	*band*	443	I_1	180—50,3	325	116	*diffuse arc*
	I_2	—80,3	83	118			I_2	—38,9	265	106	
	I_3	—72,0	62	121			I_3	—28,0	278	113	
	I_4	—59,4	43	118		444	I_1	180—31,2	359	143	*diffuse arc*
430	I_1	180—88,6	110	106	*band*		I_2	—23,9	274	110	
	I_2	—72,0	66	109			I_3	—12,5	288	113	
	I_3	—49,4	50	113			I_4	— 0,1	315	124	
431	I_1	180—86,9	91	101	*band*	445	I_1	180— 5,7	261	105	*diffuse arc*
	I_2	—78,5	73	104			I_2	+ 5,1	319	126	
	I_3	—65,8	57	102			I_3	+15,9	337	118	
432	I_1	82,6	99	100	*band*	446	I_1	180—30,9	285	102	*diffuse arc*
	I_2	89,2	74	100			I_2	—22,1	265	104	
433	I_1	180—39,6	240	100	*diffuse arc*		I_3	—10,7	245	102	
	I_2	—29,3	244	104			I_4	— 3,3	275	113	
	I_3	—14,9	266	110		447	I_1	180—33,7	295	101	*diffuse arc*
	I_4	— 4,5	289	113			I_2	—32,4	245	100	
434	I_1	180—39,2	238	112	*diffuse arc*		I_3	—13,8	235	105	
	I_2	—26,9	236	112			I_4	— 3,9	236	108	
	I_3	—12,7	262	119		448	I_1	180—31,4	310	118	*diffuse arc*
	I_4	+ 0,3	295	124			I_2	—21,4	264	114	
435	I_1	180—13,3	218	101	*diffuse arc*		I_3	— 8,1	258	121	
	I_2	— 5,5	222	99		449	I_1	180+20,5	332	183	*rays* upper limit
	I_3	+ 4,4	286	114			I_2	+20,1	348	130	
	I_4	+12,4	320	110			II_1	+23,4	350	138	
436	I_1	180—14,7	268	125	*diffuse arc*		III_1	+25,5	338	141	
	I_2	— 3,7	257	112			IV_1	+27,9	320	128	
	I_3	+ 6,0	287	113		450	I	64,7	329	146	*rays* upper limit
437	I_1	180—13,3	222	105	*diffuse arc*		I	68,7	447	125	
	I_2	— 3,6	231	102			II	64,5	294	160	» »
	I_3	+ 6,2	281	111		451	I	180—21,2	339	122	*diffuse arc*
	I_4	+13,8	313	105			I	—14,1	290	118	
438	I_1	180—36,5	181	98	*diffuse arc*		I	— 8,1	253	111	
	I_2	—23,7	193	106		452	I_1	180—39,0	282	92	*rays*
	I_3	—12,5	185	94			I_2	—41,3	283	162	upper limit
	I_4	— 0,2	237	106			II_1	—31,9	282	121	
							III_1	—30,8	216	93	
							III_2	—31,8	209	122	» »

Table III.

N	A. P.	a	D	H		N	A. P.	a	D	H	
453	I_1	180—27,6	335	161	*drapery*	467	I_1	180—32,2	220	105	*drapery*
	I_2	—22,2	322	132			I_2	—42,3	264	113	
	I_3	—14,2	331	100			I_3	—47,5	327	122	
							I_4	—52,4	358	103	
454	I_1	180—36,5	435	108	*rays*		II_1	—54,3	363	163	
	I_2	—33,5	400	110			II_2	—55,4	303	186	upper limit
	II_1	—36,8	236	82							
	II_2	—38,7	258	158	upper limit	468	I_1	180—40,1	490	116	*drapery*
	III_1	—32,6	282	112			II_1	—44,0	439	113	
	III_2	—34,3	315	205	» »		II_2	—51,1	448	112	
	IV_1	—30,6	254	121			II_3	—57,7	557	130	
	IV_2	—32,3	237	164	» »						
	V_1	—31,5	288	103		469	I_1	180—29,0	387	130	*drapery*
	V_2	—29,8	238	110			I_2	—37,2	504	129	
	V_3	—30,0	261	145	» »		I_3	—41,0	466	112	
							I_4	—40,3	452	122	
455	I_1	180—70,5	308	147	*drapery*		I_5	—40,0	449	127	
	I_2	—76,5	357	120			I_6	—48,5	379	97	
							I_7	—57,7	403	93	
456	I_1	180—79,5	441	122	*drapery*						
	I_2	—74,3	267	121		470	I_1	180—34,3	364	112	*drapery*
	I_3	—68,3	215	124			I_2	—42,5	362	111	
							I_3	—48,1	418	120	
457	I_1	180—68,0	197	133	*drapery*						
	I_2	—73,8	301	130		471	I_1	180—41,5	498	138	*drapery*
	I_3	—78,8	393	119			I_2	—46,6	522	135	
							I_3	—55,8	554	123	
458	I_1	180—82,8	429	118	*drapery*		I_4	—56,7	522	136	
	I_2	—79,1	335	112							*rays*
	I_3	—74,0	291	125		472	I_1	180—36,3	300	146	upper limit
	I_4	—69,8	213	120			I_2	—33,9	296	115	
							I_3	—37,8	296	147	» »
459	I_1	180—67,0	180	124	*drapery*		I_4	—37,1	289	113	
	I_2	—73,8	221	124			II_1	—39,8	406	157	» »
	I_3	—78,6	322	130			II_2	—39,6	400	111	
	I_4	—83,1	397	117			II_3	—40,8	446	161	» »
							II_4	—40,5	421	126	
460	I_1	180+14,0	220	105	*pulsating*						
	I_2	+ 3,6	199	105	*aurora*	473	I_1	180—27,5	285	111	*drapery*
	I_3	— 9,0	190	100			I_2	—27,9	475	102	
	I_4	—24,5	217	111			II_1	—24,4	304	88	
461	I_1	180—82,9	175	110	*drapery*	474	I_1	180—24,4	377	91	*drapery*
	I_2	—87,6	223	108			I_2	—33,7	409	118	
	I_3	—88,4	326	109							
	II_1	—76,3	218	126		475	I_1	180—73,0	163	112	*drapery*
	II_2	—79,3	265	125			I_2	—75,3	209	110	
							I_3	—77,0	254	112	
462	I_1	180—83,8	174	113	*drapery*		I_4	—77,8	278	107	
	I_2	—87,8	247	121			I_5	—78,6	353	111	
	I_3	—89,0	310	111							
						476	I_1	180—76,4	149	103	*drapery*
463	I_1	180—61,6	65	115	*band*		I_2	—78,0	221	106	
	I_2	—72,4	76	108			I_3	—78,8	385	114	
	I_3	—79.8	99	100			I_4	—83,1	350	110	
					rays		I_5	—83,8	415	108	
464	I_1	—82,4	107	209	upper limit						
	I_2	—91,4	110	142		477	I_1	180—78,4	155	113	*drapery*
	II_1	—84,2	96	190	» »		I_2	—80,3	224	109	
	II_2	—88,3	96	156			I_3	—79,0	441	112	
							I_4	—81,1	405	101	
465	I_1	180+53,3	220	127	*ray*		I_5	—84,3	301	107	
	I_2	+54,8	209	150			I_6	—83,5	368	107	
	I_3	+57,0	194	182	» »						
466	I_1	180+62,4	140	91	*rays*	478	I_1	180—76,9	132	102	*drapery*
	I_2	+66,0	171	184	upper limit		I_2	—83,0	186	109	
	II_1	+58,2	141	109			I_3	—81,6	260	107	
	II_2	+60,0	139	148	» »		I_4	—78,9	418	117	

Table III.

N	A. P.	a	D	H		N	A. P.	a	D	H	
479	I_1	58,9	510	114	*drapery*		I_4	180—16,2	282	80	
	I_2	62,5	502	107							
	I_3	61,7	505	133		491	I_1	180+12,5	316	89	*band*
	II_1	63,8	540	148							
	II_2	66,3	598	142		492	I_1	180+10,3	240	94	*drapery*
	II_3	65,5	495	166			II_1	+13,5	266	114	
					rays						
480	I_1	—86,2	353	132	upper limit	493	I_1	180+ 4,5	242	104	*drapery*
	I_2	—88,1	379	104			I_2	+ 4,5	199	116	
	II_1	—87,8	349	137	» »		I_3	+ 5,3	169	126	
	II_2	—88,7	365	111			II_1	+13,8	162	90	
	III_1	—90,4	341	180	» »						*drapery*
	III_2	—92,6	365	129		494	I_1	180—81,4	362	146	upper limit
					drapery		I_2	—79,6	419	133	
481	I_1	—92,2	394	140	upper limit		II_1	—77,4	430	129	
	I_2	—94,2	408	96			II_2	—69,8	382	83	
					ray						
482	I_1	180+86,9	445	181	upper limit	495	I_1	—11,1	74	109	*auroral*
	I_2	+84,6	459	100			I_2	—17,4	77	96	*«clouds»*
	II_1	+86,0	468	124	upper limit						
	II_2	+85,3	483	103		496	I_1	—40,4	47	111	*auroral*
	III_1	+83,4	437	108			I_2	—43,0	64	102	*«clouds»*
					ray		II_1	—52,0	45	105	
483	I_1	78,6	277	246	upper limit		II_2	—50,3	63	91	
	I_2	81,2	285	201							
	I_3	83,9	307	163		497	I_1	—59,6	59	105	*auroral*
							I_2	—58,8	81	101	*«clouds»*
484	I_1	—50,0	82	110	*band*						
	I_2	—63,6	91	110							*rays*
	I_3	—73,6	103	114		498	I_1	180+12,0	305	147	upper limit
					ray		I_2	+12,0	324	212	
485	I_1	76,0	131	204	upper limit		II_1	+30,5	285	112	
	I_2	79,6	130	170			II_2	+35,5	327	102	
	I_3	82,6	130	140			II_3	+37,0	330	146	
	II_1	72,6	124	148	» »		II_4	+38,2	312	193	upper limit
	II_2	74,8	134	117			III_1	+37,9	411	132	
							III_2	+36,7	370	129	
486	I_1	180—71,0	114	112	*pulsating*						
	I_2	—76,8	186	122	*aurora*	499	I_1	180+30,0	171	128	*drapery*
	II_1	87,5	191	120			I_2	+33,0	111	131	
	III_1	82,3	139	110			II_1	+32,2	197	139	
	III_2	84,7	175	108			II_2	+37,7	124	141	
	IV_1	76,7	124	106			II_3	+48,4	80	132	
	IV_2	79,7	158	106							*drapery*
						500	I_1	+58,4	110	180	upper limit
487	I_1	180+11,3	333	127	*rays*		I_2	+66,1	107	142	
	I_2	+12,2	322	186			II_1	+88,3	91	145	
	I_3	+12,9	315	222	upper limit						
	II_1	+15,2	372	128		501	I_1	+31,3	224	101	*pulsating*
							I_2	+20,9	189	95	*aurora*
488	I_1	82,3	191	163	*rays*						
	I_2	74,8	159	207		502	I_1	180—25,8	200	101	*ray*
	I_3	68,5	137	256	ypper limit		I_2	—30,7	190	97	
					rays						
489	I_1	180—64,0	108	230	upper limit	503	I_1	180—36,8	83	97	*ray*
	I_2	—56,4	91	124			II_1	—42,4	80	98	
	II_1	—66,8	109	224	» »						
	II_2	—57,0	97	116		504	I_1	180—44,7	255	116	*drapery*
	III_1	—68,0	156	306	» »		I_2	—59,6	305	88	
	III_2	—61,6	123	179			I_3	—60,9	264	124	
	III_3	—57,9	113	115			I_4	—67,8	229	120	
	IV_1	—71,9	159	324	» »						
	IV_2	—64,2	152	215		505	I_1	180—42,0	229	88	*drapery*
	IV_3	—59,6	136	130			I_2	—50,5	291	103	
	V_1	—71,7	207	308	» »		I_3	—60,3	229	100	
	V_2	—65,3	156	139			I_4	—73,1	249	95	
490	I_1	180+12,0	313	101	*band*	506	I_1	180—44,8	215	102	*drapery*
	I_2	+ 2,0	274	86			I_2	—57,3	238	103	
	I_3	— 7,4	292	91			I_3	—70,7	238	90	

Table III.

N	A. P.	a	D	H		N	A. P.	a	D	H	
507	I_1	180—14,5	208	110	*drapery*	520	I_1	180+30,8	343	119	*band*
	I_2	—27,8	184	99			I_2	+32,2	276	134	
	I_3	—42,7	190	94			II_1	+26,9	265	108	
	I_4	—52,0	226	99			II_2	+20,4	198	98	
							II_3	+12,2	172	97	
508	I_1	180—21,9	347	123	*drapery*						
	I_2	+22,6	324	166	upper limit	521	I_1	180+34,9	334	118	*band*
	II_1	+24,9	318	132			II_1	+29,4	310	110	
	II_2	+27,7	267	212	» »		II_2	+23,9	279	112	
	III_1	+26,0	323	114							
	III_2	+27,8	284	173		522	I_1	180+26,8	319	89	*band*
	III_3	+29,6	253	216	» »		II_1	+21,1	344	118	
	IV_1	+30,3	316	128			II_2	+11,0	360	134	
509	I_1	180+33,5	376	103	*drapery*	523	I_1	180+14,5	430	110	*band*
	I_2	+32,4	357	126			I_2	+ 4,7	498	125	
	I_3	+25,7	280	111			II_1	+ 7,9	310	84	
	II_1	+22,4	423	126			II_2	+15,5	330	102	
	III_1	+16,3	318	169			II_3	+ 8,6	317	107	
	III_2	+17,1	311	218	upper limit		II_4	+ 2,7	320	111	
	III_3	+17,9	308	297	» »						
						524	I_1	180—67,1	294	119	*drapery*
510	I_1	180+31,3	330	99	*drapery*		I_2	—73,4	364	110	
	I_2	+38,9	472	114			I_3	—75,5	403	110	
	I_3	+41,9	461	131			I_4	—77,1	374	136	
	I_4	+42,5	429	173	upper limit						
	II_1	+34,6	476	106		525	I_1	180+54,3	497	105	*band*
							I_2	51,1	339	84	
511	I_1	180+43,6	443	98	*drapery*						
	I_2	+43,5	383	127		526	I_1	180+23,0	552	132	*ray*
	I_3	+44,9	334	154	upper limit		I_2	+24,2	469	199	upper limit
	II_1	+47,5	472	106							*ray*
	II_2	+46,3	356	148	» »	527	I_1	180—77,1	310	161	upper limit
							I_2	—74,0	441	127	
512	I_1	—72,0	165	119	*auroral*		II_1	—81,6	310	172	» »
	II_1	—68,8	165	118	*«clouds»*		II_2	—78,3	407	145	
	II_2	—72,2	153	84							
						528	I_1	—69,3	243	106	*band*
513	I_1	+38,8	107	110	*auroral*		I_2	—77,0	292	107	
	I_2	+33,8	129	90	*«clouds»*		I_3	—86,1	325	94	
514	I_1	180+44,8	307	89	*diffuse arc*	529	I_1	180+74,3	358	112	*drapery*
	I_2	+37,7	286	110							
	I_3	+29,7	268	124		530	I_1	—69,7	210	112	*drapery*
							I_2	—76,5	252	97	
515	I_1	180+38,6	272	103	*diffuse arc*		II_1	—62,5	233	98	
	I_2	180+28,8	256	119			II_2	—73,0	273	89	
	I_3	+20,3	283	144							
						531	I_1	—86,7	254	118	*drapery*
516	I_1	—83,1	161	109	*band*		I_2	—83,9	303	111	
	I_2	—88,4	217	112			II_1	—66,3	268	97	
	I_3	—93,9	239	95			II_2	—77,0	300	108	
							II_3	—85,9	360	105	
517	I_1	180+22,9	340	117	*band*						
	I_2	+12,6	265	109		532	I_1	180+89,3	245	87	*drapery*
	I_3	+ 0,4	268	123			II_1	+81,5	284	139	upper limit
	I_4	— 9,1	289	138			II_2	+80,8	320	98	
							III_1	+82,5	280	100	
518	I_1	180+27,6	272	106	*band*						
	I_2	+17,9	333	119		533	I_1	180+77,7	248	91	*drapery*
	I_3	+ 9,4	330	120			I_2	+81,3	273	98	
	II_1	+19,7	224	109			II_1	+89,8	339	106	
	II_2	+10,9	168	94			II_2	+81,3	400	88	
	II_3	— 1,1	166	100							
						534	I_1	180+75,5	262	93	*drapery*
519	I_1	180+25,7	244	96	*band*		I_2	+79,6	371	107	
	I_2	+16,3	374	114			I_3	+80,1	371	81	
	II_1	+16,5	237	95			I_4	+81,6	395	111	
	II_2	+ 8,1	226	110							
	II_3	— 2,4	198	105		535	I_1	42,1	400	108	*diffuse arc*

Table III.

N	A. P.	a	D	H		N	A. P.	a	D	H	
	I_2	31,1	290	96		548	I_1	82,8	231	100	*band*
	I_3	21,2	241	94			I_2	66,0	250	95	
	I_4	10,4	209	92							
						549	I_1	63,1	240	103	*band*
536	I_1	38,9	333	89	*diffuse arc*						
	I_2	28,9	291	97		550	I_1	52,0	145	96	*band*
	I_3	19,1	250	96			I_2	45,1	94	100	
	I_4	10,9	237	100			I_3	34,2	64	100	
							II_1	54,0	110	99	
537	I_1	31,5	278	85	*diffuse arc*		II_2	46,0	64	93	
	I_2	19,6	243	89							
	I_3	6,8	229	93		551	I_1	180+41,3	271	122	*band*
							I_2	+38,5	194	106	
538	I_1	180+29,8	469	118	*drapery*		II_1	+49,2	131	93	
	I_2	+28,3	251	138	upper limit		II_2	+40,2	110	93	
	I_3	+27,2	194	138	» »		II_3	+38,0	94	100	
539	I_1	180+33,7	543	114	*drapery*	552	I_1	180+38,1	97	99	*band*
	I_2	+25,4	356	113			I_2	+43,3	102	100	
	II_1	+29,4	440	128			I_3	+42,6	82	99	
	II_2	+32,1	255	103			II_1	+48,5	211	106	
							II_2	+42,0	181	110	
540	I_1	180+30,0	425	103	*drapery*		II_3	+34,5	156	114	
	I_2	+26,3	314	118			III_1	+59,7	162	107	
	II_1	+33,7	541	126			III_2	+53,9	130	99	
	II_2	+29,3	406	125							
	II_3	+31,5	274	113		553	I_1	—48,6	84	101	*band*
							I_2	—60,4	67	131	
541	I_1	180+31,8	512	117	*drapery*						
	I_2	+27,0	319	112		554	I_1	—36,6	56	117	*band*
	I_3	+28,0	229	121			I_2	—50,6	62	115	
	II_1	+32,0	457	121	upper limit		I_3	—60,9	100	113	
	II_2	+30,5	285	110							
					drapery	555	I_1	180+41,7	625	147	*drapery*
542	I_1	180+31,8	522	131			I_2	+37,4	485	140	
	I_2	+28,0	345	112			II_1	+45,5	330	113	
	II_1	+29,4	254	91			III_1	+50,8	306	97	
	II_2	+27,4	267	111							
						556	I_1	—55,0	160	100	*drapery*
543	I_1	—62,0	140	96	*drapery*		I_2	—64,5	196	97	
	I_2	—69,3	174	95			I_3	—78,5	234	94	
	I_3	—79,7	215	100			II_1	—61,1	156	102	
	I_4	—89,5	230	97			II_2	—72,2	193	99	
							II_3	—84,8	251	104	
544	I_1	180+32,2	385	97	*drapery*						
	I_2	+34,1	233	98		557	I_1	—62,2	148	107	*drapery*
							I_2	—73,6	185	103	
545	I_1	180+26,2	387	97	*drapery*		I_3	—87,5	287	110	
	II_1	+27,1	342	103			II_1	—69,0	160	106	
	II_2	+37,8	228	97			III_1	—77,3	193	107	
	II_3	+44,0	165	95			IV_1	—82,0	223	107	
	III_1	+33,6	185	102							
	III_2	+34,7	139	106		558	I_1	—70,2	234	103	*drapery*
							I_2	—59,8	274	100	
546	I_1	180+37,8	360	91	*drapery*						
	I_2	+48,8	342	106		559	I_1	—57,8	225	90	*diffuse arc*
	II_1	+36,0	350	92			I_2	—70,6	254	86	
	II_2	+41,1	257	98							
	III_1	+34,3	284	86		560	I_1	46,5	308	86	*diffuse arc*
	III_2	+41,2	180	96			I_2	33,0	263	90	
	IV_1	+32,7	291	94			I_3	19,0	223	85	
	IV_2	+34,7	166	93							
	IV_3	+28,7	131	98		561	I_1	74,9	166	111	*band*
							I_2	67,0	188	93	
547	I_1	180+36,5	383	106	*drapery*		I_3	64,1	265	101	
	I_2	+33,1	368	92							
	I_3	+33,3	278	96							
	I_4	+28,0	254	111		562	I_1	70,5	249	122	*ray*
	II_1	+38,7	355	101			I_2	67,5	244	156	
	II_2	+40,9	321	112			I_3	64,3	225	195	upper limit

Table III.

N	A. P.	a	D	H		N	A. P.	a	D	H	
563	I_1	180+40,0	343	125	*drapery*	579	I_1	180— 9,5	130	100	*diffuse arc*
	I_2	+38,0	192	113			I_2	—27,3	132	101	
							I_3	—47,2	173	108	
564	I_1	180+30,3	338	103	*drapery*						
	I_2	+37,1	319	107		580	I_1	180+13,8	362	93	*band*
	II_1	+35,0	299	111			II_1	+11,4	351	94	
	II_2	+28,4	250	138							
						581	I_1	180+16,0	375	116	*band*
565	I_1	180+39,2	442	116	*rays*		I_2	+12,0	380	106	
	I_2	+38,7	321	126			II_1	+ 7,0	280	102	
	II_1	+40,5	361	108			II_2	— 0,3	230	104	
	III_1	+35,3	234	113			II_3	—12,4	195	102	
	III_2	+34,8	200	118							
						582	I_1	180+25,0	306	106	*band*
566	I_1	180+31,7	580	118	*diffuse arc*		I_2	+18,1	203	96	
	I_2	+19,1	465	105			I_3	+ 4,0	178	107	
							I_4	— 7,7	147	109	
567	I_1	180—52,6	330	126	*diffuse arc*						
	I_2	—62,1	342	112		583	I_1	180+31,5	253	116	*band*
	I_3	—75,6	468	106			I_2	+22,6	164	105	
							I_3	+ 9,7	134	108	
568	I_2	180— 0,8	269	90	*diffuse arc*						
	I_2	—13,4	245	96		584	I_1	180+41,4	400	125	*band*
	I_3	—25,2	236	97			I_2	+38,9	217	108	
	I_4	—39,4	223	93			I_3	+29,0	168	113	
569	I_1	180— 7,3	281	100	*diffuse arc*	585	I_1	180+47,7	480	116	*drapery*
	I_2	—16,0	259	99			I_2	+52,9	343	122	
	I_3	—29,2	276	111			I_3	+54,0	333	169	upper limit
	I_4	—38,0	279	111			II_1	+45,6	406	133	» »
							III_1	+49,1	307	112	
570	I_1	180+28,7	383	97	*band*		III_2	+43,5	236	122	
	II_1	+14,6	369	105			III_3	+36,2	195	127	
571	I_1	180— 3,9	261	89	*band*	586	I_1	180+53,9	378	102	*drapery*
	I_2	—15,1	257	89			I_2	+59,3	314	142	upper limit
	I_3	—28,7	230	79			II_1	+54,9	242	105	
							II_2	+47,5	181	109	
572	I_1	180+ 1,7	172	107	*band*		II_3	+39,3	153	109	
	I_2	—11,0	175	112			III_1	+50,4	343	118	
	I_3	—25,8	181	111			III_2	+49,7	287	130	upper limit
	I_4	—36,4	203	115							
						587	I_1	180+54,9	353	125	*drapery*
573	I_1	180—10,4	343	103	*band*		I_2	+60,6	346	108	
	I_2	—21,7	310	81			I_3	+63,0	311	157	upper limit
	II_1	—15,1	427	147			II_1	+59,4	345	120	
	II_2	—23,3	257	87			II_2	+56,1	236	110	
							II_3	+48,3	192	112	
574	I_1	180—12,3	232	86	*band*						
	I_2	—25,0	294	110		588	I_1	80,0	137	90	*drapery*
	I_3	—33,5	318	116			I_2	76,9	184	104	
							II_1	74,9	181	113	
575	I_1	180+ 1,1	354	114	*band*		II_3	79,2	159	118	
	I_2	— 9,1	280	103			III_1	72,3	178	114	
	I_3	—22,1	269	100			III_2	79,6	339	120	
	I_4	—31,0	248	89							
						589	I_1	180+39,0	362	118	*drapery*
576	I_1	180+ 1,9	282	88	*band*		I_2	+38,7	312	117	
	I_2	— 7,3	262	90			II_1	+49,1	467	157	
	I_3	—15,6	321	113			II_2	+51,3	448	249	upper limit
							III_1	+52,0	479	209	» »
577	I_1	180+18,8	333	110	*diffuse arc*						
	I_2	+28,4	277	107		590	I_1	180—20,4	176	106	*drapery*
	I_3	+37,7	227	95			I_2	—28,8	211	117	
							II_1	—32,1	114	97	
							II_2	—51,0	136	94	
578	I_1	180—10,6	154	107	*diffuse arc*						
	I_2	—23,0	140	104		591	I_1	180—70,7	277	106	*drapery*
	I_3	—35,7	135	95			I_2	—77,0	355	90	
	I_4	—49,5	135	82			II_1	—69,8	390	103	

Table III.

N	A. P.	a	D	H		N	A. P.	a	D	H	
592	I_1	180—80,5	290	89	*band*	608	I_1	180+69,5	201	133	*band*
	I_2	88,8	303	93			I_2	+77,2	236	123	
	I_3	83,6	261	108			I_3	+79,0	289	105	
	I_4	82,3	181	102							
	I_5	78,9	242	106		609	I_1	180+86,8	307	110	*drapery*
	I_6	82,8	331	101			I_2	+81,5	461	107	
	II_1	74,3	245	116			II_1	+79,9	231	105	
	II_2	82,1	357	101			II_2	+82,8	363	106	
											drapery
593	I_1	78,8	219	99	*band*	610	I_1	180+87,4	342	137	upper limit
	I_2	81,5	334	103			I_2	+84,6	430	108	
	II_1	74,9	264	117			I_3	+79,3	485	93	
							II_1	+79,0	219	99	
594	I_1	88,6	237	109	*band*		II_2	+83,7	380	109	
	I_2	180—87,1	246	104			II_3	+77,3	513	105	
	II_1	88,8	200	100							
	II_2	81,8	261	100		611	I_1	180+87,5	427	185	*drapery*
							I_2	+86,7	388	114	upper limit
595	I_1	90,0	226	117	*band*		I_3	+81,3	521	110	
	I_2	83,0	277	103			II_1	+84,0	373	132	» »
							II_2	+85,1	379	107	
596	I_1	180+21,3	402	99	*band*		II_3	+81,4	479	109	
	I_2	+15,4	317	120							
	I_3	+11,0	273	110		612	I_1	63,9	440	126	*drapery*
	I_4	+ 2,3	241	106			I_2	61,7	276	114	
							II_1	65,5	394	124	
597	I_1	180—52,0	241	103	*band*		II_2	67,8	195	98	
	I_2	—78,0	228	103							
						613	I_1	56,4	274	99	*drapery*
598	II_1	180+28,2	392	96	*band*		I_2	54,0	263	136	upper limit
	II_2	+16,9	276	93			II_1	59,7	311	111	
	II_3	+ 2,3	240	96			II_2	58,8	290	127	
599	I_1	180+19,1	317	102	*band*	614	I_1	48,2	385	109	*drapery*
	I_2	+10,2	279	98			I_2	39,0	296	112	
	I_3	+ 1,9	280	109			I_3	30,3	237	121	
							II_1	41,0	272	111	
600	I_1	180—67,6	299	110	*band*		II_2	35,5	212	109	
	I_2	—77,6	309	99			II_3	30,8	176	114	
	I_3	—78,6	440	100			III_1	42,8	267	116	
							III_2	35,8	199	128	
601	I_1	+88,5	281	100	*band*						
	I_2	+85,1	340	96		615	I_1	180+83,9	210	117	*drapery*
							I_2	+88,3	332	114	
602	I_1	+89,4	212	102	*band*		I_3	+87,0	561	116	
603	I_1	180+23,4	280	124	*band*	616	I_1	180+84,8	170	118	*drapery*
	I_2	+13,7	266	83			I_2	+86,0	230	115	
	I_3	+ 5,7	272	91			I_3	+88,3	314	109	
	II_1	+20,2	288	118			I_6	+87,7	565	132	
	II_2	+12,1	208	100							
	II_3	+ 2,0	208	111		617	I_1	180+88,5	230	124	*drapery*
							I_2	+89,9	364	131	
604	I_1	180+63,1	383	102	*band*						
	I_2	+61,6	180	102		618	I_1	180—70,5	290	134	*drapery*
							I_2	—68,9	304	106	
605	I_1	180+63,9	434	112	*band*		II_1	—75,2	341	154	upper limit
	I_2	+68,5	278	117			II_2	—73,7	342	108	
	I_3	+63,2	190	114			III_1	—70,3	331	108	
						619	I_1	180— 4,7	176	109	*ray*
606	I_1	180+69,1	402	109	*band*		I_2	— 7,7	129	116	
	I_2	+71,7	250	111			I_3	— 9,8	95	116	upper limit
	I_3	+67,0	174	111							
						620	I_1	180— 9,8	130	117	*ray*
							I_2	—10,3	127	170	upper limit
607	I_1	180+73,7	210	119	*band*		II_1	— 7,1	162	125	
	I_2	+74,7	308	116			II_2	— 7,2	132	172	» »
	II_1	+80,2	266	117							
	II_2	+71,5	463	107		621	I_1	180—39,3	152	206	upper limit

Table III.

N	A. P.	a	D	H		N	A. P.	a	D	H	
	I_2	180—35,3	141	112		637	I_1	180+68,2	316	101	*drapery*
	II_1	—44,0	168	206	upper limit *ray*		I_2	+59,7	203	102	
							I_3	+49,8	149	111	
622	I_1	180—46,3	131	179	upper limit		II_1	+50,2	365	116	
	I_2	—43,0	136	138			II_2	+51,2	317	150	upper limit
	I_3	—40,1	134	101			II_3	+52,5	311	192	» »
					ray						
623	I_1	180—44,0	114	140	upper limit	638	I_1	180+64,5	212	112	*drapery*
	I_2	—39,0	126	99			I_2	+57,4	183	115	
	II_1	—36,5	104	96			I_3	+47,2	169	139	
					rays						*drapery*
624	I_1	37,0	47	177	upper limit	639	I_1	180+ 6,7	121	114	*band*
	I_2	4,0	59	192	» »		I_2	— 8,6	150	122	
	II_1	23,0	48	203	» »		I_3	—22,5	214	139	
											drapery
625	I_1	—74,7	238	106	*pulsating*	640	I_1	88,6	225	149	upper limit
	I_2	—75,3	230	113	*aurora*		I_2	180—89,0	393	132	
	I_3	—78,3	392	89							
	I_4	—81,9	322	91		641	II_1	180—33,6	272	121	*drapery*
	I_5	—84,4	263	92			II_2	—43,5	244	108	
							II_3	—50,8	262	105	
626	I_1	—86,4	164	120	*pulsating*		II_4	—56,2	255	93	
					aurora		II_5	—59,2	261	169	upper limit
627	I_1	180—54,0	379	141	*drapery*						
	I_2	—61,9	382	113		642	I_1	180+44,9	227	99	*band*
	I_3	—63,7	394	102			I_2	+42,9	186	102	
	I_4	—66,1	366	188	upper limit		II_1	+25,7	305	114	
							II_2	+39,2	293	128	
628	I_1	180—54,1	339	133	*drapery*		II_3	+40,4	162	105	
	I_2	—60,5	372	115							
	I_3	—63,1	361	112		643	I_1	180—42,0	318	99	*band*
	I_4	—64,2	349	158	upper limit		I_2	—48,8	440	115	
							II_1	—49,8	314	115	
629	I_1	180—20,6	214	120	*drapery*		II_2	—62,9	259	89	
	I_2	—30,2	235	124			II_3	—71,5	281	81	
	I_3	—40,2	278	139							
						644	I_1	180—62,2	228	82	
630	I_1	180+22,8	402	131	*drapery*						
	I_2	+17,3	262	117		645	I_1	180— 0,1	373	101	*drapery*
	I_3	+15,2	261	145	upper limit		I_2	— 7,2	348	114	
	II_1	+ 8,9	243	130							
					ray	646	I_1	180+17,2	507	138	*drapery*
631	I_1	180+39,0	623	332	upper limit		I_2	+10,3	512	132	
	I_2	+37,6	645	238	» »		I_3	+ 2,0	461	131	
	I_3	+34,2	456	131			I_4	— 5,2	422	137	
	I_4	+35,5	493	244			I_5	—13,8	429	145	
	I_5	+37,4	462	325	» »						
						647	I_1	180+ 1,4	320	102	*ray*
632	I_1	180+70,0	150	100	*pulsating*		I_2	+ 1,6	287	150	
	I_2	+63,9	193	103	*aurora*		I_3	+ 2,0	266	194	upper limit
	I_3	+69,5	277	105							
	I_4	+73,3	180	104		648	I_1	180—28,4	152	98	*ray*
	I_5	+75,9	159	119							
						649	I_1	65,9	197	186	upper limit
633	I_1	180—84,9	219	114	*pulsating*		I_2	69,6	216	149	upper limit
	I_2	—85,0	262	101	*aurora*						
						650	I_1	180—23,0	245	113	*drapery*
634	I_1	180—49,3	118	115	*diffuse arc*		I_2	—33,5	395	148	
	I_2	—65,0	148	105			I_3	—36,6	330	130	
	I_3	—74,8	202	105			I_4	—37,9	323	208	upper limit
635	I_1	180+52,0	408	116	*diffuse arc*	651	I_1	180—12,0	224	111	*drapery*
	I_2	+59,1	357	105			I_2	—20,7	248	110	
	II_1	+55,6	308	110			I_3	—30,9	277	106	
	II_2	+45,3	209	102							
	II_3	+34,5	175	120		652	I_1	180+19,6	199	105	*drapery*
							I_2	+ 8,0	197	109	
636	I_1	180+59,7	236	100	*band*		I_3	+ 1,8	159	88	
	I_2	+51,2	231	115			II_1	+15,1	193	131	upper limit

Table III.

N	A. P.	a	D	H		N	A. P.	a	D	H	
653	I_1	180+31,8	266	130	*drapery*	656	I_1	180—43,9	372	102	*drapery*
	I_2	+39,5	250	105			I_2	—50,7	462	119	
	I_3	+44,6	435	162			I_3	—56,8	519	111	
	I_4	+47,5	417	282	upper limit		I_4	—58,8	426	109	
654	I_1	180+36,2	262	134	*drapery*	657	I_1	180—35,1	366	108	*drapery*
	I_2	+44,2	271	122			I_2	—49,6	468	107	
	I_3	+50,6	330	160	upper limit						
						658	I_1	180—33,5	363	116	*ray*
655	I_1	180+48,8	295	117	*drapery*		I_2	—40,5	442	135	
	I_2	+53,8	373	124							
	I_3	+54,8	356	157	upper limit	659	I_1	32,8	336	92	*ray*
							I_2	30,4	310	101	

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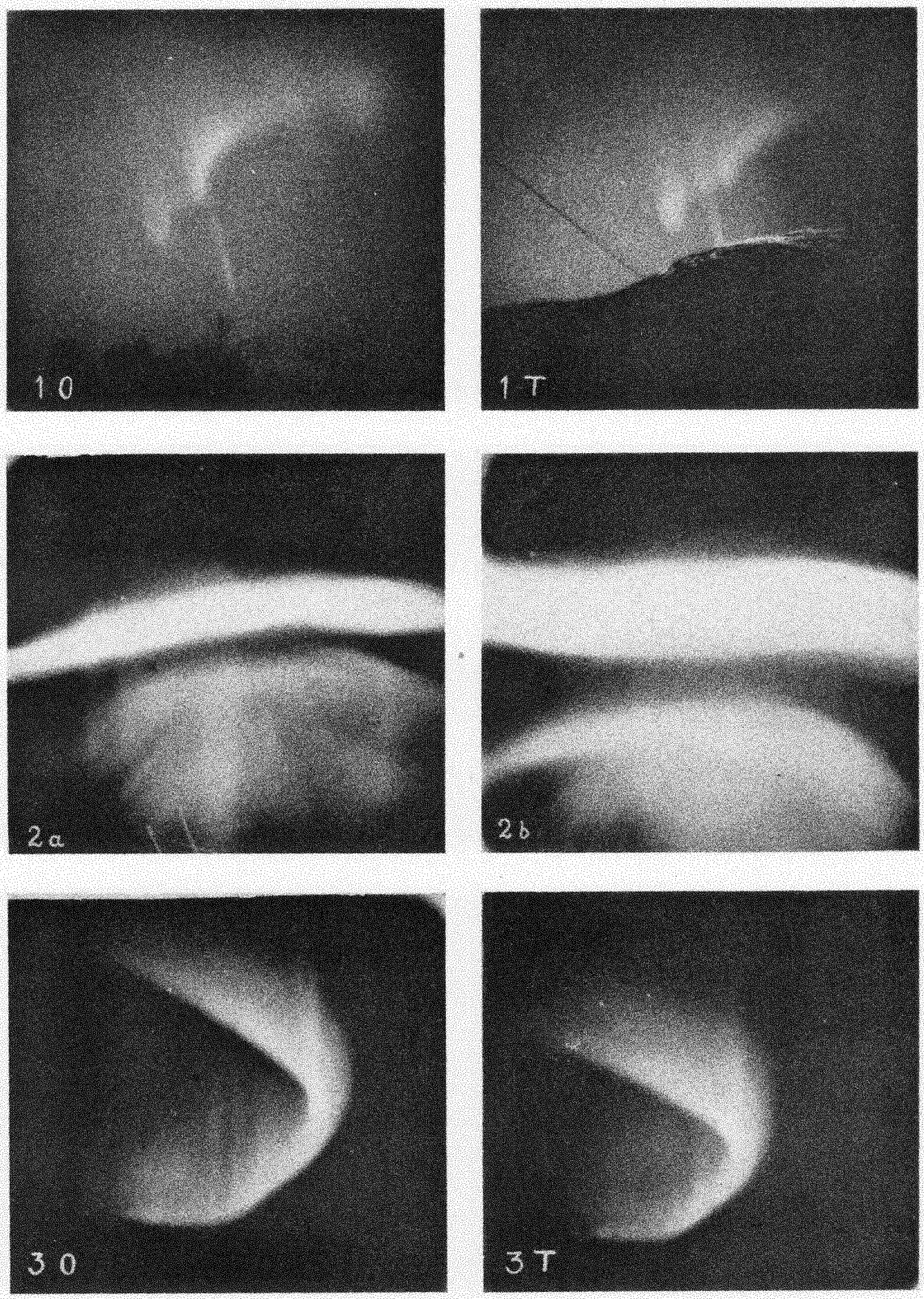

Plate A.

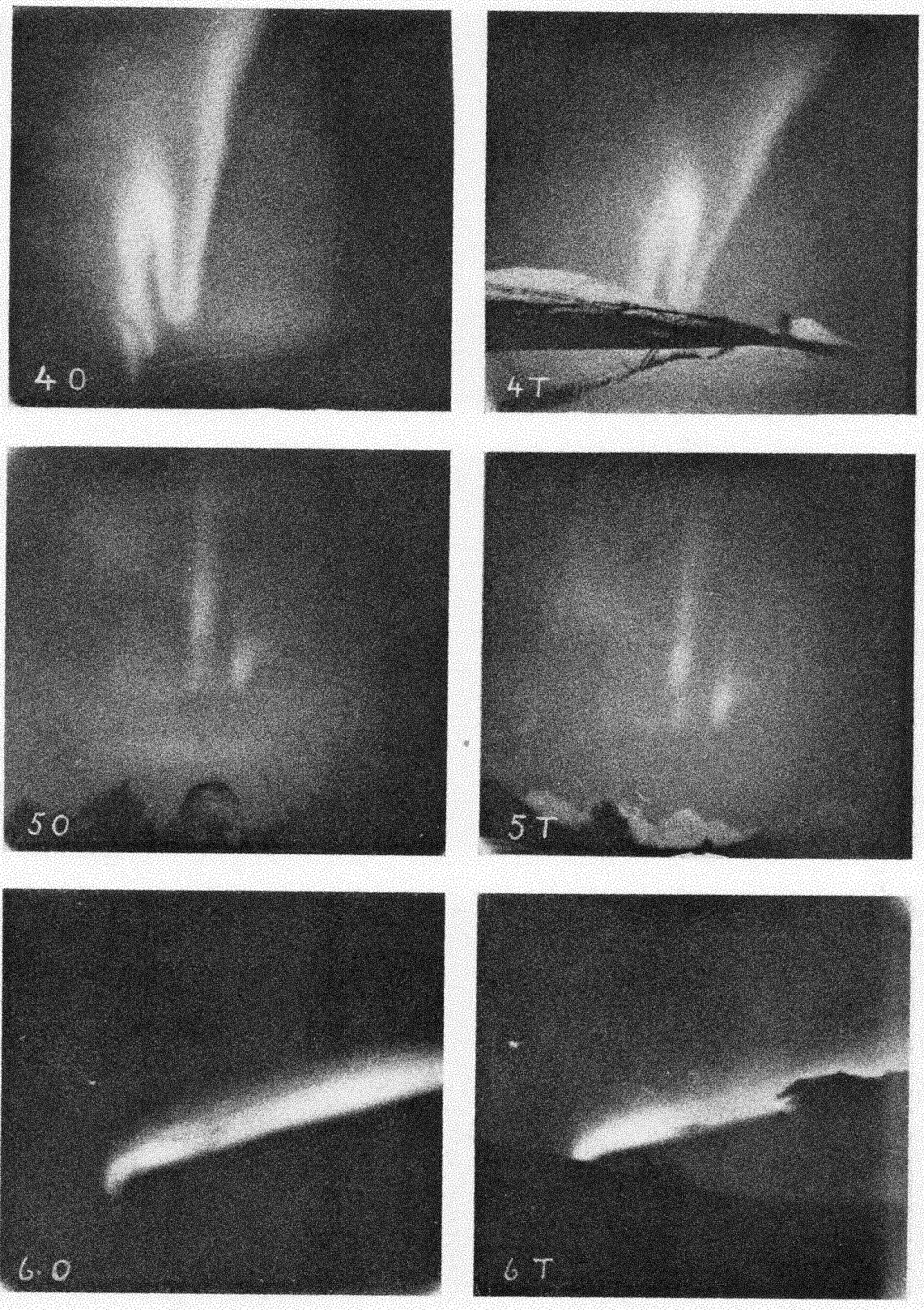

Plate B.

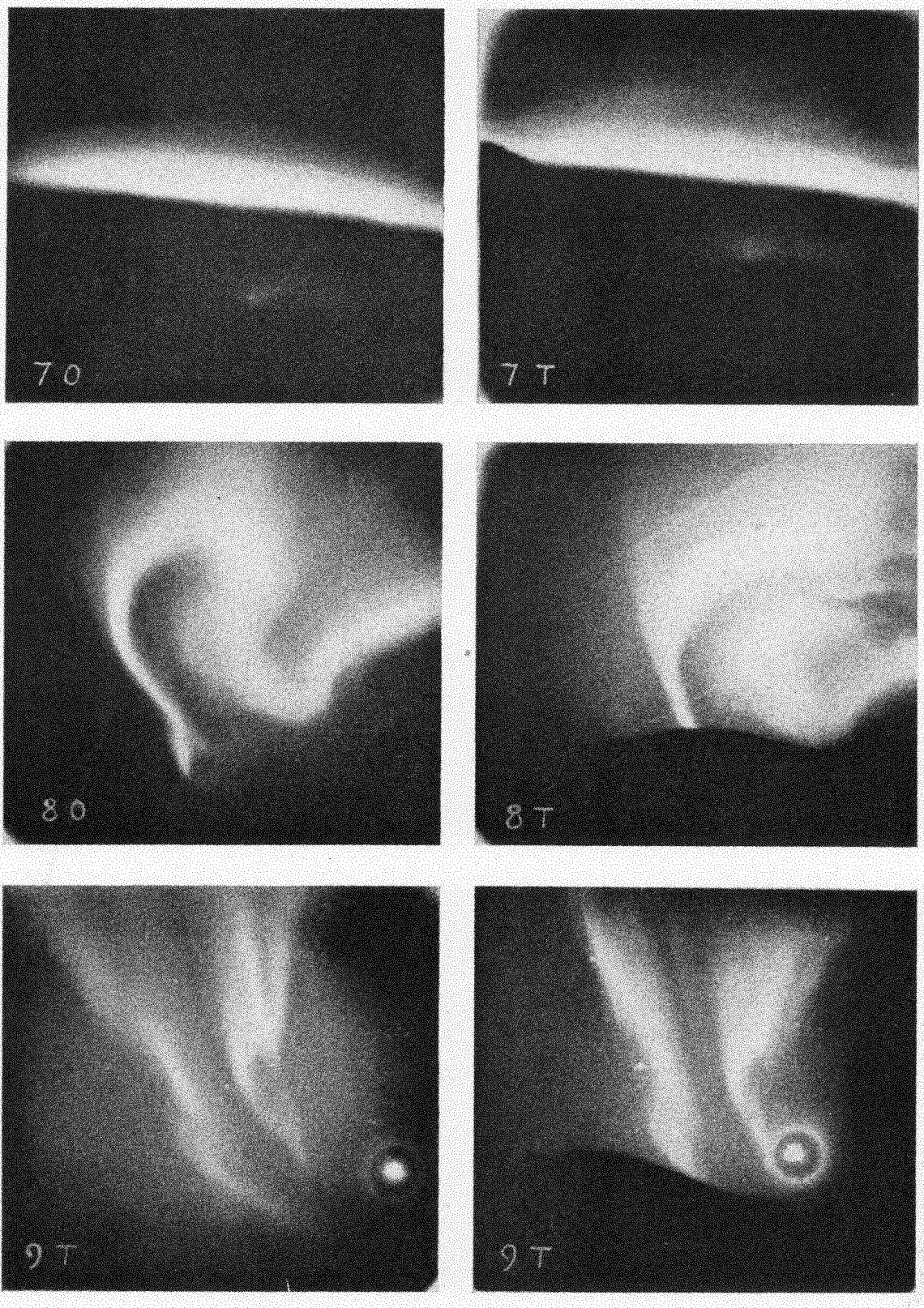

Plate C.

the drawing (fig. 11). Further, the centres of the net and the drawing must coincide approximately. To find this position of the drawing upon the net we make use of the auxiliary scale illustrated in fig. 12. We proceed in the following way: Supposing the right position of *one* star to be adjusted, and the drawing fixed by a needle through this star, then by turning the drawing around the needle, the next star is brought into its right position., and then the coordinates of the third star — the control star — must coincide with the values on the net. The drawing may be kept quiet on the net by means of small heavy weights.

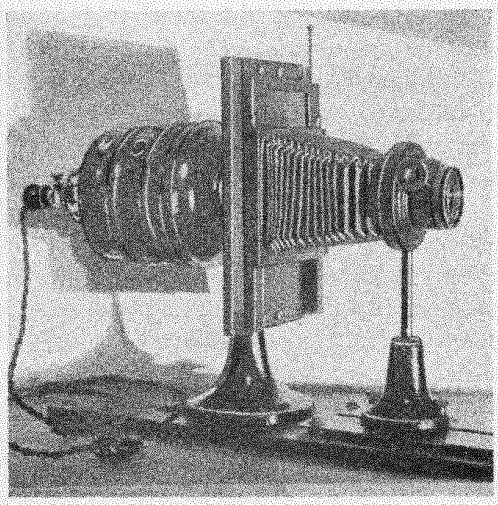

Fig. 10.

The points of intersection on the net, indicating *even* values of the coordinates δ and t can now easily be transferred to the drawing. Suppose that for these points the height h and the azimuth a with respect to the principal station, and the base-angles u and ω for a fixed base-line have been computed, we then on the drawing should have a number of points with all the coordinates required for further treatment. We then proceed as follows.

A number of points with *even* values of declination and hour angles are chosen and their h, a, u and ω are computed, using the equations (1), (2), (4), and (5) mentioned on page 6. We shall call these points «artificial stars». Table I contains 500 «artificial stars» with respect to the base-line Tromsø—Tennes. In Table I t and δ designate the hour angle and the declination of the selected points and h, a, u and ω the computed values of respectively the height, azimuth, base-distance and base-height.

As to the choice of hour-angles of the «artificial stars», experience has proved that it is sufficient to use successive values of merely 6° intervals. In view of the smaller calculation work, the hour-angles in Table I outside this interval should be replaced by the neighbour-values given by the interval. Further it may be noticed that a sufficiently large number of «artificial stars» will be procured by using 8° as interval in successive hour-angles.

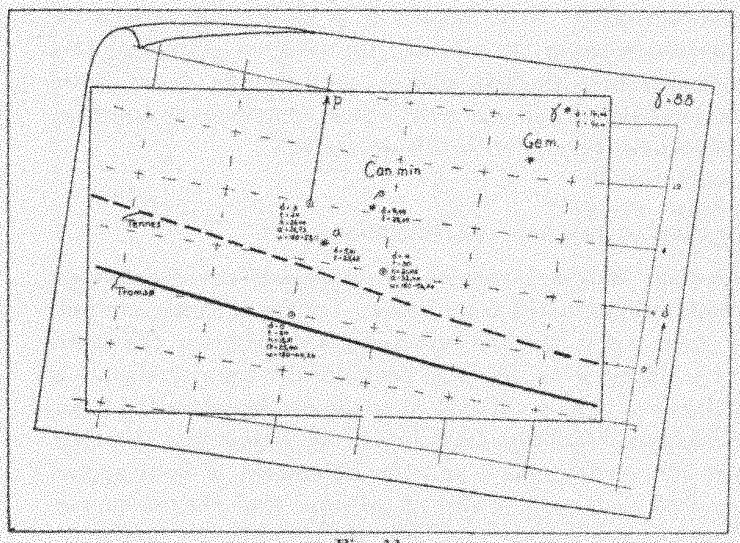

Fig. 11.

The computations are made with our self-acting calculating machine «Mercedes-Euclid», using «Lohse: Tafeln

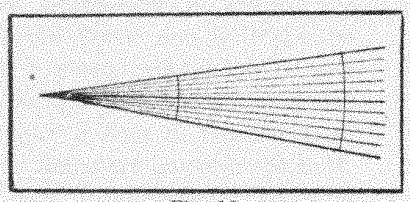

Fig. 12.

Fig. 1.

Fig. 2.

table for the field-telephone apparatus, the cassettes, et cetera. The cameras employed were procured by Størmer. They are of the Krogvesstype, which allow six pictures to be taken on the same plate. The size of the plate is 9 cm. × 12 cm., and accordingly the size of the picture about 4 cm. × 4 cm. The plates used were Herzog Sonja E. W. by the recommendation of Størmer. The objective of the camera is a Kino-Plasmat from Hugo Meyer, Görlitz, f:1,5, focal distance 5 cm. This objective gives excellent sharpness of picture.

In the autumn 1930 an objective of quartz was tried. As the strongest lines in the auroral spectrum are to be found in the violet and ultra-violet region, one should expect with such an objective to be able to diminish the time of exposure.[1]) The quartz-objective constructed consisted of three lenses of quartz which were ground biconvex to diminish the spherical aberration. Although this objective is not acromatic, the stars are visible as points on the plate. By simultaneous exposures by quartz and glass objectives with the same aperture ratio, the quartzobjective was found to give considerably more strongly exposed pictures. The results of a more detailed comparison will be published later.

Besides the camera, each station has a field-telephone apparatus, a «Nife» lantern, a piece of chalk for the numbering of the plates and a supply of new plates.

When taking photos the observers are constantly in connection with each other by the telephone, and at the same time also with a third person in the Observatory who keeps the diary. While sitting snug and warm in the Observatory — with the chronometer on the table — he puts down the moments for the beginning and end of each exposure, the constellation of stars towards which the cameras are directed, and any other information given by the Observers A and B. Supposing that A is the leader of the photography he gives brief orders and receives brief answers as agreed beforehand. However, some practice is required for rapid and succesful photography.

The slides with the exposed plates are numbered and from the second station at once sent to the Observatory for development. To avoid any confusion, the number of the plate and a letter denoting the station are written on the plate with a pencil before development.

[1]) The advantage of using quartzobjective in order to diminish the time of exposure is pointed out by Størmer in «Probleme und Richtungslinien der künftigen Nordlichtforschung», *Arktis*, 1928, Heft 3/4, page 72.